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UNIVERSITY
FOR APPLIED SCIENCE
AND TECHNOLOGY

ECT 113

Information Technology

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Lecture 2

Problem-Solving and Program Design



what is Problem-Solving ?



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- **Problem-solving** is the process of identifying an issue, analyzing possible solutions, and implementing the best one to achieve a desired outcome.

Why is it Important ?

- Essential for programming and real-world applications.
- Helps in creating efficient and logical solutions.
- Used in artificial intelligence, automation, and data analysis.

Understanding the Problem



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- Before solving a problem, it's important to fully understand it.
 - **Ask yourself the following questions:**
 1. **What is the problem statement?** Clearly define what needs to be solved.
 2. **What are the inputs?** What data is needed?
 3. **What are the expected outputs?** What should the solution produce?
 4. **Are there any constraints?** Time limits, memory limits, etc.
 5. **What are the possible solutions?** Consider different approaches.

Steps for Problem-Solving



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- **Problem-solving** typically follows these steps:
 1. Understand the Problem – Identify inputs, outputs, and constraints.
 2. Plan a Solution (Algorithm) – Develop a step-by-step approach.
 3. Represent the Solution (Flowchart & Pseudocode) – Visually or textually describe the logic.
 4. Implement and Test the Solution – Convert to code, run tests, and optimize.

What is an Algorithm?



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An **Algorithm** is a step-by-step sequence of logical instructions designed to solve a specific problem. It takes an input, processes it through a set of well-defined rules, and produces an output.

- Algorithms are generally created independent of underlying languages.
- Every algorithm should have the following 4 characteristic feature:
 1. Start
 2. Input
 3. Processing
 4. Output



What is an Algorithm?



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Example 1:

Write an algorithm that takes two numbers as input and calculates their sum.

Algorithm:

- 1.Start
- 2.Input: Read two numbers, A and B.
- 3.Processing : $SUM = A + B$
- 4.Output: $SUM = A + B$



What is an Algorithm?



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Example 1 (Cont.):

Input: $A = 8, B = 5$

Steps Execution:

Step 1: Read $A = 8$ and $B = 5$.

Step 2: Compute $SUM = 8 + 5 = 13$.

Step 3: Print 13.

Output: 13.



What is an Algorithm?



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Example 2:

Given a list of numbers, find the largest number in the list.

Algorithm:

- 1.Start
- 2.Input: Read a list of numbers.
- 3.Initialize: Set the first number as the maximum.
- 4.Loop through the remaining numbers in the list:
 - If a number is greater than the current maximum, update the maximum
- 5.Output: Print the maximum number

What is an Algorithm?



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Example 2 (Cont.):

Input: [12, 45, 7, 89, 23, 56]

Steps Execution:

Step 1: Assume $\text{max} = 12$.

Step 2: Compare $45 > 12$, update $\text{max} = 45$.

Step 3: Compare $7 > 45$, no change.

Step 4: Compare $89 > 45$, update $\text{max} = 89$.

Step 5: Compare $23 > 89$, no change.

Step 6: Compare $56 > 89$, no change.

Output: 89 (The largest number).

What is Flowchart ?



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- A **Flowchart** is a type of diagram that represents an algorithm, workflow or process, showing the steps as boxes of various kinds, and their order by connecting them with arrows.
- This diagrammatic representation illustrates a solution model to a given problem.



Main Symbols for Flowchart



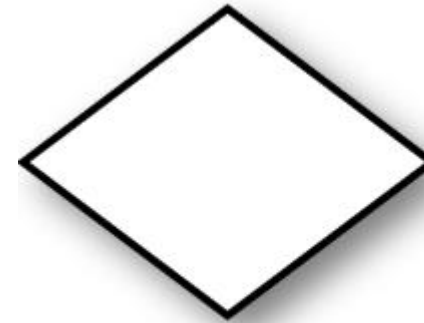
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Start & End



