

INFORMATION SYSTEMS IN HEALTH CARE

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Lesson 3 – Winter Term 2014

Schedule

1. **Review of previous lecture**
2. **Hardware Infrastructure of IS**
3. **OpenEMR**
4. **Conclusion**

Review of the previous lecture

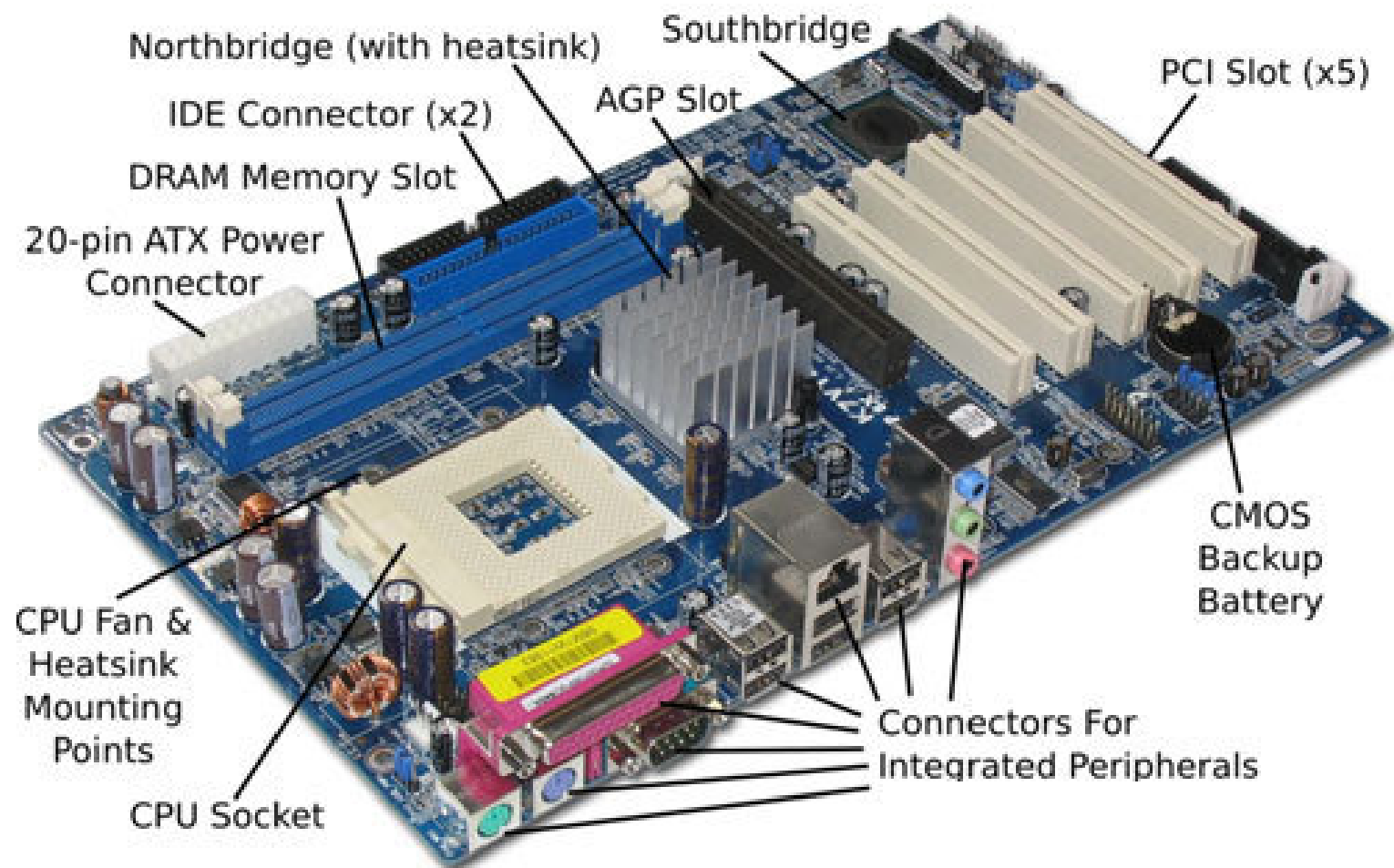
Types of information systems in health care

- ❑ **Electronic health record (EHR)**
 - ❑ systematic collection, processing and sharing of health information in electronic form.
- ❑ **Medical practice management software (PMS)**
 - ❑ set of tools for helping health provider in their day-to-day operations in a medical practice.
- ❑ **Computerized provider order entry (CPOE)**
 - ❑ ordering and fulfillment system for medical practitioner instructions for the treatment of patients.
- ❑ **Clinical decision support system (CDSS)**
 - ❑ real-time tool for diagnostic and treatment recommendations. CDSS may be used as part of CPOE and EHR.
- ❑ **Picture archiving and communications system (PACS)**
 - ❑ captures and integrates diagnostic and radiological images such as x-ray, MRI and CT.
- ❑ **Electronic materials management (EMM)**
 - ❑ tracks and manages inventory of medical supplies, pharmaceuticals, and other materials.
- ❑ **Telemedicine software**
 - ❑ provides communications and transmission of health information between patient and healthcare provider.

