HP Certified Professional
Advanced SAN Architecture
exam #HP0-815
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 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 Consultant
- Storage SA

General areas of content include:
- SAN Architecture Consulting
- SAN Planning, Design, and Security
- SAN Topologies
- Migrating Topologies, Merging and Scaling SANs
- Case Study and SAN Examples
- Backup and Recovery Impact on SAN Architecture
- SAN Replication Technologies
- SAN Virtualization Technologies
- SAN Extensions and Emerging Technologies
- SAN Management
Certification requirements

Advanced SAN Architecture Exam HP0-815 is one of the core requirements to be certified as a Master Accredited Systems Engineer (MASE) StorageWorks.

This level of certification measures the competencies required for hands-on design as well as the skills needed for the integration and support of business solutions for complex, enterprise environments. Given a set of customer business requirements this individual is expected to be able to design, support and integrate application, middleware, platform, operating system, storage, network and option components necessary 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 Systems Engineer certification.

Prerequisites for MASE SAN Architect are any one of the following:

- ASE – StorageWorks
- ASE – ProLiant + Windows
- ASE – ProLiant + NetWare
- ASE – ProLiant + Linux
- ASE – ProLiant + UnixWare (retired)
- ASE – AlphaServer + Tru64 UNIX v5
- ASE – AlphaServer + Linux
- ASE – AlphaServer + OpenVMS

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:** 74
- **Item types:** multiple choice, drag and drop
- **Time commitment:** 105 minutes
- **Passing Score:** 58%
- **Reference Material:** No on-line or hard copy reference material will be allowed at the testing site.
Exam Registration

- This exam is available at [Prometric](#).
- This exam is available at [Promissor](#).

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.

<table>
<thead>
<tr>
<th>SAN Architecture Consulting</th>
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<tbody>
<tr>
<td>Define SAN Architecture and the associated features and benefits of an architecture approach.</td>
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<tr>
<td>Explain how to translate business requirements to technology that can grow a SAN without bounds to future large SAN topologies.</td>
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<tr>
<td>Describe a phased approach to planning and designing a SAN and the associated considerations including: the deployment strategy; project planning; applications migration; organizational impact, people, processes, and components; and development and support services.</td>
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<td>Explain how to perform a storage assessment using available tools to collect pertinent data and specifically which areas need to be examined.</td>
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<td>Explain how to determine what storage to migrate to the SAN in an existing environment by considering before and after scenarios</td>
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<th>SAN Planning, Design, and Security</th>
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<tr>
<td>Describe the choices and considerations that need to be made when architecting a SAN including: HP design philosophy, Fabric zoning, and Technical requirements.</td>
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<td>Explain the importance of documentation in designing and implementing a SAN and the use of each document.</td>
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<tr>
<td>Describe the features and functions of a basic security model including: Security domains, Security expectations, and SAN component security attributes.</td>
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<td>Describe SAN security, personnel, and operating best practices.</td>
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<tr>
<td>Describe the security features integrated into devices in the SAN including: Switches—Brocade’s Secure Fabric OS, Switches—McData’s SANtegrity, Storage arrays, and Management Appliance.</td>
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<th>SAN Topologies</th>
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<tr>
<td>Distinguish between Ring, Cascaded, Mesh, Skinny Tree, Fat Tree, and Backbone topologies with regard to: Connectivity; Switch and hop counts; Oversubscription; and Multiple Port Functionality.</td>
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<tr>
<td>Describe the factors that impact performance in a SAN, the need to understand application traffic characteristics and the effects of upgrading specific components in selecting a SAN topology.</td>
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<tr>
<td>Describe the advantages of dual fabrics and features, functions and benefits of the four levels of high availability in SAN design.</td>
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<th>Migrating Topologies, Merging and Scaling SANs</th>
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<tr>
<td>Describe the features, functions and benefits of a core edge SAN design.</td>
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<tr>
<td>Describe and contrast backbone SANs using core switches and director fabrics.</td>
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</table>

Describe data availability in a SAN and the associated design, scalability, and migration considerations.
Describe the best practices for SAN architecture and design.

**Case Study and SAN Examples**
Conduct a case study that explains and applies the SAN Design phased approach and the associated procedures.

**Backup & Recovery Impact on SAN Architecture**
Define the terms, recovery point objective and recovery time objective and which solutions address these business needs.

Describe the business continuity planning process.

Describe SAN backup and recovery configuration rules and general recommendations.

Describe the factors associated with SAN-based backups that should be considered when designing a SAN architecture.

Given a scenario to backup 100TB of data, describe what factors to consider and how to size a solution that will meet this requirement.

**SAN Replication Technologies**
Describe the performance impact as it applies to synchronous and asynchronous replication methods.

List best practices associated with implementing a storage replication solution.

Describe the factors that should be considered regarding architecture in a SAN as part of a data replication solution and the process to recover from the disaster and the associated factors.

**SAN Virtualization Technologies**
Describe the purpose, features, and functions of Continuous Access Storage Appliance (CASA).

Given a scenario with replication using CASA, describe the factors that should be considered with regard to SAN architecture.

Describe the VersaStor—enabled intelligent switches and how they fit into the virtualization model and the impact of implementing virtualization in a SAN using the new Brocade ‘intelligent’ switches on the SAN architecture.

