DB Week 2 Workshop

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Workshop Overview

01

Database Development Lifecycle

What are the stages?

02

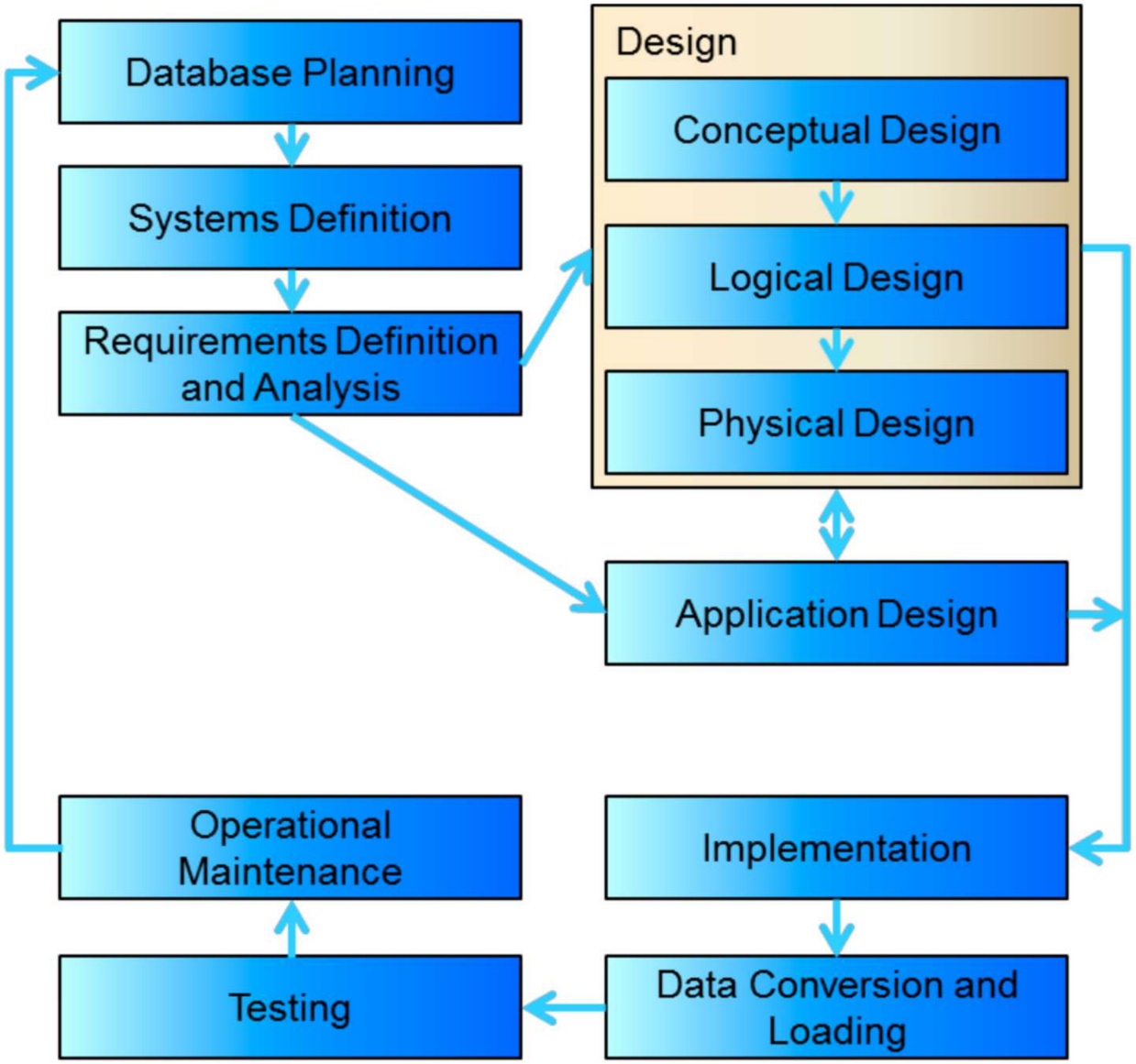
Modelling in practice (worded)

Worded description → DB model

03

Modelling w/ MySQL

Creating models in MySQL Workbench



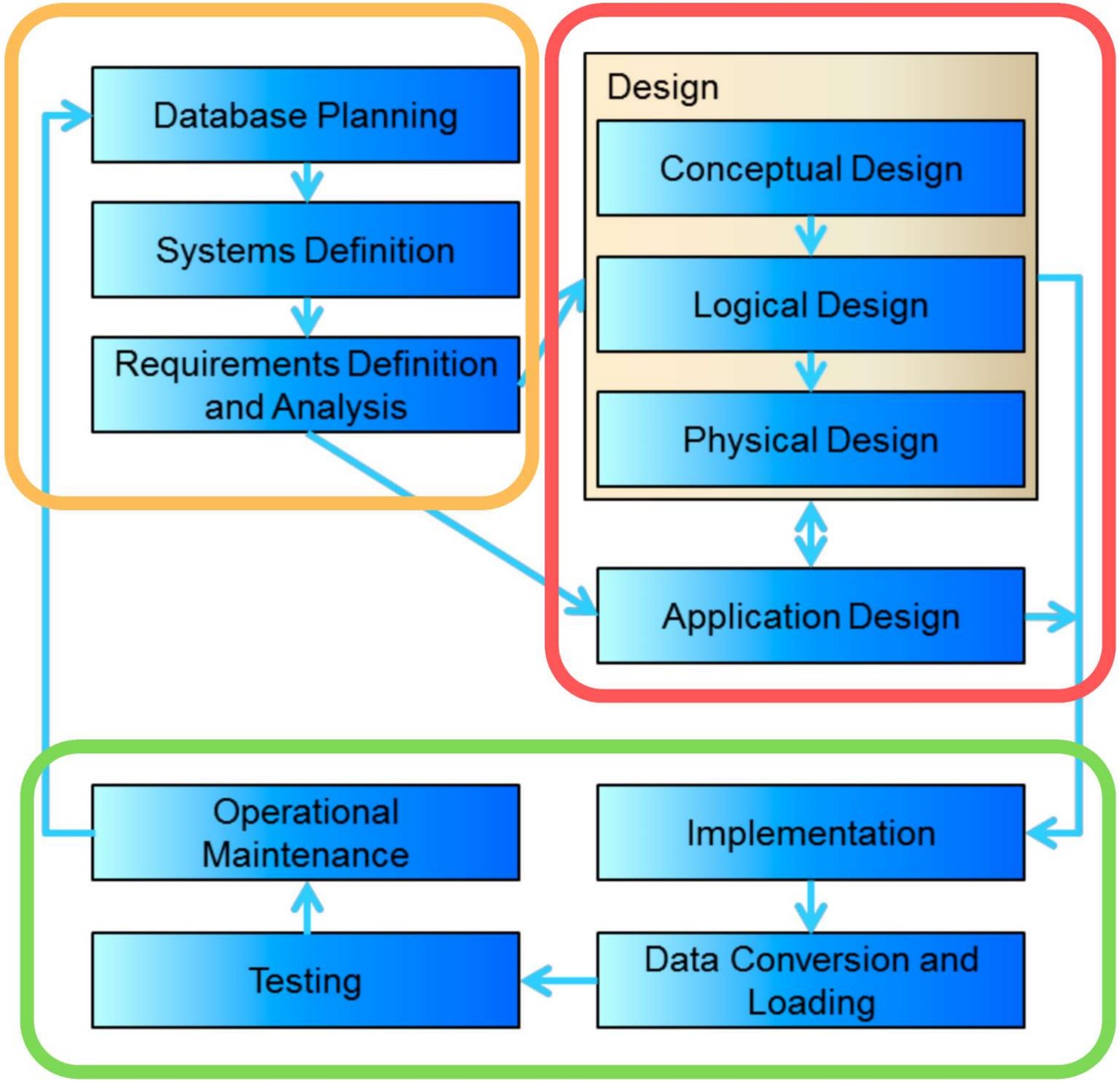
Database Development Lifecycle

What is the **purpose** of each stage?

What do we, as database designers, **need to do** in each stage?

A

Preparation:
What are we building?



B

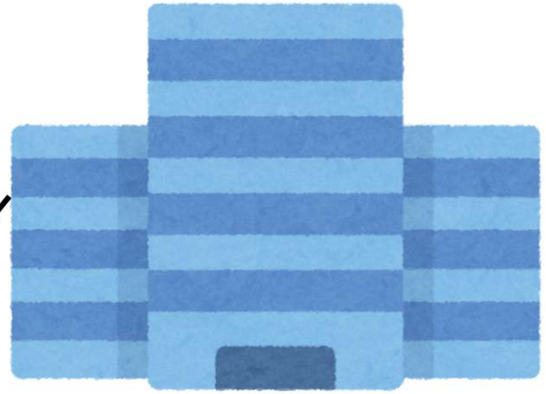
Design:
How are we building it?

