

# CS 586: Homework 1

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## Part 1

1)

**agent**(agent\_id, first, middle, last, address, city, country, salary, clearance\_id)

- agent(clearance\_id) --> securityclearance(sc\_id)

**skill**(skill\_id, skill)

**skillrel**(skill\_id, agent\_id)

- skillrel(skill\_id) --> skill(skill\_id)
- skillrel(agent\_id) --> agent(agent\_id)

**mission**(mission\_id, name, access\_id, team\_id, mission\_status)

- mission(access\_id) --> securityclearance(sc\_id)
- mission(team\_id) --> team(team\_id)

**securityclearance**(sc\_id, sc\_level, description)

2a)

**Question:** Can two languages have the same name?

**Answer:** Yes, since the primary key is `lang_id` the `language` attribute can have repeats (the cardinality of `spy.language` is not that of the `spy.language.language`). Currently, however, there are no repeats in the table.

2b)

**Question:** How many languages can an agent speak?

**Answer:** Using the table `spy.languagerel` we can see that an agent can speak as many languages as cardinality of the `spy.language` table. Currently this number is 20 languages.

2c)

**Question:** How many security clearance levels can an agent have?

**Answer:** This is a bit of a tricky question. If we assume that each agent can only have a single `agent_id` then we can say that each agent can only have a single clearance. However, because `agent_id` is the primary key it is possible that the same person could be assigned multiple `agent_id`s and could therefore be assigned multiple clearances.

2d)

**Question:** How many agents can have a given skill?

**Answer:** The `skillrel` primary key is the joint attributes `(skill_id, agent_id)`. There is no limit to the number of agents that a skill can be assigned to. The only limit to the number of agents that can have a given skill is the cardinality of the `agent` table.

2e)

**Question:** How many teams can participate in any given mission?

**Answer:** In the `mission` table, `mission_id` is the primary key and is associated with a `team_id`. Therefore, only a single team can be associated with any `mission_id`.

2f)

**Question:** Can two agents have different affiliation strengths to the same organization?

**Answer:** The question is unclear since the term *organization* does not appear in any of the relevant tables. `aff_id` is the primary key of the `affiliation` table while the combined `(aff_id, agent_id)` is the primary key of `affiliationrel`. Lets assume that *organization* has a one-to-one mapping with `aff_id`. In this case, it is still possible for two different agents to have two different affiliation strengths to the same organization, since in the `affiliationrel` table, there is no constraint on the `affiliation_strength` attribute.

2g)

**Question:** Can one agent have different affiliation\_strengths to two or more different organizations?

**Answer:** This case is the same as the previous. Organization is not clearly defined. Again assuming a one-to-one mapping from *organization* to `aff_id`, it is possible for one agent to have different affiliation strength in different organizations, since the primary key of the `affiliationrel` table would differ in the `aff_id` attribute.

2h)

**Question:** Can an agent participate in more than one ongoing mission?

**Answer:** Yes, missions are assigned to teams and agents are assigned to teams through the `teamrel` table. The primary key for the `teamrel` table is the joint `(team_id, agent_id)` attribute. Therefore, an agent can be assigned to multiple teams without violating the primary key of `teamrel`. There appears to be no constraint on `mission.mission_status` and therefore no reason an agent on two or more teams could not be assigned to multiple active missions.

## Part 2

3a)

**SELECT \* FROM Agent WHERE city = 'Istanbul' AND country = 'Turkey';**

Show me all of the attributes in the `agent` table for agents from Istanbul, Turkey.

agent_id	first	middle	last	address	city	country	salary	clearance_id
115	George	Jim	Bahr	1 70th Avenue	Istanbul	Turkey	58075	3
203	George		Pardy	43 31 35th Avenue	Istanbul	Turkey	51492	3
405	Marie		Angle	4 73th Avenue	Istanbul	Turkey	56730	1
540	George		Miller	86 94th Avenue	Istanbul	Turkey	56372	3
830	Nicholas	M	Beene	15-17 49th Avenue	Istanbul	Turkey	77777	4

(5 rows)

3b)

**SELECT city FROM Agent;**

List only the city for every agent in the agent table.

city
Athens
Paris
New York
Athens
New York

(662 rows)

3c)

**SELECT DISTINCT city FROM Agent;**

List all the cities where agents are from, once.

city
Las Vegas
Norfolk
London
Paris
Shanghai

(46 rows)

3d)

**SELECT agent\_id, city, country FROM Agent WHERE salary > 100000 AND country != 'USA';**

Show me the agent id, city and country of all agents making over 100,000 in salary that are not from the USA.

agent_id	city	country
144	Baghdad	Iraq

(1 row)

4a)

**SELECT city FROM Agent WHERE salary > 90000;**

Show the city of each agent that makes more than 90,000 in salary.

city
New York
San Francisco
Baghdad
Baghdad
New York

(131 rows)

4b)

**SELECT city FROM Agent  
WHERE Agent.salary > 90000;**

Show the city of each agent that makes more than 90,000 in salary.

city
New York
San Francisco
Baghdad
Baghdad
New York

(131 rows)

4c)

**SELECT city FROM Agent A WHERE A.salary > 90000;**

Show the city of each agent that makes more than 90,000 in salary.

city
New York
San Francisco
Baghdad
Baghdad
New York

(131 rows)

## 5a)

**SELECT DISTINCT sc\_level FROM SecurityClearance;**

Show me the list of the distinct levels of security clearances an agent can hold.

