Ethical Theories

• Subjective Relativism
  – “What’s right for you may not be right for me”
  – Each person decides what is the right or wrong behaviour for himself or herself

• Cultural Relativism
  – The meaning of right and wrong are particular to each society’s moral guidelines
  – Time and place will affect each society’s moral guidelines

Ethical Theories (2)

• Divine Command Theory
  – Good actions are aligned to the will of God and bad actions are contrary to that will.
  – The will of God has been revealed to us through the holy books

• Kantianism
  – First formulation
    • Act only from moral rules that you can at the same time will to be universal moral laws
  – Second Formulation
    • Act so that you always treat yourself and others as ends in themselves, and never only as a means to an end
Ethical Theories (3)

- **Act Utilitarianism**
  - Greatest Happiness Principle (Principle of Utility)
    - An action is right or wrong to the extent that it increases or decreases the total happiness of the affected parties
- **Rule Utilitarianism**
  - If everyone adopted and followed, the same moral rules, this will lead to the greatest increase in total happiness
  - Rule Utilitarianism applies the Principle of Utility to moral rules, whereas Act Utilitarianism applies the Principle of Utility to individual moral actions.

Ethical Theories (4)

- **Social Contract Theory**
  - Morality consists in the set of rules, governing how people are to treat one another, that rational people will agree to accept, for their mutual benefit, on the condition that others follow those rules as well
  - John Rawl’s Theory of Justice
    - Each person may claim a number of basic rights and liberties, so long as these claims are consistent with everyone else having an equal claim
    - Any social or economic inequalities must be justified and arranged so that they are of the greatest benefit to the least-advantaged (Difference Principle)

Email and Spam

- How email works
- The spam epidemic
- Ethical evaluations of spamming
Ethical Evaluations of Spamming

- Kantian evaluation
- Act utilitarian evaluation
- Rule utilitarian evaluation
- Social contract theory evaluation
- From all these perspectives, it is wrong to send spam

The World Wide Web

- Attributes of the Web
- How we use the Web
- Too much control or too little?

Censorship

- Direct censorship
- Self-censorship
- Challenges posed by the Internet
- Ethical perspectives on censorship
Intellectual Property Rights

- What is intellectual property?
- Property rights
- Extending the argument to intellectual property
- Benefits of intellectual property protection
- Limits to intellectual property protection

Protecting Intellectual Property

- Trade secrets
- Trademarks and service marks
- Patents
- Copyrights

New Restrictions on Use

- Digital Millennium Copyright Act
- Digital rights management
- Secure Digital Music Initiative
- Encrypting DVDs
- Making CDs copyproof
- Criticisms of digital rights management
Peer-to-Peer Networks

- Napster
- FastTrack
- BitTorrent
- RIAA lawsuits
- MP3 spoofing
- Universities caught in the middle
- MGM v. Grokster
- Legal music services on the Internet

Protections for Software

- Software copyrights
- Violations of software copyrights
- Software patents
- Safe software development

Open-Source Software

- Consequences of proprietary software
- Open source definition
- Beneficial consequences of open-source software
- Examples of open-source software
- The GNU Project and Linux
- Impact of open-source software
- Critique of the open-source software movement
Creative Commons

- Under current copyright law, eligible works are copyrighted the moment they are created
- No copyright notice does not mean it’s okay to copy
- Must contact people before using work
- That slows down creative re-use of others’ work
- Free Creative Commons license indicates
  - Which kinds of copying are okay
  - Which rights are being retained

Perspectives on Privacy

- Defining privacy
- Harms and benefits of privacy
- Is there a natural right to privacy?
- Privacy and trust

Disclosing Information

- Public record: information for public access
- Public information: information revealed to an organization that has right to share it
- Personal information: undisclosed information
- Types of disclosures
  - Voluntary
  - Involuntary
  - Statutory
Code of Fair Information Practices

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

Wiretaps and Bugs

- *Omstead v. United States* — wiretapping OK
- Federal Communications Act
- *Nardone v. United States* — wiretapping not OK
- FBI continues secret wiretapping
- *Katz v. United States* — bugs not OK

