



Basic Program Structure

Boolean Data Type, Relational Operators and Selection Basics



At the end of this lesson, you should be able to:

- Explain the usage of Boolean data type
- Use relational operators to form conditional expressions
- Discuss the basic concepts of program execution and flow control/ control flow
- Explain selection basics
- Describe the IF statement used for selection (branching)

Topic Outline



Boolean Data Type

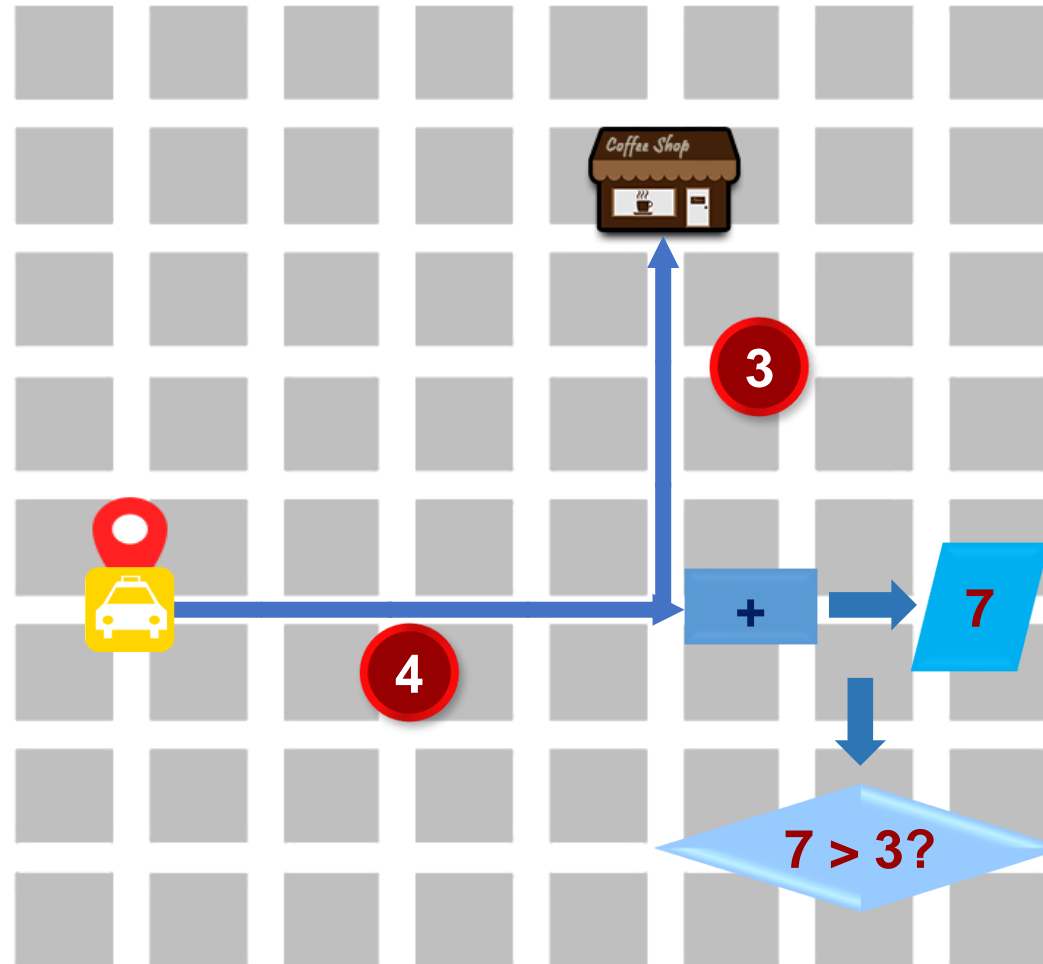


Relational Operators

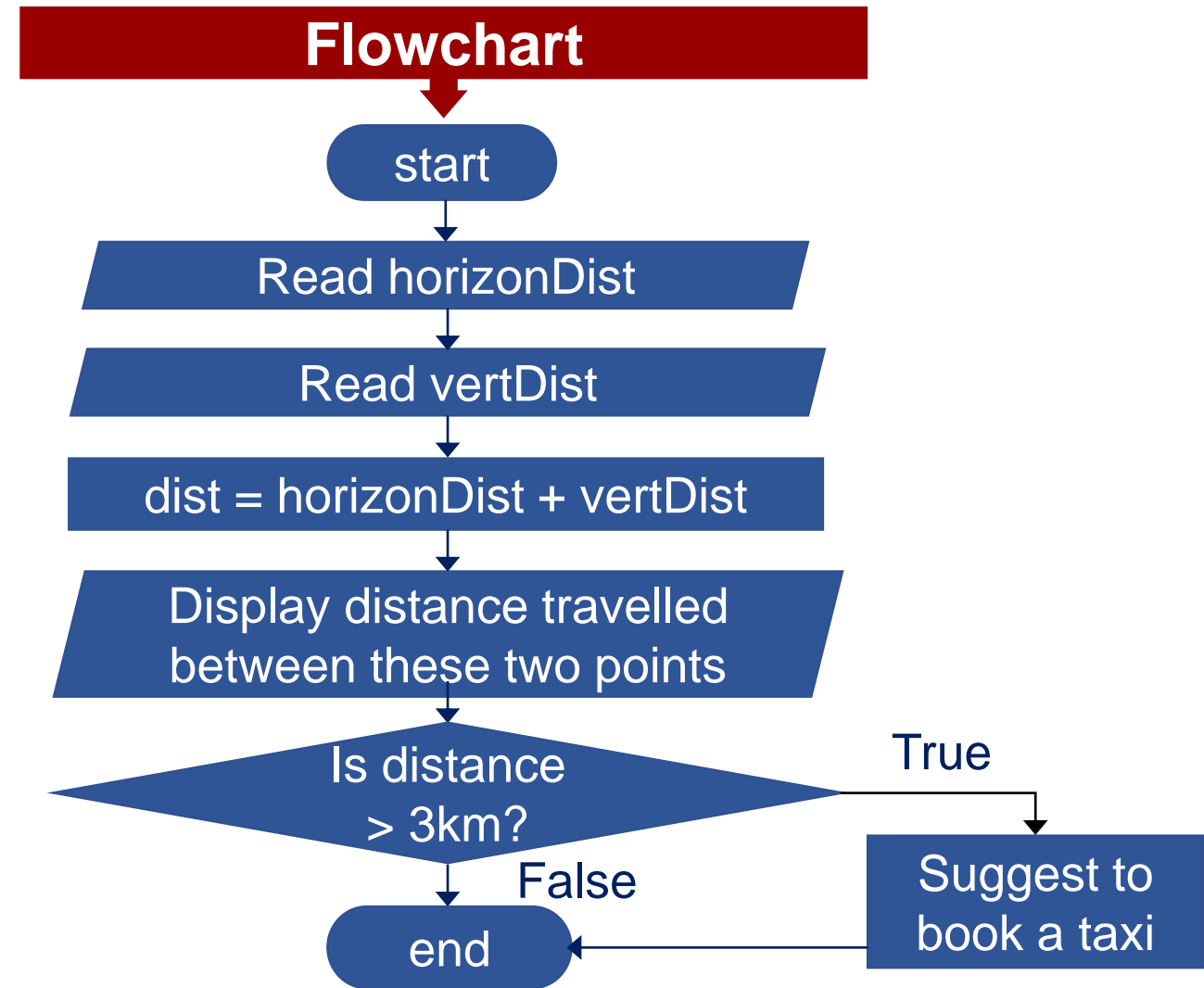
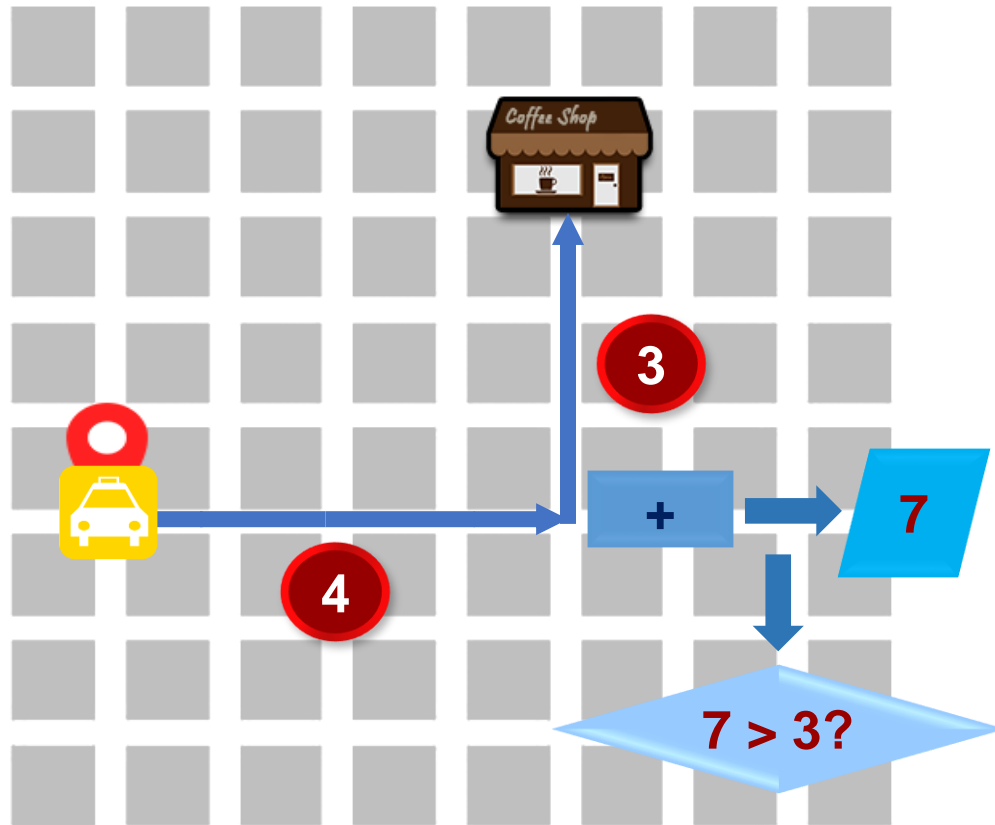


