Chapter 4

Input & Output

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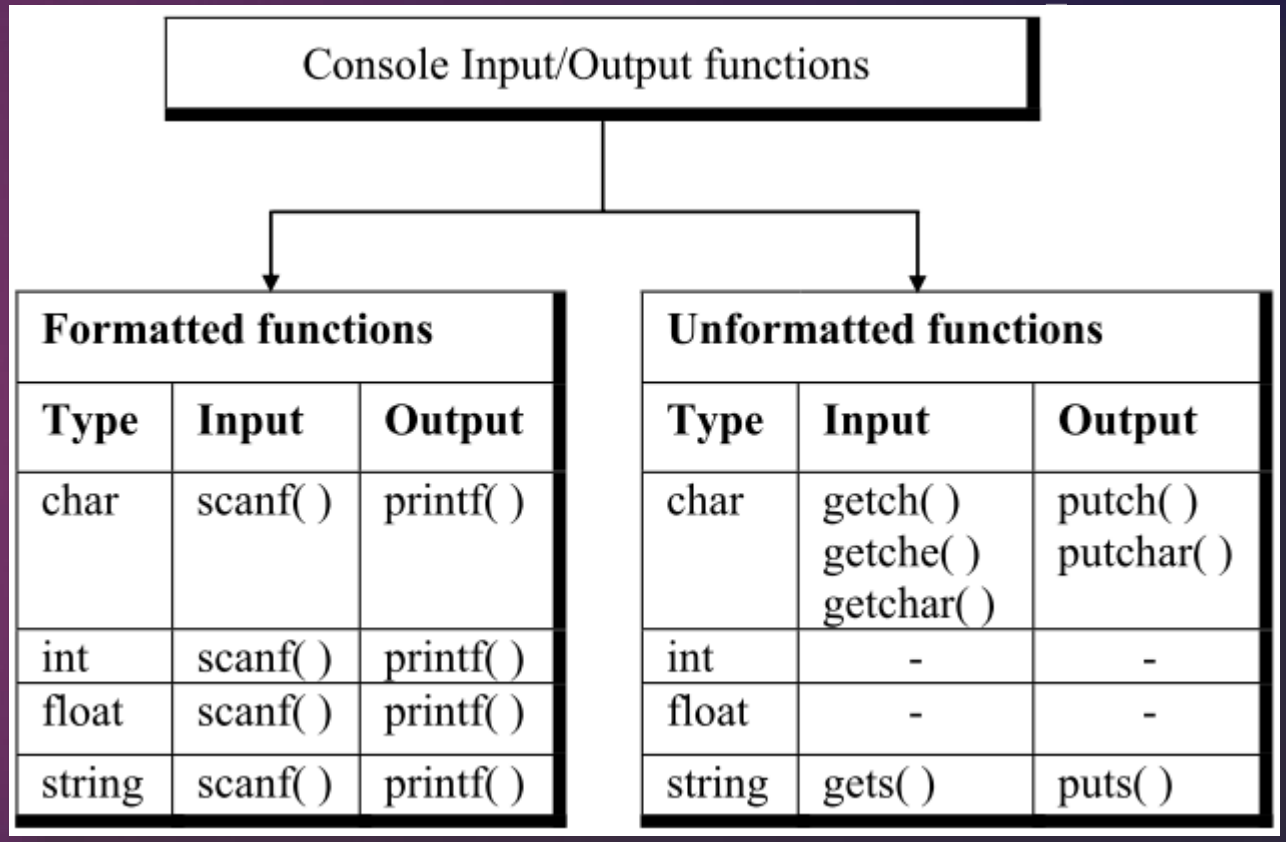
Data Input & Output

OUTPUT FUNCTIONS

- printf()
- putchar()
- puts()
- putch()

INPUT FUNCTIONS

- scanf()
- getchar()
- gets()
- getche()
- fgets()



