

Information Systems

Prepared by Dr. Amjad Qtaish

IT372
Information Systems

Lecture 02



Module 2: Information Technology Infrastructure



Chapter 3: Hardware and Software
Chapter 4: Emerging Technologies

Dr. Amjad Qtaish

*Faculty of Informatics
Midocean University*



Information Systems (IT372)



An Information Technology Infrastructure :

- Information Technology Infrastructure
- Hardware Components
- Computer Systems Types and Upgrading
- Software Component
- System Software
- Application Software
- Contemporary Hardware Platform
- Contemporary Software Platform
- Management Issues of IT infrastructure





An Information Technology Infrastructure :

- Identify the IT infrastructure and its components
- Describe how to select Hardware or IS
- Describe characteristics of memory, processor, storage, input and output devices
- Identify and briefly describe the functions of two basic types of software
- Outline the role of operating systems
- Discuss how application software support personal, workgroup and enterprise business objectives
- Discuss the current trends in computer hardware platforms
- Discuss the current trends in computer software platforms
- Identify the challenges of managing IT infrastructure and providing management solutions



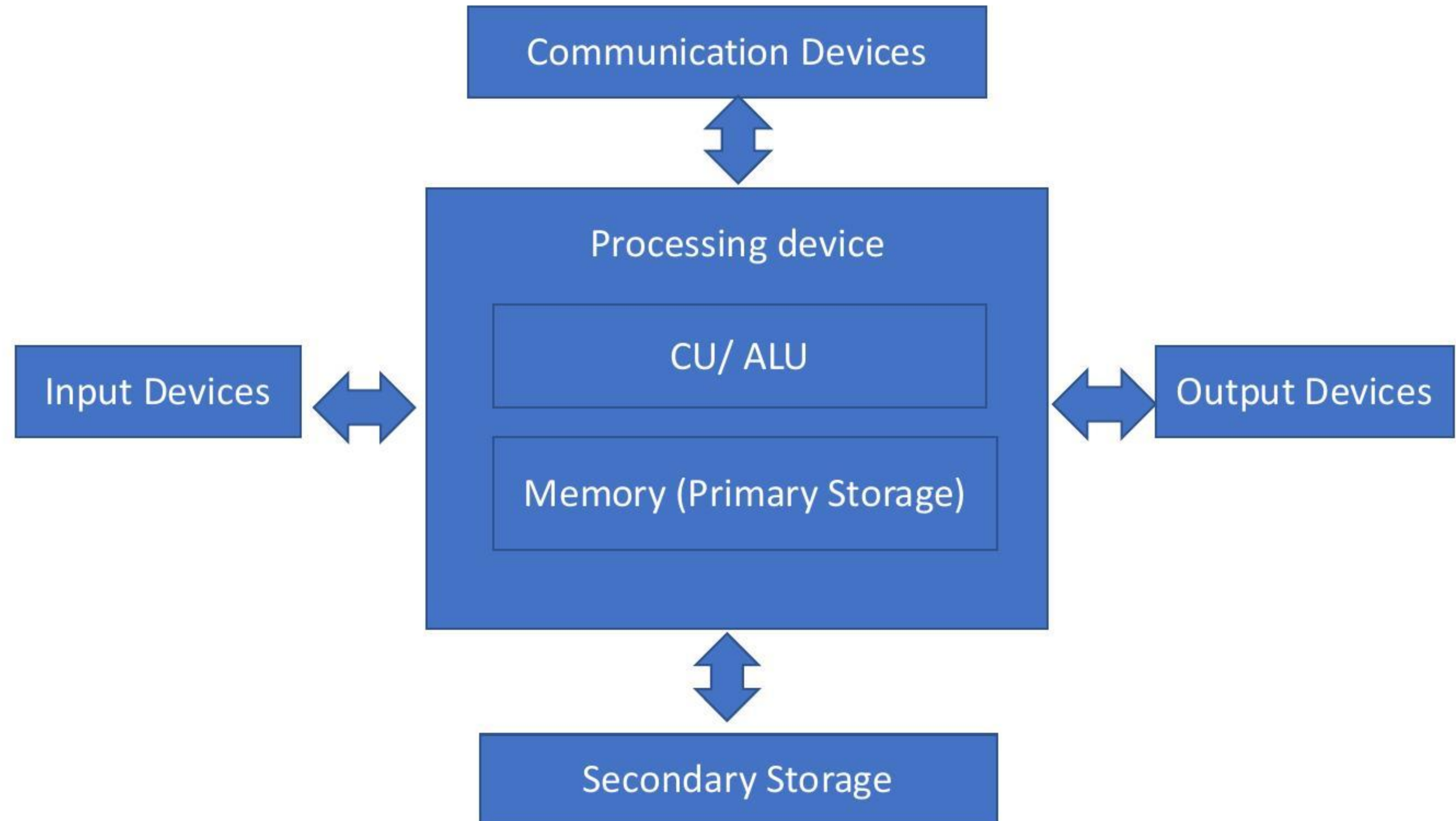


- **Physical devices and software applications**
- **Services “ Service Platform”**
 - Computing platforms
 - Telecomm services
 - Data management services
 - Application software services
 - Physical facility management
 - IT management services
 - IT standards services
 - IT training
 - IT research





- **Important to know service platform**
 - Value of technology
- **IT infrastructures have evolved**
 - Developments in computer processing/memory chips etc
- **Reason:**
- **To make technology practical and yield business benefits**





- **Cache Memory**
 - High speed memory
 - Stores frequently used data is stored
- **Costs for memory capacity continue to decline**
- **Effectiveness of a CBIS depends on memory capacity too**
 - Computer assisted product design require more memory



- **Multiprocessing involves simultaneous execution of two or more instructions at the same time**
 - Multicore microprocessor (dual core)
 - AMD and Intel
 - Core Duo technology
- **Parallel Computing is simultaneous execution of same task on multiple processors**
 - Massively Parallel computing systems
 - Single instruction/ Multiple data (SIMD)
 - Multiple Instruction/ Multiple data (MIMD)



- **Grid Computing: use of collection of computers to work in a coordinated manner**