C

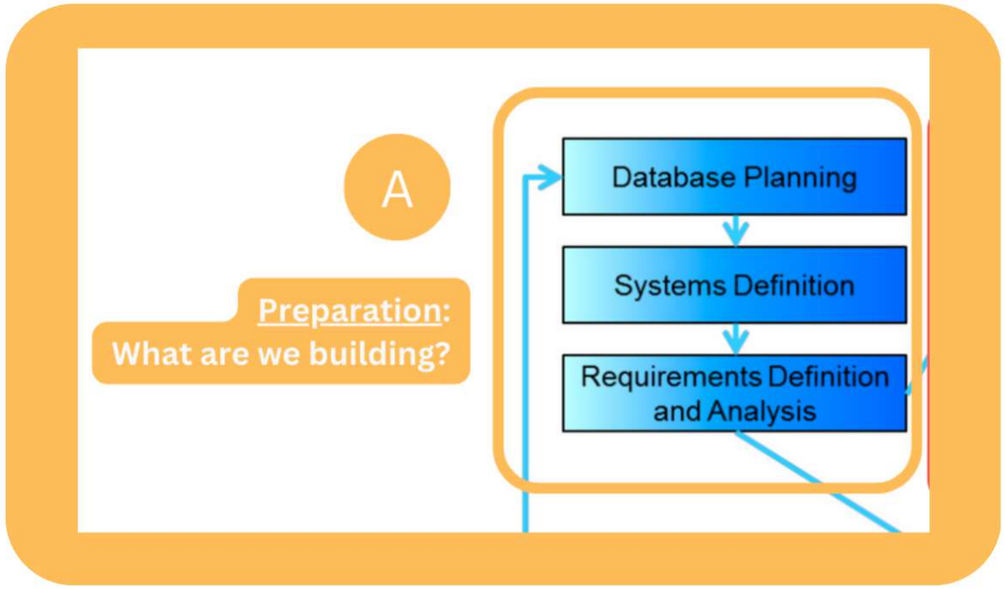
Execution:
How do we create and run it?

Preparation

1



How does the enterprise work?



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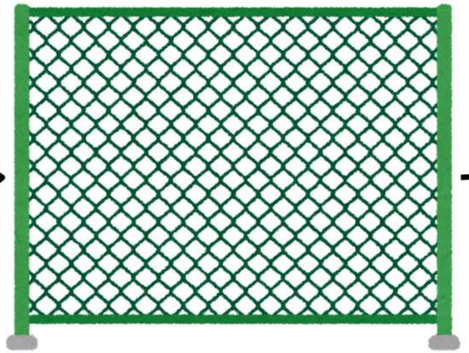
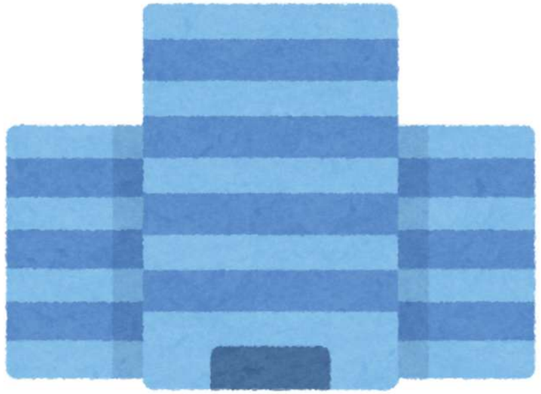


Scope & boundaries

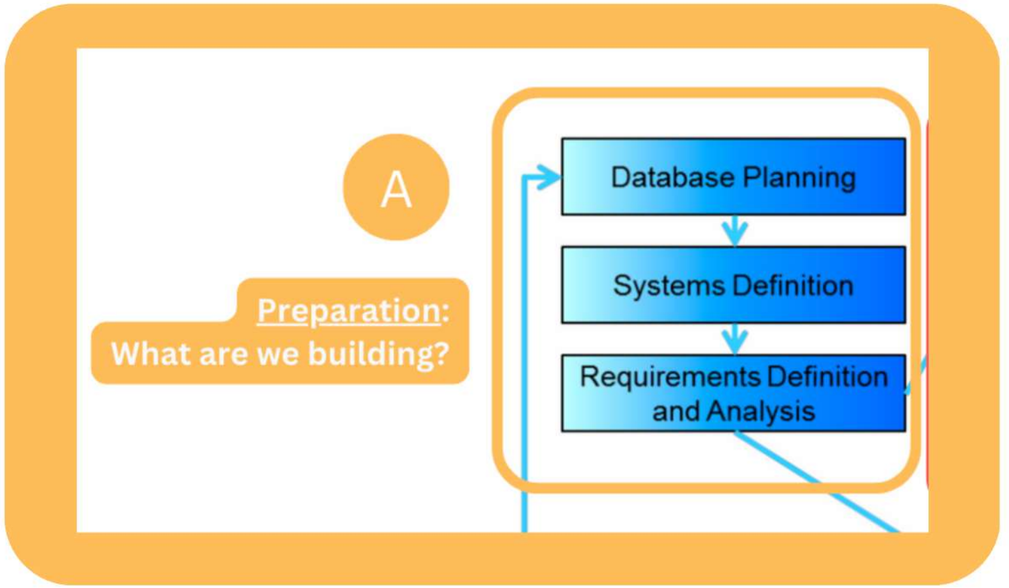
3

Requirements

1



How does the enterprise work?

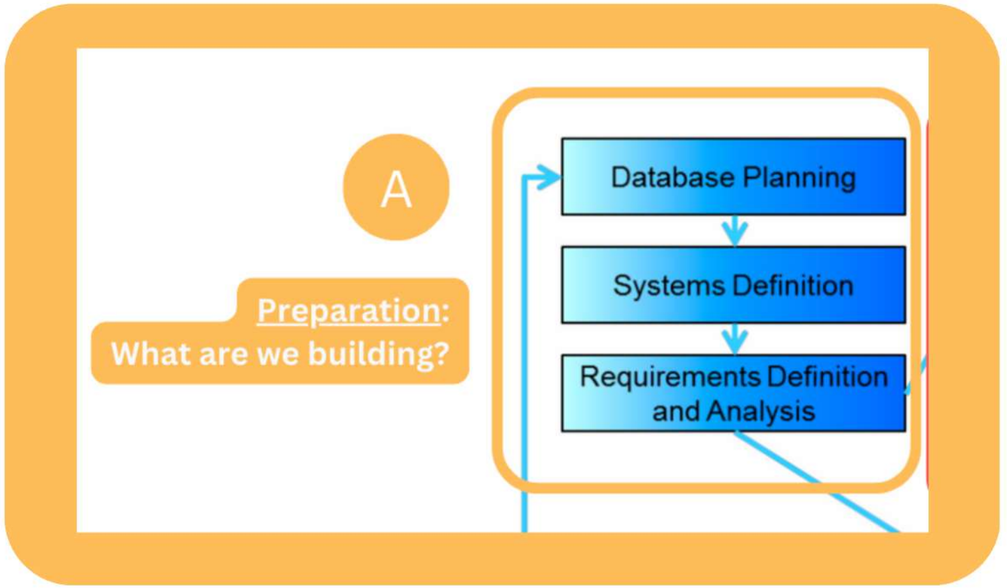


1. Database Planning *

- Purpose: Understanding the **context** of DB
- Need to do: Understanding building blocks of the enterprise
  - e.g. departments
  - *Enterprise Data Model*

2. System Definition

- Purpose: Specify **scope and boundaries**
  - Users
  - Application areas



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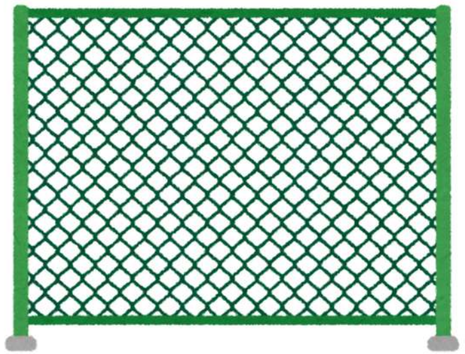


Scope & boundaries

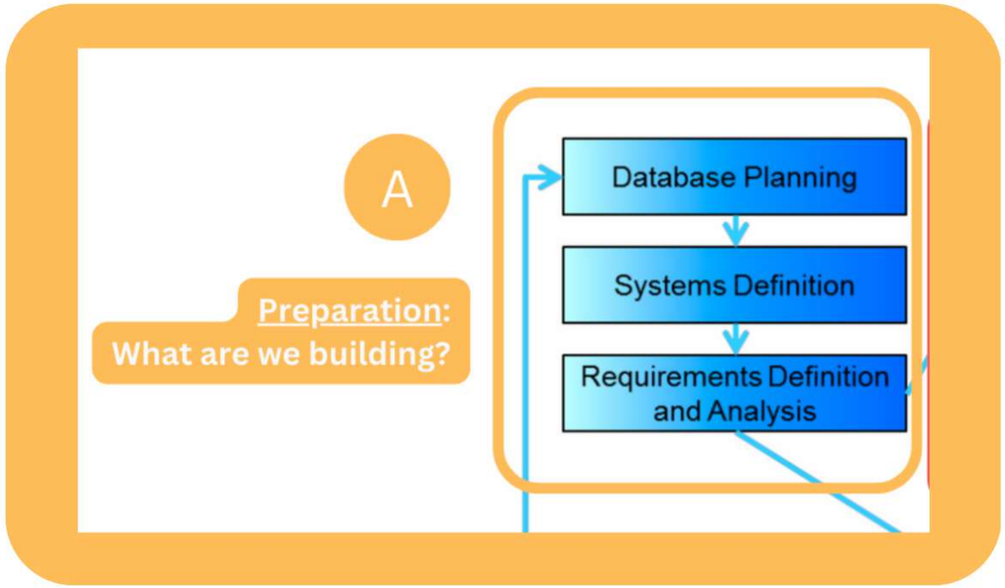
- Need to do:
  - Define how the system links w/ other organisational systems
    - Data sharing? replication?
  - Analyse different use cases

