Administration Guide

NetIQ Privileged Account Manager 3.0.1

December 2015

Legal Notice

For information about NetIQ legal notices, disclaimers, warranties, export and other use restrictions, U.S. Government restricted rights, patent policy, and FIPS compliance, see https://www.netiq.com/company/legal/.

© 2015 NetIQ Corporation. All Rights Reserved.

For information about NetIQ trademarks, see https://www.netiq.com/company/legal/. All third-party trademarks are the property of their respective owners.

Contents

About This Book and the Library **11**
About NetIQ Corporation **13**

1 Overview **15**

1.1 Web Interface . . . 15
1.1.1 Administration Console . . . 15
1.1.2 User Console . . . 16
1.2 Managing Privileges in Various Platforms . . . 16
1.2.1 Windows . . . 17
1.2.2 UNIX/Linux . . . 17
1.2.3 Database and Applications . . . 17

2 Welcome to the Framework **19**

2.1 Introduction to the Framework . . . 19
2.2 System Requirements . . . 19
2.2.1 Framework Agent Requirements . . . 20
2.2.2 Framework Manager Requirements . . . 20
2.3 Primary Components . . . 20
2.3.1 Framework Manager . . . 20
2.3.2 Framework Manager Console . . . 21
2.3.3 Framework Agent . . . 21
2.4 The Workspace Layout . . . 22
2.4.1 Navigation Bar . . . 22
2.4.2 Navigation Pane . . . 22
2.5 Viewing the Version and the License Details . . . 23
2.5.1 License Summary . . . 23

3 Managing Package Distribution **25**

3.1 Downloading Packages to a Package Manager . . . 25
3.1.1 Configuring the Package Manager . . . 25
3.1.2 Adding Packages to the Package Manager . . . 26
3.1.3 Checking for Updated Packages . . . 26
3.1.4 Deleting Packages . . . 27
3.2 Managing the Workspace . . . 27
3.2.1 Managing the Consoles . . . 27
3.2.2 Adding a Console to the Framework Manager Console . . . 27
3.2.3 Uninstalling Consoles from the Framework Manager Console . . . 28
3.2.4 Updating Consoles in the Framework Manager Console . . . 28

4 Managing Framework Hosts **29**

4.1 Managing Domains . . . 29
4.1.1 Creating a Domain . . . 30
4.1.2 Modifying a Domain . . . 30
4.1.3 Deleting a Domain . . . 31
4.2 Managing and Monitoring Hosts . . . 31
4.2.1 Adding a Host . . . 31
4.2.2 Viewing Host Details . . . 32

4.2.3 Modifying a Host . . . 33
4.2.4 Registering Hosts. . . . 33
4.2.5 Deleting a Host . . . 34
4.2.6 Moving a Host . . . 34
4.2.7 Finding a Host . . . 35
4.2.8 Monitoring Hosts . . . 35
4.3 Managing System Alerts . . . 38
4.3.1 Modifying Alert Settings . . . 38
4.4 Enabling Crash Dump Capture . . . 39
4.5 Managing Host Packages . . . 39
4.5.1 Finding Packages on Hosts . . . 40
4.5.2 Updating Packages for a Host . . . 40
4.5.3 Rolling Back Packages . . . 41
4.5.4 Committing Packages . . . 41
4.5.5 Registering and Unregistering Packages for a Host . . . 41
4.5.6 Installing Packages on a Host . . . 42
4.5.7 Uninstalling Packages from a Host . . . 42
4.5.8 Modifying Audit Settings for the Audit Manager Package . . . 43
4.5.9 Configuring SMTP Settings for the Messaging Component Package . . . 43
4.6 Managing Audit Zones . . . 44
4.7 Supported Privileged Account Manager Databases. . . . 45
4.8 Managing Database Connectors . . . 48
4.8.1 Viewing Database Connectors. . . . 48
4.8.2 Adding Database Connectors . . . 49
4.8.3 Removing Database Connectors. . . . 50
4.8.4 Modifying Database Connectors for an Agent . . . 51
4.9 Understanding Tunneling . . . 51
4.9.1 Installing Tunnel Agent and Tunnel Manager Packages . . . 52
4.9.2 Enabling and Disabling Tunneling . . . 52
4.9.3 Reregistering the Tunnel Agent Package . . . 52
4.9.4 Listing Tunnels. . . . 53
4.10 Securing Access to the Framework Manager Console . . . 53
4.10.1 Requesting a Certificate for the Framework Manager Console. . . . 53
4.10.2 Modifying the Connector . . . 54
4.11 SSL Renegotiation DOS Attack Protection . . . 55
4.12 Using Privileged Account Manager Service . . . 55
4.13 Integrating with NetIQ Access Manager. . . . 55
4.14 Troubleshooting . . . 56
4.14.1 Promoting Managers When the Primary Manager Fails . . . 56
4.14.2 Viewing Store and Forward Messages . . . 56
4.14.3 Managing Low Disk Space . . . 57
4.14.4 Restarting the Agent . . . 58
4.14.5 Managing the Registry Cache . . . 58
4.14.6 Time Synchronization . . . 60

5 Policy Templates 61

5.1 Understanding Sample Policy template . . . 61
5.1.1 Importing Sample Policy Templates. . . . 62
5.2 Adding a Policy Template. . . . 62

6 Managing Framework Users and Groups 63

6.1 Managing Users . . . 63
6.1.1 Configuring Account Settings . . . 63
6.1.2 Adding a Framework User . . . 65
6.1.3 Modifying a Framework User. . . . 65
6.1.4 Removing a Framework User Group from a User . . . 74

6.1.5 Deleting a Framework User . . . 74
6.2 Managing Groups . . . 75
6.2.1 Adding a Framework User Group . . . 75
6.2.2 Modifying a Framework User Group . . . 75
6.2.3 Configuring a Help Desk Group . . . 76
6.2.4 Configuring Roles . . . 76
6.2.5 Deleting a Framework User Group . . . 81
6.3 Deploying the Access Control Module . . . 81
6.4 Changing a Framework User's Password . . . 82

7 Command Control 83

7.1 How Does Command Control Work? . . . 85
7.2 Integrating Command Control to User Environments . . . 85
7.2.1 Using usrun with a Command . . . 86
7.2.2 Using Privileged Shell for Privileged Sessions . . . 88
7.2.3 Using cpcksh for Complete Session Capture . . . 89
7.2.4 Using Privileged Shell (pcksh) for Complete Session Control . . . 91
7.2.5 Using Shell Scripts . . . 92
7.3 Importing Command Control Configuration Data . . . 92
7.3.1 Exporting Command Control Settings . . . 92
7.3.2 Importing Command Control Settings . . . 93
7.3.3 Importing Command Control Samples . . . 93
7.4 Command Control Transactions . . . 94
7.4.1 Enabling Transactions and Configuring Settings . . . 94
7.4.2 Making Command Control Configuration Changes with Transactions Enabled . . . 95
7.4.3 Committing a Transaction . . . 95
7.5 Configuring Command Control . . . 95
7.5.1 Defining Audit Settings . . . 96
7.5.2 Creating Default Objects . . . 98
7.5.3 Backing Up and Restoring . . . 98
7.5.4 Finding a Reference . . . 98
7.5.5 Defining Custom Attributes . . . 99
7.5.6 Functions . . . 99
7.5.7 Adding a Category . . . 101
7.5.8 Deleting a Category . . . 101
7.6 Rules . . . 101
7.6.1 Adding a Rule . . . 103
7.6.2 Modifying a Rule . . . 103
7.6.3 Viewing Conditions for a Rule . . . 104
7.6.4 Setting Conditions for a Rule . . . 105
7.6.5 Removing Conditions for a Rule . . . 106
7.6.6 Configuring Script Arguments and Entities for a Rule . . . 106
7.6.7 Assigning a Script to a Rule . . . 106
7.6.8 Removing Script Arguments and Entities . . . 107
7.6.9 Removing a Script from a Rule . . . 107
7.6.10 Finding a Rule . . . 107
7.6.11 Moving a Rule . . . 108
7.6.12 Copying a Rule . . . 108
7.6.13 Linking a Rule . . . 108
7.6.14 Deleting a Rule . . . 108
7.6.15 Viewing Pseudocode . . . 109
7.7 Blocked Users . . . 109
7.7.1 Adding Users in Blocked Users Group . . . 109
7.7.2 Deleting Users in Blocked User Group . . . 109
7.8 Command Control Groups . . . 110
7.8.1 User Groups . . . 110
7.8.2 Host Groups . . . 112

7.8.3 Adding an Account Group . . . 113
7.8.4 Modifying an Account Group . . . 114
7.8.5 Deleting an Account Group . . . 114
7.8.6 Copying a Group . . . 115
7.8.7 Moving a Group . . . 115
7.8.8 Finding a Group . . . 115
7.8.9 Enhanced Access Control . . . 115
7.9 Commands . . . 118
7.9.1 Finding a Command . . . 118
7.9.2 Adding a Command . . . 118
7.9.3 Modifying a Command . . . 119
7.9.4 Setting the Command Risk . . . 121
7.9.5 Removing a Command Risk . . . 121
7.9.6 Copying a Command . . . 121
7.9.7 Moving a Command . . . 122
7.9.8 Deleting a Command . . . 122
7.9.9 Importing Sample Commands . . . 122
7.10 Scripts . . . 122
7.10.1 Finding a Script . . . 123
7.10.2 Adding a Script . . . 123
7.10.3 Modifying a Script . . . 123
7.10.4 Copying a Script . . . 124
7.10.5 Moving a Script . . . 124
7.10.6 Deleting a Script . . . 124
7.10.7 Sample Scripts . . . 124
7.11 Access Times . . . 126
7.11.1 Finding an Access Time . . . 127
7.11.2 Adding an Access Time . . . 127
7.11.3 Modifying an Access Time . . . 127
7.11.4 Copying an Access Time . . . 128
7.11.5 Moving an Access Time . . . 128
7.11.6 Deleting an Access Time . . . 128
7.12 Command Control Reports . . . 129
7.12.1 Finding a Report . . . 129
7.12.2 Adding a Command Control Report . . . 129
7.12.3 Modifying a Command Control Report . . . 129
7.12.4 Copying a Command Control Report . . . 130
7.12.5 Moving a Command Control Report . . . 130
7.12.6 Deleting a Command Control Report . . . 131
7.13 Privileged Credential Vault . . . 131
7.13.1 Creating an Account Domain for Windows Systems . . . 131
7.13.2 Creating an Account Domain for Linux or Unix Systems . . . 133
7.14 Remote Desktop Protocol Relay . . . 135
7.14.1 Configuring the Windows Machine for the RDP Session . . . 135
7.14.2 Starting a Remote Desktop Session by Using an RDP Relay . . . 136
7.15 Privileged Access to System Tools or Processes Using Run as privileged user . . . 136
7.15.1 Configuring the Windows Machine to Run as privileged user . . . 136
7.16 Secure Shell Relay . . . 138
7.16.1 Using usrun for SSH Relay . . . 139
7.17 Direct Remote Desktop Connection . . . 140
7.17.1 Remote Desktop Sessions for Windows . . . 140
7.17.2 Understanding Direct Remote Desktop Protocol . . . 141
7.17.3 Advantages of Using Privileged Account Manager for Direct Remote Desktop Sessions . . . 141
7.17.4 Configuring Rule for Direct Remote Desktop Protocol . . . 141
7.18 Credential Provider . . . 142
7.18.1 Remote Desktop Session by Using Credential Provider . . . 142
7.18.2 Configuring Credential Provider . . . 142
7.19 Disconnecting a Privileged Session . . . 143

7.19.1 Prerequisites for Disconnecting a Session . . . 143
7.19.2 Disconnecting the Session Manually . . . 144
7.19.3 Disconnecting the Session Automatically . . . 144
7.19.4 Viewing the Disconnect fields in the Reporting Console . . . 145
7.20 LDAP Group Lookup . . . 145
7.20.1 Creating the LDAP Account in the Credential Vault . . . 145
7.20.2 Defining the User Group . . . 146
7.20.3 Creating a Rule for the LDAP Group . . . 146
7.20.4 Modifying a Rule for the LDAP Group . . . 147
7.21 Test Suites . . . 148
7.21.1 Adding a Test Suite . . . 148
7.21.2 Adding or Modifying a Test Case . . . 148
7.21.3 Running a Test Suite . . . 150
7.21.4 Viewing a Test Suite . . . 150
7.21.5 Modifying a Test Suite . . . 150
7.21.6 Deleting a Test Case . . . 151
7.21.7 Deleting a Test Suite . . . 151
7.21.8 Importing a Test Suite . . . 151
7.21.9 Exporting a Test Suite . . . 152
7.22 Deploying Command Control . . . 152
7.22.1 Command Control Modules . . . 152
7.22.2 Auditing Modules . . . 152
7.22.3 Compliance Auditor Modules . . . 153
7.22.4 Installing Command Control . . . 153

8 Managing Audit Reports 155

8.1 Audit Settings . . . 155
8.2 Encryption Settings . . . 156
8.3 Syslog Settings . . . 156
8.4 Command Control Reports . . . 157
8.4.1 Adding a Report . . . 158
8.4.2 Viewing Report Data . . . 158
8.4.3 Filtering the Viewable Records . . . 159
8.4.4 Modifying General Report Information . . . 160
8.4.5 Selecting Log Files . . . 160
8.4.6 Replaying Keystrokes . . . 161
8.4.7 Removing a Report . . . 161
8.4.8 Generating an Activity Report . . . 162
8.4.9 Viewing a Report in a Comma-separated Values (CSV) Format . . . 162
8.5 Video Capture for Windows . . . 162
8.5.1 Configuring Video Capture for Windows . . . 162
8.5.2 Viewing the Videos . . . 165
8.6 Change Management . . . 165
8.6.1 Enabling Change Management . . . 165
8.6.2 Viewing Report Data . . . 165

9 Compliance Auditor 167

9.1 Controlling Access to the Compliance Auditor . . . 167
9.2 Compliance Audit Rules . . . 168
9.2.1 Adding or Modifying an Audit Rule . . . 168
9.3 Compliance Audit Reports . . . 169
9.3.1 Adding or Modifying an Audit Report . . . 170
9.3.2 Sample Command Control Report Template . . . 171
9.3.3 Deleting a Report . . . 174
9.4 Compliance Auditor Records . . . 175
9.4.1 Viewing a Compliance Audit Record . . . 176

9.4.2 Viewing and Editing a Command Control Keystroke Report . . . 176
9.4.3 Viewing a Change Management Audit Record . . . 177
9.4.4 Viewing a Report Audit Record . . . 177
9.4.5 Editing an Audit Record . . . 177
9.4.6 Archiving Records . . . 178
9.4.7 Managing Archived Records . . . 179
9.5 Access Control Levels . . . 179
9.5.1 Adding or Modifying a User ACL . . . 179
9.5.2 Deleting a User ACL . . . 180
9.6 Deploying the Compliance Auditor . . . 180

10 Load Balancing and Failover 181

10.1 Failover . . . 181
10.2 Load Balancing . . . 182

11 Command Control Components 185

12 Command Line Options 187

12.1 The unifi Options . . . 187
12.2 Command Control Options . . . 188
12.2.1 Importing and Exporting Command Control Settings . . . 188
12.2.2 Backing Up and Restoring a Command Control Configuration . . . 189
12.2.3 Running Test Suites . . . 191
12.3 Package Distribution Options . . . 191
12.4 Package Manager Options . . . 191
12.5 Registry Agent Options . . . 192
12.5.1 Registering an Agent . . . 192
12.5.2 Finding a Primary Manager Package . . . 193
12.5.3 Agent Status . . . 193
12.5.4 Adding Hosts and Domains . . . 193
12.6 Registry Manager Options . . . 194
12.7 Compliance Auditor Options . . . 194
12.7.1 Exporting and Importing Compliance Auditor Settings . . . 194
12.7.2 Managing Compliance Auditor Records . . . 195
12.8 sreplay Command Line Options . . . 196

13 Managing Shared Accounts 199

13.1 Enabling Password Checkout for Applications . . . 199
13.2 Enabling Password Checkout for Oracle Database . . . 204
13.3 Specifying Password Policies . . . 205
13.4 Adding Shared Account Credentials in the Account Domain . . . 206
13.5 Configuring Password Check out Settings . . . 206
13.6 Managing Credentials for Shared Accounts . . . 206

14 Privileged Account Monitoring of Database 209

14.1 Supported Database Versions and Platforms . . . 209
14.2 Prerequisite . . . 209
14.3 Configuring Privileged Account Manager for Database Monitoring . . . 210
14.4 Accessing the Database . . . 210
14.5 Monitoring Database . . . 211

15 Emergency Access for Privileged Sessions 213

15.1 Configuring Administrative Settings for Emergency Access . . . 213
15.2 Configuring Privileged Account Manager to Enable Emergency Access . . . 213
15.3 Examples for Emergency Access Request . . . 214
15.4 Managing Requests . . . 215

16 Requesting and Accessing through User Console 217

16.1 Privileged Sessions . . . 218
16.1.1 All . . . 218
16.1.2 Windows . . . 219
16.1.3 SSH . . . 220
16.1.4 Database . . . 220
16.1.5 Applications . . . 220
16.2 Emergency Access . . . 220
16.2.1 Requesting for Emergency Access . . . 221
16.2.2 Managing Requests . . . 225
16.2.3 Viewing the Request Status . . . 225
16.3 Enterprise Password Check out . . . 225
16.3.1 Accessing Shared Account . . . 226
16.3.2 Password Check-in . . . 226

17 Integrating Privileged Account Manager with Identity Manager 227

17.1 Benefits of Integration with Identity Manager . . . 227

18 Troubleshooting 229

18.1 The Agent is in an Offline State . . . 229
18.2 The Audit Events are Not Displayed in the Reporting Console Even When the Events are Generated . . . 229
18.3 On an AIX Platform, When the Audit Data Gets Generated in Large Amount, The Privileged Account Manager Service Restarts and an Error is Displayed in the unifid.log file. . . . 229
18.4 The RDP Relay Session Does Not Start From the myaccess Page . . . 230
18.5 The RDP Relay to a Windows Server 2012 Server Fails . . . 230
18.6 The Audits are Missing in the Configured Audit Zone Audit Manager . . . 230
18.7 The Privileged Session is Not Established Through the Backup Manager . . . 231
18.8 The Changes to the Syslog Settings Do Not Get Applied . . . 231
18.9 The Manual Disconnect for a Windows session Does Not Work . . . 231
18.10 Cannot Upgrade to RDP Relay Console 3.0 . . . 231
18.11 The Run as privileged user Option is not displayed on a Windows 2012 Server. . . . 231
18.12 Agent Registration Fails on a Windows Platform . . . 232
18.13 Direct RDP Sessions are Enabled for all Users By Default . . . 232
18.14 Issues When Updating or Downloading the License Summary . . . 232
18.14.1 Failed to connect to module. . . . 232
18.14.2 The system cannot process the details because one or more agents that have the DB Audit module is in Offline state . . . 232
18.14.3 The system cannot process the details because it cannot contact any of the Privileged Credential Vault modules . . . 233

About This Book and the Library

This guide explains how to use the Framework Manager to control and audit superuser access to Linux, UNIX, Windows, database and application servers.

Intended Audience

This guide is intended for users who manage the Privileged Account Manager product.

Other Information in the Library

NetIQ Privileged Account Manager 3.0.1 Installation Guide

About NetIQ Corporation

We are a global, enterprise software company, with a focus on the three persistent challenges in your environment: Change, complexity and risk—and how we can help you control them.

Our Viewpoint

Adapting to change and managing complexity and risk are nothing new

In fact, of all the challenges you face, these are perhaps the most prominent variables that deny you the control you need to securely measure, monitor, and manage your physical, virtual, and cloud computing environments.

Enabling critical business services, better and faster

We believe that providing as much control as possible to IT organizations is the only way to enable timelier and cost effective delivery of services. Persistent pressures like change and complexity will only continue to increase as organizations continue to change and the technologies needed to manage them become inherently more complex.

Our Philosophy

Selling intelligent solutions, not just software

In order to provide reliable control, we first make sure we understand the real-world scenarios in which IT organizations like yours operate—day in and day out. That's the only way we can develop practical, intelligent IT solutions that successfully yield proven, measurable results. And that's so much more rewarding than simply selling software.

Driving your success is our passion

We place your success at the heart of how we do business. From product inception to deployment, we understand that you need IT solutions that work well and integrate seamlessly with your existing investments; you need ongoing support and training post-deployment; and you need someone that is truly easy to work with—for a change. Ultimately, when you succeed, we all succeed.

Our Solutions

- Identity & Access Governance
- Access Management
- Security Management
- Systems & Application Management
- Workload Management
- Service Management

Contacting Sales Support

For questions about products, pricing, and capabilities, contact your local partner. If you cannot contact your partner, contact our Sales Support team.

Worldwide:	www.netiq.com/about_netiq/officelocations.asp
United States and Canada:	1-888-323-6768
Email:	info@netiq.com
Web Site:	www.netiq.com

Contacting Technical Support

For specific product issues, contact our Technical Support team.

Worldwide:	www.netiq.com/support/contactinfo.asp
North and South America:	1-713-418-5555
Europe, Middle East, and Africa:	+353 (0) 91-782 677
Email:	support@netiq.com
Web Site:	www.netiq.com/support

Contacting Documentation Support

Our goal is to provide documentation that meets your needs. If you have suggestions for improvements, click **Add Comment** at the bottom of any page in the HTML versions of the documentation posted at www.netiq.com/documentation. You can also email Documentation-Feedback@netiq.com. We value your input and look forward to hearing from you.

Contacting the Online User Community

Qmunity, the NetIQ online community, is a collaborative network connecting you to your peers and NetIQ experts. By providing more immediate information, useful links to helpful resources, and access to NetIQ experts, Qmunity helps ensure you are mastering the knowledge you need to realize the full potential of IT investments upon which you rely. For more information, visit http://community.netiq.com.

1 Overview

Certain situations open potential back doors into systems and increase the likelihood of a security breach in an enterprise network. For example, when running some commands that require elevated privileges, users sometimes get exposed to the superuser or root account credentials. Similarly, passwords are often not changed when a user is no more performing the administrative role.

NetIQ Privileged Account Manager helps IT administrators manage the identity and access for superuser and root accounts by providing controlled superuser access to administrators, allowing them to perform jobs without needlessly exposing root account credentials. It also provides a centralized activity log across multiple platforms. The introduction of NetIQ Privileged Account Manager enriches the NetIQ Identity and Access Management and Compliance Management solutions by adding auditing and tracking capabilities for privileged user activity across the organization.

NetIQ Privileged Account Manager limits corporate susceptibility to unauthorized transactions and information access by helping organizations rapidly deploy superuser management and tracking across all UNIX and Linux environments. It reduces management overhead and infrastructure costs, controls and records which privileged users have access to what, and reduces costs and errors through demonstrable compliance audits.

NetIQ Privileged Account Manager works by delegating privileged access, which is authorized via a centralized database. The end result is that a user is authorized to run the privileged command and all activity is logged. The centralized database provides for easier administration. Compared to competitive solutions in the marketplace, NetIQ Privileged Account Manager is deployed more quickly, provides faster response time, better logging and auditing and improved administration, and leads to a more secure system and a fast return on investment.

1.1 Web Interface

There are separate consoles for the users of Privileged Account Manager and the administrators for Privileged Account Manager.

- Section 1.1.1, “Administration Console,” on page 15
- Section 1.1.2, “User Console,” on page 16

1.1.1 Administration Console

The administration console helps the Administrators to manage the hosts, create rules, monitor the actions, approve or deny requests and define the administrators who can access Privileged Account Manager and to what extent. For more details about the consoles, refer Section 2.4.2, “Navigation Pane,” on page 22

1.1.2 User Console

The user console is displayed through the **My Access** webpage. If you do not have the myaccess console package installed, then **rdprelay** console package will not get updated and the users cannot view the new console. To re-direct the user to the new console from the rdp relay page, you need to install myaccess package first then update the rdprelay package.

The **myaccess** page is for the users of Privileged Account Manager to connect to any target server by using any type of sessions such as, SSH relay, RDP relay, direct RDP and credential provider. Privileged Account Manager users can get credential information to connect to a database, or an application server from the **My Access** webpage. They can manage and request access to any particular server. For more information about **My Access** refer, Chapter 16, “Requesting and Accessing through User Console,” on page 217

The My access page includes three sections:

- **Privileged Sessions:** This section displays all the policies that are defined for the Privileged Account Manager user. You can connect to a Windows session from this page when the policy is defined for you to use the target Windows server. You can start an SSH relay session by using the command that gets displayed when the policy for SSH relay session is selected. Also if the policies are defined for database and application server, you can retrieve the account credentials of the server from this page.
- **Emergency access:** This section is used in requesting emergency access to a server for a specific amount of time. If there are no policies defined for the users, the policies will not be displayed under the Privileged Sessions page hence, users need to request emergency access. If a user requires to access any server for only a specific time frame, the user must request for an emergency access. This page includes the request page, and lists all the requests.
- **Enterprise Password Checkout:** This section includes information about all the checked out password. The users need to check-in the checked out password by using this section.

NOTE: To customize the myaccess page to display your company logo, update the `logo.png` and the `bg.png` images from `C:\Program Files\NetIQ\npum\service\local\admin\docs\myaccess\images` or from `/opt/netiq/npum/service\local\admin\docs\myaccess\images`.

1.2 Managing Privileges in Various Platforms

Privileged Account Manager provides the capability to connect to a remote host using SSH, RDP Relay, direct RDP and credential provider without knowing the privileged account credentials such as passwords or identity certificate of the user. You can also configure Privileged Account Manager to connect to any database, or application server. It allows to capture users’ activity in different formats, such as keystroke, screenshots, session, and video. For platform specific configuration, see the following sections:

- Section 1.2.1, “Windows,” on page 17
- Section 1.2.2, “UNIX/Linux,” on page 17
- Section 1.2.3, “Database and Applications,” on page 17

Before trying to connect to remote hosts, you must configure Rules and Policies in Privileged Account Manager. You must create rules in the component called Command Control as an Administrator. For more information about Command Control, see Chapter 7, “Command Control,” on page 83.

1.2.1 Windows

A Windows Server user can get privileged access on the target Windows server, using RDP Relay, direct RDP, and credential provider. For information about RDP Relay, see Section 7.14, “Remote Desktop Protocol Relay,” on page 135 and for information about credential provider, see Section 7.18, “Credential Provider,” on page 142.

If any user is connecting to a Windows server by using the user credentials, you can monitor the actions of that user through Privileged Account Manager. For more information refer, Section 7.17, “Direct Remote Desktop Connection,” on page 140.

1.2.2 UNIX/Linux

A UNIX/Linux Server user can get privileged access on the target UNIX/Linux machine, using SSH Relay. For information about SSH Relay, see Section 7.16, “Secure Shell Relay,” on page 138.

1.2.3 Database and Applications

A Privileged Account Manager user can access Oracle database and any application server such as, LDAP. All the actions that the user performs on the database or any application can be monitored by configuring the settings on the Manager for Privileged Account Manager.

A user who has an account in the database server can also be monitored through Privileged Account Manager. For more information about database monitoring, see Chapter 14, “Privileged Account Monitoring of Database,” on page 209

2 Welcome to the Framework

NetIQ Privileged Account Manager delivers on the WorkloadIQ™ promise of keeping the organization secure and compliant by helping you control administrator access to the Linux, UNIX, and Windows, database and application servers.

NetIQ Privileged Account Manager manages the delegated administration through a centralized policy mechanism. This allows you to define rules for allowing or denying user activity based on a combination of user name, typed command, host name, and time (who, what, where and when). By managing privileges this way, you can control the commands users are authorized to run, along with the time and the location. User activity is recorded in an audit reporting and management tool, which enables you can take action right when suspicious activity occurs.

Privileged account management (PAM) manages the account credentials for database

Privileged Account Manager includes separate web consoles for administrator and users. Administrator console is the framework console and user console is called the My access page.

- Section 2.1, “Introduction to the Framework,” on page 19
- Section 2.2, “System Requirements,” on page 19
- Section 2.3, “Primary Components,” on page 20
- Section 2.4, “The Workspace Layout,” on page 22
- Section 2.5, “Viewing the Version and the License Details,” on page 23

2.1 Introduction to the Framework

NetIQ Privileged Account Manager uses a Framework as the base layer to provide an easy-to-use enterprise architecture into which Privileged Account Manager modules are added to create the necessary problem-solving functionality. The Framework has several key features:

- Provides the core functionality needed to implement secure, enterprise-wide services.
- Provides services such as secure and authenticated communication among components.
- Provides integrated databases and logging.
- Allows the deployment of Privileged Account Manager modules to Framework hosts to implement new functionality.
- With each module that is installed, an additional console is added to the main Framework Manager console to allow access to new administration functionality.

2.2 System Requirements

Recommended system requirements specify the minimum prerequisites to run Framework Agent and Framework Manager.

2.2.1 Framework Agent Requirements

The minimum requirements for the Framework Agent are:

- 2.5 GHz and equivalent CPU
- 1 GB memory
- 512 MB additional memory for hard disk and additional memory for audit storage

NOTE: The additional memory for audit storage is required when the Privileged Account Manager Server is down or when the connection between the Agent for Privileged Account Manager and Manager for Privileged Account Manager is weak.

2.2.2 Framework Manager Requirements

The minimum requirements for the Framework Manager are:

- 2.5 GHz and equivalent CPU
- 4 GB memory
- 1 GB additional hard disk memory and additional memory for audit storage

NOTE: Approximate additional space calculation for Audit Storage = (500 KB) X (number of Privileged Account Manager users) X (number of sessions per day).

2.3 Primary Components

The Framework is made up of three primary components:

- Section 2.3.1, “Framework Manager,” on page 20
- Section 2.3.2, “Framework Manager Console,” on page 21
- Section 2.3.3, “Framework Agent,” on page 21

2.3.1 Framework Manager

The Framework Manager is the server component of the Framework. It provides a centralized registry, enabling services and administration of the entire Framework from any single point on the enterprise network.

The Framework Manager is administered through the Framework Manager console, using a suitable Web browser with Adobe Flash Player.

The manager modules are installed on the Framework Manager by default. The modules can also be distributed to other Framework hosts to provide load balancing and failover for the Framework. If there are multiple occurrences of the same type of manager installed on the Framework, they operate in primary and backup roles. Updates to the data controlled by each group of like managers are only updated at the primary manager.

The default manager modules are:

- **Administration Manager (admin):** Provides the functionality for the Web-based user interface. Framework consoles can be installed on the Administration Manager and are used to control product features.

- **Access Manager (auth):** Maintains a list of Framework user accounts and provides authentication services for the Framework. It needs to be installed with a local Registry Manager in order to create a secure user authentication token.
- **Audit Manager (audit):** Maintains the repository for all auditing information collected by the Framework.

  NOTE: NetIQ recommends to deploy only two Audit Managers, even in large environments.

- **Command Control Manager (cmdctrl):** Maintains the rule configurations and is responsible for validating user command requests.
- **Compliance Auditor (secaudit):** Collects, filters, and generates reports of audit data for analysis and signoff by authorized personnel
- **Messaging Component (msgagnt):** Provides the transport mechanism and interacts with e-mail servers to provide reporting functionality.
- **Package Manager (pkgman):** Manages a repository for Framework packages.
- **Registry Manager (registry):** Maintains a database of all Framework hosts and modules. Provides certificate-based registration features for the hosts.
- **Syslog Emitter (syslogemit):** Provides logging of audit information to a syslog server.

2.3.2 Framework Manager Console

The Framework Manager console is the default user interface for the Framework. It allows configuration and management of the Framework through a graphical user interface.

For a description of this console, see Section 2.4, “The Workspace Layout,” on page 22.

2.3.3 Framework Agent

The Framework Agent is the client component of the Framework. It is responsible for receiving and carrying out instructions from the Framework Manager on all hosts. The following Framework Agent packages are installed on all Framework hosts:

- **Registry Agent (regclnt):** Provides a local cached lookup for module locations. The Registry Agent queries the Registry Manager when local cached information is not available or isn’t fresh.
- **Distribution Agent (distrib):** Provides the interface to control the installation and removal of packages in the Framework. It has methods to install, remove, and list the available and updatable packages. The Distribution Agent retrieves packages from the local Package Managers.
- **Store and Forward Agent (strfwd):** Provides a store and forward mechanism for guaranteed delivery of messages. It is used for various core features such as replication of the manager databases.

- **Command Control Agent (rexec):** Enables the Framework to control and audit user commands.

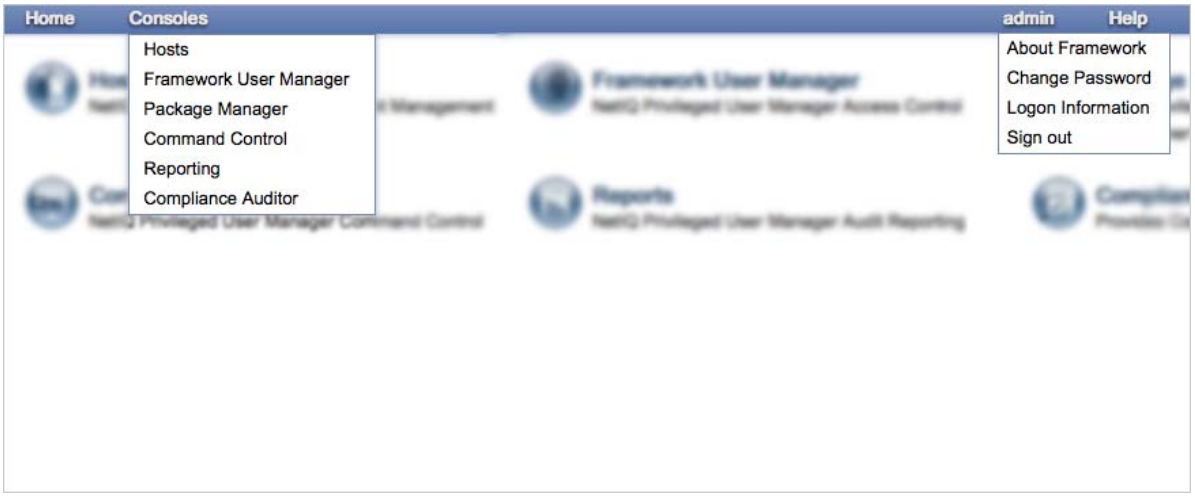
2.4 The Workspace Layout

The Framework Manager console consists of two areas: a navigation bar and a navigation pane.

- Section 2.4.1, “Navigation Bar,” on page 22
- Section 2.4.2, “Navigation Pane,” on page 22

2.4.1 Navigation Bar

The navigation bar on the top of the page has four options: Home, Consoles, admin, and Help.



Click an item on the navigation path for quick access to a given navigation pane. For example, to return to the home page, click **Home**.

2.4.2 Navigation Pane

In the navigation pane, you have access to the following administrative consoles:

- **Hosts:** Centrally manages Privileged Account Manager installation and updates, load-balancing, redundancy of resources, and host alerts. For more information, see Chapter 4, “Managing Framework Hosts,” on page 29.
- **Framework User Manager:** Manages users who log in to the Framework Manager through role-based grouping. For more information, see Chapter 6, “Managing Framework Users and Groups,” on page 63.

- **Package Manager:** Allows you to easily update any Privileged Account Manager hosts. For more information, see Chapter 3, “Managing Package Distribution,” on page 25.
- **Command Control:** Uses an intuitive graphical interface to create and manage security policies for privilege management. For more information, see “Command Control” on page 83.
- **Reporting:** Provides easy access and search capability for event logs and allows you review and color-code user keystroke activity through the Command Risk Analysis Engine. For more information, see Chapter 8, “Managing Audit Reports,” on page 155.
- **Compliance Auditor:** Proactive auditing tool that pulls events from the Audit database for analysis, according to predefined rules. It can be configured to pull filtered audit events at hourly, daily, weekly or monthly intervals. This enables auditors to view prefiltered security transactions, play back recordings of user activity, and record notes for compliance purposes. In an era of increasing regulatory compliance, the ability to supply demonstrable audit compliance at any time provides a more secure system and reduces audit risk. For more information, see Chapter 9, “Compliance Auditor,” on page 167.
- **Access Dashboard:** Allows you to manage the requests for emergency access, and view the details of password checkout. If required you can check-in the checked out password. For more information, see Chapter 15, “Emergency Access for Privileged Sessions,” on page 213.

2.5 Viewing the Version and the License Details

A framework user who has access to Administration console can verify the version and the license details of the installed Privileged Account Manager from the Administration console. To view the version and license details, the framework user must perform the following on the Administration console:

1. On the Navigation bar, Click ***admin* > About Framework**.

   Here, *admin* is the user name of the framework user who is part of default admin group or who has the **admin** role on the unifi module in the Framework User manager console. For more information about the framework user role, see “Configuring Roles” on page 76.
2. For License registration, click **Register Framework >** specify the license **> Finish**.
3. Click **Show License Summary** to view the number of each managed system that are being used through PAM, and the total license count.

   For more information about viewing the license summary and generating detailed report see, Section 2.5.1, “License Summary,” on page 23.

2.5.1 License Summary

The License Summary page includes the following information:

- The count for each managed end-points
- Total count of the managed end-points
- Time and date when the summary was last updated
- Option to download the detailed license report
- Option to update the license summary to view the latest license summary

For more information about the Privileged Account Manager license, see the Privileged Account Manager EULA in the Privileged Account Manager documentation website.

Managed End Point Type

The license count is based on the following type of managed end-points:

- **Agents:** This displays the number of all the Host servers that are added in the Hosts console and the agents that are registered in the framework.
- **Databases:** This displays the number of databases that are managed or accessed through PAM. This count is inclusive of all the database connectors that are configured for database monitoring and all the account domains of type **Database** in the privileged credential vault for password checkout/ checkin.
- **Applications:** This displays the number of applications that are managed or accessed through PAM for the password checkin/ checkout feature. This count includes all the account domains of type **Applications** that are configured in the privileged credential vault.
- **SSH hosts:** This displays the number of SSH servers that are managed though for SSH relay. This count includes the account domains of type **SSH** that are configured in the privileged credential vault.

Update License Summary

When you click **Update License Summary**, PAM deletes the previous license summary and updates the latest license summary. If you want to back up the previous license summary, you can download the license report by clicking **Download Detailed Report** before updating the summary.

The date and time when the existing license summary was generated is displayed at the bottom left corner of the License Summary page.

Download Detailed Report

To view and save the detailed report of the managed end-points that are displayed in the license summary page, click **Download Detailed Report**. The detailed report includes the following:

- Type of managed end-points.
- DNS or IP address of the managed end-points.
- Sub-type of the managed end-points.

  The sub-types can be as following:

  - Agent for all Agents
  - Local for SSH
  - The name of the application for Application
  - The name of the database for Database
- Name of hosts or servers associated with each managed end-point.

  The name can be as following:

  - Configured name for Agent
  - The configured account domain name for SSH and Application
  - *<hostname>*:*<port>* for Database

3 Managing Package Distribution

- Section 3.1, “Downloading Packages to a Package Manager,” on page 25
- Section 3.2, “Managing the Workspace,” on page 27

3.1 Downloading Packages to a Package Manager

To update Framework hosts, you must first download the updated packages to a Package Manager.

There are three options for downloading packages to a Package Manager:

- Download packages directly from the Novell Update Server (Recommended).
- Manually download packages from Novell Downloads.
- Download packages from a Local Package Manager, which was downloaded using one of the two methods mentioned above.

You must configure the Package Manager to access the server you require.

- Section 3.1.1, “Configuring the Package Manager,” on page 25
- Section 3.1.2, “Adding Packages to the Package Manager,” on page 26
- Section 3.1.3, “Checking for Updated Packages,” on page 26
- Section 3.1.4, “Deleting Packages,” on page 27

3.1.1 Configuring the Package Manager

You must supply the Package Manager with a location for downloading the packages before you can add packages for distribution.

1. Click **Package Manager** on the home page of the console.
2. Click **Settings** in the task pane.
3. (Conditional) To use the Novell Update server:
   - **3a** Select **Novell Update Server**.
   - **3b** Specify the User Name and Password (These are the Mirrored Credentials obtained from the Novell Customer Center account for Privileged Account Manager).
   - **3c** To view the update server information, select **Advanced Settings**.
     - Select the **Packages** checkbox, the following URL is configured:

       `https://nu.novell.com:443/PUM/packages`
4. (Conditional) To use a Local Package Manager:
   - **4a** Select *Local Package Manager*.
   - **4b** Fill in the following fields:

     Host name: Specify the DNS name of the host.

Port: Specify the communication port. The default is 29120.

The Local Package Manager is a Framework host that has been configured to store the packages.

5 Click *Finish*.

6 Continue with Section 3.1.2, “Adding Packages to the Package Manager,” on page 26.

NOTE: By default, Package Manager connects to *Novell Update Server* for updates.

3.1.2 Adding Packages to the Package Manager

If you have configured the Package Manager to use a Novell Update Server or the Local Package Manager (see Section 3.1.1, “Configuring the Package Manager,” on page 25), perform the following procedure to add packages to the Package Manager.

NOTE: If you downloaded the packages manually from Novell Downloads to a directory, see Section 12.3, “Package Distribution Options,” on page 191.

---

1 Click *Package Manager* on the home page of the console.

2 Click *Add Packages* in the task pane.

3 Set the *Package Filter* options:

Platforms: Select the operating systems, then use the arrow to display and select the platforms.

Types: Select the types of packages you want to add (Console, Module, Interface, Patch).

Components: Select the components (Command Control, Framework, Miscellaneous)

4 Select the packages from the list of available packages.

To select multiple packages, press the Ctrl key and select the packages one at a time, or press the Shift key to select a consecutive list of packages. To select all the packages, select *Select all the packages* checkbox.

5 Click *Add* to start downloading.

6 Click *Finish*.

7 To install these packages on your hosts, continue with Section 4.5.2, “Updating Packages for a Host,” on page 40.

8 To use this Package Manager as a Local Package Manager for downloading packages, configure other Package Managers to point to the DNS name of this host.

3.1.3 Checking for Updated Packages

After you have added packages to the Package Manager, use the *Check for Updates* option to see if any updates are available.

1 Click *Package Manager* on the home page of the console.

2 Click *Check for Updates* in the task pane.

If updates are available, the navigation pane displays the updated packages that are available for download. Else, an Alert dialog box is displayed stating *No package updates are available*.

3 Select the packages from the list of available packages.

To select multiple packages, press the Ctrl key and select the packages one at a time, or press the Shift key to select a consecutive list of packages. To select all the packages, select *Select all the packages* checkbox.

4 Click *Update* to start downloading.

5 Click *Finish*.

6 If updates were available, continue with Section 4.5.2, “Updating Packages for a Host,” on page 40 to install these packages on your hosts.

3.1.4 Deleting Packages

1 Click *Package Manager* on the home page of the console.

2 In the list of available packages, select the packages you want to delete.

To select multiple packages, the Ctrl key and select the packages one at a time, or the Shift key to select a consecutive list of packages. To select all the packages, select *Select all the packages* checkbox.

3 Click *Delete Packages* in the task pane.

4 Click *Delete* to start deleting packages.

5 Click *Finish*.

3.2 Managing the Workspace

- Section 3.2.1, “Managing the Consoles,” on page 27
- Section 3.2.2, “Adding a Console to the Framework Manager Console,” on page 27
- Section 3.2.3, “Uninstalling Consoles from the Framework Manager Console,” on page 28
- Section 3.2.4, “Updating Consoles in the Framework Manager Console,” on page 28

3.2.1 Managing the Consoles

The Framework Manager console can be extended by installing console packages. Console packages provide the administrative and reporting panes for Privileged Account Manager modules.

Console packages must be downloaded to the Package Manager before they are available for installation.

3.2.2 Adding a Console to the Framework Manager Console

1 Click *Install Consoles* on the home page of the console.

If there are no consoles available to install, an Alert dialog box stating *No consoles are available* is displayed.

2 In the list of available consoles, select the consoles you want to add.

To select multiple consoles, press the Ctrl key and select the consoles one at a time, or press the Shift key to select a consecutive list of consoles. To select all consoles, use Ctrl+A.

3 Click *Next* to start installing.

4 Review the list of installed consoles.

5 Click *Finish*.

3.2.3 Uninstalling Consoles from the Framework Manager Console

To uninstall consoles, you must uninstall the corresponding console package from the host.

1. Click *Host* on the home page, expand the host you want to uninstall a console from, then select *Packages*.
2. In the list of installed packages, select the consoles you want to remove.

   To select multiple consoles, press the Ctrl key and select the consoles one at a time, or press the Shift key to select a consecutive list of consoles. To select all consoles, use Ctrl+A.
3. Click *Uninstall Packages*.

   Review the list of removed consoles.
4. Click *Next*, then click *Finish*.

3.2.4 Updating Consoles in the Framework Manager Console

When updated console packages become available on your Package Manager, you can update the console packages installed on your Framework Manager console.

1. Click *Update Consoles* in the task pane.

   The navigation pane displays updated consoles available for deployment.
2. In the list of available consoles, select the consoles you want to update.

   To select multiple consoles, press the Ctrl key and select the consoles one at a time, or press the Shift key to select a consecutive list of consoles. To select all consoles, use Ctrl+A.
3. Click *Next* to start installing.
4. Review the list of updated consoles.
5. Click *Finish*.

NOTE: After updating a console, you must logout, close your browser and reopen the Framework Manager console to see the changes.

---

4 Managing Framework Hosts

The Hosts console provides a hierarchical view of all the defined hosts. Each host machine on which you have installed managers and agents must be added to the Framework Manager console through the Hosts console. Hosts are identified to the Framework Manager console by a unique agent name that is used during the registration process after installation.

Hosts are added to domains, which allow you to organize your hosts into a tree structure.The hierarchical structure allows easy access to a particular host regardless of the number of Privileged Account Manager hosts you have.

The Hosts console includes the following:

- **Task pane (left pane):** This pane includes the tasks or the actions that can be performed on the host servers.
- **Navigation pane (middle pane):** The navigation pane displays hierarchical view of all currently defined hosts and domains.
- **Details pane (right pane):** The details pane displays the details of the selected hosts.

This section lists the tasks that you can perform to manage host servers.

- Section 4.1, “Managing Domains,” on page 29
- Section 4.2, “Managing and Monitoring Hosts,” on page 31
- Section 4.3, “Managing System Alerts,” on page 38
- Section 4.4, “Enabling Crash Dump Capture,” on page 39
- Section 4.5, “Managing Host Packages,” on page 39
- Section 4.6, “Managing Audit Zones,” on page 44
- Section 4.7, “Supported Privileged Account Manager Databases,” on page 45
- Section 4.8, “Managing Database Connectors,” on page 48
- Section 4.9, “Understanding Tunneling,” on page 51
- Section 4.10, “Securing Access to the Framework Manager Console,” on page 53
- Section 4.11, “SSL Renegotiation DOS Attack Protection,” on page 55
- Section 4.12, “Using Privileged Account Manager Service,” on page 55
- Section 4.13, “Integrating with NetIQ Access Manager,” on page 55
- Section 4.14, “Troubleshooting,” on page 56

4.1 Managing Domains

Privileged Account Manager provides load balancing and failover capabilities based on the hierarchical structure of the hosts. Before organizing your hosts into domains and subdomains, refer to Chapter 10, “Load Balancing and Failover,” on page 181 for information about these features.

- Section 4.1.1, “Creating a Domain,” on page 30
- Section 4.1.2, “Modifying a Domain,” on page 30
- Section 4.1.3, “Deleting a Domain,” on page 31

4.1.1 Creating a Domain

When you install Privileged Account Manager, a top-level domain **Hosts** is automatically created. To rename this domain, see Section 4.1.2, “Modifying a Domain,” on page 30. You can create subdomains under the top-level domain.

1. On the home page of the console, click **Hosts**.
2. Select an existing domain to add a subdomain to the existing domain.
3. Click **Add Domain** in the task pane and on the Add Domain page specify the subdomain name.
4. Click **Add**.
5. Select to perform any of the following tasks:
   - To configure the domain, continue with Section 4.1.2, “Modifying a Domain,” on page 30.
   - To add hosts to the domain, continue with Section 4.2.1, “Adding a Host,” on page 31.
   - To move existing hosts to this domain, continue with Section 4.2.6, “Moving a Host,” on page 34.

4.1.2 Modifying a Domain

Use this page to modify the domain name and encryption settings. The encryption settings apply to all hosts within the domain, unless you modify the host encryption settings. Host settings overwrite domain settings.

1. On the home page of the console, click **Hosts**.
2. In the navigation pane, select the domain you want to modify.
3. In the task pane, click **Modify Domain**.
4. Configure the following options:

   Domain Name: Name of the domain is displayed in this field. You can change the name by specifying a new domain name.

   Audit Zone: Specify an audit zone for this domain. For example, DOMAZ1. For more information about audit zones, see Section 4.6, “Managing Audit Zones,” on page 44.

   NOTE: By default, the domain is associated with audit zone 0.

   Key Configuration: Select this option to enable configuration of the encryption key and encryption of the databases stored on the hosts in this domain.

   Host Key Rollover(days): Specify how many days the host key can be used before generating a new key for the hosts in this domain.

   Db Key Rollover(days): Specify how many days the database key can be used before generating a new key for the hosts in this domain.

   Encrypt: Select the databases you want to encrypt for the hosts in this domain.

   Ensure that you select the appropriate database for encryption. When you encrypt some database, it may cause performance issues. NetIQ recommends to encrypt the following:

   - `auth.db`: it contains usernames
   - `registry.db`: it contains the hosts.
   - `cmdctrl.db`: it contains command control rules with usernames and hosts.
   - `PrvCrdVlt.db`: It secures the account credentials in the Privileged Credential Vault.

For a brief description of databases, see Section 4.7, “Supported Privileged Account Manager Databases,” on page 45.

