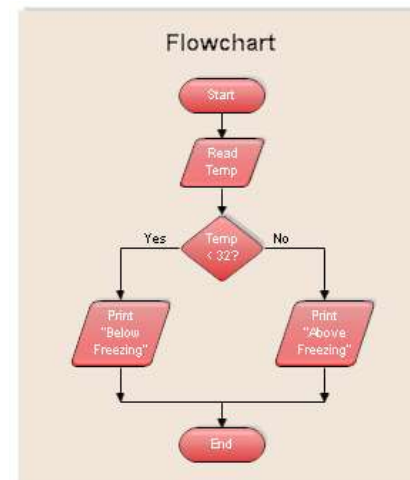
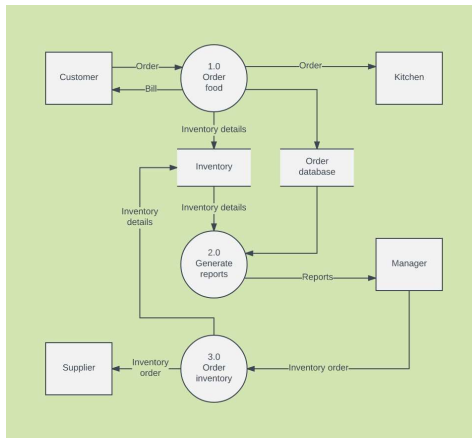


Unit 3- Design

3.4- DFD

3.5- Flow Chart



Data Flow Diagrams (DFDs)

The DFD is a simple graphical formalism that can be used to represent a system in terms of

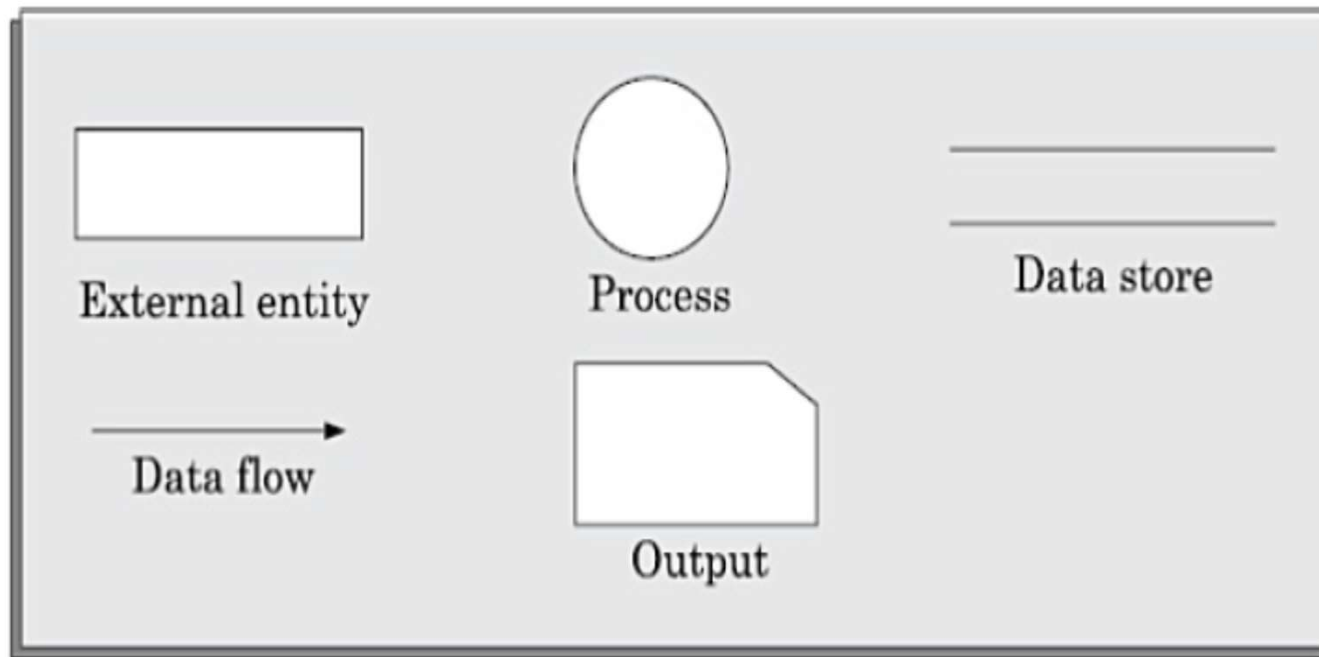
1. the input data to the system,
2. various processing carried out on those data, and
3. the output data generated by the system.