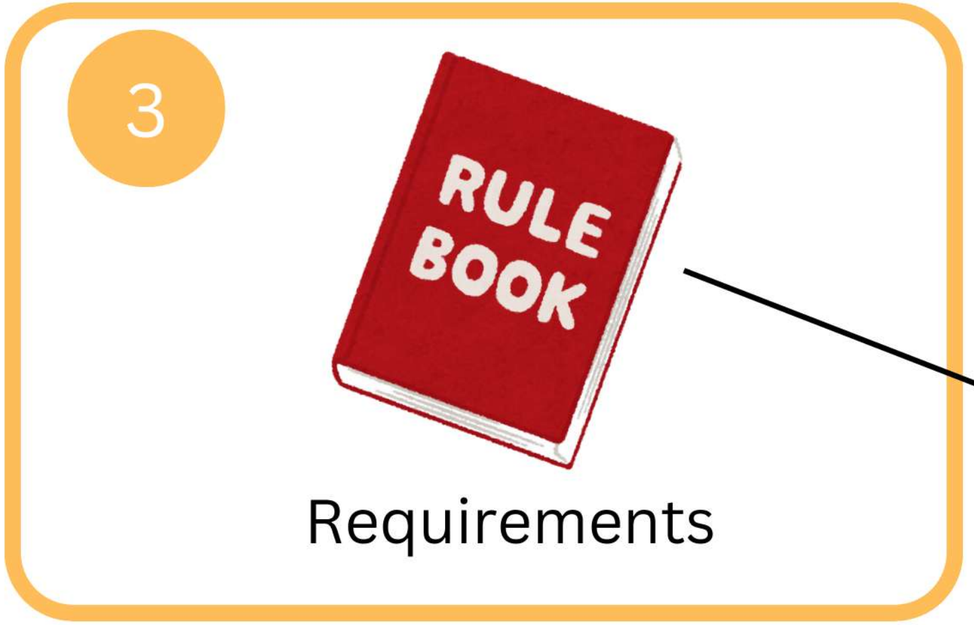
3. Requirements Definition & Analysis

- Purpose: Collect & analyse **requirements**

- Need to do: Identify:
  - Business rules
  - Client requirements

- Extract business rules & requirements from ***requirement definition*** (written doc)
- Identify info. & any **constraints**

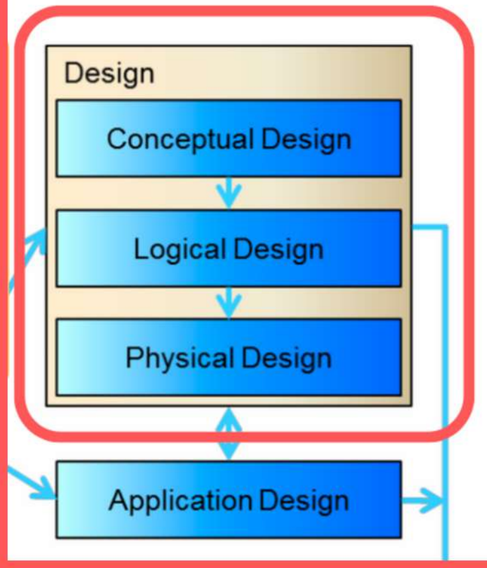




Design

7

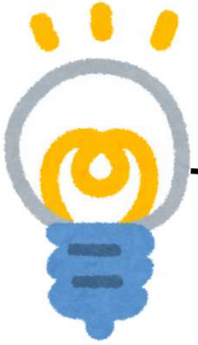
Application Design



B

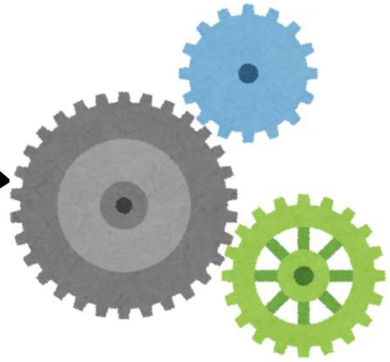
Design:
How are we building it?

4



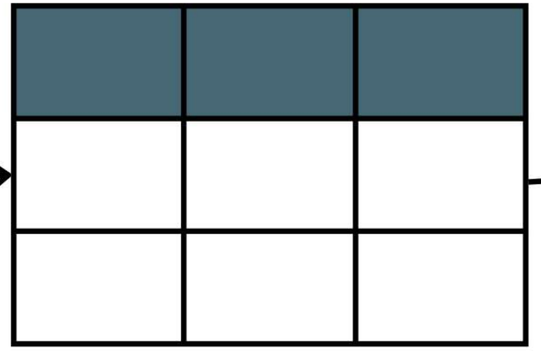
Concept

5



Logical

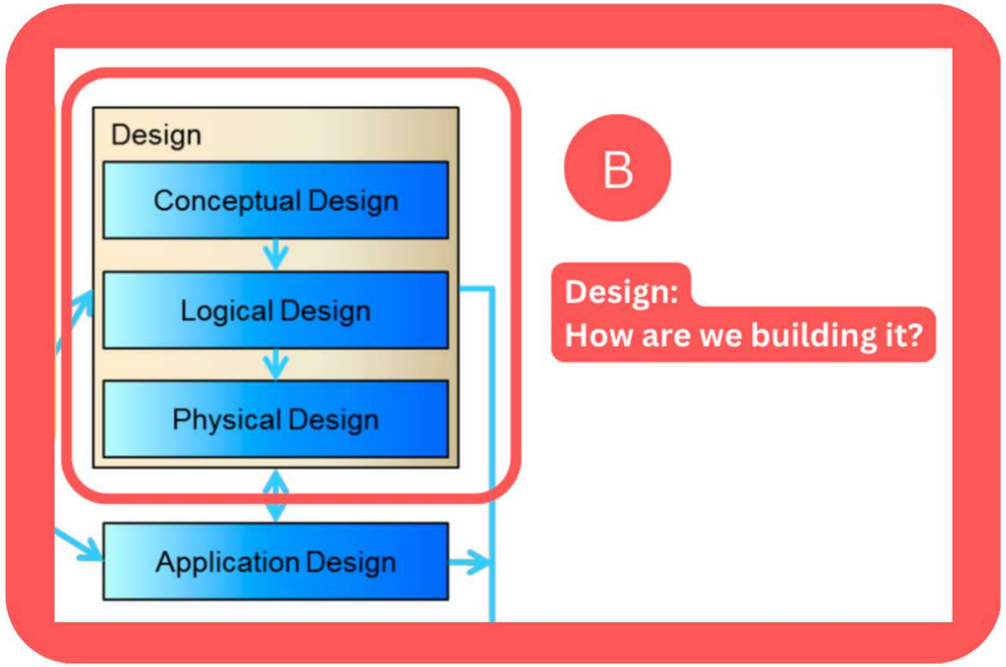
6

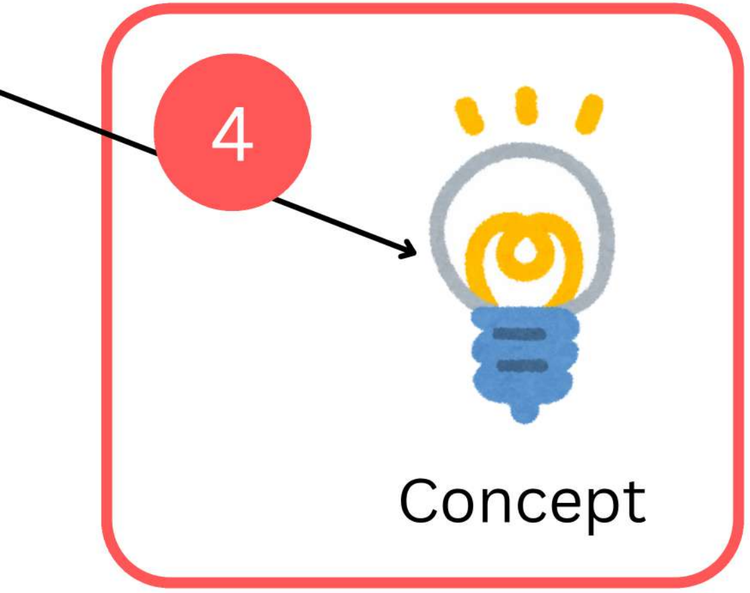


Physical

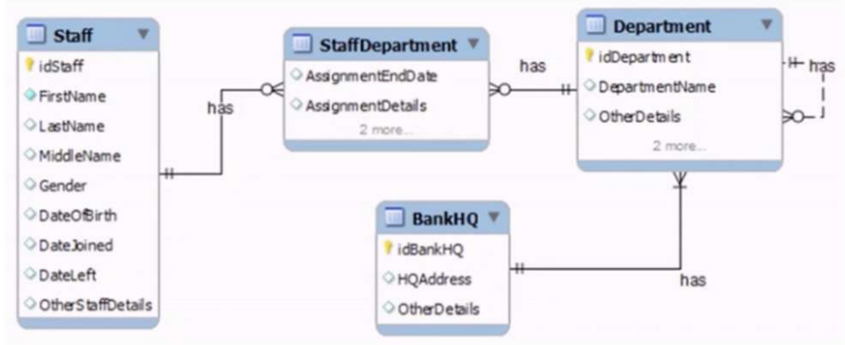
4. Conceptual Design

- Purpose: Construct **general idea** of how to model the data
  - **NO** physical / DB model / DBMS considerations





