

# Week 5–Unit 2B

## DATA MODEL

17<sup>th</sup> September 2015

# Learning Objectives

## Unit 1 Objective

- ✓ To build students capabilities on data modeling

## Learning outcome

- ✓ We expect clear understanding of the 3basic model.

# Content

**Type 1: Flat model**

**Type 2: Entity–Relationship Model**

**Type 3: Relational model**



# What is Data Model?

Data models define how the logical structure of a database is displayed. Data Models are fundamental entities to introduce abstraction in a DBMS. Data models define how data is connected to each other and how they are processed and stored inside the system.

The very first data model could be flat data-models, where all the data used are to be kept in the same plane. Earlier data models were not so scientific, hence they were prone to introduce lots of duplication and update anomalies.

Model means? : Example to follow, Prototype, Sample, Archetypal, pattern, standard, Template

# 3-Types of Data models

1. Flat model
2. E-R model
3. Relational model

## Type 1: Flat Model (Traditional Flat file Bookkeeping):

The very first type is the flat data-models, where all the data used are to be kept in the same plane. Earlier data models were not so scientific, hence they were prone to introduce lots of duplication and update anomalies.

**NB:**  
Duplication &  
Update  
Anomalies

Each file for  
Eric Opoku  
contains my  
Attributes to  
identify me  
Attributes: are  
staff ID, Age,  
Sex, Title

Eric Opoku  
Employment  
Profile File

HR Dept.

Eric Opoku  
Health  
Records File

Health Unit

Eric Opoku  
Payroll  
Records file

Finance Dept.

Eric Opoku  
Roles & Duties  
update file

Operation Dept.

Eric Opoku  
Leave Days  
update file

HR Dept.

Eric Opoku  
Family  
Dependents file

HR Dept.

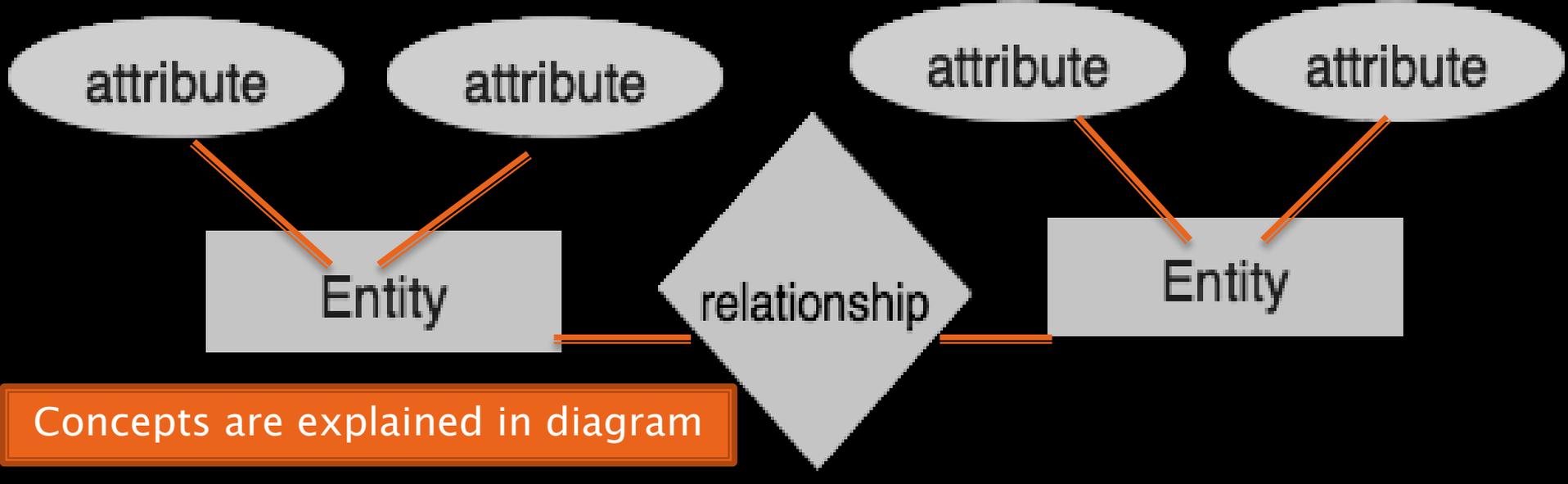
# Type 2: Entity-Relationship Model

The ER model defines the conceptual view of a database. It works around real-world entities and the associations among them. At view level, the ER model is considered a good option for designing databases.