Data Flow Diagrams (DFDs)

- Starting with a set of high-level functions that a system performs, a DFD model represents the sub-functions performed by the functions using a hierarchy of diagrams
- In a hierarchical model, starting with a very abstract model of a system, various details of the system are slowly introduced through different levels of the hierarchy.
- We now elaborate the different concepts associated with building a DFD model of a system.

Primitive symbols used for constructing DFDs

- There are essentially five different types of symbols used for constructing DFDs. These primitive symbols are depicted in following Figure:



Function symbol: A function is represented using a circle.

- This symbol is called a process or a bubble. Bubbles are annotated with the names of the corresponding functions.

External entity symbol: Represented by a rectangle. Essentially those physical entities external to the software system which interact with the system by inputting data to the system or by consuming the data produced by the system.

- In addition to the human users, they can be used to represent external hardware and software such as another application software that would interact with the software being modelled.

Data flow symbol: A directed arc (or an arrow) is used as a data flow symbol.

A data flow symbol represents the data flow occurring between two processes or between an external entity and a process in the direction of the data flow arrow.

- Data flow symbols are usually annotated with the corresponding data names.

Data store symbol: A data store is represented using two parallel lines.

- It represents a logical file. That is, a data store symbol can represent either a data structure or a physical file on disk.
- Each data store is connected to a process by means of a data flow symbol.
- The direction of the data flow arrow shows whether data is being read from or written into a data store.

Output symbol: The output symbol is used when a hard copy is produced.

Rules and tips for DFD

- Each process should have at least one input and an output.
- Each data store should have at least one data flow in and one data flow out.
- Data stored in a system must go through a process.
- All processes in a DFD go to another process or a data store.

DFD Example

Creating Data Flow Diagrams

Steps:

1. Create a list of activities
2. Construct Context Level DFD
(identifies external entities and processes)
3. Construct Level 0 DFD
(identifies manageable sub process)
4. Construct Level 1- n DFD
(identifies actual data flows and data stores)
5. Check against rules of DFD

DFD Naming Guidelines

- External Entity → Noun
- Data Flow → Names of data
- Process → verb phrase
 - a system name
 - a subsystem name
- Data Store → Noun

Creating Data Flow Diagrams

Lemonade Stand Example



Creating Data Flow Diagrams

Example

The operations of a simple lemonade stand will be used to demonstrate the creation of dataflow diagrams.



Steps:

1. Create a list of activities
 - Old way: no Use-Case Diagram
 - New way: use Use-Case Diagram
2. Construct Context Level DFD
(identifies sources and sink)
3. Construct Level 0 DFD
(identifies manageable sub processes)
4. Construct Level 1- n DFD
(identifies actual data flows and data stores)

Creating Data Flow Diagrams

Example

Think through the activities that take place at a lemonade stand.



1. Create a list of activities

Customer Order
Serve Product
Collect Payment
Produce Product
Store Product

Creating Data Flow Diagrams

Example

Also think of the additional activities needed to support the basic activities.



1. Create a list of activities

Customer Order
Serve Product
Collect Payment
Produce Product
Store Product
Order Raw Materials
Pay for Raw Materials
Pay for Labor

Creating Data Flow Diagrams

Example

Group these activities in some logical fashion, possibly functional areas.