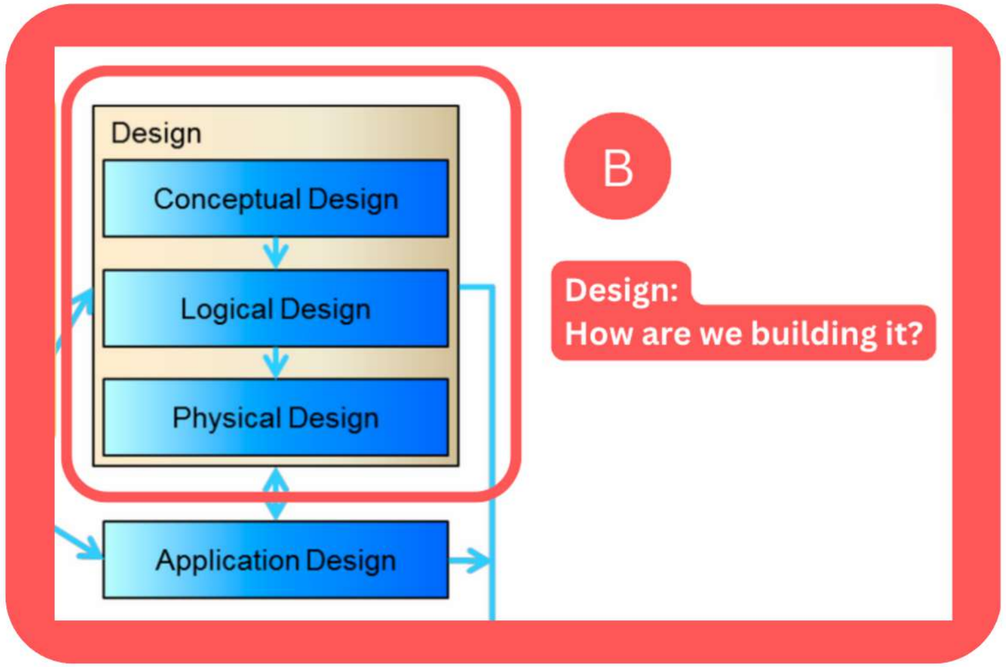
- Need to do:
  - Identify entities, attributes, relationships
  - **ER** diagrams

