SOOAD

UNIT 2

THE PROCESS MODELLING

UNIT -2 Process Modelling

- Introduction
- Data Flow Diagram
  - Reading Data Flow Diagrams
  - Elements of Data Flow Diagrams
  - Process Description
- Creating Data Flow Diagrams
  - Context Diagram
  - Data Flow Diagram Fragments
  - Level 0 Diagram
  - Level 1 Diagram
  - Validating the Data Flow Diagrams

Introduction

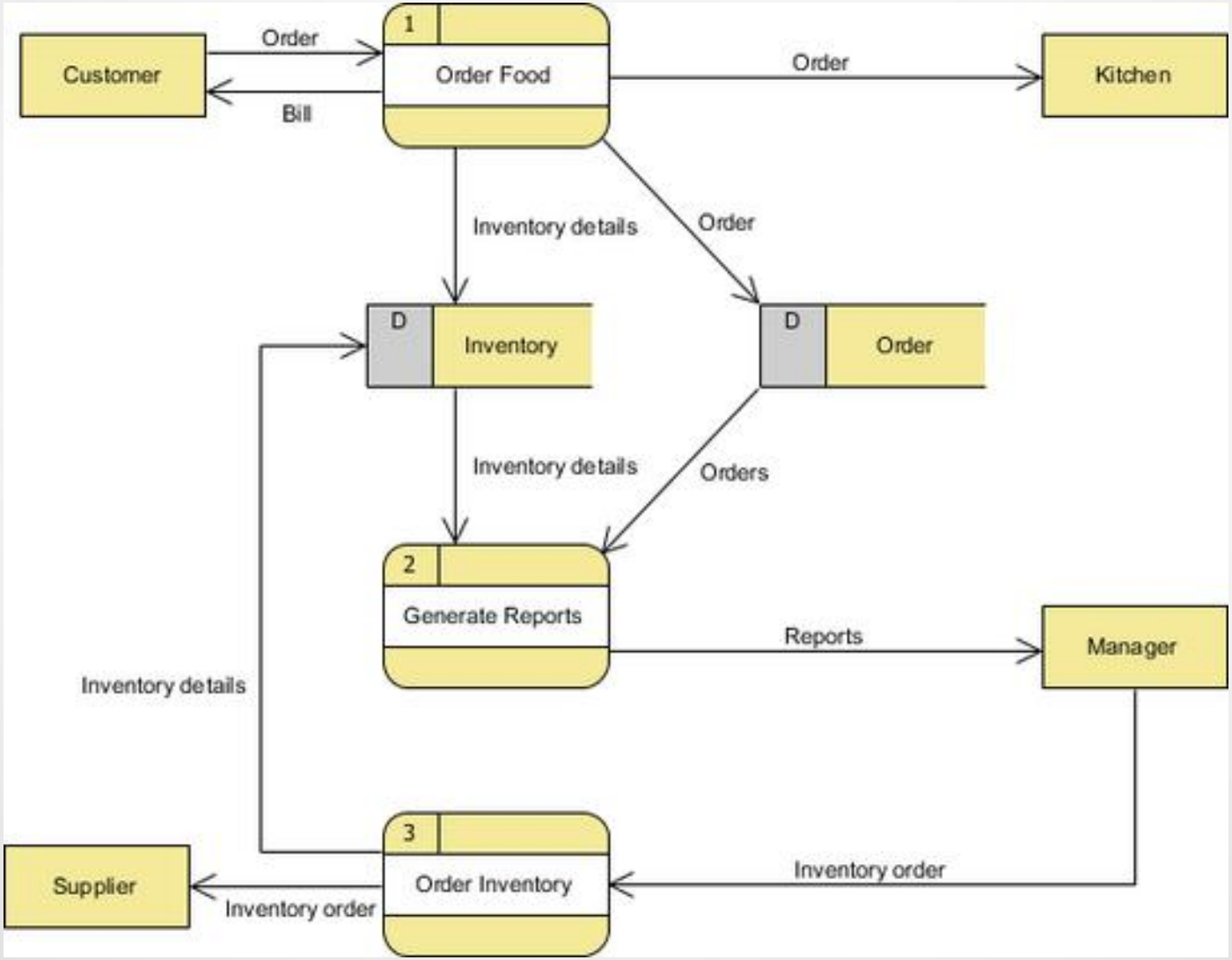
A picture is worth a thousand words.

- A Data Flow Diagram (DFD) is a traditional way to visualize the information flows within a system.
- A neat and clear DFD can depict a good amount of the system requirements graphically.
- It can be manual, automated, or a combination of both.
- It shows how information enters and leaves the system, what changes the information and where information is stored.
- The purpose of a DFD is to show the scope and boundaries of a system as a whole.

