INFO 20003 Tutorial 2

Starting ~1.05 pm

Today's tutorial

- Quiz Activity
- Database Development Lifecycle
- Cinema case study
  - group work

Quiz Activity

Questions:

(1)

Q. Which stages of the Database Development Lifecycle are fully out of scope for this subject?

answer choices

- Data Conversion and Loading
- Database Planning
- Implementation
- Requirements Definition and Analysis
- Systems Definition

(2)

Q. At what stage do we actually create the database?

answer choices

- Logical
- Physical
- Application Design
- Implementation

(3)

Q. At what stage are we independent of a specific database model?

answer choices

- Logical
- Physical
- Conceptual

(4)

Q. When do we choose a specific DBMS?

answer choices

- Conceptual
- Physical
- Logical

(5)

Q. At what stage do we apply a specific database model?
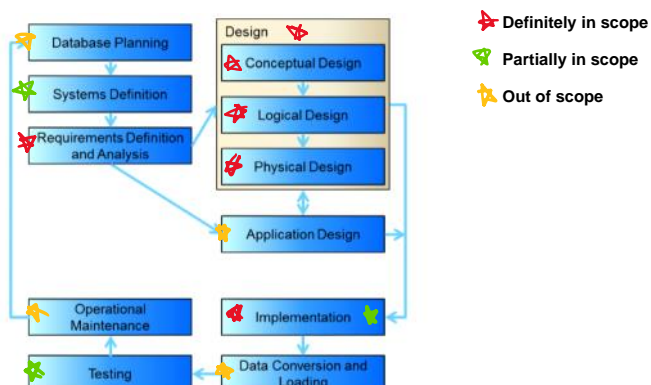
answer choices

- Conceptual
- Logical
- Physical

ANSWERS:

1. Data Conversion and Loading + Database Planning are fully out of scope
2. Implementation
3. Conceptual
4. Physical
5. Logical

Database Development Lifecycle

🌟 **Definitely in scope**

🌟 **Partially in scope**

🌟 **Out of scope**
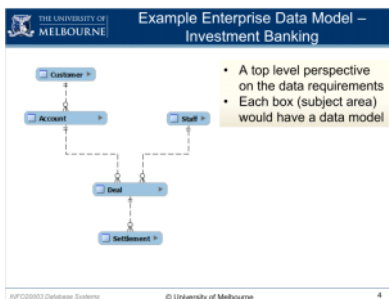
Database planning [Out of scope]

- Planning at a very high level how to do the project

- Understand the main building blocks of the model

Systems Definition [Partially Out of scope]

- Understanding scope
- How our system interferes with and is connected to all the other systems

e.g. modelling Account
- How Account is linked with other systems in the bank
 e.g. Customer

Requirements Definition and Analysis
[In scope]

- Collecting and figuring out requirements of the system we are modelling

- Business rules

- Description of the data used and how the data is to be used

- Any additional requirements

- Good strategy: is to read through the text a few times

- Very important stage, key focus of Assignment 1

Design [In scope]

- Focus of first few weeks of this subject

- Need to know differences between the 3 stages and
  how to get from
    - conceptual -> logical
    - logical -> physical

- More technical
- Goes from a higher level data model to being closer to
  an actual database
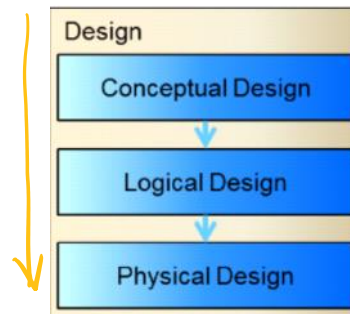
Conceptual Design [In scope]

- Model of DATA

- Independent of
    - a database model e.g. relational, network, hierarchical
    - all physical considerations

- Modelling how data is related to each other
- Entity-relational model
- Diagram of the "Requirements Definition and Analysis"

- 1b) Will brainstorm together:
  o Describe the tasks that are performed in the conceptual
    design stage to generate a conceptual model.

