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CHAPTER-5

USER DEFINED DATA TYPE – STRUCTURE , UNION & ENUM & FILE HANDLING

- What is structure ?
- Initializations and declarations
- Memory allocation functions
- Pointers with structures
- Array with structures
- Udf with structures
- Nested structures
- Introduction to union
- Difference between Structure & Union
- Enumerated Data type
- Concept of data files
- File handling
- Use of file handling functions
  - fopen, fclose, fprintf, fscanf, getw, putw, fseek,
  - ftell, rewind ,freopen, remove, rename, feof, ferror,
  - fflush, fgetpos, sprintf, snprintf, vsprintf, vsnprintf
  - fscanf, vfscanf, setbuf, setvbuf
- I/O operations
- Command line argument

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Q-1 What is structure? Explain initialization and declaration of structures.

Detail :-

- Structure is group /collection of multiple variables tht all have different Data type.
- The variables inside the structure are called members of structure.
- To declare structure in C language ,"struct" keyword can be used.

✓ **How to declare(initialize) structure with members:**

Syntax:

```
struct structure-tag
{
        datatype  variable1;
       datatype   variable2;
       datatype variable3;
}<Access Variable>;
```

Example:

```
struct emp
{
        int empid;
        char empname[20];
        float salary;
}e;
```

- The members of the structure cannot be accessed directly as other

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variables, as they are associated with a structure.

- The structure elements or member variables associated with the structure are accessed using the structure ***member operator (.) also called the dot operator*** which is used between the structure name and the member name.
- The members of the structure are accessed by two methods:

1) Accessing the values using member operator (.)
2) Accessing the values using scanf statement.

1. <u>Accessing the values using member operator (.):</u>-

Syntax:

Structure-variable **.** member-name=value;
↓
dot operator

Example:

Emp01.salary=10000;

2. <u>Accessing the values using scanf statement:-</u>
Syntax:

scanf("control string",&structure-variable . member-name);

Example:

scanf("%f",&emp01.salary);

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1 Word Question – Answer

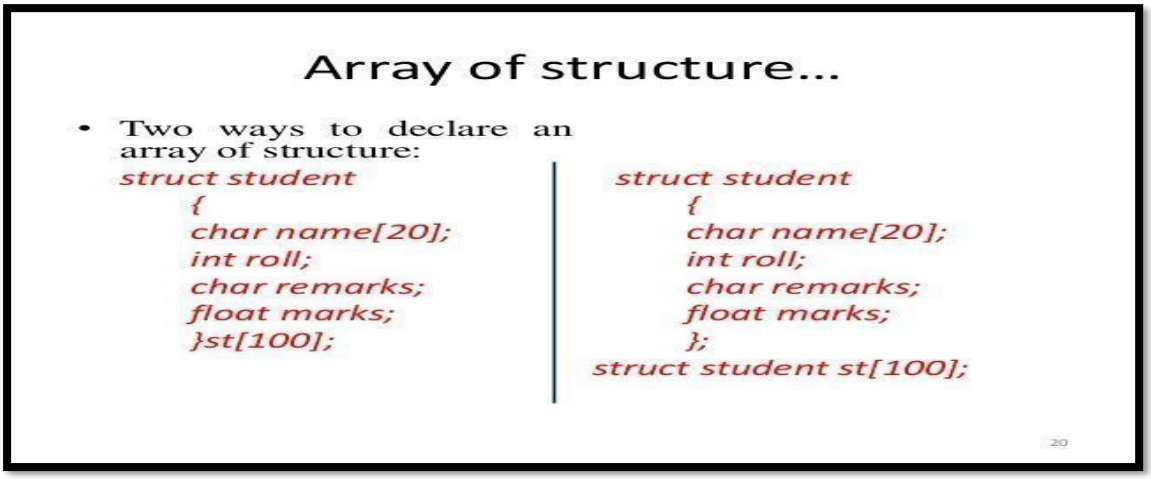
SR.NO.	QUESTION	ANSWER
1	Structure is_____datatype.	User defined
2	Structure is a collection of _____ datatypes.	Different
3	_____ keyword is used to define structure.	Struct
4	The block of structure can be terminate with _____.	;(Semi colon)
5	To access member of the structure _____ opertator can be used.	.(dot)

Q-2. Explain Array and Structure.

Detail :

- Array and structure are related in two ways:

1. Array of structure
2. Array within structure



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1. **Array of structure:**

Detail :

- Array of structure means creating the array of the type struct.