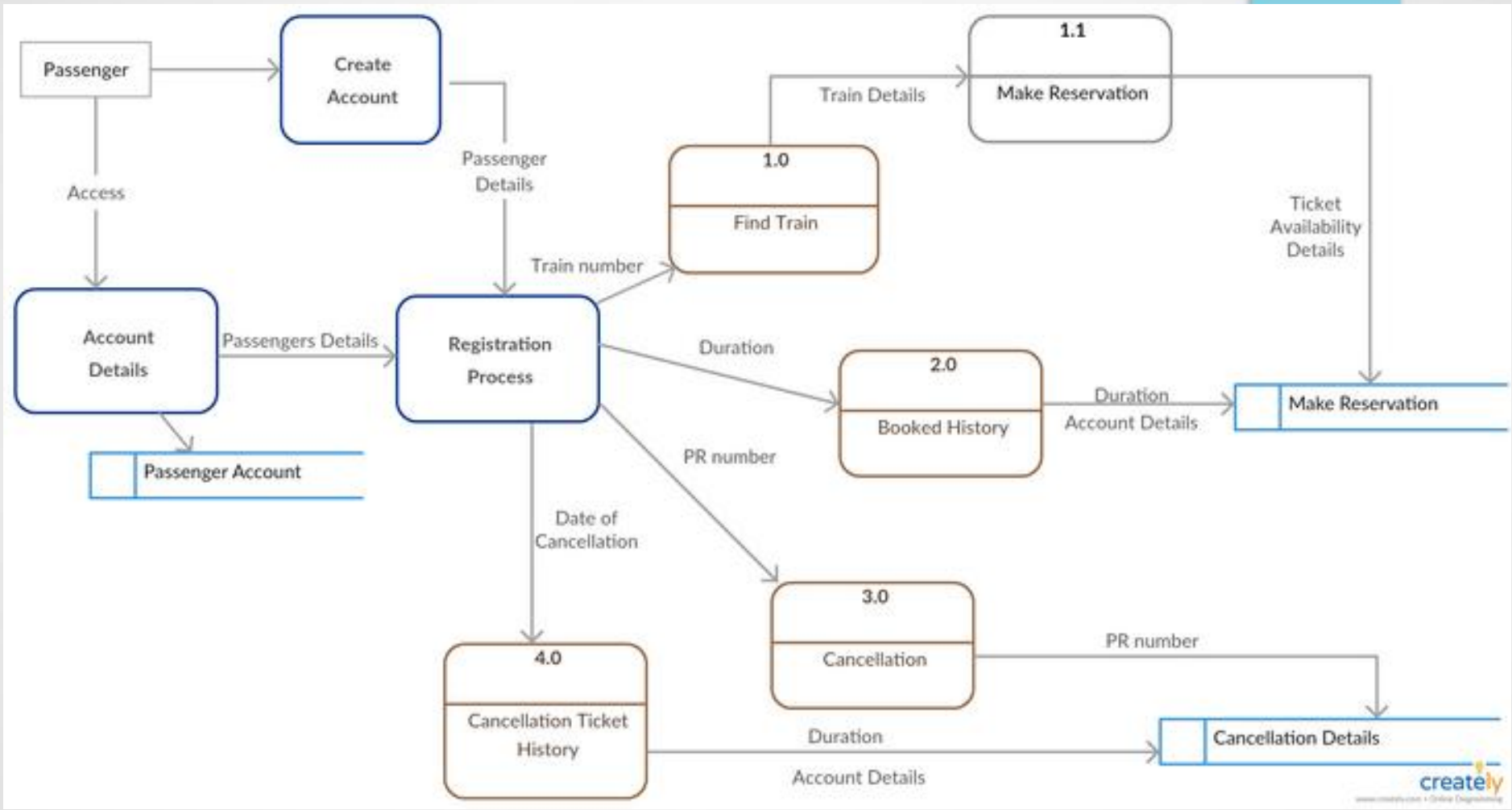
Introduction

- It may be used as a communications tool between a systems analyst and any person who plays a part in the system that acts as the starting point for redesigning a system.
- They work for both technical and nontechnical audiences, from developer to CEO.
- That’s why DFDs remain so popular after all these years.
- While they work well for data flow software and systems, they are less applicable nowadays to visualizing interactive, real-time or database-oriented software or systems.

Introduction – Example of DFD



Introduction – Example of DFD

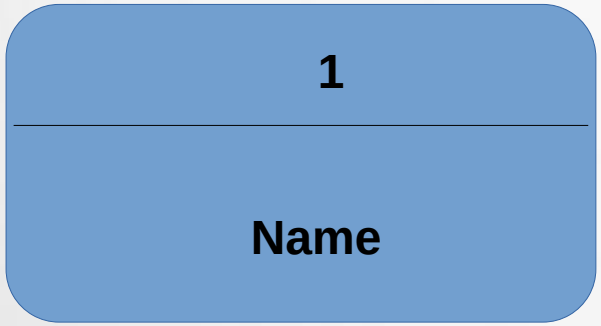


Data Flow Diagrams

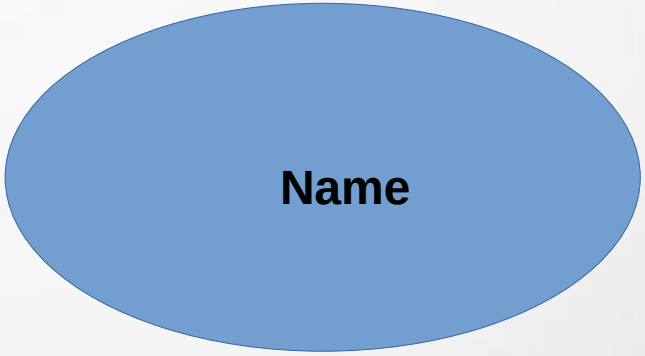
- **Elements of Data Flow Diagrams**
  - There are four symbols in the DFD
    - Process
    - Data Flow
    - Data Stores
    - External Entities
  - There are two commonly used styles of symbols:
    - Chris Gane & Trish Sarson
    - Tom Demarco & Ed Yourdon

Data Flow Diagrams - Process

- A Process is **an activity or a function that is performed** for some specific business reason.
- Every process should named starting with a **verb and ending with a noun.**
- Process performs **only one activity.**



Gane Sarson



Yourdon

Process

- Names should be short and contain information
- It contains business logic, that transforms the data and produce the required result.
- In DFD the process symbol refers to as **black box.**
- **Beacuse:- inputs,outputs and general functions of the process are known, but logic is hidden.**
- **Example:**
  - Determining request quality
  - Record offer

Process

- Every process must have at least one input data flow and at least one output data flow.
- It should have a unique identification number, a name and a description.

Data Flow Diagrams – Data Flow

- A Data flow is **a single fact or logical collection** of sereral facts.
- It should be named **with a noun.**
- It act as **a glue that holds** the processes together.

Data Flow Diagrams – Data Flow

- One end of every data flow will always come from or go to process.
- While the other arrow can be to other process or database.
- Every process must create atleast one output data flow.

Data Flow

- **Spontaneous Generation:** A process that produces output but no input data flow.
- **Black Hole**: A process has input but no output.
- **Gray Hole:** A process that has at least one input and one output, but the input is not sufficient to generate the output.
- e.g dob input is not sufficient to produce a final grade output in the **calculate grade process**.