1. Create a list of activities

Customer Order
Serve Product
Collect Payment

Produce Product
Store Product

Order Raw Materials
Pay for Raw Materials

Pay for Labor

Creating Data Flow Diagrams

Example

Create a context level diagram identifying the sources and sinks (users).

Customer Order
Serve Product
Collect Payment

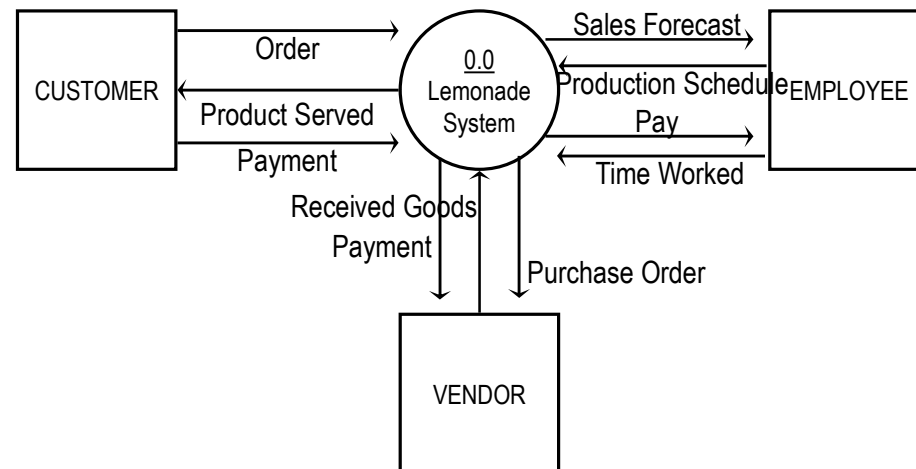
Produce Product
Store Product

Order Raw Materials
Pay for Raw Materials

Pay for Labor

2. Construct Context Level DFD (identifies sources and sink)

Context Level DFD



Creating Data Flow Diagrams

Example

Create a level 0 diagram identifying the logical subsystems that may exist.

