Chp 2 Constants, Variables, data types

* Character set

The characters in C are grouped into the following categories

1. Letters
2. digits
3. Special characters
4. white spaces. (Ignored by compiler unless they are part of string).

* Key words.

All keywords have fixed meaning and their meaning cannot be changed. All keywords are written in lowercase.

auto	double	int	struct
break	else	long	switch
case	enum	register	typedef
char	extern	return	union
const	float	short	unsigned
continue	for	signed	void
default	goto	sizeof	volatile
do	if	static	while

→ 32 keywords

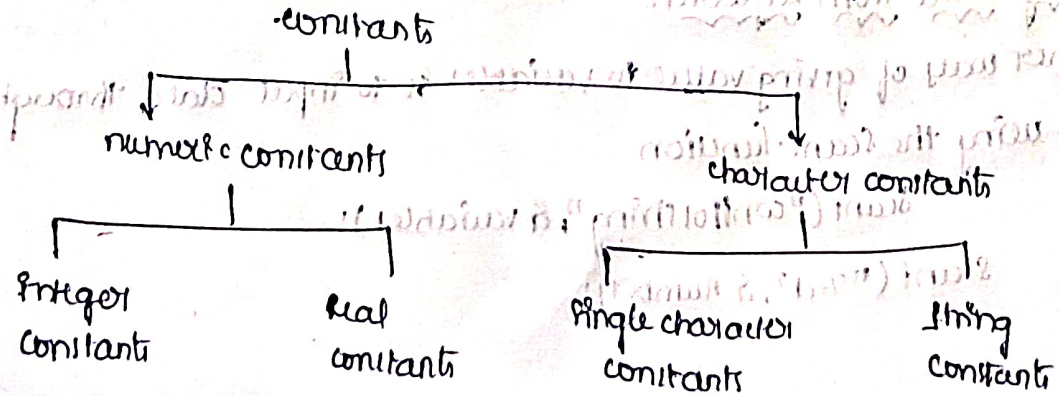
* Identifiers → User defined names for variables, functions, and arrays.

Rules

1. First character must be an alphabet or underscore
2. must consist of only letters, digits or underscore
3. only first 31 characters are significant
4. cannot use a keyword
5. must not contain white space.

* Constants

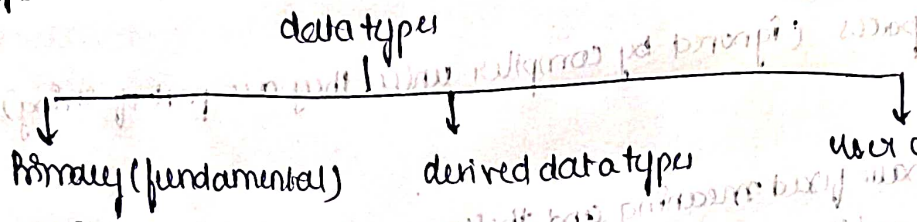
Constants in C refer to fixed value that do not change during the execution of Program.



* variables

A variable is data name that may be used to store the data value. A variable may take different values at different times during execution. To create the variable it should follow the rules of identifiers.

- data types



→ int
→ char
→ float
→ double
→ void.

- declaration of variables

1. It tells the compiler what the variable name is
2. It specifies what type of data the variable will hold

Syntax

data type $v_1, v_2, v_3 \ldots$;

Eg: int count;
double ratio;
int number, total;

- Assignment statement

Values can be assigned to variables using the assignment operator = as follows

variable_name = constant;

Eg: initial_value = 0;
balance = 75.84;

- Reading data from keyword.

Another way of giving value to variables is to input data through keyboard using the scanf function.

scanf("control string", &variable);

Eg: scanf("%d", &number);

1) Example for scanf function()

```
#include <stdio.h>
main()
{
 int number;
 Printf("Enter a integer number\n");
 Scanf("%d", &number);
 if (number < 100)
     Printf("is smaller than 100\n");
 else
     Printf("your number contain more than 2 digits\n");
}.
```