Data Flow Diagrams – Data Store

- A Data store is a collection of data is stored in some way.
- Data store is named with noun.
- All data stores must have at least one input data flow.

Gane Sarson

Yourdon

Data Flow Diagrams – Data Store

- Data flows coming out of a data store indicate that information is retrieved from the data store.
- All data stores must have atleast one input data flow.
- The data flow that stores data and the data flow that retreives data should always be shown as two seperate data flows.

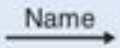
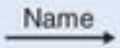
Data Flow Diagrams – External Entity

- An External entity is a person, organization unit, or system that is external to the system but interacts with it.

External Entity

- DFD entities are also known as **Terminators.**
- **Source:** Entity that supplies data to the system.
- **Sink:** Entity that receives data.
- An entity can be both source and sink.
- Example:
  - Managers
  - Clerks
  - Customers

Data Flow Diagrams

Data Flow Diagram Element	Typical Computer-Aided Software Engineering Fields	Gane and Sarson Symbol	DeMarco and Yourdon Symbol
Every *process* has a number a name (verb phase) a description at least one output data flow at least one input data flow	Label (name) Type (process) Description (what is it) Process number Process description (structured English) Notes		
Every *data flow* has a name (a noun) a description one or more connections to a process	Label (name) Type (flow) Description Alias (another name) Composition (description of data elements) Notes		
Every *data store* has a number a name (a noun) a description one or more input data flows one or more output data flows	Label (name) Type (store) Description Alias (another name) Composition (description of data elements) Notes		
Every *external entity* has a name (a noun) a description	Label (name) Type (entity) Description Alias (another name) Entity description Notes		

Business Processes

- Most business processes are t**oo complex in one DFD**.
- There for Process models are **therefore composed of a set of DFDs.**
- First **DFD provides a summary of the overall system, with the additioal DFDs providing** more and more details about each part.
- It consist of
  - Context Diagram
  - Level 0 Diagram
  - Level 1 Diagram
  - Level 2 Diagram

Process Description

- The purpose of process descriptions is to explain what the process does and provide additional information that the DFD does not provide.
- Three techniques are commonly used to describe ore complex processing logic :
  - **Structured English** : uses shorts sentences to describe the work that a process performs.
  - **Decision Trees** : display the decision logic as a set of nodes and branches.
  - **Decision Tables** : represent comples policy decisions as rules that link various condition with actions.

Context Diagram

- “The Top-level DFD in every business process model, whether a manual system or a computerized system, is the context diagram.”
- Context diagram shows the overall business process as a single process.

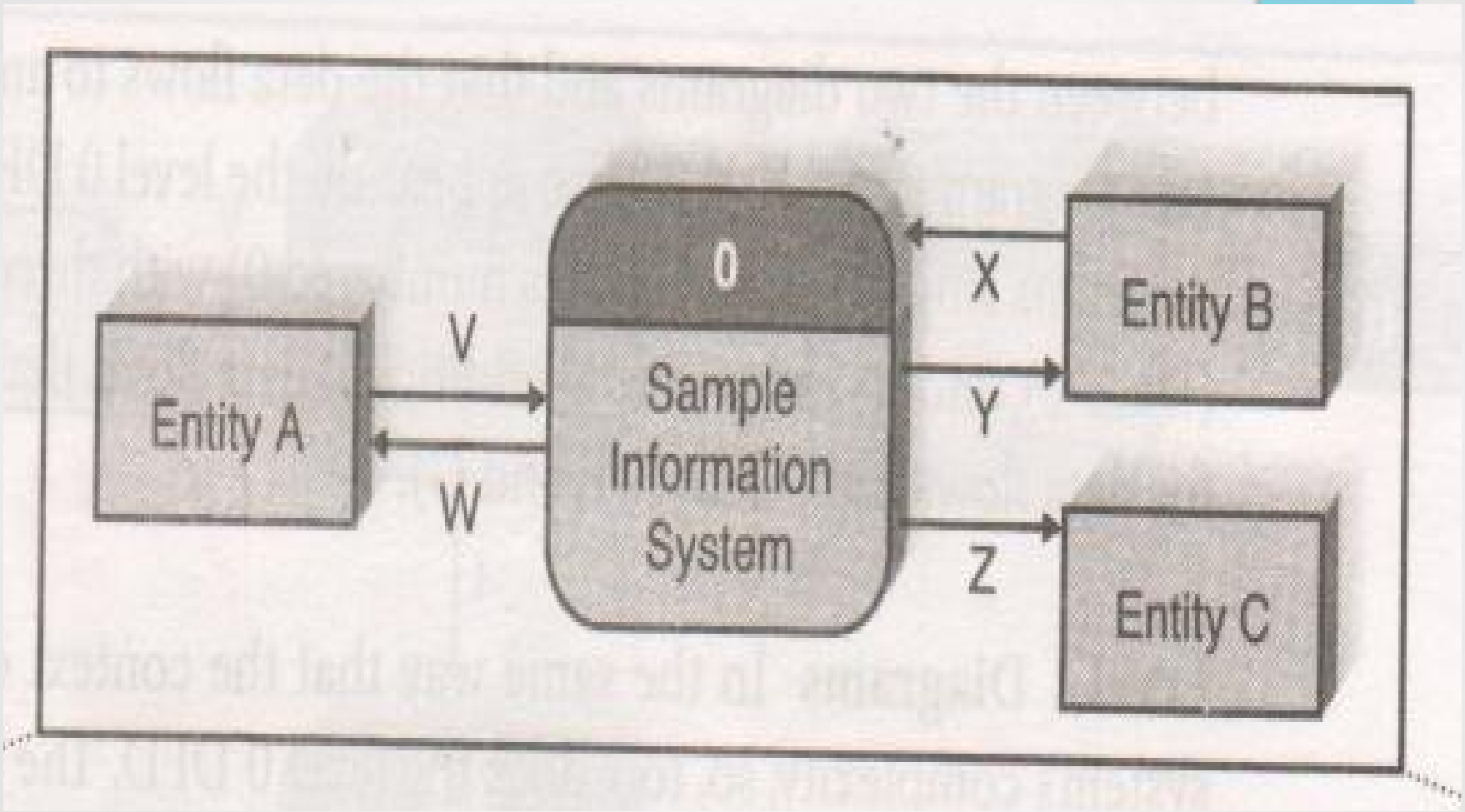
Context Diagram

- The Context diagram is the highest level in a Data Flow Diagram.
- It is a tool popular among Business Analysts who use it to understand the details and boundaries of the system to be designed in a project.
- It points out the flow of information between the system and external components.
- It is made up of a context bubble, first drawn in the middle of the chart.
- It is usually a circle shape that represents a conceptual boundary that encloses a group of interconnected processes and activities of a project.