Selection Basics

Scenario 4: Decide if a Taxi is Needed

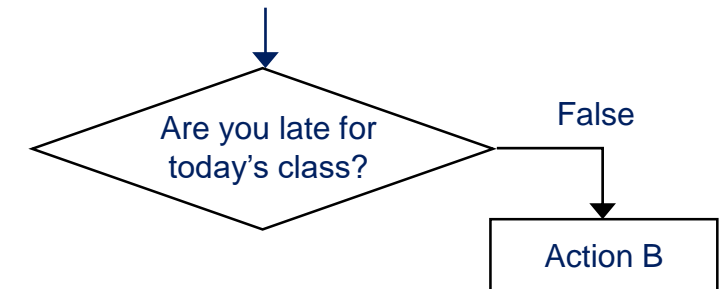
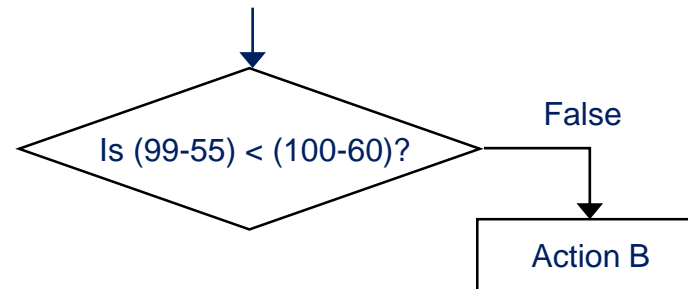
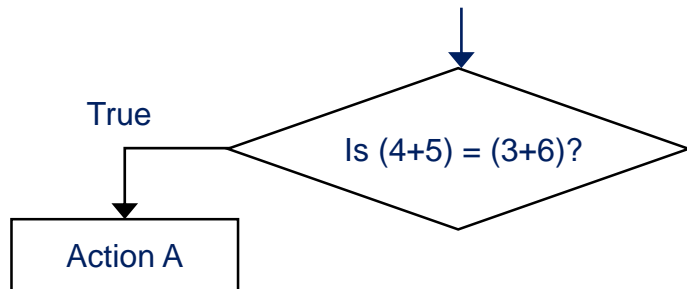
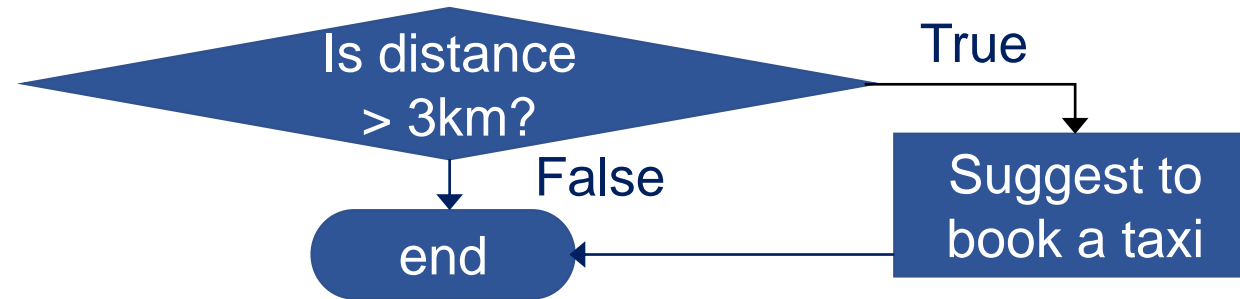


Scenario 4: Decide if a Taxi is Needed (Cont'd)

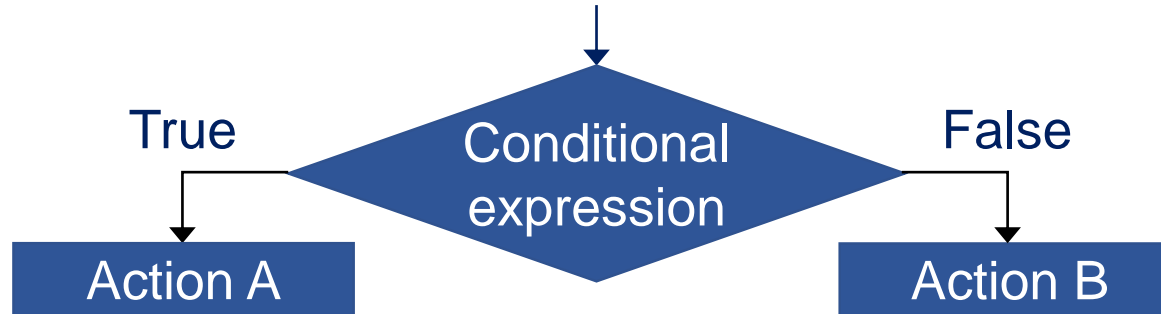


Conditional Statement

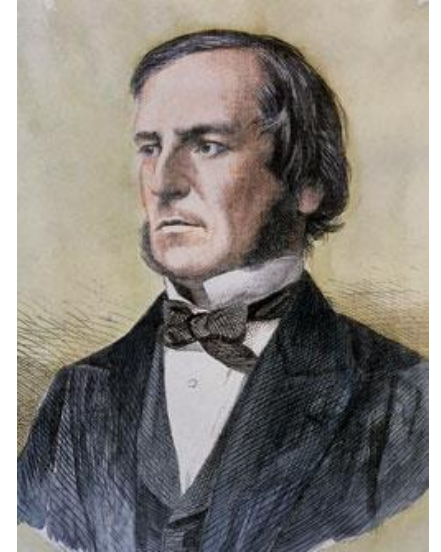
A **conditional statement** performs different actions depending on whether the condition evaluates to true or false.



