Block Diagrams & Flowcharts

Block Diagrams

- Block diagrams are graphical representations of a system or process that use blocks, arrows, and other symbols to represent the components and connections between them. Here are some basic steps to design a block diagram:

- By following these basic steps, you can design an effective and accurate block diagram to represent any system or process.
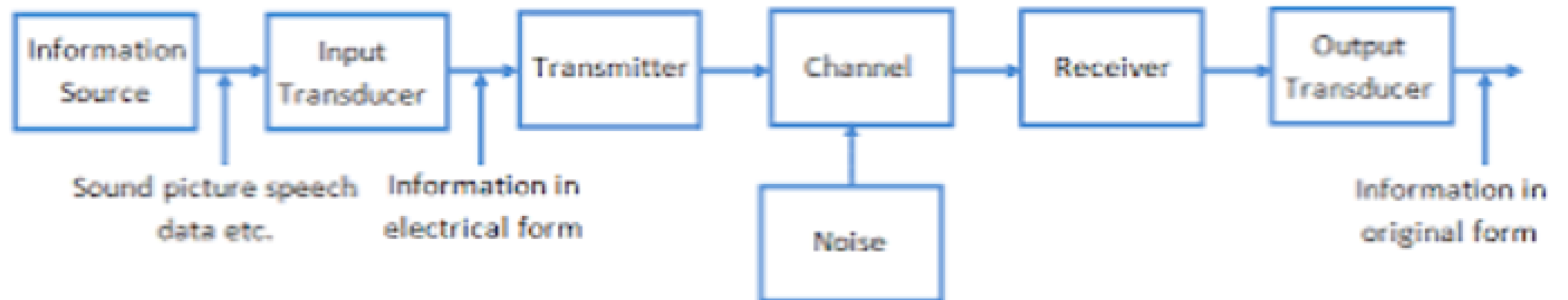
Block Diagrams Cont..

- Identify the system or process: The first step is to clearly define the system or process that you want to represent with the block diagram. Identify the inputs, outputs, and the components of the system.

- Determine the level of detail: Decide on the level of detail that you want to include in the block diagram. This will depend on the purpose of the diagram and the audience who will be using it.

- Select the symbols: Choose the symbols that best represent the components of the system. This may include rectangles, circles, triangles, or other shapes. Use arrows or lines to show the connections between the components.

Block Diagrams Cont..

- Arrange the components: Place the components in the block diagram in a logical order, starting with the inputs and ending with the outputs. Group related components together and use a consistent layout throughout the diagram.

- Label the components: Use text labels to identify each component and its function in the system. Add additional labels or annotations as needed to provide additional information or clarify the diagram.

- Review and refine: Once the block diagram is complete, review it for accuracy and clarity. Refine the diagram as needed to improve its readability and ensure that it accurately represents the system or process
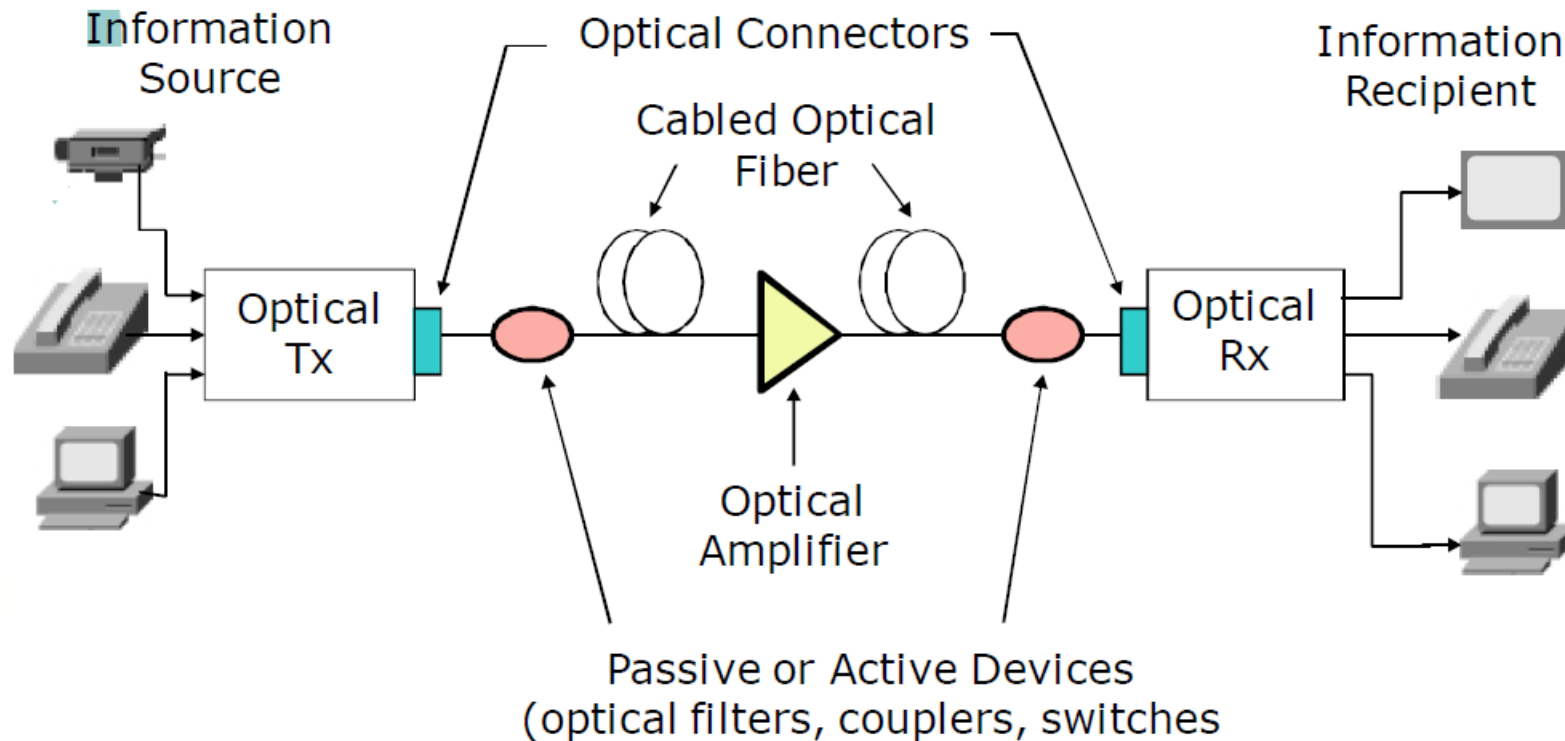
Block Diagrams Cont..