Hardware Infrastructure in Information Systems

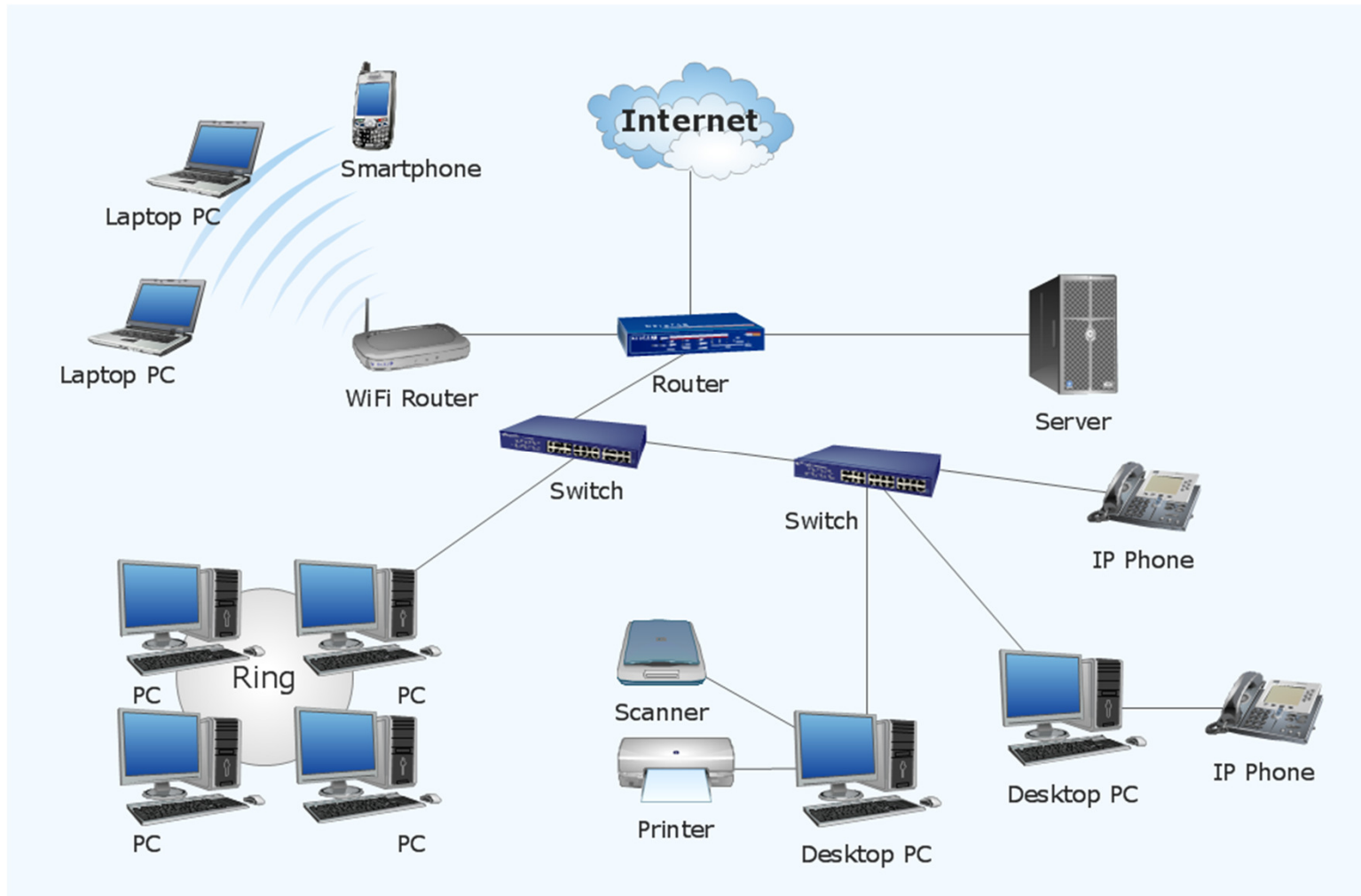
Hardware components in a computer

- A computer consists of hardware, software and BIOS
 - ▣ The Hardware consists of the physical components
 - Input: keyboard, mouse, scanner, microphone, touch screen
 - Output: monitor, printer, speakers
 - Input/Output: CD/DVD drives, disk drives, LAN, Wireless cards
 - Box: motherboard, CPU, RAM, video card
 - ▣ The Software consists of all programs used for performing tasks.
 - ▣ The BIOS is the boundary between hardware and software.