NOTE: The encryption of auditing data (/audit/cmdctrl.db) can be enabled from the Reporting console. See Section 8.1, “Audit Settings,” on page 155.

---

5 Click **Finish**.

4.1.3 Deleting a Domain

You cannot delete a domain if it contains any host. So, you must delete or move the hosts before attempting to delete a domain. For information about moving a host, refer Section 4.2.6, “Moving a Host,” on page 34.

1 On the home page of the console, click **Hosts**.

   The navigation pane displays the current hierarchy of the Framework.

2 In the navigation pane, select the domain you want to delete.

3 In the task pane, click **Delete Domain**.

4 Click **Finish**.

4.2 Managing and Monitoring Hosts

A host is created for each machine that you want to manage with Privileged Account Manager. You can register the agents and view the list of those as hosts in the Hosts console. Also, you can register the agents after adding the hosts in the Hosts console.

- Section 4.2.1, “Adding a Host,” on page 31
- Section 4.2.2, “Viewing Host Details,” on page 32
- Section 4.2.3, “Modifying a Host,” on page 33
- Section 4.2.4, “Registering Hosts,” on page 33
- Section 4.2.5, “Deleting a Host,” on page 34
- Section 4.2.6, “Moving a Host,” on page 34
- Section 4.2.7, “Finding a Host,” on page 35
- Section 4.2.8, “Monitoring Hosts,” on page 35

4.2.1 Adding a Host

1 On the home page of the console, click **Hosts**.

2 Select the domain for the new host.

3 Click **Add Hosts** from the task pane.

4 In the text box, specify the agent names for the hosts.

   You can type the names one at a time, using one name per line, or you can paste a list of names. When you add a host to the Framework Manager, the name does not need to relate to the existing DNS name that is used in locating the host on your network, however it may be helpful to keep the DNS name and Privileged Account manager host name the same for simplicity.

5 Click **Add**.

   A list of agents names is displayed.

6 Click **Finish**.

The status of the host is unregistered until the agent is installed and registered on the host machine. For instructions on this process, see "Installing and Registering a Framework Agent " in the *NetIQ Privileged Account Manager 3.0.1 Installation Guide*.

4.2.2 Viewing Host Details

1 On the home page of the console, click **Hosts**.

2 In the navigation pane, select the domain containing the hosts whose details you want to view.

3 Click the arrow ▸ next to the domain name to display the list of hosts.

4 Click the required host to display the host details and status in the details pane.

Field	Description
Agent name	The agent name configured for this host.
DNS name/ IP address	The name of the host. This is either a resolvable DNS name or the IP address.
Port	The port the host is using for Privileged Account Manager communication.
Platform	The operating system on the host.
Processor	The type of processor on the host.
OS Version	The version of the kernel running on the host.
Agent version	The version of the agent software that the host is running.
System time	The current date and time that the host is configured for, displayed in UTC. Use this time to verify that the agent's time is synchronized with the other hosts.
Service uptime	The number of days, hours, minutes, and seconds the agent has been running since the last start up.
Active sessions	The number of connections currently open between the agent and any other agent, including itself.
Active tasks	The number of internal tasks that the agent is running at any one time.
Installation path	The directory location of the installed agent software.
Disk space	The total amount of available disk space, the amount of free disk space, and the percentage of disk space in use.
Memory (approx)	The amount of memory (heap) currently being used by the agent to store its data. This is the virtual data segment size minus the thread stack and the statically initialized data (because this is a constant value) as returned by the `sbrk` system call.
Registration	The licensing state of the software, either licensed or unlicensed.
Status	The status of the host: online, offline, unregistered.

5 In the navigation pane, select the host to display the **Packages** option on the right pane.

6 Click **Packages** to view details of the packages installed on the selected host.

4.2.3 Modifying a Host

1. On the home page of the console, click **Hosts**.
2. In the navigation pane, select the host to modify.
3. In the task pane, click **Modify Host**.
4. Modify the general details:

   Agent Name: Specify a display name for this agent.

   Description: Add a description. This description is displayed next to the agent name in the navigation pane.

   DNS Name/ IP Address: Specify the DNS name or IP address of the host that is used in locating the host on your network.

   Port: Displays the port that was specified when the agent was registered.

   Audit Zone: Displays the audit zone of the host. The audit zone of the host will be same as the audit zone of the sub-domain or domain it belongs to. For more information about audit zones, see Section 4.6, “Managing Audit Zones,” on page 44.
5. Configure the encryption settings. When these settings are modified for an individual host, the host settings overwrite the settings specified for the domain.

   Key Configuration: Select this option to enable configuration of the encryption key.

   Host Key Rollover (days): Specify how many days the host key can be used before generating a new key.

   DB Key Rollover (days): Specify how many days the database key can be used before generating a new key.

   Encrypt: Select the databases you want to encrypt.

   Encrypting the database can affect the performance. The following databases can be considered for enabling encryption:

   - auth.db - Contain usernames
   - registry.db - Contains the hostnames.
   - cmdctrl.db - Contains command control rules with usernames and hostnames.

   For a brief description of databases, see Section 4.7, “Supported Privileged Account Manager Databases,” on page 45.

   NOTE: The encryption of auditing data (/audit/cmdctrl.db) can be enabled from the Reporting console. See Section 8.1, “Audit Settings,” on page 155.

   ---
6. Click **Finish**.

4.2.4 Registering Hosts

You can register the agents before performing any action on the host through the console. When you register the agent, the host is added in the host console. You can also register the agent after adding the host. Perform the following steps to register the agents after adding the host in the console.

1. On the home page of the console, click **Hosts**.
2. In the navigation pane click the root domain, **Hosts**.
3. In the task pane, click **List Unregistered Hosts**.

   Unregistered hosts that are in the subnet are listed.

NOTE: If you have registered an agent, then this agent is automatically updated as host in the **Hosts** console.

4 Select the hosts to be registered and provide the following details:
   - **PAM Admin Username:** User name for the Framework Manager.
   - **PAM Admin Password:** Password for the Framework Manager.
   - **Agent Admin Password:** The root password of the Linux or the Unix hosts on Linux platform or the administrator password on Windows platform.
5 Click **Register** to auto register the selected hosts.

NOTE: By default all the registered hosts are registered to the root of the domain. To move the hosts, see Section 4.2.6, "Moving a Host," on page 34.

4.2.5 Deleting a Host

1 On the home page of the console, click **Hosts**.
2 In the navigation pane, select the hosts to delete and click **Delete Host**.

   Or

   In the details pane, select the hosts to delete.

   To select all hosts in a domain, select **Name**.
3 In the task pane, click **Delete Host**.

   The selected hosts are listed.
4 Click **Finish**.

WARNING: Deleting the audit manager host might result in losing audit data that is received from the domain or audit zone.

4.2.6 Moving a Host

You can move hosts among the domains.

1 On the home page of the console, click **Hosts**.

   The navigation pane displays the current hierarchy for your Framework.
2 In the navigation pane, click the arrow next to the domain that contains the hosts you want to move.
3 Select the hosts to move.
4 Drag and drop the hosts to the new domain.

   If the list is large, perform the following:

   4a In the middle pane, click the domain that has the required host.

   All the hosts in the domain are listed in the right pane.

   4b In the middle pane, scroll till you can view the destination domain.

   4c Drag the host from the right pane and drop it to the destination domain in the middle pane.

NOTE: When you move a host from one domain to another, the audit zone of the host changes to the audit zone of the domain to which it has been moved.

4.2.7 Finding a Host

1. On the home page of the console, click **Hosts**.
2. On the navigation pane, click the root domain, **Hosts**.
3. In the task pane, click **Find Host**.
4. In the **Agent Name** field, specify the name of the host you are looking for.

   You can use the wildcard characters * and ?. This field is case sensitive.
5. Click **Find**.
6. To go to a host's details, double-click the agent name.

4.2.8 Monitoring Hosts

Privileged Account Manager maintains a log file for each host. Each host can be configured to send alerts to the Framework Manager console when errors occur. It allows you to monitor the status of each host:

- "Viewing the Host Status" on page 35
- "Viewing the Host Log" on page 36
- "Modifying Log Settings" on page 36
- "Example Rollover Script" on page 37

Viewing the Host Status

The **Host Status** option allows you to view the current status of all your hosts, or all the hosts in a domain, on one page.

1. On the home page of the console, click **Hosts**.
2. Select a domain.
3. Click **Host Status** in the task pane.

   The status for each host is displayed, as shown in the following table, with a summary at the bottom of the screen.

	The host is online.
	There is a status problem with the host; for example, the host's time offset exceeds the defined level (see Step 5). Click the arrow to the left of the green box to display status messages.
	The host is offline.
	The host is unregistered.

4. Use the **Online**, **Offline** and **Unregistered** check boxes to select the hosts you want to view.

   If you have a long list of hosts, deselect the **Auto scroll** check box to stop the automatic scrolling.

5 (Optional) Change the filter settings from the default values and select **Restart** to check the status again. The available filters are:

Maximum Timeoffset (minutes): The difference in system time between the host and the Primary Registry Manager. If the time offset exceeds the value in this field, a warning indicator is displayed.

Minimum Disk Space (MB): If the available disk space on the host machine goes below the value in this field, a warning indicator is displayed.

Maximum Memory (MB): If the memory used by the host exceeds the value in this field, a warning indicator is displayed.

6 To view a host's details, double-click the host or click **Close** to return to the hierarchical view.

To use a command line option to view the status, see Section 12.5.3, "Agent Status," on page 193.

Viewing the Host Log

1 On the home page of the console, click **Hosts**.

2 In the navigation pane, select the required host.

3 In the task pane, click **View Host Log**.

4 Specify the values for the following based on the required log information:

Log Level: Set the level of information you want to see on the screen.

- **Error** displays only Error messages.
- **Warning** displays Warning and Error messages.
- **Information** displays Information, Warning, and Error messages.

Refresh (secs): Set the interval between screen refreshes. You can select intervals from 1 to 60 seconds

Maximum Cached log Messages: Set the maximum number of log messages to display on the screen. You can view from 10 to 1000 messages.

5 Click the **Pause** check box to pause the screen display.

6 Click the **Clear** button to clear the screen display.

7 Click **Close** to return to the Framework hierarchy view.

Modifying Log Settings

You can modify log settings for hosts, hosts in a domain, or an individual host by using the **Domain Log Settings** or **Host Log Settings** options.

1 On the home page of the console, click **Hosts**.

2 To modify the log settings for all hosts in a domain, select the domain. To modify the log settings for an individual host, select the host in the navigation pane.

3 Click **Domain Log Settings** or **Host Log Settings** in the task pane, then modify the following settings:

File Name: Specify the filename and location of the log file. All the details are by default logged in `logs/unifid.log`.

Level: Set the level of information you need. The default level is `Info`.

- **Error** for Error messages.
- **Warning** for Warning and Error messages.

- **Info** for Information, Warning, and Error messages.
- **Debug** for Debug, Information, Warning, and Error messages.
- **Trace** for Trace, Debug, Information, Warning, and Error messages.

NOTE: The **Debug** and **Trace** settings generate a lot of data and are primarily for the use of NetIQ Support.

Show all tasks: Click **Show all tasks** to include all tasks in the log. The **Show all tasks** option is primarily for the use of NetIQ Support.

Roll Over: Select the rollover point from the drop-down list to specify when the log file is overwritten with new information. If the maximum size set for the log file is reached, the log file is overwritten regardless of this setting.

Max Size (MB): Select the maximum size of the log file from the drop-down list. This specifies when the log is overwritten with new information.

Roll Over Script: Enter a Perl script to be executed at the rollover point. For a sample script, see "Example Rollover Script" on page 37.

4 Click **Next** to apply the changes.

If the changes are applied successfully, a green box is displayed next to the agent name.

If the changes are not applied successfully (for example, if the host is not online), a red box is displayed next to the agent name.

5 Click **Close**.

Example Rollover Script

This is an example of a Perl script that can be called at the rollover point for the host log file. The script compresses the old `unifid.log` and then removes any log files that are more than 30 days old.

```
use File::Basename;
# Zip up rolled over logfile
system("/usr/bin/gzip $LOG_FILE");
my $log_root = dirname($LOG_FILE);
$ctx->log_info("Log file directory  - $log_root");
opendir(LOGDIR, $log_root);
$ctx->log_info("Zipping up $LOG_FILE");
# Find all the compressed log files
my @log_files = map { $_->[1] }
map { [ $_, "$log_root/$_" ] }
grep { /\.gz$/ }
readdir(LOGDIR);
closedir(LOGDIR);
# Delete all log files older than 30 days
my $time = time();
foreach my $log (@log_files) {
my ($mtime) = (stat($log))[9];
my $age = int((($time - $mtime) / 3600) / 24);
$ctx->log_info("Checking $log ($age days old)");
next unless $age > 30;
$ctx->log_info("Deleting $log ($age days old)");
unlink $log;
}
```

4.3 Managing System Alerts

The System Alerts page shows system status alert messages from all hosts in the Framework. The page shows the time of the alert, the host that originated the alert, the type of alert, and information about the alert.

You can define the level of system alerts by using the **Domain Alert Settings** or **Host Alert Settings** options.

System alerts is indicated by a flashing Framework icon at the bottom right corner of the screen.

1. Click the icon to display the System Alerts page.
2. To clear specific alerts, select the **Resolved** checkbox next to the desired alerts, then click **Finish**.

   To clear all alerts, select **Mark all alerts resolved**, then click **Finish**.
3. To close the System Alerts page without clearing the existing alerts, click **Cancel**.

   The Framework icon continues to flash.

4.3.1 Modifying Alert Settings

You can configure your Framework hosts to generate system status alert messages when specific events occur, such as when the agent exceeds a specified memory usage. If a system alert is triggered, the Framework icon in the bottom right corner of the screen flashes. To view the system alerts, click the icon (see "Managing System Alerts" on page 38 for details).

You can modify alert settings for all hosts, all hosts in a domain, or an individual host by using the **Domain Alert Settings** or **Host Alert Settings** options.

To modify alert settings:

1. On the home page of the console, click **Hosts**.
2. To modify alert settings for all hosts in a domain, select **Hosts** or the name of a domain. To modify alert settings for an individual host, select the host in the navigation pane.
3. In the task pane, click **Domain Alert Settings** or **Host Alert Settings**.

   Changes made to a domain's alert settings override the current settings for individual hosts in that domain. However, subsequent changes made to an individual host's alert settings override the current domain alert settings on that host.
4. Configure the following options:

   Alert on Log level: Select the level of log information needed to trigger an alert. For example, if you want alerts to be triggered when error messages occur in the log, select **Error**. The **Warning** option includes **Warning** and **Error** messages. The **Info** option includes **Info**, **Warning,** and **Error** messages. Select **Never** to switch this setting off.

   Alert Log Filter: Define a specific message you want to trigger alerts, or part of a message with wildcard symbols *. You can use regular expressions in this field by selecting the **Regular expression** check box and specifying your regular expression.

   This setting is independent of the setting in **Alert on log level**.

   Time Offset (mins): Specify the time offset in minutes when you want to trigger an alert. An alert is triggered if a host's time setting differs from the time setting of the Primary Registry Manager by this number of minutes. Time offsets can cause problems because certificates are time-based. The UTC (Universal Time Coordinated) value is used.

Pending Messages (mins): Specify the interval for when you want to trigger an alert. An alert is triggered if an event has been in the queue of store and forward messages for this number of minutes.

Maximum Memory (MB): Specify the amount of memory in MB that you want as the threshold for an alert. An alert is triggered if a host is using more than this amount of memory.

Minimum Disk Space (MB): Specify the minimum amount in MB of disk space that you want as the threshold of an alert. An alert is triggered if a host has less than this amount of disk space remaining in the default installation location.

Expired Certificate: Select this option to cause an alert to be triggered when an agent's certificate expires.

5 Click **Next** to apply the settings to the hosts.

If the settings are applied successfully, the indicator next to the hostname is green .

If the settings are not applied successfully (for example, if the host is offline), the indicator is red .

6 Click **Close**.

If any of your settings cause an alert to be triggered, the Framework icon flashes.

4.4 Enabling Crash Dump Capture

If you want to enable crash dump capture, add a configuration parameter to the `unifi.xml` file, as follows:

```
<Dump log='1'/>
```

By default, crash dump capture is disabled and there is no XML node for this. You must manually add this node in xml to enable crash dump capture.

When the Privileged Account Manager service starts, it creates an empty dump file and keeps it open. If Privileged Account Manager crashes, dump is logged to the file that is created during Privileged Account Manager service startup. If there is no crash when Privileged Account Manager service is restarted, this file is deleted and a new empty dump file is created.

The format of dump file name is `unifid_child_<pid>_<random_number>`.

NOTE: Crash dump capture is supported only on Windows.

4.5 Managing Host Packages

- Section 4.5.1, "Finding Packages on Hosts," on page 40
- Section 4.5.2, "Updating Packages for a Host," on page 40
- Section 4.5.3, "Rolling Back Packages," on page 41
- Section 4.5.4, "Committing Packages," on page 41
- Section 4.5.5, "Registering and Unregistering Packages for a Host," on page 41
- Section 4.5.6, "Installing Packages on a Host," on page 42
- Section 4.5.7, "Uninstalling Packages from a Host," on page 42

- Section 4.5.8, “Modifying Audit Settings for the Audit Manager Package,” on page 43
- Section 4.5.9, “Configuring SMTP Settings for the Messaging Component Package,” on page 43

4.5.1 Finding Packages on Hosts

You can search through all the hosts to find where a specific package is installed, or find whether the package is installed at all.

1. On the home page of the console, click **Hosts**.
2. In the navigation pane, click **Hosts**.
3. In the task pane, click **Find Package**.
4. From the **Package** drop-down list, select or enter the package you are looking for.

   For example: If you are searching for Audit Manager package, enter `secaudit` in the search field and then click **Find**.
5. If you want to find out which hosts do not have this package installed, select the **package not installed** check box. If you want to find out where the package is installed, deselect the **package not installed** check box.
6. Click **Find**. A list of hosts where the package is installed or not installed is displayed.
7. Double-click the host name to view its details or click **Close** to return to the Hosts page.

4.5.2 Updating Packages for a Host

When updated packages are available on your local Package Manager, you can update the packages installed on individual hosts or for all hosts in a domain. The distribution agent performs a number of checks to ensure that the host has enough disk space to extract and install the package. If there is insufficient space, the package is not updated.

1. On the home page of the console, click **Hosts**.
2. In the navigation pane, select either the host or the domain where you want to update the packages.
3. Click **Update Domain Packages** or **Update Packages** in the task pane.

   The console checks for updates on your Package Manager and displays any updated packages available for download.
4. Select the packages from the list of available packages.

   To select multiple packages, press the Ctrl key and select the packages one at a time, or press the Shift key to select a consecutive list of packages. To select all packages, use Ctrl+A.

   NOTE: The **Create Backup** option which creates a backup of the currently installed packages is selected by default. Only the last backup is stored. Creating backups requires additional space.

   If necessary, you can use the Rollback Packages option to roll back to the previously backed-up packages.

   ---
5. Click **Next** to start downloading the selected packages.
6. Click **Finish**.

4.5.3 Rolling Back Packages

If you chose to create a backup when updating packages for an individual host or for a domain, you can roll back to the last backup.

1. On the home page of the console, click **Hosts**.
2. In the navigation pane, select the domain or the host where you want to roll back the packages.
3. In the task pane, click **Rollback Domain Packages** or **Rollback Packages**.
4. Select the packages from the list of available backed-up packages.

   To select multiple packages, press the Ctrl key and select the packages one at a time, or press the Shift key to select a consecutive list of packages. To select all packages, use Ctrl+A.
5. Click **Next** to start rolling back to the previously backed-up packages.
6. Click **Finish**.

4.5.4 Committing Packages

When packages are updated and the **Create backup** option is enabled, a backup of the current package is created and stored in a backup directory in the working package directory. This allows you to roll back to the previous level if the current package does not perform correctly in your environment. (See Section 4.5.3, “Rolling Back Packages,” on page 41.)

If the current package does perform correctly in your environment, you can commit the package, which frees up disk space by deleting the files in the backup directory. If your hosts have limited disk space, NetIQ recommends that you commit the packages on all hosts before performing the next update.

1. On the home page of the console, click **Hosts**.
2. In the navigation pane, select the domain or the host where you want to commit packages.
3. Click **Commit Domain Packages** or **Commit Packages** in the task pane.
4. Select the packages from the list of available packages.

   To select multiple packages, press the Ctrl key and select the packages one at a time, or press the Shift key to select a consecutive list of packages. To select all packages, click the Select all checkbox.
5. Click **Next** to start the commit process.
6. Click **Finish**.

4.5.5 Registering and Unregistering Packages for a Host

If you want to stop a package from functioning without removing it completely, you can unregister it. You can then register it again later if necessary. Packages are automatically registered when you add them, so you only need to register them if you have previously unregistered them.

Registered packages are shown with a green check mark: .

Unregistered packages are shown with a red exclamation mark: .

To register or unregister a package for a host:

1. On the home page of the console, click **Hosts**.

   The navigation pane displays the current hierarchy for your Framework.

2 In the navigation pane, select the domain where you want to register or unregister packages.

3 Select the host.

4 With the host's packages displayed, select the packages you want to register or unregister.

   To select multiple packages, press the Ctrl key and select the packages one at a time, or press the Shift key to select a consecutive list of packages. To select all packages, use Ctrl+A.

5 Click **Register Package** or **Unregister Package** in the task pane.

   WARNING: Ensure that you are not unregistering an audit manager package or any other package that might cause loss of audit data.

NOTE: The Framework Manager console does not refresh automatically. To check whether your packages have been successfully registered or unregistered, go to another screen and then return to the list of packages.

4.5.6 Installing Packages on a Host

Ensure that the packages have been downloaded to the Framework Package Manager by viewing packages available to deploy. See Section 3.1, "Downloading Packages to a Package Manager," on page 25.

The distribution agent performs a number of checks to ensure that the host has enough disk space to extract and install the package. If there is insufficient space, the package is not installed.

1 On the home page of the console, click **Hosts**.

2 In the navigation pane, click the arrow next to the domain where you want to install the packages.

3 Select the required host.

4 In the details pane, click **Packages**.

5 In the task pane, click **Install Packages**.

6 Select the packages from the list of available packages.

   To select multiple packages, press the Ctrl key and select the packages one at a time, or press the Shift key to select a consecutive list of packages. To select all packages, use Ctrl+A.

7 Click **Next** to start installing the selected packages.

8 Click **Finish**.

To use a command line option to install packages on hosts, see Section 12.4, "Package Manager Options," on page 191.

4.5.7 Uninstalling Packages from a Host

You do not need to uninstall a package to disable it. You can disable it by unregistering the package. See Section 4.5.5, "Registering and Unregistering Packages for a Host," on page 41.

To uninstall a package:

1 On the home page of the console, click **Hosts**.

2 In the navigation pane, click the arrow next to the domain where you want to uninstall packages.

3 Select the required host.

4 In the details pane, click **Packages**. and then select the packages from the list of installed packages.

   To select multiple packages, press the Ctrl key and select the packages one at a time, or press the Shift key to select a consecutive list of packages. To select all packages, click the **Select All** checkbox.

5 Click **Uninstall Packages** in the task pane.

6 Click **Next** to start uninstalling the selected packages.

7 Click **Finish**.

WARNING: Ensure that you are not uninstalling an audit manager package or any other package that might cause loss of audit data.

To use a command line option to install packages on hosts, see Section 12.4, "Package Manager Options," on page 191.

4.5.8 Modifying Audit Settings for the Audit Manager Package

The databases containing audited data from command control (`cmndctrl.db`) can be placed in an alternative location. The administration audit files (`audit.db` and `audit.ldb`) and `log.msqs` are still stored in the default location `/opt/netiq/service/local/audit` or `C:\Program Files\Netiq\npum\service\local\audit`, but these files are relatively small.

To define an alternative location for the audit databases:

1 On the home page of the console, click **Hosts**.

2 In the navigation pane, select the host with the Audit Manager installed.

3 With the host's packages displayed, select the **Audit Manager (audit)** package.

4 Click **Audit Settings** in the task pane.

5 In the **Audit Path** field, specify the location for the audit databases.

6 Click **Finish**.

4.5.9 Configuring SMTP Settings for the Messaging Component Package

The **SMTP Settings** option allows you to provide details of your e-mail server so reports such as the Compliance Auditor reports and custom command control reports can be automatically e-mailed to the necessary personnel.

To configure the SMTP settings:

1 On the home page of the console, click **Hosts**.

2 Select the host where the Compliance Auditor and Messaging Component are installed.

3 Click **Packages** to view details of the packages installed on this host.

4 Select the **Messaging Component (msgagnt)**.

5 Click **SMTP Settings** in the task pane.

6 Configure the following fields:

   SMTP Host: Specify the IP address of your e-mail server.

   SMTP Port: Specify the port of your e-mail server.

SMTP Domain: If you are using a Lotus Notes server, specify the name of your SMTP domain.

7 Click **Finish**.

4.6 Managing Audit Zones

Audit zones are logical groups of audit managers, agents for Privileged Account Manager, and managers for Privileged Account Manager. You can configure audit zone for your domains. Audit zones consist of audit managers, to which audit data is sent by hosts. For example, if you configure audit zone as 'AZDOM1' for domain1, all the hosts in domain1 will send their audit data to audit managers of AZDOM1. Advantage of configuring audit zone for your domain is audit data can be sent only to the audit managers of your domain. This helps in restricting who can receive audit data of your domain, in terms of geographical and organizational demographics. It also helps avoid huge amount of data being sent to all the audit managers.

By default, audit zone of all the domains, agents for Privileged Account Manager, and managers is audit zone 0. This means that audit data is sent to all the audit managers. You can configure audit zones for domains, with one or more audit managers. If you have not configured audit zone for your domain, audit data of your domain will be sent to audit managers of audit zone 0.

IMPORTANT: There should be at least one audit manger in audit zone 0 at all times. This is necessary because, if there are no audit managers in the audit zone of any domain, then audit data of that domain is sent to audit zone 0. This prevents the loss of audit data.

If you move a host or a sub-domain from a domain to another, the audit zone of that host or sub-domain automatically changes to the audit zone of the domain to which it is moved.

If the audit managers of your audit zone are down, audit data is not sent to audit managers of audit zone 0. Instead, audit data is accumulated in the agent for Privileged Account Manager and sent to the audit managers of your audit zone when they are up.

If you move an agent host, that is an audit manager, from a domain to another during a session, the session audit data is still sent to that audit manager. This is to avoid loss of audit data. Any new session data will be sent to audit managers as per the new settings.

Here are few recommendations for configuring audit zones:

- Each audit zone should have more than one audit managers.
- Start using Audit Zones feature only after you have upgraded all your agents for Privileged Account Manager and managers to version 3.0.

To view the audit zone configuration information:

1 On the home page of the console, click **Hosts**.

2 In the navigation pane, select **Hosts**.

3 Click **Audit Zones Configurations** in the task pane.

4 Audit zone information is displayed, as shown in the following table.

Audit Zones	Name of the audit zone.
Audit Managers	Audit managers that belong to the audit zone.
Domains	Sub-domains that are in the domain.

5 Click **Close** to go back to the **Hosts** home page.

4.7 Supported Privileged Account Manager Databases

The following databases are created on the Framework Manager console machine.

Location of the database files for generic Linux rpm installs and other UNIX platforms is `/opt/netiq/npum/service/local/`, which is shown in the table below.

Database and Standard Location	Description
`admin.db` `/opt/netiq/npum/service/local/admin/`	Contains Privileged Account Manager System Alerts.
`admin.ldb` `/opt/netiq/npum/service/local/admin/`	Not used.
`https.db` `/opt/netiq/npum/service/local/admin/`	Not used.
`https.ldb` `/opt/netiq/npum/service/local/admin/`	Not used.
`audit.db` `/opt/netiq/npum/service/local/audit/`	Contains all configured report definitions, settings for database roll over, and Command Risk Settings.
`dbaudit.db` `/opt/netiq/npum/service/local/dbaudit/`	Not used
`dbaudit.ldb` `/opt/netiq/npum/service/local/dbaudit/`	Contains the configuration details of the database server that is configured in Privileged Account Manager.
`audit.ldb` `/opt/netiq/npum/service/local/audit/`	Contains roll over history and the names of rolled over databases.
`chngmgmt.db` `/opt/netiq/npum/service/local/audit/`	Contains change management events when Transactions are enabled in Command Control.
`cmdctrl.db` `/opt/netiq/npum/service/local/audit/`	Contains the current audit log.
`cmdctrl<timestamp>.ldb` `/opt/netiq/npum/service/local/audit/`	Contains the archived audit log.
`cmdctrl.ldb` `/opt/netiq/npum/service/local/audit/`	Not used.
`cmdctrlscreen.db` `/opt/netiq/npum/service/local/audit/`	Contains Windows screen capture audit data.
`report.db` `/opt/netiq/npum/service/local/audit/`	Contains Command Control Report data that is used with Compliance Auditor.

Database and Standard Location	Description
`auth.db` `/opt/netiq/npum/service/local/auth/`	Contains fully replicated authorization data including user details and settings for access to the Framework Manager console.
`auth.ldb` `/opt/netiq/npum/service/local/auth/`	Not used.
`cmdctrl.db` `/opt/netiq/npum/service/local/cmdctrl/`	Contains rules and configuration for Command Control.
`cmdctrl.ldb` `/opt/netiq/npum/service/local/cmdctrl/`	Contains rules and configuration for Command Control when Transactions are enabled and when the Command Control database is being edited.
`distrib.db` `/opt/netiq/npum/service/local/distrib/`	Not used.
`distrib.ldb` `/opt/netiq/npum/service/local/distrib/`	Not used.
`ldapagnt.db` `/opt/netiq/npum/service/local/ldapagnt/`	Not used.
`ldagagnt.ldb` `/opt/netiq/npum/service/local/ldapagnt/`	Not used.
`msgagnt.db` `/opt/netiq/npum/service/local/msgagnt/`	Contains SMTP configuration information.
`msgagnt.ldb` `/opt/netiq/npum/service/local/msgagnt/`	Not used.
`pkgman.db` `/opt/netiq/npum/service/local/pkgman/`	Contains the metadata for the packages stored locally on the Package Manager for deployment to the Framework. It also contains replicated settings for the location to download packages from.
`pkgman.ldb` `/opt/netiq/npum/service/local/pkgman/`	Contains local data, such as the location of the local package repository.
`prvcrdylt.db` `/opt/netiq/npum/service/local/prycrdylt/`	Contains Privileged Credential Vault data for SSH, Oracle database, applications and RDPrelay.
`prvcrdvlt.ldb` `/opt/netiq/npum/service/local/prycrdylt/`	Not used.
`regclnt.db` `/opt/netiq/npum/service/local/registry/`	Not used.
`regclnt.ldb` `/opt/netiq/npum/service/local/registry/`	Local cache of the registry.db.

Database and Standard Location	Description
registry.db /opt/netiq/npum/service/local/registry/	Contains public keys, hostnames, and access ports.
registry.ldb /opt/netiq/npum/service/local/registry/	Contains data used to manage registry agent caches.
rexec.db /opt/netiq/npum/service/local/rexec/	Not used.
rexec.ldb /opt/netiq/npum/service/local/rexec/	Not used.
secaudit.db /opt/netiq/npum/service/local/secaudit/	Contains rule configuration and audit data.
sa-<timestamp>.db /opt/netiq/npum/service/local/secaudit/	Contains archived compliance data.
secaudit.ldb /opt/netiq/npum/service/local/secaudit/	Not used.
sshagnt.db /opt/netiq/npum/service/local/sshagnt/	Not used.
sshagnt.ldb /opt/netiq/npum/service/local/sshagnt/	Not used.
ssh.db /opt/netiq/npum/service/local/sshrelay/	Not used.
ssh.ldb /opt/netiq/npum/service/local/sshrelay/	Not used.
sshrelay.db /opt/netiq/npum/service/local/sshrelay/	Not used.
sshrelay.ldb /opt/netiq/npum/service/local/sshrelay/	Not used.
strfwd.db /opt/netiq/npum/service/local/strfwd/	Not used.
strfwd.ldb /opt/netiq/npum/service/local/strfwd/	Contains messages intended for and received from other hosts connected to the Framework until they are acknowledged or processed by the appropriate local module.
sysinfo.db /opt/netiq/npum/service/local/sysinfo/	Not used.

Database and Standard Location	Description
`sysinfo.ldb` `/opt/netiq/npum/service/local/sysinfo/`	Not used.
`syslogemit.db` `/opt/netiq/npum/service/local/syslogemit/`	Contains configuration information.
`syslogemit.ldb` `/opt/netiq/npum/service/local/syslogemit/`	Not used.

4.8 Managing Database Connectors

You can add, remove, or edit the database connectors for any required agent to connect to any specific database. The database connectors are used for defining the following:

- Database type
- Port number on which PAM can accept the connection from database clients to specified database
- IP address of the specified database
- Port number of the database
- The protocol (TCPS for secured, or TCP for unsecured connection) that should be used for the database connection
- The version of the SSL connection (applicable for TCPS)

4.8.1 Viewing Database Connectors

You can view all the database connectors for each agent that has the dbaudit module. To view a database connector perform the following:

1. On the home page of the Administration console, click **Hosts**.
2. In the middle pane, select the root domain, **Hosts.**
3. In the left pane click **Database Connectors**.

   The Database Connectors page lists all the agents and its connectors on which dbaudit module is installed. To view the connectors only for a specific agent, see Section 4.8.4, “Modifying Database Connectors for an Agent,” on page 51.
4. (Conditional) If you can view only the agents but not connectors then you can click on the bar.

   It expands the view and all database connectors for the specific agent gets displayed.
5. (Conditional) If you want to expand the view to display all the connectors for all the agents, click **Expand All**.
6. (Conditional) If you want to collapse the view to display only the agents that contain the dbaudit package, click **Collapse All**.

If any agent that contains the dbaudit package is offline, PAM displays the agent with offline message on the database connectors page.

4.8.2 Adding Database Connectors

You can add any number of database connector to an agent listed on the Database Connector page. If you do not find some agents listed on this page, then verify if dbaudit module is installed on those agents.

To add a database connector to an agent, perform the following:

1. On the home page of the console, click **Hosts**.
2. In the middle pane select the root domain, **Hosts**.
3. In the left pane, click Database Connectors.

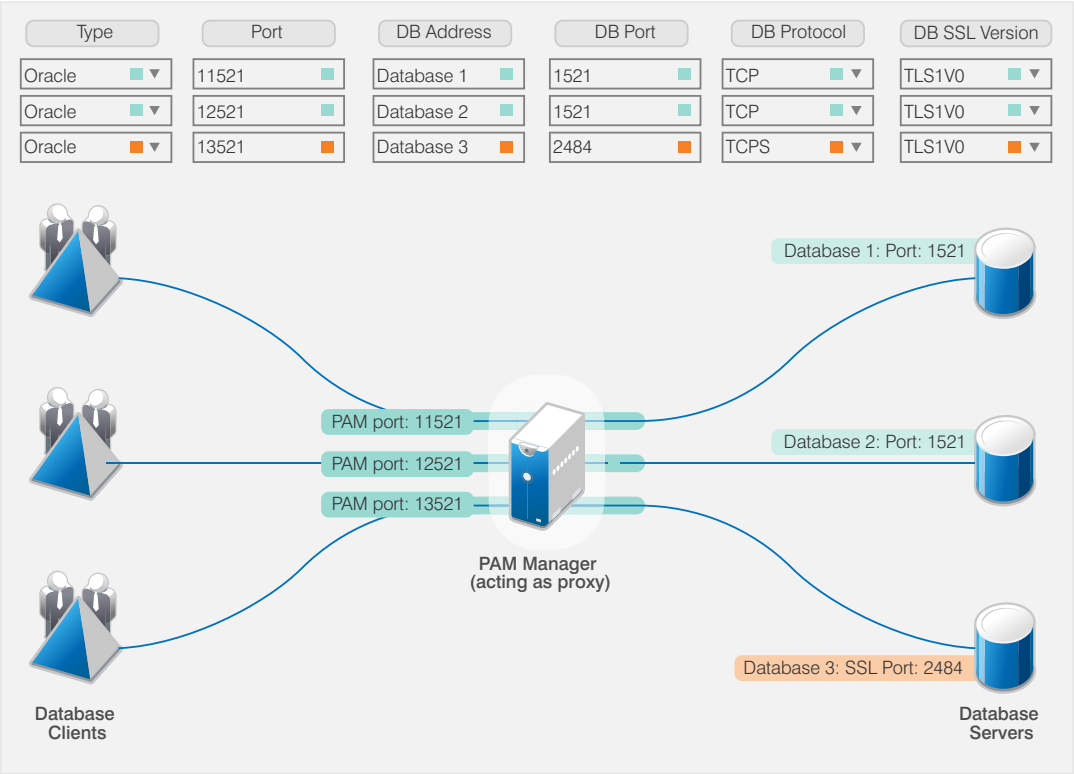
   The Database Connectors page displays all the agents that have dbaudit package installed with the list of connectors.
4. Click **Add** on the bar for the required agent.

   If you have already added a connector, you can modify it as per requirement by clicking the required connector field.
5. Specify the following:
   - **Type: Oracle**. This field gets auto-populated.
   - **Port:** Specify the port number on which the Privileged Account Manager accepts the connection from database clients to connect to a specific database server. Privileged Account Manager maps this port number to a specific database that has specific **DB address,** and **DB Port**.
   - **Database Address:** Specify the IP address or the host name of the Oracle database.
   - **Database Port:** Specify the port number of the Oracle database.
   - **Database Protocol:** Select **TCP** for non-SSL connection or TCPS for an SSL connection.
   - **Database SSL Version:** Specify the SSL version used on the database server.

NOTE

- To use SSL, import Privileged Account Manager certificate to the database client's wallet.
- If you are using Oracle 11.x or earlier versions of Oracle for an SSL connection, PAM supports only the TLS1V0 SSL version.

Figure 4-1 *Modify Connector*



6 Click **Save** on the same bar.

When you save the configuration, the agent gets restarted.

4.8.3 Removing Database Connectors

You can remove the connection from an agent to a database by removing the database connector for the required agent. To remove a database connector, perform the following:

1 On the home page of the Administration console, click **Hosts**.

2 In the middle pane select the root domain, **Hosts**.

3 In the left pane, click Database Connectors.

The Database Connectors page displays all the agents that have dbaudit package installed with the list of connectors.

4 To delete a connector, click on the required connector for the required agent, then click **Remove > Save**.

4.8.4 Modifying Database Connectors for an Agent

You can add, remove, or modify the database connectors for any specific agent that has the dbaudit module. To add or modify connectors for multiple agents through a single page, see Section 4.8.2, “Adding Database Connectors,” on page 49.

To view, add, remove, or modify the database connector for a specific agent, perform the following:

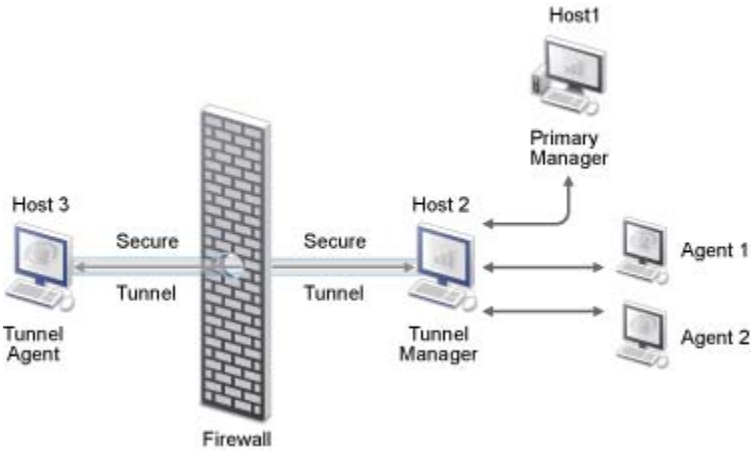
1. On the home page of the administration console, click **Hosts**.
2. In the middle pane, select the Privileged Account Manager agent that contains the dbaudit package.
3. In the right pane, click **Packages**.
4. Select the **dbaudit** package.
5. In the left pane, click **Modify Connector**.
6. Click **Add** to add a new connector.

   If you have already added a connector, you can modify it by clicking the required field. To delete the connector, click the required connector, then click **Remove**.

4.9 Understanding Tunneling

Tunneling improves the usage of Privileged Account Manager in firewall enabled deployments. It reduces the security risks and enables the exchange of data within the firewall friendly architecture. The communication between the agents/managers in a firewall deployment is established through a secure channel called a tunnel and is an effective way to deploy client server applications on either side of the firewall infrastructure.

Figure 4-2 *Tunneling Feature*



For Example: In Figure 4-2, Host 3, Host 2, and the Agents are registered with the Primary Manager (Host 1). Tunnel Agent package and the Tunnel Manager package are installed on Host 3 (Tunnel Agent) and Host 2 (Tunnel Manager) respectively. Tunnel Manager behaves as an interface between the Tunnel Agent and the Primary Manager and the communication between the Tunnel Agent and the Tunnel Manager will be through the established tunnel. If the Tunnel Agent has to communicate with Agent 2, all Privileged Account Manager specific communication is channeled through the Tunnel Manager based on the policies configured in the Primary Manager.

NOTE: Tunneling is not supported on Windows. For the list of supported platforms, see "Installation Requirements" in *NetIQ Privileged Account Manager 3.0.1 Installation Guide*.

- Section 4.9.1, "Installing Tunnel Agent and Tunnel Manager Packages," on page 52
- Section 4.9.2, "Enabling and Disabling Tunneling," on page 52
- Section 4.9.3, "Reregistering the Tunnel Agent Package," on page 52
- Section 4.9.4, "Listing Tunnels," on page 53

4.9.1 Installing Tunnel Agent and Tunnel Manager Packages

Before installing the packages, temporarily allow access from Host 3 to the 29120 port of the Primary Manager and Host 2.

NOTE

- Ensure that the hosts or agents are registered with the primary manager before installing the packages.
- Ensure that the primary manager, tunnel manager, and tunnel agent are on separate systems.

1. Publish the tunnel agent and the tunnel manager packages in the console.

   For more information to publish the **Firewall Tunnel Agent** and **Firewall Tunnel Manager**, see Section 3.1.2, "Adding Packages to the Package Manager," on page 26.

2. Install the **Firewall Tunnel Agent** package (**tnlagnt**). For more information, see Section 4.5.6, "Installing Packages on a Host," on page 42.

   You can install more than one tunnel agents outside the firewall.

   NOTE: You can also install tunnel agent directly from the installers and then register it with the primary manager. The tunnel agent rpm is in the `tunnel` folder of the ISO.

3. Install the **Firewall Tunnel Manager** package (**tnlmgr**). For more information, see Section 4.5.6, "Installing Packages on a Host," on page 42.

4.9.2 Enabling and Disabling Tunneling

To establish a secure channel of communication between the tunnel agent and tunnel manager:

1. In the home page of the console, click **Hosts**.
2. In the navigation pane select the tunnel agent host, click **Packages**, then click **tnlagnt**.
3. In the task menu, select **Enable Tunneling**, then click **OK**.

   To disable tunnel, select **Disable Tunneling**, then click **OK**.

4.9.3 Reregistering the Tunnel Agent Package

Before reregistering the tunnel agent package, ensure that you complete the following tasks:

1. Remove the access from the tunnel agent to the 29120 port of the primary manager and the tunnel manager.
2. Restart the tunnel agent.

To reregister the tunnel agent package, run the following command in the tunnel agent:

```
bash# /opt/netiq/npum/sbin/unifi regclnt register 127.0.0.1 29121
Please provide the DNS name or IP address of the framework manager : (127.0.0.1)
Please provide the port number of the framework manager: (29121)
Please provide the DNS name or IP address of this agent: <agent DNS name>
Please provide the registered agent name for this agent: <agent DNS name>

Framework manager: 127.0.0.1:29121
Agent DNS name or IP address : <agent DNS name>
Agent name : <agent name>

Is this correct: (y)
Please enter the name and password of an account
with permission to register this host.
User name: <username>
Password: <password>
Confirm password: <password>
```

NOTE: To verify the re-registration process, check for the following line in the unifid.log:

```
Info, Registration successful for <agent DNS name> to 127.0.0.1:29121
```

4.9.4 Listing Tunnels

To list the agents to which a tunnel is established with the tunnel manager:

1. Click **Hosts** in the home page of the console.
2. In the navigation pane, select the tunnel manager host, click **Packages**, then click **tnlmngr**.
3. In the task menu, select **List Tunnels**.

   A list of agents to which the tunnel is established with the tunnel manager is displayed.

4.10 Securing Access to the Framework Manager Console

The following options increase the security of the communication between the browsers and the Framework Manager console. These configuration options do not affect the communications between the Framework managers and the Framework agents.

- Section 4.10.1, “Requesting a Certificate for the Framework Manager Console,” on page 53
- Section 4.10.2, “Modifying the Connector,” on page 54

4.10.1 Requesting a Certificate for the Framework Manager Console

For added security, you can install a certificate to use when accessing the Framework Manager console. To access this option, you need to select the **Administration Manager (admin)** package on the host that you want to protect. You must then complete a certificate request form, send it to your chosen certification authority, and then install the certificate that you receive.

1. On the home page of the console, click **Hosts**.
2. In the navigation pane, select the host that you want to protect with a certificate.

3 In the details pane, click **Packages** and select the **Administration Manager (admin)** for the Framework Manager console.
4 Click **Request Certificate** in the task pane.
5 Specify the necessary details as described in your chosen certification authority documentation.
6 Click **Finish**.

   The text for your certificate request is displayed in the text area.
7 Copy the certificate request into an e-mail and send it to your chosen certification authority.
8 When you receive the certificate from your certification authority, install it as described in "Installing a Certificate" on page 54.

Installing a Certificate

When you have received the requested certificate from your certification authority:

1 Copy the certificate to the machine you use to access the Framework Manager console.
2 On the home page of the console, click **Hosts**.
3 In the navigation pane, select the host where you want to install the certificate.
4 In the details pane, click **Packages** and select the **Administration Manager (admin)** package for which you have requested the certificate.
5 Click **Install Certificate** in the task pane.
6 Paste the certificate into the text area.
7 Click **Finish**.

4.10.2 Modifying the Connector

You can modify the way you connect to the Framework Manager console. You can define which interface card and port to use, and increase the security of the connection by using SSL.

To access this option, you need to select the **Administration Manager (admin)** package on the host you want to modify.

1 On the home page of the console, click **Hosts**.
2 In the navigation pane, select the host where you want to modify the connector.
3 In the details pane, click **Packages** and select the **Administration Manager (admin)** for the Framework Manager console.
4 Click **Modify Connector** in the task pane.
5 Make the changes you want:
   - Define the address of a specific interface card
   - Define which port to use
   - Select the **SSL** check box if you want to use SSL.
6 Click **Finish**.

4.11 SSL Renegotiation DOS Attack Protection

Clients can attack the SSL server by sending many renegotiation (SSL handshake) requests to it. This can overwhelm the server and it might go down. To prevent such attacks, you can enable DOS attack protection.

To enable SSL renegotiation DOS attack protection:

1. In the `<Installation Path>/config/unifi.xml` file, edit the following line:

   ```
   <SSL reneg_dos_protection="0"/>
   ```

   reneg_dos_protection: Set the value to 1 to enable DOS attack protection. The default value is 0.

2. Save the file.

4.12 Using Privileged Account Manager Service

The Privileged Account Manager Service (PaaS) is a is part of the *Identity as a Service Powered by NetIQ* solution. Service providers host the Privileged Account Manager Service for their tenants. For more information, see the *Privileged Administrator Manager Service Installation and Configuration* (https://www.netiq.com/documentation/powered-by-netiq-22/pam/data/bookinfo.html) Guide.

4.13 Integrating with NetIQ Access Manager

You can configure Privileged Account Manager as a protected resource in NetIQ Access Manager (NAM). This helps the NAM administrator to use the single sign-on feature of NetIQ Access Manager.

Prerequisites for Privileged Account Manager and NAM integration:

1. Install and configure NAM on a supported platform. For the list of supported platforms, see the *NetIQ Access Manager 4.2 Installation Guide*.
2. Install and configure Privileged Account Manager on a supported platform. For the list of supported platforms, see the *NetIQ Privileged Account Manager 3.0.1 Installation Guide*.
3. Ensure that you have administrator privileges in NAM.

To integrate Privileged Account Manager with NAM:

1. Create a protected resource in Access Manager for Privileged Account Manager (for example, www.pam.com) and a policy for injecting headers `X_PUM_ADMIN` and `X_PUM_PASSWD`. For more information, see the *NetIQ Access Manager 4.2 Administration Guide*.
2. Set the following values in the policy:
   - Set `X_PUM_Admin` to PAM admin user name.
   - Set `X_PUM_Passwd` to PAM admin password.

After you have integrated PAM with NAM, type the following URL in a browser to access PAM administration console:

`https://www.pum.com/?sso=1` (for PAM administration console)

To integrate the myaccess page with NAM, perform the steps mentioned in the TID 7017364.

4.14 Troubleshooting

- Section 4.14.1, “Promoting Managers When the Primary Manager Fails,” on page 56
- Section 4.14.2, “Viewing Store and Forward Messages,” on page 56
- Section 4.14.3, “Managing Low Disk Space,” on page 57
- Section 4.14.4, “Restarting the Agent,” on page 58
- Section 4.14.5, “Managing the Registry Cache,” on page 58
- Section 4.14.6, “Time Synchronization,” on page 60

4.14.1 Promoting Managers When the Primary Manager Fails

If you have multiple Framework Managers deployed, the first manager installed is defined as the primary manager by default, and its packages are defined as primary. Manager packages on all other manager hosts act as backups. If your primary manager becomes unavailable, you can select single or multiple manager packages on a host to be promoted to primary status.

