



Amirkabir University of Technology  
(Tehran Polytechnic)

# Database Systems Fundamentals

Using PHP Language

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**Notice: The class is held under the supervision of Dr.Shiri**



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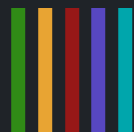
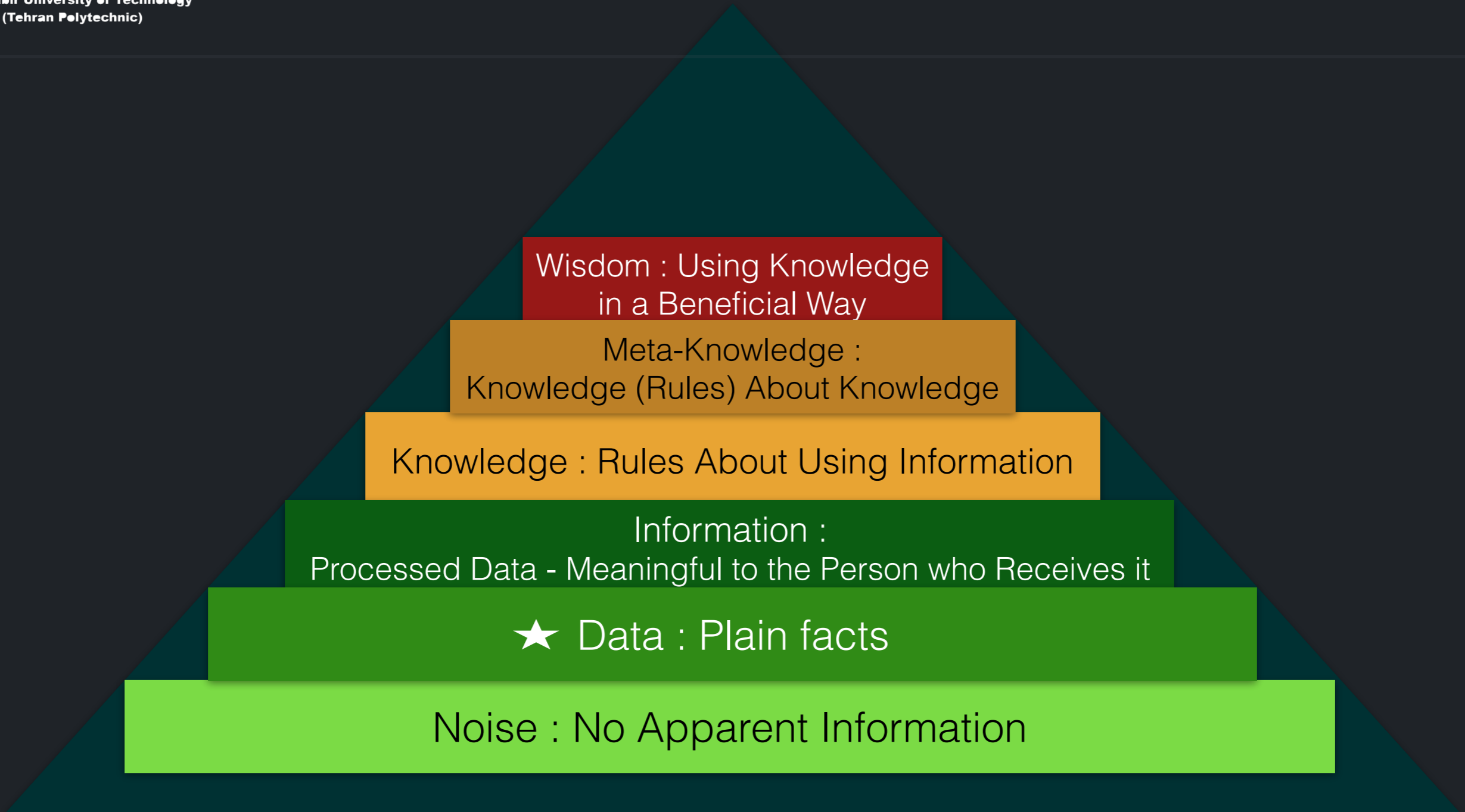
# Chapter 1 - Introduction

## Roadmap :

- Basic Definitions
- Structured Query Language Intro
- SQL vs. NoSQL
- PHP Language Intro
- Questions



# Knowledge Pyramid





# Data Hierarchy

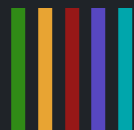
**Bit** (Character) - a bit is the smallest unit of data representation.

**Field** - a field consists of a grouping of characters. A data field represents an **attribute** (a characteristic or quality) of some **entity** (object, person, place, or event).

**Record** - a record represents a collection of attributes that describe a real-world entity. A record consists of **fields**, with each field describing an **attribute** of the **entity**.

**File** - a group of related **records**.

**Database** - is an integrated collection of logically related **records** or **files**.





# Database

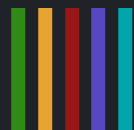
The collection of data, usually referred to as the **database**, contains information relevant to an enterprise. (Silberschatz)

A **Database** is a collection of persistent data that is used by the application systems of some given enterprise. (C.G. Date)

A database-management system (**DBMS**) is a collection of interrelated data and a set of programs to access those data. (Silberschatz)

A **database (management) system** is basically a computerized record keeping system. (C.G. Date)

The description of all tables, their columns, and the columns' types are referred to as the database's **schema**.





# Hardware & Software

**Hardware** components of a the system :

- The secondary storage volumes that are used to hold the stored data, together with the associated I/O devices.
- The hardware processor(s) and associated main memory that are used to support the execution of the database system software

**Software** :

- Between the physical database itself and the users of the system
- Known variously as database manager, or **database server**, or most commonly, the database management system (DBMS).