sc_level
Secret
Top Secret
Magellon
Majestic
Unclassified
Classified
Presidential

(7 rows)

## 5b)

**SELECT \* FROM Agent A, SecurityClearance S  
WHERE A.city = 'London'  
AND (S.sc\_level = 'Top Secret');**

For all agents from London, show all information from `agent` table and append all information from the row for `securityclearance.sc_level == 'Top Secret'` in the `securityclearance` table to each row.

agent_id	first	middle	last	address	city	country	salary	clearance_id	sc_id	sc_level	description
138	Pete		Gupta		London	England	71246	5	4	Top Secret	Fourth highest level of access
257	Nicholas		Korn	9 71st Avenue	London	England	89645	4	4	Top Secret	Fourth highest level of access
327	Elias		Breitkreuz	53 18th Avenue	London	England	54794	5	4	Top Secret	Fourth highest level of access
388	Nickolas		Mark	7 60th Avenue	London	England	54152	2	4	Top Secret	Fourth highest level of access
414	Hercules		Wadell	21 78th Avenue	London	England	89043	1	4	Top Secret	Fourth highest level of access

(9 rows)

## 5c)

**SELECT \* FROM Agent A, SecurityClearance S  
WHERE A.city = 'London'  
AND (S.sc\_level = 'Top Secret')  
AND A.clearance\_id = S.sc\_id;**

Show all information from `agent` and `securityclearance` tables for agents from London who hold a Top Secret security clearance.

agent_id	first	middle	last	address	city	country	salary	clearance_id	sc_id	sc_level	description
257	Nicholas		Korn	9 71st Avenue	London	England	89645	4	4	Top Secret	Fourth highest level of access

agent_id	first	middle	last	address	city	country	salary	clearance_id	sc_id	sc_level	description
1	George		Carter	283rd Avenue	London	England	50000	1	1	Top Secret	Fourth highest level of access

(2 rows)

## 6a)

```
SELECT A.agent_id, A.first, A.last, A.city, A.country
FROM Agent A, TeamRel TR, Team T
WHERE A.agent_id = TR.agent_id
AND TR.team_id = T.team_id
AND T.name = 'Giraffe';
```

List the agent ID, first and last name, and agent's city and country for the agents who are members of the 'Giraffe' team.

agent_id	first	last	city	country
80	Mathew	Hakanson	San Francisco	USA
131	Bob	Foster	Shanghai	China
141	Nick	House	Baghdad	Iraq
223	Kate	Wu	Madrid	Spain
437	Ethan	Adkins	Athens	USA

(9 rows)

## 6b)

```
SELECT A1.first, A1.last, A2.city, A2.country
FROM Agent A1, Agent A2
WHERE A1.city = A2.city
AND A1.country = A2.country
AND A1.clearance_id > A2.clearance_id
AND A1.salary >= A2.salary;
```

Show the first and last name and the city and country an agent is from for every instance in which that agent holds a lower level clearance but makes more or equal in salary than another agent in the same location.

first	last	city	country
Nick	Black	Athens	USA
Nick	Black	Athens	USA
Nick	Black	Athens	USA
Nick	Black	Athens	USA
Bill	Bundt	Paris	France

(5227 rows)

## Part 3

### 7) What are the team ID and the meeting frequency for the ShowBiz team?

```
SELECT team_id, meeting_frequency
FROM team
WHERE name = 'ShowBiz';
```

team_id	meeting_frequency
19	monthly

(1 row)

### 8) Which countries have agents with Classified or Magellon clearance?

```
SELECT DISTINCT country
FROM agent A, securityclearance C
WHERE A.clearance_id = C.sc_id
AND (C.sc_level = 'Classified' OR C.sc_level = 'Magellon');
```

country
Iraq
Turkey
Spain
England
Italy

(20 rows)

9) What are the first name, last name, and city of all agents on at least two teams?

```
SELECT DISTINCT A.first, A.last, A.city
FROM agent A, teamrel T1, teamrel T2
WHERE T1.agent_id = T2.agent_id
AND A.agent_id = T1.agent_id
AND T1.team_id != T2.team_id;
```

first	last	city
Tim	Brock	Milan
Bill	Zahedi	Athens
George	Byus	New York
Pluto	Herrmann	Paris
Tim	McCracken	Hong Kong

(70 rows)

10) List the name and status of all missions that have at least one agent with the skill Kung Fu. Don't repeat missions in your result.

```
SELECT DISTINCT M.name, M.mission_status
FROM mission M, teamrel T, agent A, skill S, skillrel SR
WHERE M.team_id = T.team_id
AND T.agent_id = A.agent_id
AND SR.agent_id = A.agent_id
AND SR.skill_id = S.skill_id
AND S.skill = 'Kung Fu';
```

name	mission_status
Desk Top	success
Melian	success
Causeway	success
IceT	success
Code Red Worm Attack	failed

(108 rows)

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

```
SELECT
  DISTINCT ON (A1.first, A1.last)
  A1.first, A1.last,
  A1.agent_id, A2.agent_id
FROM agent A1, agent A2
WHERE A1.first = A2.first
AND A1.last = A2.last
AND A1.agent_id != A2.agent_id;
```

first	last	agent_id	agent_id
Anri	Lazaryan	306	326
George	Carter	419	429

first	last	agent_id	agent_id
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(3 rows)