



# HPE Serviceguard I (HP-UX) H6487S

**HPE course number** H6487S

**Course length** 5 days

**Delivery mode** ILT

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This course teaches system administrators how to effectively use Serviceguard to protect mission critical applications from a wide variety of hardware and software failures. The course is 40 percent lecture and 60 percent hands-on labs using HPE servers. This course has been updated to support HP-UX 11.31 and Serviceguard version A.11.20 but is still applicable to earlier versions of the product.

## Why HPE Education Services?

- IDC MarketScape leader 5 years running for IT education and training\*
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## Audience

- HP-UX system administrators who currently, or soon will, develop, design, implement, and monitor Serviceguard clusters

## Prerequisites

- HP-UX System and Network Administration I (H3064S) and HP-UX System and Network Administration II (H3065S) or
- HP-UX System and Network Administration for Experienced UNIX® System Administrators (H5875S) and
- HP-UX Logical Volume Manager (H6285S) or HP-UX VERITAS Volume Manager (HB505S) and
- POSIX Shell Programming (H4322S)

## Course objective

- Configure a volume group or disk group that can be used on multiple systems and a basic package to run in a Serviceguard environment
- Configure and maintain a Serviceguard cluster
- Configure and implement an application monitor
- Replace a failed LVM lock disk
- Change the cluster configuration and add or delete a package to a running cluster
- Set up a Serviceguard package using the NFS toolkit and Oracle toolkit
- Configure a highly available network using redundant hubs, routers, and networks
- Perform a rolling upgrade
- Use Serviceguard Manager to manage a Serviceguard cluster
- Perform troubleshooting activities to resolve Serviceguard configuration problems

## Benefits to you

- Protect your mission critical applications against a wide variety of hardware and software failures through effective use of Serviceguard
- Deliver highly available application services to your LAN-attached clients by configuring up to 16-nodes in an enterprise cluster
- Reduce your application downtime to near zero by learning how to configure your Serviceguard cluster and using Serviceguard's rolling upgrade facility
- Minimize, and in some instances eliminate, your application downtime by learning how to automate the detection of failures and restoration of application service

## Detailed course outline

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### Module 1: Introduction to High Availability

- What Are the Risks?
- Reducing the Risk: Redundant Data
- Disk Configurations
- Reducing the Risk: Asymmetric Clusters
- Reducing the Risk: Minimizing Downtime
- Reducing the Risk: Network Redundancy
- Multi-Network Environment
- Redundant LAN Cards
- Redundant Hubs
- Redundant Routers
- Redundant Client Networks

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### Module 2: High Availability with Serviceguard

- Introducing Serviceguard
- High Availability with Serviceguard
- Features and Benefits of Serviceguard
- How Serviceguard Works
- Serviceguard Packages
- Redistributing Application Packages
- Minimizing Planned Downtime
- Serviceguard Bundle/Products
- HPE Serviceguard Solutions
- Serviceguard and Integrity VM
- Cluster File System
- Multi-Node Packages and Package Dependencies
- Oracle RAC and CFS
- Storage choices based on your priorities
- SGeRAC and LVM MORE
- System Management Homepage
- Serviceguard Manager
- Serviceguard Storage Management Suite
- Metrocluster
- Continentalclusters

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### Module 3: Storage for Serviceguard

- Serviceguard Disk Space Management Overview
- Boot and Root disk concepts
- General disk concepts
- Volume management in Serviceguard for HP-UX
- LUN, Disk, and DVD DSF Names for 11.31
- Review of LVM Concepts
- Configure a Shareable LVM Volume Group
- LVM Issues with Serviceguard
- Common LVM Commands
- LVM and VxVM Command Comparison
- Configure a Shareable VxVM Disk Group
- CFS Filesystem

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### Module 4: Cluster Concepts and Configuration

- Definition of a Cluster
- Major Components of a Cluster
- Network Interface Configuration
- Cluster Lock Configuration Using LVM Disks
- Cluster Lock Configuration Using a Quorum Server
- Quorum Server Redundancy
- Cluster Lock Configuration using Lock LUN
- Lock LUN support for HP-UX
- Lock LUN rules
- Comparison
- Heartbeat Configuration
- cmclsd Process
- Cluster Formation Requirements
- Steps to Configure a Cluster
- Cluster Configuration Procedure
- Viewing the Cluster: cmviewcl Command
- Checking the Cluster Log

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### Module 5: Additional Cluster Features

- Serviceguard Volume Groups
  - Marking Volume Groups for use in
  - Serviceguard
  - Exclusive Mode Volume Group Activation
  - Cluster Formation and Reformations
  - Ways to Initially Form the Cluster
  - Node Failures and Node Joins
  - Cluster Reformation ExamplevLocal LAN Card
  - Failover—Normal Network Flow
  - Local LAN Card Failover—Network Flow to Standby LAN Card
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**Module 6: Packages and Services**