  Example:. struct student s[5];

- If we want to access the members of the structure, it can be done in following way:-

s[0].rollno	s[1].rollno
s[0].marks[0]	s[1].marks[0]
s[0].marks[1]	s[1].marks[1]
.	.
.	.
s[0].marks[4]	s[1].marks[4]

2. **Array within structure:**

Detail :

- Array within structure means the array is used as member of the structure

  Example:

```
struct student
{
        int roll;  member of structure
```

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```
        int marks[5]; // array within structure.
};
```

marks[0] → marks of subject 1

marks[1] → marks of subject

Q-3 Explain Array within Structure with example.

- Array within structure is used to create multiple elements in the same time.
- If we want to store detail of students with multiple marks at that time array within structure can be used.
- Array within structure means we create array of particular member of structure.
- It is array within structure means array can be used as member of any structure.

Syntax:

```
Struct <structure name>
        {
            <datatype>      <variable 1>;
            <datatype>      <variable 2>[size];
        }<access variable>;
```

Example:

```
Struct stud
        {
                Int rno;
                Int marks[5];  //array within structure
```

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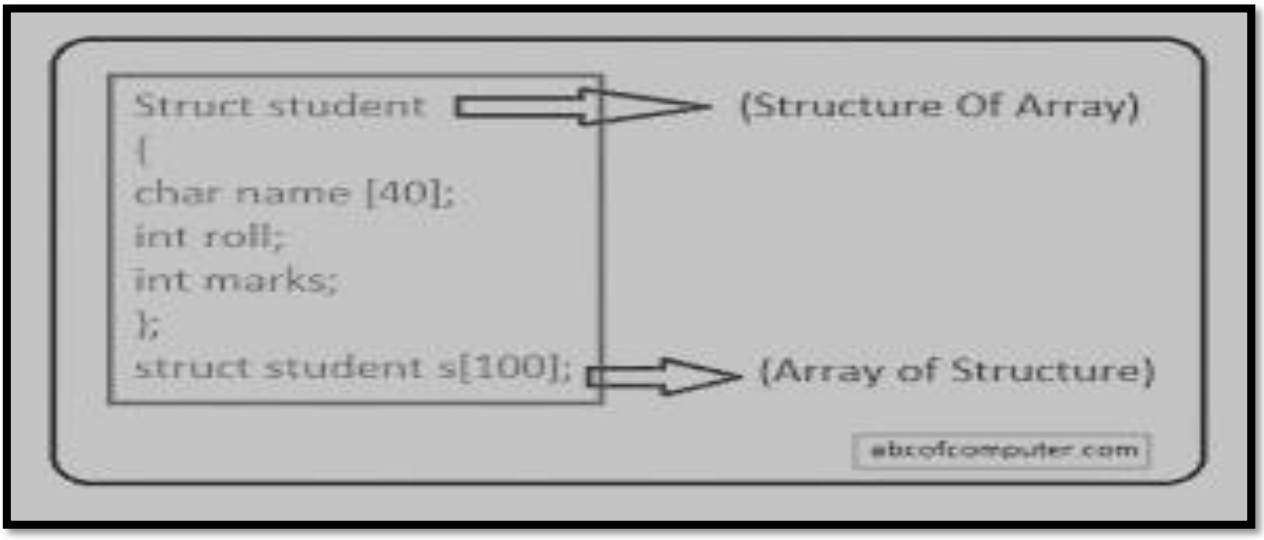
ARRAYS WITHIN STRUCRURES

- C permits the use of array as a structure members.
- We can use single or multi-dimensional array of type **int** or **float**.
- i.e.

```
Struct marks
{
    int number;
    float subject[3];
} student[2];
```



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- The array of structure means to work with more than one elements at thesame time.
- If we want to store multiple records of multiple students at that time array ofstructure can be used
- Array of structure means creating array of every elements or members ofstructure.
- The array of structure can be represented by following manner.

Syntax:

```
Struct <structure name>
 {
      <datatype>        <variable 1>;
      <datatype>       <variable 2>[size];
 }<access variable>;
```

Example:

```
Struct stud
     {
          Int rno;
          Int marks;
     }                          s[10];     //array of structure
```

1- Word Question – Answer

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SR.NO.	QUESTION	ANSWER
1	Array of structure means creating array of type_____	Struct
2	Array within structure means array is used as _____of structure	Member
3	Write down statement to declare array within structure	Struct stud s { Int rno; Int marks[5]; }s;

Q-4 Explain Pointer with Structure with example.

Detail :

- Structure is the data structure which consists of group of elements that may or may not have same data type.
- First we can define the structure like following;

Syntax:

```
struct student
{
    int roll;
    char name[20];
    char lname[20];
}struct student s1;
```

- Defining the pointer to structure

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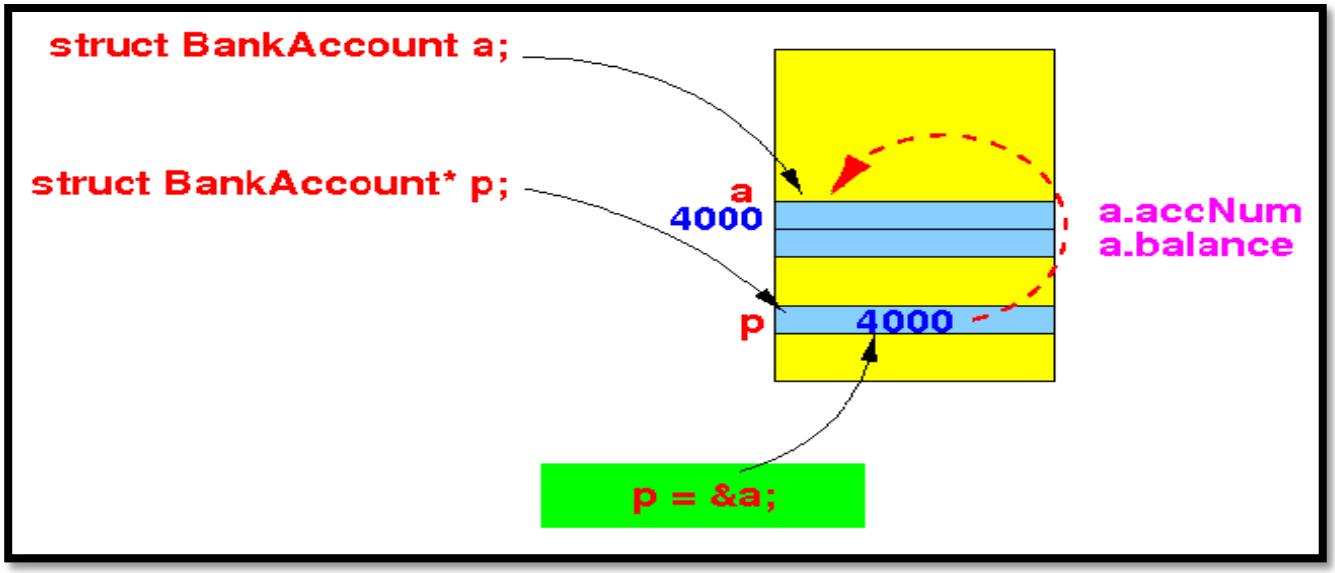
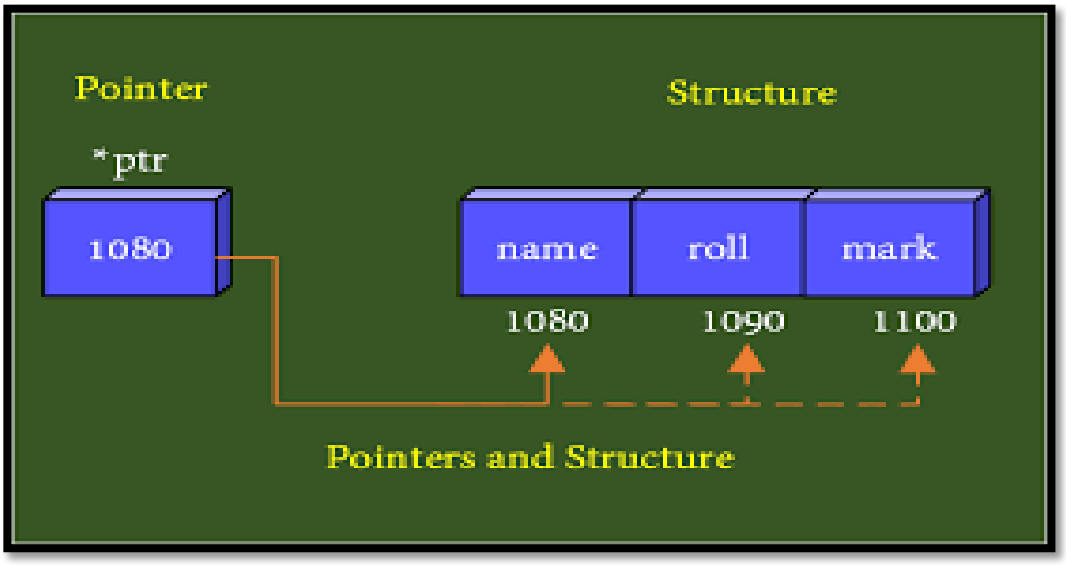
struct student *p;

- It is already known that pointer must be initialized before it is used.
- Pointer to the structure can also be allocated memory dynamically.
- p=(struct student *)malloc(sizeof(struct student));





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Example:

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

struct student
{
        int roll;
        char name[20];
        char lname[20];
}
 struct student s1;void main()
 {
         struct student *p;
p=&s1;
 clrscr();
s1.roll=1;
 strcpy(s1.name,"snehal");
strcpy(s1.lname,"pandya");
printf("\n rollno=%d",p->roll);
printf("\n name=%s",p->name);
printf("\n lname=%s",p->lname);
getch();
}
```

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER

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1	Pointer to structure can allocate memory _____.	Dynamically
2	In pointer to structure members can be access using_____operator.	->(arrow operator)
3	Write down statement to declare pointer with structure.	Struct stud *p;
4	In pointer with structure_____must be initialized before it is used.	pointer

Q-5 Explain UDF with Structure with example.