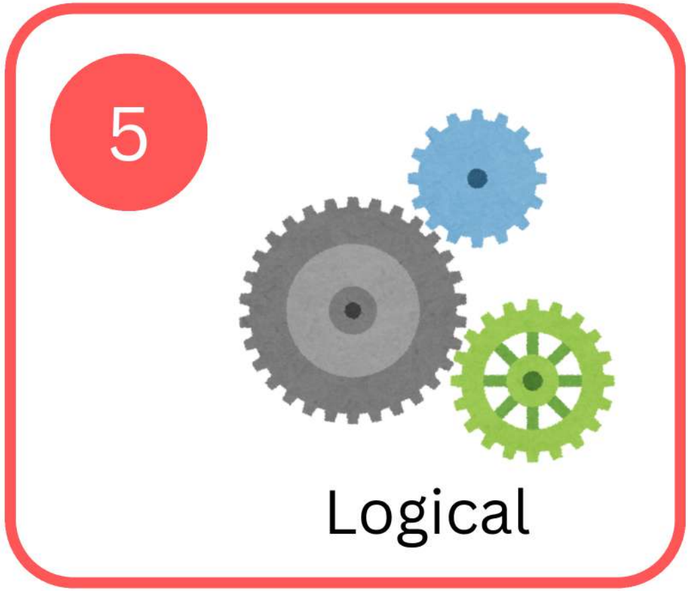


5. Logical Design

- Purpose: Decide on DB model
  - **NOT** database format / DBMS

- Need to do:
  - + FK, PFK
  - ***Relational*** model

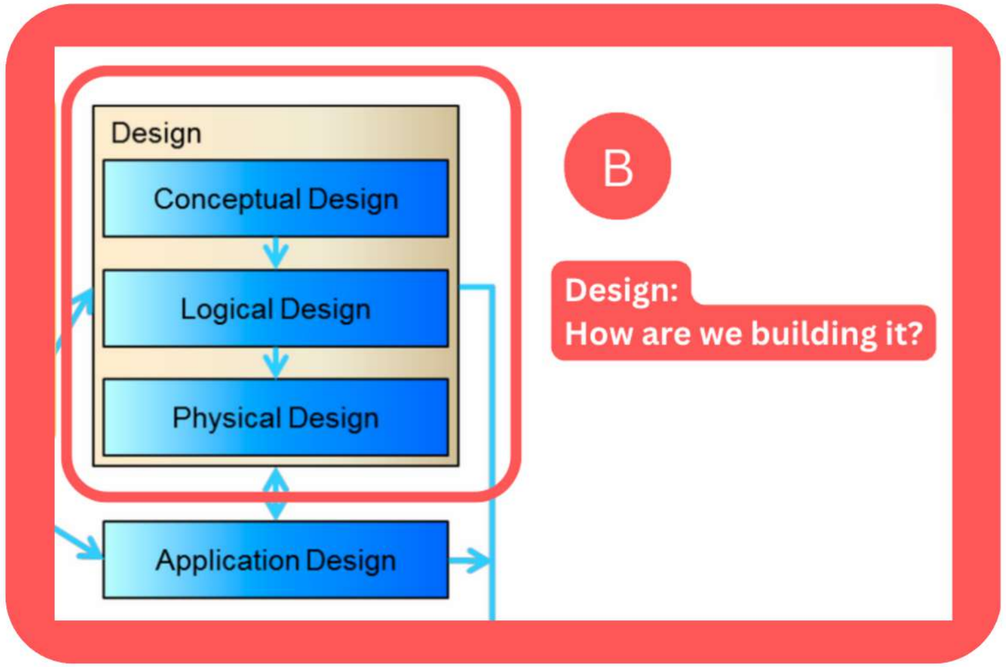


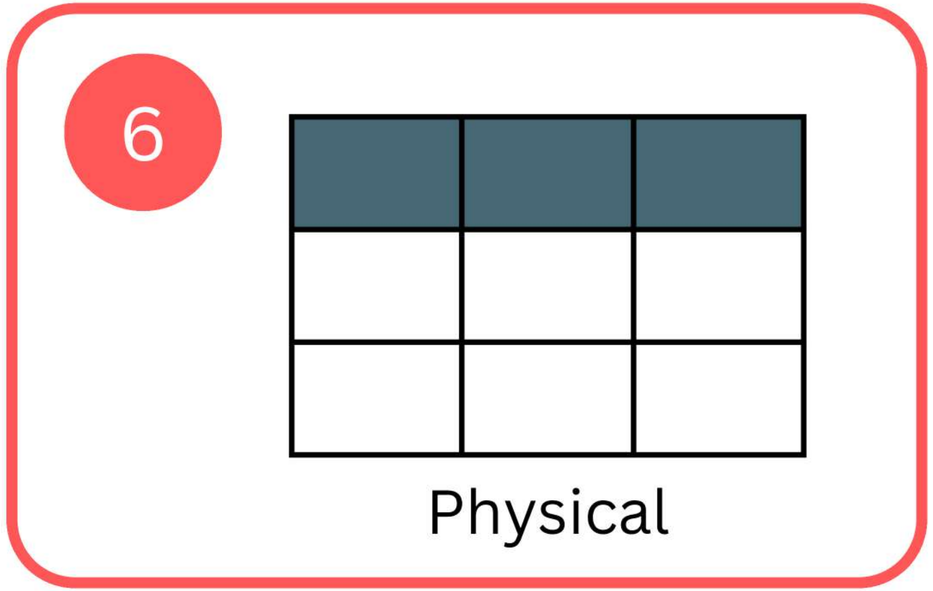


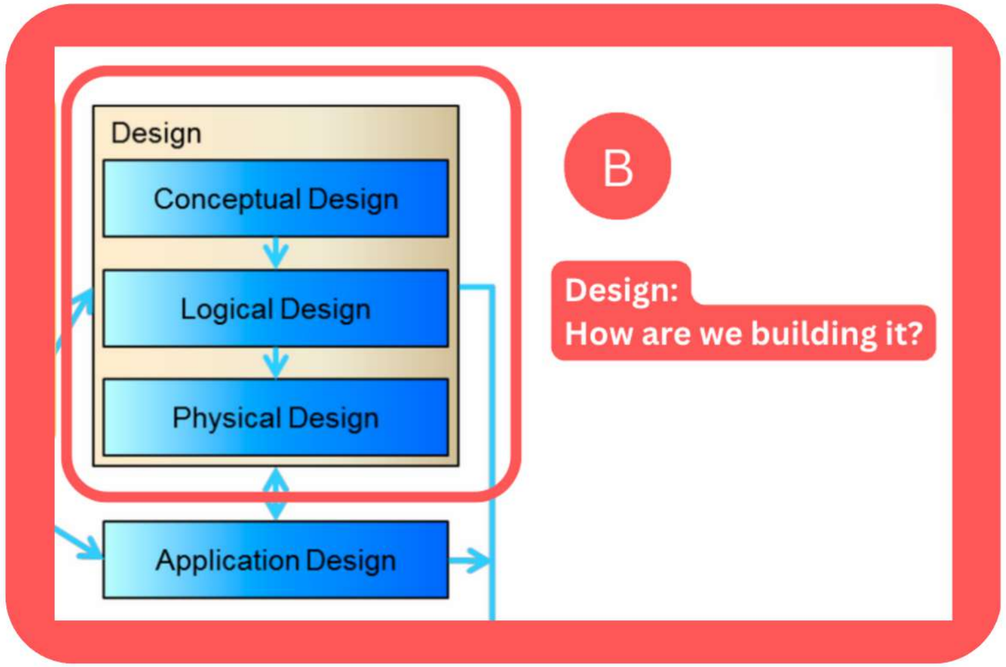
6. Physical Design

- Purpose: Decide DBMS

- Need to do:
  - + Data types
  - (file organisation, indexing...)







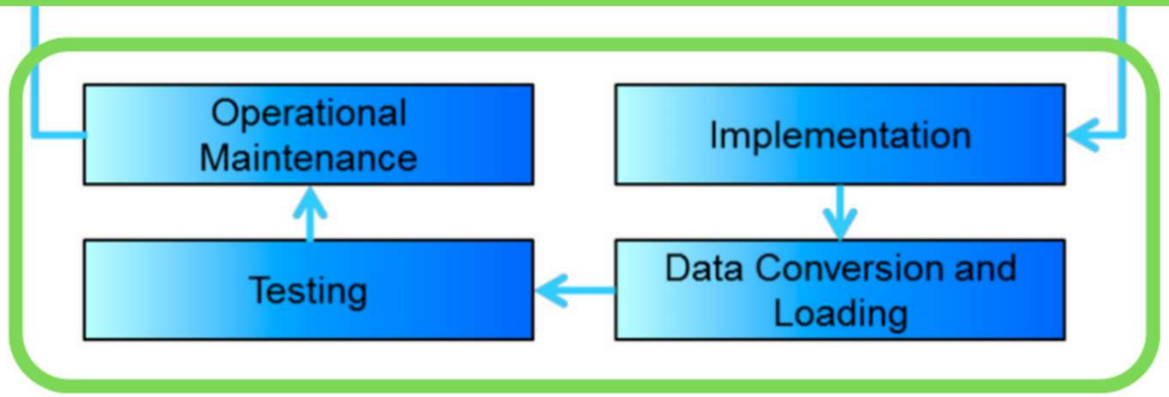
7. Application Design

- Purpose: Design UI & application that uses system
- Need to do: At the same time as other design stages (back & forth)

Execution

C

Execution:
How do we create and run it?



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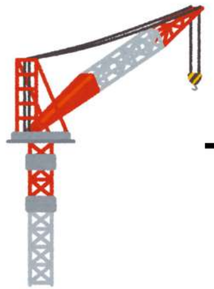


Implementation

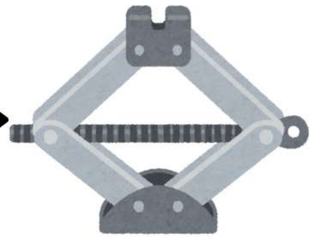
9

Data conversion & loading

10

Testing

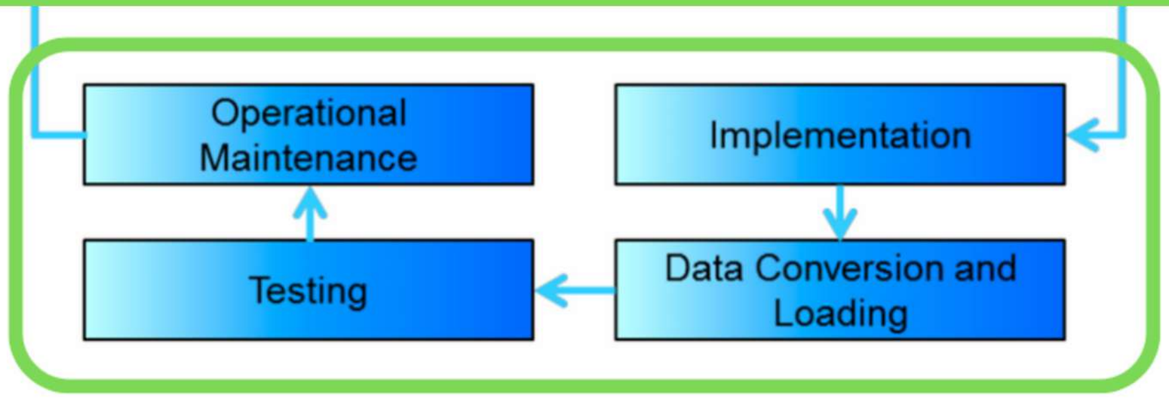
11



Maintenance

C

Execution:
How do we create and run it?



8

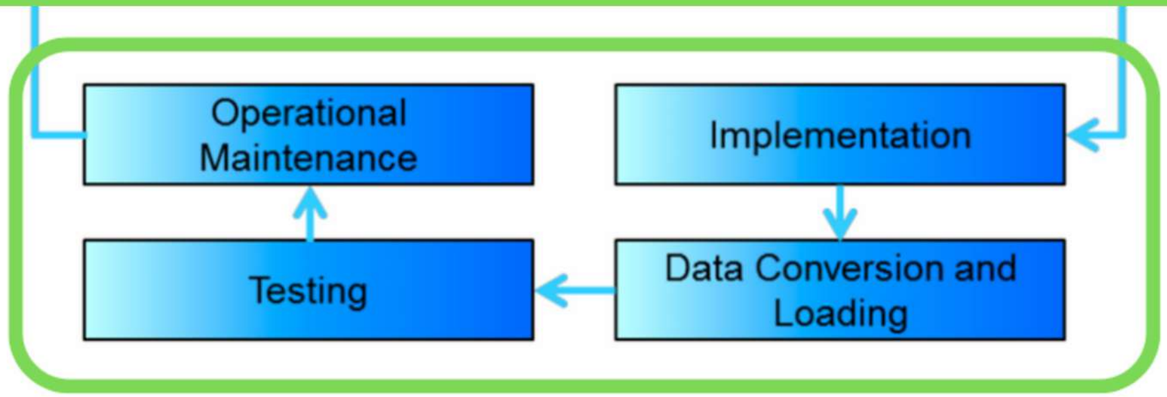
Implementation

8. Implementation

- Purpose: Code up DB
- Need to do:
  - Allow for CRUD actions

C

Execution:
How do we create and run it?

