

CH5

Information collection, exchange, combination, and distribution easier than ever means less privacy

Privacy related to notion of access

Access: Physical proximity to a person, Knowledge about a person

Privacy is a “zone of inaccessibility”

Privacy is not a natural right, but it is a **prudential right**

Harms of Privacy

- Cover for illegal or immoral activities
- Burden on the nuclear family
- Hidden dysfunctional families
- Ignored people on society’s fringes

Benefits of Privacy

- Individual growth
- Individual responsibility
- Freedom to be yourself
- Intellectual and spiritual growth
- Development of loving, trusting, caring, intimate relationships

Public record: information about an incident or action reported to a government agency for purpose of informing the public.

Examples: birth certificates, marriage licenses, motor vehicle records, criminal records, deeds to property

Records Held by Private Organizations

- Credit card purchases
- Purchases made with loyalty cards
- Voluntary disclosures
- Posts to social network sites

Data Gathering and Privacy Implications

- Facebook tags
- Enhanced 911 services
- Rewards or loyalty programs
- Body scanners
- RFID tags
- Implanted chips
- OnStar
- Automobile “black boxes”
- Medical records
- Digital video recorders
- Cookies and flash cookies

Cookie	Flash Cookies
Cookie: File placed on computer’s hard drive by a Web server	Flash cookie: File placed on your computer’s hard drive by a Web server running the Adobe Flash Player
Contains information about visits to a Web site	Flash cookie can hold 25 times as much information as a browser cookie
Allows Web sites to provide personalized services	Flash cookies not controlled by browser’s privacy controls
Put on hard drive without user’s permission	Half of 100 most popular Web sites use flash cookies
You can set Web browser to alert you to new cookies or to block cookies entirely	Some Web sites use flash cookies as a way of backing up browser cookies.

Data Mining

- Searching records in one or more databases, looking for patterns or relationships
- Can be used to profiles of individuals.
- Allows companies to build more personal relationships with customers.

Secondary use: Information collected for one purpose use for another purpose

Collaborative Filtering

- Form of data mining
- Analyze information about preferences of large number of people to predict what one person may prefer
 - **Explicit method:** people rank preferences
 - **Implicit method:** keep track of purchases

Opt-in: Consumer must explicitly give permission before the organization can share info

Opt-out: Organization can share info until consumer explicitly forbid it

Opt-in is a barrier for new businesses, so direct marketing organizations prefer opt-out

Microtargeting : Determine voters most likely to support particular candidates

Social Network Analysis: Data mining now incorporating information collected from social networks,

Example: Banks evaluate the riskiness of loans

CH6

Government must balance competing desires

- desire to be left alone
- desire for safety and security

Solove's Taxonomy of Privacy

- **Information collection**: Activities that gather personal information
- **Information processing**: Activities that store, and use personal information that has been collected
- **Information dissemination**: Activities that spread personal information
- **Invasion**: Activities that intrude upon a person's daily life, or interfere with decision-making

Wiretapping refers to the interception of a telephone conversation.

A bug is a hidden microphone used for surveillance

Carnivore Surveillance System :

- Monitored Internet traffic, including email exchanges.
- Carnivore = Windows PC + "packet-sniffing" software, captured packets going to/from a IP address

Electronic Communications Privacy Act: Allows police to attach two kinds of surveillance devices to a suspect's phone line

- **Pen register**: displays number being dialed
- **Trap-and-trace device**: displays caller's phone number

Code of Fair Information Practices

1. No secret databases
2. People should have access to personal information in databases
3. Organizations cannot change how information is used without consent
4. People should be able to correct or amend records
5. Database owners, users responsible for reliability of data and preventing misuse

Legislation for Private Institutions

1. Fair Credit Reporting Act
2. Fair and Accurate Credit Transactions Act
3. Financial Services Modernization Act

Fair Credit Reporting Act: Promotes accuracy and privacy of information used by credit bureaus, Negative information kept only 7 years

Data mining: Process of searching through one or more databases looking for patterns or relationships among the data

Syndromic Surveillance Systems: A data mining system that searches for patterns indicating the outbreak of an epidemic or bioterrorism

Legislation to restrict information dissemination

1. Family Education Rights and Privacy Act
2. Video Privacy Protection Act
3. Health Insurance Portability and Accountability Act

