Data Flow Diagrams (DFD)

DATA FLOW DIAGRAM

- A data-flow diagram is a way of representing a flow of data through a process or a system.
- Used to perform *structured analysis* to determine logical requirements.
- Useful for analyzing existing as well as proposed systems.
- Focus on the *movement* of data between external entities and processes, and between processes and data stores.

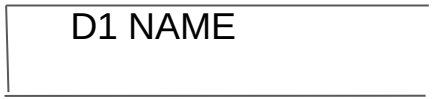
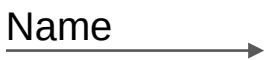
Why DFD ?

- Provides an overview of-
  - What data a system processes
  - What transformations are performed
  - What data are stored
  - What results are produced and where they flow
- Graphical nature makes it a good communication tool between-
  - User and analyst
  - Analyst and System designer

DFD elements

- Source/Sinks (External entity)
- Processes
- Data Stores
- Data flows

Symbols Used:

Symbol	Gane & Sarson Symbol	DeMarco & Yourdan Symbol
External Entity		
Process		
Data Store		
Data flow		

Descriptions :

External Entity - people or organisations that send data into the system or receive data from the system.

Process - models what happens to the data

i.e. transforms incoming data into outgoing data.

Data Store - represents permanent data that is used by the system.

Data Flow - models the actual flow of the data between the other elements.

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External Entities

They either supply or receive data

- **Source** – Entity that supplies data to the system.
- **Sink** – Entity that receives data from the system.

They do not process data

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Processes

- Work or actions performed on data
- Straight line with incoming arrows are input data flows
- Straight lines with outgoing arrows are output data flows
- Labels are assigned to Data flow.

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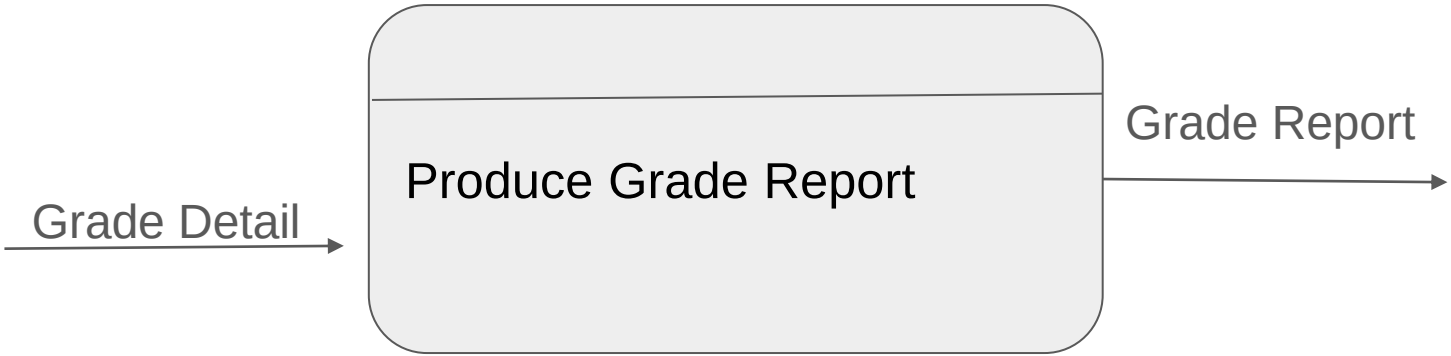

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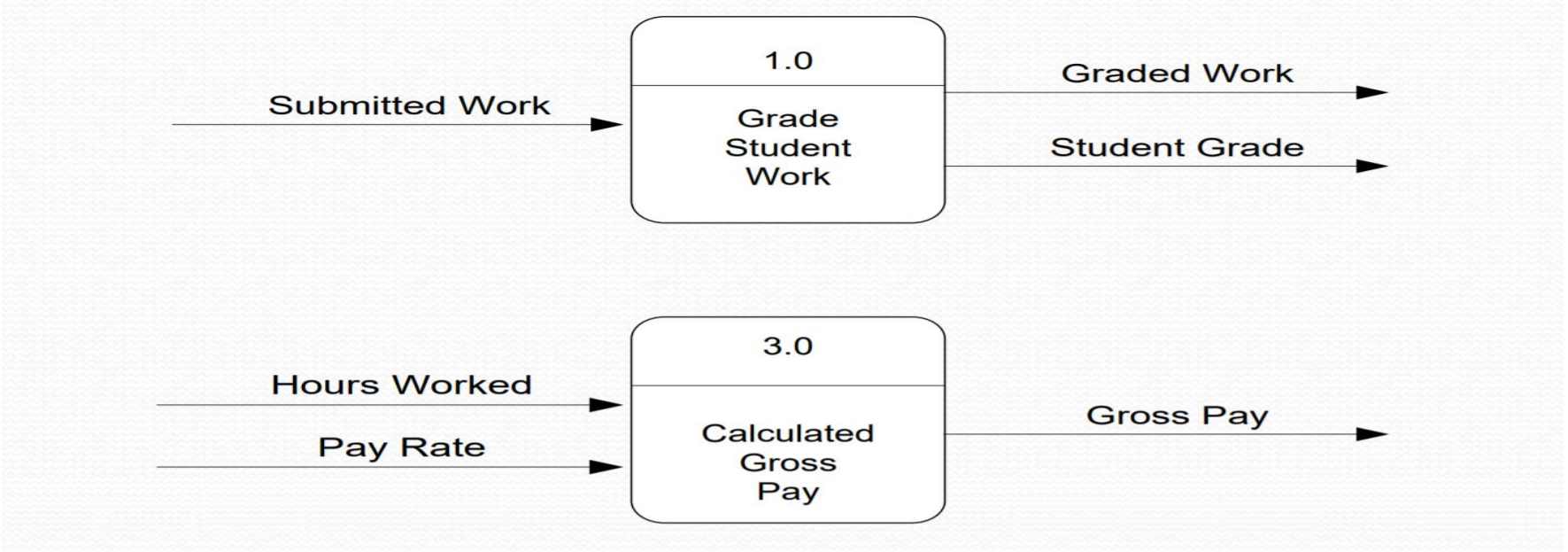
- Can have more than one outgoing data flow or more than one incoming data flow.



