Introduction to Management Information Systems

preparation for the Mid-term exam

what have we done?

intro to information	need for information systems
intro to information systems	enterprise information systems
inside a PC	device software
Hardware: Input & Output, System Software (operating systems)	
intro to computer networks	system protection, risk
system attacks	access controls

what have we done?

information systems	intro to information	need for information systems
	intro to information systems	enterprise information systems
computer systems	inside a PC	device software
	Hardware: Input & Output, System Software (operating systems)	
network systems	intro to computer networks	system protection, risk
	system attacks	access controls

Thu, 9th Jan 2025	12.00-15.00	888342 Introduction to Management Information System	702	20	ICB1210 (MAX 20)	Asst.Prof.Dr. Seamus Lyons Mr. Watcharapong Dilokjanya

Thursday
Jan 9th
12 to 3pm
ICB 1210

3 hours
answer 6 questions
choose 6 from 11 questions

Total Score: 30 points

the midterm exam is open book

BUT,
any use of Artificial Intelligence
(chat GPT, AI translator, AI paraphraser)
is cheating (0%, ‘F’, or ‘W’)

plagiarism or cheating using AI is against ICDI and CMU rules and can lead to loosing student status

6 from 11 questions

- Explain, seen in Figure 1, in detail, **using an example from your life in the past 12 months**.
- In week. we examined. Then describe the …
- Use **your own knowledge and opinion** to explain what is meant by…?
- In week we examined. … and explain all the ...
- Explain the ... *explained in week* ...?
- Explain what we need to consider to (*explained in week &*)?

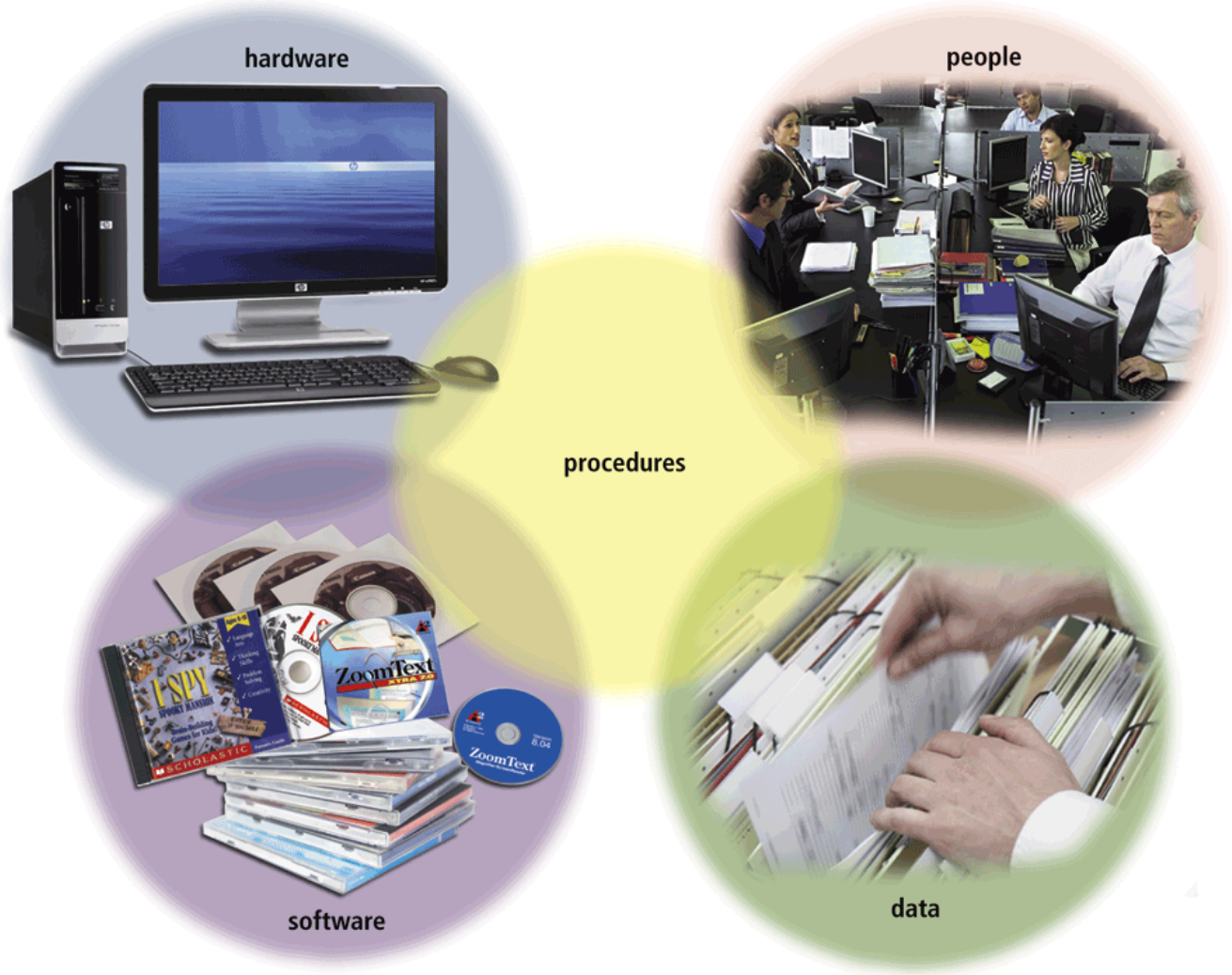
6 from 11 questions

- Use Figure 2 to explain why (*discussed in week* .)
- Explain what.
- The ….
  - Explain how …
  - Use an example to explain …
- In week … Choose **one** … and explain in detail
- Discuss the difference between … **using an example from ICDI/CMU or another local business**

1

Information Systems

An information system is a set of hardware, software, data, people, and procedures that work together to produce information



source: Discovering Computers Introductory: Your Interactive Guide to the Digital World

Data & Information

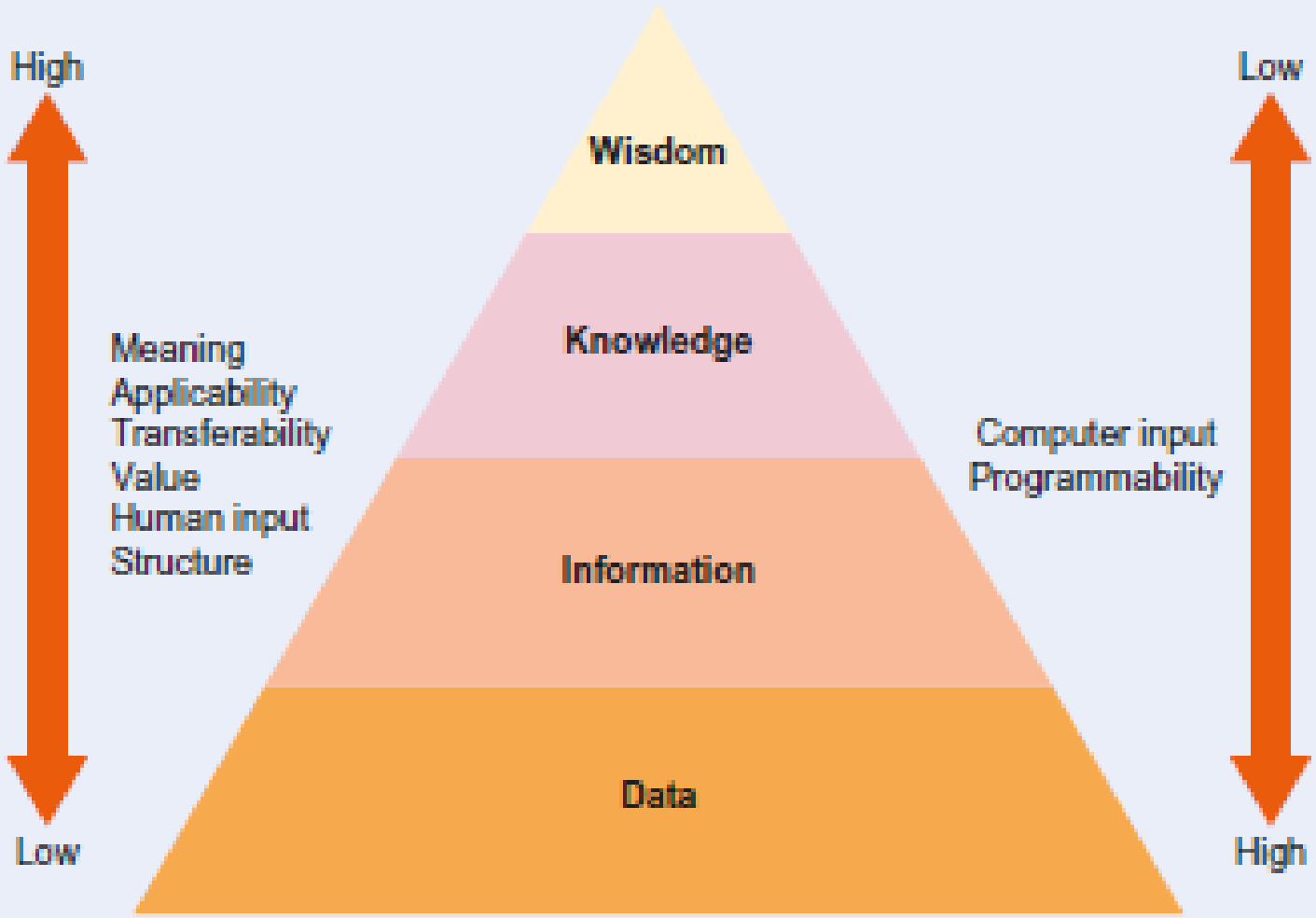
Data

- raw facts
- not random

Information

- data processed for a purpose

Figure 1.1 The 'DIKW' model



source: Business Information Systems: Technology, Development and Management for the Modern Business

Understanding information

- transform data using a process
- data in a meaningful context
- response to an information need
- reduce uncertainty to improve decisions

information value

- Consider cost of getting the information
- Tangible value
  - Financial value
- Intangible value
  - Can’t always calculate value
  - Improved decision
  - Example : Savings implementing a new system

Formal information

Reports, specific purpose

- Benefits:
  - Consistent, same format, structured
  - Accurate, relevant, comprehensive, use templates
- Disadvantages:
  - Inflexible, limited, can overlook information
  - Ignores opinions, important context

informal information

Can be important, conversational

- Upside:
  - Flexible, freedom, more details
  - Liked by some clients – builds relationships
- Downside:
  - Can lack accuracy & relevance, slow & inefficient
  - Restricted (can’t deal with large volumes of data)
  - Can be ignored, highly selective

‘good’ information

Accurate	correct and verifiable
Complete	yet concise
Cost effective	affordable, beneficial
Current	up-to-date, relevant
Accessible	easy to use

also

user-friendly / targeted

reliable (from a reliable source)

timely

information quality

Right information, in the right form, at the right time, given to the right person

Attributes of information quality (O'Brien and Marakas, 2006):

1. Time
2. Context
3. Form

Table 1.1 Summary of attributes of information quality

Time	Content	Form	Additional characteristics
Timeliness	Accuracy	Clarity	Confidence in source
Currency	Relevance	Detail	Reliability
Frequency	Completeness	Order	Formatted correctly
Time period	Conciseness	Presentation	Appropriateness
	Scope	Media	Received by correct person
			Sent by correct channels

information quality - other

- Confidence of source
- Trust
- Reliable
- Appropriateness
- How stored & formatted
- Availability
- Accessibility
  - (e.g. metadata)

decision making process

Stage	Activities
Intelligence	■ Awareness that a problem exists
	■ Awareness that a decision must be made
Design	■ Identify all possible solutions
	■ Examine possible solutions
	■ Examine implications of all possible solutions
Choice	■ Select best solution
Implementation	■ Implement solution
Evaluation	■ Evaluate effectiveness or success of decision

