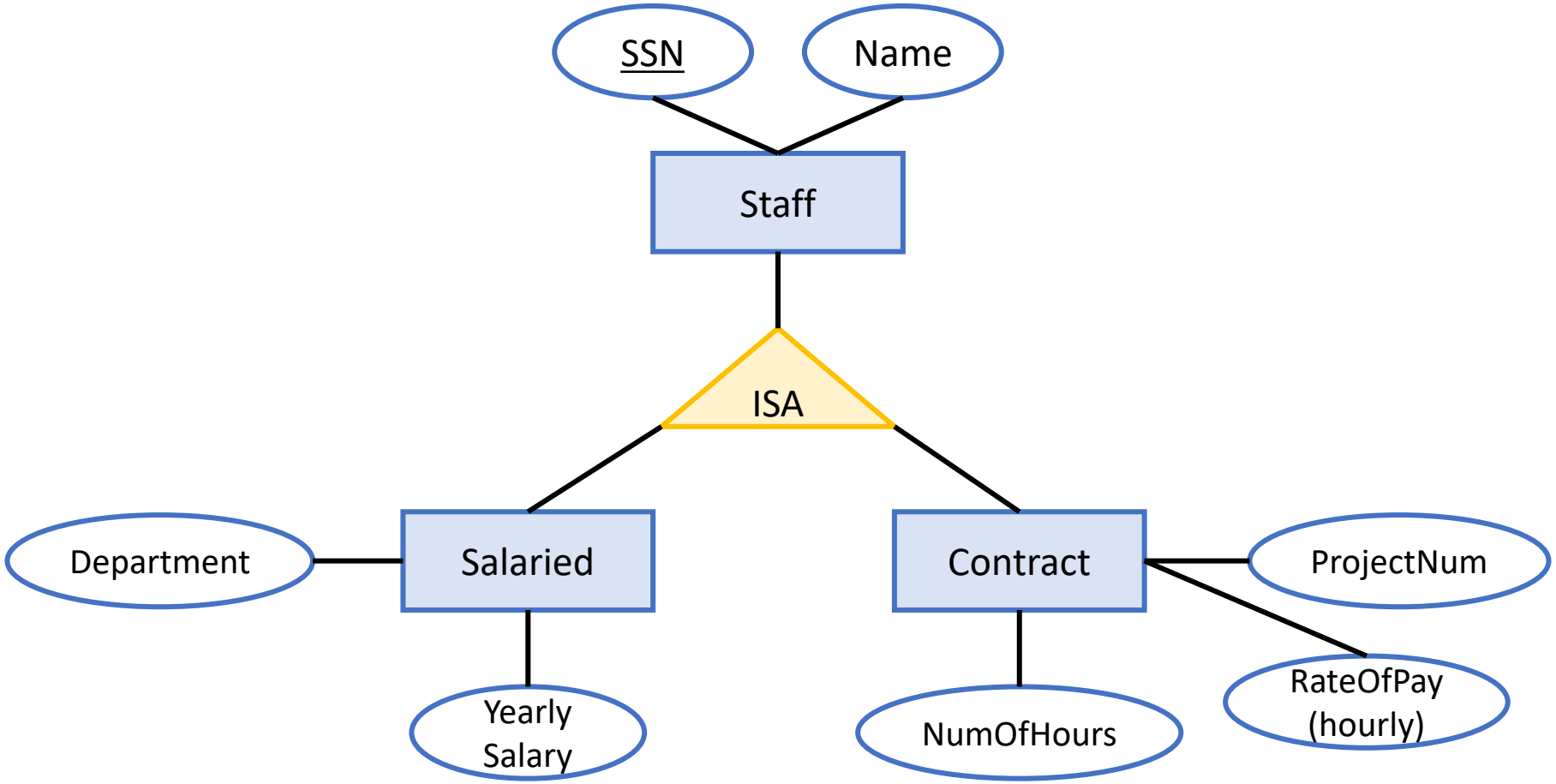
Problem 1

Megan Sin



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Possible Schema 1:

```
CREATE TABLE Staff
(SSN INTEGER Primary Key,
Name VARCHAR2(20),
Department CHAR(20),
YearlySalary REAL,
NumOfHours REAL,
RateOfPay REAL,
ProjectNum INTEGER);
```

Pro: any staff only has one record
Con: there will be null values

Since there will be null values, I do not think this is the best overall schema as there will be redundancy in data and space will be wasted.

