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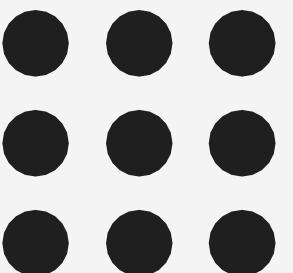**Accredited by NAAC-UGC with 'A' Grade**
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Department of Artificial Intelligence and Data Science

Data flow diagram

Data flow diagram

- A **Data Flow Diagram (DFD)** is a simple way to represent how **data moves** and gets **processed** in a system.

- It shows where the data comes from, how it moves through the system, and where it goes. Think of it like a **map** that helps you understand the flow of information.

Key Components of a DFD

- **Processes:** These are actions that happen in the system. They represent what the system does with the data. They are often shown as circles or ovals.

Example: A process might be "Add customer" in an online store. This process adds a customer's details to the system.

- **Data Flows:** These are arrows that show how data moves from one part of the system to another. Data flows show where data is coming from and where it's going.

Example: An arrow could show that customer details are sent from the user to the "Add customer" process.

- **Data Stores:** These are places where data is stored in the system, such as a database or a file. Data stores are often shown as rectangles.

Example: The "Customer Database" where all customer details are stored.

- **External Entities:** These are things outside the system that interact with it, such as users, other systems, or external devices. They are shown as squares or rectangles.

Example: A customer using the system might be an external entity.

Basic Structure of DFD

Example of DFD

Simple Example:

Imagine you are designing a system for a **Library**.

External Entity: The **Customer** who wants to borrow a book.

Process: **Check out book** (this process checks if the book is available and updates the system).

Data Store: **Book Inventory** (the list of all books in the library).

Data Flow: Data (book details) moves from the customer to the **Check out book** process, then updates the **Book Inventory** data store.

Characteristics of Data Flow Diagram (DFD)

Graphical Representation:
DFD uses **symbols** like circles, arrows, and rectangles to show how data moves and gets processed in a system.
These symbols make it easy to visualize and understand complex processes.

Problem Analysis:
DFDs help in understanding how a system works and can be used to analyze and identify issues in data flow during the **system analysis** phase.

Abstraction:
DFD simplifies complex systems by hiding unnecessary details, focusing only on **data flow** and **processes** within the system.

Hierarchy:
DFDs show a **hierarchy** of the system. The **0-level DFD** gives a broad overview, while lower-level DFDs give more detailed information about individual processes.

Data Flow:
The main goal of a DFD is to **visualize how data flows** between **external entities**, **processes**, and **data stores**. Arrows represent the data flow.

Ease of Understanding:
DFDs are easy for both **technical** and **non-technical** people to understand because of their simple symbols and clear structure.