Flow line



Decision



Process



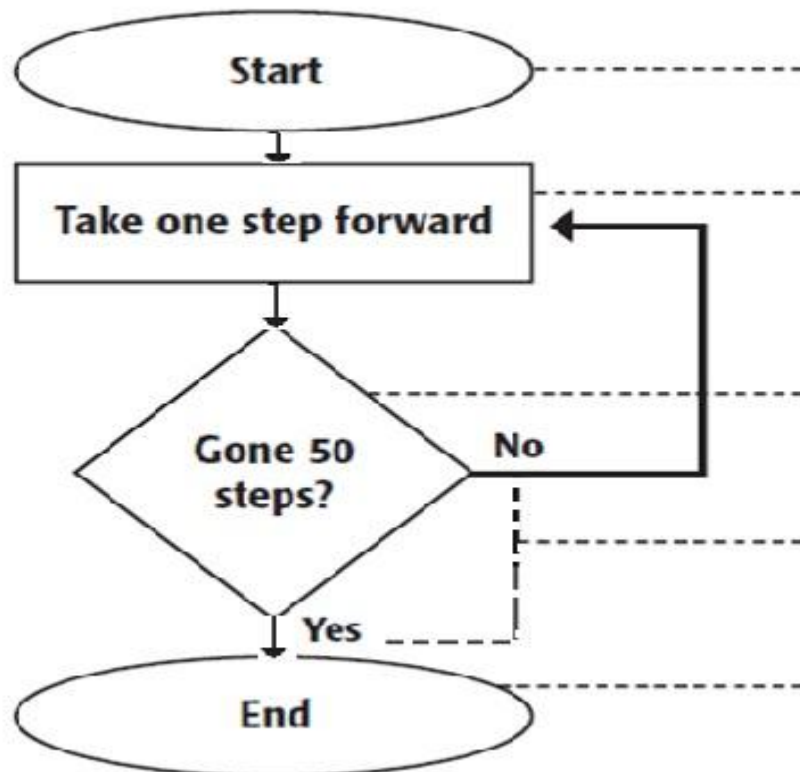
Input/output

How to Read A Flowchart 2



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PARTS of a FLOW CHART



Start of Program - Marks the beginning of the program, begin here. Follow the line to get to the next block.

Statement Block - A statement to execute, or a behavior to perform.

Decision Block - A decision point in your program. Ask a simple question, and do different things depending on the answer.

Yes/No (also True/False, etc.) - Answers to the question posed in the decision block. Follow the line labeled with the appropriate answer.

End of Program - Marks the end of the program. If you reach this point, the program is done!

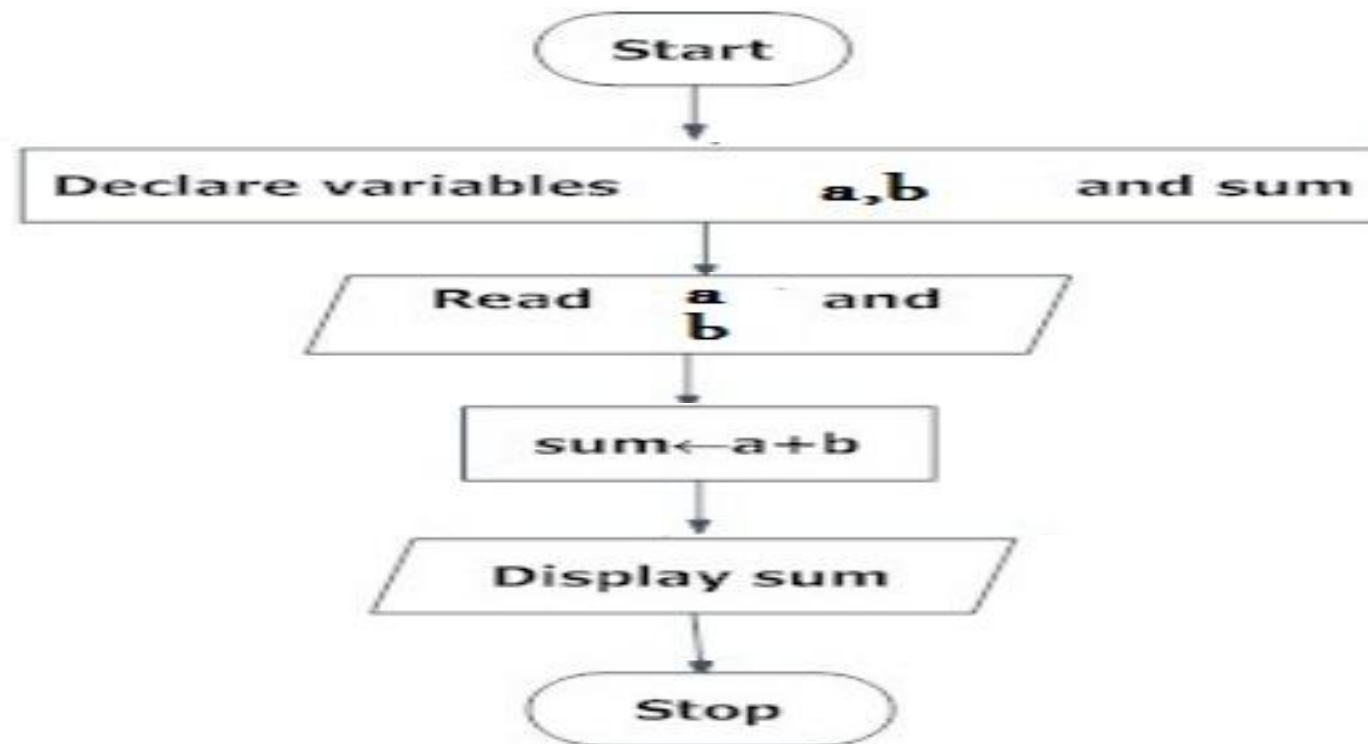


Flowchart?



Example 1:

Design a flowchart that takes two numbers as input and calculates their sum.