The Framework continues to function when the primary manager is unavailable, but no changes can be made to the Framework. Changes can only be written to the databases on the primary manager, which are then replicated to the backup managers. The only exception to this is the audit database. Each audit agent is responsible for sending its audit messages to each audit manager. This ensures that audit data is not lost.

NetIQ recommends having one host designated as a complete mirror of your primary manager. In event of a total failure of the primary manager, you can log into the backup console and promote it to primary status with no disruption of Privileged Account Manager services.

1. On the home page of the console, click **Hosts**.
2. In the navigation pane, select the host where you want to promote a manager.
3. With the host’s packages displayed, select the manager packages you want to promote.

   To select multiple manager packages, press the Ctrl key and select the packages one at a time, or press the Shift key to select a consecutive list of manager packages.
4. Click **Promote Manager** in the task pane.
5. Review the list of manager packages you have selected.
6. Click **Finish**.
7. View the host’s packages again and verify that the **Status** of the promoted manager packages has changed to Primary.

To use a command line option to promote backup host to primary status, see Section 12.6, “Registry Manager Options,” on page 194.

4.14.2 Viewing Store and Forward Messages

Messages from one host to another are stored if the sending host cannot communicate with the receiving host, and forwarded when the communication link is restored. You can view these messages and delete them if you do not need them.

You can use this feature to analyze a host and to discover whether it is having problems contacting a particular host. This problem usually occurs when a host is down or when a DNS name for a host name cannot be resolved.

1. On the home page of the console, click **Hosts**.

The navigation pane displays the current hierarchy for your Framework.

2. Select the host for which you want to view store and forward messages.
3. In the details pane, click **Packages.** .
4. In the task pane, Select **View Messages**.

   If any stored messages exist, they are displayed. Information about the message is displayed such as, the time the message was sent, the host on which the message was sent, the module that sent the message, the type of the message (method), the number of failed attempts when sending the message, and the next scheduled attempt to send the message, if any.
5. To attempt to send one or more messages again, select the messages and select **Retry**.
6. To delete one or more messages, select the messages and click **Delete**.
7. To refresh the screen, click **Refresh**.
8. Click **Close**.

4.14.3 Managing Low Disk Space

In the releases prior to PUM 2.4, usrun sessions were terminated with an auditing error when the server ran out of disk space. For long term running processes, this is not the ideal solution. You can use Command Control scripts to slow down or freeze input/output for the following conditions:

- In usrun sessions when disk space is low.
- When the store and forward process cannot contact an audit manager and its queue size is increasing.

You can control what happens under these conditions by configuring the following attributes:

disk_min_free (default: 1MB): Minimum free disk space. When free disk space goes below this level, the action defined in backoff_action is applied.

- If the backoff_action is block, the audit message is paused until disk space becomes available.
- If the backoff_action is fail, the request to store the audit message fails with an error, and the user session is terminated.
- If the backoff_action is allow, the session is unaffected.

disk_wm_free (default: 2MB): Free disk space watermark. When the free disk space goes below this level, the delay defined in backoff_delay is applied between each audited message.

queue_max_size (default: 250MB): Maximum queue size. When the queue size goes above this level, the action defined in backoff_action is applied.

- If the backoff_action is block, the audit message is paused until the queue size reduces below this level.
- If backoff_action is fail, the request to store the audit message fails with an error, and the user session is terminated.
- If backoff_action is allow, the session is unaffected.

queue_wm_size (default: 100MB): Queue size watermark. When the queue size goes above this level, the delay defined in backoff_delay is applied between each audited message.

backoff_divisor (default: 1): Provides the ability to increase the delay as the disk space reduces or the queue size increases. The delay is calculated by dividing the range between the disk_wm_free and disk_min_free (or queue_max_size and queue_wm_size) by the backoff_divisor and then applying the delay for each increment.

backoff_delay (default: 500ms): Time in milliseconds to delay the audit request.

backoff_action (default: block): Either block, fail, or allow.

The following Command Control script illustrates how to change these settings:

```
my $t=$meta->child("Audit");
$t=$meta->add_node("Audit") if(! $t);
$t->arg("disk_min_free","10");
$t->arg("disk_wm_free","20");
return 1;
```

This script sets the disk_min_free attribute to 10MB and the disk_wm_free attribute to 20 MB. You can assign this script to any rule or you can assign it to a rule at the top of the tree that all commands pass through.

You should create an emergency policy that allows administrators to access the machine when disk space is low or the store-and-forward queue size is large. Such a script would look similar to the following:

```
my $t=$meta->child("Audit");
$t=$meta->add_node("Audit") if(! $t);
$t->arg("disk_min_free","0");
$t->arg("disk_wm_free","0");
$t->arg("queue_max_size","0");
$t->arg("queue_wm_size","0");
$t->arg("backoff_action","allow");
return 1;
```

You can assign this script to any rule or you can assign it to a rule at the top of the tree that all commands pass through

4.14.4 Restarting the Agent

If you are having problems, NetIQ Support might ask you to restart an agent.

1. On the home page of the console, click **Hosts**.
2. In the navigation pane, select the host on which you want to restart the agent.

   To select multiple hosts in a domain, select the domain, then press the Ctrl key and select the hosts one at a time, or press the Shift key to select a consecutive list of hosts. To select all hosts in a domain, click **Select All**.
3. Click **Restart Agent** in the task pane.
4. Select the type of restart you want to perform, as advised by NetIQ Support.

   Soft restart: Reloads the module libraries and resets the service uptime.

   Hard restart: Restarts the daemon, reloads all modules, and resets the service uptime.
5. Click **Finish.**

4.14.5 Managing the Registry Cache

The registry cache is held by the Registry Agent on each host, and it contains a list of the packages deployed on each host in your Framework. This list is a copy of part of the information held by the Registry Manager, and it enables Framework components to locate and communicate with each other, according to their position in the hierarchy created when you add domains and hosts to your

Framework. Agents send requests to managers in the immediate subdomain, and if a request is unsuccessful, they try a manager higher up in the hierarchy. See Chapter 10, “Load Balancing and Failover,” on page 181 for details.

- You can view the registry cache to check hosts in your Framework to see if a specific manager or agent module is installed, and check the order in the Framework hierarchy according to the hosts the modules are installed on. See “Viewing the Registry Cache” on page 59.
- If the registry cache becomes out-of-date, communication problems can occur. To fix this, try clearing the registry cache on the Registry Agent to allow it to be updated by the Registry Manager. See “Clearing the Registry Cache” on page 59.

Viewing the Registry Cache

When viewing the registry cache, you can use the stale cache (the default option). The cache is considered stale if it has not been updated by the Registry Manager for 2 hours, and this is usually adequate. If you deselect the **Use Stale Cache** check box, the information is provided by the Registry Manager.

1. On the home page of the console, click **Hosts**.

   The navigation pane displays the current hierarchy for your Framework.
2. Select the host for which you want to view the registry cache.
3. Click the **Packages**.
4. Click **View Cache** in the task pane.
5. From the drop-down list, select the package you want to look up in the registry cache.
6. If you want to view the latest information from the Registry Manager, deselect the **Use stale cache** check box, then click **Lookup**.

   Details of the hosts where the module is installed are displayed in order according to their position in the Framework hierarchy. Information shown includes the Framework agent name, IP address, port number, and whether the host has the primary manager component installed (indicated by 1 in the **Primary** column) or not (indicated by 0).
7. (Optional) To clear the registry cache, click **Clear Cache.**

   This marks the cache as stale, and it is automatically updated by the Registry Manager. You can also clear the cache by using the **Clear Cache** option in the task pane.
8. Click **Close**.

Clearing the Registry Cache

NetIQ Support might advise you to try clearing the registry cache if you have communication problems among Privileged Account Manager components. The registry cache is held by the Registry Agent and contains a list of manager and agents in your Framework, copied from the Registry Manager. See “Managing the Registry Cache” on page 58 for more details.

1. On the home page of the console, click **Hosts**.

   The navigation pane displays the current hierarchy for your Framework.
2. Select the host for which you want to clear the registry cache.
3. Click the host’s **Packages** icon (click the arrow next to the host’s name to display it).

4 Click **Clear Cache** in the task pane.

The registry cache is marked as stale and is updated by the Registry Manager. You can also clear the registry cache by using the **View Cache** option (see "Viewing the Registry Cache" on page 59).

4.14.6 Time Synchronization

All agents should be configured to use a Network Time Protocol (NTP) server. Agents must have their time synchronized with the primary registry manager so that the time difference is less than two hours.

If the time difference is greater than two hours, the agent can appear offline and Command Control requests can fail.

5 Policy Templates

Privileged Account manager includes templates to import policies in the Command Control console. These templates help in better accessibility and better understanding of the policies. You can customize the policy with minimal changes and start using the policies without any hassle. You can import sample policies by using the **Import Sample Policy** template in the **Getting Started** page and add individual policies by using the Add Policy Template in the Command Control console. The sample template includes some of the commonly used policies, which an administrator can modify as per the requirement. For more information about Sample template, refer Section 5.1, “Understanding Sample Policy template,” on page 61. You can add additional sample policy after importing the sample policy template. If you already have policies created and do not want those policies to be overwritten by importing the sample policies, then you can add the additional policy individually from **Add Policy Template**. The additional sample policy creates a specific policy based on your requirement and it can be added to the existing hierarchy of policies. For more information about adding a sample policy, refer Section 5.2, “Adding a Policy Template,” on page 62.

NOTE: You can create a backup for the transaction settings by using the **Backup and Restore** option in the Command Control console. Before importing the policy template you can start the transaction so that if you require reverting back to the earlier Command Control settings you can cancel the transaction and if you require the changes after the import, you can commit the transaction.

5.1 Understanding Sample Policy template

The sample policy template is a template that imports various sample policies with required conditions. These policies include all the configuration settings for all the entities that are required to create sample policies in the Command Control console. This template helps in providing some of the sample policies that an administrator can use and it helps the administrators to understand how they can create policies with any required condition. The administrators can either use the same policy or modify it according to their requirements.

You can import the Sample Policy templates from the “**Getting Started page**” of the console. The Getting Started page is displayed initially when you install Privileged Account Manager. You can also open the Getting Started page from the home page of the console. When you import the template, all the sample policies are listed in the command control console.

IMPORTANT: If you have already defined some policies in the Command Control console, then importing these policies will overwrite those policies. The import of the sample template is helpful for the administrators who are creating policies for the first time.

To open the **Getting Started** page, perform the following:

1. (Conditional), If you are accessing the Manager for Privileged Account Manager for the first time, the first screen that gets displayed is the **Getting Started** page.
2. On the navigation path of the administration console, click ***User Name* > Getting started**. Here, User Name is the name that you use to login to the administration console of Privileged Account Manager.

5.1.1 Importing Sample Policy Templates

When you import Sample Policy template, the sample policies are added in the Command Control console. These policies are created with some specific conditions. The entities such as Account Group, Privileged Credential Vault, Commands, and so on are also created with the policies. These entities are required to create the sample policies.

To import sample Policies, perform the following:

1. On the Getting started page, click **Import Sample Policy**.
2. Click **Import**.

   The Command Control console launches with all the sample policies in the Command Control pane.

5.2 Adding a Policy Template

The policy templates are available in the Command Control console and importing any of these templates, will display the policy in the Command Control pane. You can add specific policies by selecting the required Policy template from the Command Control console. These templates help in defining the policies for a specific action that can be performed on a Host server. The policies are displayed in a hierarchical structure. To add a policy at a specific location, select the location, then select the required Policy template. You can also change the order of the policy. For more information about changing the order refer, Section 7.6.11, “Moving a Rule,” on page 108. By default the policies are disabled. The administrator can customize the policy as per the requirement and enable the policy when it is placed in the correct order in the hierarchy.

To add a specific policy template, perform the following:

1. On the home page of the console, click **Command Control**.
2. On the Command Control pane click **Rules**.

   If you want to add a rule under a parent rule then, select that specific rule.
3. In the details pane, click **Add Policy Template** then, select the required policy from the drop-down list. For example, SSH Relay, RDP Relay, Oracle DB Session and so on.

   When adding a policy template, you can get the details of that policy in the description field when you import the policy.
4. Click **Import**.

   A policy is created with the specified template. The status and the information about the policy is displayed under **Status** in the details pane.

NOTE

- By default the new policy is dimmed. In the details pane, after you modify the policy with the required changes, you can enable this policy by deselecting the **Disable** checkbox and then clicking **Apply**.
- Single sample policy can be imported multiple times at any level in the hierarchy.

---

6 Managing Framework Users and Groups

Privileged Account Manager provides comprehensive user management facilities to control access to the Framework consoles. The admin user created when the Framework is initially installed belongs to the admin group, which has full access to all installed consoles and can perform all tasks. You can use this user account to create additional user accounts and groups through the Framework User Manager console, which is part of the Access Control module. Role-based authorization is used to determine which user groups can access specific consoles and perform specific tasks.

This section describes the following Framework User Manager tasks:

- Section 6.1, “Managing Users,” on page 63
- Section 6.2, “Managing Groups,” on page 75
- Section 6.3, “Deploying the Access Control Module,” on page 81
- Section 6.4, “Changing a Framework User’s Password,” on page 82

6.1 Managing Users

When you add a new user, the user cannot access any of the Framework consoles until the user is added to a group that contains a role allowing the appropriate access. For example, if you want a user to be able to access only the Compliance Auditor console, you must create a group and configure the appropriate Compliance Auditor roles, then create the user and add the user to the group.

You can create additional users with the same access as the admin user by adding them to the admin group, or create your own group with access to all modules and roles. You can also configure these additional users to be superusers. Only users who belong to a group with the “super” role can view and administer superusers.

- Section 6.1.1, “Configuring Account Settings,” on page 63
- Section 6.1.2, “Adding a Framework User,” on page 65
- Section 6.1.3, “Modifying a Framework User,” on page 65
- Section 6.1.4, “Removing a Framework User Group from a User,” on page 74
- Section 6.1.5, “Deleting a Framework User,” on page 74

6.1.1 Configuring Account Settings

The **Account Settings** option allows you to set the default values for user settings such as minimum password length. When you add a new user, these default settings apply, but they can be overridden for individual users by modifying the individual account settings.

1. Click **Framework User Manager** on the home page of the console.
2. Click **Account Settings** in **Users** the task pane.
3. Configure the following account options:

   Inactivity Timeout (Minutes): Specify the number of minutes that users can be inactive before logging them out of the Framework Manager console.

Account Lockout: Specify the number of times a user can enter the wrong password before being locked out. You can re-enable the user's account by using the **Edit User** option and clearing the **Disabled** check box. You can reset the user's password by using the *Edit User* option.

Inactive Days (Disable): Specify the number of days that a user's account can be inactive before it is disabled. You can reactivate the user's account by using the *Edit User* option and using the *Reactivate* account check box in the *Account* section.

Inactive Days (Delete): Specify the number of days a user's account can be inactive before it is deleted.

Display Last Logon: Specify when the *Last Logon* box is displayed during a Framework login. The options are *After Failure*, *Never*, or *Always*.

Authentication Domain: Specify a configured Privileged Account Domain. Privileged Account Domains are configured through the Command Control's Privileged Credential Vault. Valid authentication domains can be configured to validate against NetIQ eDirectory or Microsoft Active Directory. Authentication Domains are used for External Groups within Command Control, or for authentication to the RDP Relay Console.

Password Lifetime (Days): Specify the number of days a user's password can be used before it expires and the user is prompted to change the password.

Minimum Password Length: Specify the minimum number of characters that must be used in a user's password.

Password History: Specify the number of unique passwords that a user must use before being allowed to reuse an old password.

Minimum Alpha: Specify the minimum number of alphabetic characters that must be used in a user's password.

Minimum Numerics: Specify the minimum number of numeric characters that must be used in a user's password.

Cache Native Passwords: Enable this option if you want the Framework Manager passwords updated with LDAP passwords. When you set up a mapping for users with an LDAP server, the Framework Manager password is updated to match the LDAP password with each successful login. (For information on setting up an LDAP mapping, see "Modify User: Native Maps" on page 70.)

If a user never successfully logs into the LDAP server, the local password is never updated, and the user can use the local Framework Manager password to log in.

If this option is disabled, the local Framework Manager passwords are never updated with the LDAP passwords. Users can attempt an LDAP login, and if that fails, they can log in locally with their Framework Manager passwords.

4 Configure the following help desk attributes.These attributes control the functionality of the Help Desk role and determine the actions that can be performed by a help desk user. For information about creating a group to use these attributes, see Section 6.2.3, "Configuring a Help Desk Group," on page 76.

Disabled: Allows the help desk user to enable and disable user accounts.

Password: Allows the help desk user to change an existing password.

Change at Next Login: Allows the help desk user to determine whether the user is forced to change the password on the next login.

Last Changed: Displays the last time the password was changed and allows the help desk user to reset it to the current date and time.

Bad Logons: Displays the number of bad logins and allows the help desk user to reset the count.

Last Bad Logon: Displays the time and date of the last bad login and allows the help desk user to reset it to the current date and time.

Last Logon: Displays the last successful login of the user and allows the help desk user to reactivate the account.

Group Membership: Allows the help desk user to assign the user to non-administrative accounts.

5 Click *Finish*.

6.1.2 Adding a Framework User

When you add a new Framework user:

- The user's account is set up according to the default values defined in the *Account Settings* option. You can change these settings for individual users by using the *Edit User* option.
- The user's password is set to expire immediately so he or she is prompted to change it on the first login to the Framework Manager console. You can change this setting for individual users by using the *Edit User* option.
- The user cannot access any of the Framework consoles until you have added the user to a group with the required roles defined. For more information, see Section 6.1.3, "Modifying a Framework User," on page 65 and Section 6.2.4, "Configuring Roles," on page 76.

To add a new Framework user:

1 Click *Framework User Manager* on the home page of the console.

2 Click *Create* in the *Users* task pane.

3 In the *Add New User* pane, specify a name for the user in the *Username* field and a password for the user in the *Password* field.

The password must comply with the default account settings for the Framework.

4 Click *Add <user name>*.

5 To configure additional settings for the user's account, continue with Section 6.1.3, "Modifying a Framework User," on page 65.

6.1.3 Modifying a Framework User

The *Edit User* option allows you to override the default account settings for an individual user, and also provides a number of additional configuration settings and tasks, including resetting a user's password and assigning a user to a group.

To modify a Framework user account:

1 Click *Framework User Manager* on the home page of the console.

2 In the *Users* pane, select the user you want to modify.

3 Click *Edit* in the *User Information* task pane.

4 Change the settings as required:

Disable Account: Select this option to disable the user's account.

Comment: Specify a short comment in the text box.

Description: Specify a detailed description in the text box.

5 To configure additional options, click *Edit* and select the section in the *Edit User: <user name>* pane:

Password: Allows you to reset the user's password and configure other password settings. For specific instructions and additional options, see "Modify User: Password" on page 66.

Password Validation: Allows you to define the minimum number of alphabetic and numeric characters required in the user's password. For specific instructions and additional options, see "Modify User: Password Validation" on page 67.

Account: Allows you to configure the user as a superuser, provides information about the user's account, and provides other account configuration options. For specific instructions and additional options, see "Modify User: Account" on page 67.

Account Details: Allows you to enter personal information for the user, including Staff ID and contact details. For specific instructions and additional options, see "Modify User: Account Details" on page 68.

Host Access Control: Allows you to control where the user can access the console from. For specific instructions and additional options, see "Modify User: Host Access Control" on page 68.

Native Maps: Allows you to map the Framework user account to a user account on a UNIX platform or on an LDAP server. For specific instructions and additional options, see "Modify User: Native Maps" on page 70.

Sign in Script: Allows you to define a Perl sign in script for the user. For specific instructions and additional options, see "Modify User: Signin Script" on page 71.

Authentication Script: Allows you to enable additional authentication apart from the default password authentication. For specific instructions and additional options, see "Modify User: Authentication Script" on page 71.

Groups: Allows you to add the user to one or more groups. For specific instructions and additional options, see "Modify User: Groups" on page 74.

6 When you have completed your changes, click *Update*.

Modify User: Password

To set password options for a Framework user:

1 Click *Framework User Manager* on the home page of the console.

2 Select the user account you want to modify, and click *Edit* in the *User Information* pane.

3 Click *Password*.

4 Change the options as desired:

Password: To reset the user's password, type the new password and retype it in the *Confirm Password* field.

NOTE: The password must comply with the default account settings for the Framework, and comply with individual user settings defined by using this option and the *Password Validation* option.

Change at Next Signin: Select the *Change at Next Signin* check box to expire the user's current password immediately, forcing the user to change it on the next login.

Last Changed: Indicates when the password was last changed by the user, or, if the password has not yet been changed by the user, indicates when the user and password were created.

Reset Password Age: Select the *Reset password age* check box to reset the age of the password to zero. The user can use the password for the full number of days defined in *Password lifetime (days)* (see Section 6.1.1, "Configuring Account Settings," on page 63), or in the *Maximum age* field if it has been configured.

Minimum Length: Override the default account settings by specifying the minimum number of characters you require in a user's password.

Maximum Age: Override the default account settings by specifying the number of days before a user's password expires, prompting the user to change the password.

History: Override the default account settings by specifying the number of unique passwords that a user must use before being allowed to reuse an old password.

5 Click *Update* or select another option.

Modify User: Password Validation

To set password validation options for a Framework user:

1 Click *Framework User Manager* on the home page of the console.

2 Select the user account you want to modify, and click *Edit* in the *User Information* pane.

3 Click *Password Validation*.

4 To override the default account settings for this user, select the appropriate check box and set the required values as follows:

Min Alpha Characters: Specify the minimum number of alphabetic characters you require in the user's password.

Min Numeric Characters: Specify the minimum number of numeric characters you require in the user's password.

5 Click *Update* or select another option.

Modify User: Account

To set account options for a Framework user:

1 Click *Framework User Manager* on the home page of the console.

2 Select the user account you want to modify, and click *Edit* in the *User Information* pane.

3 Click *Account*.

4 Change the options as required:

Super user: Select this check box to make this user a superuser.

Disable account: Select this check box to disable this user account.

NOTE: The *Super user* and *Disable account* options are available only if you are logged in as a superuser. Superusers can be viewed and administered only by users belonging to a group with the super role defined for the auth module.

Comment: Add comment about the user account.

Last Bad Logon: The last time the user failed to log on successfully.

Last Logon: Indicates when the user last logged in to the Framework Manager console.

Reactivate Account: Select the *Reactivate account* check box to re-enable a user's account that has been locked through bad logons.

Disable Inactive Days: Override the default account settings by specifying the number of days the user's account can be inactive before it is disabled. You can reactivate the user's account by using the *Reactivate* account option described above.

Delete Inactive Days: Override the default account settings by specifying the number of days the user's account can be inactive before it is deleted.

Inactivity Logout Mins: Override the default account settings by specifying the number of minutes the user can be inactive before the user is logged out of the Framework Manager console.

Bad Logons: The number of times the user has failed to log on successfully since the last successful logon.

Reset Bad Logon Count: Resets the number of unsuccessful logons to zero.

Lockout: Override the default account settings by specifying the number of times the user can enter the wrong password before being locked out. You can re-enable the user's account by clearing the *Disabled* check box in the main *Modify User* section. You can reset the user's password in the *Password* section.

Message of the day: Override the default account settings by specifying a message to be displayed to the user after a successful logon.

Description: add a description about the user account.

5 Click *Update* or select another option.

Modify User: Account Details

To set personal account details for a Framework user:

1 Click *Framework User Manager* on the home page of the console.

2 Select the user account you want to modify, and click *Edit* in the *User Information* pane.

3 Click *Account Details*.

4 To set the following options, select the appropriate check box and specify the text:

Staff ID: Specify the user's staff ID, for example, the user's unique company identifier.

Display Name: Specify a display name for the user, for example, the user's full name. If a name is defined here it can be automatically entered as the *Manager Name* in Account Group and User Group definitions for Command Control by selecting the manager's Framework user name (see "Modifying an Account Group" on page 114 and "Modifying a User Group" on page 111). It can also be used in Compliance Auditor reports (see Section 9.3.1, "Adding or Modifying an Audit Report," on page 170).

Email Address: Specify the user's e-mail address. If an e-mail address is defined here, it can also be used in Command Control (see "Modifying an Account Group" on page 114 and "Modifying a User Group" on page 111) and in the Compliance Auditor (see Section 9.3.1, "Adding or Modifying an Audit Report," on page 170).

Telephone Number: Specify the user's telephone number. If a telephone number is defined here, it can also be used in Command Control (see "Modifying an Account Group" on page 114 and "Modifying a User Group" on page 111) and in the Compliance Auditor (see Section 9.3.1, "Adding or Modifying an Audit Report," on page 170).

5 Click *Update* or select another option.

Modify User: Host Access Control

You can control where the user can access a Framework Manager console from by defining a list of ports and hosts to which access is allowed, or a list of ports and hosts to which access is denied.

If you make no entries for this option, access is allowed from any location.

To control where the user can access the Framework Manager console from:

1. Click *Framework User Manager* on the home page of the console.
2. Select the user account you want to modify, and click *Edit* in the *User Information* pane.
3. Click *Host Access Control*.
4. (Optional) Define a list of locations from where the user is allowed to access the console, and deny access from all other locations:
   - **4a** If auditing is required, select the *Auditing* check box and use the drop-down list to select the events you want to be audited.
   - **4b** Select the *Host Access* check box.
   - **4c** Click the *Add* button below the *Host Access* list.
   - **4d** In the *Port Range* column, specify the required port number or range of port numbers. The following entries are allowed:

*	All ports
port	A single port, such as 80
port-port	A range of ports, such as 20-30
svcname	Resolves a service name to its port, such as HTTP

   - **4e** In the *Host/IP Subnet* column, specify the required host definition. The following entries are allowed:

*	All hosts
ip address	A full IP address, such as 192.168.1.1
ip address-ip address	A range of IP addresses, such as 192.168.1.1-192.168.1.12
part ip address	Part of an IP address, such as 192.168.1
network/netmask	A network/netmask pair, such as 192.168.1.0/255.255.255.0
network/nnn CIDR	A network/nnn CIDR, such as 192.168.11.0/24
hostname	A hostname, such as dellsrv1.netiq.com
domain	A domain name, such as *.netiq.com

   - **4f** In the *Allow* column, click the check box.
   - **4g** Repeat Step 4c through Step 4e for any other required location definitions.
5. (Optional) Define a list of locations from which the user is denied access to the console, and allow access from all other locations:
   - **5a** If auditing is required, select the *Auditing* check box and use the drop-down list to select the events you want to be audited.
   - **5b** Select the *Host Access* check box.
   - **5c** Click the *Add* button below the Host Access list.
   - **5d** Specify the desired locations as described in Step 4d and Step 4e above.

5e To make this a deny entry, make sure the check box is not selected in the *Allow* column.

5f Repeat steps Step 5c and Step 5e for any other required location definitions.

6 Click *Update* or select another option.

Modify User: Native Maps

The *Native Maps* option allows you to map Framework User accounts to UNIX or Linux accounts and to LDAP accounts.

- "UNIX or Linux Account Mapping" on page 70
- "LDAP Account Mapping" on page 71

UNIX or Linux Account Mapping

The Privileged Account Manager Framework provides the ability to perform a number of functions from the command line. When using the command line, you are required to authenticate to the Framework. For example, the following command returns the status of all agents:

```
/opt/netiq/npum/sbin/unifi -u admin regclnt status -a
```

The command contains a switch for the username (`-u admin`). When the command is executed, the user is prompted for a password.

You can use the *Native Maps* option to map a platform system user to a Privileged Account Manager account.If you use an additional switch in the command line call, you are no longer required to provide authentication. A user with a native map can enter the following command:

```
/opt/netiq/npum/sbin/unifi -n regclnt status -a
```

The native map plus the `-n` switch allows the command to be executed without prompting the user for a name or a password.

To add a native map for a UNIX or Linux user:

1 Click *Framework User Manager* on the home page of the console.

2 Select the user account you want to modify, and click *Edit* in the *User Information* pane.

3 Click *Native Maps*.

4 Click *Add*.

5 In the *User* column, specify the user's name for the UNIX or Linux platform.

6 In the *Host* column, select the hostname for the UNIX or Linux platform.

7 Repeat Step 4 through Step 6 for any additional maps you require.

8 To edit a native map, select it and make the required changes.

9 To remove a native map, select it and click *Remove*.

10 Click *Update* or select another option.

LDAP Account Mapping

Native maps can be used to allow Framework Manager users to obtain their authentication credentials from an LDAP server. This allows the LDAP server to remain the authoritative source for user credentials and active accounts. If you want LDAP mapped users to be able to log in when the LDAP server is not available, see the *Cache native passwords* option in Section 6.1.1, "Configuring Account Settings," on page 63.

To configure an LDAP mapping:

1. Click *Framework User Manager* on the home page of the console.
2. Select the user account you want to modify, and click *Edit* in the *User Information* pane.
3. Click *Native Maps*.
4. Click *Add*.
5. In the *User* column, specify the user's fully qualified distinguished name. For example:

   ```
   cn=plou,ou=development,o=netiq
   ```

6. In the *Host* column, specify the scheme (`ldap` or `ldaps`) and IP address of the LDAP server. Specify a port only if the LDAP server is not using the standard port for the scheme. For example:

   ```
   ldaps://10.10.16.165
   ldaps://10.10.16.166:736
   ```

7. Click *Update* or select another option.

Modify User: Signin Script

You can assign a Perl script to a user to be run when the user logs on to the Framework Manager console. For example, you could assign a script that causes an e-mail to be sent to a manager when the user logs on.

1. Click *Framework User Manager* on the home page of the console.
2. Select the user account you want to modify, and click *Edit* in the *User Information* pane.
3. Click *Signin Script*.
4. Specify the logon script you require for this user. You can type the script or paste it from another document.
5. Click *Update* or select another option.

Modify User: Authentication Script

Two factor authentication is required to enhance the security and to ensure the identity of the user is valid. Any framework user has to enter the secondary password to log in to the Privileged Account Manager Administration Console. To enable two factor authentication:

1. Click *Framework User Manager* on the home page of the console.
2. Select the user account you want to modify, and click *Edit* in the *User Information* pane.
3. Click *Authentication Script*.
4. Add the following script based on your requirement:

   Script to Prompt the Secondary Password in the Hidden Mode

```
my $module = $args->child("Args")->child("Module");
my $http_req = $args->child("Args")->child("http_req");

#RDPRelay Checks
if($http_req && ($http_req->child()->arg("HTTP_REFERER") =~ m/rdprelay/) )  {
  return 0;
}

#myaccess Checks
if($http_req && ($http_req->child()->arg("HTTP_REFERER") =~ m/myaccess/) )  {
  return 0;
}

#Non Admin Module Checks
if($$module && ($module->arg("name") ne "admin")) {
  return 0;
}

my $exauth = get_msgs($args);
if($exauth) {
    my $pwd=$exauth->arg("imsg");
    if($pwd && $pwd eq "letmein") {
        return 0;
    } else {
        return -1;
    }
} else {
    add_conv($args,"Enter your Secondary Password in the below Text Box and
Press on 'Finish' Button", 1);
    return 1;
}
```

Script to Prompt the Secondary Password and Display It

```
my $module = $args->child("Args")->child("Module");
my $http_req = $args->child("Args")->child("http_req");

#RDPRelay Checks
if($http_req && ($http_req->child()->arg("HTTP_REFERER") =~ m/rdprelay/) )  {
  return 0;
}

#myaccess Checks
if($http_req && ($http_req->child()->arg("HTTP_REFERER") =~ m/myaccess/) )  {
  return 0;
}

#Non Admin Module Checks
if($$module && ($module->arg("name") ne "admin")) {
  return 0;
}

my $exauth = get_msgs($args);
if($exauth) {
    my $pwd=$exauth->arg("imsg");
    if($pwd && $pwd eq "letmein") {
        return 0;
    } else {
        return -1;
    }
} else {
    add_conv($args,"Enter your Secondary Password in the below Text Box and
Press on 'Finish' Button", 0);
    return 1;
}
```

Show the Configured Message After Primary Login

```
my $module = $args->child("Args")->child("Module");
my $http_req = $args->child("Args")->child("http_req");

#RDPRelay Checks
if($http_req && ($http_req->child()->arg("HTTP_REFERER") =~ m/rdprelay/) )  {
  return 0;
}

#myaccess Checks
if($http_req && ($http_req->child()->arg("HTTP_REFERER") =~ m/myaccess/) )  {
  return 0;
}

#Non Admin Module Checks
if($$module && ($module->arg("name") ne "admin")) {
  return 0;
}

my $exauth = get_msgs($args);
if($exauth) {
        return 0;
} else {
    add_msg($args, "Message from Administrator : Click on OK to Login");
    return 1;
}
```

Combination of all the Previous Scripts

```
my $module = $args->child("Args")->child("Module");
my $http_req = $args->child("Args")->child("http_req");

#RDPRelay Checks
if($http_req && ($http_req->child()->arg("HTTP_REFERER") =~ m/rdprelay/) )  {
  return 0;
}

#myaccess Checks
if($http_req && ($http_req->child()->arg("HTTP_REFERER") =~ m/myaccess/) )  {
  return 0;
}


#Non Admin Module Checks
if($$module && ($module->arg("name") ne "admin")) {
  return 0;
}

my @exauth = get_msgs($args);
if($#exauth > 0) {
    my $pwd=$exauth[0]->arg("imsg");
    my $inp=$exauth[2]->arg("imsg");

   # Second Password is - letmein
   # Third Password is - 123

   if($pwd && $pwd eq "letmein" && $inp && $inp eq "123") {
        return 0;
    } else {
        #(Show the message if any or both the passwords are wrong)
        $eval_rsp->arg('message', "Admin Message : Wrong Password!!!");
```

```
            return -1;
        }
    } else {
        #(Ask for input as password)
        add_conv($args, "Enter your Secondary Password", 1);

        #(Show the message with 'OK')
        add_msg($args, "Click on OK");

        #(Ask for input as clear text)
        add_conv($args, "Enter your Third Password", 0);

        return 1;
    }
```

5 Click *Update* or select another option.

Modify User: Groups

To assign a Framework user to one or more groups:

1 Click *Framework User Manager* on the home page of the console.

2 Select the user account you want to modify, and click *Edit* in the *User Information* pane.

3 Click *Groups*.

4 Select the check boxes for the groups you want this user to belong to.

5 Click *Finish*.

You can also assign a user to a group by using the *Modify Group* option, by dragging and dropping the user to the group, or by dragging and dropping the group onto the user.

You can remove a user from a group by deselecting the check box for the required group. See Section 6.1.4, “Removing a Framework User Group from a User,” on page 74 for other methods.

6.1.4 Removing a Framework User Group from a User

There are several ways of removing a Framework user group from a Framework user’s account. You can modify the user, modify the group, or use the objects in the navigation pane.

1 Click *Framework User Manager* on the home page of the console.

2 Select the group you want to remove from the user’s account.

3 In the right pane, select the user.

4 Click *Remove User* in the task pane. The user is removed.

6.1.5 Deleting a Framework User

1 Click *Framework User Manager* on the home page of the console.

2 In the *Users* task pane, select the user you want to delete.

3 Click *Delete* in the *User Information* task pane.

4 Click *Finish* to confirm the deletion.

6.2 Managing Groups

Framework users must be assigned to one or more groups with the appropriate roles defined before they can access any Framework consoles or perform any tasks.

- Section 6.2.1, “Adding a Framework User Group,” on page 75
- Section 6.2.2, “Modifying a Framework User Group,” on page 75
- Section 6.2.3, “Configuring a Help Desk Group,” on page 76
- Section 6.2.4, “Configuring Roles,” on page 76
- Section 6.2.5, “Deleting a Framework User Group,” on page 81

6.2.1 Adding a Framework User Group

1. Click *Framework User Manager* on the home page of the console.
2. Click *Create* in the *Groups* task pane.
3. Specify a name for the group in the *Add New Group* task pane.
4. Click *Create <group name>*.
5. To configure the group, continue with Section 6.2.2, “Modifying a Framework User Group,” on page 75.

6.2.2 Modifying a Framework User Group

Modifying a user group allows you to:

- Add a comment describing the group
- Add users and subgroups to the group
- Define administrative roles for the group
- Specify an audit manager for the group.

To modify a Framework user group:

1. Click *Framework User Manager* on the home page of the console.
2. In the *Groups* pane, select the group you want to modify.
3. Click *Edit* in the *Group Information* task pane.
4. (Optional) In the *Comment* field, enter a comment.
5. In the *Members* section, select the users you want to be members of this group.

   You can also add a user to groups in the *Groups* section of the *Edit User* option, by dragging and dropping the user onto the group, or by dragging and dropping the group onto the user.

   You can remove users from the group by deselecting them here. See Section 6.1.4, “Removing a Framework User Group from a User,” on page 74 for other methods.
6. In the *Sub Groups* section, select the groups you want to be subgroups of this group.

   You can also add subgroups to groups by dragging and dropping the group onto the main group.
7. In the *Roles* section, configure the roles you require for this group of users according to the consoles you want them to be able to access and the tasks you want them to be able to perform. You must assign at least one role. See Section 6.2.4, “Configuring Roles,” on page 76 for more details.

8 In the *Audit Manager* section, specify the details of the group's manager.

9 Click *Update*.

6.2.3 Configuring a Help Desk Group

The help desk role allows a predefined set of attributes to be set on the Account Settings page so that users assigned to the help desk group can only manage the subset of user attributes.

To set up a help desk group:

1 Configure the attributes:

   1a Click *Framework User Manager* on the home page of the console.

   1b Click *Account Settings* in the *Users* task pane.

   1c Configure the *Helpdesk Attributes*.

   For information about these attributes, see Section 6.1.1, "Configuring Account Settings," on page 63.

   1d Click *Finish*.

2 Create the group:

   2a Click *Create* in the *Groups* task pane.

   2b Specify a name for the group, then click *Create <group name>*.

   2c Select the group you just created, then click *Edit*.

   2d In the *Members* option, select the users that you want to belong to the help desk group.

   2e In the *Roles* option, click *Add*, then add the following roles:

Module	Role
auth	console
auth	read
auth	helpdesk

3 Click *Update*.

6.2.4 Configuring Roles

When you create a new Framework user group, you must assign at least one role to the group to allow the users in the group to access one or more Framework modules and perform tasks.

To allow access to all modules and tasks, you can define a role with Module set to * and Role set to *. This is how the default admin group containing the default admin user is initially configured.

To allow access only to specific modules and tasks, use the *Modify Group* option (see Section 6.2.2, "Modifying a Framework User Group," on page 75) and define one or more roles according to the tables below:

- "Framework User Roles" on page 77
- "Audit Report Roles" on page 77
- "Compliance Auditor Roles" on page 79
- "Host Roles" on page 79

- “Package Manager Roles” on page 80
- “Command Control Roles” on page 80
- “Distribution Roles” on page 80

Framework User Roles

The following roles can be assigned to the authentication module in order to control access to the Framework User Manager console. Select from these roles when you are setting up a group to manage Framework Manager users and groups.

Module	Role	Allows users to
auth	act_settings	Modify account settings.
	admin	Add or delete users and groups, and assign users to groups.
	console	View the Framework User Manager console.
	helpdesk	Modify the user account settings. To change which attributes are available for modification, see Section 6.1.1, “Configuring Account Settings,” on page 63.
		For information on how to use this role to create a Help Desk group that can manage user passwords, see Section 6.2.3, “Configuring a Help Desk Group,” on page 76.
	read	Read the auth database.
		This role must be used with all other auth roles.
	role_admin	Add or remove roles.
	super	View and modify superusers, and view and modify groups with the super role defined.
	*	Perform all roles.

Audit Report Roles

The following roles can be assigned to the auditing module in order to control access to the Reporting console. Select from these roles when you are setting up a group to manage the command control reports.

Module	Role	Allows users to
audit	read	Read the audit database. This role must be used with all other audit roles.
	console	View the Reporting console.
	admin	Modify reporting settings.
	command	View Command Control reports.
	logon	View Account Logon reports.
	*	Perform all roles.
	write	Create new audit reports and adjust filter settings.
	report	Access reports with the report defined roles.
	<report defined>	Read and update the reports defined in the *General* tab of the Reporting console. This role is only useful when used in conjunction with the report role.

You can use these Audit Report roles to create the following types of audit managers:

- **Administrator:** To allow the group to update all aspects of the auditing module, including encryption and rollover, the group needs to be assigned the following roles for the audit module:

  admin
  write
  read
  command
  console

- **Manager:** To allow the group to update all aspects of the auditing module, except encryption and rollover, the group needs to be assigned the following roles for the audit module:

  write
  read
  command
  console

- **User:** To allow the group to read and update a specific report, the group needs to be assigned the following roles for the audit module:

  command
  console
  report
  <report defined read>
  <report defined update>

If you want the group to have read-only privileges to the report, do no assign the <report defined update> role. Users with read-only rights to a report can view the report from the console, view the keystroke sessions within the report, and select which audit databases to view (see the *LogFiles* tab). Users who also have the update right can update the report's filter, its name, and its description.

Each report allows you to specify a read role and an update role. You need to remember those names and manually enter them here. The console does not provide any error checking, so you need to make sure to enter the correct name. For information on how to enable a report for a role, see Section 8.4.4, "Modifying General Report Information," on page 160.

Compliance Auditor Roles

The following roles can be assigned to the compliance auditing module in order to control access to the Compliance Auditor console. For a group to manage compliance auditing, the group also needs read roles to the auditing and authentication modules.

Module	Role	Allows users to
secaudit	console	View the Compliance Auditor console.
	audit	View and edit records.
	admin	Add and modify audit rules.
	*	Perform the console, audit, and admin roles.
	<*audit role name* >	Access the records collected by audit rules with this role defined in the *Audit Role* field on the Modify Audit Rule page. You can choose your own name for the role. See Section 9.2.1, "Adding or Modifying an Audit Rule," on page 168 for details about configuring audit rules.
audit	read	View a keystroke replay.
auth	read	Extract user credentials, including name and e-mail address, from the auth database for use with reports.

Host Roles

The following roles can be assigned to the host module in order to control access to the Hosts console. Select from the following roles when creating a group to manage the hosts.

Module	Role	Allows users to
unifi	info	Run the host status check by using the command line interface. You must type the word `info` because it is not available in the drop-down list.
	admin	View the Hosts console and perform administrative actions.

Package Manager Roles

The following role can be assigned to the package manager module in order to control access to the Package Manager console. When you are creating a group that you want to manage the distribution of updates to Privileged Account Manager, select the following:

Module	Role	Allows users to
pkgman	admin	View, add, update, or remove packages.

Command Control Roles

The following roles can be assigned to the command control module in order to control access to the Command Control console. Select from the following roles when you are creating a group that you want to manage and test the rules in the command control database.

Module	Role	Allows users to
cmdctrl	read	View the Command Control console and run test suites.
	write	Modify the command control database. Users with this role cannot cancel other users' transactions or modify audit or transaction settings. Must be used in conjunction with the cmdctrl read role.
	admin	Modify the Command Control database, including canceling other users' transactions and modifying audit and transaction settings.
	*	Perform all roles.
auth	read	Extract user credentials, including name and e-mail address, from the auth database into the account and user group definitions. Used in conjunction with the cmdctrl write (with read) and admin roles.

Distribution Roles

The following roles can be assigned to the distribution module in order to restrict the installation and deployment of certain packages.

Module	Role	Allows users to
distrib	acl	Restricts deployment of packages to specified modules.
	Module:rexec	Install or patch the Command Control Agent (rexec).
	Module:distrib	Install or patch the Distribution Agent (distrib).
	Module:regclnt	Install or patch the Registry Agent (reglcnt).
	Module:strfwd	Install or patch the Store and Forward Agent (strfwd).
	Module:sysinfo	Install or patch the System Information Agent (sysinfo).

All modules can be allowed by following the above configuration of Module:<desired-package-name>.

6.2.5 Deleting a Framework User Group

1. Click *Framework User Manager* on the home page of the console.
2. In the *Groups* pane, select the group you want to delete.
3. Click *Delete* in the *Group Information* task pane.
4. Click *Finish* to confirm the deletion.

6.3 Deploying the Access Control Module

When you install Privileged Account Manager, the Framework User Manager console is installed with the other required modules. If you want to manage Framework users from other hosts, you need to deploy the Access Control modules on these hosts. You should always have at least one host that contains a backup of this console.

The Access Control module consists of the following packages:

- **Access Manager (auth):** Holds the Framework user account information and controls access to the Framework modules.
- **Access Control Console:** Required for configuring Framework users and groups. It is installed into the Framework Manager console as the *Framework User Manager* console.

The Access Control module has the following dependencies:

- The Access Manager package is shown as an available package only on hosts that have the Registry Manager (registry) package installed.
- The Access Control Console can only be deployed on hosts that have the Administration Manager (admin) package installed.

To deploy the Access Control modules on another host:

1. Download the following packages to your local Package Manager:
   - Access Manager
   - Access Control Console
   - Registry Manager
   - Administration Manager

   See Chapter 3, “Managing Package Distribution,” on page 25 for details.
2. Install the Registry Manager on the host you want to be the Access Manager, then install the Access Manager on the same host.

   This can be on any operating system, including Windows*. See Section 4.5.6, “Installing Packages on a Host,” on page 42 for details. The packages can be deployed to as many hosts as you need in order to build an environment with load balancing and failover.
3. Install the Administration Manager on the same host or a different host.

   It can be deployed to as many hosts as you need in order to build an environment with load balancing and failover.
4. Install the Access Control Console on a host where the Administration Manager is installed. See Section 3.2.2, “Adding a Console to the Framework Manager Console,” on page 27 for details.

The Access Control module is now deployed and ready to use.

6.4 Changing a Framework User's Password

Framework users can change their own passwords by using the *Change Password* option, which is always available in the task pane. If a Framework user belongs to a group with the appropriate auth role defined (see Section 6.2.4, "Configuring Roles," on page 76), they can also change other users' passwords by using the *Modify User* option.

To change your own password:

1. Click *admin>Change Password* in the navigation bar.
   Here, admin is the user name that is used to log in to the administration console of the Privileged Account Manager. This name will change depending on the user name that you define.
2. In the *Old Password* field, specify your current password.
3. In the *New Password* field, specify your new password and confirm it in the *Confirm Password* field.

   Your password must comply with the default *Account Settings* for the Framework, and comply with individual user settings defined by using the *Edit User* option.
4. Click *Ok*.

7 Command Control

The Command Control feature provides UNIX and Linux users with controlled access to privileged commands in a secure manner across the enterprise. Command Control enables the complete lockdown of user privilege by providing rules to determine the commands that are authorized to run, and a powerful account delegation feature that removes the need for common access to the `root` account.

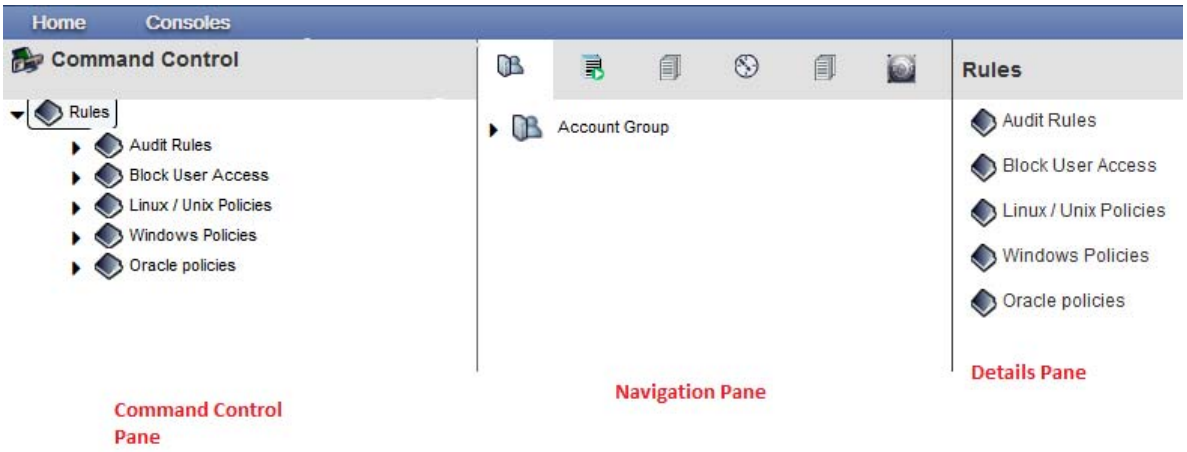
Command Control provides a centralized logging of activity across all platforms, and enables the selective capture of session activity for any user, to the keystroke level, which can be viewed through the Compliance Auditor and reporting features.

Additional features include external scripting that provides the ability to authenticate via third-party security databases or applications, and comprehensive test suite tools that allow the administrator to model and test new rule combinations before committing them to production use.

The Command Control console includes the following:

- **Command Control pane (left pane):** This pane includes the rules and policies. You can create policies and manage those by using this pane.
- **Navigation pane (middle pane):** The navigation pane displays the icons for the following entities:
  - Account Group
  - Commands
  - Scripts
  - Access Time
  - Reports
  - Privileged Credential Vault

  When you select any of the icons the hierarchy of that group is displayed.
- **Details pane (right pane):** The details pane displays the details of whatever you select in the Command Control pane, and the navigation pane. All the required tasks such as, adding, modifying, deleting and so on are performed through the details pane.



This section lists the tasks that you can perform to manage the policies.