The ER Model creates entity set, relationship set, general attributes, and constraints.

ER Model is based on:

- Entities** and their attributes.
- Relationships** among entities.



## · What is an Entity ?

An entity in an ER Model is a real-world entity having properties called **attributes**. Every attribute is defined by its set of values called **domain**.

**For example**, in a school database, a student is considered as an entity. Student has various attributes like {**Name** (domain are-first, surname), **Age** (domain are-day, month, year), **Class** (level 300, Room A), etc. }

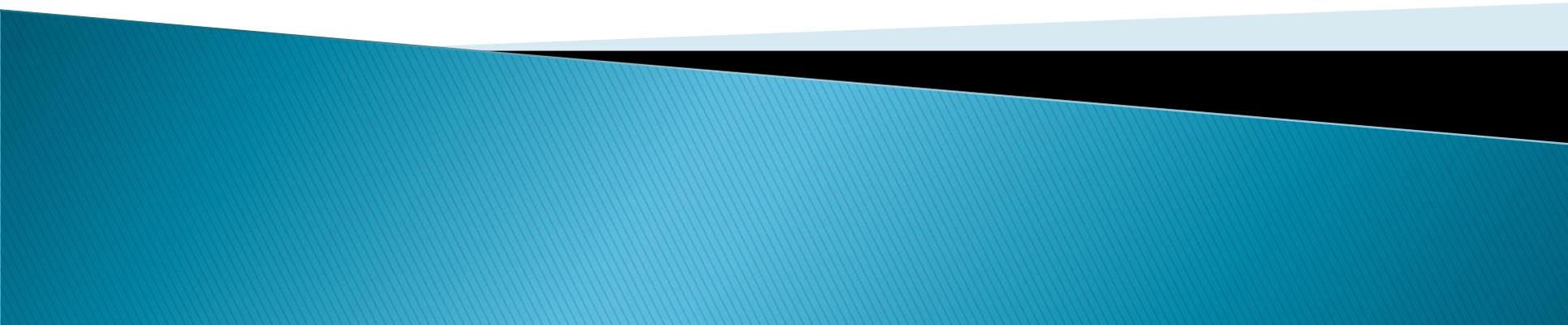
## · What is Relationship ?

The logical association among entities is called **relationship**. Relationships are mapped with entities in various ways. Mapping cardinalities define the number of association between two entities.

