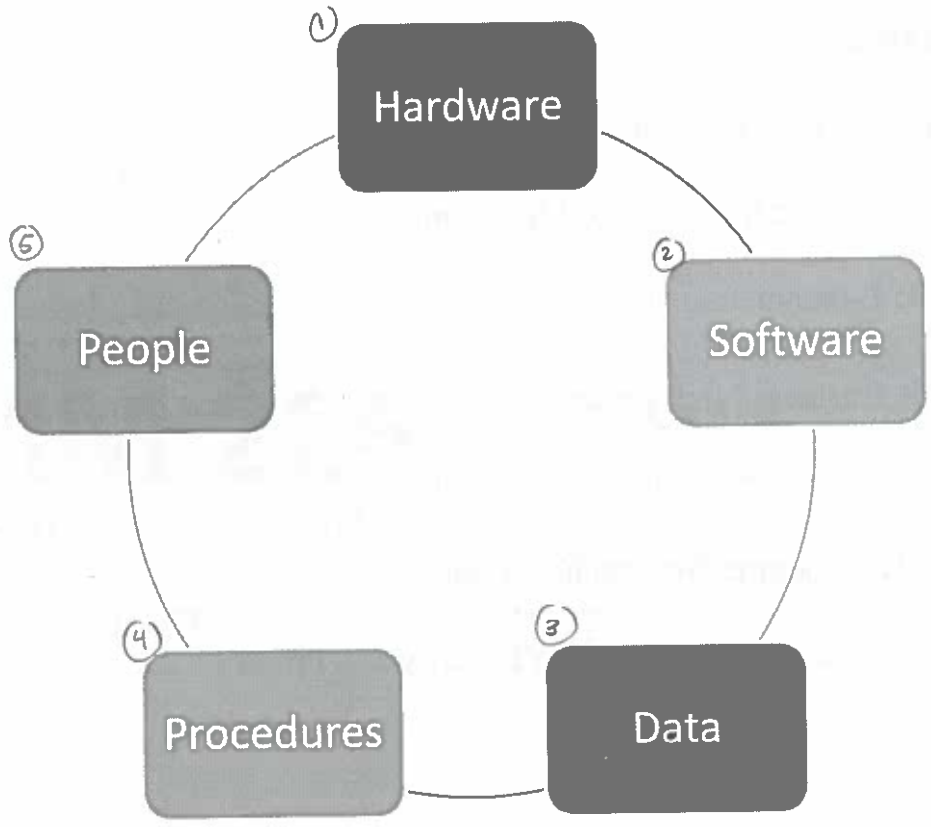
PS&I Chapter 1
THE IMPORTANCE OF MIS

Information Systems Defined

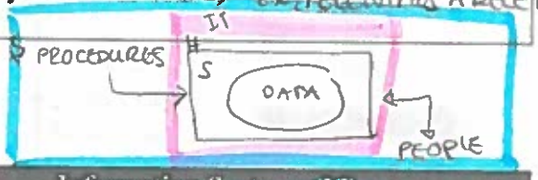
- System: A **group of components** that **interact** to achieve a **purpose**
  - Not necessarily technology-related (e.g. a tree is a system, so is a human)
  - When the system's PURPOSE to is to create information, it then becomes an information system
  - Still not necessarily technology-related (e.g. market researchers going door-to-door and consolidating results on paper without ever using a computer)
    - This was the reality before computers – information systems still existed!

- Computerized Information System CIS
  - An information system that is enabled by technology
  - What we commonly associate with MIS in business today
MIS - Consist of 5 components



The 5 Components Explained

COMPONENT	EXPLANATION	EXAMPLES
Hardware (= COMPUTER)	All electrical components of the system	Computer, Cables, phones
Software (INSIDE OF PC)	Programs and application that are part of the system	Microsoft Office, Adobe Photoshop, MyConcordia
Data	Facts and statistics collected to form information	Sales revenue, grades in school, temperature
Procedures	Instructions or steps followed to achieve an outcome	How to turn on a computer, how to write an essay
People	The humans using or interacting with the system (both directly and indirectly)	DIRECT USERS" (USING THE SYSTEM) Programmers, employees inputting data, someone who logs in (PAYING WITH DEBIT) INDIRECT USERS: (GET SMT OUT OF THE SYSTEM) Manager who receives a system-generated report (didn't physically use the system themselves) EX: RECEIVING A RECEIPT



IT vs. IS

	Information Technology (IT)	Information Systems (IS)
Included Components	✓ Hardware (THE INSIDE) ✓ Software ✓ Data	✓ Hardware (THE WHOLE THING) ✓ Software ✓ Data ✓ Procedures ✓ People
The Difference	Raw Technology	Gives IT a purpose
Example	Just a computer	A computer that is used by a manager (people), to generate monthly sales forecasts (process)

Information Systems + Business Professionals

- **Tradeable Job:** A job that is not dependent on a specific location (A JOB THAT CAN BE REPLACED BY COMPUTER)
- Since routine tasks can be outsourced, we need to learn non-routine skills

↳ will make your job interesting

SKILL	DEFINITION	EXAMPLE: THE PAINTING
1. ABSTRACT REASONING	Building and manipulating models; simplification of an object; develop theories, ideas, detect patterns	Understanding the meaning and symbols behind a painting
2. SYSTEMS THINKING	How parts work together (inputs and outputs) to achieve a goal; interrelations	Seeing how the different colours were blended, strokes made, and tools used to create the art
3. COLLABORATION	Developing ideas and plans with others; providing and receiving feedback	Work as a team to re-create the work of art, presenting it, receiving constructive criticism
4. EXPERIMENTATION	Create and test alternatives, develop a recommendation, learn from mistakes	Test the different ways to recreate the painting (sketch, paint, digital) and determine which one is best

Moore's Law

INSIDE OF COMPUTER THAT MAKES IT WORK (CPU, CPU)

The number of transistors per square inch on electronic chips is roughly doubling every 18 months or so which leads to… (OR 2 YEARS)

↳ THE LAW OF MOORES.

CONSEQUENCES OF MOORE'S LAW

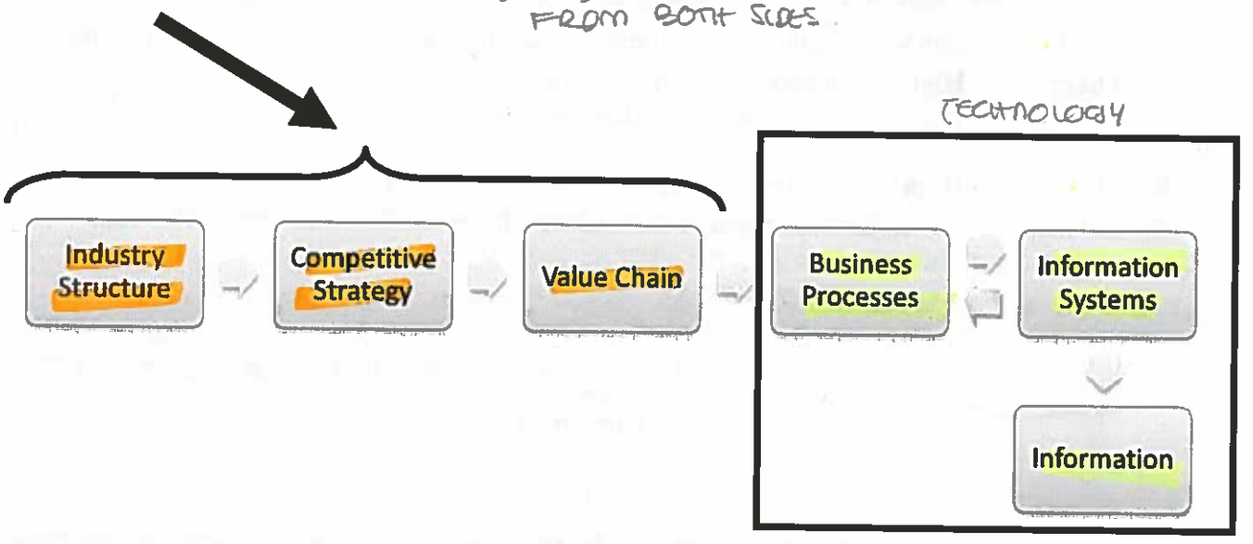
1. Computer speed increasing exponentially (not at a stable rate, but still continuously)
2. Mobile platforms and Internet access is growing worldwide
3. Data storage and data communication costs virtually 0$
4. Routine tasks can be outsourced cheaply – if your job can be automated, you job isn't secure

Key points:

- Created by: Gordon Moore, founder of Intel, in 1965
- Not a real law - A prediction that has become reality

What is MIS?

- Using technology to achieve strategic business goals and objectives
- Created to solve a business problem or optimize the business in some way
  Example: Developing a website for the sake of having one doesn't solve anything
  - Always ask yourself, what is the company's *need* → the system should address it
  - **The newest, biggest, shiniest system will not always solve the issue!**



- **Business Process:** A sequence of activities that serve to accomplish something
- **Information Systems:** See above – the tools we use
- **Information**: Insights gathered that help us do our job – the outcome

Think of IS as a tool used to accomplish organizational goals

1 INDUSTRY STRUCTURE

Porter's 5 Forces Model

- Defines the industry structure
- Shows if an industry is **attractive** and **profitable**

New Entrants How easy is it for new companies to enter the market?
High – Easy to set up shop
Low – Laws, setup costs are high, few new competitors

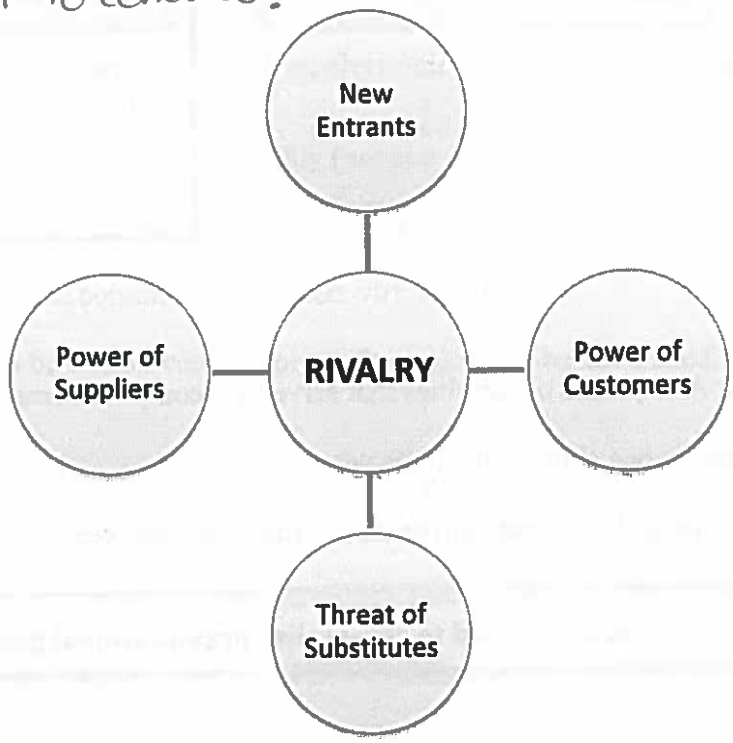
Power of Customers Can the customers put pressure on the firms? → CAN THEY STOP BUYING YOUR PRODUCTS?
High – Lots of choice, very sensitive to price
Low – Something they need, no choice but to buy from you ex: YOU CAN CHOOSE DIFFERENT PRODUCT OF COFFEE ex: COFFEE FIRMS OR STARBUCK (SAME PRODUC

Threat of Substitutes Are there other products that can be bought instead of the ones in your industry?
High – Your product is one of many alternatives
Low – Your product is unique and irreplaceable ex: USING A DIFFERENT TYPE OF PRODUCT ex: DRINKING TEA INSTEAD OF COFFEE.

Power of Suppliers Can your suppliers control prices and put pressure on your ability to produce?
High – You need to buy from them
Low – You can switch suppliers easily

Existing Rivals
High – Lot of innovation, advertising, price wars
Low – Few competitors, little advertising

DONT FORGET TO CONCLUDE!



Example COFFEE SHOP

① INDUSTRY STRUCTURE

New Entrants (HIGH)
VERY EASY TO OPEN COFFEE SHOPS (MANY ENTRANTS)

Power of Customers (HIGH): YOU HAVE THE CHOICE BETWEEN COFFEE FROM STARBUCKS OR TIM HORTONS., SENSITIVE TO PRICE
LOTS OF CHOICES

Threat of Substitutes (HIGH): YOU CAN GO TO A STORE OTHER THAN A COFFEE SHOP
- ANYTHING OTHER THAN A COFFEE SHOP INDUSTRY
- MAKING COFFE AT HOME

Power of Suppliers: (MEDIUM-LOW) MORE SUPPLIERS, MORE CHOICES, SWITCH EASILY

Existing Rivals (HIGH)
- STARBUCKS.
- TIMS
- JAVA-U

CONCLUSION: IS THE INDUSTRY PROFITABLE/ATTRACTIVE?
THIS INDUSTRY IS NOT VERY ATTRACTIVE AND IT WILL BE HARD TO GET INTO THIS MARKET FOR THESE REASONS. LONG TIME TO TURN A PROFIT.

① Porter's 4 Competitive Strategies

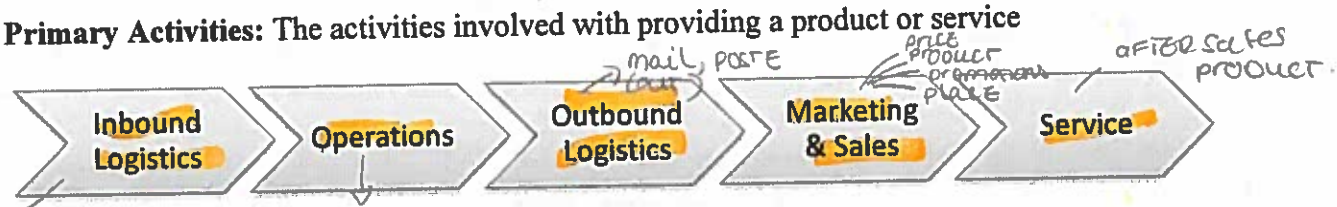
- Companies can adopt one or several of these strategies to compete
- Company goals, culture, and activities must be in line with the chosen strategy

	Cost	Differentiation
Industry-Wide (Mass)	Providing low-cost products targeting all consumers • Wal-Mart, Dollarama	Providing unique products targeting all consumers • Coke, FedEx
Focus	Providing low-cost products for a specific customer • Forever 21	Providing a unique product for a specific type of customer • Ferrari, Canada Goose

(3) Value Chain Analysis

- Formalized by Michael Porter (Harvard University)
- Looks internally (within the company)
- Different for each business (depends on their processes)
- **Value:** The amount of money a customer is willing to pay for a resource

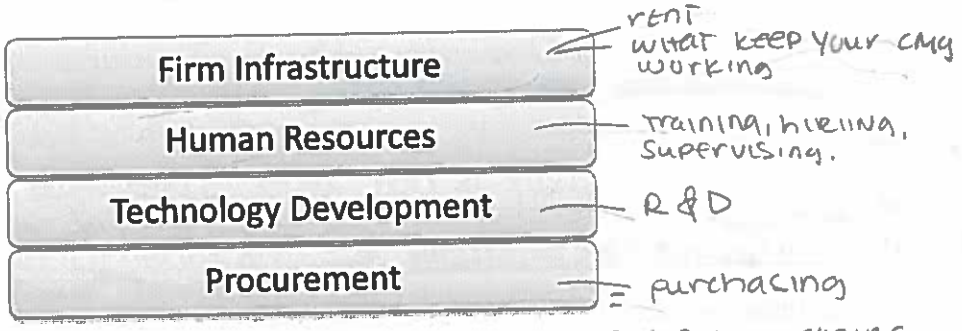
Primary Activities: The activities involved with providing a product or service



Support Activities: The activities that support the primary ones

- The background stuff that helps the business run

Examples: finances, hiring, tech support



EXAMPLE: APPLE

INBOUNDS: GETTING RAW MATERIALS TO PRODUCE PHONE
ex: GLASS,

OPERATIONS: PRODUCING THE PHONE ITSELF

OUTBOUND LOGISTICS: DELIVERING TO CUSTOMERS (HOME), SHIPPING

MARKETING & SALES: PRICING, PROMOTIONS, PLACE

SERVICE: - GARANTIES
- APPLE CARE.

FIRM INFRASTRUCTURE: RENT, FIRM ITSELF, ELECTRICITY ---

HR: HIGHER

TECHNOLOGY: FINDING NEW SYSTEMS THEY CAN USES THEIT ARE FASTERS

PROCUREMENT: CHAIRS, TABLE ...

PS&I Chapter 1
PRACTICE PROBLEMS

1. Which of the following is NOT TRUE about Moore's Law?

   a. Density of transistors on a given microchip increase every 18 months or so
   b. Computer speed increases every 18 months (IF TRANSISTOR↑, CP SPEED↑)
   c. Costs of computers decreases as density on microchips increase
   d. Moore's law is a prediction but not a real law founded on science

2. _____ cost(s) virtually 0$.

   a. Hardware
   b. Microchips
   c. Communication Technology } BOTH ARE CORRECT
   d. Data Storage

3. Moore's Law has resulted in some jobs becoming obsolete. Which of the following skills would not be impacted by Moore's Law when it comes to job security here in Canada?

   a) Programming skills
   b) Statistics computation skills
   c) Business analysis skills
   d) Assembly line skills

4. You go on a shopping spree at your favourite clothing store. The clerk hands you the processing machine so that you can pay with your credit card. The physical machine she hands you is an example of:

   a. Software
   b. Hardware
   c. People
   d. Procedures

5. When you are handed a copy of your receipt at your local Starbucks, you are becoming the following part of the information system used for the transaction:

   a. Direct User
   b. Indirect User
   c. Data
   d. Output

6. Which of the following is a valid reason for a company to develop a new information system?

a. All of its competitors have new systems
b. New industry standards recommend the new system
c. To make you produce your products at a lower cost
d. Because it's being offered by the supplier at a discount

7. Which of the following components help to characterize a computerized information system but are not involved in information technology?

IT
software
hardware
data

a. Direct Users
b. Data
c. Hardware
d. Software

8. The Porter's 5 Forces model aims to determine which of the following:

a. The company's strategy relative to that of its competitors
b. Ways to improve the internal workings of the company
c. Potential profitability of an industry and its attractiveness to a company
d. How to increase productivity through IT value

9. Which of the following is considered a competitive strategy for a firm?

a. Increasing promotions to attract new customers
b. Launching a new product targeted at a cost conscious niche market
c. Increasing prices because the cost of production has gone up
d. Opening more stores in current markets

10. MIS is said to be made up of all of the following components except for

a. The use of technology to achieve business Strategy
b. The creation of technology for businesses
c. Facilitating communication between IT and management teams
d. The understanding of processes, information systems, information

11. Amazon.ca stores products in its warehouse in Mississauga. This activity represents which activity of the value chain?

a. Procurement
b. Processing = operations
c. Outbound Logistics
d. Marketing and Sales

12. Which of the following is NOT part of the 5 forces model

a. Competitive Rivalry
b. Market Entry Potential
c. Barriers to Entry
d. Bargaining Power of Suppliers
e. Buyer Bargaining Power

13. Mark works for a manufacturer of electrical components for cars. Every day, he in charge of going down to the factory floor and taking note of the number of parts that are being produced at each station throughout the day. He fills in a form on his clipchart and hands it in at the end of day to his manager. Mark's work would be considered a(n):

a. Computerized Information System
b. System
c. Information System
d. Business Analyst

14. MIS professionals are most likely found at the intersection of the following 2 departments within a business:

a. Programming and software development
b. Programming and the marketing department
c. Marketing and Accounting
d. Human resources and the recruiters

Essay Question 1

LG has recently begun producing Smart TVs. These TVs differ from traditional models as they have software built-in that allows the viewer to use apps that provide access to the Internet, digital content, games, and more, thus augmenting the traditional cable/satellite experience.

LG has decided to focus on providing high-end smart TVs with more user-friendly software. The TVs can be purchased at any electronics retailer (e.g. Best Buy, Wal-Mart), as well as online (e.g. Amazon). LG faces aggressive competition in these stores as popular TV makers such as Sony, Samsung, and Sharp have also jumped on the Smart TV opportunity. Smaller manufacturers have found it more difficult to enter this market due to high investment needed to first develop, and then produce Smart TVs – especially with the major existing players.

threat of new entrants

Unlike competitors, LG does not rely on heavy discounting and rarely runs promotional campaigns, instead relying heavily on their brand name and cross-selling opportunities from other product lines. Each of these companies is doing whatever they can to develop technologically superior products. As a result, customers have many choices when looking for a Smart TV.

