Chapter 1

Catalysts for Change

1. According to the author, there is good reason to say we are living in the Information Age because computer and communication technologies have made it easy to collect, store, manipulate, and distribute vast amounts of information.
2. The Amish demonstrate that people have the ability to evaluate every technology critically and determine whether its use will improve or degrade their quality of life.
3. Mathematical tables prepared centuries ago usually had errors because each table entry was computed by somebody and each entry was typeset by somebody. Errors could occur in any of these steps.
4. Commercial mechanical calculators became practical in the late nineteenth century because advances in machine tools and mass-production methods made it possible to manufacture reliable devices at a reasonable price.
5. Rapid industrialization, economic expansion, and a concentration of corporate power in the late 19th century created a growing market for devices that could speed up accounting.
6. The Burroughs Adding Machine Company surpassed its competitors by combining an excellent product with excellent marketing.
7. The widespread adoption of the mechanical calculators led to the lowering of wages of bookkeepers and the transformation of a male-only occupation to an occupation employing a large number of women.
8. A cash register was an important information-processing device that was essentially an adding machine which expressed values in dollars and cents. It created printed, itemized receipts for customers, maintained printed logs of transactions and performed other accounting functions which helped store owners keep detailed sales records.
9. In the early twentieth century, the U.S. Census Bureau used punched cards to store census data, Marshall Field's used punched cards to analyze information generated by

cash registers, railroads used punched cards to send out bills more frequently, and the Pennsylvania Steel Company used punched cards to do cost accounting on manufacturing processes.

10. A data-processing system has three principle components. The _rst component inputs data, the second performs calculations, and the third outputs data.

11. Although many improvements were made in the design of EDVAC over ENIAC, the most important improvement was that the EDVAC stored the program in primary memory, along with the data manipulated by the program.

12. IBM quickly overtook Remington Rand as the leading mainframe computer maker because it had a larger base of existing customers and a much better sales and marketing organization, and it made a much greater investment in research and development.

13. The motivation for the creation of higher-level programming languages was a desire to make programming less tedious and error-prone and improve programmer productivity. Higher-level programming languages changed computing by enabling programs to be moved more easily from one manufacturer's computers to another manufacturer's computers. It also led to a large increase in the number of people writing computer programs.

14. Time-sharing gave more organizations access to electronic digital computers in the 1960s by allowing them to share the cost of purchasing (or leasing) and operating a computer system.

15. Between 1962 and 1965, the Minuteman II missile program was the largest single consumer of integrated circuits in the United States, representing about 20 percent of total production. In the course of making these chips, manufacturers found ways to make chips less expensive and more reliable.

16. The principal innovation of the IBM System/360 was the creation of a series of nineteen binary-compatible computers. All nineteen computers had the same instruction set. That means customers could upgrade from one IBM System/360 to a bigger, faster computer in the same product line without having to rewrite their programs.

17. The French had constructed a network of telegraph towers in the 1790s. Two semaphores were installed at the top of each of these towers. Operators raised and lowered them to form patterns which corresponded to letters or symbols.

A message that was initiated by one tower, would be seen and repeated by another tower. This process continued until the message reached its destination.

18. Morse's telegraph put the Pony Express out of business. Morse's telegraph made

possible _re alarm boxes in urban areas.

19. The telephone blurred the traditional boundaries between private life and public life, between family and business. The telephone eroded traditional social hierarchies. The telephone enabled the creation of the _rst \on-line" communities.

20. A circuit-switched network sets up a permanent physical circuit between the machines that are communicating. The circuit may not be used for other communications while these two machines are holding the circuit, even when they are not actually exchanging messages. A packet-switched network divides messages into groups of bits called packets. Network routers transfer packets from a message sender to a a message receiver. At one moment a physical wire may be carrying a packet from one message, and at the next moment it may carry a packet from another message.

21. The Internet has a decentralized structure because ARPA did not want the ARPANET to collapse if a single computer were lost. It is widely reported that fear of a nuclear attack led ARPA to this design decision.

22. The harmonic or musical telegraph is an improved version of the traditional telegraph system, which transmitted only one message at a time. A different note or different sound frequency was assigned to each message by the harmonic telegraph. When receiving the messages, different receivers could be tuned to respond to different notes.

23. The codex is more durable than a papyrus scroll, and it makes it much easier for readers to move to a particular passage in a book.

24. Hypertext is a linked network of nodes containing information.

25. A hypertext link is similar to a citation in a book in the sense that both point to a source of related information. A hypertext link is superior to a citation in that you can jump immediately to the related material by clicking on the link.

26. The Apple Lisa was not commercially successful because it was too expensive and its processor was too slow. The Macintosh was much cheaper and faster.

