

CS371 course note

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1 Component of PC

1.1 intro

1. Social engineering
is when hacker use their knowledge of psychology to trick people into divulging confidential information
2. Hardware Components
 - Processor: CPU
where symbols, characters and numbers are manipulated
 - Main Memory
where data and program instructions are stored temporarily during processing
e.g. registers, cache, ram
 - Secondary storage
Store data and programs even when computer is turned off
e.g. flash drives, SSD, HDD, CD, DVD
 - Input devices
Covert data and instructions from the outside world into electronic form
e.g. keyboard, mouse
 - Output Devices
convert electronic data produced by computer into a form understood by human or the outside world
e.g. printer, speaker, monitor
 - Communication Devices
Provide connections between the computer and communications networks
e.g. WIFI, bluetooth
3. Capacity
small b is **bit** for single binary digit
Big B is Byte(8 bits), there are 2^8 possible values
dealing with data storage, use multiples of 1024
dealing with frequencies, use multiples of 1000
 - KB = 1024 bytes
 - MB = 1024^2 bytes
 - GB = 1024^3 bytes
 - TB = 1024^4 bytes
 - Kb's or Kbps = 1024 bits/s
 - Mb/s or Mbps = 1024^2 bits/s
 - Gb/s or Gbps = 1024^3 bits/s

1.2 Processor

1. Processor

64 bit have backwards compatibility: still works for older program

- Build for efficiency
used for small product, do not need a fan, try to minimize the number of transistors they use
- Build for speed
used for large product like laptops, desktops and require large battery
need a fan to keep cool
they have lots of transistors

2. Processor Operations

- Arithmetic and logic
- comparisons
- Accessing data
- Flow control

3. Components of Processor

- Program Counter(PC):
holds the address of the current/next instruction
- Instruction Register(IR):
holds the instruction that is being executed
- Arithmetic logic Unit(ALU):
perform arithmetic and logic operations
- Registers:
a small amount of temporary storage, usually a source or destination for the data
- Control Unit:
reads the instruction in the instruction register and turns on and off the other components of the processor to execute the instruction
- Cache
stores recently used data and instructions

4. Processing power

clock speed

Mhz: 1 million clock tick per s, or Ghz: 1 billion clock ticks per second

- millisecond: ms : $\frac{1}{10^3}$ s
- microseconds: us: $\frac{1}{10^6}$ s
- nanoseconds: ns: $\frac{1}{10^9}$ s
- picoseconds: ns: $\frac{1}{10^{12}}$ s

5. Main Memory Hierarchy

Type	Speed	Capacity
Register	0.2 ns	100B - 300 B
caches	1-10 ns	10KB - 10 MB
RAM	100 ns	4GB - 400GB
SSD	10 us	256GB - 1TB
hard drive	10ms	8TB - 12 TB
network storage		
off-site storage		

1.3 Secondary Storage

1. Secondary Storage

- Hard drive
- Flash drive
- Optical drive

Not directly access able by the processor

Slow than main memory, cheaper than main memory and non-volatile
must copied into main memory before do action

2. How Secondary Storage works

- Platter
Aset of disks stacked on top of each others, with smooth magnetic coating on both side
RPM: rotation per minute
- Actuator arm
move across the disk to read/write
change the orientation of the magnetic field

3. Parameters of Hard Drives Basics

- Mean Time Between Failures (MTBF) around 100000 hours
bathtub curve
more likely to fail initially due to manufacturer error
more likely to fail later due to wearing out
 - Annualized Failure Rate(AFR)
 - 0.7-0.8% for enterprise drives (what UW buys)
 - 1.25-1.89% for consumer drives
1.89% means on average roughly $(1.0 - 0.0189)^4 \times 100\% = 92\%$
- Have over 100000 hard drives Tracks failures and make datat public

4. SSD

- Pros
 - 10x faster access data
 - last longer
 - has no moving parts
- Cons
 - More expensive
 - Can wear out sooner than hard disk when writing a lot of data
 - data can fade

