Database REVIEW

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Contents

Course Syllabus

1 General Introduction (part 1)

1.1 What is data?

- Data is just the data and information that can be stored.
- it is typically **unprocessed** and **raw**.
- Once we have put our data into **context**, **data is transformed into information**, which is then used to make decisions.

1.2 Databases, Data, and Information

Database

- Collection of data organized in a manner that allows access, retrieval, and use of

Data

- Collection of unprocessed items
- Text, Numbers, Images, Audio, Video

Information

- Processed data
- organized, meaningful, useful

1.3 What is Database?

Database = A large collection of related data

1.4 Database Management System (DBMS)

- Compilation of related data
- A collection of programs for accessing data
- A database management system (DBMS) stores information about a specific organization.
- Reliable and easy to use

1.5 DBMS Core Functions

DBMS gives us an interface or tool to carry out a variety of tasks, including building databases, storing data in them, updating data, creating tables in the databases, and much more.

- Defining a particular database in terms of
  its data types ,structures , and constraints
- Manipulating the database

  - Retrieval: Querying, generating reports
  - Modification: Insertions, deletions and updates to its content
  - Accessing the database through Web applications

- Processing and sharing by a set of concurrent users and application programs yet, keeping all data valid and consistent.

1.6 DBMS Con.

Additionally, DBMS offers security and protection to the databases.
Maintaining data consistency when multiple users are present.
Example of DBMS software: MySql, Oracle, Ms SQL Server

1.7 Types of Database

- Traditional Applications:
  - Numeric and Textual Databases
- More Recent Applications:
  - Multimedia Database (images, audio, video...)
  - Geographic Information Systems (GIS): Store and analyze maps, weather data, and satellite images
- Data Warehouses and online analytical processing (OLAP) systems
  - Extract and analyze useful business information from very large databases.
  - Support decision making.
- Real-time and Active Databases
  - A real-time database is a database system that processes data in real time to handle workloads that are constantly changing.

1.8 The Database approach's main characteristics

- Data Abstraction
  - A data model hides storage details while providing users with a conceptual view of the database.
  - Programs refer to the data model constructs rather than data storage details.
- Multiple data views are supported
  - Each user may see a different view of the database that only shows the data that is relevant to them.
- Data sharing and transaction processing for multiple users
  - Allowing multiple users to access and update the database at the same time.

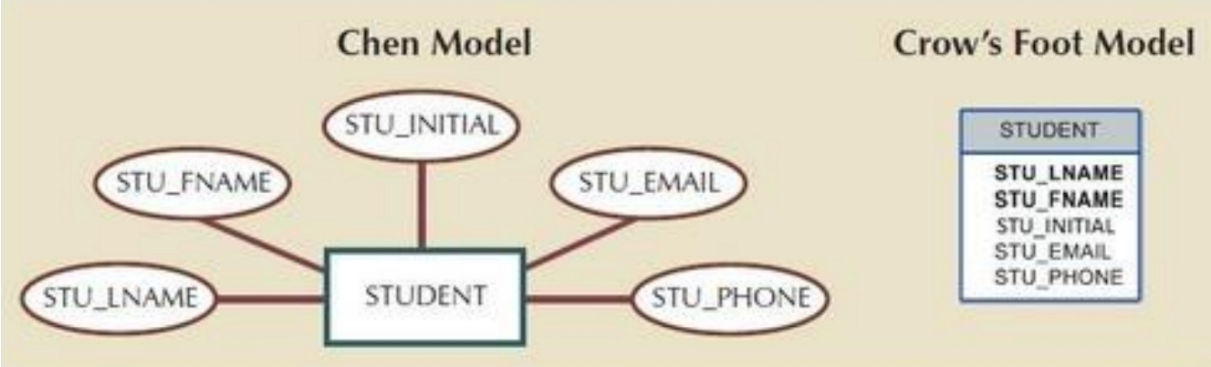
- The recovery subsystem ensures that the effect of each completed transaction is permanently recorded in the database.
- Database applications rely heavily on OLTP (Online Transaction Processing). Hundreds of concurrent transactions can be executed per second as a result of this.