Customer Order
Serve Product
Collect Payment

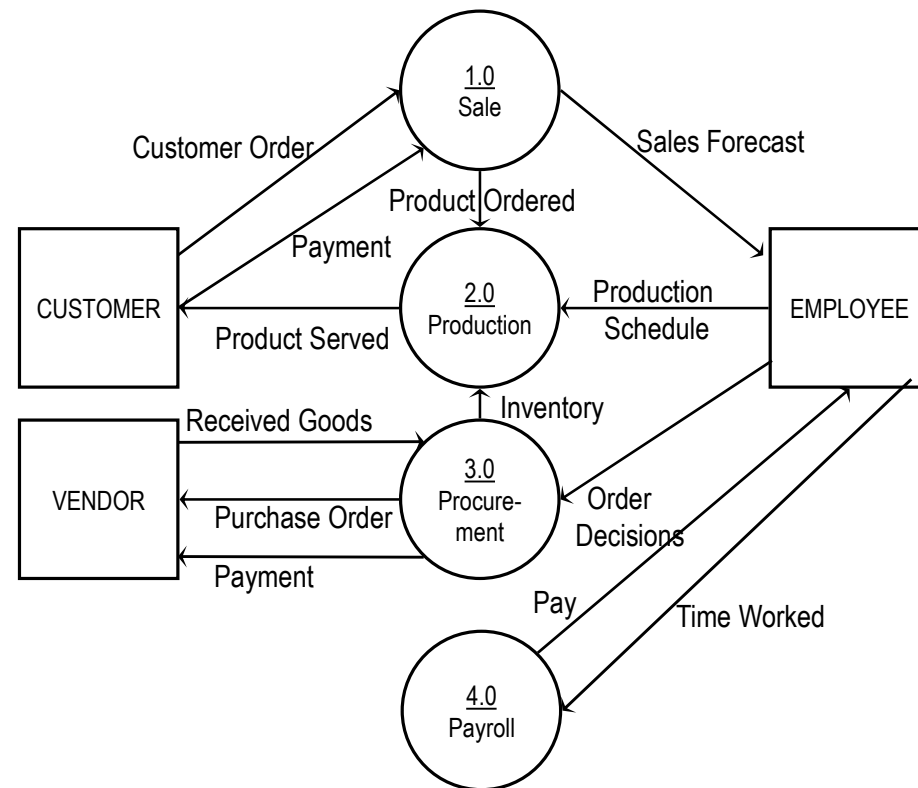
Produce Product
Store Product

Order Raw Materials
Pay for Raw Materials

Pay for Labor

3. Construct Level 0 DFD (identifies manageable sub processes)

Level 0 DFD



Creating Data Flow Diagrams

Example

Create a level 1 decomposing the processes in level 0 and identifying data stores.

Customer Order
Serve Product
Collect Payment

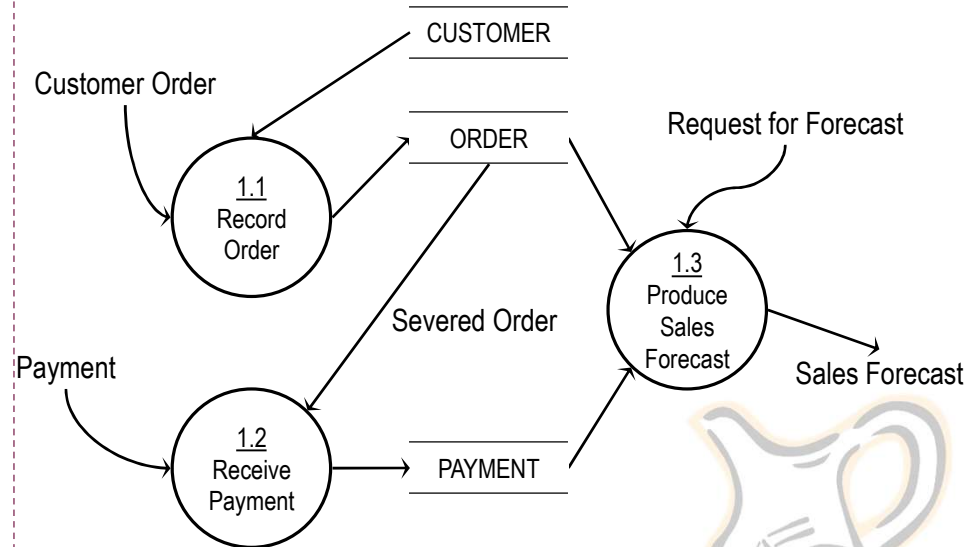
Produce Product
Store Product

Order Raw Materials
Pay for Raw Materials

Pay for Labor

4. Construct Level 1- n DFD
(identifies actual data flows and data stores)

Level 1 DFD



Creating Data Flow Diagrams

Example

Create a level 1 decomposing the processes in level 0 and identifying data stores.