- Section 7.1, “How Does Command Control Work?,” on page 85
- Section 7.2, “Integrating Command Control to User Environments,” on page 85
- Section 7.3, “Importing Command Control Configuration Data,” on page 92
- Section 7.4, “Command Control Transactions,” on page 94
- Section 7.5, “Configuring Command Control,” on page 95
- Section 7.6, “Rules,” on page 101
- Section 7.7, “Blocked Users,” on page 109
- Section 7.8, “Command Control Groups,” on page 110
- Section 7.9, “Commands,” on page 118
- Section 7.10, “Scripts,” on page 122
- Section 7.11, “Access Times,” on page 126
- Section 7.12, “Command Control Reports,” on page 129
- Section 7.13, “Privileged Credential Vault,” on page 131
- Section 7.14, “Remote Desktop Protocol Relay,” on page 135
- Section 7.15, “Privileged Access to System Tools or Processes Using Run as privileged user,” on page 136
- Section 7.16, “Secure Shell Relay,” on page 138
- Section 7.17, “Direct Remote Desktop Connection,” on page 140
- Section 7.18, “Credential Provider,” on page 142
- Section 7.19, “Disconnecting a Privileged Session,” on page 143
- Section 7.20, “LDAP Group Lookup,” on page 145
- Section 7.21, “Test Suites,” on page 148
- Section 7.22, “Deploying Command Control,” on page 152

7.1 How Does Command Control Work?

UNIX/Linux commands are passed to the Command Control through scripts, commands, or replacement shells, using the methods described in Section 7.2, “Integrating Command Control to User Environments,” on page 85.

When a command is received, Command Control uses the following to evaluate the command:

- The command is validated against configured rule criteria such as submit user, submit host, run host requested, date/time, and the command name itself.
- Any Perl script associated with the rules are executed, such as setting environment variables.

If the evaluation authorizes the command to run:

- The command is executed on the requested run host unless a matching rule specifies a run host. When a rule specifies a run host, the command is executed on that host. Rule values always overwrite values in the command request.
- The command is executed as the requested run user unless a matching rule specifies a run user. When a rule specifies a run user, the command is executed as that user. Rule values always overwrite values in the command request.

If the evaluation returns unauthorized, the command is not executed and the reason for the failure is returned.

7.2 Integrating Command Control to User Environments

Privileged Account Manager provides a number of shells and functions that are installed as part of the Command Control Agent.

- The pcksh and cpcksh shells, which are based on the Korn shell (ksh)
- The `usrun` command, which provides for command execution as a privileged user.

These shells and functions allow you to integrate Command Control into the UNIX and Linux user environments.

cpcksh is normally used to audit users who do not need any additional privileges. With NetIQ Privileged Account Manager, you can change a user’s login shell to cpcksh (`/usr/bin/cpcksh`), then configure a Command Control rule to authorize cpcksh and enable session capture. When the users log in, the commands are captured and audited through NetIQ Privileged Account Manager. Auditing is transparent to the users, and the users perceive no change.

pcksh is normally used to grant privileges, such as the ability to run commands as `root`. A user logs in as a non-privileged user, then issues a `usrun pcksh` command to access the root ksh shell. Privileged Account Manager can be configured to perform a complete session capture of everything the user does as `root`. In addition, you can configure rules that set up command risks for specific commands. You can also configure rules that prevent the execution of specific commands.

Depending upon the users logging in to your host machines, you can create rules for one or more of the following scenarios:

- Section 7.2.1, “Using usrun with a Command,” on page 86
- Section 7.2.2, “Using Privileged Shell for Privileged Sessions,” on page 88
- Section 7.2.3, “Using cpcksh for Complete Session Capture,” on page 89

- Section 7.2.4, “Using Privileged Shell (pcksh) for Complete Session Control,” on page 91
- Section 7.2.5, “Using Shell Scripts,” on page 92

7.2.1 Using usrun with a Command

Type `usrun` before any command to pass the command to the Command Control Manager for authorization.

The usrun function can be used with the following options:

```
usrun [-b] [-p] [-t] [-x] [-u <user>] [-h <host>] <command>
```

Option	Description
`-b`	Puts the execution of the command into the background.
`-p`	Provides a pipe compatibility option for competitive products. It is only used for a competitive swap-out.
`-t`	Provides a test command option that tests the specified command against the rule structure. A yes or no is printed to the screen, indicating whether the command would be accepted or not.
`-x`	Enables the X11 forwarding option.
`-u <user>`	Specifies the user you want the command to run as, although this can be overwritten by the Command Control rules.
`-h <host>`	Specifies the host you want the command run on, although this can be overwritten by the Command Control rules. For *<host>* you can use either the hostname of the server or the agent name specified in the Hosts console.
<command>	Specifies the command to pass to the Command Control Manager.

For example, to provide administrators access to the `passwd` command so they can change user passwords, you must define a Command Control rule to authorize the `passwd` command for the appropriate administrators.

1. On the home page of the console, click **Command Control**.
2. Add a password command:
   - **2a** Click the **Commands** icon, then click **Add** in the details pane.
   - **2b** Specify command name, then click **Add**.
   - **2c** Select the new command, then click **Modify Command**.
   - **2d** Fill in the following fields:

     Description: Explain the purpose of this command. Specify something similar to the following:

     Allows a user to submit a `usrun passwd` command to change account passwords.

     Commands: Specify the following command.

     `passwd *`
   - **2e** Click **Modify**.

3 Add an Account User Group for the password command:

3a In the navigation pane, click **Account Groups** > **User Group**, then in the details pane, click **Add.**

3b Specify the user group name, then click **Add**.

3c In the details pane, select the user group, then click the Edit icon.

3d Fill in the following fields:

Description: Explain the purpose of this user group. Specify something similar to the following:

Defines the user accounts that can run the `usrun passwd` command to change account passwords.

Users: Specify the usernames of the users on the Linux and UNIX hosts that have the permission to use the `usrun passwd` command.

3e Click **Modify**.

4 Add a rule for the password command:

4a In the Command Control pane, Click **Rules**, then in the details pane, click **Add**.

4b Specify the rule name, then click **Add**.

4c Select the password command that you had created in Step 2 on page 86, then drag and drop it to the password rule that you have created.

4d Select the password user group that you had created in Step 3 on page 87, then drag and drop it to the password rule.

4e Select the password rule, then in the details pane, click **Modify**.

4f Fill in the following fields:

Description: Explain the purpose of this rule and the users it matches. Specify something similar to the following:

Matches users who submit a `usrun passwd` command. It authorizes their session and sets the run user to `root`.

Session Capture: Select **Off**.

Authorize: Select **Yes**, then select **Stop from the drop-down menu**.

Run User: Specify `root`.

4g Click **Modify**.

Repeat this process for each command you want the users to run with the `usrun` command.

7.2.2 Using Privileged Shell for Privileged Sessions

To use the privileged shell (pcksh), the user logs in using a non-privileged account. Then the user uses the `usrun` command to gain privileged shell access to perform administrative functions. The privileged shell performs complete session capture and can optionally audit the actual commands executed for use with Command Risk.

For this scenario, you must enable session capture and define a Command Control rule to authorize `pcksh` for the appropriate users.

1. On the home page of the console, click **Command Control**.
2. Add a pcksh command:
   - **2a** In the navigation pane, click the **Commands** icon, then in the details pane, click **Add**.
   - **2b** Specify a command name, then click **Add**.
   - **2c** Select the new command, then in the details pane click the **Edit <new command name>** icon.
   - **2d** Fill in the following fields:

     Description: Explain the purpose of this command. Specify something similar to the following:

     When a user submits a `usrun pcksh` command or a `usrun shell` command, the command is rewritten to `/usr/bin/pcksh`. The Command Control Audit level is set to 1, which enables an additional level of audit to use with the Command Risk.

     Rewrite: Specify the following:

     ```
     /usr/bin/pcksh -o audit 1
     ```

     Commands: Specify the following commands, each on a separate line.

     ```
     pcksh
     shell
     ```

   - **2e** Click **Modify**.
3. Add an Account User Group for the pcksh shell:
   - **3a** Click **Account Groups** > **User Groups**, then in the details pane, click **Add**.
   - **3b** Specify a user group name, then click **Add**.
   - **3c** In the details pane, select the new user group, then click the Edit <*newUser Group name*> icon that is next to the user group name.
   - **3d** Fill in the following fields:

     Description: Explain the purpose of this user group. Specify something similar to the following:

     Defines the user accounts that can run the `usrun pcksh` command to access root privileges.

     Users: Specify the usernames of the users on the Linux and UNIX hosts that have the permission to use the `usrun pcksh` command.

   - **3e** Click **Modify**.
4. Add a rule for the pcksh command:
   - **4a** Click **Rules**, then in the details pane, click **Add**.
   - **4b** Specify a rule name, then click **Add**.
   - **4c** In the navigation pane, click the Commands icon.

4d Select the pcksh command, then drag and drop it to the pcksh rule.

4e In the navigation pane, click the Account Groups icon.

4f Select the pcksh user group, then drag and drop it to the pcksh rule.

4g Select the pcksh rule, then in the details pane, click **Modify**.

4h Fill in the following fields:

Description: Explain the purpose of this rule and the users it matches. Specify something similar to the following:

Matches users who submit a `usrun pcksh` or `usrun shell` command. It authorizes their session and enables session capture as root. The command assigned to this rule also included a rewrite that enables the additional level of audit to be used in conjunction with the command risk list. For information on this feature, see Section 7.9.4, "Setting the Command Risk," on page 121.

Session Capture: Select **On**.

Authorize: Select **Yes**, then select **Stop from the drop-down menu**.

Run User: Specify `root`.

4i Click **Modify**.

5 (Conditional) If the users need different environment variables to run some of their privileged commands, you can use a script to set up the values.

By default, Command Control uses the environment variables of the executing user. If the users receive a "not found" message for a command, you need add environment variables to the rule. For configuration information, see Section 7.10, "Scripts," on page 122 and "Modify Environment Script" on page 125.

You can also define illegal commands, including built-in shell commands, in a script assigned to the rule. For configuration information, see Section 7.10, "Scripts," on page 122 and "pcksh Illegal Commands Script" on page 126.

7.2.3 Using cpcksh for Complete Session Capture

This method of integration provides the most auditing functionality. By changing the user's shell to the cpcksh client instead of the pcksh client, Command Control can be configured to capture the user's complete session, in addition to all other audit and control features.

When the user logs in to the server, the session is started with the cpcksh client, which executes as a normal Korn shell. A request is sent to the Command Control Manager for authorization. You must define a cpcksh rule that enables session capture, as described in the steps below. Functions and aliases that can replace normal system commands are read from `/etc/profile.pcksh`. When the user issues a command that needs privileges to run, it is executed through the Command Control system.

1 Use the tool provided in the UNIX or Linux environment to set the user login shell to

```
/usr/bin/cpcksh
```

2 Add a cpcksh command:

2a In the navigation pane, click the **Commands** icon > click **Command** > **Add**.

2b Specify a name (for example, `cpcksh shell`), then click **Add**.

2c In the details pane, select the name of the cpcksh command, then click the **Edit *<command name>*** icon.

2d Fill in the following fields:

Description: Explain the purpose of the rule. Specify something similar to the following:

When a user's shell is set to `/usr/bin/cpcksh` and the user logs in, a Command Control request is sent with a submitting command of -cpcksh to indicate login. The user's login shell is rewritten to `/usr/bin/pcksh`. The Command Control Audit level is set to 1, which enables an additional level of audit to use with the Command Risk.

Rewrite: Specify the following:

```
/usr/bin/pcksh -o audit 1
```

Commands: Specify the following:

```
-cpcksh
```

2e Click **Modify**.

3 Add a cpcksh Account User Group:

3a In the navigation pane, click the **Account Groups** icon > **User Group**, then in the details pane, click **Add**.

3b Specify a name, then click **Add**.

3c In the details pane, select the cpcksh user group, then click the **Edit *<user group name>*** icon.

3d Fill in the following fields:

Description: Explain the purpose of this user group. Specify something similar to the following:

Defines the user accounts that can use the cpcksh command.

Users: Specify the usernames of the users on the Linux and UNIX hosts that have the permission to use the `cpcksh` command.

3e Click **Modify**.

4 Add a cpcksh rule:

4a In the Command Control pane, click **Rules**, then in the details pane click **Add**.

4b Specify a name for the rule, then click **Add**.

4c In the navigation pane, click the Commands icon.

4d Select the cpcksh command, then drag and drop it to the cpcksh rule.

4e In the navigation pane, click the Account Groups icon.

4f Select the cpcksh user group, then drag and drop it to the cpcksh rule.

4g In the Command Control pane, select the cpcksh rule, then in the details pane click **Modify**.

4h Fill in the following fields:

Description: Explain the purpose of this rule. Specify something similar to the following:

Authorizes the matching of submit users who have `/usr/bin/cpcksh` as their defined login shell. It authorizes their session and enables session capture, when they are still running as their original login ID.

Session Capture: Select **On**.

Authorize: Select **Yes**, then select **Stop if authorized** from the drop-down menu. These settings allow subsequent commands to be executed without authorization checks whenever the user has had one command authorized.

4i Click **Modify**.

7.2.4 Using Privileged Shell (pcksh) for Complete Session Control

You can change the user's login shell to the pcksh client so that no authorization request is sent when the user logs on. This provides a method of integration that is invisible to the user.

The pcksh client executes as a normal Korn shell. Functions and aliases that replace normal system commands that are read from `/etc/profile.pcksh`. When the user issues a command that needs privileges to run, it is authorized through the Framework.

1. Use the tool provided in the UNIX or Linux environment to set the users' shell to the following:

   `/usr/bin/pcksh`

2. To ensure that configured commands are authorized at the Framework, add the following line to either the user's profile file or to the central `profile.pcksh` file in the `/etc` directory on the appropriate UNIX or Linux servers:

   `set -o remote`

   IMPORTANT: The `set -o remote` option forces all commands that are not built in to the user's shell to be authorized at the Framework. Commands for which a defined rule does not exist are not permitted to execute. To prevent all commands in the `profile.pcksh` file or `.profile file` from being passed to the Framework for authorization, add the `set -o remote` command at the end of the file.

3. (Optional) Set the following additional options in the profile file:

Option	Description
`set -o host <hostname>`	Specifies that all authorized commands are executed on the defined host, if permitted.
`set -o user <username>`	Specifies that all authorized commands are executed as the defined user if permitted.
`set -o audit <n>`	Enables auditing, Set <n> to one of the following values: ◆ **1:** Enables auditing of all commands that are not built into the user's shell. ◆ **2:** Enables auditing of all commands including commands that are built into the user's shell. This level of auditing can affect login times. After the audit value has been set, it cannot be changed. If it is turned on in the profile, the user cannot turn it off later.
`set -o ignoreperm`	Enables commands that have not been successfully authorized at the Framework to execute according to the local permissions in effect on the server where the command was issued.
`set -o test`	Allows typed commands to be checked to see if they would be accepted by the rule structure. A yes or no output to screen indicates the result. The `set -o test` option is normally used in conjunction with the `set -o remote` option.

Option	Description
`set -o test '${}$'`	Returns the complete metadata result that is generated by the Command Control manager.

Rule definitions override the settings for user and host. If a successfully matched rule specifies a run user or a run host, this user or host is used to execute the command, and not those specified in the `set -o` commands.

You can use rule conditions to match the run user or run host to the username or hostname defined by using these commands (see "Setting Conditions for a Rule" on page 105), but if a run user or run host is defined in the rule configuration, these are the ones that are used.

You can define a list of illegal commands, including built-in shell commands, in a script assigned to a rule. Users using the pcksh shell cannot run these commands, even if they are `root`.

7.2.5 Using Shell Scripts

You can hide some of the complexities of the privileged command syntax from the users by using scripts and aliases to wrap privileged tasks. Using this technique, the end user can log in with their non-privileged account and use what appear to be standard commands to perform privileged tasks. Alternatively, you could create a script that provides a menu system to access a set of administrative tasks. With this method, the user would simply select options from the menu to perform their privileged tasks.

Either method requires a shell script that executes under the pcksh shell and performs remote authorization. For example:

```
#!/usr/bin/pcksh
set -o remote
passwd $*
```

This script executes the pcksh client, sets it to use Command Control, and executes the `passwd` command.

7.3 Importing Command Control Configuration Data

You can import a complete command control configuration database, including test suites, using the Import Settings option, or you can import test suites only, using the Import Test Suites option under Test Suites.

If you import a complete command control configuration database, all existing data is overwritten, including test suites. If you import test suites only, they are added to the existing configuration and do not overwrite the existing test suites.

- Section 7.3.1, "Exporting Command Control Settings," on page 92
- Section 7.3.2, "Importing Command Control Settings," on page 93
- Section 7.3.3, "Importing Command Control Samples," on page 93

7.3.1 Exporting Command Control Settings

You can export the Command Control configuration settings to a text file for backup purposes, or for use in another Framework. You use the **Import Settings** option to restore the backed-up configuration settings, or to import the settings into another Framework.

NOTE: NetIQ recommends that you take frequent backups of the Command Control configuration settings.

1. On the home page of the console, click **Command Control**.
2. In the command control pane, click **Command Control**.
3. In the details pane, click **Export Settings**.
4. Use Ctrl+A to select all the Command Control configuration settings, or right-click in the text window and click **Select All**.
5. Use Ctrl+C to copy the settings, or right-click in the text window and click **Copy**.
6. Paste the text into a text document and save it.
7. Click **Close**.

To use a command line option to export Command Control settings, see Section 12.2.1, “Importing and Exporting Command Control Settings,” on page 188.

7.3.2 Importing Command Control Settings

You can use the **Import Settings** option to restore a previously backed-up version of the Command Control configuration settings, or to import Command Control configuration settings from another Framework. You then use the **Export Settings** option to obtain configuration settings so you can paste them into a text document for backup or for use on another Framework.

IMPORTANT: This process overwrites the existing configuration settings.

1. Access the Command Control configuration settings you need and copy the whole configuration.
2. On the home page of the console, click **Command Control**.
3. In the Command Control pane, click **Command control**.
4. In the details pane, click **Import Settings**.
5. Click in the text area, then use Ctrl+V to paste the copied settings, or right-click in the text area and click **Paste**.
6. Click **Finish**.

To use a command line option to import Command Control settings, see Section 12.2.1, “Importing and Exporting Command Control Settings,” on page 188.

7.3.3 Importing Command Control Samples

NetIQ Privileged Account Manager provides a set of sample commands and Perl scripts to assist you with configuring the Command Control rules.

To add these samples to the configuration:

1. On the home page of the console, click **Command Control**.
2. In the command control pane, click **Command Control**.
3. In the details pane, click **Import Samples**.
4. Select the samples you want.

To select multiple samples in a folder, display the samples, then press the Ctrl key and select the required samples one at a time, or press the Shift key and select a consecutive list of samples. You cannot import samples by selecting a folder.

5 Click **Finish**. The samples are added to the appropriate section of the configuration.

7.4 Command Control Transactions

The Command Control database can be protected through the use of the Transactions feature, which automatically locks the database when you start making changes and prevents other Framework users from making any changes. You must then commit the transaction to save the changes and release the lock, and you are prompted by customized questions to provide information that can be viewed in the Compliance Auditor. You can cancel the transaction at any time.

To use this feature, you must first enable it and create a customized Commit Transactions page, then you can use the feature and commit the changes you have made.

- Section 7.4.1, “Enabling Transactions and Configuring Settings,” on page 94
- Section 7.4.2, “Making Command Control Configuration Changes with Transactions Enabled,” on page 95
- Section 7.4.3, “Committing a Transaction,” on page 95

7.4.1 Enabling Transactions and Configuring Settings

You can configure the Command Control Manager to use the Transactions feature when configuring Command Control rules.

You can also configure the Commit Transaction page that can be used for committing a transaction. The data entered on the Commit Transaction page is displayed in Compliance Auditor.

To configure this feature:

1 On the home page of the console, click **Command Control**.

2 In the command control pane, click **Command Control**.

3 In the details pane, click **Transaction Settings**.

4 Select the **Enable Transaction** check box to enable the use of Command Control transactions.

5 Click **Add**.

6 Specify a name for the field that you want to be displayed when a user commits a transaction. For example, to request the user’s name when committing a transaction, specify the value as **Name**.

7 Select **Text** if you want the user to enter one line of text, or select **TextArea** if you want the user to be able to enter several lines of text.

8 Select **required** if you want to force the user to enter text in this field. The **Finish** button on the **Commit Transaction** page does not become available until the user has entered text in this field.

9 Repeat Step 5 through Step 8 for any other fields you want to display when the user commits the transaction.

10 Select **Finish**.

7.4.2 Making Command Control Configuration Changes with Transactions Enabled

1. On the home page of the console, click **Command Control**.
2. Make the configuration changes you want.

   A message appears next to **Command Control** in the navigation pane to indicate that the Command Control database is locked, by whom, and when it was locked.
3. In the command control pane, click **Command Control**, then in the details pane, click **Commit Transaction**.

   Complete the fields as set up on the Transaction Settings page, then click **Finish**.

   Alternatively, if you do not want to keep the changes you have made, select **Cancel Transaction** in the details pane and select **Yes** to confirm. Any changes you have made since the database was locked are removed.

7.4.3 Committing a Transaction

When you have finished changing the Command Control database, you must commit the transaction to save the changes and release the lock on the database. The Commit Transaction page can be customized to request whatever information you require when a transaction is committed (see "Enabling Transactions and Configuring Settings" on page 94 for details).

To commit a transaction:

1. On the home page of the console, click **Command Control**.
2. In the command control pane, click Command Control.
3. In the details pane, click **Commit Transaction**.
4. To create a backup of the Command Control database enable the **Create Backup** checkbox to restore it in future and, then specify a reason for the backup in the text box.
5. Complete the customized fields according to company policies.
6. Click **Finish**.

7.5 Configuring Command Control

Command Control uses rules to protect and control user commands. When configuring a rule, you must set conditions for the rules to determine which rule or rules are processed, for example, on the command submitted or the user who submitted it. You also need to define what processing to do if the rule conditions are matched.

The components that you can define and configure for a rule are as following:

- The rule. For configuration information, see Section 7.6, "Rules," on page 101.
- Account groups, user groups, and host groups, which determine who matches the rule. For configuration information, see Section 7.8, "Command Control Groups," on page 110.
- Commands. For configuration information, see Section 7.9, "Commands," on page 118.
- Privileged Credential Vault. For configuration information, see Section 7.13, "Privileged Credential Vault," on page 131.

- Scripts for additional functionality. For configuration information, see Section 7.10, “Scripts,” on page 122.
- Access time to define specific time interval during which access is denied or granted. For configuration information, see Section 7.11, “Access Times,” on page 126.

NOTE: To enable access to the Command Control console for a Framework user and to control the level of access available, you must add the user to a group with the appropriate roles defined. See Section 6.2.4, “Configuring Roles,” on page 76 for details.

The following additional features are provided to assist you with Command Control configuration and management:

- Section 7.5.1, “Defining Audit Settings,” on page 96
- Section 7.5.2, “Creating Default Objects,” on page 98
- Section 7.5.3, “Backing Up and Restoring,” on page 98
- Section 7.5.4, “Finding a Reference,” on page 98
- Section 7.5.5, “Defining Custom Attributes,” on page 99
- Section 7.5.6, “Functions,” on page 99
- Section 7.5.7, “Adding a Category,” on page 101
- Section 7.5.8, “Deleting a Category,” on page 101

7.5.1 Defining Audit Settings

All Command Control audit records contain the following information:

- Submit details such as, the submitting username, hostname, and primary group.
- Target details such as, the run username and the run hostname.
- Command details, which include the original command requested and the actual command run.
- Authorization status, either yes or no.
- Session capture status, either yes or no.
- Audit ID, which is the unique ID used to group audit events for the user’s session.
- Codeset, which is the character encoding used for localization.
- Terminal details such as tty name, terminal dimensions, and type.

The **Audit Settings** option allows you to modify this default record and add the following:

- Encryption of sensitive password data in keystroke capture reports along with a password that allows authorized Framework administrators to decrypt it.
- Additional options that can be audited for each record.

To define audit settings:

1. On the home page of the console, click **Command Control**.
2. In the command control pane, click **Command Control**.
3. In the details pane, click **Audit Settings**.

4 Configure the Password keystorke settings:

4a Select the **Password filter** check box.

4b In the **Password filter** text box, specify the text that is used to prompt users for their passwords.

For example, if the systems request a user's password by using the word `Password`, specify `Password` in this field. If the systems use `password`, enter `password` in this field. This ensures that the password the user enters in response to this prompt is encrypted in the command control reports.

You can also use regular expressions as a password filter.

For example:

```
=~#([Pp]assword:)|(RDN:)#
```

This password filter would match Password, password, or RDN.

4c Select the **Encryption password** check box.

NOTE: If a filter is set and the **Encryption Password** is not set, then the filtered data is deleted from audit records.

4d In the **Encryption password** text box, specify the password that you require to decrypt the sensitive password data in the report.

This password must be entered on the **Command Control Keystroke Report** page under the Reporting console to decrypt the password data.

4e Specify the password again in the **Confirm password** text box.

5 (Optional) Select the required check boxes under **Metadata Audit Settings** to add more information to the audit record:

Command: Complete information about the command being run, including the actual filename and arguments.

Host: Information about the submitting host

Environment: Complete list of the environment variables that are passed to the executed command.

Local time: The time on the machine that submitted the request.

Cwd: Details about the current working directory where the command was executed.

Options: Details about the various process control options for executing the command.

Run Account: Information about the account that is used to execute the command.

Process: Details about the process that submitted the request.

Jobs: The job control setting that were passed to the executed command.

Passwd: Details of the `/etc/passwd` entry for the user submitting the request.

Groups: The group membership details for the executed command.

Logon: The login time and source for the user submitting the request.

6 Click **Finish**.

7.5.2 Creating Default Objects

When you install Privileged Account Manager, some objects are created by default. These are required for the proper functioning of the policies. If you have upgraded from an earlier release to the latest release, the manager for Privileged Account Manager may not have all the new default objects. You can add those default objects by using the **Create Default Objects** option in the **Command Control** console.

To create default objects, perform the following:

1. On the home page of the administrator console, click **Command Control**.
2. In the left pane click **Command Control**.
3. In the details pane, click **Create Default Objects**.
4. Click **Create**.

7.5.3 Backing Up and Restoring

The backup option allows you to create snapshots of the command control database and restore these snapshots at future date. You can back up and restore from the Framework Manager console, but you need to use the command line to remove a backed-up snapshot. For information about the command line options, see Section 12.2.2, “Backing Up and Restoring a Command Control Configuration,” on page 189.

1. On the home page of the console, click **Command Control**.
2. In the Command Control pane, click **Command Control**.
3. In the details pane, click **Backup and Restore**.
4. To back up the database, specify a reason for the backup, then click **Backup**.
5. To restore a previous version of the database, select the version, then click **Restore**.

   The current version is overwritten by the selected version.
6. Click **Close**.

The following information is recorded for each backed-up version:

Date: The date and time the backup was performed.

Administrator: The user that performed the backup.

Reason: The reason for performing the backup. This is optional information, but recommended.

7.5.4 Finding a Reference

The **Find References** option allows you to find where a specific account group, user group, host group, command, script, or access time is referenced in the database. For example, you could use this option to find out which account group or groups a specific user group belongs to.

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, select the required icon and select the entity for which you want to find references.
3. In the task pane, click the **Find References** icon. The groups or rules in which the entity is referenced are displayed.

4 To go to one of the listed groups or rules, click on **Goto Rule** or **Goto <*entity*>**.

   To modify the rule or groups from the task pane, click **Modify Rule** or **Modify <*entity*>**

7.5.5 Defining Custom Attributes

Custom attributes can be defined for account groups, user groups, host groups, commands, and access times to provide additional parameters for use in scripts. For example, you could set an expiration date as a custom attribute for a user group, check for this date in the script, then expire the user group when the date is reached.

To define custom attributes:

1. On the home page of the console, click **Command Control**.
2. Select the entity you want to add custom attributes to.
3. In the task pane, click the **Define Custom Attributes** icon.
4. Click **Add**.
5. In the **Name** field, specify the name of the custom attribute. For example, `Expiration date`.
6. In the **Value** field, specify the value for the attribute. For example, the date you want the entity to expire.
7. Repeat Step 4 through Step 6 for any other custom attributes you want to add.
8. Click **Finish**.

7.5.6 Functions

The `udsh` command invokes commands on a set of hosts. It concurrently issues a Command Control request for each host that is specified and returns the output from all the hosts, formatted so that command results from all hosts can be managed.

- "Syntax" on page 99
- "Options" on page 99
- "Keywords" on page 100

Syntax

```
udsh [-bcdqv] [-t <timeout>] [-l <user>] [-f <num>] [-w <host>, <host wildcard>] [-
g <hostgrp>, <hostgrp wildcard>] [cmd ...]
```

Options

The following options can be specified only on the command line:

Table 7-1 *udsh Options*

Option	Description
-b	Do not break lines to column width when displaying output.
-c	Do not remove the host from the list if the command fails.
-d	Add a time stamp to the displayed output.

Option	Description
-f <*num*>	Specify the maximum number of concurrent processes to run.
-g <*hostgrp*>, <*hostgrp wildcard*>	Specify the Command Control host groups to retrieve the list of agents to run the command on. Wildcards must be properly escaped. For example to run udsh against all host groups that begin with `ho`, enter the following: `-g ho\*`
-l <*user*>	Specify the user to run the command as.
-q	Quiet. Do not display output.
-t <*timeout*>	Specify the timeout in seconds for the command to complete on each host.
-v	Verbose output.
-w <*host*>, <*host wildcard*>	Specify the agents to run the command on. Wildcards must be properly escaped. For example, to run udsh against all hosts that begin with `host1`, enter the following: `-w host1\*`

If a command is not specified, the user is placed at a command prompt. Each entry run from this prompt is run separately on each host. If readline(3) is available, command line editing and history are provided.

Keywords

There are various macros that can be specified in the command to substitute keywords when the command is run on the remote host. For example, the following command uses the `${rhost}$` keyword. It performs a `usrun echo` command of the remote host name on all agents that have a command control agent deployed:

```
udsh -w \* /bin/echo '${rhost}$'
```

Table 7-2 udsh Keywords

Keyword	Description
${uid}$	Calling user's UID
${gid}$	Calling user's primary group ID
${gecos}$	Calling user's gecos
${home}$	Calling user's home directory
${shell}$	Calling user's shell
${cwd}$	Calling user's current working directory
${lhost}$	Local hostname
${rhost}$	Remote hostname
${pid}$	PID of the individual `udsh` call
${ppid}$	PID of the `udsh`

7.5.7 Adding a Category

You can use the appropriate **Add Category** option for account groups, user groups, host groups, commands, scripts, and access times into categories for ease of use and maintenance.

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the required icon and select the section to which you want to add a category.

   You can also add subcategories to the existing categories.
3. In the task pane, click **Add Category**.
4. Specify a name for the category.
5. Click **Finish**.

7.5.8 Deleting a Category

Before deleting a category, you must delete or move the items and subcategories that it contains.

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, select the category that you want to delete.
3. In the task pane, click **Delete Category**.

7.6 Rules

Rules provide the means by which you can control commands. Commands can be authorized to run, or not authorized to run, by setting rule conditions based on different criteria:

- The command being submitted
- The user and host submitting the command
- The user and host assigned to run the command

- The time the command is submitted
- The contents of Perl scripts you have defined.

See "Setting Conditions for a Rule" on page 105 for details.

If a rule's conditions are met, there are a number of options you can set to determine how the rule processes the command. You can configure a rule to:

- Display a message to the user submitting the command
- Capture the user session for reporting and auditing purposes
- Authorize or not authorize the command to be run
- Specify what further rule processing to do. The rule can specify that the processing of additional rules ends by using the stop conditions (**Stop**, **Stop if authorized**, **Stop if unauthorized**).

  When the Framework Manager receives a command request, the evaluation starts at the top of the rule tree. Even when a request matches a rule, the evaluation continues until a rule has a stop condition or the rule tree has been processed.

You can also:

- Specify the user and host to run the command
- Set a risk level for use with keystroke reports
- Assign an audit group to the rule for use with the Compliance Auditor.

See "Modifying a Rule" on page 103 for details.

You can also create and assign Perl scripts to the rule to provide additional functionality. See "Adding a Script" on page 123 and "Assigning a Script to a Rule" on page 106 for details.

NOTE: If you are using a different user (run user) to run an authorized command than the user who submitted the command (submit user), by default the submit user's environment variables are used for the run user. If you want to use the environment variables associated with the run user, you can add a script to a rule containing the following text:

```
$meta->get_params("Job")->arg("job_default_env",0);
return 1;
```

- Section 7.6.1, "Adding a Rule," on page 103
- Section 7.6.2, "Modifying a Rule," on page 103
- Section 7.6.3, "Viewing Conditions for a Rule," on page 104
- Section 7.6.4, "Setting Conditions for a Rule," on page 105
- Section 7.6.5, "Removing Conditions for a Rule," on page 106
- Section 7.6.6, "Configuring Script Arguments and Entities for a Rule," on page 106
- Section 7.6.7, "Assigning a Script to a Rule," on page 106
- Section 7.6.8, "Removing Script Arguments and Entities," on page 107
- Section 7.6.9, "Removing a Script from a Rule," on page 107
- Section 7.6.10, "Finding a Rule," on page 107
- Section 7.6.11, "Moving a Rule," on page 108
- Section 7.6.12, "Copying a Rule," on page 108
- Section 7.6.13, "Linking a Rule," on page 108

- Section 7.6.14, “Deleting a Rule,” on page 108
- Section 7.6.15, “Viewing Pseudocode,” on page 109

7.6.1 Adding a Rule

1. On the home page of the console, click **Command Control**.
2. In the command control pane, click **Rules**.
3. In the task pane, click **Add** to add a rule at the top level.

   To add a rule as a child of another rule, select the rule and click **Add** in the task pane.
4. Specify a name for the rule.
5. Click **Finish** to add a new rule.
6. Select the rule, then click **Modify Rule** in the task pane.

   For configuration information, see Section 7.6.2, “Modifying a Rule,” on page 103.
7. Move the rule by using the Alt key and drag and drop it to the correct position according to the order in which you want to process the rules. This moves the rule in the same hierarchy.

   When a user specifies a command under Command Control, the following rule processing takes place:

   - The conditions set for the first rule in the hierarchy are checked.
   - If there is a match, the rule is processed. Depending on how the rule is configured, processing of additional rules takes place or stops. If rule processing is not stopped, the next rule for which conditions are checked is the child of this rule. Rule checking and processing continues until it is stopped by a rule, or until all appropriate rules have been processed.
   - If there is no match, the conditions for the next rule at the same hierarchical level as the first rule are checked, and this continues until a match is found. Rule processing then takes place as described above.

   You can change the default order of rule processing on the **Modify Rule** screen, or by using scripts. See “Modifying a Script” on page 123.

7.6.2 Modifying a Rule

1. On the home page of the console, click **Command Control**.
2. In the command control pane, click **Rules**.
3. Select the rule you want to modify.
4. In the details pane, click the edit icon.
5. Modify the following as per your requirement:

   Name: Change the name of the rule.

   Disabled: To disable the rule, select the **Disabled** box. A disabled rule is dimmed.

   Description: Specify a description of the rule.

   User Message: Specify a user message to be displayed to the user when this rule is processed, before any commands are run.

   Session Capture: Select either **On** or **Off**. Setting **Session Capture** to **On** allows the Audit Manager to perform keystroke logging for the rule. To view a captured session from a Command Control report, an Auditing Manager and the Reporting Console must be installed.

Authorize: Select either **Yes** or **No**, depending on whether you want the command protected by the rule to be authorized or not authorized if the rule conditions are met.

Define what happens next by using the drop-down list as follows:

- **Blank:** The next rule in the hierarchy is checked.
- **Stop:** No more rules are checked for the command.
- **Return:** The next rule to be checked is up one level in the hierarchy from the current rule.
- **Stop if authorized:** If **Authorize** is set to **Yes**, no more rules are checked for the command.
- **Stop if unauthorized:** If **Authorize** is set to **No**, no more rules are checked for the command.

Run User: Define a run user by selecting the name of the user you want to run this command (this overrides any username defined through a set command).

Account Domain: Select the appropriate LDAP or SSH account domain from the drop down list.

Credentials: The credential for the selected account domain gets populated. You can also select the required credential from the drop-down list.

Run User: The Run User gets automatically populated with the domain user provided in the account domain.

Run Host: Define a run host by selecting the name of the host on which you want to run this command (this overrides any hostname defined through a set command).

Risk Level: Set a **Risk Level** of 0 to 99. This option allows you to set a value representing the relative risk of a rule with the session auditing option (see Section 7.2, “Integrating Command Control to User Environments,” on page 85). When viewing a Command Control Keystroke Report, you see commands controlled by rules with different risk values represented in different colors.

Audit Group: Define an **Audit Group**. This setting is for use in Compliance Auditor reports.

NOTE: To configure video capturing refer section Section 7.5, “Video Capture for Windows,” on page 146

---

6 Click **Modify**.

7.6.3 Viewing Conditions for a Rule

You can view all the conditions that create a rule. These conditions are created with the help of the entities such as host group, user group and so on. You can view the entity that includes the condition and also modify it if required.

To view the condition perform the following steps:

1 In the Command Control pane, click the required rule.

2 In the details pane, click **View Condition**.

This displays the list of entities that are part of the condition.

3 (Conditional) Click **Locate** to locate the required entity.

This locates and selects the required entity in the middle pane.

4 (Conditional) In the details pane, click the edit icon o modify the fields of the entity.

7.6.4 Setting Conditions for a Rule

You can set a number of conditions for a rule to determine whether the rule is processed or not. For example, you can set a particular command as a condition, and only process the rule if a user enters that command.

There are two ways of setting conditions for a rule:

- Dragging and dropping an entity onto the rule.
- Using the **Edit Condition** option, as described in the steps below.

NOTE: When you drag and drop an entity onto a rule, you might need to edit the condition to ensure that the condition logic is what you want. If you want to use a script in rule conditions, you must set it to Conditional first (see "Modifying a Script" on page 123).

To set conditions by using the **Edit Condition** option:

1. On the home page of the console, click **Command Control**.
2. In the Command Control pane, click **Rules**.
3. Select the rule for which you want to set conditions.
4. In the details pane, select the currently defined condition then click **Edit Condition**.

   If you have not yet defined a condition, select **Match All**
5. In the **Add Condition** drop-down list, select the type of condition you want.
6. Set the condition to the value and logic you want. For example, if you set a condition to match a run user to a user group:

   6a Change **user** (submit user) to **run user**.

   6b Leave the logic setting as **IN**.

   6c Select the user group you require from the user group drop-down list.
7. Repeat Step 5 and Step 6 for any other conditions you want. Set the condition logic as necessary.

   You can use parentheses to group conditions according to the necessary logic by selecting the parentheses ( ) entry from the **Add Condition** drop-down list. The opening and closing parentheses are displayed.

   7a Select the opening parenthesis.

   7b Select the condition type you want to place inside the parentheses and set it as necessary.

   7c Select the opening parenthesis again.

   7d Select another condition type to place inside the parentheses and set it as necessary.

   7e If necessary, change OR to AND.

   7f Repeat Step 7d through Step 7f for any other conditions you require inside this set of parentheses. You can also place parentheses within parentheses.
8. Click **Finish**.

7.6.5 Removing Conditions for a Rule

You can remove all the conditions for a rule, or you can remove individual conditions.

1. On the home page of the console, click **Command Control**.
2. In the Command Control pane, click **Rules**.
3. Use the arrow to display all the rules and select the rule for which you want to remove conditions.
4. In the task pane, select the currently defined condition.
5. To remove all conditions, click **Remove Condition** in the task pane, then click **OK** to remove the condition.

   The rule condition is displayed as **Match All.**
6. To remove individual conditions, click **Edit Condition** in the task pane, click the delete icon against the condition to remove the condition, then click **Finish**.

7.6.6 Configuring Script Arguments and Entities for a Rule

You can configure script arguments and entities for the scripts assigned to a rule before or after assigning the scripts. You can define only one set of arguments and entities, which applies to all scripts assigned to a rule.

1. On the home page of the console, click **Command Control**.
2. In the Command Control pane, click **Rules**.
3. Select the rule for which you want to add script arguments.
4. In the task pane, click **Script Arguments**.
5. Click **Add**.
6. In the **Name** field, specify a name for the argument.
7. In the **Value** field, specify a value for the argument.
8. To add more arguments, repeat Step 5 through Step 7.
9. When you finish adding arguments, click **Finish**, or continue with Step 10 to add script entities.
10. Click the arrow under **Add Script Entity** to display the list of available entities, then select the type of entity you want.

    A drop-down list of entities is displayed in the **Script Entities** table.
11. Select the entity you want from the drop-down list.
12. To add more entities, repeat Step 10 and Step 11.
13. Click **Finish**.

7.6.7 Assigning a Script to a Rule

You can use Perl scripts to provide additional, customized functionality to the rules (see "Adding a Script" on page 123). To assign a script to a rule, use drag and drop as described in the following procedure.

NOTE: If you drag and drop a script that has been set to Conditional, the script is added to the rule conditions.

1. On the home page of the console, click **Command Control**.
2. In the Command control pane, click **Rules**.
3. Click the arrow to display the list of rules.
4. In the navigation pane, click the **Scripts** icon.
5. Select the script you want to assign to the rule.
6. Drag and drop the selected script to the rule.
7. Configure script arguments and entities for the scripts if necessary. For more information, see "Configuring Script Arguments and Entities for a Rule" on page 106.

7.6.8 Removing Script Arguments and Entities

1. To remove a script argument, select the argument, then click **Remove**.
2. To remove a script entity, select the icon next to the name of the entity, then click **Remove**.

7.6.9 Removing a Script from a Rule

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Rules**.
3. Use the arrow to display the list of rules, then select the rule from which you want to remove a script.
4. In the details pane, select the required script.
5. Click **Remove Script**.
6. Click **OK** to confirm the removal. The scripts are removed from the rule.

7.6.10 Finding a Rule

1. On the home page of the console, click **Command Control**.
2. In the Command Control pane, click **Rules**.
3. In the details pane, click the Find Rule icon to find a rule from the entire list of rules.

   or

   Select the parent rule, then in the details pane click the Find Rule icon.
4. In the **Rule Filter** field, specify the name of the rule you are looking for, then click **Find**.

   You can use wildcard characters "*" and "?". This field is case sensitive.

   NOTE: Some special characters, such as "[" and "]", might not work in this field. For example, if you search for *first rule [linked rule]*, you might get an error message. In such case, replace "[" and "]" with "*" or "?".
5. When the name of the rule is displayed, you can modify the rule by using **Modify Rule** and if you want to view the rule in the Command Control pane, click **Goto Rule**. Click **Close** to return to the Command Control pane without a rule selected.

7.6.11 Moving a Rule

1. On the home page of the console, click **Command Control**.
2. In the Command Control pane, click **Rules**.
3. Select the rule you want to move.
4. Press the Alt key then drag and drop the selected rule to the location in the same hierarchy. If you require to move a rule to a child hierarchy then drag and drop the rule to the required location.

7.6.12 Copying a Rule

You can create a copy of an existing rule in the rule hierarchy, so you can use the same rule in more than one place in the hierarchy, or so you can create a new rule based on the existing rule.

NOTE: If you want to use the same rule in more than one place and you want any changes you make to the rule to be reflected in the other copy or copies, you should link the rule instead. See "Linking a Rule" on page 108 for details.

---

1. On the home page of the console, click **Command Control**.
2. In the Command Control pane, click **Rules**.
3. Select the rule you want to copy.
4. To create the copy, press the Ctrl key and drag and drop the selected rule to the desired location
5. (Optional) Use the **Modify Rule** option to rename or modify the copy.
6. Move the rule to the correct position according to the order in which you want to process the rules. See "Adding a Rule" on page 103 for details.

7.6.13 Linking a Rule

If you want a specific rule to be used in different places in the hierarchy of rules, you can create a linked rule. Any changes you make to the linked rule are reflected in all the instances of the rule in the hierarchy. If you simply copy the rule, any changes made to the original rule or to one of its copies are not reflected in the other copies.

Changes to sub-rules of a linked rule are not linked. For example if you add or modify a rule under a linked rule, the change is not reflected in other instances of the linked rule.

1. On the home page of the console, click **Command Control**.
2. In the Command Control pane, click **Rules**.
3. Select the rule to link.
4. To create the links, press the Ctrl key and the Shift key at the same time, then drag and drop the selected rule to the location you want.

   A linked rule is displayed with an arrow .

7.6.14 Deleting a Rule

1. On the home page of the console, click **Command Control**.
2. In the Command Console pane, click **Rules**.

3 Select the rule you want to delete.

4 In the details pane, click **Delete**.

5 Click **Delete** to delete the rule and all rule children.

7.6.15 Viewing Pseudocode

The pseudocode for a rule provides a simplified representation of the actual code that is processed when the rule is activated. For complex rules, this can assist you with understanding what happens in different situations.

To view the pseudocode for a rule:

1 On the home page of the console, click **Command Control**.

2 In the Command Control pane, click **Rules**.

3 Select the rule for which you want to view the pseudocode.

4 In the details pane, click **Pseudocode**.

You can copy the pseudocode by using Ctrl+A or Ctrl+C, then paste it into a document for printing.

5 Click **Close**.

7.7 Blocked Users

The Blocked Users list displays all the users who are blocked from accessing any privileged account session. This group includes the list of users who are blocked from accessing any server. The users are either added automatically when you block the session during a manual/ automatic disconnect**,** or added manually when you block a user by adding the user to the **Blocked Users** list.

To add a user to the blocked user group refer, "Adding Users in Blocked Users Group" on page 109. If you do not want a particular user in the blocked list then you can delete the user from the list. To delete a user from the group refer, "Deleting Users in Blocked User Group" on page 109.

7.7.1 Adding Users in Blocked Users Group

1 In the navigation pane of the Command control console click the User Groups icon > **Blocked Users**.

2 In the details pane, click **Add** then specify the user.

IMPORTANT: The User Name must be provided in capital letters for the following type of users:

- Windows users for direct RDP
- LDAP users who are part of the authentication domain.

---

3 Click **Finish**.

7.7.2 Deleting Users in Blocked User Group

1 In the navigation pane of the Command control console click the User Groups icon > **Blocked Users**.

2 In the details pane, select the user that you require to remove from the blocked user list, then click the delete icon.

7.8 Command Control Groups

Command Control has three types of groups:

User Groups: Contain users with similar responsibilities. This allows you to use the group as a condition for a rule, which either allows or denies the users the rights to run commands.

Host Groups: Contains hosts with similar content. This allows you to use the group as a condition for a rule that either allows or denies the rights to run the command on a host.

Account Groups: Combine host groups and user groups to be used together in setting rule conditions. Account groups can also contain other account groups. You can also use account groups as script entities.

For example, you could create a Web Account Group, and to this group you could add a user group that contains all the Web server managers and a host group that contains all the host that are Web servers. You could then use the Web Account Group as a condition when creating rules for Web server management.

The following sections explain how to manage these groups:

- Section 7.8.1, “User Groups,” on page 110
- Section 7.8.2, “Host Groups,” on page 112
- Section 7.8.3, “Adding an Account Group,” on page 113
- Section 7.8.4, “Modifying an Account Group,” on page 114
- Section 7.8.5, “Deleting an Account Group,” on page 114
- Section 7.8.6, “Copying a Group,” on page 115
- Section 7.8.7, “Moving a Group,” on page 115
- Section 7.8.8, “Finding a Group,” on page 115
- Section 7.8.9, “Enhanced Access Control,” on page 115

7.8.1 User Groups

User groups contain users who are allowed, or not allowed, to submit or run commands controlled by the rules that you specify. You can add user groups to the specified rule conditions to control whether the rule is processed, depending on the user who is submitting a command or the user who is specified to run a command. You can also use user groups as script entities.

Command Control has the default user groups, **Everyone** and **Submit User**. Do not modify these groups.

Everyone: Use this group to match against any user who has a local account on the hosts where Privileged Account Manager is installed.

Submit User: Use this group to match against the user that submitted the privileged request. This is useful if you want to ensure that a rule only authorizes access to the account that submitted the request. For example when adding a cpcksh login shell, you should add a clause to the rule that ensures that the run user is in the Submit User group. This ensures that a user cannot use the `-u` option in `usrun` to gain access to other accounts.

You can search for a specific user in a user group by using suitable regular expressions, strings, or wild cards in the command. For example, the wildcards that you can use in the command could be `vi *` or `/usr/bin/vi *`.

To add a regular expression term to the list, prefix the regular expression with =~. For example,

```
=~/^vi .*$/
```

```
=~/^user*/
```

Command Control also includes a user group that is used for adding or deleting the users in the blocked list.

IMPORTANT: The User Name for Windows user must be provided in capital letters.

Managing the User Groups

The following sections explain how to manage user groups:

- "Adding a User Group" on page 111
- "Modifying a User Group" on page 111
- "Deleting a User Group" on page 112

Adding a User Group

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the **Account Groups** icon.
3. Click **User Groups**.
4. In the details pane, click **Add** to add a user group to root level. To add the user group for a category, select the category then click **Add**.
5. Specify a name for the user group.
6. Click **Add**.

   User groups are represented by the group icon.
7. To configure the user group, continue with "Modifying a User Group" on page 111.

Modifying a User Group

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Account Groups**, then click **User Groups**.
3. In the details pane, select the user group you want to modify, then click the edit icon next to the user group name.
4. Configure the following fields:

   Name: Specify a name for the group.

   Disabled: Select this check box to disable the group. A disabled user group is dimmed.

   Description: Describe the purpose of this user group.

   Manager Name, Manager Tel., Manager Email: Specify the name, telephone number, and e-mail address of the manager of this user group. The manager details can be used in the Compliance Auditor.

   If these details have been entered in the manager's Framework user account details (see "Modify User: Account Details" on page 68), they can be entered automatically by selecting the manager's username from the drop-down list. This option is only available if you belong to a Framework user group with the read role defined for the auth module (see Section 6.2.4, "Configuring Roles," on page 76).

Users: Add or change the users you want to include in this group. You can type the user names, one on each line, or paste them from elsewhere. You can use the **Sort** button to sort the list of users into alphabetical order. For Windows users, specify the user name in capital letters.