- Share and collaborate: Share the block diagram with others who need to understand the system or process. Collaborate with others to identify any issues or improvements to the diagram.

- Example 1: Communication System

Block Diagrams Cont..

- Example 2: Optical Fiber Link

Flowchart

- A flowchart is a diagram that illustrates the steps, sequences, and decisions of a process or workflow. While there are many different types of flowcharts, a basic flowchart is the simplest form of a **process map**. It's a powerful tool that can be used in multiple fields for planning, visualizing, documenting, and improving processes.

Purpose of Flow Charts

- Visually show flow of data/process steps within a system
- Flow Charts Will
  - Define the problem
  - Show sequence of steps to solve problem
  - Show alternatives if problem is not solved during the process

- Usually created at beginning stages of a project
- Used to facilitate communications between engineers and clients/stakeholders
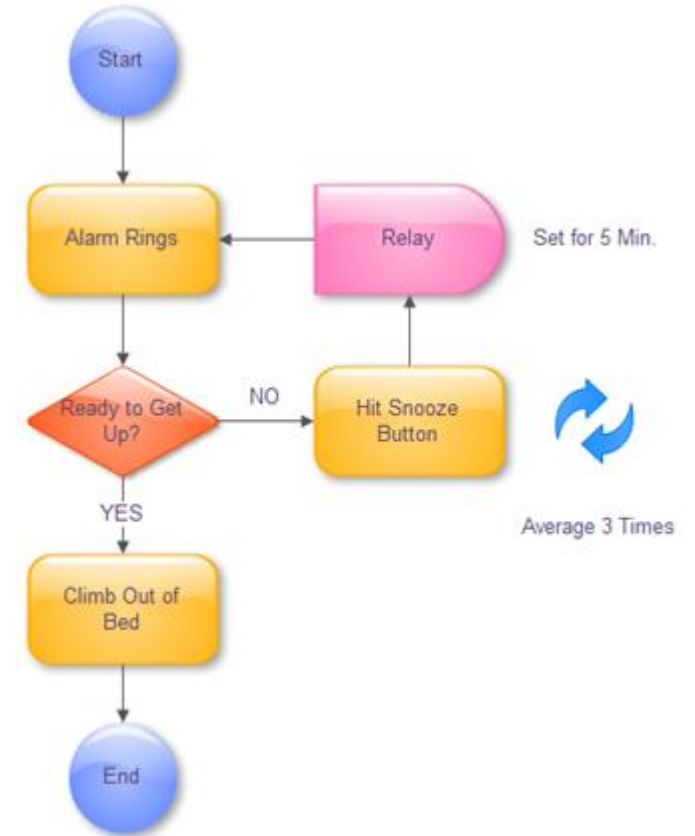
Flowchart..

- Flowcharts are visual representations of a process or algorithm. They use a set of standardized symbols to depict the steps involved in a process or the logical flow of an algorithm. Here are some basic steps to design a flowchart:

- By following these basic steps, you can design an effective and accurate flowchart to represent any process or algorithm.

Flowcharting Steps..

- Define the problem: Before designing a flowchart, it's important to understand the problem or process you're trying to represent. Define the inputs, outputs, and the logical steps involved in the process.

- Identify the symbols: Flowcharts use different symbols to represent different types of actions, decisions, or processes. Identify the appropriate symbols for your flowchart, such as start/end, process, decision, input/output, and connector symbols.

- Draw the flowchart: Start by placing the start/end symbol at the top of the page, followed by the process symbols representing the steps in the process. Use decision symbols to represent choices or branching points in the process. Connect the symbols using arrows to show the logical flow of the process.

Flowcharting Steps..

- Test the flowchart: Once the flowchart is designed, review it to make sure it accurately represents the process or algorithm. Test it by following the steps in the flowchart and ensure that the output matches the expected result.

- Refine and improve the flowchart: Based on the testing, refine the flowchart to improve its accuracy, clarity, and readability. Use colors, labels, and annotations to make it easier to read and understand.

- Share and collaborate: Once the flowchart is finalized, share it with others who need to understand the process or algorithm. Collaborate with others to identify any issues or improvements to the flowchart.

How to create a flowchart

- By following these summarized basic steps, you can design an effective and accurate flowchart to represent any process or algorithm.
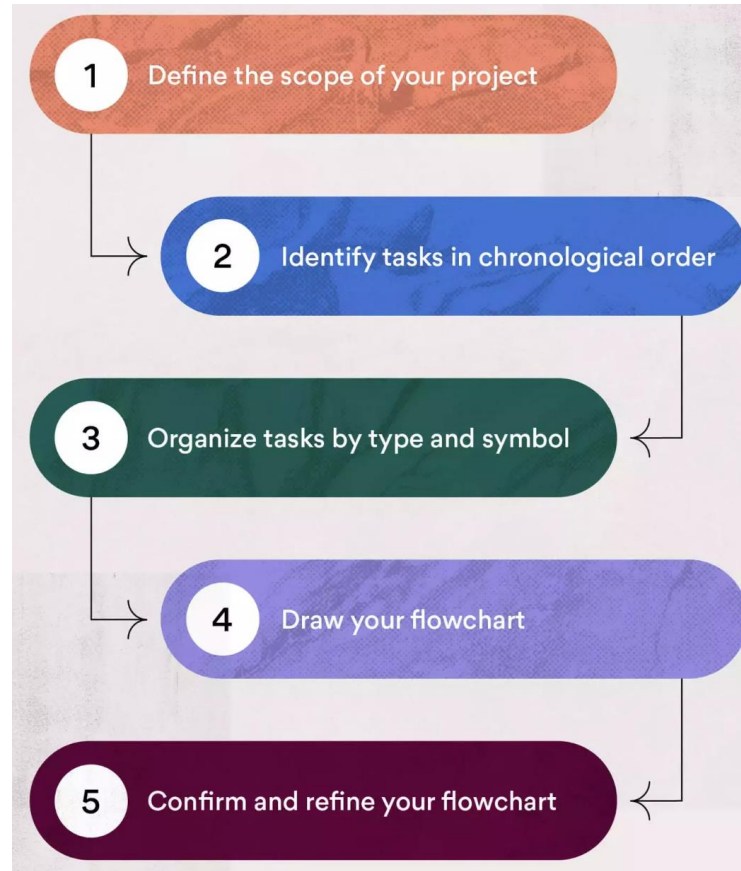
Flowchart Symbols

- Flowcharts use a set of standardized symbols to represent different types of actions, decisions, or processes. Here are some of the most common flowchart symbols:

- **Start/End symbol:** This symbol represents the beginning or end of a process or program. It's usually an oval or rounded rectangle shape.