Customer Order
Serve Product
Collect Payment

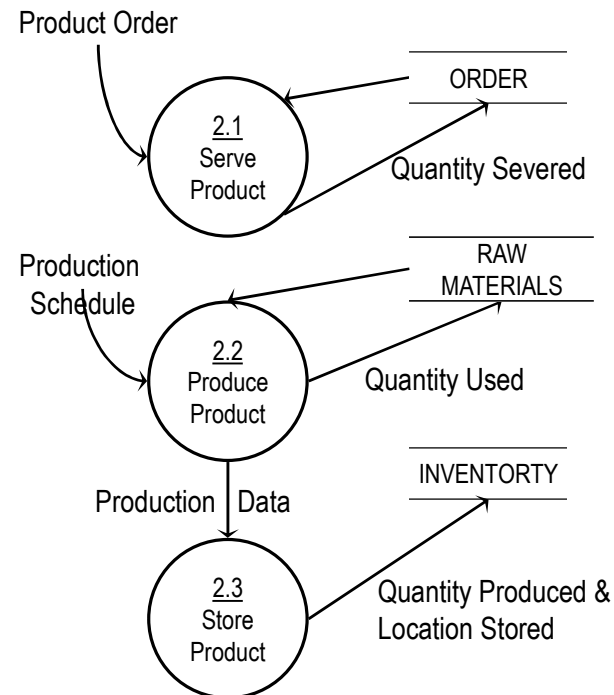
Produce Product
Store Product

Order Raw Materials
Pay for Raw Materials

Pay for Labor

4. Construct Level 1 (continued)

Level 1 DFD



Creating Data Flow Diagrams

Example

Create a level 1 decomposing the processes in level 0 and identifying data stores.