structured decisions

Rules & constraints known

- Routine
  - Re-ordering stock
- Analytical
  - can provide justification

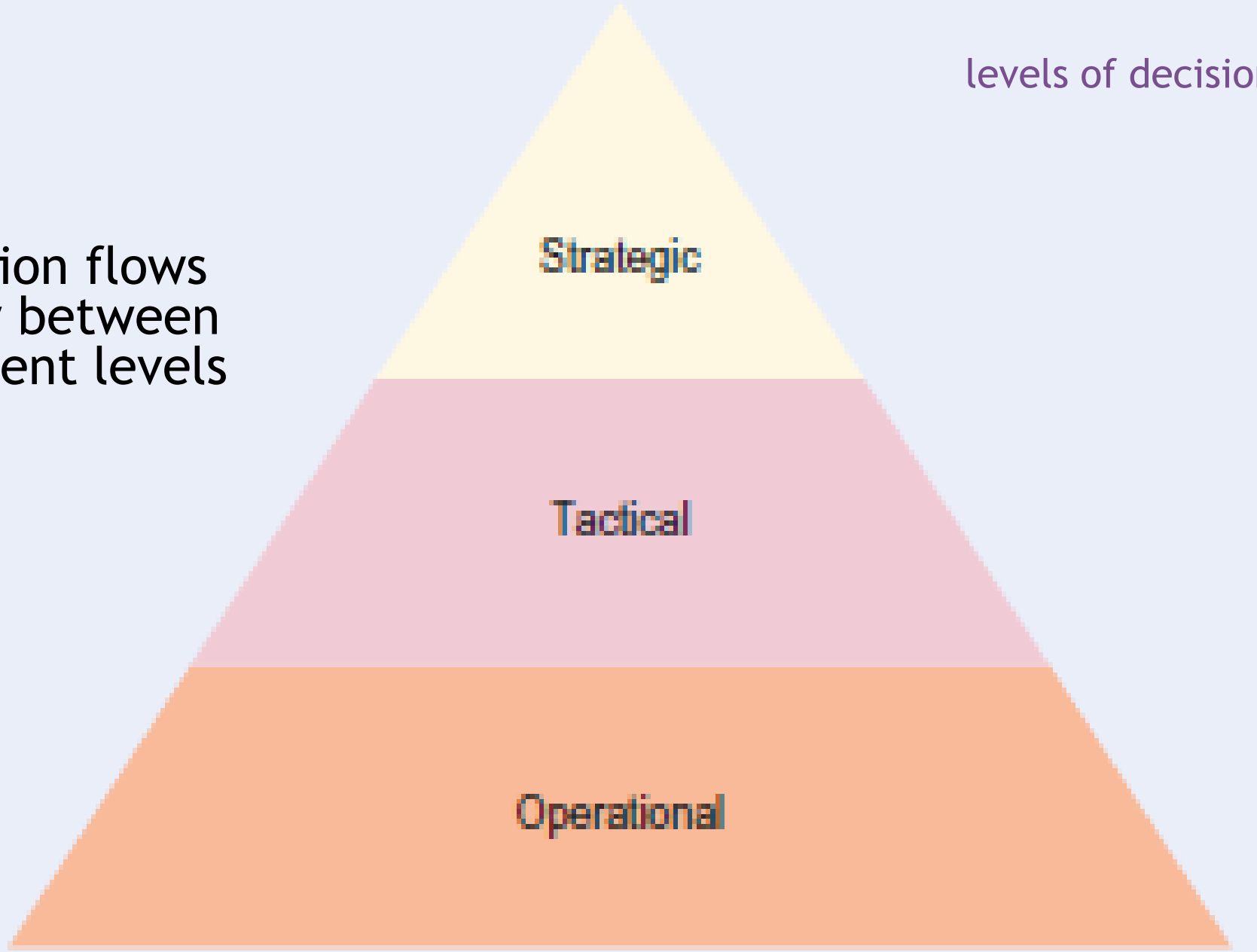
unstructured decisions

More complex

- Rely on experience, judgement, knowledge
  - E.g. open a new branch?
- intuitive
  - Based on experience

levels of decision making

Information flows vertically between management levels



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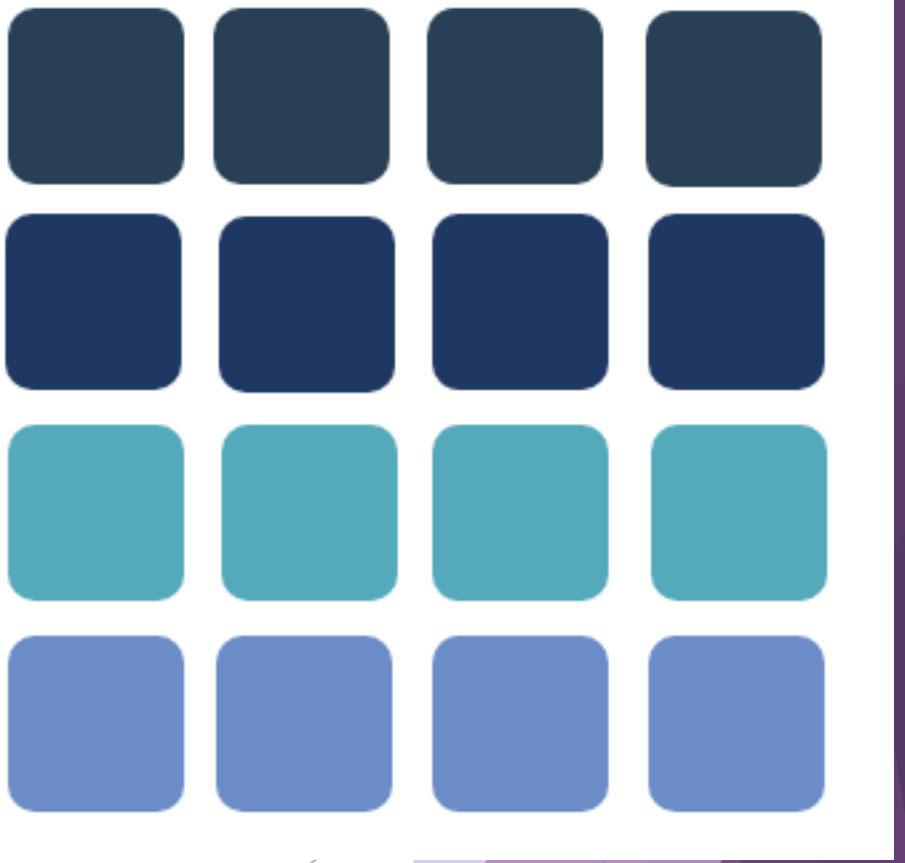

unstructured decisions

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strategic level

Top managers concerned with strategic or long-term planning and decisions

- Unstructured
- Infrequent
- Large impact
  - e.g. new market

tactical level

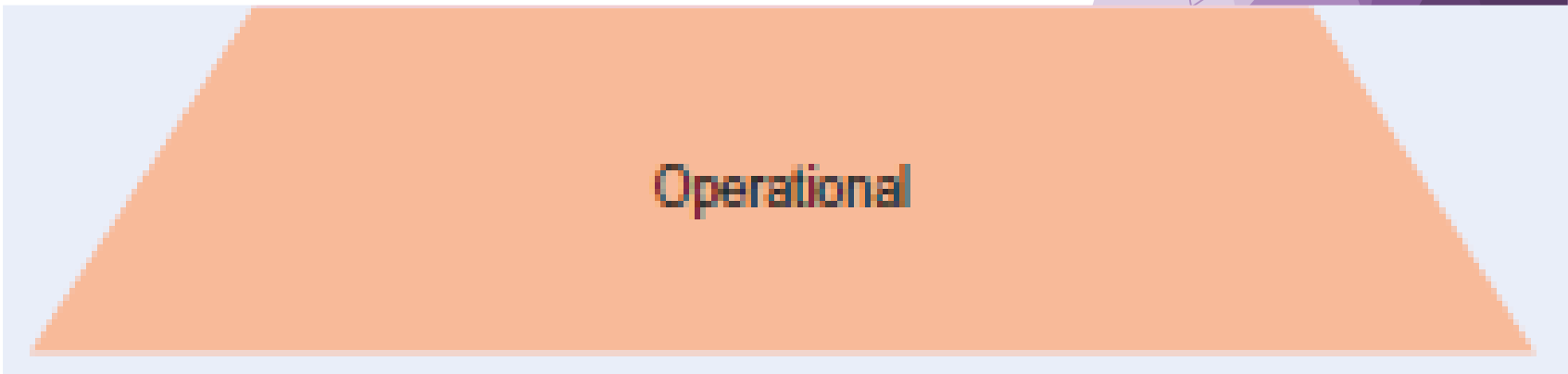
Middle level managers who make decisions to implement the strategic goals set for the organization

- Medium term planning
- Monitor performance
- Budget & resources
- Set policies - apply to meet strategic goals
- e.g. set department budget

operational level

Low-level supervisors make daily operational decisions

- Short term, day-to-day control
- Meet the tactical goals
- Highly structured, little impact (organization-wide)
- e.g. daily schedule



management information system (MIS)

a system
provides information
needed by managers
to support activities
in achieving business objectives

system

a collection of interrelated components that work together towards a collective goal

A business information system (BIS)
is a group of interrelated components
that work collectively
to carry out input, processing, output, storage and control actions
in order to convert data into information products
that can be used to support
forecasting, planning, control, coordination, decision making
and operational activities in an organization.

system

- receive inputs and transform these into outputs
- often multiple goals
  - profit
  - improving product quality

Changes that affected the need for Information systems

Increasing Competition

- global market / globalization
- businesses have had to become more efficient and effective
- fast pace of change, innovation and market uncertainty

Need for Transparency

- Public Concerns & Pressures, increased access

Investment & Work Practices

- Outsourcing
- Investment on IT

remember we worked on this in groups

1. Competition
2. Globalization
3. Uncertainty in the Marketplace
4. Tendency of Outsourcing
5. Reduced Hierarchy and Improved Transparency
6. Clout of Civil Society and Media
7. Focus on Knowledge in Business
8. Awareness of the Value from Managing Information
9. Customer Focus
10. Investment on Information Technology

Formal (written) warning from ICDI
Formal disciplinary process with CMU, with appropriate punishment

Ordered on August 5, 2024.

(Assoc.Prof.Dr. Manad Khamkong)
Associate Dean
Acting for Dean of the International College of Digital Innovation
Chiang Mai University

Note:

1. Students are required to present their student ID cards to the committee upon entering the examination.
2. Any students found cheating will be subject to punishment in accordance with the regulations of Chiang Mai University. As per the Examination 2011, Item 18, "Deletion of a student's name from Chiang Mai University" will be enforced unless there is a reason to reduce the sentence. The prescribed punishment includes a minimum suspension of one semester and receiving a Grade F for the respective course.

Types of Information Systems

Types of Information Systems

- Functional information systems
  - departmental
  - Accounts, finance, HR, marketing, sales, production

- Enterprise information systems (Enterprise IS)
  - Organization-wide
  - e.g. ERP & TPS

Table 2.1 Categories of computer-based information systems

Operations information systems	Management information systems
Transaction processing systems	Decision support systems
Process control systems	Information reporting systems
Office automation systems	Executive information systems

Customer moment of value

Customer ‘touch points’

- TIME - when the customer wants it
- LOCATION - where the customer wants it
- FORM - how the customer wants it
- DELIVERY - In the manner to satisfy the customer

enterprise systems

ERP
CRM
SCM
SRM

remember we discussed this in pairs

Enterprise resource planning

Enterprise resource planning (ERP) is a process used by companies to manage and integrate the important parts of their businesses.

- help implement resource planning
- integrating all of the processes
- in a single system

Customer relationship management

- Customer Relationship Management (CRM) is a technology used to manage interactions with customers and potential customers.
- A CRM system helps organizations
  - build customer relationships and
  - streamline processes so they can
    - increase sales,
    - improve customer service, and
    - increase profitability.

CRM benefit

Identify and categorise leads

- identify and add new leads easily and quickly
- create customised documents
- sales staff can focus their attention

Increase referrals from existing customers

- understanding customers better,
- cross-selling and up-selling opportunities
- new business from existing customers
- better customer service
- Happier customers
- increase sales from customers

Improve products and services

- gather information from a huge variety of sources
- more insight into how your customers feel
- what they are saying about your organization
- improve what you offer
- identify problems early
- utilize social networks

Supply chain management (SCM)

The coordination of all supply activities of an organisation from its suppliers and partners to its customers.