User Groups: From the list of groups you have already defined, select the user groups you want to include as subgroups of this user group. You can also add subgroups to a user group by dragging and dropping the groups to the target user group in the navigation pane.

5 Click **Modify**.

You can now use this user group in rule conditions or as a script entity.

Deleting a User Group

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click **Account Groups**, then click **User Groups**.

3 In the details pane, select the required user group and click the delete icon next to the user group name.

To delete multiple user groups, click **Delete Multiple** then select the user groups from the list to delete.

4 Click **Delete** to delete the selected user groups.

7.8.2 Host Groups

Host groups contain hosts that are allowed, or not allowed, to submit or run commands that the rules control. You can add host groups to the rule conditions to control whether the rule is processed, depending on the host that is submitting a command or the host specified to run a command. You can also use host groups as script entities.

Command Control has two default host groups. Do not modify these groups.

All Hosts: Use this group to match against any host that have been registered with the Framework. Use the Hosts console to view the hosts that are included has matches for this group.

Submit Host: Use this group to match against the host from which the privileged request was made. This is useful if you want to ensure that a rule only authorizes access to the host from which the privileged request was made. This ensures that a user cannot use the `-h` option in `usrun` to gain access to other hosts.

You can search for a specific host in a host group by using suitable regular expressions, strings, or wild cards in the command. For example, the wildcards that you can use in the command could be `vi *` or `/usr/bin/vi *`.

To add a regular expression term to the list, prefix the regular expression with =~. For example,

```
=~/^vi .*$/
```

```
=~\w+\.netiq\.com
```

The following sections explain how to manage host groups:

- “Adding a Host Group” on page 113
- “Modifying a Host Group” on page 113
- “Deleting a Host Group” on page 113

Adding a Host Group

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Account Groups**, then click **Host Groups**.
3. In the details pane, click **Add**. To add a host group to a category, select the category and click **Add**.
4. Specify a name for the host group.
5. Click **Add**.

   Host groups are represented by the icon.
6. To configure the host group, refer "Modifying a Host Group" on page 113.

Modifying a Host Group

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Account Groups**, then click **Host Groups**.
3. In the details pane, select the host group you want to modify, then click the edit icon next to the host group name.
4. Configure the following fields:

   Name: Specify a name for the group.

   Disabled: Select this check box to disable the group. A disabled host group is dimmed.

   Description: Describe the purpose of this host group.

   Hosts: Add or change the hosts you want to include in this group. You can type the host names, one on each line, or paste them from elsewhere. You can use the **Sort** button to sort the list of hosts into alphabetical order.

   Host Groups: From the list of groups you have already defined, select the host groups you want to include as subgroups of this host group. You can also add subgroups to a host group by dragging and dropping the groups to the host group in the navigation pane.
5. Click **Modify**. You can use this host group in rule conditions or as a script entity.

Deleting a Host Group

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Account Groups**, then click **Host Groups**.
3. In the details pane, select the host group you want to delete, then click the delete icon next to the host group name.

   To select multiple host groups, click **Delete Multiple** and select the host groups from the list.
4. Click **Delete.** The selected host groups are deleted and are also removed from any account group, rule conditions, and script entities in which they have been defined.

7.8.3 Adding an Account Group

To add a new account group:

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Account Groups**.

3 In the details pane, click **Add**. To add an account group to a category, select the category, then click **Add**.

For information about categories, refer Section 7.5.7, “Adding a Category,” on page 101.

4 Specify a name for the account group.

5 Click **Add**.

Account groups are represented by the icon.

6 To configure the group, continue with “Modifying an Account Group” on page 114.

7.8.4 Modifying an Account Group

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click **Account Groups**.

3 In the details pane, select the account group you want to modify and click the edit icon next to the account group name.

4 Modify the following fields:

Name: Change the name of the group.

Disabled: To disable the account group, click **Disabled**. A disabled account group is dimmed.

Description: Add or change the description.

Manager Name, Manager Tel., Manager Email: Specify the name, phone number, and e-mail address of the manager of the users in this account group.

If these details have been entered in the manager’s Framework user account details (see “Modify User: Account Details” on page 68), they can be entered automatically by selecting the manager’s username from the drop-down list. This option is only available if you belong to a Framework user group with the read role defined for the auth module (see Section 6.2.4, “Configuring Roles,” on page 76).

The manager details can be used in the Compliance Auditor.

User Groups, Host Groups, Account Groups: From the lists of groups you have already defined, select or remove the user groups, host groups, and account groups. You can also add groups to an account group by dragging and dropping the groups to the target account group in the navigation pane.

5 Click **Modify**. You can now use this account group in rule conditions or as a script entity.

7.8.5 Deleting an Account Group

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click **Account Groups**.

3 In the details pane, select the account group that you want to delete and click the delete icon next to the account group name.

To select multiple account groups, click the top level account group and click **Delete Multiple**.

4 Click **Delete**. The selected account groups are deleted and are also removed from any other account groups, rule conditions, and script entities where they have been defined.

7.8.6 Copying a Group

1. On the home page of the console, click **Command Control**.
2. Click the category of the group that you are copying such as **Account Groups**, **Host Groups**, or **User Groups**.
3. Select the group you want to copy.
4. To create the copy, press the Ctrl key and drag and drop the selected group to the desired location.

7.8.7 Moving a Group

1. On the home page of the console, click **Command Control**.
2. Click the category of the group you are copying such as **Account Groups**, **Host Groups**, or **User Groups**.
3. Select the group you want to move.
4. Drag and drop the selected group to the desired location.

You can also drag and drop account groups, user groups, and host groups into an account group. This does not delete the groups from their original location.

7.8.8 Finding a Group

1. On the home page of the console, click Accounts Group icon and select **Account Groups** in the middle pane.
2. In the details pane click **Find**.
3. In the **Account Group Filter** field type the required group name.

   For finding user groups or host groups, click **User Groups** or **Host Groups** in the middle pane, then click **Find** in the details pane.

7.8.9 Enhanced Access Control

Command Control policies give you additional options to control the execution of commands. For example, you can use a policy to restrict the rights and roles of a command so that the command works only for one particular directory, file, network address, or system call.

- "Configuring a Command Control Policy" on page 115
- "Configuring a Path Policy" on page 116

Configuring a Command Control Policy

A command control policy is defined by using the policy script arguments. A policy script argument specifies the access rights of the applications based on the path, network, and capability.

1. On the home page of the console, click **Command Control**.
2. From the **Command Control Sample Scripts**, add the **Enhanced Access Control Policy** script.
3. Drag and drop the **Enhanced Access Control Policy** script from **Scripts** to **Authorizing Rule**.

4 Click the **Authorizing Rule** and access the **Script Arguments**.

5 Create a script argument with a name *policy* and add that policy to the **Value** field.

Configuring a Path Policy

A Path policy is a type of command control policy that restricts an application from accessing a specific directory based on the path.

The syntax of a Path policy is as follows:

`path [owner] <path> <capability:capability:!capability>`

owner specifies the file or directory ownership that should match with the current user ID.

path specifies a particular directory based on the path. Replace *path* with any of the following options:

Table 7-3 *Path Options*

Option	Description
/dir/file	Specifies the file that the application can access in the */dir/*directory.
/dir/	Specifies the directory that the application can access.
*/dir/f**	Specifies a file that begins with `f` in the `/dir/`directory that the application can access.
*/dir/**	Specifies that the application can access all the files in the */dir/* directory.
*/dir/***	Specifies that the application can access all the files and the subdirectories within the */dir/*directory.
*/dir/**/*	Specifies that the application can access all subdirectories that are recursively searched for in the */dir/*directory.
*/dir/**/**	Specifies that the application can access all the files that are recursively searched for in any subdirectory within the */dir/*directory.

capability specifies the rights of the application. You can use the `!` symbol in the syntax to denote a logical *not*. For example, `all:!write` grants all the rights except the *write* role.

Replace *capability* with any of the following options:

Table 7-4 *Capability Options*

Option	Description
`privperms`	Enables the application with the `read`, `write`, and `ownership` permissions for the specified directory or file. The `privperms` command limits two areas of functionality: 1. Using the `chmod` command to set a file to setuid or setgid. 2. Using the `chown` or `chgrp` command to change the ownership of a file.

Option	Description
`perms`	Enables the application to assign the permissions of a specified directory or file.
`read`	Enables the application to assign the `read` permission for a specified directory or file.
`write`	Gives the application the `create` and `write` permissions for the specified directory or file.
`unlink`	Gives the application the `deletion` rights for the specified directory or file.
`mknod`	Enables the application to create system files in the specified directory.
`exec`	Enables the application to execute the shared files and files for which the application does not have `read` and `write` permission.
`unsafe`	Enables the application to execute any file that does not inherit the policy.
`link`	Enables the application to create a symbolic link or hard link to another file.
`log[=<0-9>]`	Enables the application to audit system calls, with an optional risk value of `0-9`.
`all`	Enables the application to have all permissions.

You can use wildcards, regular expressions, and strings in the Path policy. For example, using the word `default` in the following example specifies the default policy.

```
path default all:log
path /opt/oracle/private/** !all:log=9
```

When administering EAC policy, do not restrict the following permissions to the listed folders:

Read / Write Permission	Read Permission
`/tmp/`	`/etc/resolv.conf`
`/dev/zero`	`/etc/hosts`
`/dev/null`	`/etc/passwd`
`/dev/tty`	`/etc/groups`
`/devices/**`	`/dev/random`
`/proc/<pid>/**`	`/dev/urandom`
`/tmp/**`	`/etc/utmp`
`/var/tmp/**`	`/etc/utmpx`
	`/usr/share/**`
	`/usr/lib/**`
	`/lib/**`
	`/usr/lib64/**`
	`/lib64/**`

NOTE: `Solaris 9/sbin/sh` is a static binary and therefore cannot enforce EAC.

7.9 Commands

Command definitions contain the commands you want to control. A command definition can contain a single command, or several commands that you want to control in the same way. You can also specify a command that you want to run in place of a submitted command.

- Section 7.9.1, “Finding a Command,” on page 118
- Section 7.9.2, “Adding a Command,” on page 118
- Section 7.9.3, “Modifying a Command,” on page 119
- Section 7.9.4, “Setting the Command Risk,” on page 121
- Section 7.9.5, “Removing a Command Risk,” on page 121
- Section 7.9.6, “Copying a Command,” on page 121
- Section 7.9.7, “Moving a Command,” on page 122
- Section 7.9.8, “Deleting a Command,” on page 122
- Section 7.9.9, “Importing Sample Commands,” on page 122

7.9.1 Finding a Command

1. On the home page of the console click **Command Control**.
2. In the navigation pane, select Commands icon and select **Command**.
3. In the details pane, select **Find**.
4. In the find filter, type the required name.

   As you type, the search displays the results. When you click on the required name, that command gets selected in the middle pane. If you require to modify that command you can modify it from the details pane.

7.9.2 Adding a Command

You can add command definitions to your rule conditions to control whether the rule is processed, depending on the command that is submitted by the user. You can also use commands as script entities.

To add a new command:

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Commands**.
3. In the details pane, click **Add** in the task pane. To add a command to a category, select the category and click **Add**.
4. Specify a name for the command. This can be different from the name of the actual command you want to control.
5. Click **Add**.
6. To configure the command, continue with Section 7.9.3, “Modifying a Command,” on page 119.

7.9.3 Modifying a Command

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Commands**.
3. In the details pane, select the command you want to modify and click on the edit icon next to it.
4. Configure the following fields:

   Name: Specify a different name for the command.

   Disabled: Select this check box to disable the command. A disabled command is dimmed.

   Description: Describe the purpose of this command.

   Rewrite: In the **Rewrite** field, define a command to be used in place of the commands listed in the **Command** field. You can also enter command arguments. Positional parameters can be used, as described in "Using the Command Rewrite Functionality for Command Arguments" on page 119. To use the **Rewrite** field to enable auditing of the command, see "Configuring Auditing with the Rewrite Functionality" on page 120

   Commands: Define one or more commands, one on each line. You can also enter command arguments. For example:

   ```
   vi *
   /usr/bin/vi *
   ```

   To add a regular expression term to the list, prefix the regular expression with =~. For example,

   ```
   =~/^vi .*$/
   ```

   ```
   =~#/usr/bin/vi .*#
   ```

   You can copy and paste a list of commands from elsewhere. You can use the **Sort** button to sort the commands into alphabetical order.

   Sub Commands: From the list of command definitions you have already created, select the subcommands you want to include in this command definition. You can also add subcommands to a command definition by dragging and dropping them to the command definition in the navigation pane.
5. Click **Finish**.

- "Using the Command Rewrite Functionality for Command Arguments" on page 119
- "Configuring Auditing with the Rewrite Functionality" on page 120

Using the Command Rewrite Functionality for Command Arguments

The following table provides examples showing how the command rewrite functionality provided on the Modify Command page can be used with positional parameters to replace the submitted command and parameters. The examples use the `echo` command as the rewritten command to display the selected parameters on the screen.

Table 7-5 *Command Rewrite Examples*

Function	Rewrite	Submitted Command	Executed Command
Insert all arguments ($0 is not displayed)	`echo $*`	`ls passwd shadow fstab`	`echo passwd shadow fstab`
Insert argument 'r;n'	`echo $3`	`ls passwd shadow fstab`	`echo fstab`

Function	Rewrite	Submitted Command	Executed Command
Insert all but argument 'n' ($0 is not displayed)	`echo ${^2}`	`ls passwd shadow fstab`	`echo passwd fstab`
Insert arguments from 'n' to end	`echo ${2-}`	`ls passwd shadow fstab`	`echo shadow fstab`
Insert arguments from 0 to 'n'	`echo ${-2}`	`ls passwd shadow fstab`	`echo ls passwd shadow`
Insert arguments from 'm' to 'n'	`echo ${1-2}`	`ls passwd shadow fstab`	`echo passwd shadow`
Insert the total number of arguments	`echo $#`	`ls passwd shadow fstab`	`echo 3`
Insert contents of argument $#	`echo ${$#}`	`ls passwd shadow fstab`	`echo fstab`

Rewrite Example Using ufsdump

In this example, the administrator usually does a backup of the system by using the following command:

```
ufsdump -0f /dev/rmt/0 /usr
```

Assume that new tape drive is installed on the host, and it must be used for the backup. In addition, the administrator must make sure that it is working correctly by using the -v flag to verify the tape.

You can ensure that the administrator doesn't need to remember the changes by using the **Rewrite** field to create a command definition for the original command:

```
$0 -v $1 /dev/rmt/1 ${$#}
```

When the administrator enters the original command, the following command runs instead:

```
ufsdump -v -0f /dev/rmt/1 /usr
```

Configuring Auditing with the Rewrite Functionality

To enable auditing of the command, add the following to the **Rewrite** field:

`-o audit <n>`

Replace <*n*> with one of the following values:

- **0:** Disables auditing. It has the same effect as removing the audit setting from the **Rewrite** field.
- **1:** Enables auditing of all commands that are not built into the user's shell.
- **2:** Enables auditing of all commands, including commands that are built into the user's shell. This level of auditing can affect login times.

7.9.4 Setting the Command Risk

This option allows you to set a value representing the relative risk of a command when using the pcksh or cpcksh clients with the session auditing option (see Section 7.2, “Integrating Command Control to User Environments,” on page 85). When you view a Command Control Keystroke Report, the commands with different risk values are represented in different colors.

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the **Commands** icon.
3. In the details pane, click **Command Risk**.
4. Click **Add**.
5. Set a value for the command risk.
6. Specify the command you want to set a risk value for, or the regular expression. You can use wildcard symbols.
7. If you want to base the risk level on the directory in which the command is running, define a working directory.
8. If you want to base the risk level on who is running the command, define a user.
9. If you want to base the risk level on the host where the command is running, define a host.
10. If you want to disconnect any particular user using a particular command, specify the user in the **Submit User** field.

    Ensure that the user name is typed in capital letters for the following users:

    - Windows users for Direct RDP
    - LDAP users who are part of the authentication domain
11. If you want to disconnect the user when the specified command is executed, specify 1 in the **Auto Disconnect** field.

    If you want to refrain the user from starting the session again after it was disconnected, specify 1 in the **Auto Block** field.
12. If you want to change the order in which the commands are listed, use the arrow buttons.
13. Click **Finish**.

7.9.5 Removing a Command Risk

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the **Commands icon**.
3. In the details pane, click **Command Risk**.
4. Select the entry, then click **Remove**.

7.9.6 Copying a Command

1. On the home page of the console, click **Command Control** on the home page of the console.
2. In the navigation pane, click the **Commands** icon.
3. Select the command you want to copy.

To select multiple commands in the same category, press the Ctrl key and select the required commands one at a time, or press the Shift key to select a consecutive list of commands.

4 To create the copy, press the Ctrl key and drag and drop the selected command to the desired location

7.9.7 Moving a Command

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click **Commands**.

3 Select the command you want to move.

4 Drag and drop the selected command to the desired location.

7.9.8 Deleting a Command

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click **Commands**.

3 In the details pane, select the command you want to delete and click the delete icon next to it.

To select multiple commands in the same category, click **Delete Multiple** and select the required commands.

4 Click **Delete**. The selected commands are deleted and are also removed from any rule conditions and script entities in which they are defined.

7.9.9 Importing Sample Commands

Privileged Account Manager ships with the following types of sample commands that you can import and use or import and modify to fit your needs:

- Shell commands (`ksh, sh, csh, bash`)
- vi commands
- System commands (`kill, mount, passwd, date, mkdir, useradd, chgrp, chown`)
- User commands (`env, ls, id, cat uname`)

To import these sample commands, click `Command Control` > `Import Samples` > `Sample commands`.

7.10 Scripts

You can use Perl scripts to provide additional, customized functionality to your rules. You can also use scripts in rule conditions. Privileged Account Manager contains the embedded Perl interpreter version 5.8.9. You can use any of the core Perl modules for your script. It is not recommended that you install any CPAN Perl modules into the embedded Perl interpreter. If you create a script, be aware that any time consuming tasks within the script affect response times.

- Section 7.10.1, “Finding a Script,” on page 123
- Section 7.10.2, “Adding a Script,” on page 123
- Section 7.10.3, “Modifying a Script,” on page 123
- Section 7.10.4, “Copying a Script,” on page 124
- Section 7.10.5, “Moving a Script,” on page 124

- Section 7.10.6, “Deleting a Script,” on page 124
- Section 7.10.7, “Sample Scripts,” on page 124

7.10.1 Finding a Script

1. On the home page of the console click Command Control
2. In the navigation pane, select Scripts icon and in the details pane select Scripts.
3. In the details pane, select Find.
4. In the filter type the required name.

   As you type, the search displays the results. When you click on the required name, that script gets selected in the middle pane. If you require to modify that script you can modify it from the details pane.

7.10.2 Adding a Script

You can add your own custom attributes for account groups, user groups, host groups, commands, and access times to provide additional parameters for use in your scripts. See “Defining Custom Attributes” on page 99 for details.

To add a new script:

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the **Scripts** icon.
3. In the details pane, click **Add**. To add a script to a category, select the category and click **Add**.
4. Specify a name for the script.
5. Click **Add**.
6. To configure the script, continue with Section 7.10.3, “Modifying a Script,” on page 123.

7.10.3 Modifying a Script

1. On the home page of the console, click **Command Control** on the home page of the console.
2. In the navigation pane, click the **Scripts** icon.
3. Select the script you want to modify.
4. In the details pane, click the edit icon next to the script.
5. Configure the following fields:

   Name: Specify a different name for the script.

   Conditional script: Select the check box to set the script to be conditional. Scripts defined as conditional can be used in rule conditions. The return codes are limited to 1 for true and 0 for false.

   Disabled: Select the check box to disable the script. A disabled script is dimmed.

   Description: Describe the purpose of the script.

   Script: Specify the text of your script in the text box by typing it or by pasting it from elsewhere. The possible return codes you can use in your script for processing by the Command Control software are shown below this field.

   For some sample scripts, see Section 7.10.7, “Sample Scripts,” on page 124.

6 Click **Modify**.

You can assign the script to a rule, or you can specify it in rule conditions if you have set the script to be conditional.

7.10.4 Copying a Script

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click **Scripts**.

3 Select the script you want to copy.

4 To create the copy, press the Ctrl key and drag and drop the selected script to the desired location.

5 If necessary, use the **Modify Script** option to rename or modify the copy. For details, see "Modifying a Script" on page 123.

7.10.5 Moving a Script

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click **Scripts**.

3 Select the script you want to move.

4 Drag and drop the selected script to the desired location.

7.10.6 Deleting a Script

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click.

3 Select the script you want to delete.

To delete multiple scripts click **Delete Multiple** and select the scripts from the list.

4 Click **Delete.**

7.10.7 Sample Scripts

Privileged Account Manager ships with the following sample scripts that you can import and use:

- Display message scripts
- Password validation scripts
- Alternate validation scripts
- Email scripts
- Modify environment script
- Emulate `su` script
- Secure `vi` script

Before creating your own Perl script, check out the sample scripts to see if one is available that meets your needs or one that can be modified to meet your needs. To understand what is available, see the sample scripts in the following sections.

- "Modify Environment Script" on page 125
- "pcksh Illegal Commands Script" on page 126

To import a sample script, click `Command Control` > `Import Samples` > `Sample Perl Script`.

Modify Environment Script

This script is used to process environment variables. It has a number of script arguments that can add, delete, clear, and keep environment variables.

Argument	Description
`clearenv=1:`	Clears all environment variables (unless specifically kept using keepenv)
`keepenv=VAR:`	Specifically keeps environment variables. As soon as this is set, all other environment variables are deleted.
`setenv=VAR=val:`	Sets up a specific environment variable.
`unsetenv=VAR:`	Deletes a specific environment variable.
`defaultenv=#:`	Sets the default environment: **0:** Sets up no default environment variables. **1:** Sets up all default environment variables. **2:** Sets up default environment variables that do not already exist in the environment.

Sample Environment Script

```
my $e=$meta->child("Environment");
return(1) if(! $e);

my $n=$e->node_args();
my %env=();

while($n) {
    $env{$1}=$2 if($n->key() ne "items" && $n->value() =~ /^(.*)=(.*)$/);
    $n=$n->next();
}

my %keepenv=();
my $clearenv=0;

for(my $a=$args->node_args();$a;$a=$a->next()) {
    if($a->key() eq "clearenv" && $a->value() > 0) {
        $clearenv=1;
    } elsif($a->key() eq "keepenv" && $a->value() ne "") {
        $keepenv{$a->value()}=1;
    } elsif($a->key() eq "defaultenv" && $a->value >= 0) {
        $meta->child("Job")->arg_int("job_default_env",$a->value());
    }
}

if(scalar %keepenv || $clearenv) {
    while(my ($key,$val) = each %env) {
```

```
        delete $env{$key} if(! $keepenv{$key});
    }
}

for(my $a=$args->node_args();$a;$a=$a->next()) {
    if($a->key() eq "unsetenv" && $a->value() ne "") {
        delete $env{$a->value()};
    } elsif($a->key() eq "setenv" && $a->value() =~ /^(.*)\s*=\s*(.*)$/) {
        $env{$1}=$2;
    }
}

$meta->del($e);
$e=$meta->add_node("Environment");

my $items=0;

while(my ($key,$val) = each(%env)) {
    $e->arg("arg-$items","$key=$val");
    $items++;
}

$e->arg_int("items","$items");

return(1);
```

pcksh Illegal Commands Script

When using the pcksh shell, Command Control has the ability to restrict the commands being run (even as root). This sample script is named illegalcmd, and it restricts the use of the `passwd` command.

This script does not restrict a user that initiates another shell from within a session. When a user does this, Command Control cannot continue a full audit or control the illegal commands, although the session is still captured

```
#to set script argument - name=illegalcmd value= kill *
my $t=$meta->get_params('Ticket');
if(! $t) {
$t=$meta->add_param('Ticket');
}

my $i=$t->get_params('IllegalCmds');
if(! $i) {
$i=$t->add_param('IllegalCmds');
}

my @illegal = $args->arg_values('illegalcmd');

#my @illegal=("echo","ls -l","passwd","/usr/bin/ls -l","ksh","echo date");
foreach my $b (@illegal) {
my $c=$i->add_param('Command');
$c->arg("cmd",$b);
}
return 1;
```

7.11 Access Times

You can restrict the times when a rule is valid by defining an access time and adding it to the rule conditions. You can also use access times as script entities.

- Section 7.11.1, “Finding an Access Time,” on page 127
- Section 7.11.2, “Adding an Access Time,” on page 127

- Section 7.11.3, “Modifying an Access Time,” on page 127
- Section 7.11.4, “Copying an Access Time,” on page 128
- Section 7.11.5, “Moving an Access Time,” on page 128
- Section 7.11.6, “Deleting an Access Time,” on page 128

7.11.1 Finding an Access Time

1. On the home page of the console click Command Control
2. In the navigation pane, select Access Times icon and in the details pane select Access Time.
3. In the details pane, select Find.
4. In the filter type the required name.

   As you type, the search displays the results. When you click on the required access time, that gets selected in the middle pane. In the details pane, click modify to modify the access time.

7.11.2 Adding an Access Time

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the **Access Times** icon.
3. In the details pane, click **Add**. To add an access time to a category, select the category and click **Add**.
4. Specify a name for the access time, for example, `Office hours`.
5. Click **Add**.
6. To configure the access time, continue with Section 7.11.3, “Modifying an Access Time,” on page 127.

7.11.3 Modifying an Access Time

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Access Times**.
3. In the details pane, select the access time you want to modify and click the edit icon next to it.
4. Modify the access time as required:
   - Change the name of the access time.
   - Specify a description of the access time.
   - Click **Disabled** to disable the access time. A disabled access time is dimmed.
   - Set the access time as described in Step 5.
5. Set the access time in multiples of half-hourly intervals. The default access time is set to **Deny Access** for the whole week, shown in the calendar as blue.
   - To allow access at specific times, drag and drop across the days and times until the hours when you want to grant access are shown in green,
   - To allow access for the majority of times and deny access for specific times, click the **Grant Access** box below the table to grant access for the whole week, then click and drag across the days and times until the hours when you want to deny access are shown in blue.

For example, to allow access only during the hours from 9:00 to 18:00 from Monday to Friday:

5a Ensure that the whole week is set to Deny Access (blue).

5b Click in the calendar on 9 on Monday morning, then drag and drop to 18 and down to Friday. This creates a green block representing the times when access is allowed.

6 Click **Finish**. You can now use this access time in rule conditions or as a script entity.

7.11.4 Copying an Access Time

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Access Times**.
3. Select the access time you want to copy.
4. To create the copy, press the Ctrl key and drag the selected access time and drop it to the desired location.
5. If necessary, rename or modify the copy by using the **Modify Access Time** option, as described in "Modifying an Access Time" on page 127.

7.11.5 Moving an Access Time

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Access Times** in the navigation pane.
3. Select the access time you want to move.
4. Drag and drop the selected access time to the desired location.

7.11.6 Deleting an Access Time

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Access Times**.
3. In the details pane, select the access time you want to delete and click the delete icon next to the access time.

   To delete multiple access times in the same category, click **Delete Multiple** and select the access times.
4. Click **Delete**.

   The access time is deleted, and is also removed from any rule conditions and script entities in which it is defined.

7.12 Command Control Reports

You can configure customized reports of the contents of the Command Control configuration database, which are dynamically created and e-mailed to the specified person at defined intervals. You can use Perl template scripting to extract the required information and format it into an e-mail for the target person. An option is available for sending your reports to the Compliance Auditor for escalation management.

To use this feature, you must provide details of your e-mail server to the Messaging Component (msgagnt) so that reports can be e-mailed. See "Configuring SMTP Settings for the Messaging Component Package" on page 43 for details.

- Section 7.12.1, "Finding a Report," on page 129
- Section 7.12.2, "Adding a Command Control Report," on page 129
- Section 7.12.3, "Modifying a Command Control Report," on page 129
- Section 7.12.4, "Copying a Command Control Report," on page 130
- Section 7.12.5, "Moving a Command Control Report," on page 130
- Section 7.12.6, "Deleting a Command Control Report," on page 131

7.12.1 Finding a Report

1. On the home page of the console click Command Control
2. In the navigation pane, select Reports icon and in the details pane select Reports.
3. In the details pane, select Find.
4. In the filter type the required name.

   As you type, the search displays the results. When you click on the required name, that report gets selected in the middle pane. If you require to modify that report you can modify it from the details pane.

7.12.2 Adding a Command Control Report

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click **Reports**.
3. In the details pane, click **Add**.

   To add a report to a category, select the category and click **Add**.
4. Specify a name for the report.
5. Click **Add**.
6. To configure the report, continue with Section 7.12.3, "Modifying a Command Control Report," on page 129.

7.12.3 Modifying a Command Control Report

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the **Reports** icon and click **Report**.
3. In the details pane, select the report you want to modify and click the edit icon next to it.

4 Modify the report as required:
   - Change the name of the report.
   - Click **Disabled** to disable the report. A disabled report is dimmed.
   - Set the **Run Report** settings to determine the time of the first report and subsequent frequency of each report. You can set the initial date by using the calendar and type in the time, then set the frequency as required.
5 Select the e-mail options you want:
   5a In the **Email To** field, specify the e-mail address of the person you want to send the report to.
   5b In the **Email From** field, specify the e-mail address of the person you want to send the report from.
   5c In the **Email Subject** field, specify a subject for the e-mail.
   5d If you want the e-mail to be displayed in HTML, select the **HTML** check box.
   5e If you require a receipt, select the **Receipt** check box.
   5f Enter a Perl script in the **Report Template** field to control how the e-mail will be formatted and what it will contain.
   5g If you want the report to be available for auditing through Compliance Auditor, select the **Audit** check box.
6 If you want to send an e-mail while testing this report, select the **Send email** check box.
7 (Optional) Click **Test Report** to view the report that will be sent to the defined e-mail address. If there are errors in the Report Template, those are displayed.
8 Click **Back** to return to the report configuration page.
9 Click **Finish**.

7.12.4 Copying a Command Control Report

1 On the home page of the console, click **Command Control**.
2 In the navigation pane, click **Reports**.
3 Select the report you want to copy.
4 To create the copy, press the Ctrl key and drag and drop the selected report to the desired location.
5 If necessary, use the **Modify Report** option to rename or modify the copy, as explained in "Modifying a Command Control Report" on page 129.

7.12.5 Moving a Command Control Report

1 On the home page of the console, click **Command Control**.
2 In the navigation pane, click **Reports**.
3 Select the report you want to move.
4 Drag and drop the selected report to the desired location.

7.12.6 Deleting a Command Control Report

1. On the home page of the console, click **Command Control** on the home page of the console.
2. In the navigation pane, click the Reports icon and click **Report**.
3. In the details pane, select the report you want to delete and click the delete icon next to the report.

   To select multiple reports in the same category, click **Delete Multiple** and select the reports.
4. Click **Delete.**

7.13 Privileged Credential Vault

The Privileged Credential Vault manages and secures the account credentials for a specified account domain. The privileged account credentials and domain information are stored in Privileged Credential Vault. The user can create multiple credentials for a single domain.The credentials are securely stored in an encrypted form. To encrypt the Privileged Credential Vault database (PrvCrdVlt.db), refer Section 4.1.2, “Modifying a Domain,” on page 30. The proceeding sections provide the information on creating account domains. For creating account domain on database or applications, refer Chapter 13, “Managing Shared Accounts,” on page 199.

- Section 7.13.1, “Creating an Account Domain for Windows Systems,” on page 131
- Section 7.13.2, “Creating an Account Domain for Linux or Unix Systems,” on page 133

7.13.1 Creating an Account Domain for Windows Systems

- “Finding an Account Domain” on page 131
- “Adding an Account Domain” on page 131
- “Modifying an Account Domain” on page 132
- “Deleting an Account Domain” on page 133
- “Adding Credentials” on page 133

Finding an Account Domain

1. On the home page of the console, click Command control.
2. In the navigation pane, click the Privileged Credential Vault icon and click **Find Account Domain**.
3. In the **Account Domain Filter** field type the account domain that you require.

   As you type, the search displays the results. When you click on the required name, that account domain gets selected in the middle pane. If you require to modify that account domain you can modify it from the details pane.

Adding an Account Domain

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the Privileged Credential Vault icon and click **Privileged Credential Vault**.
3. In the details pane, click **Add Account Domain**.

4 Specify the following information:

Name: Specify the name of the domain. For example, if your Active Directory domain is `DC=PAMDOMAIN,DC=com`, specify the value for this field as `pamdomain`. This name is used along with the **Credential** to authenticate. If you do not provide the correct domain name, user authentication fails.

Type: Select the required account type from the list.

Profile: Select the profile for the user.

Based on the type of the account that you select in the **Type** field, specify the following:

NOTE: If the type of account is database, or application refer Chapter 13, "Managing Shared Accounts," on page 199.

LDAP: If the account type is **LDAP**, specify the following:

LDAP URL: Specify the DNS name. For example: `netiq.com`

Base DN: To display the domain name, click **Lookup.**

Scope: Select the scope for the user.

Account: Specify the account name of the domain user. For example: `administrator`

User DN: Specify the complete name for the domain user. For example: `CN=administrator,CN=Users,DC=netiq,DC=com`

Password: Specify the password for the domain user account.

5 Click **Finish** to save the account domain details.

An account domain and a credential is created for the specified domain. To add multiple credentials continue with "Adding Credentials" on page 133.

Modifying an Account Domain

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click the Privileged Credential Vault icon and click **Privileged Credential Vault**.

3 In the details pane, select the account domain you want to modify.

4 Click **Modify**.

5 Specify the following information:

Name: Specify the name of the domain.

Type: Select **LDAP** as the account type for the user.

Profile: Select the profile for the user.

Base DN: To display the domain name, click **Lookup.**

Scope: Select the scope for the user.

Account: Specify the account name of the domain user. For example: `administrator`

Credential: Select a credential for the domain.

6 Click **Finish** to save the account domain details.

Deleting an Account Domain

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the Privileged Credential Vault icon and click **Privileged Credential Vault**.
3. Select the account domain you want to delete.
4. In the details pane, click **Delete**.
5. Click **Delete**.

   The account domains are deleted, and are also removed from any other account groups, rule conditions, and script entities where they have been defined.

Adding Credentials

To add multiple credentials to the existing account domain do the following:

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the Privileged Credential Vault icon and click **Privileged Credential Vault**.
3. Select an **Account Domain**.
4. In the details pane, click **Add**.
5. Specify the following details:

   Account: Specify the account name of the domain user. For example: `administrator`.

   User DN: Specify the complete name for the domain user. For example: `CN=administrator,CN=Users,DC=netiq,DC=com`

   Password: Specify the password for the domain user account.
6. Click **Add** to save the account domain and credential details.

7.13.2 Creating an Account Domain for Linux or Unix Systems

- "Adding an Account Domain" on page 133
- "Modifying an Account Domain" on page 134
- "Deleting an Account Domain" on page 134

Adding an Account Domain

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the Privileged Accounts icon and click **Privileged Account**.
3. In the details pane, click **Add Account Domain**.
4. Specify the following information:

   Name: Specify the IP address or full name of the host.

   Type: Select **SSH** as the type for the user.

   SSH Host: Specify the IP address or the full name of the host.

   SSH Host Key: Click **Lookup** to populate the host key, otherwise manually specify the SSH host key.

   Credential Type: In the drop-down list select either **Password** or **SSH Private Key**.

Account: Specify the account name of the domain user. Example: `root`.

Password: Specify the password for the domain user account, if you have selected credential type as **Password**.

Private Key: Generate the key pair and copy the private key content here, if you have selected credential type as **SSH Private Key**.

To generate the key pair do the following:

1. Open an terminal to the remote host and browse to the `/root/.ssh` folder
2. Type `ssh-keygen -t rsa`

   Public and private keys are generated.
3. Copy the content of the public key from the remote host to the `authorized_keys` file on the SSH Relay Agent Host.
4. Copy the content of the private key from the remote host to the Privileged Account Manager SSH private key.

Passphrase: Specify the passphrase that was entered while generating the key pair.

5 Click **Finish** to save the account domain details.

Modifying an Account Domain

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click the Privileged Accounts icon and click **Privileged Account**.

3 Select the account domain you want to modify

4 In the details pane, click **Modify**.

5 Specify the following information:

Name: Specify the IP address or full name of the host.

Type: Select **SSH** as the account type for the user.

SSH Host: Select the host for the user.

SSH Host Key: Click **Lookup** to populate the host key, otherwise manually specify the SSH host key.

Credential: Select a credential for the user.

6 Click **Finish** to save the account domain details.

Deleting an Account Domain

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click the Privileged Accounts icon and click **Privileged Account**.

3 Select the account domain you want to delete.

4 In the details pane, click **Delete**.

5 Click **Delete**.

The account domains are deleted, and are also removed from any other account groups, rule conditions, and script entities where they have been defined.

7.14 Remote Desktop Protocol Relay

The Remote Desktop Protocol Relay (RDP Relay) feature offers Single Sign-on capability and remote access to desktops through a secured connection.

In a privileged session, an administrator user who is allowed to access various devices can sign on to many managed devices from a single workstation without knowing the authentication passwords of those devices. In addition, the user can remotely view the desktops of the managed devices and work on them.

You enable privileged sessions for an administrator user with the user's user group information. Then you associate the privileged session with a rule that controls the commands that the user can run on permitted devices and applications.

NOTE: RDP Relay is supported with the following installers:

- Windows Installers
- Generic Linux Installers

- Section 7.14.1, “Configuring the Windows Machine for the RDP Session,” on page 135
- Section 7.14.2, “Starting a Remote Desktop Session by Using an RDP Relay,” on page 136

7.14.1 Configuring the Windows Machine for the RDP Session

You can configure a RDP Relay for Windows machines to allow users to remotely access these machine without the privileged account credentials.

Before configuring an RDP relay, you need to create a host. For detailed information on creating a host, see Section 4.2.1, “Adding a Host,” on page 31.

NOTE: In Windows 2008 R2, configure the following User Account Control settings:

- Disable **Switch to the secure desktop when prompting for elevation**.
- Set **UAC: Behavior of the elevation prompt for administrators in Admin Approval Mode** to a value other than `Prompt for credentials on the secure desktop` and `Prompt for consent on the secure desktop`.

Configuring a machine for an RDP relay involves the following:

- “Creating a Privileged Account Domain” on page 135
- “Adding a Rule” on page 135

Creating a Privileged Account Domain

For information on creating a privileged account domain, see “Creating an Account Domain for Windows Systems” on page 131.

Adding a Rule

After creating an account, you need to set up the rules using the RDP session command for the user to log in with a credential. For detailed information on adding a rule, see Section 7.6.1, “Adding a Rule,” on page 103.

7.14.2 Starting a Remote Desktop Session by Using an RDP Relay

1. Launch the My Access page.

   In a browser specify the IP address of the Framework Manager in the address bar in the following format:

   ```
   https:// <IP address of the Framework Manager>/myaccess
   ```

2. Press **Enter**. A Login screen appears.
3. Specify the username and password to log in to Privileged Account Manager and click **Login**.

   A list of rules defined for that particular user is displayed in the following format:

   ```
   <rulename>(<username>@<machinename>)
   ```

4. Select the rule required for remotely accessing the Windows machine and click **Connect** to start the remote desktop session.

NOTE

- RDP Relay works only on Internet Explorer 8.0 or later.
- RDP Relay Manager name is always shown in the RDP connection bar.
- When connecting to the remote session specify the username in capital letters.
- When establishing a remote session through RDP Relay, the following error may be displayed:

  ```
  The remote computer disconnected the session because of an error in the
  licensing protocol
  ```

  To continue establishing a remote session, perform the following steps before starting an RDP session:

  1. Install the latest version of Privileged Account Manager.
  2. Launch Internet Explorer in **Run as administrator mode**.

7.15 Privileged Access to System Tools or Processes Using Run as privileged user

The administrator can use the Run as privileged user feature to provide privileged access to users for a specific process, system tools, or specific files. For example, `service.msc` or `notepad.exe`.

7.15.1 Configuring the Windows Machine to Run as privileged user

- “Creating a Privileged Account Domain” on page 137
- “Adding a Command” on page 137
- “Modifying a Command” on page 137
- “Adding a Rule” on page 137
- “Modifying a Rule” on page 137
- “Executing Run as privileged user” on page 137

Creating a Privileged Account Domain

For information on creating a privileged account domain, see Section 7.13.1, “Creating an Account Domain for Windows Systems,” on page 131.

Adding a Command

For information on adding a command, see Section 7.9.2, “Adding a Command,” on page 118.

Modifying a Command

1. On the home page of the console, click Command Control.
2. In the navigation pane, click the Commands icon and click **Command**.
3. Select the command category that includes the command that you want to modify.
4. In the details pane, click the command and click the edit icon next to it.
5. In the Commands field, type the processes which requires privileged access.

   For example:

   - `*notepad.exe*`
   - `*note*d.e*e*`
   - `*n.....ex.*`
   - `*C:\WINDOWS\system*\notepad.exe*`
6. Click **Modify**.

Adding a Rule

For information on adding a rule, see Section 7.6.1, “Adding a Rule,” on page 103.

Modifying a Rule

To modify a rule, see Section 7.6.2, “Modifying a Rule,” on page 103.

Ensure that you modify the following option:

Run Host: Click **Submit Host**

Executing Run as privileged user

1. Login to the system as an administrator by using any remote desktop accessing tool.
2. Right-click the process and select **Run as privileged user** to provide privileged access to the process.

   NOTE

   - In Windows 2008 R2, Shift+right-click the applications in the **Start** menu to execute Run as privileged user.
   - In Windows 2012, right-click the application in the folder where the application is installed to execute **Run as privileged user**.

You can also provide privileged access to specific files.

For Example: To provide privileged access to `critical.txt` file:

1. Create a short-cut to Notepad.

   Notepad is the process that is used to open the `critical.txt` file.
2. Right-click the short-cut to Notepad, then select **Properties**.
3. In the **Target** field, add the file path of the `critical.txt` file after the file path of the process, then click **OK**.

   NOTE: For example, the path can be added in the following format:

   ```
   C:\WINDOWS\system32\notepad.exe "C:\critical.txt"
   ```
4. Right-click the shortcut and select **Run as privileged user** to provide privileged access to the `critical.txt` file.

7.16 Secure Shell Relay

Secure Shell Relay (SSH Relay) provides the ability to access privileged accounts using a standard SSH client. This feature provides the ability to access Privileged Account Manager functionality without an agent for Privileged Account Manager on the target host.

SSH Relay allows users to connect to a remote host by using secure shell without knowing the privileged account credentials such as password or identity certificate of the user.

Configuring an SSH Relay Session

The packages are:

- SSH Relay Agent
- SSH Agent

SSH Relay listens on port 2222. You need to verify port 2222 is assigned for hosts running the `SSH Relay Agent` package.

Configuring an agent-less host for SSH Relay involves the following:

- **Create a Privileged Account Domain:** For information on creating a privileged account domain, see "Creating an Account Domain for Linux or Unix Systems" on page 133.
- **Add a Rule:** After creating an account, you need to set up the rules for the user to log in with a credential. For detailed information on adding a rule, see Section 7.6.1, "Adding a Rule," on page 103

Starting an SSH Relay Session

1. Start an SSH client, using the following format for the command:

   ```
   ssh -t -p2222 <PUMframeworkuser@sshrelayhost> <root@hostname>
   ```
2. Provide credentials details for the SSH Relay user.

NOTE: Starting an SSH relay session with the above syntax will list all available sessions to the authenticated Privileged Account Manager framework user.

7.16.1 Using usrun for SSH Relay

This feature extends the SSH relay functionality by supporting the ability to issue a `usrun` command to access a machine through SSH and a credential vault.

- "Creating an Account Domain with Credentials" on page 139
- "Creating a Rule" on page 139
- "Import SSH Session Command" on page 140
- "Adding a Command to a Rule" on page 140

Creating an Account Domain with Credentials

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the **Privileged Accounts** icon.
3. In the details pane, click **Add Account Domain**.
4. Specify the following information:

   Name: Specify the IP address or full DNS name of the host.

   Type: Select **SSH** as the account type for the user.

   SSH Host: Select the host for the user.

   SSH Host Key: Click **Lookup** to populate the host key; otherwise, manually specify the SSH host key.

   Credential Type: In the drop-down list, select either **Password** or **SSH Private Key**.

   Account: Specify the account name of the domain user. Example: `root`.

   Password: Specify the password for the domain user account, if you have selected credential type as **Password**.

   SSH Key: Generate the key pair and copy the private key content here, if you have selected credential type as **SSH Private Key**.

   To generate the key pair:

   1. Open an terminal as root to the remote agentless host and browse to the `/.ssh` folder.
   2. Enter `ssh-keygen -t rsa`.

      Public and private keys are generated.
   3. Copy the content of the public key from the remote agentless host to the `authorized_keys` file.
   4. Copy the content of the private key from the remote agentless host to the Privileged Account Manager SSH private key.

   Passphrase: Specify the passphrase that was entered while generating the key pair.
5. Click **Finish** to save the account domain details.

Creating a Rule

1. On the home page of the console, click **Command Control**.
2. In the Command control pane, click **Rules**.
3. In the details pane, click **Add Rule**.
4. Specify a name for the rule, then click **Finish**.

5 To configure the rule, select the rule, then in the details pane, click **Modify**.

   Make the following changes:

   Run User: Specify the user as `root`.

   Credentials: From the drop-down list, select the required account domain. The Run User is automatically populated with the domain user provided in the account domain.

   Run Host: Specify as `Submit Host`.

6 Click **Finish**. The settings you have defined for the rule are displayed in the console.

Import SSH Session Command

1 On the home page of the console, click **Command Control**.
2 In the Command Control pane click **Command Control**.
3 In the details pane click **Import Samples**.
4 Expand **Sample Commands** and select **SSH Session**.
5 Click Finish. The samples are added to the appropriate section of the configuration.

Adding a Command to a Rule

After creating a rule and a command, you need to add command definitions to your rule conditions to control whether the rule is processed, depending on the command that is submitted by the user.

To add a command to your rule, drag and drop the command definition to the rule in the navigation pane

7.17 Direct Remote Desktop Connection

When a user connects to a remote Windows server through any remote desktop connection client, the user's actions are not monitored. But, with the direct remote desktop protocol (direct RDP) feature you can control the authorization, and monitor the actions of users connecting to a remote Windows server through remote desktop connection client.

7.17.1 Remote Desktop Sessions for Windows

You can perform any of the following to connect to a Windows server:

- **RDP relay:** Connect to a Windows server through RDP (Remote Desktop) relay where, the user needs to login to the myaccess webpage and then click on the privileged session. When users connect to the Windows server through RDP relay, they are elevated with the privileges that are defined in the rule. Hence, they connect to the server with the administrator credential, or the credential that is existing on the server. For more information about using RDP relay, refer Section 7.14, “Remote Desktop Protocol Relay,” on page 135.

  Here, users can connect to the Windows server with the account credentials and get elevated to the role that is defined in the rules and Privileged Account Manager monitors the user’s actions.
- **Remote desktop connection:** Connect to the Windows sever by using a remote desktop connection client. When you connect by using the RDP client, you can use your account credentials that are set up on the Windows server. You are not elevated to use the administrator credentials.

Here the users can connect to Windows server with their account credentials and are not elevated to any role and Privileged Account Manager monitors their actions.

- **Direct login to the server:** Log in to the Windows server with your account credentials.

  Here the users can connect to Windows server with their account credentials on the server and Privileged Account Manager monitors their actions.

- **Credential Provider:** Log in to the Windows server through the Privileged Account Manager Credential Provider with your privileged account credentials.

  Here the users can connect to Windows server with Privileged Account Manager credentials and Privileged Account Manager monitors their actions.

7.17.2 Understanding Direct Remote Desktop Protocol

You can connect to a Windows server by using your account credentials that are set up on the server. If you require to monitor the actions of the users, then you can use the direct remote desktop protocol feature. The **Windows Direct Session** command object is included with the `rdpDirect` command, which helps in monitoring the direct sessions. You can create a rule and specify who is authorized to connect to a Windows server and also disconnect the session when any malicious activity is detected.

Prerequisite: To use this feature, the target Windows machine must have an agent for Privileged Account Manager installed on it.

7.17.3 Advantages of Using Privileged Account Manager for Direct Remote Desktop Sessions

The following list sums up the advantages of this feature:

- You can use any RDP client to connect and do not require to connect from a webpage.
- Privileged Account Manager verifies if a user is authorized to connect to a particular server.
- Privileged Account Manager monitors the session and disconnects the session when malicious activity is detected.
- Video capturing can be activated for the session.
- The submit user feature helps in allowing the user to connect to the server with their account credentials that are set up on the server.
- You do not have to create credentials for each users but provide the account domain credential as **SubmitUser**.

7.17.4 Configuring Rule for Direct Remote Desktop Protocol

You can create rule to allow/ deny access to specific users on a Windows server to connect to the server. You need to add the **Windows Direct Session** command to the rule to monitor the actions that a user performs after connecting to the server. To disconnect a session refer, Section 7.19, “Disconnecting a Privileged Session,” on page 143.

To configure the rule for a Windows server, perform the following:

1. On the home page of the administrator console, click **Command Control**.
2. Create an account domain for the Windows server and specify **Account** as **SubmitUser**.

   For more information about creating account domain, refer Section 7.13.1, “Creating an Account Domain for Windows Systems,” on page 131

3 (Conditional) If you want to control who can access a particular server, create a user group with the user name in capital letters.

   3a If you want to deny specific users to access the server, create a separate user group and add the user names (in capital letters) in the **Users** field. By default all the users are granted access to the server.

4 Create a rule and include the following details for the users, who are allowed to access the server:

   Session Capture: Yes

   Authorize: Yes

   Run Hosts: Submit Host

5 Create a rule and include the following details for the users, who are denied to access the server:

   Session Capture: No

   Authorize: No

NOTE: If some of the users are not part of any defined user group, the actions of that user is not monitored but in the reporting console you can view the users who are connecting to the server, and the time when they started the session.

