Computer Programming & Problem Solving
CS100

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National Institute of Technology, Goa
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Today

1. Goals of the Course
2. Some administrative information
3. Concepts and Tools for Computational thinking and Problem Solving

Goals of the Course

1. Easy entry into programming for those without prior experience
2. Build your confidence in your ability to write/read/understand code in C language
3. How to computationally tackle problems

Skills

1. Use basic tools of computational thinking to write code
2. Have vocabulary of computational tools
3. Understand capabilities, limitations and costs associated with computation
4. Map scientific problems into a computational frame
5. We teach you to read, write and understand

Some Administrative Information

1. Theory Class – 3 hours/week – 60% of total marks
2. 2 short tests – First of which will be in week 5 – Dec 12th
   - 30 marks
   - 1 hour each
   - 30-40% of the marks
3. 2 long tests – First of which will be in week 7
   - 100 marks
   - 2-3 hours each
   - 70-60% of the marks
4. 3 hours of lab/ week – 40% of total marks
   - 1 lab test
5. Cheating/resorting to unfair means will be penalized

Some Administrative Information

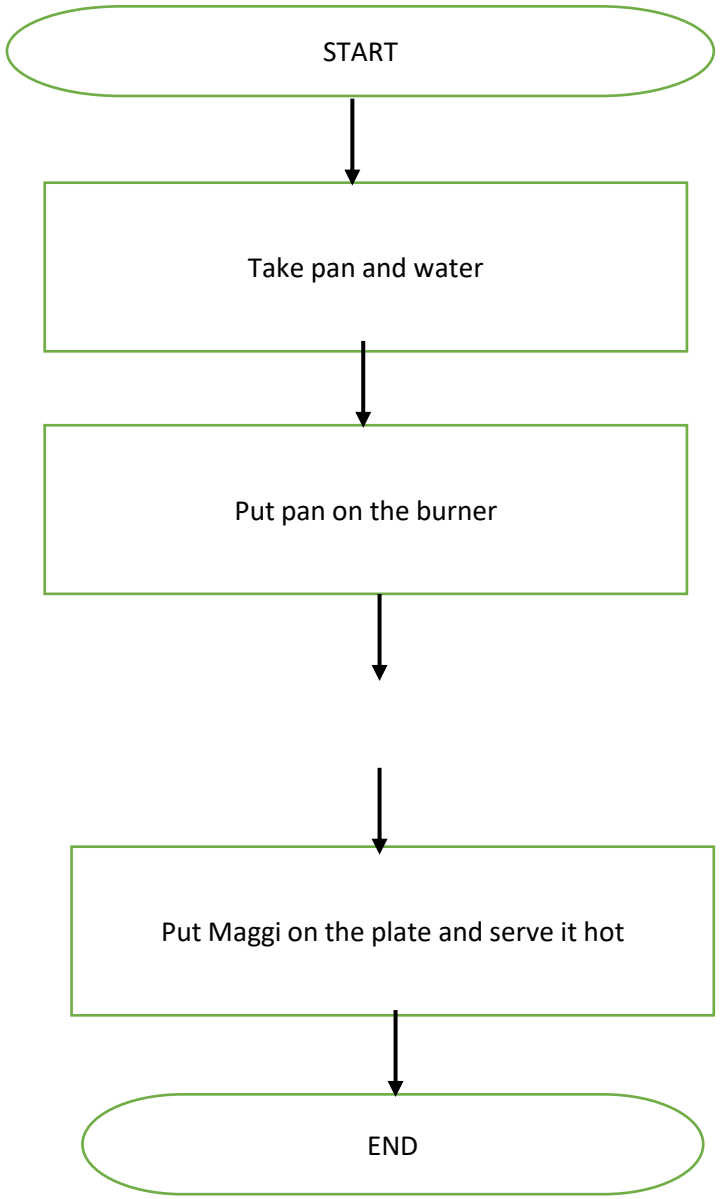
1. Mail ID: s.chaki@nitgoa.ac.in
2. Computer Lab 2
3. Teaching Assistants
4. Slides/Material/Links

Let’s Dive In!

1. Problem Solving
    a) Understand the problem
    b) Devise a plan
    c) Carry out the plan
    d) Look back and check
2. Computer Programming
3. Very much inter-related
4. We will see how with a real life example

Problem – Cook Maggi

1. What are the steps?
   - **a) Start**
   - b) Take pan and water
   - c) Put pan on the burner
   - d) Switch on the gas burner
   - e) Put the Maggi and masala.
   - f) Give two minutes to boil
   - g) Take off the pan
   - h) Take out the maggi
   - i) Put maggi on the plate and serve it hot
   - **j) Stop**