Supply chain management

The supply chain consists of

- the series of activities that moves materials from suppliers,
- through the organization to customers

Each product or service will have its own supply chain,

- which may involve many organizations
- in processing, transportation, warehousing and retail.

supply relationship management

supply relationship management (SRM) refers to all activities involved with obtaining items from a supplier

- includes procurement and inbound logistics
  - transportation, goods-in and warehousing
- connect ERP system to suppliers

supply relationship management

flexible manufacturing systems (FMS)

- process technology
- reduction in labour costs
- control of material costs major focus of overall manufacturing costs
- requires a high quality and reliable source of materials to be available

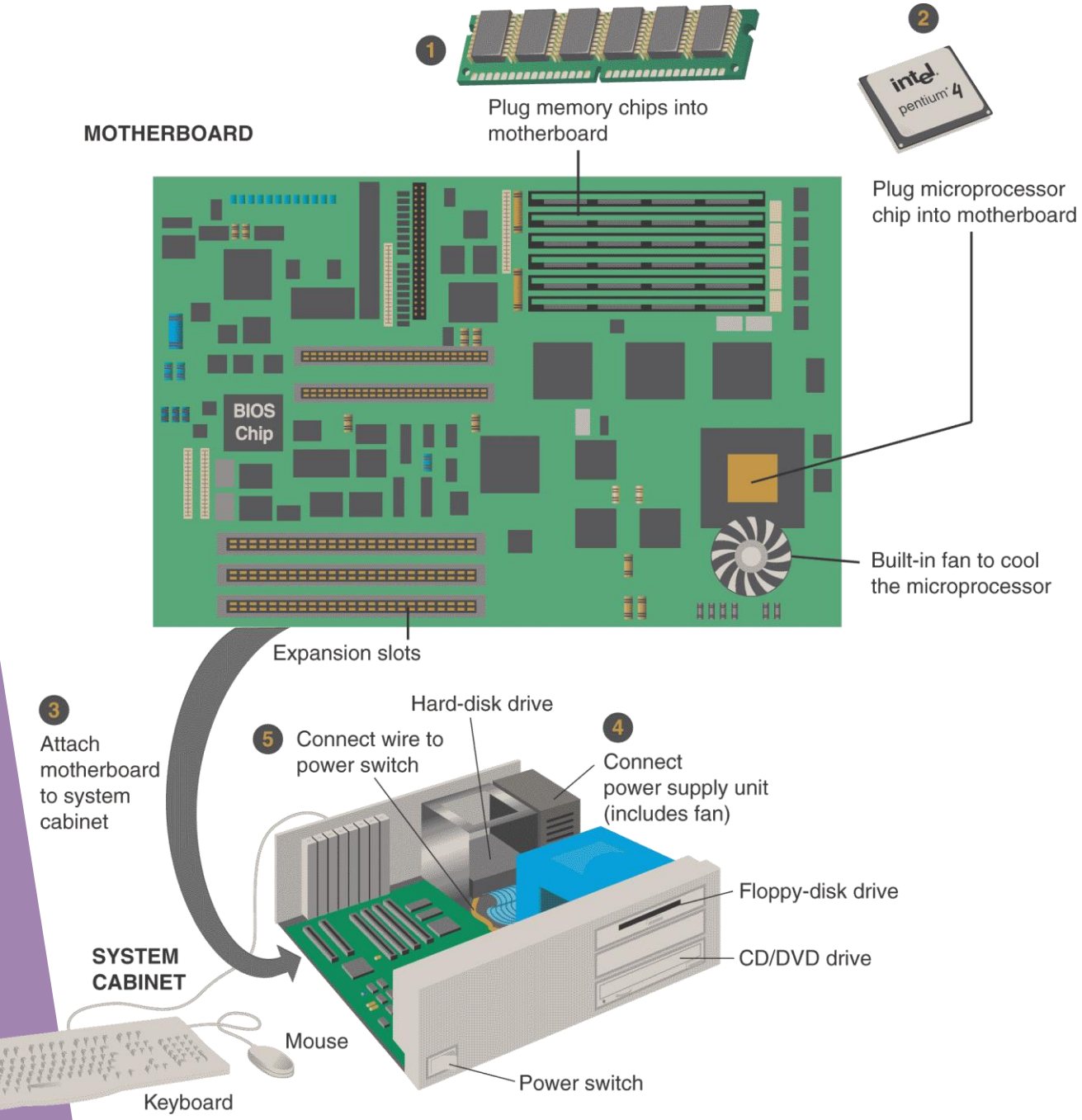
production planning systems

require the delivery of materials of perfect quality, at the right time and the right quantity

e.g. JIT

2

Computer Systems



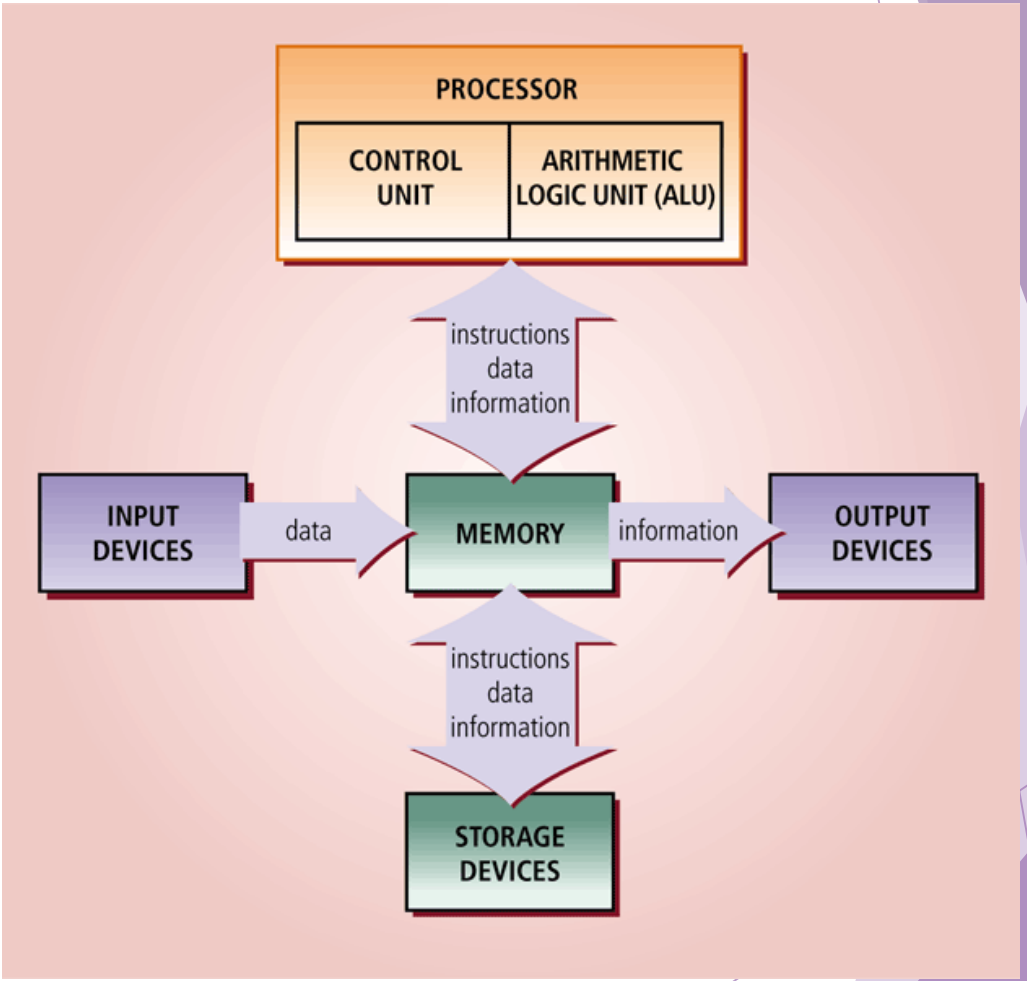
inside of computers

- motherboard
- CPU
- memory
- storage
- communications & input / output (I/O)
- slots / cables

Processor / CPU

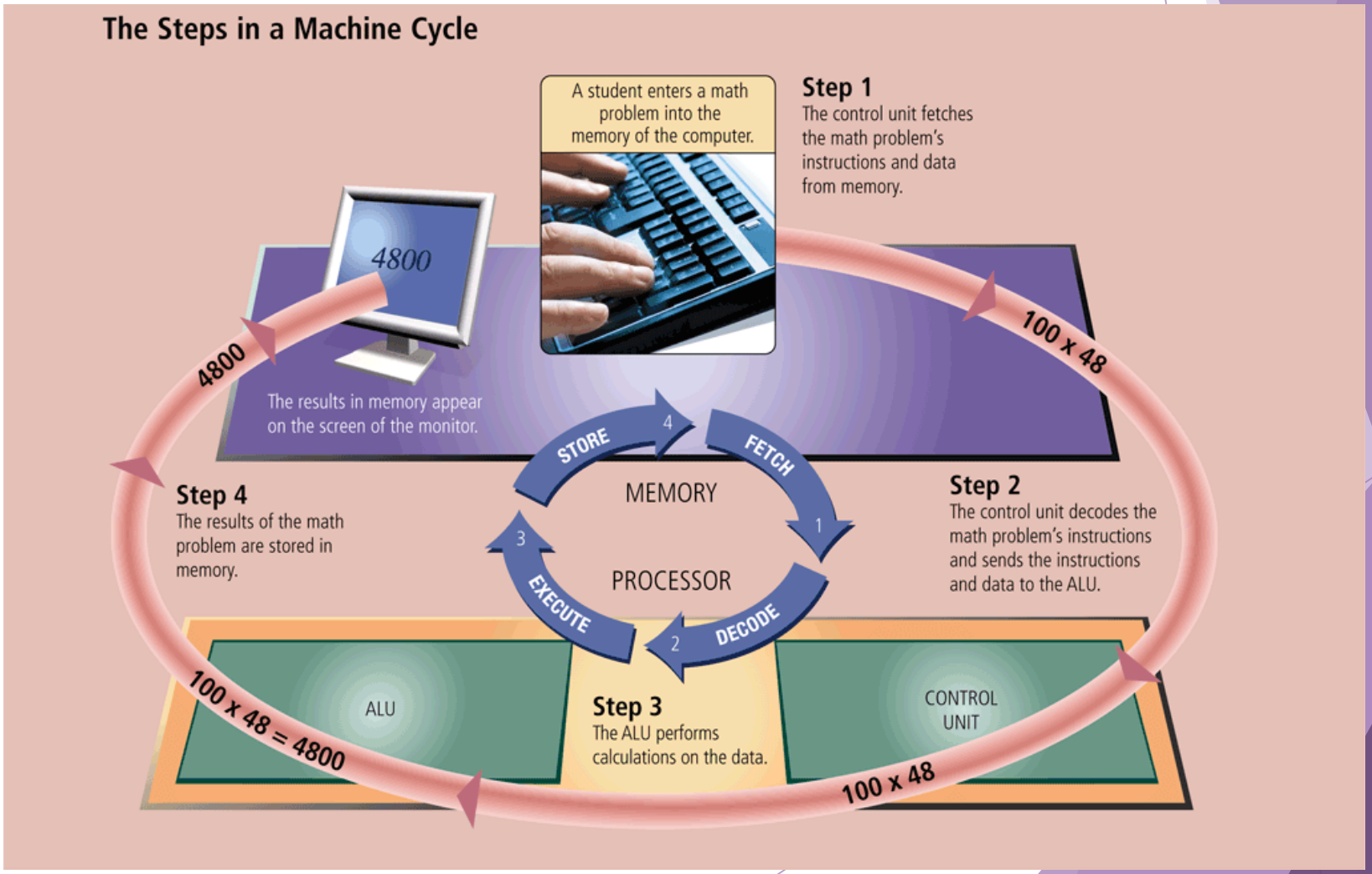
The control unit directs & coordinates most operations in the computer. It deciphers instructions and carries them out

The arithmetic logic unit (ALU) performs arithmetic, comparison, and other operations



Machine Cycle

For every instruction, a processor repeats a set of four basic operations, which comprise a machine cycle



Hardware

memory

- temporary storage of data & instructions

storage devices

- stores data & programs
- e.g. hard drive
- more permanent storage

output devices

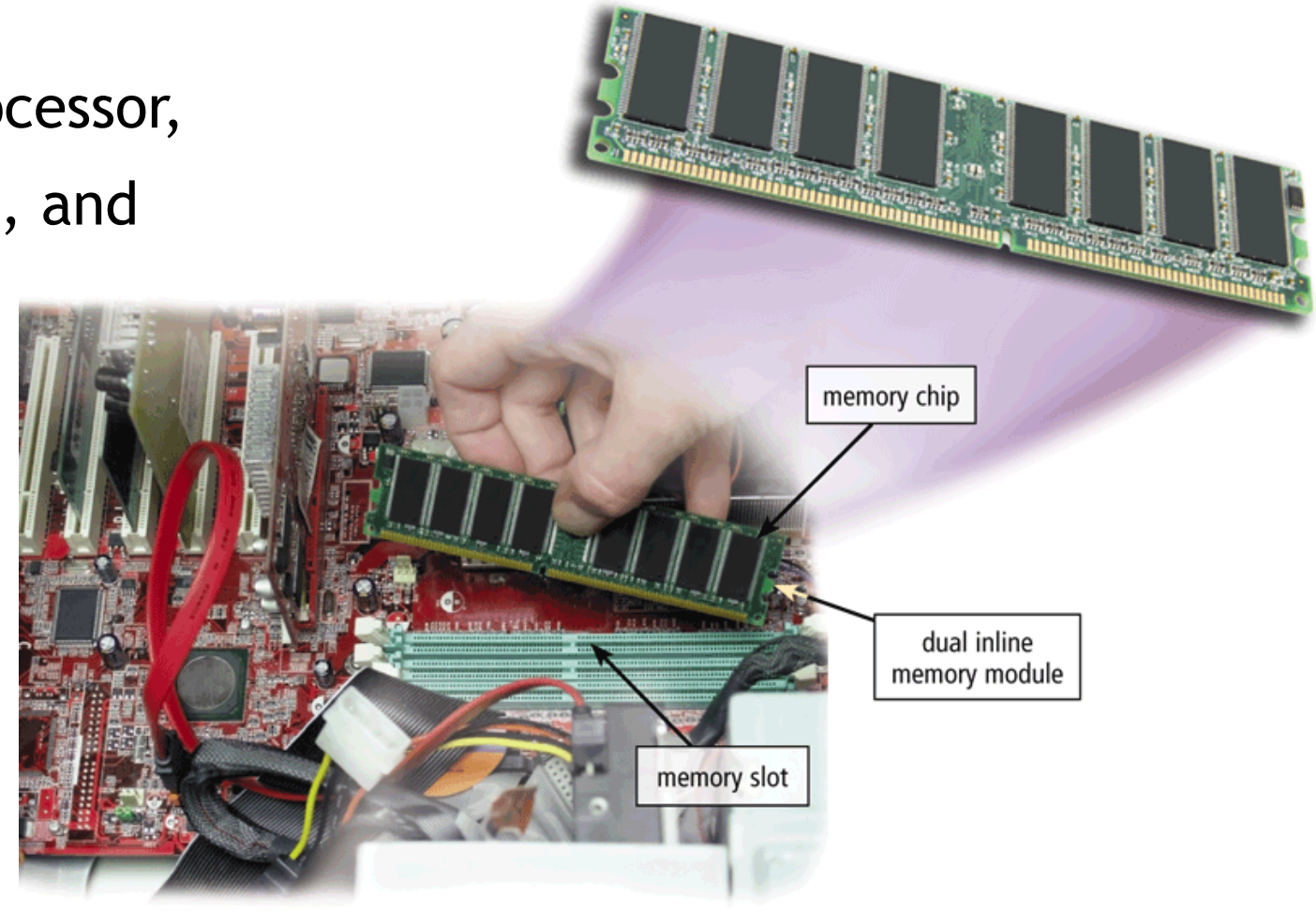
- translates processing output
- computer-readable form -> form humans understand

memory

- consists of electronic components
- that store instructions
- waiting to be executed by the processor,
- data needed by those instructions, and
- the results of processing the data