Algorithm: Convert Fahrenheit to Celsius



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Example 2:

Write an algorithm then design a flowchart that change the temp. from F to celicus. $C=5*(F-32)/9$

Algorithm:

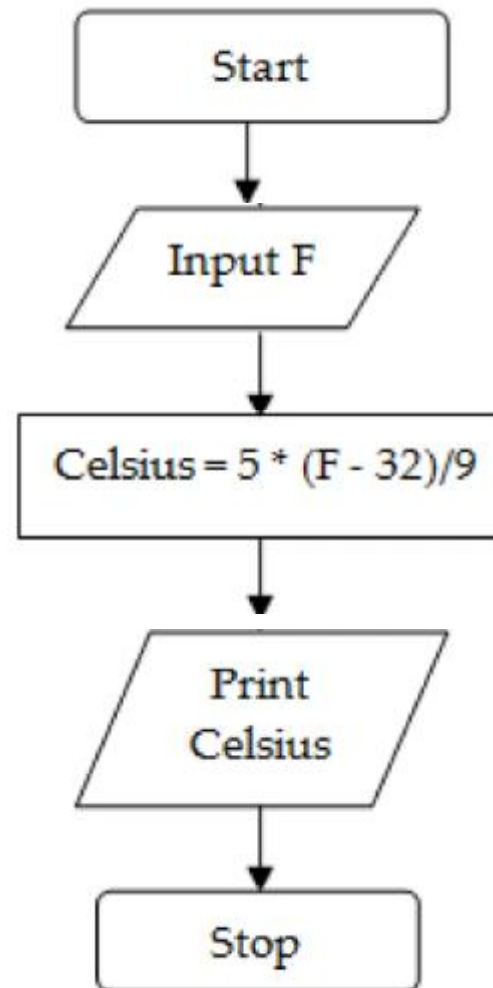
1. **Start**
2. **Input:** the temperature in Fahrenheit (F).
3. **Compute:** the Celsius temperature using the formula:
$$C=5*(F-32)/9$$
4. **Print:** the Celsius temperature
5. **Stop**

Flowchart



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Example 2 (Cont.):



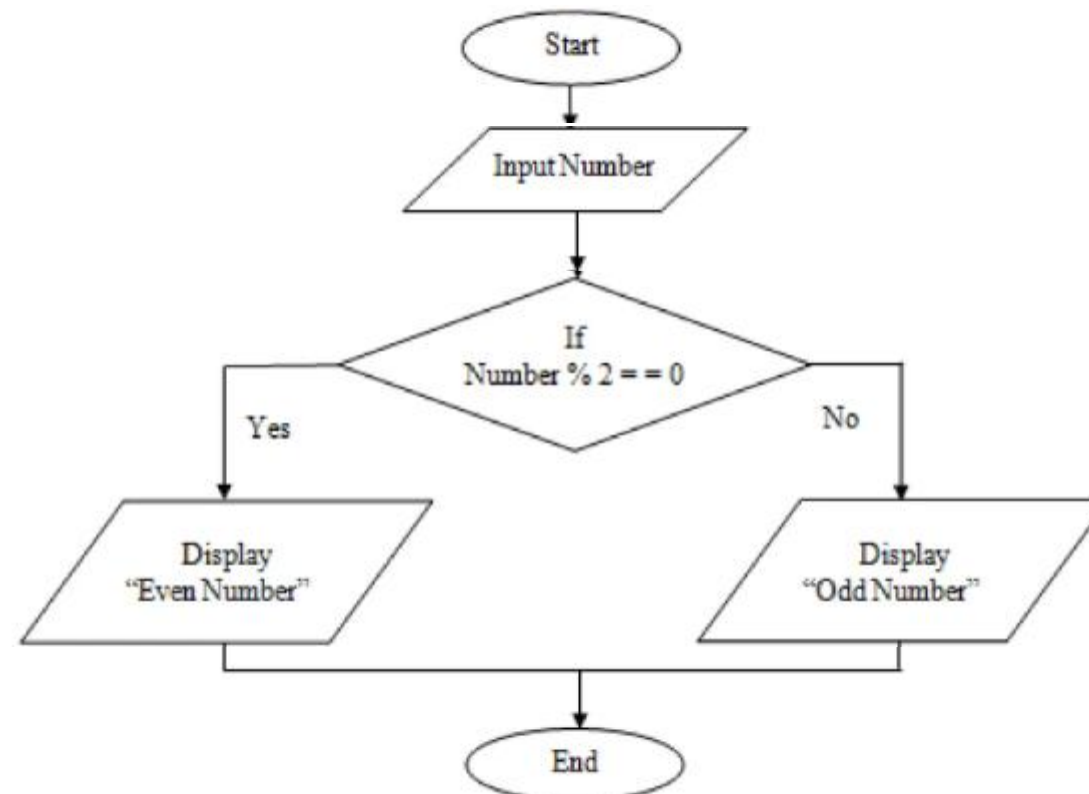
Flowchart



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Example 3:

Design a flowchart that display the even number.





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THANK YOU

