

Introduction to Flowcharting

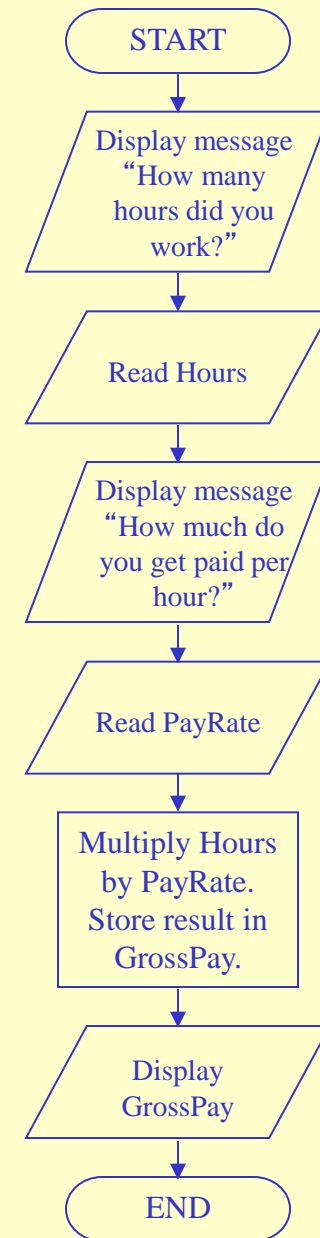
Computer Science Principles

2013-2014

ASFA

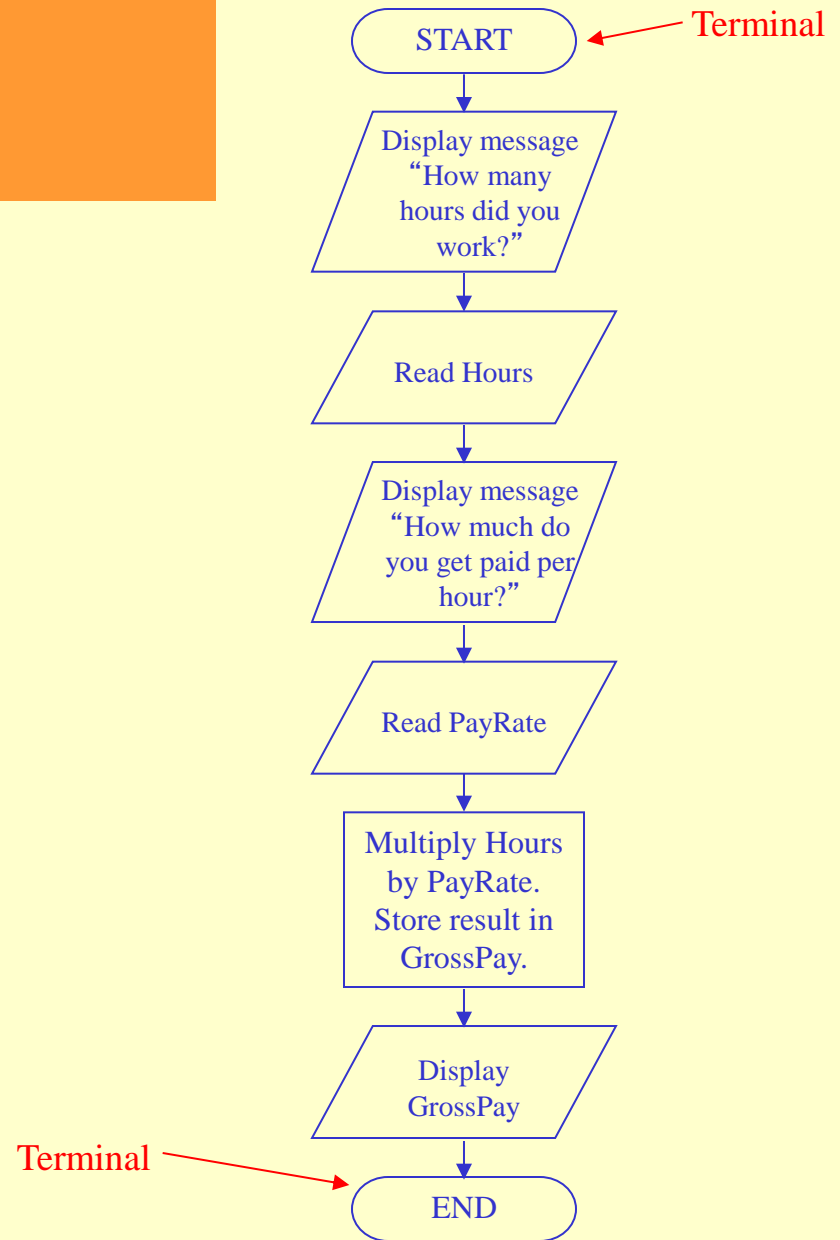
What is a Flowchart?

- A flowchart is a diagram that depicts the “flow” of a program.
- The figure shown here is a flowchart for the pay-calculating program shown in Program 1-1.



