1. Good Evening

2. Lecture begins at 9:05pm

3. Topic – Schema Design

Agenda

1. Keys → PK, FK, UK

2. Relationships
   - Types
   - Identify
   - Represent.

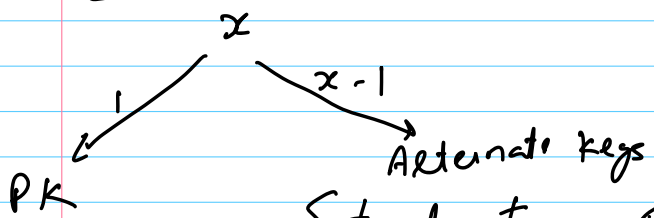
3. Schema Design → What?
   - Why?
   - When?
   - How?

4. Case Study

Keys
- PK
- FK
- UK

Superkey → Any collection of attr. that can uniquely identify a tuple.

Candidate Key → Super key with minimal attr. All attr are necessary.



Student → id INT (PK)
- fname
- lname
- email ✓
- phone ✓

Primary key → A selected candidate key is designated as PK. The purpose is to have a default way of identifying tuples in a relation.

Candidate key
- email ✓
- phone ✓

[Alternate keys]

- id ✓ [PK]

Properties of PK

1. Only 1 allowed per table. ✓
2. Null not allowed]
3. Unique values ✓

UNIQUE KEY

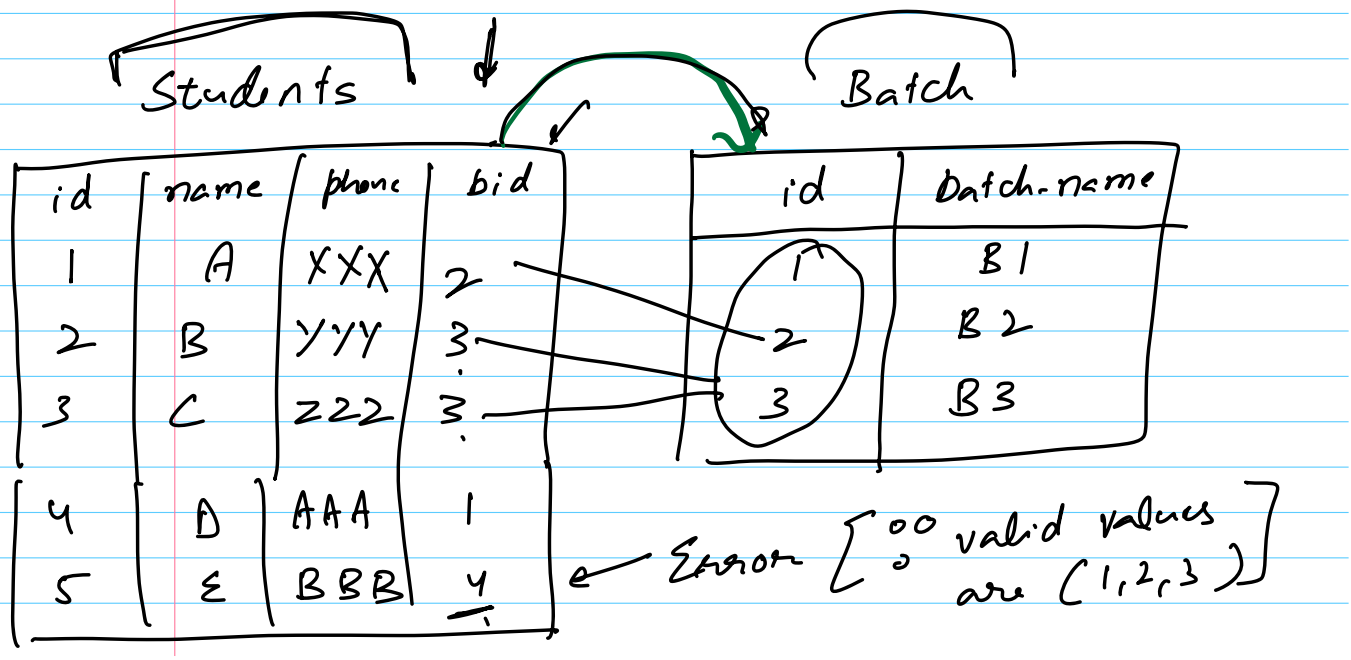
— To enforce unique constraint in a column

✓ 1. More than 1 unique key allowed in same table.

