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Information Assurance: Homework 8 Answers and Comments

Due November 28, 2007.

1. YoYoDyne has created a great new program that analyzes key aspects of the environment, your history, your genetics, and your mental state to predict the future which greater than random probability. They have copyrighted the current version of the program. Which of the following scenarios are legal? Why or why not?
    a. You install the program and then make a back up of your system.

Legal. Falls within acceptable personal use according to the Digital Millennium Copyright Act (DMCA).

    b. You make a backup of the install media and put the original in a safe place.

Legal. Falls within acceptable personal use according to the DMCA.

    c. You post the install media on your web server so your friends can try it out.

Mostly likely not legal. It depends on your license. Most commercial end-user programs have a single seat license restriction. By posting on the general Internet, you break that license. Even if you could restrict access to your friends, that would break a single seat license.

    d. You tire of the program, so you uninstall your version and give a copy of the install media to your little brother.

Legal according to the concept of "first sale" from copyright law.

    e. You tire of the program, so you uninstall your version and sell the install media to your neighbor.

Legal also according to first sale.

    f. You write a web program wrapper that takes questions from a web page, feeds the questions to the YoYoDyne program, and creates a new web page with the answers.

Most likely not legal. Seems likely that this would be beyond the fair personal use for the software. Certainly, if you were selling your software and had to include a copy of YoYoDyne's program, this would be reselling the original program, and would require some other licensing agreement with YoYoDyne.

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g. You figure out their prediction algorithm, and you write your own version of their program.

If the prediction algorithm is not patented, reverse engineering the algorithm is legal. If the algorithm is patented, then it is illegal.

2. Consider the case of searching for electronic information.
   a. What is the main federal law that covers domestic electronic search?

Electronic Communication Privacy Act of 1986 (ECPA). Ultimately all these protections are based on the 4th ammendment.

In each of the following cases, determine whether the search is legal and why or whether additional actions must be undertaken to make the search legal.

b. Denise sits a coffee shop with an open wireless network and sets up her computer to gather all packets.

Illegal unless Denise is the service provider responsible for the network and she is performing normal maintenance work, or she is a law enforcement agent with an appropriate warrant. If the law enforcement case, her warrant would be covering a particular individual, so in that case gathering all packets might be necessary technically to get the packets of interest but it does fall outside the intent of the law.

c. Eric, the owner of the coffee shop, notices that his wireless network is not behaving well, so he sets up his computer to gather all packets to diagnose the problem.

Legal given service provider access exceptions to ECPA.

d. The FBI gathers information about what other entities Martin is communicating with from his home computer.

Not legal unless the agents have gained the appropriate search warrant from the courts. In this case, they would only need a tap and trace warrant.

e. The FBI gathers information about what other entities Martin is communicating with from all computers Martin uses on a daily basis.

Again, not legal unless the agents have gained the appropriate warrant. Thanks to the US Patriot Act, the search warrant is associated with an individual, not a particular computer. So with a search warrant, they could tap all of the computers Martin uses.

f. The FBI copies all conversations Martin has over his home computer with other entities.

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Not legal. The agents would need to get a search warrant, this time for a full wiretap. This stronger warrant puts a greater requirement of proving probable cause on the agents.

g. Nelson works for Oscar. Oscar thinks that Nelson is moonlighting for a competitor and passing them company secret information. Monitors all of Nelson's company email.

Most likely legal. The employee has some reasonable right to privacy. For example, if the employee carried around private information on a USB key, it would not be reasonable for his boss to dig through his bags and check out what is on the USB key. In general company email is not considered to have a reasonable expectation of privacy. The company should make this non-expectation of privacy explicit through email policies that the employee must read.

3. Consider the example in the book where two airline agents are attempting to reserve one of two blocks of three contiguous seats for their respective clients. The reservation program is operating on a table with the attributes "Passenger-name" and "Seat-number". Both agents are attempting to update the rows with "Seat-number" equal 11D, 11E, and 11F. Using ACID transactions and a two-phase commit, the database should ensure that one reservation will complete and the other one will not. Sketch out how the database manager could log and store data to ensure that this is the case.

Each agent would perform the following steps

1. *Gather the information for the three seat assignments into temporary values or a log.*
    1. *Determine that the rows were Seat number equals 11D, 11E, and 11F are rows 34, 35, and 36.*
    2. *Create change log entries: Set Passenger in row 34 to Bob, Set passenger in Row 35 to Carol, Set passenger in row 36 to Dave.*
2. *Grab the flag or the write lock associated with rows 34, 35, and 36.*
3. *Apply the logged changes*
    1. *Make sure the Passenger-name for rows 34, 35, and 36 are not set.*
    2. *If they are set, make sure that are set to your stored values*
    3. *Otherwise, the transaction fails.*
    4. *Apply the changes from the log.*

With this two phase commit, each agent can gather information independently. At step 2, the lock (or flag discussed in the book) serializes their efforts. In step 3, the transaction makes the changes permanent. The transaction will make a final check to ensure the seats are still open before making the transaction changes permanent. So only one transaction will win for a particular seat.

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If the system crashes in the middle of step 3, the DBMS will note that the transaction was in progress on system start up and finish applying the changes defined in the log, so the transaction is durable.

4. In general, returning information about groups in a database does not impact privacy (e.g., how many students at UIUC are receiving financial aid or what is the average value of a financial aid package or how many students live in a particular dorm). However, of the sample set is too small or if results of multiple queries can be linked, one can deduce information about individuals from these group queries. One approach suggested to ensure privacy is to reject (return no result) if the result is computed from a too small set. Consider the student database discussed in the text. It has attributes of "Student-name", "Dorm", "Financial-aid-amount", "Gender", and it will refuse to return a result if it was computed over four or fewer entries. Show how you can still make multiple queries to return information about the sensitive "Financial-aid" attribute.

Say we wanted to determine how much Financial Aid a particular student (named "Bob") received. Directly asking the sum of Financial Aid where name = Bob will fail because the set to compute over is too small. We could follow the example in the text to compute the salary of the President of an organization. Compute the sum of Financial Aid for all all students. Compute the sum of Financial Aid for all students not named Bob. Subtract the two values to find how much financial aid Bob is receiving.

We could asking a statistical result over a more general query, e.g. Average Financial Aid for all Female students in the ISR dorm. Say that set matching the query is less than five entries. We could break our request again into two parts: Average Financial Aid for all female students and Average Financial Aid for all Female Students not in ISR. Again, we can use these two results to find the answer to our original request.

5. Consider again the student database with attributes "Student-name", "Netid", "Major", "Dorm", "Grade", "Gender", "Amount-Due", "GPA", "Financial-aid-amount".
    a. The University has determined that any individual should be able to access, "Student-name", "Dorm", and "Major". Write the view definition that enables this access.

A view for all public attributes of the student database table could be defined as.

```
create view student_public as select Student-name, Dorm,
Major from Students;
```

Then to give all students the right to read this information, we would also need to issue a grant statement

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```
grant select on student_public to *;
```

b. A student should be able to access this all information about himself. Write the view definition that enables this access.

In this case you need to define a view for each student. For example for student Bob, you would define the following.

```
create view bob_student as select * from Students where
Student-name = 'Bob';
```

Then a grant statement will give Bob access to the new view.

```
grant select on bob_student to Bob;
```