

the Master Course

{C0DENATION}

Software Development

Algorithms, Flowchart & Pseudocode

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Learning Objectives

To know what an algorithm is and create simple examples.

To know what a flowchart represents and its features.

To create a flowchart from an algorithm, containing loops and decisions, inputs/outputs and processes.



SDLC

Algorithm?

Algorithm

An **algorithm** is a set of ordered steps for solving a problem.

Examples:

An algorithm for preparing a meal.

An algorithm for converting degrees Celsius to Fahrenheit.

An algorithm to produce a document.

Algorithms in Real-Life

Algorithm

Problem: I want to bake a cake

Steps required to bake a cake:

1. Start
2. Preheat the oven to 180°C
3. Prepare a baking tin
4. Beat butter with sugar
5. Mix them with flour, eggs and vanilla essence
6. Pour the dough into the baking tin
7. Put the tin into the oven
8. After 40 minutes, remove the cake from the oven
9. End

Activity A

Algorithm

Select one of the following activities. In 5 minutes, write an algorithm to explain how the task is completed:

- Making a cup of tea.
- Making a jam sandwich.
- Changing a flat car tyre.

Be prepared to share your algorithm ...

Why build Algorithms?

If we wish to build a house, we need to **design** it first.

Can you think of possible consequences of **not** designing a house before building it?

Why build Algorithms?

Similarly, **computer programs** need to be designed before they are written.

What could be the possible consequences of **not** designing a program before building it?

Algorithm

Why build Algorithms?

One of the things considered when designing a computer program is the algorithm which it will be based on.



Algorithm

Algorithms in Program Design

A computer program is built to solve a problem.

Examples:

- A program to calculate the grade obtained given a mark.
- A program to convert Celsius temperature to Fahrenheit.
- A program to produce a document.



Algorithm

Algorithms in Program Design

Here are the steps for building a program to solve a problem:

- Analyse the problem.
- Design a computer solution to the problem by developing an **algorithm**.
- Design a **flowchart** to demonstrate the flow of data through the algorithm.
- Write the **Pseudocode** based on the flowchart
- Write a computer program based on the Pseudocode.
- Test the program.



SDLC

Flowcharts?

Flowchart

A flowchart is a **graphical representation** of the sequence of operations in a set of instructions or **algorithm**.

An algorithm can be represented graphically using a flowchart.

