Assignment 5: E-R Diagram Structure

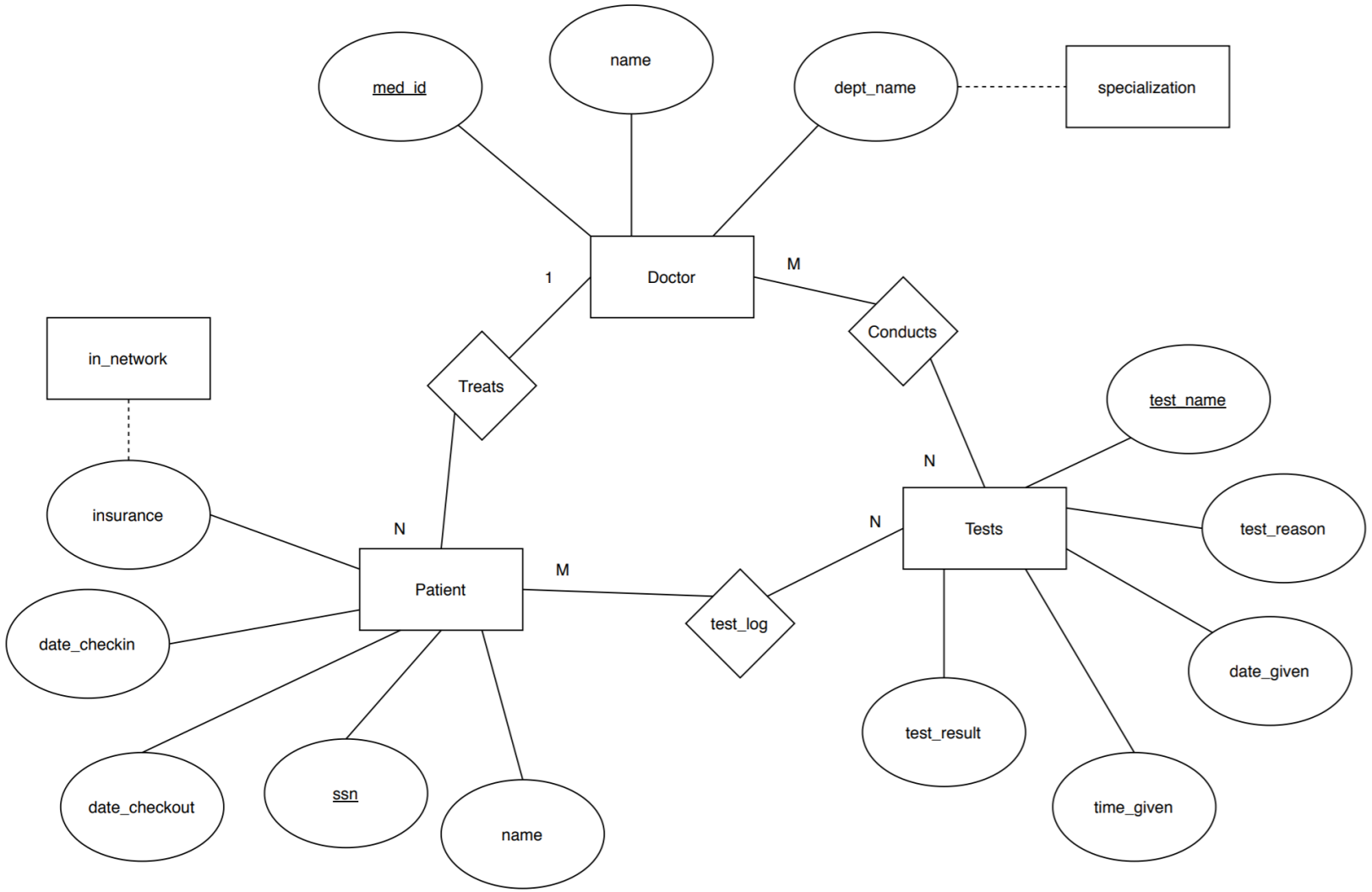
EPPS 6354: Information Management

1. An E-R diagram can be viewed as a graph. What do the following mean in terms of the structure of an enterprise schema?

- The graph is disconnected.
  - Entity sets are not related to each other if the graph is disconnected
  - This means that the sets are completely independent of each other
- The graph has a cycle.
  - This indicates that there is a relationship between connected pairs of entity sets on the cycle
  - A minimum of two types of relations between pairs of entity sets may exist in a cycle

2. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors.

- Associate with each patient a log of the various tests and examinations conducted.



3. Why do we have weak entity sets?

- Weak entity sets can be converted into a strong entity set by adding primary key attributes.
- The purpose of weak entity sets is to demonstrate that a relation has a dependent relationship with a strong entity set.
- Converting weak entity sets into strong entity sets results in data redundancy (both sets include the same primary key) and impacts data storage.

4a. SQL exercise

- i. Find ID and name of each employee who lives in the same city as the location of the company for which the employee works.

```sql
SELECT e.ID, e.person_name
FROM employee AS e, works AS w, company AS c
WHERE e.ID = w.ID AND w.company_name = c.company_name
AND e.city = c.city;
```

4a. SQL exercise

- ii. Find ID and name of each employee who lives in the same city and on the same street as does her or his manager.

```
SELECT e.ID, e.person_name
FROM employee AS e, employee AS em, manages AS m
WHERE e.ID = em.ID AND em.ID = m.ID AND e.street = em.street
AND e.city = em.city;
```

4a. SQL exercise

- iii. Find ID and name of each employee who earns more than the average salary of all employees of her or his company.

```sql
SELECT e.ID, e.person_name
FROM employee AS e, works AS w
WHERE e.ID = w.ID AND salary > (SELECT AVG(salary)
                                FROM works AS wa
                                WHERE w.company_name = wa.company_name);
```

```sql
SELECT e.ID, e.person_name
FROM employee AS e
WHERE salary > (SELECT AVG(salary)
                FROM works AS w
                WHERE e.ID = w.ID);
```

4b. SQL exercise

- This query lists the Game Design course twice.

```
SELECT name, title
FROM instructor NATURAL JOIN teaches NATURAL JOIN section NATURAL JOIN course
WHERE semester = 'Spring' AND year = 2017;
```

name	title
Brandt	Game Design
Brandt	Game Design
Kim	Intro. to Digital Systems

4b. SQL exercise

- This error occurs because the course had two sections in Spring 2017 with the same instructor, Prof. Brandt.

```
SELECT *
FROM course AS c NATURAL JOIN teaches AS t NATURAL JOIN instructor AS i
WHERE t.semester = "Spring" AND t.year = 2017;
```

course_id	title	dept_name	credits	ID	sec_id	semester	year	name	salary
CS-190	Game Design	Comp. Sci.	4	83821	1	Spring	2017	Brandt	92000
CS-190	Game Design	Comp. Sci.	4	83821	2	Spring	2017	Brandt	92000
EE-181	Intro. to Digital Systems	Elec. Eng.	3	98345	1	Spring	2017	Kim	80000

4b. SQL exercise

- The following code ensures that the course name is selected only once.

```
SELECT DISTINCT i.name, c.title
FROM course AS c NATURAL JOIN teaches AS t NATURAL JOIN instructor AS i
WHERE t.semester = "Spring" AND t.year = 2017;
```

name	title
Brandt	Game Design
Kim	Intro. to Digital Systems