5. Hybrid drives

combine small SSD with larger HD to create more space and faster speed

6. Optical Drives Basics

Similar to hard drive

use a laser than actuator arm

slower and have less capacity than hard drive, inexpensive and durable

less common as cloud and streaming are more popular

7. Assessing Performance

- Price per gigabyte
Best: hard drive
- Capacity
Best: hard drive
- Bandwidth(speed)
Best: SSD
- Durability
Best: DVD/SSD

2 About PC

2.1 Type of PC

1. Specialty Computers

- Mainframes
 - Reliability
 - ability to hot swap
 - ability to support many users
- Supercomputers
 - Fast floating point computations
 - Main use: calculation and simulation
 - use order of 100000 of cores
- Microcontrollers
 - Main Characteristic: simple processors with ram and I/O abilities
 - used in embedded systems

2. Evolution of IT

(a) mainframe/minocomputer

- Very expensive
- One centralized system

(b) Personal computers

- Used by one person
- cost \$4000
- do simple programmings

(c) Client/Server

- 2 machine: clients(very cheap) servers(more expensive)
- Client: requests and user services
- servers: runs an application and provides it to others

(d) Enterprise computing

- Link together different networks and applications
- use internet to create

(e) Cloud and mobile computing

- is an extension of client/server but rather than a server have a shared pool of resources
- like a cluster of computer, software, storage

3. Peer-to-peer (P2P)

every machine in the network consumes and provides services at the same time

2.2 Drivers of Technology

1. Moore's law

- The number of transistors that can fit on a chip doubles every 18 months
- Trend has been true since 1959, but slow down since 2010-2013

2. Law of Mass Digital Storage

- Amount of digital information is roughly doubling every year
- Since 1990, rate become 65% year
- Hard disk drive capacity growing exponentially

3. Metcalfe's law

- The value of a net work grows exponentially as a function of the number of network members

4. Declining communication Costs

- Communication costs have been declining

5. Creation of Standards

- The creation of technology standards allows competition, increase interoperability and reduces costs

2.3 Infrastructure Components

1. Computer Hardware Platforms

- Client machines: desktops, laptops....
- Server machines
could be single mainframe or large number of rack servers or blade servers

2. Operating System Platforms

- OS manages a computer's hardware and software resources
- For laptops and desktops
 - 88.6 % of PCs ran Windows
 - 9.4 % ran macOS
 - 1.5 % run linux
- For smartphones
 - 71.3 % run Android
 - 28.3 % run IOS
- For servers
 - 69.7 % run Unix or linux
 - 30.3 % run windows

3. Enterprise Applications

Computer programs used by organizations that integrate business applications and services across the many different departments

4. Data Management System and store

Role: organize and store the company's data

Use Redundant Array of Independent Disk(RAID0 to improve hard disk performance

- improve in reliability, availability, performance, capacity
- RAID 0: Disk striping
Split the file into different part and store in different disk
* number of disk speed
Decrease Reliability
- RAID 1: Disk Mirroring
Store same data on two or more disks
Improve Reliability, Read Performance
Decrease Capacity
- Parity (2-6)
Help Detect error

5. Network Platforms

Components:

- hub
Data received by the hub is send to all connected devices
- Bridge
only one input and one output, looks like destination and decides whether to forward it across the bridge or not
- switch
has many ports, decide which port sent it out to
- router
like switch but connectes different networks together

Use Network Interfacing Card(NIC)

Network Operating System (NOS)

6. Telecom Platforms

Include telephone and cell phone services

7. Internet Platforms

- Sinternet Service Provider
Provides the link from your home or company network to the rest of the internet
- Web Development
Simple website use HTML and JS and static
- Web hosting
need a server, domain name and web server