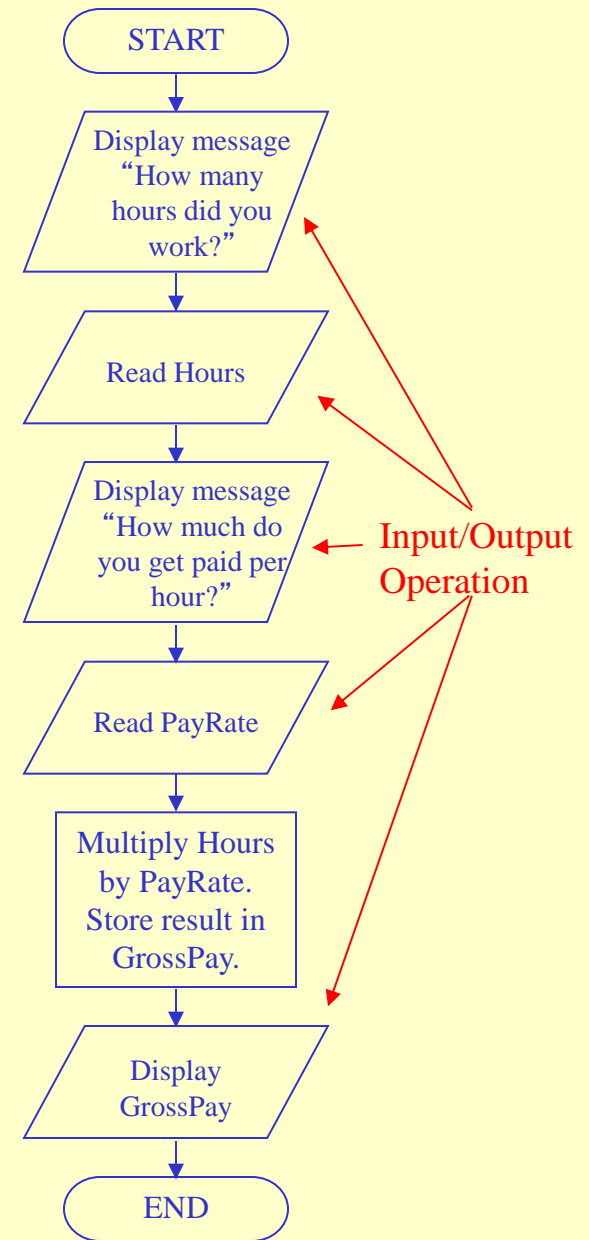
Basic Flowchart Symbols

- Terminals
 - represented by rounded rectangles
 - indicate a starting or ending point



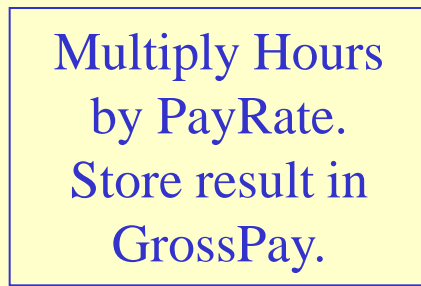
Basic Flowchart Symbols

- Input/Output Operations
 - represented by parallelograms
 - indicate an input or output operation

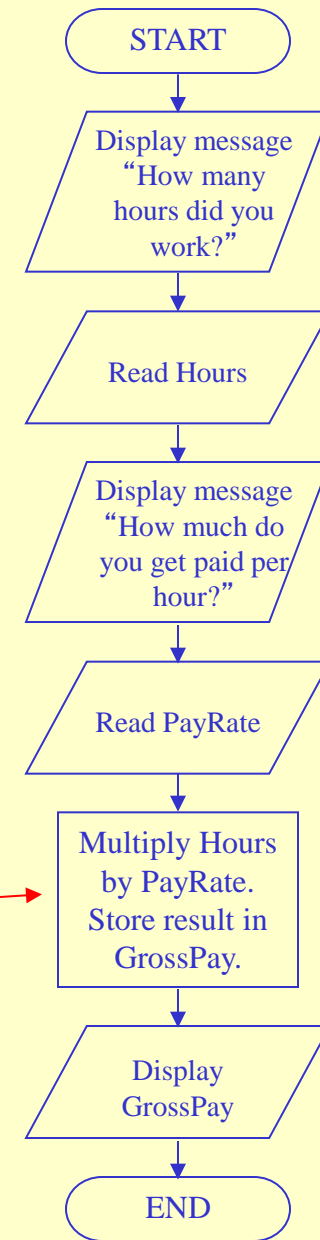


Basic Flowchart Symbols

- Processes
 - represented by rectangles
 - indicates a process such as a mathematical computation or variable assignment



Process

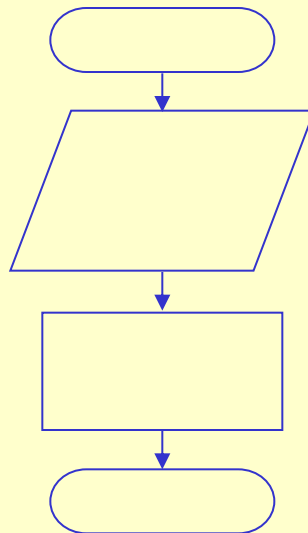


Four Flowchart Structures

- Sequence
- Decision
- Repetition
- Case

Sequence Structure

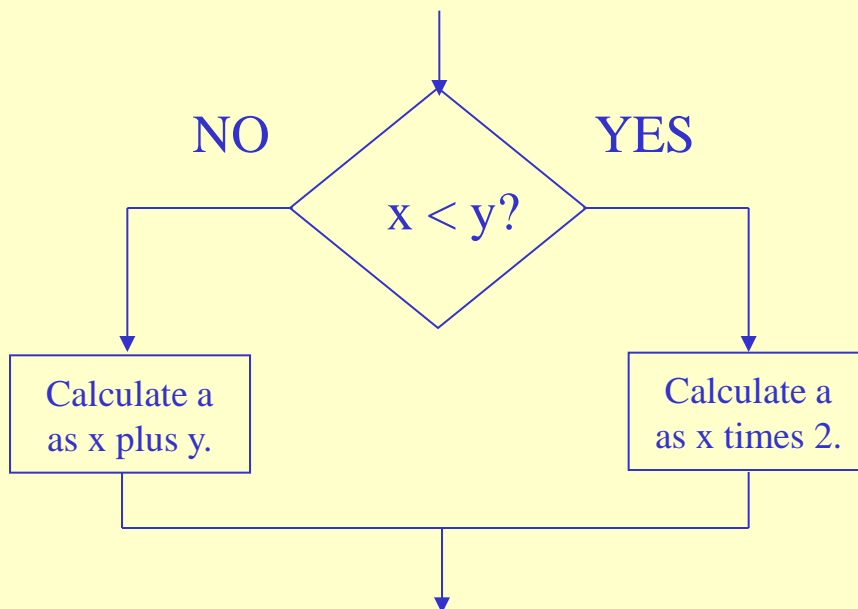
- A series of actions are performed in sequence
- The pay-calculating example was a sequence flowchart.



Decision Structure

- The flowchart segment below shows how a decision structure is expressed in C++ as an if/else statement.