- **Process symbol:** This symbol represents a step or action in the process. It's usually a rectangle shape.

Flowchart Symbols

- **Decision symbol:** This symbol represents a branching point in the process where a decision needs to be made. It's usually a diamond shape.

- **Input/Output symbol:** This symbol represents data or information that is being input or output from the process. It's usually a parallelogram shape.

Flowchart Symbols

There are a lot of symbols, below are basic/commonly used:

- **Connector symbol:** This symbol is used to connect different parts of the flowchart that are not adjacent to each other. It's usually a circle shape.
- **Arrows:** Arrows are used to show the flow and direction of the process or program. They connect the symbols and show the logical flow of the process.
- **Annotation:** Annotations are used to provide additional information or clarification about a particular symbol or step in the process. They can be added as text within the flowchart or as notes outside the flowchart.
- By using these standardized symbols, flowcharts can effectively communicate complex processes or algorithms in a clear and easy-to-understand way.

Flowchart Symbols Cont..

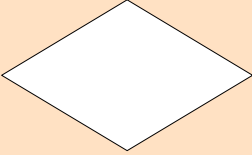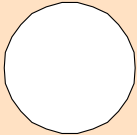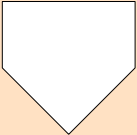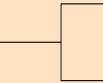|	
	Terminal: Used to indicates the start and end of a flowchart. Single flow line. Only one "Start" and "Stop" terminal for each program. The end terminal for function/subroutine must use "Return" instead of "Stop".
	Process: Used whenever data is being manipulated. One flow line enters and one flow line exits.
	Input/Output: Used whenever data is entered (input) or displayed (output). One flow line enters and one flow line exits.
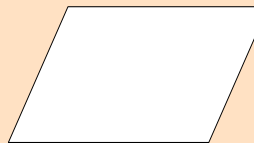
Flowchart Symbols Cont..

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◇	**Decision: Used to represent operations in which there are two possible selections. One flow line enters and two flow lines (labeled as "Yes" and "No") exit.**
▭	**Function / Subroutine: Used to identify an operation in a separate flowchart segment (module). One flow line enters and one flow line exits.**
○	**On-page Connector: Used to connect remote flowchart portion on the same page. One flow line enters and one flow line exits.**
⬠	**Off-page Connector: Used to connect remote flowchart portion on different pages. One flow line enters and one flow line exits.**
⊐	**Comment: Used to add descriptions or clarification.**
↓	**Flow line: Used to indicate the direction of flow of control.**

Connectors on the same page
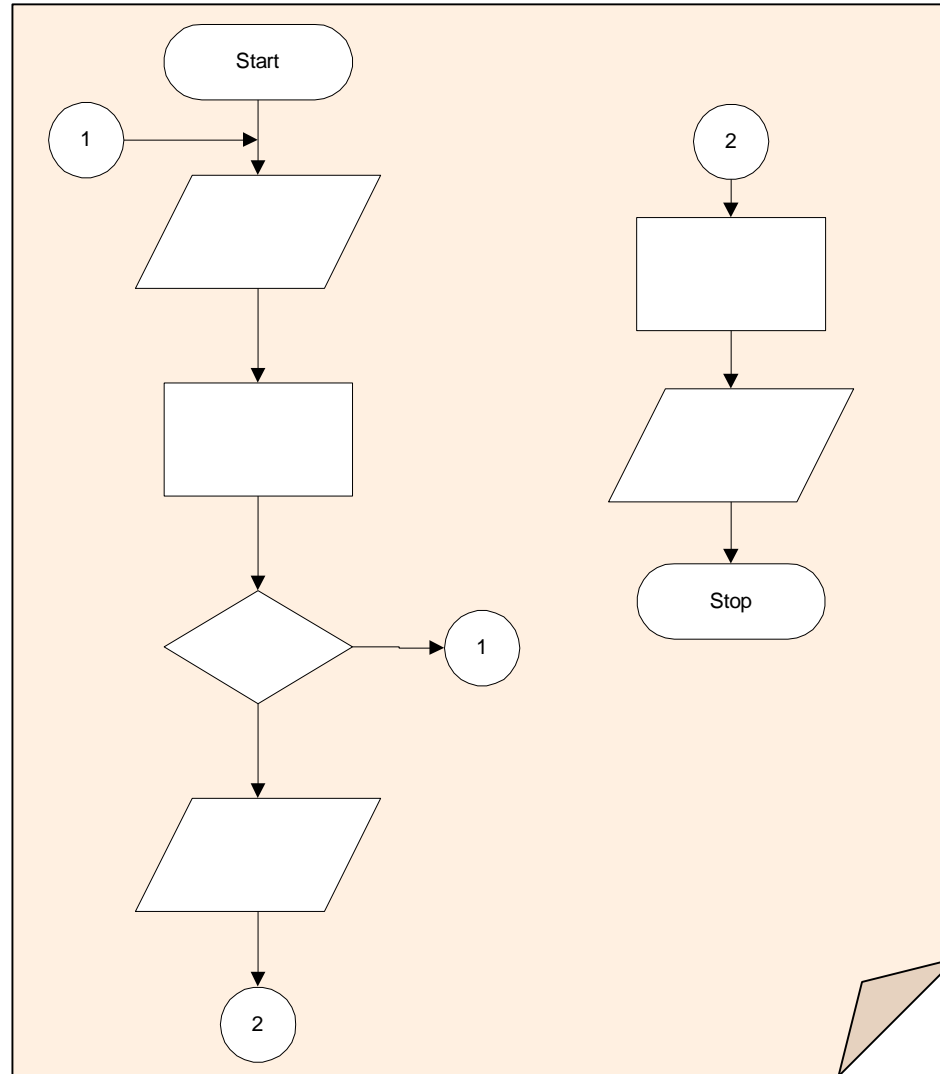
1- connection on the same flowchart portion