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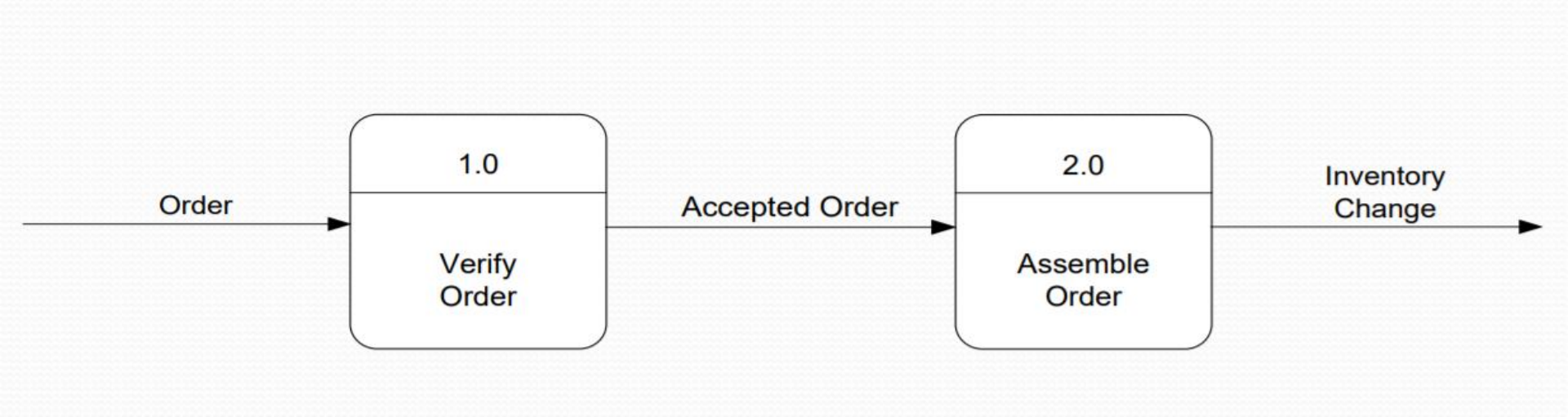
Can connect to any other symbol (including another process symbol)



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Data Stores

- A Data Store is a repository of data
- Data can be written into the data store. An incoming arrow represents writing data
- Data can be read from a data store. An outgoing arrow represents reading of data

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Data Flows

- Data in motion
- Marks movements of data through the system pipeline to carry data.
- Connects the processes, external entities and data stores.