Flowchart



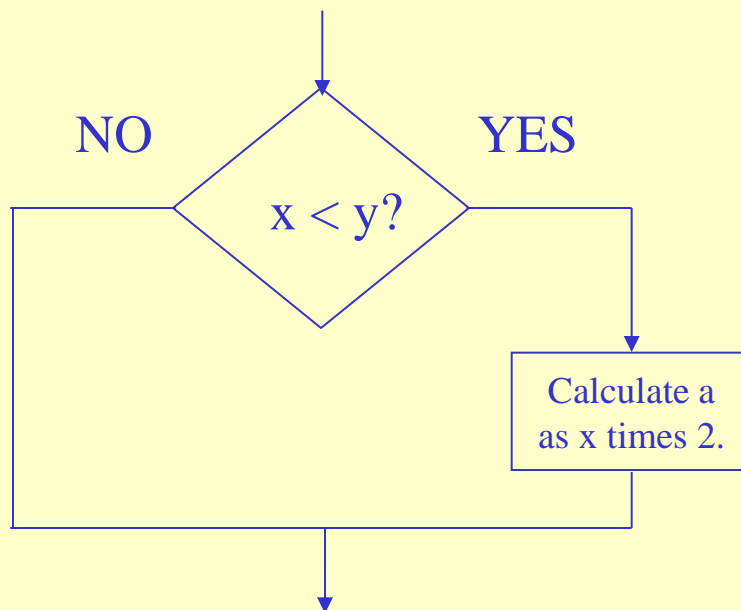
C++ Code

```
if (x < y)
    a = x * 2;
else
    a = x + y;
```


Decision Structure

- The flowchart segment below shows a decision structure with only one action to perform. It is expressed as an if statement in C++ code.

Flowchart



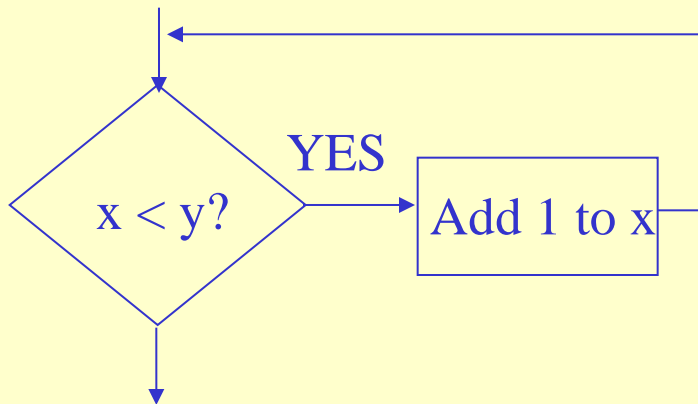
C++ Code

```
if (x < y)
    a = x * 2;
```

Repetition Structure

- The flowchart segment below shows a repetition structure expressed in C++ as a while loop.

Flowchart

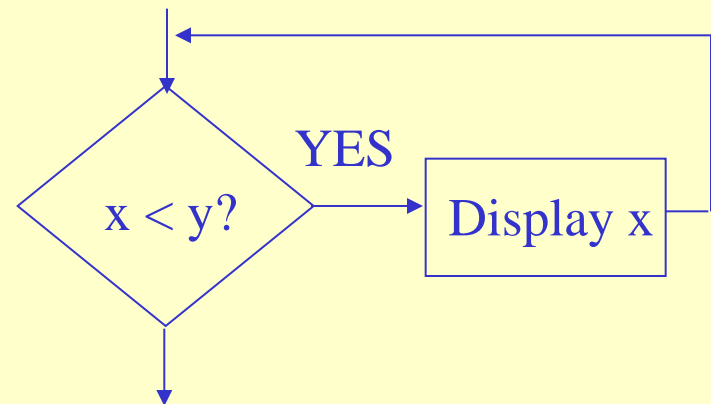


C++ Code

```
while (x < y)
    x++;
```

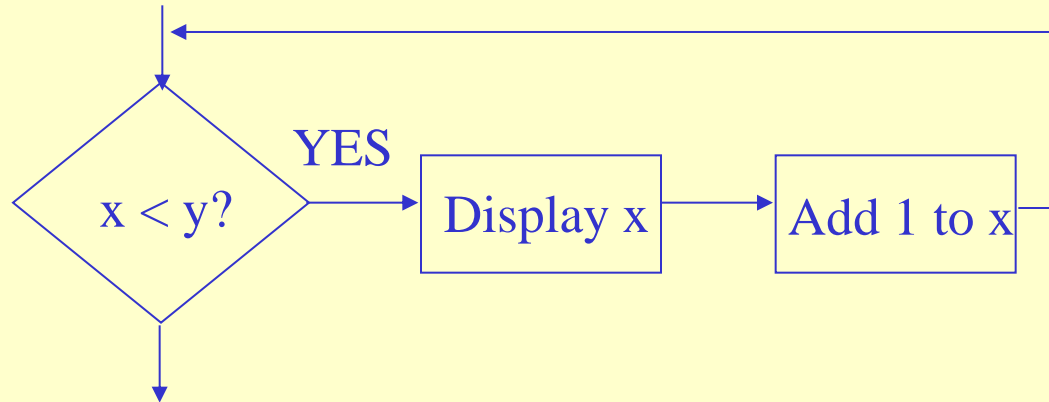
Controlling a Repetition Structure

- The action performed by a repetition structure must eventually cause the loop to terminate. Otherwise, an infinite loop is created.
- In this flowchart segment, x is never changed. Once the loop starts, it will never end.
- QUESTION: How can this flowchart be modified so it is no longer an infinite loop?

