Experiment 2: Draw DFD

Learning Objective: Students will able to identify the data flows, processes, source and destination for their mini-project and analyze and design the DFD up to 2 levels
Tools: Draw.io, StarUML

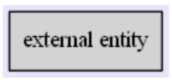
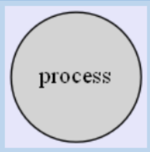
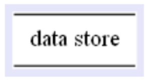
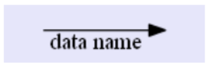
Theory:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It can be manual, automated, or a combination of both.
The objective of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communication tool between a system analyst and any person who plays a part in the order that acts as a starting point for redesigning a system. The DFD is also called as a data flow graph or bubble chart.

The following observations about DFDs are essential:

1. All names should be unique. This makes it easier to refer to elements in the DFD.
2. Remember that DFD is not a flow chart. Arrows is a flow chart that represents the order of events; arrows in DFD represents flowing data. A DFD does not involve any order of events.
3. Suppress logical decisions. If we ever have the urge to draw a diamond-shaped box in a DFD, suppress that urge! A diamond-shaped box is used in flow charts to represents decision points with multiple exists paths of which the only one is taken. This implies an ordering of events, which makes no sense in a DFD.
4. Do not become bogged down with details. Defer error conditions and error handling until the end of the analysis.

Standard symbols for DFDs are derived from the electric circuit diagram analysis and are shown in fig:

Term	Notation	Remarks
External entity		Name of the external entity is written inside the rectangle
Process		Name of the process is written inside the circle
Data store		A left-right open rectangle is denoted as data store; name of the data store is written inside the shape
Data flow		Data flow is represented by a directed arc with its data name

- **Process:** Processes are represented by circle. The name of the process is written into the circle. The name of the process is usually given in such a way that represents the functionality of the process. More detailed functionalities can be shown in the next Level if it is required. Usually it is better to keep the number of processes less than 7. If we see that the number of processes becomes more than 7 then we should combine some the processes to a single one to reduce the number of processes and further decompose it to the next level .
- **External entity**: External entities only appear in context diagram. External entities are represented by a rectangle and the name of the external entity is written into the shape. These send data to be processed and again receive the processed data.
- **Data store:** Data stores are represented by a left-right open rectangle. Name of the data store is written in between two horizontal lines of the open rectangle. Data stores are used as repositories from which data can be flown in or flown out to or from a process.
- **Data flow:** Data flows are shown as a directed edge between two components of a Data Flow Diagram. Data can flow from external entity to process, data store to process, in between two processes and vice-versa.

Levels in Data Flow Diagrams (DFD)

The DFD may be used to perform a system or software at any level of abstraction. Infact, DFDs may be partitioned into levels that represent increasing information flow and functional detail. Levels in DFD are numbered 0, 1, 2 or beyond. Here, we will see primarily three levels in the data flow diagram, which are: 0-level DFD, 1-level DFD, and 2-level DFD.

0- level DFD

It is also known as fundamental system model, or context diagram represents the entire software requirement as a single bubble with input and output data denoted by incoming and outgoing arrows. Then the system is decomposed and described as a DFD with multiple bubbles. Parts of the system represented by each of these bubbles are then decomposed and documented as more and more detailed DFDs. This process may be repeated at as many levels as necessary until the program at hand is well understood. It is essential to preserve the number of inputs and outputs between levels, this concept is called leveling by DeMacro. Thus, if bubble "A" has two inputs x_1 and x_2 and one output y, then the expanded DFD, that represents "A" should have exactly two external inputs and one external output as shown in fig:

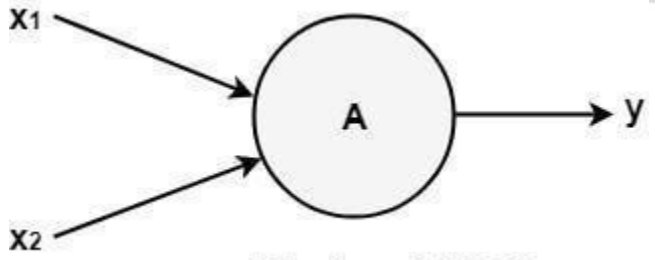


Fig: Level-0 DFD.