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Possible Schema 2:

```
CREATE TABLE Salaried
(SSN INTEGER Primary Key,
Name CHAR(20),
Department CHAR(20),
YearlySalary REAL);
```

```
CREATE TABLE Contract
(SSN INTEGER Primary Key,
Name CHAR(20),
NumOfHours REAL,
RateOfPay REAL,
ProjectNum INTEGER);
```

I think this possible schema is best overall, but only when assuming a staff member must be either a salaried-employee or a contract-employee (Total and Disjoint). However, if a staff member takes on a salary and contract job, common attributes (SSN and Name) will be replicated in both tables, wasting space.

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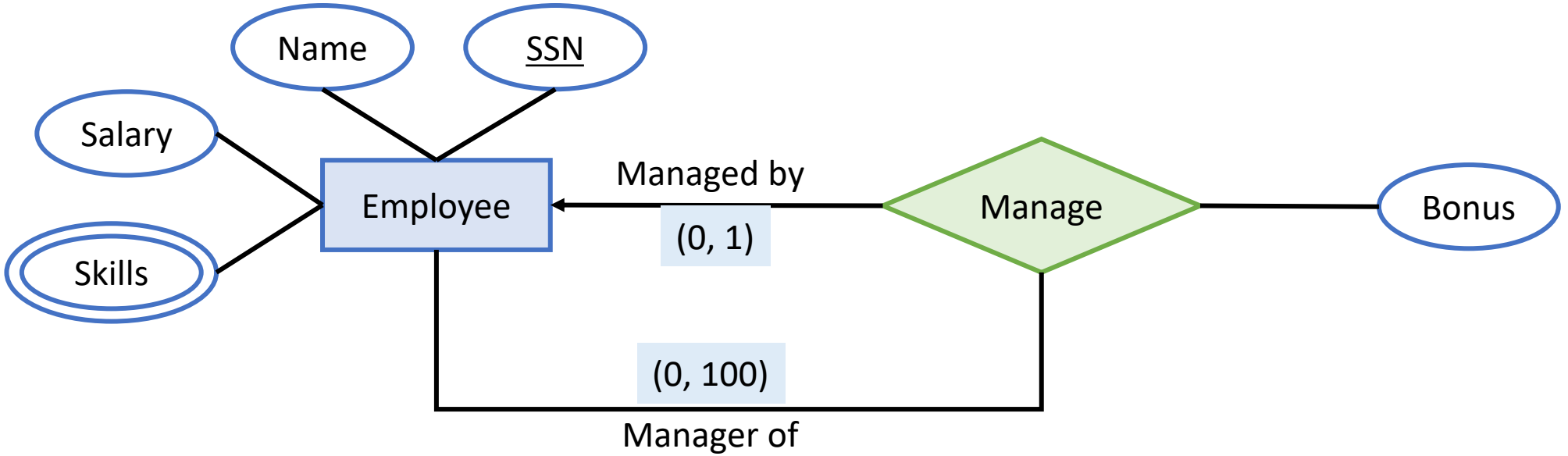
Possible Schema 3:

```
CREATE TABLE Staff
(SSN INTEGER Primary Key,
Name CHAR(20);
```

```
CREATE TABLE Salaried
(SSN INTEGER Foreign Key
References Staff (SSN),
Department CHAR(20),
YearlySalary REAL);
```

```
CREATE TABLE Contract
(SSN INTEGER Foreign Key
References Staff (SSN),
NumOfHours REAL,
RateOfPay REAL,
ProjectNum INTEGER);
```

If there is no assumption that employees must be either a salaried or contract employee, this schema design is the best as it is the most flexible and still separates salaried and contracted employees. There will be no null values (no space wasted) and there is no redundancy of data.