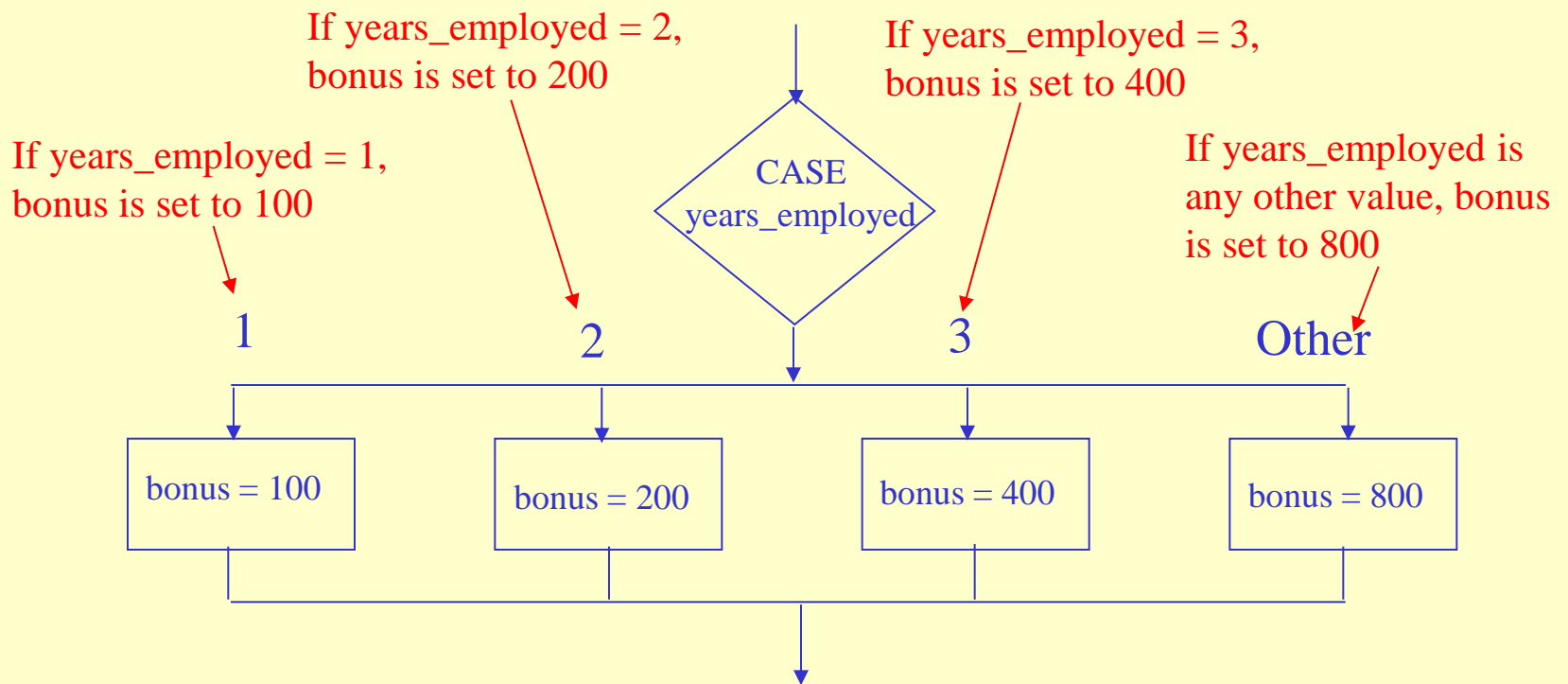


Controlling a Repetition Structure

- ANSWER: By adding an action within the repetition that changes the value of x .

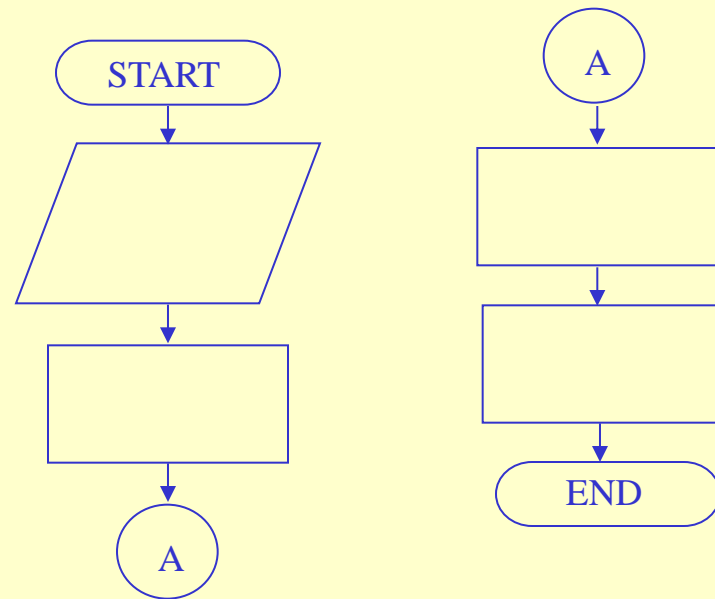


Case Structure



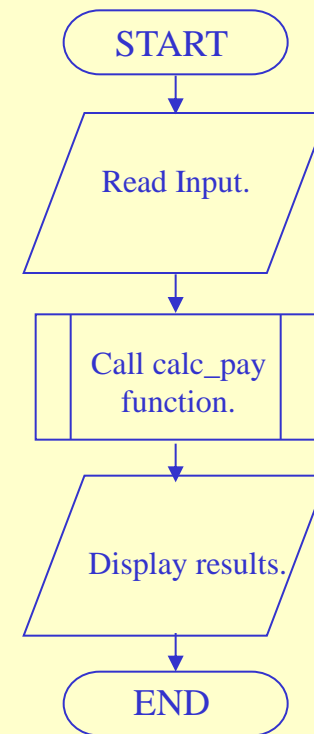
Connectors

- The “A” connector indicates that the second flowchart segment begins where the first segment ends.