Modularity:
DFDs break down complex systems into smaller, manageable **modules** (processes), making it easier to analyze and design the system.
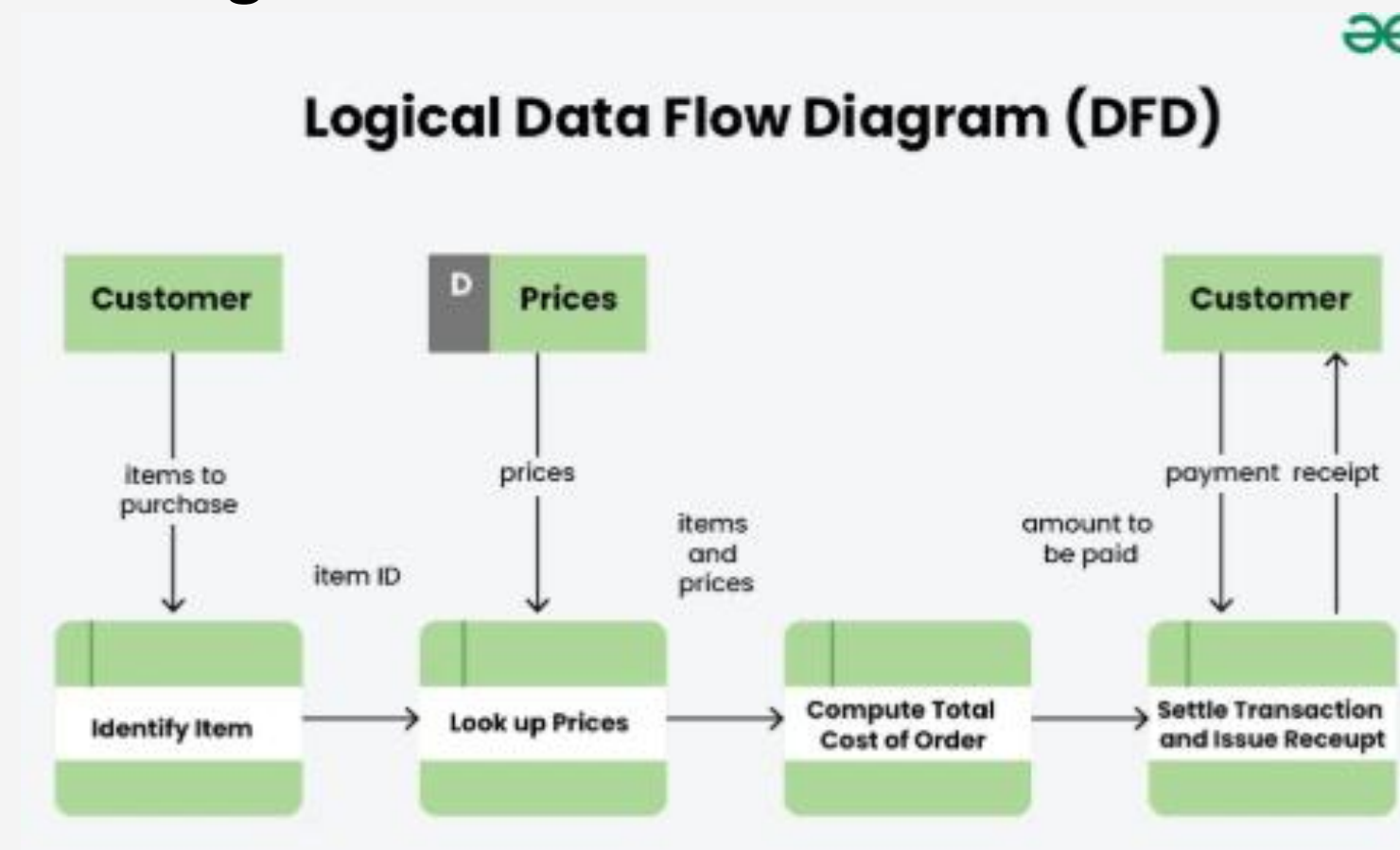
Types of Data Flow Diagram (DFD)

There are two types of Data Flow Diagram (DFD)