Data FLow

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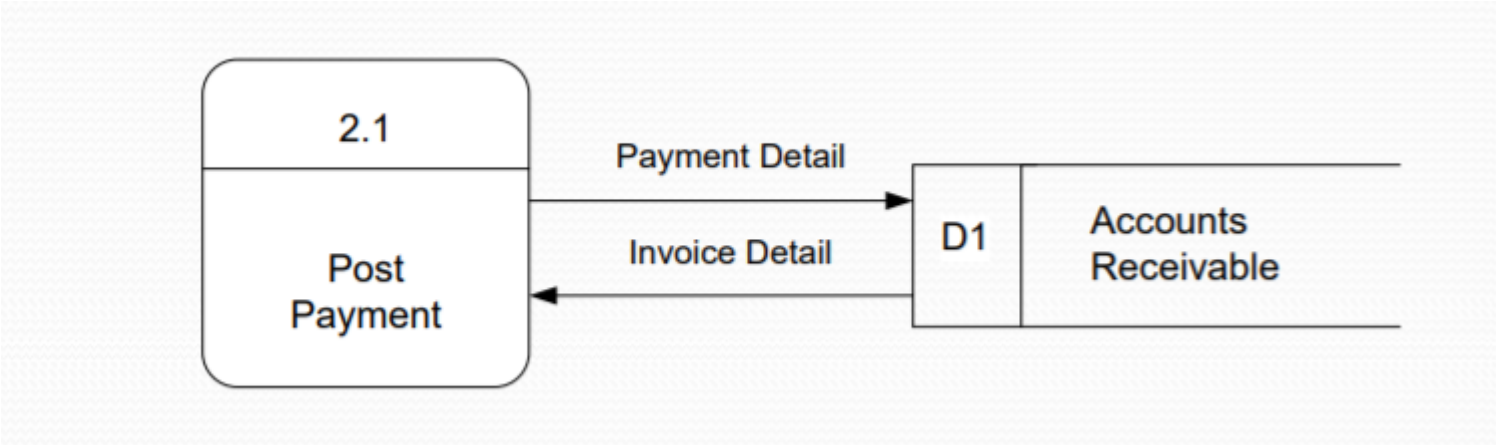
Data Flow

- Generally unidirectional, if same data flows in both directions, double-headed arrow can be used.
- Can represent flow between process and data store by two separate arrows.



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Decomposition Of DFD

Levels	Description	Explanation
Level 0	Context diagram	Contains only one process
Level 1	Overview diagram	Utilizes all four elements
Level 2	Detailed diagram	A breakdown of a level 1 process

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Level 0 Diagram

- One process represents the entire system.
- Data arrows show input and output.
- Data Stores NOT shown.
- Data stores are implicitly contained within the system.

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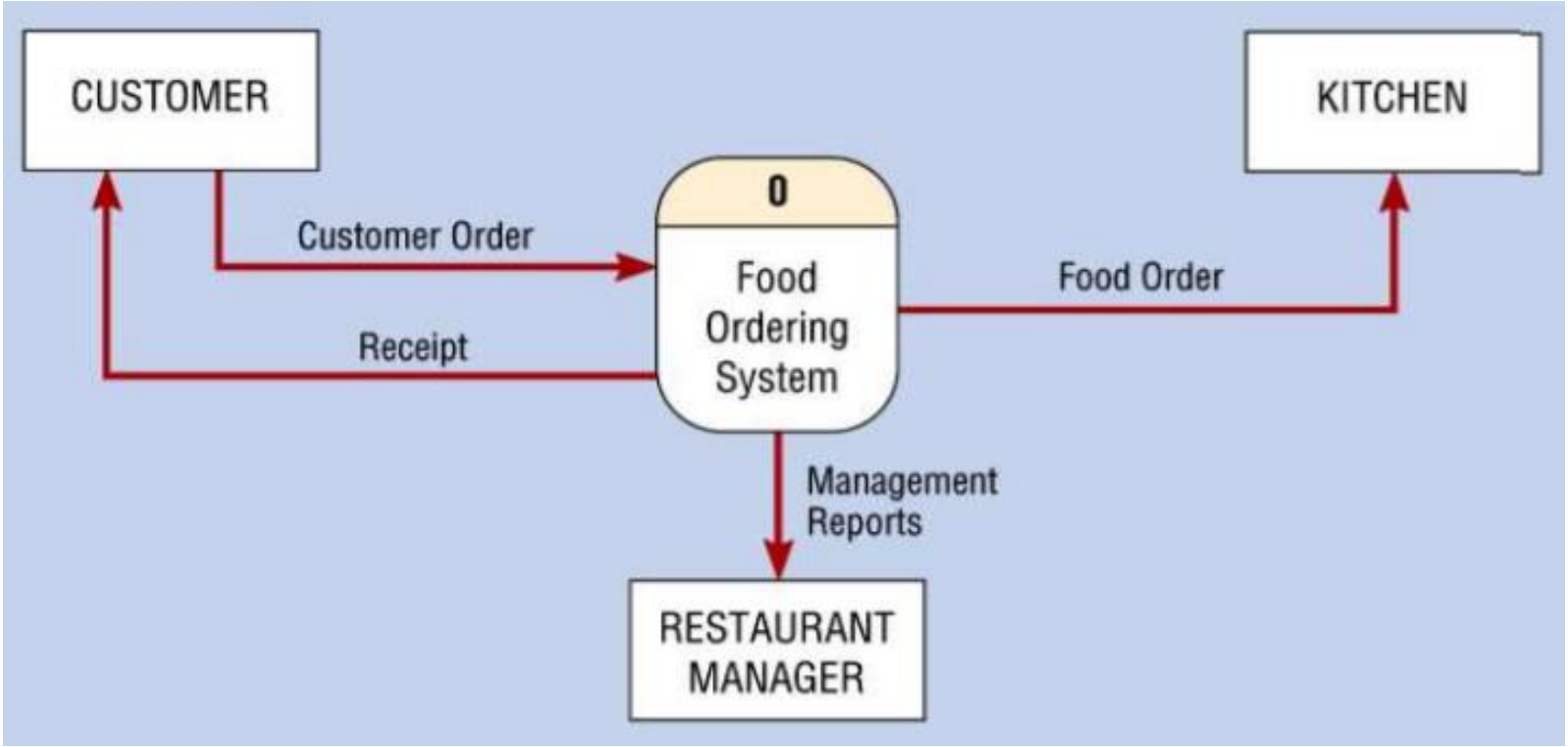