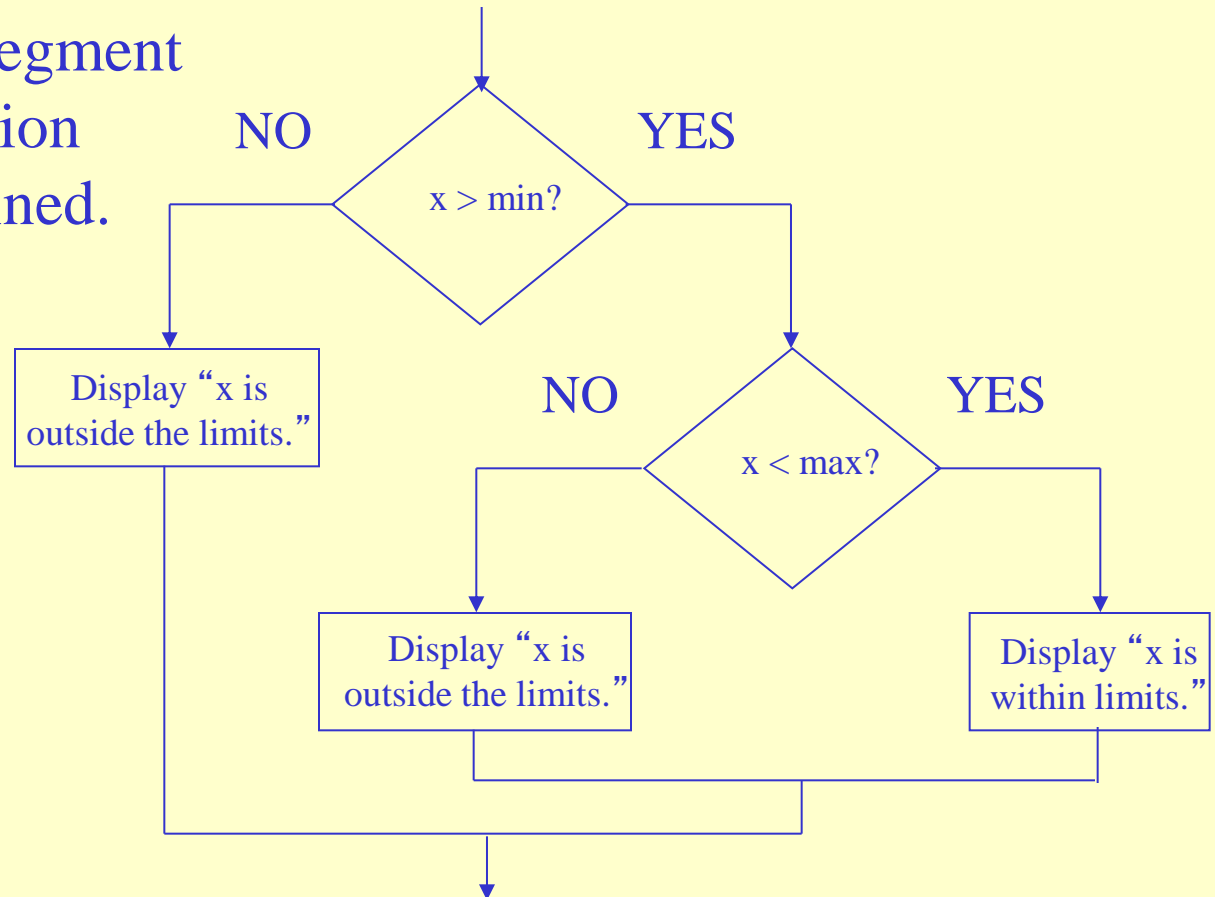
Modules

- The position of the module symbol indicates the point the module is executed.
- A separate flowchart can be constructed for the module.



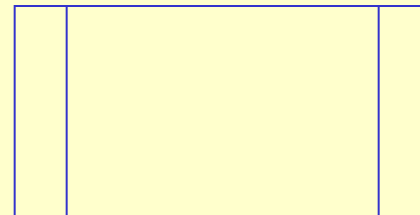
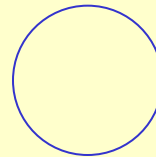
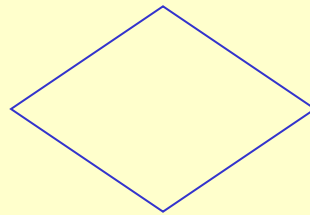
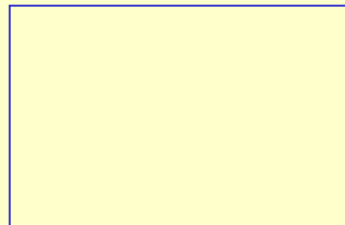
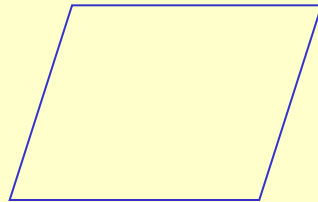
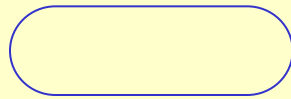
Combining Structures

- This flowchart segment shows two decision structures combined.



Review


- What do each of the following symbols represent?

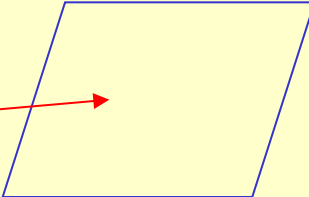


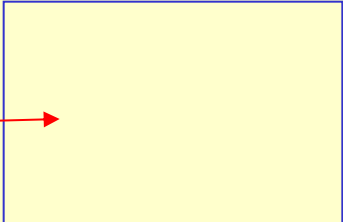
(Answer on next slide)

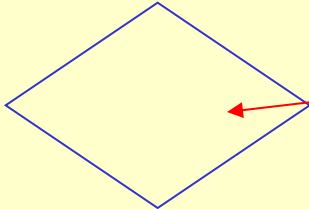
Answer

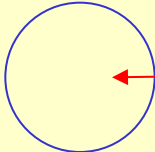
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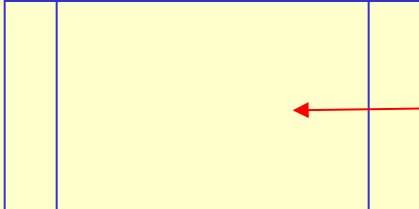
Terminal 

Input/Output Operation 

Process 

 Decision

 Connector

 Module

Review

- Name the four flowchart structures.

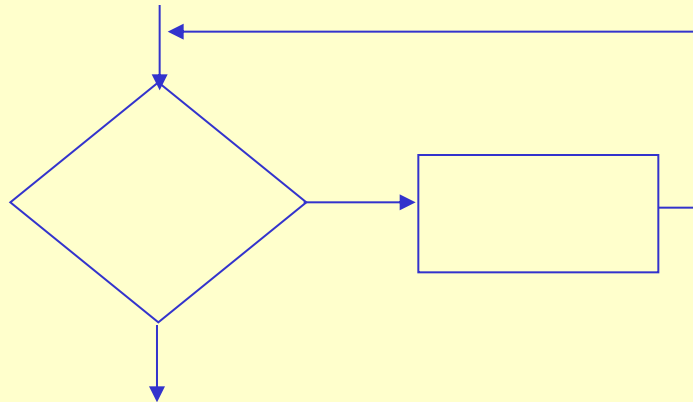
(Answer on next slide)

Answer

- Sequence
- Decision
- Repetition
- Case

Review

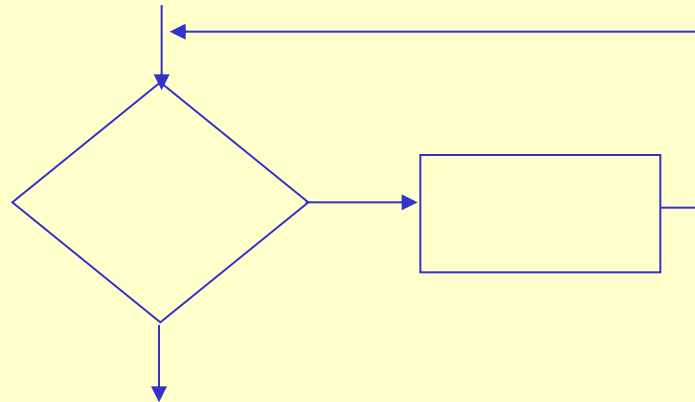
- What type of structure is this?