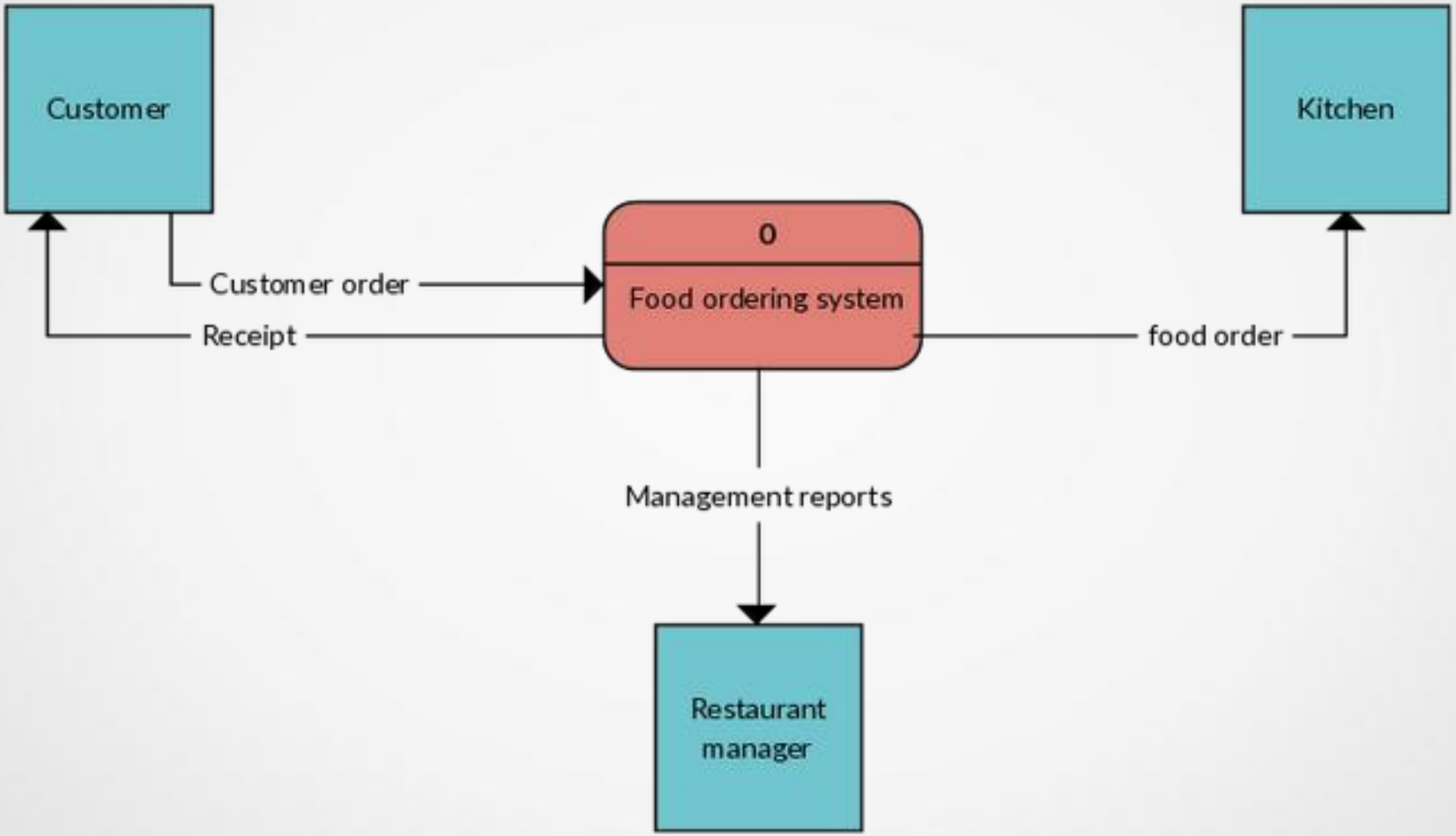
Context Diagram

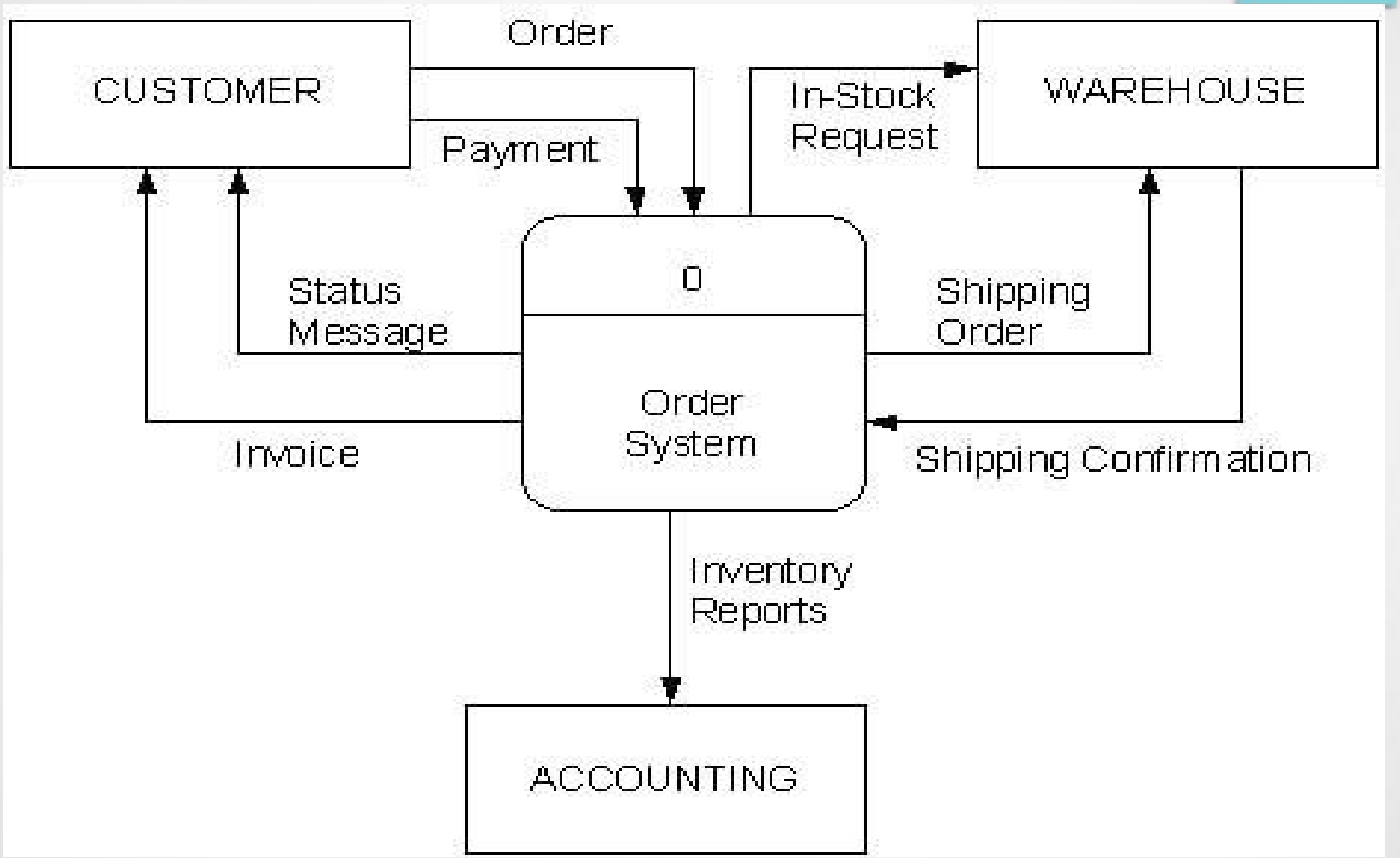
- The objective of the system context diagram is to focus attention on external factors and events that should be considered in developing a complete set of systems requirements and constraints.
- A system context diagram is often used early in a project to determine the scope under investigation.
- A system context diagram represents all external entities that may interact with a system.