Customer Order
Serve Product
Collect Payment

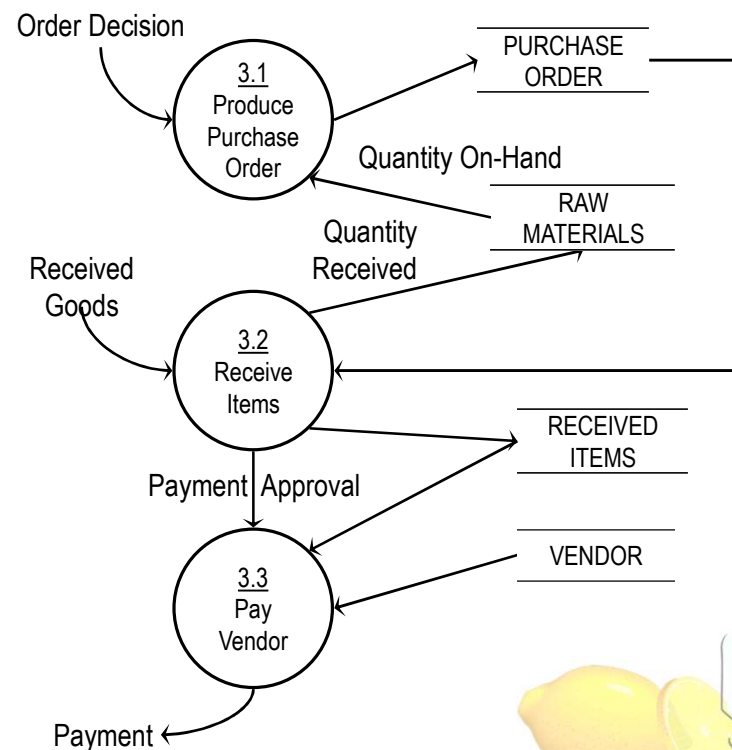
Produce Product
Store Product

Order Raw Materials
Pay for Raw Materials

Pay for Labor

4. Construct Level 1 (continued)

Level 1 DFD



Example