As a major player, LG is able produce most of the raw components and software needed in-house. As such, they invest heavily in R&D to develop the latest technology and manufacture as much as possible in proprietary plants mostly located throughout Asia. They ship their product from these plants to their distribution centers located throughout the world (at least 1 on each continent) and then further distribute to their retail partners. LG has outstanding agreements with major carriers around the world such as DHL, FedEx, and UPS to ensure that stock is managed and delivered as quickly as possible.

a. Is the Smart TV industry profitable?

PORTER 5 FORCES.

1) THREATS OF NEW ENTRANTS: (LOW) DUE TO HIGH START-UP COSTS IN PRODUCING TECHNOLOGY AND UNCOVERING TECHNOLOGICAL INNOVATION.

2) THREAT OF SUBSTITUTE: (HIGH) MANY OTHER CHOICES, THERE ARE OTHER FORMS OF TV AVAILABLE ON MARKET. (INSTEAD OF BUYING A SMART TV THEY CAN BUY A TABLE OR A HD TV (REGULAR)

3) POWER OF SUPPLIERS: (LOW) BUY RAW COMPONENTS & SOFTWARE LG BUY ITS OWN RAW MATERIAL AND PRODUCE THE PRODUCT IT SELF. (CABLE, GLASS..) THERE ARE MANY SUPPLIERS FOR THESE TYPES OF GOODS. ADDITIONALLY LG IS A MAJOR COMPANY WITH MAJOR DIFFERENT PRODUCTS BEING MANUFACTURED USING SIMILAR PRODUCT MOST SUPPLIERS WANT TO SUPPLY TO LG.

4) POWER OF CUSTOMER: LOW. MODERATE. TV'S ARE 1 TIME PURCHASES. WHEN CUSTOMER ARE LOOKING FOR SMART TV THEY WANT A GOOD ONE (PREFERENCES) BUY → THERE ARE MANY)

5) RIVALRY: (HIGH) LG IS INSTALLING ITS PRODUCTS IN BIG ELECTRONIC RETAILERS (BEST LG IS ALREADY A BIG PLAYER TO PRODUCTS RELATED

CONCLUSION: MARKET ATTRACTIVE SUBSTITUTES AND RIVALRY ARE THE HIGHEST CONCERN

b. What competitive strategy is being employed by LG? Justify.

INDUSTRY-WIDE FOCUS

DIFFERENTIATION STRATEGY: THEY HAVE A WIDE MARKET APPEAL WITH THEIR PRODUCT, THERE IS NO FOCUS ON ANY PARTICULAR SEGMENT

→ THEY TRY TO PROVIDE SUPERIOR TECHNOLOGY WITH AN EMPHASIS ON USER-FRIENDLY SOFTWARE = DIFFERENTIATION.

c. Perform a value chain analysis. Make logical assumptions as needed

INBOUND → OPERATION → OUTBOUND → SALES & MARKETING → SERVICE

① INBOUND: RAW MATERIALS TO PRODUCE TVS, ELECTRONIC COMPONENTS, PLASTICS

② OPERATION: PRODUCING THE TV'S IN ASIA

③ OUTBOUT: PARTNERS GLOBALLY FOR DISTRIBUTION WITH SATTELITE WAREHOUSES GLOBALLY

④ MARKETING & SALES: RARELY USE DISCOUNTING, FOCUS ON CROSS SELLING WITH OTHER PRODUCT LINE, EMPHASIS ON THEIR BRAND NAME. HIGHER PRICED THAN COMPETITORS, AVAILABLE THROUGH ALL MAJOR ELECTRONIC CHANNELS

4 P'S

⑤ AFTER SALES: WARANTIES, HOTLINE

⑥ INFRASTRUCTURE: MANUFACTURING PLANTS IN ASIA, DISTRIBUTION CENTERS GLOBALLY

⑦ PROCUREMENT: PURCHASING RAW MATERIALS

⑧ HUMAN RESOURCE: NO REALINFO, CAN ASSUME STAFF IS MOSTLY IN MKT/SALES

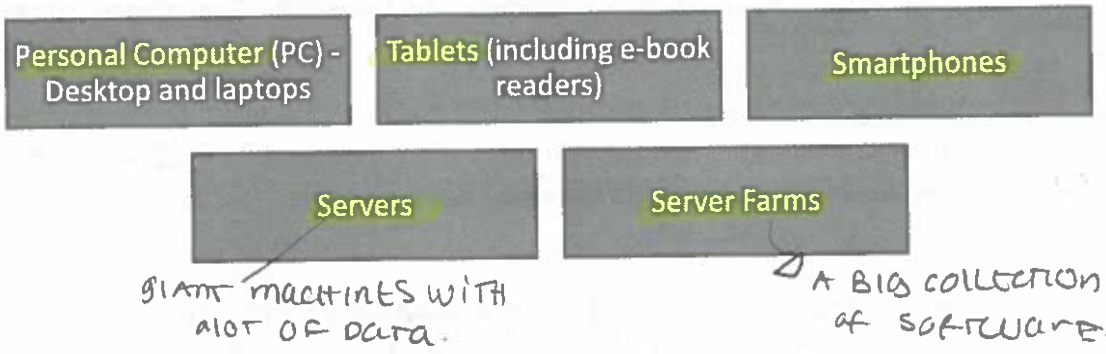
⑨ TECHNOLOGY & R/D: USER-EXPERIENCE FOCUS.

PS&I Chapter 3 – Part 1
HARDWARE AND SOFTWARE

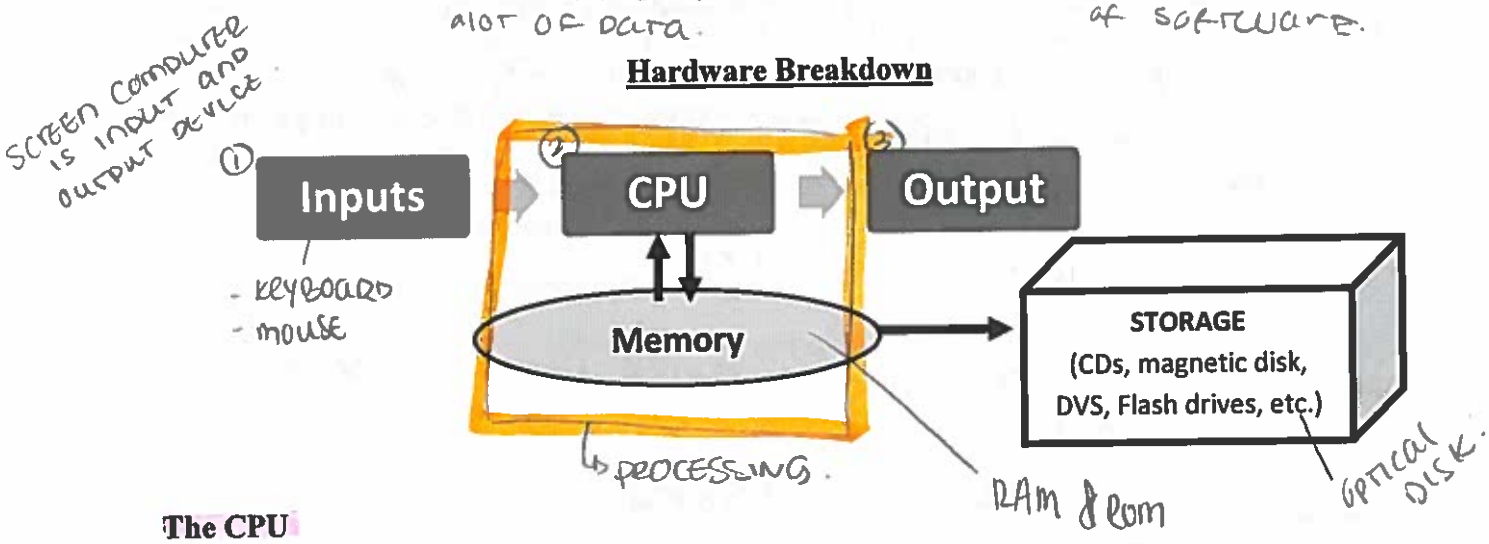
Hardware

- All the raw electrical components of an IS system (one of the 5 components in chapter 1)
- Despite changing technology, all computers consist of these components.

Types Of Hardware



Hardware Breakdown



The CPU

- The brain of the computer
- Compared based on 3 criteria: Speed, function, cost
  - Speed is measured in Hertz (Hz), generally Gigahertz for CPUs (GHz)
- Dual-processor = 2 CPUs in the computer, Quad-Processor = 4 CPUs
- Classified as either 32-bit or 64-bit; the latter can have more than 4 GB of memory
- Moore's Law continues to bring down the prices

EVALUATED BY
- IN COST
- IN SPEED
- FUNCTION

Memory: RAM vs. ROM

	ROM	RAM
Full Name	Read-Only Memory	Random Access Memory
Memory State	Permanent (Non-Volatile)	Temporary (Volatile) (changing)
Purpose	Start the computer	Run programs when the computer is on
Speed	Adding ROM has little impact on processing speed	Adding RAM lets you do more things at the same time
Human Example	Vital Functions - breathing doesn't need to be thought about – your body just does it	Daily Activities - you can listen to music, study, and chat on Facebook at the same time… but then try also cooking and working out at the same time; your brain can't process that many tasks at the same time. When you go to sleep, you stop doing all those activities!

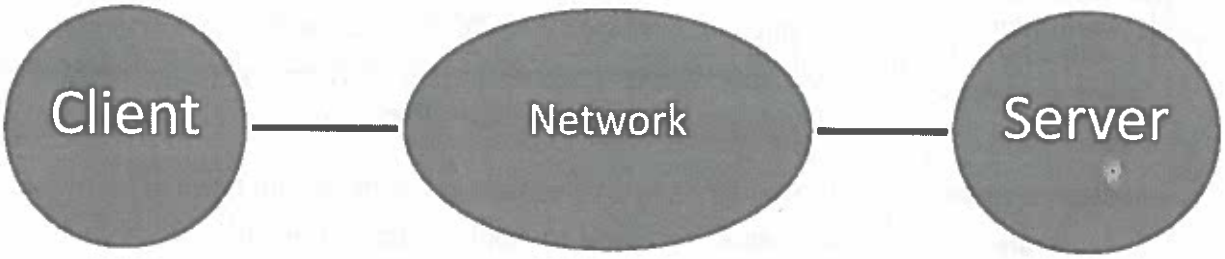
- ROM is what allows a computer to start.
  - The instructions that explain to the CPU how to start are stored here because it doesn't need electricity to store them

    Examples: Your computer knows how to start itself even if its unplugged for a while
- RAM is erased when it loses electricity.
  - This why you need to re-open Firefox, Word, Excel and other programs when you reboot.

Client-Server Architecture

- Connected using a public (***example:*** Internet) or private (***example:*** within a business) network

  Example: Data is stored on a server on the other side of the factory (private) or on a website that you access using Google Chrome (public)



Measuring Computer Data

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- Computers use a language called, BINARY CODE for its components to communicate
  - Binary code consists of 1's (ON) and 0's (OFF)
  - It is incomprehensible to humans – that's why we have programming languages.
  - Each 1 or 0 = 1 bit
    - Bits are organized into groups of 8, called BYTES → 8 BITS = 1 BYTE
      - Example of a byte: 01101001
      - Each character is represented by a BYTE
      - 1 Kilobyte is **1024 BYTES**, NOT 1000 like in other measurements
        Example: 1000 grams = 1 kilogram)

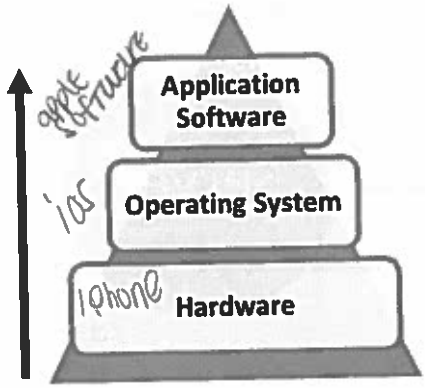
NAME	SIZE	EXAMPLES
Kilobyte (K)	1024 BYTES	Small files
Megabyte (MB)	1024 KILOBYTES	Small programs, files, photos
Gigabyte (GB)	1024 MEGABYTES	Large programs, files, photos
Terabyte (TB)	1024 GIGABYTES	Modern hard drives
Petabyte (PB)	1024 TERABYTES	Used in large businesses, not in our personal computers

Source Code (Programming Languages) → **Binary Code (Machine Language)**

Software

1. **Operating System (OS):** Controls the computer's resources
   Examples: iOS, Android, Windows, Mac OS, Linux, etc.

2. **Application Software:** Allows the user to perform a specific task
   Examples: Shazam, Calendar applications, Instagram, Facebook Messenger, Microsoft Office, Adobe Acrobat



Application Software is made to run on certain operating systems.
Example: Apple software, such as Keynote and Pages, cannot be run on a Windows operating system.

Operating Systems are made to run on certain types of hardware.
Example: You need an Apple phone to run iOS.

ex: apps only for iOS and or Android
you have to do 2 version of app.

Common Operating Systems			
Name	**Description**	**Typical Users / User Fields**	**Notes**
Windows	Most popular OS in the world with over 85% of computers running it	Everyone	Also used for servers in businesses
Mac OS	Developed by Apple	Everyone (less so in businesses)	Used almost exclusively for arts and graphics before 2006 when it gained widespread popularity
Unix	Powerful OS developed in the 1970s by Bell Labs	Science and engineering	Very complex and difficult to use; sometimes used in servers but increasingly replaced by Linux
Linux OPEN SOURCE → DIFFICULT TO HACK	A version of UNIX that is free for users and developed by an open-source community **	Engineering, computer science, servers	Very popular for servers, rarely in business

Note:

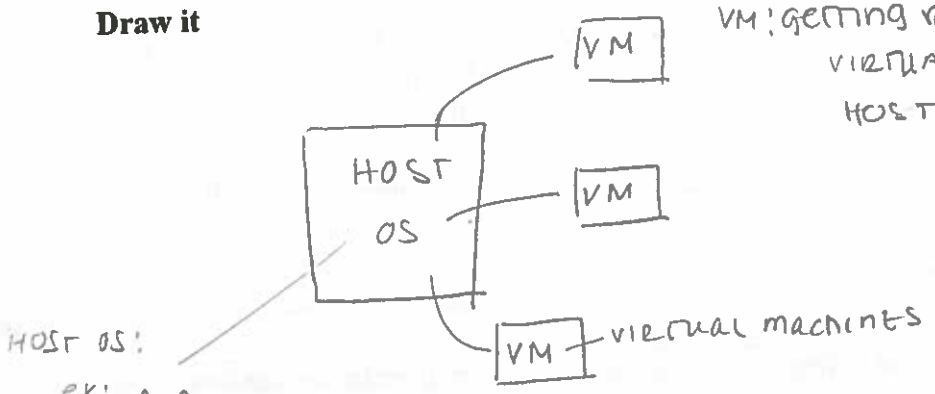
Open-source means that the software was developed by a community of programmers who volunteer their time to develop it. It is often free and is maintained entirely by the community. This differs from closed source in which case the code is heavily protected.

Mobile OS	
Name	**Description**
Symbian	Popular in Europe and Eastern Europe; Nokia and Samsung phones mostly
BlackBerry OS	Was popular for business but increasingly irrelevant
iOS	High growth; based on Mac OS
Android → MOST POP OS IN THE WORLD	Linux-based and developed by Google. High growth.
Windows RT	Windows Phone; mostly used on tablets, some PCs

Virtualization

- When one computer hosts the appearance of many computers
- The main operating system installed is called the **host operating system**
- You run applications on the machine that are actually OS → **Virtual Machines**

Draw it

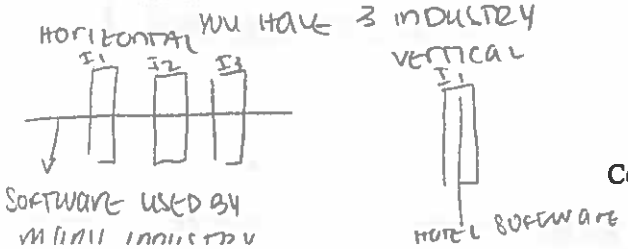


VM: getting resources virtually from the HOST OS.

seeing your work desktop on your PC
ex: screensharing

PC Virtualization	Server Virtualization	Desktop Virtualization
•Running Microsoft and Mac OS (two operations systems) on your own personal computer	•Divides the server into separate virtual environments, resouorces, and operations run in isolation	•Your desktop is housed on the computer but can be accessed from any device

Application Software Categories		
Category	**Description**	**Examples**
Horizontal Market Apps	Applications used across all organizations and industries	Word, Excel, Paint, Photoshop
Vertical Market Apps	Applications designed for specific organizations and industries	Hotel software, accounting programs
One-of-a-kind Apps	Applications designed for a very specific purpose	Software used by Canada Revenue Agency



NATIVE APPLICATIONS	THIN-CLIENT APPLICATIONS
• Software made to run on a single operating system ex: Insta, FB • Use complex programming languages to make • Difficult, requires vast skills, costly • Fast and great user experience	• Software that runs on web browsers and thus can be used on any OS • Use web languages (HTML, CSS) • Less difficult; less costly to develop, easy to update over the web • Lack sophisticasted user experience and speed

run OFF the internet not really on your phone (opens a web page)

Lex. Gmail (runs on the internet) concordias insurance page on phone.

Licensing vs. Owning Software

- When you buy a copy of Windows or Mac OS, you **do not** own it
- You are provided with a license, the rights to use the program
- Windows and Apple respectively still own the software
- They can technically withdraw your rights to use their program at any time
- **Firmware:** Software that is installed into devices (examples: printers, keyboard, etc.)
  - All devices have bits of software (firmware) inside to help them talk with the computer
  - Can be considered as **Software for the Hardware** (instead of for the user)
  - Helps the device turn itself on
    - For computers, this software is called **BIOS (Basic Input/Output System)**

      Example: When you press the on button, the computer goes into the ROM (see above) and runs these instructions (BIOS) that turn the computer on.

(DESIGN OF APP) THE LOOK OF YOUR APP → EMOTIONS →

Mobile User Experience

- **User Interface (UI):** The presentation and format of an application (menus, icons, toolbars)
- **User Experience (UX):** The way the user responds to the UI (happiness, frustration, desire)
- **Chrome:** Visual overheard – the menus, toolbars, etc. (THE ITEMS ITSELF)

UI IS THE PRESENTATION AND FORMAT OF THE CHROME

Feature Content
- Use as much display space as possible on the screen

Use Context-Sensitive Chrome
- Chrome should only appear when needed

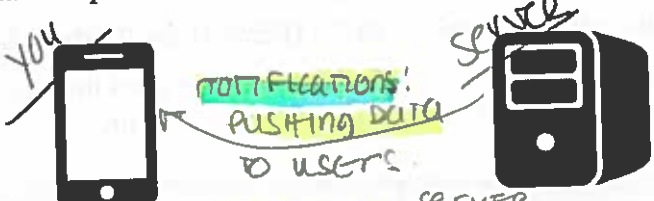
Provide Animation / Lively Behaviour
- Flashy, beautiful, well designed, gain attention

Design to Scale and Share
- Application need to be able to co-exist well

→ EX: SHARE PIC FROM INSTA TO FB

Use the cloud
- Seamless move activities across devices (ROAMING)

- **Push Data:** Server sends notifications to the client (push from server)
- **Pull Data:** Data is requested from the server (pull from server)



PULL DATA: SERVER REQUESTING DATA FROM USER

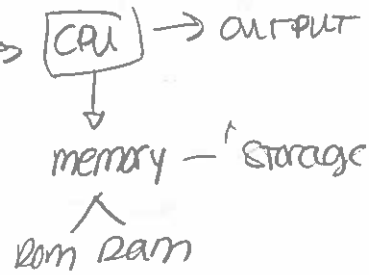
Why Does This Matter For Business Managers?

1. Managers must know what tools their employees need to accomplish their daily tasks:
   - How fast should the computer be?
   - Which programs are needed to accomplish the tasks?
   - Which programs on the server does my employee need to access?
2. Must understand how computers work so that they can communicate with the IT department.