7.18 Credential Provider

The Credential Provider feature helps the users to single sign-on to any Windows server through a secured Remote Desktop Connection. With Credential Provider, users can login to Windows server as a Privileged user by using Privileged Account Manager credentials. To start a remote desktop connection by using credential provider, the user must save the properties for remote session to that machine. For starting a remote desktop session with credential provider refer, "Starting Remote Desktop Connection with Credential Provider" on page 220.

NOTE: The users can use the domain credentials or the Privileged Account Manager credentials to login to the Windows server. To use the domain credentials, refer Section 7.13.1, "Creating an Account Domain for Windows Systems," on page 131.

7.18.1 Remote Desktop Session by Using Credential Provider

The Credential Provider authenticates privileged users to establish a Remote Desktop session without logging in to PAM web interface. You can allow users to use their system or domain credentials to access remote desktop sessions. For more information about creating domain account refer section Section 7.13, "Privileged Credential Vault," on page 131. You need to modify the Remote Desktop Connection settings to use the credential provider feature. This creates a shortcut for the remote desktop session. The users can directly launch the Remote Desktop Connection from the shortcut that they create for the RDP session.

7.18.2 Configuring Credential Provider

When you configure credential provider, a credential provider tile is displayed and the users can log in with his account credentials or the privileged account credentials. Users can connect to a Windows server by using any remote desktop connection client Following are the steps that you must perform to configure the remote desktop session through Credential Provider:

IMPORTANT: The user names must be provided in capital letters for the LDAP users who are part of the authentication domain.

1. Create a rule for using credential provider.

   For information about creating a rule, refer Section 7.6.1, “Adding a Rule,” on page 103.

2. Configure the rule.

   For information about configuring the rule, refer Section 7.6.2, “Modifying a Rule,” on page 103.

3. Create a command.

   For information about creating a command, refer Section 7.9.2, “Adding a Command,” on page 118.

4. Configure the command with the command <`*NPAMCP`>. For information about configuring the Command refer Section 7.9.3, “Modifying a Command,” on page 119.

   When you configure the fields for this command, you can specify any name for the command but you must specify <***NPAMCP**> in the **Commands** field.

5. Add the command to the rule that you created for credential provider.

6. Assign the rule to the privileged account that requires access to remote server.

7.19 Disconnecting a Privileged Session

A privileged user is allowed to start a remote desktop session to a Windows server by using RDP relay, Direct RDP or Credential Provider, and to a Linux server by using pcksh and SSH relay. But if the user performs an action that is unauthorized, you as an administrator can disconnect that session and if required you can block the user from starting the session again. The administrator can configure the level of risk, enable auto disconnect, and enable auto block. You can either disconnect the session manually or you can configure this feature to disconnect the session automatically.

You can also disconnect a database or an application session.

7.19.1 Prerequisites for Disconnecting a Session

- When defining policies ensure that **Run Host** should be same as the agent name that you have specified in the **Host** console.
- If you want to grant access to any framework user to use the reporting console that includes the disconnect field, then in the **Framework User Manager** console, you need to add the user to a group that has a role with the following specification:
  - **Module:** *
  - **Role:** *

  For information about **Framework User Manager**, refer Chapter 6, “Managing Framework Users and Groups,” on page 63.

7.19.2 Disconnecting the Session Manually

When you, as an administrator, are monitoring every activity that is performed on a remote machine for a particular session, and if you find an unexpected command that is run on the remote server, you can disconnect the session manually and send the reason for disconnecting the session to the user. You can also block the user from using the session again.

The administrator can disconnect the session when a high risk level or any suspicious activity is displayed in the Report data of the Reporting console. To disconnect a user from the session on which an unauthorized command is used, perform the following steps in the **Reporting** console:

1. Click **Command Control Reports** then select the report.
2. Open the session that is active.
3. In the **Disconnect Reason** field, specify the reason for disconnecting the session.

   This is required for auditing.
4. (Conditional) If you want to block the user from connecting to the same session, select **Block User**.

   By default this checkbox is deselected. Because you may not want to block the user but warn the user about the unauthorized activity that was performed during the session.

   NOTE: When you block a user from a session, the user gets added to the **Blocked Users** list and the user will be blocked from accessing any of the sessions.
5. Click **Disconnect**.

7.19.3 Disconnecting the Session Automatically

You can automatically disconnect the session based on the risk of using a command. In case of emergency access, the session is disconnected automatically based on the expiry time that is specified for emergency access.

NOTE: An SSH relay session cannot be disconnected automatically.

Disconnecting a Session Based on Risk Level

An Administrator can configure **Command Risk** to automatically disconnect a remote session when a particular risk level is detected or when a user executes a particular command.

The administrator can add commands to a rule and enable the auto disconnect feature for the required commands that can be performed on the remote Windows server.

NOTE: For a pcksh session: the disconnect based on the risk can happen either when the command `/usr/bin/pcksh -o audit 1` or /usr/bin/pcksh -o audit 2 is defined in the **Rewrite** field for the **Commands** object, or when the **Enhanced Access Control Policy** script is added.

To configure disconnecting the session automatically, perform the following:

1. In the navigation pane of the command control console, click the command icon then select **Command**.
2. In the details pane, click **Command risk**.
3. Set **Command Risk**.

For information on setting the command risk refer Section 7.9.4, “Setting the Command Risk,” on page 121.

Specifying 1 in **Auto disconnect** field will automatically disconnect the user when the specified command is executed on the host server. Specifying 1 in **Auto Block** will block the user from further starting the session.

Disconnecting a Session Based on Expiry of an Emergency Access Request

When you have approved a request for emergency access for a specific time frame, the session gets expired after the expiry time that includes the grace period with the specified time. To disconnect a session based on the expiry time you need to configure the administrative settings for emergency access. For information about configuring the settings, refer Section 15.1, “Configuring Administrative Settings for Emergency Access,” on page 213.

7.19.4 Viewing the Disconnect fields in the Reporting Console

In the Reporting console, an administrator can view which session was disconnected, the type of disconnect (automatic or manual disconnect), and the reason of disconnecting the session. This can be monitored by using Command Control Reports. To include the fields that display the disconnect information you must perform the following:

1. On the home page of the console, click **Reporting**.
2. Click **Command Control Reports** then, click the required report.

   To add a report, refer section Section 8.4.1, “Adding a Report,” on page 158.
3. Click the **Filter** tab then, select **Disconnect Details**.

   The **Disconnect Type** and the **Disconnect Reason** fields are displayed under **Report Data**.

To view the reports for only the disconnected sessions, select **Disconnect Report** in the **Command Control Reports**.

7.20 LDAP Group Lookup

The LDAP Group lookup feature retrieves LDAP group membership information for a user whose details are stored in external LDAP directories, such as NetIQ eDirectory or Microsoft Active Directory. The information fetched can be used to perform external group matching in the rules.

- Section 7.20.1, “Creating the LDAP Account in the Credential Vault,” on page 145
- Section 7.20.2, “Defining the User Group,” on page 146
- Section 7.20.3, “Creating a Rule for the LDAP Group,” on page 146
- Section 7.20.4, “Modifying a Rule for the LDAP Group,” on page 147

7.20.1 Creating the LDAP Account in the Credential Vault

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the **Privileged Accounts** icon.
3. In the details pane, click **Add Account Domain**.
4. Specify the following information:

Account Name: Specify a name for the domain.

Type: Select **LDAP** as the account type for the user.

Profile: Select **Windows Active Directory** on the NetIQ directory as the profile for the user.

LDAP URL: Specify the DNS name. For example, netiq.com.

Base DN: Click **Lookup** to display the domain name.

Account: Specify the account name of the domain user.

User DN: Specify the complete name for the domain user.

Password: Specify the password for the domain user account.

5 Click **Finish** to save the account domain details.

7.20.2 Defining the User Group

After creating an Account Domain, define a group to refer to the external LDAP group. For information on creating a user group, see "Adding a User Group" on page 111.

To configure an existing user group, perform the following:

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click the **Account Groups** icon, then click **User Groups**.

3 In the details pane, select the user group that you want to modify, then click the edit icon next to the user group name.

4 Configure the following fields:

Name: Specify a name for the group.

Type: You must select the **External Group** check box.

External Group:

Description: Describe the purpose of this user group.

Manager Name, Manager Tel., Manager Email: Specify the name, telephone number, and e-mail address of the manager of this user group.

Users: Add or change the users you want to include in this group. You can type the user names,one on each line, or paste them from elsewhere.

For example, the external group can be matched by using the `%:=~/^[Cc][Nn]=G*/` regular expression,. This expression matches all external groups starting with `Cn=G` and followed by anything where user is part of the group.

User Groups: From the list of groups you have already defined, select the user groups you want to include as subgroups of this user group. You can also add subgroups to a user group by dragging and dropping the groups to the target user group in the navigation pane.

5 Click **Finish**.

You can now use this user group in rule conditions or as a script entity.

7.20.3 Creating a Rule for the LDAP Group

After creating a user group, you need to set up rules to use the created External User Group in Commands. For detailed information on adding a rule, see Section 7.6.1, "Adding a Rule," on page 103.

7.20.4 Modifying a Rule for the LDAP Group

1. On the home page of the console, click **Command Control**.
2. In the Command Control pane, click **Rules**.
3. Select the rule that you want to modify.
4. In the details pane, click **Modify**.
5. Make the following changes:

   Name: Change the name of the rule.

   Description: Specify a description of the rule.

   User Message: Specify the user message as `$<ExtGroups>$`.

   Session Capture: Select either **On** or **Off**.

   Authorize: Select either **Yes** or **No**, depending on whether you want the command protected by the rule to be authorized or not authorized if the rule conditions are met.

   Run User: Select **Submit User** from the drop-down list.

   Credentials: From the drop-down list, select the required account domain. The Run User is automatically populated with the domain user provided in the account domain.

   Run Host: Define a run host by selecting the name of the host on which you want to run this command (this overrides any hostname defined through a set command).

   Risk Level: Set a **Risk Level** of 0 to 99.

   Audit Group: Define an **Audit Group**. This setting is for use in Compliance Auditor reports.
6. Click **Finish**. The settings you have defined for the rule are displayed in the console.

A typical result of the LDAP group lookup rule when a rule is created for a user to run the ID command as a `root` user is displayed below:

```
user1@pum-sles10sp3:/root> usrun id

<ExtGroups>

<groupname="CN=GROUP3,CN=Users,DC=pum,DC=com"/>

<groupname="CN=GROUP2,CN=Users,DC=pum,DC=com"/>

<groupname="CN=GROUP1,CN=Users,DC=pum,DC=com"/>

<groupname="cn=G1,o=netiq"/>

<groupname="cn=G2,o=netiq"/>

</extroups>

uid=1001(user1) gid=100(users) groups=0(root), 16(dialout), 33(video), 100(users)

user1@pum-sles10sp3:/root>
```

7.21 Test Suites

Command control test suites allow you to test the defined rules by running specified commands, submit users and other input values through your rule configuration, and performs a check to ensure the result is as expected. Each test suite can contain a number of test cases where you specify the expected outcome for one or more input values.

- Section 7.21.1, “Adding a Test Suite,” on page 148
- Section 7.21.2, “Adding or Modifying a Test Case,” on page 148
- Section 7.21.3, “Running a Test Suite,” on page 150
- Section 7.21.4, “Viewing a Test Suite,” on page 150
- Section 7.21.5, “Modifying a Test Suite,” on page 150
- Section 7.21.6, “Deleting a Test Case,” on page 151
- Section 7.21.7, “Deleting a Test Suite,” on page 151
- Section 7.21.8, “Importing a Test Suite,” on page 151
- Section 7.21.9, “Exporting a Test Suite,” on page 152

7.21.1 Adding a Test Suite

1. On the home page of the console, click **Command Control**.
2. In the Command Control pane, click **Command Control**.
3. In the details pane, click **Test Suites**.
4. Click **Add Test Suite** in the task pane.
5. Specify a name for the test suite.
6. Specify a description for the test suite.
7. Click **Finish**.
8. Continue with “Adding or Modifying a Test Case” on page 148 to add test cases to your test suite.

7.21.2 Adding or Modifying a Test Case

A test case allows you to emulate an end user running a command through the Command Control system.

1. On the home page of the console, click **Command Control**.
2. In the details pane, click **Test Suites**.
3. Select the test suite to add a test case, or modify an existing test case.
4. In the details pane, click **View Test Suite**.
5. Perform either of the following:
   - To add a new test case, click **Add Test Case** in the task pane.
   - To modify a test case, select the test case, then click **Modify Test Case**.
6. Specify the values and the expected results that you want to run through the rule configuration. (To review the rule configuration you want to test with this case, see Section 7.6.2, “Modifying a Rule,” on page 103.)

Enter a single value in each field. The purpose of the test case is emulate the user performing a `usrun` command from the command line.

- To create a test case that can be used for general testing and could possible match multiple rules, supply only submit information for the test case.
- To create a test case that matches only one rule, use the expected fields to specify values that match a single rule.

Command: (Required) Specify the command the user would run.

For example, if the user would enter the following on the command line:

```
usrun passwd user1
```

Specify the following as the command:

```
passwd user1
```

Submit User: (Required) Specify the name of the user who is entering the privileged command.

Submit Host: (Required) Specify the name of the host that the submit user is logged in to.

Run User: (Optional) When the submit user is requesting to run the command as a specific user with the usrun command, specify the username that is being requested. For example, if the user would enter the following on the command line:

```
usrun -u root ksh
```

Specify the following as the run user:

```
root
```

Run Host: (Optional) When the submit user is requesting to run the command on a specific host, specify the hostname that is being requested. For example, if the user would enter the following on the command line:

```
usrun -h hosta ksh
```

Specify the following as the run host:

```
hosta
```

User Input: (Optional) Use this field to specify the information that a script, associated with the Command Control policy, expects the user to enter.

Expected command: (Optional) Use this field to confirm that the command being executed is the correct command. If the command specified in this field does not match the results, the test case fails.

Expected authorized: (Optional) Use this field to confirm that the request was authorised. If value in this field does not match the results, the test case fails.

Expected capture: (Optional) This field is compared with the result of the authorization request to confirm the capture mode is correct. If this field does not match the results, the test case fails.

Expected run user: (Optional) Use this field to confirm that the user context used to execute the command is correct. If this field does not match the results, the test case fails.

Expected run host: (Optional) Use this field to confirm that the host on which the command is being executed is correct. If this field does not match the results, the test case fails.

Expected risk: (Optional) This field is compared with the result of the authorization request in order to confirm the risk associated with the command being executed is correct. If this field does not match the results, the test case fails.

Submit Time: (Optional) Specify the time that the request should appear to be made. This is useful for testing access time restrictions in the policy.

Custom Input: (Optional) Use this field to add attributes within the request object. These XML definitions are inserted into the privileged request. For example, you could use this field to configure the group memberships for a user in order to test policies that perform tests on the user's group membership:

```
<Groups>
  <Group name='grpa'/>
  <Group name='grpb'/>
</Groups>
```

7 Click **Finish**. The input values are shown in the **Test Cases** table.

8 Repeat Step 5 through Step 7 for any additional test cases you want to include or modify in this test suite.

You can now run the test suite as explained in "Running a Test Suite" on page 150.

7.21.3 Running a Test Suite

1 On the home page of the console, click **Command Control**.

2 In the details pane, click **Test Suites**.

3 Select the required test suite.

To select multiple test suites, press the Ctrl key and select the required test suites one at a time, or press the Shift key to select a consecutive list of test suites. Use Ctrl+A to select all test suites.

4 Click **Run Test Suites** in the task pane. The results are displayed for each test case as Success or as Failure, along with the reason for the failure.

5 Use the buttons on the left and right of the table to find previous successes and failures, and the next successes and failures.

6 To view further details on a specific entry, select the entry and click **Details**.

The configuration for the test case is shown, and a list of rules that have been tested, with configuration settings for each rule. The **Matched** column shows true if the rule conditions were met, and false if the rule conditions were not met.

7 Click **Back** to return to the main Run Test Suite page.

8 Click **Cancel** to return to the list of test suites.

To use a command line option to run a test suite or to run a specific test case, see Section 12.2.3, "Running Test Suites," on page 191.

7.21.4 Viewing a Test Suite

1 On the home page of the console, click **Command Control**.

2 In the details pane, click **Test Suites**.

3 Select the required test suite, then click **View Test Suite**.

From here you can also modify the test suite; add, modify and delete test cases; and run the test suite.

7.21.5 Modifying a Test Suite

1 On the home page of the console, click **Command Control**.

2 In the details pane, click **Test Suites**.

3 Select the test suite you want to modify.
4 In the details pane, click **View Test Suite**.
5 Click **Modify Test Suite**.
6 Modify the test suite as desired:
   - Change the name of the test suite.
   - Add or change the description.
   - Use the **Up** and **Down** buttons to change the order in which the test cases are run.
7 Click **Finish**.

7.21.6 Deleting a Test Case

1 On the home page of the console, click **Command Control**.
2 In the details pane, click **Test Suites**.
3 Select the test suite from which you want to delete a test case.
4 In the details pane, click **View Test Suite**.
5 Select the test case to delete.
6 In the details pane, click **Delete Test Case**.
7 Click **Yes** to confirm the deletion.

7.21.7 Deleting a Test Suite

1 On the home page of the console, click **Command Control**.
2 In the details pane, click **Test Suites**.
3 Select the test suite that you want to delete.

   To select multiple test suites, press the Ctrl key and select the required test suites one at a time, or press the Shift key to select a consecutive list of test suites.
4 Click **Delete Test Suite**.
5 Click **Yes** to confirm the deletion.

7.21.8 Importing a Test Suite

You use the **Import Test Suites** option to restores a previously backed-up test suite, or to test suites from another Framework. You then use the **Export Test Suites** option to obtain configuration details so you can then paste them into a text document for backup or for use on another Framework.

NOTE: When you import test suites, they are added to your existing configuration and do not overwrite your existing test suites. However, if you import a Command Control database by using the **Import Settings** option, your existing test suites are overwritten.

---

1 Access the test suite data you require and copy it.
2 Click **Command Control** on the home page of the console.
3 Click **Test Suites** in the task pane.
4 Click **Import Test Suites** in the task pane.

5 Click in the text area, then paste the copied settings by using Ctrl+V, or right-click in the text area and click **Paste**.

6 Click **Finish**.

7.21.9 Exporting a Test Suite

You can export your Command Control test suites to a text file for backup purposes, or for use in another Framework. You can then use the **Import Test Suites** option to restore the backed-up test suites, or to import the test suites into another Framework.

1 Click **Command Control** on the home page of the console.

2 Click **Test Suites** in the task pane.

3 Select the test suite you want to export.

   To select multiple test suites, press the Ctrl key and select the required test suites one at a time, or press the Shift key to select a consecutive list of test suites. To select all test suites, use Ctrl+A.

4 Click **Export Test Suites** in the task pane.

5 Select the test suite data by using Ctrl+A, or right-click in the text window and click **Select All**.

6 Copy the test suite data by using Ctrl+C, or right-click in the text window and click **Copy**.

7 Paste the text into a text document.

8 Click **Finish**.

7.22 Deploying Command Control

To deploy Command Control, you must download several modules to your local Package Manager, then install them:

- Section 7.22.1, “Command Control Modules,” on page 152
- Section 7.22.2, “Auditing Modules,” on page 152
- Section 7.22.3, “Compliance Auditor Modules,” on page 153
- Section 7.22.4, “Installing Command Control,” on page 153

7.22.1 Command Control Modules

The Command Control feature is made up of the following packages:

- **Command Control Manager:** Holds the rule configuration and is responsible for validating user command requests.
- **Command Control Agents:** Installed on machines where user commands are to be controlled or audited.
- **Command Control Console:** Installed into the Framework Manager console. Required for configuring Command Control rules.

7.22.2 Auditing Modules

The auditing modules are made up of the following packages:

- **Audit Manager:** Acts as the repository for auditing information collected by the Framework.

- **Reporting Console:** Installed into the Framework Manager console. Required for viewing audit information.
- **Command Reporting Console:** Installed into the main Reporting Console. Required for viewing Command Control audit information.

7.22.3 Compliance Auditor Modules

The Compliance Auditor modules are made up of the following packages:

- **Compliance Auditor:** Holds the compliance auditor rules and audit information.
- **Compliance Auditor Console:** Installed into the Framework Manager console. Required for configuring compliance auditor rules and for viewing audit information.

7.22.4 Installing Command Control

To install Command Control, perform the following:

1. Download the required packages to your local Package Manager. See Section 7.22, “Deploying Command Control,” on page 152 for details.
2. Install the Command Control Manager package on the host you want to be the Command Control Manager. This can be on any operating system, including Windows.

   See Section 4.5.6, “Installing Packages on a Host,” on page 42 for details. Command Control Managers can be deployed to as many hosts as you need in order to build an environment with load balancing and failover.
3. Install the Command Control Agent package on all UNIX hosts on which you want to implement Command Control.
4. Install the Audit Manager package on the host you want to be the Audit Manager, then install the Compliance Auditor package on the same host.

   This can be on any operating system, including Windows, and can be a different host from your Command Control Manager. The auditing packages can be deployed to as many hosts as you need in order to build an environment with load balancing and failover.
5. Install the following consoles:
   - Command Control Console
   - Reporting Console
   - Command Reporting Console
   - Compliance Auditor Console

   See Section 3.2.2, “Adding a Console to the Framework Manager Console,” on page 27 for details.

Command control is now deployed and ready to use.

8 Managing Audit Reports

Privileged Account Manager enables auditing of events at several levels, such as keystroke logging, command authorization, and login success or failure. The Reporting console allows you to view these records and manage them.

- Section 8.1, “Audit Settings,” on page 155
- Section 8.2, “Encryption Settings,” on page 156
- Section 8.3, “Syslog Settings,” on page 156
- Section 8.4, “Command Control Reports,” on page 157
- Section 8.5, “Video Capture for Windows,” on page 162
- Section 8.6, “Change Management,” on page 165

8.1 Audit Settings

Use this page to control the rollover of the audit database files. The default configuration does not encrypt or roll over the audit databases. If your security model requires you to keep audit records available for years, you need to configure the rollover options and move the rolled-over files to an archive location.

1. Click **Reporting** on the home page of the console.
2. Click **Audit Settings** in the task pane.
3. For each audit database file, set the rollover parameters. Rolled-over databases are kept as SQLite databases.

   Time (hours): Specify the time interval for rolling over the audit file. If the time interval is always reached before the maximum size is reached, the time interval is used for rollover and the size restriction is ignored.

   Size (MB): Specify the maximum size the file can reach before the audit file is rolled over. If the file always reaches the maximum size before the time interval is reached, the size restriction is used for rollover and the time interval is ignored.

   Protection: Select **none** to allow the rollover file to be an unencrypted file or select **encrypted** to encrypt the audit database.

   Encrypting the file can impact performance of your audit managers. Also, the encrypted file can be decrypted by the Framework Console, but it cannot be displayed on new systems that do not know the encryption keys.

   To configure the encryption keys, click **Reporting** > **Encryption settings**.
4. If you want to zip the rollover files or move them to another location, use the *Rollover Script* option to specify a Perl script that can perform these tasks. The script is called whenever an audit database is rolled over.

   For example, the following script uses gzip to compress the rolled-over file and enters an error message in the `unifid.log` file.

```
if ($DBGRP eq 'cmdctrl') {
system("gzip $AUDIT_FILE");
$ctx->log_error("Audit rollover $DBGRP $AUDIT_FILE");
}
```

5 Click *Finish*.

8.2 Encryption Settings

Use this page to configure when the randomly generated encryption key is changed.

1 Click *Reporting* on the home page of the console.

2 Click *Encryption Settings* in the task pane.

3 To specify how frequently the key is changed, specify a *Key Rollover* interval, then select the type of interval (years, months, weeks, or days).

4 (Optional) In the *Key* list, disable or enable keys.

   Each time a new key is generated, it is added to the list.

   If you disable a previous key, Privileged Account Manager re-encrypts all database with the old key to the latest key. This can be very time-intensive and can affect performance until it is completed.

   If you disable the null cipher key, Privileged Account Manager encrypts all unencrypted databases with the latest key. This takes precedence over the encryption setting on the Audit Settings page. This can be very time-intensive and can affect performance until it is completed.

5 Click *Finish*.

8.3 Syslog Settings

Use this page to configure Privileged Account Manager so that it can send syslog messages to a syslog server. This server can be a Sentinel server, a Sentinel Log Manager, or a syslog server that supports TCP with optional TLS or SSL support. Older syslog servers require UDP for the transport protocol.

To configure communication with a syslog server:

1 Click *Reporting* on the home page of the console.

2 Click *Syslog Settings* in the task pane.

3 Configure the following fields:

   Syslog host: Specify the DNS name or IP address of the syslog server.

   Port: Specify the port the syslog server is listening on for syslog events. The default port is 514. The default port for a Sentinel server or a Sentinel Log Manager is 1468.

   SSL: Select the check box to enable SSL communication with a Sentinel server. For a syslog server, do not select this box.

   Allow Persistent Connections: Select the check box to enable a connection in which, a single connection provides multiple responses instead of opening a new connection for every single request and response.

   NOTE: To apply the changes made to the persistent connection, you must restart Privileged Account Manager.

   ---

4 In the Event table, select the events and the format. All possible events are select:

Session Failure: Sends an event when a Privileged Account Manager session fails.

Start Session: Sends an event when a user starts a Privileged Account Manager session on a host.

Session Terminate: Sends an event when a user logs out of the Privileged Account Manager session.

Command Audit: If you have enabled auditing on the user's session or on commands, this option sends all audited events as syslog events.

- For information on configuring commands for auditing, see "Configuring Auditing with the Rewrite Functionality" on page 120.
- For information on using a .profile file to enable session auditing, see Section 7.2.4, "Using Privileged Shell (pcksh) for Complete Session Control," on page 91.

Privilege Escalation: Sends an event when a user starts a privileged session.

4a To delete an event, highlight it, then click *Remove*.

4b To configure the format, click the format text box and specify a format string.

The ${}$ string logs the complete string of the audit record in JSON format. For a Sentinel server, format string must be set to ${}$.

If you are sending the events to a syslog server, you can specify strings from the Privileged Account Manager templates. For example, the format of the Start Session event could use the following string:

```
User ${StartSession.user}$ initiated a Command Control session from
${StartSession.host}$
```

This format string would produce output similar to the following:

```
Jan 1 01:20:45 localhost npum: User ctaylor initiated a Command Control
session from citlaptop
```

5 Click *Finish*.

Sentinel Notes

For Privilege User Manager to communicate with a Sentinel server, you need to add a Syslog Connector to the Sentinel console. This connector must be configured to listen on port TCP 514 using SSL and the SSL type must be Open. Configure it to listen specifically for the host that has the Syslog Emitter installed. This is usually the Framework Manager console.

8.4 Command Control Reports

After you have installed the Framework Manager, all command control requests have records automatically created in the audit database. The default Sample Report displays all of the collected audit records and any associated keystroke captures. In the Command Control Reporting console, you add reports that can be customized by using the *Filters* tab to display records according to your preferences. You can also assign custom roles to the report, which allows you to restrict the read and write access your Framework Manager users have to these reports.

- Section 8.4.1, "Adding a Report," on page 158
- Section 8.4.2, "Viewing Report Data," on page 158
- Section 8.4.3, "Filtering the Viewable Records," on page 159
- Section 8.4.4, "Modifying General Report Information," on page 160

- Section 8.4.5, “Selecting Log Files,” on page 160
- Section 8.4.6, “Replaying Keystrokes,” on page 161
- Section 8.4.7, “Removing a Report,” on page 161
- Section 8.4.8, “Generating an Activity Report,” on page 162
- Section 8.4.9, “Viewing a Report in a Comma-separated Values (CSV) Format,” on page 162

8.4.1 Adding a Report

1. Click *Reporting* on the home page of the console.
2. Click *Command Control Reports* in the navigation pane.
3. Click *Add Report* in the task pane.
4. Configure the following fields:

   Name: Specify a name for the report.

   Description: (Optional) Describe the purpose of the report.
5. Click *Finish*.
6. Continue with one or more of the following:
   - To modify the report so that it displays only a portion of the available records, continue with Section 8.4.3, “Filtering the Viewable Records,” on page 159.
   - To assign roles so that a specific group of Framework Manager users can view the reports, continue with Section 8.4.4, “Modifying General Report Information,” on page 160.

8.4.2 Viewing Report Data

1. Click *Reporting* on the home page of the console.
2. Click *Command Control Reports* in the navigation pane.
3. Select the report in the navigation pane.

   The navigation pane displays the following information about each instance of the report.

Column	Description
Start Time	Displays the date and time when the report started. **NOTE:** It displays the session start time as set in the Manager.
End Time	Displays the date and time when the report ended.
User	Displays the name of the Framework user who issued the command.
Host	Displays the name of the host from which the command was issued.
RunAs	Displays the name of the user who ran the command.
RunHost	Displays the name of the host that the command was run on.
Command	Displays the command that was executed.
Authorized	Displays whether the rule for this command authorized the command.
Capture	Displays whether the rule for this command captured the keystrokes. If a keystroke is present, the *Keystroke Replay* option is available in the task pane.

Column	Description
Audit Status	If the record has been referenced in the Compliance Auditor, displays the name of the compliance rule and the status.
Audit ID	Displays the unique ID of the audit record.

8.4.3 Filtering the Viewable Records

Use the *Filter* tab to build a list of matching conditions that allows you to customize the records that are displayed in the *Report Data* tab. This allows you to build reports that show only the information that your users require.

1. Click *Reporting* on the home page of the console.
2. Click *Command Control Reports* in the navigation pane.
3. Select the report in the navigation pane.
4. Click the *Filter* tab in the navigation pane.
5. Select from the following conditions. You can combine conditions with AND logic, which requires the report to match all conditions that have been joined with an AND. You can also combine conditions with OR logic, which requires the report to match either the conditions before the OR or the conditions after the OR.

   Authorized: Select this option to use session authorization by the Command Control as a matching criteria. Use the Yes/No drop-down list to specify whether the session matches when the session was authorized or not.

   Session Capture: Select this option to use session capture as a matching criteria. Use the Yes/No drop-down list to specify whether the report matches when the session capture was authorized or not.

   User: Select whether you want to match on the submitting user or the run user. For the matching type, select one of the following:

   - Select *Matches* or *Doesn't Match*, then specify an exact value or a value with an asterisk (*) wildcard such as jo*.
   - Select *Regexp* or *Doesn't Regexp*, then specify a regular expression.

   Host: Select whether you want to match on the submitted host or the run host. For the matching type, select one of the following:

   - Select *Matches* or *Doesn't Match*, then specify an exact value or a value with an asterisk (*) wildcard such as jo*.
   - Select *Regexp* or *Doesn't Regexp*, then specify a regular expression.

   Command: Select whether you want to match on the submitted command or the audited command. An audited command is a command that has been audited within a session capture. Audited commands are collected when the session used the pcksh shell with the audit option. For the matching type, select one of the following:

   - Select *Matches* or *Doesn't Match*, then specify an exact value or a value with an asterisk (*) wildcard such as jo*.
   - Select *Regexp* or *Doesn't Regexp*, then specify a regular expression.

Audit ID: Select to match the session on the audit ID assigned to the session. For the matching type, select one of the following:

- Select *Matches* or *Doesn't Match*, then specify an exact value or a value with an asterisk (*) wildcard such as 4bd*.
- Select *Regexp* or *Doesn't Regexp*, then specify a regular expression.

Time: Select to match the session on when it started or when it ended. Select either *Session Start* or *Session End*, select *After* or *Before* for the matching operator, then use the calendar to specify a date and use the time fields to specify the hour and minute.

(): Select to group conditions so that the record is displayed if it matches the conditions defined by one group in the filter.

6 Click *Apply*.

7 To view the results, click the *Report Data* tab.

8.4.4 Modifying General Report Information

Use the *General* tab to keep the report's name and description in sync with the configured filter and to restrict access to the report by assigning read and update roles.

1 Click *Reporting* on the home page of the console.

2 Click *Command Control Reports* in the navigation pane.

3 Select the report in the navigation pane.

4 Click the *General* tab in the navigation pane.

5 Modify the values of the following fields:

Report name: Specify a new name for the report.

Description: Describe the type of records that the report displays.

Roles: Specify values if you want to allow users read access to this report and the ability to update specific information such as its name, description, and filters.

- **Read:** To enable read access, specify a unique name for the read role for this report.
- **Update:** To enable update rights, specify a unique name for the update role for this report.

If you use the same name for a role on multiple reports, the role grants rights to multiple reports. If you use the same name for both the read role and the update role, the role grants both read and update rights.

To assign these roles to a group, see "Audit Report Roles" on page 77.

6 To save your changes, click *Apply*, or to discard your changes, click *Reset*.

8.4.5 Selecting Log Files

Any rolled-over audit database is indexed by the Audit Manager. You use the *Log Files* tab to select which of these rolled-over databases is used to display information in the *Report Data* tab. This allows you to review archived data or current activity.

Only the audit databases currently in the audit directory view are displayed. If an audit database has been taken offline (zipped or moved), it does not appear in the list.

1 Click *Reporting* on the home page of the console.

2 Click *Command Control Reports* in the navigation pane.

3 Select the report in the navigation pane.

4 Click the *Log Files* tab in the navigation pane.

5 Select the log files that are required for the report.

To include all available log files, select the *All log files* box.

6 Click *Apply*.

8.4.6 Replaying Keystrokes

Where a rule has been configured to capture session information, you can review the entire session in the report.

1 Click *Reporting* on the home page of the console.

2 Click *Command Control Reports* in the navigation pane.

3 Select the report in the navigation pane.

4 In the navigation pane, select the session that you want to review

Commands for the session data that has been captured are indicated by a Yes in the *Capture* column.

5 Click *Keystroke Replay* in the task pane.

6 Edit the following fields:

Terminal Type: Change the terminal type if it is set incorrectly.

Find: To find a specify command or string in the report, specify the text in the text box, then click *Find*. If the report contains hundreds of lines, this allows you to find the command you are interested in.

Decryption key: If an encryption password has been defined on the Command Control Audit Settings page to encrypt the sensitive password data in the reports (see "Defining Audit Settings" on page 96), specify this password in the text box, then click *Refresh* to display the passwords.

Show control characters: Use this option to show or hide control characters on the screen.

Show audited commands: Use this option to show or hide the full list of audited commands. If this option is enabled, the screen shows the actual commands that are being run when a user types a command. You can also view each input command individually by mousing over the command.

Show profile commands: Use this option to show or hide the commands run in the user's login profile when the user's pcksh login shell has auditing configured to level 2.

7 From the list of input commands, select a command, then click *Output*.

8 Use the *Play*, *Rewind*, and *Pause* buttons to review the data.

9 Click *Cancel* to return to the list of reports.

8.4.7 Removing a Report

IMPORTANT: This action can not be undone.

1 Click *Reporting* on the home page of the console.

2 Click *Command Control Reports* in the navigation pane.

3 Select the report you want to delete.

4 Click *Delete Report* in the task pane.

5 Click *Finish*.

8.4.8 Generating an Activity Report

The Activity Report option allows you to generate a graphical snapshot of all the audit records currently being displayed in the report. The activity report can then be printed, providing a visual record for managers to see the number of commands each host is processing, the names of users requesting sessions, and the number of session accepted or rejected.

1. Click *Reporting* on the home page of the console.
2. Click *Command Control Reports* in the navigation pane.
3. Select the report you want generate an activity report for.
4. Click *Activity Report* in the task pane.

   The navigation pane displays the selected activity report.
5. To print the report, click *Print*.
6. To return to the list of reports, click *Cancel.*

8.4.9 Viewing a Report in a Comma-separated Values (CSV) Format

You can view an audit report in a CSV format when PAM is installed on a Linux or a UNIX server. Run the `sreplay -c <host>` command to view the report. For more information about the sreplay command refer, Section 12.8, “sreplay Command Line Options,” on page 196.

8.5 Video Capture for Windows

- Section 8.5.1, “Configuring Video Capture for Windows,” on page 162
- Section 8.5.2, “Viewing the Videos,” on page 165

Video Capture for Windows monitors user activity by capturing videos of every task performed by the user.

- You can browse the text log of a user and select a particular task and watch the video. This way you do not have to go through the entire video but watch the video of the specific user activity that you require.
- You can search for a particular event in a video based on the keyword search option. For example, if an important file is deleted, then you can search for all the user activities where a deletion task is performed just by the keyword search, and then select the video of your interest.
- You can schedule compression and archiving of video files to external storage.
- You can turn the Video Capture feature ON or OFF for a particular user based on your requirement. This way you can manage your system’s storage capacity.

8.5.1 Configuring Video Capture for Windows

- “Configuring the Video Path (Optional)” on page 163
- “Configuring the Video Report Filter Settings (Optional)” on page 163
- “Configuring Video Archival (Optional)” on page 163
- “Enabling Video Capture for Windows” on page 164

Configuring the Video Path (Optional)

The video path is where all the recorded videos are stored. This feature creates the path by default. If you want to create a new video path:

1. Click *Hosts* in the home page of the console.
2. Select the host for which you want to configure the video path.
3. Click *Packages* > *Audit* > *Audit Settings*.
4. Add the new path to store the videos under *Video path*. Ensure that you have created the new folders before you change the path.

   You can also save the videos in a shared folder by adding the path under *Shared Folder Access Credential* in the following format:

   ```
   \\<ip address>\<sharedfolder>
   ```

   If Audit Manager is in a non Windows environment, change the path accordingly.

   NOTE

   - Access credential drop down will contain only those credentials which are created in the Command Control under Privileged Accounts.
   - The access credential for the Windows shared folder must have write permission.

5. Click *Finish*.

Configuring the Video Report Filter Settings (Optional)

To simplify the search for a particular video, Video Capture for Windows has a set of preconfigured filters for any task performed by you, like type, click and so forth. To edit the filter settings:

1. Click *Reporting* in the home page of the console.
2. Click *Video Report Setting*.
3. Edit the *Video Report Filter Settings*.

   By default, *Video Report Filter Settings* has the following filters:

   ```
   Type|click|Checked|Close window|Terminate|msc|user|group|start|stop|Log Off
   ```

4. Click Finish.

NOTE: After editing the filter configuration if you want the initial filter configuration then click *Reset* > *Finish*.

Configuring Video Archival (Optional)

To archive the videos:

1. Click *Reporting* in the home page of the console.
2. Click *Audit Settings*.
3. Add the following sample script under *Rollover Script*:

```
use warnings;
use File::Copy;


if ($DBGRP eq 'cmdctrl') {
    my $srcdir = ($^O eq "MSWin32) ? "C:/Program
Files/Netiq/npum/service/local/audit/video/capture/" :

"/opt/netiq/npum/service/local/audit/video/capture/";

    my $dest = ($^O eq "MSWin32) ? "C:/Program
Files/Netiq/npum/service/local/audit/videobck/":"/opt/netiq/npum/service/
local/audit/videobck/";

    my $fileage = 1;     #Age in days



    opendir(DIR, $srcdir) or die $ctx->log_error("Can't open $srcdir: $!");
    my @files = grep {!/^\.+$/ } readdir(DIR);
    foreach my $file (@files) {
        my $old = "$srcdir/$file";
        if( (-f $old) && ($fileage< -M $old) ) {
            move($old, $dest) or die $ctx->log_error("Move $old -> $dest
failed: $!");
        }
    }
    close(DIR);
    $ctx->log_info("Backup Complete");
}
```

4 Click *Finish*.

Enabling Video Capture for Windows

To enable video capture:

1 Add an account domain. For more information, see "Adding an Account Domain" on page 133.

2 Click *Command Control* on the home page of the console, then click *Create a rule*.

3 Select the LDAP account that you created from the *Credentials* drop-down list.

Only windows credentials are supported for enabling Video Capture for Windows

4 Select the following options:

Session Capture: Set this option to *ON* to enable session capture

Video Capture: Set this option to *ON* to enable video capture

Video Index: Set this option to *Yes*. You can navigate from one audit event to another within a video if the video index is set to *Yes*. If you set this option to *NO*, then there is no mapping between the audit events and the video and you cannot navigate between audit events.

Video fps: By default the value is set to 10. This option determines the quality of the video.

NOTE

- When Video Index is set to *Yes*, more hard disk memory is consumed.
- Increasing the Video fps value increases the consumption of hard disk memory.

---

5 Click *Finish*.

8.5.2 Viewing the Videos

To view the videos:

1. Click *Reporting* on the home page of the console.
2. Click *Command Control* > *Sample Report*.
3. Select the session report you want to view, then click Keystroke Replay.
4. In the Command Control Keystroke Report page, click Playback

   The Playback button is displayed only if video capture is enabled for that session.
5. In the Video playback screen, click the button to play the video.

   Time: The time when the event occurred.

   Standard Input: Action performed by the user.

   All events: Displays all the events.

   Filtered events: You can filter the events based on the predefined filter option. For more information, see "Configuring the Video Report Filter Settings (Optional)" on page 163.

   Find: Searches the events based on the options provided by you.

8.6 Change Management

Any GUI specific operations performed by you is audited by the Change Management feature. Each operation is tracked and the log is maintained in the Change Management report. The default Sample Report displays all of the collected audit records and any associated keystroke captures.

8.6.1 Enabling Change Management

A package named `report_chngmgmt` is available as part of the PAM 3.1 ISO which has to be installed to enable the Change Management feature.

8.6.2 Viewing Report Data

1. Click *Reporting* on the home page of the console.
2. Click *Change Management Reports* in the navigation pane.
3. Select the report in the navigation pane.

The navigation pane displays the following information about each instance of the report.

Column	Description
Change Time	Displays the date and time when the GUI operation was performed.
User	Displays the name of the Framework user who performed the GUI operation.
Module	Displays the module where the GUI operation was made.
Source	Displays the name of the particular functionality within the module where the GUI operation was performed.
Action	Displays the specific operation performed by the user. For example, registering a host to the PAM Framework.
Host	Displays the name of the host on which the GUI operation was performed.
Audit ID	Displays the unique ID of the audit record.

9 Compliance Auditor

The Compliance Auditor collects, filters, and generates reports of audit data for analysis and sign-off by authorized personnel. The Compliance Auditor can be used in conjunction with Command Control to enable auditors to view security transactions and play back recordings of user activity. Auditors can record notes against each record, creating permanent archives of activity.

Rules can be configured to pull any number of audit events matching a given filter into the Compliance Auditor at specific intervals. Examples of filters include username, host, and command for Command Control. Roles can be assigned to each rule to ensure that an auditor is able to view only extracted records with a matching role defined in his or her user account. In addition, Access Control Levels (ACLs) can be defined to restrict access to individual events, and to prevent users from auditing their own activity.

When an audit event is viewed, auditors can authorize the event, or mark it as unauthorized, escalate it, and assign it to someone else. Each change is recorded in an indelible audit trail within each record, along with any notes made by the auditor. Automatic reports can be generated and e-mailed to the appropriate personnel, and can be used, for example, for daily reporting to managers on audit activity awaiting sign-off, or hourly reporting triggered by an escalation value to notify senior management of activity.

To use the Compliance Auditor:

- Define roles in user groups to control user access to the Compliance Auditor. See Section 9.1, “Controlling Access to the Compliance Auditor,” on page 167.
- Create one or more rules to pull the required events into the Compliance Auditor. See Section 9.2.1, “Adding or Modifying an Audit Rule,” on page 168.
- Define ACLs for individual users. See Section 9.5, “Access Control Levels,” on page 179.
- View event records and authorize them, or mark them as unauthorized and define further action. See Section 9.4, “Compliance Auditor Records,” on page 175.
- Configure auditing reports to be automatically e-mailed to the appropriate personnel. See Section 9.3.1, “Adding or Modifying an Audit Report,” on page 170.
- Provide failover and load balancing by installing the Compliance Auditor on multiple hosts. See Section 9.6, “Deploying the Compliance Auditor,” on page 180.
- Export and import compliance auditing settings. See Section 12.7.1, “Exporting and Importing Compliance Auditor Settings,” on page 194.

9.1 Controlling Access to the Compliance Auditor

Roles can be used to restrict the Compliance Auditor options available to Framework users. For example, you might want users to be able to audit events, but not administer rules, ACLs, or reports.

To define roles for a user group to control use of the Compliance Auditor:

1. Click **Framework User Manager** on the home page of the console.
2. (Conditional) To add a new group, click **Groups** > **Add Group**, specify a name, then click **Finish**.

3 To modify an existing group or configure the group you just created, select the group, then click **Modify Group**.

4 Select the users you want to be members of this compliance auditing group.

5 In the **Roles** option, click **Add**, then add the following roles

Module	Role	Description
secaudit	console	View the Compliance Auditor console.
secaudit	audit	View and edit records.
secaudit	<*audit role name*>	(Optional) Allows the users to access records generated by the rules configured to use this Audit Role. If you do not add the <*audit role name*> role, the users can only access records generated by rules with no Audit Role defined.
audit	read	View a keystroke replay.

Users belonging to this group can access the Compliance Auditor console, view and edit records, and review keystroke logs. If you do not add the <*audit role name*> role, the users can access all records. If you add the <*audit role name*> role, the users can access only the records generated by the rules configured to use this Audit Role.

With these roles, the users cannot manage rules, reports, or ACLs. For the roles required for these additional tasks, see "Compliance Auditor Roles" on page 79.

6 Click **Finish**.

7 To continue setting up the Compliance Auditor, see Section 9.2.1, "Adding or Modifying an Audit Rule," on page 168.

9.2 Compliance Audit Rules

Audit rules specify the events to be pulled in to the Compliance Auditor for viewing and authorization. You can specify:

- The filters to display the type of event
- The number of events
- The time and frequency when the events are pulled in
- An audit role to restrict access to records of events pulled in by a specific rule

To add or modify a rule, see Section 9.2.1, "Adding or Modifying an Audit Rule," on page 168.

9.2.1 Adding or Modifying an Audit Rule

You can add, modify, and disable audit rules, but you cannot delete them.

1 Click *Compliance Auditor* on the home page of the console.

2 Click *Audit Rules* in the task pane.

3 Select one of the following:

- To add a new rule, click *Add Rule* in the task pane

- To modify an existing rule, select the rule, then click *Modify Rule*.
- To copy an existing rule and modify it, select the rule, then click *Copy Rule*.

4 Configure the following fields:

Rule Name: Specify a name for your rule.

Disable: Select the check box to disable the rule.

By default, disabled rules are not shown in the rule list. You cannot delete a rule.

Records and All Records: To collect all records, enable the *All Records* check box, or deselect the *All Records* option and set the number of records to be collected on each audit run.

Audit Role: (Optional) Specify the audit role that has been assigned to a group. For configuration information, see Step 5 in Section 9.1, “Controlling Access to the Compliance Auditor,” on page 167.

Run Filter: To determine the time and frequency of each audit run, use the calendar to set the initial date, then set the frequency as required.

Audit Category: Select the category of events to audit.

Add Filter: (Optional) Select one or more filters from the *Add Filter* drop-down list for the type of event you want this rule to pull in, and configure them as required

The filters and configuration options depend on the *Audit Category* selected. For example, you can choose to pull in only those Command Control events that have been submitted by a particular user and that include a session capture.

You can add more than one filter of the same type for filters such as the Command Control Submit User, then select the logic you require from AND or OR. You can also set these filters to be inclusive or exclusive using *matches* or *does not match*.

You can remove a filter by clicking the button to the left of the filter.

5 Click *Finish*.

9.3 Compliance Audit Reports

You can configure customized reports of events that require compliance auditing. The reports are dynamically created and e-mailed to selected users at defined intervals. You can use filtering and Perl template scripting to extract the appropriate event information and format it into an e-mail for each target user.

Audit reporting uses a tokens object that contains all the user information and other information. You can use keyword anchors in your report configuration, which are replaced by the appropriate values from the tokens object. It is also possible for the Perl code in the report template to set values in the tokens object. Sample report templates are supplied to assist you with creating your own.

- Section 9.3.1, “Adding or Modifying an Audit Report,” on page 170
- Section 9.3.2, “Sample Command Control Report Template,” on page 171
- Section 9.3.3, “Deleting a Report,” on page 174

9.3.1 Adding or Modifying an Audit Report

To use this feature, you must provide details of your e-mail server to the Messaging Component (msgagnt) so that reports can be e-mailed. See "Configuring SMTP Settings for the Messaging Component Package" on page 43 for details.

To add or modify an audit report:

1. Click *Compliance Auditor* on the home page of the console.
2. Click *Audit Reports* in the task pane.
3. Select one of the following:
   - To add a new report, click *Add Report* in the task pane.
   - To modify an existing report, select the required report, then click *Modify Report* in the task pane.
   - To copy an existing report, select the report, then click *Copy Report* in the task pane.
4. Configure the following fields:

   Report Name: Specify a name for the report.

   Disable: To disable the report, select the *Disable* check box.

   By default, disabled reports are not shown on the report list.

   Run Report: To determine the time and frequency of each audit report, use the calendar to set the initial date, then set the frequency as required

   Report Category: To limit the report to one category, select the category, or to include all categories, select *All*.

   Report Target: (Conditional) To send the report to a user or all users in a group, click *User Report* in the *Report Target* section, then select the user or group from the drop-down list.

   Ensure that the users' e-mail addresses are defined in the *Account Details* section in the Framework User Account definitions. You must define a keyword anchor in the *Email To* field.

   Report Filter: Set the *Report Filter* to include the required event records:

   - Select one or more from *New*, *Pending*, *Authorized*, and *Unauthorized*.
   - Select the age of events you want to include in the report. Events older than the number of days you specify are included.
   - Select the escalation level of events you want to include in the report. Events at this escalation level and above are included.