**SAN Extensions and Emerging Technologies**
Explain the need for SAN extensions and the supported SAN extension technologies.

Describe the impact of SAN extensions on performance and how to optimize performance.

Describe the available Fibre Channel long distance technologies including transceivers, Fibre Channel repeaters, and wave division multiplexers.

Describe and contrast the limits that apply to switches from Brocade and switches/directors from McData.

Describe the IP data protocol technologies, Fibre Channel over Internet Protocol and extended fabric compatibility support.

Explain what factors to consider when using an existing IP network including Network speeds, Network distance considerations, and Network distance/latency examples.

Given a scenario where servers cannot be connected to a SAN, explain how to use the iSCSI storage router SR2122 to connect the servers over IP and the associated features and benefits.

Describe best practices associated with implementing IP storage networks.

**SAN Management**
Describe and contrast the Brocade and McData switch storage management platforms (Fabric Manager and HAFM) and associated access authentication and authorization.

Discuss SAN management areas and associated procedures and processes.

Describe SAN-LAN security considerations.

Explain the process of designing a SAN management infrastructure and use an example to demonstrate the process.

**Lab Exercises**
Describe and implement the process and procedure to backup, restore, and update configuration data of a SAN using the available software tools.

Describe and implement the process and procedures to merge SAN islands and scale the number of switches in a SAN.

Describe and implement the process and procedures to migrate the SAN topology from in a dual fabric.
NSPOF cascaded topology, to a ring topology, to a Core-Edge topology (skinny/fat tree) all while NOT disrupting the production environment.

Describe the factors that need to be considered and associated best practices when merging, migrating, and scaling a SAN.

**Case Study**

Given a scenario to design a SAN architecture for a customer, describe the specific phases, process, procedures and duration associated with each to create the SAN architecture.

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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.

- Advanced SAN Architecture

**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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<tr>
<td>SAN Design Reference guide</td>
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<tr>
<td>Enterprise Backup Solutions</td>
<td>All</td>
<td>342250e2.pdf</td>
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<tr>
<td>Design Guide</td>
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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. Which tool should you use to conduct a storage assessment?
   a. HP OpenView Storage Profiler
   b. HP OpenView Storage Provisioner
   c. HP OpenView Storage Area Manager
   d. HP OpenView Storage Configuration Manager

2. When planning to scale a SAN by migrating topologies, best practices recommend the SAN should be _____.
   a. restarted
   b. well documented
   c. zoned before the change
   d. using non-persistent addressing

3. What are Fiber Optic Interconnects/Distance Rules for HP StorageWorks M-Series (McDATA) and B-Series (Brocade) fabric switches, per cable segment between devices and switches or switches and switches using 1 Gbit/sec speed and 50/125 micron multi-mode fiber optic cable and short wavelength GBICs or GLMs?
   a. up to 200 meters maximum distance
   b. up to 300 meters maximum distance
   c. up to 500 meters maximum distance
   d. up to 1000 meters maximum distance
4. A customer has a SAN solution that is configured for disaster recovery using EVAs with synchronous data replication. An employee suggests that they do not need to back up their EVAs anymore as the data is protected at all times.

As a SAN architect, what is your advice to the customer?

a. You agree with the employee.
b. You disagree and recommend continuing with the backups and explain.
c. You agree with the employee but only if clones are maintained at set intervals.
d. You with the employee but only if snapshots and clones are maintained at set intervals.

5. A customer has an application that is considered mission critical. In the event of a disaster, they want a replication solution that will guarantee that the replicated data is identical to the source without any data loss.

Which solution accomplishes this?

a. fan-out replication
b. bidirectional replication
c. synchronous replication
d. asynchronous replication

6. You are replicating data over long distances using 1 Gbps B-serious (Brocade) fabric switches.

Extended fabrics (increased buffer-to-buffer credits) should be used when the minimum distance exceeds _____ km.

a. 10
b. 15
c. 20
d. 35
7. What virtualization model is used in the Continuous Access Storage Appliance (CASA)?
   a. out-band management of symmetrical virtual objects
   b. symmetrical pooling or also called in-band virtualization
   c. asymmetrical pooling or also called out-band virtualization
   d. either symmetrical or asymmetrical selected at the initial configuration

8. A customer wants to use 2 Gbps B-series (Brocade) fabric switches in an extended fabric configuration with two 35 km single-mode fiber optic ISLs.
   What is required for the two switches on either end of the link?
   a. Nothing is required, simply connect the ISLs.
   b. A remote switch license must be added to both switches.
   c. An extended fabric license must be added to both switches.
   d. An extended fabric license must be added to all switches in the SAN.

9. FCIP is best used for _____. (Choose two.)
   a. increasing network bandwidth
   b. eliminating unacceptable performance delays
   c. MAN extensions based on cost effectiveness for distance
   d. WAN extensions based on cost effectiveness for distance

10. What are three fabric topology events that can be monitored with the B-Series (Brocade) Fabric Manager? (Choose three.)
    a. zone changes
    b. topology reconfigurations
    c. SAN peak hours traffic changes
    d. GBIC/SFP extractions/insertions
    e. average SAN resource utilization
Answers:

1. C
2. B
3. C
4. B
5. C
6. A
7. B
8. C
9. C, D
10. A, B, D

Conclusion

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