HP Certified Professional
Designing and Implementing SAN Solutions
HP0-831
Exam Preparation Guide

Purpose of the exam prep guide
The intent of this guide is to set expectations about the content and the context of the exam and to help candidates prepare for the exam. In this guide, you will find recommended HP training courses, reference and study material, and sample test items to help you achieve a successful passing score.

Studies conducted by HP and Prometric show that a combination of course attendance and self-study maximizes the likelihood of passing the exam on the first attempt.

Audience
This exam is for technical presales personnel who design, deploy, configure and integrate SAN-based storage solutions.

Examples of job roles:
- SAN Architect
- Storage SA

General areas of content include:
- SAN Design and Implementation
- SANworks Network View
- Enterprise Backup Solutions in SANs
- Heterogeneous SANs
- Storage Performance
- SAN Management — SDCM
- StorageWorks SAN Director
- SAN Management—Switch Management (SAN Switch 8-EL/16-EL/8/16)
- Fibre Channel Switches
- Fibre Channel Switch Concepts
SAN Concepts

Certification requirements

This Designing and Implementing SAN Solutions Exam (HP0-831) is one of the core requirements to be certified as an ASE – StorageWorks.

This level of certification measures the competencies required for hands-on integration and support of technical solutions in complex, enterprise class environments. Given a set of customer business requirements, this individual is expected to be able to design, support and integrate platform, operating system, storage, network and option components to solve business needs. The ideal candidate is anyone who deploys complex solutions based on HP technologies. Individuals pursuing this level must meet the prerequisite of having the Accredited Integration Specialist certification.

Prerequisites

Successful completion of one of the following:

- AIS – StorageWorks + Windows & NetWare
- AIS – StorageWorks + UNIX

Exam details

At the beginning of the exam, you will be asked to answer several survey questions. The survey questions are designed to assist the exam development team in accurately profiling test results and to improve future exams.

The following are details about the exam:

- **Number of items**: 60
- **Item types**: multiple choice and drag-and-drop
- **Time commitment**: 75 minutes time
- **Passing Score**: 66%
- **Reference Material**: No on-line or hard copy reference material will be allowed at the testing site.

Comments on the exam

During the exam, participants can make specific comments about the items (i.e., accuracy, appropriateness to audience, etc). HP welcomes these comments as part of our continuous improvement process.
Exam content

The following testing objectives represent the specific areas of content covered in the exam. Use this outline to guide your study and to check your readiness for the exam. The exam measures your understanding of these areas.

### SAN Concepts
- Define the following storage solutions: Storage Area Network (SAN), Direct Attached Storage (DAS), and Network Attached Storage (NAS).

### Fibre Channel Switch Concepts
- Describe the basic operation of a Fibre Channel switched fabric including: Addressing, Login procedures, and Name Server.
- Describe the following switch concepts: Domain ID, Inter-Switch Link (ISL), Hops, Path, Fabric Shortest Path First (FSPF), Route, Cascading, Load Sharing, Over-subscription/Head of line blocking, Zoning, Translative Mode Addressing, and QuickLoop.
- Describe the following 2Gbps associated switch technology: Bandwidth—2Gbps versus 1Gbps, Cabling and Connectors—LC to LC, LC to SC, and Transceivers (Small Form Factor Fixed (SFF) transceivers and Small Form Factor Pluggable (SFP) transceivers).
- Describe the purpose, features, and functions of ISL Trunking.
- Describe latency in Fibre Channel switches and switch fabrics.

### Compaq Fibre Channel Switches
- Describe the purpose, features, and functions of the Compaq Fibre Channel switches: FC-AL Switch 8, SAN Switch 8-EL, SAN Switch 16-EL, SAN Switch 8, SAN Switch 16, and SAN Switch Integrated /32 and SAN Switch Integrated /64.

### SAN Management—Switch Management (SAN Switch 8-EL/16-EL/8/16)
- Describe the features and identify the benefits of Web Tools v3.0 and Fabric Watch.
- Identify the requirements to use Web Tools v3.0.
- Explain how to use Web Tools to perform the following: update switch firmware, zone administration, performance monitoring, configure alarm thresholds and notifications in fabric watch, configure link costs and create static routes, configure trunking, and access the switch report.
- Explain how to backup and restore a switch configuration.

### StorageWorks SAN Director
- Describe the purpose, features, and functions of the StorageWorks SAN Director 64.
- Describe how a SAN director differs from a fabric switch: Availability—99.999% (5 minutes per year), Non network disruptive—hot swappable components, Non-disruptive code loading, Scalability, Interoperability, and Security.
- Explain how to manage the SAN Director using the SANworks Director Connectivity Manager (SDCM).
- Identify concepts that are unique to the SAN Director: Port Intrusion and Security (Switch Port Binding, Distributed Lock Manager, and Management Authentication—MD5 standard (RFC 1321)).

### SAN Management — SDCM
- Describe the features and identify the benefits of SANworks Director Connectivity Manager (SDCM).
- Identify the requirements to use SDCM.
- Explain how to use SDCM to perform the following: update switch firmware, zone administration, performance monitoring, configure alarm thresholds and notifications, and access director logs and reports.