8. Service Platform

A collection of services that enable the infomation system of function

2.4 Contemporary H/W Trends

1. Mobile Digital Platform
internet access happens via highly portable devices: smartphone
2. Consumerization of IT and BYOD
BYOD = bring Your own device (to work)
allow employee to bring own device
and allow use software services
3. Grid computing
processor are idle most of the time, so simulate a super computer by
organizing the computational power of a network of PC
Can be remote, different OS
Broke task into smaller independent tasks (parallelized)
Only benefit task can be parallelized
4. Virtualization
Creation of a virtual rather actual version of something-*iii* make something look like something
In computer a computer looks like
 - Application
interact with hardware with OS
 - Operation system
 - Hardware
managed by OSTo virtualization
 - This is a fake Linux on Windows
 - Linux app
 - Linux OS
 - Virtual Hardware
 - Operation system
Windows
 - Hardware

Benefit: better resource management, test software on variety virtual configurations

5. Cloud Computing

Leasing as a service(hardware or programing tools) from another company that is accessed over the internet

- pros
 - Cost: less expense way to cover peak demad
 - Convinient: use as needed
 - Flexible: not tied to a fixed number of computers of types of OS
- Cons
 - Privacy: less control
 - Liability: might went down
 - Legal: must comply with canadian privacy laws
 - Loss of control

6. Green Computing

Design and use of computer system in a way the minimizes their impact on the environment

- Reduce power consumption
- Reduce use of standby power
- Reuse: make parts avilable to repair older PCs
- Recycle e-waste

Sanitizing a device

Different for HD and SSD

7. Autonomic Computing

industry-wide effort to develop systems that are capable of self-management

8. Future Hardware Technology

(a) Nanotechnology

- Definition
 - using nanostructures to build devices
- ideas
 - a trasistor is about 14 nanometes wide
 - minimum 5 nanometers
- Quantum Computing
 - use quantum property of a group of electrons to represent data
 - n eletrons have over 2^n different states

2.5 Contemporoary S/W trends

1. Open-Source Software(OSS) \neq Free software
 - Different stardards
 - Free software Foundation(1985): derived software must have the same freedoms
 - Open Source Initiative: make OSS more commerical
 - Many popular OSS are developed and maintained by worldwide network
may make product they don't support open source
or fund an open source challenger
 - pros
 - lower cost
 - more security, less bugs
 - flexibility
 - transparency
 - not reliant on single person
 - cons: less likely to
 - easy to use
 - meet customer needs
 - fit your particular hardware
 - have support
2. HTML
use for website
 - hypertext = text contain links
 - markup language = a way to anotation and presenting text
3. Web services and SOA
 - XML
provice a format for program to exchange informations
 - SOA
service-oriented architexture
cost effective way to adopt to new techs
4. Software Outsourcing
create software outside of the company

2.6 Management Issues

1. Dealing with change
firms need to be able to grow
scalability: ability to expand to serve a larger number of user
2. Management and Governance
Who is responsible for IT:
each department has own IT group
one overall IT group for who company
mix of both
3. Infrastructure Investment:
 - Total cost of ownership (TCO)
the acquisition cost for hardware and software represent 20 % of TCO
can break into
 - Capital expenditure: fixed, one-time cost
 - Operational expenditure: ongoing expenses
 - 2 type of cost
 - Direct IT cost: cost would pay explicitly
 - indirect IT cost: cost due to lost productivity
 - Management
the more a computer is managed, the less size of the indirect costs
 - Competitive forces model
 - Demand of services
 - Business strategy
 - IT strategy
 - IT assessment
 - Competitor's services
 - Competitor's IT investments

3 DataBases

3.1 ideas

1. Flat files
 - Pros
 - simple to create
 - all data in one place
 - good for one person processing a small amount of data
 - Cons
 - lack of security
 - lack of concurrent access
 - lack of data integrity
 - lack of scalability
 - program-data dependence
 - lack of custom formats
2. Database Management System
 - integrity
 - data independence
 - sharing and high availability
 - have standard software packages
3. Common type of databases
 - Hierarchical model: like a tree
 - Network model: as a network
 - Relational model: as a table
 - Object-oriented model: as an object

3.2 Relational Databases

1. Structure

- entities
row in a table
- Attributes or field
a column of the table, information of entity
Domain: set of allowed values
- Record
collection of attributes

