Homework 1

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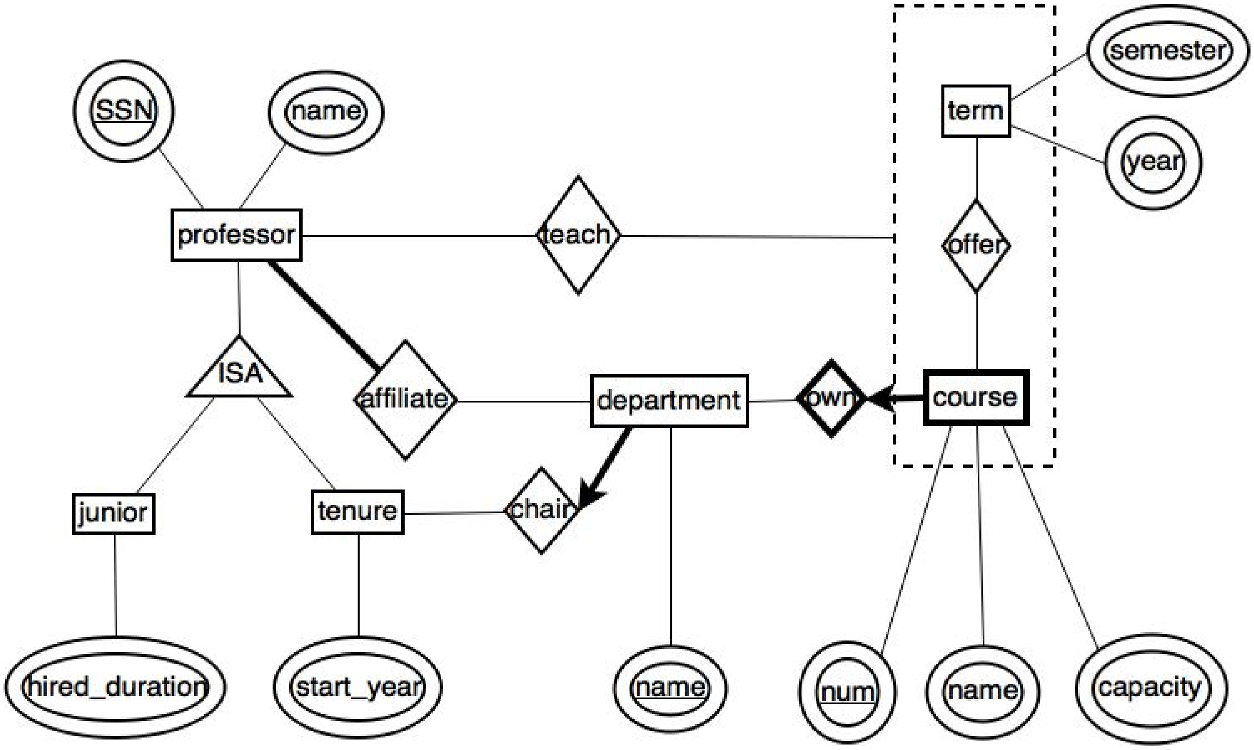
Database Design: UniDB

Assumptions:

See the ER diagram for details.

ER Diagram:



SQL Statements:

```
CREATE TABLE professor (
    SSN CHAR(11) NOT NULL,
    name TEXT,
    PRIMARY KEY (SSN)
);

CREATE TABLE tenure (
    SSN CHAR(11) NOT NULL,
    start_year INTEGER,
    PRIMARY KEY (SSN),
    FOREIGN KEY (SSN) REFERENCES professor (SSN)
);

CREATE TABLE junior (
    SSN CHAR(11) NOT NULL,
    hired_duration INTEGER,
    PRIMARY KEY (SSN),
    FOREIGN KEY (SSN) REFERENCES professor (SSN)
);
```