✓ 2. Can have null values. [Can have multiple null value]

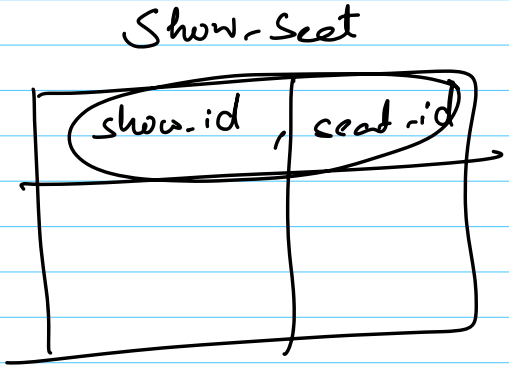
3. Unique values

FOREIGN KEY



Properties

1. Multiple foreign keys are allowed
2. Allows null values
3. No uniqueness check



PRIMAR KEY
(show_id, seat_id)

PK & UK are nearly similar

→ Indexes
8th Lecture

- When we create a PK data of the table is sorted according to the values in PK

Break = 10:03 to 10:10

1. Relationships
2. Schema Design
3. Case Study

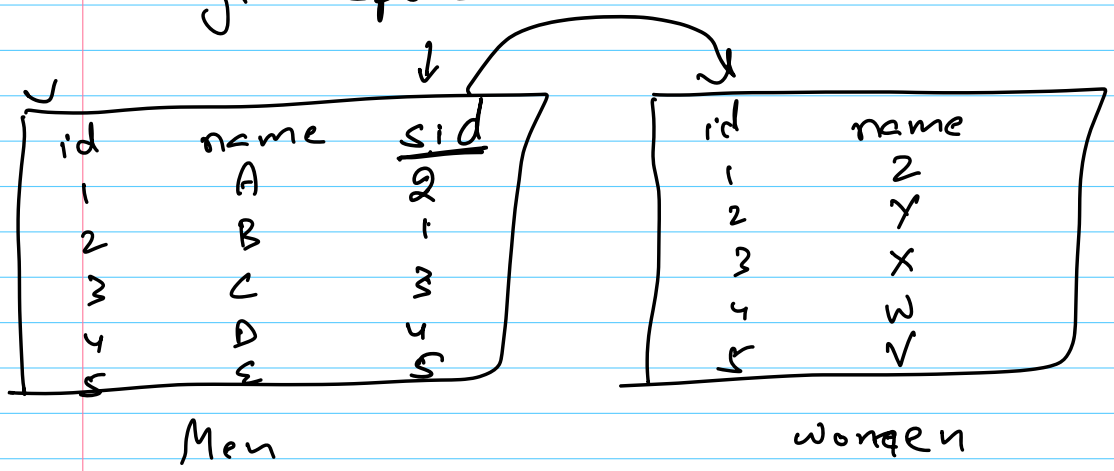
Relationships btw Tables.

1. Cardinality
2. How to identify?
3. How to create these relationships?

Cardinality → 1:1
→ 1:m [m:1]
→ m:m

1 : 1 relationships

e.g. Sponse



1. For 1 : 1 relationship create an extra column on either side,
   - make a FK to other side.
2. Create a UK on FK column