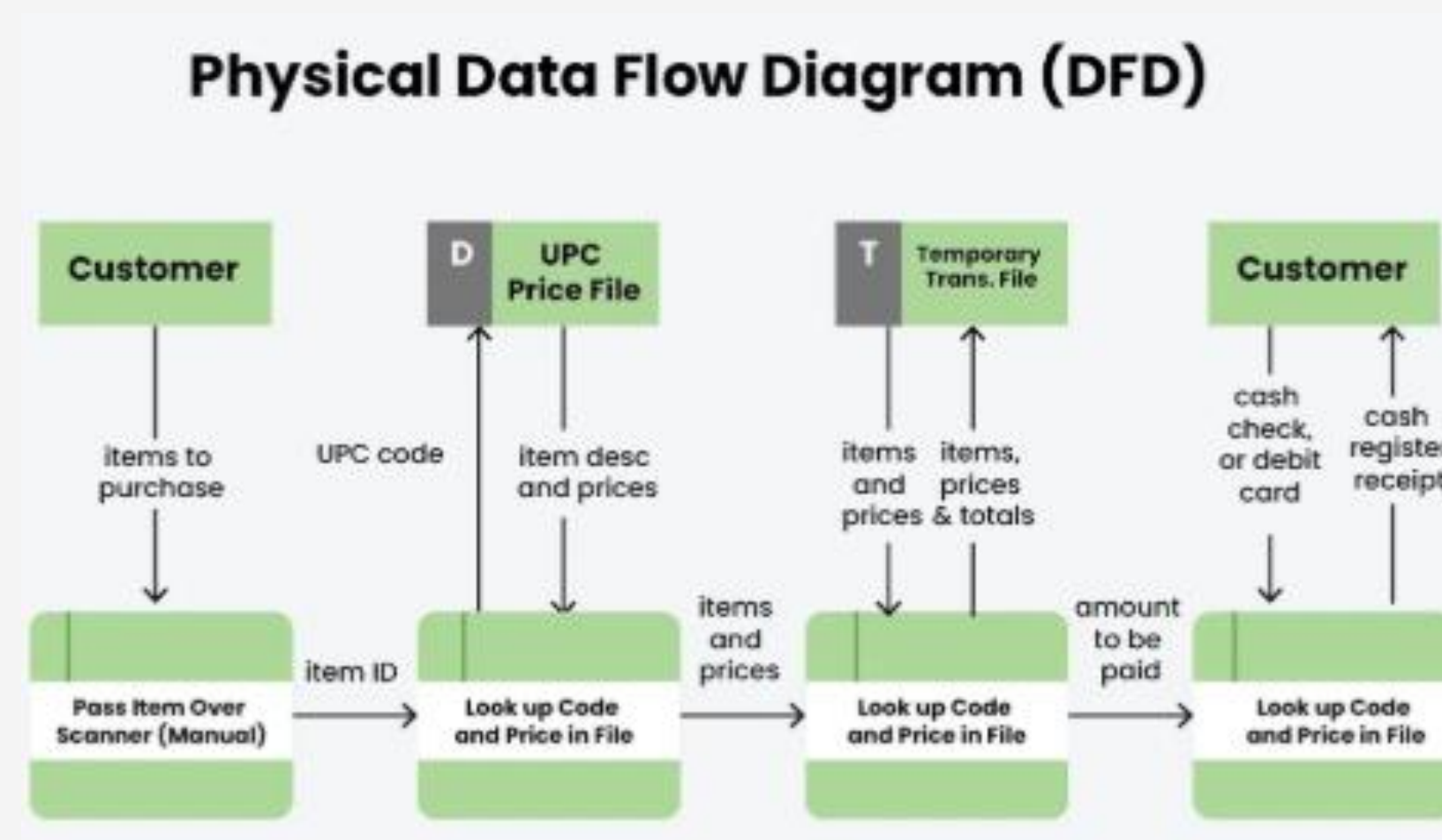*   Logical Data Flow Diagram

*   Physical Data Flow Diagram

Logical Flow Diagram (DFD)

- A **Logical Flow Diagram** (LFD) visually represents the flow of data and processes in a system, focusing on the **logical** aspects rather than technical details.