27. Standards like Ethernet were developed to link different components in computer networking. For example: Ethernet defines physical configuration of cable and connecters.

28. Constructing the World Wide Web on top of the TCP/IP protocol, rather than one vendor's proprietary network protocol, helped ensure the success of theWeb, because it enabled the Web to span computers made by di_erent manufacturers running di_erent operating systems.

29. Four popular Web browsers in use today are Microsoft's Internet Explorer, Google's Chrome, Mozilla's Firefox, and Apple's Safari.

30. A search engine is program that accepts a list of keywords from a user, searches a database of documents, and returns those documents most closely matching the spec-i_ed keywords.

Crawler-based search engines automatically create the database of information about Web pages. Google and AltaVista are crawler-based search engines. The other type of search engine relies upon databases of Web page information constructed by humans. OpenDirectory is an example of this kind of search engine.

31. Information technology can be used in an organization for excellence by using devices and technology for creation, storage, manipulation, exchange, and dissemination of data. Organization can also use information technology for fast communication and monitoring.

32. Inventions mentioned in this chapter that were created for a military application are the the ENIAC, radar, and the ARPANET.

33. (1) The need for large amounts of timely information by corporate managers in the late nineteenth century fueled the growth of the manual calculator market. (2) The need to store and manipulate large amounts of data prompted the invention of punched-card tabulation and data-processing systems. (3) A demand for less expensive access to computers stimulated the development of time sharing. (4) BASIC became popular because there was a demand for an easy-to-learn programming language. (5) An inter-est in accessing and sharing information led to the rapid adoption of the World Wide Web created by Tim Berners-Lee. (Other examples are possible.)

34. Individuals and nongovernmental organizations use the World Wide Web to get their messages across to billions worldwide. They use social media and emails to connect with others in seconds. Organizations now have their own Web sites to help them reach out. Thanks to the Web, it is now very easy to share information with people all over the world.

Chapter 2

Introduction to Ethics

1. The \ethical point of view" means respecting not only your own goals and aspirations, but taking into consideration the goals and aspirations of other people as well.

2. Morality refers to guidelines that you can use to determine what you ought to do in a particular situation. Morality also allows you to _gure out whether a particular decision or action is right or wrong. Ethics is the philosophical study of morality.

3. Morality is focused on solving particular problems. Ethics is broader than morality in that it includes the higher-level activities evaluating moral systems and the creation of new ways of evaluating moral problems.

4. Relativism is the view that \the good" exists inside the human mind; i.e., it is a human

invention. Since \the good" is invented, its de_nition is malleable. Objectivism is the view that \the good" exists outside the human mind. Our role as humans is to _nd or discover \the good." Since \the good" exists independently of our intellectual activity, its de_nition never changes.

5. An ethical theory allows its proponents to examine moral problems, reach conclusions, and defend those conclusions based on reasoning from facts or commonly accepted values. Workable theories are those that make it possible for a person to present persuasive, and logical arguments in order to convince people who are skeptical yet open-minded.

6. Person B has not made a strong ethical argument because she has not brought up any facts or values that would undermine or contradict the explanation of Person A.

7. When we say an ethical theory is rational, we mean that it relies upon logical reasoning from facts or commonly held values.

8. Every society has its own rules—dos and don’ts which one has to follow. This helps in the development of morality and ethics in individual.

9. We are obliged to fulfill perfect duties in each instance, whereas in case of imperfect duties, we are obliged to fulfill them in general but not in every instance. If there is a conflict between a perfect and an imperfect duty, the perfect duty gains precedence.

10. Sometimes I leave home a little late, but I'd still like to get to work on time. I want to be able to drive through red lights on those days when I am running late. The proposed moral rule is: I may ignore tra_c laws when I am pressed for time. It is also my will that the tra_c lights keep everyone else driving in an orderly manner. If we universalized this rule and everyone else who was running late also ignored tra_c laws, then the streets would be chaotic, contradicting my desire that everyone else drive in an orderly manner so that I can accomplish my illegal maneuvers. Hence my proposed moral rule is logically self-defeating. It is wrong for me to drive through red lights on those days when I am running late.

11. Plagiarism is the use of someone else's words or ideas without giving that person credit. Appendix A actually gives _ve ways of committing plagiarism: copying another's words without putting the words in quotation marks and citing the source; paraphrasing another's words without citing the source; incorporating someone else's _gures or drawings without citing the source; referencing facts that are not common knowledge without citing the source; and using another person's ideas without giving that person credit.

12. Plagiarism refers to deliberately concealing the fact that you have used someone else's words or ideas. If the action is not intentional, it should be called misuse of sources.

13. Utilitarianism is also referred to a consequentialist theory because the focus is on the consequences of an action. For example, if any of your actions makes more people happy than sad, the act is called good.

