

COMP3311 Week 3

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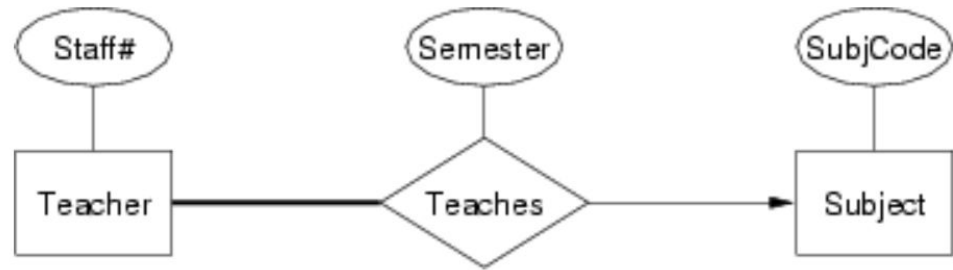
Slides adapted from Evan Krul and Kyu-Sang Kim

Admin slides

- Assignment 1 Released - Due Week 5 Friday
- Quiz 2 due this Friday

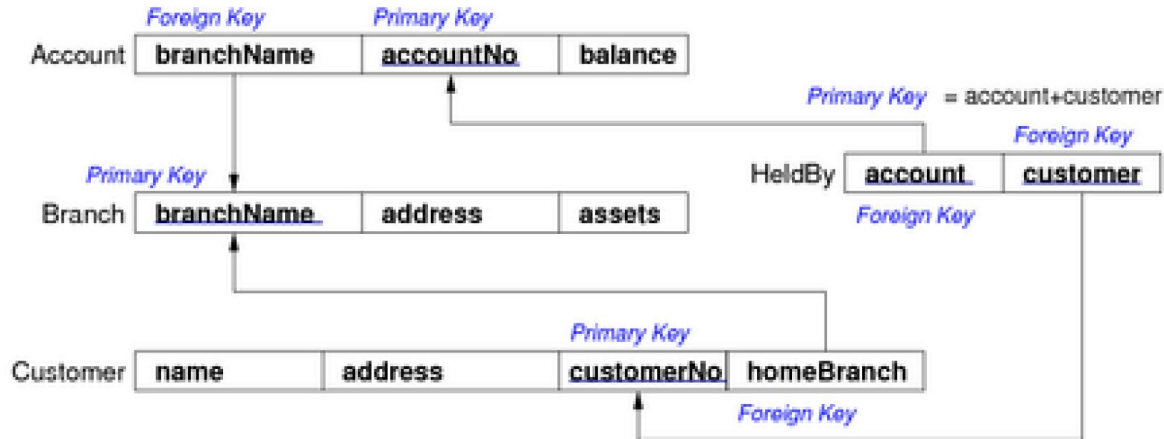
ER diagrams – a recap

- Entities (rectangle)
- Attributes (oval)
 - Composite, multivalued, **key**
- Relationships
 - Cardinality
 - Totality (participation)
- Other stuff:
 - Weak entities
 - Derived attributes



Relational diagrams

- Model data as a set of relations with attributes
- General process is to create a relational model from ER diagram

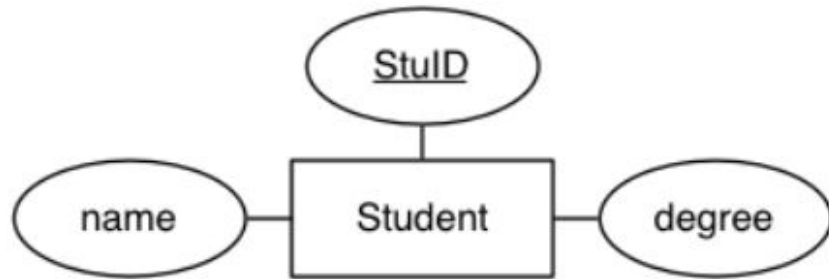


ER -> Relational

- Entities become tables
- Relationships are either:
 - Separate table (many to many) with foreign keys
 - Put in one of the two sides (depending on totality / 1 to many)
- Subclasses
 - ER Style
 - OO Style
 - Single table with nulls