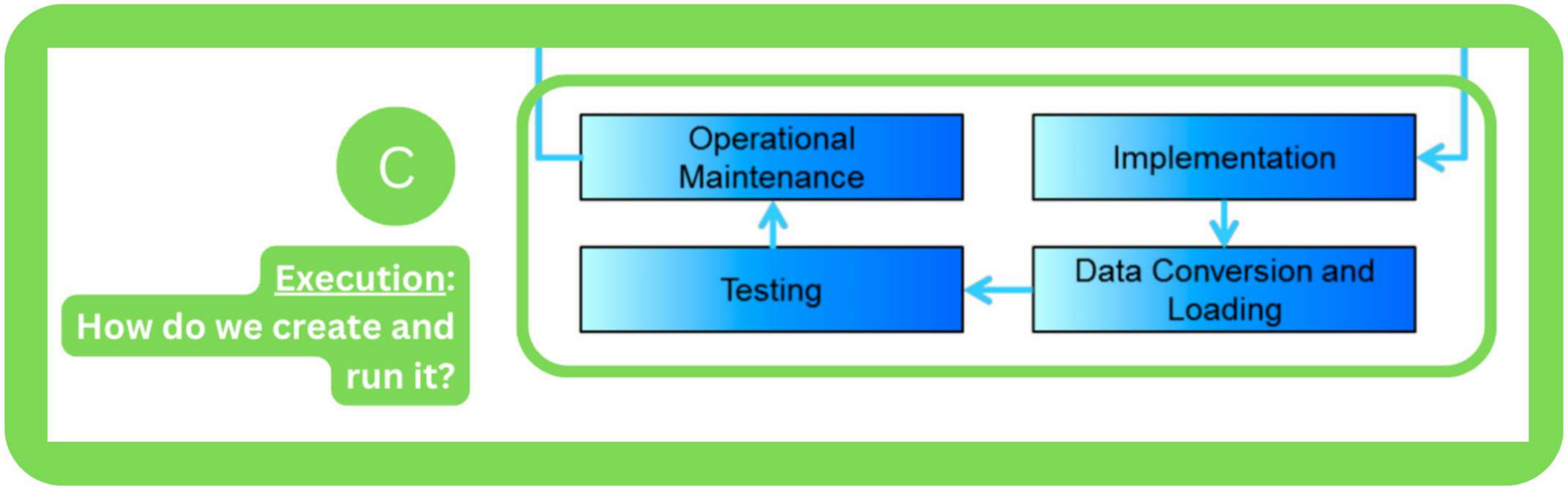


9

Data conversion & loading

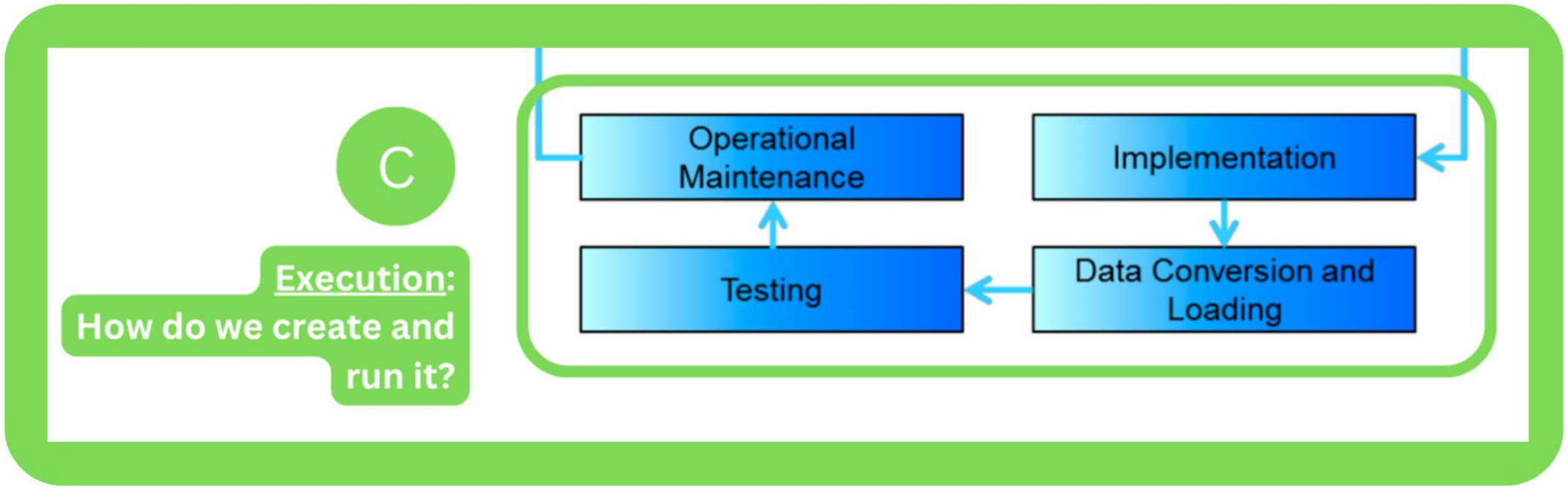
9. Data Conversion & Loading *

- Purpose / Need to do: Transfer existing data into system



10. Testing

- Purpose: Find errors
- Need to do: Analyse:
  - Performance, Robustness, Recoverability, Adaptability

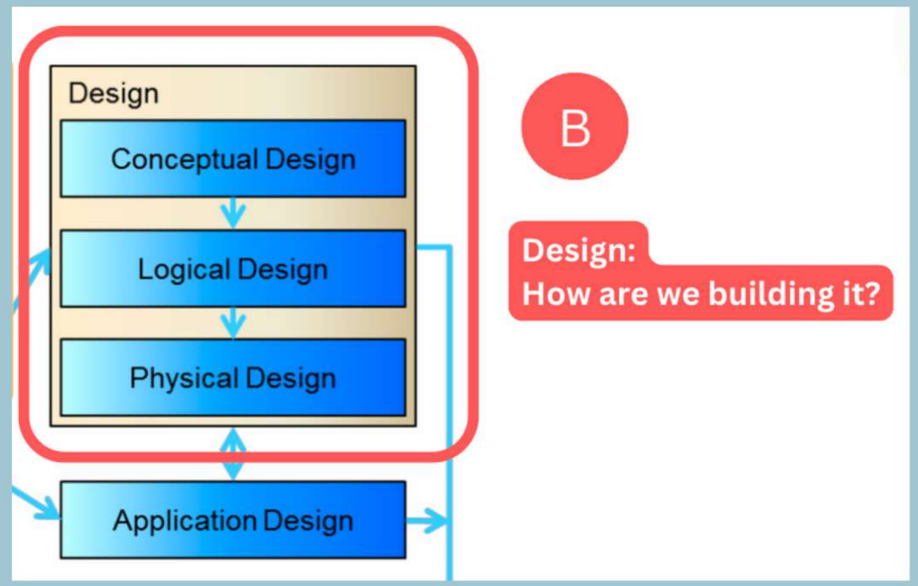


11. Operational Maintenance

- Purpose: Maintain system to work properly
- Need to do:
  - Monitoring, maintaining, updating

Q1(b)

Describe the tasks that are performed in the **conceptual design** stage to generate a conceptual model



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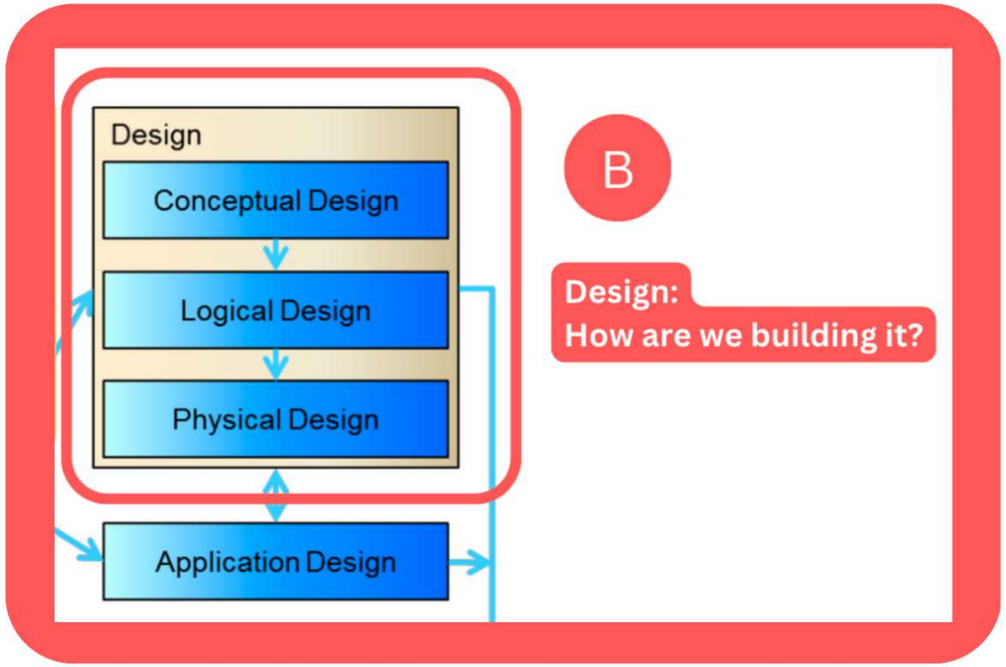