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14. Three situations in which my action would be primarily motivated by a sense of duty or obligation:

(a) I promised someone if he could get two tickets to a rock concert, I would purchase a ticket and go with him. He got the tickets and expects me to pay for mine. I keep my promise, even though I just lost my job and I really can't a_ord to go.

(b) I pay my income taxes, even though I think the government has some wasteful programs.

(c) Everybody in my fraternity is going to give blood. I donate blood, too, even though just thinking about it makes me queasy.

Three situations in which my action is primarily motivated by its expected consequences:

(a) I give money to a particular charity because it has the lowest administrative overhead of any international relief organization. I _gure more of my money will actually reach those who need it.

(b) I work extra hard in a particular class, even though I am not interested in the material, because I hope the professor will write me a good letter of recommendation.

(c) I slightly exaggerate my experience in order to get a good job as a server in a nice restaurant, _guring that the probability of someone discovering my exaggeration is very low.

15. Moral luck is a problem associated with act utilitarianism. According to act utilitarianism, the moral worth of an action depends solely on its consequences. If the consequences are out of the control of the moral agent, an action that should have had a good e_ect may end up having a harmful e_ect. In this case, the action is deemed to be wrong, even though it was no fault of the person performing the action.

16. Businesses and governments often use utilitarian thinking to determine the proper course of action because it allows all the consequences of a decision to be boiled down to dollars and cents (or some other quanti_able unit of measure). In this way a cost-bene_t analysis can identify the alternative with the best outcome.

17. Moral and the legal are not identical because certain actions may be wrong even if there are no laws forbidding these actions. For example, talking very loudly on the phone in a

restaurant may be ethically wrong but there is no law banning it.

18. Social contract theory as _rst presented is a non-consequentialist theory. Social contract theory as articulated in Rawls's two principles of justice is a non-consequentialist theory.

19. Virtue ethics is based on the idea that a person of good character will, under normal circumstances, do what is right when faced with a moral decision.

20. Here are some moral virtues not mentioned in Section 2.10: altruism, ambition, charity, compassion, conscientiousness, continence, courteousness, courtesy, discretion, empathy, generosity, hospitality, humility, industry, integrity, kindness, patience, perseverance, persistence, prudence, sincerity, temperance, tranquility, and trustworthiness,

21. Subjective relativism and ethical egoism are similar in the sense that both theories allow an individual to put himself or herself _rst in determining the right action to take in a particular situation. However, there is a crucial di_erence between the two theories. Subjective relativism, like all relativistic theories, holds that each person decides what is right for himself or herself. Two people in the same circumstances could choose completely di_erent actions, and both could be right. Ethical egoism, on the other hand, is an objective theory. It holds that the right action for a person to take in a particular situation is the action that will be to the greatest long-term bene_t of that person. A rational, objective process is used to determine the greatest long-term bene_t, meaning anyone in the same situation should reach the same conclusion.

22. Both divine command theory and Kantianism are objective, holding that right and wrong can be expressed in rules that are true for all people at all times in history. Divine command theory identi_es the good with the will of God, and holds that the will of God is communicated through holy books. Kantianism, on the other hand, holds that we can use our reason to determine what is good.

23. Ethics is the philosophical study of morality—a rational examination of people's moral beliefs and behavior—whereas morality comprises the rules defined by society for people belonging to that society. For example, suppose that your university has defined rules for all the stakeholders. Your university can be an example of a society and obeying its rules is an example of morality. Ethics are the monitoring measures used by your university to check whether stakeholders are following the rules.

24. Both Kantianism and rule utilitarianism are objective. According to both theories, right actions are those that are in line with universal moral rules. However, the two theories derive the rules in di_erent ways. Kantianism determines whether a proposed moral rule is acceptable by evaluating it according to the Categorical Imperative.

Utilitarianism determines whether a proposed moral rule is acceptable by considering the long-term, overall total change in happiness that would result if everyone always followed the rule.

25. Both act utilitarianism and rule utilitarianism are consequentialist theories. However, act utilitarianism considers the consequences that would result from an action taken in one particular situation. Rule utilitarianism considers the consequences that would result if everyone always took a certain course of action in all similar situations.

26. Both theories focus on the notion of society, but they are quite di_erent. For one thing, cultural relativism is an example of relativism, while social contract theory is an example of objectivism. Cultural relativism says each society determines what people ought to do in various situations. Di_erent societies may come up with di_erent moral codes. These rules may be based heavily on tradition and not on reason. Social contract theory says morality consists in those rules that rational people ought to recognize are in everyone's best bene_t if they are universally obeyed.

27. Both Kantianism and social contract theory are objective, rule-based theories. In Kantianism, proposed rules are derived by seeing if they can meet the requirements of the Categorical Imperative. In social contract theory, proposed rules are derived by seeing if their universal adoption would be to everyone's mutual bene_t.

