Introduction to Programming

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The Four Questions

- What – do I have to do – Introduction to Programming
- When – do I have to do – at least this semester
- How – do I have to do it – Attend the lectures, work on the Lab assignments and do a lot of programming.
- Why – should I have do – Perhaps the most important questions

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Motivation

- What is Programming – Translation of your thoughts into a language that a computer can understand
- What makes the modern computers so versatile – Program
- Almost Universal skill – Application to wide range of problems.
  - From finance to physics
  - From archaeology to predicting the future
- Programming is Interdisciplinary
- What is the most sought after quality in graduates – Problem Solving
  - That is exactly what will be developed through the course – e.g. First Practice Problem
  - Evaluation scheme – Hackathons and Quizzes

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Excelling in ID 1063

1. Just keep programming, even if you think you know get your hands dirty
2. Follow rule no. 1
3. Follow rule no. 2

- Why the Three Rules
  - To learn a new language we need to practice – Recall when you were learning a new language
  - Why we find Programming intangible
    - Abstraction of physical phenomena into mathematical formulae and then abstracting the formulae into programming

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Code, Compile, Execution

- **Code:** Helloworld.c
- **Compile:** gcc Helloworld.c -o Helloworld Compiler translates the C program into a machine-language code (object code).
- **Execution:** ./Helloworld Computer, under the control of its CPU, executes the program one instruction at a time.

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Understanding the first code

Helloworld.c

```
//My first C program
#include ⟨stdio.h⟩

int main() /*function main begins*/
{
    printf("Hello World! This is my first C program in ID1063. \n");
    printf("I will excel in ID1063");
    return 0;
} /*End function main*/
```

Escape sequence

\n	Newline
\t	Horizontal tab
\a	Alert
\\	Backslash
\“	Double quote

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Taking inputs and adding two integers

```
#include ⟨stdio.h⟩ //Including std input output header

int main()                                          // Start of the main function
{
    int integer1, integer2, sum;                    /* Declaration of variable */
    printf("Enter two integers: ");                                    //prompt
    scanf("%d %d",&integer1,&integer1);                    //Read two integers
    sum = integer1 + integer1;              // Calculating the sum and assigning
    printf("Sum = %d", sum);                        // Print the sum on the screen
    return(0);
}
```

Variable names

- Allowed – Alphabets (uppercase and lowercase), numbers and underscore.
  - Be creative so that the names are clear to anyone (including yourself) trying to read the program.
  - C is case sensitive!
- Disallowed – keywords

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Data Types and Storing Data

- Data Types
  - int (examples: -10. -5, 0, 12, 14)
  - float (examples: 0.5, -1.33)
  - double (examples: 0.5, -1.33)
  - char (example: 'a','x','y')
- The data are stored in memory (like RAM, Cache). Memory is divided into chunks (called *bytes* – set of 8 *bits*)
  - char – 1 byte
  - int – 4 bytes
  - float – 4 bytes
  - double – 8 bytes

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Arithmetic Operators

- Addition +
- Subtraction -
- Multiplication *
- Division /
- Modulus % Reminder after integer division.

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Logical, relational, and bitwise operators – Some time later

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Operator – Precedence and Order of Evaluation

- Precedence – When multiple operators are present in a statement then to determine which operation has to be performed first
  - 10 + 20 % 10 will be evaluated as 10 + (20 % 10) and not as (10 + 20) % 10

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- The code the depends on the order of evaluation is a BAD code.
- Golden Rule: Use parentheses () when in doubt and make code evaluation independent

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Precedence and Order of Evaluation

Operator	Operation	order of evaluation
()	Parentheses	Evaluated first. Inner most pair evaluated first.
* / %	Multiplication Division Reminder	Evaluated second. If many, then evaluated from left to right.
=	Assignment	Evaluated last and from right to left

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How to write good program

- Use proper indenting, one statement per line, space before and after operator, space after comma etc.
- Meaningful variable names.
- Add proper comments.

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- Precedence and order of evaluation.
- Writing good program.

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