# E-R Mapping

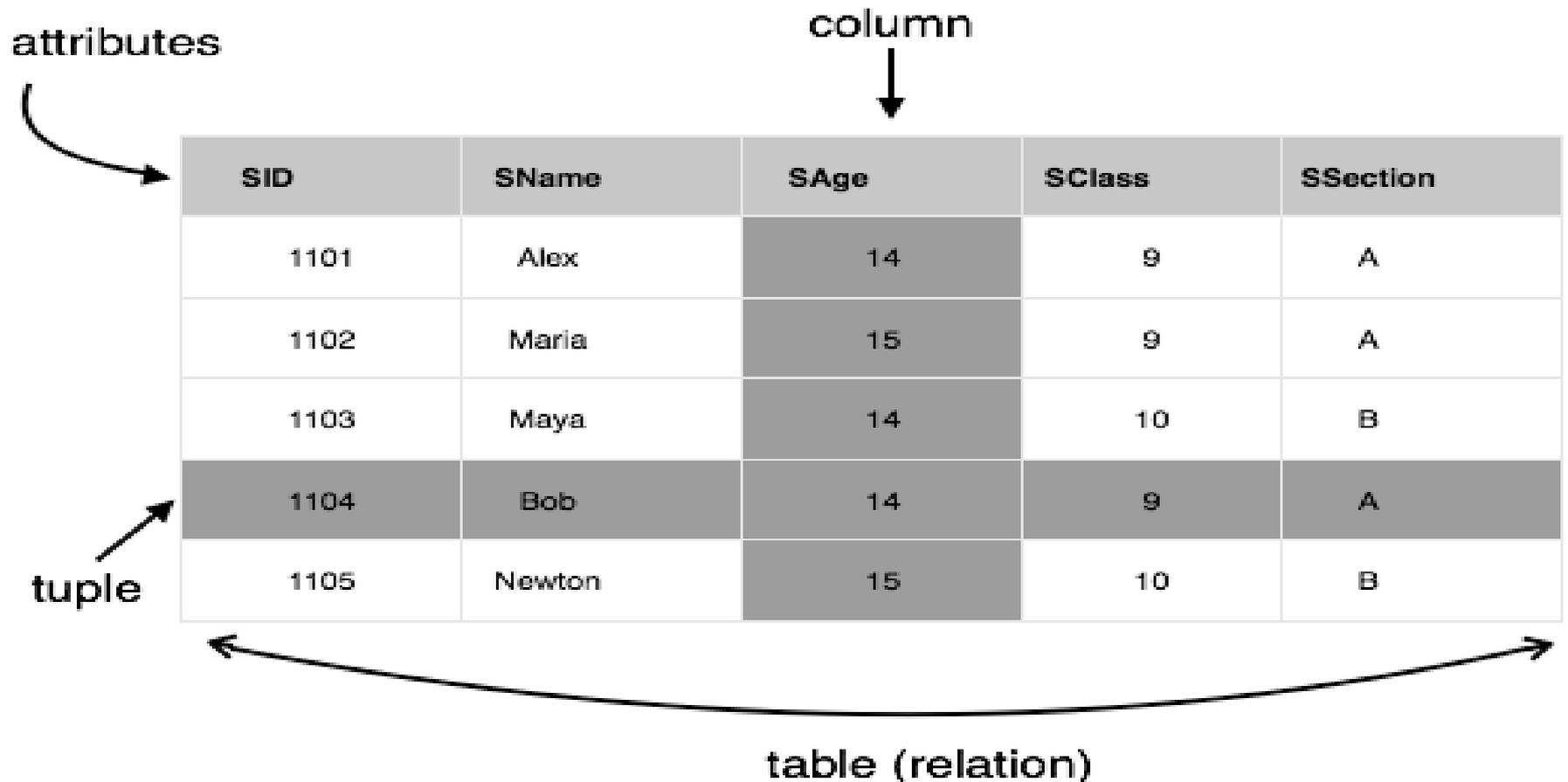
The logical association among entities is called **relationship**. Relationships are mapped with entities in various ways. Mapping cardinalities define the number of association between two entities.

## Mapping cardinalities:

- one to one
  - one to many
  - many to one
  - many to many
- 

## Type 3: Relational Model

The most popular data model in DBMS is the Relational Model. It is more scientific a model than others. This model is based on first-order predicate logic and defines a table as an **n-ary relation**. (n-ary Mapping to be discuss later)



- ▶ The main highlights of this Relational model are:
  - ❑ Data is stored in tables called **relations**.
  - ❑ Relations can be normalized (easy to mitigate anomalies)
  - ❑ In normalized relations, values saved are **atomic** values.
  - ❑ Each row in a relation contains a unique value.
  - ❑ Each column in a relation contains values from same domain.

E.G 1. ( Entity called **Samuel** has Attribute called Name, with 3-domains; first\_name, Surname, Other\_Name)

**NB: To avoid query anomalies each of the 3-domains may have unique column. We can best query to pull out all students first names captioned "Samuel"**

E.g 2. (Entity called **Janet** has Attribute called Age, with 3-domains; day, month, year) (Go to "domain column called "month" pull out all September born).

**NB: The larger your table the better query results  
Practically it is complex creating larger tables.**

# NEXT WEEK

- ▶ **Data models continue...**

Thank you