Formatted functions

Type	Input	Output
char	scanf( )	printf( )
int	scanf( )	printf( )
float	scanf( )	printf( )
string	scanf( )	printf( )

Unformatted functions

Type	Input	Output
char	getch( ) getche( ) getchar( )	putch( ) putchar( )
int	-	-
float	-	-
string	gets( )	puts( )

Single Character Input/Output

IO_1.C

```c
# include<stdio.h>
#include<conio.h>
void main( ){
    char ch;
    printf("Type one character:") ; // message to user
    ch = getchar() ;
    printf("The character you typed is = %c", ch) ; // output
    getch();
}
```

IO_2.C

```c
#include<stdio.h>
#include<conio.h>
void main( ){
    char in; // character declaration of variable in.
    printf ("Please enter one character:"); // message to user
    in = getchar( ) ; // assign the keyboard input value to in.
    printf("The character you typed is %c.\n", in) ; // output
    putchar(in); // output 'in' value to standard screen.
    getch();
}
```

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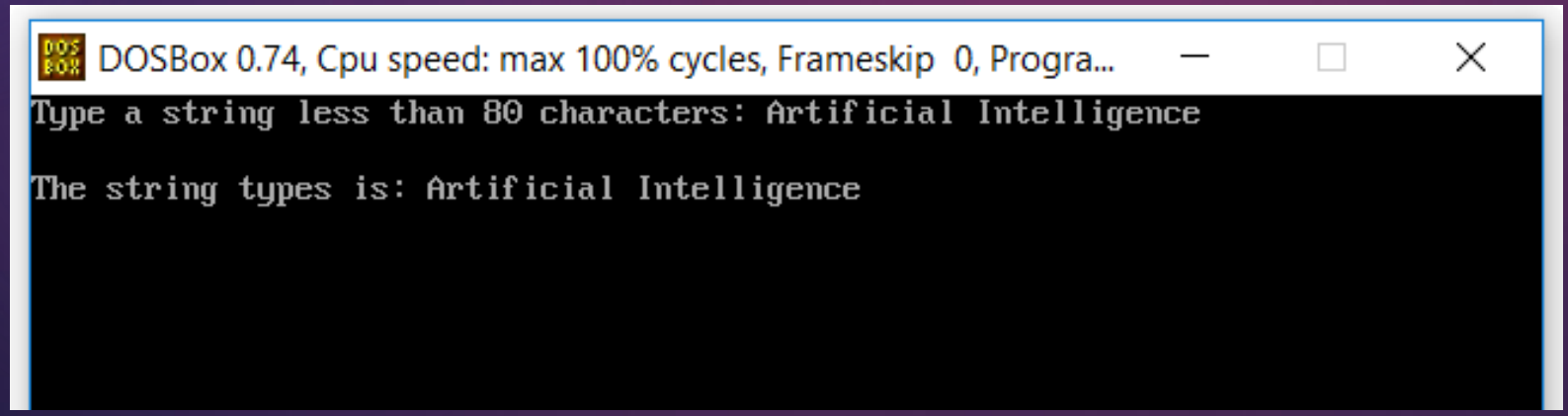
String Input/Output

IO_3.C

```c
#include<stdio.h>
#include<conio.h>
void main( ){
  char s[80];
  printf("Type a string less than 80 characters: ");
  gets(s);
  printf("\nThe string types is: ");
  puts(s);
  getch();
}
```



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Formatted Functions

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Formatted-Input

- scanf()
- scanf ("control string", arg1, arg2, arg3, …, argn);

Input Specifications for Integer Number: %xd

- For Long Integer: %ld
- For Short Integer: %hd

Input Specifications for Real Number:

- scanf ("%f", &variable);