PS&I Chapter 3 – Part 1
PRACTICE PROBLEMS

1. The computer's keyboard, scanners, and the power button are examples of
   a. Storage devices
   b. Input devices
   c. Processing devices
   d. Output devices
   e. Physical devices

2. Basic hardware always consists of the following components:
   a. Software, networking components, memory
   b. Memory, processor, networking components
   c. Processor, memory, storage
   d. RAM, ROM, software, CPU, input devices, output devices



3. Data is ~~represented~~ measures using:
   a. Bits and bytes
   b. Pixels and dots
   c. Bits and characters
   d. Binary Code

8 BITS = 1 BYTE

4. In binary code, which pattern represents the value: 11001?
   a. Closed, Open, Open, Closed, Open
   b. Closed, Closed, Open, Open, Closed
   c. Open, Open, Closed, Closed
   d. Open, Open, Closed, Closed, Open

1 : ON
0 : OFF

ON ON OFF OFF ON

5. One (1) GB is equal to 1024 MEGABYTES
   a. 1000 megabytes
   b. 1024 megabytes
   c. 1000 terabytes
   d. 1024 bytes

6. Which of the following is true about native applications
   a. They allow for sophisticated UI
   b. They are made to run on a specific operating system
   c. They require specialized skills and programming knowledge
   d. All of the above
   e. None of the above

7. Which of the following is NOT a characteristic of the computer's ROM?
   a. Adding ROM makes the computer boot faster
   b. ROM is permanent memory
   c. Without ROM, the computer does not have instructions needed to start
   d. ROM stands for Read-Only Memory

8. Software can be defined as:
   a. A physical component of the computer
   b. Instructions that the computer executes to accomplish something
   c. A processing device
   d. An operating system

9. Horizontal market applications are characterized as:
   a. Software that is designed for a specific industry
   b. Software that can be used across many industries
   c. Custom software
   d. Software for businesses

10. Jimmy is developing a mobile application for his company and wants to know where he should focus his efforts. Which of the following is not important in mobile UI design?
    a. The ease of transferring data and files from one device to another
    b. Having menus and toolbars always available to easily navigate the app
    c. Good use of the limited space on the screen
    d. The use of animation and lively behavior

11. Server virtualization can be defined as the following:

a. An individual user running multiple OS on the same device
b. Dividing the server to run multiple OS and allowing clients to pick
c. Running personalized user environments that clients can access from any device
d. When the virtual machine has many host servers

12. Which of the following statements is not true about open-source software?

a. Users have access to the source code of the software
b. They are maintained by a community of developers
c. Unix and Linux are examples of open-source software
d. Users pay less than for closed source software

PS&I Chapter 3 – Part 2
NETWORKS AND DATA COMMUNICATIONS

Computer Networks

- **Network:** Collection of devices that communicate with one another over transmission lines (cables, wires, etc.) or wireless connections

Network Type	Description	Examples
LOCAL AREA NETWORK (LAN)	Computers connected within a small, single location	Your home network, Starbucks Wi-Fi
WIDE AREA NETWORK (WAN)	Connects computers geographically apart, two or more locations	Concordia Wi-Fi at both SGW and Loyola campuses
An internet (lower-case i)	A collection of several WANs and/or LANs	PepsiCo's internal network used around the world
The Internet (capital I)	The most popular internet	What we use every day to access emails and Facebook

How Networks Work

- **Switch:** An intermediary device that allows two computers to talk, it relays the message
- **Network Interface Card (NIC):** Allows a device (computer, phone) to be able to talk to the network (otherwise, the computer is just a box of wires with no connectivity)
  - **Onboard NIC:** When it's built into a computer
- **Wireless NIC:** Allows devices to connect without wires (e.g. there's one in your phone)
  - **Access Point** (APs): Like a switch – the computer that all wireless devices connect to
    - Range from 40 to 100 meters
- **Protocols:** Rules that allow two computers to talk with each other (common language)
  - All devices on 1 LAN must use the same protocol (must speak the same language) or use a SWITCH to help translate the different languages between devices
  - **IEE 802.3 PROTOCOL:** Most popular one today for wired connections
    - Also known as **Ethernet**
    - The NICs needed to use this protocol support 10/100/1000 **Ethernet** (Mbps)
  - **IEE 802.11 PROTOCOL:** Most popular today for wireless connections (max 600 Mbps)
  - **Bluetooth:** A protocol that transfers data between devices at a short distance

How The Internet Works

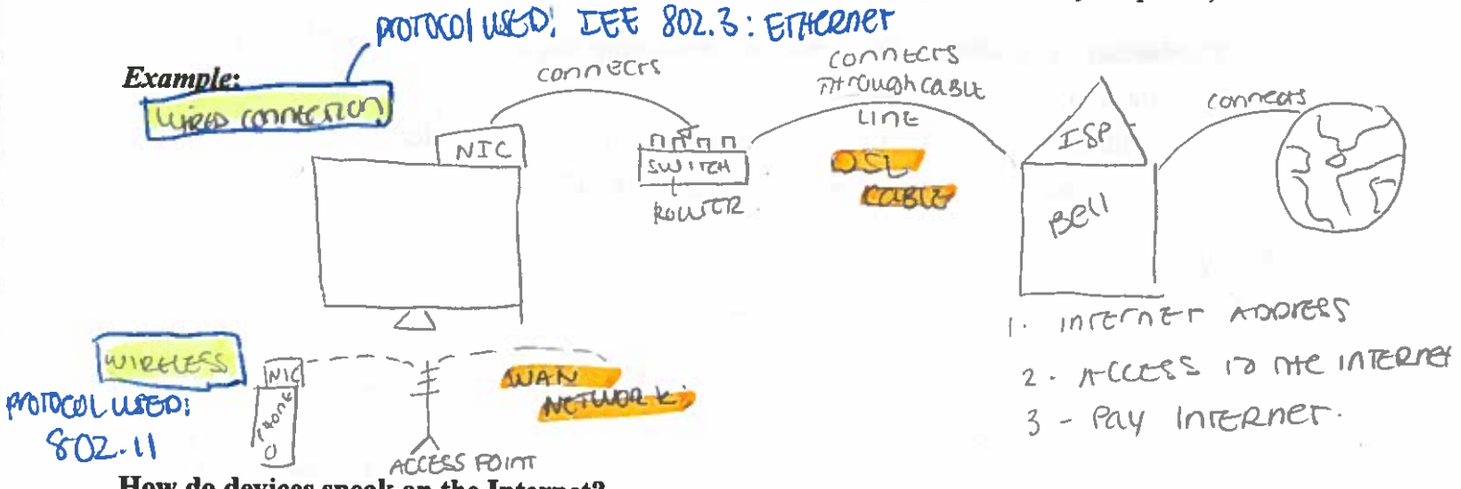
- The Internet is a giant WAN

- **Internet Service Provider (ISP):** Company that allows you to connect to the Internet
  Examples: Bell, Videotron
  1. Provides you with a legitimate Internet address
  2. Gives you access to the Internet
  3. They pay for the Internet

Connect to your ISP using one of the following

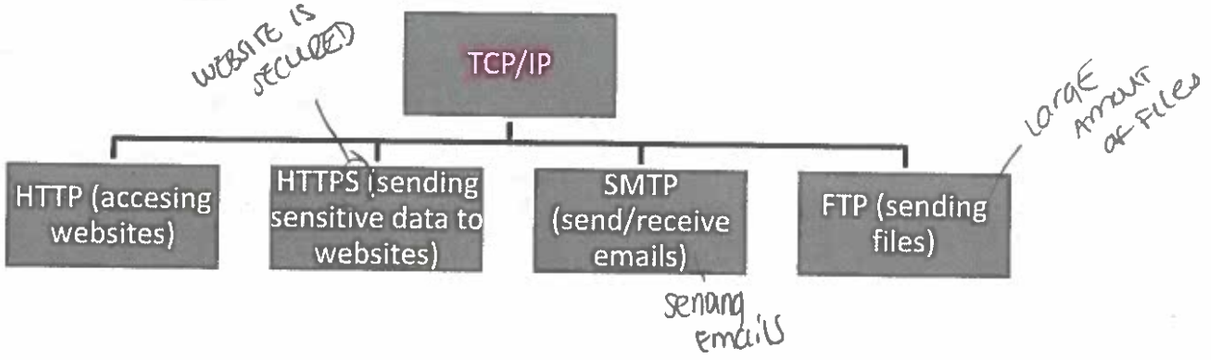
- **DSL Line (Digital Subscriber Line):** Uses the telephone line to connect to the Internet
  - Doesn't interfere with phones anymore
- **CABLE LINE:** Uses television cable line to connect to the Internet
- **WAN Wireless:** Wireless networks by mobile providers (***example:*** Data on your phone)

Example:



How do devices speak on the Internet?

- TCP/IP (Transmission Control Program / Internet Protocol)
  - Communication language of the Internet
  - Made up of 5 protocol types and dozens of different protocols



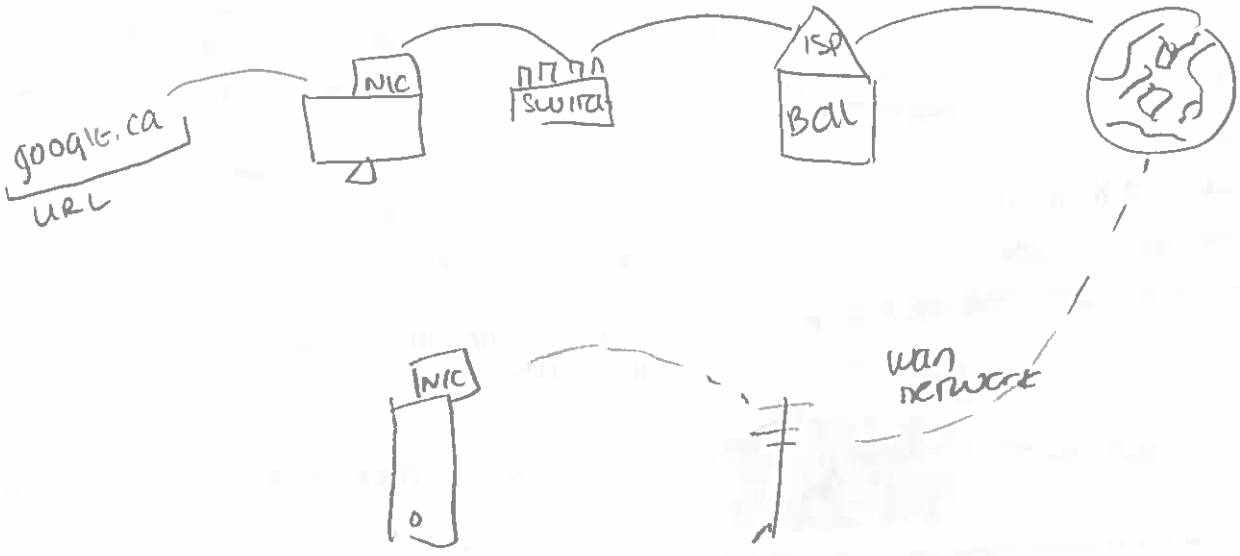
The Web vs. the Internet

- **Not the same thing**
- **The WEB:** Subcategory of the Internet that uses Hypertext Transfer Protocol (http://)
  Example: Just the websites on the Internet
- **Browsers:** The software that speaks in HTTP so that you can talk with **websites**
  Example: Firefox, Internet Explorer, Safari, Chrome

Naming Websites (Domains)

- All websites have a **TLD (Top-Level Domain)** at the end of its name
  Examples: .com, .ca, .net, .org
- **Uniform Resource Locator (URL):** The address of the website in human language
  Example: concordia.ca
- **IP Address:** The address of the website in networking language
  Example: 198.103.238.30
  - IP Addresses can be PUBLIC (websites) or private (your computer)
    - Your address is assigned at random by the DCHP

***Example*:**



How Websites Work

- **Web Server:** Manage traffic by sending and receiving web pages to and from clients
- **Commerce Server:** User requests and action to be taken (check inventory, purchase); server checks and updates the database, then sends response back to client
- **Web Farm:** Facility housing many web servers to support the traffic, ensure performance

Web Coding

- **Hypertext Markup Language (HTML):** Most common language for defining structure and layout of web pages
  - HTML code is made up of commands contained inside angle brackets < > called TAGS
- **Hyperlinks:** Pointer to other web pages containing its URL
- **Attributes:** Properties of a given tag

  Example: HREF is the attribute where you define the page that a hyperlink goes to

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
    "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en-AU">
  <head>
    <P@Page subIncludes @P>
    <title><P@Computed name="dspTitle" useKeyword="AppName" @P>: <P@Computed name="@
  </head>

  <body>
    <!-- For non-visual user agents: -->
      <div id="top"><a href="#main-copy" class="doNotDisplay doNotPrint">Skip to mai

    <p>This is a test</p>

    <!-- ##### Header ##### -->
    <div id="header">
      <div class="superHeader">