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Level 1 Diagram

- Level 1 DFD, must balance with the context diagram it describes.
- Input going into a process are different from outputs leaving the process.
- Data stores are first shown at this level.

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Level 2 Diagram

- Level 2 DFD must balance with the Level 1 describes.
- Input going into a process are different from outputs leaving the process.
- Continue to show data stores.

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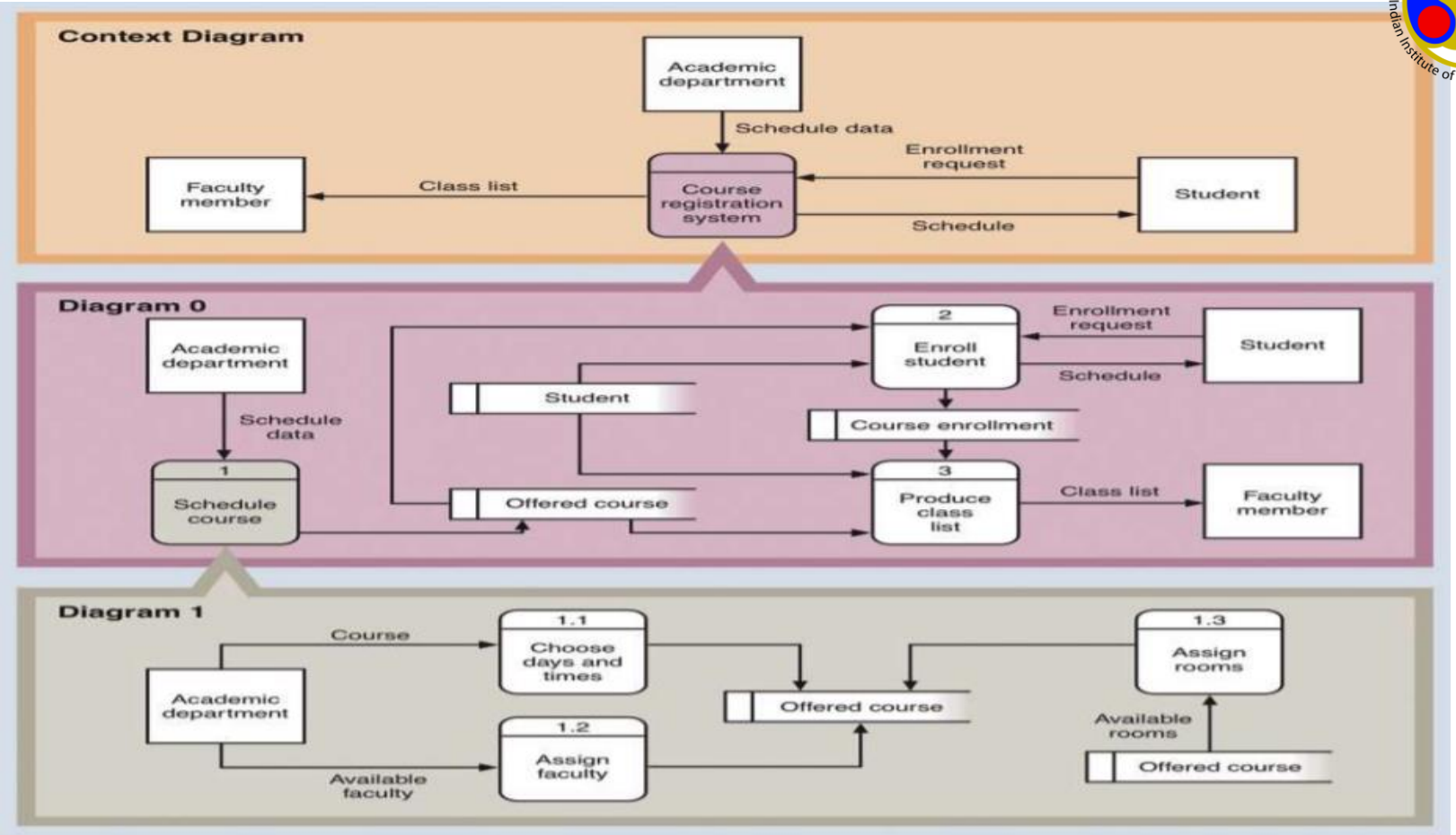
Layers of DFD Abstraction



