

Programming Fundamentals

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Transition Phase

Yearly system to Semester System

Course Content

- Building Blocks
- Decision Control Structures
- Iterative Control Structures
- Arrays
- Functions
- Pointers
- Structures

Books

- C How to Program by Paul Deitel, Harvey Deitel
- Turbo C Programming for the PC by Robert Lafore
- Problem Solving and Program Design in C by Maureen Sprankle , Jim Hubbard
- Let us C by Yashwant Kanetkar

Assessment Instruments with Weights

- Assignment and Quizzes /Class participation 20
- Midterm (2 midterms) 30
 - 6th week
 - 11th week
- Final 50

Tools

- Language: C
- IDE: DevC++, Visual Code

What is Programming?

- What is a Program ?
- What is a Language ? (Computer Language)

Why Programming?

Class 2, Week 1

Problem Solving

Pre-Programming

- Step 1: Analyzing the problem.
- Step 2: Developing the IPO chart.
- Step 3: Writing the algorithm.
- Step 4: Drawing the program flowcharts.

Analyzing the problem

- Understand the Problem
- Analyze the Requirements of the Problem
- A good way to analyze a problem is to separate it into four parts, problem analysis chart(PAC) :

Problem Analysis Chart(PAC)

- *1.The given data.(constant and variables)*
- *2.The required results.(the out put)*
- *3.The processing that is required in the problem .(equations and expressions)*
- *4.A list of solution alternatives .*

Problem Analysis Chart(PAC)

Given Data	Required Results
Section 1: Data given in the problem or provided by the user. These can be known values or general names for data, such as price, quantity, and so forth.	Section 2: Requirements for the output reports. This includes the information needed and the format required.
Processing Required	Solution Alternatives
Section 3: List of processing required. This includes equations or other types of processing, such as sorting, searching, and so forth.	Section 4: List of ideas for the solution of the problem.

Example

- Calculate the gross pay of an employee. The formula to be used is

$$\text{GrossPay} = \text{Hours} * \text{PayRate}$$

- Develop PAC for a solution to this problem?

PAC

Given Data	Required Results
Hours Pay Rate	Gross Pay
Processing Required	Solution Alternatives
$GrossPay = Hours * PayRate$	<ol style="list-style-type: none">1. Define the hours worked and pay rate as constants.*2. Define the hours worked and pay rate as input values.

Developing Input Processing Output (IPO) Chart

IPO chart shows:

- What data item are input
- What processing takes place on that data
- What information will be the end result, the output

Input	Processing	Output
All input data (from Step 1 of PAC)	All processing in steps(3 and 4 of PAC)	All output requirements (step 1 and 2 of PAC)

IPO

Input	Processing	Output
1- Hour worked 2- Rate per hour	1- Enter/Read hours worked 2- Enter/Read Rate per hour 3- Calculate pay by multiplying hours with rate 4- Print Gross Pay 5- End	Print Gross Pay

Writing the Algorithm

- The next step of organizing a solution is to develop sets of instructions for the computer, called algorithms
- The programmer writes a separate set of instructions for each module in the structure chart
- The number of instruction is determined by the way the programmer chooses to solve the problem

“Step by Step procedure / instructions to perform a specific task”

Drawing the Flowchart

- Graphic representations of the algorithms.
- The algorithms and flowcharts are the final steps in organizing a solution.
- A flowcharts shows the flow of the processing from the beginning to the end of a solution.
- Each block in a flowchart represents one instruction from an algorithm.

Class 3, Week 1

Introduction to C

Introduction

- C is a general-purpose programming language created by Dennis Ritchie at the Bell Laboratories in 1972.
- C is strongly associated with UNIX.
- It was developed to write the UNIX operating system.

Requirements

- A text editor.
- A compiler. **GCC** “GNU Compiler Collection” OR **MinGW**
- An IDE (Integrated Development Environment) is used to edit AND compile the code.

Steps to write a program

- Step 1 : open new file.
- Step 2: add Header files `#include <stdio.h> #include<conio.h>`
- Step 3: write program
- Step 4: Compile Program
- Step 5: Save file with an extension “.c”
- Step 6: Run Program
- Step 7: Exit

Basic Structure of C program

```
#include<stdio.h>
```

```
#include<conio.h>
```

```
void main (void) {
```

```
    WRITE YOUR CODE HERE
```

```
}
```


Output function

Syntax:

```
printf("WRITE ANYTHING HERE TO PRINT ");
```

Remember: Every line is terminated by a ;

Example :

```
printf("My first program");
```

My first Program

```
#include<stdio.h>
#include<conio.h>
void main (void){
    printf("My first program");
}
```

- **Step 1: Build the program (Compile)**
- **Step 2: Run program (Execute)**

Elements of a language

- Character Set: Alphabets
- Grammar: The rules of language
- Sentences: Meaningful element created with the help of Characters and Grammar.

Elements of Computer Language

- Character Set
- Keywords
- Data Types
- Syntax