        <div class="left">
          <span class="doNotDisplay">Current Host:</span>
          <P@UserName value="abbreviated" @P> @ <P@Computed name="@Host" @P>
        </div>
```

Cloud Computing

- **Cloud:** Elastic leasing of pooled computer resources over the Internet
  - By elastic we mean scalable; resources leased can be increased or decreased
  - By pooled we meant that the hardware is centralized and shared by many remote organizations who all purchase space on those systems

  Example: a power grid

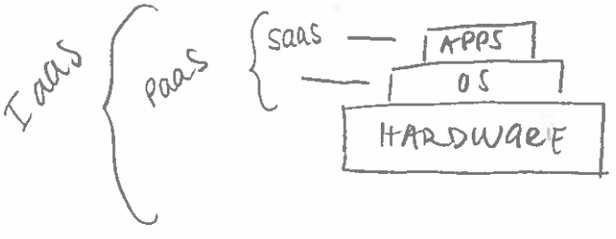
BENEFITS	DOWNFALLS
Lower investment required – No need to buy & install software, hardware, maintenance	**Dependency on vendor** – Prices, updates, and their stability are not up to you
Speedy development – Easy for deployment of patches, upgrades	**Loss of control over data** – Data can be located anywhere; copies of it
Flexibility and adaptability to fluctuating demand – Systems are easily scalable	**Little visibility into security / disaster preparedness** – In hands of vendor
Known cost structure – Regular fees are based on users, usage, etc.	
Strong security / disaster preparedness – Specialized third-parties handle backend work	
No obsolescence - Constantly updated	
Economies of scale – Spread out across all users of the platform bringing down costs	

What has made cloud computing possible?

1. Moore's Law – Reducing costs for increasing computing power
2. Virtualization technology allowing for virtual machines and splitting resources
3. Internet protocols and service-oriented architecture (SOA); services offered over Internet

SaaS	PaaS	IaaS
•Application software that is accessed over Internet, running on a remote OS and hardware that the company need not own	•The cloud vendor provides hardware, and operating system, and tools to build an application on their infrastructure	•The cloud vendor provides remote hardware, storage, and networking, but the client chooses the software that is used (application, OS, etc.)

- **Private Cloud:** Computing resources located inside an organization used for a specific task (access over company internet – data stored on site, belongs to the company)



PS&I Chapter 3 – Part 2
PRACTICE PROBLEMS

1. Web addresses such as "google.ca" are synonymous with:

   a. HTTP
   b. URL
   c. TCP/IP
   d. IP address

2. A _____ is the intermediary that relays data between computers on the network , while the _____ actually allows your computer to communicate with said network

   a. Wireless LAN, Access Point
   b. NIC, Switch
   c. Media Control Address, Network Interface Card
   d. Switch, NIC

   Network Interface Card.

3. Protocols are defined as:

   a. A common language that allows two computers to communicate
   b. The language of the Internet
   c. TCP/IP
   d. The language of email

4. 802.11 is a standard for what?

   a. Wi-Fi
   b. Cloud computing
   c. TCP/IP
   d. HTTP

   PC: Binary
   How computers communicate together → Networks' protocols
   Internet. TCP/IP.
   Transmission control / internet protocol

5. The Internet uses the following protocol:

   a. TCP/IT to send packets and accomplish different tasks
   b. FTP to send emails
   c. IE 802.3 protocol
   d. ADSL

6. The following is an example of a uniform resource locator:

   a. 198.102.20.1
   b. sostutoring.com
   c. 10001011
   d. Videotron

7. Websites on the Internet speak the following language / use the following protocol when a user tries to access them:

   a. DNS
   b. SMTP
   c. HTTP
   d. IP and MAC

8. _____ secures text that is being transferred over the Internet so that it cannot be read by unwanted users while a(n) _____ is a type of connection between two computers over the Internet

   a. VPN, Firewall
   b. Firewall, Encryption
   c. Authentication, VPN
   d. Encryption, Virtual Private Network

PS&I Chapters 2 and 5
BUSINESS PROCESSES

Processes

- **Business Process:** A sequence of activities that serve to accomplish something.

  Example: Taking orders at Tim Hortons

  Example: Making sandwich at Tim Hortons

- **Activity:** The tasks involved in completing a business process

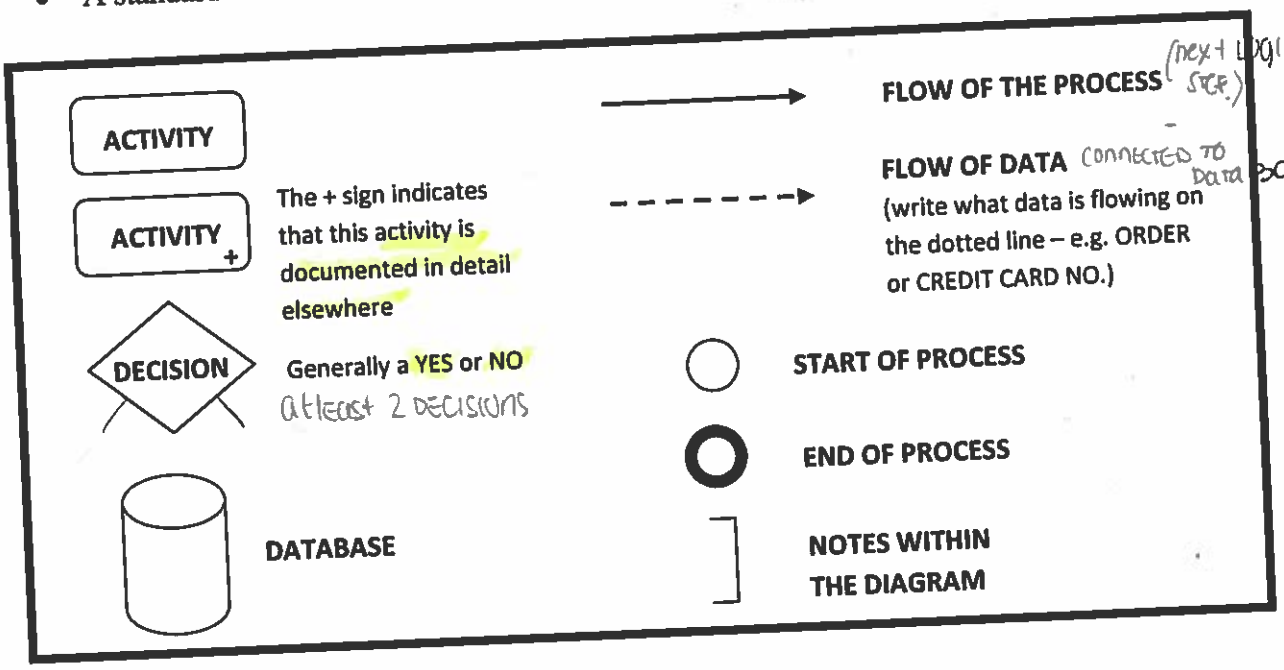
  Example: When making the sandwich, the tasks include adding chicken, cutting bread, toasting, etc.

Why Standardize Processes?

	Reason	Example – Starbucks
1	Enforce Policy	Creating standard processes gives Starbucks something concrete that can be enforced (***example:*** having it in writing allows you to enforce it)
2	Consistency	Starbucks quality is the same everywhere due to standard processes
3	Scalable for change	If we make a new drink at Starbucks, we have a base for how to make it
4	Reduces Risk	Less likely to mess up your drink since there's a set way of making it regardless of which employee is working

Business Process Model & Notation (BPMN)

- A standard for communicating businesses processes in visual, human terms



- ROLE: A category of activities within the process performed by an actor (e.g. cashier)
  - Think departments in the business
- ACTOR: A **human** or **computer** that accomplishes certain tasks in the process
  - E.g.: Two roles at Tim Hortons may include 1, taking the order, and 2, making the coffee. On a slow night, one actor (employee) may perform both roles.
- SWIMLANES: All of the activities in one role (thus for one actor)
  - Can be drawn horizontally or vertically

SOS Steps

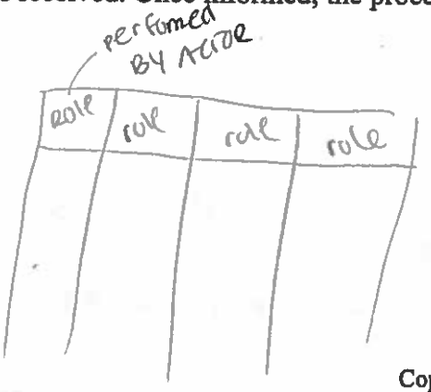
STEP 1: Read the case and list all the roles in your case.
STEP 2: Draw a column for each role with that role's name at the top of the column. Place all activities and decisions in your columns (swimlanes).
STEP 3: Draw the PROCESS and DATA flows. Don't forget to label your data flows.
STEP 4: Draw the START and STOP point
STEP 5: RE-READ THE CASE! Cross off all the activities to ensure that you haven't forgotten anything.

Example CASE 1 – Requesting Vacation at Alpha Industries

A set process exists for when employees at Alpha Industries want to request time off from work. Employees must first inform their manager that they will be requesting time off. Once they are informed, the employee completes an online request form. The form is then recorded into the company's HR system called Total HR. This system exists to track all types of employee requests.

Once the request is recorded by Total HR, a notification is sent to the Human Resources department who will immediately evaluate the request. If the request is approved, the person evaluating the request will record the vacation hours. They then create a notice that is sent back to the employee. If the request is rejected, they still create a notice to inform the employee.

As per company policy, the employee must inform their manager of the decision once the notice is received. Once informed, the process is complete.



NOTES

1. Draw your BPMN and be sure to label everything accordingly.

ROLE — ACTIVITIES

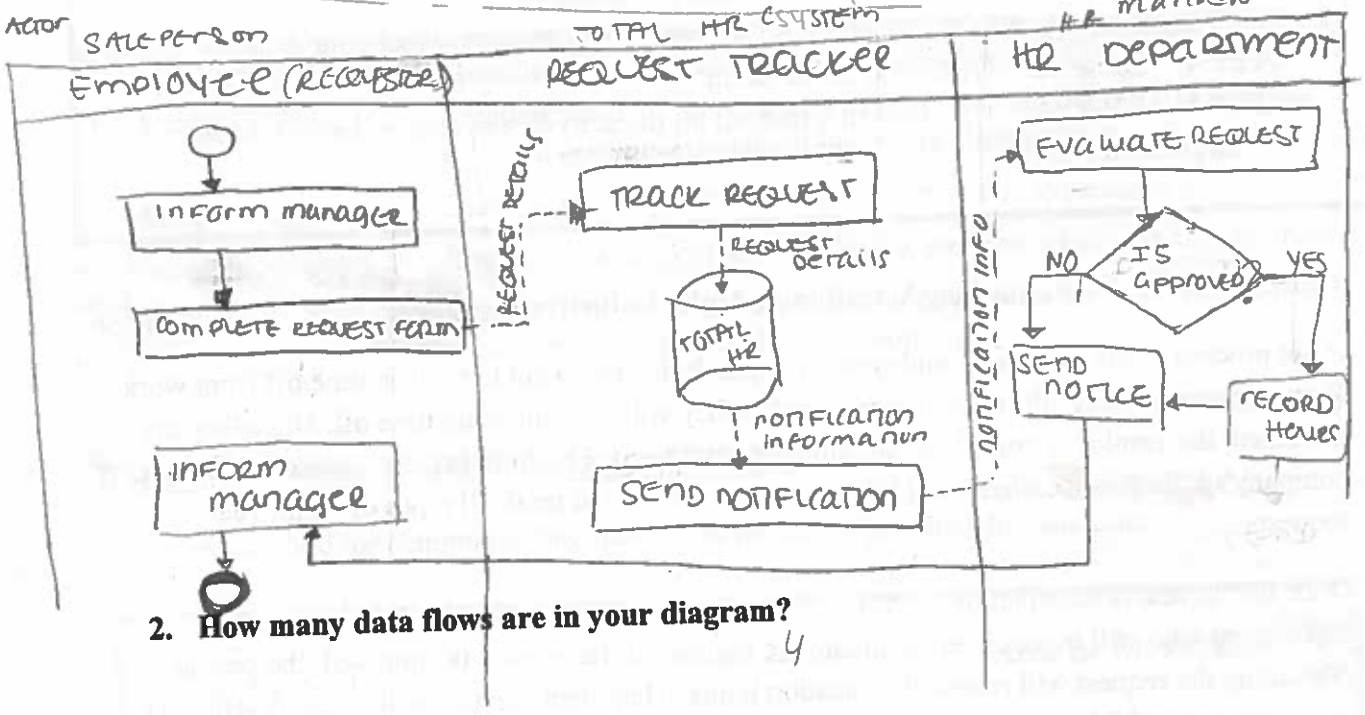
Employee
- inform manager
- complete request form
- inform manager (end)

Request Tracker
- track request
- send notification

HR
- evaluate request
  → decision? is approved
  - YES → record hours → send notice
  - NO → sending notice

→ physical

- - - → data flow (notification)



2. How many data flows are in your diagram? 4

3. How many activities are in your diagram? 8 decision: 1

4. How many process flows are in your diagram? 8

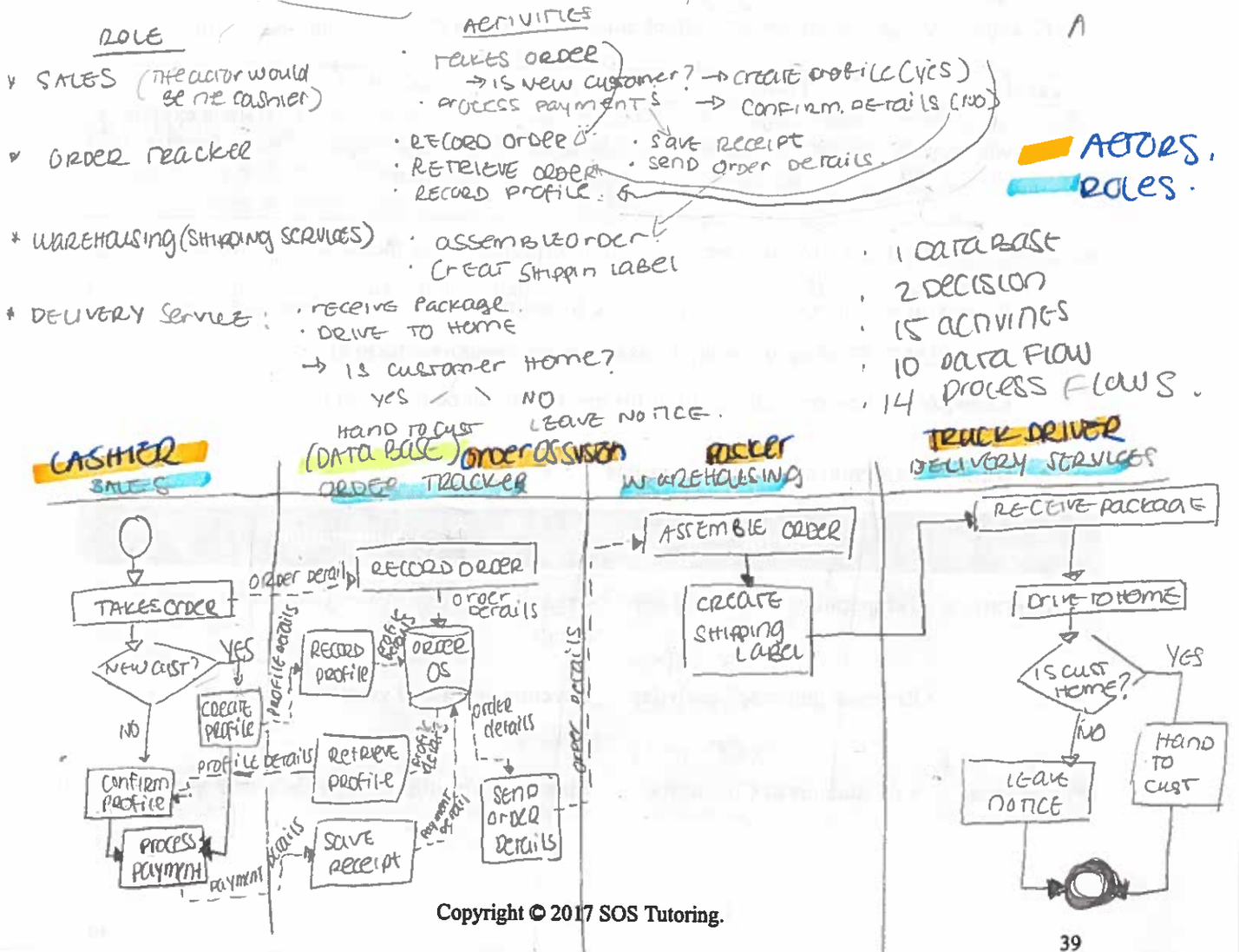
5. Provide an actor name for each role

Always link the activities

- Salesperson: Employee
- Total HR (System): Request Tracker
- HR manager: HR department.

Example CASE 2 – Best Buy Home Delivery Order Fulfillment

1. A customer enters and the cashier takes his or her order. The order is entered into the system (called Order OS).
2. After entering the order, if the customer is new, a profile must be created by the cashier and the profile must be recorded in Order OS. In this case, the cashier enters all customer information (address, telephone, email). If it is a returning customer, the cashier confirms the profile details with the customer. These details are retrieved from the Order OS database.
3. The cashier processes the payment and saves a copy in the system.
4. Order OS sends a message to a packer in the central warehouse with details about what to package and where to send it to. This triggers the packer to assemble the order. Once assembled, the packer then manually fills in a shipping label.
5. The order is given to a truck driver who drives it to the address on the label. If the customer is home, it is handed directly to them. If no one is home, the driver leaves a notice on the door.



Structured vs. Dynamic Processes

- **Structured Processes:** Formal activities that don't change from day-to-day
  Example: Making a coffee at Tim Hortons – one way of doing it properly

- **Dynamic Processes:** Informal activities that aren't always done the same way
  Example: A sales rep at Future Shop – the experience differs depending on customer needs

Category	Structured (making sandwich)	Dynamic (selling clothes)
Limitations	Many – there's one way of doing things	Few – more relaxed
Innovation	Not necessary	Very necessary
Control	Procedures are enforced by the company	Must adapt as you go
Efficiency	Very important – save time & money	Less important, more strategic

Data vs. Information

- DATA: Recorded facts and figures (stats)
  Example: Number of houses on a street, number of tickets sold

Accurate	Timely	Relevant	Sufficient	Cost
Must be able to rely on what comes out of systems	Need it in a timely fashion to make decisions	Must be usable in the decision at hand	You need enough to make proper decisions	Data is expensive – think of surveys or the census!

INFORMATION: The knowledge we gain from interpreting those facts (data), provides meaning

(to process the data)

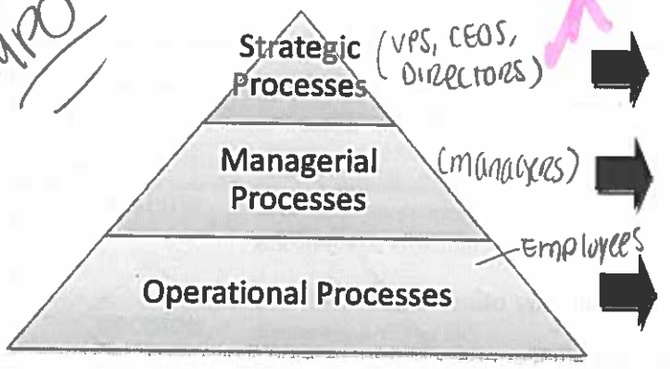
- When you sort, process, or interpret data, it becomes information – becomes meaningful
- The MEANING of information differs from one person to the next
  Example: 25 degrees outside is hot for me, but might be just right for you

- **Data vs. Information using Examples**

	Data	Information
Temperature	Temperature taken each day	Organized by day over 5 years to see annual trends
Sales	Revenue generated each day	Revenue generated yearly compared over 3 years
Population	# of students at Concordia	Change in enrollment over the past 3 years

Types Of Processes In Organization

IMPO

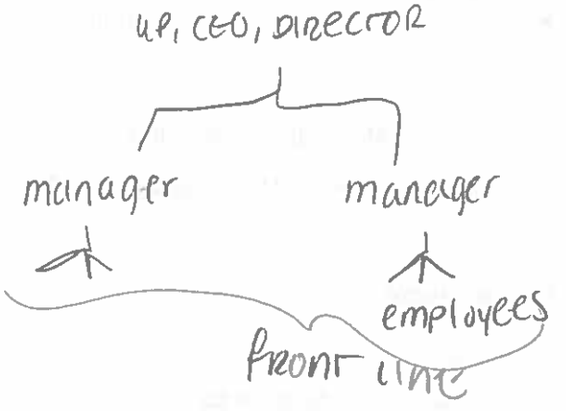


TYPES OF SYSTEMS

- Executive Support Systems (ESS)
- Management Information Systems (MIS)
- Transaction Processing System (TPS)

	Explanations	Examples
Strategic	Solving broad, organization-wide issues, direction of company. Often made by executives	• New product lines • New menu items • Outsourcing
Managerial	Planning, analyzing, and managing resources in order to meet objectives	• Schedule maintenance • Inventory Management • Financial Statements
Operational	Day-to-day tasks with structured processes that focus on efficiency (i.e. front-line staff)	• Customer Service Agents • Bookkeeping • Software testing

- Each activity in the **Value Chain** (chapter 3) has processes from **each** level above
- Systems play a role in business processes (automation, recording, data storage)



Process Improvement

KPI: Key Performance Indicator.

Objectives
- Defined by management
- Must be properly communicated

Measures/Metrics
- How are we doing at meeting the objectives set?
- Indicates performance

***Example* – McDonalds:**

- OBJECTIVE: Serve customers faster than any other fast food chain
- METRIC: Customer served in less than 45 seconds

***** Process improvement is about changing the way we do things to better meet our objectives *****

NOT TO IMPO

How IT helps	
How?	**Examples**
Improve Activity	• Grills that heat up and cook faster • Fries made in major batches
Improve Data Flow	• Screens that show cooks the order as its placed • Tracker that sends message to manager when stock is low
Improve Control	• Burgers come with pre-chosen toppings instead of letting customer customize it
Improve Procedures	• 1 person grilling, 1 person assembling instead of the same • More training so employees work faster
Automation	• Timers turn deep fryers on and off • Drinks fill themselves to the right level

- **BOTTLENECK**: When an activity slows down the whole process

  Example: We can't keep producing clothes 24/7 because fabric delivery is too slow

Using BPNM Diagrams for Improvement

- As-is diagrams: The way the process currently looks
- Out-to-be-diagrams: How the process looks once its improved and re-mapped

Ps&I Chapters 2 & 5

PRACTICE PROBLEMS

1. Process improvement is fundamentally characterized as:

   a. Improving procedures by which employees accomplish activities
   b. Creating metrics to measure processes
   c. Improving the way we do things to better meet out company objectives
   d. Automation of processes

2. A grocery store collects data regarding the number of transactions processed per cashier, the number of items scanned per minute, and the number of clients passed per hour. What type of processes are being monitored?

   a. Transactional processes
   b. Managerial processes
   c. Operational processes
   d. None of the above
   e. All of the above

3. Which of the following is an example of information

   a. Today's temperature
   b. The number of sales made today
   c. You grades
   d. Your GPA

4. What type of process is one that does not change on a daily basis?

   a. Structured process
   b. Dynamic process
   c. Innovative process
   d. Sales process

5. What type of system would primarily be used to support the VP Sales and Marketing?

   a. Transaction Processing System
   b. Executive Support System
   c. Strategic Support System
   d. Management Information System

ESSAY QUESTION #2

You decided to open a small clothing store in Montreal. The company sells inexpensive but fashionable clothing. There are many other businesses (Forever 21, H&M) that also use this "cheap chic" concept. This is made possible by the many suppliers of cheap clothing, most of which come from China. Your store succeeds because it is able to source clothing from a very cheap supplier but you sometimes have trouble attracting people to the store. People also don't seem to return after their first purchase.

a. Analyze the industry attractiveness

5 FORCES MODEL

① NEW ENTRANTS: IT EASY TO ENTER THE MARKET

② POWER OF CUSTOMERS: THEY CAN CHOOSE TO SHOP ELSEWHERE (HIGH)

③ THREAT OF SUBSTITUTES: HIGH MANY DIFFERENT TYPE OF CLOTHING.

④ SUPPLIER POWER: LOW. THERE ARE MANY SUPPLIER (CAN SWITCH EASILY)

⑤ RIVALRY: HIGH MANY STORES WITH HIGHER MARKET SHARE.

CONCLUSION: NOT TO PROFITABLE.
ATTRACTIVE BUT ?

b. What competitive strategy should be used? Explain.

C

THE EASIEST THING TO DO WOULD BE TO TARGET A NICHE MARKET (YOUNGER GIRLS, PLUS SIZE CLOTHING). THIS STAYS NEAR TO WHAT YOUR GOOD AT BUT MOVES YOU AWAY FROM THE BIG COMPETITOR.

c. Perform a value chain analysis and suggest areas for improvement

iP, G↓ → selling Box

d. Describe one business process used in the store

Sales process, return process, stocking process

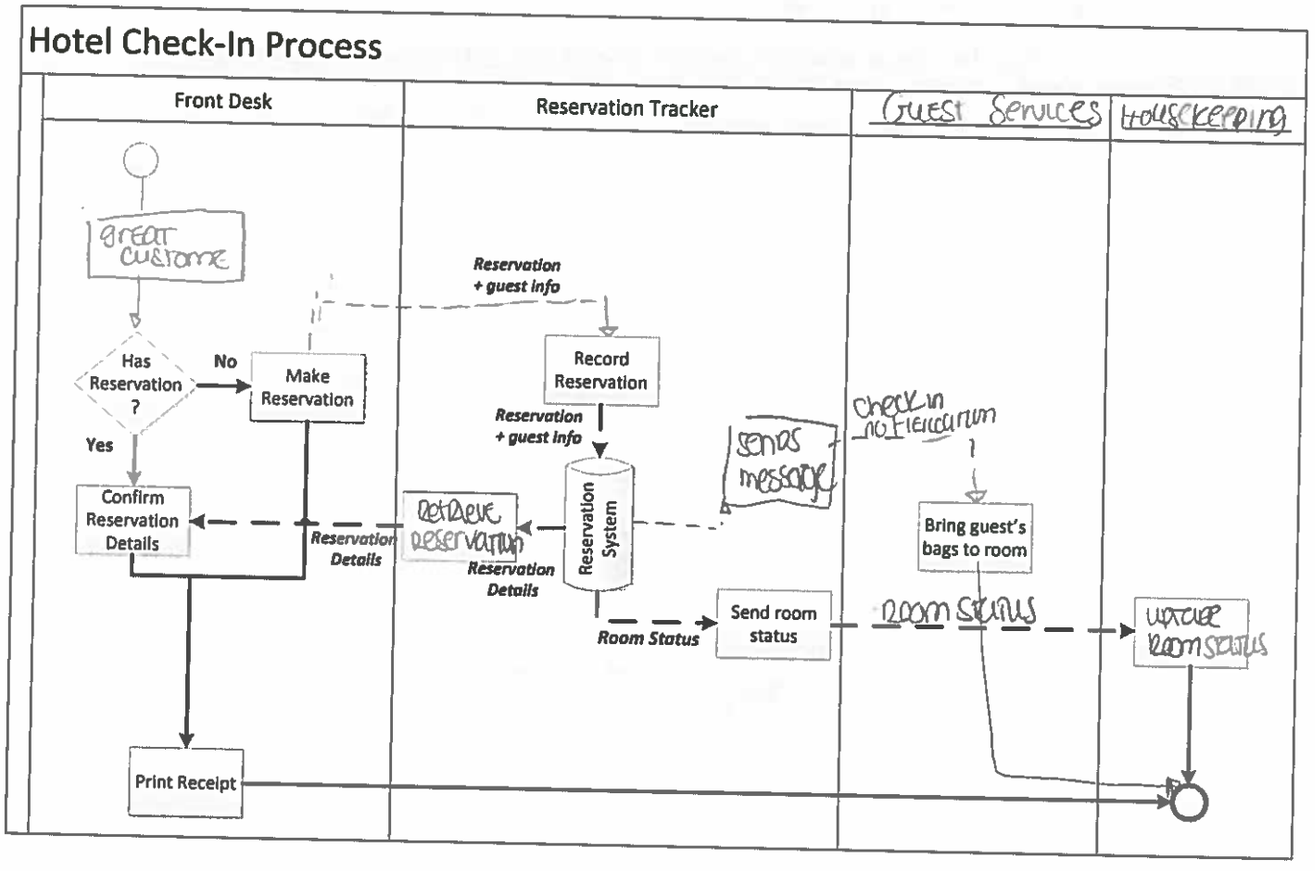
e. What type of data is collected in the store? You are thinking of going electronic with your sales so what types of systems should be used to collect this data?

Transactional

BPMN Practice Case

1. A customer enters the hotel to check-in and is greeted by the agent. If they do not have a reservation, the front desk agent makes one for them. The reservation and guest information is recorded into the reservation system. Otherwise, the reservation is retrieved from the reservation system and the details are confirmed with the guest.
2. The front desk agent processes the payment and then prints a receipt.
3. The reservation system sends a message to a bellboy in Guest Services that the guest has checked in. The bellboy then helps the guest bring their bags to their room.
4. Once checked-in, the reservation system sends the room status to the housekeeping team to inform them that it is now occupied. Housekeeping updates the room status on their rooming chart to ensure that it is cleaned the following day.

