Objectives
- In this discussion, you will learn to:
  - Describe the activities of information systems professionals
  - Describe the technical knowledge of computer hardware and system software needed to develop and manage information systems
  - Identify additional sources of information for continuing education in computer hardware and system software

Technology and Knowledge
- Computers
  - Increasingly complex and powerful
  - Easier to use
- Why is technological knowledge important?

Acquiring and Configuring Technological Devices
- Requires more knowledge than using devices effectively
- Challenges of an IS professional
  - Computer acquisition
  - Upgrading
  - Configuration choices

Information System Development
- Systems development life cycle (SDLC)
  - Unified Process (UP)
- Iterations
  - Series of repeated steps
  - Produce testable models or working software
- Disciplines
  - Groups of related activities

Business Modeling and Requirements Disciplines
- Purpose
  - To understand the system environment and tasks the system must perform
- Technical knowledge required to:
  - Assess degree to which users’ needs are being met
  - Estimate resources required to address unmet needs

Design Discipline
- Purpose
  - To determine structure of a specific information system that fulfills system requirements (information architecture)
- Technical knowledge required to:
  - Select hardware and network components
  - Evaluate compatibility
- Sets of design activities
  - Architectural design
    - Select and describe exact configuration
  - Detailed design
    - Narrower in scope
    - Constrained by information architecture
Specific Systems Design Tasks

<table>
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<tr>
<th>Selection of…</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Computer hardware</td>
<td>Processing, storage, I/O, and network components</td>
</tr>
<tr>
<td>Network hardware</td>
<td>Transmission lines, routers, firewalls</td>
</tr>
<tr>
<td>Software</td>
<td>OS, database management system, network services, network protocols, security protocols and software</td>
</tr>
<tr>
<td>Application program development tools</td>
<td>Programming languages, component libraries, integrated development environments</td>
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</table>

Implementation and Testing Disciplines
- Purpose of implementation
  - To build, acquire, and integrate application software components
- Purpose of testing
  - To verify correct functioning of infrastructure and application software components and ensure they satisfy system requirements
- Require specific knowledge of hardware, networks, and system software

Deployment Discipline
- Purpose
  - To install and configure infrastructure and application software components and bring them into operation
- Technical knowledge required to:
  - Format storage devices
  - Set up system security
  - Install and configure network services
  - Establish accounting and auditing controls

Systems Evaluation and Maintenance
- Accounts for much of long range system cost
- Technical knowledge required to:
  - Address maintenance changes
  - Classify a proposed change as major or minor
  - Modify an existing system

Managing Computer Resources
- Requires attention to compatibility and future trends
- Technical knowledge required to ensure that:
  - Each new system operates correctly by itself and operates smoothly with other systems in the organization
  - Software/hardware acquisitions provide a good foundation for current and future systems

Roles and Job Titles
- Classification of computer professionals
  - Software developers
    - Often called systems developers
  - Systems programmers
    - Also application developers
- Hardware personnel
- Systems managers
  
  - Computer hardware and software knowledge requirements of each group

Software (Systems) Developers
- Contribute to different parts of SDLC
  - Systems analyst: business modeling and requirements
  - Systems designer: design discipline, sometimes deployment
  - Programmer: builds and tests software
- Need in-depth hardware and system software knowledge

Types of Applications

<table>
<thead>
<tr>
<th>Type</th>
<th>Role</th>
<th>Education needed</th>
</tr>
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<tbody>
<tr>
<td>Business transactions/</td>
<td>Process business transactions or provide information to managers</td>
<td>College or technical degree in management or business with specialization in information processing</td>
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<tr>
<td>information processing</td>
<td></td>
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<tr>
<td>Scientific</td>
<td>Meet data processing and numerical modeling needs</td>
<td>Degree in mathematics, computer science or a branch of engineering</td>
</tr>
<tr>
<td>Technical</td>
<td>Control or directly interact with hardware devices</td>
<td>Degree in mathematics, computer science or a branch of engineering</td>
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Systems Programmers
- Develop system software (operating systems, compilers, database management systems, network security monitors)
- Perform hardware troubleshooting and software installation and configuration
- Have degrees in computer science or computer engineering
- Work outside “tech” firms only in large orgs that maintain large systems, server farms, etc.
- Need in-depth knowledge of system software, computer hardware, and networks
  - System software often directly controls computer hardware or interacts with networks

Hardware Personnel
- Design, install, and maintain hardware
- Education
  - Technical degree and/or vendor-specific training (lower level)
  - Degree in computer science or computer engineering (higher level)
- Require extensive knowledge of computer hardware (processing, data storage, input/output, and networking devices)

Systems Managers
- Common job titles
  - Computer operations manager
  - Network administrator
  - Database administrator
  - Chief information officer
Computer operations manager
• Oversees operation of a large information processing facility (scheduling, staffing, security, system backups, maintenance, upgrades)
• Knowledge requirements
  – Broad base of technical knowledge to understand organization’s information systems and infrastructure
  – Capability of understanding advice of technical staff

Network administrator roles
• May be responsible for network infrastructure
  – Requires technical expertise in computer hardware, telecommunications, and system software
  – Emphasis on network and data communication technology
• May be responsible for local area network
  – Provides access to many resources
  – One of the most demanding positions

Network administrator responsible for LAN
• Operates and maintains network
• Installs and maintains end-user software
• Installs and configures hardware
• Trains users
• Assists management in selecting and acquiring software and hardware

Database administrator
• Responsible for management of large collections of data
• Requires technical expertise and ability to help the organization exploit its data resources

Responsibilities of a Chief Information Officer
• Organization’s computers, networks, software, and data
• Strategic planning
• Effective use of information/computing technology
• Broad base of technical knowledge to interact effectively with all technical specialists
• Vision of how technology is changing and how best to respond to changes to support organizational objectives

Computer Technology Information Sources
• Periodical literature (most important)
• Web sites
  – Technology-oriented
  – Vendor and Manufacturer
• Training courses offered by hardware and software vendors

Periodical Literature
• Examples of available literature
  – ACM Computing Surveys
  – Computerworld
  – Communications of the ACM
  – Computer
  – InformationWeek
• Web-based periodicals
  – Provide content from back issues, additional content, a search engine, and other links
**Technology-Oriented Web Sites**
- Provide a common interface to publication families
- Enable publisher to provide additional content and services
- Can generate revenue in several ways
- May have biased content (expect to pay for completely unbiased information)

**Vendor and Manufacturer**
**Web Sites**
- Primarily marketing and customer support tools
- Provide current detailed technical product information
- Often biased in favor of vendor's products

**Professional Societies**
- AITP (Association for Information Technology Professionals)
- ACM (Association for Computing Machinery)
- IEEE Computer Society (Institute for Electrical and Electronics Engineers Computer Society)

**Summary**
- Technical knowledge of computers
  - Required to develop information systems
  - Required to manage an organization's information systems and infrastructure
- (compatibility, future trends)
  - Must be constantly updated
- Self-study and training
- Information available on Web