M1: Introduction to C Programming-II

Mr. J. Mishra MGCUB, INDIA

Objectives

Introduction

Different Codes

Testing and Debugging

Storage Class

Type Conversion

goto Statement

Tertiary Operator

sizeof() Operator

Exercise

References

Introduction to Programming-IV
Introduction to C Programming-II

Course: BTech in CSE
Course Name: Programming for Problem Solving
Course Code:
Semester: II
Session: 2019-20

Mr. Joynath Mishra
Assistant Professor (Guest)
Department of Computer Science and Information Technology

Mahatma Gandhi Central University
Bihar, INDIA

April 23, 2020

Outline

Objectives

- Srudy on programe code
- Study on testing and debugging
- Study on storage class of C
- Study on type conversion
- Study on goto statement
- study on tertiary and sizeof operator

Problem to Programming

- Problem Analysis
- Algorithm Development
- Flowchart Development

- Program Coding
  - External file, modules and variable declaration
  - Start of *main()* function
    - Variable declaration and initilization
    - Calculation
    - Output display section
    - Return value to *main()*
  - Close of *main()*
- Compile and Execution
- Debug and Testing
- Documentation

M1:
Introduction to
C
Programming-II

Mr. J. Mishra
MGCUB, INDIA

Objectives

Introduction

Different Codes

Testing and
Debugging

Storage Class

Type Conversion

goto Statement

Tertiary
Operator

sizeof() Operator

Exercise

References

Problem to Programming (Contd...)

Find largest number among three

Example

```c
#include <stdio.h>
int main()
{   int num1=4, num2=2, num3=8;
    if (num1 > num2)
    {   if (num1 > num3)
        {   printf("num1 is the greatest among three \n");}
        else
        {   printf("num3 is the greatest among three \n");}
    }
    else if (num2 > num3)
        printf("num2 is the greatest among three \n");
    else
        printf("num3 is the greatest among three \n");
    return 0;
}
```

Output

num3 is the greatest among three

Different Codes

Different Codes of a Problem Solution

M1:
Introduction to
C
Programming-II

Mr. J. Mishra
MGCUB, INDIA

Objectives

Introduction

Different Codes

Testing and
Debugging

Storage Class

Type Conversion

goto Statement

Tertiary
Operator

sizeof() Operator

Exercise

References

Pseudo Code

- Pseudocode is an informal high-level description of the operating principle of a computer program or other algorithm. It uses the structural conventions of a normal programming language, but is intended for human reading rather than machine (compiler/interpreter) reading. Algorithm and flowchart are said as pseudo code.

Source Code

- When a programmer types a sequence of C programming language statements on a text editor and save it with **.c** file extension, is said as source code.

Object Code

- Object code is machine code(executable code/binary code/ combination of bibary numbers) which is not connected with the library/external header files, but contain machine code of all stepwise statements written in current program. Some tasks would be unsuccessful due to absent of library files. The library files could be connected with this machine code with help of linkers.

Machine Code

- Machine code is binary code (combination of 1 and 0) that could execute directly from processor. If we open a machine code file in a text editor we will see binary numbers and unreadable characters in short garbage values. Thses codes are not readable hu human being.

Testing

- Testing is a process of verifying and validating that a programme is bug free and meets the technical requirements as guided by its design and development and meets the user requirements effectively and efficiently with handling all the exceptional and boundary cases.

Debugging

- Debugging is the process of fixing a bug in programme. It is a process to identify, analyze and remove errors. This activity begins after the source code fails to execute properly and concludes by solving the problem and successfully testing the software. It is considered to be an extremely complex and tedious task because errors need to be resolved at all stages of debugging.

Syntax Error

- Thsese errors result when rules of syntax of programmming language are not followed. Such programming errors typically involve incorrect pountuation, incorrect word sequence terms, misuse of terms.,

Linking Error

- To build an executable file the linker collects files and libraries. Linking errors may occurs during the linking process. Example- if we call a function in main() which is not defined then a linking error will be displayed.

Runtime Error

- After compiling and linking, output may be wrong due to errors in logic or division by zero, square root of negative number, which is not possible on the system, These erroprs are detected by computer at the time execution of program.

Logical Error

- Thsese errors occur in planning the programmes logic. In this case, the language compiler successfully translates the source code in machine code. A computer actually does not know that an error has been made. It follows the programme instructions and outputs the result, but the result of the out may not be correct.