Boolean Data Type



- In most computer programming languages, a **Boolean** data type is a data type with only two possible values, either **True** or **False**.
- Conditional expression, also called **Boolean expression**, may be composed of a combination of the Boolean constants True or False, Boolean-typed variables, Boolean-valued operators, and Boolean-valued functions.



George Boole is the author of The Laws of Thought that introduces Boolean algebra.



Can you think of any application of Boolean-valued operators?

Relational Operators

A **relational operator** compares two numbers (**float** or **int**) and returns a **Boolean** value of either **True** or **False**.

Relational Operator	Meaning	Example
<code>==</code>	equal to	<code>a == 1</code>
<code>!=</code>	not equal to	<code>b != 2</code>
<code><</code>	less than	<code>c < 3</code>
<code><=</code>	less than or equal to	<code>d <= 4</code>
<code>></code>	greater than	<code>f > 5.0</code>
<code>>=</code>	greater than or equal to	<code>f >= 6.0</code>

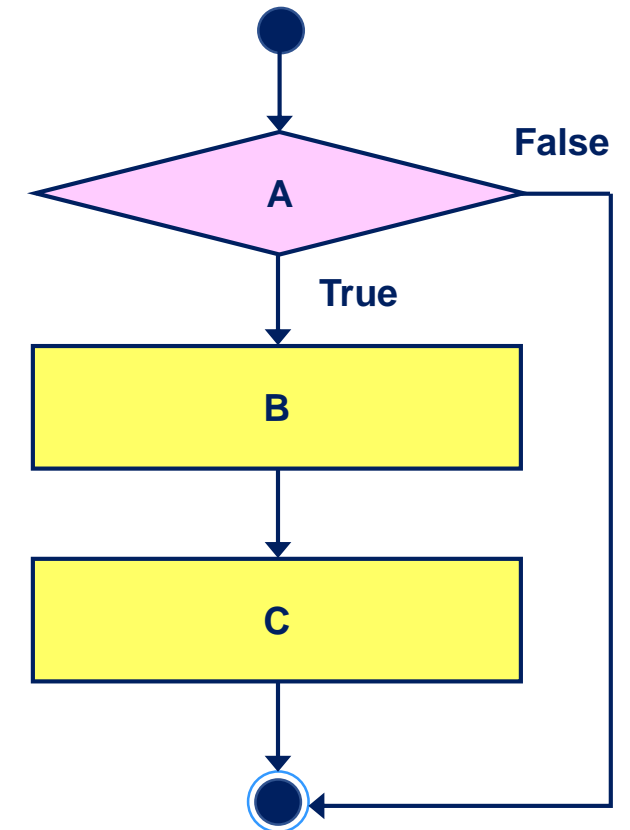
Program Execution and Flow Control/ Control Flow

- It controls which instruction should be executed next.
- By default, it is defined by the “sequence” concept, i.e., one after another.
- However, some structures can **alter** the flow, e.g., selection.
 - Selection (Branching) occurs when an “algorithm” makes a choice to do one of two or more things.