- It shows how data moves between **objects** or **components** without specifying implementation details like databases or storage.
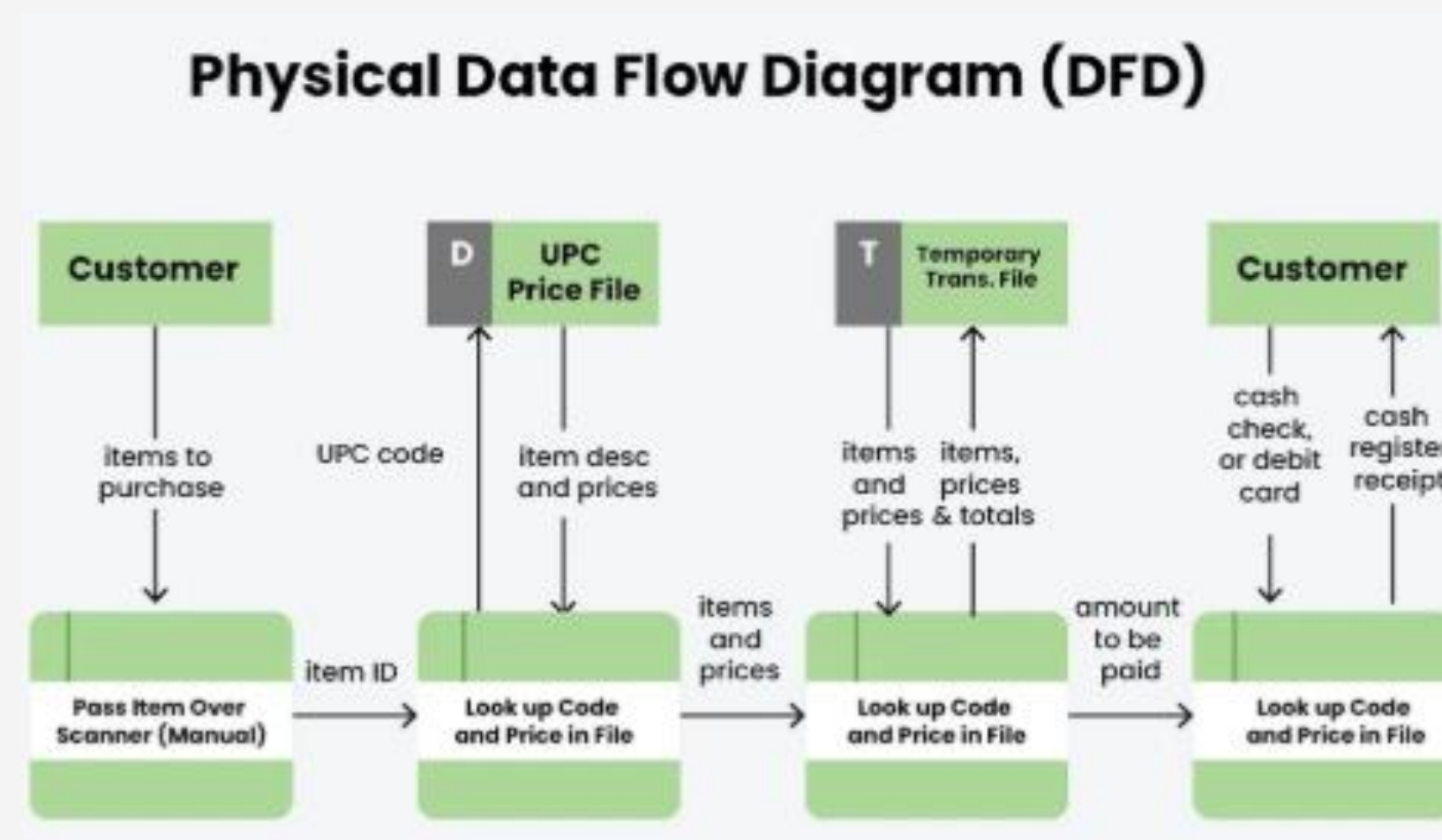

Logical Data Flow Diagram (DFD)

Physical Data Flow Diagram

- A **Physical Data Flow Diagram (DFD)** represents how data moves through a system, focusing on the **actual implementation**, including data storage, hardware, and software components.

- It shows the **physical entities** (like databases, servers) involved in data processing and flow.