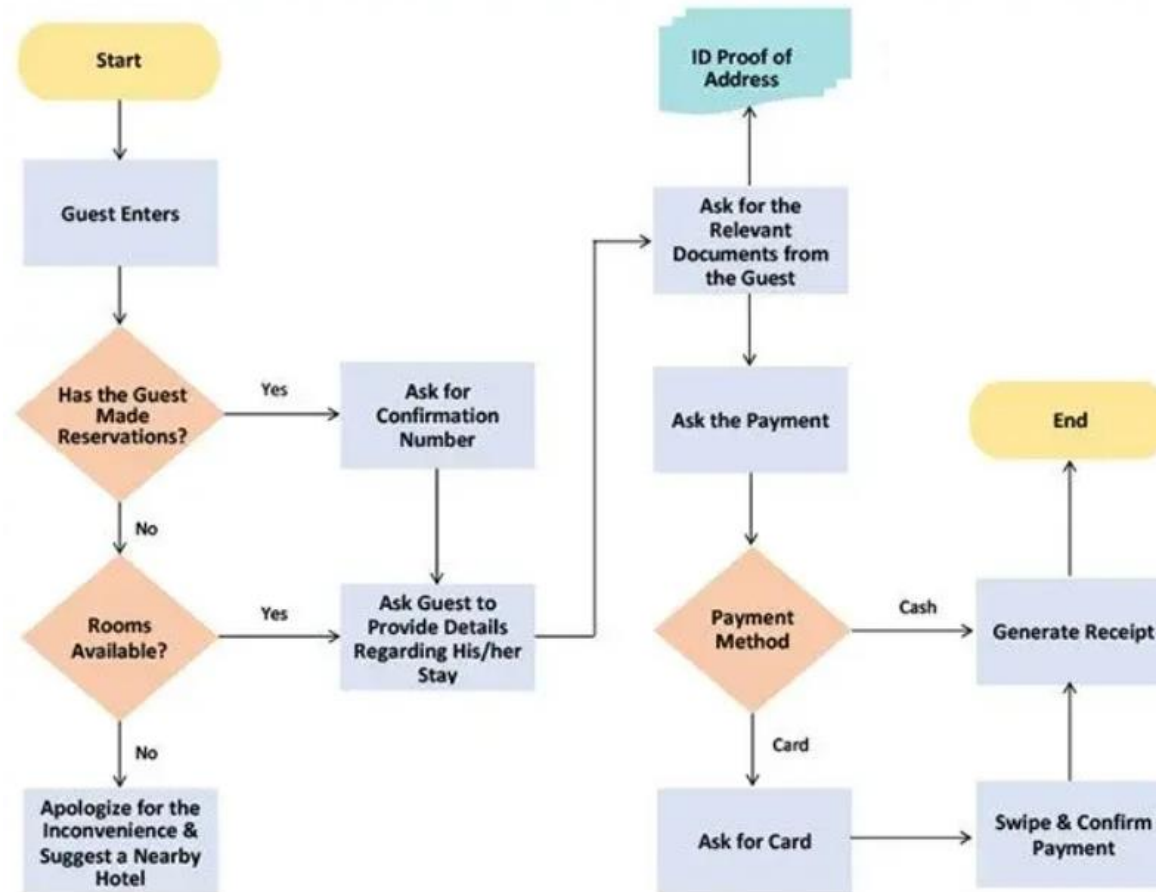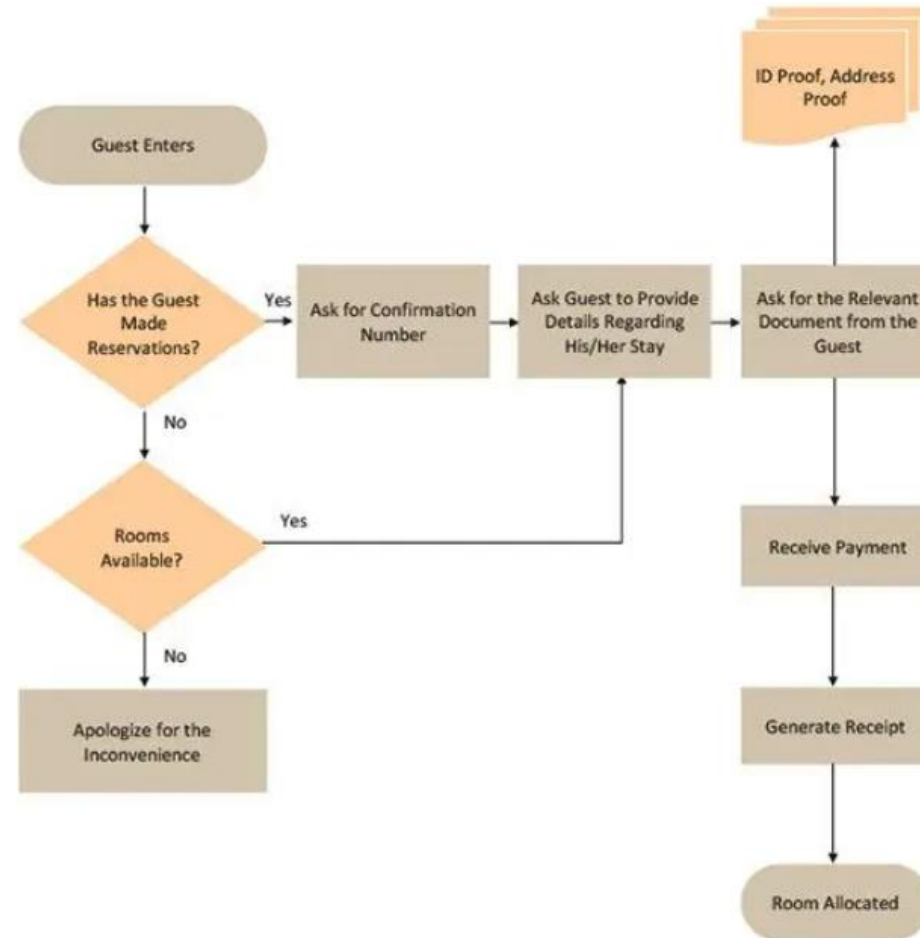**2- connection on the different flowchart portion**

