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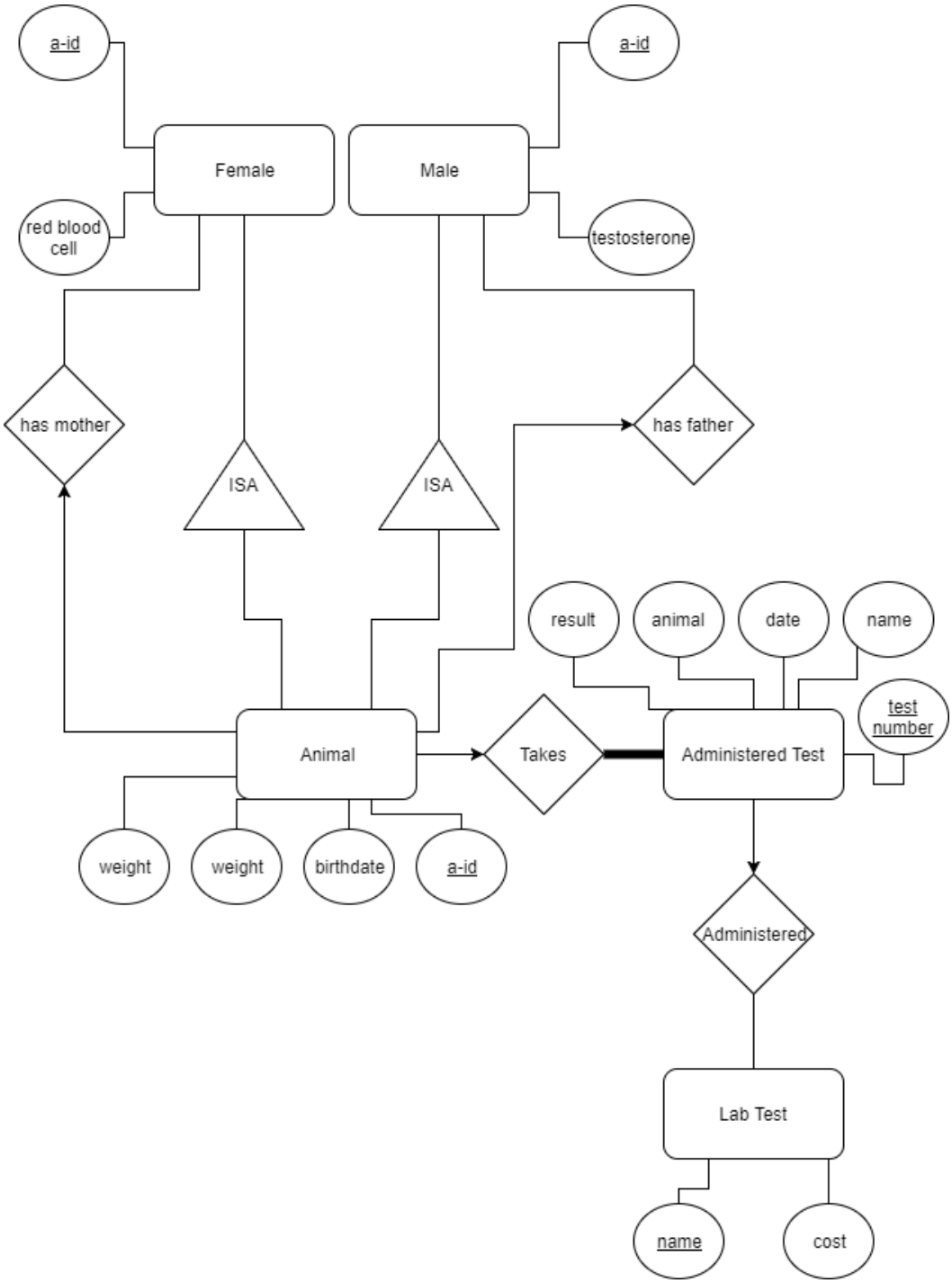
1/27/18

Problem 1

1.



2.