Physical Data Flow Diagram (DFD)
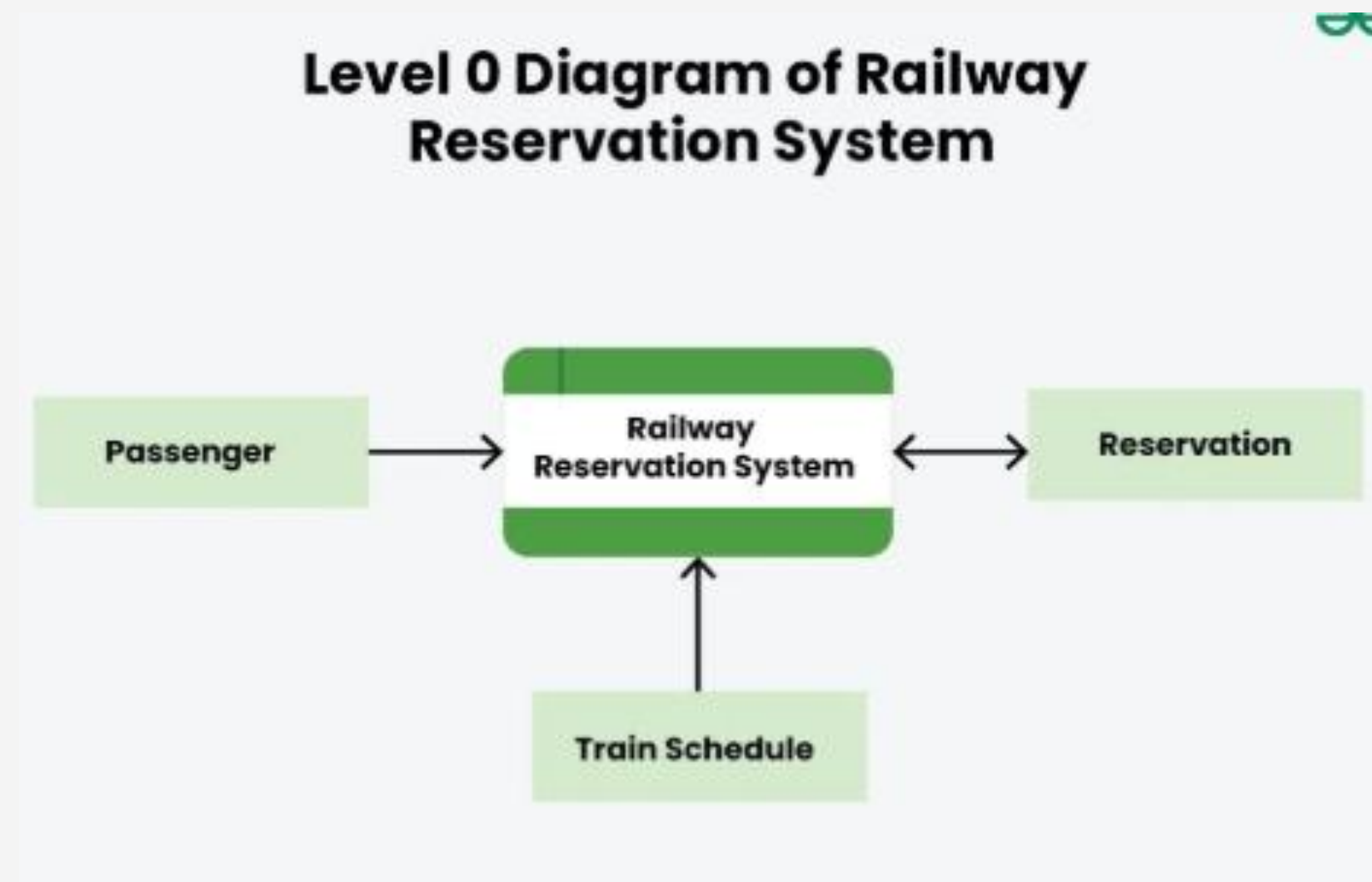
Physical Data Flow Diagram

- A **Physical Data Flow Diagram (DFD)** represents how data moves through a system, focusing on the **actual implementation**, including data storage, hardware, and software components.

- It shows the **physical entities** (like databases, servers) involved in data processing and flow.