Health Insurance Portability and Accountability Act

1. Limits how doctors, hospitals, pharmacies, and insurance companies can use medical information
2. Health care providers need signed authorization to release information
3. Health care providers must provide patients with notice describing how they use medical information

Video Privacy Protection Act Videotape service providers cannot disclose rental records without consumer's written consent, Rental stores must destroy personal information related to rentals within a year of when it is no longer needed

Freedom of Information Act: Federal law designed to ensure public has access to U.S. government records

Chapter 7: Computer and Network Security

Hackers, Past and Present

- ❖ **Original meaning of hacker**: explorer, risk taker, system innovator
- ❖ **Modern meaning of hacker**: someone who gains unauthorized access to computers and computer networks

Criminalizes wide variety of hacker-related activities:

- ❖ Transmitting code that damages a computer
- ❖ Accessing any Internet-connected computer without authorization

- ❖ Transmitting classified government information
- ❖ Trafficking in computer passwords
- ❖ Computer fraud, Computer extortion

hacker-related activities Maximum penalty: 20 years in prison and \$250,000 fine

Sidejacking: hijacking of an open Web session by capturing a user's cookie

- ✓ Sidejacking possible on unencrypted wireless networks because many sites send cookies "in the clear"

Malware

1. **Viruses:** Piece of self-replicating code embedded within another program (host)

Viruses associated with program files

- a. Hard disks, floppy disks, CD-ROMS
- b. Email attachments

How viruses spread

- c. Diskettes or CDs
- d. Email
- e. Files downloaded from Internet

Antivirus Software Packages:

- ❖ Allow computer users to detect and destroy viruses
- ❖ Must be kept up-to-date to be most effective
- ❖ Many people do not keep their antivirus software packages up-to-date
- ❖ Consumers need to beware of fake antivirus applications

2. **Worm:** Self-contained program, Spreads through a computer network, Exploits security holes in networked computers
3. **Cross-site Scripting:** Another way malware may be downloaded without user's knowledge. Problem appears on Web sites that allow people to read what others have posted. Attacker injects client-side script into a Web site.
4. **Drive-by Downloads:** Unintentional downloading of malware caused by visiting a compromised Web site. Also happens when Web surfer sees pop-up window asking permission to download software
5. **Trojan horse:** Program with benign capability that masks a sinister purpose
6. **Backdoor Trojan:** Trojan horse that gives attack access to victim's computer
7. **Rootkit:** A set of programs that provides privileged access to a computer Activated every time computer is booted. Uses security privileges to mask its presence
7. **Spyware:** Program that communicates over an Internet connection without user's knowledge or consent

Adware: Type of spyware that displays pop-up advertisements related to user's activity "ممکن تجی" "مقار نہ"

Backdoor Trojans often used to deliver spyware and adware

8. **Bots:** A kind of backdoor Trojan that responds to commands sent by a command-and-control program on another computer

First bots supported **legitimate** activities

- a. Internet Relay Chat
- b. Multiplayer Internet games

Other bots support **illegal** activities

- c. Distributing spam
- d. Collecting person information for ID theft
- e. Denial-of-service attacks

9. Botnets and Bot Herders

ممکن تجی مقار نہ

Botnet: Collection of bot-infected computers controlled by the same command-and-control program.

Bot herder: Someone who controls a botnet

Defensive Measures

- ❖ **Security patches:** Code updates to remove security vulnerabilities
- ❖ **Anti-malware tools:** Software to scan hard drives, detect files that contain viruses or spyware, and delete these files
- ❖ **Firewall:** A software application installed on a single computer that can selectively block network traffic to and from that computer

Cyber Crime and Cyber Attacks

1. **Phishing**: Large-scale effort to gain sensitive information from gullible computer users
2. **Spear-phishing**: Variant of phishing in which email addresses chosen selectively to target group of recipients
3. **SQL Injection** Method of attacking a database-driven Web application with improper security. Attack inserts SQL query into text string from client to application. Application returns sensitive information
4. **Denial-of-service attack**: Intentional action designed to prevent legitimate users from making use of a computer service
5. **Distributed denial-of-service attack**: DoS attack launched from many computers, such as a botnet
6. **Cyber Crime**: Criminal organizations making significant amounts of money from malware.