2 General Introduction (part 2)

2.1 placeholder

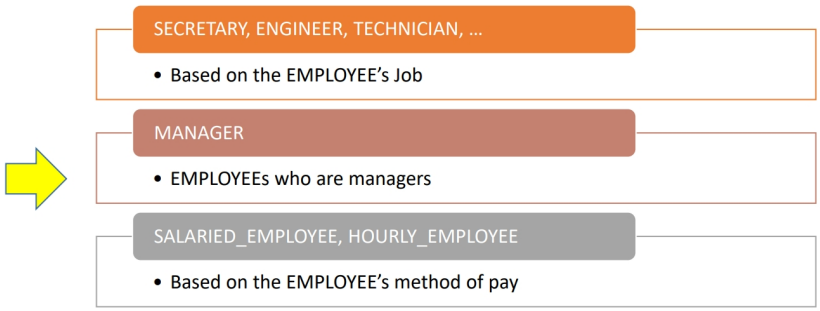
3 Chapter 2C: Enhanced Entity Relationship Model(EERDM

3.1 Chen Model vs Crow's Foot Model



3.2 Subclasses & Superclasses

- An **entity** type may have additional meaningful **subgroupings** of its entities
  - Example:
    EMPLOYEE may be further grouped into:



EER diagrams extend ER diagrams to represent these additional subgroupings, called subclasses or subtypes

- Each is called a **subclass** of EMPLOYEE
- EMPLOYEE is the **superclass** for each of these subclasses
- These are called superclass/subclass relationships:
  - EMPLOYEE/SECRETARY
  - EMPLOYEE/TECHNICIAN
  - EMPLOYEE/MANAGER
- These are also called IS A relationships
  - SECRETARY IS-A EMPLOYEE, TECHNICIAN IS-A EMPLOYEE, ...

3.3 Generalization & Specialization

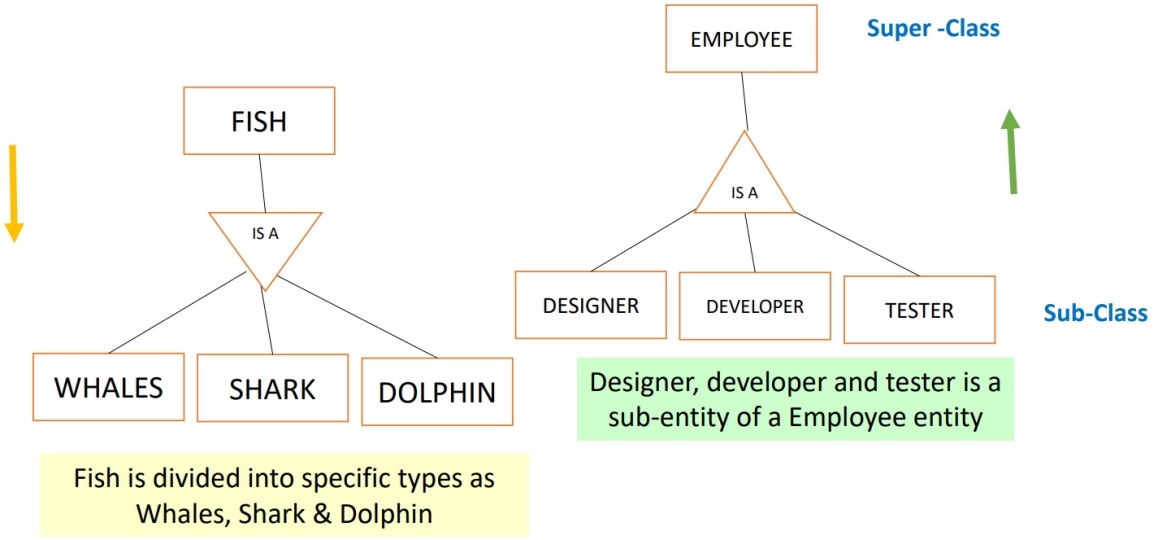
3.3.1 Generalize

- A bottom-up strategy called generalization combines two lower level entities to create a higher level entity.
- Called a bottom up conceptual synthesis process.