 - Solve extremely large processing problems
 - Central server acting as Grid leader
 - World Community Grid (through Rosetta Software)
- **Business Uses: Modeling, simulating, analysing large amounts of data**
 - Marketing programs or boosting sales and customer relationships



- **Amount of data to be stored is increasing every year**
- **Secondary storage: non volatile, greater capacity, greater economy**
 - IS needs determine the access methods, storage capacity and portability
 - Access faster = expensive than slower media
 - Security
- **Types**
 - Magnetic Disks - Hard Disk
 - Optical Discs – CD-ROM, CD-RW, DVD, DVD-R
 - Memory Cards – used in digicams, video cams, photo printers, handheld games, smart phones
 - Flash Memory - EEPROM



- **RAID (redundant array of independent disks)**
 - Fault tolerance – requirement of organizations
 - Technology to rebuild lost data
 - Data is split and stored on different physical drives
 - Improves system performance and reliability
 - Simpler way is duplicating data, *disk mirroring*
- **Enterprise Storage**
 - Large secondary storage
 - Attached Storage
 - Network Attached Storage
 - Storage Area Network



- **Businesses consider certain features**
 - Form of output
 - Nature of data required
 - Speed and accuracy
- **PC Input**
 - Keyboard, mouse, track ball, touch pad
- **Voice/ Video**
 - Microphone, digital camera, web camera
- **Scanning Devices**
 - Optical Scanner (flatbed , handheld etc)
- **Pen Input**
 - Stylus, Digital Pen



- **Reading Devices**
 - Magnetic strip reader, Bar code reader, RFID reader
- **Touch Sensitive Screens**
- **Terminals**
 - Dumb, Smart , Special purpose (POS, ATM)
- **Biometric Input Devices**
 - Translates personal characteristics into digital code
 - Finger print scanner, Face recognition, Voice verification, Signature verification, Retina/ Iris scanners



- Output should be the right information at right time to the right person in the right format
- **Display Devices**
 - **CRT Monitors:** use the CRT to display images on the screens. Dot on the screen is called Pixel (on/off)
 - More pixels, more resolution (ppi)
 - Dot pitch: distance between pixels in millimetres (.25 to .33 mm)
 - **LCD monitors and screens:** flat panel displays that use liquid crystals to display images on screen
 - Less space, costlier, less power consumption, flicker free
 - TFT: use transistors to control each pixels
 - **OLED screens:** organic light emitting diodes, organic molecules that emit light
 - Brighter than LCD, flexible displays, less expensive
 - cell phones, car radios, digital cameras



