

# A Software Development Life Cycle

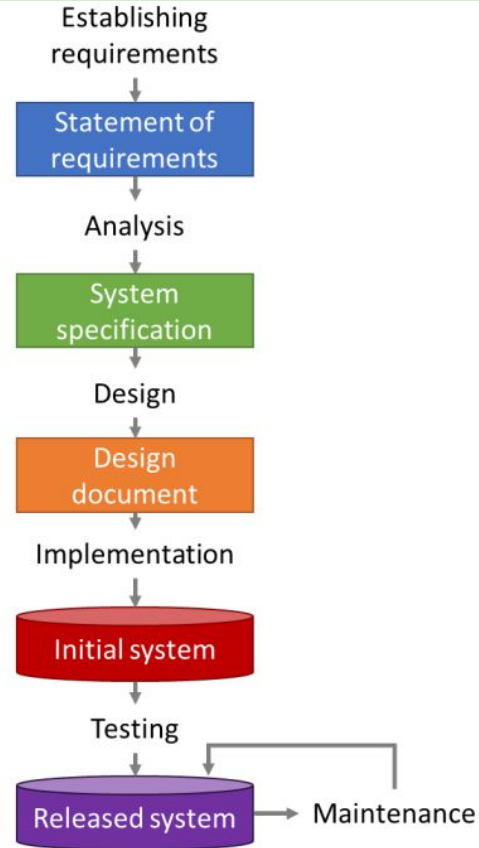


Figure 4. Waterfall Process (Watt & Eng, 2014)

# How do levels of abstraction fit into the bigger process of developing a database?

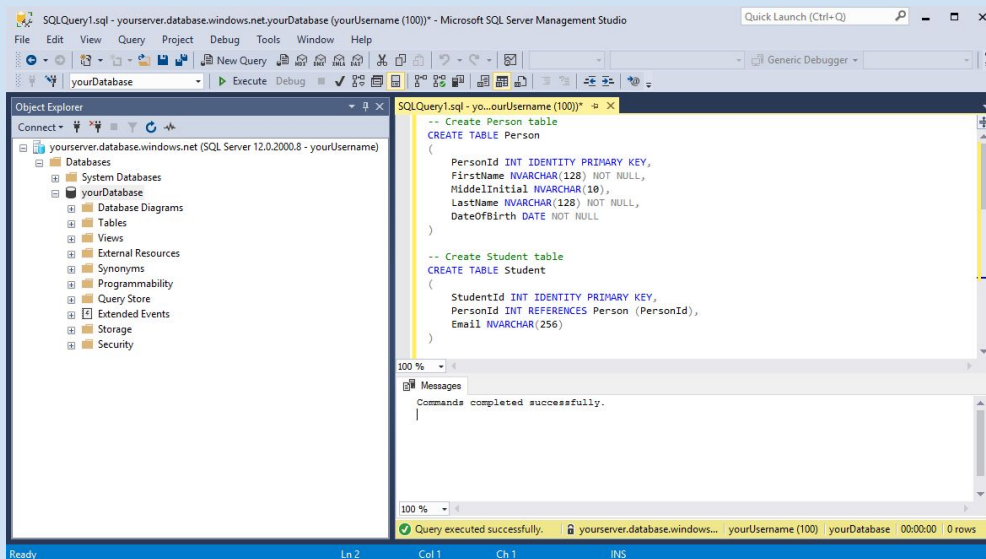
- MM Page 19
- Business rules



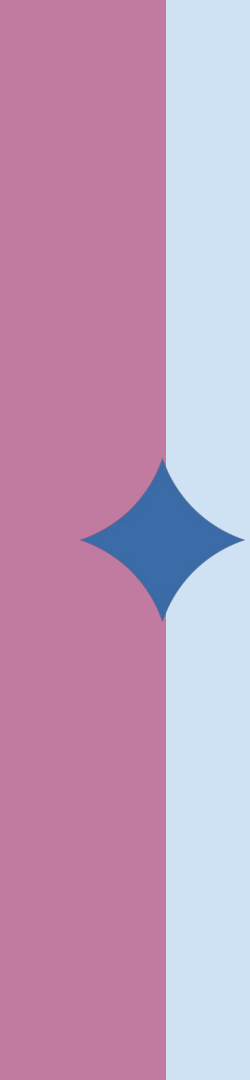
# Relational Databases

## Tables:

- Rows = Records
- Columns = Fields



<https://learn.microsoft.com/en-us/azure/azure-sql/database/design-first-database-tutorial?view=azuresql&tabs=ssms>

- 
- **Structured Query Language (SQL)**
  - **Normalisation**

## **Relationships in Relational Databases:**

- **One-to-Many**
- **Many-to-Many**
- **One-to-One**



## **Advantages of Relational Databases:**

- **Data Integrity & Consistency**
- **Flexibility**
- **Security**
- **Scalability**

# Big Data

## Three characteristics

- **Volume**
- **Velocity**
- **Variety**

**Terms like value (the potential worth of the data) and veracity (whether the data is trustworthy) have also been added to describe big data.**