CREATE TABLE Animal(aid INTEGER, birthdate DATE, weight DOUBLE, height DOUBLE,
PRIMARY KEY(a-id));

Animal			
a-id	birthdate	weight	height

CREATE TABLE Administered_Test(test_number INTEGER, name CHAR(10), date DATE, result INTEGER,
PRIMARY KEY(test_number), FOREIGN KEY(name) REFERENCES Lab_Test);

Administered_Test				
test_number	name	date	result	animal

CREATE TABLE Male(testosterone DOUBLE, a-id INTEGER, PRIMARY KEY(a-id),
FOREIGN KEY(a-id) REFERENCES Animal);

Male	
testosterone	a-id

CREATE TABLE Female(red_blood_cell DOUBLE, a-id INTEGER, PRIMARY KEY(a-id),
FOREIGN KEY(a-id) REFERENCES Animal);

Female	
red_blood_cell	a-id

CREATE TABLE Takes(a-id INTEGER, test_number INTEGER, PRIMARY KEY(a-id, test_number), FOREIGN KEY(a-id) REFERENCES Animal, FOREIGN KEY(test_number) REFERENCES Adminstered_Test

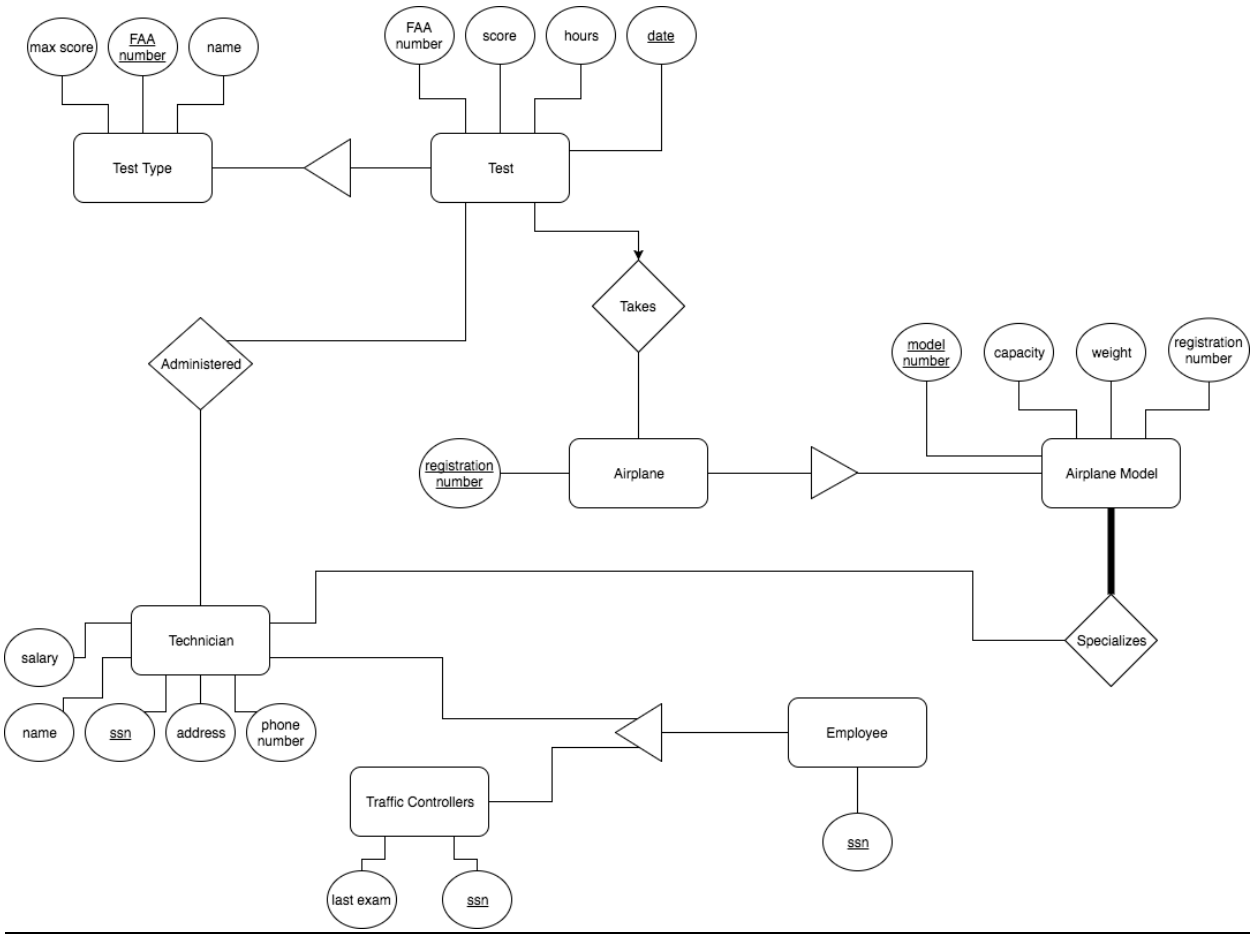
Takes	
a-id	test_number

CREATE TABLE Lab_Test(name CHAR(10), cost DOUBLE, PRIMARY KEY(name));

Lab_Test	
name	cost

Problem 2

1.



In this example, Airplanes have registration numbers and models. Each airplane model has at least one technician that specializes in them and many technicians can specialize on many airplane models. Technicians and Traffic Controllers are both employees of an airport. Airplanes take tests that are administered by technicians of a specific test type.

2.

CREATE TABLE Airplane(registration_number INTEGER, PRIMARY KEY(registration_number));

Airplane
registration_number