- Packaging Concepts
- Sample Package Configuration
- Sample Configuration after Node Failure
- Package Switching
- Viewing Package Status
- Package Owner and State
- Modifying Package Status
- Review Commands for Controlling a Cluster
- Configuration of Packages
- Package Modules Types
- Modularized Package Control Script
- Modularized Package Control File
- Package Configuration Procedure
- Create the Package Configuration File
- Edit the Package Configuration File
- Verify and Distribute the Binary File
- Enhancements to cmapplyconf/cmcheckconf
- The Package Script Log File

**Module 7: Package Policies**

- Package Policies
- Package Type
- Failover Policies
- Failback Policies
- Example of Automatic Failback
- Access Control Policies
- Node Fail Fast and Service Fail Fast
- Package Dependencies
- Dependency Rules
- Complex Dependencies
- Cross node dependencies example
- Exclusionary dependency example
- cmapplyconf warning
- Complex dependency challenge
- Package Priorities
- Setting Package Priority
- Resource Dependency
- cmrunpkg review
- Package Weight/Node capacity
- Node Capacity/Package Weight challenge
- Configuration file example
- Node Capacity Configuration
- Package Weight Configuration Methods
- Package Weight/Node Capacity Rules
- Capacity "package\_limit"
- Package priority & package weight rules
- Priority and Weight challenge

**Module 8: Application Monitoring Scripts and ECMT Toolkits**

- Package Startup and shutdown
- Rules for Service Processes
- Application Monitoring Script
- HA Toolkit Overview (or how to use monitoring)
- ECMT Version B.06.00
- Modular toolkit architecture
- Modular Oracle db toolkit deployment
- Configuration directory operations for Modular Packages

**Module 9: Cluster Troubleshooting**

- Troubleshooting in Serviceguard
- Approaches to identifying problems
- Double-checking supported configurations
- Log files
- Monitoring the syslog File
- Monitoring the package log file
- Useful Troubleshooting Commands
- Using cmviewconf and cmgetconf
- Using cmquerycl and cmcheckconf
- Using cmviewcl
- Common problem categories
- System administration errors
- Package control script hangs or failures
- Package Log File Enhancements
- Causes of cluster reformations
- Approaches to fixing problems
- Resolving Serviceguard command hangs
- Modifying debugging options
- Modifying startup debugging options
- Starting applications outside of a Serviceguard package
- cmgetconf
- The Built-in Safety Net
- Patch recommendations
- Common Cluster Configuration Issues
- Testing Cluster Operations
- Testing the package manager
- Testing the cluster manager
- Testing the network manager
- Notification for Package Failure