Connectors on different page

Page 1

Start

1

Yes → 1

No

2

Page 2

2

Stop
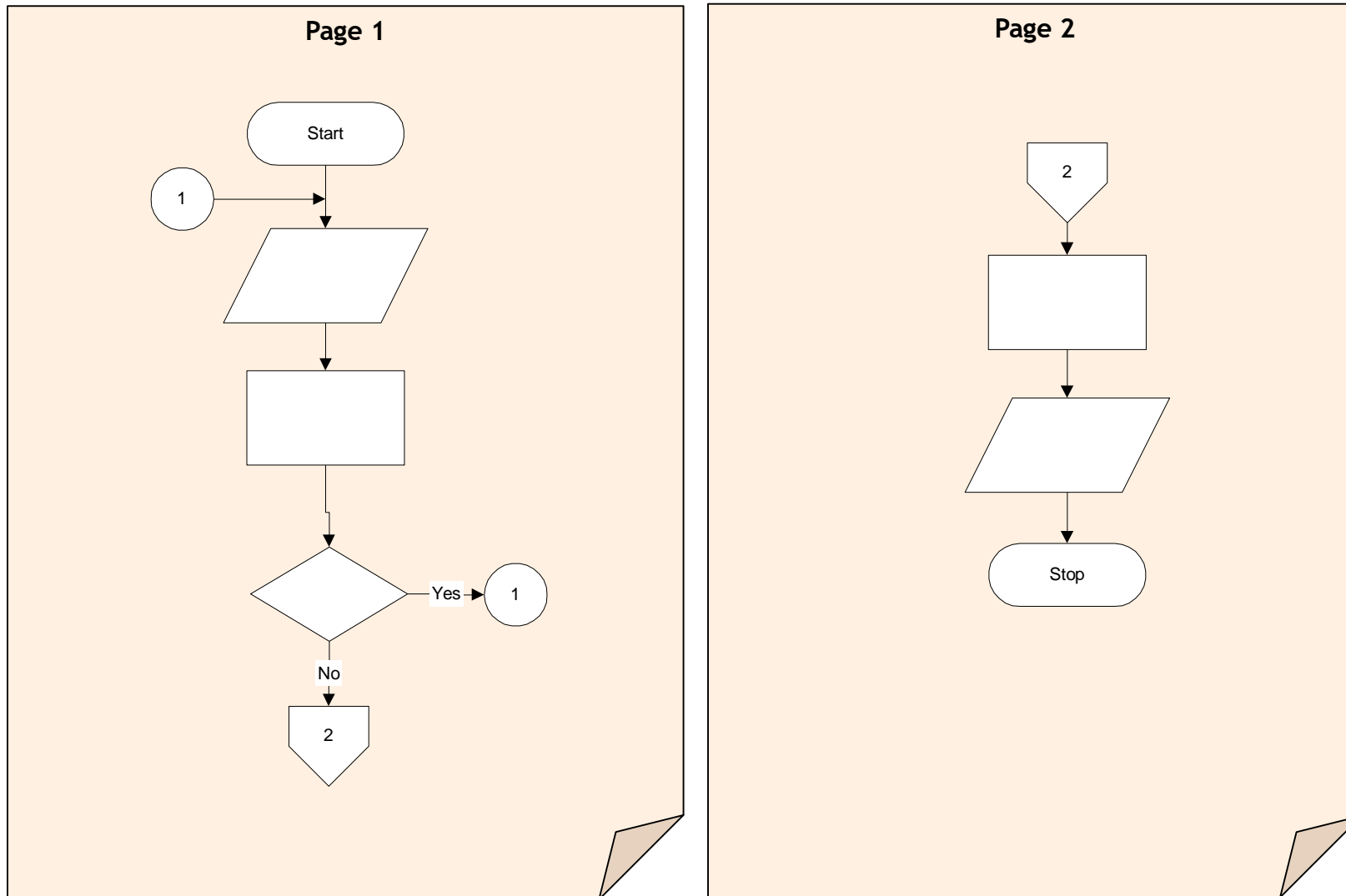