a. Complete the diagram below



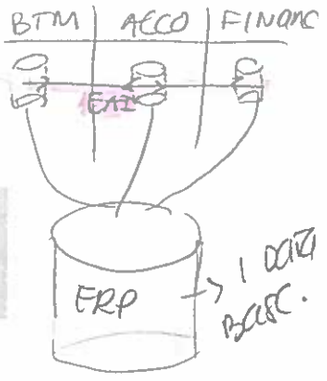
b. How many data flows are in this diagram?

c. How many databases are in the system? Identify it

d. Name 1 activity in the BPMN that could potentially be broken up into a sub-process. Please justify your answer. How would that activity be represented in the diagram if it were indeed a completely separate sub-process?

e. How many activities are represented in this diagram?

PS&I Chapters 6 & 7
ERPs and SAP



What Are ERPS?

- **Enterprise Resource Planning (ERP):** A system that centralizes data

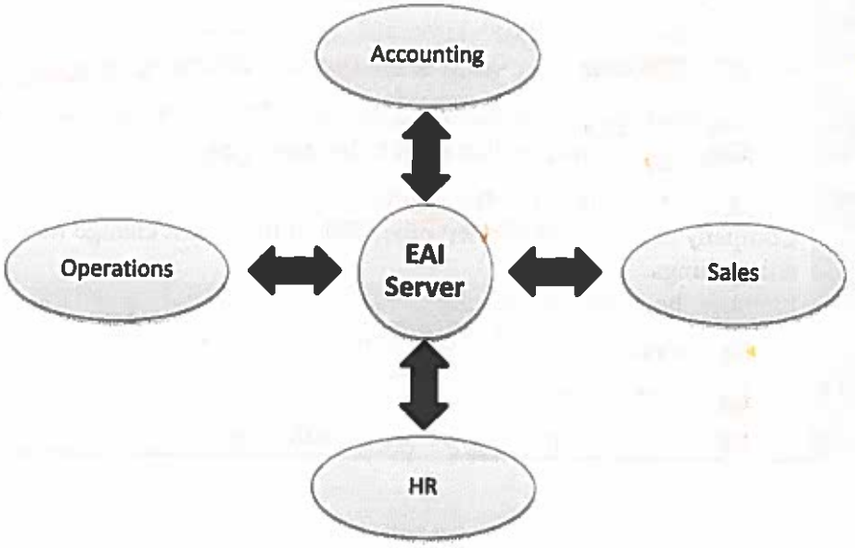
1. ONE Database
2. Integrated, industry-leading processes needed to use the system

- Prevents **Information Silos** (when data is stored in separate systems)
  - If not prevented, departments work in isolation
- Since the ERP comes with processes, the organization must change the way it does things
  - These processes are called **Inherent Processes** or **Process Blueprints**
  - **Gap Analysis:** Uncovering differences between business needs and ERP's ability

↳ Gap between your processes and the ones the ERP TELLS you TO DO.

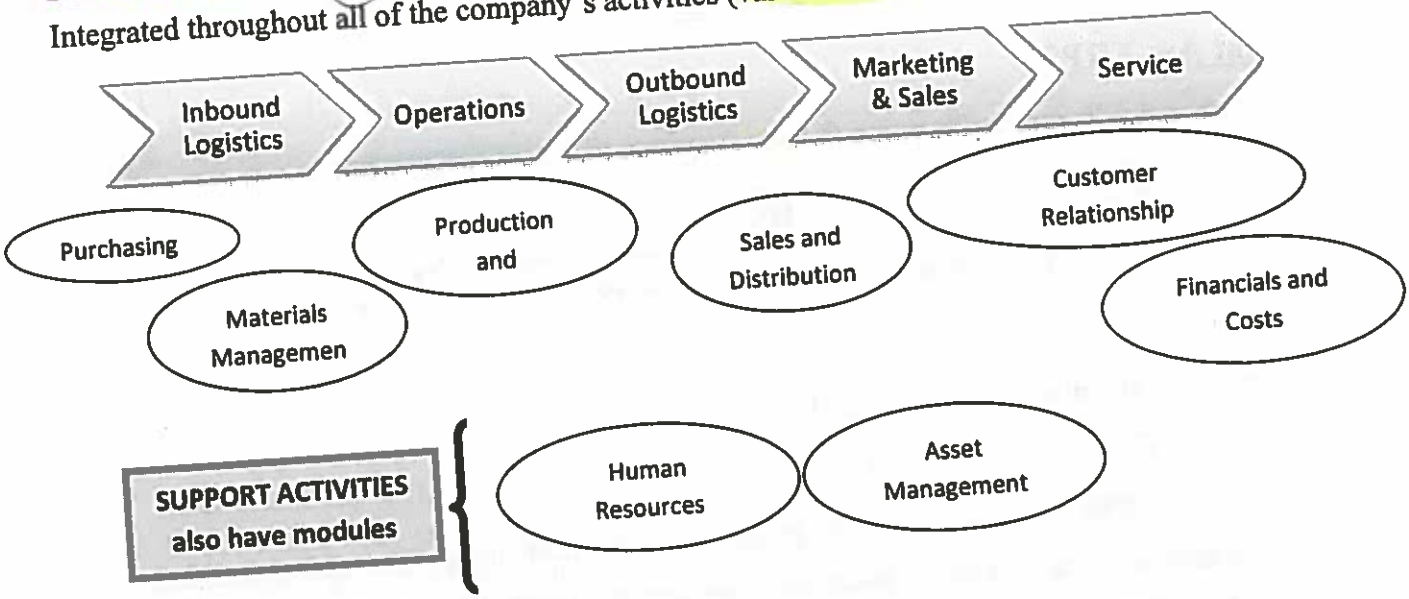
When ERPs are too expensive...

- **Enterprise Application Integration (EAI):** Provides software that allows the separate databases to communicate with each other
  - Enables communication
  - Departments maintain their own data but it can be integrated as needed
  - Allows companies to gradually move to ERP



Elements Of An ERP

Integrated throughout all of the company's activities (value chain)



- Each function (the ovals) is called a **Module**
- ERPs were developed over time
  - Started with Materials Requirement Planning (MRP) then made its way through the value chain to integrate the whole business
  - Originally started in manufacturing companies
- Involves all 5 components of an IS:

Hardware	• Purchase needed computers, servers, printers, network devices, etc. • On-the-cloud of physical system?
Software	• **Configuration:** The setup of the system on the company's computers • **Customization:** Modifications to the ERP to meet specific needs
Data	• Big empty databases that need to be converted. • Old data needs to be moved into it
Procedures	Company chooses which ERP processes. It then must change its old way of doing things.
People	Includes the following people: 1. Users 2. Systems Analysts 3. Consultants from the vendor or a third-party

Types of Data in an ERP

1. **Transactional Data:** Day-to-day data collected from operations, changes by transaction
   Example: Sales made, items purchases

2. **Master Data:** Data that doesn't change between transactions
   Example: Supplier names, customer names, addresses

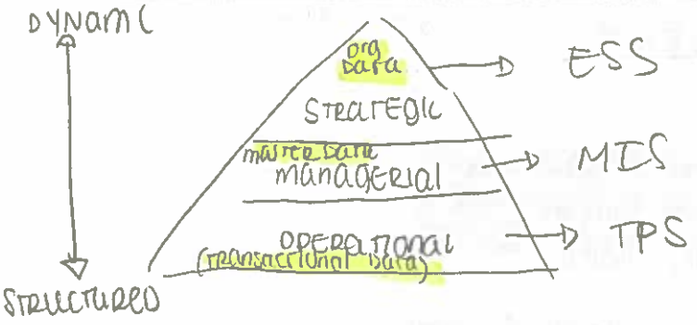
3. **Organizational Data:** Data about the company
   Example: Locations, warehouses, financial accounts

IF aircanada & Bombardier have same ERP can comm together (aircanada orders planes) makes it faster.

Benefits of ERP

IMPO

	Benefit	Example
1	Suppliers are integrated	Your system can talk with the supplier's system
2	Access to more data for managers	Managers from around the world can see statistics from divisions around the world
3	No more silos	Marketing can collaborate with operations since all data is together
4	Data is shared in real-time	When an update is made in the production in China, managers in the US can see it right away
5	Integrated processes based on best practices	The processes that come with the ERP are based on optimal ways of doing things



- main issues implementing ERP?
- ERP in hardware systems

Implementation Challenges

Decision Challenges	
Decision	**Example**
Vendor Selection	SAP, Oracle, Microsoft??
Gap Analysis	Which modules do we integrate, which do we not? Do we customize?
Configuration	The rules – Order sizes, who approves new orders, who modifies
Data Issues	The way we stored data in our old databases may not be same as the ERP
Cutover Process	When and how do we switch to the new system?

People Challenges		
Category	**Challenge**	**Example**
Management	Not supporting it throughout	Management says "go, implement it" then doesn't ask for updates on progress
	Oversell benefits	ERP will not change the world, it's not the solution to all company problems
	Ignores Cultural Resistance	The way work is done will change – people need to be made aware of this
Team	Lack of Collaboration	The wrong configuration is set up because the end users are not consulted on their needs
Individual	Users don't see benefit	Using the new system makes it longer for me to place an order

Company Hierarchy

What Types Of Organizations Use ERP?

- **Industry:** Used across all industries
- **Company Size:** Used by large organizations with revenues above 5 million
  - Smaller companies don't need massive software
  - May not have the IT resources to implement it
- **Country:** Used around the world and in multi-national companies
  - **Single Instance:** For the whole company around the world
  - **Multiple Instances:** Different installation in different regions

Big org uses ERP cuz:
- more $
- more data

ERP Vendors

IMPO
- SAP
- Oracle
- microsoft

Smaller vendors focus on niche markets (e.g. advertising agencies, small companies, cloud)

SAP

- Built in Germany founded in 1972
- Used by more than 80% of Fortune 500 companies
- First ERP designed to work at multiple companies
- Most popular version is **R/3** → rebranded as SAP Business Suite
- Runs on **NETWEAVER**, the operating system for SAP
- **ABAP** is the programming language for SAP customization

NOT TO IMPD / JUST MCQ DEF.

Procurement Concepts

- **Procurement:** The process of acquiring goods and services from suppliers
  Example: Raw materials, machines, parts, ingredients
- **Purchase Order (PO):** A document that requests the delivery of a product + the quantity
- **Raw Materials Inventory:** Stock of materials used to make our core product
  Example: Starbucks – How much sugar do we have left, how many coffee beans
- **Supplier Relationship Management (SRM):** Interaction between supplier and company
  - Automated with the use of ERPs

  Example: Automatically place order for more coffee beans when we have less than 5 bags
- **Returns Management Process:** Getting defective products back to the supplier
- **Supplier Evaluation Process:** Adding, removing, and approving new suppliers
- **Bullwhip Effect:** When a company orders more products than needed
  - Caused by a sudden change in demand

Other Concepts

- **Train the Trainer:** The vendor trains super users, who then train others below, and so on
  - Reduces costs of training
- **Access Controls:** Which parts of the ERP a user can access

PS&I Chapters 6 & 7
PRACTICE PROBLEMS

1. Which of the following is NOT a characteristic of ERPs?
   a. ERPs can help to prevent information silos when properly implemented
   b. ERPs come with inherent processes meaning companies need to adapt the way they operate to meet the system's processes
   c. ERPs contain one database
   d. ERPs should be custom developed to better fit company needs (TO EXPENSIVE CUZ TO HUGE)

2. A cheaper alternative to ERPs is...
   a. EAI
   b. Database systems
   c. TPS
   d. None, ERP is the best solution

3. How is software involved in an ERP implementation? SOFTWARE COMES WITH ERP
   a. Software must be purchased separately
   b. Software must be used to convert databases and move data from the old database to the new one used with the ERP
   c. Software that comes with the ERP must be configured and customized
   d. Software is not part of an ERP integration

4. A hotel has a database with profiles of all its past guests. What type of data is being stored?
   a. Transactional data
   b. Master data (CUSTOMER DATA – DOESNT CHANGE)
   c. Organizational data
   d. Primary Data

5. Which of the following concepts is characterized by a company ordering more products than it needs because demand for said product has suddenly and unexpectedly decreased:
   a. Supplier relationship management
   b. Returns management process
   c. Procurement
   d. Bullwhip effect

6. SAP is the gold standard for ERP software. What is the basis for this system?

   a. It is fully customizable to the business' processes
   b. It has industry-specific platforms that are then customized based on the needs of each individual company
   c. It has high-quality technical staff that has helps businesses implement the system
   d. It is the least expensive ERP system on the market thus allowing more companies to implement it without excessive financial risk

Essay Question #3

You're an IT manager at SOX Inc, a company that sells sports equipment. You have suggested that the company implement a new ERP system in order to streamline its operations between the currently segregated departments. However, the management team is not fully convinced. You must come up with a report in order to address their concerns and secure buy-in for this project.

a. List and explain 5 benefits of implementing and ERP?

(1) suppliers are integrated ; they will be able to communicate with you more easely . this will lead to a stronger relationship.

(2) No more silos : ex: marketing depart can collaborate in the operations = (improve collaboration) all dep. together

(3) integrated processes based on best practices : SOX can improve the way the operate (= efficency)

(4) Access to more data for managees : managers cromacross the world would have access to the data . (= everyone is informed)

(5) Data shared in real time ; always have the most updated info. when making sales.

b. What challenges will arise if management doesn't support the project?

→ if management doesn't support the project, it will be even hard to get the end users on board. its possible that they will not see the benefits just as management was not able to. = the system will not be used.

Having managers on board will also help to push the benefit to users and help show them how it improves their day to day work.

c. Name 3 key decisions that you will have to make in order to anticipate this project

1- vendor decision

2- Gap analysis (which of our processes we keep, which to take from the system)

3- configuration (for supporting goods cmg)

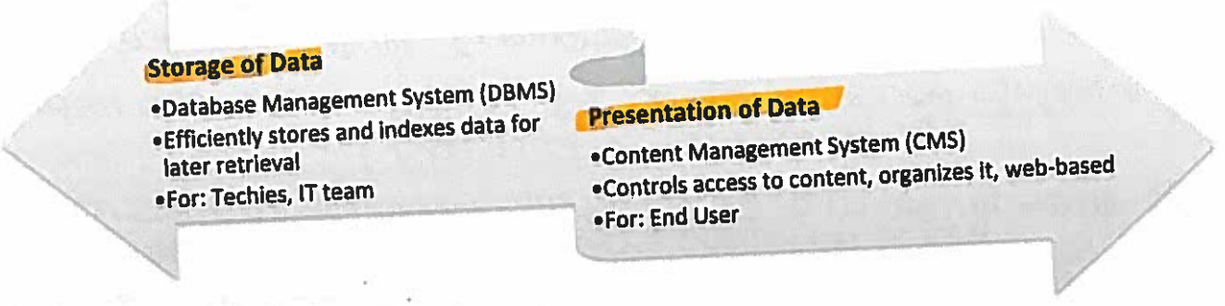
4- How will we store data ? do we have to clean our data base

5- cutover process : how will we switch over to the new system.

Chapters 5, 5a, 5b
DATABASE MANAGEMENT

Content Defined

- Content = Organization's Property
  - All files, documents, web pages, videos, data collected, employee info, orders, etc.
  - **Challenge:** Storing and managing all of this information collected



Databases Defined

- **Database**: A collection of structured data
  - Tables / Files
  - Relationships among rows in tables
  - Metadata

1 TABLES/ FILES

Each collection is a table is called a **FILE**. A database contains many of these

Each column is a **FIELD** – attributes of what we're collecting data about

RECORD = ROW

Each row is called a **RECORD** (one instance of what is being collected in that database)

- E.g. one order, one customer

Customer ID	Name	Address	Phone Number	# of past orders	Type of Customer
1	SMITH, JOHN	123 Rainbow Road	514-234-3242	3	Normal
2	DOE, JANE	832 Rue Ste. Catherine	438-233-5463	8	Normal
3	KIMMEL, JIMMY	434 Hollywood Blvd	312-424-2313	1	VIP
4	DION, CELINE	3721 Falsetto Lane	418-356-2984	12	Repeat

Every character in the database is a **BYTE**

1 BYTE = 8 BITS.

relationship among rows

2

Customer ID	Name	Address	Phone Number	# of past orders	Type ID
1	SMITH, JOHN	123 Rainbow Road	514-234-3242	3	1
2	DOE, JANE	832 Rue Ste. Catherine	438-233-5463	8	1
3	KIMMEL, JIMMY	434 Hollywood Blvd	312-424-2313	1	3
4	DION, CELINE	3721 Falsetto Lane	418-356-2984	12	②

Type ID	Type of Customer	Discount	Notes
1	~~Normal~~	0%	Default customer type
②	Repeat	10%	Minimum 10 past orders
3	VIP	15%	Celebrities, media, etc.

- **Primary Key:** A column that contains unique data that identifies a row/record in a table
  Examples: Student ID, Customer ID, Employee No. (in the second table) bc it's unique no one can have the same emp # as you
- **Foreign Key:** A column that refers to another table to form a relationship between the 2
  - Matches the primary key of another table (first table)
- Using this structure prevents us from storing the same data over and over
  Example: Instead of storing all that information about each type of customer, each type is stored once in a separate table and referred to using the keys

3

Metadata: Data about the data

- What type of data are we storing in the column?

Examples: Dates, numbers, characters, currency

Customer ID	Name	Address	Phone Number	# of past orders	Type ID
1	SMITH, JOHN	123 Rainbow Road	514-234-3242	3	1
2	DOE, JANE	832 Rue Ste. Catherine	438-233-5463	8	1
3	KIMMEL, JIMMY	434 Hollywood Blvd	312-424-2313	1	3
4	DION, CELINE	3721 Falsetto Lane	418-356-2984	12	②

NUMBER

VARCHAR (variable characters)

VARCHAR (variable characters because of the dashes —)

NUMBER

Why Databases vs. Spreadsheet?

Databases	Spreadsheets
1. Safer (access control) 2. Multiple users can access it and edit at the same time from anywhere 3. Can store larger quantities of data 4. Better data integrity (fewer errors, duplicates) 5. Easy to generate reports and find data	1. Easier to use 2. Better for small amounts of data about a single theme (e.g. a list of contacts)

Database Management Systems (DBMS)

- **DBMS:** Software that is used to create, process, and manage databases
  - Provides user with access to the database
  - Using the DBMS, the data can be created, modified, deleted, read, and secured
  - Most popular DBMS program: Access, SQL Server, MySQL, DB2
  - The language used to speak to databases is called **Structured Query Language (SQL)**
    - Made up of **queries** – questions that we ask the data to answer

Database Applications

- The tools that users use in the DBMS in order to interact with the database
  - Allows the user to interact without typing in SQL (code)
  - Includes: REPORTS, FORMS, and QUERIES
- Often allow **Multi-User Processing** – multiple updating the DB simultaneously
  - **Lost-Update Problem:** When two people open up the same file, edit it, and both save it... the person who saved last overwrites the other person

Types of DBMS

- **Enterprise DBMS:** Used in organizations and large groups
- **Personal DBMS:** Used for small, simple databases
  - Often used by fewer than 15 people
  - Only remaining one is **MICROSOFT ACCESS**

Entity-Relationship Diagrams (ERD)

- **Data Model:** A visual representation of what the database will look like (a blueprint)
  - Shows the structure of how the data is stored and how everything is related
  - The most popular data model is the **Entity Relationship Diagram (ERD)**
  - Second most popular is the **Unified Model Language (UML)**
    - For COMM 226, you need to be able to draw ERDs and just be aware that UML exists

Components of an ERD

Component	Description	Examples
Entities	Something that we are collecting data about	• CUSTOMER • ORDER
Attributes	Characteristics about the entity	• CUSTOMER_NAME • ORDER_QUANTITY
Relationships	Common data between entities	• CUSTOMER places ORDERS

- **Note:** All entities should have an identifier, something that distinguishes 1 row from another
  - This becomes the primary key when we want to make relationships
- **Note 2:** All attributes should be pre-fixed with the name of the entity to which they belong

Every entity needs a primary key

PK: Primary key can ADD one unique ID! It's unique no one else can have it

PK: UNIQUE TO A SINGLE THING

Example #1A

A university in Montreal has a database for course scheduling. The university keeps track of all employee information for their professors including address, phone number, years with the company, and which department they are in. The professors teach courses that are in turn taken by students. The university evidently tracks the student ID numbers, their names, addresses, major, and email address. When registering for a course, students know which (what's) the name of the course, the course code, the time at which the course it taught, the room it's in, and the professor's name.

