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Designing a Network

Designing a Network

- More than assembling hardware and software

- You must consider:
  - Capacity, response time, throughput, ease of use, reliability, security, and so forth

- Must be designed to fulfill the needs of the business and its end-users

- You must custom tailor your design per the required and/or desired user requirements

Network Design Process

Step 1: Identify the Uses of the Network

Step 2: List Which Tasks Execute on Which Computers

Step 3: Select the Type of Network: Centralized or Not?

Step 4: Select the Proper Equipment

Step 5: Draw the Network

Steps 6 & 7: Write the Specifications & Build It!

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Step 1: Identify the Uses of the Network

Step 1: Identify the Uses of the Network

- This aligns with our network planning phase

- Need to determine why the organization needs a network

- Find out via interviews:

    o The organization's core business (What do they do?)

    o How they want to change & improve business operations (How can a network help the business?)

- You want to interview the owners, executives, managers, operations staff, etc.

- The more you find out about the business, the better!

Step 2: List Which Tasks Execute on Which Computers

Step 2: List Which Tasks Execute on Which Computers

- Know which **applications** and **tasks** have to be performed at each of the computers on the network

- You need to know **how powerful** each computer should be and what each computer should be capable of (CPU, RAM, HD Space, Monitor Size)

- This goes for both server and client computers

- **Example**: A computer for data entry versus a computer for video editing

Step 3: Select the Type of Network: Centralized or Not?

Step 3: Select the Type of Network – Centralized or Not?

- Will a peer-to-peer network suffice or do you require a client-server architecture?

- Types of servers services:
  - File server, print server, email server, application server, web server, database server, authentication server, backup server, and so forth.
  - In-House Physical Server(s) or Cloud-Based Infrastructure as a Service (IaaS)?
    - Multiple Physical Servers In-House or a Single Server Utilizing Virtualization?
    - Utilization of a Cloud Provider: Amazon AWS, Microsoft Azure, etc.?

Step 4: Select the Proper Equipment

Step 4: Select the Proper Equipment

- Determine what networking equipment is right for the custom-tailored network design.

- Consider everything you had done so far:
  - o Identified the Uses of the Network
  - o Identified What Task is Done on What Computer
  - o Peer-to-Peer or Client/Server Architecture Selection

- Also consider:
  - o Monetary Constraints
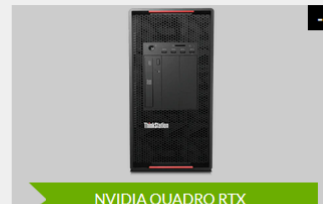 - o Reliability, Security, Availability, and Scalability Requirements
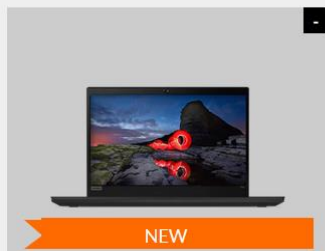
Desktop & Laptop Selection

ThinkStation P330 Tiny Workstation
Starting at
$674.10

ThinkStation P330 Tower Workstation
NEW MODELS
Starting at
$683.10

ThinkStation P920 Tower Workstation
NVIDIA QUADRO RTX
Starting at
$1,925.10

T490 (14")
NEW
Starting at
$1,029.00

T480 (14")
Starting at
$849.00

T470s
Starting at
$699.00

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Server Selection

ThinkSystem ST50

ThinkSystem ST50 is a compact, affordable, single-socket entry tower optimized for SMB, remote/branch offices, workgroups, departmental groups, and small/home offices.

Datasheet
Product Guide

Starting at: $1,394.00

ThinkSystem ST250

An ideal server for small-to-medium-sized businesses looking for enterprise-level power in an easily-managed tower form factor.

Datasheet
Product Guide

Starting at: $2,151.00

ThinkSystem SR530

ThinkSystem SR530 is an ideal budget-friendly, two-processor, 1U rack server, designed to tackle entry cloud, hosting, file serving, and scale-out workloads.

Datasheet
Product Guide

Starting at: $3,476.00

ThinkSystem SR250

A single-processor rack server in a compact 1U form factor that offers enterprise power, reliability, and flexibility for workloads including entry cloud, virtualization, and data analytics.