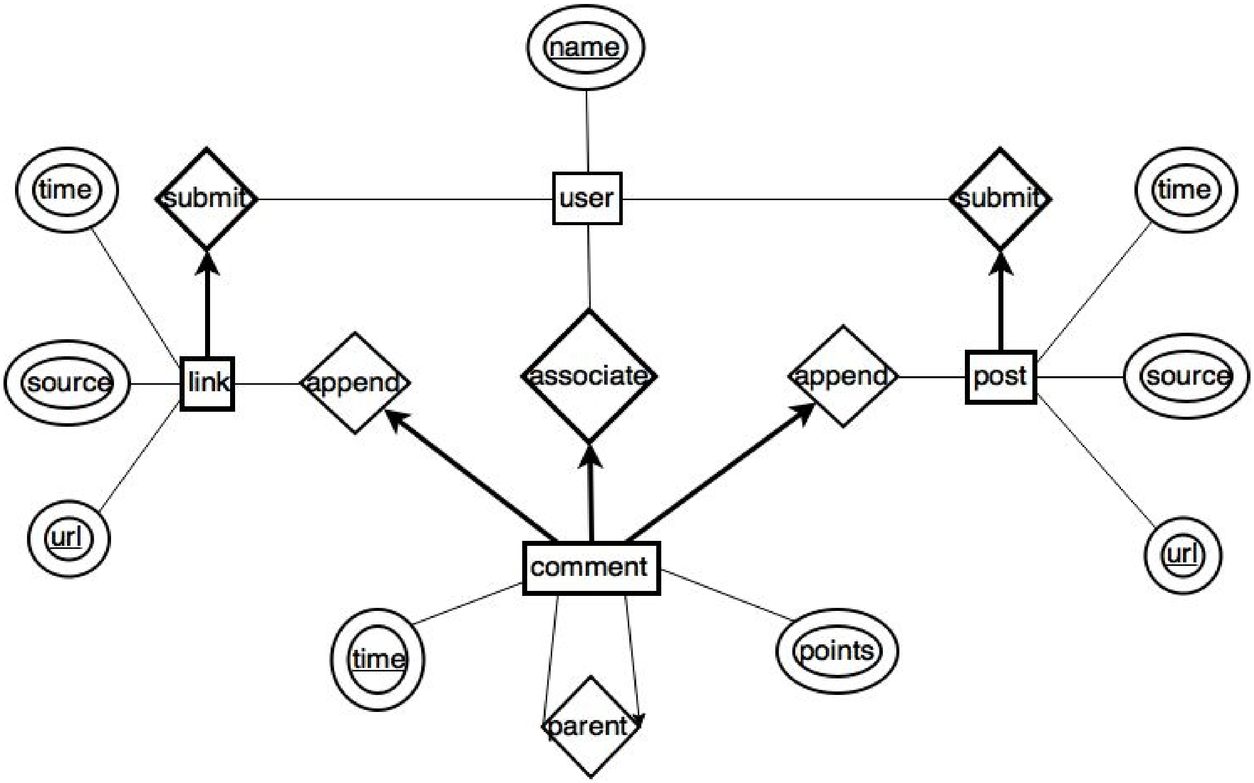
```
CREATE TABLE department (
    name TEXT NOT NULL,
    chairperson CHAR(11) NOT NULL,
    PRIMARY KEY (name),
    FOREIGN KEY (chairperson) REFERENCES tenure (SSN)
);

CREATE TABLE course (
    department_name TEXT NOT NULL,
    num TEXT NOT NULL,
    name TEXT NOT NULL,
    capacity INTEGER,
    PRIMARY KEY (department_name, num),
    FOREIGN KEY (department_name)
        REFERENCES department (name)
        ON DELETE CASCADE
);

CREATE TABLE term (
    semester TEXT NOT NULL,
    year INTEGER NOT NULL,
    PRIMARY KEY (semester, year)
);

CREATE TABLE affiliate (
    prof_SSN CHAR(11) NOT NULL,
    dept_name TEXT NOT NULL,
    PRIMARY KEY (prof_SSN, dept_name),
    FOREIGN KEY (prof_SSN)
        REFERENCES professor (SSN),
    FOREIGN KEY (dept_name)
        REFERENCES department (name)
);

CREATE TABLE offer (
    term_semester TEXT NOT NULL,
    term_year INTEGER NOT NULL,
    course_dept TEXT NOT NULL,
    course_num INTEGER NOT NULL,
    PRIMARY KEY (term_semester, term_year,
        course_dept, course_num, course_name),
    FOREIGN KEY (term_semester, term_year)
        REFERENCES term (semester, year),
    FOREIGN KEY (course_dept, course_num)
        REFERENCES course (department_name, num)
);

CREATE TABLE teach (
    offer_semester TEXT NOT NULL,
    offer_year INTEGER NOT NULL,
    offer_dept TEXT NOT NULL,
    offer_num INTEGER NOT NULL,
    teacher_SSN CHAR(11),
    PRIMARY KEY (teacher_SSN,
        offer_semester, offer_year, offer_dept, offer_num),
    FOREIGN KEY (teacher_SSN)
        REFERENCES professor (SSN),
    FOREIGN KEY (offer_semester, offer_year,
        offer_dept, offer_name, offer_num)
        REFERENCES offer (term_semester, term_year,
            course_dept, course_num)
);
```

Failed-to-Capture Constraints:

1. That junior and tenure professors may cover all professors and no professor can play both roles. Because an ISA with constraints cannot be represented by SQL.
2. That each professor should be affiliated with at least one department. Because the ‘at-least-one’ constraint cannot be effectively represented by SQL.

More Database Design

ER Diagram:



Description:

- Each user has a name which uniquely identifies him or her;
- Each link/post is a weak entity depending on a user through submit relationship, both of them have attributes including post time, source website and url for redirection;

- Each comment is a weak entity depending on a user through associate relationship, its attributes include post time and points earned;
- Each comment is supposed to append one and only one post/link;
- Two comments can involved in a parent relationship. A comment can involve in multiple such relations being a parent, meaning it has multiple children. But a comment cannot play the child role in the relation more than once, meaning each comment can have no more than one parent.