Homework 1 – Basic SQL & Relational Algebra Queries

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**Part One (20 Points)**

Question-1) (5 pts) Describe the following tables: [agent, skill, skillrel, affiliation, affiliationrel, mission, securityclearance] from the spy database schema in the format shown below. Underline the attributes making up the primary key of each table and describe foreign keys in a separate line.

**TableName1**(Attribute1, Attribute2, Attribute3,…)

Attribute2 is a foreign key to Table3(Attribute2)

Or: Attribute2 -> Table3(Attribute2)

**Answer: -**

For 2a through 2e, please give the answer – you do not have to write SQL queries to answer these questions, you only have to examine the schema of the spy database.

(3 points each)

2a) How many security clearance levels can an agent have?

2b) How many skills can an agent have?

2c) Can two affiliations have the same name? (Note: name refers to the attribute/column named 'title' in the relation affiliation)

2d) How many agents can be affiliated with a particular affiliation?

2e) Can two agents have different affiliation strengths to the same affiliation?

**Part Two (15 points)** Give the English request that could have resulted in each of the SQL queries below. (Don’t just paraphrase the SQL into words.) Also include the first five rows of the result for each query (or fewer if the result is smaller), and the total number of rows returned.

3.

(a) SELECT \* FROM agent WHERE country = 'USA' and city ='Washington DC';

(b) SELECT salary FROM agent;

(c) SELECT DISTINCT clearance\_id FROM agent;

(d) SELECT agent\_id, city, country, [clearance\_id](http://dbclass.cs.pdx.edu/redirect.php?server=localhost%3A5432%3Aprefer&database=f20tdb74&schema=spy&table=agent&subject=table&sortkey=9&sortdir=asc&strings=collapsed&page=1) FROM Agent WHERE salary > 95000 AND country != 'USA';

4.

(a) SELECT DISTINCT country FROM agent WHERE salary > 100000;

(b) SELECT DISTINCT country FROM agent

WHERE agent.salary > 100000;

(c) SELECT DISTINCT country FROM agent A WHERE A.salary > 100000;

**Part Three (50 points - 10 points each)** Write a single SQL statement for each of the following queries. Show the first five rows of the result for each query (or fewer, if the result is smaller) and the number of rows returned. You should be able to write these SQL queries using only the features covered in the first lecture notes. Throughout this class (and in real life!) when writing queries, make sure you are using the data you are given. Eg. If you are asked to find all the agents who speak Hindi, your query should contain something along the lines of “language = Hindi” and not “lang\_id = 19”. **There are good reasons for this – ask on Slack if you're curious about what they are!**

5. What is the team ID and the meeting frequency for the team ‘Vikings’?

6. Which countries have agents with Top Secret or Majestic clearance? (**Your query shouldn’t depend on what clearance IDs are used for these clearance levels, just the names of the levels.**)

7. What are the first name, last name, and city of all agents in at least two affiliations? (You can do this without COUNT.)

8. List the name and status of all missions that have at least one agent with the skill VooDoo/Blackmagic. Don’t repeat missions in your result.

9. Which pairs of agents have the same first and last names? (List each pair only once.)

**Part Four Relational Algebra (15 pts)**

10. Write the following queries in Relational Algebra

1. Find the first and last names for all agents having clearance level more than 5.
2. Find the unique agent id, first, and last names for agents who have Secret clearance and have a salary greater than $65,000.
3. Find the unique agent names of all agents in Spain and with the Communications skill.