Flowchart Notations

Flowchart



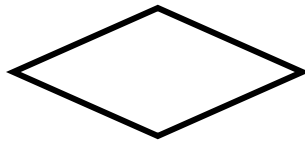
Start/End



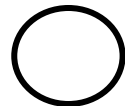
Process



Input/Output



Decision



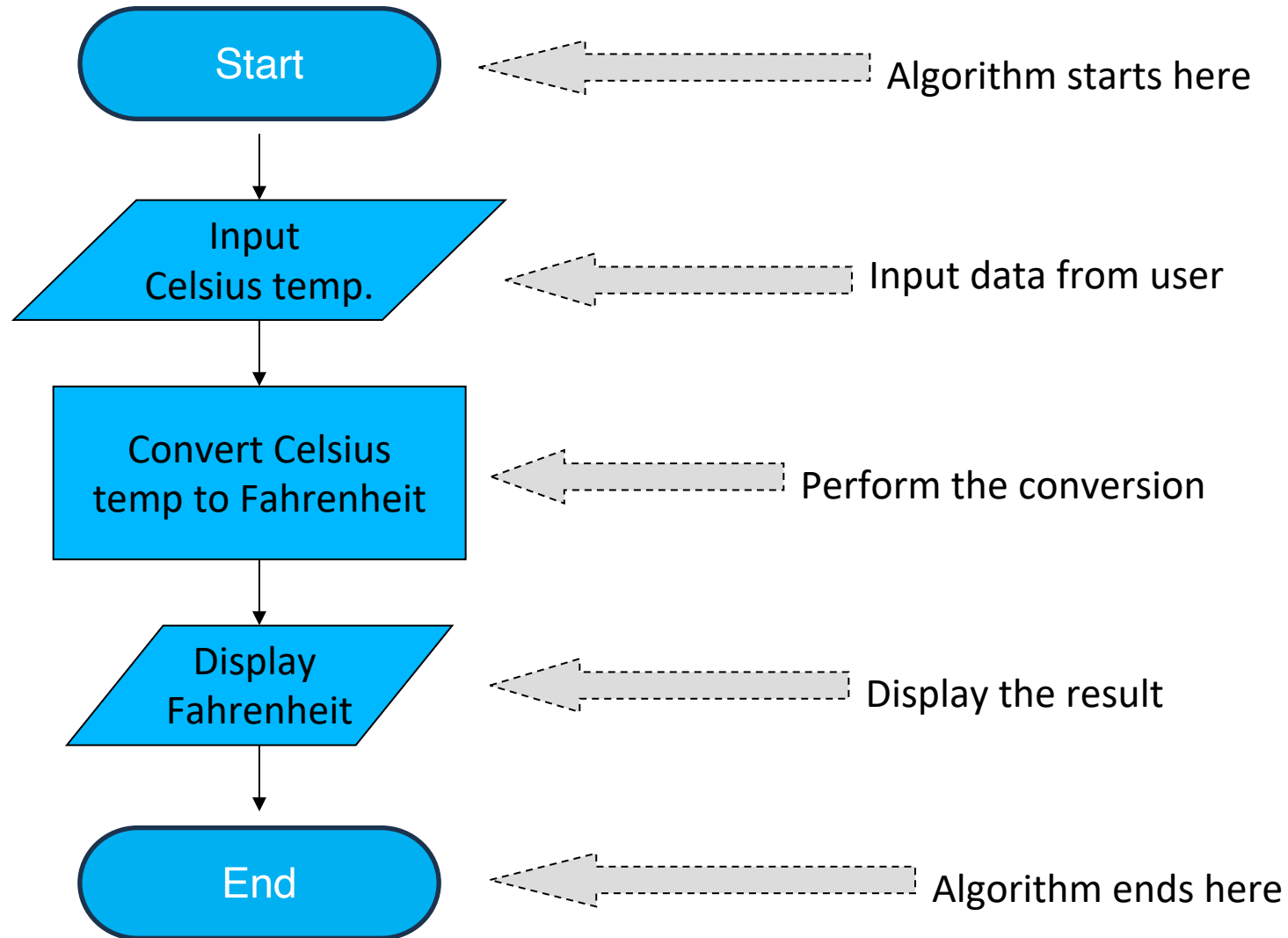
Connector



Flow of activities

Flowchart Example 1

Flowchart





Pseudocode

Pseudocode?



Pseudocode

Pseudocode

It is a plain language description of the **steps** in an algorithm. It is detailed yet readable, and it resembles the actual program that will be implemented later, however it cannot be compiled nor executed.

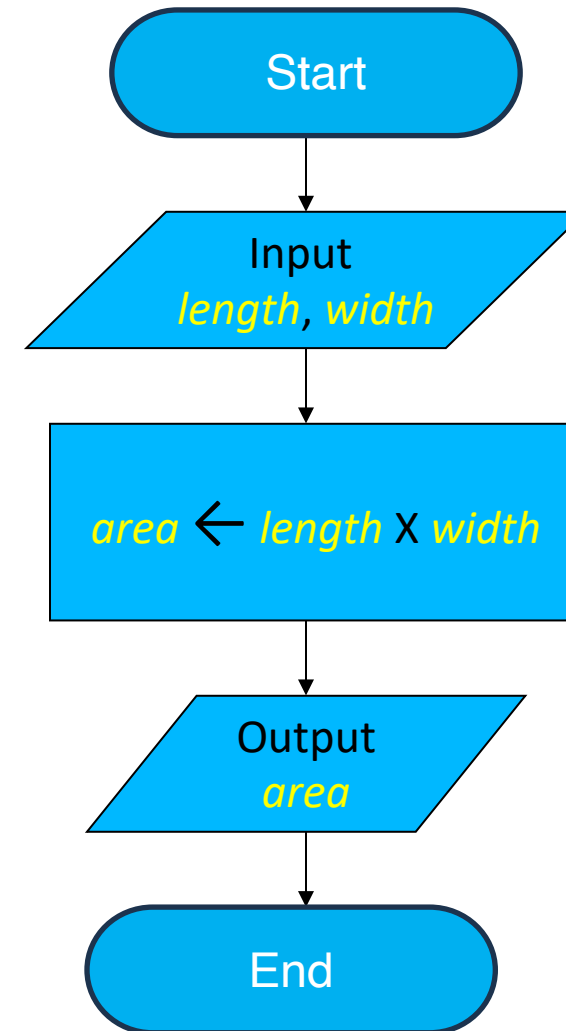
Pseudocode can also help with the following:

- Variables names
- Assignment of values to the variables
- Arithmetic operations used
- Relational operations

Example 2

A **Pseudocode** program to calculate the **area of a rectangle** based on user inputs.