Men : Women

→ 1 : 1 ←

→ 1 : 1 ←

1 : 1

Men

id	name	sid
1	A	4
2	B	1
3	C	3

Women

id	name
1	Z
2	X
3	X
4	W
5	V

---

1 : M or M : 1 Relationships

Instructor : Lecture

1 : m ✓

1 : 1 ✓

---

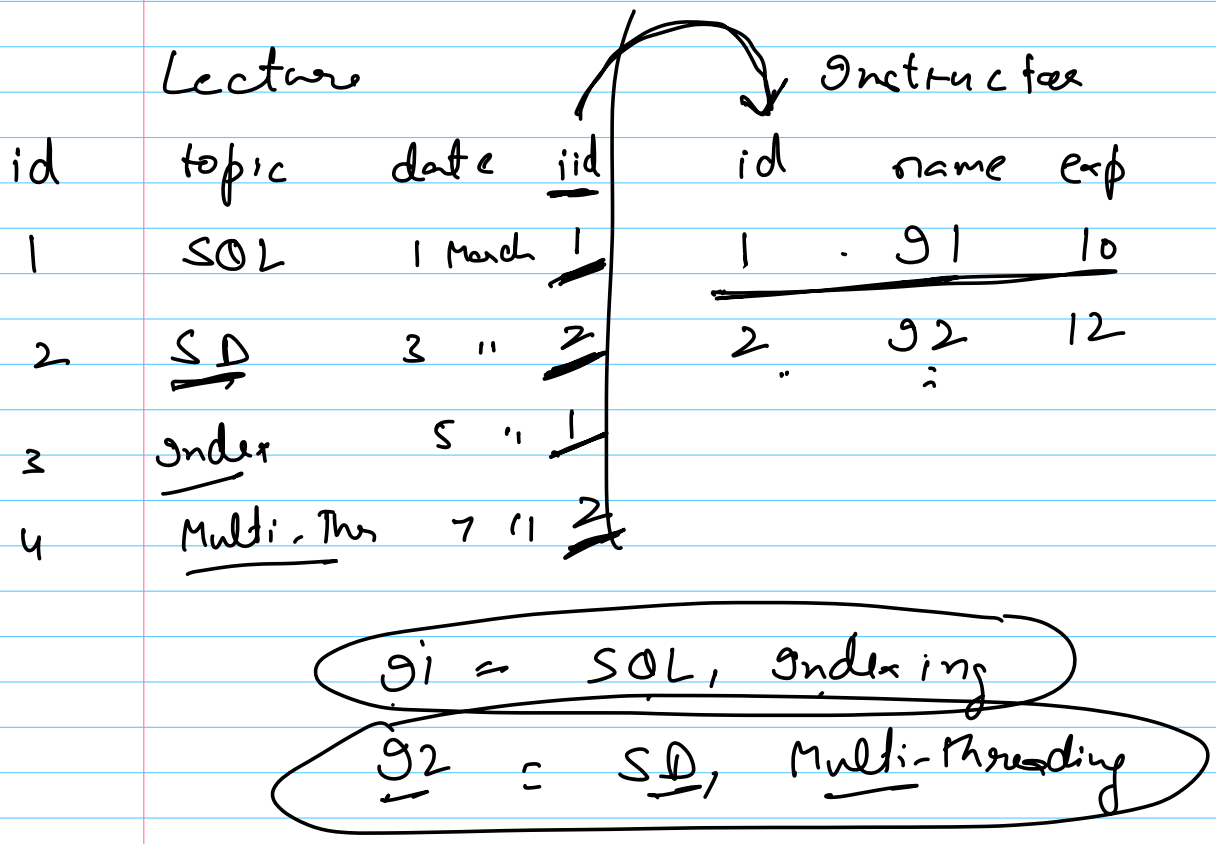
1 : M

Lecture : Instructor ✓

m ✓ : 1

1. Make a column on m side

2. " " FK to 1 side.



m : m Relationship.

e.g. Batch : Lecture.

1 : m.