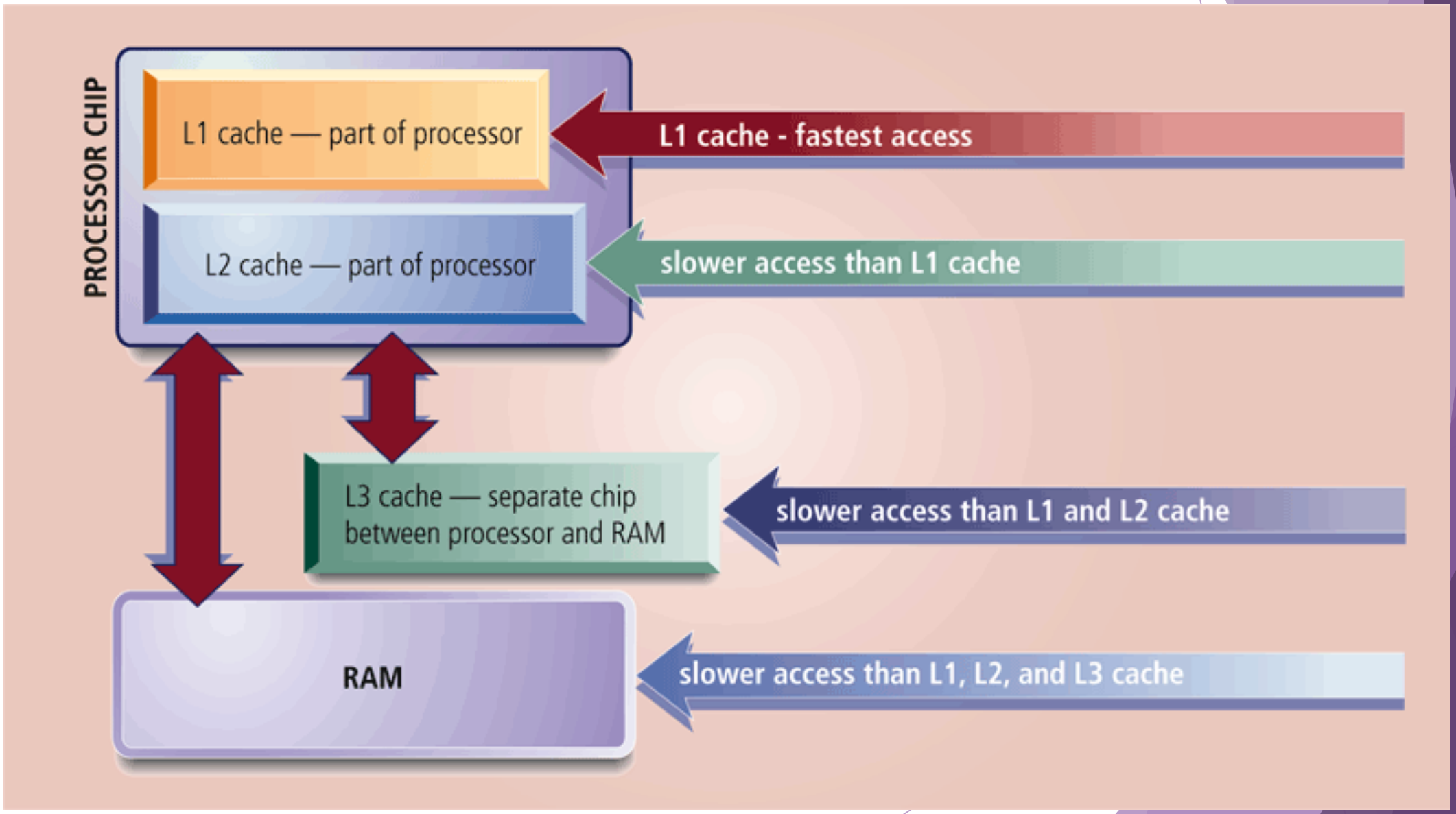
RAM chips

- reside on a **memory module**
- inserted into **memory slots**



memory

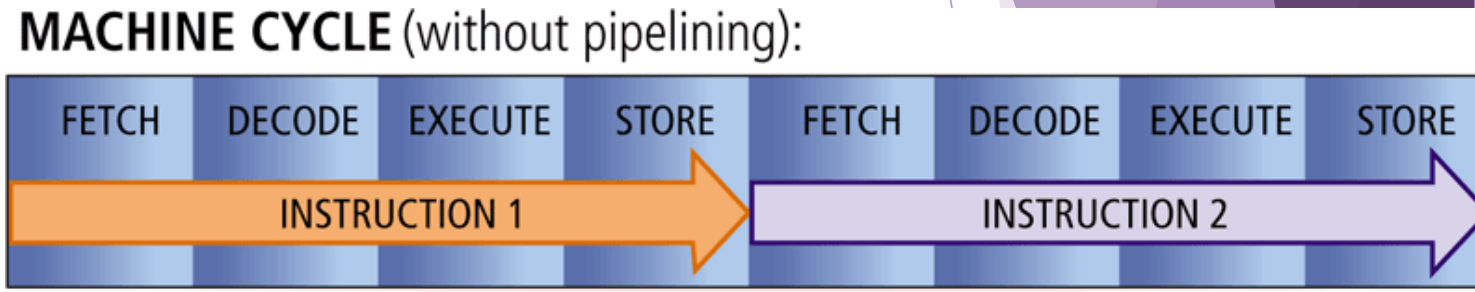
Cache memory speeds the processes of the computer because it stores frequently used instructions and data

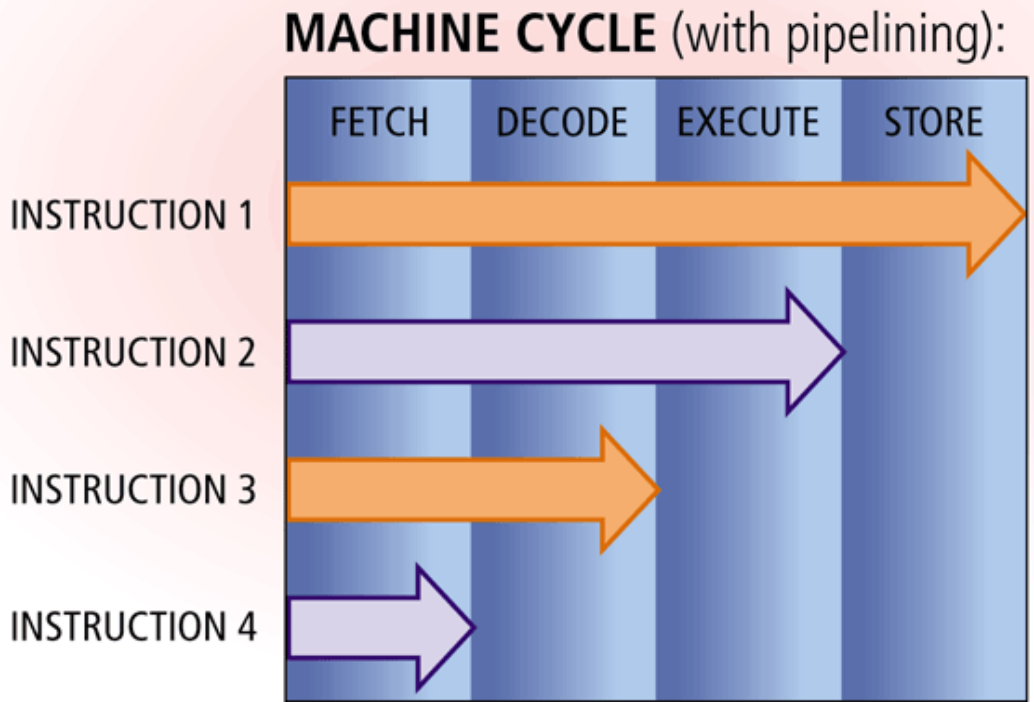


Pipelining

Most current personal computers support pipelining

- Processor begins fetching a second instruction before it completes the machine cycle for the first instruction

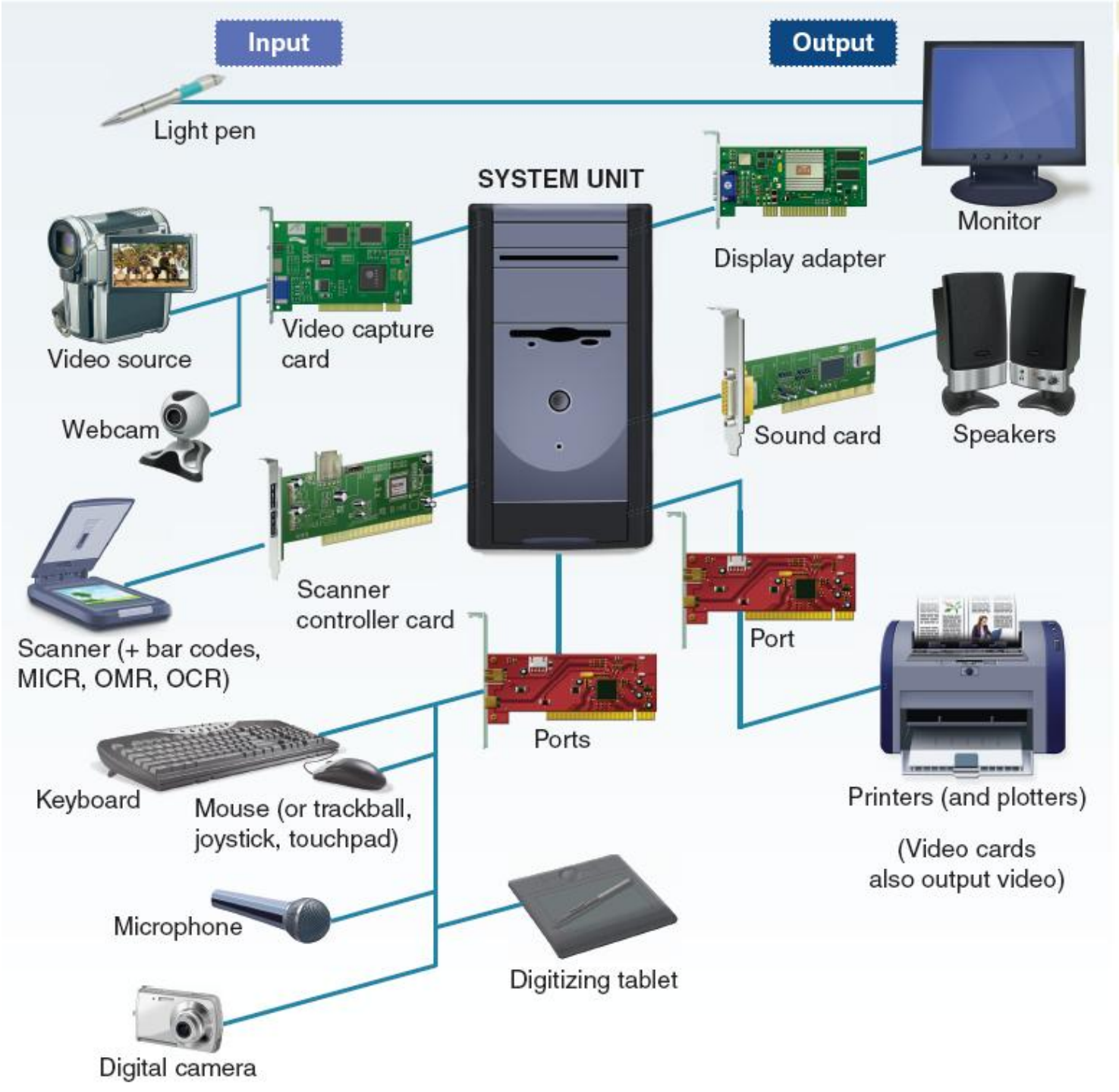




input & output devices

keyboard & mouse
microphones
cameras
tablets & pens
touch screens
scanners
joysticks
biometric devices

monitors
printers
speakers



Hardware

input devices

- enter or capture data
- convert into the appropriate format
- human-readable form -> form computer uses

processor (CPU)