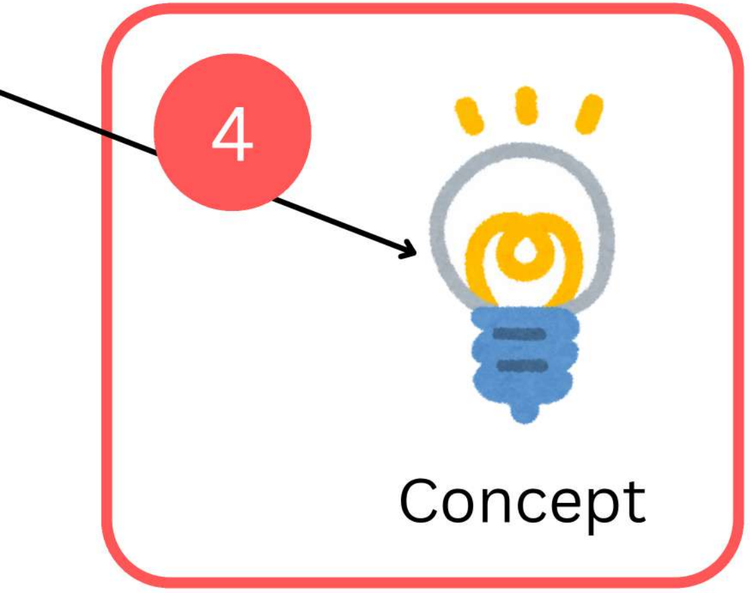

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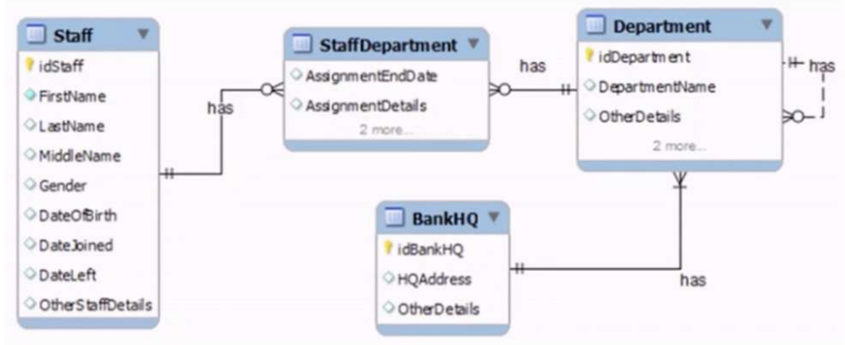
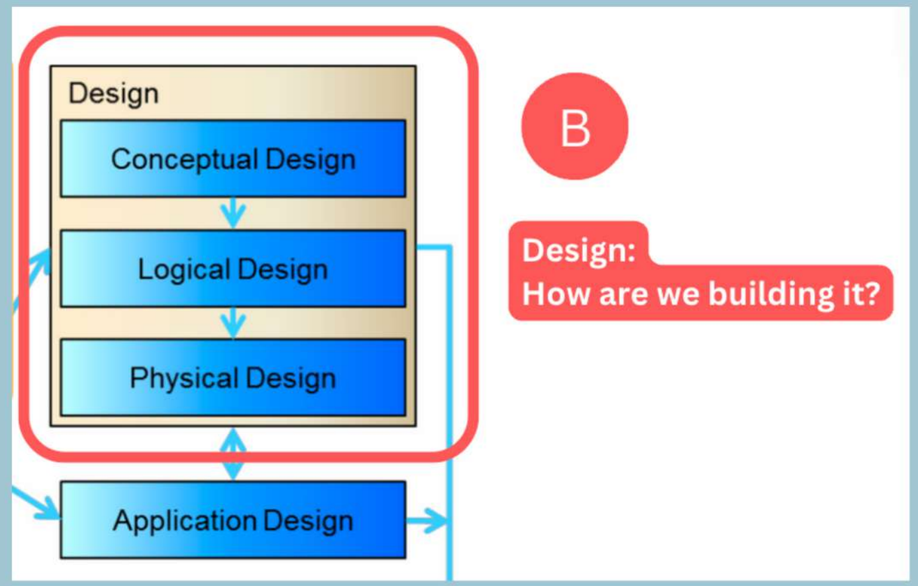


Q1(b)

- Evaluate the requirement analysis
- Identify:
  - ***Entities***, ***relationships*** (and their ***attributes***)
  - ***Constraints***
- Organise into ***ER*** *model*

Q1(c)

How do you refine a **conceptual** model to convert it to a **logical** model (relational)?



5. Logical Design

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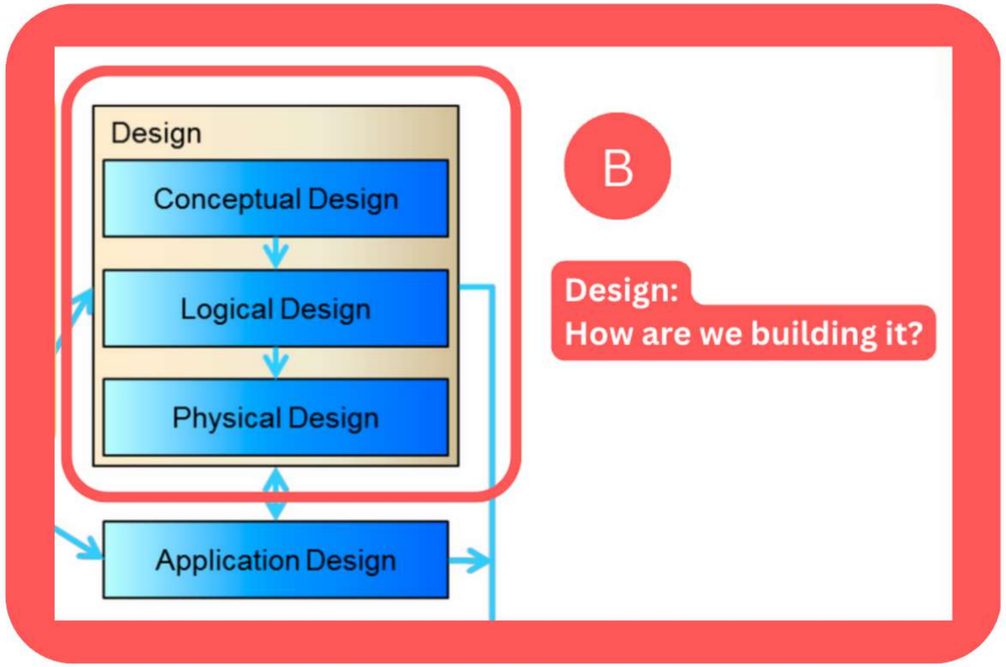
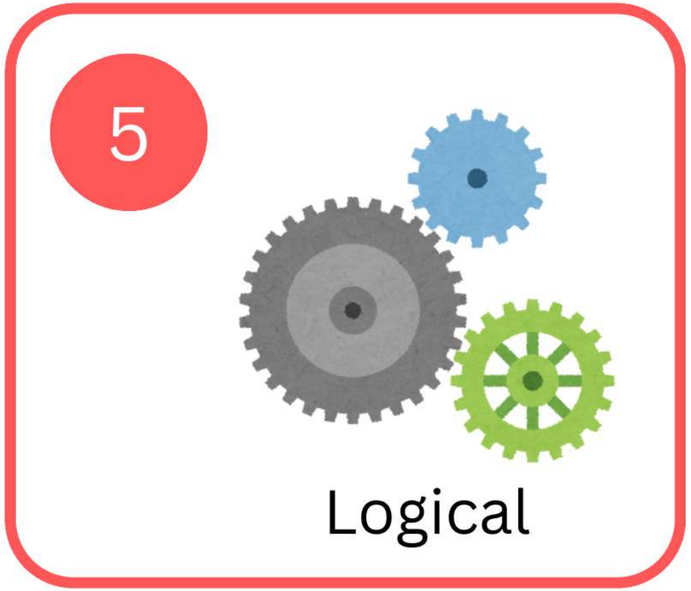
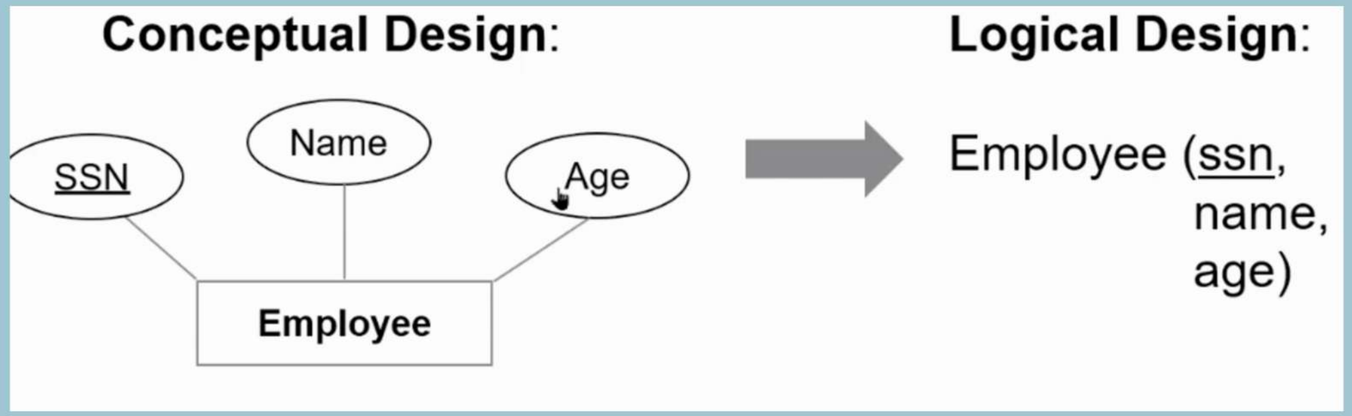




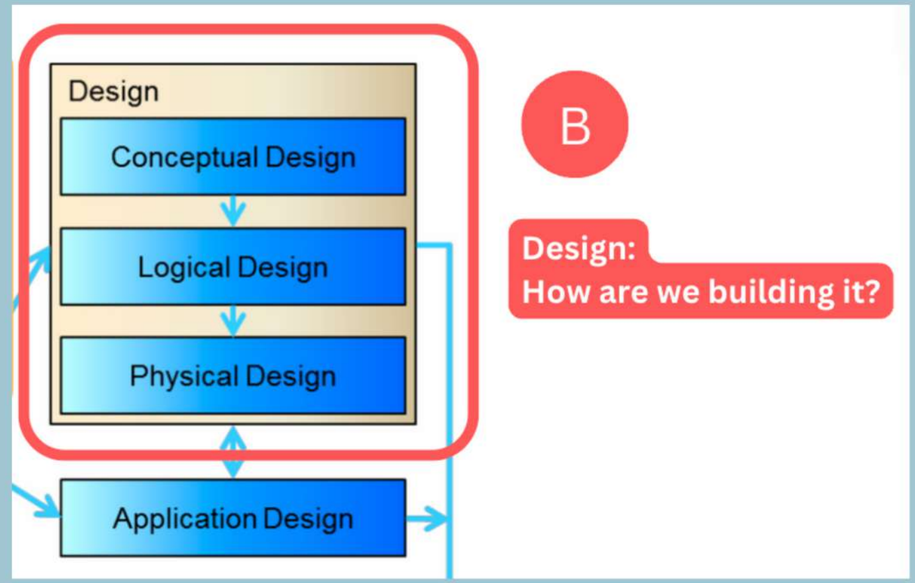
Q1(c)