28. Virtue ethics is not perfect because humans are not born with virtue ethics. It is inculcated gradually and depends on the upbringing and environment of the individual. Virtue ethics which are perfect in one environment may be imperfect in another. For example, some might consider stealing from the rich and helping the less fortunate to be an ethical thing, but society may not view it as ethical.

29. Alexis did wrong when she made use of a student's login and password to gain access to the library's computers and printers. Alexis treated that student as a means to her end of getting access to the private college's computers.

The anti-spam organization is treating the innocent computer users in the East Asian country as means to its end of reducing spam. That is wrong.

The analysis depends upon the expectation of privacy people should have. The exis-tence of the cameras is public knowledge. If nobody is being \used," the action appears to be morally acceptable.

Releasing the software without informing the potential users of the possible bugs would be wrong. However, if the hospital sta_ were fully noti_ed that the product was in beta test, a decision to release the product could be justi_ed.

30. The bene_ts to Alexis were large. The harms to others were small. Her action was

morally acceptable.

Millions of people are getting much less spam. The bene_t to each of these persons is small, but meaningful. Tens of thousands of citizens of the East Asian country cannot send email to the United States. The harm to each of these persons is signi_cant. Concluding whether the action is right or wrong depends upon the weight you give to each person's bene_t or harm.

In this case the bene_ts seem to outweigh the harms. The actions of the East Dakota State Police are morally acceptable.

To do the analysis, we must examine the various courses of action and weigh, for each one, the potential bene_ts and harms to the patients, nurses, hospital, and members of the start-up company.

31. A rule utilitarian is likely to subscribe to the rule \Gaining access to another person's private information is wrong," since a great deal of harm can result if people were unable to protect con_dential information such as credit card numbers. For this reason, Alexis did wrong when she used someone else's login and password to access the library's computers and printers.

The challenge with this scenario is to determine whether any moral rules have been broken. In general, utilitarianism is comfortable with the notion that maximizing the overall good may mean that the majority gains a bene_t while the minority su_ers a harm.

The East Dakota State Police is using technology to increase the safety of the community. Its actions appear to be morally acceptable.

As long as the company fully discloses the status of the product, it appears to be on safe ground.

32. Alexis violated the property rights of the private college when she used its computers without permission. Her action was wrong.

The residents of the East Asian country had a reasonable expectation that their email would be delivered. By blacklisting the country's ISPs, the anti-spam organization encouraged American ISPs to refuse to forward email. This seems wrong.

How much privacy should a person have while operating a motor vehicle on a freeway? If a person has given up all privacy, then there seems to be nothing wrong with this action. If a person has a reasonable expectation of privacy, then the East Dakota State Police may have done something wrong if it secretly gave the FBI access to the information.

The purchaser of a product has a right to expect the manufacturer stands behind the

quality of the product. In this case it would be wrong for the company to sell the product as if it were completely debugged and 100 percent reliable. On the other hand, the hospital might be willing to beta test the device if it could get a discounted price or if that would help the company certify its reliability. The company could begin shipping the device to hospitals that understood the current state of the software.

33. Virtues associated with students are honesty, justice, and industriousness. Alexis demonstrated industriousness by working a part-time job, _nding a way to get access to PCs and printers, and completing the extra research projects. Alexis did not demonstrate honesty when she sneakily found a valid login/password combination, and she did not act in a just way when she used the resources of the private college without paying for them. Taken as a whole, Alexis's actions do not appear to be characteristic of a virtuous student.

Virtue ethics is not an appropriate theory to use when evaluating the action of a government or business, so we skip Scenarios 2 and 3.

Two virtues associated with a good employee are honesty, industriousness, and loyalty. Out of loyalty to the company, you want to _nd a way for your company to stay in business in the short run and prosper in the long run. However, honesty compels you to inform the customer regarding the true state of the software. Rather than cover up the problem, you should _nd a way to work with the customer to ensure the customer sticks with your company's product. As an industrious employee, you should volunteer to put in some extra time if that will help reduce the delay in getting the product to market.

Chapter 3

Networked Communications

1. Spam is unsolicited, bulk email.

2. In a directory harvest attack or directory attack, spammers bombard Internet service providers with millions of arbitrary emails ids which may or may not exist. Most of these emails will bounce back because the addresses are no good. However, if an email doesn’t bounce, the spammer knows there is a user with that email address and adds it to its mailing list.

3. A URL is a Uniform Resource Locator. Every Web page has a unique URL, enabling hyperlinks to be set up between arbitrary pages.

4. A wiki is a collaborative Web site that allows multiple people to create and edit the contents of the site using Web browsers.

5. A blog (Web log) is a personal diary or journal kept on the Web. The journal may

contain text, photos, or videos.