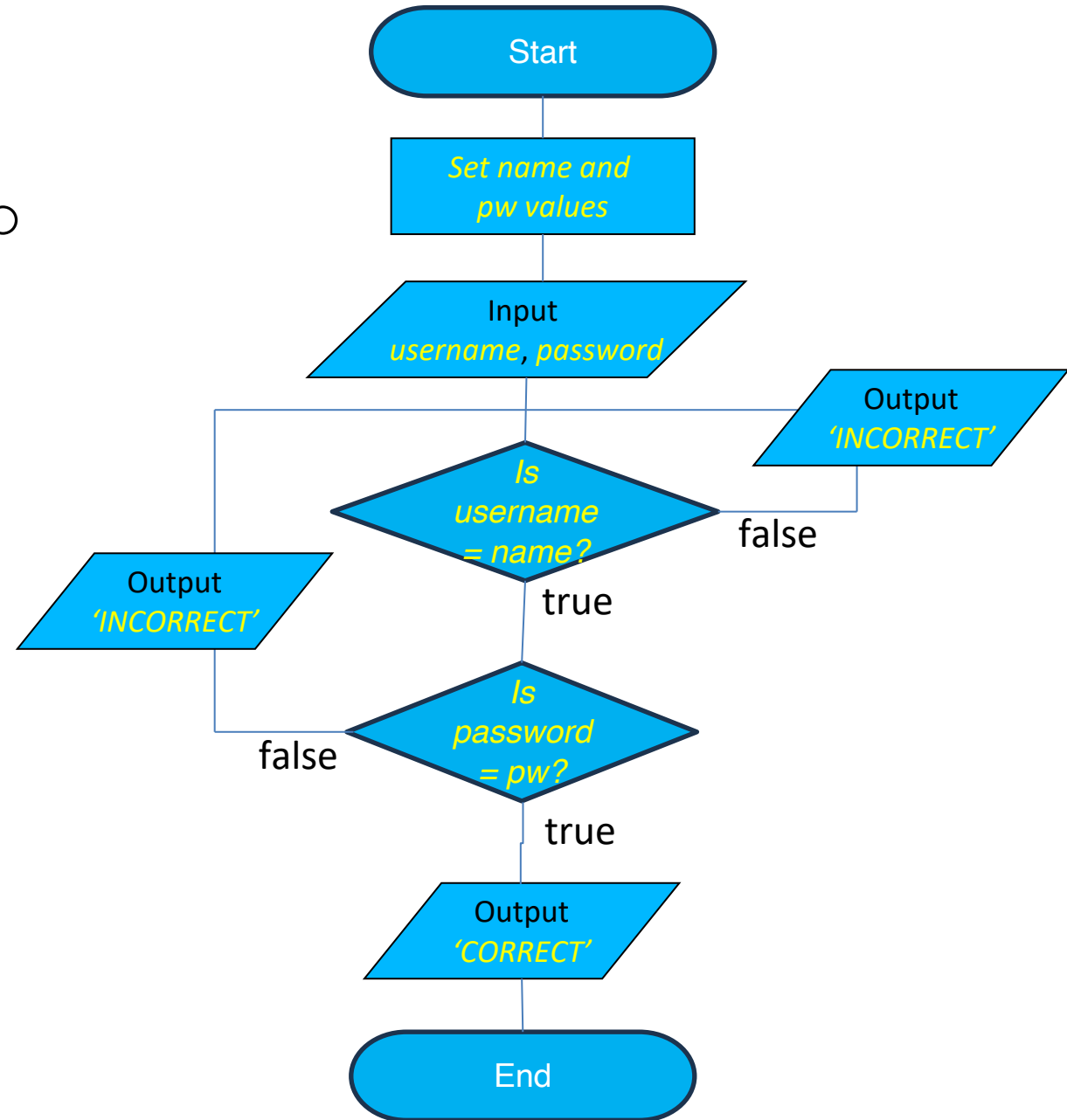
1. length = Get user input for length
2. width = Get user input for width
3. Area = length x width
4. Print area
5. End



