CS275 – Intro to Databases

ER Model to Relational Schema
Chap. 3.5 – 3.8
Roadmap

• Entities and attributes to tables
• Relation sets to tables
• Weak entities
• Class hierarchies
Entity sets to tables

- Entity sets to tables

```
| SSN | Name | HDate |
```
CREATE TABLE Employees (  
  SSN CHAR(11),  
  Name CHAR(30),  
  HDate Date,  
  PRIMARY KEY (SSN)  
)
Relationships to tables

• Relationships to tables (no constraints)
CREATE TABLE WorksIn (
    SSN CHAR(11),
    DID INTEGER,
    Since DATE,
    PRIMARY KEY (SSN, DID),
    FOREIGN KEY (SSN) REFERENCES Employees,
    FOREIGN KEY (DID) REFERENCES Departments
)
Relationships to tables

- Relationships to tables (no constraints)
CREATE TABLE ReportsTo (  
supervisor_SSN CHAR(11),  
subordinate_SSN CHAR(11),  
PRIMARY KEY (supervisor_SSN, subordinate_SSN),  
FOREIGN KEY (supervisor_SSN) REFERENCES Employees(SSN),  
FOREIGN KEY (subordinate_SSN) REFERENCES Employees(SSN)  
)
Relationships to tables

• Now featuring at least 10% more constraints!
CREATE TABLE Manages (  
  SSN CHAR(11),  
  DID INTEGER,  
  Since DATE,  
  PRIMARY KEY (DID),  
  FOREIGN KEY (SSN) REFERENCES Employees,  
  FOREIGN KEY (DID) REFERENCES Departments  
)
Relationships to tables

• Or we could get fancy!
• How might we save some space?
Relationships to tables

• I don’t like this. Just buy more hard drives.

CREATE TABLE Dept_Mgr (  
    DID INTEGER,  
    DName CHAR(20),  
    Budget REAL,  
    SSN CHAR(11),  
    SINCE DATE,  
    PRIMARY KEY (DID),  
    FOREIGN KEY (SSN) REFERENCES Employees  
)
Relationships to tables

• Saves some space
• Can be slower when joining
• Get to work overtime when department gets a 2nd manager

CREATE TABLE Dept_Mgr (  
DID INTEGER,  
DName CHAR(20),  
Budget REAL,  
SSN CHAR(11),  
SINCE DATE,  
PRIMARY KEY (DID),  
FOREIGN KEY (SSN)  
REFERENCES Employees
)

CREATE TABLE Manages (  
SSN CHAR(11),  
DID INTEGER,  
Since DATE,  
PRIMARY KEY (DID),  
FOREIGN KEY (SSN)  
REFERENCES Employees,  
FOREIGN KEY (DID)  
REFERENCES Departments
)

• Wastes some space
• Can be faster when joining
• Does not hose you when a department gets a 2nd manager
Relationships to tables

- Notice the bold arrow. What can we do now?
Relationships to tables

• Notice the bold arrow. What can we do now?

CREATE TABLE Dept_Mgr (  
  DID INTEGER,  
  DName CHAR(20),  
  Budget REAL,  
  SSN CHAR(11),  
  SINCE DATE,  
  PRIMARY KEY (DID),  
  FOREIGN KEY (SSN) REFERENCES Employees  
)
Relationships to tables

• Notice the bold arrow. What can we do now?

CREATE TABLE Dept_Mgr (  
    DID INTEGER,  
    DName CHAR(20),  
    Budget REAL,  
    SSN CHAR(11) NOT NULL,  
    SINCE DATE,  
    PRIMARY KEY (DID),  
    FOREIGN KEY (SSN) REFERENCES Employees  
)
Relationships to tables

• What if we still want to use the Manages option?

CREATE TABLE Manages (SSN CHAR(11),
    DID INTEGER,
    Since DATE,
    PRIMARY KEY (DID),
    FOREIGN KEY (SSN) REFERENCES Employees,
    FOREIGN KEY (DID) REFERENCES Departments
)
Relationships to tables

• Nope, you are hosed.
Weak entities to tables
Weak entities to tables

CREATE TABLE Dep_Policy(
    PName CHAR(20),
    Age INTEGER,
    Cost REAL,
    SSN CHAR(11),
    PRIMARY KEY (PName, SSN),
    FOREIGN KEY (SSN) REFERENCES Employees
    ON DELETE CASCADE
)

[Diagram of entities and relationships]
Class hierarchies

• What if the subclasses cover?

CREATE TABLE Boat(
    boatstuff varchar(255),
    vehiclestuff varchar(255)
)
Where is your schema now!?
Class hierarchies

• When should we have vehicle, boat, vehicle_boat etc.?
Questions

• ?
Quiz

• What is a candidate key?
• What is a foreign key?
• What are two ways we can handle the situation where we delete a row that was referenced via foreign key elsewhere?