(Answer on next slide)

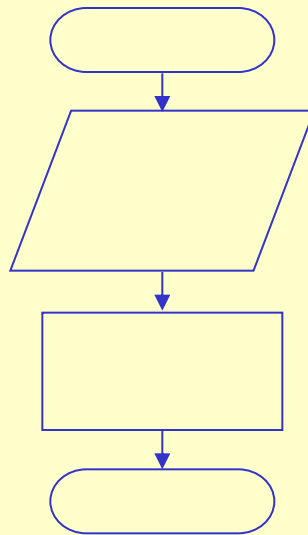
Answer

- Repetition



Review

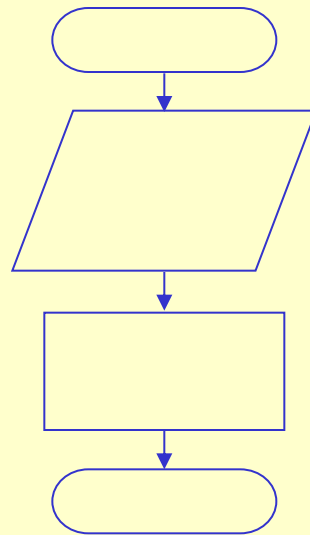
- What type of structure is this?



(Answer on next slide)

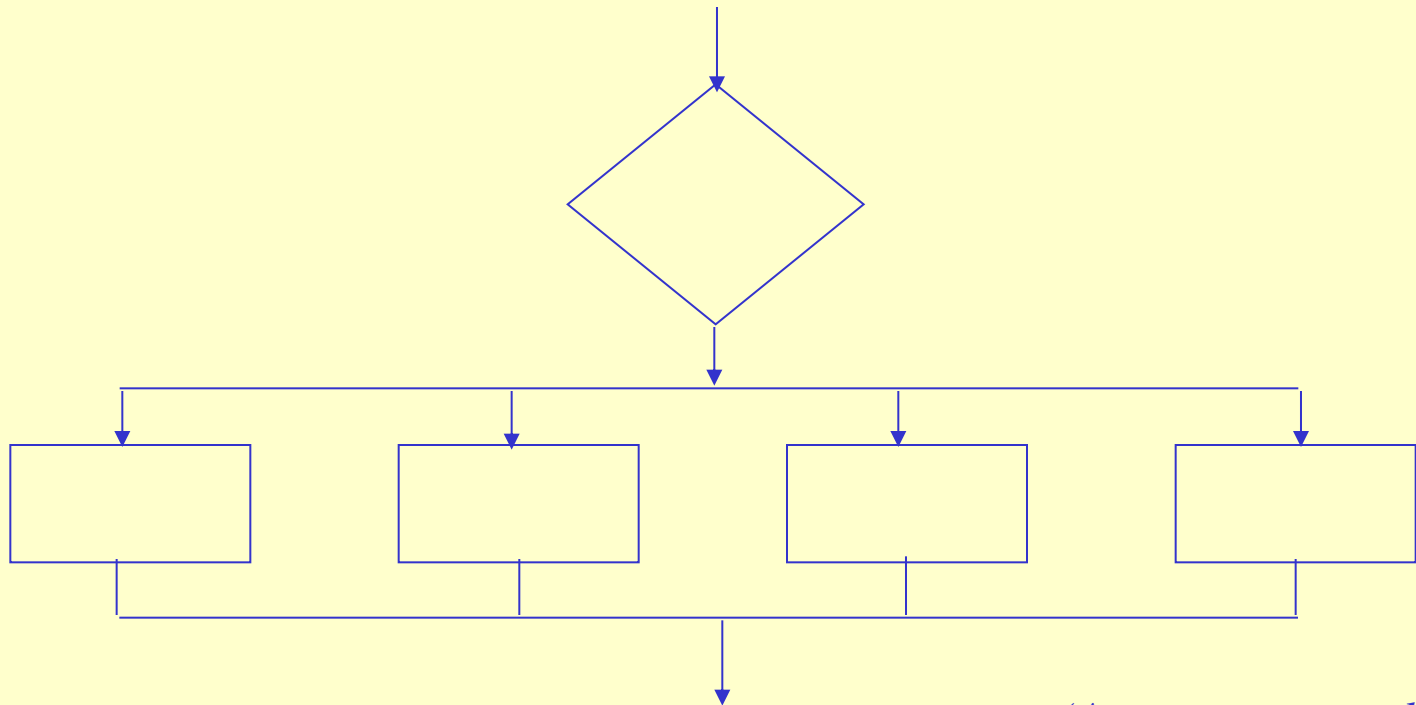
Answer

- Sequence



