



THE UNIVERSITY OF
MELBOURNE

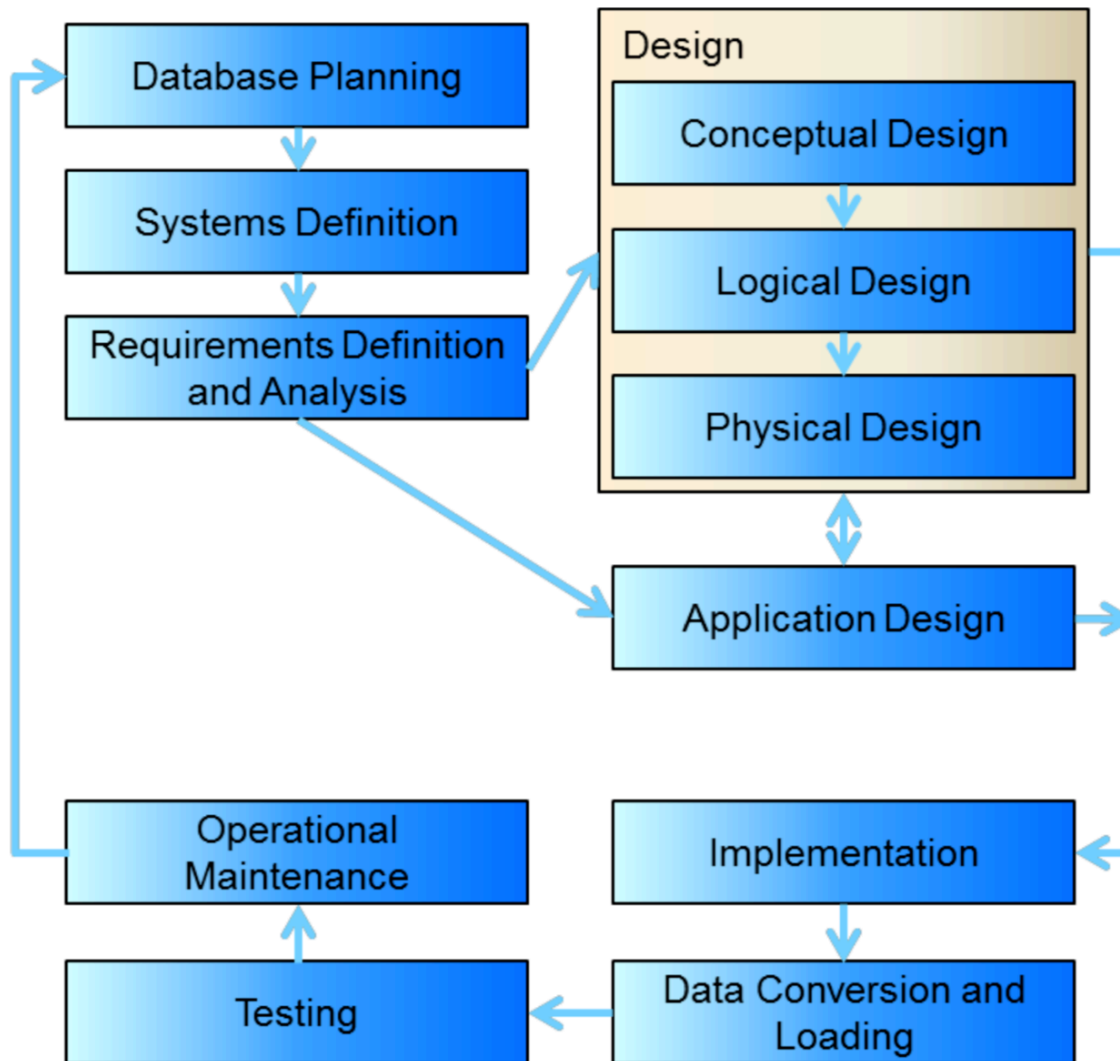
INFO20003 Database Systems

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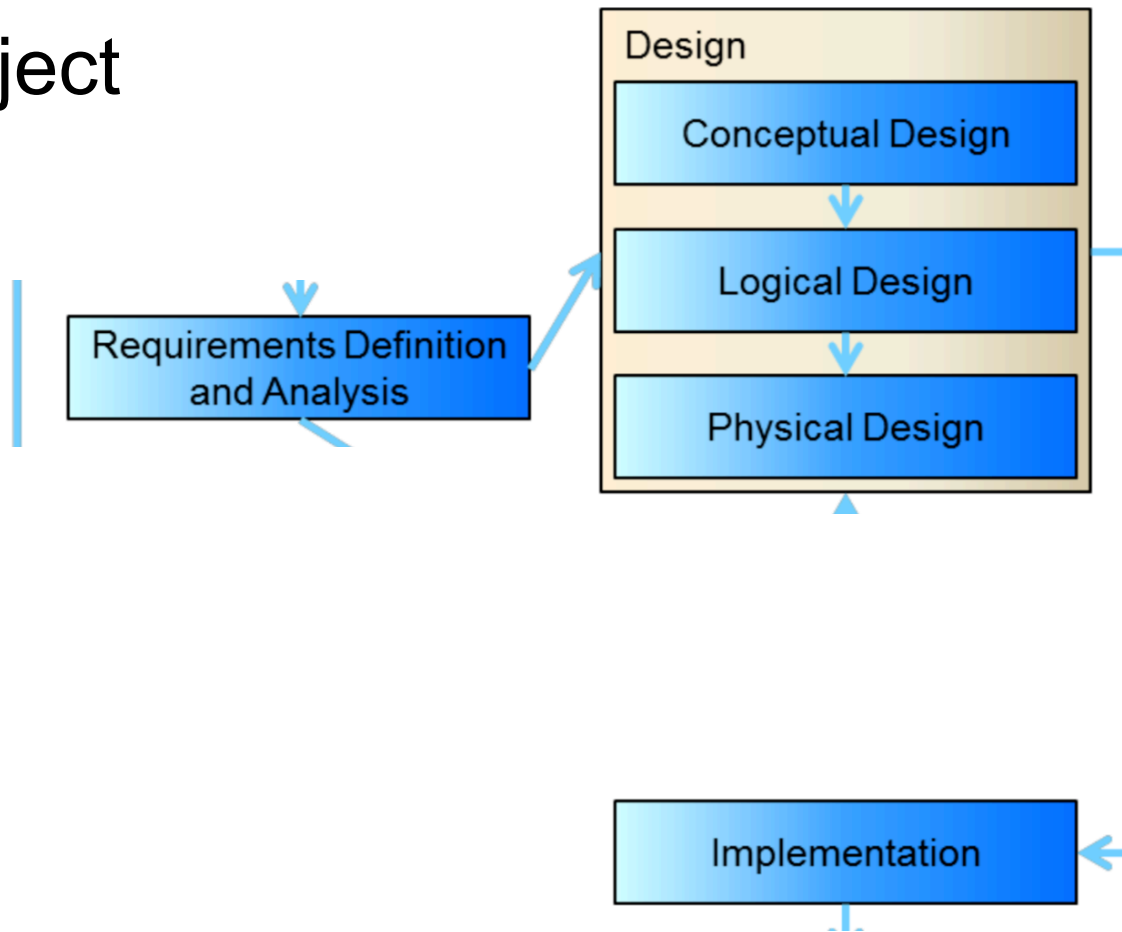
Tutorial 2
2021.03.08



- 1. Development Lifecycle Tutorial - 15min**
- 2. Case Studies - 35min**



This subject



a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?



Database planning:

Planning how to do the project

Understanding how the enterprise works.

a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?

Systems Definition

System definition:

Specifying scope and boundaries.

How to operate?

How interfere with others systems?

a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?

Requirements Definition
and Analysis

Requirements Definition and Analysis:

Collect and **analysis** of requirements

Description of the data used or generated

Details of how the data is to be used or generated.

Case study will be given for this subject, containing all the requirements.

a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?



Conceptual Design

Conceptual design:

Construction of a model of the data used in the database, independent of all physical considerations.

ER and EER diagrams.

a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?



Logical Design:

The model of the data to be used is based on a **specific data model**, but independent of a particular database management system.

e.g. relational data model.

a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?



Physical Design

Physical Design:

The **description of the implementation of the database** on secondary storage is created.

The base relations, indexes, integrity constraints, security, etc. are defined using the SQL language.

a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?



Application Design

Application Design:

Design of the **user interface** and the **application programs**

a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?



Implementation

Implementation:

Physical realization of the database and application designs.

Programming phase

a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?

Data Conversion and
Loading

Data conversion and loading:

Needed when a new database is replacing an old system.

Existing data will be **transferred** into the new database.

a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?



Operational
Maintenance

Operational Maintenance:

Monitoring, Maintaining and upgrading.

a. What is the purpose of each stage and what do we, as database designers, need to do in each stage?



Testing:

Find error and analyze performance

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

1. requirement analysis