List all entities and their attributes. Then, draw relationships between the entities. Identify a primary key (unique identifier) for each entity.

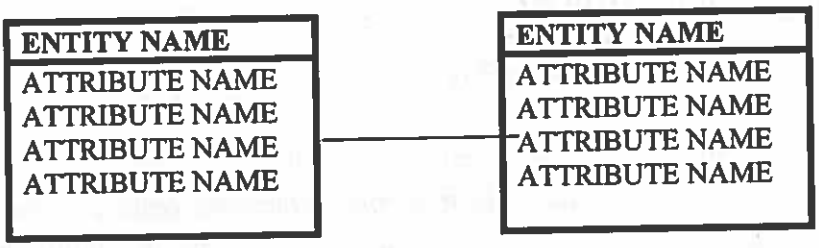
ENTITIES:

ATTRIBUTES

- EMPLOYEE
  - EMP_NAME
  - EMP_ADDRESS
  - EMP_PHONE
  - EMP_YEAR
  - EMP_DEPARTMENT
  - EMP_ID (PK)
- STUDENT
  - STU_ID (PK)
  - STU_NAME
  - STU_ADDRESS
  - STU_MAJOR
  - STU_Email
- COURSE
  - COU_NAME
  - COU_CODE
  - COU_TIME
  - COU_ROOM
  - COU_ID (PK)

1! PRIMARY ANYTHING WITH 1! ID

How To Draw The ERD



maximum cardinality

Types of Relationships

1. ONE-to-ONE relationships (1:1) ——
2. ONE-to-MANY relationships (1:N) ——<
3. MANY-to-MANY relationships (N:M) >——<

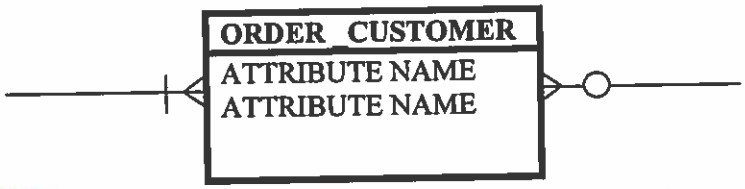
(mostly used)

Crow's Foot Notation

ONE (1) **Professor** can teach _____ **Section** (max).
ONE (1) **Section** can be taught by _____ **Professors** (max).

EXCEPTION: Many-To-Many Relationships

- When you have a many-to-many (N:M) relationship, you need to break it apart
  - Add a table in between containing the names of both



minimum cardinality

zero or many ——o<

one or many ——|<

zero or 1 ——o|

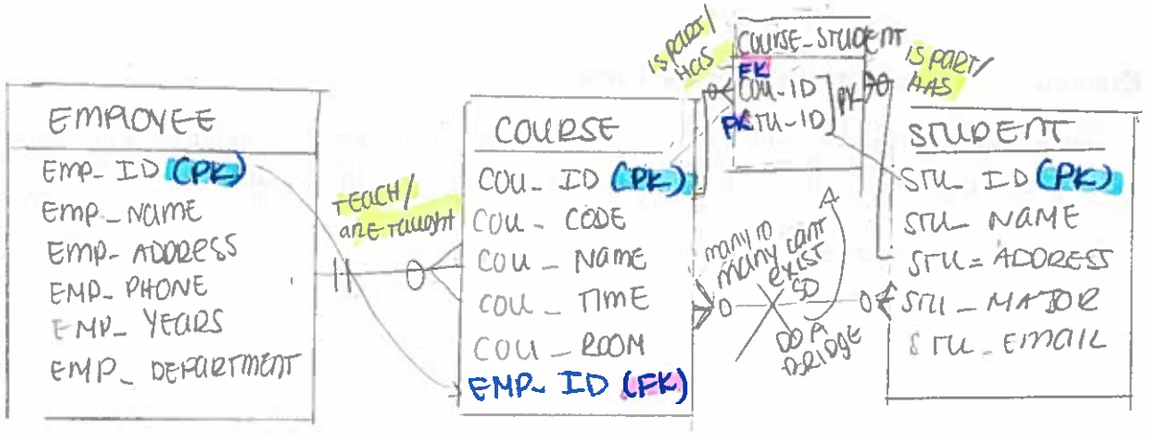
1 and only 1 ——||

Example #1B – Defining Relationships

Some teachers do not teach any classes. However, all courses must be taught by one and only one professor.

Students can take multiple sections in a semester. Evidently, it's possible that a student may not be taking classes in the event that they are taking a semester off.

Using the entities, attributes, and relationships you listed in the previous example, draw your ERD. Add the crow's foot notation and cardinality for each relationship.



ASSUMPTIONS:

- A PROF can teach many courses
- A course can be empty.

foreign key always on the many side to take primary from the other side and put it in the many table side

consist of
is of
is part of
involves
are part of

PRIMARY KEYS, FOREIGN KEYS, ACTION VERBS

- PRIMARY KEY: A column that contains unique data that identifies a row/record in a table
  Examples: Student ID, Customer ID, Employee No.
  - Be sure that all entities have a primary key
- FOREIGN KEY: A column that refers to another table to form a relationship between the 2
  - Matches the primary key of another table
  - Goes on the "Many" side of all relationships
- Each relationship must have a verb on it to describe the nature of said relationship

Example #1C – Complete with Keys & Verbs

Complete your ERD on the previous page by adding any primary keys or foreign keys that are missing. Be sure that there is an action verb on every relationship in your diagram

SOS Steps Box

1. Read the case once and make a list of all the entities and the attributes for each entity. Don't forget to include a unique **identifier for each entity**
2. Re-read the case and draw the relationships between each of the entities.
3. Using the lists you've made, DRAW YOUR ERD.
4. Re-read your case one last time – fill in the crow's foot notation and cardinality
5. Include a foreign key on the MANY side of each relationship and add verbs on each relationship
6. State assumptions as needed

Example #2 – Timeless Inc. CDs

In 2013, Matthew and Chelsea Martin opened Timeless Inc., a family-owned business that sells audio CDs of classic and best-selling children's stories.

The Company has a number of distributors that supply them with the CDs for resale. The company collects information about the address of each distributor and the number of purchases made from each one. Not all CDs come from distributors, some are second-hand CDs bought from customers.

For selling purposes, the CDs are classified by appropriate age groups: 3–6; 7–12; and 13–17. Each physical CD is tagged with an individual serial number allowing the store to better track inventory.

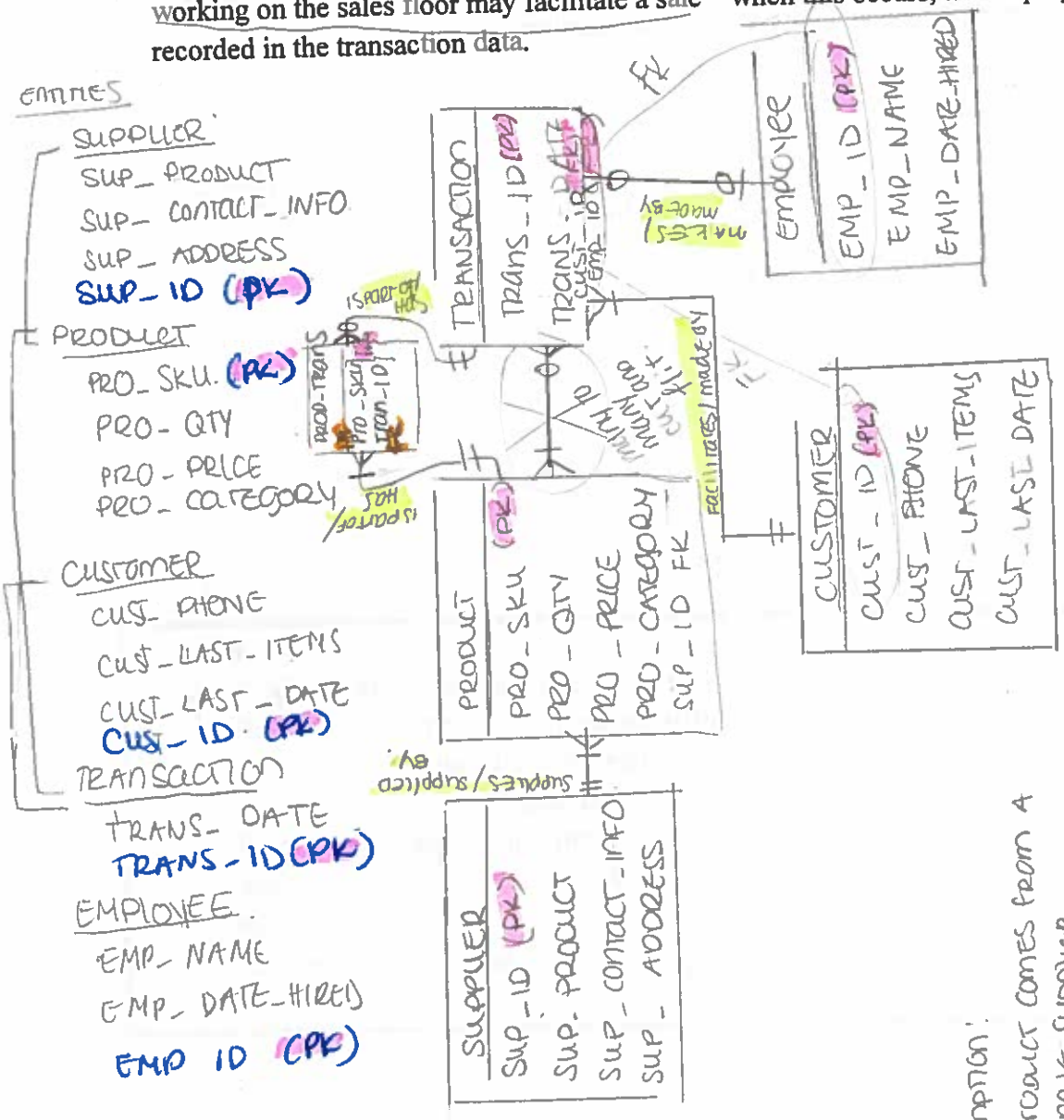
Roughly 20% of total sales occur within their single retail store; the remaining 70% are through the website. Sales are particularly strong during the summer vacation months and Christmas shopping season. As such, dates and amounts of each sale are always collected for planning purposes.

Example #3 – M&H Clothing

M&H is a clothing retailer located around the world. Each store has its own database to manage its operations. M&H has several suppliers from which it receives clothing. The company thus tracks what each company supplies, their contact information, and address. All products have a SKU, a quantity in stock and price associated with it. The products sold range from shirts and pants to jewellery and accessories. All suppliers stored in the system have supplied at least 1 article of clothing.

When customers make a purchase, the company asks for their phone number and records the number of items purchased as well as the date of their last purchase. Each transaction is also recorded including the date it was made. When the transaction is made, the items that were sold are deducted from the inventory in the system.

M&H tracks the names of all employees and the date they were hired. Sometimes, employees working on the sales floor may facilitate a sale – when this occurs, the employee's name is recorded in the transaction data.



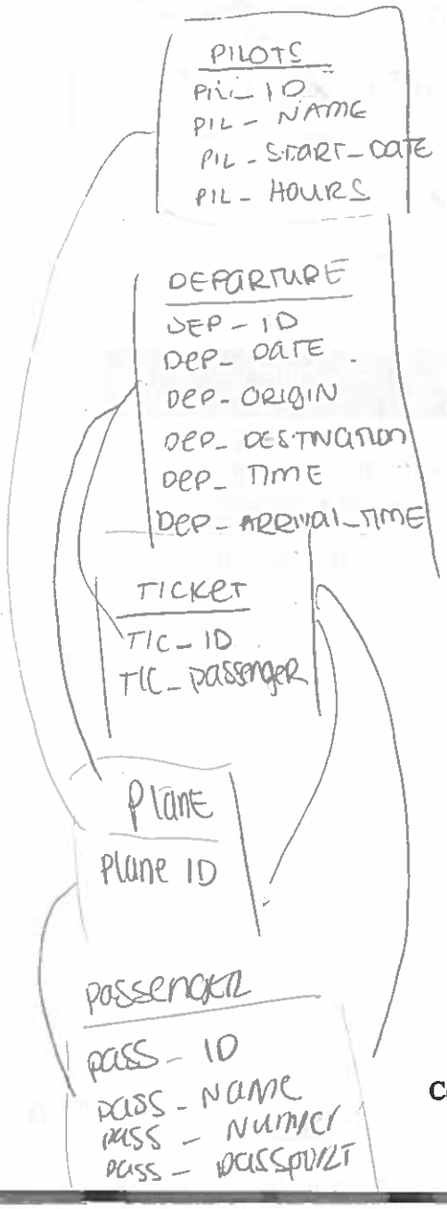
ASSUMPTION:
- A product comes from a single supplier
- Transactions can be made without employees help.

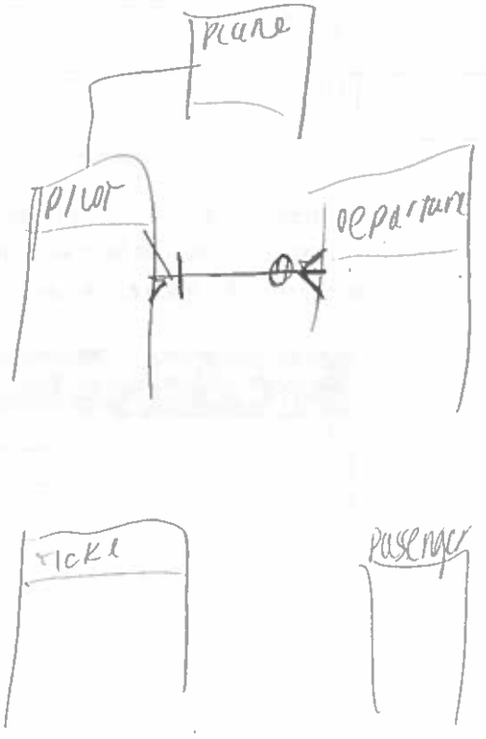
Example #4 – Destination Air

Destination Air is a new Canadian airline serving major cities across the country. The company hires all of its pilots and records their names, start date, and number of hours that they have flown. A pilot can serve many departures during their time with the company and a single departure can have a minimum of 1 and up to 4 pilots depending on the size of the aircraft. For each departure, the company records the date, its origin city, its destination city, the expected departure time, and the expected arrival time.

A single plane must be assigned to each departure. Evidently, planes can fly many different departures during the years that it's in service.

The company issues tickets when a departure is purchased. An issued ticket is valid for one and only one departure. Each ticket has a unique ID so that it can easily be scanned at the airport. In turn, each ticket is assigned to a single individual passenger. However, passengers can evidently purchase many tickets. A passenger is only entered into the database when they buy their first ticket.





Normalizing Data

Breaking apart a poorly structured table into two or more well-structured ones

- Done to prevent DATA INTEGRITY problems
  - Occurs when data is duplicated throughout the database (hard to update)

  Example: What if the course name changes? We'd need to update each student's schedule!

- When you see duplicate data, eliminate it by placing it in a new table
  - Each table should only represent one theme, one concept

Customer ID	Name	Address	Phone Number	# of past orders	Type of Customer
1	SMITH, JOHN	123 Rainbow Road	514-234-3242	3	Normal
2	DOE, JANE	832 Rue Ste. Catherine	438-233-5463	8	Normal
3	KIMMEL, JIMMY	434 Hollywood Blvd	312-424-2313	1	VIP
4	DION, CELINE	3721 Falsetto Lane	418-356-2984	12	Repeat

Separated into a different table so if we were to update the discount %, it wouldn't have to be changed for each customer individually

Type ID	Type of Customer	Discount	Notes
1	Normal	0%	Default customer type
2	Repeat	10%	Minimum 10 past orders
3	VIP	15%	Celebrities, media, etc.

PRACTICE PROBLEMS

1. A group of similar rows are grouped into a

   a. Column
   b. Record
   c. File
   d. Database

2. What is a byte?

   a. A group of columns
   b. A group of rows
   c. One column of data
   d. One character of data

3. What type of column is used to reference another row in another table within a relational database?

   a. Metadata
   b. Primary Key
   c. Foreign Key
   d. Authentication Key

4. Humans must go through the following in order to access the database

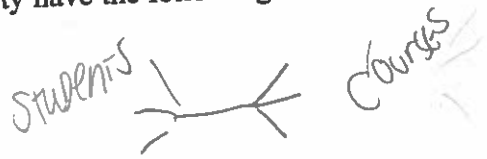
   a. DBMS
   b. Firewall
   c. Tables
   d. Authentication

5. Which of the following is NOT a function of a DBMS?

   a. Allows the user to process things in the database
   b. Provides the user with secured access to the database
   c. Allows the user to perform queries
   d. Provides tools to create ERD diagrams

6. Students and classes in a university have the following relationship

a. One-to-one
b. One-to-many
c. Many-to-many
d. Zero or 1



7. In an ERD diagram, the two lines representing the cardinality of the relationship means:

a. One or many
b. One and only one
c. Many or many more
d. Zero or one

8. Which of the following represents data hierarchy from smallest to largest

a. Byte, attribute, table, database
b. Record, field, file, database
c. Database, file, record, field, byte
d. Field, file, database, column
e. Field, file, column, database

1 BYTE = 8 Bit

9. Which of the following statements best represents the purpose of normalizing data?

a. To make databases easier to understand for humans
b. To maintain data integrity by preventing data duplication
c. To prevent many-to-many relationships
d. To secure the data held within databases

10. Which of the following is one of the only advantages to using spreadsheets instead of databases?

a. They are more secure since they are contained on only one device
b. They provide tools to maintain better data integrity than databases
c. They are easier to use for smaller amounts of data
d. They can store unlimited amounts of data

Chapter 9
E-COMMERCE, SOCIAL MEDIA, WEB 2.0

E-Commerce

- **E-Business:** Any business activity conducted electronically (using IT) accounting, finance
  - This can include any business functions such as looking at reviews before buying in-store, checking the weather, customer support

- **E-Commerce:** A sub-category of e-business that involves a transaction (buying or selling) involving goods or services over a network (public or private)
  - Merchant Companies: Buy and sell their goods
  - Non-Merchant Companies: Facilitate sales but never own the goods (intermediary)

MERCHANT COMPANIES	NON-MERCHANT COMPANIES
Business-to-Consumer (B2C) *Example*: Amazon **Business-to-Business (B2B)** *Example*: a small clothing store ordering clothes from a supplier in China **Business-to-Government (B2G)** *Example*: The QC government buying computers from Dell	**Online Auctions** Buyers bid like in a real-world auction but all through an online system *Example*: eBay **Clearinghouses** The website advertises the goods, and delivers them on behalf of someone else – they never own them though *Examples*: some Amazon items, Expedia **Electronic Exchange** Sellers name their price and buyers will make an offer, simultaneously buyers can name a price and sellers can make an offer – like a stock market *Examples*: Priceline.com, Bandcamp, Adblock

Pros and Cons of E-Commerce

Advantages	Disadvantages
1. Disintermediation: The middle man is cut out... the manufacturer sells directly to the customer thus eliminating businesses	1. Channel Conflict: When the artist sells a CD directly to the customer, how does HMV feel?
2. Available Information: Can now look at reviews and make more informed purchases	2. Price Conflict: Buying a book on indigo.ca is cheaper than going into a Chapters store
3. Price Elasticity: Companies can better understand demand and supply through online tracking and experimenting with prices easily	3. Logistics Expense: its costly for Amazon to ship so many small orders instead of 1 big one
4. More Feedback: The company and customer can interact easily	4. Customer Service: The salesperson isn't there to show the customer how the phone works
5. Convenience: You can shop in your PJs!	5. Showrooming: People go into the store to play with the computers, then buy it online (that's why BestBuy stores are shutting down)
	6. Taxation: If you buy something from a US retailer, do you pay American or Canadian taxes?

Social Networking

- **Social Networking:** A web of related individuals and organizations
- **Social Capital:** The benefit derived from social networking
- From the business' perspective, the following capital exists
  1. Physical capital: Physical resources such as assembly lines, computers, machines
  2. Human Capital: Knowledge and skills from your employees
  3. Social Capital: Social relationships between people (employees, customers, etc.)
     - There are 4 benefits to social capital:

Information Shows opportunties, threats, problems, the way the customer is thinking	**Influence** Your relationships with co-workers can influence their decision, your customers can influence others to buy (word of mouth)
Social Credentials Social status helps to shape who you are and the business' brand	**Personal Reinforcement** Networks reinforce your professional image or position in an industry

Weak vs. Strong Relationships

- The people you know best (**Strong**) tend to all know each other (close circle of friends)
  - This means your network won't expand with them!
- The people you know least (**Weak**) contribute most to your network
  - When you see them at cocktails or other events, you'll me

getting new knowledge

Social Networking Enabled by IT

- You don't need a computer to network, but Facebook has made it synonymous with the Internet
- IT brings benefits that don't exist in face-to-face networking
  1. **Sorting Through Data** is easier with IT, you can find what and who you need
  2. **Tracking Relationships** is easier (such as birthdays, last time we spoke)
  3. **Network Effects** means that platforms like Facebook will grow as more people use them... this means your network keeps growing automatically!

Web 2.0

- Started with the creation of smartphones, user-created content, social media, e-commerce – not a specific change in technology.

	Web 2.0	Traditional Web (1.0)
Software	A service that is free for all to use via the cloud / the Internet, constantly changing (***example***: Google.ca)	Licenses needed, updates released periodically
Client	**Thin Client** – You don't need to download extra software to use things like Google Maps, Gmail	**Thick Client** – Required downloads, updates released one at a time
Product Value	**Network Effects** – More users adds more value (***example***: Twitter)	Value depends on the product (***example***: a laptop's value depends on it specs)
User Experience	Differs on each website (***example***: Amazon looks different from Expedia)	Static, standardized user interface (***example***: all MS Office programs look the same)
Content	Participation from user is welcome	Static – Company posts the content
Business Model	Free services, advertising for revenue	Licenses, software sales
Advertising	Viral, shared by customers	Static ads spread everywhere by the company

Other Terms

- **User-Generated Content:** The user creates value for the business/transaction by creating content (***example***: user reviews)
- **Crowdsourcing:** New ideas are posted online and customers can pre-order thus contributing to the product actually coming to life (***example:*** Kickstarter)
- **Mashups:** Taking a services from website and combining with another (***example***: when you see a Google Map on a company website's "Contact Us" page)

How do companies benefit?

1. **Advertising:** More targeted and focussed
   Example: You can't determine who will see a billboard, for a website you can
2. **Mashups:** More collaboration between businesses
   Example: Hotels can team up with car rentals so you can book both simultaneously

Chapter 9
PRACTICE PROBLEMS

1. Which of the following is NOT an e-commerce business model?

   a. B2B
   b. E-business
   c. B2G
   d. Clearinghouses

2. Company X allows airlines to post their trips and fares. Travelers can then buy the tickets through Company X's website. Company X takes a 10% commission on each ticket sale. What type of business is Company X operating?