Baseline

ER Model

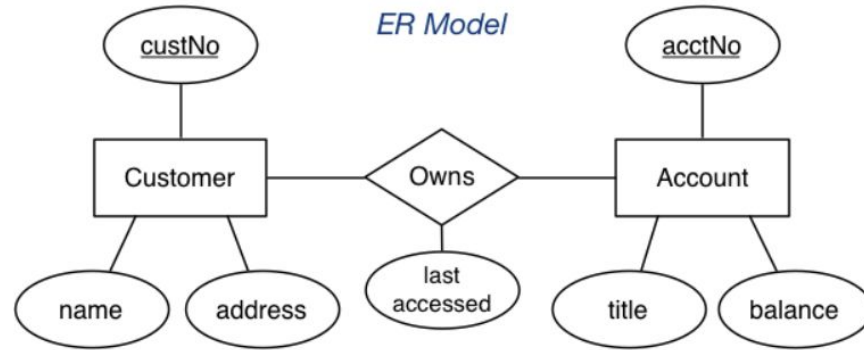


Relational Version

Student

| | | |
|--------------|------|--------|
| StuID | name | degree |
|--------------|------|--------|

N:M

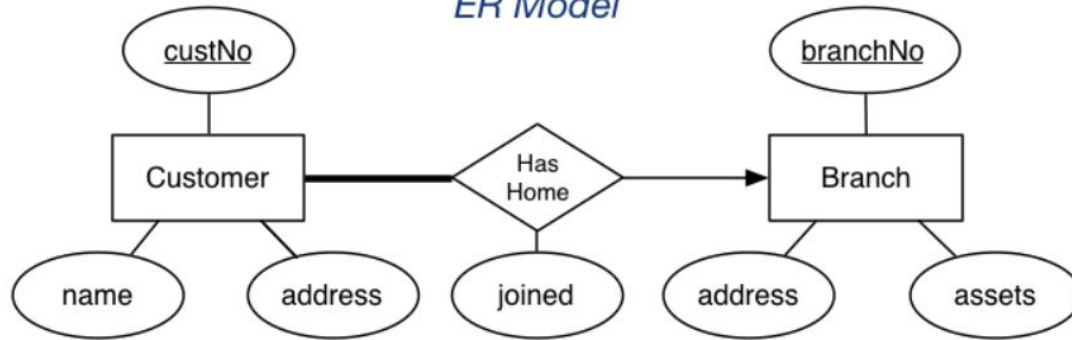


Relational Version

| | | | |
|----------|---------------|---------------|--------------|
| Customer | custNo | name | address |
| Account | acctNo | title | balance |
| Owns | acctNo | custNo | lastAccessed |

N:1

ER Model



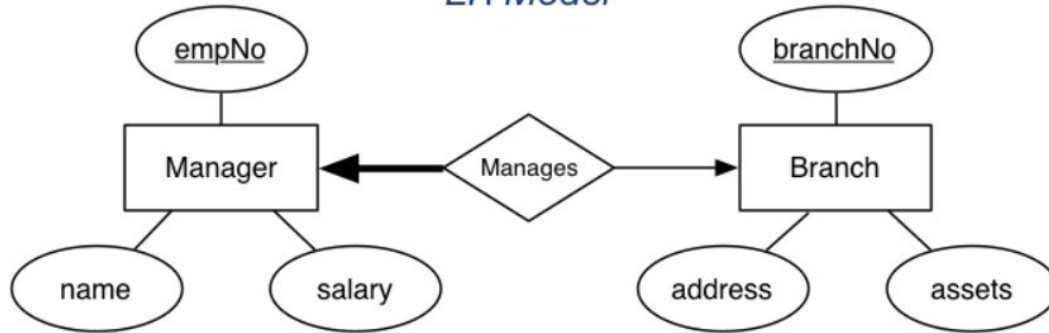
Relational Version

| | | | | | |
|----------|---------------|------|---------|----------|--------|
| Customer | custNo | name | address | branchNo | joined |
|----------|---------------|------|---------|----------|--------|

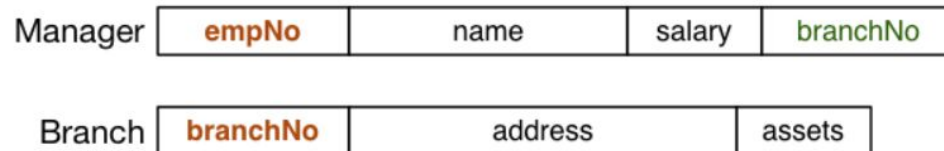
| | | | |
|--------|-----------------|---------|--------|
| Branch | branchNo | address | assets |
|--------|-----------------|---------|--------|