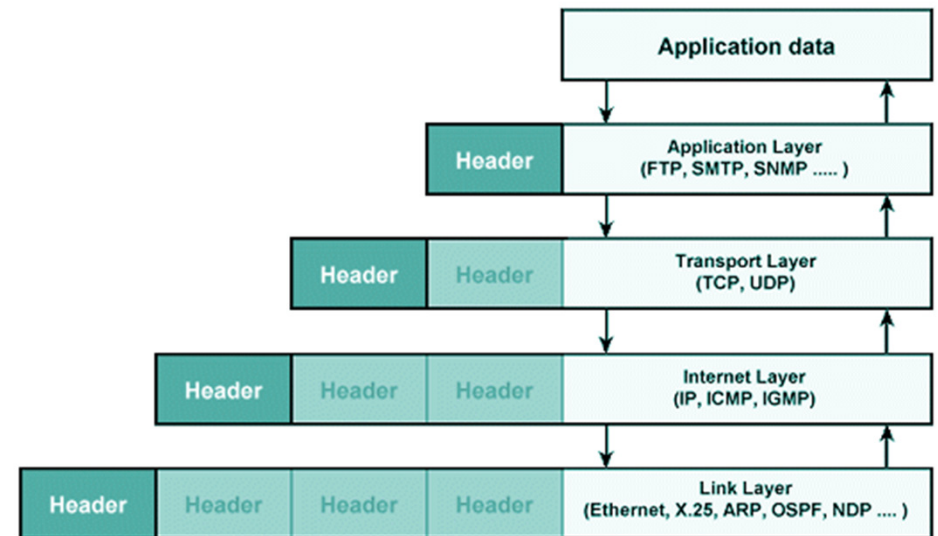
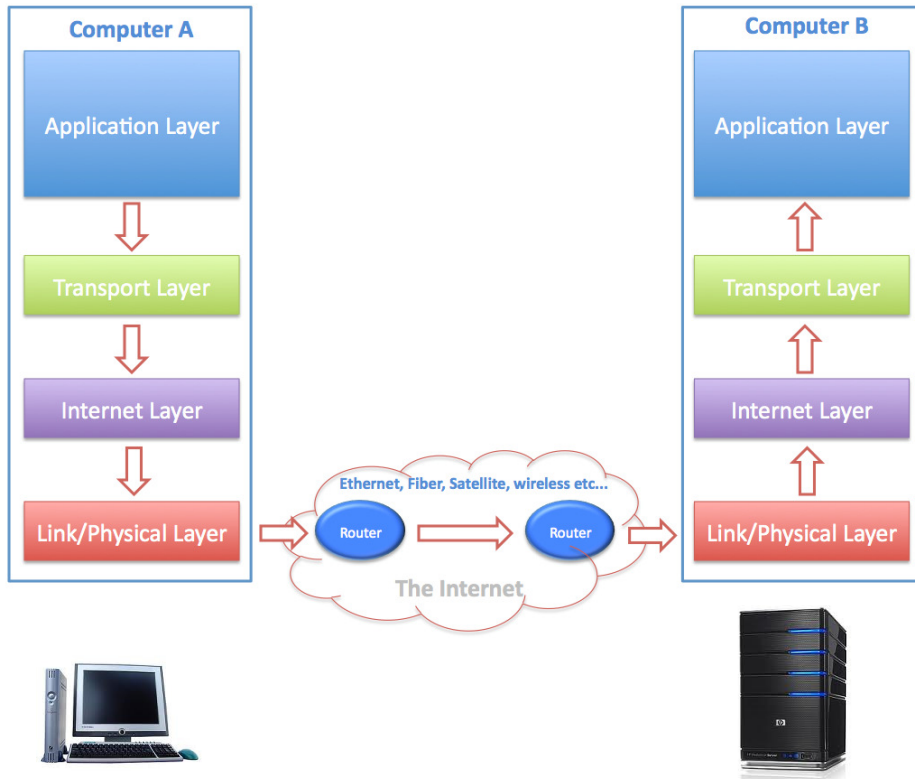
Hardware in computer networks

- A computer network is a group of two or more computers connected electronically for data exchange.
 - ▣ Wired technology: twisted pair wire, coaxial cable, optical fiber
 - ▣ Wireless technology: radio, cellular, infrared
- Hardware components in a computer network
 - ▣ Network interface controller (NIC) allows the computer to accept a network cable. It has a unique Media Access Control (MAC) address
 - ▣ Hubs repeat a network signal over multiple ports
 - ▣ Switches are intelligent hubs
 - ▣ Routers are devices that connects two or more computer networks
 - ▣ Firewalls are network devices that control network security and access rules
- Network topologies
 - ▣ Bus, star, ring, mesh, tree