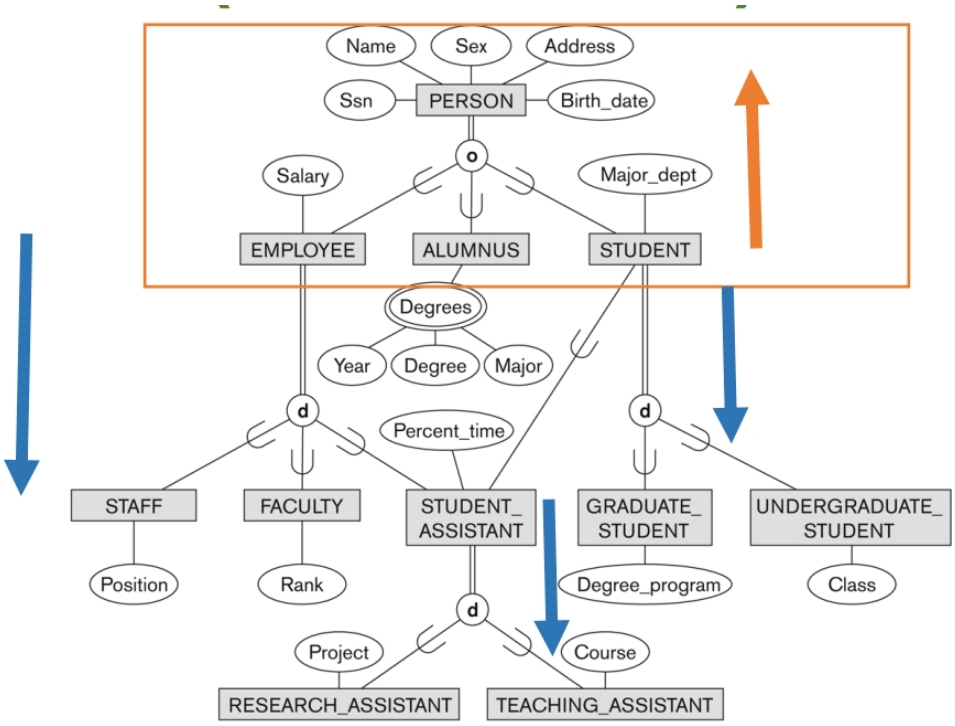
3.3.2 Specialization

- start with an entity type and then define subclasses of the entity type by successive specialization.
- called a top down conceptual refinement process.

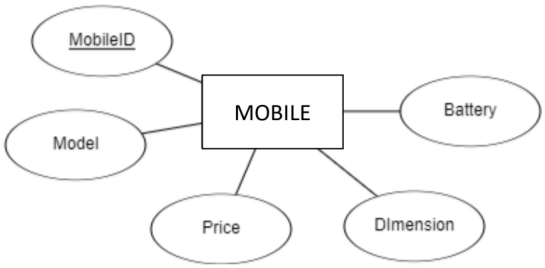
3.3.3 Difference between Generalization & Specialization

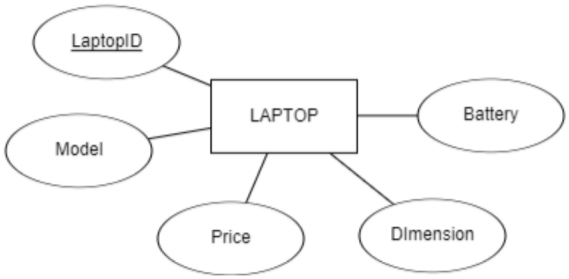


Example:

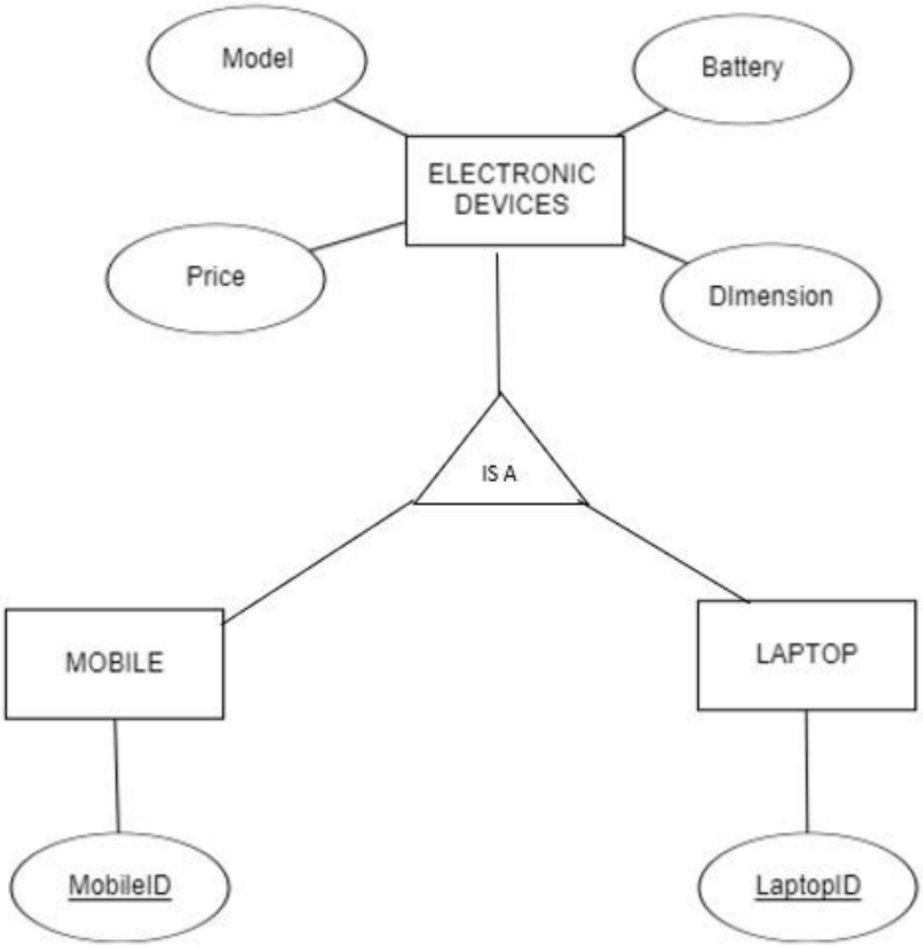


Entity Before Generalization

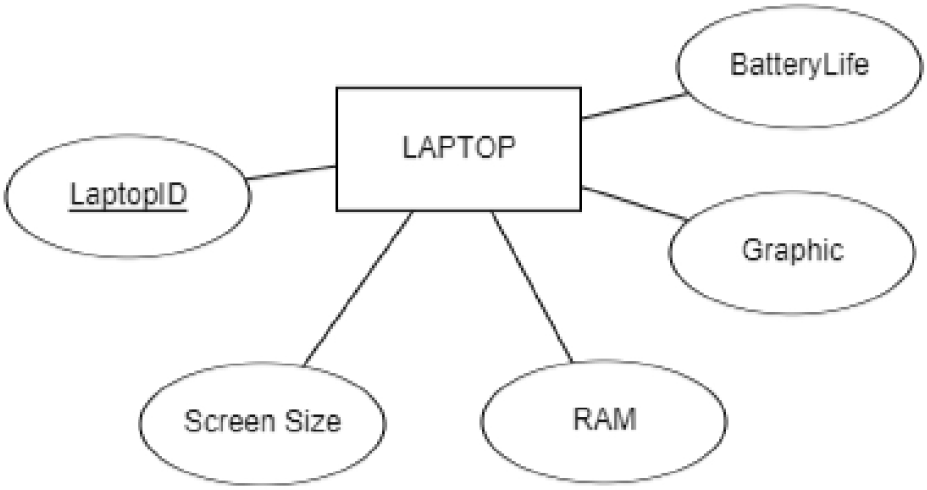




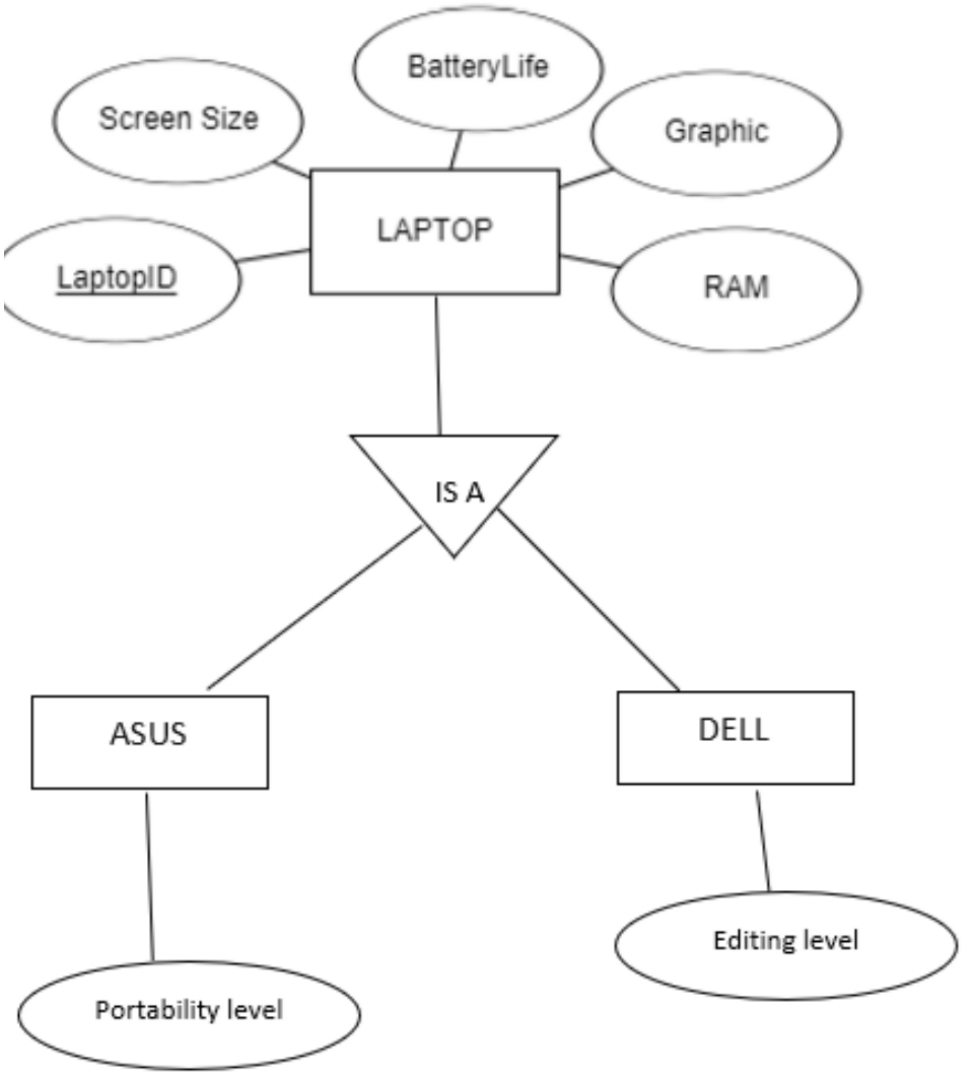
Entity After Generalization



Entity Before Specialization



Entity AFTER Specialization



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