

# Core Fundamentals of Storage Area Network

*Skills and expertise to help you increase your knowledge in the field of storage technologies*

## Course Highlights

Training will be delivered by an experienced trainer with 25+ years of career experience imparting education and training services both locally and internationally and have served international enterprise technology vendors including IBM, Fujitsu, and ICL.

Our instructor holds various industry professional certifications in the space of enterprise servers and storage technologies, Information Security, Enterprise Architecture, ITIL, Cloud, Virtualization, Green IT, and a co-author of 10 IBM Redbooks. The training course flow will be a mix of lectures & classroom discussions so that participants can have a detailed understanding of various components of Storage technologies discussing different sales scenarios.



The storage training course is vendor neutral and it makes the attendee completely familiar with lot of technologies surrounding storage and various complex issues and solutions thereof due to explosive growth of data.

Often people take training courses on storage products ranging from Storage switches to Arrays to Tape Devices to Storage Virtualization appliances. However, few of them really understand the gamut of storage technologies that made those products. As a result, there is an acute shortage of people in the storage market who has a holistic understanding of the storage capabilities and how they relate to each other.

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## Prerequisites:

Participants attending this course should be familiar with basic Information Technology (IT) concepts and the role of general storage systems technology.

This four-day online instructor led class is designed to develop storage technology skills and strategies associated with managing the explosive growth of business data across the enterprise in today's networked economy. In this course we will be discussing what is a storage area network? What are the benefits and pitfalls of installation? How can a SAN fit into your organization? These questions and more are answered in this Storage Area Network course.

## Unit 1 – Introduction to SAN

- What is a Storage Area Network?
- The importance of standards – The role of SNIA.
- Compliance with the standards – Interoperability.
- Storage Area Network Defined.
- SAN Architecture – Supporting Heterogeneous Environment.
- How a SAN Works and Understand Fibre Channel.
- Fiber Versus Fibre – Fibre Channel protocol.
- Protocols supported by SAN – FC SAN and IP SAN.
- Fibre Channel Adapter Interface Bus Speed – FC HBA's
- Why Fibre Channel and why we need a SAN?
- Fibre Channel components.
- Fibre Channel storage array under a HA environment.
- Understanding Block Level Storage & its applications
- SAN – A high speed data transfer between hosts.
- Types of SAN Applications.
- Unit 1 Assessment.

## Unit 2 – SAN Building Blocks and Data Protection

- Defining SAN components and their use.
  - Components found in the server
  - Components found in the SAN fabric
- SAN ports and naming convention
- Fibre Channel consists of the following layers.
- Looking at the Logical Unit Numbers (LUN).
- Understanding igroup and LUN.
- Information you require to create a LUN.

- Understand why Data Protection is important?
- Unit 2 Assessment.

## Unit 3 – Prerequisites for Planning, Designing and Architecting a SAN Solution

- Describe Fibre Channel protocols.
- Understanding Multimode & Single-mode fiber.
- Understanding the role of Latency in SAN.
- Understanding the role of Attenuation in light of Latency.
- Storage Area Network – Fibre Vs. Copper Media.
- Fiber drawbacks that cannot be ignored.
- Understanding the Role of TOGAF.
- The four essential pillars of TOGAF Architecture Framework.
- Reduce cost & minimize risk – Improve Services.
- Understand the SAN Ecosystem.
- Concepts behind storage efficiency technologies.
- SAN Planning – An essential component from designing POV.
- Knowing your infrastructure – Servers & Application POV.
- Consideration prior investing in new SAN solution.
- Unit 3 Assessment.

## Unit 4 - Understand SAN Design Topologies

- Connecting two different networks – IP and FC.
- Fibre Channel SAN Topologies.
- Fibre Channel Topologies – Point to Point Topology.
- Fibre Channel Topologies – “FC-AL” and “FC-SW” Fabric Switch Vs. Hub Comparison.
- How an Arbitrated Loop Hub works.
- How a Switched Fabric works.
- Switched Fabric – Traditional and Single Switch Topology.
- Understand Inter Switch Links (ISLs).
- Switched Fabric – Traditional, Cascaded and Ring Topology.
- Switched Fabric – Traditional Topology – Mesh Topology.
- Switched Fabric – Tiered Topology – Edge Core Topology.
- Switched Fabric – Tiered, Edge Core Edge Topology
- Unit 4 Assessment.