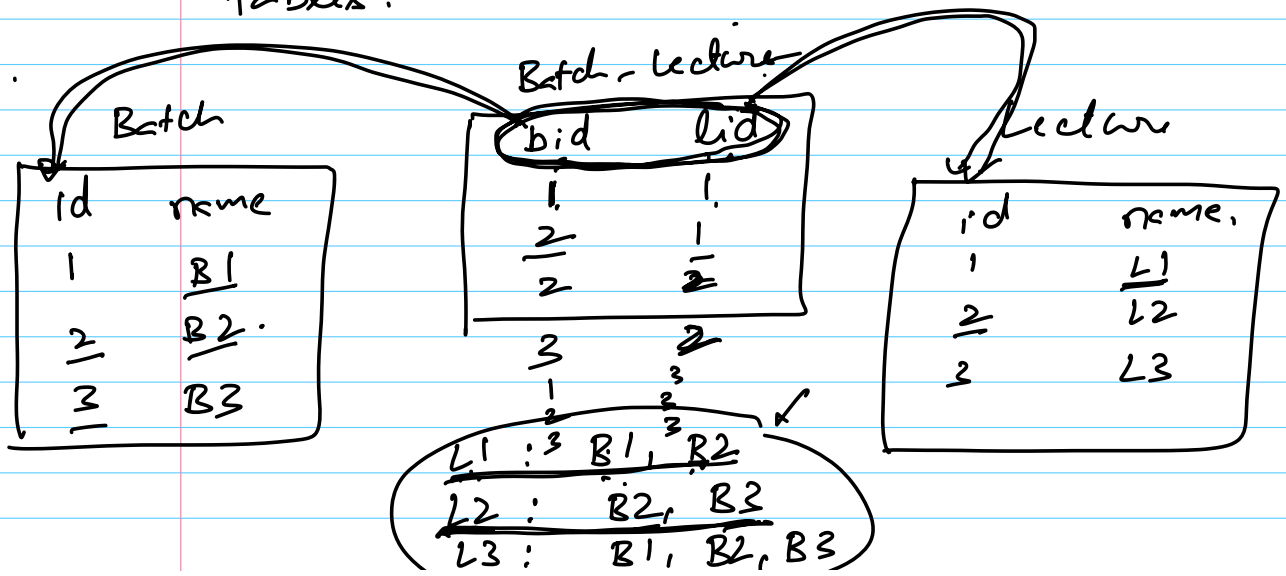
m : 1.

m : m

Identification

Tbl 1	:	Tbl 2
1	:	m
m	:	1
m	:	m

1. Create a new table (mapping tbl)
2. Make a composite PK in mapping tabl.
3. Make two FK from mapping tbl, reference the PK of both original tables.



1. Identify the type → 1 : 1
→ 1 : m
→ m : m

2. 1 : 1 → Column on either side
→ FK from extra column to PK of other side
→ UK on extra column.

3. 1 : m → Extra column on m side
→ FK from extra column to PK of other side.

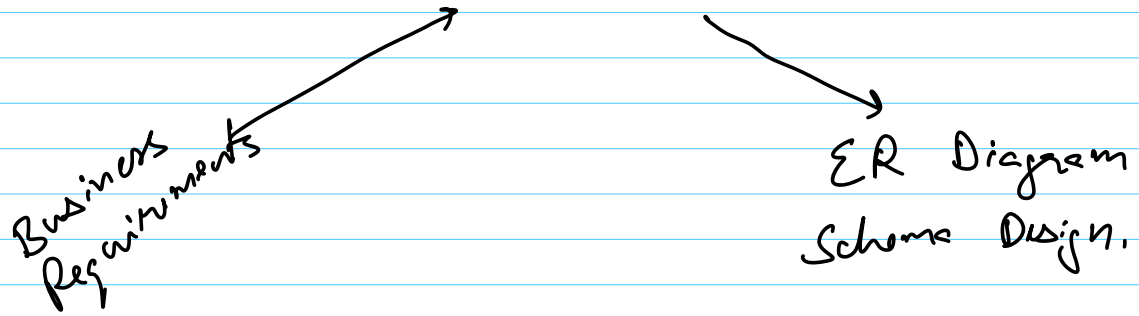
4. m : m → 1. Mapping table
2. Composite PK
3. Two FK

Schema Design

1. What is it?
2. When is it done?
3. Why is it done?
4. How is it done?

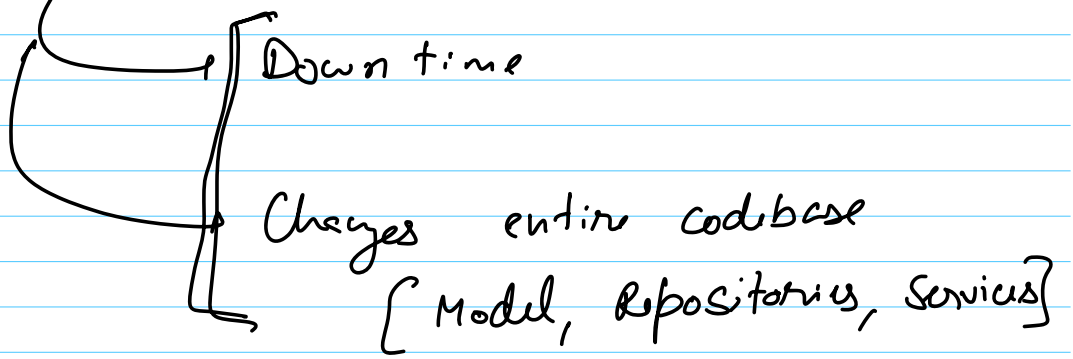
What? → Process of designing database
1. what tables?
2. & columns?
3. What relationships?