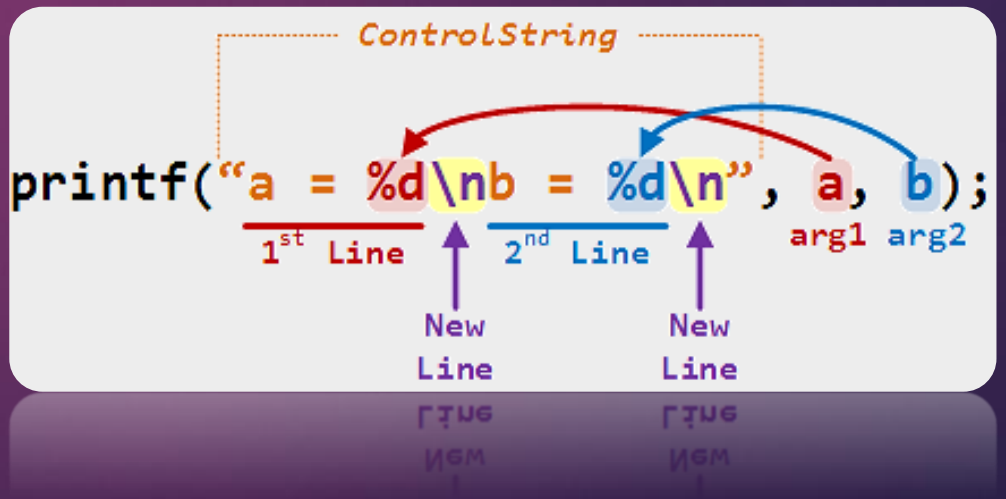
Input Specifications for a Character:

- scanf ("%c %15c", &ch, name)

Formatted-Output

- printf()
- printf ("conversion string", variable_list);

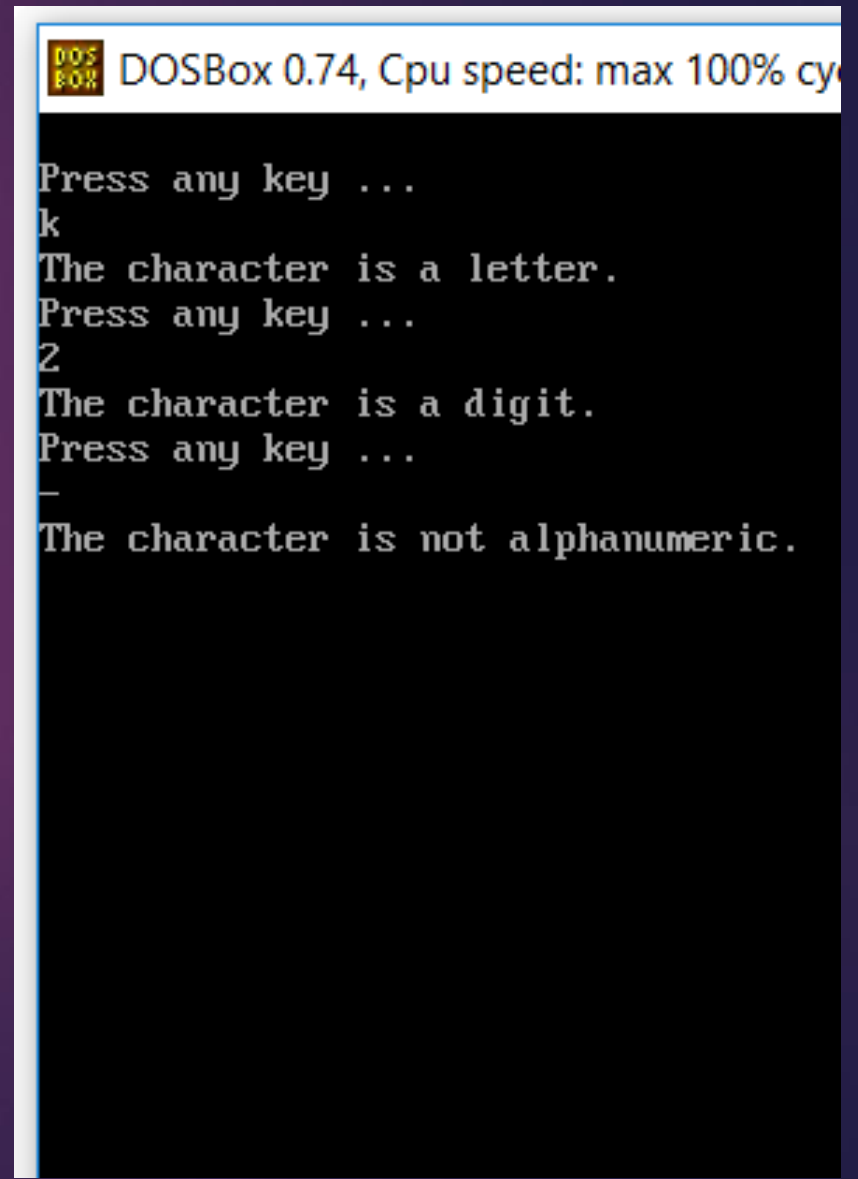
Conversion Strings and Specifiers:



Eg#4: Checking Character Type

IO_4.C

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



Eg#5: Reading & Writing of Alphabets in Reverse Case


```
#include<stdio.h>
#include <ctype.h>
void  main(){
      char alphabet;
      printf("Enter an alphabet");
      putchar('\n');    /* move to next line */
      alphabet = getchar();
      if (islower(alphabet)){
          putchar(toupper(alphabet));
      }else{
          putchar(tolower(alphabet));
      }
}
```

Output

```
Enter an alphabet
a
A
Enter an alphabet
Q
q
Enter an alphabet
z
Z
```

Commonly Used printf Format Codes

Specifier	Meaning
%c	Print a character
%d	Print a Integer
%i	Print a Integer
%e	Print float value in exponential form.
%f	Print float value
%g	Print using %e or %f whichever is smaller
%o	Print octal value
%s	Print a string
%x	Print a hexadecimal integer (Unsigned) using lower case a-f
%X	Print a hexadecimal integer (Unsigned) using upper case A-F
%a	Print a unsigned integer.
%p	Print a pointer value
%hx	Print hex short
%lo	Print an octal long
%ld	Print a long integer

Formatted Output

General Form: %[flag][field_width][.precision]conversion_char

- [flag], [field_width] & [.precision] are optional

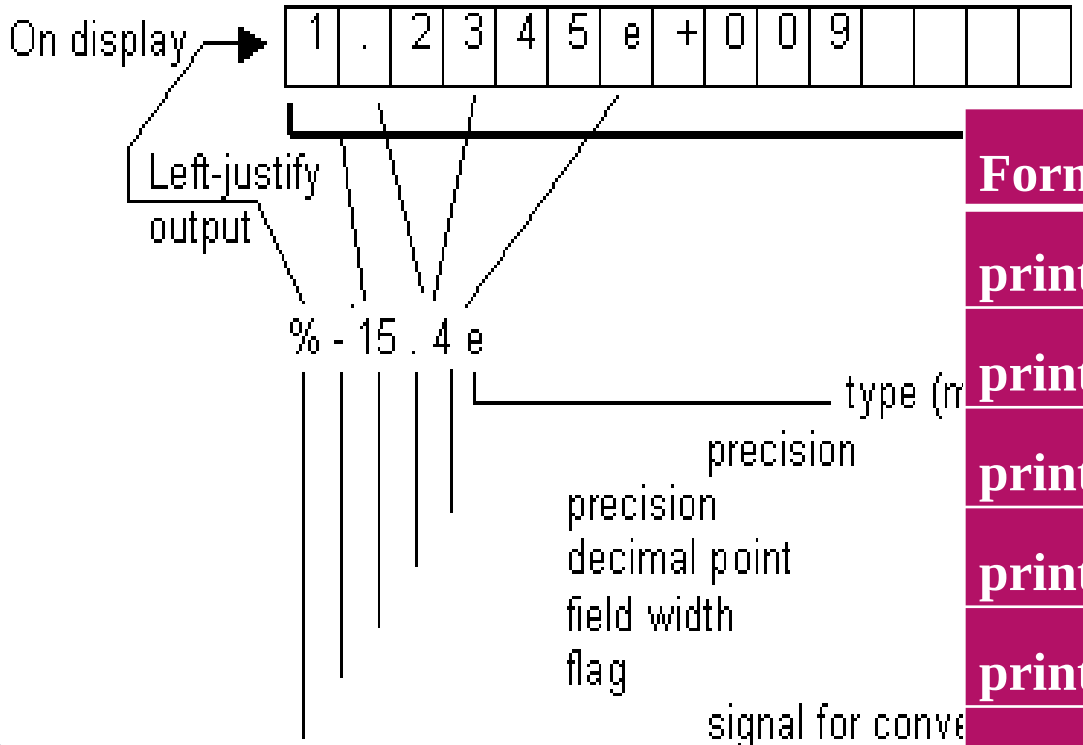
Printing Integer Numbers

Note: 0 pads with zeros the leading blanks, - used for left justification

Format	Output					
printf("%d",9876)	9	8	7	6		
printf("%6d",9876)			9	8	7	6
printf("%2d",9876)	9	8	7	6		
printf("%-6d",9876)	9	8	7	6		
printf("%06d",9876)	0	0	9	8	7	6

Printing Real Numbers: float y = 98.7654;

```
Code        income=1234567890.12;
            printf("%-15.4e",income);
```




```