Example 3

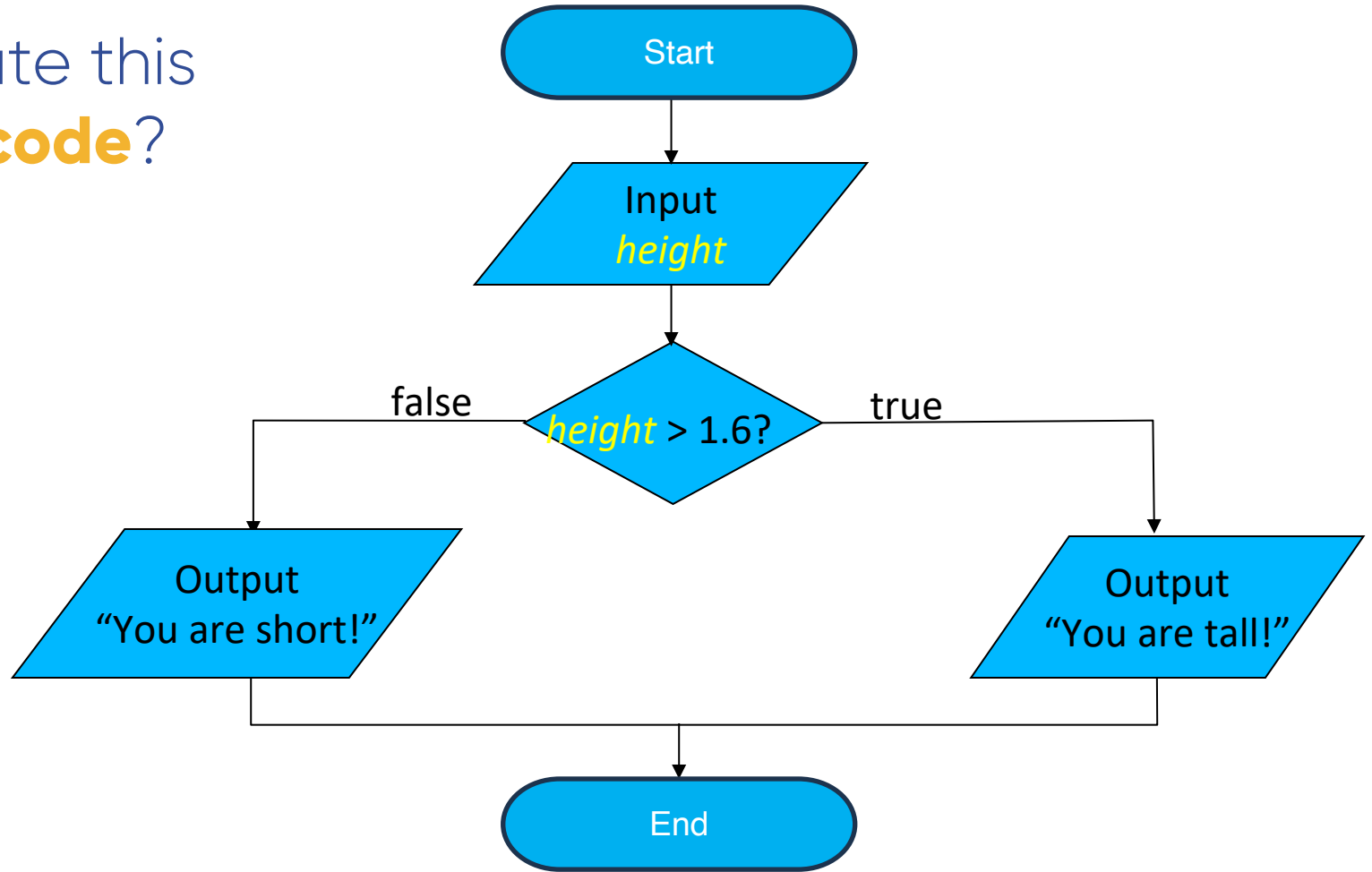
A **Pseudocode** program which checks to see if a user's name and password has been entered correctly.

1. Let **name**, **pw** = string values
2. **username** = Get user input for name
3. **password** = Get user input for password
4. If **username** equals **name** then
5. If **password** equals **pw** then
6. Print "CORRECT"
7. Else Print "INCORRECT"
8. Else Print "INCORRECT"
9. End



Question:

How would you translate this flowchart into **Pseudocode**?



Activity B

Draw a flowchart which represents the algorithm built in **Activity A** (previous slide). Your flowchart must include at least one decision element.

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