CSE 417: Software Engineering & Design Pattern

Lecture 8: Data Flow Diagrams

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Data Flow Diagrams

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Data Flow Diagrams (DFD)

- **Definition:** Visual representation of the information flows within a system.
- It shows how data enters and leaves the system, what changes the information, and where data is stored.
- It shows how a system is divided into smaller pieces
- Objective: Show the scope and boundaries of a system as a whole
- Also called as a data flow graph or bubble chart.

Components of DFD

Components of DFD

The Data Flow Diagram has 4 components:

Process

- Input to output transformation in a system takes place because of process function.
- Symbols of a process: rectangular with rounded corners, oval, rectangle or a circle.
- Process is named a short sentence, in one word or a phrase to express its essence.

Components of DFD

Data Flow

- Describes the information transferring between different parts of the systems.
- Symbol of a Data Flow: Arrow

Components of DFD

Warehouse

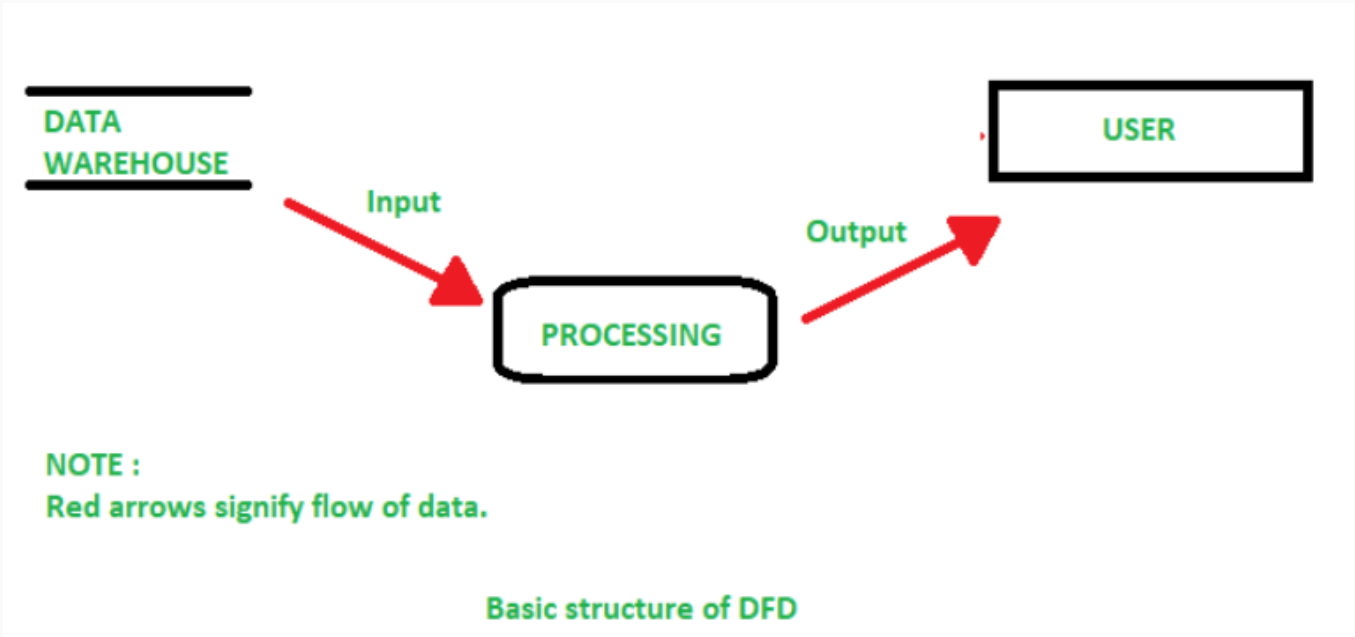
- The data is stored in the warehouse for later use.
- Symbol of a Warehouse: Two horizontal lines
- The warehouse can be a data file, a folder with documents, an optical disc, a filing cabinet.