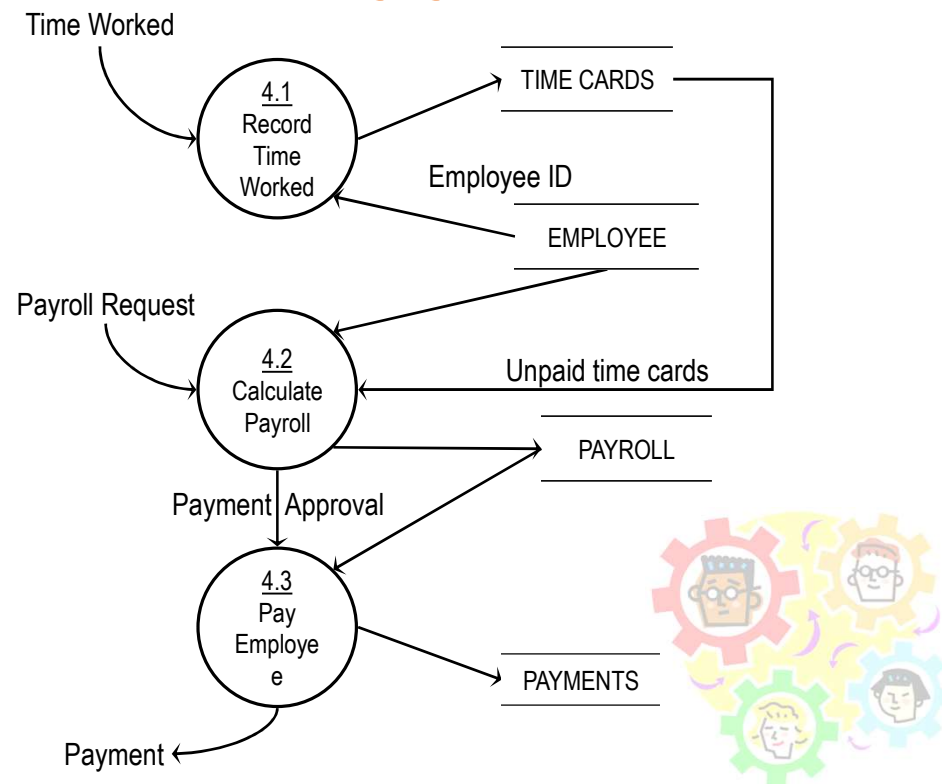
Create a level 1 decomposing the processes in level 0 and identifying data stores.

Customer Order
Serve Product
Collect Payment

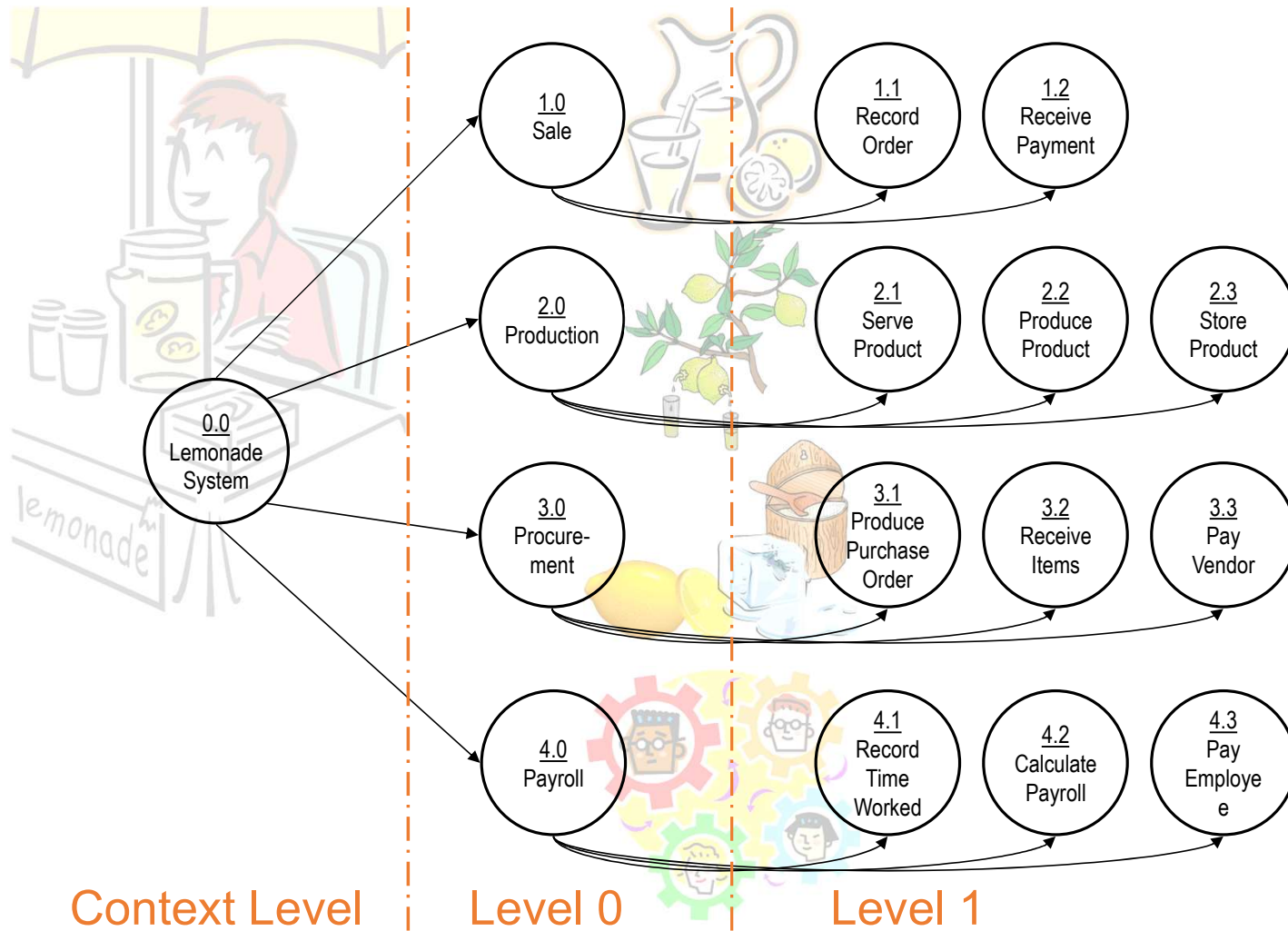
Order Raw Materials
Pay for Raw Materials