6. A PC bang is a Korean cybercafe in which people play persistent, on-line games.

7. Here are five among a multitude of other uses of the Web:

(a) We sell stuff in on-line auctions (such as eBay).

(b) We seek medical information from on-line special interest groups of people suffering from particular diseases.

(c) We learn about the weather.

(d) We find out about current traffic conditions before deciding whether to leave work.(e) We get directions before driving to a place we've never been before.

8. Censorship is when one person or organization prevents another person or organization from expressing their opinion.

9. There are three forms of direct censorship: government monopolization, pre-publication review and licensing and registration. Government monopolization means the government owns all the media outlets. Pre-publication review means the government must approve information before it is disseminated. Licensing and registration means a news organization must get a license from the government before operating. Licensing is used for media with limited bandwidth, such as radio and television.

10. There should be restrictions on the freedom of speech because unbridled expression of one's opinions without basing them on facts may prove to be harmful. Also, some restrictions on freedom of speech may be imposed to ensure greater public good. For example, television advertisements of alcohol may be prohibited as alcohol consumption is detrimental to public health.

11. Censorship is difficult on the Internet because:

(a) The Internet supports many-to-many communication. The Internet has far more information outlets than television or radio.

(b) The Internet is dynamic. Millions of computers are being added to the Internet every year.

(c) The Web is huge, containing billions of pages. Nobody can keep track of everything published on the Web.

(d) The Internet is global. Laws passed in one nation may have no effect outside that nation's borders.

(e) It is hard to distinguish between children and adults on the Internet.

12. A Web filter is a piece of software that prevents Web browsers from displaying certain pages, presumably because they have objectionable content.

13. The term "sexting" refers to sending text messages or emails that are sexually sugges-tive.

Often sexting involves sending nude photos.

14. The leading form of identity theft in the United States is credit card fraud.

15. Phishing is a form of spamming in which the email messages are designed to trick victims into revealing sensitive financial information.

16. Cyberbullying refers to bullying via the Internet or the phone system.

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17. The term \Internet addiction" stretches the traditional concept of addiction because the traditional de_nition of addiction focuses on the misuse of a chemical substance or drug.

18. The Enlightenment view of addiction is that people are responsible for the decisions they make about what they put into their bodies. Therefore, the responsibility for a person becoming addicted rests with the addict himself/herself.

Chapter 4

Intellectual Property

1. Use of information technology has led to a need for intellectual property rights because it has made copying and transmission of data easy. Anyone can copy digital content and reuse it without knowledge of intellectual property.

2. John Locke holds that when people remove something from Nature through their own labor, they have mixed their labor with it, and therefore they have a property right in that object.

3. Two paradoxes arise when we attempt to extend a natural right to property into the realm of intellectual property. (1) If more than two people create the identical intellectual property, there is only one instance of that property, not two, meaning both people cannot claim full rights to that property. (2) Copying an intellectual property is di_erent from stealing a physical property. Perfect copies can be made of objects embodying an intellectual property. When this happens, the original owner has lost exclusive control over use of the property, even though he or she still has the original article. Put another way, since perfect copies can be made of objects embodying an intellectual property, multiple people can make use of the intellectual property at the same time.

4. An individual or _rm in the United States may protect intellectual property through trade secrets, trademarks, service marks, patents, and copyrights.

5. A trademark is a word, symbol, picture, sound, color, or smell used to identify a product. It is good when a company's trademark becomes well known to the public. Examples of trademarks are Kleenex, McDonald's Golden Arches, and Advil. Your

college or university's logo is most likely trademarked.

A trade secret is a piece of intellectual property that is kept con_dential. Examples of trade secrets are formulas, processes, proprietary designs, strategic plans, and customer lists. The information loses much or all of its value if it becomes public knowledge.

In short, trademarks are public, and trade secrets are private.

6. The advantage of a trade secret is that it does not expire. The disadvantage of a trade secret is that a company cannot prevent another company from attempting to reverse engineer the formula or process.

The advantage of a patent is that the government gives the patent owner the exclusive right to the intellectual property. The disadvantage of a patent is that this right expires after 20 years.

7. Fair use refers to those circumstances under which it is legal to reproduce a copyrighted work without permission.

8. As information technology has advanced, companies have begun using digital media (such as CDs and DVDs) to store copyrighted songs, movies, and computer programs. The widespread availability of personal computers and CD/DVD burners has made it much easier for consumers to make copies of CDs and DVDs.

9. The Digital Millennium Copyright Act curtails fair use of copyrighted material by consumers by making it illegal to burn personal copies of copyrighted DVDs.

10. The Secure Digital Music Initiative (SDMI) was put in place make CDs copy protected and to create digital music downloading secure by ensuring that downloaded music would play only on SDMI-compliant devices.