2. Keys

- Primary keys
a unique attribute
- Composite
two or more attributes that are combined unique
- candidate
more than two key that are unique(each unique individually)
- Foreign keys
an attribute in a table that is primary key in another table

3. Schema Architecture

- External Schema (logical view)
displayed to a particular user
- Conceptual Schema (global view)
can see the entire database
- Physical Schema (physical view)
can see how data is physically stored and organized

4. SQL operation

- Select
finds the row that match a certain attributes
- join
adds relevant columns from another table
- Project
display the data with only those columns

3.3 Types of Databases

1. Hierarchical Database
tree captures the relationship among the data
a parent have many children
2. Network database
child can have multiple parents
3. OO database
like a OOP program
 - Inheritance (jicheng)
a children have the attributes of a parent
 - Polymorphism(duotai)
a children and it's parent can use the same function
 - Limitation of relational Databases
 - Multimedia
graphs are hard to store
 - Arrays of data
 - Unstructured text
like email...
 - Hierarchical data
maps

3.4 Database Design

1. Good design
 - Correctness
 - Completeness
 - Minimum redundancy
2. Steps
 - Identify the entities and the relationship between them
use a ER diagram to do it
 - Convert the ER diagram into table
 - Fine-tune your design
apply normalization to remove redundancy
3. ER diagram
 - Rectangle are entities
 - diamonds are relationships
 - oval are attributes
underline → primary keys
 - Relationships
 - 1:1
one entity have only one attributes
 - 1:N
one entity have many this type of attributes
 - N:M
many entity can have many this type of attributes
 - Relationships connection
 - single line
not every entity participate
 - double line
every entity participate

4. Map ER to table

- Entity from ER is represented a table
- Relationships are one of
 - Foreign keys
 - own table
- 1:1 relationships
place the primary key from one entity and any attributes of that relationship into the other entity's table
should include : own attributes, other's primary key, attributes for relationship
- 1:N relationships
place primary key from the "1" side into "N" 's table
N should include: own attributes, 1's primary key
- N: m relationship
create a new table with composite key
new table: primary key from both entites, own attributes
- Boyce-Codd Normal Form
every attribute fro an entity only
- Functional Dependency $A \rightarrow (B, C)$
A determines the value of B and C
B, C depend on A

3.5 Beyond

1. Data Warehouse
A decision support database that is maintained separately from organization's operational database
used to find relationships between data
2. Data Marts
departmental subsets that focus on selected subjects
3. Online Analytical Processing
supports multidimensional data analysis

4 Networking

4.1 Overview

1. Definition

A computer network is two or more computers connected together so that they can share resources

2. Components

- Network Interface Card
allows computer to connect to network
- Network Operation system
routes and manages communications on the network and coordinates network resources
- Connection medium
eg. wire, cable, radio waves
- Dedicated servers
e.g. file server, email server, database
- Hubs, bridges and switches
connect machines on the same network and forward data from one to another
- Routers
connect two or more different networks
- Firewall
hardware or software put between the internal network

3. Switching

- Circuit Switching
create connection using wires
like telephones
- Packet Switching
Data is broken down to 1KB size
sent it from source to destination

4. Topologies

Star, ring, bus
star most popular, others are rare

5. Geographical Scale

- NFC - near field communication
up to 4 cm : apple pay and google pay
- PAN - personal area network
up to 10cm: Bluetooth
- LAN - local area network
within a small building: Wi-Fi
- WAN - wide area network
internet

6. Internet Protocol Suite

is a set of rules governing how data is exchanged in a network including Transmission Control Protocol(TCP), Internet Protocol(IP) each computer have unique IP

7. Different Layer

- Application Layer
Defines protocol for applications to exchange data
- Transport Layer
set up and manages the connection
- Internet Layer
address and routes a packet through the network
- Network Interface Layer
Transporting a bit in the network medium