   a. Clearinghouse → not owning tickets, just selling.
   b. B2C
   c. Online Auction
   d. Electronic Exchange

3. Which of the following is a disadvantage of e-commerce from a business' perspective?

   a. Disintermediation
   b. More feedback
   c. Showrooming
   d. Price elasticity is more obvious

4. Which of the following benefits of social capital involves the company gathering feedback from its customers

   a. Social credentials
   b. Influence
   c. Information
   d. Personal Reinforcement

5. What type of relationship allows you to grow your network and gain new opportunities?

   a. Strong relationships
   b. Normal relationships
   c. Weak relationships
   d. Many-to-many relationships

6. Traditional web is characterized by which of the following:

   a. Standardized interfaces
   b. Free services
   c. Network effects
   d. Participation and user-generated content

7. Amy wants to connect with people in her city who want to join together in an effort purchase bulk gym memberships. She creates a website that allows people to join her cause. Amy's business best represents which e-business concept?

   a. Customer-to-customer
   b. Mashup
   c. Electronic exchange
   d. Crowdsourcing

Essay Question #4

Your friend wants to open an online store to sell the custom iPhone cases that he makes by hand.

a. Name 3 different e-commerce models that he could employ in order to sell his cases. Explain each model and how each would work for him.

B2B, B2C, Online Auction

B2B: He can sell his cases to another business.

B2C: He can sell directly to consumers

Online Auctions: can sell them on eBay.

b. What are the 3 advantages to selling his cases online instead of the in the real world?

- No middle man. He sells directly to customer and makes the full amount.
- He can get feedback from customers.
- Better management and demand and supply using software and analytics to track it.

Convenience and availability of info benefits customers.

c. What are 3 disadvantages?

- logistic expense – shipping might be expensive.
- customer service: providing customer service and convincing people to buy is difficult without salespeople
- taxation issues if he ships internationally.

Chapter 8
BUSINESS INTELLIGENCE

IF YOU HAVE A RATIONAL DECISION NOT NECESSARY GOOD OUTCOMES

Decision making is considered to be a rational act – however, this isn't always true in reality

1. Rationality is often defined as a decision that likely leads to a positive outcome
2. Positive outcomes don't always stem from good decisions, and bad ones can still result from good processes
3. **Bounded Rationality:** Humans have limited cognitive ability; we can't always make fully rational decisions

- **Ackoff's Assumptions – Event with good information…**

TOO MANY POSSIBILITIES

- Humans usually create decision criteria to make a decision
- Due to the wealth of possibility in any decision, proper data doesn't always mean you can make a perfect decision

INFORMATION OVERLOAD

- We can now measure data in Exabytes (EB)
- How can managers find exactly what they truly need?

DATA QUALITY

- DIRTY DATA: Problematic (e.g. phone number entered is 999-999-9999)
- MISSING VALUES: We don't always collect all the data we'll ultimately need
- INCONSISTENT DATA: Data not collected at same time; situation changed between data collection times
- DATA NOT INTEGRATED: Collected for different purposes; stored separately

- DATA GRANULARITY: The degree of summarization or detail
  - COARSE DATA: Highly summarized
  - FINE DATA: Lots of detail, too precise (***Example:*** CLICKSTREAM DATA)

Collecting Data – OLTP and OLAP

- **Online Transaction Processing (OLTP):** Systems that collect and process data online immediately as it is entered, in real-time
  - The opposite of **Batch Processing**, waiting for an accumulation of data

    Example: Amazon or Ticketmaster vs. Employee time punch or Credit cards
- **Data Resource Challenge:** Collecting data that you don't need or use
  - You need to use it properly for it to become an asset

Processing Data – OLAP

- Most OLTP systems are not made for analysis and reporting – as a result, analysis is tricky

Decision Support Systems (DSS): Systems that collect and process OLTP data for decision-making purposes

Online Analytial Processing (OLAP): Systems that process historical data to support decision making

- Extremely expensive to maintain
- Large volumes of data
- The resulting reports are called OLAP CUBES
- Allows you to DRILL DOWN, that is break the data down into fine levels of detail
- An example of a DSS

TYPES OF DATABASES

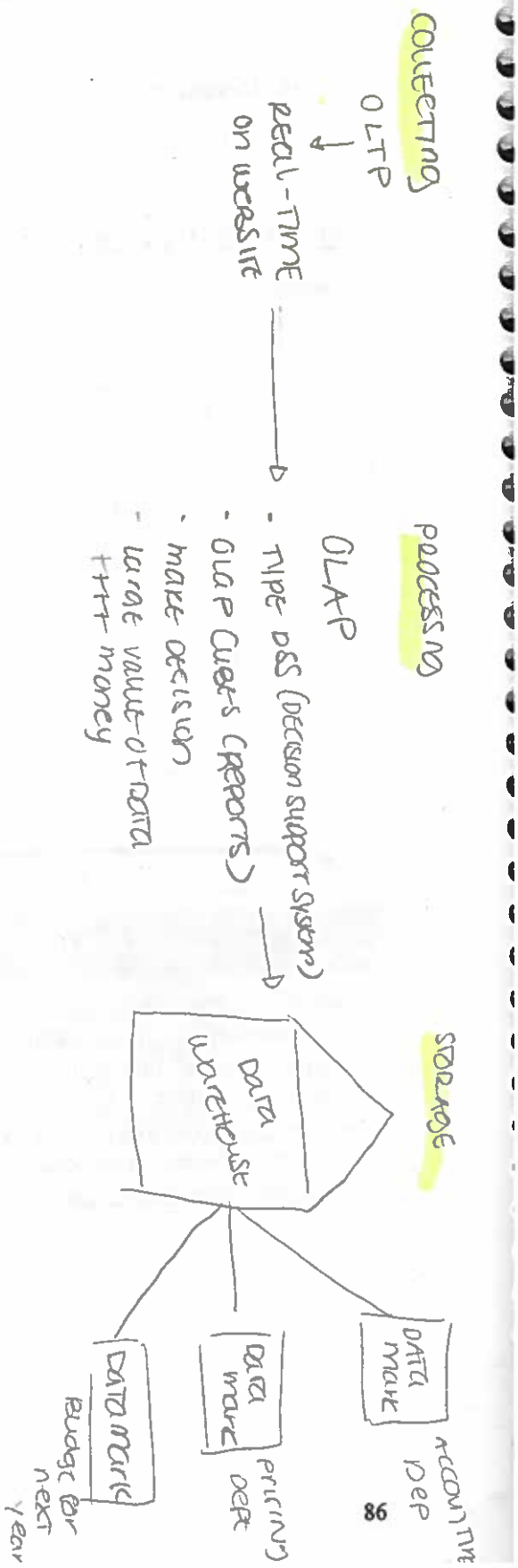
DATA WAREHOUSE

- Set of databases designed to support decision-making in an organization
  - Structured for fast online queries and exploration of data
  - Can aggregate lots of data from many different operational systems
  - Master DB for metadata

DATA MART

- Database focused on addressing a particular problem or business unit
  - Lower-cost, smaller scale compared to data warehouses
  - Usually pulls data from the data warehouse

DRAW IT – OLTP AND OLAP



Business Intelligence Systems

- **Purpose:** To provide information for improved decision making
  - Having the technology is not enough – must be well incorporated into the company's overall information systems

BI System	What it does	How it helps
Group Decision Support Systems (GDSS)	Allows collaboration between decision making, at different times, geographically dispersed	Reduces bias in group discussion and option evaluation
Reporting Systems (for reports)	Collect data from many sources; group, summarize, and format it into reports	Provides relevant, accurate, timely information
Data-Mining Systems (STATS & numbers)	Uses sophisticated statistical techniques to find patterns and relationships	Discover patterns and relationships to predict future outcomes
Knowledge Management Systems (KMS)	Share knowledge about products uses, best practices, human knowledge	Improve decisions through knowledge sharing, being more information, using existing intellectual capital – improvements and innovation
Expert Systems	Simulate the human mind using if/then rules to make a recommendations	Improve decision-making for people without expert skills

- **Other Analyses**
  - **Market-Basket Analysis:** Computes correlations between past orders in order to determine items frequently purchased together thus anticipating future purchase (NOT TO IMPO)
    - **Support:** The ratio of number of times two or more items occur together to the total number of transactions (***Example:*** 20% of purchases have both items)
    - **Confidence:** Conditional probability that a randomly selected transaction will include Item A given Item B (***Example:*** 33% of people who purchase A will also purchase B)
    - What type of BI system does this type of analysis represent?

  - **RFM Analysis:** Analyzing and ranking customers according to their purchase patterns
    - R refers to how recently the customer has ordered
    - F refers to how frequently a customer order
    - M refers to how much they usually spend per order

Data Mining (stats & numbers)

UNSUPERVISED DATA MINING

- GOAL: Develop hypotheses after analysis is performed based on patterns found in the analysis
- No models or hypotheses are created before running the analysis

no starting points.

SUPERVISED DATA MINING

- GOAL: Tests hypotheses and models that are pre-established
- Analysis is run in order to determine their validity or to what extent they apply

starts with hypothesis (theory) I believe that.

- **Cluster Analysis:** Identifying groups in the data in order to find similar characteristics and patterns (***Example:*** customers by age with similar purchasing habits)
  - What type of data mining is this?

    unsupervised

- **Regression Analysis:** Measures the impact of a set of variables on another variable (***Example:*** change in customer's ages, impact on cell phone usage)
  - What type of data mining is this?

    supervised

- **Neural Networks:** Creates a model of the human brain that looks at data to predict values and make classifications
  - What type of data mining is this?

    supervised

- **Big Data:** Large amounts of data that are collected from a variety of sources, over a period of time, with the ultimate goal of making better decisions.

  unsupervised.

Chapter 8
PRACTICE PROBLEMS

1. Certain BI systems enable managers to use statistical techniques to find patterns and relationships in the data that have been collected by the organization. Such systems are referred to as:

   a. Knowledge Management Systems
   b. Reporting Systems
   c. Data Mining Systems
   d. Decision Support Systems

2. Regression analysis is categorized as Supervised data mining and can be defined as an analysis that _____.

   a. Unsupervised; measures the impact of a set of variables on another
   b. Supervised; identifies groups in the data to find patterns
   c. Supervised; measures the impact of a set variables on another
   d. Unsupervised; identifies groups in the data to find patterns

3. Data quality is a major concern for managers. The degree of summarization or detail is what type of problem in the quality of data collected by organizations

   a. Data granularity
   b. Dirty data
   c. Inconsistent data
   d. Coarse data

4. Which of the following statements is false when it comes to the use of OLAP for business?

   a. OLAP systems are extremely expensive to maintain
   b. They are a type of Decision Support System
   c. The resulting reports are called OLAP CUBES
   d. They aid in the collection of data for decision-making purposes

   They process
   don't collect

5. Which of the following is not one of Ackoff's assumptions?

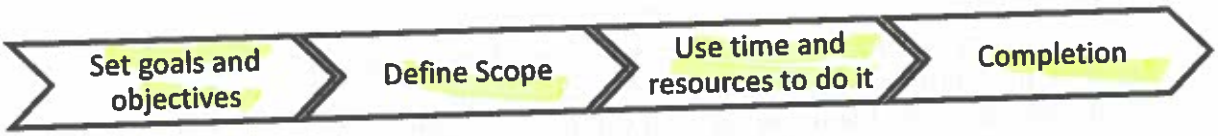
   a. Data quality is not always available for proper decision making
   b. Bounded rationality prevents us from making rational decisions
   c. Today's managers suffer from information overload
   d. Too many possibilities exist for managers to always make the right decision

Chapter 10
ACQUIRING IS THROUGH PROJECTS

Project Management

- Standards put in place through the **PMBOK** (Project Management Book of Knowledge)
  - Developed and maintained by **PMI** (Project Management Institute)
  - People certified to manage projects are **PMPs** (Project Management Professionals)
  - **ITPM** (Information Technology Project Management) are techniques and methods used to better run projects used by all project managers

- If it involves technology, it becomes an **IT Project**
  - Affects all 5 components of the system (including people and procedures)



The Iron Triangle

- It's almost impossible to get all 3 in balance
- Only **16%** of projects are completed on time, within budget, and on scope
- **30%** of projects are cancelled before completion

The key to successful projects is good planning.

PMBOK = projects
ITIL = operations

Operations vs. Projects

- **IT Operations:** The day-to-day tasks
  - **Goal:** Keep things running efficiently, stable, predictably, and securely

- **Projects:** Implementing changes over a set period of time
  - **Goal:** Improve the business

- ITIL (Information Technology Infrastructure Library) = PMBOK for operations
  - Standards and procedures for driving value from operations
  - People working in operations usually specialize (e.g. Windows expert, website admin)

Risks in Projects

1. **Scope:** IT is virtual, I can't see what the project will look like when complete
2. **Costs:** IT costs are constantly changing
3. **Time:** How do I know how long each part will take?

Risks aren't only related to the technology, it's also human!

- Lack of knowledge
- Unclear requirements
- Too complex
- Lack of support from management

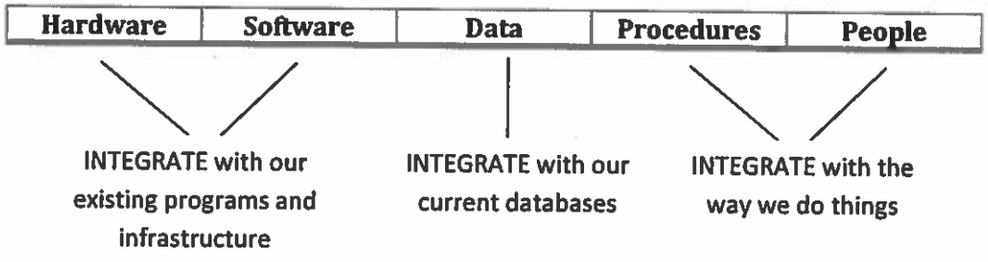
Acquiring New Systems

* MIPO

short question

Key Questions

- Do you have the skills needed to develop it?
- Which option is cheapest?
- Which takes the least time?
- Which best meets our needs?
- Does something already exist on the market (no need to re-create it)?
- How will integrate with our existing systems?



Implementing New Systems

- **System Development Life Cycle (SDLC):** A classic process for acquiring or developing IS
- **Phase 1: System Definition**
  - Define Goals and Purpose

    Example: Help PepsiCo compete against a new competitor

    Example: Enable Starbucks to take online orders

COMPANY STRATEGY (CHAPTER 3)
- Industry Forces (Porter's 5)
- Value Chain (internal improvements)
- Competitor Actions

Organization's Response →

PROJECTS
Improvements that make us more competitive or help us to execute the strategy

  - Assess Feasibility
    - **Cost Feasibility:** Do the benefits outweigh the cost?
    - **Schedule Feasibility:** Can we complete it in reasonable time?
    - **Technical Feasibly:** Can our existing systems work with the new system?
    - **Organizational Feasibility:** Will it fit with the way we work? Culture? Legal?

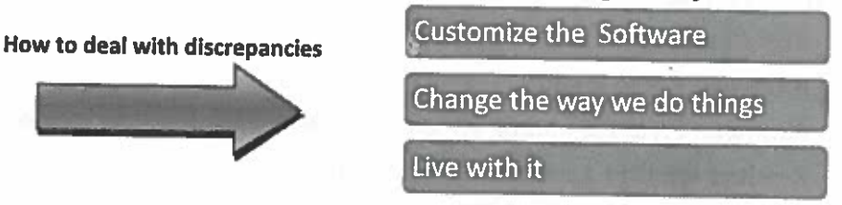
- **Phase 2: Requirements Analysis**
  - It's hard to visualize what the system will look like when complete
  - Involve the end users of the system, they know best how the system will be used

    Example: The accountants know what they need to do their job better than IT does
  - Getting users on board helps to gain their support
  - Now is the cheapest time to change the requirements

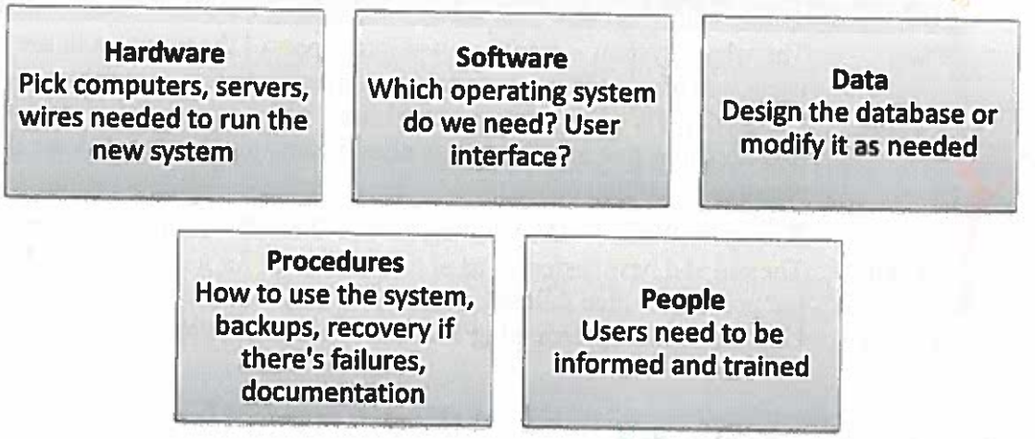
    Example: Adding a new feature half way through the project is costly
  - Team consists of **Systems Analysts** and **Business Analysts** in this phase
    - These people need to understand both IT and the business (MIS background)

Phases for implementing New Systems
1. System definition
2. Requirement Analysis
3. Component design
4. implementation
5. System maintenance

- **Phase 3: Component Design**
  - If you choose to **buy it**, there will always be discrepancies between what you need and what is offered
    - Commercial off-the-shelf (COTS) software will never fit perfectly



  - If you choose to **build it**, you need to design all 5 components of the IS



- **Phase 4: Implementation**
  - Once it's all designed, the programmers come in and make it (coding, programming)!
  - If it's purchased, this is when we start hooking things up and installing all the components
  - **System Testing**
    - **Test Plan:** List of actions users need to perform to test all parts of the system

      Example: Try to log in

      Example: Press the button; write down which page it brings you to
    - **Product Quality Assurance:** Same as testing
    - **Beta Testing:** Allows users to try the system on their own before fully released
  - **Transitioning To The New System (Conversion)**

Options	How it's done
Pilot	The whole system is implemented into 1 part of the business to see how users will react. Allows us to test and improve before giving to everyone.
Phased	Different parts of the system are released to different parts of the organizations one at a time. This allows users to adapt and allows for regional tweaking. ***Example***: Week 1 – Accounting gets it, Week 2 – Marketing team gets it
Parallel	The old and new system runs at the same time for a short period. Very costly but provides a nice fallback plan in case of problems
Plunge	Unplug the old system, plug the new one it – all in one shot

- **Phase 5: System Maintenance**
  - Making modifications as needed after implementation
  - Patch or service packs fix the problems
  - Prioritize requests for changes
    - Requests can either be due to **errors** or just for **suggested improvements**

Weakness of SDLC Methodology

1. Considered a **Waterfall Method**... once you move to the next phase, you don't go back
   - ➔ ***Example***: Once you start designing, sometimes you need to go back and redo some requiring with the end user... SDLC doesn't allow for this

2. Some projects are just too complicated
   - ➔ ***Example***: Can you list all the requirements to build an airplane all at once?