Review

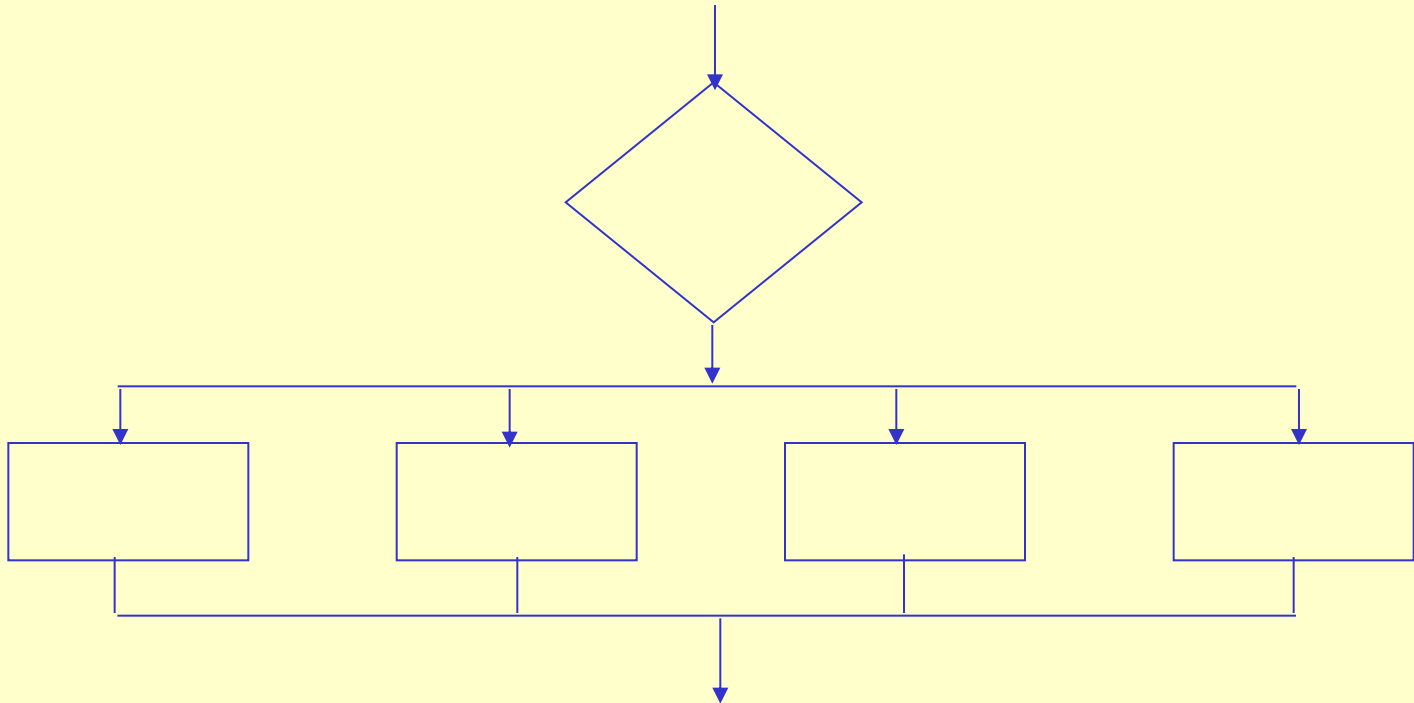
- What type of structure is this?



(Answer on next slide)

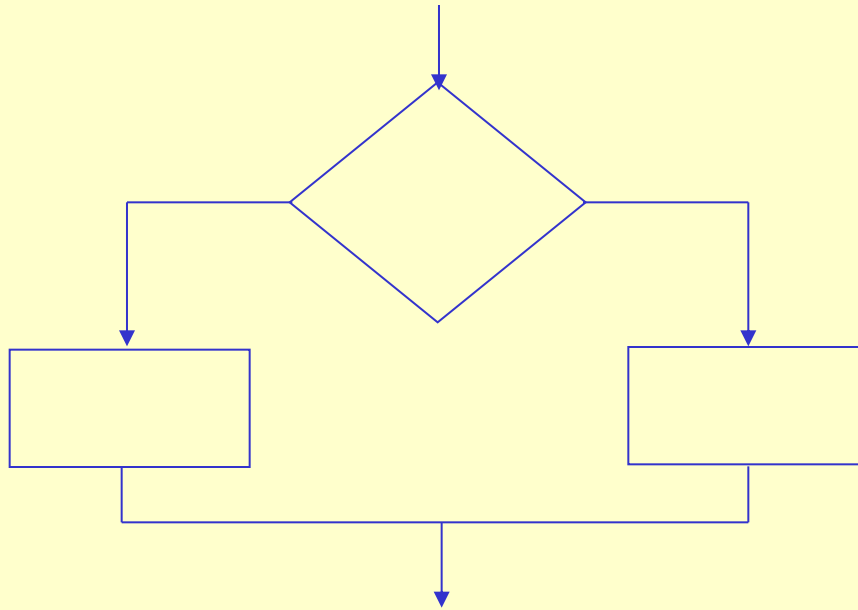
Answer

- Case



Review

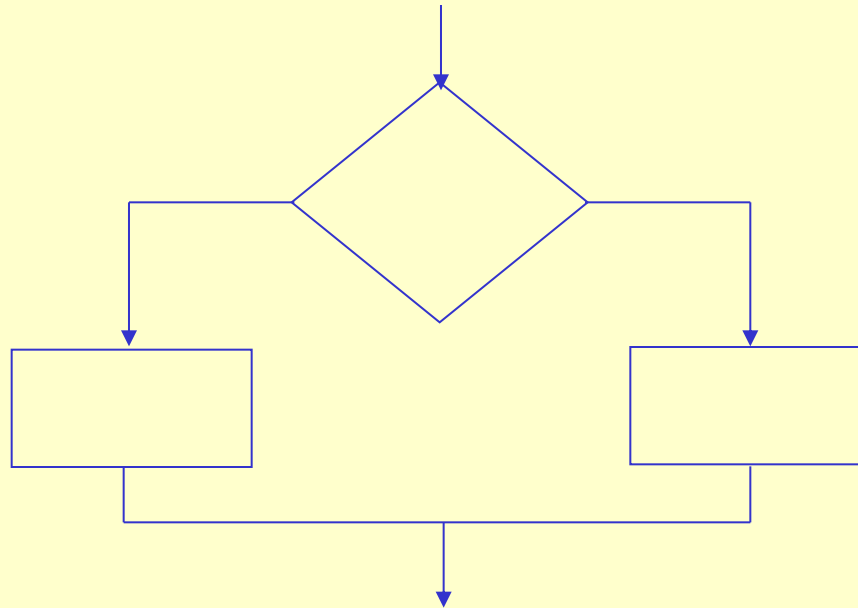
- What type of structure is this?