Protocols in computer networks

- A communication protocol is a set of formal rules for data exchange between computers in a network
- TCP/IP (Transmission Control Protocol/Internet Protocol) is a widely used protocol
 - ▣ **Physical layer:** implements rules for transmission in basic networking hardware (e.g. network adapters, hubs, modems)
 - ▣ **Internet layer:** provides rules for hosts identification using IP addresses and packets routing over distinct networks
 - ▣ **Transport layer:** implements rules for end-to-end data communication channel
 - ▣ **Application layer:** implements high-level protocols for specific network services



Clients and Servers in computer networks

- A server is a network system (hardware and software) that responds to requests from other systems, called clients
- Types of servers
 - ▣ Web server provides access to web pages
 - ▣ Database server provides access to databases
 - ▣ Application server provides remote execution of programs
 - ▣ Mail server provides service for sending and receiving emails
 - ▣ File server provides remote access to files (e.g. FTP, SMB)
 - ▣ Name server provides translation services between domain names and IP addresses
 - ▣ Print server provides remote access to printers

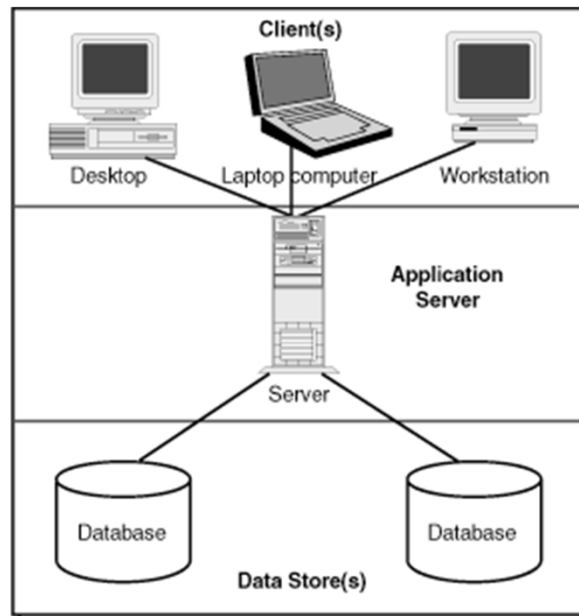
OpenEMR

What is OpenEMR?

- ❑ OpenEMR is an electronic health record (EHR) and medical practice management software.
- ❑ Features
 - ▣ Patient demographics
 - ▣ Patient scheduling
 - ▣ Patient portal
 - ▣ Electronic medical records
 - ▣ Prescriptions
 - ▣ Clinical decision support
 - ▣ Medical billing
 - ▣ Reports
 - ▣ Multilanguage support
 - ▣ Security
 - ▣ Free: Open Source under GNU General Public License

OpenEMR Architecture

- ❑ OpenEMR is a web-based 3-tier application
 - ▣ The client sends a request using a web browser
 - ▣ The web and application server receives and processes the request
 - ▣ The database server executes queries against a database



OpenEMR: basics

- Adding a patient
 - ▣ Fill demographics, insurance
- Using the calendar
 - ▣ Setting up a weekly schedule for the provider
 - ▣ Making appointments
- Opening a new encounter for first visit
 - ▣ Entering family history, brief description, allergies, life style, medications
 - ▣ Entering system checks, vitals
 - ▣ Adding a fee sheet
 - ▣ Making a prescription
- Adding a medical issue (problem)
 - ▣ Associate medical issue and encounter
- Adding Immunization

OpenEMR: basics

- Adding patient notes and sending messages
- Creating a referral transaction
- Using patient portal
 - ▣ Enabling access
 - ▣ Resetting password
 - ▣ Viewing reports

OpenEMR: Billing

- ❑ Opening a new encounter for your established patient
 - ▣ Adding a fee sheet for a comprehensive visit and a diagnosis
 - ▣ Associate the encounter with patient's medical issue
 - ▣ Enter the primary insurance of your patient
- ❑ Basic billing
 - ▣ View all billable encounters for your patient
 - ▣ Select today's encounter and generates a X12 claim for sending to the insurance company
 - ▣ View billing status

Homework

- Provide a comparative overview of computer data storage technologies
 - ▣ RAM and ROM memories
 - ▣ IDE, SATA, eSATA, USB hard disks
 - ▣ CD, DVD disks
 - ▣ Network-attached storage (NAS)
 - ▣ Redundancy with RAID
- Suggest 5 scenarios where a client-server architecture is used (e.g. your web browser Firefox and the web server www.google.com)
 - ▣ Which protocols are used on the application level?
 - ▣ Which IP addresses are used?
 - ▣ Through which network nodes are data packets routed between client and server?
- Send your essay as editable document (e.g. MS Word format) by Oct 12

Plan for next week

- Operation systems and databases of IS
- GaiaEHR electronic health records