Two voting irregularities traced to these machines

- a. Hanging chad
- b. "Butterfly ballot" in Palm Beach County

Benefits of Online Voting:

- ❖ More people would vote
- ❖ Votes would be counted more quickly
- ❖ No ambiguity with electronic votes
- ❖ Cost less money
- ❖ Eliminate ballot box tampering
- ❖ Software can prevent accidental over-voting
- ❖ Software can prevent under-voting

Risks of Online Voting:

- ❖ Gives unfair advantage to those with home computers
- ❖ More difficult to preserve voter privacy
- ❖ More opportunities for vote selling
- ❖ Obvious target for a DDoS attack
- ❖ Security of election depends on security of home computers
- ❖ Susceptible to vote-changing virus or RAT
- ❖ Susceptible to phony vote servers
- ❖ No paper copies of ballots for auditing or recounts

Chapter 8: Computer Reliability

Computer systems are sometimes unreliable

- ❖ Erroneous information in databases
- ❖ Misinterpretation of database information
- ❖ Malfunction of embedded systems

Effects of computer errors

- ❖ Inconvenience مضايقات
- ❖ Bad business decisions
- ❖ Fatalities

Two Kinds of Data-related Failure

- ❖ A computerized system may fail because wrong data entered it
- ❖ A computerized system may fail because people incorrectly interpret data, they retrieve

Example for Data-related Failure

- ❖ Disfranchised Voters
- ❖ False Arrests

Errors When Data Are Correct

- ❖ Assume data correctly fed into computerized system
- ❖ System may still fail if there is an error in its programming

(Software Errors) Race condition: order in which two or more concurrent tasks access a shared variable can affect program's behavior

Two race conditions in Therac-25 software

- ❖ Command screen editing
- ❖ Movement of electron beam gun

Software lessons

- ❖ Difficult to debug programs with concurrent tasks
- ❖ Design must be as simple as possible
- ❖ Documentation crucial
- ❖ Code reuse does not always lead to higher quality

Uses of Simulations:

- Simulations replace physical experiments Experiment too expensive or time-consuming, Experiment unethical , Experiment impossible
- Model past events
- Understand world around us
- Predict the future

Validating Simulations:

Verification: Does program correctly implement model?

Validation: Does the model accurately represent the real system?

Validation methods

- Make prediction, wait to see if it comes true
- Predict the present from old data
- Test credibility with experts and decision makers

Software engineering is an engineering discipline focused on the production of software, as well as the development of tools, methodologies, and theories supporting software production. Software engineers follow a **four-step process** to develop a software product

1. **Specification**: defining the functions to be performed by the software

- Determine system requirements
- Understand constraints
- Determine feasibility
- End products "the output "

2. **Development**: producing the software that meets the specifications

- Discover and resolve mistakes, omissions in specification
- Create high-level design
- CASE tools to support design process
- Object-oriented systems have advantages
- After detailed design, actual programs written Result: working software system

3. **Validation**: testing the software

- Ensure software satisfies specification
- Ensure software meets user's needs
- Test modules, then subsystems, then system

Challenges to testing software

- ❖ Noncontinuous responses to changes in input
- ❖ Exhaustive testing impossible
- ❖ Testing reveals bugs, but cannot prove none exist

4. **Evolution**: modifying the software to meet the changing needs of the customer

Chapter 9: Professional Ethics

Characteristics of a Profession:

- Initial professional education
- Accreditation
- Skills development
- Certification
- Licensing
- Professional development
- Code of ethics
- Professional society

Eight Principles Identify Morally Responsible Relationships

- Public
- Client and employer
- Product
- Judgment
- Management
- Profession
- Colleagues
- Self

Analysis of Preamble: No mechanical process for determining if an action is right or wrong, Should not take an overly legalistic view of the Code

Intellectual virtue: developed through education

Moral virtue: developed by repeating appropriate acts

Strengths of Virtue Ethics:

- Provides a motivation for good behavior
- Provides a solution to the problem of impartiality
 - Some virtues are partial (e.g., generosity)
 - Other virtues must be impartial (e.g., honesty)

Alternative, Discipline-Independent List of Fundamental Principles:

- Be impartial.
- Disclose information that others ought to know.
- Respect the rights of others.
- Treat others justly.
- Take responsibility for your actions and inactions.
- Take responsibility for the actions of those you supervise.
- Maintain your integrity.
- Continually improve your abilities.
- Share your knowledge, expertise, and values