8. Physical Transmission Media

- Twisted pair
- Coaxial cable
- Fiber optic cable
- Wireless transmission

Bandwidth : the number of bits that can be transmitted per second

Latency: how long it takes to receive the first byte of data

9. Wireless communication

- Bluetooth
for PAN, 10 metres or less
- Wifi
for WLAN
- Wimax
secure remote wireless access for longer distances (up to 50 kilometres)

- Generation Cellular Networks
1G voice only, 2G text, 3G-5G internet access
3G = 1-2mb/s, 4G = 4-200Mb/s, 5G 1Gb/s
- Cell towers
35km

10. WWW

- HyperText transfer Protocol (HTTP)
structures the communication between the web browser
- Hypertext Markup Language (HTML)
is the file type that a browser understands
- Uniform resource locator (URL)
webpage's address

11. IP addresses

every device have one when connected to internet
with a domain name is the english like name

12. Voice Over IP

is a way of making telephone calls using the internet

13. VPN virtual private network

provide ability to work remotely and securely access files

14. Radio Frequency Identification (RFID)

passive cost a few pennies, don't need battery

active: cost a few dollars, need a battery, can be read from over 100 feet away

5 Management Information System

1. Key definition

- Data: raw facts
- Information: Data shaped into a form that is meaningful, to human
- Information technology
all hardware and software that a firm needs to use in order to achieve its business objectives
- Information System IS:
A set of interrelated components that connect, process, store and distribute information to support decision making and control

2. Dimension of an information System

- Technical
like processor, memory ...
- Organization (next topic)
different groups in a firm have different information needs
rules are embedded in the information system
- Management
make decision, formulate action plans

3. Mission of MIS

To improve the performance of people
have automated data gathering, to convert business data into information with business intelligence
Business Intelligence: is IT to help users make better business decisions

4. Strategic objectives of an IS

- Create or maintain a competitive advantage
 - Operational excellence, improved efficiency
 - Help develop new products
 - Understand customer and suppliers
 - Improved decision making
 - Survival
- Adapt to internal or external change
focused on the future, incremental improvement is guaranteed to make you obsolete
Creative Destruction
- Cost/Benefit Analysis
Need complementary assets: assets required to derive value from a primary investment

5. Contemporary Approaches: from IS to mIS

- Technical Approaches
 - Computer Science: methods of computation, storage and access
 - Operation Research: optimizing selected parameteres such as transportations costs, inverntory levels
 - Management Science: Models for decision making and manafae-ment practices
- Behaviour Approaches
 - Sociology: How IS affect individuals
 - Economics: production of digital goods, dynamics of digital mark-tes
 - Psychology: how humans decision makers use formal information
- Sociotechnical Approach
 - optimal organizational performance is achieved by jointly optimizing both the social and technical systems
 - consider both

6 Business Processes and Types of Information Systems

1. Business Processes

Are the collection of activities required to produce a product or service
how they might be improved by using information technology
use IS to automated BP

2. Business function

each business is a collection of business functions

- Manufacturing and production
producing and delivering products and services
- sales and marketing
selling the organization's products and services
- Finance and accounting
Managing the organization's financial assets and records
- Human resources
attracting, developing and maintaining the organization's labour force

3. Type of IS

(a) Sales and Market

- Which business process can be automated
ordering process, order fulfillment...
- What data can be gather
individual order: what, when, where
customer data: name, contact info, purchases, return
- What info can help improve business
purchase habits, promotion strategy
Terminology: called Customer relationship management(CRM)

(b) Manufacturing and production

- Which business processes can be automated?
making of individual parts, assembling testing, stocking/shelving
- what data can be gather?
inventory of parts, products
- What information can help improve business?
efficiency of the production process
Called Supply Chain mangement(SCM)

(c) Finance and accounting

- Which business processes can be automated?
Everything with money
- what data can be gather?
inventory, pruchase order, AP, sales order, billing, AR
- What information can help improve business?
cash flow, financial status ...
Called Accounting information System(AIS)

