# MIS 131: Information Systems Administration

## Part IV: Data Center

# What is a Data Center?

- A data center is the concentration of computing hardware and software, communication networks, application systems, physical facilities, and personnel that support the computing requirements of an enterprise
- There may be several data centers that support specific functions of the organization

# Functions of a Data Center

- Process production systems (both online and batch)
  - Data entry
  - Production runs
  - Reports (e.g. printing, distribution, etc.)
- Provide technical assistance to all users regarding computing problems

# Functions of a Data Center

- Manage and maintain hardware and software system to run efficiently and effectively
- Provide  and manage network support
- Secure all resources and access to resources

# Functions of a Data Center

- Manage media resources
- Monitor performance of hardware and software resources
- Plan for future hardware and software upgrades based on performance of systems

# Data Center Personnel

- Data center manager
- Computer operators
- Systems administrators / systems programmers
- Database administrators
- Security administrators
- Network administrators and engineers

# Data Center Personnel

- Data center manager
  - Ensures all functions of a data center are carried out
  - Minimizes losses by spearheading solutions to operational problems
  - Identifies possible operational problems and develops control measures to prevent their occurrence

# Data Center Personnel

- Junior Computer Operator
  - Performs batch and online procedures
  - Performs back-up or restore activities
  - Logs all operator activities
- Senior Computer Operator (team supervisor)
  - Ensures timely execution of procedures
  - Ensures back-up procedures are done
  - Troubleshoots system or application *abends*

# Data Center Personnel

- Systems Administrator / Systems Programmer
  - Tunes O/S and other software for efficient operation of information systems
  - Troubleshoots hardware or software problems
  - Installs new software, software upgrades, and evaluates impact on systems
  - Monitors system performance then conducts capacity planning

# Data Center Personnel

- Database Administrator (DBA)
  - A technical position whose responsibilities include
    - Maintenance of database structure
    - Installation and upgrade of DBMS
    - Database backup and recovery
    - Database tuning
  - Not just involved in operations but also in other major phases of SDLC

# Data Center Personnel

- IT Security Administrator
  - Ensures appropriate access of end-users through proper authentication schemes
  - Protects resources from unauthorized use
  - Protects data from unauthorized access
  - Prepares contingency plans for system failure

# Data Center Personnel

- Network Administrator / Network Engineer
  - Builds and maintains the LAN and/or WAN
  - Ensures trouble-free network operations by implementing network redundancy
  - Troubleshoots network problems
  - Sets up servers, file structures, etc.
  - Administers user log-in profiles and other administrative functions (i.e. “Message of the Day” login banner)

# Data Center Efficiency and Misconceptions

- More money = Efficiency?
  - Studies show that there is no correlation between the amount of money spent and the efficiency of data center operations
- Industry = Efficiency?
  - Studies show that efficiency of data center operations is independent of industry

# Factors Affecting Efficiency

- Functional quality of applications
  - How well applications meet user needs
- Technical quality of applications
  - Ease of maintenance, logical algorithm design, efficient program code

# Factors Affecting Efficiency

- Age of applications
  - The older the application, the less efficient it is (i.e. exception vs. detailed reporting, new languages more efficient)
- Portfolio coverage
  - Measured by how much of the work that can be automated is actually automated

# Improving Data Center Efficiency

- Data entry - data should be captured as close as possible to the source
- More exception reporting - minimize printing and distribution of large number of reports
- Lessen data center personnel (without being overburdened)

# Improving Data Center Efficiency

- Invest on “knowledge workers” (technical support, management) rather than on “hands-on people” (tape mounters, print distributors, etc.)
- Use of computers and equipment that can operate in *unattended mode*

# Unattended Operations

- Totally automated operation of all data center functions
- A dark-room environment in which computers run without human intervention
- Also known as “lights-out” operations
- Usually entails additional costs on new equipment and applications

# Implementing Unattended Operations

- Define areas of human intervention and categorize into “Easy to Eliminate” and “Hard to Eliminate”
- Define need for additional hardware
- Define areas and method for necessary changes in applications and other affected software
- Test and implement additions

# Setting up a Data Center

- Requires definitive and careful plan
- Plan developed, monitored, and updated by aggressive project team with experts in
  - O/S
  - Databases
  - Telecommunications
  - Networks
  - Construction
  - Applications that support the enterprise

# Assumptions

- Site has been selected already (e.g. no need for real estate search, building permits, etc.)
- Project is already sanctioned and budgeted by senior management
- Schedule for completion has already been laid out

# Construction Considerations

- Blue print of data center must include:
  - LAN and WAN connections
  - Heating, ventilation, and air-conditioning (HVAC)
  - Moisture detection
  - Drainage
  - Fire detection
  - Fire suppression (e.g. water, Halon, or CO2)
  - Personnel cubicles
  - Office assignments
  - Emergency exits
  - Alternative consoles for emergency backup
  - Security backup
- Plan must be compliant with building code, and other similar regulations

# Facilities and Utilities

- UPS
- Motor generator power supply
- Separate power grid (must be discussed with local power company)

# Facilities and Utilities

- Industrial grade air-conditioners (optimal: 65 deg F or 18 deg C)

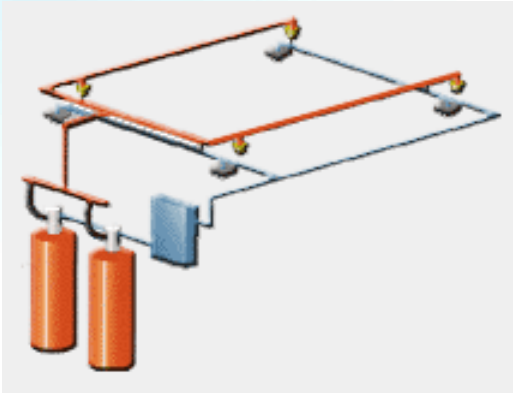
# Facilities and Utilities

- Raised flooring
  - Enables constant flow of AC that maintains uniform room temperature
  - Reduces static electricity

- Air filters (to keep dust out)
- Redundant telephone lines

# Facilities and Utilities

- Fire suppression systems




# Compatibility Issues

- Heterogeneity must be kept at a minimum for better reliability, reduced slow response times and finger pointing during outages
- Thorough testing must be completed
- Ensure vendor response time as negotiated

# Physical Security

- Surveillance cameras


- Entrances and exits
  - Convenient locations for center personnel
  - Readily accessible by police, fire department, and medical personnel
  - Doors with security codes (use biometric authentication if possible)

# Connectivity

- Redundant Internet backbone connection
- High bandwidth
- Latency considerations
  - Internal LAN
  - ISPs LAN

# Business Continuity

- Fault tolerance
  - RAID
  - Redundant, hot-swappable disks and power supplies
  - Redundant servers
- Good backup and recovery system
  - Onsite and offsite
  - Use of robotic systems for scheduled backups
- Definitive disaster recovery plan
- Identify vital information and store offsite