# Entity-Relationship Model

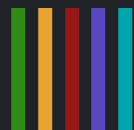
The Entity-Relationship Model (**ERM**) defines the conceptual view of a database.

**Entity** : A real-world object, either animate or inanimate, that can be easily identifiable.

★ Entities are represented by means of their properties, called **attributes**.

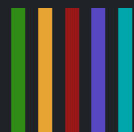
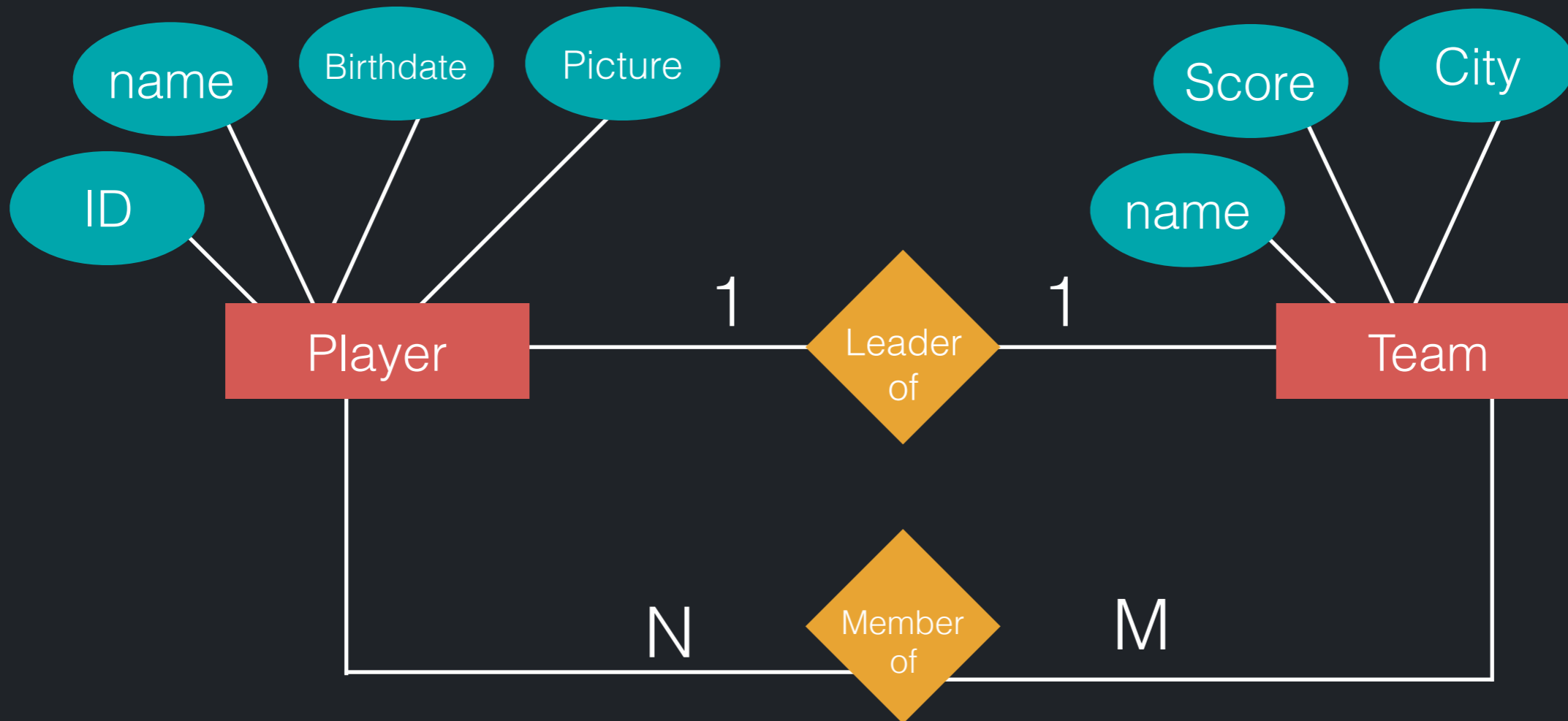
**Relationship** : The association among entities

For example, an employee works\_at a department, a student enrolls in a course. Here, **Works\_at** and **Enrolls** are called relationships.





# ER Diagram Example







# Structured Query Language

- A specialized language for updating, deleting, and requesting information from databases.

Main Commands

- ❖ SELECT - extracts data from a database
- ❖ UPDATE - updates data in a database
- ❖ DELETE - deletes data from a database
- ❖ INSERT INTO - inserts new data into a database

- First Appeared in 1974
- Designed by Donald D. Chamberlin & Raymond F. Boyce
- A Conversational Language



# SQL vs. NoSQL

Not only SQL

	NoSQL	SQL
Model	Non-relational (JSON)	Relational (Table)
Data	Different Records' Properties	Same Records' Properties
Performance	Can be Maximized by Reducing Consistency	Strong Consistency is Enforced
Performance	All information about an entity is in a single record	Information about an entity may be spread across many tables





# PHP Language : Facts

- First appeared : 21 years ago
- Designed by : Rasmus Lerdorf
- Object-oriented
- Lastest Release : 7.1.1
- Typing discipline : Weak, Dynamic
- Some big projects : Yahoo, Wikipedia, Wordpress, Facebook



# Questions

- Which Type of Databases is Used in Social Networks? SQL or NoSQL?
- Why Do We Need a Database in Our Software Package?
- Make a Relation Between the ERM and Data Hierarchy
- What's the Difference Between a Large Data Set and Big Data?
- What is a Knowledge Base?





# References

- [1] Database System Concepts - Textbook by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
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