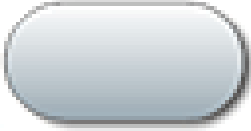

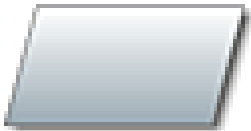




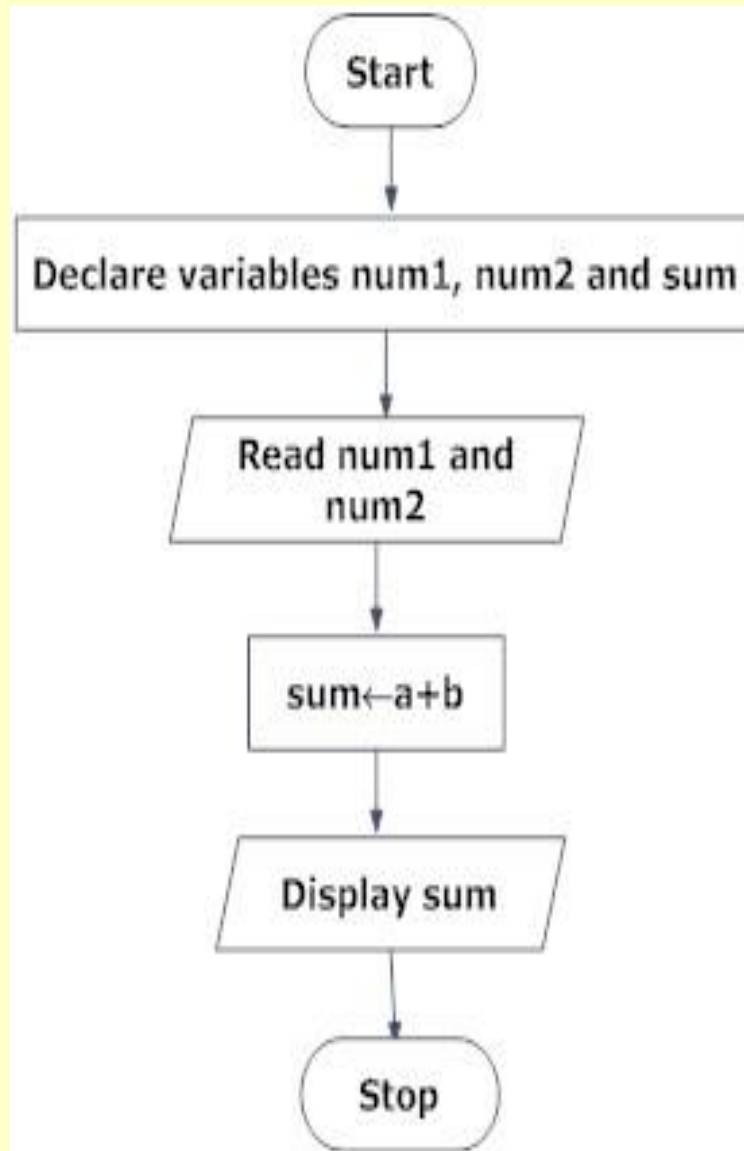
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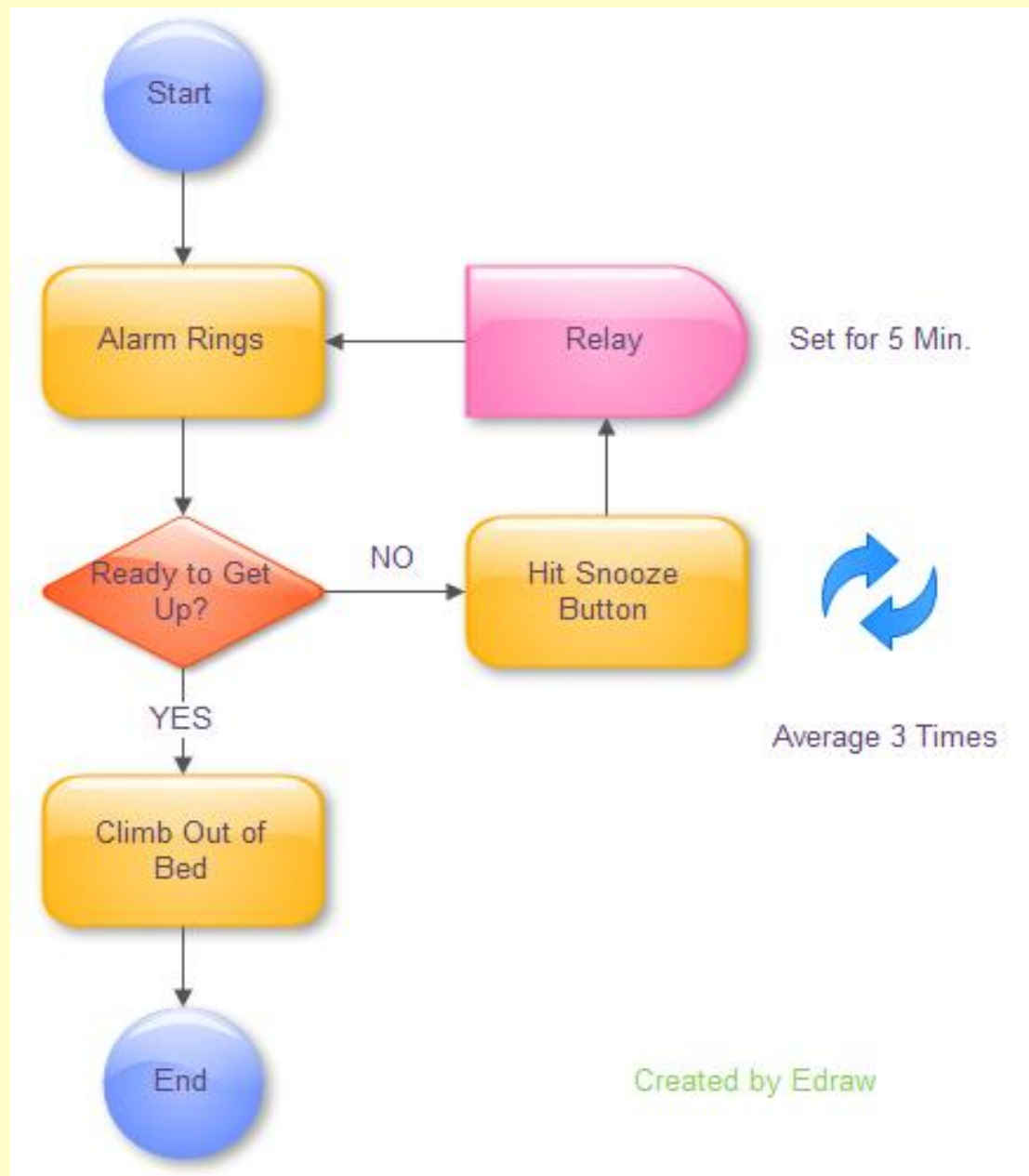
Answer

- Decision



Symbol	Name	Function
	Start/end	An oval represents a start or end point.
	Arrows	A line is a connector that shows relationships between the representative shapes.
	Input/Output	A parallelogram represents input or output.
	Process	A rectangle represents a process.
	Decision	A diamond indicates a decision.





Examples ???