Detail :

- UDF stands for User Defined Function.
- UDF means the functions that are created by the user itself.
- It is also possible to pass structure as arguments to a function.
- When you create UDF with the help of structure then it is called UDF with structure.
- The following Example will display how to pass structure as argument in UDF.

Example:

```
#include<stdio.h> #include<conio.h>
struct data
{
        float amount;
        char fname[30];
        char lname[30];
}rec
void print_rec(struct data x)
{
        printf("\n %s %s %f",x.fname,x.lname,x.amount);
}
void main()
```

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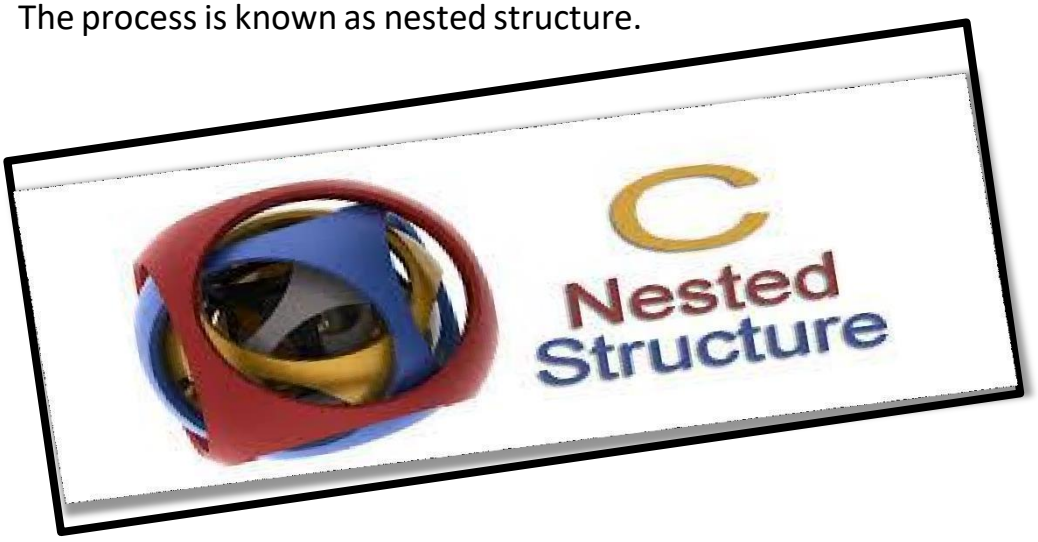
```
{
        clrscr();
        printf("\n Enter the donor's first and last names");
        scanf("%s %s", rec.fname, rec.lname);
        printf("\n Enter the donation amount");
        scanf("%f",&rec.amount); print_rec(rec);
        getch();
}
```

Q-6 Explain Nested Structure with example.

Detail :

- Nested Structure means you can create one structure inside anotherstructure.
- In simple words, "**Structure within a structure"** is called nested structure**.**
- When the structure is declared as member of another structure then it iscalled structure within structure.
- The process is known as nested structure.



Syntax:

```
struct structure_nm
{
    <data-type> element 1;
```

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```
<data-type> element 2;
- - - - - - - - - - -
- - - - - - - - - - -
<data-type> element n;

struct structure_nm
{
        <data-type> element 1;
            <data-type> element 2;
            - - - - - - - - - - -
            - - - - - - - - - - -
            <data-type> element n;
    }inner_struct_var;
 }outer_struct_var;
```

Example :

```
struct stud_Res
{
    int rno;
    char nm[50];
   char std[10];