(d) HUman resources

- Which business processes can be automated?
automatic deposits, tax forms, pay slips
- what data can be gather?
recuriting, hiring and reassignment, payroll, time, attendance...
- What information can help improve business?
high employee turnover in a certain area
Human resources management System(HRMS) or HUman re-
sources information System(HRIS)

4. Types of Management

- Senior Management
is concerned with long range
use ESS
- Middle Management
concered with implementing the plans of the senior management
use DSS, MIS
- Operational Management
concerned with monitoring the day-to-day activities
use TPS

5. IS for different management

- TPS
Automates the business process, record stuff for day-to-day stuff
- MIS
provides routine repots on department's current performance to middle management
reports contain same information of each time they produced
- DSS
Supports ad-hoc(non-routine, the first time this question has been asked and this information has been created)
create sattistical model
- ESS
supports ad-hoc, decision requiring judgment, evaluation, and insight by senior management
provide view for entire company, sepcialized version of DSS
- Enterprise Resource Planning (ERP)
Integrates many of the existing IS into a big system
make report to all level

7 Organizatios and IS

1. Feature of organization

Behavioural View: rights and obligations apply to everyone, whereas privileges and responsibilities depend on your role

- Rountines and Business Processes
organizations become very efficient over time because they develop rountines
- Organization Politics
people with different background will struggle for limited company resources
- Organizational Culture:
unquestioned assumptions that organizations make about their goals and products
- Organizational Enviornment
government, competitors, customers, financial institutions
- Organizational Structure
different organizational sturctures would have different IS
- Other organiztional features
democratic/authoritarian leadership

2. Impact of IS on organizations

- reduce transactional cost
cost associated with an organization buying a product or service
- reduce agency costs
cost of managing employees
- IT flattens organizations
management more efficient
- IT innovations cause resistance
the organizational structure

3. Porter's Competitive Forces Model

- Competitors
- New market entrants
- subsitute products
- customers
- suppliers
- government

4. Competitive strategies

- decrease costs, increase quality
- differentiate products, enable new products
- focus on market niche
- develop strong ties with suppliers and customers

5. Business value chain model

find where IS are particularly useful

- Primary activities: directly related to create product or service
automated warehouse, computer control manufacturing
- Support activities: make primary possible
electronic scheduling and messaging system...

8 Social, Ethical, and Legal Issues

1. Technology trends

- Storage costs decreasing
cheaper to store lots of info about people
- Computing power increases
more dependence on computers
- Big data techniques
can develop profiles of people and make prediction
- Growth of internet
easy to access or buy personal data
- Growth of mobile phone usage
location may be tracked without user knowledge

2. Implications

- Personal information (PI) right and obligations
- Digital property right and obligations
- Data and system quality
- Accountability, liability and control
- Quality of life

3. Key legal terms

- Responsibility
accepting the potential cost, duties
- Accountability
provide mechanism to identify who is responsible
- Liability
laws exist that permit individuals to recover damages
- Due process
laws are well known and understood, can appeal to a higher authority

4. Ethical Principles

- Golden Rule
Do unto others as you would have them do unto you
- Kant's categorical imperative
if an action is not right for everyone to take, then it is not right for anyone
- Descartes rules of change
if an action cannot be taken repeatedly, then it is not right to be taken at all time
- Utilitarian Principle
take the action that achieves the higher or greatest value of all concerned
- Risk aversion principle
take actions that do not have a high cost of failure

5. PI in Canada

Personal Information Protection and Electronic Documents Act(PIPEDA) include

- demographics
age, income, ethnic origin, religion, marital status
- internet
email, content of email, IP
- physical
age, height, weight....
- financial
purchases, spending habits, banking information....