1:1

ER Model

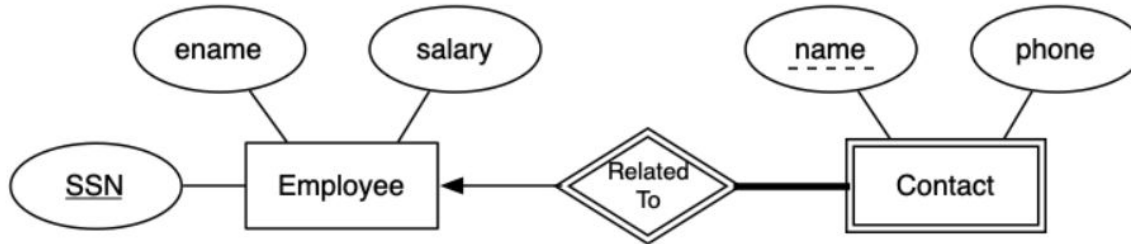


Relational Version

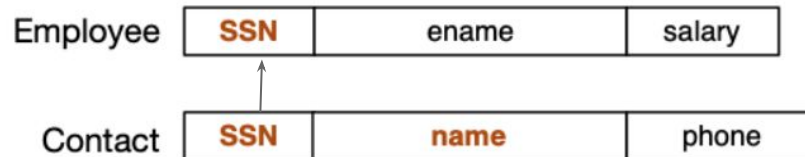


Weak Entity

ER Model

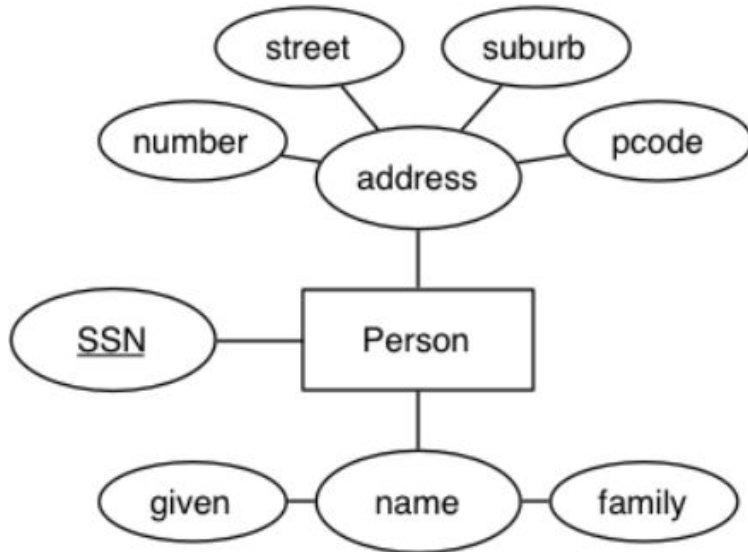


Relational Version



Composite Attributes

ER Model



Relational Version #1

Person

| | | |
|------------|------|---------|
| SSN | name | address |
|------------|------|---------|

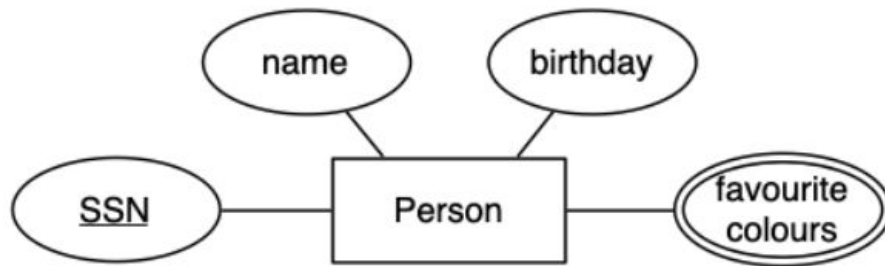
Relational Version #2

Person

| | | | | |
|-------|--------|--------|--------|-------|
| SSN | given | family | | |
| | number | street | suburb | pcode |