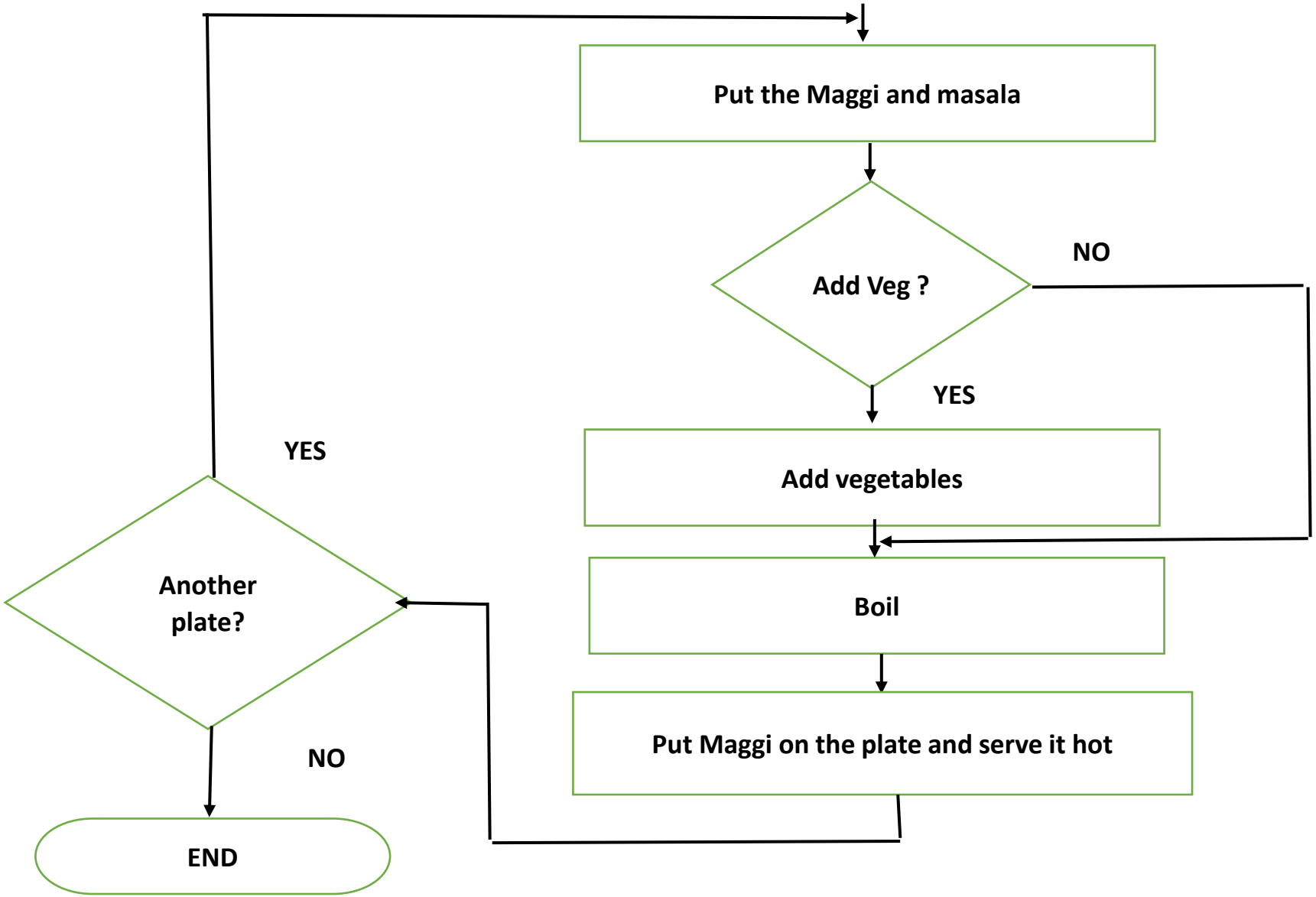


Algorithm and Flowchart – Your best friends

1. Algorithm
   a) In mathematics and computer science,
   b) finite sequence of rigorous instructions
   c) typically used to solve a class of specific problems
   d) or to perform a computation.

2. Flowchart
   a) A type of diagram that represents a workflow or process.
   b) A diagrammatic representation of an algorithm
   c) A step-by-step approach to solving a task.