1- level DFD

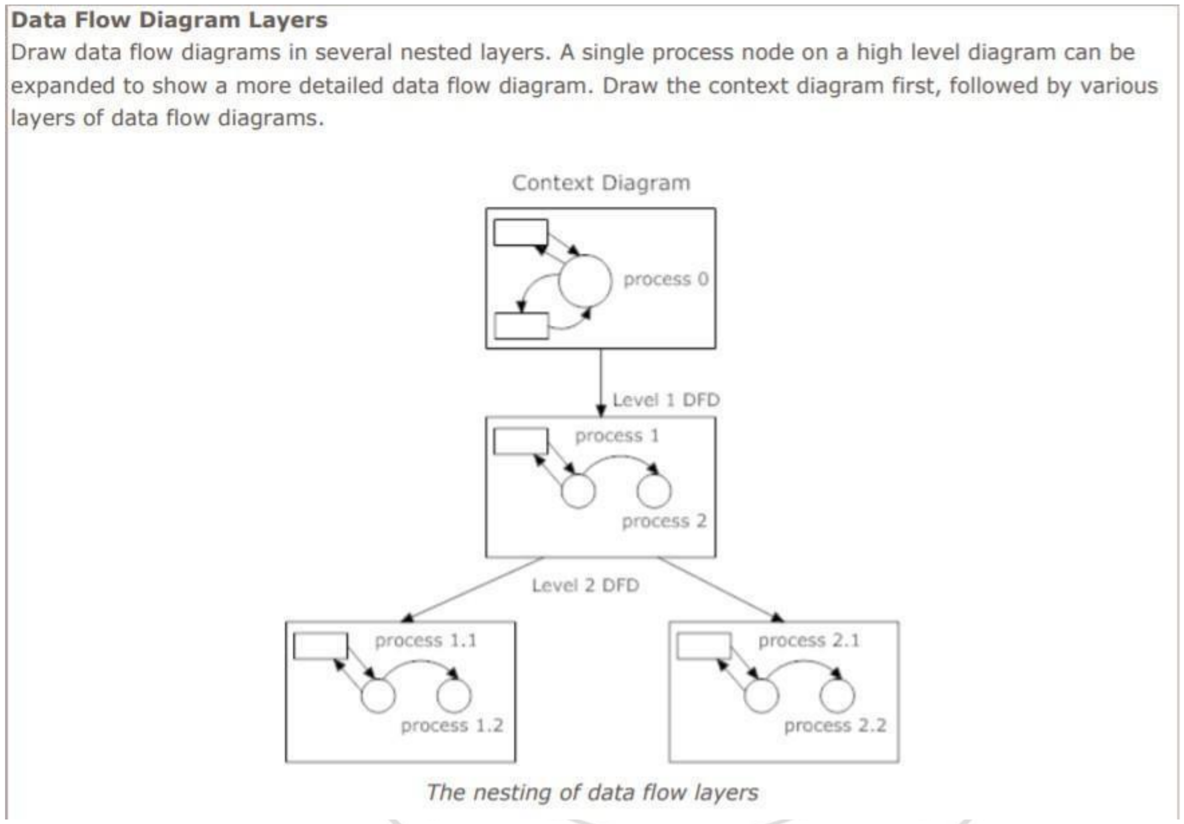
In 1-level DFD, a context diagram is decomposed into multiple bubbles/processes. In this level, we highlight the main objectives of the system and breakdown the high-level process of 0-level DFD into sub-processes.

2- Level DFD

2-level DFD goes one process deeper into parts of 1-level DFD. It can be used to project or record the specific/necessary detail about the system's functioning.

Steps in developing DFDs

1. List business activities to identify processes, external entities, data flows, and data stores
2. Create a context diagram
3. Create the next level diagram
4. Create child diagrams.