Example 1: Area/Perimeter
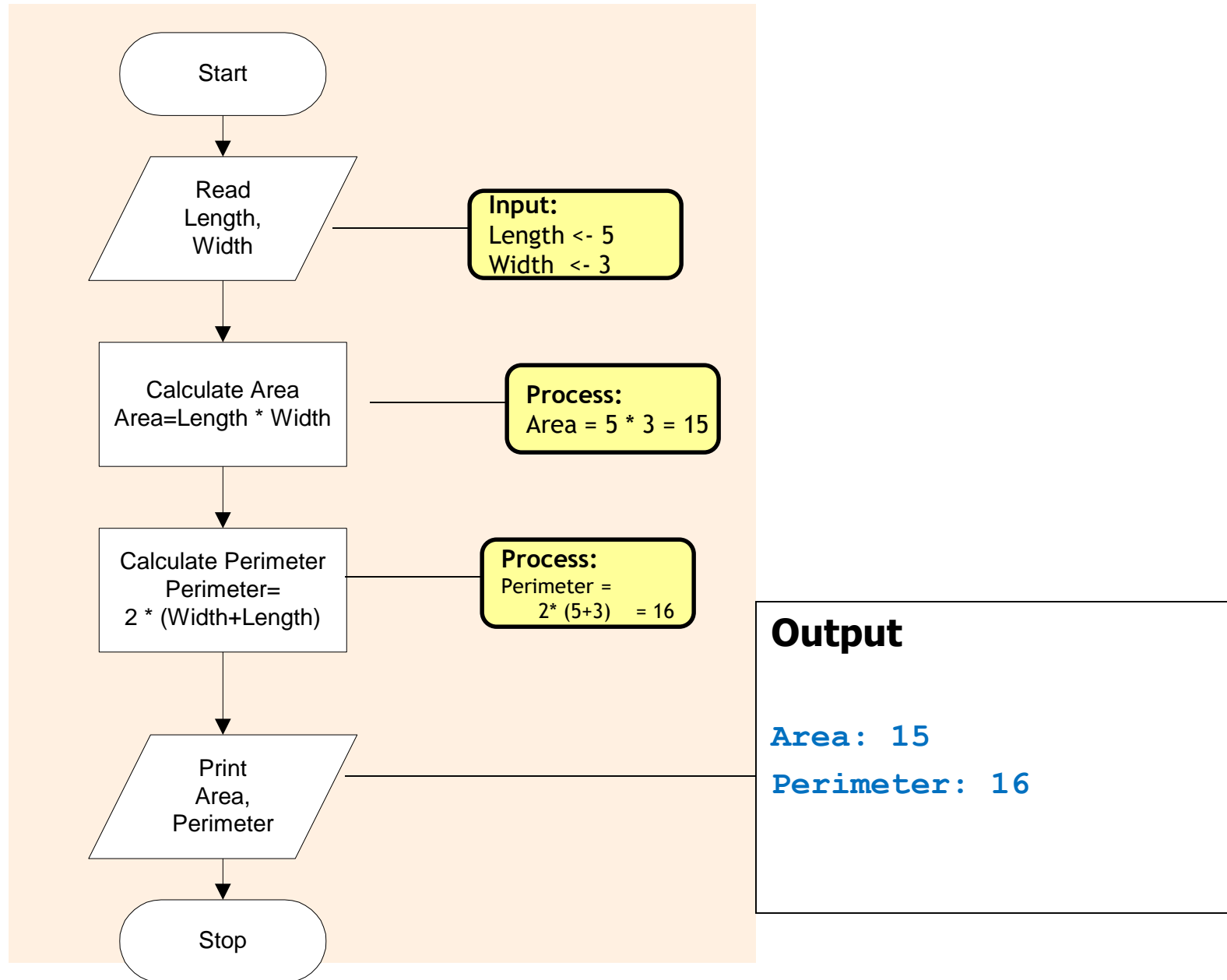
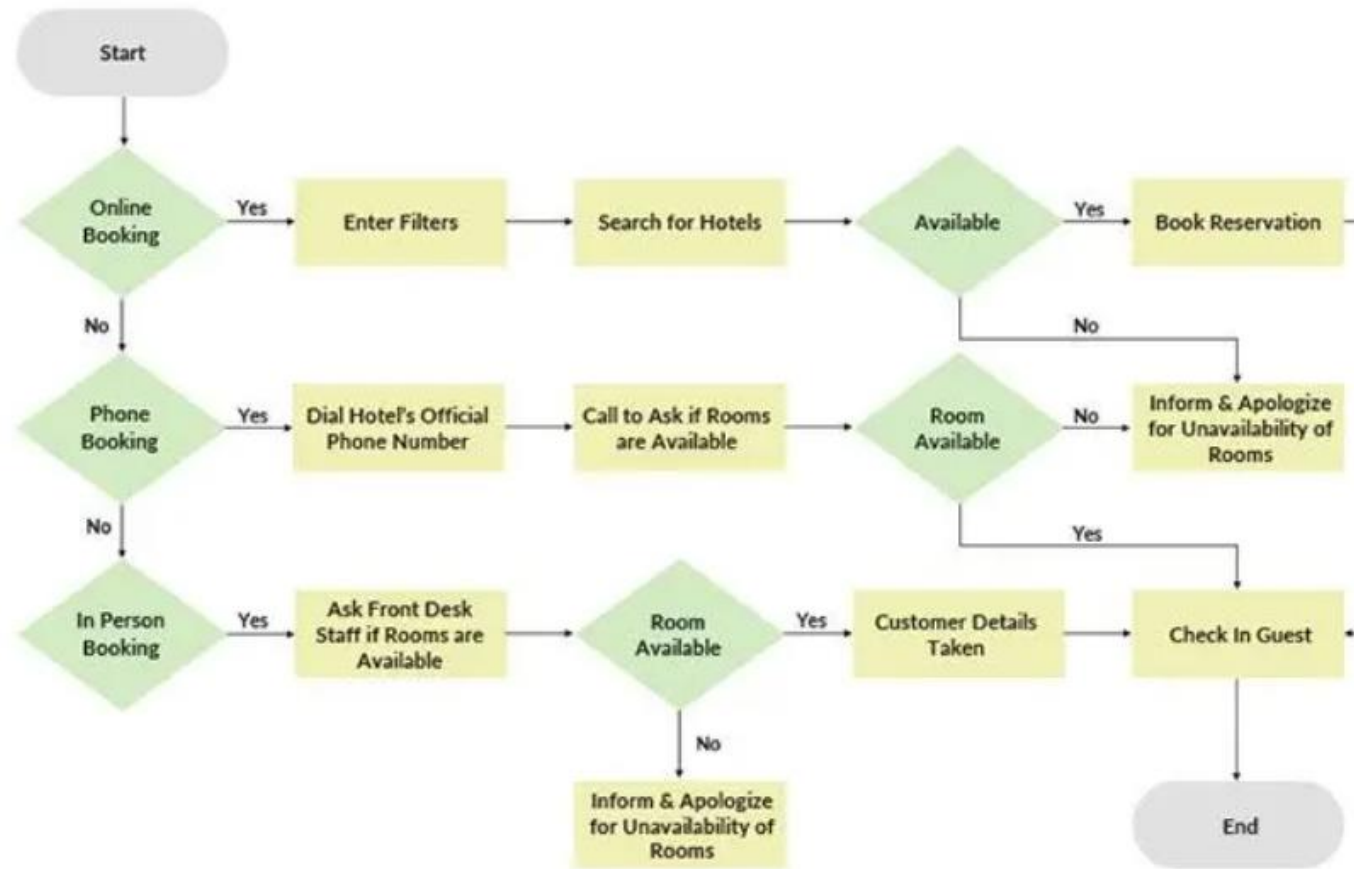# Example 2: Hotel Booking Flowchart