Multi-Valued Attributes

ER Model



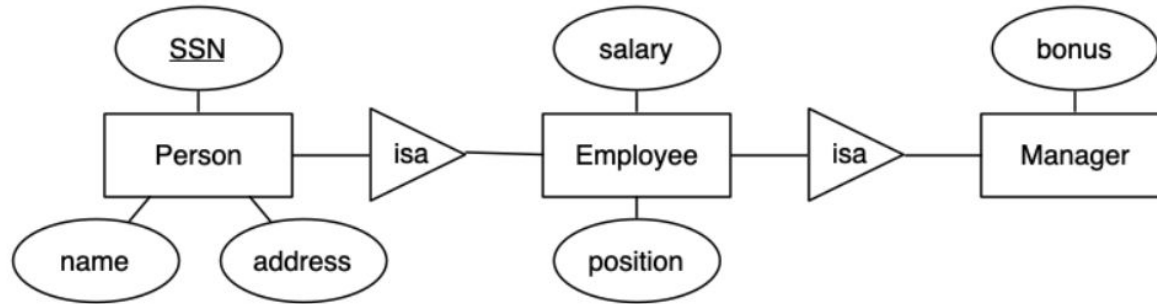
Relational Version

| | | | |
|---------------|------------|------|----------|
| <i>Person</i> | SSN | name | birthday |
|---------------|------------|------|----------|

| | | |
|------------------|------------|--------|
| <i>FavColour</i> | SSN | colour |
|------------------|------------|--------|

ER-style Mapping

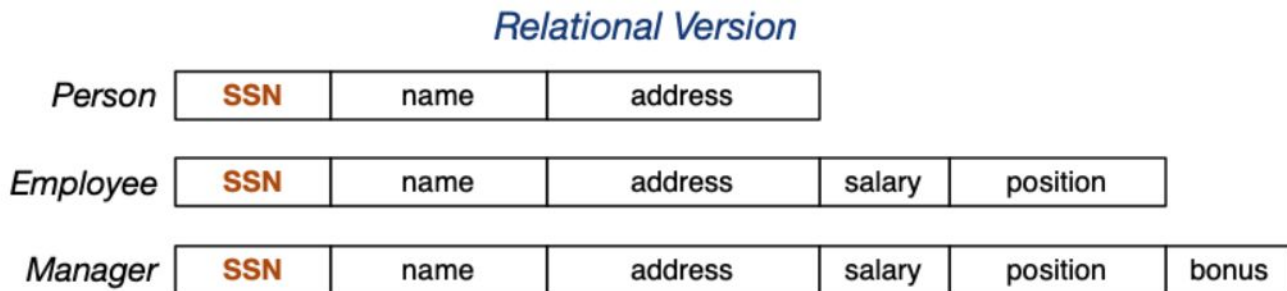
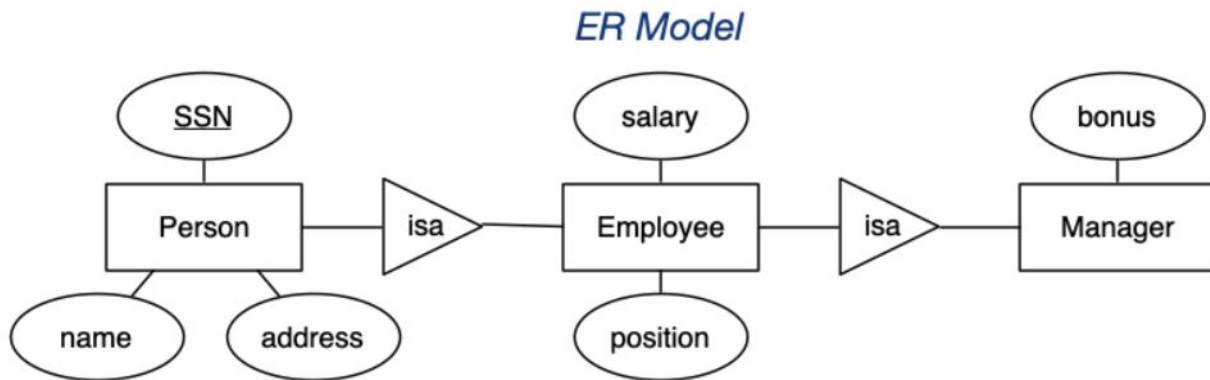
ER Model



