4. Managing input and output operations

* Reading a character

Standard input → from keyboard
Standard output → on screen.

Reading a single character can be done by using the function getchar or scanf

variable-name = getchar();

Eg: char name;
name = getchar();

1) demonstrating of getchar function.

```
#include <stdio.h>
main()
{
char answer;
printf("would you like to know my name? \n");
printf("Type Y for YES and N for NO:");
answer = getchar();
if (answer == 'Y' || answer == 'y')
    printf("My name is Buvy\n");
else
    printf("You are good for nothing\n");
}
```

2) using isalpha or isdigit

```
#include<stdio.h>
#include <ctype.h>
main()
{
 char character;
 printf("Press any key\n");
 character = getchar();
 if (isalpha(character) >0)
    printf("The character is a letter\n");
 else
    if (isdigit(character) > 0)
      printf("The character is a digit");
 else
      printf("The character is not a alphanumeric.");
}
```

* writing a character.

like getchar, there is an analogous function putchar for writing characters one at a time to the terminal

```
putchar(variable_name);
```

3) demonstrating of putchar (islower, toupper, tolower).

```
#include<stdio.h>
#include<ctype.h>
main()
{
  char alphabet;
  printf("enter an alphabet\n");
  alphabet = getchar();
  if(islower(alphabet))
    putchar(toupper(alphabet));
  else
    putchar(tolower(alphabet));
}
```

* formatted input

By scanf function

```
scanf("control string", arg1, arg2, ..., argn);
```

4) inputting integer numbers.

```
#include<stdio.h>
main()
{
 int a,b,c,x,y,z;
 int p,q,r;
 printf("enter three integer numbers\n");
 scanf("%d %d %d",&a,&b,&c);
 printf("%d %d %d\n", a,b,c);
}
```

lly we can use the scanf function to read the input from keyboard.

5) inputting Real numbers.

```
main()
{ float x,y,z;
  double p,q;
  printf("%f %f",&x,&y);
  Printf("x=%f\n y=%f\n", x,y);
  Print("value of p and q:");
  Scanf("%lf and %lf", &p, &q);
  Printf("%f %f", p,q)
}
```

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*Inputting character strings

%.ns or %.nc

6) Reading strings using %wc and %ws

```
main()
{
 int no;
 char name1[15], name2[15], name3[15];
 printf("enter serial number and name one\n");
 scanf("%d %15c", &no, name1);
 printf("%d %15s\n", no, name1);
 printf("enter serial number and name two\n");
 scanf("%d %s", &no, name2);
 printf("%d %15s\n", no, name2);
 printf("enter serial number and name three\n");
 scanf("%d %15s", &no, name3);
 printf("%d %15s\n", no, name3);
}
```

* duration of Errors in input

If scanf("%d %f %s", &a, &b, name);

We have to enter the input in same format only

7)

```
main()
{
 int a;
 float b;
 char c;
 printf("Enter values of a, b, and c\n");
 if (scanf("%d %f %c", &a, &b, &c)==3)
    printf("a=%d b=%f c=%c\n", a, b, c);
 else
    printf("Error in input\n");
}
```

* commonly used scanf format codes.

%c — Single character

%d — decimal integer

%e — floating point value

%f — floating point value

%g — "

%.h - short int
%.i - decimal, hexadecimal and octal int
%.o - octal integer
%.s - string
%.u - unsigned decimal int
%.x - hexadecimal int
%[..] - string of words.

*formatted output

using printf function.

printf("control string", arg1, arg2, arg3 ... argn);

It is similar to the scanf function.

8) output of integer numbers

%.wd

```
main()
{
int m = 12345;
printf("%d\n", m);
printf("%10d\n", m);
printf("%010d\n", m);
}
```

9) output of real numbers.

```
main()
{
float y = 98.76543;
printf("%7.4f\n", y);
printf("%f\n", y);
printf("%10.2e\n", y);
printf("%12.4e\n", -y);
}
```

* Enhancing the readability of output

1. provide enough blank space between two numbers
2. introduce appropriate headings and variable names in the output
3. print special messages whenever a peculiar condition occurs in the output
4. introduce blank lines between the important sections of the output

10) Basic input and output

```
#include <stdio.h>
int main()
{
 int a;
 float b;
 char c;
 printf("enter a integer: ");
 scanf("%d", &a);
 printf("enter a float: ");
 scanf("%f", &b);
 printf("enter a character: ");
 scanf("%c", &c);
 printf("you entered: %d, %.2f, %c\n", a, b, c);
 return 0;
}
```

11) character I/O using getchar() and putchar()

```
#include <stdio.h>
int main()
{
 char ch;
 printf("enter a character: ");
 ch = getchar();
 printf("you entered: ");
 putchar(ch);
 return 0;
}
```

12) multiple inputs

```
#include <stdio.h>
int main() {
 int x, y, z;
 printf("enter three integers: ");
 scanf("%d %d %d", &x, &y, &z);
 printf("sum = %d\n", x+y+z);
 printf("prod = %d\n", x*y*z);
 printf("avg = %.2f\n", (x+y+z)/3.0);
 return 0;
}
```