Name
SSN
Salary
Employee
Managed by
(0, 1)
Manage
Bonus
Skills
(0, 100)
Manager of

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```
CREATE TABLE Employees
(SSN INTEGER Primary Key,
Name VARCHAR2(100),
Salary REAL,
SuperSSN INTEGER Foreign Key
References Employees (SSN),
Bonus REAL);
```

```
CREATE TABLE SkillSets
(EmployeeSSN INTEGER Foreign
Key References Employees (SSN),
Skill VARCHAR2(50),
Constraint pk_cols Primary Key
(EmployeeSSN, Skill));
```

Problem 2.3

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0.55000001 seconds | WPI Oracle Server

Worksheet | Query Builder

```sql
SPOOL "/Users/megansin/Desktop/HW2_Problem2.txt";

CREATE TABLE Employees
(SSN INTEGER,
Name VARCHAR2(100),
Salary REAL,
SuperSSN INTEGER,
Bonus REAL,
PRIMARY KEY (SSN),
FOREIGN KEY (SuperSSN) REFERENCES Employees (SSN));

CREATE TABLE SkillSets
(EmployeeSSN INTEGER,
Skill VARCHAR2(50),
PRIMARY KEY (EmployeeSSN, Skill),
FOREIGN KEY (EmployeeSSN) REFERENCES Employees (SSN));

INSERT INTO Employees(SSN, Name, Salary, SuperSSN, Bonus) VALUES(123456789, 'John', 60000, NULL, NULL);
INSERT INTO Employees(SSN, Name, Salary, SuperSSN, Bonus) VALUES(374928127, 'Sally', 70000, NULL, 100);
INSERT INTO Employees(SSN, Name, Salary, SuperSSN, Bonus) VALUES(987654321, 'Jawn', 50000, 374928127, NULL);

INSERT INTO SkillSets(EmployeeSSN, Skill) VALUES(123456789, 'SQL');
INSERT INTO SkillSets(EmployeeSSN, Skill) VALUES(123456789, 'Microsoft Word');
INSERT INTO SkillSets(EmployeeSSN, Skill) VALUES(374928127, 'SQL');
INSERT INTO SkillSets(EmployeeSSN, Skill) VALUES(374928127, 'Public Speaking');
INSERT INTO SkillSets(EmployeeSSN, Skill) VALUES(374928127, 'Microsoft Powerpoint');

SELECT * FROM Employees;
SELECT * FROM SkillSets;

SPOOL OFF;
```

Script Output

Task completed in 0.55 seconds

```
 123456789 John                                  60000
 374928127 Sally                                 70000                 100
 987654321 Jawn                                  50000   374928127


EMPLOYEESSN SKILL
----------- --------------------------------------------------
```

```
Table EMPLOYEES created.


Table SKILLSETS created.


1 row inserted.


1 row inserted.


1 row inserted.


1 row inserted.


1 row inserted.


1 row inserted.


1 row inserted.


1 row inserted.


       SSN NAME
SALARY   SUPERSSN      BONUS
----------
--------------------------------------------------------------------------
------------------------------ ---------- ---------- ----------
 123456789 John
60000
 374928127 Sally
70000                    100
 987654321 Jawn
50000  374928127


EMPLOYEESSN SKILL
----------- --------------------------------------------------
  123456789 SQL
  123456789 Microsoft Word
  374928127 SQL
  374928127 Public Speaking
```

374928127 Microsoft Powerpoint

Problem 2.4

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Assumptions:

- Not every employee has to have a manager
- Managers can manage at most 100 employees
- If an employee doesn't manage another employee their Bonus value is Null
- Not all employees necessarily have a list of skills

Problem 2.5

An employee can have several skills (multi-valued attribute) and since multiple skills for a single employee can't be out into the employee table as SSN (primary key) has to be unique for each entry, a separate table called SkilledSets is necessary.

Problem 2.6

- An employee can manage at most 100 employees
- An employee can be managed by at most one manager

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```
CREATE TABLE Student
(StudentID INTEGER Primary Key,
Name VARCHAR2(50),
Address VARCHAR2(100),
Gender VARCHAR2(10),
GPA REAL Default 0,
Major VARCHAR2(10) NOT NULL,
Minor VARCHAR2(10),
Constraint GenderVal check
(Gender in ('Male', 'Female',
'Other')));
```

```
CREATE TABLE Course
(CourseID INTEGER Primary Key,
Title VARCHAR2(20),
NumOfCredits INTEGER);
```

```
CREATE TABLE Registration
(StudentID INTEGER,
CourseID INTEGER,
Semester VARCHAR2(20),
Grade REAL,
Constraint pk Primary Key (StudentID,
CourseID, Semester)
Constraint fk1 Foreign Key (StudentID)
References Student (StudentID)
Constraint fk2 Foreign Key (CourseID)
References Course (CourseID));
```