Components of DFD

Terminator

- An external entity that stands outside of the system and communicates with the system.
- Example: Organizations like banks, groups of people like customers or different departments of the same organization, which is not a part of the model system and is an external entity.

Components of DFD



Basic structure of DFD

Rules for creating DFD

Rules for creating DFD

- A single DFD can have a maximum of nine processes and a minimum of three processes.
- The name of the entity should be unique, easy and understandable without any extra assistance(like comments).
- The processes should be numbered or put in ordered list to be referred easily.
- The DFD should maintain consistency across all the DFD levels.

Symbols used in DFD

Symbols used in DFD

Symbol used in DFD

- **Square Box:** Defines source or destination of the system. Also called entity and represented by rectangle.
- **Arrow or Line:** Identifies the data flow i.e. it gives information to the data that is in motion.
- **Circle or bubble chart:** Represents as a process that gives us information. It is also called processing box.
- **Open Rectangle:** Data store. In this data is store either temporary or permanently.

Levels in Data Flow Diagrams (DFD)

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Levels in Data Flow Diagrams (DFD)

Levels of DFD are as follows:

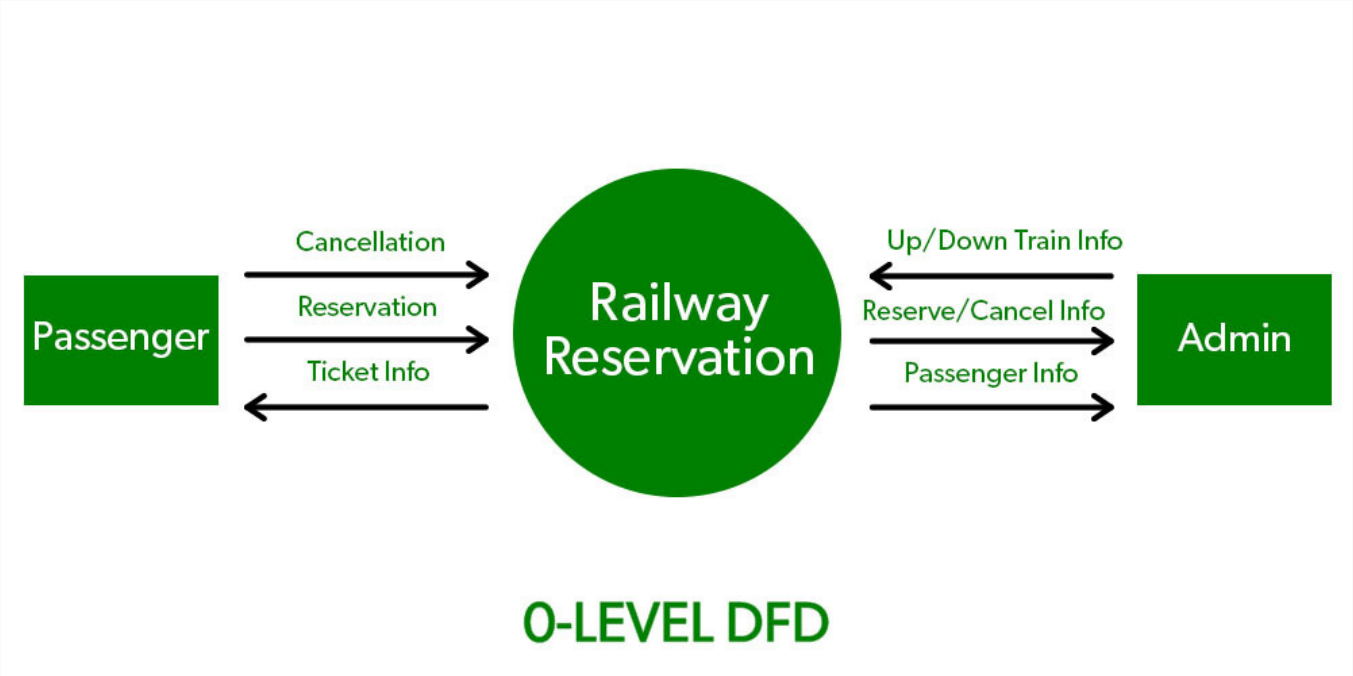
- 0-level DFD: Represents the entire system as a single bubble and provides an overall picture of the system.
- 1-level DFD: Represents the main functions of the system and how they interact with each other.
- 2-level DFD: Represents the processes within each function of the system and how they interact with each other.