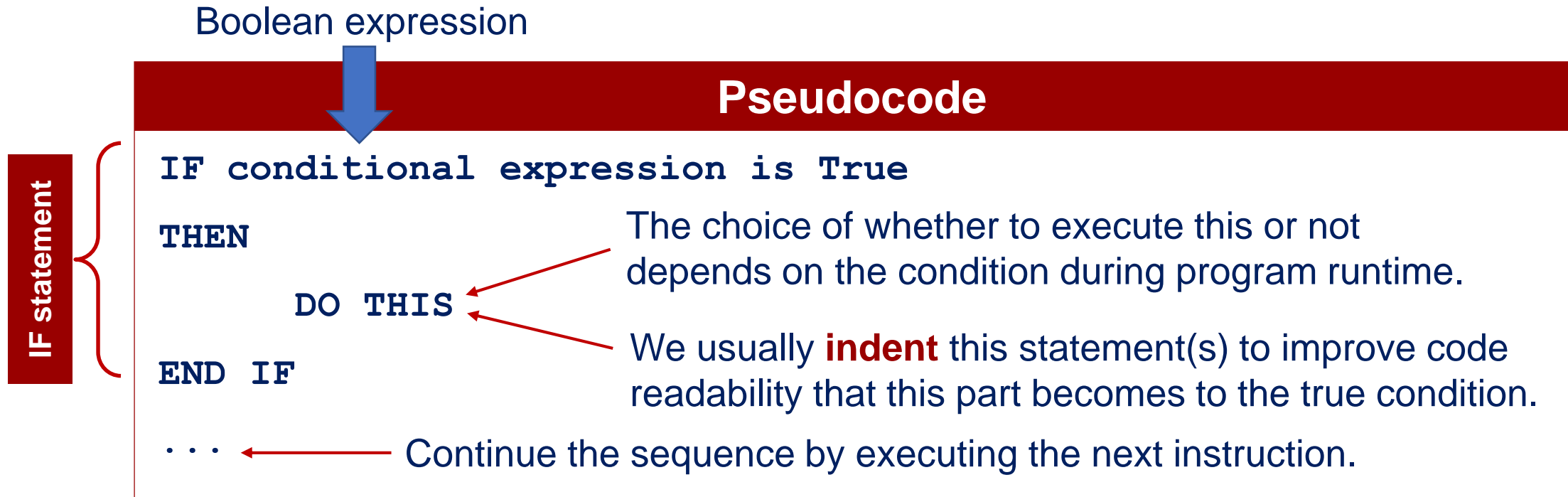


Message

- The flow control in a program is, in essence, **logic**.
- When writing or reading a program, ensure that you could **understand the flow**, i.e., what should be executed next for every step.



IF statement is the most common programming "statement" used for branching.



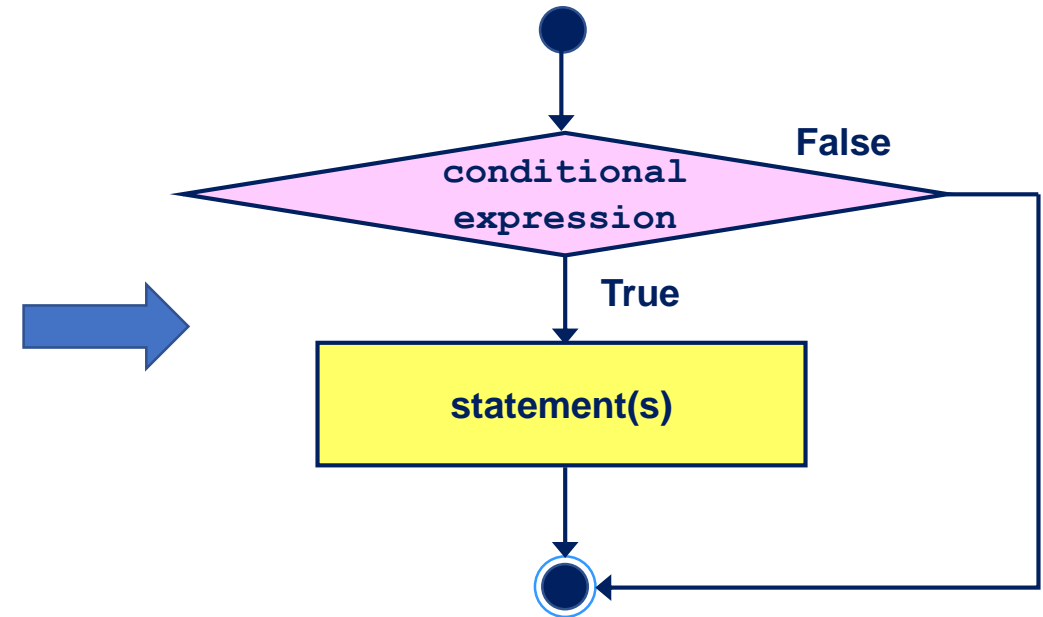
Note: Proper indentation is adopted in many programming languages.