- computer ‘brain’
- carries out instructions (software)

Video, audio & speech input devices

Cameras

Webcams

Microphones

Voice control

Test-to-speech (TTS) systems

Intelligent personal assistants

e.g. Siri

Speech understanding systems

Other output devices

- multi-function devices = *p*rinters with scanning, faxing and photocopying
- Audio – speakers
- MIDI devices – instruments
- Computer output to microfilm (COM)
- Speech synthesis

storage

Hard Drives (SATA)

solid State Drives (SSD)

USB sticks

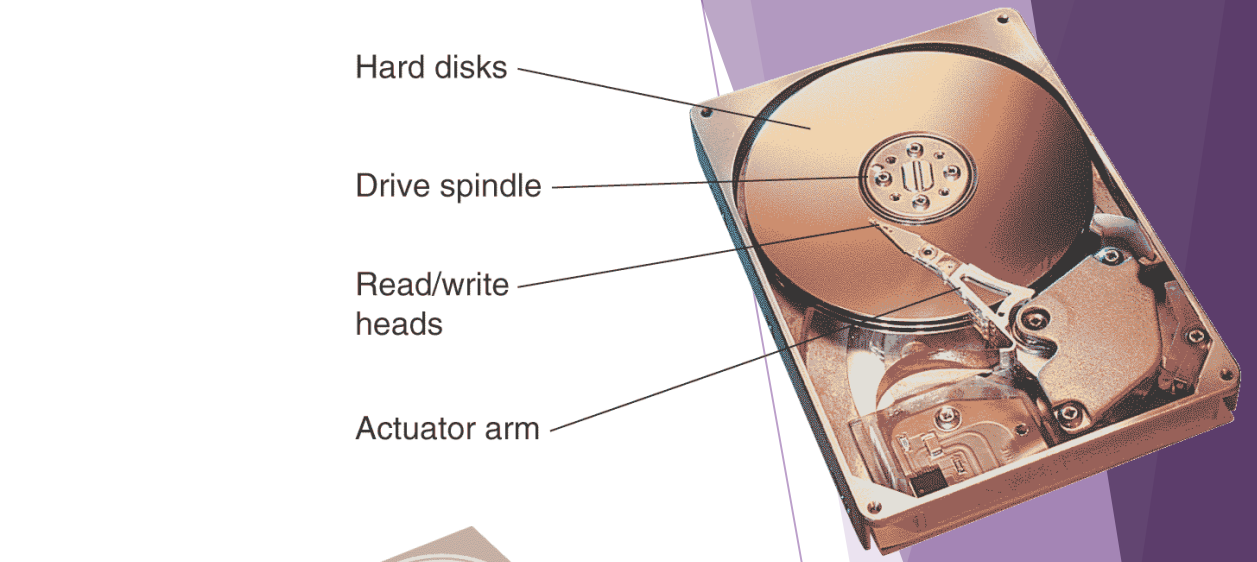
External Hard Drives

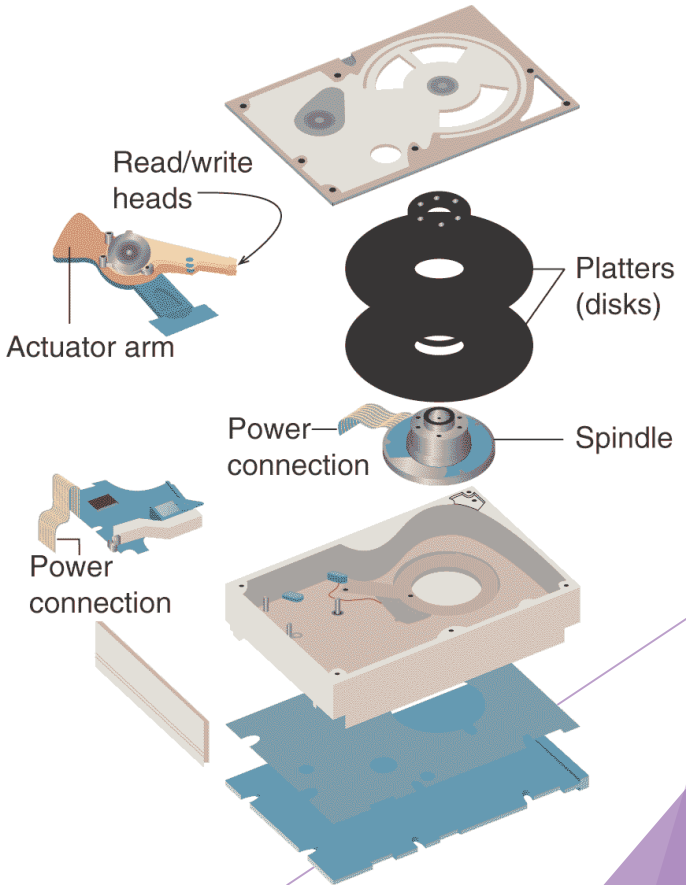
Flash memory

Magnetic tape

Optical disks (CD/DVDs)

Online secondary storage





software

a series of detailed electronic instructions

- that tell the computer how to perform a task
- that control the operation of a computer system
- translated into binary instructions (0s & 1s) for the processor
- form programs which are developed by computer programmers

system software and application software

System Software

serves as the interface between

- the user,
- the application software,
- and the computer's hardware

system software

consists of the programs that control or maintain the operations of the computer and its devices

- Operating systems (OS)
  - system management
- Utility programs
  - system maintenance

operating system

- Start and shut down a computer
- Provide a user interface
- Manage programs
- Manage memory
- Coordinate tasks
- Configure devices
- Establish an Internet connection
- Monitor performance
- Provide utilities
- Automatically update
- Control a network
- Administer security

utility programs

"allows a user to perform maintenance-type tasks"

Virus protection

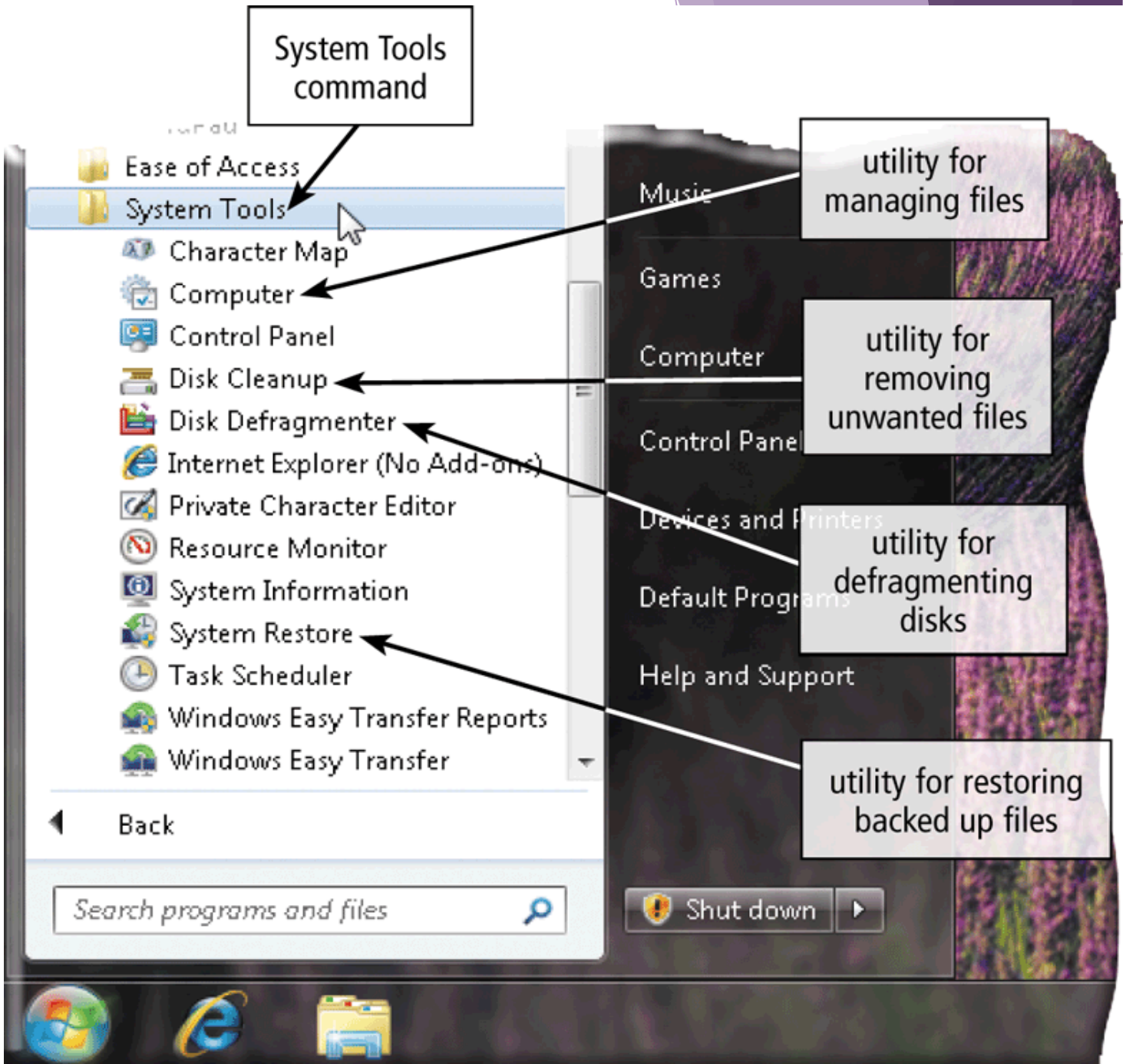
Data compression

File defragmentation

Disk scanner & disk cleanup

Backup

Data recovery



Application Software

Business

- Word Processing
- Spreadsheet
- Database
- Presentation
- Note Taking
- Personal Information Manager (PIM)
- Business Software
- Business Software Suite
- Project Management
- Accounting
- Document Management
- Enterprise Computing

Graphics and Multimedia

- Computer-Aided Design (CAD)
- Desktop Publishing (for the Professional)
- Paint/Image Editing (for the Professional)
- Video and Audio Editing (for the Professional)
- Multimedia Authoring
- Web Page Authoring

Home/Personal/Educational

- Software Suite (for Personal Use)
- Personal Finance
- Legal
- Tax Preparation
- Desktop Publishing (for Personal Use)
- ...ing
- ...e)
- ...nd Photo Management (for Personal Use)
- Clip Art/Image Gallery
- Video and Audio Editing (for Personal Use)
- Home Design/Landscaping
- Travel and Mapping
- Reference and Educational
- Entertainment