- **Printers and Plotters**

- Produce text/ graphics on physical medium (hard copy)
- Non Impact (inkjet, Laser, Mobile)
 - Different speeds (ppm), quality (dpi), capabilities
- Impact (Dot Matrix)
 - Continuous form of paper (cps)
- **Plotters:** high quality drawings like blue prints, maps, circuit diagrams
 - Upto 60 inch width

- **Audio Output**

- Speakers, head phones, ear phones

- **Data Projectors**

- Projects text and images on larger screens



- **Handheld/Mobile Devices**
 - As small as a credit card, pocket size, portability
 - No disk, save data on special memory, GPS
 - Handheld computer, PDA, smartphones
- **Portable Computers**
 - Laptops, notebooks, tablet PCs
 - Thin, lightweight, powerful
- **Thin Client**
 - Low-cost , centrally managed computer, no drives, limited capabilities
- **Desktop and Workstation**
 - Inexpensive, single user systems
 - Expensive, powerful
 - Mathematical computing, CAD, special effects for motion pictures



- **Servers**

- Used by many people to perform certain tasks, provides access to hardware, software, resources
- Scalability : ability to increase processing capability
- **Blade servers:** thinner than box-based servers, circuit board with processors, memory and network connections, secondary storage maybe added

- **Mainframes**

- Large, powerful, thousand computers connected, and handle millions of instructions
- Information processing and data storage that are too large, backups

- **Supercomputers**

- Special purpose machines, complex, sophisticated mathematical calculations



- **Bank of New York**
- traditionally information services are provided by z-series mainframes
- Competition from server based distributed systems
 - midrange servers, blade servers
 - Distributed systems: system dividing business processes among network servers,
 - Open and agile
 - Deployment of applications easy
 - Scalability
 - Inexpensive servers



Case Study: Mainframes or Distributed Systems



- **Mainframes**
 - Ease of management
 - More secure and stable
 - Useful means of consolidation
 - Very large complex problem solving
- Expensive to shift from mainframe to distributed system
- IS professionals need to take advantage of both the technologies



- **System software**

- Set of programmes that coordinate activities and functions of computer hardware & other programs

- **Application Software**

- Programs to help the users perform tasks

- **Sphere of Influence**

- Scope of problem/opportunities addressed by organizations
 - Personal
 - Workgroup
 - Enterprise
 - Support the firm in the interactions with environment



- **Operating System**

- Plays a central role in the functioning of complete computer system
- After boot up, OS is loaded in RAM
- **Common Hardware Function:** acting as intermediary between hardware and programs
- **User Interfacing:** command based, GUI
- **Memory Management:** control access of memory & maximize usage and storage
- **Processing tasks:** task management allocates computer resources, allows multitasking (running more than one application at a time) and task sharing
- **Networking capabilities:** features and capabilities to aid users in connecting to computer network
- **File Management:** files are available when needed, protected from access by unauthorized users
- **Security:** provided by logon feature and identification code



PERSONAL	WORKGROUP	ENTERPRISE
Windows Vista Windows mobile and Windows Embedded Android Mac OS Mac OS X	Windows NT Server Windows 2003 Server Mac OS Server	Windows NT Server Windows Advanced Server
UNIX Solaris Linux Red Hat Linux Palm OS	UNIX Linux Netware IBM OS/390 IBM z/OS HP MPE/iX	Linux UNIX Red Hat Linux IBM OS/390 IBM z/OS HP MPE/iX



- **Embedded Operating Systems**

- Certain OS are embedded into the devices
- Some developed for special purpose devices e.g. computers on the space shuttle
- Windows CE : embedded in small computer devices
- Windows Mobile
- BlackBerry
- Symbian OS
- Google Android
- iPhone OS



- **Utility Programs**

- Help to perform maintenance with a computer system
- Hardware Utilities: Disk Scanner, Disk defragmenter, Diagnostic Utility
- Virus Detection and Recovery Utilities
- File compression Utilities
- Pop up blocker utilities
- Server and Mainframe Utilities
 - Reporting workgroup activities
 - Managing power supply
 - Archiving contents of database
 - Reporting status of computer jobs



- **Most of the jobs and activities can be handled by application software**
- Proprietary software: one of a kind program for specific application
- Off the shelf software: acquiring an existing software program
- Personal Application Software
- Workgroup Application Software
 - Collaborative software
 - Google docs, Yahoo groups
- Enterprise Application Software
 - SAP's ERP
- Mobile Application Software
 - App stores provide them