The SDMI was unsuccessful for three reasons:

a) Before technology could be put into effect to protect against copying, there was a huge growth in the number of music files that were being copied on the Internet.

b) Consumer electronics companies, which were some for the sponsors of SDMI, began to sell a large number of devices which were used increasingly by consumers as they had easy access to free MP3 files. A restriction on copying could have hurt the sales of the consumer electronics companies.

c) The scheme to digitally watermark downloads failed.

11. A peer-to-peer network is a transient (temporary) network allowing computers running the same networking program to connect with each other and access _les stored on each other's hard drives. Peer-to-peer networks facilitate _le sharing.

13. BitTorrent achieves an order-of-magnitude increase in downloading speed, compared

with KaZaA and Grokster, by allowing a user to download di_erent pieces of a _le from many di_erent sources simultaneously.

14. Sony did not actively encourage its customers to record or disseminate copyrighted material, and the Supreme Court ruled that time-shifting was not an infringement of copyright. In contrast, Grokster and StreamCast encouraged the availability of copyrighted _les on their networks and helped consumers download these _les, because these actions increased the popularity of their services and heightened their advertising revenues.

15. Patents are considered an unreliable way of protecting intellectual property rights in software because the Patent O_ce has given out many bad software patents than cannot hold up in court. This has happened because for decades the Patent O_ce did not give out patents on software. During this time a lot of \prior art" was being developed. Now, when a company applies for a software patent, the Patent O_ce may not be aware of some of the prior art. It may issue a patent even though the algorithm is not novel. Such a patent has little value. The existence of bad patents in software reduces the value of software patents in general.

16. Company A can develop a program that duplicates the functionality of a program made by company B without violating company B's copyright through the process of \clean room" software development. Two independent teams work on the project. The _rst team is responsible for determining how Company B's program works, perhaps by examining the object code, and produces a technical speci_cation. The second team relies solely on the technical speci_cation to develop the software. Because the code developers are isolated from Company B's product, Company A can ensure no code get copied, even unconsciously.

17. Open source software is different from licensed software because they are distributed in an alternative way. Their source codes are freely available for use and can be modified without restriction. They can also be freely sold or given away. People can use the software in whichever way they like. There is no need for additional licensing agreements for subsequent users. On the other hand, licensed software can be used only after purchasing them from the developer or owner of the software. Licensed software cannot be used or distributed freely as there are restrictions to it.

12. Napster relied on a single central server to mediate requests. FastTrack distributes the index of available _les among many supernodes. Shutting down Napster simply requires shutting down the single central server. Shutting down FastTrack would require shutting down all of the supernodes. Hence FastTrack would be more di_cult for the

judicial system to shut down than Napster.

18. Linux has a_ected the market for proprietary software by putting price pressure on companies selling proprietary versions of Unix. It is providing an alternative to servers running the Windows operating system.

19. My band can select a Creative Commons license that allows people to download music for noncommercial purposes, but still protects the band's copyright to the song.

Chapter 5

Information Privacy

1. Whitepages.com combines information contained in two databases. The _rst database ties phone numbers to addresses. The second database ties addresses to locations on a map. By combining information in these databases, Whitepages.com can show the map location associated with a phone number.

2. Privacy is a negative right because all I have to do to give you privacy is leave you alone.

3. The Third Amendment to the U.S. Constitution gives people the right to refuse to let the government quarter soldiers in their homes in peacetime.

4. When we say privacy is a prudential right, we mean that granting people this right provides a net bene_t to society. Hence it is prudent for a society to choose to give its members some privacy.

5. It is true that we have more privacy than our grandparents had at our age. Some possible answers are as follows (other examples are also possible): a) We spend more time in our own houses than outside. This could be attributed to air conditioning and television sets becoming more common. b) Young adults are more likely to stay independently and away from their parents. The increase in the number of nuclear families also means that there is greater privacy. c) There is also an increase in the use of private vehicles which gives us greater privacy than our grandparents who had to use public transport.

6. A public record contains information reported to a government agency for the purpose of informing the public.

7. Here are a few examples of public records that may exist about a person: legal name, address, list of real estate owned, property tax records, political party, date of birth, date of marriage, date of divorce, and date of death.

8. Here are a couple of possible answers. In order to get a job, many people are required to take a drug test; i.e., submit a urine sample. People routinely submit urine and blood samples and hand over medical records in order to get a life insurance policy.

9. The Electronic Privacy Information Center _led a complaint about Facebook Tag Suggestions because Facebook apparently used photos posted on its site to develop its facial recognition technology, but it never received consent from Facebook users to use their photos for this purpose.

10. Enhanced 911 service raises new concerns about privacy because in order to implement this service, cell phone companies must install technology that enables them to track the positions of all active cell phones.