CREATE TABLE Specializes(model_number CHAR(10), ssn CHAR(10), PRIMARY KEY(model_number), PRIMARY KEY(ssn), FOREIGN KEY(model_number) REFERENCES Airplane_Model, FOREIGN KEY(ssn) REFERENCES Technician);

Specializes	
model_number	ssn

CREATE TABLE Administered(ssn CHAR(10), date DATE, PRIMARY KEY(ssn), PRIMARY KEY(date),
FOREIGN KEY(ssn) REFERENCES Technician, FOREIGN KEY(date) REFERENCES Test);

Administered	
ssn	date

CREATE TABLE Test_Type(max_score INTEGER, FAA_number INTEGER, name CHAR(10),
PRIMARY KEY(FAA_number));

Test_Type		
max_score	FAA_number	name

CREATE TABLE Test(FAA_number INTEGER, score INTEGER, hours INTEGER, date DATE,
registration_number INTEGER, PRIMARY KEY(date),
FOREIGN KEY(FAA_number) REFERENCES Test_Type,
FOREIGN KEY(registration_number) REFERENCES Airplane);

Test				
FAA_number	score	hours	date	registration_number

CREATE TABLE Airplane_Model(model_number INTEGER, capacity INTEGER, weight DOUBLE,
registration_number INTEGER, PRIMARY KEY(model_number),
FOREIGN KEY(registration_number) REFERENCES Airplane);

Airplane_Model			
model_number	capacity	weight	registration_number

CREATE TABLE Technician(salary INTEGER, name CHAR(20), ssn CHAR(10), address CHAR(20),
phone_number CHAR(13), PRIMARY KEY(ssn), FOREIGN KEY(ssn) REFERENCES Employee);

Technician				
salary	name	ssn	address	phone_number

CREATE TABLE Traffic_Controller(last_exam DATE, ssn CHAR(20), PRIMARY KEY(ssn), FOREIGN KEY(ssn)
REFERENCES EMPLOYEE);

