

IS2510/TEL2810 Information Security & Privacy

Homework 3

Total Points: 100

Due Date: by noon of April 23, 2013 (the solutions will be posted after that)

Q1: Assume that Alice and Bob are friends. Consider two conflict of class sets $COI1 = \{X, Y\}$ and $COI2 = \{U, V\}$. Let CDX, CDY, CDU, and CDV be the company data sets of companies X, Y, U and V.

(Points 30)

Show all the possible assignments that are allowed and prohibited by the Chinese wall policy - consider *read* only assignments as well as *read* and *write*.

Consider the following scenarios;

1. Only read accesses need to be provided to CDs
2. Both read and write accesses need to be provided together to any CD.
3. Both read/write required for CDX, and CDV, and read-only to remaining CDs.

Note that Alice and Bob may not be able to cover all the CDs – for that you can assume there are others who can take on the assignment. You need to only consider Alice and Bob.

Q2: Let the following be the role hierarchy relationships, **(Points 10 + 20)**

$RH = \{(r_1, r_2), (r_1, r_3), (r_2, r_4), (r_2, r_5), (r_3, r_5), (r_3, r_8), (r_6, r_3), (r_6, r_7), (r_7, r_8)\}$.

Note that (r_i, r_j) means r_i is senior of r_j . Let each role be assigned to exactly one unique user. We can assume that u_i is assigned to role r_i . Further, note that if u is assigned to r that means u is authorized for r . Based on these, answer the following.

1. Find $authorized_users(r_5)$ and $authorized_users(r_4)$?
2. For each of following SSD constraints, state if the above hierarchy and the user assignments would result in a conflict (Consider each of these individually only)
 - $(\{r_2, r_7\}, 2)$
 - $(\{r_2, r_3, r_4, r_7\}, 3)$

Q3: [40 Points]

Suppose the following medical record dataset has been published.

SSN	Name	Race	DateOfBirth	Sex	ZIP	Marital Status	HealthProblem
		asian	09/27/64	female	94139	divorced	hypertension
		asian	09/30/64	female	94139	divorced	obesity
		asian	04/18/64	male	94139	married	chest pain
		asian	04/15/64	male	94139	married	obesity
		black	03/13/63	male	94138	married	hypertension
		black	03/18/63	male	94138	married	shortness of breath
		black	09/13/64	female	94141	married	shortness of breath
		black	09/07/64	female	94141	married	obesity
		white	05/14/61	male	94138	single	chest pain
		white	05/08/61	male	94138	single	obesity
		white	09/15/61	female	94142	widow	shortness of breath

Considering the publicly available voter registration list below, answer the following questions.

Name	Address	City	ZIP	DOB	Sex	Party
.....
.....
Sue J. Carlson	900 Market St.	San Francisco	94142	9/15/61	female	democrat
.....

- a. Answer the following questions:
 - i. What kind of anonymization has been performed on the released dataset before being published, if any?
 - ii. Explain if it is possible to infer any privacy-sensitive information from the released data using the voter list.
- b. Consider the medical record dataset above. Given attributes *Race*, *DOB*, and *Sex* together as the quasi-identifier, and attribute *Health Problem* as the sensitive attribute, create and report a 2-anonymous version of the medical dataset (*k*-anonymity where *k*=2). How many equivalency classes are there in the result dataset?
Note: There is no unique answer to this question. However, your result should have fairly low information loss.
- c. Repeat the previous exercise for attributes *Sex*, *ZIP*, and *Marital Status* as quasi-identifier with *k* = 3. Explain what the *l* value of the result is in terms of the *l*-diversity principle (considering distinct *l*-diversity)?