Storage class of C

A storage class represents visibility and a location of a variable. It tells from what part of code it can be accessed. A storage class is used to describe the following things: scope of variable, variable creation memory location, initial value of variable and lifetime of variables.

- Automatic: int x; or auto int x;
- Register: register int x;
- External: extern int x;
- static: static int x;

Table 1: Different features of storage classes of C

Storage Specifier	Storage	Initial Value	Scope	Life
auto	stack	garbage	within block	end of block
extern	data segment	zero	global multiple files	till end of programme
static	data segment	zero	within block	till end of programme
register	CPU register	garbage	within block	end of block

Type Conversion

- Type conversion refers to changing a variable of one data type into another. The compiler will automatically change one type of data into another if it makes sense.
- bool → char → short int → int → unsigned int → long → unsigned → long long → float → double → long double

Implicit Type Conversion

- When the type conversion is performed automatically by the compiler without programmers intervention, such type of conversion is known as implicit type conversion or type promotion.

Explicit Type Conversion

- This type of conversion performed by the programmer by posing the data type of the expression of specific type is known as explicit type conversion. This is also known as type casting.
- Syntax: (data_type) expression

Example

```c
#include<stdio.h>
int main()
{
  int x;
  for(x=97; x<=122; x++)
  {
    printf("%c", x);    /*Implicit casting from int to char
      thanks to %c*/
  }
return 0;
}
```

Output

abcdefghijklmnopqrstuvwxyz

Example

```c
#include<stdio.h>
int  main()
{
  int a=7, b=5 ;
  float c;
  c=a/b;     /*Here the value of c is 1.000000*/
  printf("Value of c is: %f ", c);

//Explicit Type Conversion
  int x=7, y=5;
  float z;
  z = (float)x/(float)y;  /*Value of z is 1.400000*/
  printf("Value of z is: %f ", z);
  return 0;
}
```

Output

Value of c is: 1.000000
Value of z is: 1.400000

goto Statement

M1:
Introduction to
C
Programming-II

Mr. J. Mishra
MGCUB, INDIA

Objectives

Introduction

Different Codes

Testing and
Debugging

Storage Class

Type Conversion

goto Statement

Tertiary
Operator

sizeof() Operator

Exercise

References

Example (Iterative Operation)

```c
#include <stdio.h>
int main()
{
    int number;
    number=1;

repeat:
    printf("%d\t",number);
    number++;
    if(number<=10)
        goto repeat;

    return 0;
}
```

Output

12345678910

Syntax

value=condition? expression1: expression2;

Example

```c
#include<stdio.h>
int main()
{
  int a, b, c, largest;
  printf("Enter three number: ");
  scanf("%d%d%d", &a,&b,&c);
  largest=a>b?(a>c?a:c):(b>c?b:c);
  printf("Largest number is %d", largest);
  return 0;
}
```

Output

Enter three number: 4 2 8
Largest number is 8

Example

```c
#include<stdio.h>
int main()
{
_Bool b;  printf("Size of b: %ld byte", sizeof(b));
char ch;  printf("Size of ch: %ld byte", sizeof(ch));
int x;     printf("Size of x: %ld byte", sizeof(x));
float f;  printf("Size of f: %ld byte", sizeof(f));
double d; printf("Size of d: %ld byte", sizeof(d));
return 0;
}
```

Output

Size of b: 1 byte
Size of ch: 1 byte
Size of x: 4 byte
Size of f: 4 byte
Size of d: 8 byte

- Differentiate between testing and debugging.
- Describe different storage class in C language.
- What is type casting? Explain with suitabel example.
- Write a program to find a given number is even or odd by using ?: operator.
- Write a program to find the size of an array[20] variable which is double in data type.
- Write a program to find a given year is leapyear or not.

K. Yashwant, "Let us c," *Array and pointers, 7th edition, BPB publication*, 1999.

S. Jain, *Programming and Problem Solving through C Language Design.* BPB Publications, 2003.

M1:
Introduction to
C
Programming-II

Mr. J. Mishra
MGCUB, INDIA

Objectives

Introduction

Different Codes

Testing and
Debugging

Storage Class

Type Conversion

goto Statement

Tertiary
Operator

sizeof() Operator

Exercise

References

Get in touch via...

+91 9046174189

✉: jaynath4025@gmail.com

Thank You...