- The entire software system is shown as a single process.
- Such a diagram pictures the system at the center, with no details of its interior structure, surrounded by all its External entities, interacting systems, and environments.

Context Diagram



Example: Ordering system



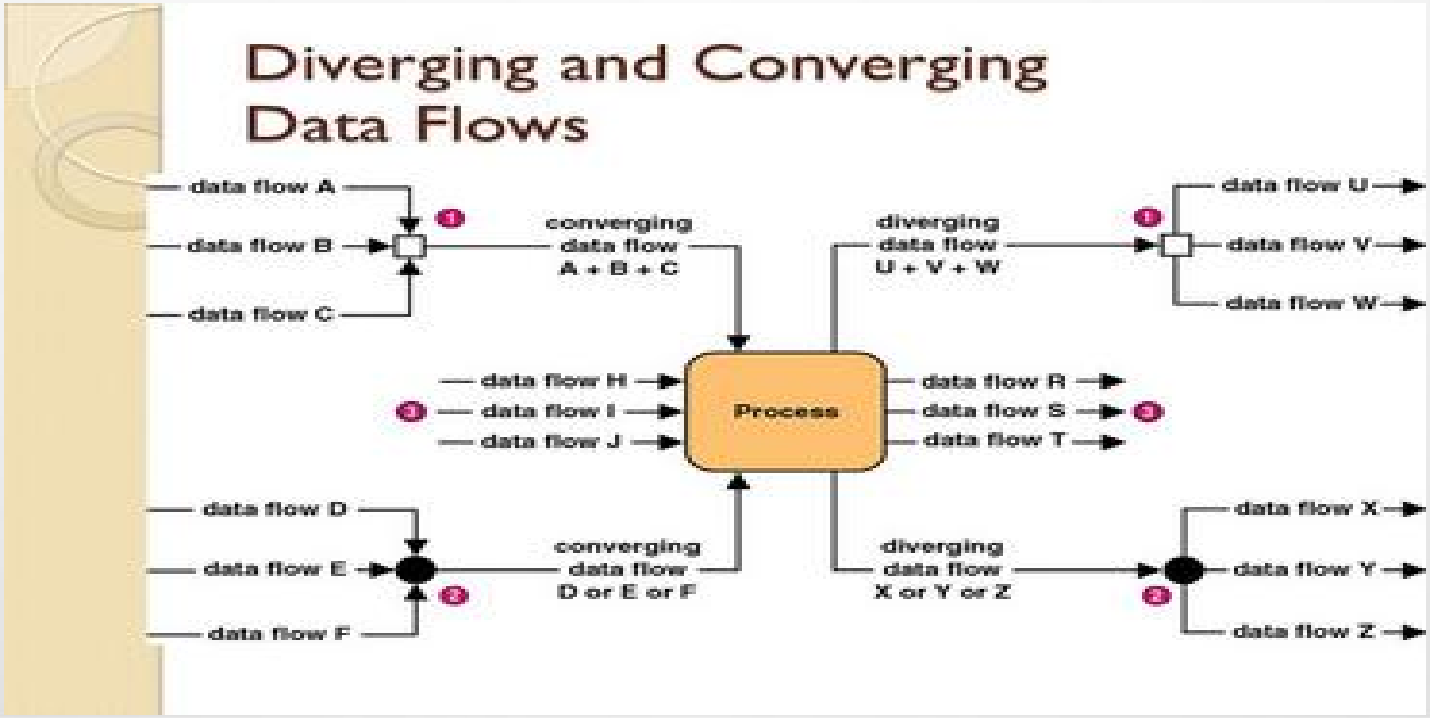

CUSTOMER
Order
Payment
In-Stock
Request
WAREHOUSE
0
Status
Message
Shipping
Order
Order
System
Invoice
Shipping Confirmation
Inventory
Reports
ACCOUNTING