0-level DFD

0-level DFD

- Also known as fundamental system model/context diagram.
- Represents the entire software requirement as a single bubble with i/p and o/p.
- Abstraction view, showing the system as a single process with its relationship to external entities

0-level DFD

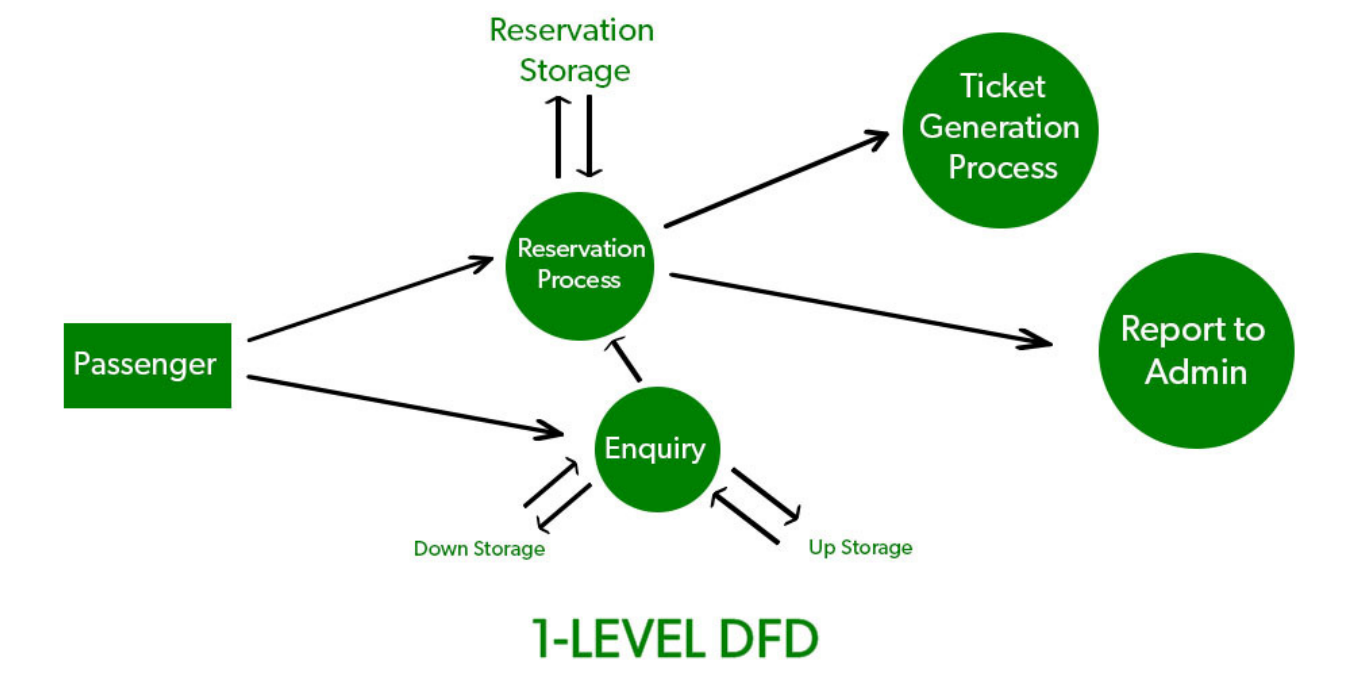

Passenger
Cancellation
Reservation
Ticket Info
Railway Reservation
Up/Down Train Info
Reserve/Cancel Info
Passenger Info
Admin
0-LEVEL DFD

1-level DFD

1-level DFD

- Context diagram is decomposed into multiple bubbles/processes.
- Highlight the main functions of the system
- Breakdown the high-level process of 0-level DFD into subprocesses.