DOSBox 0.
98.7654
  98.77
98.77
98.765404
  9.88e+01
-9.8765e+01
9.88e+01
9.876540e+01
```

Format	Output									
printf("%7.4f",y)	9	8	.	7	6	5	4			
printf("%7.2f",y)			9	8	.	7	7			
printf("%-7.2f",y)	9	8	.	7	7					
printf("%f",y)	9	8	.	7	6	5	4			
printf("%10.2e",y)			9	.	8	8	e	+	0	1
printf("%11.4e",-y)	-	9	.	8	7	6	5	e	+	0	1
printf("%-10.2e",y)	9	.	8	8	e	+	0	1		
printf("%e",y)	9	8	.	7	6	5	4			

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Printing a single character


```
char ch = 'Y';
putchar(ch);
```

Printing Strings
"NEW YEAR 2075"

Specification	Output
%s	NEW YEAR 2075
%20s	NEW YEAR 2075
%20.10s	NEW YEAR 2
%.5s	NEW Y
%-20.10s	NEW YEAR 2
%5s	NEW YEAR 2075

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Printing Mixed Data

printf("%d %s %f %c", a, b, c, d);

- // Outputs Integer String Float Character

Formatted Input

General Form:
[whitespace_char][ordinary_char]%[field_width]conversion_char

- [whitespace_char], [ordinary_char] & [field_width] are optional

Points to be cared using scanf()

- Arguments of scanf() must be address *except control string*.
- Format specifications must match the arguments in order.
- Input data item(s) must be separated by any white space and must match the variable(s) receiving the input in the same order.
- While searching for a value, scanf() ignores all the white spaces like tabs, new line, etc.
- If field width is used, it should be large enough to the size of input data.
- When scanf() encounters an invalid value of the data item being read, the reading will be terminated.
- Any unread data item(s) in a line will be considered as a part of next scanf() call.