Level 0 Diagram / Level 0 DFD

- The Level 0 diagram shows all the
  - major processes at the first level of numbering
  - The data stores
  - External entities
  - Data flow among them

Level 0

- Diverging data flow:
  - Indicates data that starts out naturally as one flow, but is routed to different destinations. – Also useful to indicate multiple copies of the same output going to different destinations.
  -

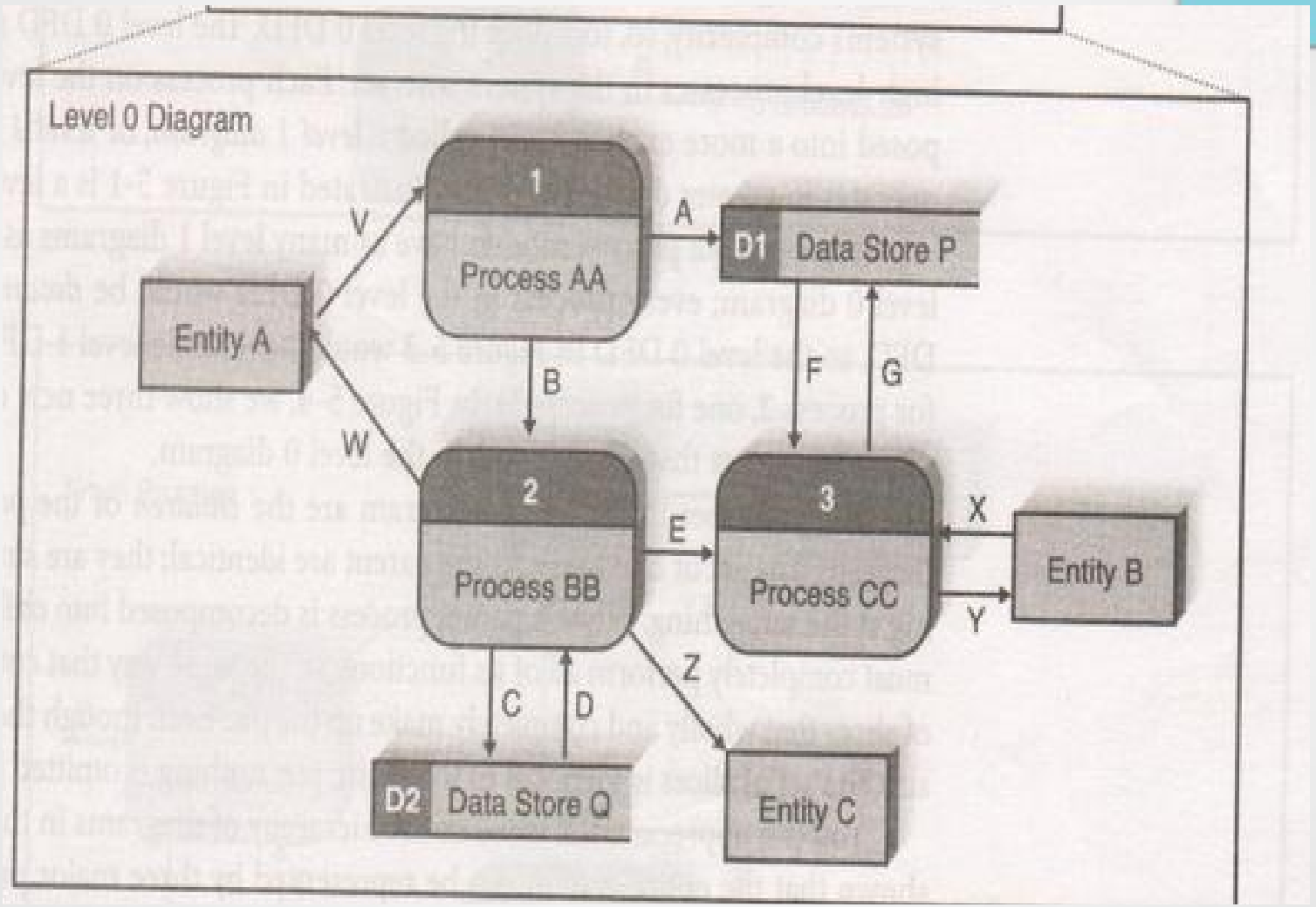


Functional Primitive

- It is a process that consists of a single function that is not exploded further.
- e.g Assign final grade process.
- Leveling: it also known as exploding, partitioning.

- **Black Hole** - A process that may have input flows but no output flows.
- **Grey Hole** - A process that may have outputs that are greater than the sum of its inputs - e.g., its inputs could not produce the output shown.
- **Diverging Data flow** – is a data flow in which same data goes to two or more different locations.
- **Parent Diagram** - Higher level Diagram
- **Child Diagram** – lower level Diagram
- **Functional Primitives** – a process that consists of a single funciton that is not exploded further.
- **Black Box** – most general view of system and contains a single process.
- **Leveling** – process of drawing a series of increasingly detailed diagrams, untill all functional primitives are identified.