    struct stud
   subject
    {
    Char subname[30];
      Int marks;
    }subj;
}result;
```

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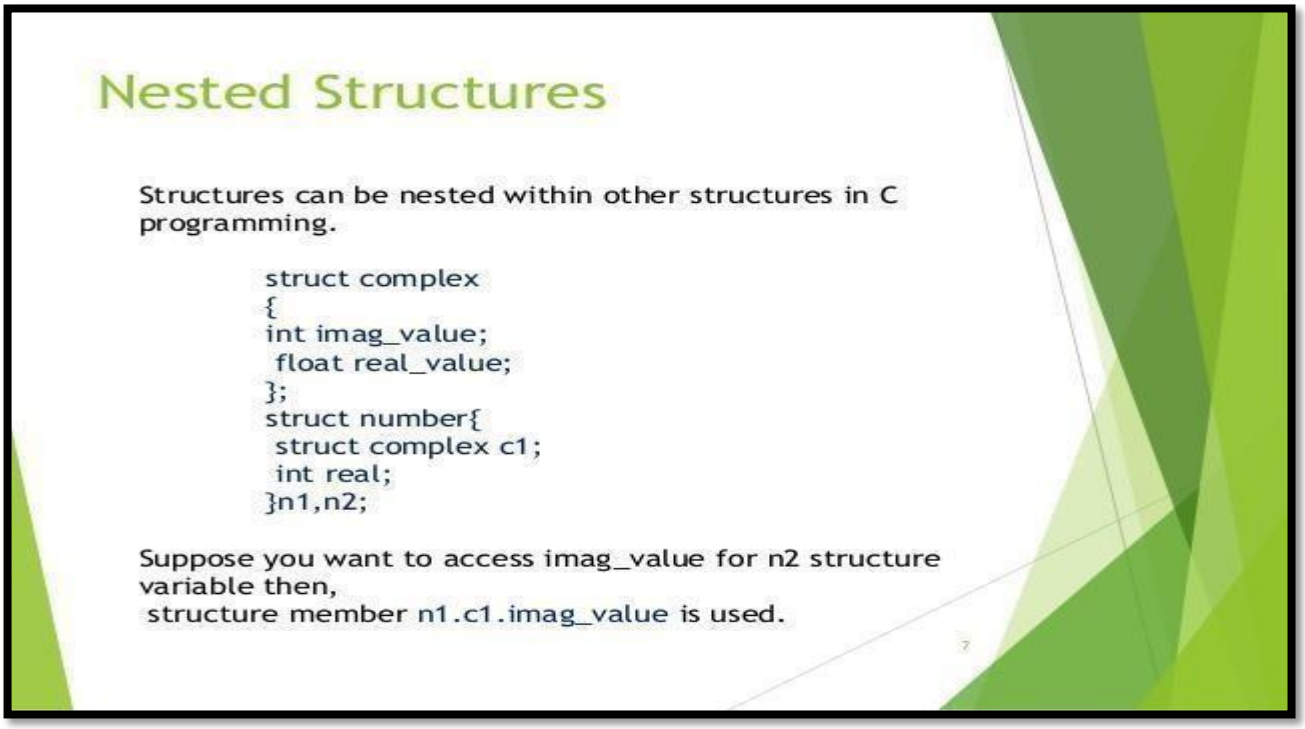

2 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	Nested structure means_____.	Structure within structure
2	In nested structure , one structure can be declare as_____of another structure.	Member