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Rules of Data Flow

Data can flow from

- ➔ External entity to process
- ➔ Process to external entity
- ➔ Process to store and back
- ➔ Process to process

Data can not flow from

- ➔ External entity to external entity
- ➔ External entity to store
- ➔ Store to external entity
- ➔ Store to store

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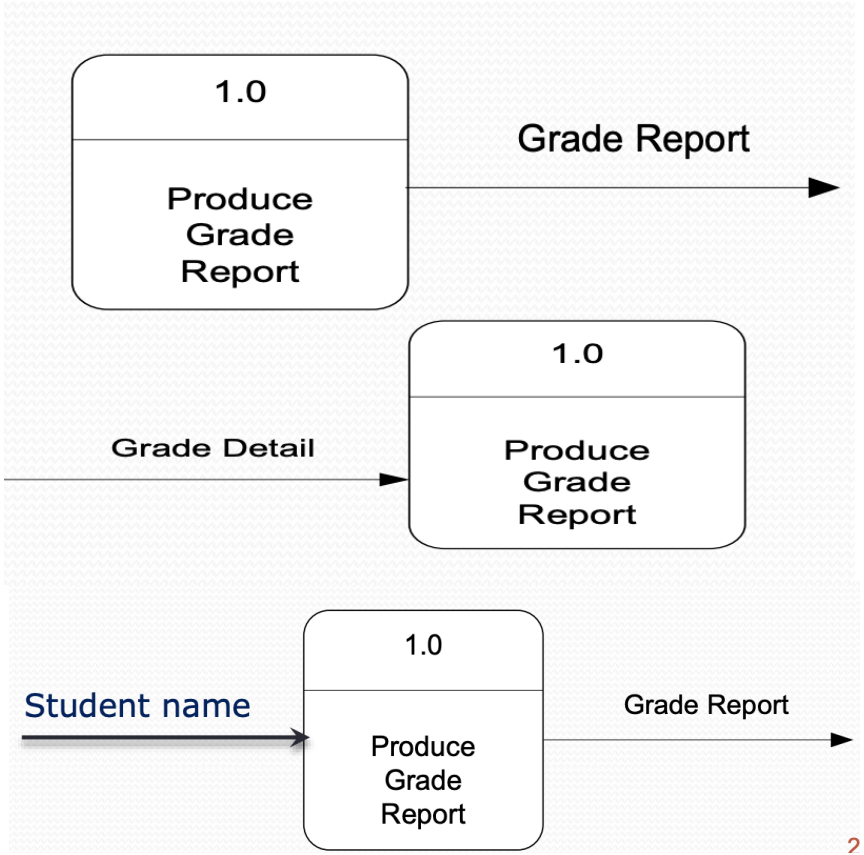
Three INCORRECT Data Flow

- Miracle
- Black Hole
- Gray Hole



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Good Style in Drawing DFD

- Use meaningful names for data flows, processes and data stores.
- Use top down development starting from context diagram and successively levelling DFD
- Only previously stored data can be read
- A process can only transfer input to output. It cannot create new data
- Data stores cannot create new data

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Creating the Level 0 Diagram

- Draw one process representing the entire system (process 0)
- Find all inputs and outputs that come from or go to external entities; draw as data flows.

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Creating Level 1 Diagram

- Draw the data-flows between the external entities and processes
- Identify data stores by finding where the data needs to be held within the system.
- Add data-flows flowing between processes and data stores within the system

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Creating Level 2 Diagram

- Each process in level 1 DFD is broken down into multiple processes.
- Level 2 DFD is be used to project or record the necessary details about the system's functioning.
- Include sources and destinations of data flows to processes and stores within the DFD.

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When to stop decomposing DFDs?

- Ideally, a DFD has at least three levels.
- When the system becomes primitive i.e. lowest level is reached and further decomposition is useless.

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Validating DFD

- Do all data stores have flows both in and out? A one-way data store is of little use.
- Are symbols correctly labelled and uniquely referenced?
- Can the flows be reduced? If a process is too busy, it can be broken down into two or more processes.