Inuptting/Scanning Integer Number

Using Formatted Input

scanf("%d", &a);

Inuptting Real Number

Using Formatted Input

scanf("%f", &a);

Inuptting a character using scanf()

char ch;

scanf("%c", &ch);

IO_1_1.C | IO_4.C | Op2.c

```
1  # include<stdio.h>
2  #include<conio.h>
3  void main( ){
4      int a;
5      char ch;
6      clrscr();
7      printf("Enter a: ");
8      scanf("%d",&a);
9      printf("Type one character:");
10     //scanf("%c", &ch);
11     scanf(" %c", &ch);
12     printf("Integer a = %d, Character ch = %c", a, ch);
13     getch();
14 }
```

DOSBox 0.74, Cpu speed: max 100% cycles, Frameskip 0

```
Enter a: 2
Type one character:Integer a = 2, Character ch =

Enter a: 3
Type one character:i
Integer a = 3, Character ch = i_
```

Inuptting Strings

Using Formatted Input

```
char name[20];
scanf("%s", name);
```

Mixed Input


```
int a;
char b[100];
float c;
char d;
scanf("%d%s%f%c", &a, b, &c, &d);
```

- // Inputs Integer String Float Character

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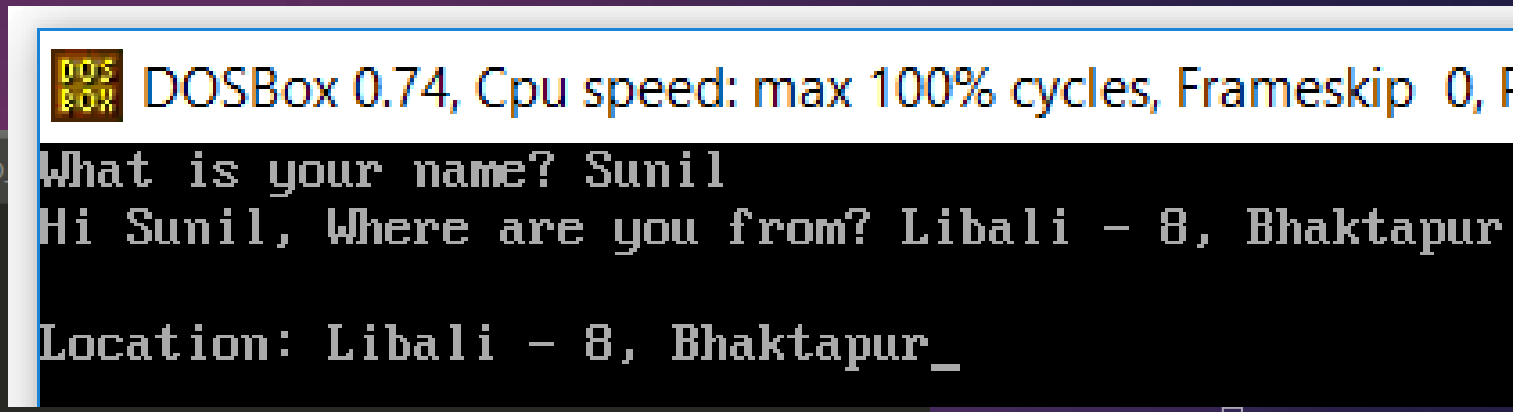
Interactive (conversional) programming

IO_1_1.C • IO_6.C •

```c
#include<stdio.h>
#include<conio.h>
void main( ){
    char name[100], address[100];
    clrscr();
    printf("What is your name? ");
    scanf("%s", name);
    fflush(stdin);
    printf("Hi %s, Where are you from? ", name);
    gets(address);
    printf("\nLocation: %s", address);
    getch();
}
```



Search Set

The search set for different purposes can be defined as follows:

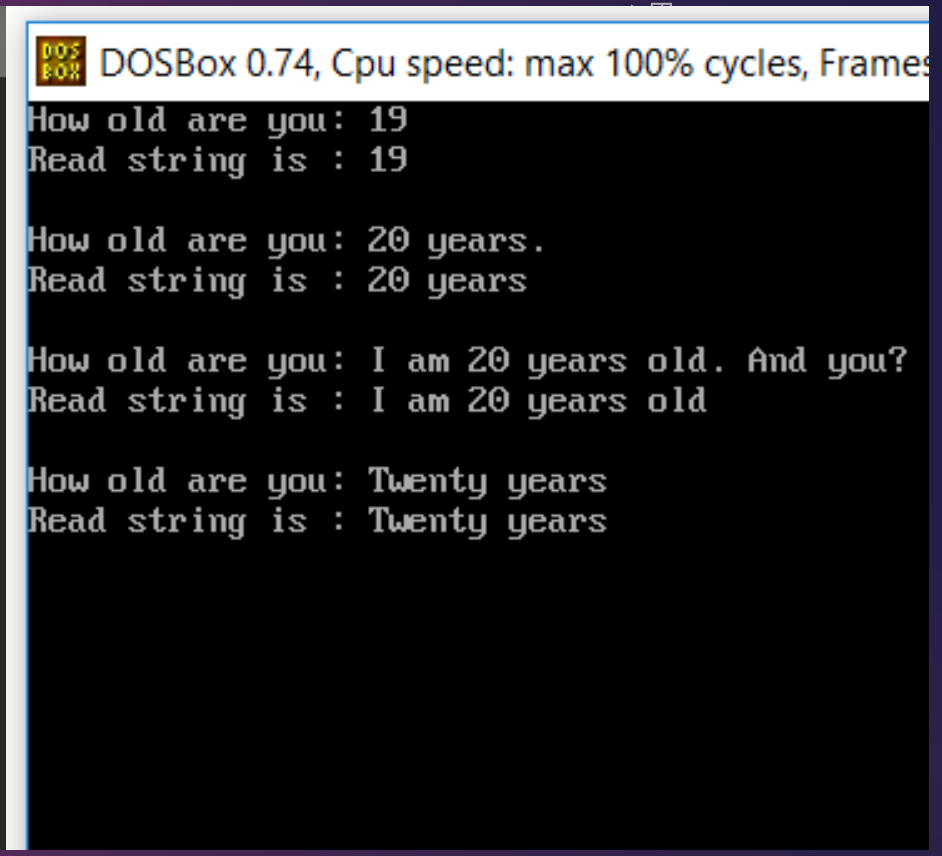
- To read all decimal digits - %[0123456789] or %[0-9]
- To read all uppercase characters - %[A-Z]
- To read all lowercase characters - %[a-z]
- To read all decimal digits & alphabets - %[0-9a-zA-Z]
- To read digits from 1 to 5 & p-z - %[1-5p-z]

Note:- Minus Sign(-) used in search set must be lexically less than one after it i.e A-Z is valid, but Z-A is invalid.

Search Set (Eg#1)

LE2_10.C

```c
#include<stdio.h>
#include<conio.h>
void main( ){
    char str[50];
    clrscr();
    printf("How old are you: ");
    scanf("%[A-Z a-z0-9]", str);
    printf("Read string is : %s\n", str);
    getch();
}
```



Search Set (Eg#2)

LE2_10.C | LE2_11.C

```c
#include<stdio.h>
#include<conio.h>
void main( ){
    char str[50];
    clrscr();
    printf("Enter a string: ");
    scanf("%[^M]", str);
    printf("Read string is : %s\n", str);
    getch();
}
```

```
Enter a string: Match
Read string is :

Enter a string: TestMatch
Read string is : Test

Enter a string: NPL Cricket Match
Read string is : NPL Cricket

Enter a string: 001 Sandip Lamichhane'sMatch
Read string is : 001 Sandip Lamichhane's

Enter a string: TIA Nepal - International Airport
M
Read string is : TIA Nepal - International Airport
```

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Unformatted Functions

1. getchar() & putchar()
2. getch(), getche() & putch()
3. gets() & puts()

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Functions getch(), getche(), getchar()

Syntax

- character_variable = getch();
- character_variable = getche();
- putchar(character_variable);

Q/A?

Thank You!

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