Q-7 Briefly Explain Union.

Detail :

- The concept of union is similar to that of structures but differs in terms ofstorage space.

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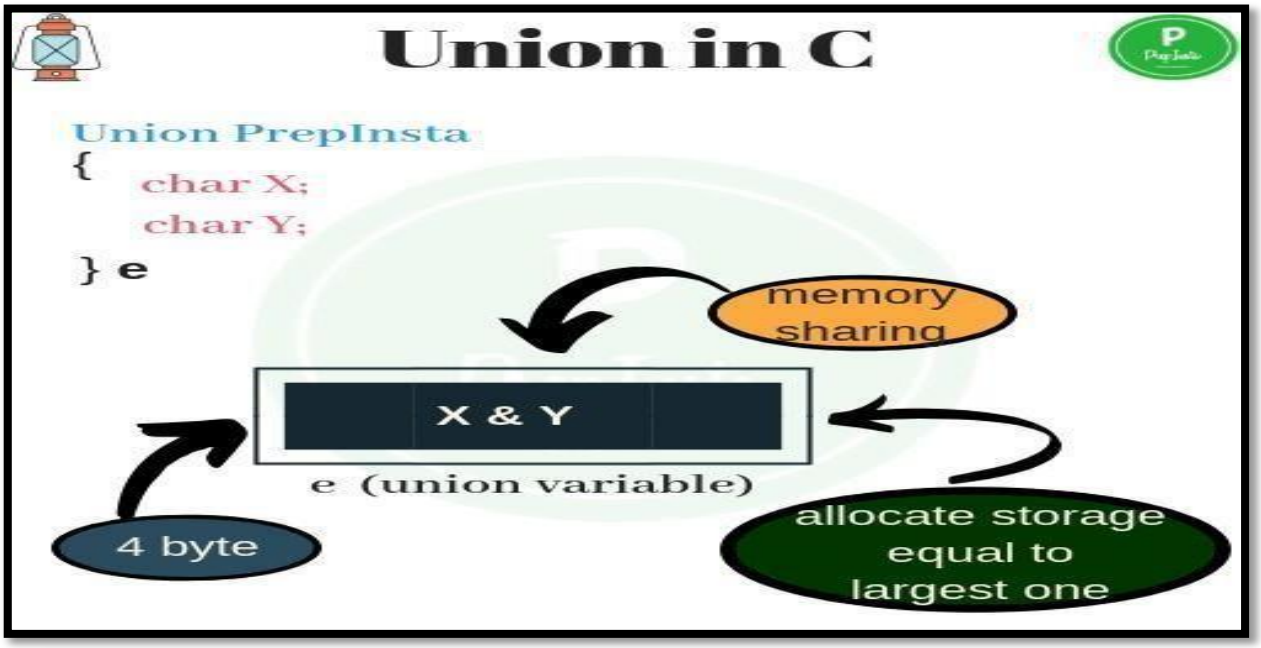
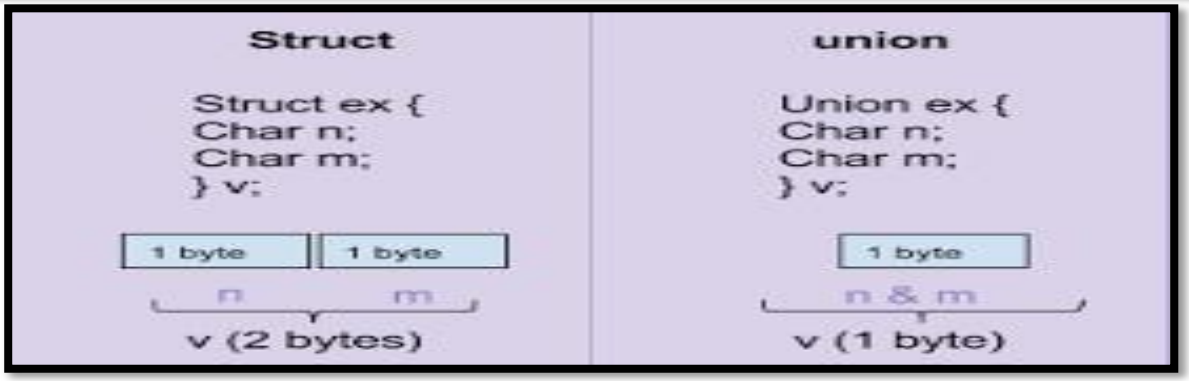
- Union is declared and used in same way as the structures.

Syntax:-





keyword union tag name