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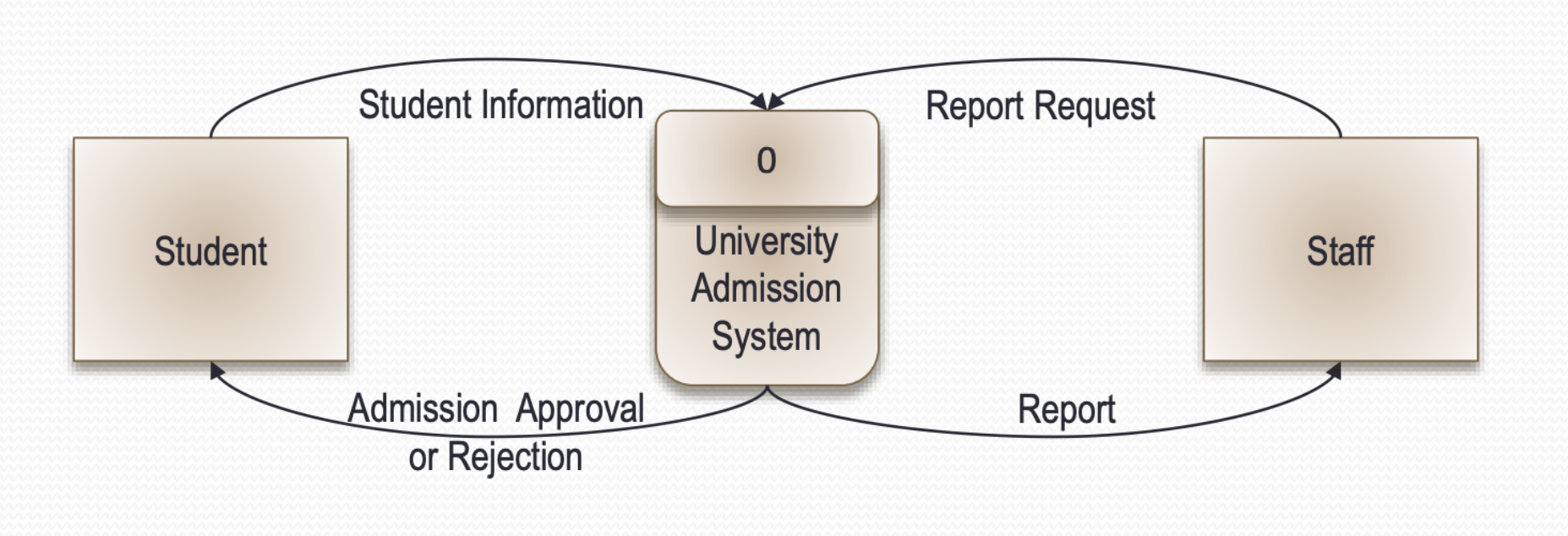
DFD for University Admission System

Level 0



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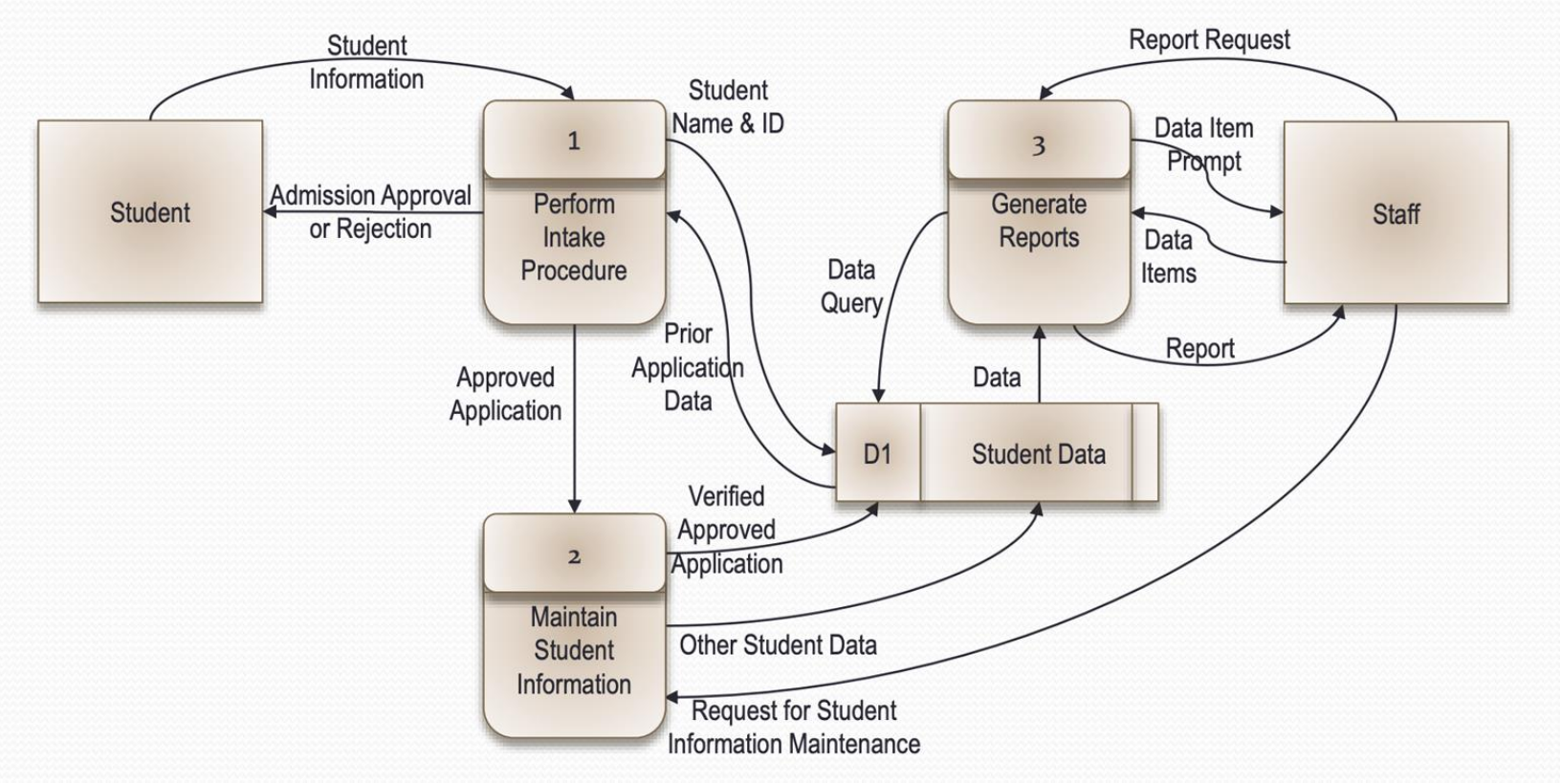
Level 1