- Flatten conceptual entities to **relations**
  - Resolve *multi-valued* / *composite* attributes
  - Resolve relationships (many-to-many...)
- Entity name → CamelCase
- Attribute name → lower case

Q1(c)

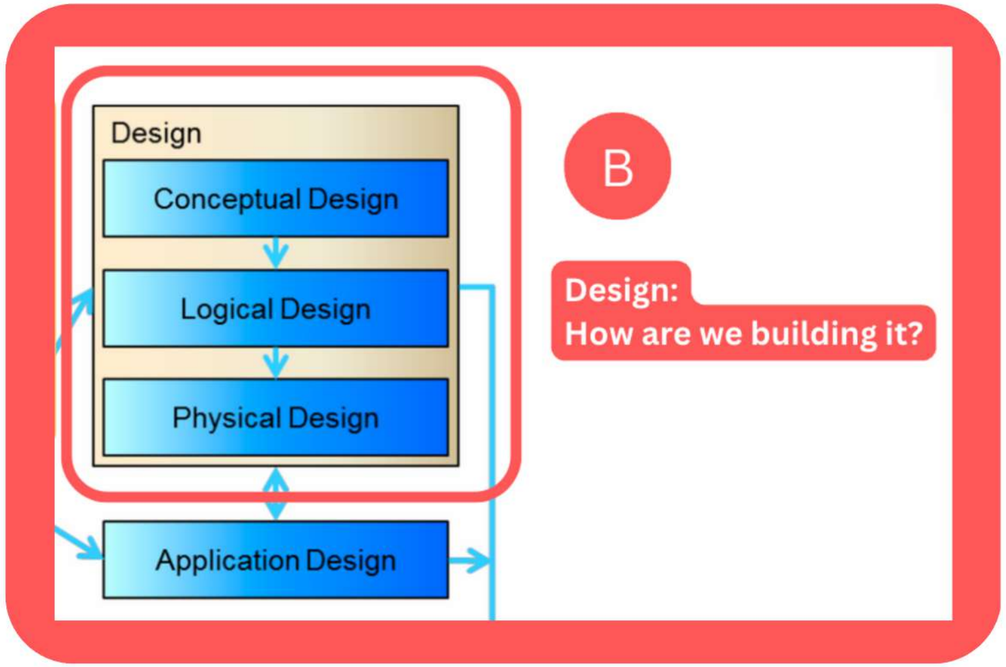
What must be done to transform a **logical** model to a **physical** model (Relational)?

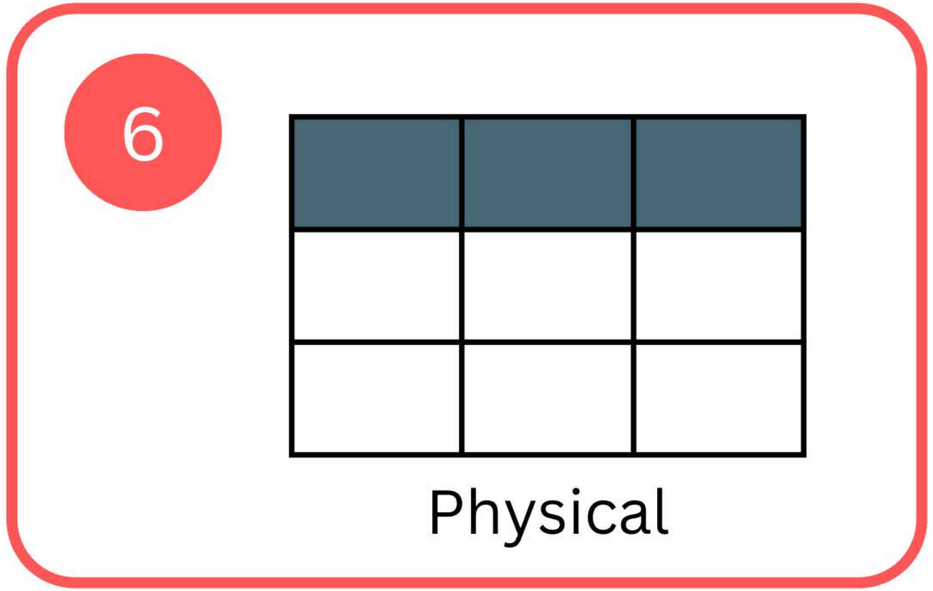


6. Physical Design

- Purpose: Decide DBMS

- Need to do:
  - + Data types
  - (file organisation, indexing...)



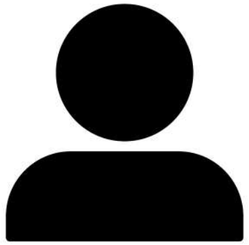


Q1(c)

- + Data types
- Add constraints (null, non-null...)

Q2 -
Case Study

Terms

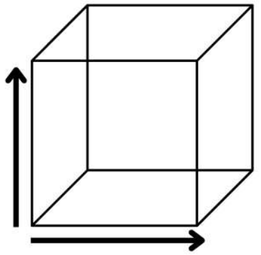


Entities

“**Object**” w/ important associated info. describing it

Business rules

A business’ **constraint** on its data



Attributes

Information that **describes** an entity

For the following case study, identify:

1. Entities
2. Business rules
3. For any 3 entities, list the attributes

A cinema chain operates a number of cinemas. Each cinema has several screens, numbered starting from 1. The chain keeps track of the size (in feet) and seating capacity of every screen, as well as whether the screen offers the Gold Class experience.

The cinema chain owns hundreds of movie projectors – both film projectors (16 mm and 35 mm) and digital projectors (2D and 3D). The chain stores key information about each projector, namely its serial number, model number, resolution and hours of use. Each movie screen has space for a single projector; technicians must be able to identify which screen each projector is currently projecting onto.

A wide range of movies are shown at these cinemas. The system should keep track of the last time a movie was shown on a particular screen. The marketing department needs to know the movie's title and year of release, along with the movie's rating (G, PG, M, MA15+ or R18+).

Each cinema has a numeric ID, name and address. For cinemas that are not owned outright, the business also keeps track of yearly rent. The system needs to be able to generate weekly activity reports for the chain's chief operating officer.

Q2(a): Entities

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Q2(a): Entities

- Cinema
- Screen
- Projector
- Movie

Why is “cinema chain” not an entity?

Q2(b): Business Rules

A cinema chain operates a number of cinemas. Each cinema has several screens, numbered starting from 1. The chain keeps track of the size (in feet) and seating capacity of every screen, as well as whether the screen offers the Gold Class experience.

The cinema chain owns hundreds of movie projectors – both film projectors (16 mm and 35 mm) and digital projectors (2D and 3D). The chain stores key information about each projector, namely its serial number, model number, resolution and hours of use. Each movie screen has space for a single projector; technicians must be able to identify which screen each projector is currently projecting onto.

A wide range of movies are shown at these cinemas. The system should keep track of the last time a movie was shown on a particular screen. The marketing department needs to know the movie's title and year of release, along with the movie's rating (G, PG, M, MA15+ or R18+).

Each cinema has a numeric ID, name and address. For cinemas that are not owned outright, the business also keeps track of yearly rent. The system needs to be able to generate weekly activity reports for the chain's chief operating officer.

Q2(b): Business Rules

- Each cinema has several screens, numbered starting from 1
- Each movie screen has space for a single projector
- Technicians must be able to identify which screen each projector is currently projecting onto.
- The system should keep track of the last time a movie was shown on a particular screen

Q2(c): Attributes

A cinema chain operates a number of cinemas. Each cinema has several screens, numbered starting from 1. The chain keeps track of the size (in feet) and seating capacity of every screen, as well as whether the screen offers the Gold Class experience.

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A wide range of movies are shown at these cinemas. The system should keep track of the last time a movie was shown on a particular screen. The marketing department needs to know the movie's title and year of release, along with the movie's rating (G, PG, M, MA15+ or R18+).

Each cinema has a numeric ID, name and address. For cinemas that are not owned outright, the business also keeps track of yearly rent. The system needs to be able to generate weekly activity reports for the chain's chief operating officer.

Q2(c): Attributes

- **Cinema** (ID, name, address, yearlyRent)
- **Screen** (number, size, seatingCapacity, goldClass)
- **Projector** (format [16 mm film/35 mm film/2D digital/3D digital], serialNumber, modelNumber, resolution, hoursUsed)
- **Movie** (title, yearReleased, rating)