CompTIA Storage+ Powered by SNIA

http://snia.org/education/courses/training_tc

Course Length: 1 day
• 9AM–5PM

Course Fee: $395 USD
• Register: https://www.regonline.com/Register/Checkin.aspx?EventID=635346

Course Location:
• April 6, 2015 – Santa Clara, CA
• Hyatt Regency Santa Clara, 5101 Great America Parkway, Santa Clara, California, USA, 95054

Course Description (Overview):
This seminar covers all topics in the CompTIA Storage+ Certification Powered by SNIA certification exam. The session is based upon the blueprint used to develop the exam and each topic is covered to the appropriate level to pass the exam.

1.0 Storage Components

1.1 Describe disk types, components, and features.
        SATA, FC, SAS, SCSI
        HDD, HHD, SSD
        Disk characteristics, geometry, performance, capacity

1.2 Compare removable media types, components, and features.
        Tape type, size, speed, multi-streaming, multiplexing, Shoe-shining
        Compression and encryption (hardware/software)
        DVD, Blu-Ray, Flash drives, WORM

1.3 Given a scenario, install and maintain connectors and cable types (keeping in mind their properties).
        Fiber cables, Multimode (shortwave) vs. single mode (long wave)
        Length, speed and distance limitations
        Connectors: LC, SC, SFP
        Care of cables: bend radius, stress
        Copper cables: CAT5, 5e, 6, SAS, speed, distance, connectors
        SAS1 and SAS2 port speeds

1.4 Describe the uses of physical networking hardware.
    Switch and features; trunking, ISL, Fibre Channel port types, directors
    HBA, CNA, Routers

1.5 Given a scenario, install and maintain modular storage array components.
    Controller Raid-head; single, dual, grid, caching, expansion, host ports
    Disk enclosure, controllers, monitoring cards, addressing, cabling

1.6 Identify the following environmental concerns and their associated impacts.
    HVAC; cooling and humidity control systems, fire suppression, and power
    Floor and rack loading

1.7 Use appropriate safety techniques during installation and maintenance of storage equipment.
    Weight considerations, lifting techniques, antistatic, rack loading and stabilization.

2.0 Connectivity

2.1 Identify common storage networking industry terms.
    Links, flow control, buffer-to-buffer credit, oversubscription, N_port ID, worldwide names

2.2 Explain the following storage networking industry terms.
    Alias, name service, connections, initiator, target, fabric, LUN

2.3 Given a scenario, implement the following fibre channel technologies.
    FC Topologies, Point-to-point, Arbitrated loop, single/redundant fabrics
    Implementations: Zone, Zone Set, Zone Alias, Zoning best practices, Hard/soft zoning
    Domain IDs, NPIV, SCSI IDs
    Multipathing/Load balancing/Fail over, physical vs. logical connections
    FC Protocols: SCSI-FCP, FCIP, IPFC

2.4 Given a scenario, implement the following Ethernet network technologies.
    Features, LAN, MAN, WAN, VLAN
    Multipathing; iSCSI, MPIO, link aggregation
    Protocols: iSCSI, NFS, CIFS

2.5 Identify the basics of converged storage network technologies.
    FCoE, DCB (DCE, CEE), LLDP, 10GbE
    Class of service, priority tagging, Baby-jumbo frames

2.6 Given a scenario, use the appropriate network tools.
    TCP/IP network: ping, tracert/traceroute, ipconfig/ifconfig, nslookup

Fibre channel network: Port error counters, fcping, Name server, rescan

2.7 Troubleshoot the following common networking problems.
Bad cables (wrong), ports, connectors, NIC, NIC improperly connected, switch
Incorrect configuration on NIC, incorrect VLAN, Firewall settings

2.8 Troubleshoot the following common fibre channel problems.
Zoning errors or mis-configuration, failed/intermittent HBA or SFP
Connectivity, Failed cable, mis-configured fibre channel cable
Interoperability/incompatibility of hardware/software/drivers/firmware

2.9 Compare and contrast common storage infrastructures.
SAN, FC, Block mode, file systems, protocols, fabrics
NAS, TCP/IP/Ethernet based, UNC addressable storage, File system on storage (NFS or CIFS)
DAS: SATA, SAS, SCSI