Datasheet
Product Guide

Starting at: $2,530.00

Tape Backup Solutions

Scalar i3

Designed For

Small to Medium Backup Environments

Specs

Number of Tapes: 25 to 400

Native Capacity with LTO-8 Media: 300 TB to 4.8 PB

Scalar i6

Enterprise Data Centers, PB-scale 'scale out' cold storage

Number of Tapes: 50 to 800

Native Capacity with LTO-8 Media: 600 TB to 9.6 PB

Scalar i6000

Enterprise Data Centers, PB-scale 'scale up' cold storage

Number of Tapes: 100 to 12,000

Native Capacity with LTO-8 Media: 1.2 PB to 144 PB

Uninterrupted Battery Backup (UPS)

APC Back-UPS Pro BR UPS AC 120 V 900 Watt 1500 VA USB - Black
$224.99

APC Back-UPS 850VA UPS Battery Backup (BE850M2)
$110.99

APC Back-UPS Pro 1500VA Battery Backup & Surge Protector (BR1500G)
$249.99

APC Back-UPS Pro BR UPS AC 120 V 810 Watt 1350 VA - USB
$184.99

Physical Security

Kensington Combination Cable Lock for Laptops and Other Devices (K64673AM)
★★★★☆ 396
$18.99 ✓prime

Kensington Desk Mount Anchor Accessory for Cable Locks (K64613WW)
★★★★☆ 80
$9.50 ✓prime

Kensington Cable Lock for HP Laptops, Lenovo, Asus, Acer & Other Devices - NEW Smaller &...
★★★★½ 52
$24.99 ✓prime

RUBAN Notebook Lock and Security Cable (PC/Laptop) Two Keys 6.2 foot (Black)
★★★★½ 234
$14.99 ✓prime

Networking Equipment

Network Switches

Managed / Smart Switches
Unmanaged Switches
Switch Modules

Shop All ▸

Routers & Access Points

Wireless APs
Wireless Routers
Wired Routers

Shop All ▸

Firewalls / Security Appliances

Wired
Wireless

Shop All ▸

Network Interface Cards

PCI-E
Up to 1Gbps
Greater than 1Gbps

Shop All ▸

Network Adapters

Wired Adapters
Wireless Adapters
Bluetooth Adapters

Shop All ▸

Network Attached Storage

Desktop NAS
Rackmount NAS

Shop All ▸

Telephones / VoIP

VoIP Adapters / Accessories
Phone & Conferencing Devices
VoIP Phones
Telephone Accessories

Shop All ▸

Range Extenders

Internal Antenna
External Antenna

Shop All ▸

Network Transceivers

Up to 1Gbps
Greater than 1Gbps

Shop All ▸

Cloud Computing

- Software as a Service (SaaS)
  - Office 365
  - SharePoint Online
- Infrastructure as a Service (Iaas)
  - Amazon Web Services (AWS)
  - Microsoft Azure
- Cloud-Based Data Storage & Backups
  - Microsoft OneDrive
  - DropBox
  - iCloud
- **Concern**: Security, HIPPA-Certified, PCI-DSS, etc.

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Step 5: Draw the Network

Step 5: Draw the Network

- By the time you reach this step, you should know the following:
  - The purpose of the network
  - The specifics of the network's use
  - The number of users and computers
  - Whether the network will be centralized or not
  - The network topology
- In this step, you want to draw the physical and logical design:
  - Physical layout of IT equipment (blueprint)
  - Logical layout of IP addressing schema

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Step 6 & 7: Write the Specifications & Build It!

Step 6: Write the Specifications

- The purpose of the specification document is:
  - To limit the scope of the network design; prevents scope creep
  - To provide a reference document for network administrators

- **Should Include:**
  - Why the organization is building the network
  - What the network will be used for
  - How many people and computers the network will support
  - If the network is peer-to-peer or client-server
  - The response time and throughput requirements
  - The security requirements (physical and logical)
  - The reliability requirements (availability)
  - The scalability requirements
  - Specifications & justification for all hardware and software

Step 7: Build It!

- After you've completed steps 1 through 6 and the organization agrees, build the network.

- But make sure you follow some sort of project management lifecycle, such as the Waterfall lifecycle, depicted here.

Requirements Gathering & Documentation

Network Design

Network Implementation

Network Testing

Network Deployment

Network Operations & Maintenance