### Storage Performance
- Explain the performance factors that affect disk performance, such as data rates and response time.
- Explain how to interpret I/O performance data.
- Describe Fibre Channel technology performance considerations in a SAN.
- Explain how drive speed affects performance.
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<thead>
<tr>
<th>Explain how the number of outstanding I/O requests can be tuned to increase performance.</th>
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<tr>
<td>Explain I/O profiles and identify examples for the following environments: Microsoft SQL-Server 7.0 and 2000, Oracle Database 8 and 9, and General Mail and Messaging for Exchange Server 5.5 and 2000.</td>
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<td>Given a scenario, design a disk system for optimum performance by selecting the appropriate RAID, cache, and chunk size.</td>
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<tr>
<td><strong>Heterogeneous SANs</strong></td>
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<tr>
<td>Define a heterogeneous operating system Storage Area Network (SAN).</td>
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<td>Identify the supported operating and storage systems that are used in a heterogeneous operating system SAN.</td>
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<td>Identify and describe the purpose, function, and features of the Fibre Channel host bus adapters (HBAs) required for each supported operating system.</td>
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<tr>
<td>Identify the supported operating system SAN configurations and associated restrictions for: Tru64 UNIX, Microsoft Windows NT, Microsoft Windows 2000, Compaq OpenVMS, Sun Solaris, HP-UX, IBM AIX, Novell NetWare, Redhat Linux, SUSE Linux, and SGI IRIX.</td>
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<td>Describe the purpose and function of Open SAN Interoperability Initiative (OSII).</td>
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<td>Describe the purpose, features, and/or functions of the high-availability cabling.</td>
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<td>Discuss SAN and Data Replication Manager (DRM) integration.</td>
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<td><strong>Enterprise Backup Solutions in SANs</strong></td>
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<tr>
<td>Identify the advantages and disadvantages of the following backup methods: Direct Backup, Centralized Server, Automated Centralized Backup.</td>
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<td>Identify and describe the purpose, features, and functions of performance backup characteristics.</td>
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<tr>
<td>Given a scenario, explain how a Storage Area Network (SAN) can be used to improve backups.</td>
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<td>Identify the rules for implementing EBS with primary storage on the same SAN.</td>
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<td>Identify the features, purpose, and benefits of the EBS sizer.</td>
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<td><strong>Compaq SANworks Network View</strong></td>
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<td>Describe the features and identify the benefits of Network View.</td>
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<td>Explain how to implement Network View in a single and multiple SAN environment.</td>
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<td>Identify which SAN components can be managed by Network View and the type of information that is available and configurable.</td>
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<td>Describe the function of the host agents and identify the supported operating systems.</td>
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<td>Identify purposes, features, and functions of logging with Network View.</td>
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<td>Explain how to configure alerting with the following options: Email, Pager, and SNMP.</td>
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<td>Discuss the performance monitoring capabilities of NetWork View.</td>
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<td><strong>SAN Design and Implementation</strong></td>
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<td>Describe the purpose, features, and functions of a phased approach to designing a SAN.</td>
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<td>Identify the rules associated with the various components in a SAN.</td>
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<td>Identify the factors that impact SAN performance and explain how to optimize the design.</td>
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<td>Identify the steps to implement a SAN solution.</td>
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<td>Identify situations that would benefit from switch zoning.</td>
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<td>Explain how to migrate SAN topologies and merge SAN fabrics.</td>
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<tr>
<td>Given a scenario, explain how to apply SAN design rules and knowledge to implement a required solution.</td>
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Recommended Training and Study References

This section lists training courses and documents that can help you acquire a majority of the knowledge and skills needed to pass the exam. You must also gain the practical experience outlined in this guide.

You are not required to take the courses listed in this section. However, HP strongly recommends that you attend the classes, participate in class labs, and thoroughly review all course material and documents before taking the exam, even if you believe you have sufficient on-the-job experience.

Instructor-Led Training

Use the information in this guide and the practical experience you have gained to determine your need for the instructor-led training.

- Designing and Implementing SAN Solutions

Web-based Training

Self-paced training and technical documentation may provide appropriate learning alternatives to instructor-led training for more experienced candidates.

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Documentation

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Other Reference Material

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Sample Test Items

The sample test items give you a preview of what the actual test items will look like. It is important to note that these items WILL NOT be on the exam itself. However, they are representative of the actual items, and they should help you become familiar with the format and complexity of the test items. These sample test items are not a check for readiness.

1. What is the maximum number of SAN switches in a fabric that contains a first generation Fibre Channel switch?
   a. 2
   b. 4
   c. 8
   d. 16

2. Which switch model does NOT have replaceable fans?
   a. SAN Switch 8
   b. SAN Switch 16
   c. SAN Switch 16-EL
   d. Fibre Channel Switch 16

3. Which SANworks Director Connectivity Management log displays a history of user actions?
   a. Audit log
   b. Event log
   c. Session log
   d. Product Status log

4. An HSG80 controller has READ-AHEAD cache disabled for all units. Which I/O profile type would benefit the most from having the READ-AHEAD cache enabled?
   a. random read operations
   b. sequential read operations
   c. mixed random read and write operations
   d. mixed sequential read and write operations
5. A company has an application that has a high request rate with high locality, using a RAID disk on an HSG RAID controller. The chunk size should be _____ times the average transfer size.
   a. 10
   b. 15
   c. 17
   d. 20

6. What does a Tru64 UNIX cluster in a Compaq heterogeneous SAN require?
   a. a separate zone on the SAN
   b. a separate zone from Solaris servers
   c. SCSI 3 mode on the MA family controllers
   d. transparent failover mode on the MA family controllers

7. In a single fabric with zoning enabled, you are adding a new host. The host has a single HBA. It needs to communicate with one StorageWorks MA8000 storage subsystem that is in multibus failover mode. What needs to be included in the zone membership?
   a. the HBA and all of the controller ports
   b. the HBA and any one of the controller ports
   c. the HBA (the controller ports are automatically included)
   d. all of the controller ports (the HBA is automatically included)

Answers:
1. B
2. C
3. A
4. C
5. A
6. A
7. A

Conclusion
HP wishes you success in the HP Certified Professional Program and in passing the exam for which you are preparing.