IF Statement (Cont'd)

- Alternatively, when visualized as a flowchart:

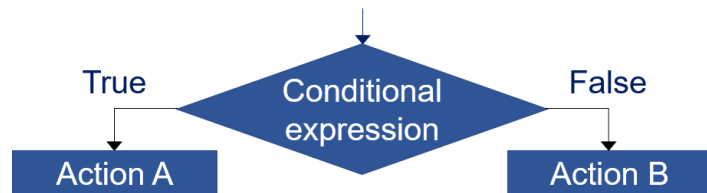
Pseudocode

```
IF conditional expression is True
THEN
    DO THIS
END IF
...
```



- Hence, a program can make **decisions**!

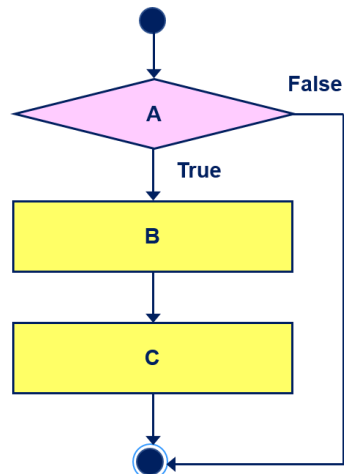
Boolean Data Type



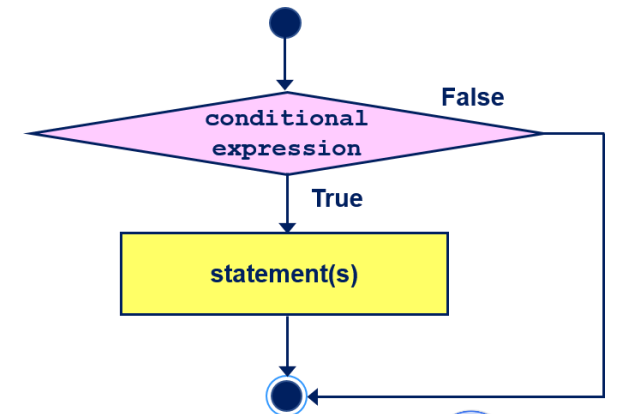
Relational Operators

<code>==</code>	<code>!=</code>
<code><</code>	<code><=</code>
<code>></code>	<code>>=</code>

Program Execution and Flow Control/Control Flow







IF Statement



 *More on this later..*

References for the Images

No.	Slide No.	Image	Reference
1	8		Question problem [Online Image]. Retrieved April 24, 2018 from https://pixabay.com/en/question-problem-think-thinking-622164/ .
2	8		By Unknown - http://schools.keldysh.ru/sch444/museum/1_17-19.htm , Public Domain, retrieved April 18, 2018 from https://commons.wikimedia.org/w/index.php?curid=19667097 .
3	10		Warning [Online Image]. Retrieved April 18, 2018 from https://pixabay.com/en/attention-warning-sign-danger-303861/ .
4	11, 13		By User:Bobarino - Made by following Information.png, CC BY-SA 3.0, retrieved April 28, 2014 from https://en.wikipedia.org/w/index.php?curid=9180601 .