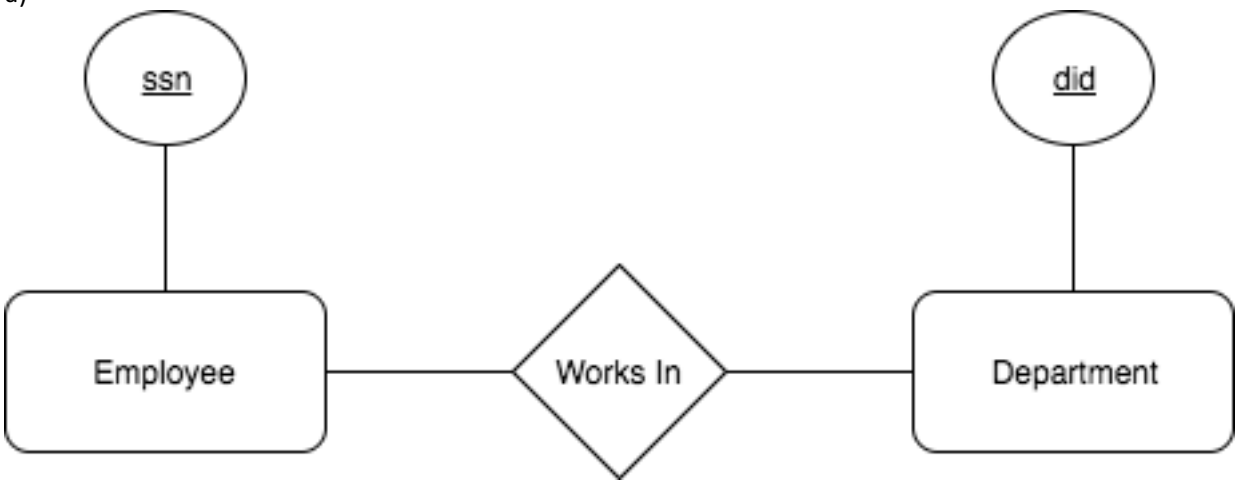
Traffic_Controller	
last_exam	ssn

CREATE TABLE Employee(ssn CHAR(20), PRIMARY KEY(ssn));

Employee
ssn

Problem 3

a)



CREATE TABLE Employee(ssn CHAR(9), PRIMARY KEY(ssn));

Employee
ssn

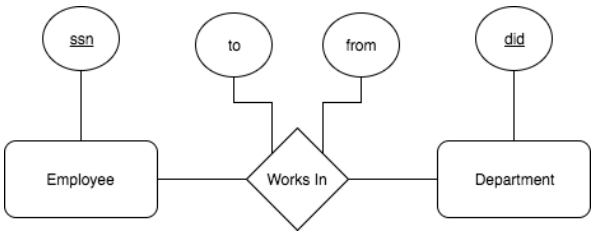
CREATE TABLE Department(did INTEGER, PRIMARY KEY(did));

Department
did

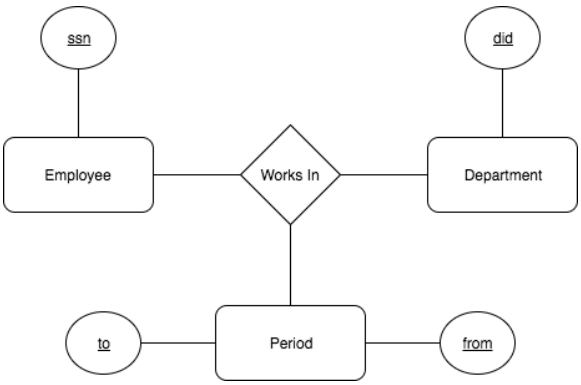
CREATE TABLE Works_In(ssn CHAR(9), did INTEGER, PRIMARY KEY(ssn), PRIMARY KEY(did),
FOREIGN KEY(ssn) REFERENCES Employee, FOREIGN KEY(did) REFERENCES Department);

Works_In	
ssn	did

b)

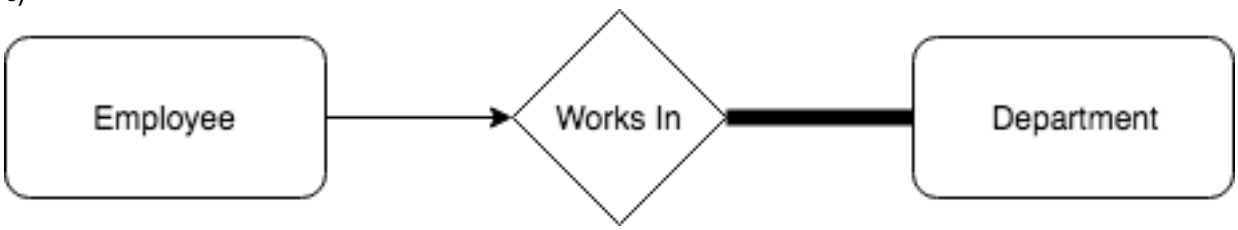


In this example, since ssn and did are primary keys in the Works_In relationship and “to” and “from” are not, there is only one time an Employee can work in a department.



In this example, since to and from are now primary keys of Works_In, an employee may now work in a department over multiple periods of time.

c)



In this example, the arrow represents a MANY significance and the bold line represents a the ONE and AT MOST ONE significance. All employees must work in only one department and each department may have more than one employee, but MUST have at least one.