# Big Data

**Sources of Big Data include:**

- **Media (e.g., social media)**
- **Cloud data**
- **Web pages**
- **Internet of Things (IoT)**
- **Traditional databases**

**To harness the value of big data, organizations must:**

- **Integrate data.**
- **Store it.**
- **Analyse it.**



# ERD using Unified Modelling Language (UML) Notation

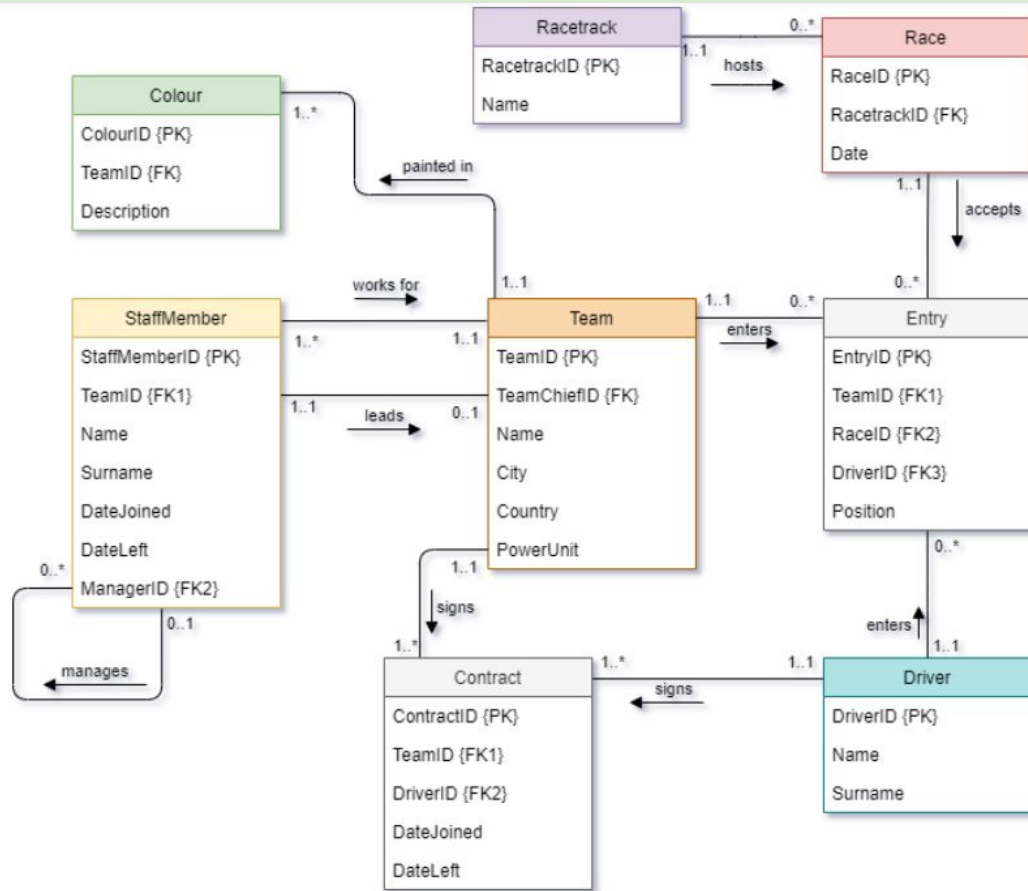


Figure 36. Combined Diagram



# ERD

- **Business Rule 1 – When a team enters, the following information needs to be provided: team name, location of where the team is based, the power unit used by the team and the team colours.**
- **Business Rule 2 – A racetrack hosts multiple races over time. A racetrack can be stored even before the first race is scheduled to take place there. Each race takes place at a specific racetrack, on a specific date.**
- **Business Rule 3 – Each team has several staff members (that are not drivers). A staff member is only allowed to ever work for one team. The name and surname of each staff member needs to be stored in the database, as well as the date that they joined and (optionally) the date that they left the team. One of the staff members is the team chief.**

# ERD

- **Business Rule 4 – Each team can have two drivers at a time. Drivers may decide to change teams, and the history of that needs to be stored in the database. The date joined that a driver joined a team and (optionally) the date that they left needs to be stored. The name and surname of each driver needs to be recorded.**
- **Business Rule 5 – One staff member is designated as the crew chief. The crew chief manages other staff members that work in the pit crew.**
- **Business Rule 6 – A driver participates in a specific race, racing for a specific team. The position that the driver places in that race needs to be recorded in the database. A driver can compete in many races over time.**

## Activity:

The university is looking to develop an online movie rental system that allows customers to browse and rent movies, track their rental history, and make payments for rented movies. The system will also allow the admin to manage movies, customers, and rental transactions.

### Business Rules:

- A Customer can place multiple Rentals, but each Rental is linked to only one Customer.
- A Rental can consist of multiple Rental Items, and each Rental Item references a specific Movie.
- A Movie can appear in multiple Rental Items (for different customers and rentals).
- A Rental will have a total amount calculated based on the price of the rented movies and the quantity of movies rented.
- A Payment is associated with a Rental, and the total payment amount must match the rental total amount.
- A Customer can have multiple Payments for the same or different rentals.