Complex Problem – 10 plates of veg/simple Maggi



Connecting Problem Solving with Programming

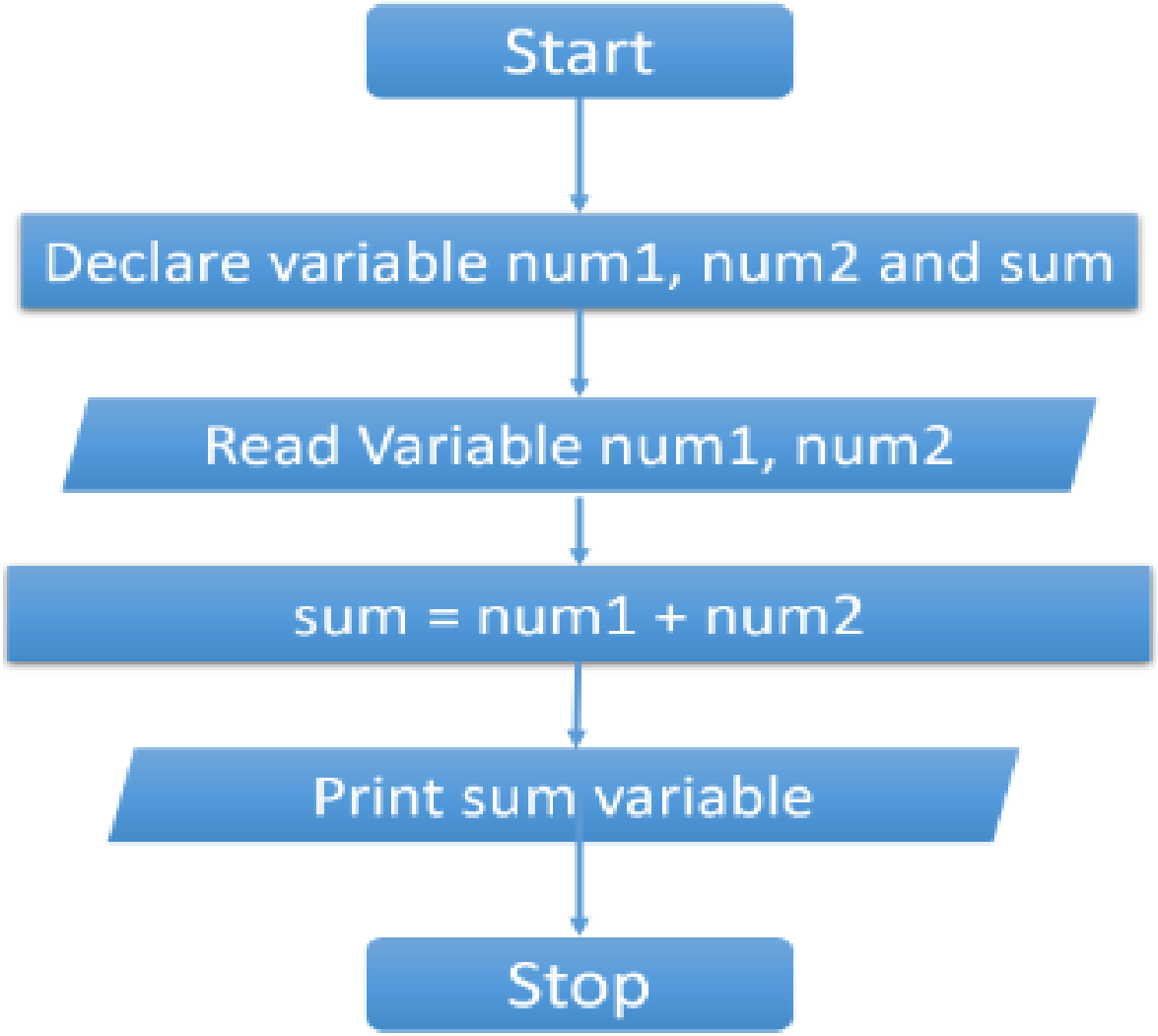
Problem Solving

1. Starting and ending instructions
2. Sequence of instructions to solve the problem
3. Variables – to store changing information
4. Input/Output
5. Decisions
6. Loops
7. Other relevant constructs

Programming in C

1. Dedicated syntax (like in English, start and end of sentences)
2. Sequence of C instructions
3. 3 types – int, float, char
4. printf() and scanf() functions
5. If-else statements
6. do, do-while and for
7. And more

Mathematical problem – Add two Numbers



Mathematical problem – Add two Numbers

```c
// Online C compiler to run C program online
#include <stdio.h>

int main() {
    int num1, num2, sum;
    printf("Please enter 2 integer numbers: ");
    scanf("%d %d", &num1, &num2);
    sum = num1 + num2;
    printf("The sum = %d", sum);
    return 0;
}
```

1. Start instructions
2. Declaring variables
3. Output
4. Input
5. Arithmetic instruction
6. Stop instruction

Mathematical problem – Add two Numbers

```c
// Online C compiler to run C program online
#include <stdio.h>

int main() {
    int num1, num2, sum;
    printf("Please enter 2 integer numbers: ");
    scanf("%d %d", &num1, &num2);
    sum = num1 + num2;
    printf("The sum = %d", sum);
    return 0;
}
```

```
Please enter 2 integer numbers: 10 20
The sum = 30
```

Books/Resources

1. Programming with C, Byron Gottfried
2. The C Programming Language, Brian W Kernighan, Dennis M Ritchie
3. Let us C, Yashavanth Kanetkar, BPB Publications
4. Programming in ANSI C, E. Balaguruswamy
5. A guide to Programming Logic & Design, Joyce Farrell
6. NPTEL resources

Next class

1. C variables,
2. C keywords
3. C instructions.