- **Open Source**
- **Freeware**
- **Shareware**
- **Public Domain**



- **Emerging Mobile Digital Platform**

- Smartphones evolving to become handheld computers
- Transmission of data, surfing Web, e-mail and IM, display digital content
- Low-cost light weight subnotebooks called *netbooks*
- Tablet computers
- Digital e-book readers
- Business computing will gradually move towards mobile devices

- **Grid Computing**

- Connecting geographically remote computers into a single network to create a virtual supercomputer
- Combines computational power of all computers in the grid
- Reason: most computer use CPU for 25% of the time for a certain work
- Special software programs control and allocate resources
- Benefits:
 - Cost savings
 - Speed of computing
 - Agility
 - Reduced power consumption



• Virtualization

- Process of presenting computing resources, that are accessed without restriction of geographic location or physical configuration
- Enables Single physical resource appears to users are multiple logical resources
- Enables Multiple physical resources appear as a single logical resource
- Benefit
 - Computing processing storage handled using computer resources at remote locations
 - Increase equipment utilization
 - Conserving data center space
 - Conserving energy usage
 - Run legacy systems on old OS on the same server
 - Centralization of hardware administration





- **Cloud Computing**

- Computer processing, storage, software and other services are obtained as a pool of virtualized resources over networks
- Main characteristics:
 - ON-demand self –service
 - Ubiquitous network access
 - Location independent resource pooling
 - Rapid elasticity
 - Measured service
- Available as three services: **Cloud infrastructure, cloud platform and cloud software**
- Types: Public cloud and private cloud





- **Green Computing**

- Practises and technologies for designing, manufacturing, and using devices to minimize impact on environment
- Reducing power consumption
- Metrics:
 - Power Usage Effectiveness
 - Data Center Infrastructure efficiency
 - Average Data Efficiency

- **Autonomic Computing**

- The more computer systems become complex, more difficult to manage
- Effort to develop systems themselves, optimize and heal themselves, also protect from intruders
- E.g. firewalls and virus protection