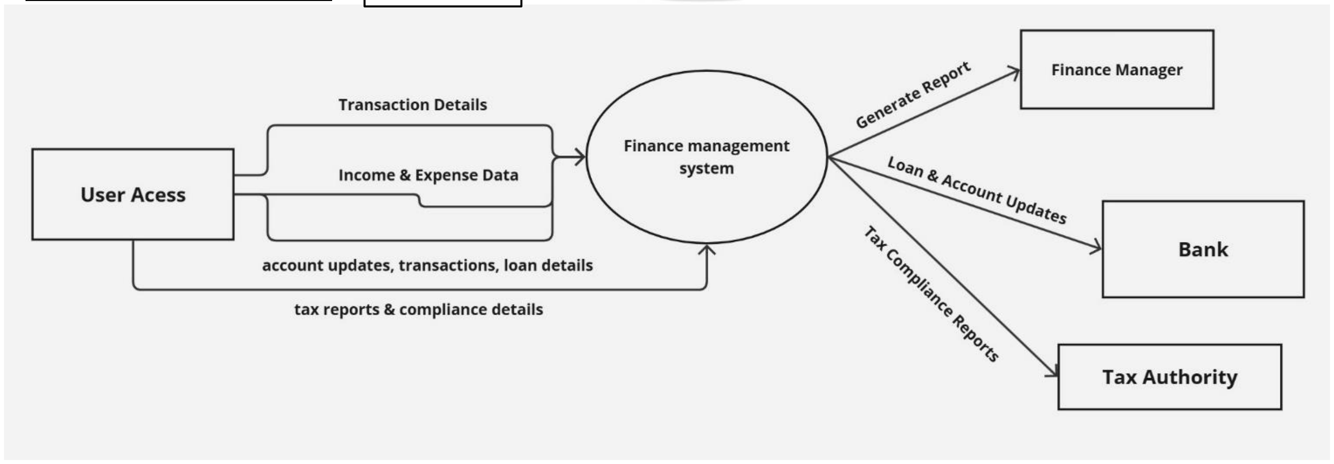


Data Flow Diagram Layers

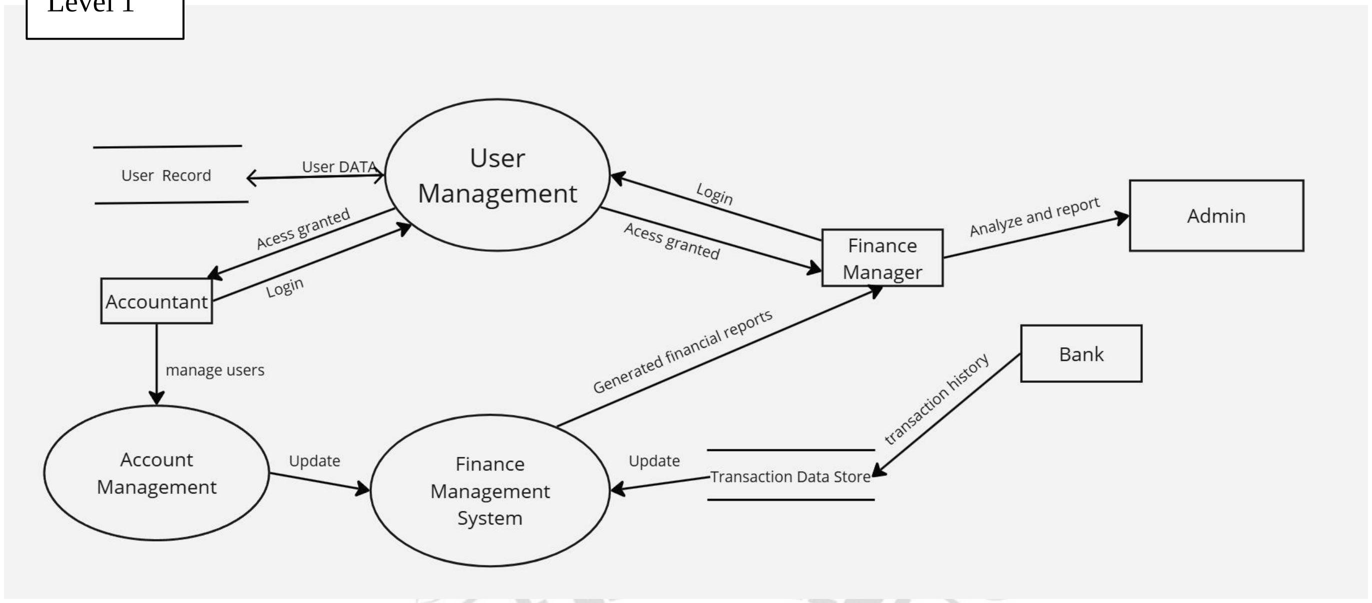
Draw data flow diagrams in several nested layers. A single process node on a high level diagram can be expanded to show a more detailed data flow diagram. Draw the context diagram first, followed by various layers of data flow diagrams.