Levels of Data Flow Diagram (DFD)
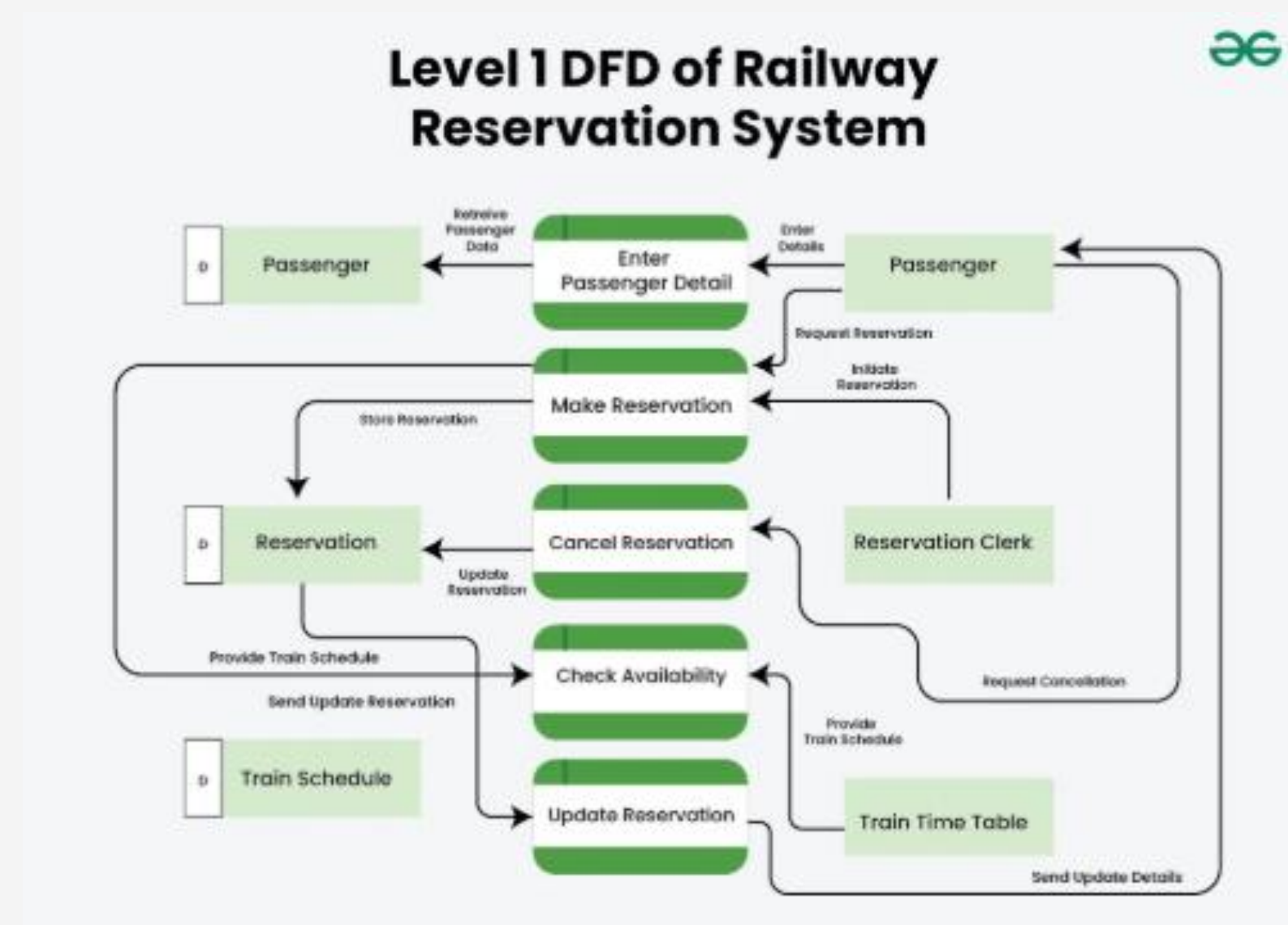
0-level DFD

It is also known as a context diagram. It's designed to be an abstraction view, showing the system as a single process with its relationship to external entities. It represents the entire system as a single bubble with input and output data indicated by incoming/outgoing arrows.

Level 0 Diagram of Railway Reservation System

Levels of Data Flow Diagram (DFD)

1-Level DFD

This level provides a more detailed view of the system by breaking down the major processes identified in the level 0 DFD into sub-processes.

Level 1 DFD of Railway Reservation System

Levels of Data Flow Diagram (DFD)

2-level DFD

- This level provides an even more detailed view of the system by breaking down the sub-processes identified in the level 1 DFD into further sub-processes.

- Each sub-process is depicted as a separate process on the level 2 DFD.

Rules for Data Flow Diagram (DFD)

Following are the rules of DFD:

Data can flow from:

- Terminator or External Entity to Process
- Process to Terminator or External Entity
- Process to Data Store
- Data Store to Process
- Process to Process

Data Cannot Flow From

- Terminator or External Entity to Terminator or External Entity
- Terminator or External Entity to Data Store
- Data Store to Terminator or External Entity
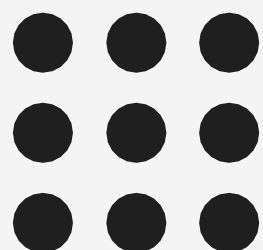- Data Store to Data Store

How to Draw Data Flow Diagram?

Following are the steps to Draw Data Flow Diagram

- Understand the System
- Identify External Entities
- Identify Processes
- Identify Data Stores
- Use Standard Symbols
- Create Level 0 Diagram
- Based on Complexity Draw Further Level Diagram like Level 1, 2 and so on.
- Identify Data Flows:
- Number Processes and Data Stores
- Review and Validate