3.0 Storage Management

3.1 Explain the following RAID levels and associated properties.
RAID Levels 0, 1, 5, 6, 10, 01 and impact on performance, fault tolerance and capacity
Properties: high read/write, failure modes, rebuild times,

3.2 Given a scenario, execute storage provisioning techniques.
LUN numbers, provisioning, LUN masking, host-based vs. storage-based
Best practices for disk provisioning, Load balancing, thin provisioning/reclamation

3.3 Explain volume management concepts.
File vs. block level architecture, LVM, Volume groups, mount points

3.4 Describe general virtualization concepts.
Virtual storage: disk, tape, and provisioning of the host, array and fabric
VSAN/Virtual fabric, VLAN and NPIV

3.5 Given a scenario, implement monitoring, alerting, and reporting.
Setting thresholds, trends, forecasting, capacity planning, recording baselines
Setting alerts, Auditing log files, alerting methods (e.g. email, SNMP, call home)

3.6 Explain management protocols, interfaces, and associated purpose.
Management protocols: SNMP, SMI-S, WBEM
Administration: CLI, Serial, Telnet, SSH, HTTP/s
In-band vs. out-of-band management

3.7 Explain Information Lifecycle Management concepts.
Data migration strategies (HSM) and storage tiers
Archiving and purging
Compliance and preservation
Content Addressable Storage (CAS) / Object Oriented Storage (OOS)
Value of data based on frequency of access

3.8 Explain the various functions and differences of de-duplication and compression.
Inline and post-process de-duplication
Software based vs. appliance based
Single instance storage
Performance and capacity implications
Reduction ratios vs. data type

4.0 Data Protection

4.1 Explain redundancy concepts, associated purposes, and components.
Single point of failure, path/bus, and high availability
Component redundancy: Power supply, controller, disks (hot spare), HBA, NICs, Arrays, switches
Cache battery backup and cache mirroring

4.2 Compare and contrast different replication methods and properties.
Synchronous and asynchronous, local/remote, site redundancy, snapshots and clones, replication consistency

4.3 Explain the basics of data backup concepts for long term storage.
Recovery Point Objective (RPO) and Recovery Time Objective (RTO)
Backup and restore methods: full, incremental, differential, progressive
Backup implementation methods: LAN-free, Server-less, Server-based
Backup targets: disk-to-disk, disk-to-tape, VTL, D2D2T
Vaulting vs. e-vaulting, Offsite tape storage/disaster recovery plan
Verify backups: data integrity, checksums, and application
Data retention and preservation policy/Corporate and legal compliance
Rotation schemes (GFS - Grandfather, Father, Son)

4.4 Explain the basic concepts and importance of data security.
Access management: ACL, physical, multi-protocols
Encryption: disk, tape, network, host, encryption keys
Storage security: Shared access (NFS3 vs. NFS4), Shared access (CIFS), File permissions vs. share/export permissions

5.0 Storage Performance

5.1 Explain how latency and throughput impact storage performance.
  Caching schemes: read vs write traffic, de-staging, hits and misses
  RAID type and size verses number of disks
  IOps/MBps calculations
  Random vs. sequential I/O

5.2 Identify tuning and workload balance concepts.
  Application to storage data profiling
  Tiering: automatic, HSM, manual
  Partition alignment and fragmentation
  Queue depth

5.3 Describe storage device bandwidth properties and functions.
  Bus bandwidth/loop bandwidth, cable speeds, throughput vs bandwidth, caching,
  embedded switch port speeds, shared/dedicated connections, multipathing for load
  balancing.

5.4 Describe network device bandwidth properties and functions.
  Shared vs. dedicated, Teaming/link aggregation, Class of service, jumbo frames, TOE

5.5 Explain performance metrics, parameters, and purposes of storage/host tools.
  Base lining and data capture
  Switch, port stats, thresholds, hops, port groups, ISL, trunking, bandwidth
  Array: cache hit rate, CUPloads, port stats, bandwidth, throughput I/O latency multiple
  LUNs in same array
  Host tools: Sysmon, Perfmon, Iostat