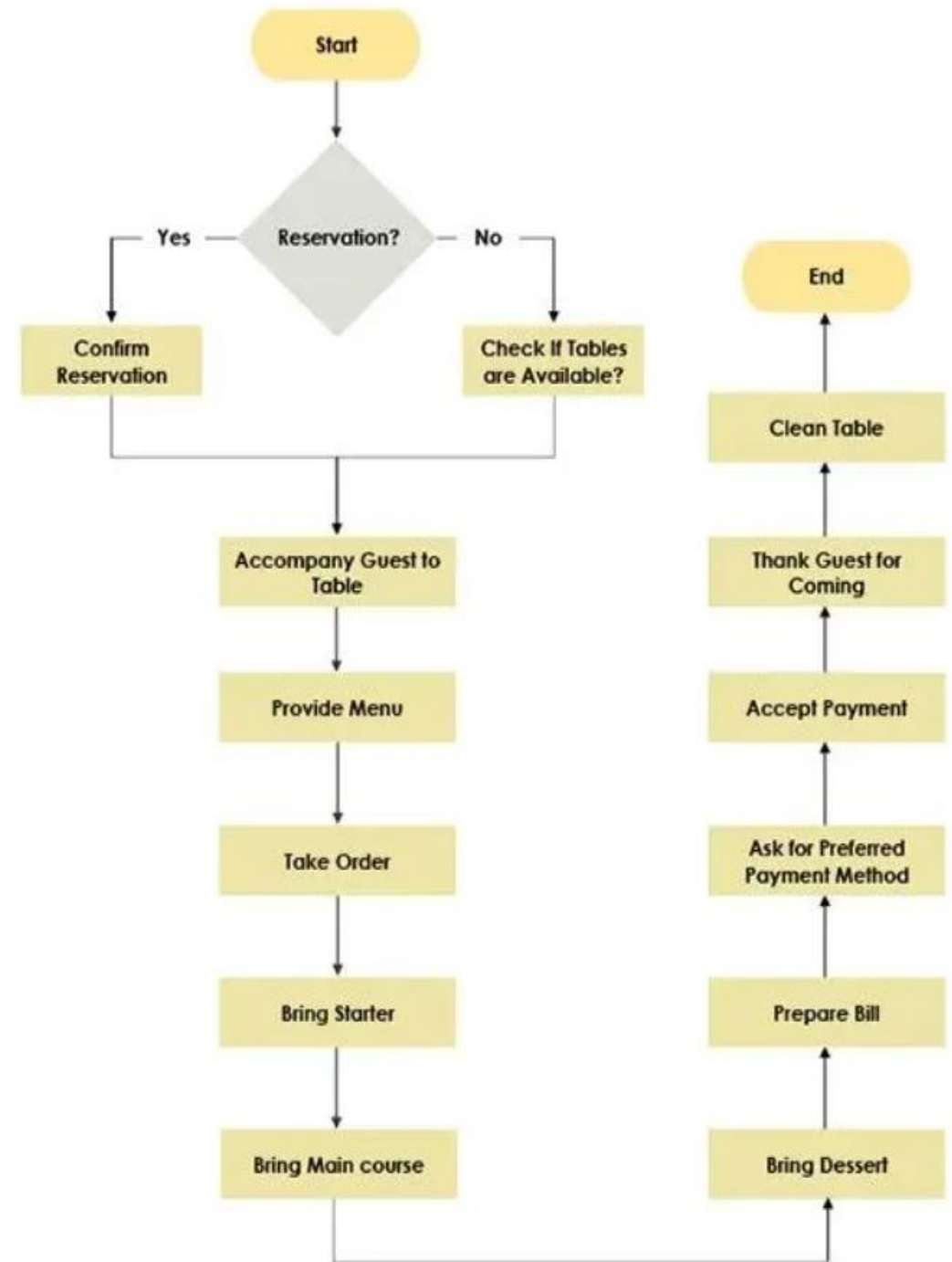# Example 3: Hotel Booking Flowchart

Note the differences btn Ex 2 & 3: How terminal symbols have been used & payment method

Hotel Check-in Flowchart

Example: Restaurant Flowchart

- Food Ordering Process/Flow Map

5 Types of Business Flowchart

- According to Mark A. Fryman and his 2002 book Quality and Process Improvement, there are five types of flowcharts from a business perspective:

Decision to make or justify a step

Logic to uncover and prevent issues

System to represent data flow

Product to visualize product creation process

Process to display process outcomes
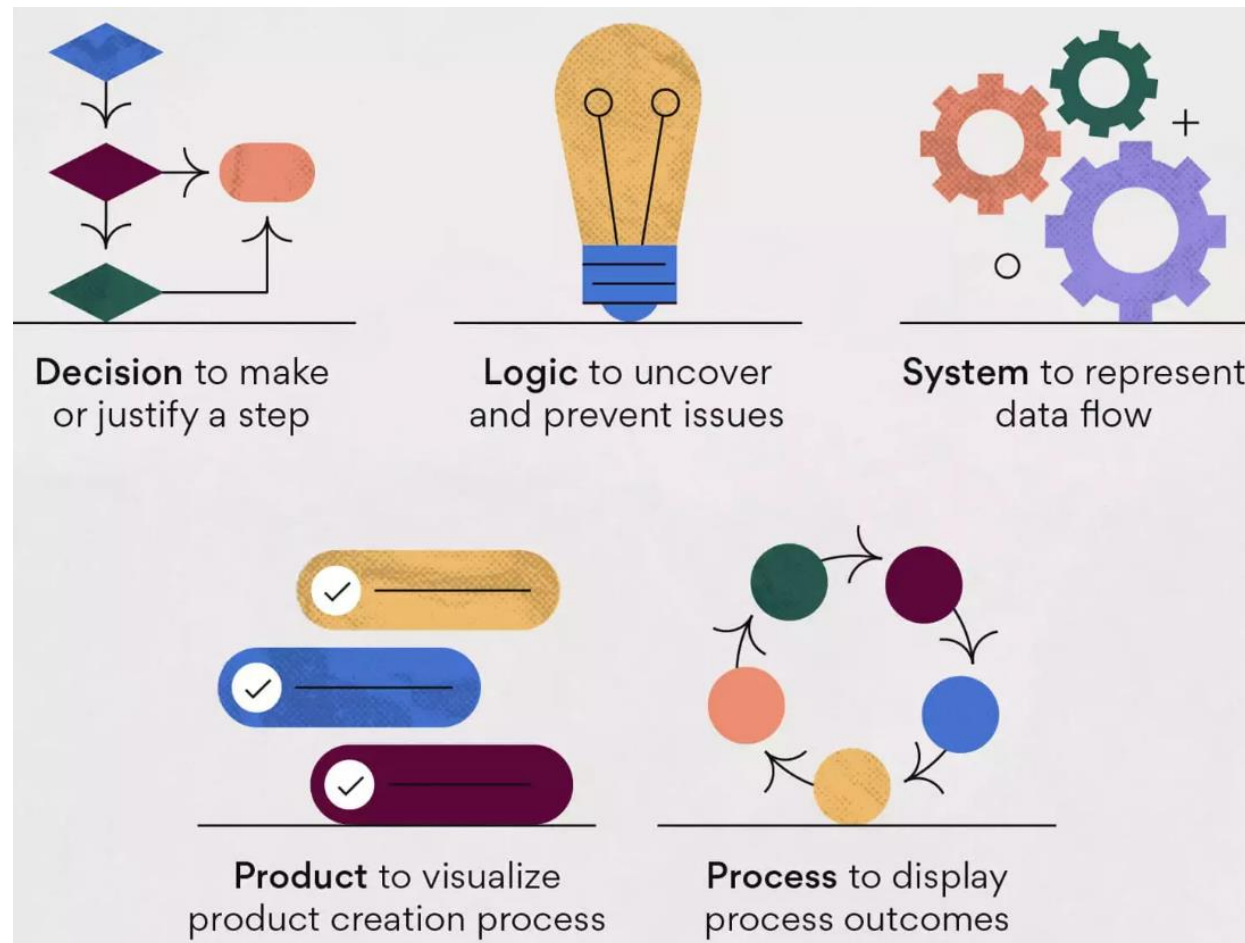
5 Types of Business Flowchart

- A decision flowchart helps to explain steps that are taken to justify a decision. This type of flowchart can be helpful in anticipating the consequences of different decisions.