   Email To: Specify the e-mail address of the user who is to receive the report:

   - If you want the report to be sent to a user who is not defined as a Framework user, specify the user's e-mail address in the *Email To* field.
   - If you want the report to be sent to a user or group defined as the *Report Target* above, specify the following keyword anchor in the *Email To* field:

     ```
     $User.ACT_EMAIL.value$
     ```

   You can view the format in XML of the object tokens passed into the audit report by entering `$<>$` in the *Report Template* field, deselecting the HTML check box, then clicking *Test Report* (ensure that you have defined a *Report Target*). To view just the user subtree, use `$<User>$`.

   The tokens that appear are dependent upon what has been configured for the users. If the ACT_EMAIL.value token is not present for the target, an email address has not been defined for the user. For user configuration information, see Section 6.1.3, "Modifying a Framework User," on page 65.

Email From: Specify the email address of the user sending the report.

You can also use a keyword anchor in the *Email From* field.

Receipt: Select if you want to enable notification when the receiver has read the message. The message is sent to the email address specified in the *Email From* field.

Email Subject: Specify a subject for the email message.

This can be a text string or you can use a keyword anchor in the *Email Subject* field. For example, if you wanted to display the target user's name in the e-mail subject, you could enter the following in the *Email Subject* field.

```
Report for $User.ACT_FULL_NAME.value$
```

Report Template: Specify a Perl script in the *Report Template* field to control how the e-mail messages are formatted and what they contain. If you want the messages to be displayed in HTML, select the *HTML* check box.

For an example report template, see "Sample Command Control Report Template" on page 171.

5 Click *Test Report* to view the report that is sent to each e-mail target.

Use the arrow buttons with the mouse to page through the reports. In the test, the reports are not shown in HTML format. If there are errors in the *Report Template*, these are shown.

6 Click *Back* to return to the report configuration screen.

7 Click *Finish*.

9.3.2 Sample Command Control Report Template

If you are using this sample as a base for your own report templates, select *HTML* to correctly display the messages. The sample displays a message to the recipients of the e-mail messages, requesting them to log in to the Compliance Auditor and review activity. It extracts selected events and lists them in tables according to the age of the events, and provides information about the events.

As shown in the sample, you can use the user name keyword anchor $User.ACT_FULL_NAME.value$ to display a user's name in the e-mail, if you are using the Report Target option. You must ensure that a *Display name* is entered for the user in the *Account Details* section in the Framework User Account definitions.

```
<%!
my @lvl0;
my @lvl1;
my @lvl2;
my @lvl3;
my @gt0;
my @gt5;
my @gt10;
my @gt20;
%>
<%
my @audit_records = @{$tokens->{'AuditRecords'}->{'AuditRecord'}} if
(defined($tokens->{'AuditRecords'}) && defined($tokens->{'AuditRecords'}-
>{'AuditRecord'}));
foreach my $ar (@audit_records) {
  my $age = $ar->{'age'};
  my $lvl = $ar->{'level'};

  if ($age > 5 && $age < 10) {
    push(@gt5,$ar);
  } elsif ($age >= 10 && $age < 20) {
    push(@gt10,$ar);
  } elsif ($age >= 20) {
    push(@gt20,$ar);
  } else {
```

```
    push(@gt0,$ar);
  }
  if ($lvl == 1) {
    push(@lvl1,$ar);
  } elsif ($lvl == 2) {
    push(@lvl2,$ar);
  } elsif ($lvl >= 3) {
    push(@lvl3,$ar);
  } else {
    push(@lvl0,$ar);
  }
}
%>
<%
my $total = @audit_records;
if ($total > 0) {
%>
<style type="text/css">
<!--
.style1 {
 color: #000000;
 font-family: Arial, Helvetica, sans-serif;
 font-size: 12px;
}
.style2 {
 color: #000000;
 font-family: Arial, Helvetica, sans-serif;
 font-size: 12px;
 font-weight:bold;
}
.style4 {
 color: #000000
}
-->
</style>
<p class="style1"> Hello $User.ACT_FULL_NAME.value$,<br/>
  <br/>
  This is an automated event notification email from the Compliance Auditor. <br/>
<br/>

  It is the responsibility of management to log into the Compliance Auditor each
day and review their team's keystroke logs.  <br/> <br/>

  Please log on to the Compliance Auditor at your earliest convenience using this
link: <a href="https://admin.company.com">https://admin.company.com</a></p>

<%
my $gt0 = @gt0;
%>
<span class="style2">Events &lt; 5 days old (<%= "$gt0" %>)</span>
<table border="1">
  <tr class="style1">
    <td>Time</td>
    <td>User</td>
    <td>Run As</td>
    <td>Host</td>
    <td>Command</td>
  </tr>
  <%
foreach my $ar (@gt0) {
  my $cmd = $ar->{'cmdctrl'}->{'cmd'};
  my $usr = $ar->{'cmdctrl'}->{'user'};
  my $ras = $ar->{'cmdctrl'}->{'runAs'};
  my $hst = $ar->{'cmdctrl'}->{'host'};
  my $tme = $ar->{'cmdctrl'}->{'time'};
 $tme = localtime($tme);
%>
  <tr class="style1">
    <td><%= "$tme" %></td>
    <td><%= "$usr" %></td>
```

```
    <td><%= "$ras" %></td>
    <td><%= "$hst" %></td>
    <td><%= "$cmd" %></td>
  </tr>
<%
}
%>
</table>
<br/>

<%
my $gt5 = @gt5;
%>
<span class="style2">Events &gt; 5 days old (<%= "$gt5" %>)</span>
<table border="1">
  <tr class="style1">
    <td>Time</td>
    <td>User</td>
    <td>Run As</td>
    <td>Host</td>
    <td>Command</td>
  </tr>
<%
foreach my $ar (@gt5) {
  my $cmd = $ar->{'cmdctrl'}->{'cmd'};
  my $usr = $ar->{'cmdctrl'}->{'user'};
  my $ras = $ar->{'cmdctrl'}->{'runAs'};
  my $hst = $ar->{'cmdctrl'}->{'host'};
  my $tme = $ar->{'cmdctrl'}->{'time'};
 $tme = localtime($tme);
%>
  <tr class="style1">
    <td><%= "$tme" %></td>
    <td><%= "$usr" %></td>
    <td><%= "$ras" %></td>
    <td><%= "$hst" %></td>
    <td><%= "$cmd" %></td>
  </tr>
<%
}
%>
</table>
<br/>

<%
my $gt10 = @gt10;
%>
<span class="style2">Events &gt; 10 days old (<%= "$gt10" %>)</span>
<table border="1">
  <tr class="style1">
    <td>Time</td>
    <td>User</td>
    <td>Run As</td>
    <td>Host</td>
    <td>Command</td>
  </tr>
<%
foreach my $ar (@gt10) {
  my $cmd = $ar->{'cmdctrl'}->{'cmd'};
  my $usr = $ar->{'cmdctrl'}->{'user'};
  my $ras = $ar->{'cmdctrl'}->{'runAs'};
  my $hst = $ar->{'cmdctrl'}->{'host'};
  my $tme = $ar->{'cmdctrl'}->{'time'};
 $tme = localtime($tme);
%>
  <tr class="style1">
    <td><%= "$tme" %></td>
    <td><%= "$usr" %></td>
    <td><%= "$ras" %></td>
    <td><%= "$hst" %></td>
```

```
    <td><%= "$cmd" %></td>
  </tr>
<%
}
%>
</table>
<br/>

<%
my $gt20 = @gt20;
%>
<span class="style2">Events &gt; 20 days old (<%= "$gt20" %>)</span>
<table border="1">
  <tr class="style1">
    <td>Time</td>
    <td>User</td>
    <td>Run As</td>
    <td>Host</td>
    <td>Command</td>
  </tr>
<%
foreach my $ar (@gt20) {
  my $cmd = $ar->{'cmdctrl'}->{'cmd'};
  my $usr = $ar->{'cmdctrl'}->{'user'};
  my $ras = $ar->{'cmdctrl'}->{'runAs'};
  my $hst = $ar->{'cmdctrl'}->{'host'};
  my $tme = $ar->{'cmdctrl'}->{'time'};
 $tme = localtime($tme);
%>
  <tr class="style1">
    <td>
    <td><%= "$usr" %></td>
    <td><%= "$ras" %></td>
    <td><%= "$hst" %></td>
    <td><%= "$cmd" %></td>
  </tr>
<%
}
%>
</table>
<br/>

<p class="style2">Total Events = <%= $total %></p>

<%
}
%>
```

9.3.3 Deleting a Report

1. Click *Compliance Auditor* on the home page of the console.
2. Click *Audit Reports* in the task pane.
3. Select the report you want to delete.
4. Click *Delete Report* in the task pane.
5. Click *Finish* to confirm the deletion.

9.4 Compliance Auditor Records

The Compliance Auditor main page lists the records (events) collected according to defined audit rules.

By default, all new and pending events are displayed, as indicated in the *Status* column. To view authorized and unauthorized events, select the appropriate check boxes and click *Refresh*. Pending events are events that have been viewed and their records edited, but they have not been classified as authorized or unauthorized. You can click any of the column headings to sort by that column.

To view events for a specific time period, select the *From* and *To* check boxes, select the required dates, specify the required times, and click *Refresh*.

The table displays the following information about each event:

Column	Description
First	The color-coded indicators for Command Control command risk level and rule risk level, ranging from green (low) to red (high). For more information, see "Setting the Command Risk" on page 121.
Level	The escalation level set by the auditor editing the event record.
Status	The status of the event, indicating whether an auditor has classified the event as authorized or unauthorized. New events have not been viewed. Pending events have been viewed and edited, but have not been marked as authorized or unauthorized.
Time	The date and time the event occurred.
Event	A description of what the record contains.
Note	Any notes made by the auditor when editing the event record.
Assigned	The user the event has been assigned to by the auditor of the event record.
Rule	The audit rule that pulled in the event.
Type	The type of event.
Size	The size of the keystroke capture with the total time of the session displayed between parentheses.
Event ID	The unique event ID.

From this page, you can perform the following tasks:

- Section 9.4.1, "Viewing a Compliance Audit Record," on page 176
- Section 9.4.2, "Viewing and Editing a Command Control Keystroke Report," on page 176
- Section 9.4.3, "Viewing a Change Management Audit Record," on page 177
- Section 9.4.4, "Viewing a Report Audit Record," on page 177
- Section 9.4.5, "Editing an Audit Record," on page 177
- Section 9.4.6, "Archiving Records," on page 178
- Section 9.4.7, "Managing Archived Records," on page 179

9.4.1 Viewing a Compliance Audit Record

1. Click *Compliance Auditor* on the home page of the console.
2. Select the record you want to view.
3. Click *View Record* in the task pane.

   Record data for this event is shown, including the submit user and host, the run user and host, the command, whether it was authorized by Command Control, and whether the session was captured.

From here you can view a Command Control keystroke report, if it exists, or edit the record. If a keystroke report exists, you must review it before you can edit the record. See Section 9.4.2, "Viewing and Editing a Command Control Keystroke Report," on page 176 for more information.

9.4.2 Viewing and Editing a Command Control Keystroke Report

1. Click *Compliance Auditor* on the home page of the console.
2. Select the record for which you want to view a keystroke report.
3. Click *View Record* in the task pane.
4. Click *View Keystroke Report* in the task pane, or click the *Keystroke* button.

   The text that the user entered during the session is shown on the Input page. The first column displays color-coded indicators for command risk level and rule risk level, ranging from green (low) to red (high). For more information, see "Setting the Command Risk" on page 121 and "Modifying a Rule" on page 103.
5. On the Command Control Keystroke Report page, edit the following fields:

   Terminal Type: Change the terminal type if it is set incorrectly.

   Find: To find a specify command or string in the report, specify the text in the text box, then click *Find*.

   Decryption key: If an encryption password has been defined on the Command Control Audit Settings page to encrypt the sensitive password data in the reports (see "Defining Audit Settings" on page 96), specify this password in the text box, then click *Refresh* to display the passwords.

   Show control characters: Use the *Show control characters* check box to show or hide control characters on the screen.

   Show audited commands: Use the check box to show or hide the full list of audited commands. If this option is enabled, the screen shows the actual commands that are being run when a user types a command. You can also view each input command individually by mousing over the command.

   Show profile commands: Use the check box to show or hide the commands run in the user's login profile when the user's pcksh login shell has auditing configured to level 2.
6. (Optional) To see the keystroke text being played back with the screen output, click *Output*.

   You can start the playback from a specific line in the input by selecting that line before clicking *Output*.

   - Click *Play* to play the keystroke entries and view the output.
   - Click *Rewind* to go back to the beginning.
   - Click *Pause* to pause the playback.
   - Click *Forward* to skip any pauses in the playback where the user might have taken a break from typing.
   - Set the *Playback Speed* to *Real Time*, *Double Speed*, or *Full Speed*.

- Set the *Scrollback* field to the amount of text you want to be able to scroll back through, in kilobytes.
- Change the *Terminal Type* to the one you want.

7 Click *Cancel* to return to the record list.

9.4.3 Viewing a Change Management Audit Record

1 Click *Compliance Auditor* on the home page of the console.

2 Select the Command Control Change Management record you want to view.

The record type is shown in the *Type* column. You might need to scroll to the right to see this column.

3 Click *View Record* in the task pane.

Information about the Change Management action is displayed, including the name of the user who made changes to the database, and any entries the user made when committing the Command Control transaction.

4 To edit the record, see Section 9.4.5, “Editing an Audit Record,” on page 177.

9.4.4 Viewing a Report Audit Record

1 Click *Compliance Auditor* on the home page of the console.

2 Click the record you want to view.

The record type is shown in the *Type* column. You might need to scroll to the right to see this column.

3 Click *View Record* in the task pane.

Record data for this report is shown, including the contents of the report sent.

4 To edit the record, see Section 9.4.5, “Editing an Audit Record,” on page 177.

9.4.5 Editing an Audit Record

For each event listed in the Compliance Auditor, you can edit the audit record to authorize the event, or mark it as unauthorized, escalate it, and assign it to another user. You can also add notes for display in the event record, and comments that are permanently recorded in the event history.

NOTE: For Command Control events for which a keystroke report exists, you must view the keystroke report before editing the audit record. See Section 9.4.2, “Viewing and Editing a Command Control Keystroke Report,” on page 176 for more information.

To edit an audit record:

1 Click *Compliance Auditor* on the home page of the console.

2 Select the record you want to edit.

3 Click *View Record* in the task pane.

4 Click *Edit Record*.

5 (Optional) Authorize the event:

   5a Select the *Authorized* check box.

   5b In the *Note* field, specify a note to be displayed on the event list and event record.

   5c In the *Comment* field, specify a comment to be permanently displayed in the *History* on the View Record page.

6 (Optional) Mark the event as unauthorized:

   6a Select the *Unauthorized* check box.

   6b If necessary, set an *Escalation Level* to be displayed on the event list.

   This can be used as a report filter when setting up reports. See Section 9.3.1, "Adding or Modifying an Audit Report," on page 170.

   6c If necessary, use the *Assigned to* field to assign the record to a different user.

   6d Specify a *Note* or a *Comment* to explain why the event is unauthorized.

7 Click *Finish*.

9.4.6 Archiving Records

Audit records can be archived from the console or from the command line. For information about the command line options, see Section 12.7.2, "Managing Compliance Auditor Records," on page 195.

To archive records from the console:

1 Click *Compliance Auditor* on the home page of the console.

2 Select the records you want to archive.

   To select multiple records, press the Ctrl key and select the records one at a time, or press the Shift key to select a consecutive list of records.

3 Click *Archive Record*s in the task pane.

   A list of the selected records is displayed.

4 Configure the following fields:

   Comment: (Required) Specify the reason for the archive.

   Keep Online: (Optional) Select if you want the archived records to continue to be displayed in the list of records.

5 Configure the types of records to archive.

   By default, authorized and unauthorized records are selected. New and pending records are not displayed. If you want to archive these records, select the *New* and *Pending* options.

   IMPORTANT: After a record is archived, it cannot be modified. If you archive new or pending records, their status can never change.

6 Click *Finish*.

9.4.7 Managing Archived Records

From the Framework Manager console, you can restore an archive and move archives from an online state (viewable in the console) and to an offline state (not viewable in the console) and from an offline state to an online state. You must use the command line options to purge an archive. See Section 12.7.2, “Managing Compliance Auditor Records,” on page 195.

To manage archived records from the console:

1. Click *Compliance Auditor* on the home page of the console.
2. Click *Manage Archives* in the task pane.
3. To restore an archive to an online status, select the archive, then click *Restore*.
4. To move an archive from an online status to an offline status, select the archive, then click *Remove*.
5. Click *Close*.

9.5 Access Control Levels

You can define an Access Control Level (ACL) for your auditors that specifies which events they are allowed to view and restricts auditors from authorizing their own activity.

- Section 9.5.1, “Adding or Modifying a User ACL,” on page 179
- Section 9.5.2, “Deleting a User ACL,” on page 180

9.5.1 Adding or Modifying a User ACL

1. Click *Compliance Auditor* on the home page of the console.
2. Click *Access Control* in the task pane.
3. To add a new ACL, click *Add User ACL* in the task pane. To modify an existing ACL, select the required *User* and click *Modify ACL* in the task pane.

   When creating a new user ACL, select the user from the *Username* drop-down list.
4. Click *Add*.
5. At the bottom of the table, select the attribute from the drop-down list that describes the entity to which you want to control access for the selected user.

   For example, if you do not want this user to be able to audit Command Control events involving a particular command, click *Command*.
6. In the *Matches* field, specify the value of the attribute you want to control access to.

   For example, if you do not want this user to be able to audit any Command Control events that involve the `cat /etc/passwd` command, specify this command in this field. You can use wildcard characters in this field.
7. Set the *Action* to allow or deny.
8. (Optional) Use the arrow buttons to move entries up and down the list.

   You might want to do this if, for example, you are allowing the user to access a restricted list of commands, and using the wildcard * to deny access to all other commands. The `allowed commands` entries must be above the `deny all` entry. By default, all commands are allowed.
9. (Optional) Remove an attribute by selecting it and then clicking the *Remove* button.

10 (Optional) Modify an entry by selecting it, then specifying the changes.

11 Click *Finish*.

9.5.2 Deleting a User ACL

1 Click *Compliance Auditor* on the home page of the console.

2 Click *Access Control* in the task pane.

3 Select the user for whom you want to delete an ACL.

4 Click *Delete User ACL* in the task pane.

5 Click *Finish* to delete the ACL for the user.

9.6 Deploying the Compliance Auditor

You can provide failover and load balancing by installing the Compliance Auditor on multiple hosts. The Compliance Auditor consists of the following packages:

- **Compliance Auditor (secaudit):** Holds the compliance auditor rules and audit information.
- **Compliance Auditor Console:** Installed into the Framework Manager console. Required for configuring Compliance Auditor rules and for viewing audit information.

The Compliance Auditor has the following dependencies:

- The Compliance Auditor package is shown as an available package only on hosts that have the Audit Manager (audit) deployed.
- If you want to use the Compliance Auditor reporting facilities, you need to install the Access Manager (auth) on the host with the Compliance Auditor.

To deploy the Compliance Auditor:

1 Download the required packages to your local Package Manager. See Chapter 3, “Managing Package Distribution,” on page 25 for details.

2 Install the Audit Manager package on the host you want to be the Audit Manager, then install the Compliance Auditor package on the same host.

   This can be on any operating system, including Windows. See Section 4.5.6, “Installing Packages on a Host,” on page 42 for details. The auditing packages can be deployed to as many hosts as you need in order to build an environment with load balancing and failover.

3 If you need reporting facilities, install the Access Manager package on the same host as the Compliance Auditor package.

4 Install the Compliance Auditor console. See Section 3.2.2, “Adding a Console to the Framework Manager Console,” on page 27 for details.

The Compliance Auditor is now deployed and ready to use.

10 Load Balancing and Failover

The load balancing and failover features work by using a hierarchical view of the hosts associated with the Framework.

The hierarchy of hosts is created by using the Hosts console to group hosts into domains and subdomains, which are representative of your enterprise network structure. This effectively gives them a chain of command, where they always address requests to managers in their immediate subdomain before moving along a branch to another subdomain or parent domain.

To achieve an effective load balancing and failover environment, at least two Framework Manager packages must be deployed across the same Framework. The licensing model is not based on how many managers or agents are deployed, but how many hosts the Framework is deployed on. This means that there are no restrictions on how many Framework Manager packages you can deploy.

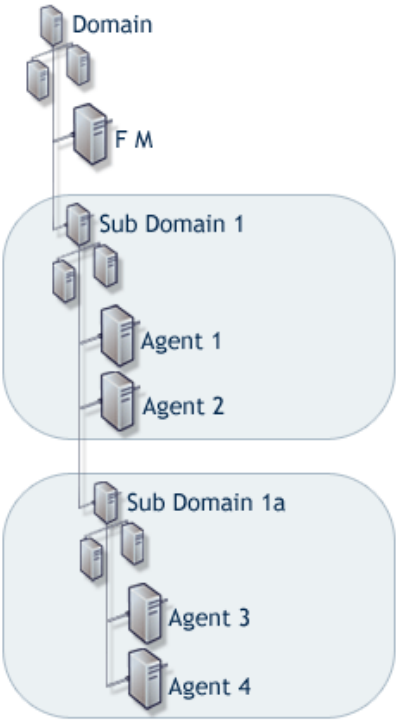
The Registry Manager controls a database that records the location and status of each package deployed on each of the hosts within the Framework. A copy of this information is held at each host by the Registry Agent package that is included as part of the agent installation. The distributed information is used to calculate the route to the appropriate manager for requests from any agent registered on the Framework. The structure of the registry data enables each host to determine which Framework Manager on the Framework should be the target of requests, and which Framework Manager to use if there is a failure or withdrawal of the initially selected Framework Manager.

- Section 10.1, “Failover,” on page 181
- Section 10.2, “Load Balancing,” on page 182

10.1 Failover

The failover feature automatically and transparently redirects requests from a failed or withdrawn Framework Manager to the next available manager of the same type. The agent automatically connects to a manager that is next in line in accordance with your defined hierarchy.

Table 10-1 Creating a Failover Environment



This diagram shows an example of a typical way to create an effective failover environment.

The Framework Manager (FM) is a Windows host. All agents are UNIX hosts.

Deployment: Deploy the Command Control Manager package on the Framework Manager, Agent 1, and Agent 3 hosts.

Who authenticates to whom: By default, each agent contacts the following host for Command Control authentication:

Agent 1 and 2 contact Agent 1.
Agent 3 and 4 contact Agent 3.

IMPORTANT: Windows supports only the Command Control Manager package.

Examples:

1. Agent 3 is downed for maintenance. Agent 4 seeks authentication from Agent 1.
2. Agent 1 is downed because of a broken network card. Agents 2, 3, and 4 seek authentication from the Framework Manager.
3. The Command Control Manager package is removed from the Framework Manager and the Agent is still broken. Agents 2, 3, and 4 seek authentication from Agent 3.

IMPORTANT: If an additional subdomain is added, agents under Subdomain 1 and 1a then seek authentication from the new Subdomain if no other Command Control Manager is available.

10.2 Load Balancing

Load balancing means the ability to evenly distribute processing and communications activity across the Framework so that no single Framework Manager is overwhelmed by agent requests.

Load balancing is particularly important in situations where it is difficult to predict the number of requests that are directed to a specific category of manager.

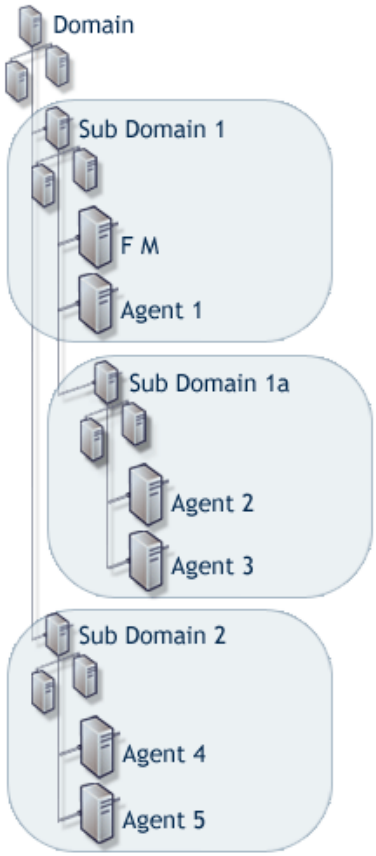
The Framework automatically replicates data from the defined primary manager to each additional manager that is deployed in the Framework. Replication takes place automatically when the manager is initially deployed and then again at any stage when the data on the primary manager is modified.

The following packages can be load balanced:

- **Registry Manager:** Maintains a database of all hosts and modules and provides certificate-based registration features for the hosts.
- **Package Manager:** Manages a repository for packages.

- **Administration Agent:** Provides the functionality for the Web-based user interface. Consoles can be installed on the Administration Agent and used to control product features.
- **Access Manager:** Maintains a list of Framework user accounts and provides authentication services for the Framework. This package must be installed with a local Registry Manager in order to create a secure user authentication token.
- **Command Control Manager:** Maintains a database of all defined command control rules, commands, and scripts.

Table 10-2 *Creating a Load Balancing Environment*



This diagram is an example of a typical way to create an effective load-balanced environment.

The Framework Manager (FM) is a Windows host. All agents are UNIX hosts.

Deployment: Deploy the Command Control Manager package on the Framework Manager, Agent 2, and Agent 4.

Who authenticates to whom: By default, each agent contacts the following host for Command Control authentication:

Agent 1 contacts the Framework Manager.

Agents 2 and 3 contact Agent 2.

Agents 4 and 5 contact Agent 4.

IMPORTANT: Windows supports only the Command Control Manager package.

Example of load balancing working with failover:

1. Agent 2 is downed for maintenance. Agent 3 seeks authentication from the Framework Manager.
2. Agent 4 is down because of a broken network card. Agents 5 seeks authentication from the Framework Manager.

11 Command Control Components

The components of the Command Control module interact with other Privileged Account Manager modules as indicated in the following table.

Table 11-1 *Command Control Components*

Component	Description
Command Control Console	Provides the user interface with the Command Control database to allow creation and management of Command Control rules. Available on all supported platforms. Interacts with: **Framework Manager Console:** Provides the main user interface. **Command Control Manager:** Contains the Command Control information.
Command Control Manager	Contains the database of Command Control rules. Available on all supported platforms. Interacts with: **Command Control Console:** Provides a user interface to the Command Control module. **Command Control Agents:** Provides client functionality for the Command Control module.
Command Control Agent	Provides the client for Command Control, including shells and remote execution binaries. Available on all supported UNIX and Linux platforms. Interacts with: **Command Control Manager:** Obtains command authentication information. **System Information Agent:** Obtains remote host information from alternative hosts. **Audit Manager:** Sends collected audit information to the Audit Manager.
System Information Agent	A background agent that gathers host and user information on the agents. Available on all supported UNIX and Linux platforms. Interacts with: **Command Control Agents:** Supply requested information regarding hosts and users.

Component	Description
Audit Manager	Contains the database of all Command Control activity and user-logged sessions. Available on all supported platforms. Interacts with: **Command Control Reports:** Provide a user interface for Command Control audited events. **Command Control Agent:** Receives the auditing information.
Reporting	Provides the primary user interface for auditing. You add plug-ins to view appropriate package information. Available on all supported platforms. Interacts with: **Framework Manager Console:** Provides the main user interface. **Command Control Reports:** Provide the Command Control auditing interface.
Command Control Reports Console	Provides the Command Control auditing interface that reports on all successful/unsuccessful Command Control events, as well as captured sessions and replay. Available on all supported platforms. Interacts with: **Audit Manager:** Contains the audited information. **Reporting:** Parent console of the Command Control Reports console.

12 Command Line Options

The command line options can be run from either a Linux/UNIX Framework Manager or a Windows Framework Manager. Some can be run from an agent machine.

To use the command line options, change to the `unifi` directory:

Linux/UNIX: `/opt/netiq/npum/sbin/unifi`

Windows: `<Drive>:\Program Files\Netiq\npum\sbin\unifi`

The following sections assume that you are running the commands from the `unifi` directory. If you are using the new Windows power shell, replace the `./` of the syntax with `.\`. If you are not using this new Windows shell, remove the `./` from the command. For example:

Linux/UNIX: `./unifi -v`

Windows Power Shell: `.\unifi -v`

Windows: `unifi -v`

This command displays version information for the Command Control module.

Privileged Account Manager supports the following command line options:

- Section 12.1, “The unifi Options,” on page 187
- Section 12.2, “Command Control Options,” on page 188
- Section 12.3, “Package Distribution Options,” on page 191
- Section 12.4, “Package Manager Options,” on page 191
- Section 12.5, “Registry Agent Options,” on page 192
- Section 12.6, “Registry Manager Options,” on page 194
- Section 12.7, “Compliance Auditor Options,” on page 194
- Section 12.8, “sreplay Command Line Options,” on page 196

12.1 The unifi Options

The `unifi` binary is located in the `/opt/netiq/npum/sbin/unifi` directory for Linux and Unix platforms and in the `\Program Files\Netiq\npum\sbin\unifi` directory for the Windows platform. The command has the following syntax:

Syntax: `./unifi [options]`

Replace `[options]` with one or more of the following:

Option	Description
-v	Displays the version of the Framework patch.
-s	Displays the service name if you have changed it by modifying the `unifi.xml` file.

Option	Description
-u <*username*>	Specifies the username of the user requesting the command. This is used to verify that the user has sufficient rights to execute the command. Most, but not all commands, require authorization.
-p <*pwd*>	Specifies the password of the user.
-n	Indicates that the user's native account can be used for credentials. This option replaces the -u <*username*> -p <*pwd*> options. For information on how to set up native maps, see "Modify User: Native Maps" on page 70. Most of the module commands require authentication credentials to verify the user's rights to issue the command.

For example:

```
/opt/netiq/npum/sbin/unifi -v
```

This command displays the version of the Framework patch.

12.2 Command Control Options

The command line options for the Command Control module allow you to perform the following tasks:

- Section 12.2.1, "Importing and Exporting Command Control Settings," on page 188
- Section 12.2.2, "Backing Up and Restoring a Command Control Configuration," on page 189
- Section 12.2.3, "Running Test Suites," on page 191

12.2.1 Importing and Exporting Command Control Settings

The following commands allow you to export a current command control configuration and import one. Importing a configuration overwirtes any existing rule set; therefore before importing a configuration, you should back up the current configuration (see Section 12.2.2, "Backing Up and Restoring a Command Control Configuration," on page 189).

The export command has the following syntax:

Syntax: `./unifi -n cmdctrl export [options]`

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u <*username*> -p <*password*> options and specify the name and password of a Framework Manager user who has the rights to perform this task.

Replace [options] with one or more of the following:

Options	Description
-f <*arg*>	Specifies where to export the configuration to. Replace <*arg*> with a filename or a path and filename.
-c	Specifies that the configuration should be exported in clear text. This option cannot be used with the -p option.
-p <*pwd*>	Specifies an encryption password for the file. If a password is specified, the password must be entered when importing the file. This option cannot be used with the -c option.

The import command has the following syntax:

Linux Syntax: `./unifi -n cmdctrl import [options]`

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u <*username*> -p <*password*> options and specify the name and password of a Framework Manager user who has the rights to perform this task.

Replace [options] with one or more of the following:

Options	Description
-f <*arg*>	Specifies the file to import. Replace <*arg*> with a filename or a path and filename.
-p <*pwd*>	Specifies the password that was used to encrypt the configuration when it was exported.

12.2.2 Backing Up and Restoring a Command Control Configuration

The following commands can be executed on the primary console or on backup hosts. When they are executed on a backup host, the commands actually execute on the primary console.

Syntax: `./unifi -n cmdctrl [option]`

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u <*username*> -p <*password*> options and specify the name and password of a Framework Manager user who has the rights to perform this task.

Replace `[option]` with one of the following:

Option	Description
`backup -t <"reason">`	Backs up the current command control database. The -t <*"reason"*> parameter allows you to supply a reason for the backup, and is optional but recommended. Enclose the reason text in double quotes.

Option	Description

`listcfg` *<format>*	Lists the backups that are available for restoration. To specify a format, use one of the following:
	
	-x: `For XML output. For example: <a.Item I.version="0" who="admin" reason="Backup 1" I.timestmp="1247146780" I.id="1"/>`
	
	-D *<date>*: For modifying the date format. For example, if you replace *<date>* with `%D` for the format, the time stamp is displayed as `07/14/09` rather than `2009-07-14_11-52-56`. For possible options, see strftime(3C).
	
	-F *<fmt>*: For specifying what template information is displayed. By default, the following information is displayed.
	
	◆ **id:** The unique ID of the backup.
	◆ **who:** The ID of the user who created the backup.
	◆ **reason:** The reason for the backup, if provided by the user.
	◆ **timestmp:** The date and time when the backup occurred.
	
	Replace *<fmt>* with one or more of these options. Individual options are enclosed with ${ }$ and separated from other options with a comma. The entire string is enclosed in single quotes. For example:
	
	`-F '${id}$,${reason}$'`
	
	This string would print out the following:
	
	`1,Basic test rules for session closure`

`restore -n` *<id>*	Restores the command control database to the select version. Replace *<id>* with the version number you want to restore. The current configuration is overwritten. You cannot restore when transactions are enabled (see Section 7.4, “Command Control Transactions,” on page 94).
`delcfg -n` *<id>*	Deletes the selected backup from the list. Replace *<id>* with the version number you want to delete. Deleting a backup is permanent and cannot be undone.
`backup --?`	Displays the usage help for the `backup` command.
`listcfg --?`	Displays the usage help for the `list` command.
`restore --?`	Displays the usage help for the `restore` command.
`delcfg --?`	Displays the usage help for the `delete` command.

Sample Commands

To back up the database:

```
./unifi -n cmdctrl backup -t "Added the ls command."
```

To restore the second backup in the list:

```
./unifi -n cmdctrl restore -n 2
```

12.2.3 Running Test Suites

The test suite options allow you to run part or all of the Command Control test suites.

Syntax: `./unifi -n cmdctrl runTest [option]`

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u *<username>* -p *<password>* options and specify the name and password of a Framework Manager user who has the rights to perform this task.

Replace `[option]` with one or more of the following:

Option	Description
`-t <'arg'>`	Specifies a specific test suite to run. Replace *<arg>* with the name of the test suite. This option cannot be used with the -A option
`-A`	Runs all the test suites. This option cannot be used with the -t option.
`-v`	Outputs the full debug information to the screen.
`-V <file>`	Outputs the full debug information to the specified file or the specified path and file.
`-o <file>`	Outputs the test results to the specified file or the specified path and file.

For example:

```
./unifi -u admin cmdctrl runTest -A -o /tmp/test.log
```

This command writes the results of the test suites to the `test.log` file in the `/tmp` directory.

12.3 Package Distribution Options

The following command allows you to import packages into the Package Manager

Syntax: `./unifi -n distrib publish [option]`

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u *<username>* -p *<password>* options and specify the name and password of a Framework Manager user who has the rights to perform this task.

Replace `[option]` with one of the following:

Option	Description
`-d <directory>`	Imports the packages from the specified directory, for example: `-d /tmp/framework`
`-f <package>`	Imports the specified package, for example: `-f /tmp/framework/xxx.pak`

12.4 Package Manager Options

The following commands allow you to install and uninstall the packages on the agents.

Syntax: `./unifi -n pkgman install <agent> <package>`

Syntax: `./unifi -n pkgman uninstall <agent> <package>`

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u <*username*> -p <*password*> options and specify the name and password of a Framework Manager user who has the rights to perform this task.

Replace <*agent*> with the agent name for the host. To view a list of these names, click **Hosts** on the home page of the Framework Console.

Replace <*package*> with the name of the package to install or uninstall. To view a list of package names in the Framework Console, click **Hosts**, select a host, select to display the packages. The name field contains the package name that is used in this command.

NOTE: You cannot use this command to install or uninstall consoles. It can only be used to install and uninstall modules.

12.5 Registry Agent Options

The Registry Agent module allows you to perform the following tasks from the command line:

- Section 12.5.1, "Registering an Agent," on page 192
- Section 12.5.2, "Finding a Primary Manager Package," on page 193
- Section 12.5.3, "Agent Status," on page 193
- Section 12.5.4, "Adding Hosts and Domains," on page 193

12.5.1 Registering an Agent

The following command registers an agent with the Framework Manager. It must be run from the agent machine.

To run the command and be prompted to supply information:

```
./unifi regclnt register
```

You are prompted to supply the IP address of the Framework Manager, the registration port (the default port is 29120), the DNS name or IP address of the agent machine, the agent name, then a Framework Manager username and password.

To run the command with all the parameters on the command line:

```
./unifi regclnt register <manager> 29120 <hostname> <agent name> <admin> <password>
```

Replace <*manager*> with the IP address of the Framework Manager, <*hostname*> with the DNS name or IP address of the agent machine, <*agent name*> with the name of the agent, <*admin*> with a Framework Manager username, and <*password*> with the user's password. For example:

```
./unifi regclnt register manager1 29120 agent1.domain.com agent1 admin netiq
```

12.5.2 Finding a Primary Manager Package

The following command displays details about primary manager packages. It can be run from any host machine, and displays the primary manager information contained in the local machine's databases.

Syntax: `./unifi -n regclnt getManager <package>`

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u *<username>* -p *<password>* options and specify the name and password of a Framework Manager user who has the rights to perform this task.

Replace *<package>* with one of the following: `admin, audit, auth, cmdctrl, msgagnt, pkgman, registry, secaudit, syslogemit`.

For example, the following command returns details about the primary Command Control Manager:

```
./unifi regclnt getManager cmdctrl
```

12.5.3 Agent Status

The following command displays the status of agents within the framework. It can be run from any host machine.

Syntax: `./unifi -n regclnt status [option]`

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u *<username>* -p *<password>* options and specify the name and password of a Framework Manager user who has the rights to perform this task.

Replace *[option]* with one or more of the following:

Option	Description
`-s <server>`	Displays status of the specified host. This option can be repeated on the command line for more than one host.
`-o <domain>`	Allows you to request status for all agents in a domain. This option can be repeated on the command line for more than one domain.
`-S <server>`	Confirms whether the host can communicate with the specified agent.
`-M <module>`	Confirms whether the agent can communicate with the specified module.
`-a`	Displays the status for all defined hosts.
`-c`	Provides output in CSV format.
`-h`	Prevents the display of the CVS header.
`-?`	Displays the usage message.

12.5.4 Adding Hosts and Domains

The `unifi` command supports the addition of hosts and domains directly from the command line during the host registration process. The additional roles that must be provided in the Framework User Manager are:

- To allow creation of host records during registration

Module: unifi Role: register_host

- To allow creation of domain records during registration

  Module: unifi Role: register_domain

For example:

- To create a host record from command line:

  Syntax: `/opt/netiq/npum/sbin/unifi regclnt register <Manager IP Address> 29120 <Agent IP Address> /Host <admin> <password>`

- To create a host under a domain:

  Syntax: `./unifi regclnt register <manager> 29120 <hostname> <agent name> </Host or Domain/Host> <admin> <password>`

12.6 Registry Manager Options

The registry command allows you to promote the registry on a backup host to primary status from the command line. After you have promoted the registry to primary, you can log in to the backup console and promote the remaining packages to primary.

Syntax: ./unifi -n registry promote

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u *<username>* -p *<password>* options and specify the name and password of a Framework Manager user who has the rights to perform this task.

12.7 Compliance Auditor Options

The command line options for the Compliance Auditor allow you to perform the following tasks:

- Section 12.7.1, "Exporting and Importing Compliance Auditor Settings," on page 194
- Section 12.7.2, "Managing Compliance Auditor Records," on page 195

12.7.1 Exporting and Importing Compliance Auditor Settings

The Compliance Auditor now supports the ability to export and import its settings from the command line. You can export and import the following settings:

- Audit Rules
- Audit Reports
- Access Control Levels

Exporting: The export command exports only configuration settings; the audit records are not exported. The export includes all rules and reports, even those that have been disabled. The Compliance Auditor does not allow rules or reports to be deleted, because they might be associated with audit records. The exported file is in XML format.

Importing: You should import the settings only on a system that hasn't been configured or on a system where the current configuration is not needed. Every rule and report contains a unique ID, but if that ID already exists on the current system, the rule or report is overwritten by the imported configuration.

Commands: The commands use the following syntax:

```
./unifi -n secaudit import -f <file>
./unifi -n secaudit export -f <file>
```

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u *<username>* -p *<password>* options and specify the name and password of a Framework Manager user who has the rights to perform this task.

Replace *<file>* with the name of the file to import or to create for the export.

12.7.2 Managing Compliance Auditor Records

The compliance auditor now supports the ability to archive, restore, and purge the audit records from the command line. These commands can be performed on the Framemaker Manager console machine or from a backup host. When executed from a backup host, a command is actually execute on the primary host.

If a backup host is promoted to be a primary host, the archived database can be placed on the promoted manager and restored.

The `secaudit` command has the following syntax:

```
./unifi -n secaudit [list] [listarchive] [archive] [restore] [purge]
```

If you have not mapped your local account to a Framework Manager user (see "Modify User: Native Maps" on page 70), replace the -n option with -u *<username>* -p *<password>* options and specify the name and password of a Framework Manager user who has the rights to perform this task.

The `secaudit` command supports the following options:

Option	Description
`list <format>`	Displays all of the audit records currently stored, including any records already archived, unless archived records have been purged. To view a format other than the default, specify one of the following: **-x:** `For XML output.` **-D *<date>*:** For modifying the date format. For example, if you replace *<date>* with `%D` for the format, the time stamp is displayed as `07/14/09` rather than `2009-07-14_11-52-56`. For possible options, see strftime(3C). **-F *<fmt>*:** For specifying what template information is displayed. By default, the following information is displayed. ◆ **id:** The unique ID of the archive. ◆ **who:** The ID of the user who created the archive. ◆ **reason:** The reason for the archive, if provided by the user. ◆ **timestmp:** The date and time when the archive occurred. Replace *<fmt>* with one or more of these options. Individual options are enclosed with ${ }$ and separated from other options with a comma. The entire string is enclosed in single quotes. For example: `-F '${id}$,${reason}$'`

Option	Description
`archive -n <from:to> -p <pwd> -r "<reason>"`	Creates a database in the `/opt/netiq/npum/service/local/secaudit` directory with the following format: `sa-2009-06-05_11-38-43.db` Each archived database can then be taken offline (moved to another storage area) and put back in place at any point. Specify values for the following parameters: **-n *<from:to>*:** Specifies the records to archive. To archive one record, specify its ID. To archive a range of records, replace *<from:to>* with the range. For example to archive records 20 to 40, specify `20:40`. Use the `list` option to view the IDs of the records. **p *<pwd>*:** (Optional) Specifies a password. If a password is specified for an archive, the same password must be used to restore the archive. **-r *"<reason>"*:** (Optional) Specifies a reason for the archive. The text must be included in double quotes.
`listarchive <format>`	Displays each of the archives that have been created. To view a format other than the default, replace *<format>* with a supported format. See the `list` option for valid values.
`restore -n <archid> -p <pwd>`	Restores an archive set of audit records so that they are displayed in the Compliance Auditor console. **-n *<archid>*:** Specifies the archive to restore. Use the `listarchive` option to view the IDs of the archives. **p *<pwd>*:** (Conditional) Specifies a password. If a password is specified for an archive, the same password must be used to restore the archive.
`purge`	Purges audit records that have been archived. Records that have been purged no longer appear in the Compliance Auditor console. A restore of the archive makes these records viewable again.

12.8 sreplay Command Line Options

The sreplay option is used to view the audit records from the command line. The sreplay binary is located in the `/opt/netiq/npum/sbin/` directory for Linux and Unix platforms.

Syntax: `sreplay <options> <host>`

The various options are:

Option	Description
`-U user`	Username
`-P passwd`	Password
`-N`	Uses native account for authorization
`-l`	Lists available logs
`-g <logfile>`	Gets available session entries in log

Option	Description
`-u <user>,<logfile>`	Gets available session entries for a particular user
`-r <session#>,<logfile>`	Replays a particular session
`-f`	Date format
-c	csv output
-z	csv separator

Options that can be used with `-g` and `-u`

Option	Description
`-F <FMT>`	Displays extra info, specified by FMT (comma seperated list)
`groupid[=n]`	Display group id of session
`time[=n]`	Displays time of start of session
`key[=n]`	Displays session number
`user[=n]`	Displays submit user
`host[=n]`	Displays submit host
`runas[=n]`	Displays run user
`runhost[=n]`	Displays run host
`cmd[=[-]n]`	Displays command
`term[=n]`	Displays term type
`size[=n]`	Displays size of session in Kb
	NOTE: This can cause high CPU utilization on large files.
`all`	Lists all events

Option that can be used with `-g` and `-r`

Option	Description
`-z`	Get using group ID

Options that can be used with `-r`

Option	Description
-i	Displays stdin
-o	Displays stdout
-e	Displays stderr
-s	Displays signals
-p	Displays passwords
-d <# ms>	Sets display delay
-c <charset>	Enables character set conversion
-a	Displays all data
-l	Displays character by character, waiting for keypress
-m	Displays line by line, waiting for keypress
-x	Displays x11 capture

Sample Commands

- To list all the available logs

  Syntax: `./sreplay -l -U admin -P netiq123`

  Sample output:

  ```
  Audit Group: cmdctrl
  Archive: cmdctrl.db - available
  ```

- To get the available sessions stored in log file

  Syntax: `./sreplay -l -U admin -P netiq123 -g cmdctrl.db`

  Sample output:

  ```
  root 1 "25-Feb-2011 11:05:29"
  root 161 "25-Feb-2011 11:08:51"
  user2 331 "25-Feb-2011 11:09:07"
  ```

13 Managing Shared Accounts

In an enterprise when a user uses the shared account credentials for privileged access to any application or database, the security vulnerability increases. Users can use the shared account credentials without any time limit. If the privileged access to shared accounts are not managed, auditing becomes difficult and leads to security risk.

Privileged Account Manager (PAM) manages the access and the security of the privileged account credentials through the Privileged Credential Vault. For more information about Privileged Credential Vault, refer Section 7.13, “Privileged Credential Vault,” on page 131. Privileged Account Manager stores the shared account credentials of the application or the database in the privileged credential vault. The password checkout feature helps in retrieving the credentials from the Privileged Credential Vault. The password checkout feature helps in managing the account credentials and provides the following capabilities:

- Provide available shared account credentials and deny access if all the credentials are in use.
- Provide users access to application or database for a fixed time period.
- After every session, reset the password of the account in the target application to maintain the password security.

A Privileged Account Manager administrator can create a privileged account for an application/ database and save the application/ database administrator credential. These credentials will be used only when resetting or checking-in the password. So, when a user requests for credentials to connect to Oracle database or any application, Privileged Account Manager checks for the login credentials that are available for that application, then provides the credentials to the user. An administrator can monitor the commands that a user runs on any application and audit the report based on the defined risk score.

The following sections provide details on configuring, accessing and managing shared account credentials by using the password checkout feature.

- Section 13.1, “Enabling Password Checkout for Applications,” on page 199
- Section 13.2, “Enabling Password Checkout for Oracle Database,” on page 204
- Section 13.3, “Specifying Password Policies,” on page 205
- Section 13.4, “Adding Shared Account Credentials in the Account Domain,” on page 206
- Section 13.5, “Configuring Password Check out Settings,” on page 206
- Section 13.6, “Managing Credentials for Shared Accounts,” on page 206

13.1 Enabling Password Checkout for Applications

The password checkout feature can be customized for the applications such as Salesforce, SAP and so on. You can use the policy template for **LDAP Password Checkin-Checkout,** and **Active Directory Password Checkin-Checkout** then customize it as per requirement. For more information about adding a policy template refer, Section 5.2, “Adding a Policy Template,” on page 62. To enable

password checkout for any application, you need to add the account credentials of the application server to the credential vault. Perform the following to enable password checkout feature for applications:

1 Create a privileged account for the application server:

   1a On the home page of the console, click **Command Control**.

   1b In the navigation pane, click the Privileged Credential Vault icon and click **Privileged Credential Vault**.

   1c In the details pane, click **Add Account Domain**.

   If you have imported a policy template for password checkout, a sample account domain gets created with the name `DOM-APP_<application name>`. You need to modify the sample account domain by clicking **Modify** in the details pane.

   1d Specify the following information:

   Account Name: Specify the name of the application domain. The name of the domain should be followed by an underscore (_) and the application name.

   For example, if a SAP server is on the *172.16.0.1* domain, you need to specify the Account Name as *172.16.0.1_SAP.* If you do not provide the correct domain name, user authentication fails.

   Type: Select **Application**

   Sub-Type: This field gets auto populated with the application name that you have specified in the Account Name field. For example, if you have specified the **Account Name** as abc_pqr_Salesforce. the **Sub-Type** field will be auto-populated as Salesforce.

   Host: Specify the IP address of the of the host server. Also provide the port number.

   Password check-in: Select the appropriate option that can be used for password check-in. You can specify either of the following:

   - **Script:** Specify any perl script to reset the account password for the application. The perl script should return 0 when the reset is unsuccessful or 1 when the reset is successful. You can add more attributes to the script. To add a custom attribute to the script, click **Custom Attributes**.
   - **Delegate to Identity Manager:** You can delegate the password check-in process to Identity Manager. On selecting this option, the IDM (Identity Manager) driver for PAM takes care of generating random password and synchronizing the password to IDM. The PAM driver checks-in the new password to PAM. IDM takes care of synchronizing password on the applications through the respective application driver. For more information refer the *Driver Implementation guide* on the PAM documentation page.

     NOTE: Before delegating password check-in to Identity Manager ensure that the PAM driver and the application driver are operational.