When? → 1. Design phase



Why? → If db is not planned properly & modified later, then we how to give db migration [leading to down time]

change in DB



How is Schema Design done?

I/p → Business Requirements

1. Identify Entities [Nouns] [Tables]
2. " non-relationships attributes of entities [Adjectives] [Columns]

3. Identify relationships. [1:1, 1:m, m:m]

↓

represent

- Column & keys
- Tables, Columns & key.

CASE STUDY

1. Entities : students, batches, mentors, instructors, lectures.

2. Attributes (Non-relation.)

✓ Student : ✓name, ✓email, ✓phone

✓ Batches : ✓name, ✓start_date, ✓end_date

✓ Mentors : ✓name, ✓dob, ✓exp

✓ Instructors : ✓name, ✓dob, ✓exp

✓ Lecture : ✓topic

3. Relationships

- Student is assigned to a batch.
  - " can shift batches ✓
- " has a mentor. ✓
- Batches have Lectures.
- Lecture is taken by an instructor.
- Multiple Batches can learn together.

Student : Mentor

1 : 1

m : 1

---

m : 1

→ mentor_id in students table.

Batch : Lecture

1 : m

m : 1

---

m : m

Lecture : Instructor

1 : 1

m : 1

---

m : 1

Current Batch

Student : Batch

1 : 1

m : 1

---

m : 1

Previous Batch

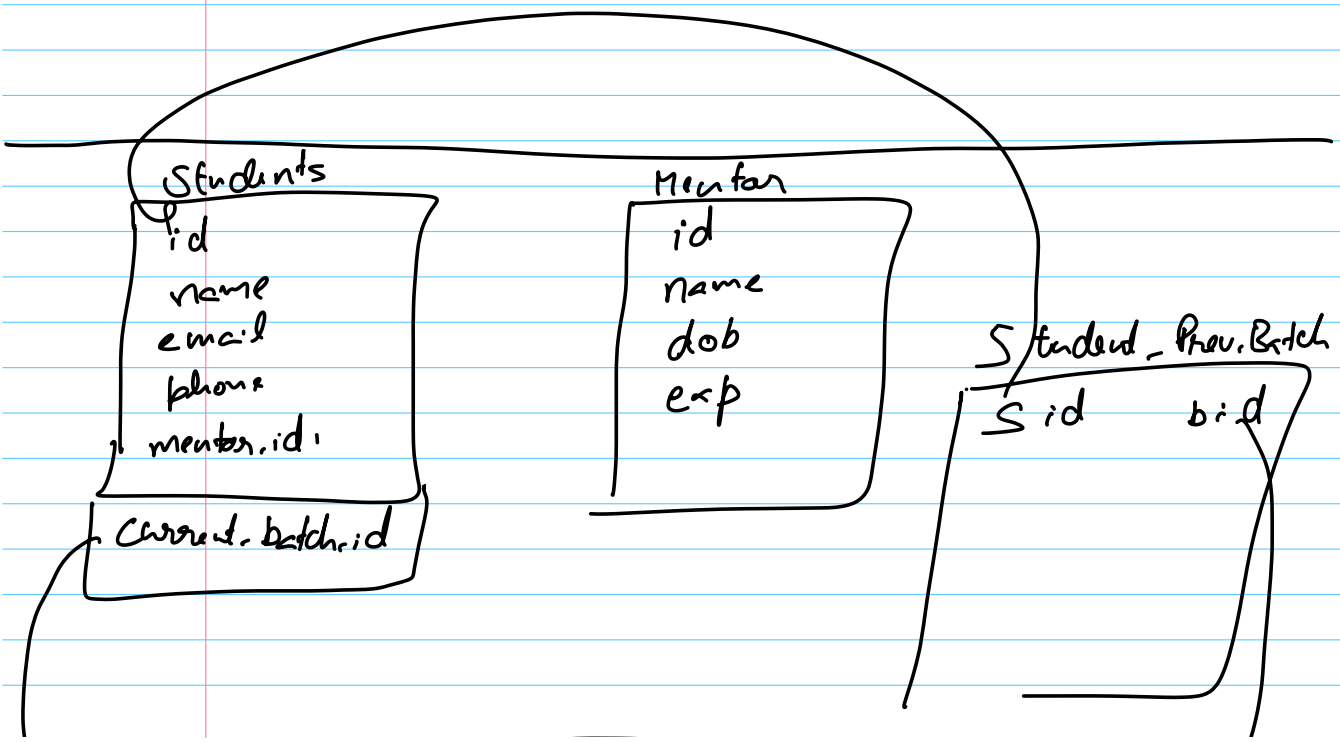
Student : Batch

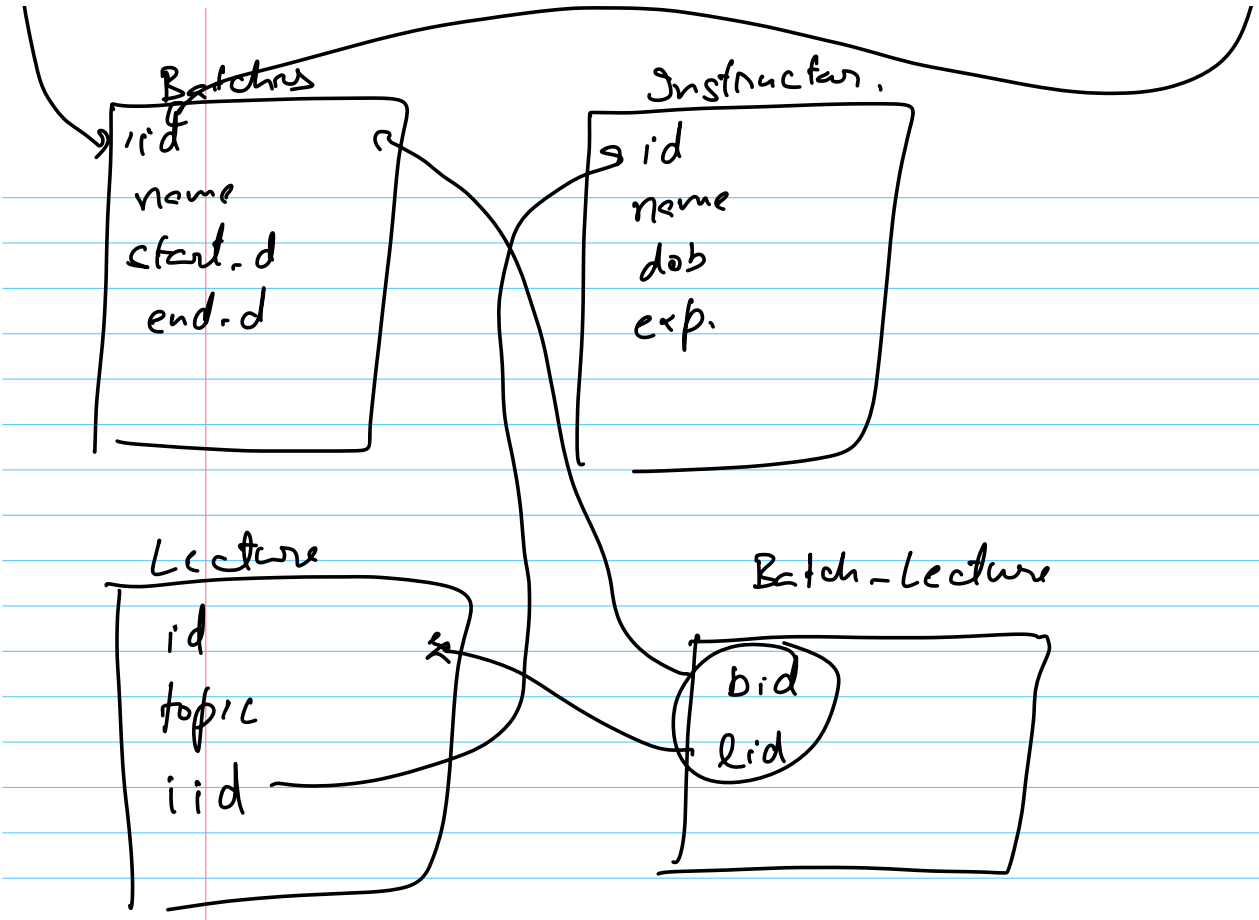
1 : m

m : 1

---

m : m





Summary

CK (x)

1 → PK = 1, NOT NULL, Unique

x-1 → Alternate keys

1. Key
   - UK = m, NULL, Unique