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## Unit 5 – Understand what's make a SAN Stop & Troubleshooting

- Discovering what causes SAN problems.
- Staying out of trouble.
- Knowing the limits and Monitoring your SAN.
- Understand Change Management role.
- Following general guidelines to avoid poor SAN design.
- Other SAN configuration issues to watch.
- Problem determination.
- SAN problem pointers – Switch & Array.
- The role of Diagnostics Port feature in SAN Fabric Switches.
- D-port Guidelines and Restrictions.
- The role Zoning in regards to SAN Troubleshooting.
- Basic replication performance troubleshooting.
- General Troubleshooting Hints and Tips.
- Unit 5 Assessment.

## Unit 6 – Disaster Recovery Planning for SAN

- Data Protection Overview & Data Protection Strategy.
- Comparison of Data Protection Methods and Business Continuity Management.
- Crafting a disaster recovery plan.
- 7 things your IT disaster recovery plan should cover
- Fibre Channel SAN Array HA/DR design configuration.
- Fibre Channel SAN Array HA/DR Architecture.
- The two main sides of Data Protection .
- Successful Recovery Operations – Data Consistency
- Important consideration from Data Recovery POV .
- Disaster recovery objectives – RPO & RTO.
- Synchronous and Asynchronous data replication.
- Methods used for using Data Replication Services
- Pros & Cons of Data Replication services.
- Best practices for using Data Replication Services.
- Network Bandwidth and Replication.
- The importance of bandwidth, distance, and latency.

## Unit 7 – SAN Backup Methodologies

- Understanding the importance of backup.
- Able to describe LAN free Backup
- Understand Server free or Serverless Backup.
- Network Backup Speed for performing backups.
- Backup Restore and Types of Backups – Full Backup.
- Pros and Cons to the use of Daily Full Backups.
- Types of Backups – Incremental Backup.
- Pros and Cons to the use of Incremental Backups.
- Types of Backups – Differential Backup.
- Pros and Cons to the use of Differential Backups.
- A comparison of different backup operations.
- Unit 7 Assessment.

## Unit 8 – Booting into your SAN

- Understand what is SAN Boot and Benefits of SAN Boot.
- Some of the drawbacks of SAN Boot.
- Host Bus Adapter (HBA) configuration for SAN Boot.
- Zoning Consideration following best practices.
- What are WWNNs and WWPNs – Concepts
- Using Multipathing is an integral component of SAN Boot.
- Multiple SAN Boot Configuration and Basic SAN Boot procedure.
- List of requirements and guidelines for SAN Boot
- The SAN boot process – Six Steps.
- The SAN boot process – Choosing the right Host Bus Adapter.
- The SAN boot process – Booting into the SAN the right way.
- Recommendations for tracing SAN Boot problem.
- Unit 8 Assessment.

## Unit 9 - Using Point-in-Time

- Understanding what a “Point-in-Time” copy Technology.
- Understanding six general types of snapshot technologies.
- Snapshots as a part of your Backup Strategy.
- Copy-on-write, Redirect-on-write, Clone or split-mirror, Copy-on-write (COW) with background copy, Incremental, and Continuous data protection (CDP)

- Pros and Cons to the use of snapshots and Best practices for using Snapshots.
- Unit 9 Assessment.

## Unit 10 - Approaches to SAN Management

- The need for SAN Management practices.
- SAN Management Overview.
- Traditional Practices for SAN Management.
- Understanding the need for SAN Management practices.
- Knowing your installed SAN components.
- Go from “Component” management to System” management.
- What does the SAN Management Framework offers you.
- SAN Management Automation.
- Using a “framework” of software to handle it all.
- What does a good SAN Management framework do for you?
- SAN Switch features and Advanced Web Tools.
- Unit 10 Assessment.

## Unit 11 - SAN Best Practices and general Guidelines

- Best Practice defined.
- Applying best practices across SAN Building Blocks.
- Zoning from Best Practices Point of View.
- Zone element Naming Conventions.
- Understand why to keep Disk and Tape traffic separate.
- Performance and Metrics from Best Practices Point of View.
- The use of Logical Unit Number Masking – LUN Masking.
- Interoperability – A subject that needs attention!
- Cabling Best Practices.
- SAN Best Practices that you can implement today.
- Unit 11 Assessment.

## Detail Information

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| Course Code         | : TN165   |
| Course Duration     | : 4-Day Instructor-led Online Workshop.             |
| Course Location     | : Online, TLC office, Karachi and Customer On-site. |
| Terms & Conditions  | : 100% payment in advance.                          |
| Course Deliverable: | Comprehensive Student Guide and Course Certificate. |