Data Mining

- Data mining
  - Searching for patterns or relationships in one or more databases
  - Way to generate new information
- Secondary use: information collected for one purpose used for another purpose
- Information about customers is a valuable commodity
Ownership of Transaction Information

- Who controls transaction information?
  - Buyer?
  - Seller?
  - Both?
- Opt-in: consumer must explicitly give permission for the organization to share info
- Opt-out: consumer must explicitly forbid an organization from sharing info

Encryption

- Symmetric encryption
- Public key cryptography
- Pretty Good Privacy
- Clipper chip
- Effects of U.S. export restrictions
- Digital cash

Viruses, Worms, and Trojan Horses

- Viruses
- Worms
- The Internet worm
- Trojan horses
- Defensive measures
Phreaks and Hackers

- Hackers
- Phone Phreaking
- The Cuckoo’s Egg
- Legion of Doom
- *U.S. v. Riggs*
- Steve Jackson Games
- Retrospective
- Penalties for Hacking

Data-Entry or Data-Retrieval Errors

- Disfranchised voters
- False arrests
- Analysis: Accuracy of NCIC records

Software and Billing Errors

- Errors leading to system malfunctions
- Errors leading to system failures
- Analysis: E-retailer posts wrong price, refuses to deliver
Errors Leading to System Malfunctions

- Qwest sends incorrect bills to cell phone customers
- Faulty USDA beef price reports
- U.S. Postal Service returns mail addressed to Patent and Trademark Office
- Spelling and grammar error checkers increased errors
- BMW on-board computer failure

Errors Leading to System Failures

- Los Angeles County + USC Medical Center laboratory computer
- Japan's air traffic control system
- Chicago Board of Trade
- London International Financial Futures and Options Exchange
- Comair's Christmas Day shutdown

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 Engineering

• Specification
• Development
• Validation (testing)
• Software quality is improving

Moral Responsibility of Software Manufacturers

• If vendors were responsible for harmful consequences of defects
  – Companies would test software more
  – They would purchase liability insurance
  – Software would cost more
  – Start-ups would be affected more than big companies
  – Less innovation in software industry
  – Software would be more reliable
• Making vendors responsible for harmful consequences of defects may be wrong
• Consumers should not have to pay for bug fixes

Automation and Unemployment

• Automation and job destruction
• Automation and job creation
• Effects of increase in productivity
Rise of the Robots?

- Some experts suggest most jobs will be taken over by machines
- Artificial intelligence: field of computer science focusing on intelligent behavior by machines
- Rapid increases in microprocessor speeds have led to various successes in AI
- What will happen as computers continue to increase in speed?

Workplace Changes

- Organizational changes
- Telework
- Temporary work
- Monitoring
- Multinational teams

Globalization

- Arguments for globalization
- Arguments against globalization
- Dot-com bust increases IT sector unemployment
- Foreign workers in the IT industry
- Foreign competition
The Digital Divide

• Digital divide: some people have access to modern information technology while others do not
• Evidence of the digital divide
• Models of technological diffusion
• Critiques of the digital divide

Access to Public Universities

• Effects of tuition increases
• Moral question
• Ethical analyses
  – Utilitarian
  – Kantian
  – Rawls’s Principles of Justice

Is Software Engineering a Profession?

• Characteristics of a profession
• Certified Public Accountants
• Software engineers
Software Engineers

- Certification and licensing not needed
- Without these, other characteristics are irrelevant
  - No college education needed
  - No apprenticeship needed
  - No membership in professional society needed
  - No continuing education needed
- Most software engineers are part of teams
- Software engineers have ability to harm public

Software Engineering Code of Ethics

Preamble

- Software engineers have opportunities to do good or do harm
- Software engineers ought to be committed to doing good
- Eight principles identify key ethical relationships and obligations within these relationship
- Code should be seen as a whole, not a collection of parts
- Concern for the public interest is paramount

Software Engineering Code of Ethics

Principles

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