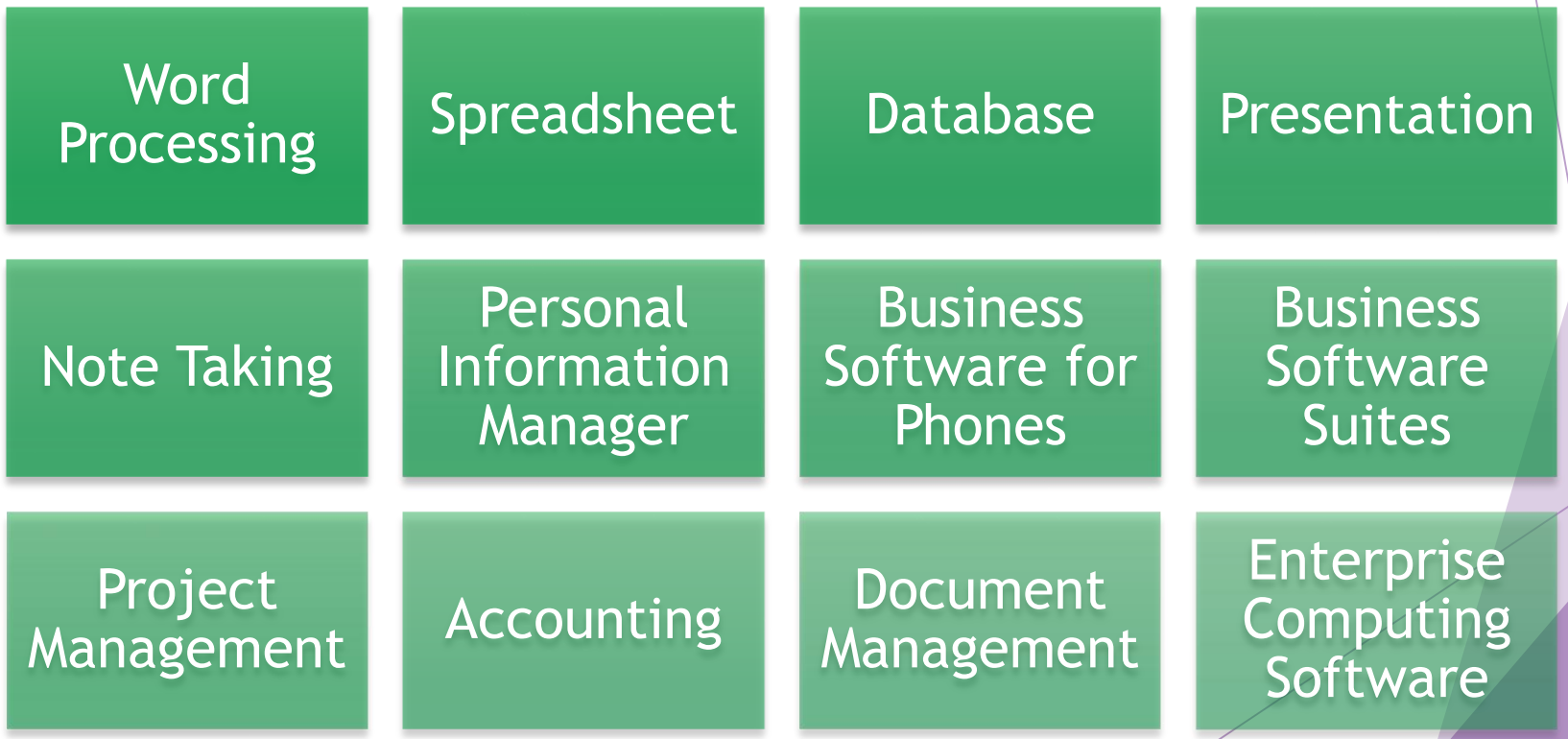
we used our own devices

Communications

- Web Browser
- RSS Aggregator
- E-Mail
- Blogging
- Instant Messaging
- Newsgroup/Message Board
- Chat Room
- FTP
- Text, Picture, Video Messaging
- VoIP
- Video Conferencing

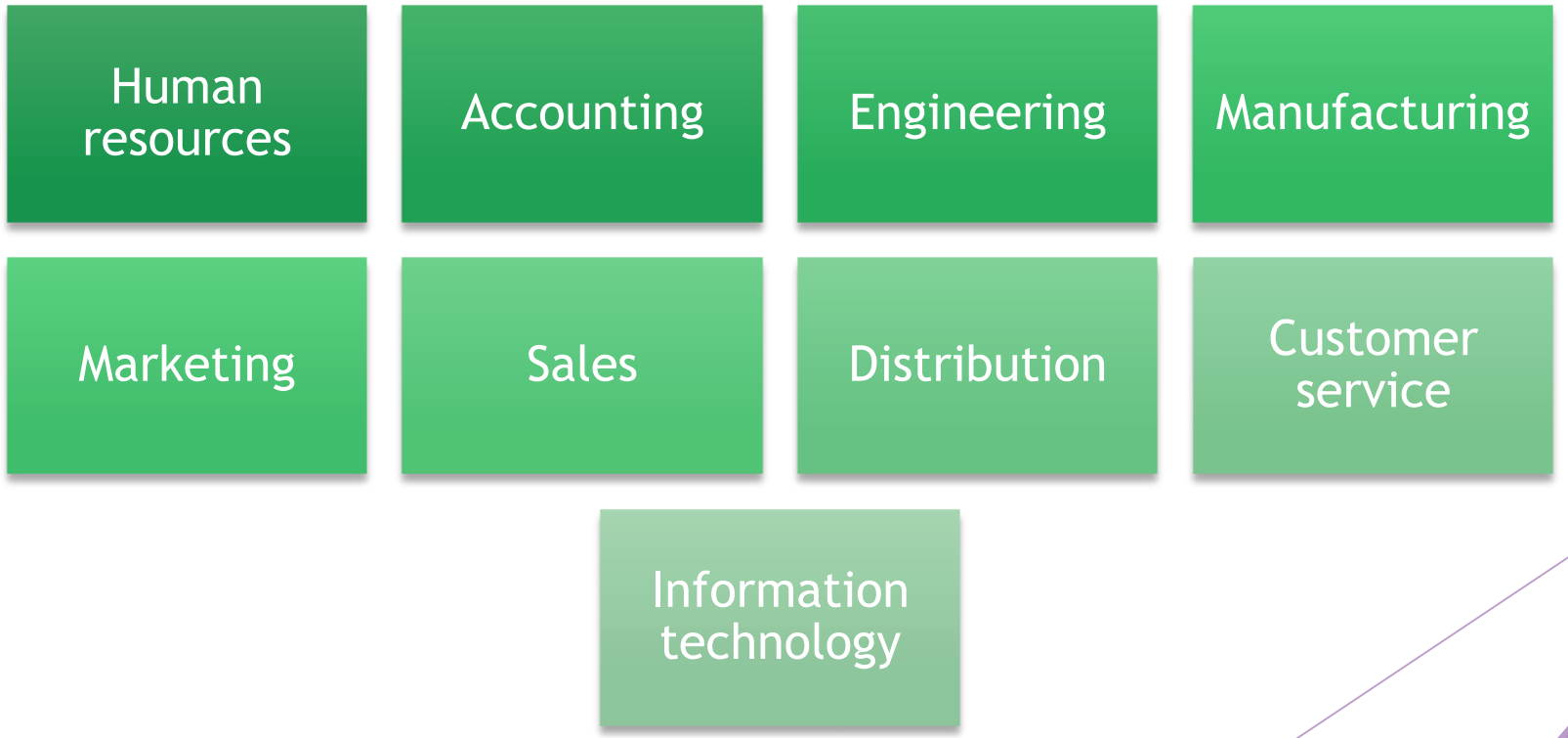
Business Software

Business software is application software that assists people while performing business activities



Business Software

Enterprises typically require special computing solutions for various functional units



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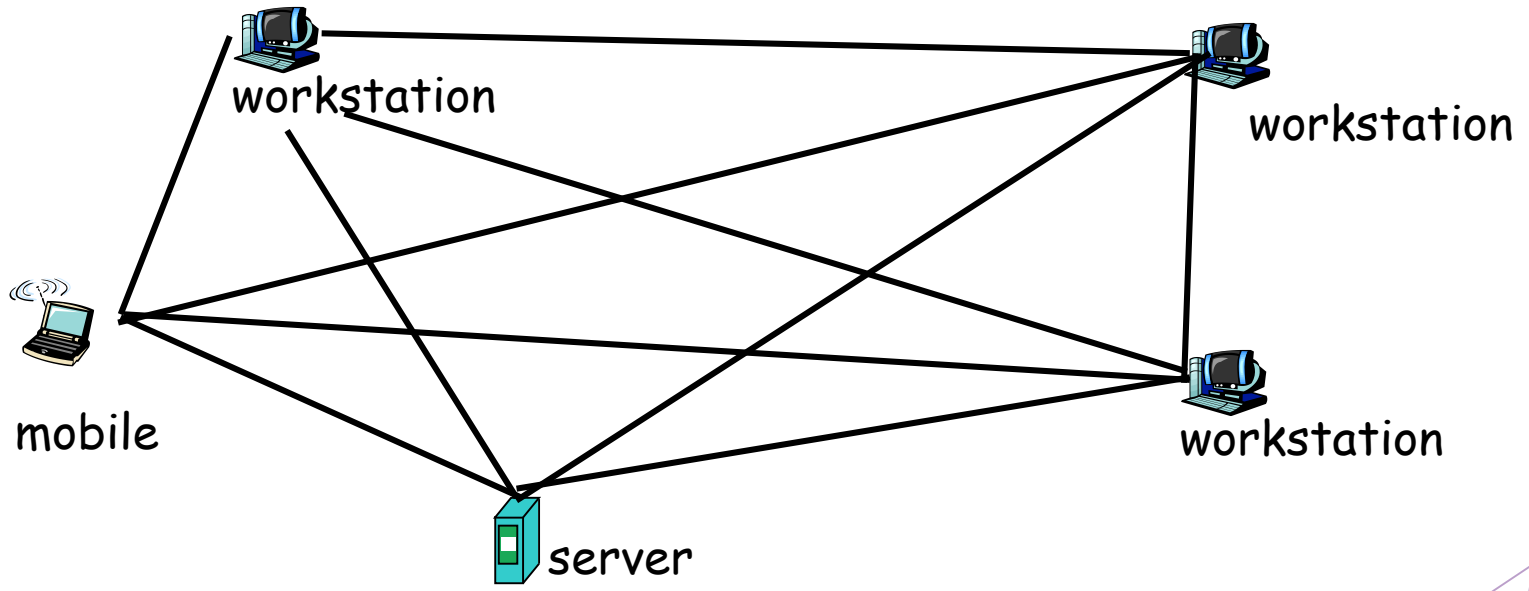
Network Systems

What's a network

- A group of devices that can communicate with one another - *hosts*
- Physical connections between devices are called *links*



network advantages vs disadvantages

Reduce cost compared to traditional communications

Reduce time for information transfer

Enable sharing and dissemination of company information

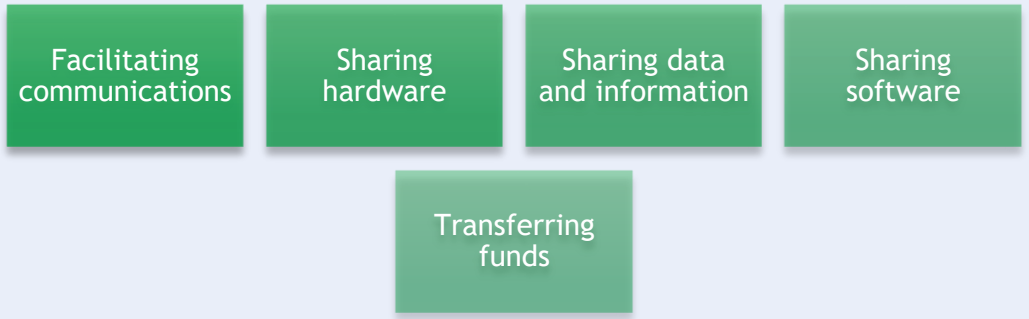
Enable sharing of hardware resources such as printers, backup, processing power

Promote new ways of working
Operate geographically separate businesses as one.
Restructure relationships with partners

- initial setup cost high,
- considerable period before the costs are paid off
- considerable practical difficulties.
- companies become reliant on networks, and
- breaks in service can be very disruptive.
- investment in network maintenance is vital
- reduced security more access points to sensitive data.

Advantages of a Network

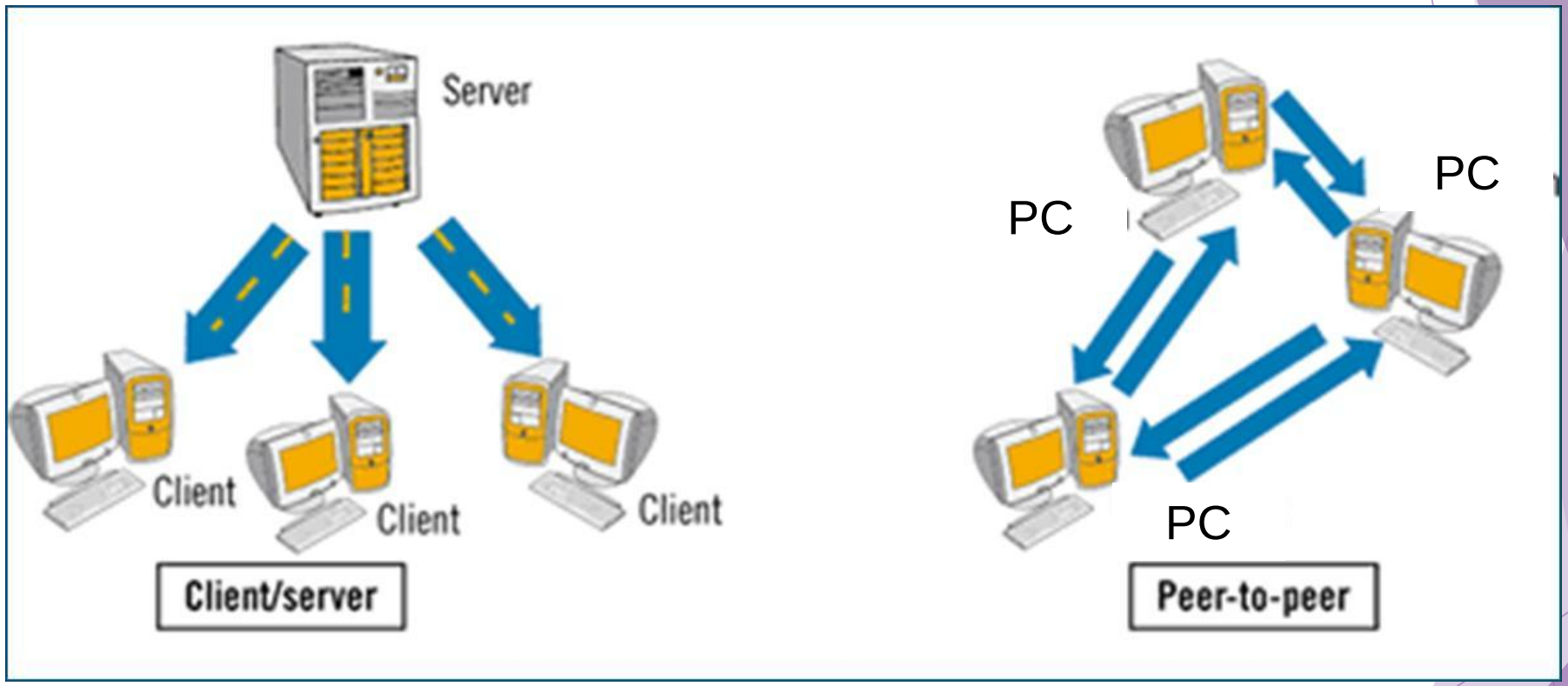
Advantages	Disadvantages
1. Lower transaction costs due to less human input	1. Overreliance on networks for mission-critical applications
2. Improved sharing of information and hardware resources	2. Cost of initial setup and administration
3. Reduced costs through sharing hardware and software	3. Disruption during initial setup and maintenance
4. Reduced time for communication compared with traditional methods postal mail	4. Reduced security due to more external access points to the network on wide-area networks and the Internet
5. Increased security of data which are backed up on file servers. Increased security through restricting access via user names and passwords	