The nesting of data flow layers

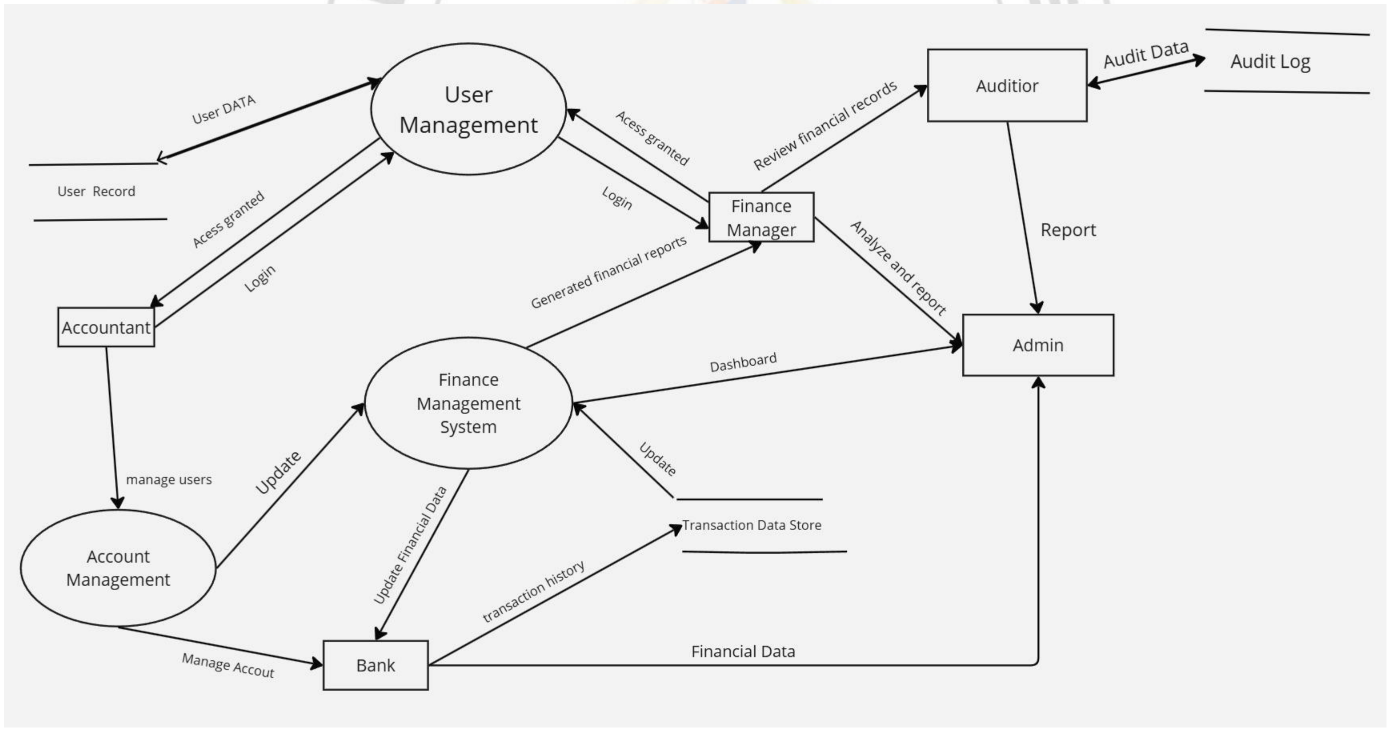
<u>Result and Discussion:</u> Level 0



Level 1



Level 2



Learning Outcomes: Students should have the ability to

LO1: Identify the data-flows, processes, source and destination for the project. LO2: Analyze and design the DFD up to 2 levels

Outcomes: Upon completion of the course students will be able to prepare draw DFD (up to 2 levels)

Conclusion:

For Faculty Use

correction parameter s	formative assessment [40%]	imely ompleti on of ractical [0%]	ttendance / earning Attitude 20%]
Marks Obtained			