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```c
#include <stdio.h>
#include <string.h>
int main()
{
        char str[] = "WORDPROCESSING";
        printf("(a) %s %s\n", "WORD", "PROCESSING");
        printf("(b)\n%s\n%s\n", "WORD", "PROCESSING");
        printf("(c) W.P.\n");
        return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp4$ ./string
(a) WORD PROCESSING
(b)
WORD
PROCESSING
(c) W.P.
```

```
#include <stdio.h>
int main()
{
        float x, y;
        printf("Enter values of x and y: ");
        scanf("%f %f", &x, &y);
        if (x != y)
                printf("(a) (x+y)/(x-y) = %.2f\n", (x + y) / (x - y));
        else
                printf("(a) Division by zero not allowed\n");
        printf("(b) (x+y)/2 = %.2f\n", (x + y) / 2);
        printf("(c) (x+y)(x-y) = %.2f\n", (x + y) * (x - y));
        return 0;
}
supriya@ubuntu:~/Desktop/c/chp4$ ./exp
Enter values of x and y: 4 5
(a) (x+y)/(x-y) = -9.00
(b) (x+y)/2 = 4.50
(c) (x+y)(x-y) = -9.00
```

```c
#include <stdio.h>
#include <math.h>
int main() {
    float a = 35.7, b = 50.21, c = -23.73, d = -46.45;
    printf("Rounded values:\n");
    printf("%.2f -> %d\n", a, (int)round(a));
    printf("%.2f -> %d\n", b, (int)round(b));
    printf("%.2f -> %d\n", c, (int)round(c));
    printf("%.2f -> %d\n", d, (int)round(d));
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp4$ ./int
Rounded values:
35.70 -> 36
50.21 -> 50
-23.73 -> -24
-46.45 -> -46
```

```c
#include <stdio.h>
int main()
{
    int a, b;
    printf("Enter two two-digit integers: ");
    scanf("%d %d", &a, &b);
    int d1 = b % 10;
    int d2 = b / 10;
    int p1 = a * d1;
    int p2 = a * d2;
    int result = a * b;
    printf("      %d\n", a);
    printf("  x   %d\n", b);
    printf(" --------\n");
    printf("%2d x %d is %4d\n", d1, a, p1);
    printf("%2d x %d is %4d\n", d2, a, p2);
    printf("Add them %4d\n", result);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp4$ ./mul
Enter two two-digit integers: 46 16
      46
  x   16
 --------
 6 x 46 is  276
 1 x 46 is   46
Add them  736
```

```c
/* Read 3 integers and output in different ways*/
#include <stdio.h>
int main()
{
    int a, b, c;
    printf("Enter three integers: ");
    scanf("%d %d %d", &a, &b, &c);
    printf("%d ", a);
    printf("%d ", b);
    printf("%d\n", c);
    printf("%d %d %d\n", a, b, c);
    printf(a > 0 ? "   " : "");
    printf(b > 0 ? "   " : "");
    printf(c > 0 ? "   " : "");
    printf("%d %d %d\n", a, b, c);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp4$ ./out
Enter three integers: 1 2 3
1 2 3
1 2 3
```

```c
/*Exponential format printing*/
#include <stdio.h>
int main()
{
    double x = 10.45678;
    printf("(a) %.2e\n", x);
    printf("(b) %.4e\n", x);
    printf("(c) %.8e\n", x);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp4$ ./dec
(a) 1.05e+01
(b) 1.0457e+01
(c) 1.04567800e+01
```

```c
/* Fixed-point format printing*/
#include <stdio.h>
int main()
{
    double x = 345.6789;
    printf("(a) %.2f\n", x);
    printf("(b) %.5f\n", x);
    printf("(c) %.0f\n", x);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp4$ ./fix
(a) 345.68
(b) 345.67890
(c) 346
```

```c
/* Name formatting*/
#include <stdio.h>
int main()
{
    char fname[20], mname[20], lname[20];
    printf("Enter first, middle, and last name: ");
    scanf("%s %s %s", fname, mname, lname);
    printf("(a) %s %c. %s\n", fname, mname[0], lname);
    printf("(b) %c.%c. %s\n", fname[0], mname[0], lname);
    printf("(c) %s.%c.%c.\n", lname, fname[0], mname[0]);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp4$ ./name
Enter first, middle, and last name: su priya gudela
(a) su p. gudela
(b) s.p. gudela
(c) gudela.s.p.
```

```c
/*Table of data*/
#include <stdio.h>
int main()
{
    char name1[20], name2[20];
    int code1, code2;
    float price1, price2;
    printf("Enter name, code, price for first item: ");
    scanf("%s %d %f", name1, &code1, &price1);
    printf("Enter name, code, price for second item: ");
    scanf("%s %d %f", name2, &code2, &price2);
    printf("%-10s %6s %10s\n", "Name", "Code", "Price");
    printf("%-10s %6d %10.2f\n", name1, code1, price1);
    printf("%-10s %6d %10.2f\n", name2, code2, price2);
    return 0;
}
```

```
supriya@ubuntu:~/Desktop/c/chp4$ ./table
Enter name, code, price for first item: fan 4550 6799
Enter name, code, price for second item: motor 76134 650
Name         Code      Price
fan          4550    6799.00
motor       76134     650.00
```