Pay for Labor

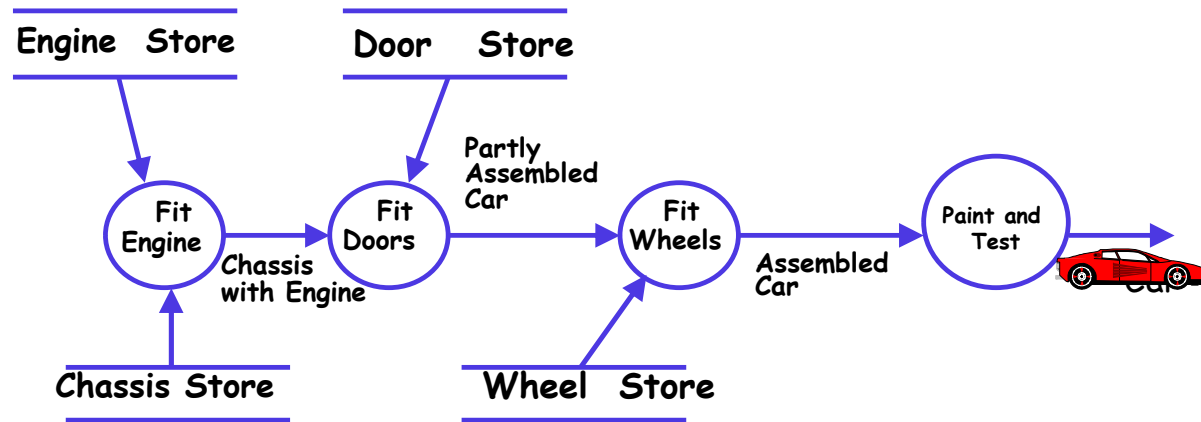
Level 1 DFD



Process Decomposition



Data Flow Model of a Car Assembly Unit



What is a flowchart

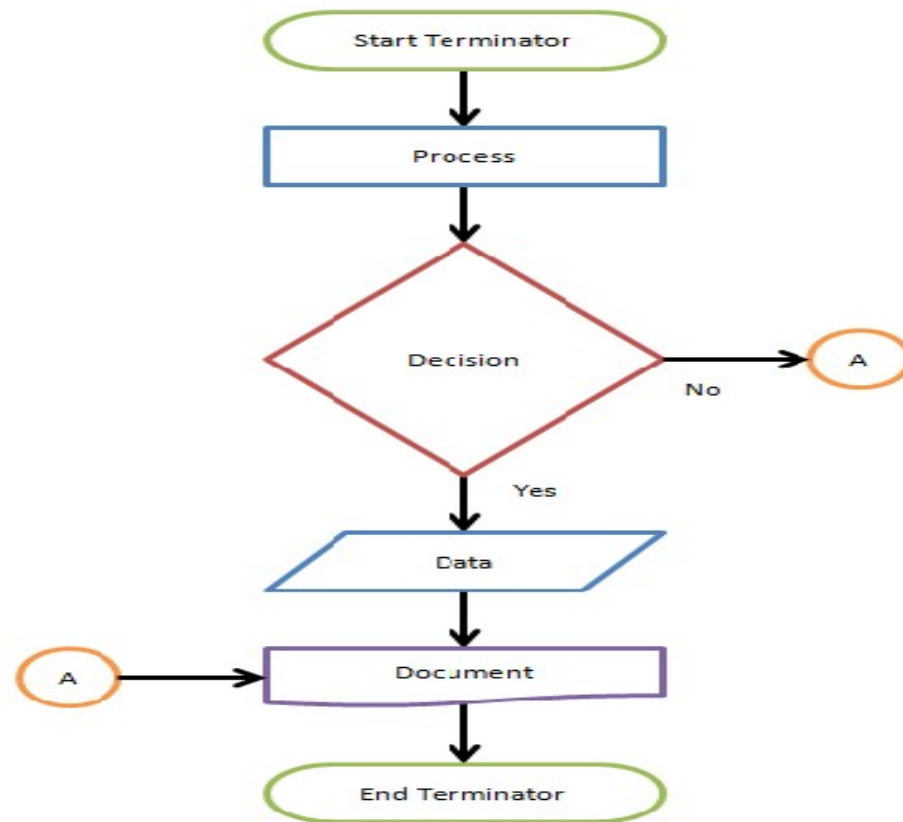
- A flowchart is a diagram that depicts a process, system or computer algorithm.
- They are widely used in multiple fields to document, study, plan, improve and communicate often complex processes in clear, easy-to-understand diagrams.
- Flowcharts use rectangles, ovals, diamonds and potentially numerous other shapes to define the type of step, along with connecting arrows to define flow and sequence

When it is used

- To develop understanding of how a process is done.
- To study a process for improvement.
- To communicate to others how a process is done.
- When better communication is needed between people involved with the same process.
- To document a process.

Common Flowchart Symbols

- **Terminator:** An oval flow chart shape indicating the start or end of the process.
- **Process:** A rectangular flow chart shape indicating a normal process flow step.
- **Decision:** A diamond flow chart shape indication a branch in the process flow.
- **Connector:** A small, labeled, circular flow chart shape used to indicate a jump in the process flow. (Shown as the circle with the letter “A”, below.)
- **Data:** A parallelogram that indicates data input or output (I/O) for a process.
- **Document:** Used to indicate a document or report



S.No	Flowchart	Data Flow Diagram (DFD)
1	Flow chart presents steps to complete a process	Data flow diagram presents the flow of data
2	Flow chart does not have any input from or output to external source	Data flow diagram describes the path of data from external source to internal store or vice versa.
3	The timing and sequence of the process is aptly shown by a flow chart	The processing of data is taking place in a particular order or several processes are taking simultaneously is not described by a data flow diagram.
4	Flow chart shows how to make a system function.	Data flow diagrams define the functionality of a system
5	Flow charts are used in designing a process	Data flow diagram are used to describe the path of data that will complete that process.
6	<p>We have following types of flowcharts,</p> <ul style="list-style-type: none"> • System flow chart • Data flow chart • Document flow chart • Program flow chart 	<p>We have following types of data flow diagrams,</p> <ul style="list-style-type: none"> • Physical data flow diagrams • Logical data flow diagrams