```
union union-tag
{
      datatype    variable1;
     datatype     variable2;
     datatype variable3;
};terminating semicolon
```

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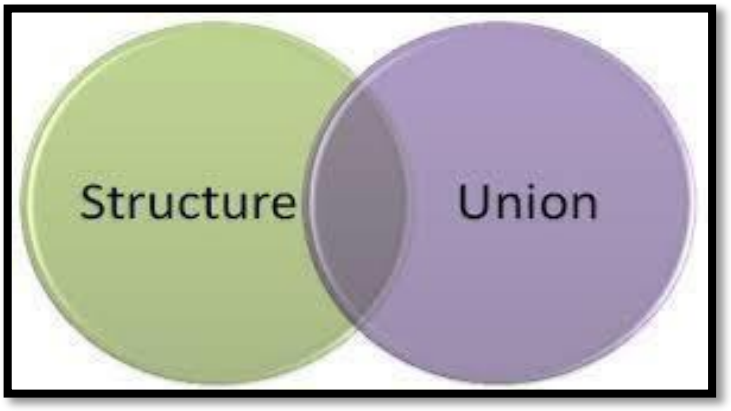
Example:-

```
union emp
{
        Char c;
        Float x;
}b;
```

Q-8 Give difference between Structure & Union.

Detail :

Structure	Union
1) In structure, each memberhave its own Storage Space.	1) In Union, All the members canshare Same Memory Space.
2)Structure can be declared using“struct” keyword.	2)Union can be declared using“union” keyword.
3)The size of structure depends onlength of its elements.	3)The size of union depends onmaximum length of integer elements.



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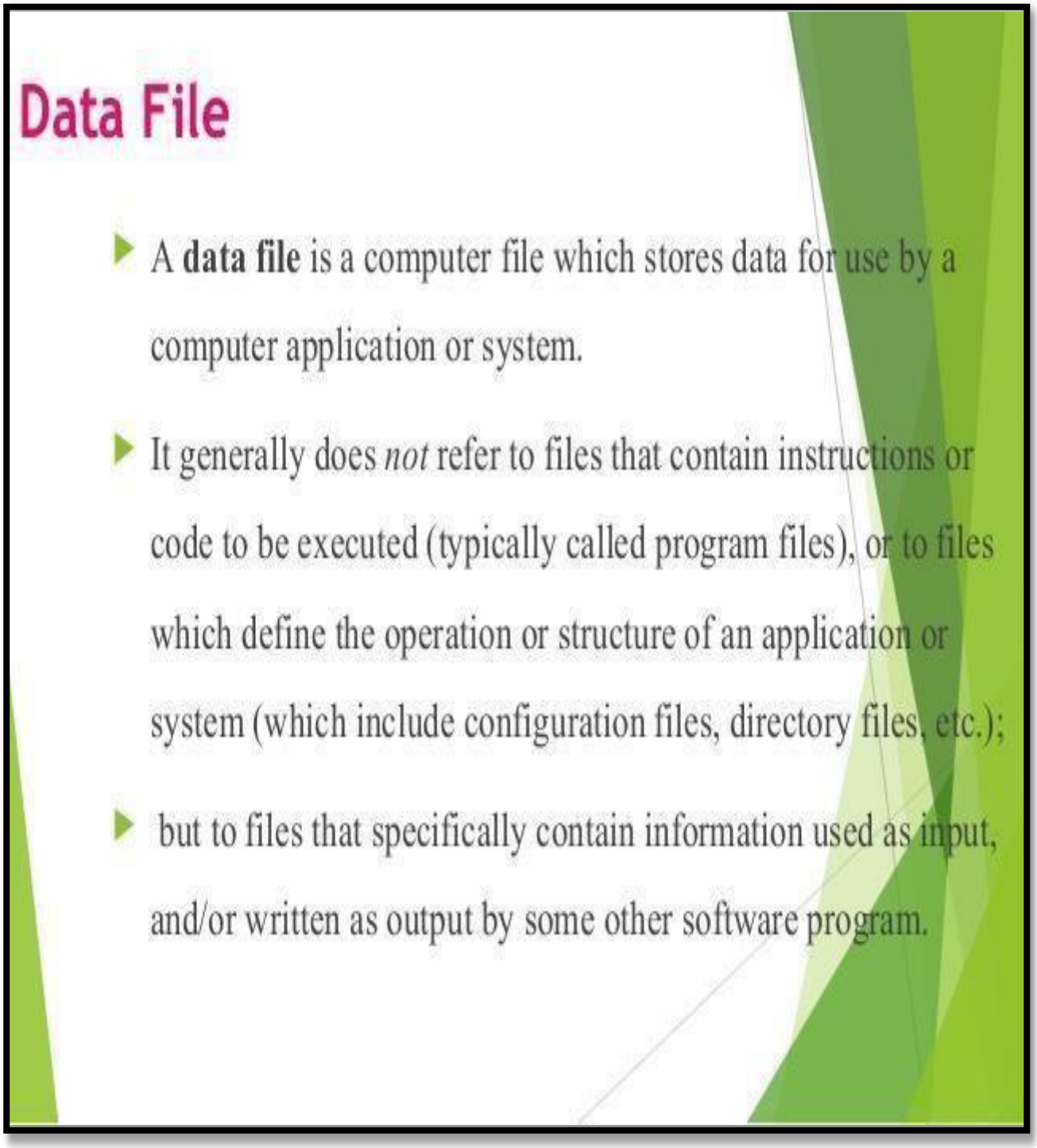
Q-9 What is Data file? [1 mark]



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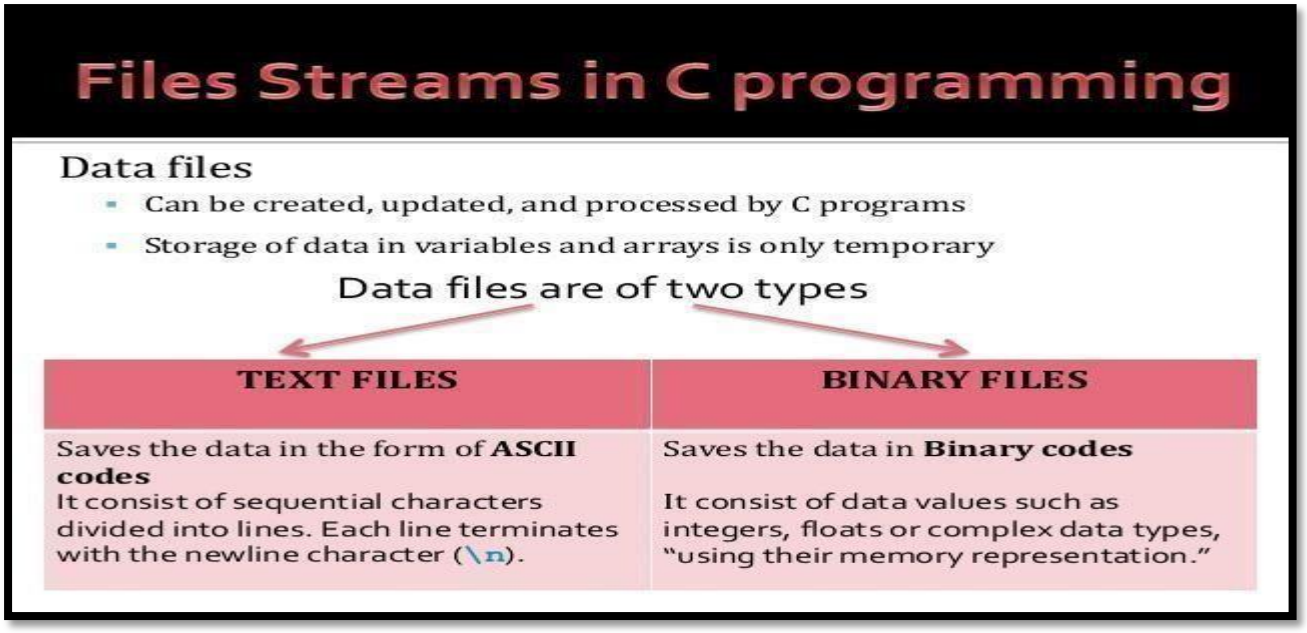

Detail :-

