

## Introduction to SAN (H41BQS)

**ID** H41BQS **Price** 1,500.— €(excl. tax) **Duration** 2 days

### Course Overview

This course is designed for new or entry-level SAN administrators, offering an overview of general SAN technologies. It provides a comprehensive understanding of everyday administration within an HPE SAN solution, covering a broad range of technologies and concepts such as Fibre Channel (FC), iSCSI, and NVMe-oF. It discusses basics and building blocks of FC and IP-SAN, as well as the role of SAN-enabled hosts and disk targets. Other topics include SAN management, basic SAN security, and performance aspects of SAN as well as long distance connectivity overview.

### Who should attend

This course is ideal for new or entry-level technical professionals seeking a learning path that includes conceptual knowledge of SAN technologies.

### Prerequisites

Before attending this course, you should have:

- Basic technical understanding of concepts and terminology related to networking and storage
- Basic experience in managing Windows systems

### Course Objectives

After completing this course, you should be able to:

- Define a storage area network (SAN)
- Describe SAN benefits
- Discuss data access methods
- Identify SAN hardware components
- Describe HPE Storage Networking elements and benefits
- Recall the format of a WWN
- Explain Fibre Channel (FC) terminology and port types
- Describe FC topologies
- Identify FC addressing
- List the steps for port initialization
- Identify the node and port types

- Describe the role of Simple Name Service
- Describe concepts associated with zoning
- Explain the data center bridging (DCB) standard
- Describe the Fibre Channel over Ethernet (FCoE) standard
- Discuss the Non-Volatile Memory Express over Fabrics (NVMe-oF) standard, types, and building blocks
- Discuss host connectivity
- Discuss N\_Port ID Virtualization (NPIV) support and products based on it
- Explain the function of multipathing and load balancing
- Discuss the need for SAN management
- Discuss technologies driving SAN management
- Describe HPE SAN management today
- Discuss SAN extension technologies and implementations
- Explain the use and effects of buffer (BB) credits on distance and speed
- Describe approaches to planning security in a SAN
- Outline the core components for securing a SAN
- Outline topology choices and design considerations
- Describe SAN performance factors
- Identify levels of high availability in SAN architecture

### Course Content

Module 0: Course Overview Module 1: SAN Introduction Module 2: Fibre Channel Module 3: iSCSI Module 4: NVMe-oF Module 5: Host Module 6: SAN Management Module 7: Long Distance Connectivity Module 8: SAN Security Module 9: SAN Design

### Detailed Course Outline

#### Module 0: Course Overview

- Course topics

#### Module 1: SAN Introduction

- What is a SAN?
- HPE Storage Networking: Enables systems for critical workloads
- Business continuance
- High availability
- Server and storage consolidation
- Centralized management



- Basic methods of storage connectivity
- SAN considerations
- DAS versus NAS versus SAN
- SAN components
- HPE Storage Networking: Hardware positioning
- Fibre Channel and Ethernet—Decoded and positioned

## Module 2: Fibre Channel

- Fibre channel introduction
- World Wide Name (WWN)
- Nodes, ports, and links
- SAN topologies
- Fibre Channel port types
- Fibre Channel addressing
- Basic Fibre Channel services
  - Simple Name Service
  - Zoning
- Fabric segmentation
- Fibre Channel networking products portfolios

## Module 3: iSCSI

- Overview of iSCSI protocol
- iSCSI maps SCSI onto a network
- iSCSI stack
- iSCSI initiators
- iSCSI target discovery
- iSCSI operations
- iSCSI authentication
- Internet Storage Name Service (iSNS)
- iSCSI advantages and disadvantages
- M-series switches

## Module 4: NVMe-oF

- Data center bridging (DCB)
  - Data Center Bridging vs other technologies
  - Remote Direct Memory Access (RDMA)
- Fibre Channel over Ethernet (FCoE)
  - FCoE integrated with FC SAN fabric
  - FCoE encapsulation
  - Converged network adapters
- Non-Volatile Memory Express over Fabrics (NVMe-oF)
  - What is NVME?
  - Why NVMe over fabrics
  - NVMe based storage end-to-end
  - NVMe over the network—Fabric transport options
  - Deciding between the NVMe-oF options

## Module 5: Host

- Host role within the SAN
- Host and adapters

- N\_Port ID Virtualization (NPIV) overview
- HPE Virtual Connect
- Boot from SAN
- Host preparation and install
- Multipath concepts and load balancing

## Module 6: SAN Management

- SAN management categories
- B-series SAN management interfaces and tools
  - Web tools
  - SANnav management software
  - C-Series/Cisco Data Center Network Manager
  - HPE GreenLake for Storage Fabric Management
- Management protocols and APIs
  - Simple Network Management Protocol (SNMP)
  - REST(ful) API

## Module 7: Long Distance Connectivity

- Why extend the SAN?
- SAN extension technologies
- Wavelength Division Multiplexing (WDM) options
- Fibre Channel over SONET/SDH
- Fibre Channel over IP (FCIP)
- IP network considerations
- FCIP security and encryption
- Buffer-to-buffer flow control

## Module 8: SAN Security

- Basic security model
- Attacks and exposures
- Mitigation of risk
- Storage security model
  - Data access
  - Management security
- B-Series fabric security access control lists
  - SCC
  - DCC
  - FCS
  - IP Filter
- B-Series role-based access control (RBAC)
- B-Series authentication options
- Data path and management path security summary

## Module 9: SAN Design

- Topologies
  - HPE standard supported SAN topologies
  - Design using HPE supported SAN topologies
    - Single-switch fabric
    - Cascaded fabric
    - Ring fabric



- Meshed fabric
  - Core-edge fabric
- Performance
  - Topology data access usage
  - ISL oversubscription
  - ISL bandwidth aggregation
  - Hop latency
  - Device attachment points
  - Performance guidelines within the SAN
  - Backup performance considerations



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