Network Components

- Connections
  - Wired – twisted-pair, coaxial cable, or fiber-optic
  - Wireless – infrared, microwave (Bluetooth), broadcast (Wi-Fi) or satellite
- Hosts & Nodes
  - Host: the central computer that controls the network
  - Node: a device that is attached to the network
- Packets
  - The format for sending electronic messages
  - A fixed-length block of data for transmission

Network Architecture



(Source: Shelly et al.)

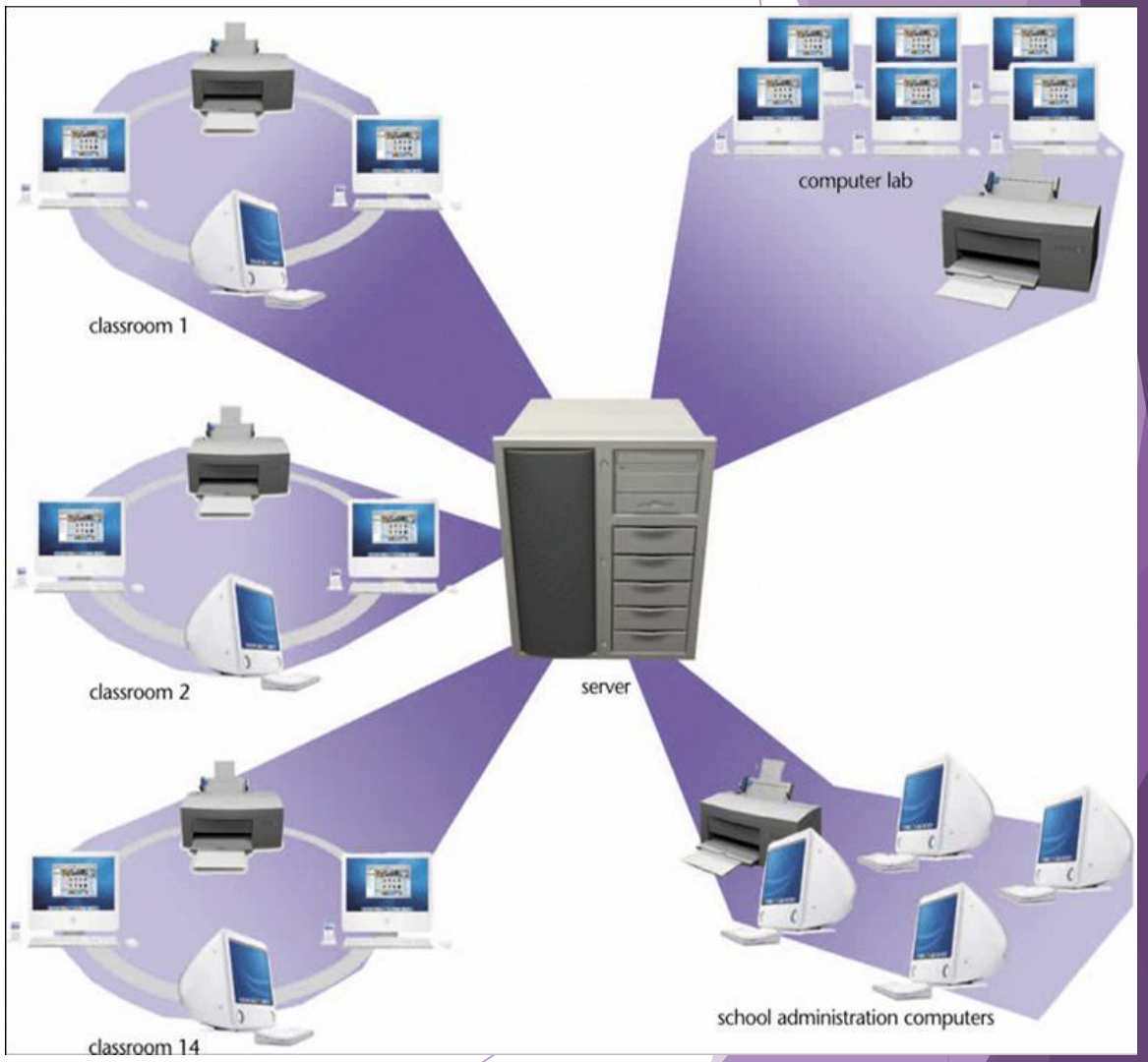
WAN – Wide Area Network

Covers a wide geographic area, such as a country or the world

(Source: Shelly et al.)

LAN – Local Area Network

Connects computers and devices in a limited geographic area such as an office, building, or group of nearby buildings



(Source: Shelly et al.)

Networks

Intranets

- An organization's private network that uses the infrastructure and standards of the Internet and the web

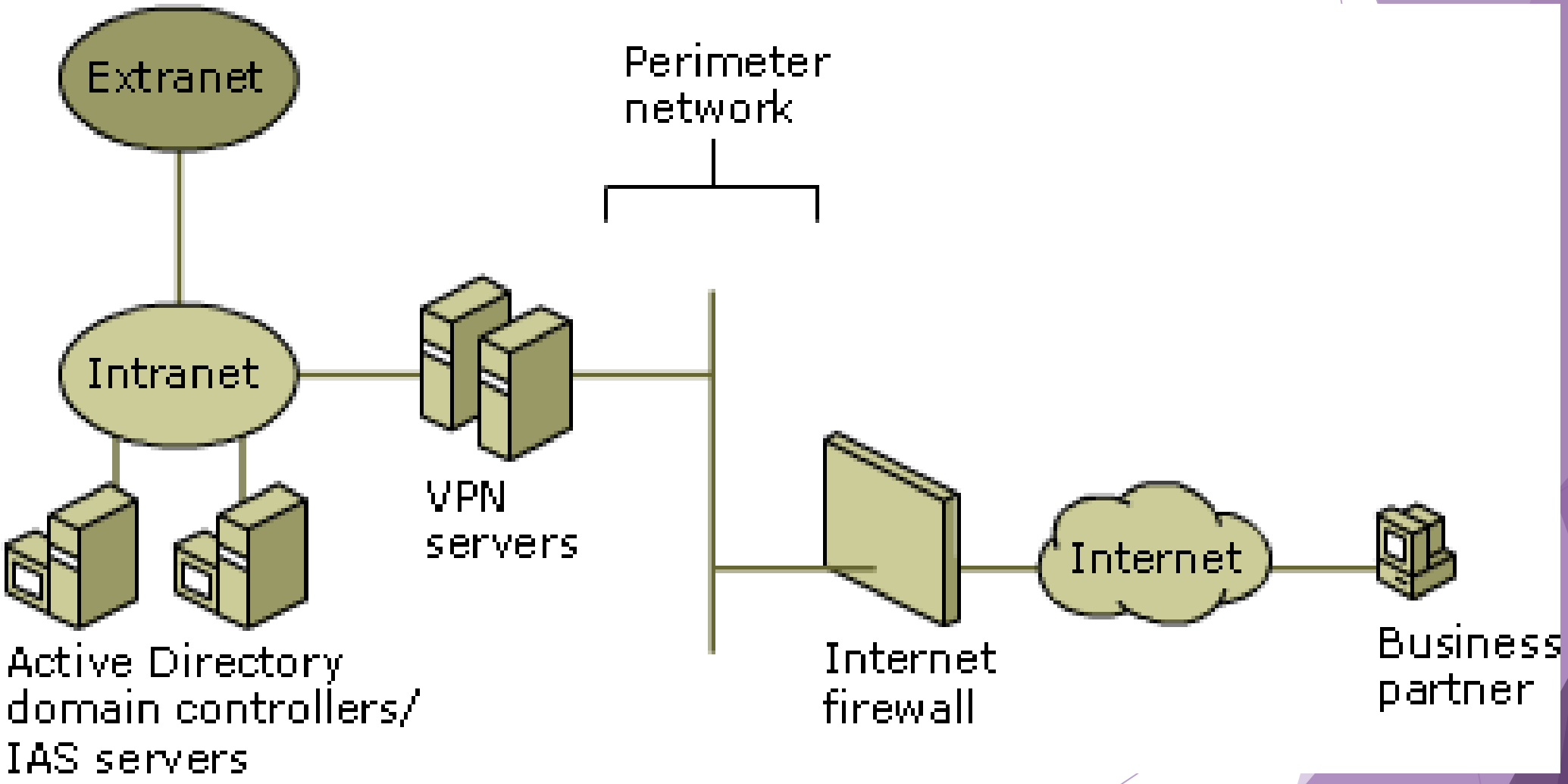
Extranets

- Private internets that connect not only internal personnel but also selected suppliers and other strategic parties

Virtual Private Networks (VPN)

- Private networks that use a public network, usually the Internet, to connect remote sites

Networks



(source: Microsoft)

server advantages vs disadvantages

- maintain security
- sharing of devices
- sharing of applications
- sharing of information
- data managed better when stored on a server.
- ensure data security,
- shared data load
- accessible by everyone
- storage space, cable reduction, reliability, and economy of scale

- management problems
- cost
- more that can go wrong
- more support staff
- More systems = less reliable
- Delays
- Distraction of staff
- regulate the flow of information around the network

Internet

- The Internet allows communication between millions of connected computers worldwide
- The Internet is a large-scale client/server system
- early 1990s when the web browser adopted , growth of widespread use
- There are 4.72 billion **internet users** in the world today.
- The total number of **internet users** around the world grew by 332 million in the past 12 months (Google)

world wide web

provides a standard method for exchanging and publishing information on the Internet

based on formats such as HTML (Hypertext Markup Language)

been widely adopted because:

- interactive, user input e.g. forms
- links
- easy to read on different access devices
- graphics and animations

Application layer

- provides functions for privacy, messaging and file transfer.

Presentation layer

- data-transfer protocols such as SMTP, HTTP and FTP.

Session layer

- manages session and connection coordination,
- is specific to each presentation-layer type such as SMTP, HTTP or FTP

T*ransport layer*

- ensures data integrity
- TCP

Network layer

- routing and forwarding
- opening and maintaining links between servers.
- handles the routing of the data
- Internet protocol (IP)

Data link layer

- defines the rules for sending, receiving and acknowledging exchange
- at the level of 1s and 0s.