11. By keeping track of a consumer's purchases using a loyalty card, a company can predict which other products that consumer may be interested in purchasing and generate coupons for those products to stimulate a sale.

12. If consumers cannot detach or disable the RFID tags associated with items they have purchased, then information about their possessions may be collected by other people with RFID scanners.

13. If every pet has an embedded RFID tag with the address and phone number of the owner, then authorities who recover a stray pet can use an RFID scanner to read this information and quickly return the pet to her owner.

14. A two-way communication system allows drivers who need help to contact an OnStar representative. If the vehicle's airbags deploy, the system automatically communicates the location of the vehicle to an OnStar center. OnStar can be used to help owners recover stolen vehicles. OnStar representatives also have the power to disable the gas pedal on OnStar-equipped vehicles.

15. Consolidating a patient's medical records into a single database can make it easier for multiple health care professionals to provide quality service to that patient. For example, having all of a person's prescriptions in a single database makes it easier to identify potentially dangerous drug interactions. The risk of consolidation is that if someone should gain access to the database without authorization, that person would get access to all of that patient's medical information.

16. The use of digital video recorder can result in infringement of the user’s privacy because the recorder collects detailed information about the viewing habits of its users by monitoring the activities of the users. This information is then shared with the subscription service providing digital video recording.

17. Cookies created by a Web server can a_ect your privacy because if someone else should steal the your cookie, that person can impersonate you. (This issue will be discussed in Chapter 7.)

18. Data mining means searching through multiple databases looking for patterns or rela-

tionships in the records.

19. Collaborative _ltering is a way of helping an individual wade through a large amount of choices and focus in on the best ones. It uses information about the preferences of a large number of people to predict those items an individual is more likely to like. On-line retailers and movie-rental sites use collaborative _ltering to make recommendations.

20. Business houses can use data mining in marketing and customer satisfaction as it lets them generate new information by combining facts found over many transactions of consumers, and could help them predict future purchases the consumer may want to make. This analysis enables business houses to offer consumers better combinations of products, which in turn increase customer satisfaction.

21. An opt-in policy requires a consumer to explicitly give permission before an organization can share information it has collected about the individual. An opt-out policy allows an organization to share information it has collected about a consumer unless the individual explicitly forbids it.

22. (1) Bharti Airtel is using data mining on social network to determine \inuencers" and give them incentives to keep them loyal. (2) Police in Richmond, Virginia are monitoring Facebook and Twitter in order to more e_ciently deploy o_cers on big party nights. (3) Banks are combining information from social networks with other information to evaluate the creditworthiness of people applying for loans.

23. Facebook's decision to make their Beacon system opt-out infuriated many Facebook users, who didn't even know Beacon existed until it had revealed information they thought was private, such as purchases they had made.

Chapter 7

Computer and Network Security

1. A hacker is someone who seeks and exploits weaknesses in a system, computers and networks in particular. Hackers may be motivated by reasons such as profit, protest, challenge, or enjoyment.

2. Three \low-tech" methods that hackers have used to obtain login names and passwords are eavesdropping, dumpster diving, and social engineering.

3. The maximum penalty for violating the Computer Fraud and Abuse Act is 20 years in prison and a $250,000 _ne.

4. It is dangerous to surf the Web using an open WiFi network because others within range of the wireless access point can sidejack your Web session by capturing a cookie being sent to your computer.

5. Here are de_nitions of common types of malware:

(a) Adware is a type of spyware that displays pop-up advertisements.

(b) A backdoor Trojan is a Trojan horse program that gives an outsider access to the victim's computer.

(c) A bot is a type of backdoor Trojan that can be controlled by a command-and-control program on another computer.

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(d) A botnet is a network of bot-infected computers controlled by a single person or organization.

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(e) Cross-site scripting is one way that a Web surfer can accidentally run malware. The victim visits a Web site and reads something posted by someone else (the attacker). The posting contains a client-side script that is executed by the victim's Web browser.

(f) A drive-by download is the unintentional downloading of malware caused simply by visiting a compromised Web site.

(g) A rootkit is a set of programs that are launched every time the victim's computer is booted. The programs have privileged access to the computer's functions, and because they start executing before the operating system has launched, they use their privileges to hide their presence.

(h) Spyware is a program that communicates over a computer's Internet connection without the knowledge or consent of the user.

(i) A Trojan horse is a program that publicly does something bene_cial but privately performs other harmful actions.

(j) A virus is a piece of self-replicating code contained inside another program, called the host.

(k) A worm is a self-contained program that is capable of automatically propagating through a computer network by exploiting security holes.