<b>Module 10: Cluster and Package Online Reconfiguration</b>	<ul style="list-style-type: none"> <li>• Serviceguard Online Reconfiguration</li> <li>• Online cluster reconfiguration</li> <li>• Storage reconfiguration</li> <li>• Add a Node while a Cluster Is Running</li> <li>• Remove a Node while a Cluster Is Running</li> <li>• Add a Package while a Cluster Is Running</li> </ul>	<ul style="list-style-type: none"> <li>• Remove a Package while a Cluster Is Running</li> <li>• Modify a Package while the Cluster and Package are Running</li> <li>• Modify a Package while the Cluster Is Running, but the Package Is Down</li> <li>• New Preview Functionality</li> <li>• SG commands—t option</li> </ul>
<b>Module 11: Highly Available NFS</b>	<ul style="list-style-type: none"> <li>• Highly Available NFS Server Package</li> <li>• Using the modular NFS Server Toolkit</li> </ul>	<ul style="list-style-type: none"> <li>• Highly Available NFS Client Package</li> </ul>
<b>Module 12: The Highly Available Oracle Database</b>	<ul style="list-style-type: none"> <li>• Highly Available Oracle Package—Overview</li> <li>• Serviceguard Toolkits</li> </ul>	<ul style="list-style-type: none"> <li>• ECMT modular Toolkit Contents</li> <li>• Create Oracle Package</li> </ul>
<b>Module 13: WBEM, EMS Resources and Serviceguard Packages</b>	<ul style="list-style-type: none"> <li>• EMS Overview</li> <li>• Configuration of EMS Requests</li> <li>• What can be configured</li> <li>• Select EMS Resources</li> <li>• Select EMS Configuration</li> <li>• Resource Dependency</li> </ul>	<ul style="list-style-type: none"> <li>• Setting up a Package to use an EMS Resource</li> <li>• WBEM Overview</li> <li>• WBEM Services Value Proposition</li> <li>• WBEM relative to SNMP, DMI and EMS</li> <li>• HPE WBEM Based Enterprise Management</li> <li>• HP-UX 11i WBEM Providers</li> </ul>
<b>Module 14: High Availability Networking</b>	<ul style="list-style-type: none"> <li>• Network Redundancy</li> <li>• Multi-Network Environment</li> <li>• Redundant LAN Cards, Hubs and Routers</li> <li>• Redundant Client Networks</li> <li>• Multiple IP Addresses</li> <li>• Cross-subnet support</li> <li>• Serviceguard Command Changes</li> <li>• Serviceguard Package Configuration Changes</li> </ul>	<ul style="list-style-type: none"> <li>• Cross subnet network configuration requirements</li> <li>• APA Auto-Port Aggregation (APA) Overview</li> <li>• APA/LAN Monitor Requirements</li> <li>• Configuring APA</li> <li>• IPv6 Networks</li> <li>• IP Monitor</li> <li>• Failures and Recovery</li> </ul>
<b>Module 15: Rolling Upgrade</b>	<ul style="list-style-type: none"> <li>• Minimizing Planned Downtime</li> <li>• Rules for Rolling Upgrade</li> <li>• New Cluster Manager (CM2) in SG 11.19</li> <li>• Special Considerations for Upgrade to Serviceguard A.11.20</li> <li>• CM2 Changes</li> <li>• CM2 similarity to CM</li> <li>• Cluster Reformation</li> <li>• Rolling Upgrade CM to CM2 Process</li> <li>• Special Considerations for Upgrade to Serviceguard A.11.20</li> <li>• syslog messages during protocol switch</li> <li>• Rolling upgrade to A.11.19 restrictions</li> <li>• Special Considerations for Upgrade to Serviceguard A.11.20</li> <li>• Serviceguard Rolling Upgrades</li> <li>• Operating System Rolling Upgrades</li> </ul>	<ul style="list-style-type: none"> <li>• Cluster before Rolling Upgrade</li> <li>• Example of a Rolling Upgrade—Running Cluster with Packages Moved</li> <li>• Example of Rolling Upgrade—Node 1 Upgraded to HP-UX 11.31</li> <li>• Example of Rolling Upgrade—Install Serviceguard, Rejoin Cluster</li> <li>• Example of Rolling Upgrade—Run Cluster with all Packages on Node 1</li> <li>• Example of Rolling Upgrade—Upgrade Node 2</li> <li>• When a Rolling Upgrade Is Not Possible</li> <li>• Dynamic Root Disk (DRD) for Serviceguard</li> <li>• DRD Use-case—recovery</li> <li>• DRD Use-case—maintenance</li> </ul>
<b>Module 16: Storage Maintenance for Packages</b>	<ul style="list-style-type: none"> <li>• Storage Maintenance for Packages</li> <li>• Modifying a Volume Group</li> <li>• Modifying a Logical Volume</li> <li>• Extending a Logical Volume to a specific disk</li> <li>• Reducing the size of a Logical Volume</li> <li>• Moving all data on one LVM disk to another</li> <li>• Make a Logical Volume/File System Larger or Smaller</li> </ul>	<ul style="list-style-type: none"> <li>• LVM Maintenance to a Package</li> <li>• Add Disk to Volume Group Owned by a Package</li> <li>• Add Logical Volume/File System to Volume</li> <li>• Group Owned by a Package</li> <li>• Add a Volume Group to a Package</li> <li>• Manage VxVM Disk Groups</li> <li>• Manage VxVM Volumes</li> </ul>

## Course data sheet

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### Module 17: Serviceguard Manager

- HPE Cluster Monitoring Tools
- Serviceguard Manager B.03.xx for SMH
- SG Mgr B.03.00.10 Enhancements
- Topology Map Feature Highlights
- Graphical Map
- Navigation
- Contextual Menu
- Pop-up Summary
- Drag and Drop

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### Module 18: Live Application Detach and Other Features

- Serviceguard 11.20 Enhancements
- Live Application Detach (LAD)
- Live Application Detach—Rules
- Application Packages Can Use NFS
- Cluster-Wide Device File Names
- Cluster-Wide Device Files
- Cluster Verification
- Cluster Verification with SG Manager
- VxVM and LVM Monitor
- Serviceguard Manager A.05.03
- Easy Deployment

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### Module 19: Easy Deployment

- Easy Deployment Commands—cmdeploycl
  - Easy Deployment Commands—cmpreparecl
  - Easy Deployment Commands—cmpreparestg
  - Easy Deployment Commands—cmquerycl cmapplyconf
  - Serviceguard Manager B.03.00 Enhancements
  - Serviceguard Manager Easy Deploy
  - Easy Deploy Cluster Creation
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## Next steps

- HPE Serviceguard II: Continentalclusters, CFS, & Oracle RAC (U8601S) or HPE Metrocluster (HB507S), HPE Integrity Virtual Machines (HB506S), HPE StorageWorks XP Disk Arrays (H6773S)

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