   Following is an example script for resetting the password of the accounts on eDirectory.

```
## PAM script to reset password of an LDAP user

## global variables
my $ldapURL = "";
my $retVal = 0;
my $ldap = "";

## DEFAULT ARGUMENTS passed from the account domain configuration

my $host = $args->arg("host");
my $port = $args->arg("port");
my $secure = $args->arg("secure");
my $adminDN = $args->arg("adminName");
my $adminPasswd = $args->arg("adminPasswd");
my $userDN = $args->arg("userName");
my $userPasswd = $args->arg("userPasswd");

## custom attributes to the script should also be accessed in this way

$ctx->log_info("START PASSWD RESET");
$ctx->log_debug("Input LDAP parameters : host - $host :: port - $port ::
secure - $secure :: adminDN - $adminDN :: userDN - $userDN ");
$ctx->log_info("Resetting the password of the LDAP user $userDN");

## validate inputs
if ($host eq "" or $adminDN eq "" or $adminPasswd eq "" or $userDN eq "" or
$userPasswd eq "") {
 $ctx->log_error("Incomplete LDAP inputs - following parameters are
mandatory - host, adminDN, adminPasswd, userDN and userPasswd are
passed.");
 return 0;
}
# set default ldap port numbers
if ($port eq "") {
 if ($secure eq "" || $secure != 0) {
  $port = 636;
 } else {
  $port = 389;
 }
}

# create ldap url
if ($secure != 0) {
 $ldapURL = "ldaps://".$host.":".$port;
} else {
 $ldapURL = "ldap://".$host.":".$port;
}

# Login as LDAP admin
$ctx->log_debug("Authenticating to the LDAP server...");
$ldap = ldap_bind($ctx, $ldapURL, $adminDN, $adminPasswd, 100);
if ($ldap->arg('err') != 0) {
 my $le = $ldap->arg('err');
 $ctx->log_error("LDAP authentication failed - $le");
 return 0;
} else {
 $ctx->log_debug("LDAP authentication to $ldapURL as $adminDN
successful.");
}

# Reset the user password
$ctx->log_debug("Modifying the password of the user $userDN ...");
$ldap = ldap_modify($ctx, $userDN, "userpassword", $userPasswd);
if ($ldap->arg('err') != 0) {
```

```
 my $le = $ldap->arg('err');
 $ctx->log_error("LDAP modify failed - $le ");
 return 0;
} else {
 $ctx->log_debug("LDAP modify successful in resetting the password of the
user $userDN.");
}

# Logout LDAP admin
$ctx->log_debug("Logging out $adminDN from $ldapURL");
ldap_unbind($ctx);

$ctx->log_info("END PASSWD RESET");
return 1;
```

Following is the sample script for resetting the password on an Active Directory with SSL enabled:

```
## PAM script to reset password of Microsoft ActiveDirectory LDAP user
use MIME::Base64;
use Encode qw(encode);

## global variables
my $ldapURL = "";
my $retVal = 1;
my $ldap = "";

## DEFAULT ARGUMENTS passed from the account domain configuration

my $host = $args->arg("host");
my $port = $args->arg("port");
my $secure = $args->arg("secure");
my $adminDN = $args->arg("adminName");
my $adminPasswd = $args->arg("adminPasswd");
my $userDN = $args->arg("userName");
my $userPasswd = $args->arg("userPasswd");
my $userPasswdEncoded = encode_base64(encode("UTF-16le",
"\"$userPasswd\"")); 

## custom attributes to the script should also be accessed in this way

## my $customArg = $args->arg("customArgName");

$ctx->log_info("START PASSWD RESET");
$ctx->log_debug("Input LDAP parameters : host - $host :: port - $port ::
secure - $secure :: adminDN - $adminDN :: userDN - $userDN ");
$ctx->log_info("Resetting the password of the LDAP user $userDN");

## validate inputs
if ($host eq "" or $adminDN eq "" or $adminPasswd eq "" or $userDN eq "" or
$userPasswd eq "") {
 $ctx->log_error("Incomplete LDAP inputs - following parameters are
mandatory - host, adminDN, adminPasswd, userDN and userPasswd are
passed.");
 return 0;
}
# set default ldap port numbers
if ($port eq "") {
 if ($secure eq "" || $secure != 0) {
  $port = 636;
 } else {
  $port = 389;
 }
}

# create ldap url
if ($secure != 0) {
 $ldapURL = "ldaps://".$host.":".$port;
} else {
```

```
 $ldapURL = "ldap://".$host.":".$port;
}

# Login as LDAP admin
$ctx->log_debug("Authenticating to the LDAP server...");
$ldap = ldap_bind($ctx, $ldapURL, $adminDN, $adminPasswd, 100);
if ($ldap->arg('err') != 0) {
 my $le = $ldap->arg('err');
 $ctx->log_error("LDAP authentication failed - $le");
 return 0;
} else {
 $ctx->log_debug("LDAP authentication to $ldapURL as $adminDN
successful.");
}

# Reset the user password
$ctx->log_debug("Modifying the password of the user $userDN ...");
$ldap = ldap_modify($ctx, $userDN, "unicodePwd", $userPasswdEncoded);
if ($ldap->arg('err') != 0) {
 my $le = $ldap->arg('err');
 $ctx->log_error("LDAP modify failed - $le ");
 $retVal = 0;
} else {
 $ctx->log_debug("LDAP modify successful in resetting the password of the
user $userDN.");
}

# Logout LDAP admin
$ctx->log_debug("Logging out $adminDN from $ldapURL");
ldap_unbind($ctx);

$ctx->log_info("END PASSWD RESET");
return $retVal;
```

To use password checkout script for SAP refer the NetIQ Cool Solutions for Configuring Privileged Account Manager to Enable Password Checkout for SAP.

Password Policy: Select the appropriate password policy. By default **Default Password Policy** is selected. You can either modify the default password policy or create a new password policy. For more information about specifying password policy refer, Section 13.3, “Specifying Password Policies,” on page 205.

Create Command for subtype: Select this check box to create the command for the application. For example if the application is ABC_PQR a command is created for the application, APP PQR, which you use for the application rule.

If you have imported a policy template for application password checkout, the command is created automatically.

1e Click **Finish** to save the account domain details.

1f Add the application server account credentials. For more information refer, Section 13.4, “Adding Shared Account Credentials in the Account Domain,” on page 206

These credentials are provided to the user when they checkout the password for the application. The available credentials are provided to the users and if all credentials are used, then the user who checks out password later will get a message that all credentials are in use. The user can try to connect after some time.

2 Create rule. For information about creating rule, refer Section 7.6.1, “Adding a Rule,” on page 103.

If you have added the policy template, this rule gets created automatically.

13.2 Enabling Password Checkout for Oracle Database

The password checkout feature can be used for Oracle database. To enable password checkout, perform the following:

1. Download the Oracle database client by using the instantclient-basic-linux.x64-x.x.zip package.

   NOTE: You can download the Oracle database client from the Instant Client at http://www.oracle.com/technetwork/indexes/downloads/index.html#database. All the files that you retrieve through the oracle client zip/ tar file should be saved in `/lib64` for 64-bit machine and `/lib` for 32-bit machine.

2. Create a symbolic link `libclntsh.so` for `the libclntsh.so.`*`xx.x`* `file` and save it at /lib64 or /lib.

   For example, for `libclntsh.so.12.1` create a symbolic link and name it `libclntsh.so` (`libclntsh.so` -> `libclntsh.so.12.1`).

3. On the home page of the Privileged Account Manager administration console click **Hosts**.
4. On the middle pane, select the Privileged Account Manager host.
5. On the right pane, click **Packages**.
6. Select the **dbaudit** package.
7. On the left pane, click **Settings**.
8. In the **Oracle Client Library Path** field, specify the path where oracle client is installed. By default the path is `/lib64` for a 64-bit machine or `/lib` for a 32-bit machine.

   This library must be installed on a Privileged Account Manager server.

9. Create a privileged account for the database server:

   9a On the home page of the console, click **Command Control**.

   9b In the navigation pane, click the Privileged Credential Vault icon and click **Privileged Credential Vaults**.

   9c In the details pane, click **Add Account Domain**.

   9d Specify the following information:

   Name: Specify the name of the database domain. This name is used along with the **Credential** to authenticate. If you do not provide the correct domain name, user authentication fails.

   Type: Select **Database**

   Profile: Select **Oracle**

   Password: Specify the password for the domain user account

   Connect String: You can specify the string that will reset the password in the database and check-in the password. Specify the following string for Oracle database:

   `(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(Host=<`*`IP address of the database`* `that you have configured>)(Port=<`*`configured port number`*`>))(CONNECT_DATA=(SID=orcl)))`

   Password check-in: If you want to delegate the password check-in process to Identity Manager, select **Delegate to Identity manager**. You can delegate the password check-in process to Identity Manager. On selecting this option, the IDM (Identity Manager) driver for PAM takes care of generating random password and synchronizing the password to IDM.

The PAM driver checks-in the new password to PAM. IDM takes care of synchronizing password on the database through the respective database driver. For more information, refer the *Driver Implementation guide* on the PAM documentation page.

NOTE: Before you delegate password check-in to Identity Manager ensure that both the PAM driver and the database driver are operational.

Connect As: Select **SYSDBA**. If you want PAM to perform the password check-in process then, to check the connection to the database server click **Test Connection**.

Password Policy: Select the appropriate password policy. By default **Default Password Policy** is selected. You can either modify the default password policy or create a new password policy. For more information about specifying password policy refer, Section 13.3, "Specifying Password Policies," on page 205.

This option is available only when the **Delegate to Identity Manager** option is not selected.

9e Click **Finish** to save the account domain details.

9f Add database account credentials. For more information refer, Section 13.4, "Adding Shared Account Credentials in the Account Domain," on page 206

These credentials are provided to the user when they checkout the password for the database. The available credentials are provided to the users, and if all credentials are used, then the user who checks out the password later gets a message indicating that all credentials are in use. The user can try to connect after some time.

10 Create a database rule.

10a On the home page of the console, click **Command Control**.

10b In the Command control pane, click **Rules**.

10c In the details pane, click **Add Rule**.

10d Specify a name for the database rule, then click **Finish**.

10e To configure the rule, select the rule, then in the details pane, click **Modify**.

Make the following changes:

Account Domain: Specify the account domain for the database server.

Credentials: From the drop-down list, select **Run User@Run Host**.

10f Click **Finish**. The settings you have defined for the rule are displayed in the console.

11 Add the `DBOraclePasswd` command to the database rule.

To add the command to the rule, perform the following:

11a On the middle pane, click the **Commands** icon.

11b For database password check out rule, From the drop down list of commands, drag the **Oracle DB Password Check Out** command and drop it to the database rule

13.3 Specifying Password Policies

You can specify the password policies so that when the password is reset through Privileged Credential Vault, the specified password policy is applied.

1. On the home page of the console, click **Command Control**.
2. In the navigation pane, click the Privileged Credential Vault icon then in the details pane, click **Password Policies**.

Default Password Policy is displayed. You can modify the **Default Password Policy** but you cannot delete it.

3 (Conditional) If you want to modify the default password policy, click **Default Password Policy** then click the modify icon.

4 (Conditional) If you do not want to modify the default password policy, click **Add** and create a new password policy.

5 Add the details and click **Finish**.

13.4 Adding Shared Account Credentials in the Account Domain

To add multiple shared account credentials to the existing account domain perform the following:

1 On the home page of the console, click **Command Control**.

2 In the navigation pane, click the Privileged Accounts icon and click **Privileged Accounts**.

3 Select an **Account Domain**.

If the account domain is not created, create it by using the **Add Account Domain** option.

4 In the details pane, click **Add**.

5 Specify the following details:

Username: Specify the complete name for the domain user.

Password: Specify the password for the domain user account.

6 Click **Add** to save the account domain and credential details.

13.5 Configuring Password Check out Settings

1 On the home page of the Privileged Account Manager console, click **Access Dashboard**.

2 Click the **Configuration** tab.

3 In the **Delete Request After** field, select the number of days after which the request should be deleted from the list under **All**. For example, if you select **15 Days** all the requests that are 15 days old is deleted from the list of requests.

4 In the **Allow Grace Period of** field, select the extra duration that a user can access the password, after the requested time period expires.

5 In the **Server Email Id** field, enter the email id that is defined for the Privileged Account Manager server. This is the email id from which emails are sent to the users.

6 In the **Admin Email Id** field, enter the email id of the administrator for Privileged Account Manager.

13.6 Managing Credentials for Shared Accounts

Privileged Account Manager (PAM) resets the passwords for the shared accounts in the target application or database so that the account is made secure. This is called password check-in and password check-ins are performed in the following ways:

- **User check-in:** When a user checks in the password after using it for the specified time and within the allowed time including the grace period.

- **Force check-in:** When an administrator forcibly checks in the password. This check-in is helpful when any suspicious activity is detected. To force check-in the password, perform the following:

  1. In the **Emergency Access** page, click **Pending Check-ins**.

     Check for the Target system on which the suspicious activity is detected, then click **Check-In**

- **Auto check-in:** When a user has not checked in the password even after the expiry of the specified duration, Privileged Account Manager checks-in the password automatically.

  For more information about auto disconnect feature, refer Section 7.19.3, “Disconnecting the Session Automatically,” on page 144.

14 Privileged Account Monitoring of Database

When users access database with privileged credentials, there are chances of data loss or sensitive information misuse. The administrators need to ensure that the connection to the database is secure and the database credentials are mot misused. Privileged Account Manager provides the database monitoring feature where, administrators can protect the database by controlling and monitoring the activities of the users who connect to the database.

In the Command Control console, you can assign the risk based on the query or the table. If there are any suspicious activities, administrator can disconnect or block the user from accessing the database.

14.1 Supported Database Versions and Platforms

Supported Database Servers: The database servers that are tested with Privileged Account Manager are as following:

- Oracle 11.x
- Oracle 12.x

Supported Database Clients: The database clients that are tested with Privileged Account Manager are as following:

- SQL Developer
- SQL Plus
- DbVisualizer
- Toad

Supported Platform: Currently, the only supported platform is Linux. The **dbaudit** package, which is used in database monitoring, is supported only in Linux servers.

14.2 Prerequisite

Before starting database monitoring, ensure that you meet the following prerequisites:

- Direct access from database client to the database server should be blocked.

  The database server should only accept the data transfer through the Privileged Account Manager server.
- If the database is connected over SSL, import Privileged Account Manager certificate to the database client's wallet.

14.3 Configuring Privileged Account Manager for Database Monitoring

To monitor the actions performed on a database, you must configure the following settings:

1. Specify the connector details to establish a connection from database client to database server through Privileged Account Manager. To add or remove database connectors see Section 4.8, “Managing Database Connectors,” on page 48.
2. On the home page of the administration console, click **Command Control**.
3. Add a rule and include the `DBOracleAccess` command in the rule for Oracle database access.
   - **3a** In the Command control pane, click **Rules**.
   - **3b** In the details pane, click **Add**.
   - **3c** Specify a name for the database rule, then click **Finish**.
   - **3d** To configure the rule, select the rule, click edit icon **in the details pane**.

     Make the following changes:

     Session Capture: Select **On** to capture the activities done by the user.

     Authorize: Select **Yes**, then select **Stop** from the drop-down list.
   - **3e** Click **Modify**.

     The settings that are defined for the rule are displayed in the console.
   - **3f** In the middle pane, click the **Commands** icon.
   - **3g** From the drop down list of commands, drag the **Oracle DB Access** command and drop it to the database rule.

14.4 Accessing the Database

A user connects to a database server through a Privileged Account Manager server by using a database client. Privileged Account Manager receives the connection request from the database client and sends the connection request to the database server. When the database server receives the connection request from Privileged Account Manager, it allows the data transfer to the database client through Privileged Account Manager. You can add multiple connectors in Privileged Account Manager to connect to multiple database servers. Figure 4-1, “Modify Connector,” on page 50 displays how the database clients connect to the specific Oracle database by using the Privileged Account Manager port.

The access is granted to the user by using the `DBOracleAccess` command, when the access is granted, the user can access the database server with the connection through Privileged Account Manager.

The Oracle database users can access the database when the credentials are defined and the user has access to the Oracle database. User can also request for an emergency access to the Oracle database by using the **myaccess** page. To request through the emergency access refer, Chapter 15, “Emergency Access for Privileged Sessions,” on page 213.

14.5 Monitoring Database

The Privileged Account manager uses the `DBOracleAccess` command to monitor the database session. To monitor the activities of a database user, perform the following:

1. In the **Reporting** console select the session that includes the `DBOracleAccess` command.
2. Open the session to view the activities of the user.
3. (Conditional)If **Command Risk** for database query/ table is defined in the Command Control console, based on the level of risk a color is displayed against a particular input.

   You can disconnect a session if the activity of a user is suspicious. For more information refer Section 7.19, “Disconnecting a Privileged Session,” on page 143.

15 Emergency Access for Privileged Sessions

When a user requires access to privileged session, database server, or to any application server but do not have rules defined, then they can request for an emergency access. The Emergency Access feature helps the users to get access to any privileged session or application for a specific duration. An administrator for Privileged Account Manager can create rules for a user for permanent access but with emergency access, the users who do not have permanent rule can request for privileged access for a limited period.

A user requests for access and administrator approves or denies the request. Administrator monitors all the requests and can revoke the approved request if there is any malicious activity detected. Privileged Account Manager audits all the activities done by the user.

15.1 Configuring Administrative Settings for Emergency Access

To configure emergency access settings, perform the following:

1. On the home page of the console click **Access Dashboard**.
2. Click the **Configuration** tab.
3. Configure the following settings:

   Delete Request After: Select the number of days after which the request gets deleted. The requests that are in the expired, revoked or denied state are deleted. All the approved but not expired, and the pending requests are not deleted.

   Allow Grace Period of: Select the extra time period that a user is allowed, after the approved time period expires. User is notified about the expiry time so, grace period gives some time to the user to check-in the password or end the session. For example, if an administrator has approved a request for an hour and configures this setting for 15 minutes, then the user can access the session or application for 1 hour 15 minutes.

   Disconnect after grace period: Select this check box if you want to disconnect the connection after the grace period expires.

   Server Email Id: Enter the email address that is defined for the Privileged Account Manager server. This is the email id from which emails are sent to the users with the status of the request.

   Admin Email Id: Enter the email address of the administrator. This is the email address to which an email is sent when a user requests for emergency access.

15.2 Configuring Privileged Account Manager to Enable Emergency Access

You need to configure the Account domain for each type of access. The following table displays the prerequisite for each type:

Session	Prerequisite
Privileged Shell	◆ The target machine (the machine for which the request is sent) must be registered as an agent. ◆ The user's account must be set up on the target machine.
Direct RDP	◆ The **Submit User** credential for the required account domain must be created in the Privileged Credential Vault. ◆ The target machine (the machine for which the request is sent) must be registered as an agent. ◆ The user's account must be set up on the target machine.
RDP	◆ The privileged account credential must be defined in the Privileged Credential Vault. ◆ The target machine (the machine for which the request is sent) must be registered as an agent.
SSH	◆ The privileged account credential must be defined in the Privileged Credential Vault.
DB Oracle	◆ The privileged account credentials must be defined in the Command Control console. ◆ If users request for Emergency Access for the **Target type**: **DB Oracle** and they require account credentials to connect to the database through **Password Checkout**, then you require to add credentials to that privileged credential vault. If users request for database access, the database user's account must be on the database server. Also, the configuration for IP address and port number of the Oracle database, must be done in dbaudit. For information refer, Section 14.3, "Configuring Privileged Account Manager for Database Monitoring," on page 210
Applications	◆ Account Domain needs to be configured for that application in the Privileged Credential Vault.

15.3 Examples for Emergency Access Request

This section includes some scenarios when users request for emergency access.

Scenario 1

A user requires access to a Linux server by using **Privileged Shell** (pcksh) but does not have policy defined. The user requests for Emergency access and the administrator requires to approve it.

Prerequisite: The following list describes the prerequisites for the user to access the pcksh session:

- The target machine (the machine for which the request is sent) must be registered as an agent.
- The user's account must be active on the target machine.

Approval: To approve the request, perform the following:

1. On the home page of the administrator console, click **Access Dashboard**.
2. In the **Emergency Access** page, select the request that needs to be approved.

   By default the All tab is selected. You can also use the pending tab to select a request to approve.
3. On the Approval form provide the following details:

   Run User: Specify the name of the user as whom the requesting user can start the session.

   Request Period: Select the time frame till when the user can access the specified server. It is in hour format.

   Comment: Provide the reason for approval.

Scenario 2

A user requires access to a Linux server by using SSH relay, but do not have policy defined. The user requests for Emergency access and the administrator wants to deny the access.

To deny the request, perform the following:

1. On the home page of the administrator console, click **Access Dashboard**.
2. In the Emergency Access page, select the request that needs to be denied.

   By default the **All** tab is selected.
3. (Conditional) If you want to deny multiple requests, click the Pending tab and select the checkboxes against the requests that you want to deny.
4. Click **Deny** and provide the reason in the comment field.

15.4 Managing Requests

Administrator can approve or deny any request by performing the following:

1. On the home page of the console, click **Access Dashboard**.
2. Click the appropriate tab to view the requests.

   All: Displays all the requests with the details.

   Pending: Displays all the requests that are in pending state.

   Approved: Displays all the requests that are in approved state.

   Denied: Displays all the requests that the administrator has denied.

   Revoked: Displays the requests that are revoked.
3. (Conditional) If you want to approve a request, click **All** then the required request > **Approve**.

   In the **Approve Request** form fill the details, then click **Approve**.

   Following lists the additional fields that are required for approving a specific type of privileged session:

For Privileged Shell: Specify the appropriate **Run User**. For example if you want the requesting user to run the session as root, specify Run User as root.

For RDP: Select the required account domain in the **Account Domain** field and select the appropriate credential from the **Credential** field.

For direct RDP: Select the required account domain in the **Account Domain** field. Here, the **Credential** field gets auto-populated with **SubmitUser**.

For Applications: You can select the **Send Run Host ID to the User** checkbox so that the user gets the host details as part of the approval comment.

NOTE: If a user is in **Blocked Users** usergroup, you cannot approve the request until the user is removed from the **Blocked Users** usergroup.

---

4 (Conditional) If you want to deny a request or multiple requests, click the Pending tab, then select the requests that you want to deny and click **Deny**.

5 (Conditional) If you want to revoke an already approved request, click the request, then on the Emergency Access page, click **Revoke** then add the reason then click **Finish**. You can also click on the **Approved** tab and select the specific request then click **Revoke**.

NOTE: When you revoke a request, if the user is accessing that server, the session is not disconnected but the user will not be able to access the server for the next session.

If you want to block a user from accessing any server, you can add the user to the Blocked user group. For more information about the blocked user group refer, "Blocked Users" on page 109.

---

16 Requesting and Accessing through User Console

The user console is enhanced so that users can access and request for access to any SSH, Windows, database or application session through the **myaccess** page. You can also view status of the request, notifications and alerts.

You need to login to the myaccess page, `https://<IP address of the Framework Manager>/myaccess`, by using your Privileged Account Manager credentials.

This page includes the following three sections:

Privileged Sessions: This section displays different tabs for different types of sessions. Under each tab you can view the privileged sessions that an administrator for Privileged Account Manager has defined through policies, or approved through Emergency Access. For more information, refer Section 16.1, “Privileged Sessions,” on page 218.

Emergency Access: This section is used for requesting emergency access to any particular host through a particular type of session. It also displays the requests that you have created for emergency access and its status.

Enterprise Password Checkout: This section is used for password check out/ check in and viewing the details of the password checkout.

Icons	What they mean
	If you need to sign out or want to see the alerts, you can click on this icon and select **Sign out** or **Alerts**. The number in the box shows the number of alerts and notifications. The alerts and messages are displayed in different colors. **Red color** : The red color indicates that there is an alert or few alerts. The alerts are displayed for the following: ◆ When the Privileged Account Manager administrator revokes an earlier approved request. ◆ When the Privileged Account Manager administrator checks in the password. ◆ When the request time is expired and the password is automatically checked in. **Orange color:** The orange color indicates only notifications. Notifications are displayed for the following: ◆ When the Privileged account Manager administrator approves a request. ◆ When the Privileged account Manager administrator denies a request.
	To reload the page click this icon.
	To customize the size of the session screen during an RDP relay session, click on this icon and choose the appropriate size. You can also disconnect the RDP session by clicking **Disconnect**.
	To search for specific help content.

16.1 Privileged Sessions

In Privileged Sessions, you can view all the privileged sessions that you are entitled to access either through policies or emergency access approval. You can click on the required privileged session and start the session based on the type of the session. There are different tabs for each type of session. The following lists the details of each tab:

16.1.1 All

The **All** tab lists all the privileged sessions that are available for you based on the policy or the emergency access request that an administrator of Privileged Account Manager creates or approves.

To start a privileged session, perform the following:

1. In Privileged Sessions, under the **All** tab, click on the policy that you require for starting a particular session.
2. (Conditional)For RDP session, on the **Remote Desktop Connection** dialog box, click **Connect**.

   This helps you to connect to a Windows server with the privileges that are defined for you in the policy or request.

   NOTE: RDP Relay is supported only on Internet Explorer 9.0 or later.

3. (Conditional)For SSH session, copy the command that is displayed when you click on the SSH policy and paste it in a terminal to start an SSH session.

   This helps you to connect to an SSH server with the privileges that are defined for you in the policy or request.
4. (Conditional) For Database, check out the password and connect to the database by using the database client with credentials that you receive.

   You can connect to the database based on the permission whether you can directly access the database or you need to access the database through Privileged Account Manager. For more information about password checkout refer, Section 16.3, “Enterprise Password Check out,” on page 225.
5. (Conditional) For Applications, check out the password and connect to the application server by using the appropriate application client. For more information refer, Section 16.3, “Enterprise Password Check out,” on page 225

NOTE: For access to sessions such as direct remote desktop connection, privileged shell, and credential provider, though you have access to those, the session is not displayed under the **Privileged session** tab.

16.1.2 Windows

The **Windows** tab lists all the privileged sessions that are created for access to a Windows server. This includes policy created for a remote desktop session with specific privileges and request of type RDP. If you have requested for an RDP session through emergency access, then you also get emergency access to credential provider.

To start a session from the **Windows** tab, perform the following:

1. In **Privileged Sessions**, click the **Windows** tab.
2. Click on the required policy depending on which server you want to connect to.
3. On the **Remote desktop client** dialog box, click **Connect**.

   NOTE: RDP Relay is supported only on Internet Explorer 9.0 or later.

Starting Remote Desktop Connection with Credential Provider

To start a remote desktop connection by using credential provider, you must save the properties for remote session to that machine.

Perform the following to save the properties of a particular remote desktop connection:

1. Click on **Remote Desktop Connection client**.
2. Type the IP address of the target machine.
3. Click **Options** then click **Save** to save the Remote Desktop connection to the RDP file.

   Specify the location and filename for the RDP file to display the Remote Desktop Connection icon on that location.
4. Add the following value to the saved Remote Desktop Connection properties by using any xml editor and save the file:

   ```
   enablecredsspsupport:i:0
   ```
5. Start the saved Remote Desktop Connection client.

   For subsequent sessions you can just click on the saved **Remote Desktop Connection** icon.

NOTE: Ensure that you provide the user name in capital letters.

16.1.3 SSH

The **SSH** tab lists all the privileged sessions that are created, and also lists the approved requests for an SSH relay session. When you click on any of these privileged sessions, a command is displayed, which you can use in a terminal to connect to an SSH server.

16.1.4 Database

The **Database** tab lists all the privileged sessions that are created, and also lists the approved requests for a database session. When you click on any of these listed privileged sessions, you need to fill the password checkout page. The Privileged Account Manager provides database credentials, which you can use to connect to the database server.

16.1.5 Applications

The **Applications** tab lists all the privileged sessions that are created, and also lists the approved requests for an application session. When you click on any of these listed privileged sessions, you need to fill the details in the password checkout page to checkout the credentials for the application server. The Privileged Account Manager provides the application credentials, which you can use to connect to the application server.

16.2 Emergency Access

You can create request to access any type of session by using Emergency Access. This is required when there are no policies defined.

16.2.1 Requesting for Emergency Access

To get emergency access to any privileged session, application, or database you must request for the access. When you request for emergency access, the request is sent to the administrator of Privileged Account Manager and the request is approved or denied based on the administrator's discretion.

When a request is approved, you are authorized to connect to the required session.

To send a request for emergency access, perform the following:

1. Login to the myaccess page, `https://<IP address of the Framework Manager>/myaccess`.
2. In the menu bar, click **Emergency access**.
3. Click the **New Request** tab.
4. Select any of the following Type:

Session type	What you can access
Privileged Shell	Access to target Linux server through pcksh session by using the `usrun -u <approved run user> pcksh` command.
Direct RDP	Access to the target Windows server by using your account credentials that are set up on the server. You can also access the server through remote desktop connection with your account credentials on the server.
RDP	Access to a target Windows server through RDP relay session. You can connect to the server by using the policy that is displayed under the **Windows** tab in **Privileged Sessions**.
SSH	Access to target SSH server. You can find the session details to connect under the **SSH** tab in **Privileged Sessions**.
DB Oracle with Password Checkout	Access to the privileged account credentials of the database that are saved in the Privileged Credential vault. You can use it to connect to the database server.
DB Oracle with Database Access	Access to Oracle database through Privileged Account Manager.
Applications	Access to the privileged account credentials of an application that are saved in the Privileged Credential vault. You can use it to connect to the application server.

5. Fill the following details and then click **Create Request**.
6. Click the My Requests tab, to check the status of the request.

   An email is sent with the approval or denial message with the reason if the request is denied.
7. (Conditional) If the request is approved, select the privileged session and access the session, or check out the password for applications and database.

Emergency Access for an RDP Session

When the privileged session for the required Windows server is not listed under either the **All** tab or the **Windows** tab, you need to request for an emergency access. If the request is approved, you can start the session either through RDP relay or through credential provider.

To request for an RDP session, perform the following:

1. Login to the myaccess page, `https://<IP address of the Framework Manager>/myaccess`.
2. In the menu bar, click **Emergency access**.
3. Click the **New Request** tab.
4. Fill the following details:

   Target: RDP. When you select RDP, you are requesting for a privileged access to a Windows server through an RDP relay or a credential provider session.

   Access As: Select an option based on whether you need to access host server as a normal user or a super user.

   Host: Specify the IP address or the agent name of the host server that you require to access.

   Access Duration: Select a duration specifying for how much time you require the access.

   Email: Specify your email address.

   Reason for Access: Provide the reason for this request.
5. Click **Create Request**.
6. Click the **My Requests** tab, to check the status of the request.

   An email is sent with the approval or denial message.
7. (Conditional) If the request is approved, in the **Privileged Sessions** tab, select the privileged session under the **Windows** tab or the **All** tab and access the session.

NOTE: When an emergency access request is approved for an RDP session, you can access the host server by using either credential provider or RDP relay.

Emergency Access for a Direct RDP Session

To request for a direct RDP session, perform the following:

1. Login to the myaccess page, `https://<IP address of the Framework Manager>/myaccess`.
2. In the menu bar, click **Emergency access**.
3. Click the **New Request** tab.
4. Fill the following details:

   Target: Direct RDP. When you select this option, you are requesting for access to a Windows server either by using Remote Desktop Connection or by directly connecting to the host server.

   Access As: Select an option based on whether you need to access host server as a normal user or a super user.

   Host: Specify the IP address or the agent name of the host server on which you require access.

   Access Duration: Select a duration specifying the time that you will require for the session.

   Email: Specify your email address.

   Reason for Access: Provide the reason for this request.
5. Click **Create Request**.

6 Click the **My Requests** tab, to check the status of the request.

   An email is sent with the approval or denial message.

7 (Conditional) If the request is approved, you can connect to the host server by using your account credentials.

Emergency Access for an SSH Session

To request for an SSH session, perform the following:

1 Login to the myaccess page, `https://<IP address of the Framework Manager>/myaccess`.

2 In the menu bar, click **Emergency access**.

3 Click the **New Request** tab.

4 Fill the following details:

   Target: SSH. When you select this option, you are requesting for access to an SSH server that is configured in Privileged Account Manager.

   Access As: Select an option based on whether you need to access host server as a normal user or a super user.

   Host: Specify the IP address of the host server on which you require access.

   Access Duration: Select a duration specifying the time that you will require for the session.

   Email: Specify your email address.

   Reason for Access: Provide the reason for this request.

5 Click **Create Request**.

6 Click the **My Requests** tab, to check the status of the request.

   An email is sent with the approval or denial message.

7 (Conditional) If the request is approved, you can connect to the SSH server by using the command that is displayed when you click the policy name that is displayed under the **SSH** or the **All** tab.

Emergency Access for a Privileged Shell

When requesting for a Privileged Shell session, the host server must be an agent registered to the Privileged Account Manager.

To request for a Privileged Shell (pcksh) session, perform the following:

1 Login to the myaccess page, `https://<IP address of the Framework Manager>/myaccess`.

2 In the menu bar, click **Emergency access**.

3 Click the **New Request** tab.

4 Fill the following details:

   Target: Privileged Shell. When you select this option, you are requesting for access to a Linux/UNIX agent.

   Access As: Select an option based on whether you need to access host server as a normal user or a super user.

   Host: Specify the IP address or the agent name of the host server on which you require access.

   Access Duration: Select a duration specifying the time that you will require for the session.

   Email: Specify your email address.

Reason for Access: Provide the reason for this request.

5 Click **Create Request**.

6 Click the **My Requests** tab, to check the status of the request.

An email is sent with the approval or denial message.

7 (Conditional) If the request is approved, you can connect to the Linux/ Unix server by using the command `usrun -u <approved run user> pcksh`.

To use other options with usrun, refer Section 7.2.1, “Using usrun with a Command,” on page 86.

Emergency Access for a Database Session

You can request for an access to the database, or password checkout option.

To request for a database session, perform the following:

1 Login to the myaccess, `https://<IP address of the Framework Manager>/myaccess`.

2 In the menu bar, click **Emergency access**.

3 Click the **New Request** tab.

4 Fill the following details:

Target: Select **DB Oracle**. When you select this option, you are requesting for access to a database server.

If you require access to checkout the password select **Password checkout**. For database access through Privileged Account Manager, select **Database Access**.

Host: Specify the IP address of the database server on which you require access.

Access Duration: Select a duration specifying the time that you will require for the session.

Email: Specify your email address.

Reason for Access: Provide the reason for this request.

5 Click **Create Request**.

6 Click the **My Requests** tab, to check the status of the request.

An email is also sent with the approval or denial message.

7 (Conditional) If the request is approved, you can connect to the database server by using either your account credentials or the credentials that you receive when you check out the password. For more information regarding password check out refer, Section 16.3, “Enterprise Password Check out,” on page 225.

Emergency Access for an Application Session

You can request for an access to any application server that is configured in Privileged Account Manager.

To request for an application session, perform the following:

1 Login to the myaccess page, `https://<IP address of the Framework Manager>/myaccess`.

2 In the menu bar, click **Emergency access**.

3 Click the **New Request** tab.

4 Fill the following details:

Target: Select **Applications**. When you select this option, you are requesting for access to an application server. You can request for a shared account credential.

Select Application: Select the appropriate application from the drop down list.

Access As: Select an option based on whether you need to access the application server as a normal user or a super user.

Host: Select the host from the drop down for the application server on which you require access.

Access Duration: Select a duration specifying the time that you will require for the session.

Email: Specify your email address.

Reason for Access: Provide the reason for this request.

5 Click **Create Request**.

6 Click the **My Requests** tab, to check the status of the request.

An email is also sent with the approval or denial message.

7 (Conditional) If the request is approved, you can connect to the application server by using the account credentials that you receive when you check out the password. For more information regarding password check out refer, Section 16.3, “Enterprise Password Check out,” on page 225.

16.2.2 Managing Requests

You can manage the requests from the My Requests page. You can get all the details of all the previous requests made, in the **All**, **Approved**, **Denied** and **Revoked** tabs. You can select the **Pending** tab and delete the request that are not required. The **Going to Expire** tab displays the list of requests that will expire in 15 minutes.

16.2.3 Viewing the Request Status

After requesting for emergency access you can view the status of the request either through email or through the myaccess page. To view the status from myaccess page, perform the following:

1 Login to the myaccess page, `https://<IP address of the Framework Manager>/myaccess`.

2 In the menu bar, click Emergency access.

3 Click **My Requests**.

All the requests are displayed. You can choose to view the requests that are in pending, approved, denied or revoked state. You can also filter the requests that will expire in the specified time by using the **Going to Expire** option.

If you want to delete a request, you can delete it from the pending list under the **Pending** tab.

16.3 Enterprise Password Check out

This section helps you to check out a shared account credential from a database server or an application. You require the credential, port number, and IP address to access the database/ application through the database/ application client.

When you have accessed database/ application for the specified time period, you must check-in the password. For more information about checking in the password, refer Section 16.3.2, “Password Check-in,” on page 226.

16.3.1 Accessing Shared Account

When you require access to any database or application, even though policies are created, you require the credentials to connect to the server. These credentials you get when you check out the password. When a policy is not created, request for an emergency access and connect to the application or the database for a specified time duration. For more information about emergency access refer Section 16.2, “Emergency Access,” on page 220.

To access a shared account, perform the following:

1. (Conditional) Request for emergency access if the application or database policy name is not displayed in the myaccess page.
2. Click the required application or database session.
3. Specify the email address and the time period for accessing the credentials.
4. Click **Checkout**.
5. The credentials are checked out from the account domain.
6. Access the application or the database for the specified time by using the checked out credentials.
7. Check-in the credentials before the specified time expires.
8. This resets the password in the account domain and also in the application/ database server.

16.3.2 Password Check-in

The password needs to be checked in after each session. Either a user or an administrator can check-in the password.

To check-in the password perform the following:

1. Login to the myaccess page, `https://<IP address of the Framework Manager>/myaccess`.
2. (Conditional) If a privileged session exists for the request, click the request > **Check-in**.
3. Click **Enterprise Password Checkout**.
4. Under the **Checked Out** tab or the **All** tab you can view the details of the active sessions.
5. Click the session on which you no longer need access, or time is about to expire, then click Check-in.

   If the time has expired but you still need access to the application or the database, you have to perform password check out process again.

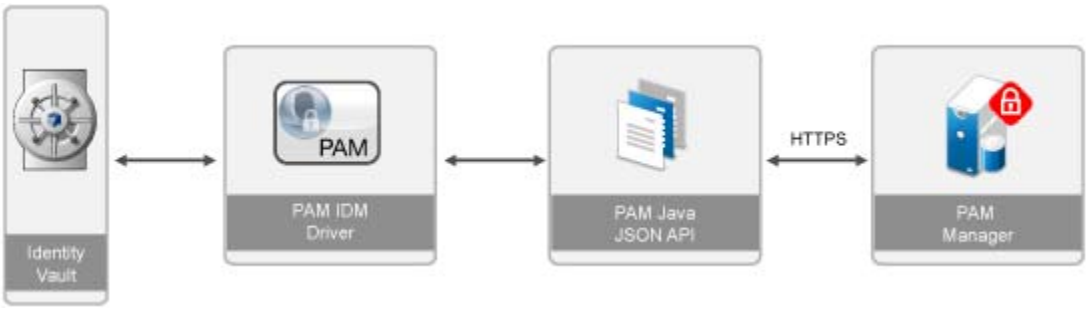
17 Integrating Privileged Account Manager with Identity Manager

Privileged Account Manager can communicate with Identity Manager (IDM) by using the Identity Manager driver for Privileged Account Manager. An Identity Manager driver is an interface between the NetIQ Identity Manager and the connected application. Here, the connected application is PAM. For more information about Identity Manager, see Identity Manager documentation page.

The PAM driver is a Java program running in Identity Manager. This driver communicates with the PAM application using Java JSON API library provided by PAM. This communication happens over HTTPS channel.

To view the high level architecture diagram of how PAM is integrated with the Identity Manager, see Figure 17-1 on page 227. For more information about the driver, see NetIQ Identity Manager® Driver for NetIQ Privileged Account Manager Implementation Guide.

Figure 17-1 *Integrating PAM with Identity manager*



From PAM 3.0.1 onwards, the PAM driver creates a channel from Identity Manager to PAM to synchronize the password that is changed through the password check-in process. The PAM driver checks for any changes performed on the PAM credential object. When a user checks-in the password, the driver generates a random password through Identity Manager and the same password gets reset on the application/ database through the driver for the respective application/ database.

17.1 Benefits of Integration with Identity Manager

The integration with Identity Manager helps us with the following:

- **Ease for access request through IDM Entitlements:** An IDM Entitlement defines a permission or an access that a user can have on an application. An end user requests for an Entitlement by using the web based user portal called NetIQ RBPM or UserApp. Also, the UserApp has Workflow capability that takes the request through an approval process before granting access to the user.

For PAM, the UserGroup objects are made available as Entitlements in Identity manager through the Driver. The UserGroup object is used in the PAM policy for authorizing privileged access to a server or an application. A user could login to UserApp and request for a PAM Entitlement. When the request is approved, the user gets the privileged access through the UserGroup membership. Hence, the privileged access request becomes automated through UserApp.

- **Managing multiple PAM Account Domains:** The driver for PAM can synchronize PAM's Credential Vault objects from IDM to PAM. So, the account domain and the respective credential object creation and management can be easily done as IDM (eDirectory) objects.
- **Delegation of Password Checkin to IDM:** PAM allows emergency access and password checkout/check in to any applications. During the password check in process, PAM generates a random password and the script that is set on the account domain takes care of resetting the new password on the target application. PAM supports password checkout for few applications. For every additional application, a perl script needs to be written and set on the corresponding account domain object. For more information about password checkout/ check in process, see Chapter 13, "Managing Shared Accounts," on page 199.

  In a corporate environment where Identity Manager is already used for centralized password policy definitions, management of identities and their passwords on various applications, performs the same function as the password check in process. Hence, the password check in process can be delegated to IDM. The driver for PAM and IDM takes care of random password generation, password policy definition for the applications, syncing the new password to the end application and finally checking in the password to PAM. Also with IDM integration, the number of applications that PAM supports for password checkout will be as many as that IDM supports, which is very large. For more information about other drivers for Identity Manager, see Drivers for Identity Manager documentation page.

  For auditing the password check in event details, the PAM audit report can be used and these events can also be logged in the SIEM system like Sentinel. For more details refer to Chapter 8, "Managing Audit Reports," on page 155.

18 Troubleshooting

This section contains potential problems and error codes that you may encounter when configuring or using Privileged Account Manager.

18.1 The Agent is in an Offline State

Issue: If the Agent is in an offline state, the users cannot access the agent.

Workaround: To resolve this issue, the administrator of Privileged Account Manager can perform the following:

- Ensure that the time synchronization is maintained between the Manager and the Agent.
- Ensure that you can ping the Agent from the Manager by using the DNS names with which it is registered with the Manager.

18.2 The Audit Events are Not Displayed in the Reporting Console Even When the Events are Generated

Issue: When the audit events are not getting replicated from the Agent to the Manager, the reporting console does not display the latest events. This happens when the connection between the Agent and the Manager is interrupted and large amount of data gets stored in the Store and Forward (strfwd.ldb) file.

Workaround: To resolve this issue, the administrator can perform the following:

- Check if the database is working fine by performing a db integrity check. To check this, You can use the `strfwdutil -i` command.
- Check if the msq file is working fine by using the tstdb tool. To check this, you can use the `tstdb -m strfwd.msq –V` command.

For more information about this issue refer the tid 7005851.

18.3 On an AIX Platform, When the Audit Data Gets Generated in Large Amount, The Privileged Account Manager Service Restarts and an Error is Displayed in the unifid.log file.

Issue: If Manager for Privileged Account Manager is installed on an AIX platform and the AIX users try to access session simultaneously large amount of audit data gets generated and the further sessions may hang. This results in restart of the Privileged Account Manager service.

Workaround: To resolve this issue the administrator can perform the following:

1. Check the unifid.log file for the `Error, Db strfwd.ldb - SQL Error, out of memory` error.

2. Restart the Privileged Account Manager service by using the following command so that PAM can scale upto 2 GB:

   `startsrc -s npum –e "LDR_CNTRL=MAXDATA=0x70000000"

   On an AIX platform, by default each process is limited to 256MB which may not be sufficient for the Privileged Account Manager service under high load conditions.

18.4 The RDP Relay Session Does Not Start From the myaccess Page

Issue: When a user tries to connect to an RDP relay session through the myaccess page, the session does not start. This may happen if the target server is unreachable.

Workaround: An administrator can perform the following:

1. Check if the user is using Internet Explorer. RDP relay works only on Internet Explorer.
2. Ask the user to check if RDP Relay host is reachable by using the DNS name and IP address.
3. Ensure that the 1339 port is not blocked by firewall in the user's computer.
4. Check if RDP relay from the Manager to the target server is working fine.
5. Check if the target server agent logs the error `agent is not initialized`. If this error exists then, restart the agent server (Windows restart).
6. Check if the target system agent logs the error `user lookup failed`. If this error exists, then ensure that the **RunAs** user is available in the target server.
7. Ensure that the Agent for Privileged Account Manager is installed on the target machine when the session capture is set to **On**. If the Agent is not installed on the target server, and the session capture is **On**, RDP relay fails, then you need to modify the policy by setting the session capture to **Off**.

18.5 The RDP Relay to a Windows Server 2012 Server Fails

Issue: If a user is starting an RDP relay session to connect to a Windows server 2012 computer and has the remote desktop client version 8.0 or higher, the session fails to connect.

Workaround: To workaround this issue, users can use Windows 7 or earlier version with mstsc version 6.1.7601 or earlier. If Windows 7 is updated to use latest version of RDP, you can downgrade to lower version by uninstalling the patch `KB 2592687`. This is an optional update for Windows 7 and Windows Server 2008 R2 to update RDP protocol version.

18.6 The Audits are Missing in the Configured Audit Zone Audit Manager

Issue: If you have configured the Audit Manager for a specific audit zone, the audits from the agents do not get displayed in the Reporting Console.

Workaround: Start using Audit Zones feature only after you have upgraded all your agents for Privileged Account Manager and managers for Privileged Account Manger to version 2.4 or higher. If you are using primary and backup server, ensure that the audit zone values are properly set in both the managers and all the configurations are synchronized.

18.7 The Privileged Session is Not Established Through the Backup Manager

Issue: When users connect to a privileged session through the backup manager for Privileged Account Manager, the session is not established. But they can connect to the privileged session through the primary manager.

Workaround: The administrator can check if the replication from the primary to the backup manager is successful.

18.8 The Changes to the Syslog Settings Do Not Get Applied

Issue: In the Reporting console of Privileged Account Manager when you save the changes to syslog settings, such as select **SSL**, or **Allow Persistent Connections,** the changes are not applied.

Workaround: To workaround this issue, restart Privileged Account Manager.

18.9 The Manual Disconnect for a Windows session Does Not Work

Issue: When a Privileged Account manager administrator tries to disconnect a windows session manually, the error `No module available` is displayed.

Workaround: Ensure that **Run Host** that is configured in the policy should be same as the agent name that you have specified in the Host console.

18.10 Cannot Upgrade to RDP Relay Console 3.0

Issue: When you upgrade to Privileged Account Manager 3.0, the RDP Relay package is not upgraded.

Workaround: If you do not have the **myaccess** package installed, then the **rdprelay** package will not get updated and the users cannot view the new console. To re-direct the user to the new console from the rdp relay page, you need to install the **myaccess** package first then update the **rdprelay** package.

18.11 The Run as privileged user Option is not displayed on a Windows 2012 Server

Issue: When you right-click **Start** on a Windows 2012 server, the **Run as privileged user** option does not get displayed.

Workaround: To workaround this issue, right-click the application in the folder where the application is installed to execute **Run as privileged user**.

18.12 Agent Registration Fails on a Windows Platform

Issue: When you are registering a Windows agent for Privileged account Manager to a Manager, the registration fails.

Workaround: Ensure that you launch `cmd.exe` by selecting **Run As Administrator** and log in with the administrator credentials.

18.13 Direct RDP Sessions are Enabled for all Users By Default

Issue: By default, the Direct RDP sessions are enabled for all users.

Workaround: If you want to deny specific users to access the server, create a separate user group and add the user names in the **Users** field. By default all the users are granted access to the server

---

NOTE: For latest version of troubleshooting information, refer Chapter 18, “Troubleshooting,” on page 229.

18.14 Issues When Updating or Downloading the License Summary

The following sections include the issues that may occur when you are updating or downloading the license summary from the License Summary page.

18.14.1 Failed to connect to module

Issue: When you click **Update License Summary** or **Download Detailed Report** you get an error, `Failed to connect to module`. This happens when the agent from where you are trying to update the license summary, cannot contact the primary registry.

Workaround: Verify if the primary registry is online by performing the following:

1. Click **Hosts > Find Packages**.
2. In the Package field select **Registry manager > Find**.
3. Click the registry that displays the asterisk(*) symbol.
4. Check **Status**.
5. (Conditional) If the primary registry is offline, refer TID.

18.14.2 The system cannot process the details because one or more agents that have the DB Audit module is in Offline state

Issue: When the agents that have the dbaudit module is offline, the license summary does not get updated.

Workaround: For updating the license summary, it is a prerequisite that all the agents that have dbaudit module must be in an online state.

To check which agent is offline, perform the following on the Hosts console:

1. In the middle pane click the root host, **Hosts**
2. In the left pane click **Database Connectors**
3. Check the required agent, if it is offline, the text, `offline` is displayed next to the agent name.

18.14.3 The system cannot process the details because it cannot contact any of the Privileged Credential Vault modules

Issue: The error gets displayed when there are no privileged credential vault module in the PAM framework, or no privileged credential vault module is reachable from the primary registry module.

Workaround: For updating the license summary, it is a prerequisite that at-least one privileged credential vault module is online & reachable from the primary registry module.

You need to install a privileged credential vault module in at least one of the agents and rectify any network issues between the primary registry and the agent with credential vault module.