1-level DFD

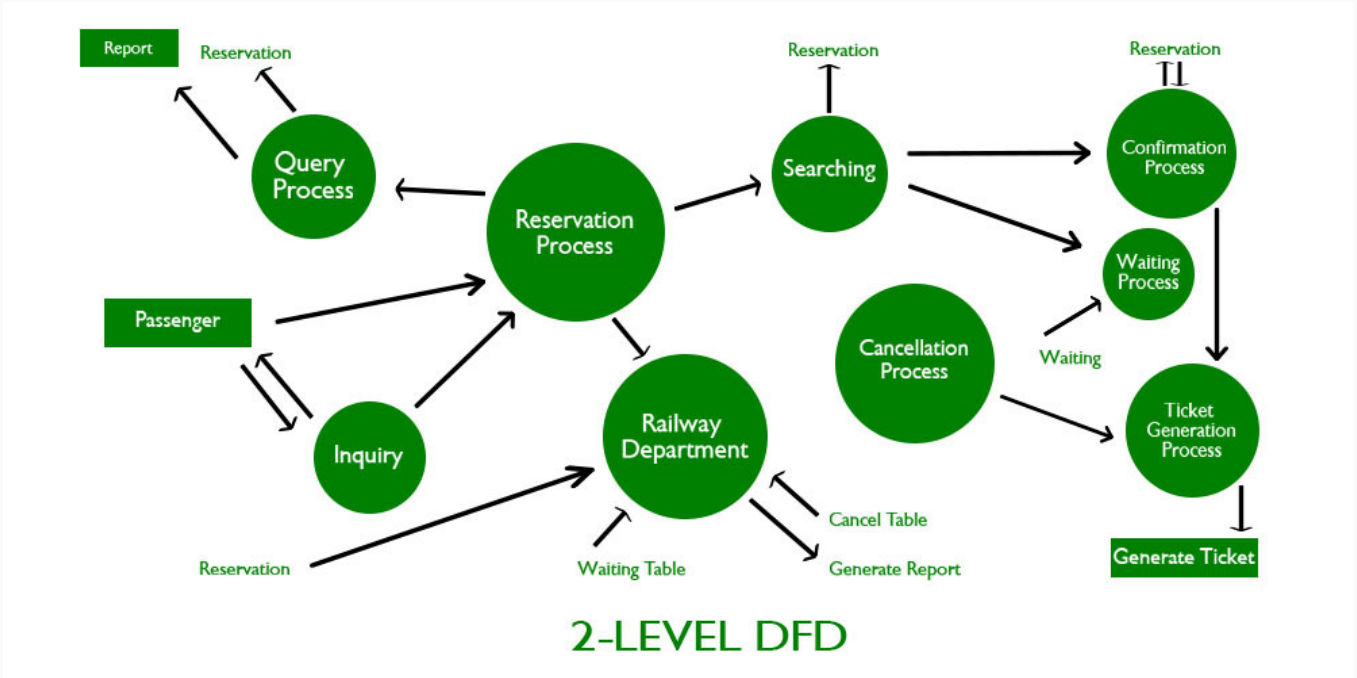

Reservation Storage
Ticket Generation Process
Reservation Process
Passenger
Report to Admin
Enquiry
Down Storage
Up Storage
1-LEVEL DFD

2-level DFD

2-level DFD

- One step deeper into parts of 1-level DFD.
- Can be used to plan or record the specific/necessary detail about the system's functioning

2-level DFD


Report
Reservation
Query Process
Reservation Process
Reservation
Searching
Reservation
Confirmation Process
Waiting Process
Passenger
Inquiry
Cancellation Process
Waiting
Ticket Generation Process
Railway Department
Reservation
Waiting Table
Cancel Table
Generate Report
Generate Ticket
2-LEVEL DFD

Any Questions??