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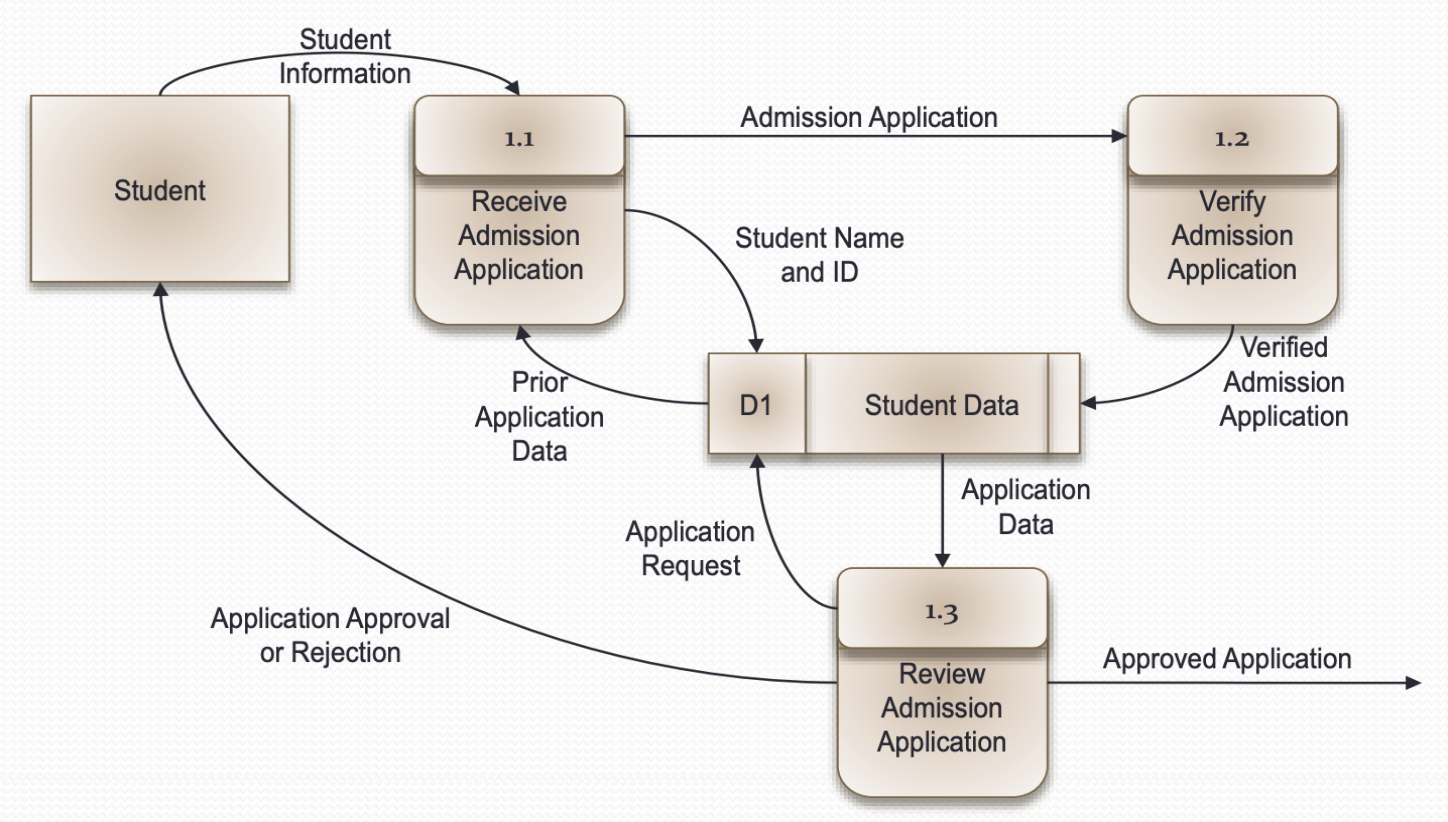
Level 2 Process 1, Perform Intake Procedure