Treatment of PI

- Accountability: appoint someone to be responsible
- Consent: inform you purpose of collecting that info
- Limiting use: only use of the purpose you claim
- Safeguards: you PI must be protected
- Individual access: you have right to access your PI
- Identifying purposes: reason for collecting PI
- limiting collection: only gather information that is necessary
- Accuracy: should keep your info accurate
- Openness: privacy policy should be easy to find and understand
- Resoueces: you should provided with a complaint procedure

6. Terms of service
is the name we give to the document you consent to when you use
7. WWW challenges to privacy
 - Cookies
a website store a unique bit of data (like an account number) on your device
like primary key for database
 - Third party cookies
companies like facebook, google, amazon, track your activity across many websites
 - Web beacons
website can tell if you viewed a certain item
 - spyware
that gather information about user without user's knowledge
 - International mobile (station) equipment identity (IMEI)
each smartphone has a unique one, tracks that device and can be used to blacklist a phone in case of theft
 - Browser fingerprinting
each pc/phone has many setting and hardware specs
the combination make a pc/phone unique
8. Strategies of protect PI
 - Use 2 browser
one for dat-to-dat access
one for more private access
 - use a old computer for private access
 - Use a public computer
9. Intellectual property (IP)
is intangible property created by individuals or corporation
 - Trade secret
is intellectual work or product belonging to a business
confers economic advantage, and reasonable attempts have been made to keep it secret
 - Copyright
copyright protects original literary.....
 - Patent
grants the owner an exclusive monopoly on the ideas behind an invention between 17 and 20s
key: originality (you created it), novelty (new idea), invention (useful, solve a problem)

9 Security

1. Secure Communication terms

- encryption: render message unreadable
- decryption: retrieve the original message
- strength: number of possible key
- symmetric key encryption: the same key is used for both en and de
- Brute force search: try every possible key
- Computationally secure: it will take attacker a very long time to solve
- Hash function is a function that map input of any size onto an output of a fixed size
- Key distribution Problem
use public key encryption to solve it

2. Public key encryption

for symmetric key encryption, you have a single key

public key encryption use 2 key: public key and private key, and are mathematically related which must be used in pair

3. Digital signature

goal: show that message came from the sender rather than an imposter

4. Certificates

The certificate has the digital signature of a known certificate Authority (CA)

https is based on using this

contain information about sender and public key

5. Secure Browsing steps

- Amazon create 2 key,
- send public key to CA, get certificates, contain info about amazon and public key
- show certificate to pat's browser
- browser check certificate by CA's public key, browser get public key from certificate
- also generate a symmetric key and encrypts using Amazon's public key and send back to amazon, only amazon can decrypt it (by its private key)
- now use symmetric key to communicate

6. Terms

- tapping: eavesdropping on telephone lines
- sniffing: eavesdropping on computer network
- Radiation: intercept signal without damaging the wire
- web scraping

7. Classes of Threats

- Malware: malicious software
software designed to cause damage to a pc
- Computer virus
software that attaches to other program or data in order to be executed
- worm
similar to viruse but run on their own
- Trojan horse
a software that appears to be good, but does something bad behind the scenes
- Phishing
an email or text message that pretends to come from a trusted authority
ask for confidential information
- Denial of Service Attack(DOS):
many computer overwhelm a website requesting service
- Sniffing
eavesdropping on network communication
- Spam
junk email
- Botnet
a collection of PC that used together for common purpose
- Ransomware
software that threatens user's information unless a ransom is paid

8. Computer Security

policies: password must have two special characters

procedures: eg. how to get access to eduroam

technical measures: two factor authentication

9. Security Service

- Authentication: make sure the other party is the one we want
- Access Control: prevention of unauthorized use of resource
- Data confidentiality: protect data from unauthorized disclosure
- Data Integrity: assurance the data get is what they send
- Availability: assurance service is available when needed
- Non-repudiation: keep the message between partys

10. Wireless Security

- Bandwidth
- Security
- Authentication

11. Security and control framework

- Risk Assessment: Determine level of different risk to the firm
- Security Policy:
identitfies main seutiry risks, acceptable security goals, mechanisms
to achiveve these goals
- Acceptable Use Policy(AUP)
state the acceptable uses and users's info
- Disaster Recovery Planning
get IT running after disruption: back up system/file
- Business Continuity Planning
get business up and running after disaster
- Security Auditing: check current secuti y and control framework

10 Managing Knowledge

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