DATABASE DESIGN

ENTITY RELATIONSHIP DIAGRAMS

- **GOAL**: Model & design relational databases.
- **ER Diagrams** consist of 3 main symbols:

  1. ENTITY ("Nouns")
     - Ex: Products, Customers, Employees
  2. ATTRIBUTE ("Characteristics")
     - Ex: name, price, age
  3. RELATIONSHIP ("Verbs")
     - Ex: Product sold by company, employee works for manager

- These components are arranged to visually illustrate connections between data objects.

RELATIONAL MODELLING

- Based on the mathematical concept of "relations" - i.e. tables of values
- Made up of 2 parts: relational schema + relational instance

DIMENSIONAL MODELLING

- An adaptation of the relational model for data warehouses
- Optimized for fast data retrieval rather than frequent updates
- Two key table types: fact & dimension
  - De-normalized tables
  - Contain descriptions of a fact
  - Less frequent changes

NORMALIZATION

A design choice that weighs data integrity vs. data retrieval.

- Reduce redundancy & favor consistency by dividing data into small, logical units.
- Aggregate data, at the cost of redundancy, to improve query performance.

**Example ER Diagram**

Cardinality & Ordinality Notation

- Line symbols indicate the minimum & maximum number of times that entities be related.

**RELATIONAL MODEL ALTERNATIVES?**
NoSQL: MongoDB, Redis, Cassandra, HBase