identify **entities and relationships**

Entities: real-world object or concept distinguishable from other objects or concepts

Each entity is described using a set of attributes.

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

2. identify and document business rules.

allow the identification of **relationships, participation rules and constraints** in creating a correct data model. They also allow designers to understand **business processes, and the nature, role and scope of the data**

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

3. identify what information about these entities and relationships should be stored in the database.

From this, a database schema is developed and displayed as an **ER model (diagram)**, using the basic constructs of entities, relationships and attributes.

c. How do you refine a conceptual model to convert it to a logical model (Relational)?

Refine: double-check with business rules, cover everything states in the requirements, and do not cover anything that is not in there.

Convert to logical model:

1. Resolve relationship, create foreign keys
2. ...

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

Convert to physical model:

1. Choose data type
2. Add data related constraints (Null/Not null)
3. ...



More about logical and physical model will be discussed next week

Any questions?



Group/Individual case study

- 1. Already have a study group and they are all in this tut?**
 - **Message me the name of all group members**
- 2. No group yet but happy to join some groups.**
 - **No need to do anything**
 - **I'll randomly allocate you to some groups**
- 3. Don't want be in a group for now?**
 - **Totally fine, please message me about this**

Some tools to help you collaborate:

1. Zoom (whiteboard, chat channel ...)
2. Post ideas (<https://padlet.com/auth/login>)
3. ER diagram (<https://app.diagrams.net>)
4. Slack
5. Microsoft teams
6. ...

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.



a. Identify the **entities**.

- Cinema
- Screen
- Projector
- Movie

Q: How about Cinema chain? Why?

A: **not an entity** in this scenario.

1. Only one instance.
2. There is no data to store about it.

So: Do not normally include the actual business or company whose business processes you are modeling.

b. Identify the **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

c. For any three identified entities, list the **attributes**.

1. Cinema (ID, name, address, yearly rent)
2. Screen (number, size, seating capacity, has Gold Class?)
3. Projector (format [16 mm film/35 mm film/2D digital/3D digital], serial number, model number, resolution, hours of use)
4. Movie (title, year of release, rating)

Any questions?