6. IA virus is a piece of self-replicating code, which is embedded in another program called the host. An email virus is spread through email attachments. Attachments containing macros may contain small pieces of executable code; when a user opens a corrupted attachment, the virus takes control of the computer, reads the user’s email address book, and uses these addresses to send virus-contaminated emails to others.

7. Andy Sudduth's email was of no help for two reasons. First, it didn't have a subject line. Second, and more importantly, the email was not delivered in a timely manner,

because the mail server handling it was infected with the worm.

8. Here are descriptions of common types of cyber attack:

(a) A denial-of-service attack is an intentional action designed to prevent legitimate users from gaining access to a networked computer service.

(b) A distributed denial-of-service attack is a type of denial-of-service attack in which multiple computers attack the computer service. Botnets are frequently used to launch distributed denial-of-service attacks.

(c) Phishing is an e_ort to gain sensitive information from gullible computer users through the use of a mass emailing.

(d) Spear-phishing is a type of phishing in which the email list is narrowed down to improve the success rate.

(e) SQL injection is a way to attack a database-driven Web application by injecting an SQL query into a text string.

9. Some criminal organizations use the Internet to launch phishing attacks. They sell the credit card numbers and other _nancial information netted by their phishing schemes. Other criminal organizations rent botnets to those who wish to send spam, attempt a phishing scheme, or launch a distributed denial-of-service attack.

10. A cyber attack is an attack from one computer to another that attempts to disable the target computer or steal information from it.

11. Companies are converting SCADA systems to the Internet Protocol because it saves them money and allows them to do remote maintenance and monitoring.

12. The Stuxnet worm infected computers in Iran that controlled centrifuges processing uranium, causing a temporary shutdown of Iran's nuclear program.

13. Security patches, antimalware tools, and firewalls are used to protect computer systems. Software makers release security patches so that the users of the software can update their systems to remove the vulnerabilities. Antimalware tools protect computers against viruses, worms, Trojan horses, adware, and spyware, etc. Antimalware software is used to scan a computer’s hard drive, to detect files that may contain viruses or spyware, and to delete the files. A firewall is a software application installed on a computer that selectively blocks network traffic to and from it. A firewall allows the user to control which programs running on the computer are able to access the Internet.

Chapter 10

Work and Wealth

1. Traditional economists have the view that automation and information technology have

globalized the job market, increased productivity, and created more jobs.

2. There is evidence that automation eliminates jobs. The percentage of American workers involved in manufacturing dropped from 35 percent in 1947 to 9 percent in 2011. Spreadsheets and other software packages are reducing the need for accountants and bookkeepers. A large number of white-collar, middle-management jobs were

There is also evidence that automation creates more jobs than it destroys. Automation causes new kinds of jobs to be created. For example, the automation of stock exchanges has led securities _rms to hire mathematicians and computer scientists to develop automated trading systems.

3. The work week hasn't gotten shorter, even though productivity has doubled since World War II, because the increase in productivity has been used to improve the average standard of living. Another reason is that people are aware that layo_s have happened and can happen again. This knowledge is a strong incentive for salaried workers to put in long hours so they won't be part of the next layo_.

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4. Robots are the programmable machines that imitate human activities either in performance or in appearance. Robots are used in organizations in many ways as a substitute for human labor. For example, robots are used for mechanical or repeated tasks that require extreme precision. They can also be used in hazardous situations where it is not safe for humans to work. (There can be other possible answers to this question.)

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5. Telework can improve the environment by reducing pollution caused by automobiles driven by commuters.

6. Teleworkers fret about being less visible, because they do not want to be forgotten when it's time for raises or promotions. In addition, they don't want to be undervalued when managers are trying to _gure out who should be laid o_.

7. Proponents of globalization say it helps workers in developing countries in several ways. Globalization increases competition and lowers prices, improving the purchasing power of everyone, and raising the global standard of living. Globalization gives people in developing countries access to jobs. When they gain employment, their prosperity increases. Every example in the 20th century of a poor country becoming more prosperous has been the result of that country producing goods for the world market, rather than trying for self-su_ciency. Prosperity reduces the chance of countries going to war.

Opponents of globalization say it hurts workers in developing countries by forcing them

to compete with subsidized American agribusinesses. Mexican farmers who cannot compete with these prices are driven out of business. Most of them cannot _nd jobs in Mexico and end up immigrating to the United States.

8. Pippa Norris says the digital divide has two dimensions. The global divide refers to the disparity in Internet access between more industrialized nations and less industrialized nations. The social divide refers to the di_erence in access between the rich and poor within a particular country.

9. Artificial intelligence is a field of computer science and engineering that deals with the computational understanding of what is commonly called intelligent behavior, and with the creation of artifacts that exhibit such behavior. Personal intelligence would be unwilling to accept its status as a piece of property; this limitation is overcome by the use of artificial intelligence.