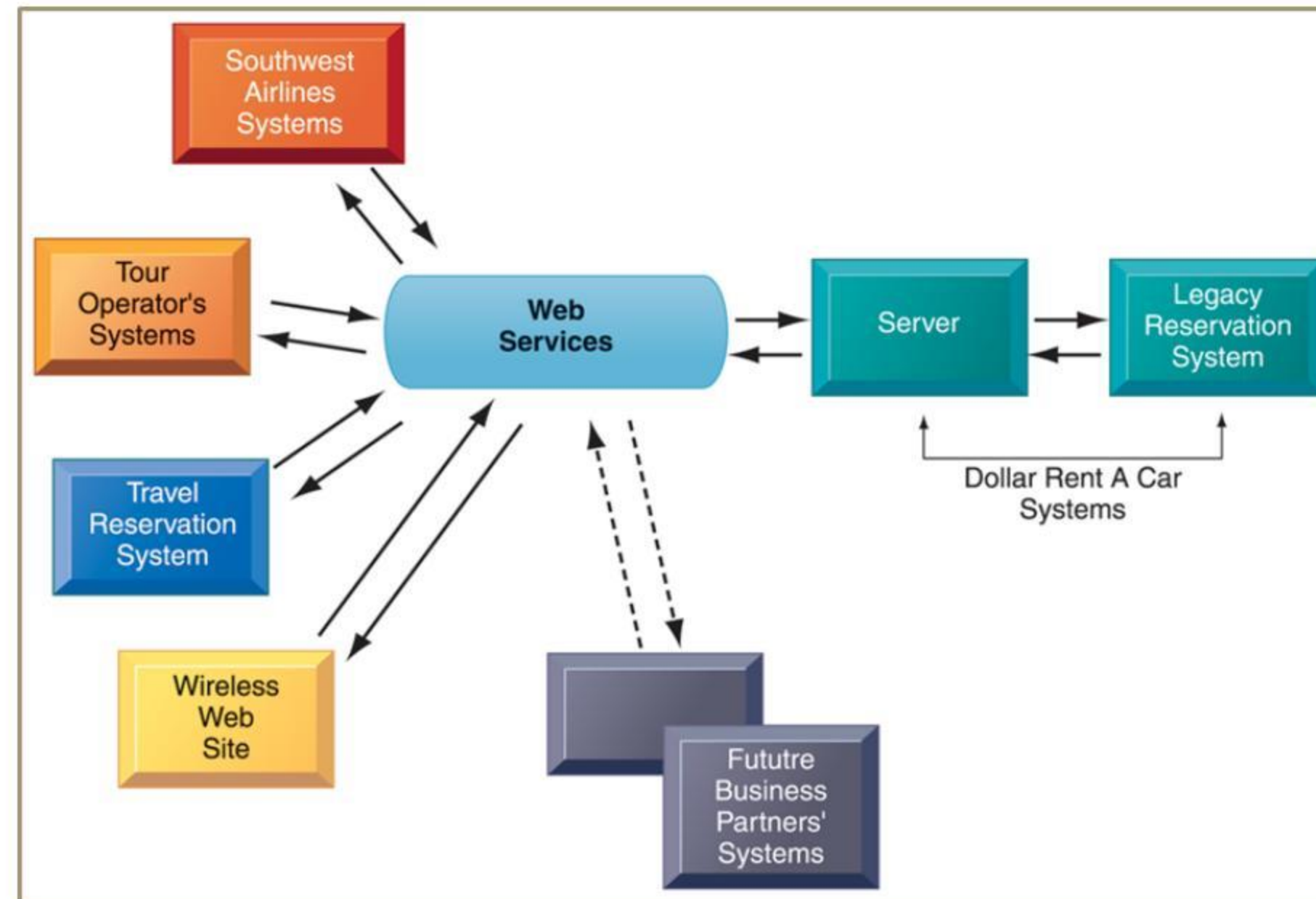


- **Service Oriented Architecture**

- Web Service: set of loosely coupled software components that exchange information with each other using standard web communications standards and languages
- XML: more powerful than HTML
 - Perform presentation, communication and storage of data
 - Provides standard format for data exchange
- SOA: set of self contained services that communicate with one another to create a working software application
- IBM's Websphere e-business software platform
- Microsoft's .Net platform



- How Dollar rent a Car uses Web services





• Software Outsourcing and Cloud Services

- Software package: prewritten, commercially available , e.g. SAP
- Outsourcing: enables firms to contract custom software development to outside firms, usually off shore
 - Low-level maintenance, data entry, call center, and now new program development
- Cloud-based: software and data hosted on powerful servers and accessed through Internet and Web browser
 - MS Word, Adobe Illustrator
- Enterprise software, other business function also available as a service
- Software as a Service (SaaS)
 - Subscription or per transaction



- **Linux and Open Source Software**

- **OSS:** software produced by a community of several hundred thousands of programmers around the world
- Free, modifiable, and free to be redistributed
- **Linux:** operating systems based on Unix
- Applications embedded in smart phones, netbooks, consumer electronics
- IBM, HP, Dell, Oracle produce Linux-compatible version o their products
- Used in Web servers, high performance computing





- **Platform and Infrastructure issues**

- Scalability: ability of a computer, product, or system to expand to serve large number of users
- New policies, procedures or legal contracts required if changing kind of infrastructure
 - Response time and availability of mission critical systems