Whistleblower

- ❖ Tries to report harmful situation through authorized channels
- ❖ Rebuffed by organization
- ❖ Makes disclosure through unauthorized channels

Motives of Whistleblowers

- ❖ People become whistleblowers for different reasons
- ❖ Morality of action may depend on motives
- ❖ **Good motive**
 - Desire to help the public
- ❖ **Questionable motives**
 - Retaliation الانتقام
 - Avoiding punishment

Whistleblowing harms organization

- ❖ Bad publicity
- ❖ Ruined careers
- ❖ Erodes team spirit

Chapter 10: Work and Wealth

Information technology and automation affecting workplace

- ❖ Increases in productivity
- ❖ Globalization of job market
- ❖ Organization of companies
- ❖ Telework
- ❖ Workplace monitoring

• Impacts of information technology on society

- ❖ **Digital divide:** some people do not have access to modern information technology, particularly the Internet.
- ❖ **Winner-take-all effects:** a few top performers have disproportionate share of wealth

Artificial intelligence: Field of computer science focusing on intelligent behavior by machines

• Organizational Changes:

Information technology integration into firms

- Automating back office functions (e.g., payroll)
- Improving manufacturing
- Improving communication among business units

Results

- Flattened organizational structures
- Eliminating transactional middlemen (supply-chain automation)

Higher Demand	Lower Demand
Computer engineers	Bank clerks
Computer support specialists	Procurement specialists
Systems analysts	Financial records processing staff
Database administrators	Secretaries, stenographers, and typists
Desktop publishing specialists	Communications equipment operators
	Computer operators

Telework: Employees work away from traditional place of work, **Examples:** Home office

Advantages of Telework

- ❖ Increases productivity
- ❖ Reduces absenteeism
- ❖ Improves morale
- ❖ Saves overhead
- ❖ Improves company resilience
- ❖ Helps environment
- ❖ Saves employees money

Disadvantages of Telework

- ❖ Threatens managers' control and authority
- ❖ Makes face-to-face meetings impossible
- ❖ Sensitive information less secure
- ❖ Team meetings more difficult
- ❖ Teleworkers less visible
- ❖ Teleworkers "out of the loop" ملاحظة
- ❖ Isolation of teleworkers

Temporary Work: Companies less committed to employees. Lay-offs not taboo as they once were.

Monitoring: 82% of companies monitor employees in some way

Purpose of Monitoring: Identify inappropriate use of company resources. Can also detect illegal activities

Other uses of monitoring: Gauge productivity (10% of firms). Improve productivity. Improve security

multinational teams: is a group of characters with **different nationalities**

Advantages of multinational teams: Company has people on duty more hours per day., Cost savings

Disadvantage of multinational teams: Poorer infrastructure in less developed countries

Globalization: Process of creating a worldwide network of businesses and markets

Arguments for Globalization

- Increases competition
- People in poorer countries deserve jobs, too
- It is a tried-and-true route for a poor country to become prosperous
- Global jobs reduce unrest and increase stability

Arguments against Globalization

- Makes the United States subordinate to the World Trade Organization
- Forces American workers to compete with foreigners who do not get decent wages and benefits
- Accelerates exodus of manufacturing and white-collar jobs from United States
- Hurts workers in foreign countries

• Foreign Competition

- China is world's number one producer of computer hardware
- ACM Collegiate Programming Contest provides evidence of global competition

Evidence of the Digital Divide:

- ❖ **Global divide**
 - ❖ Access higher in wealthy countries
 - ❖ Access higher where IT infrastructure good
 - ❖ Access higher where literacy higher
 - ❖ Access higher in English-speaking countries
 - ❖ Access higher where it is culturally valued
- ❖ **Social divide**
 - ❖ Access higher for young people
 - ❖ Access higher for well-educated people

Technological diffusion: rate at which a new technology is assimilated

Net neutrality legislation would require all Internet packets be treated the same

Tiered service: Charging more for high-priority routing of Internet packets

• **Winner-take-all:** a few top performers have disproportionate share of wealth

• Reducing Winner-Take-All Effects

- ❖ Limit number of hours that stores remain open
- ❖ Businesses form cooperative agreements to reduce positional arms races
- ❖ More progressive tax structures
- ❖ Campaign finance reform

دعواتكم لكل من ساهم.... بالتوفيق