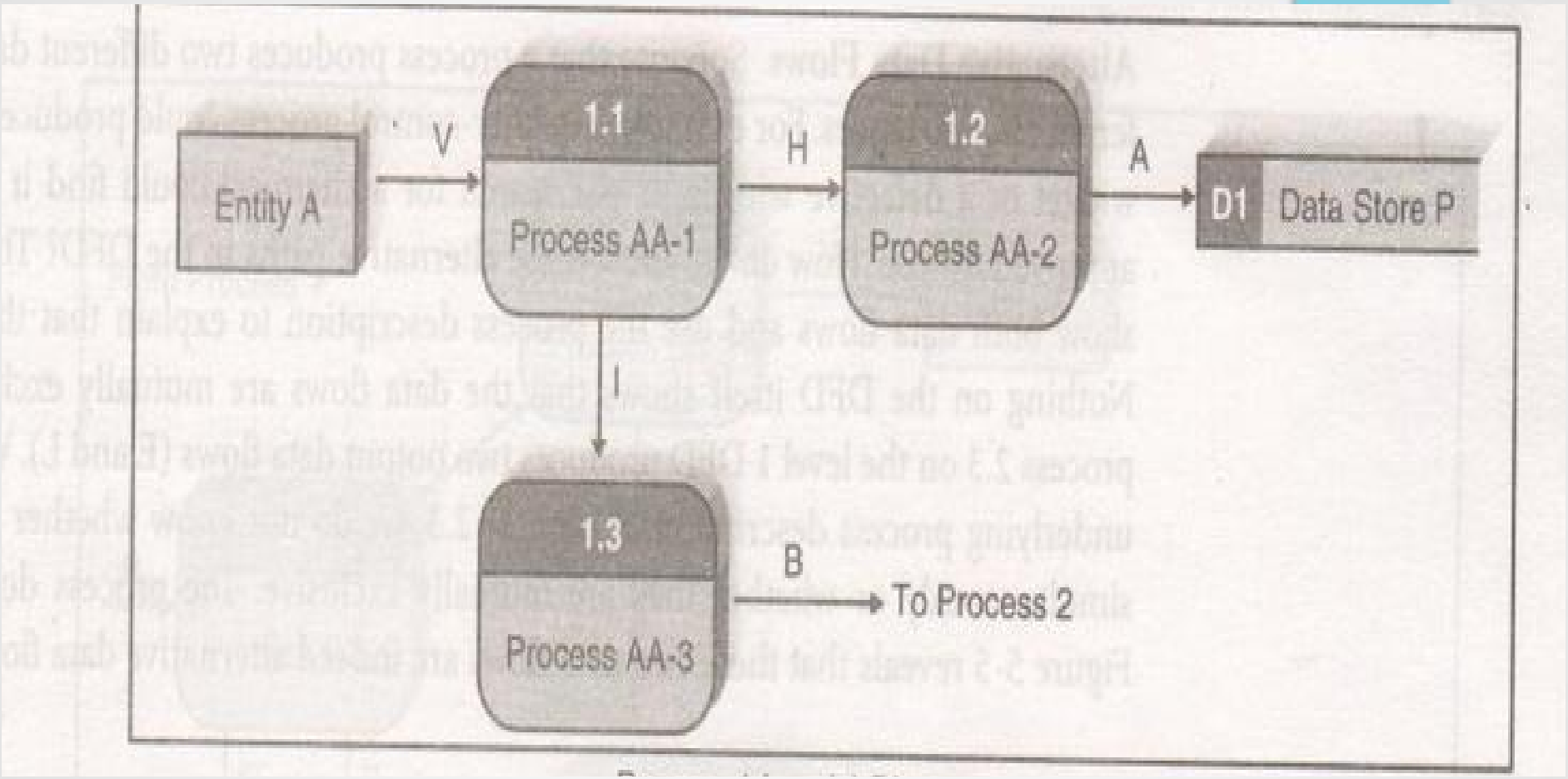
Level 0 Diagram / Level 0 DFD



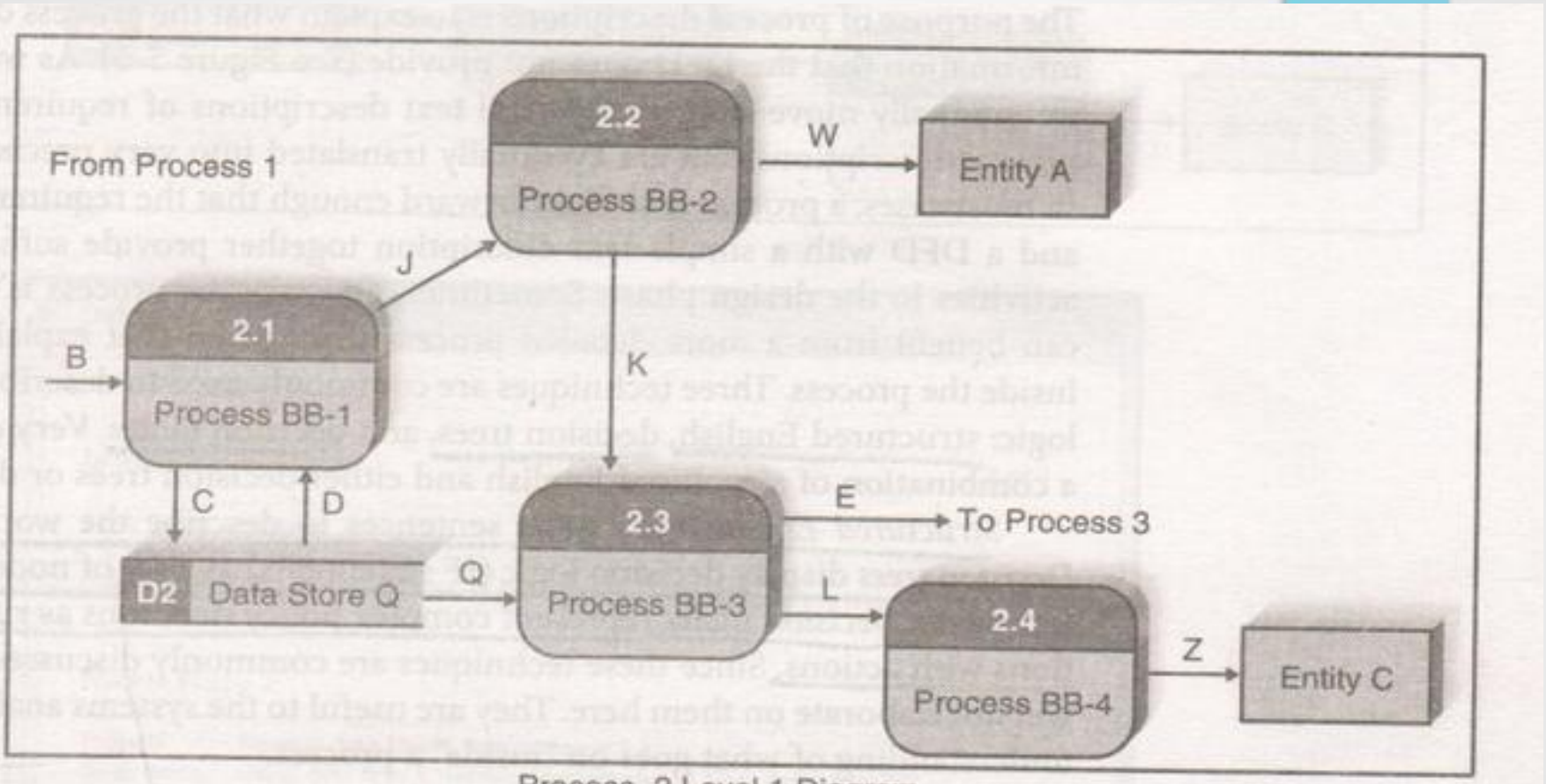
Level 1 Diagram / Level 1 DFD

- The level 0 DFD shows only how the major high-level processes in the system interact.
- **Each process on the level 0 DFD MUST be decomposed into a more explicit DFD called a level 1 diagram or level 1 DFD.**

Level 1 Diagram / Level 1 DFD – Process 1

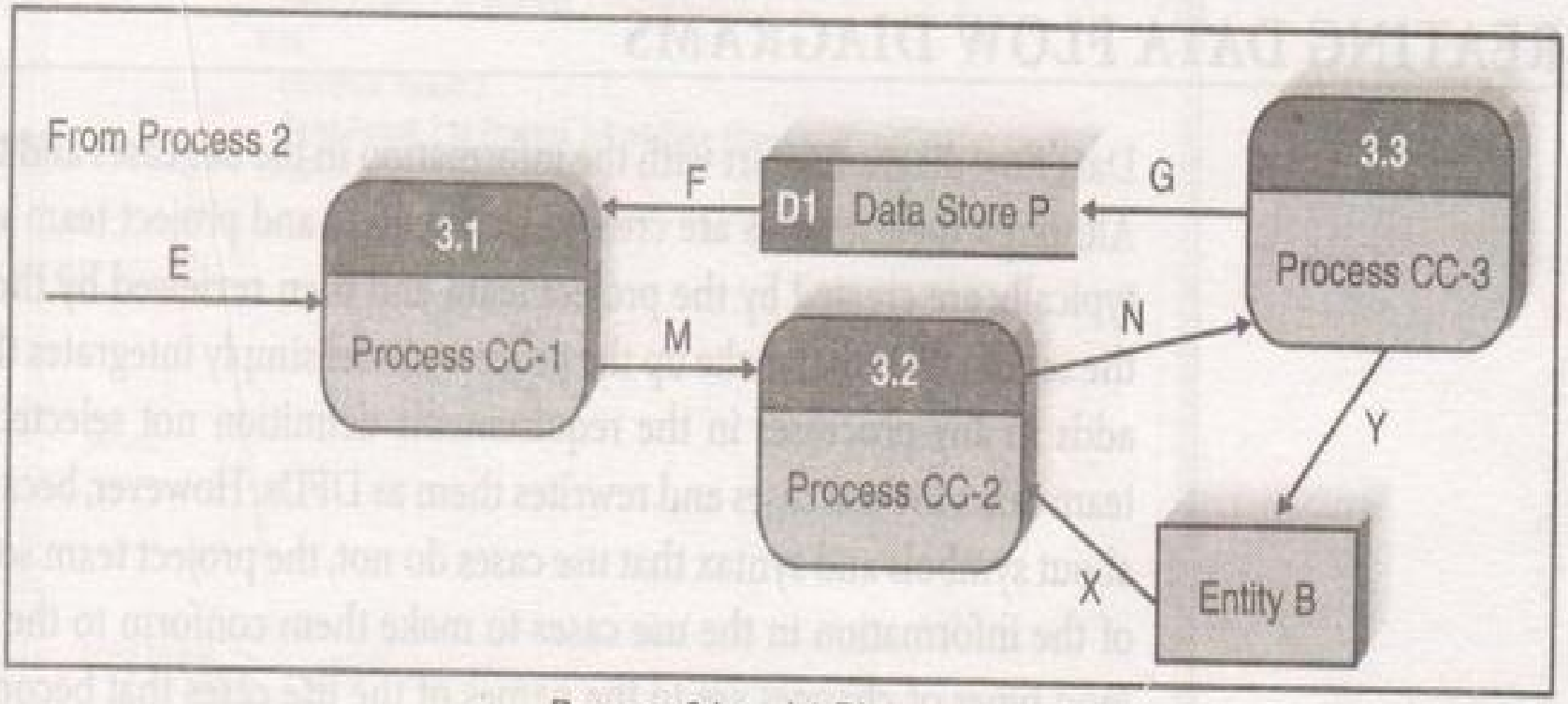


Level 1 Diagram / Level 1 DFD – Process 2



Process 2 Level 1 Diagram

Level 1 Diagram / Level 1 DFD – Process 3



Process 3 Level 1 Diagram

Level 2 Diagram / Level 2 DFD

- If any of the processes in **the level 1 diagram appear to be “busy” with multiple inflows and outflows**, IT MAY be appropriate to decompose that process iinto a lower level child diagram.
- Such diagram, the next level under level 1 would be labeled as level 2.

Numbering Rule for Process in Diagram

A **level 0 DFD** has process numbers **with no decimal** points (i.e 1, 2, 3 .....)

A **level 1 DFD** has process numbers **with one decimal** points (i.e 2.1, 5.4,....)

A **level 2 DFD** has process numbers with has numbers **with two decimal** points (i.e 1.2.1, 3.3.2, ...)

And so on.....