- A logic flowchart is applied to uncover loopholes, bottlenecks, or constraints in the process which could cause disruptions or issues.

- A system flowchart represents how data flows in a system. They're often used in the accounting world.

- A product flowchart visualizes the product creation process and order of sequences. This type of flowchart can be a helpful piece of documentation when you're launching a new product or improving the production process.

- A process flowchart displays how a process will achieve a certain outcome. You will likely create a process flowchart to improve an existing process or establish a new one. An example for a process flowchart is a swimlane diagram.

Commonly used flowcharts

Some of the most widely used types of flowcharts were coined by Alan B. Sterneckert in his 2003 book Critical Incident Management and include:

- Document flowchart

- Data flowchart

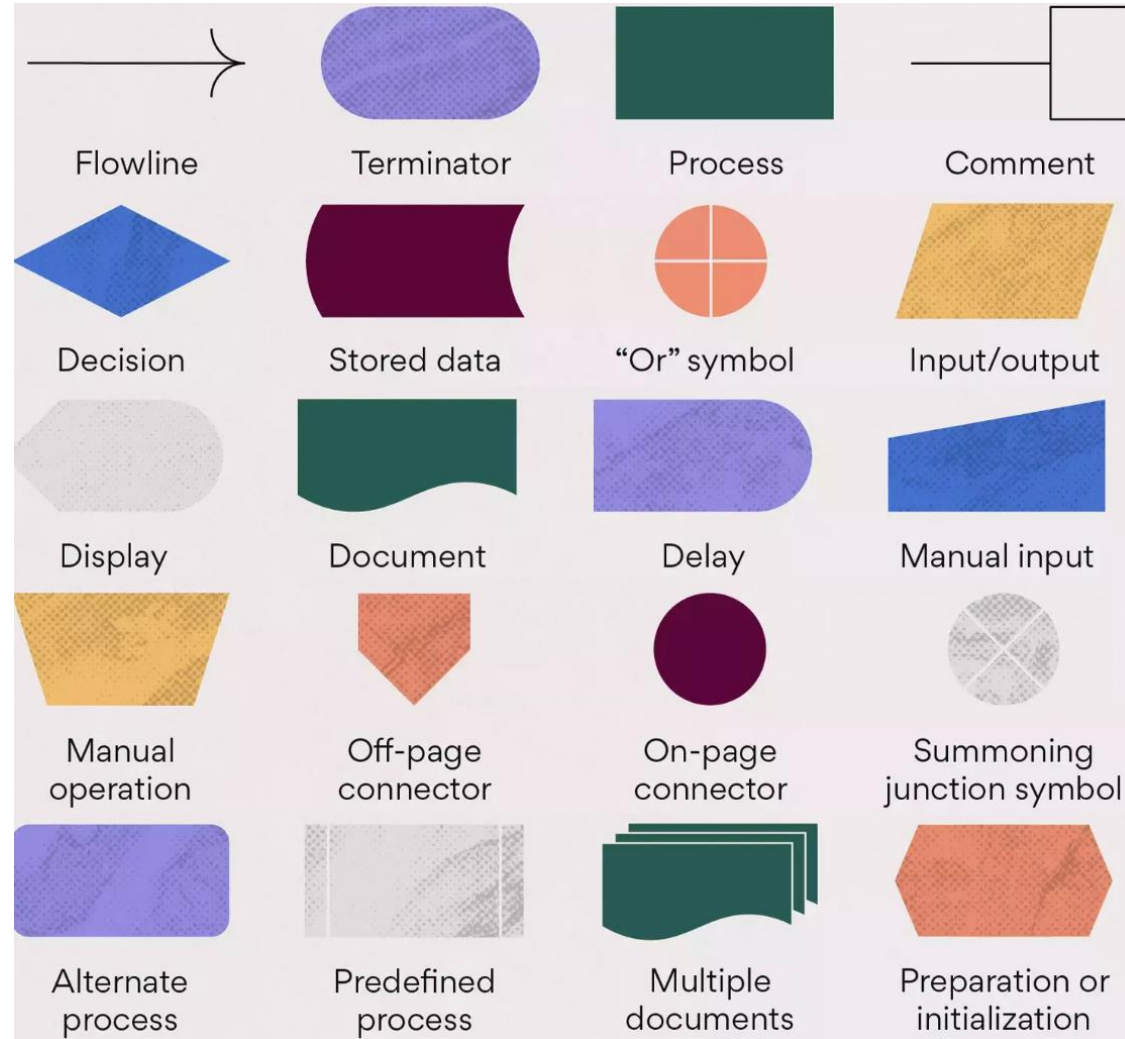- System flowchart

- Program flowchart

Summary-Flowchart

Making an Effective Flowchart

- Define the process boundaries with starting and ending points.
- Complete the big picture before filling in the details.
- Clearly define each step in the process. Be accurate and honest.
- Identify time lags and non-value-adding steps.
- Circulate the flowchart to other people involved in the process to get their comments.
- Flowcharts don't work if they're not accurate or if the team is too far removed from the process itself. Team members should be true participants in the process and feel free to describe what really happens. A thorough flowchart should provide a clear view of how a process works. With a completed flowchart, you can:
- Identify time lags and non-value-adding steps.
- Identify responsibility for each step.
- Brainstorm for problems in the process.
- Determine major and minor inputs into the process with a cause & effect diagram.
- Choose the most likely trouble spots with the consensus builder.

Exercise

- Describe the use of the flowchart symbols that have not been discussed in class:

END