- **Management and Governance**

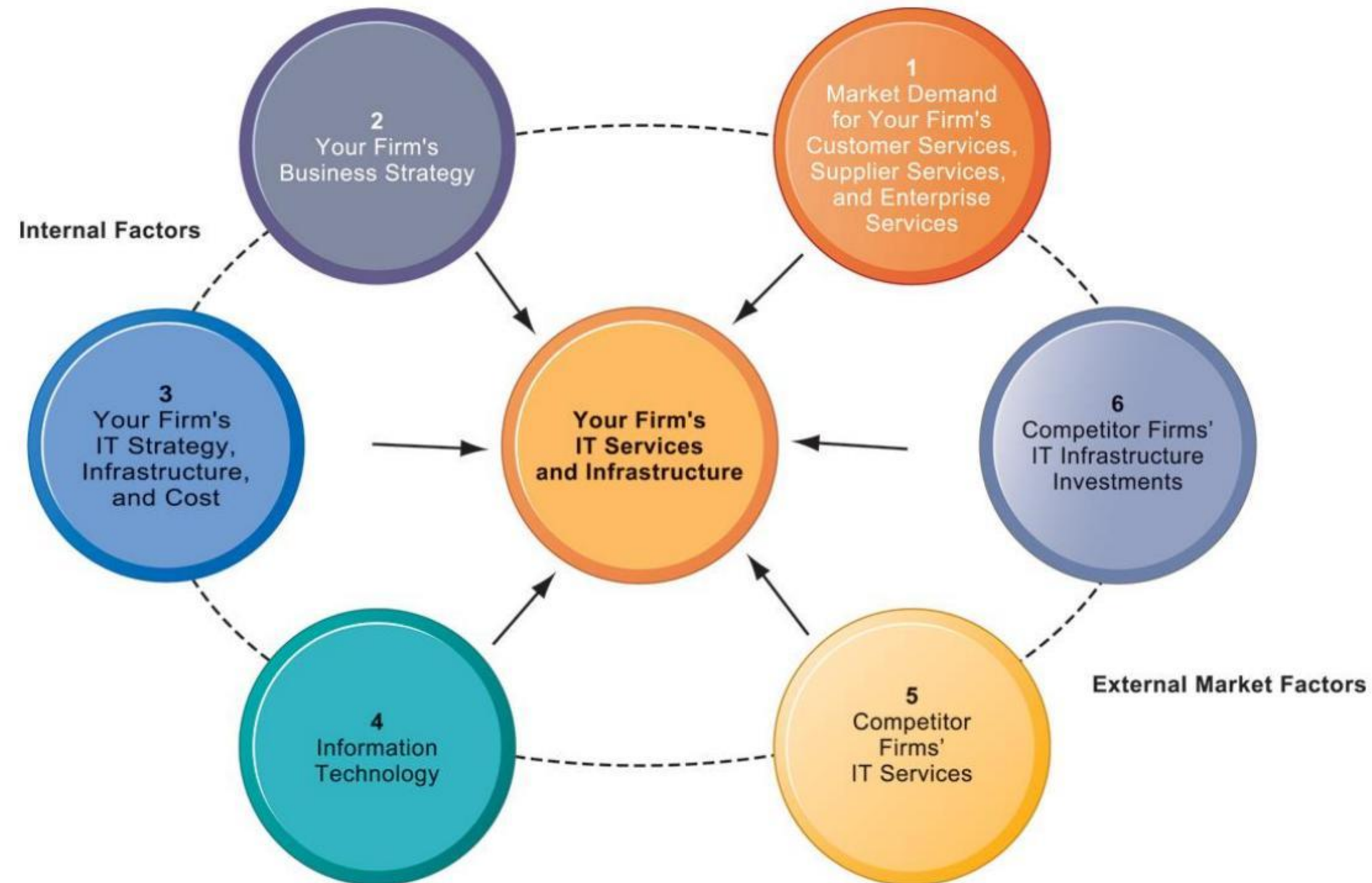
- Who controls the IT infrastructure?
- How will infrastructure costs be allocated among business units?

- **Making Wise Investments**

- How much should be spent?
- Cloud computing low-cost and flexible but issue of security and work flow



- Competitive Forces Model





- **Company: Salesforce.com**
 - Provides CRM and other application software solutions as 'software as a service'
- On-demand model
 - Eliminates need for hardware/software investments
 - Very low subscription rate
 - No OS, database servers, application servers to install
 - No expensive licensing and maintenance fees
- Challenges
 - Increased competition
 - Security and reliability
 - Need to expand business model
 - Constant availability



- Company providing additional functionality
 - Partnership with Google App
 - Partnership with Apple
 - Integration with Facebook
- Service improvement
 - SaaS to Platform as a Service
- Intensified efforts
 - Sales Cloud, Service Cloud, Custom Cloud
 - Force.com application development platform
 - Customise CRM application or built new one and run them in the cloud
 - AppExchange: for small businesses



- Using Cloud Computing
 - SaaS on-demand model
- Challenges and meeting challenges
 - Partnerships and integration
 - Providing broader cloud computing 'platform'
 - Providing tools to assure customers about system reliability
 - Offer PC applications so that users can work offline as well
- Factors to use Salesforce.com
 - Availability
 - Reliability
 - Security
 - Long term costs and subscription costs
 - Customization



- System and application software are critical in achieving organizational goals
- Developing proprietary application software is effective only if it meets an organizational need and provide competitive advantage
- Software industry continues to undergo constant change, so users need to be aware of trends and issues
- Current trends in Computer Hardware platforms
- Current Trends in Computer software platforms
- Challenges of managing IT infrastructure and management solutions

Thank You