2) Interest program with manual input from keyboard.

```
#include <stdio.h>
main()
{
 int year, period;
 float amount, inrate, value;
 Printf("Input amount, interest rate and period\n");
 Scanf("%f %f %d", &amount, &inrate, &period);
 year = 1;
 while(year <= period)
   {
     value = amount + inrate * amount;
     Printf("%d Rs %.2f\n", year, value);
     amount = value;
     year = year + 1;
   }
}
```

```c
#include <stdio.h>
int main()
{
    int n, i;
    float sum = 0.0;
    printf("Enter the value of n: ");
    scanf("%d", &n);
    for(i = 1; i <= n; i++)
    {
        sum=sum+( 1.0 / i);
    }
    printf("Sum of Harmonic Series = %.2f\n", sum);
    return 0;
}
```

```
suprtya@ubuntu:~/Desktop/c/chp2$ ./harmonic
Enter the value of n: 3
Sum of Harmonic Series = 1.83
```

```
supriya@ubuntu:~/Desktop/c/chp2$ cat price.c
/*price in paisa*/
#include <stdio.h>
int main()
{
    float price;
    int paise;
    printf("Enter the price in decimal form ");
    scanf("%f", &price);
    paise = (int)(price * 100);
    printf("Price in paise = %d\n", paise);
    return 0;
}
supriya@ubuntu:~/Desktop/c/chp2$ ./price
Enter the price in decimal form 15.46
Price in paise = 1546
```

```c
/*even numbers from 1to 100*/
#include <stdio.h>
int main()
{
    int i;
    printf("Even numbers from 1 to 100:\n");
    for(i = 2; i <= 100; i += 2)
    {
        printf("%d ", i);
    }
    printf("\n");
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./even
Even numbers from 1 to 100:
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56
 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100
```

```c
/*division of 2 float*/
#include <stdio.h>
int main()
{
    float a, b;
    printf("Enter two float numbers: ");
    scanf("%f %f", &a, &b);
    if(b != 0)
        printf("%.2f / %.2f = %.2f\n", a, b, a/b);
    else
        printf("Division by zero is not allowed.\n");
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./div
Enter two float numbers: 1.6 4.6
1.60 / 4.60 = 0.35
```

```c
/*display the list of groceries*/
#include<stdio.h>
int main()
{
        float rice,sugar;
        rice =16.75;sugar=15.00;
        printf("*** LIST OF ITEMS***\n");
        printf("Rice\t RS\t %.2f\n",rice);
        printf("Sugar\t RS\t %.2f\n",sugar);
                return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./list
*** LIST OF ITEMS***
Rice     RS      16.75
Sugar    RS      15.00
```

```c
/*count pos and neg numbers and 0 to terminate*/
#include <stdio.h>
int main()
{
    int num, pos = 0, neg = 0;
    printf("Enter numbers:\n");
    while(1)
    {
        scanf("%d", &num);
        if(num == 0)
            break;
        if(num > 0)
            pos++;
        else
            neg++;
    }
    printf("Positive numbers: %d\n", pos);
    printf("Negative numbers: %d\n", neg);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./num
Enter numbers:
-9 7 6 -8 46 16 -5 0
Positive numbers: 4
Negative numbers: 3
```

```c
/*sum of numbers*/
#include <stdio.h>
int main()
{
    int x, y, z;
    x = 123456;
    y = 654321;
    z = (short)(x + y);
    printf("x = %d\n", x);
    printf("y = %d\n", y);
    printf("z = %d\n", z);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./sum
x = 123456
y = 654321
z = -8655
```

```c
/*sum of 2 float and sum as int*/
#include <stdio.h>
int main()
{
        int sum;
    float a, b;
    printf("Enter two floating point numbers: ");
    scanf("%f %f", &a, &b);
    sum = a + b;
    printf("a = %.2f, b = %.2f, sum = %d\n", a, b, sum);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./float
Enter two floating point numbers: 16.46 46.16
a = 16.46, b = 46.16, sum = 62
```

```c
/*using typedef*/
#include <stdio.h>
typedef unsigned int uint;
int main()
{
    uint a = 100, b = 200;
    uint sum = a + b;
    printf("a = %u, b = %u, sum = %u\n", a, b, sum);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./type
a = 100, b = 200, sum = 300
```

```
supriya@ubuntu:~/Desktop/c/chp2$ cat def.c
/*using define*/
#include <stdio.h>
#define PI 3.14159
#define RADIUS 5
int main()
{
    float area = PI * RADIUS * RADIUS;
    printf("Area of circle with radius %d = %.2f\n", RADIUS, area);
    return 0;
}

supriya@ubuntu:~/Desktop/c/chp2$ ./def
Area of circle with radius 5 = 78.54
```

```
/* Use const keyword to define pi and calculate area of a circle*/
#include <stdio.h>
int main() {
    const float PI = 3.1416;
    float r = 5, area;
    area = PI * r * r;
    printf("Area of circle = %.2f\n", area);
    return 0;
}

supriya@ubuntu:~/Desktop/c/chp2$ ./const
Area of circle = 78.54
```

```c
/* Declare variables of all basic data types and print values*/
#include <stdio.h>
int main()
{
    int a = 10;
    float b = 5.5;
    char c = 'X';
    double d = 123.456789;
    printf("int=%d, float=%.1f, char=%c, double=%.6f\n", a, b, c, d);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./vari
int=10, float=5.5, char=X, double=123.456789
```

```c
/* Print size of each data type using sizeof*/
#include <stdio.h>
int main()
{
    printf("Size of int=%lu\n", sizeof(int));
    printf("Size of float=%lu\n", sizeof(float));
    printf("Size of char=%lu\n", sizeof(char));
    printf("Size of double=%lu\n", sizeof(double));
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./size
Size of int=4
Size of float=4
Size of char=1
Size of double=8
```

```c
/* Swap two numbers (using third variable)*/
#include <stdio.h>
int main()
{
    int a, b, temp;
    printf("Enter two numbers: ");
    scanf("%d %d", &a, &b);
    temp = a; a = b; b = temp;
    printf("After swap: a=%d, b=%d\n", a, b);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./swap
Enter two numbers: 6 7
After swap: a=7, b=6
```

```c
/* Swap two numbers (without third variable)*/
#include <stdio.h>
int main()
{
    int a, b;
    printf("Enter two numbers: ");
    scanf("%d %d", &a, &b);
    a = a + b;
    b = a - b;
    a = a - b;
    printf("After swap: a=%d, b=%d\n", a, b);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./temp
Enter two numbers: 4 6
After swap: a=6, b=4
```

```c
/* Find ASCII value of a character*/
#include <stdio.h>
int main()
{
    char ch;
    printf("Enter a character: ");
    scanf(" %c", &ch);
    printf("ASCII value of %c = %d\n", ch, ch);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./ascii
Enter a character: s
ASCII value of s = 115
```

```c
/*Print character from ASCII value*/
#include <stdio.h>
int main()
{
    int code;
    printf("Enter ASCII code (0-127): ");
    scanf("%d", &code);
    printf("Character for ASCII %d = %c\n", code, code);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./char
Enter ASCII code (0-127): 94
Character for ASCII 94 = ^
```

```c
/* Calculate average of 3 numbers*/
#include <stdio.h>
int main() {
    int a, b, c;
    printf("Enter 3 numbers: ");
    scanf("%d %d %d", &a, &b, &c);
    printf("Average = %d\n", (a+b+c)/3);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp2$ ./avg
Enter 3 numbers: 4 5 6
Average = 5
```