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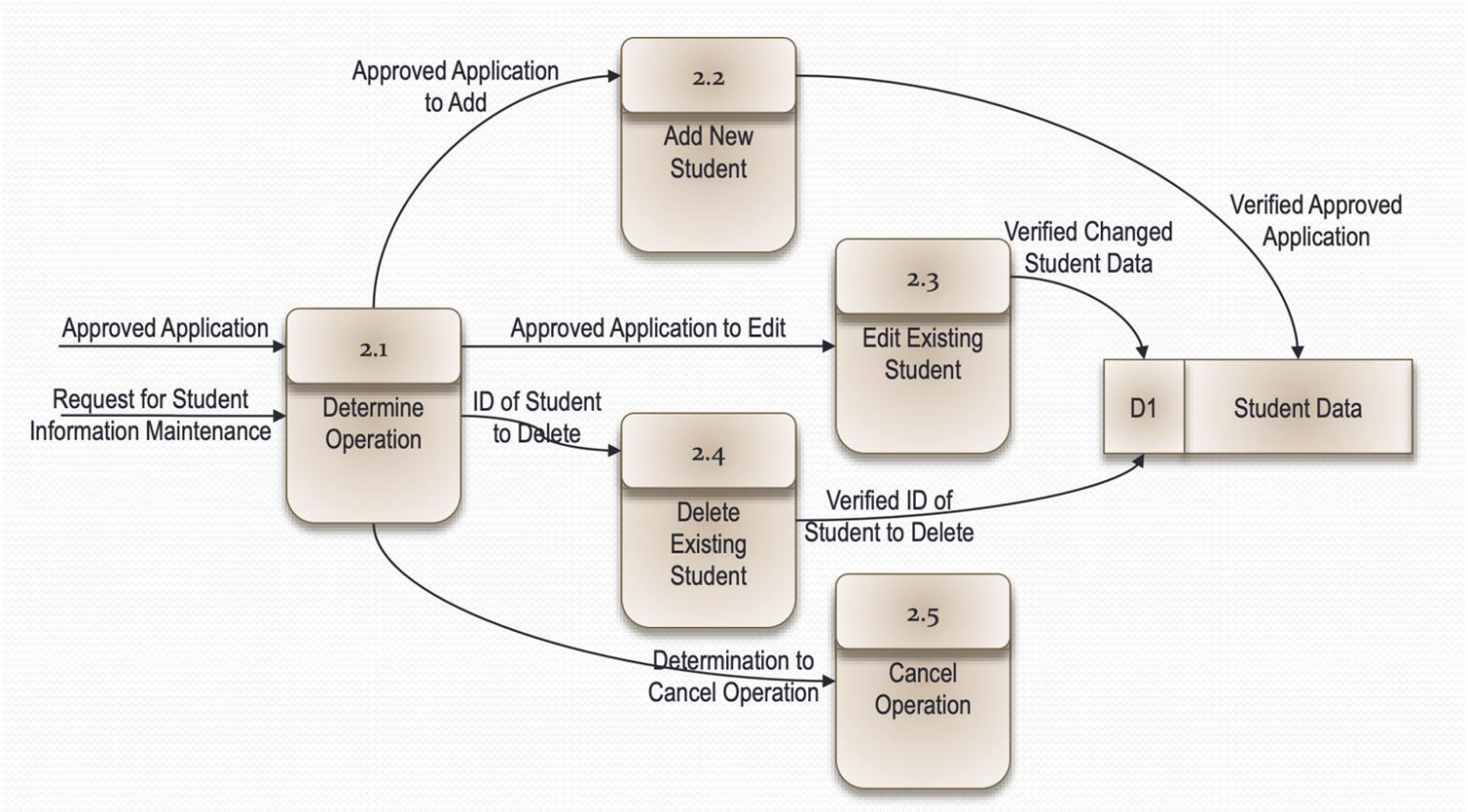
Level 2 Process 2, Maintain Student Information



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Logical and Physical DFD

- DFDs considered so far are called logical DFDs
- A physical DFD specifies who does the operations specified by the logical DFD
- Physical DFD may depict physical movements of the goods

Source: slideshare

References

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Thank You!