     - **Analysis Paralysis**: When documentation and defining requirements goes on forever even when we have enough to move forward

Other Methodologies

- Agile Methods: Like hybrid methods
- Why they exist? No single process works for all organizations

Outsourcing

- **Outsourcing:** Having another organization perform a service for you
  Example: Manage your database
  - If they are on a different continent, this is called **Offshoring**
  Example: Indian call centers

Advantages	Disadvantages
1. IT isn't everyone's expertise 2. Less costly elsewhere (India, China) 3. Risk reduction (projects often fail)	1. Loss of control 2. Tied to the developer (they know your system better than you) 3. If they mess up, you still pay 4. Expensive and difficult to change vendors

- **Application Service Providers (ASPs):** Provides software and applications for rent
  - The system is maintained by the ASP and is accessed via the Internet
  - Risks include:
    1. No control over your data, stored abroad
    2. If you lose the Internet, your whole system can't be used
    3. Can get locked-in, make sure you can take your data if you need to switch vendors

Chapter 10
PRACTICE PROBLEMS

1. Which of the following lists the given steps in chronological order:

   a. Define scope, use time and resources to do it, testing, completion
   b. Set goals and objectives, use time and resources to do it, completion
   c. System definition, requirements analysis, component design, implementation, system maintenance
   d. Define scope, set objectives and goals, use time and resources to do it, completion
   e. All of the above make sense

2. People who are certified to manage projects are called Project Management Professionals (PMPs). What is the name of the organization that regulates this certification?

   a. PMBOK
   b. PMI
   c. ITPM
   d. CISA

3. Which component of information systems deals with integrating the new system with the company's current systems?

   a. Data
   b. Hardware
   c. Software and Hardware
   d. People and Procedures

4. Which of the following situations represents a company having difficulty with the organizational feasibility of a project?

   a. Sales reps have never had to document their leads in the system
   b. The system will only generate cost savings 3 years after implementation
   c. The company's IT team doesn't have the needed skills to develop the system
   The system will take 2 years to implement by which time the software may be obsolete

5. Which of the following statements is true of systems analysts?

   a. They are active during the system conversion phase and help with development
   b. They program the new system
   c. They integrate the work of programmers, testers, and end users
   d. They are the project managers

6. The cheapest time to change system requirements is in the _____ phase

   a. Requirements analysis
   b. Component Design
   c. Implementation
   d. System Maintenance

7. Company X outsourced development of their new system. The developer created a document in another language that the IT managers at Company X do not understand. This phenomenon can be described as:

   a. Loss of control
   b. Being tied to your developer
   c. Expensive to change vendors
   d. Paying for developer mistakes

8. Which of the following statements is NOT true in regards to IT projects

   a. IT projects must be founded in the company's strategy
   b. The goal is to keep things running efficiently, stable, predictably, and securely
   c. The biggest struggle is keeping time, scope, and budget in check
   d. Projects work at improving the business

Essay Question #5

You are a project manager at EastJet Airlines. Your job is to implement a new system that will allow customers to reserve book their tickets, check-in for their flight, and gather information all through a mobile application. EastJet has a skilled technical team. The project needs to be implemented within 1 year in order to be effective. The budget is 500,000$. The company is very open to new technologies and is excited for the new platform to be implemented.

a. Based on what you know about this company and the project, how would you go about acquiring the new system?

→ CMG IS IN TIME CONSTRAINT : FIND BASIC PLATFORM AND THEN CUSTOMIZE. TO MEET THEIR NEED.

(THEY WILL HAVE FREEDOM TO DEV THE APP AS THEY WISH.)

→ CHECK FIT WITH THE COST AND TECHNICAL FEASIBILITY.

→ BIGGEST ISSUE = TIME SCHEDULE

b. Who should be part of the project team? Why?

- THE MANAGER
- BUSINESS ANALYSIST : TO BETTER CONNECT THE BUSINESS NEEDS WITH IT'S
- SOFTWARE TESTERS
- THE END USERS, WHO WILL BE CONSULTED ALL THE WAY THROUGH HELPS GAIN SUPPORT FOR THE SYSTEM

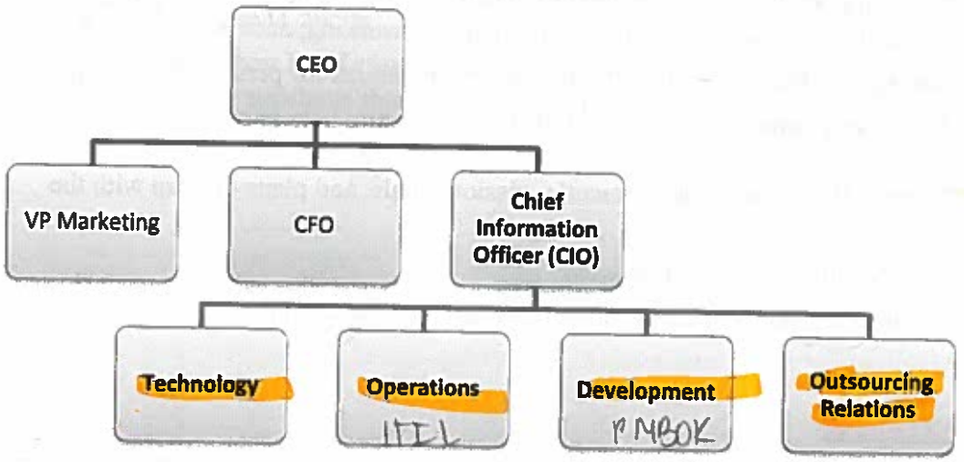
FEW PROGRAMMER : DEPENDING ON HOW MUCH TESTING IS NEEDED.

c. Which conversion (cutover) strategy should be used? Why?

A PLUNGE : SINCE THERE'S NOT MUCH RESISTANCE TO IT. THE CMG IS EXCITED FOR THE PROJECT AND THE TIMELINE DOESN'T ALLOW FOR A PROGRESSIVE OR PILOT LAUNCH.

Chapter 11
STRUCTURE, GOVERNANCE, ETHICS

IT Department Structure



- **Technology:** Lead by the Chief Technology Officer (CTO) – in charge of new tech & innovation
- **Operations:** Day-to-day administration (network administrators, infrastructure, user support)
- **Development:** Improve current systems and implements new ones project management
  - If the company develops in-house: includes programmers, testers, project managers
  - If the company only buys: Mostly business and system analysts
- **Outsourcing Relations:** Monitors relationships and service levels

* * * * *

- WEB → Marketing Team
- Most jobs in IT require communication skills, business skills, and interpersonal skills

IT Architecture

- IT should contribute to the company's strategy
  Example: Wal-Mart invests heavily in IT to make logistics flawless → lowers prices

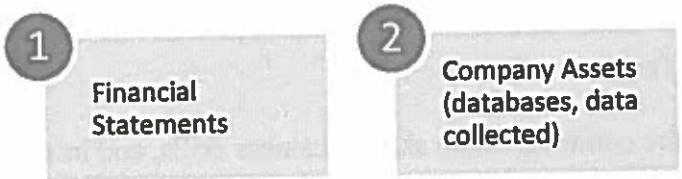
- **IT Architecture:** The plan for everything IT in the business
  - All computers, when they're bought, when they should be replaced, who's in charge of what, what software is on which computers, networking, access controls, etc.
  - **Enterprise Architect:** Job title in large organizations for person who manages this
  - **Zachman Framework:** A model for IT architecture to help companies develop it

- **Alignment:** When the IT department's mission, goals, and plans overlap with the organization's ones
  - Major challenge in business today
  - Requires constant communication between business and IT

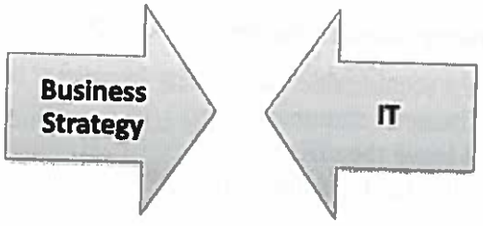
IT Governance

- **Governance:** Standard management policies and processes for IT services
  - Deals with sourcing, prioritizing IT investments, security, and privacy
  - Recent laws have made this increasingly important for companies
    1. Budget Measures Act (ONTARIO)
    2. Sarbanes-Oxley Act (SOX)

- **Sarbanes-Oxley Act (SOX)**
  - Result of fraud in the early 2000s (Enron, WorldCom)
  - Key executives are now criminally liable
  - Requires companies to create internal controls to protect…



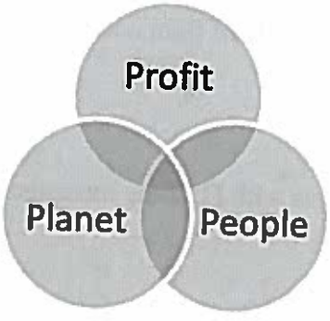
- **IT Audit**
  - **Information Systems Audit:** Making sure that the IT systems that hold financial data are secured and that the data inside of them is reliable
  - **Information Systems And Control Association (ISACA):** Develops standards for IT governance and IT audit
    - **Certified Information Systems Auditor (CISA):** Professional designation for people who do the IT audits
    - **Control Objectives For Information And Related Technologies (COBIT):** Frameworks and standards that help to align IT with the business



COBIT: IT

Ethics and Green IT

- Computers don't have ethics, it's how HUMANS use the data that causes the problems
  - Issues surround privacy of data and what we do with it
- **Green IT:** Understanding the impact of our tech resources on our environment
- **Triple-Bottom Line:** Not all about the money



- **Energy Star:** An international program that labels products that consume less power
  Example: Consume less electricity to run your fridge
  Example: Sleep mode on computers after 15 mins of inactivity
- **E-Cycling:** Recycling computers and devices
- **E-Waste:** Disposing of computers and devices

Chapter 11
PRACTICE PROBLEMS

1. What role does the development division in the IT department do?

   a. Runs day-to-day operations of the company's systems
   b. Improves current systems and acquires new ones
   c. Monitors relations with service providers
   d. Website design and programming

2. Which of the following is an impact of the Sarbanes-Oxley Act on the IT department?

   a. The CIO is now personally accountable for security breaches
   b. The CIO is in charge of financial statements
   c. Company assets must not leave the office
   d. The impact is on the accounting department, not IT

3. What does ISACA do?

   a. Creates standards for governance and IT audit
   b. Audits information systems
   c. Creates outsourcing standards
   d. Provides innovation to companies

4. Ethics are closely linked to:

   a. Religion
   b. Society's norms and our understanding of right and wrong
   c. Individual values
   d. Computers

5. Which of the following concepts deals with IT at the management level?

   a. IT Architecture
   b. IT Audit
   c. IT Governance
   d. Green IT

Chapter 12
MANAGING INFORMATION SECURITY AND PRIVACY

Identity Theft and PIPEDA

- **Identity Theft:** Critical personal information is stolen and used to impersonate a person
  - One of the fastest growing crimes in Canada
  - Commonly Stolen Information: Social insurance Number, name, address, credit card

- Organizations have a responsibility to keep customer data safe → PIPEDA
  - **PIPEDA** = Personal information Protection and Electronic Act (a Canadian act)
    - Under this act, business what tell you...
      1. What they are collecting
         Example: Websites that record when you visit tell you this in their terms of service
      2. What they will do with your information
         Example: Apple can't sell your information to Facebook without telling you
      3. How they keep your information safe (upon request)
         Example: You have the right to know what country Google stores your info in

Threats faced by Organizations

Security Threats		Problems
1. Human Error (Accident) 2. Malicious Behaviour (Intentional) 3. Natural Events (Non-Human)	→	1. Unauthorized Data Leak 2. Incorrect Data Modification 3. Faulty Service 4. Denial of Service 5. Infrastructure

How Data Gets Out Intentionally

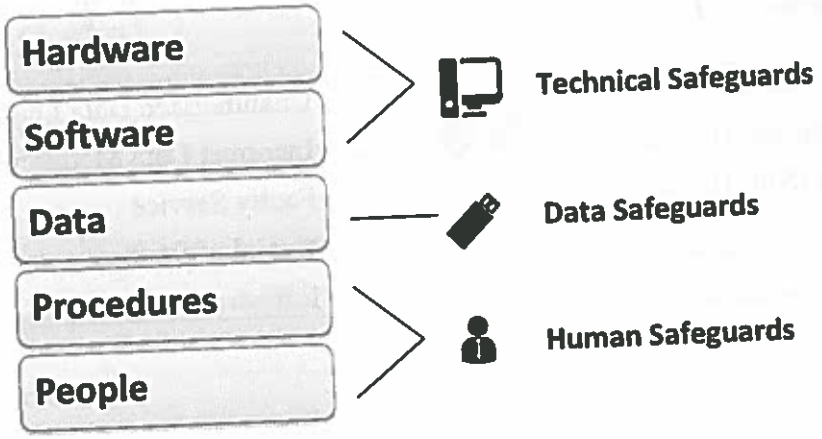
General (*examples*: Phone, in-person)

- **Pretexting:** Saying that you are someone you're not to gain access to sensitive information
  Example: Someone calls pretending to be your bank and asks for your account number
- **Spoofing:** Hiding your identity to pretend someone you're not
  Example: When the caller also disguises their number as the bank's

IT Specific

- **Phishing:** Same as pretexting but done via email
  Example: Email from your "bank" telling you to click a link to change your password
- **Email Spoofing:** Synonym for phishing
- **IP Spoofing:** When the website pretends to be another then directs you to another one
- **Sniffing:** Intercepting communication to steal the data
  Example: a virus that makes a copy of all emails you send
- **Hacking:** Gaining unauthorized to a system for malicious reasons (stealing, wreaking havoc)

As a result of all these threats, management must create security procedures to manage risks...



Technical Safeguards

	Safeguard	Description	Examples
1	**Identification and Authentication**	Ways of determining who is accessing the computer and validating that it's the right person	o Username and Password o Smart Cards (employee badge) o Biometric Authentication: Eye or hand scanner o Single Sign-On: You only enter your password once but have access to all your applications such as email, intranet, etc.
2	**Encryption and Firewalls**	Sending data safely between computers and networks	*See Chapter 6*
3	**Malware Protection**	Software programs and human actions that are used to prevent and remove viruses, worms, malware, spyware, etc.	o Antivirus and antispyware software o Scan frequently o Update malware definitions (how the antivirus programs detect new viruses) o Be careful with email attachments o Install updates and patches o Be careful of where you use Internet

Data Safeguards

1. **Database Administration:** Policies and standards used to manage databases
2. **Backups:** Creating copies of the database in case it fails
3. **Physical Security:** Log who goes into the rooms where databases are stored

Human Safeguards

Safeguard	Types	Explanations
1 **For Employees**	Segregation of Duties	Just like in accounting, the person approving accesses should not be same person granting them
	Assign least possible privileges	Only give employees access to the data they will need regularly
	Document accesses	This allows companies to modify and remove access easily as needed
	Security Training	All new employees should be subject to training and shown the security policies
	Enforcement	3 components (RAC) *
	Termination	Accesses should be removed as quickly as possible when someone quits or is fired. If they leave on bad terms, be aware of the risks (e.g. stealing customers)
	Hire and screen carefully	Be careful of who you hire especially if the job requires them to have access to sensitive information
2 **For Non-Employees**	Hardening	Given temporary employees and contractors very basic access
	Protect Supplies, Customers	Make sure the systems they use (e.g. your website) are safe
3 **Account Administration**	Account Management	○ Giving Access ○ Modifying Access ○ Removing Access Having unused accounts left around in your system is extremely unsafe!
	Password Management**	Require employees to choose safe passwords
	Help-Desk Policies	For instance, when you call your bank, they ask security questions so they know that it's really you

	Procedures and Operations	1. NORMAL: How to perform jobs properly 2. BACKUP Operations: How to make sure we have copies or everything and are prepared if something stops working 3. RECOVERY Operations: How to restore the system if it goes down
4 **Security Monitoring**	Check logs and investigate incidents	Systems log who accesses them, who performs operations, etc. When something goes wrong, you need to use this data and patch your software or procedures as needed!

*** RAC determines who enforces different parts of the systems (*example:* credit card data)**

R – Who's **Responsible** for the credit card data

A – Who's **Accountable** if someone hacks it

C – Who's in charge of ensuring that everyone **Complies** to the security policy

**** Password Etiquette**

1. Change password immediately when its created
2. Change passwords frequently
3. Don't let users switch back and forth between passwords
4. Require a mix of lower-case, UPPER-CASE, numb3rs, and special characters ($%&)

NEVER give your password out to anyone... if someone really needs it, go enter it for them

Disaster Recovery And Business Continuity Plans

If disaster strikes, whether human or natural, we need to make sure the business keeps working!

1. **Location:** Make sure you know where data is backed up and spread around
   Example: If there's an earthquake in California, Apple must keep operating elsewhere

2. **Mission-Critical Systems:** Know the basics you need to keep running
   Example: Google has multiple servers that are used for Gmail – if one goes down, the others kick in to keep the service going

3. **Hot Sites:** Third-party companies that keep backups at a fee
   Example: A law firm will store copies of case material documents elsewhere

4. **Cold Sites:** Office space to be used in the event of a disaster in your main locations
   Example: If your office catches fire, we can restart tomorrow in another office

Just like in a fire drill, companies need to practice, have standards for speed, time, resource allocation, and plans in place to make sure that nothing can take down the companies IT or its daily operations.