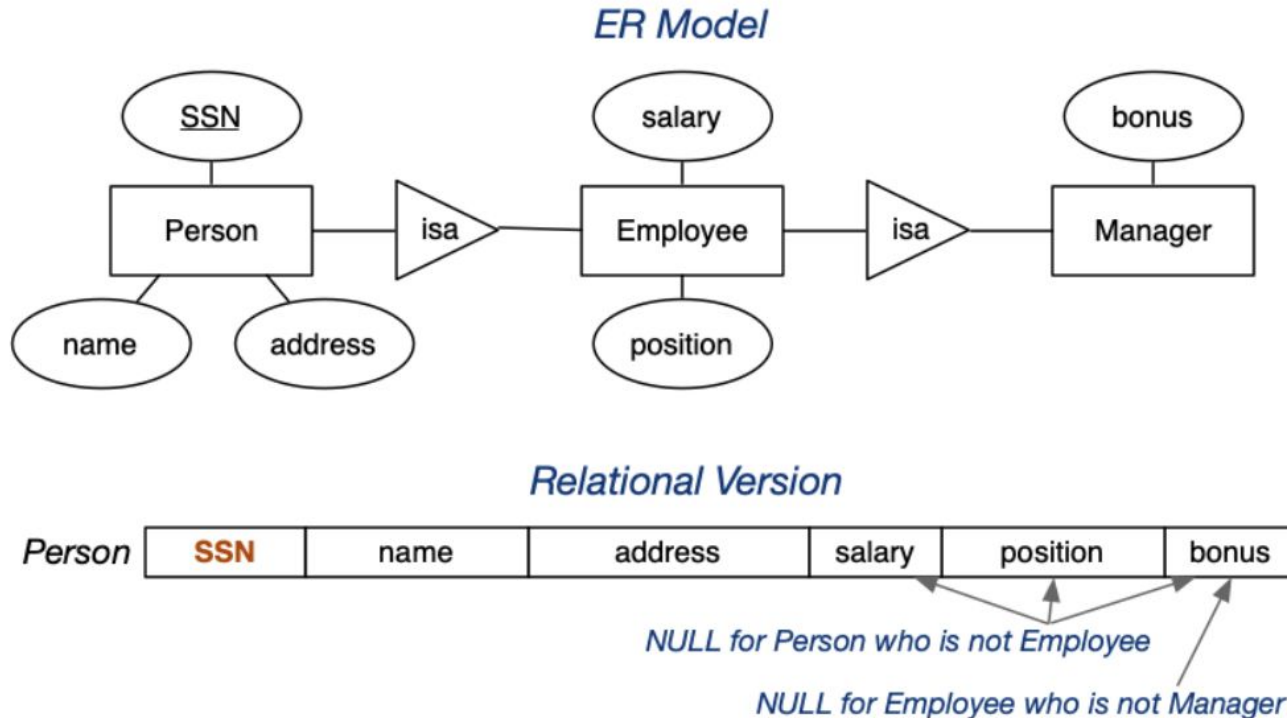
Relational Version

| | | | |
|-----------------|------------|--------|----------|
| <i>Person</i> | SSN | name | address |
| <i>Employee</i> | SSN | salary | position |
| <i>Manager</i> | SSN | bonus | |

Object-Oriented Mapping



Single-Table-With-Nulls Mapping



SQL Data Definition Language

In SQL we can model relation schemas as tables

```
CREATE TABLE TableName (  
    attribute1    domain1    constraints1,  
    attribute2    domain2    constraints2,  
    ...  
    table-level constraints, ...  
)
```


SQL Data Definition Language Examples

```
CREATE TABLE Students (  
    zid          integer,  
    family       varchar(40),  
    given        varchar(40) NOT NULL,  
    d_o_b        date NOT NULL,  
    gender       char(1) CHECK (gender in ('M','F','X')),  
    degree       integer,  
    PRIMARY KEY (zid),  
    FOREIGN KEY (degree) REFERENCES Degrees(did)  
);
```

```
CREATE DOMAIN GenderType AS  
    char(1) CHECK (value in ('M','F'));  
  
CREATE TABLE Students (  
    zid          serial PRIMARY KEY,  
                -- only works if primary key is one attr  
    family       text,    -- no need to worry about max length  
    given        text NOT NULL,  
    d_o_b        date NOT NULL,  
    gender       GenderType,  
    degree       integer REFERENCES Degrees(did)  
);
```

ER -> SQL

2 (+1) simple steps:

1. Convert ER to a relational diagram
2. Convert relational diagram to SQL
3. Have both diagrams to ensure the SQL obeys all the constraints set out in the ER diagram

Tutorial

- Q4: different ways to model subclasses in relational model
- **Q9: Discussion on serial (and the side effects)**
- Q11: ER -> SQL CREATE TABLE
- Q14: ER -> Relational -> SQL for total participation constraints not expressed by relational
- Q15: ER -> Relational -> SQL for 1:1 and 1:n combinations
- Q17: ER -> Relational -> SQL for mutually recursive pair of foreign keys