Physical layer

- Low-level

network security

Information Assurance & Security

- Threats: Malware
- Threats: Hacking Tools & Techniques
- Network Security
- Software Security
- Operational Security
- Cryptography
- Access Controls
- Risk, Response & Recovery

Information Systems Security

Terms

- Risk
  - something bad might happen to an asset
  - losing data, losing business
- Threat
  - an action that could damage an asset
  - natural (earthquake, flood)
  - human-induced
- businesses need to plan to deal with threats

Information Systems Security

Threats

- Human-caused threats include:
  - viruses
    - a program written to cause damage
  - malicious code
    - a program to cause a specific action to occur
  - unauthorized access

Vulnerability

- A weakness that allows a threat to have access to an asset

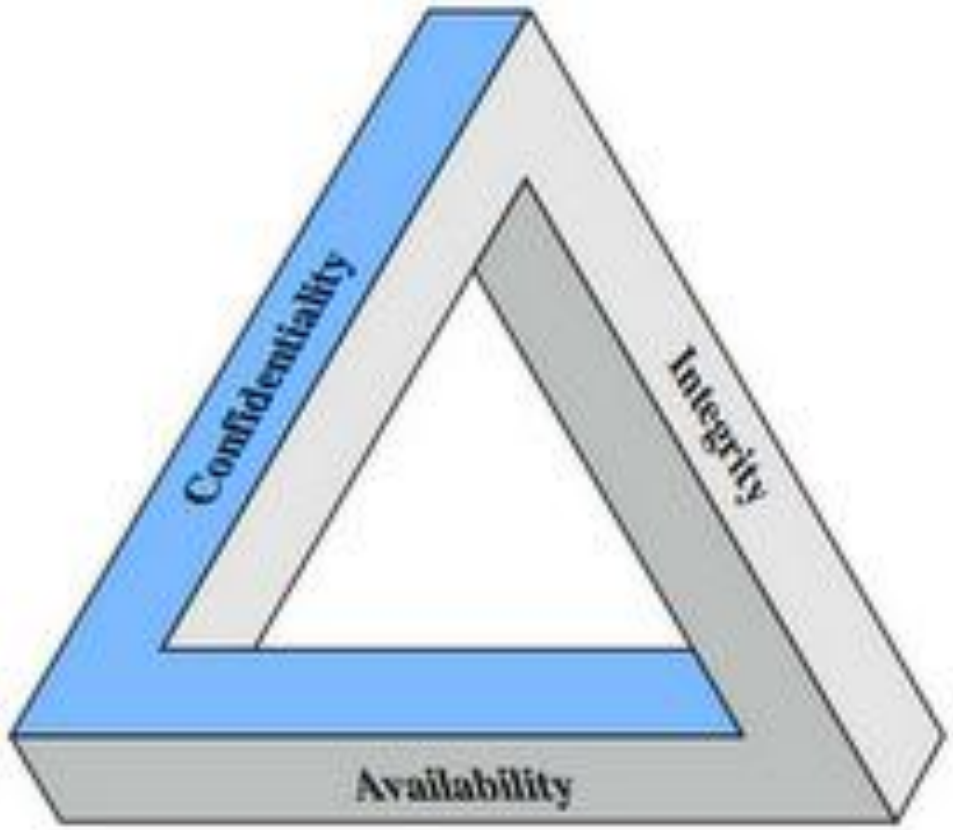
Network Security

principles :

encryption = cryptography

CIA

- confidentiality
- integrity
- availability

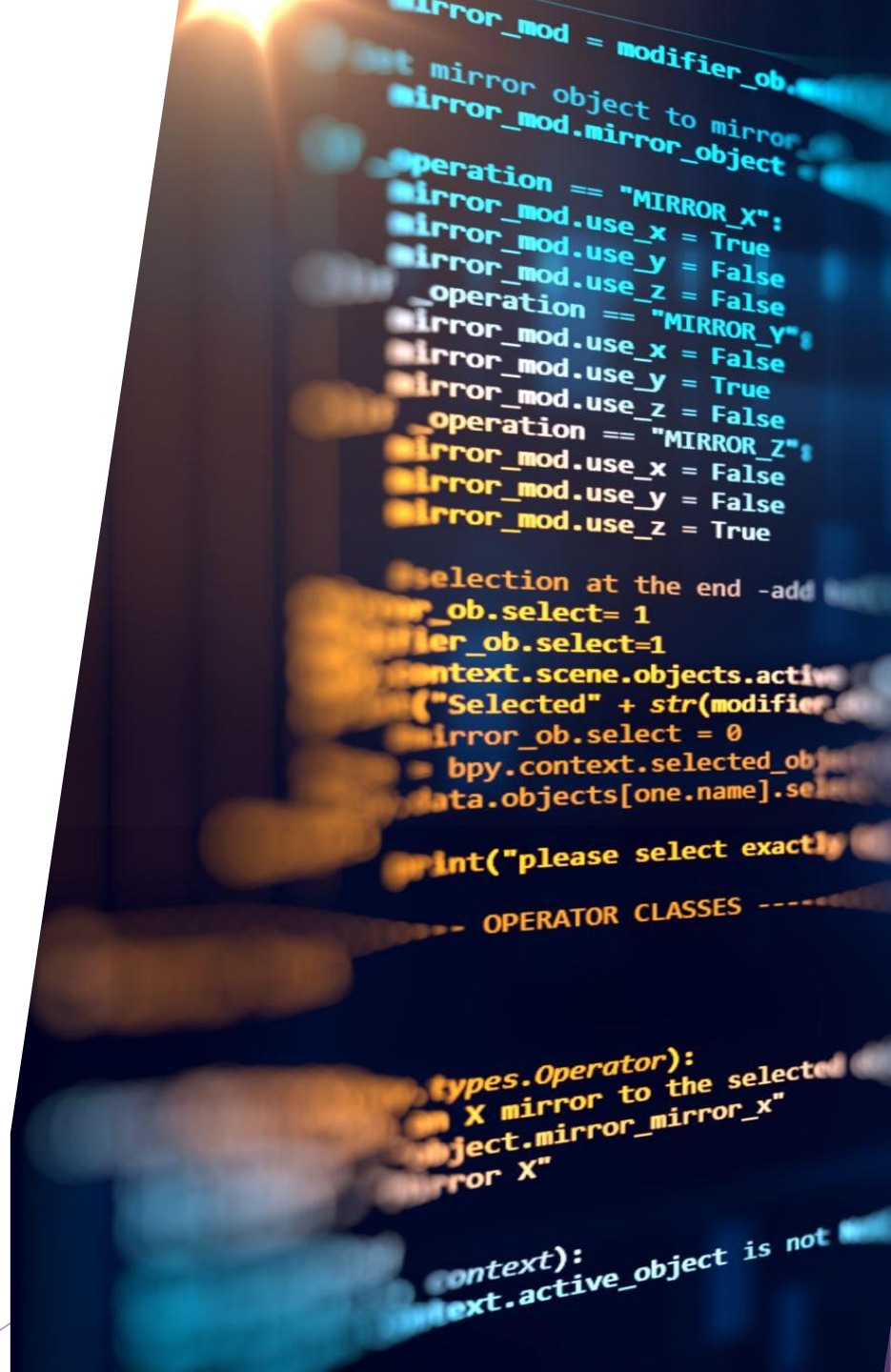


in practice:

firewalls and intrusion detection systems

malware

- Viruses: Self-replicating code that attaches to files.
- Worms: Standalone malware that replicates across networks.
- Trojans: Malicious software disguised as legitimate applications.
- Spyware: Software that collects user information without consent.
- Adware: Software that displays unwanted advertisements.
- Ransomware: Malware that encrypts files and demands payment for decryption.
- Rootkits (Backdoors)



Hacking Stages

Reconnaissance (Footprinting)
Gathering information about the target system or network.

Scanning
Using tools to discover open ports, services, and vulnerabilities.

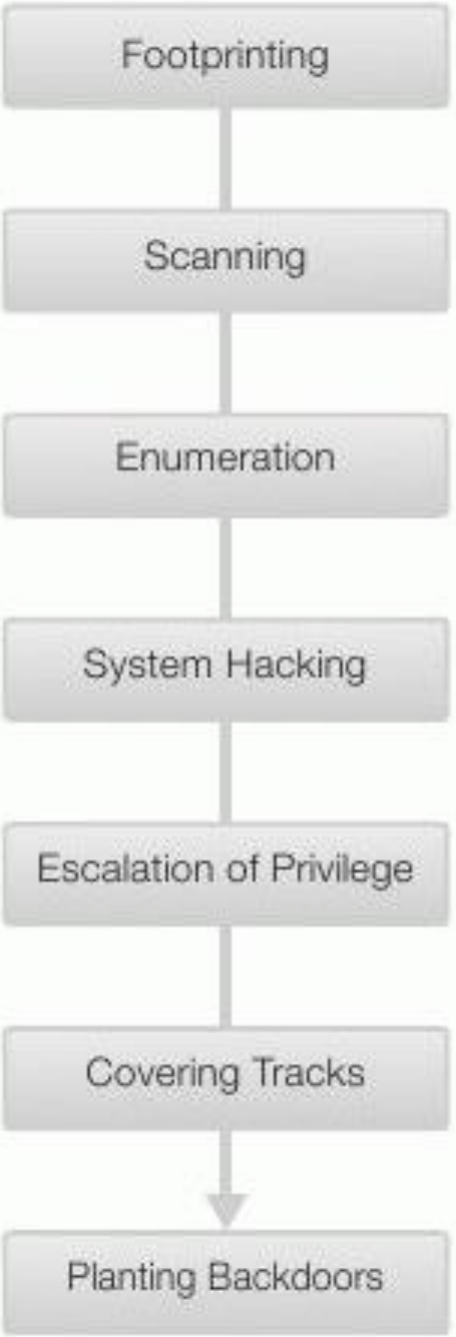
Enumeration
Actively probing for detailed information about the system, such as user accounts, network shares, and services.

Gaining Access
Exploiting vulnerabilities to breach the target system and establish control.

Escalation of Privileges
Increasing access rights to obtain administrative or root-level control.

Covering Tracks
Hide the intrusion by deleting logs, hiding files, and erasing evidence.

Maintaining Access
Installing backdoors, rootkits, or other tools to ensure continued access.



Security Mechanisms

- Prevention, Detection, Recovery
- Prevention:
  - Encryption
  - Software Controls (DB access limitations, operating system process protection)
  - Enforce policies (frequent password change)
  - Physical Controls
- Detection: Intrusion detection systems (IDS)

Two Factor Authentication

- First factor: what user knows
- Second factor: what user *has*
  - Password token
    - Passcode creator (*every n minutes*)
  - USB key
  - Digital certificate
  - Smart card

RSA SecurID SD600

RSA SecurID SID700

RSA SecurID SD200

RSA SecurID SID800

RSA SecurID SD520

BlackBerry with
RSA SecurID software token

How a User Should Treat Userids and Passwords

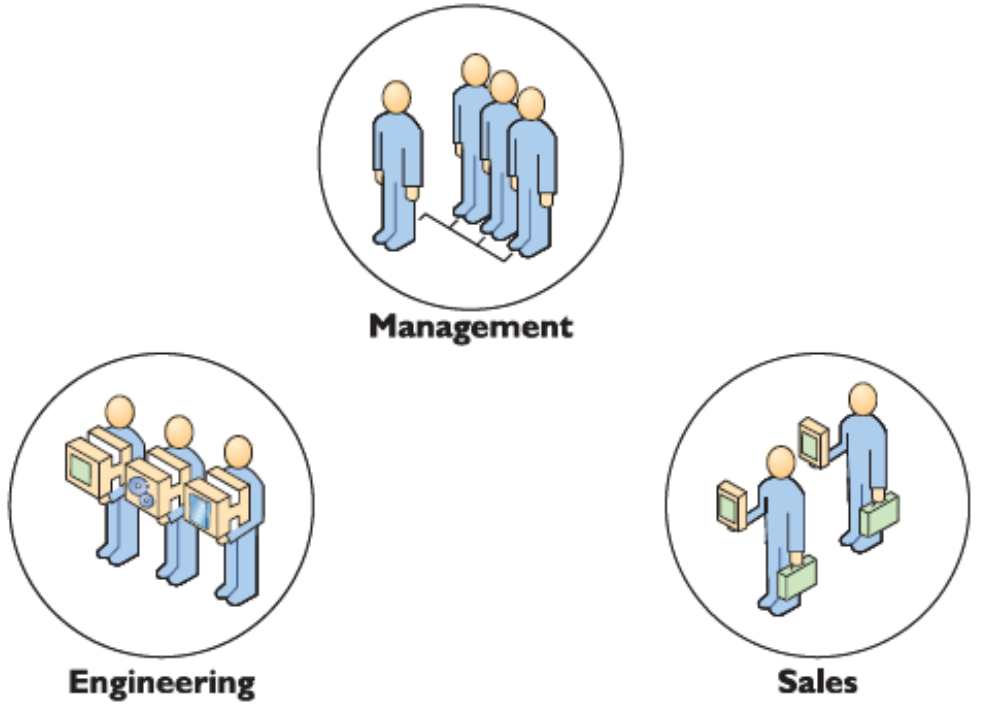
- Like a toothbrush –
  - don’t let anyone else use it, change it every month or so
- Keep it secret
- Do not share with others
- Do not leave written down where someone else can find it
- Store in an encrypted file or vault

Access Control

User – Any person accessing a computer system

Group – Multiple users that are granted access to a resource at the same time

Role – Access is granted or denied based on a person's job or function within the organization



Thu, 9th Jan 2025	12.00-15.00	888342 Introduction to Management Information System	702	20	ICB1210 (MAX 20)	Asst.Prof.Dr. Seamus Lyons Mr. Watcharapong Dilokjanya

Thursday Jan 9th 12 to 3pm
ICB 1210

3 hours
answer 6 questions
choose 6 from 11 questions

GOOD LUCK!

the midterm exam is open book

BUT,
any use of Artificial Intelligence
(chat GPT, AI translator, AI paraphraser)
is cheating (0%, ‘F’, or ‘W’)

plagiarism or cheating using AI is against ICDI and CMU rules and can lead to loosing student status