    □ What are the components of an ER Model / Conceptual
      model?
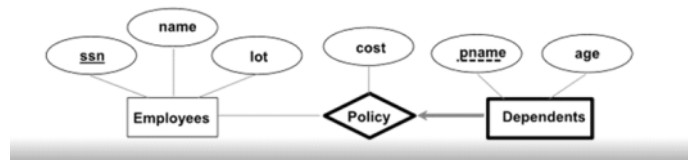
1b)

    ☐ Identify entities and relationships

    ☐ Business rules (constraints, specifications)
      ◆ relationships

    ☐ What information about entities and relationships we
      need to store

    ☐ ER Model (4)
      ◆ Entities
      ◆ Relationships
      ◆ Attributes (includes keys)
      ◆ Constraints

What is an entity?

    ◆ Real-world object/concept which is distinct from other
      objects/concepts

    ◆ Entities are described by a set of attributes

Logical Design [In scope]

- Choose the DB model we want
    ▪ e.g. relational/network/hierachical model

- Still independent of specific DBMS, data types and other <u>physical</u> considerations

Physical Design [In scope]

- Choose a specific DBMS
    - e.g. MySQL, Oracle, MongoDB etc

- Thus deal with other physical considerations like the **data types** we use in that DBMS, indexing, how DBMS will store files etc

Application Design [Out of scope]

- Design of UI
- Applications that use database
- Applications sit on top of database
    - You can take web development subjects to learn more about this

Implementation [Partially in scope]

- Actually create the relations, tables
- Database goes live
- Physical realisation of database

Data conversion and loading [out of scope]

- New database is replacing an old system

Testing [Partially in scope]

- Test the database
- Find errors
- Does it support the requirements?
- Analyse performance, robustness, adaptability

- Outside scope slightly, but you will need to test your
  solutions when creating databases

Operational Maintenance [out of scope]

- Handling new requirements, upgrading database etc
- Hence, you go through another development lifecycle

Cinema Case Study

○ Work in groups

2. **Consider the following case study:**

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.
b. Identify the **business rules**.
c. For any three identified entities, list the attributes.
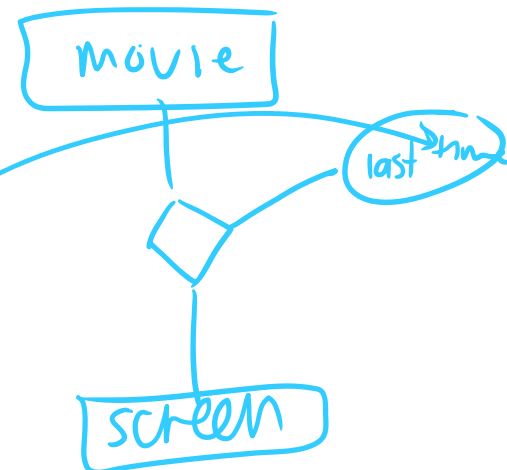
What are business rules?

• Anything that **defines data**
  ○ May capture <u>relationships</u> between entities
  ○ Definition of an <u>entity</u> or <u>attribute</u> is a business rule

• The tutorial sheet answers aren't fully correct for 2 (b),
  there's more business rules than shown

- It's okay if you don't fully get this concept because we don't ask you to list business rules in any assessments
  - Instead, you are assessed on how you go straight from requirements analysis -> model
  - Business rules is just an intermediate step to do in your head

Final 10 minutes:

Is 'cinema chain' an entity?
- No!
- Usually, we do not include the actual company whose business processes we are modelling
- There's only 1 instance of the company anyway, and there's no data (attributes) to store about it

Entities & Attributes

Cinema (ID, name, address, yearly rent)
  - yearly rent : can be an optional attribute

Screen (number, size, seating capacity, has Gold Class?)

Projector (format [16 mm film/35 mm film/2D digital/3D digital], serial number, model number, resolution, hours of use)

  - Can use enum
    - e.g. "Day"
      - data type = enum(Mon, Tue, Wed)
  - or look up tables

Movie (title, year of release, rating)

- "The system should keep track of last time a movie was shown on a particular screen"
  - Is this 'last time' an attribute of an entity?
  - Which entity does it belong to? screen or movie?
  - It's a bit hard to say which is why it might be a good idea to model it as a relationship attribute