   - FK = m, NULL, Not necessarily unique.

2. Relationship
   - 1 : 1
   - 1 : m
   - m : m

→ Identify
→ Create
   - 1 : 1
   - 1 : m
   - m : m

3. Schema Design
   - What?
   - Why?
   - When?

↓

How?
- Entities [Nouns]
  - Non-relnship attn [Columns]
  - Relationships.

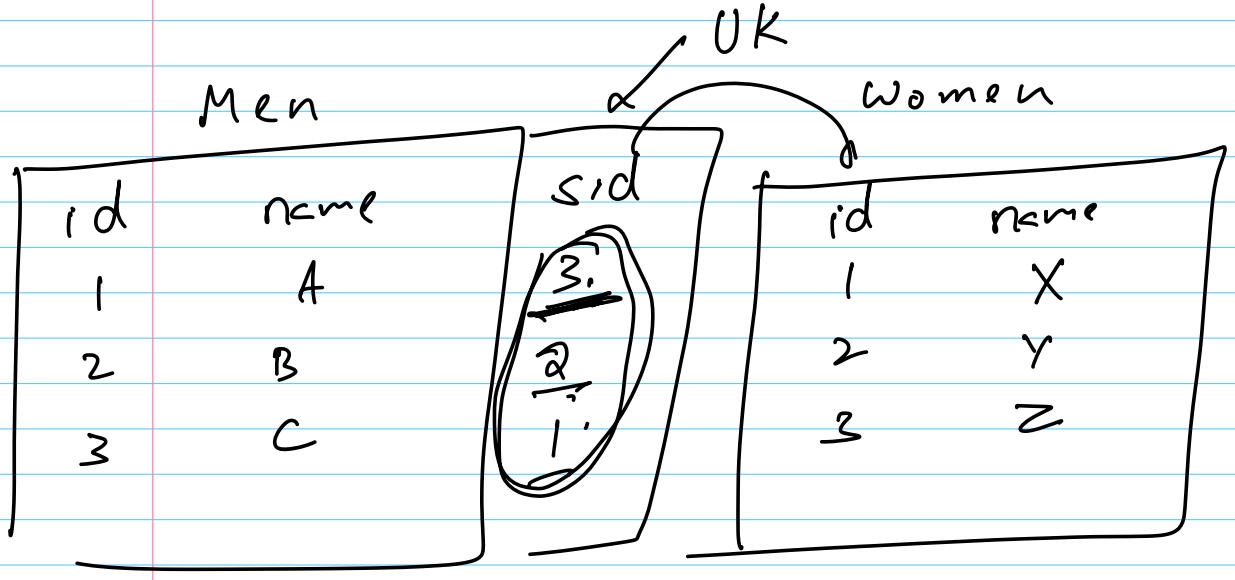
Exceptions in Relationships

Conceptual

- Super
- Candidate
- Composite
- Alternate / Secondary

Practically

- PK
- FK
- UK



A → Z

B → Y

C → X

Student : Batch

1 : m

m : 1

---

m : m

Student

id	name	cbid
1	A	4
2	B	3
3	C	4
4	D	1

Batch

id	name
1	B1
2	B2
3	B3
4	B4

sid	bid
1	1
1	3

PB

A → B1, B3

B → B2

C → B1, B3

CB

A → B4

B → B3

C → B4

D → B1

MySQL

Schema → db

MSSQL