- Data file is used to store amount of informations permanently.
- Data file can be of 2 types:
  (1) Text file (.txt)
  (2) Binary file(.obj , .exe)

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	The types of Data file can be of _____ &_____.	Text file & Binary file
2	The extension of binary file may be_____	.exe or .obj
3	Textfile saves data in the form of _	ASCII Code

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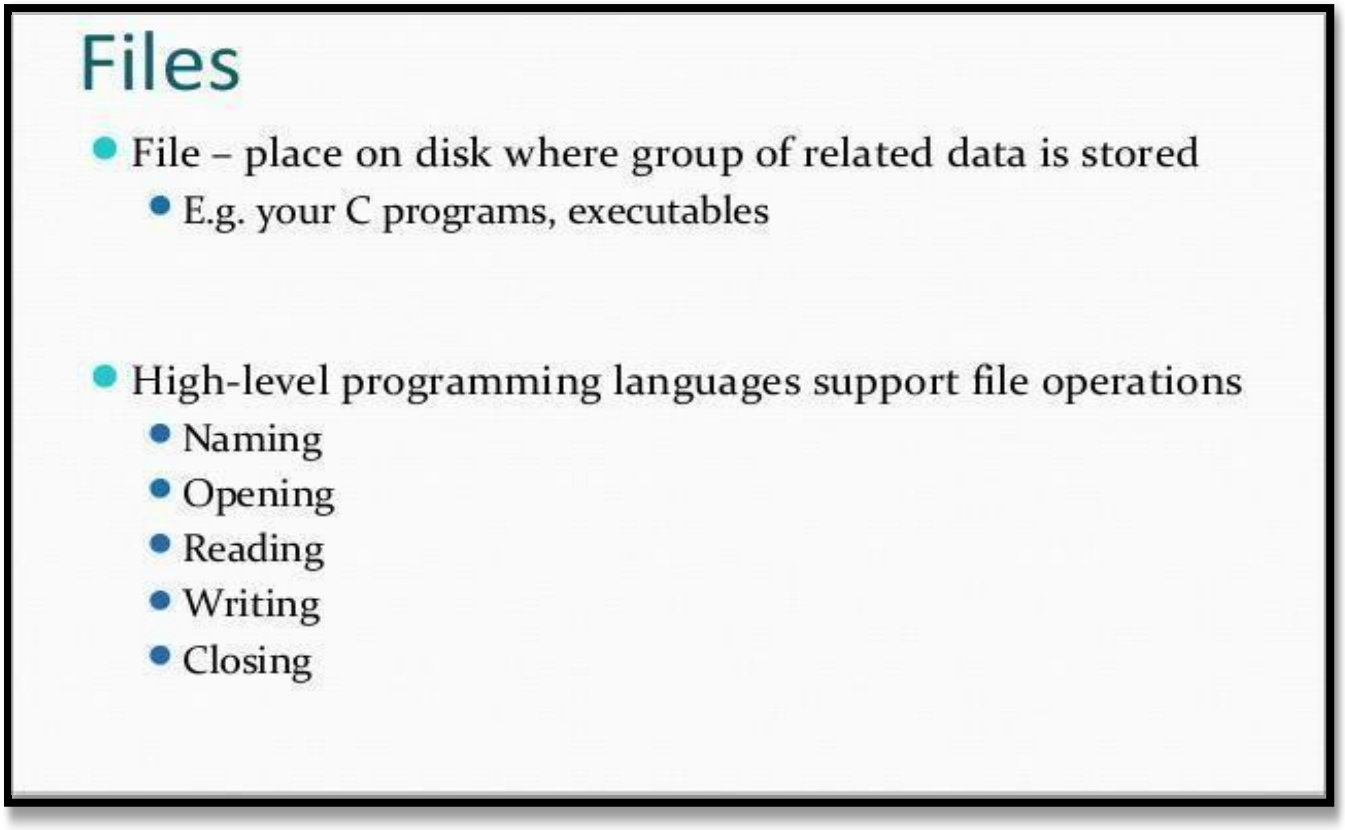
4	The End of the file can be indicate using _____character.	NULL (‘\0’)

Q-10 What is File Handling?[1 mark]

Detail :-

- The process of accessing file from particular program is known as file handling.
- File handling also known as I/O (Input / Output).
- File handling include following operations :-
    - Naming the file
    - Opening the file
    - Reading from the file
    - Writing to the file
    - Closing file



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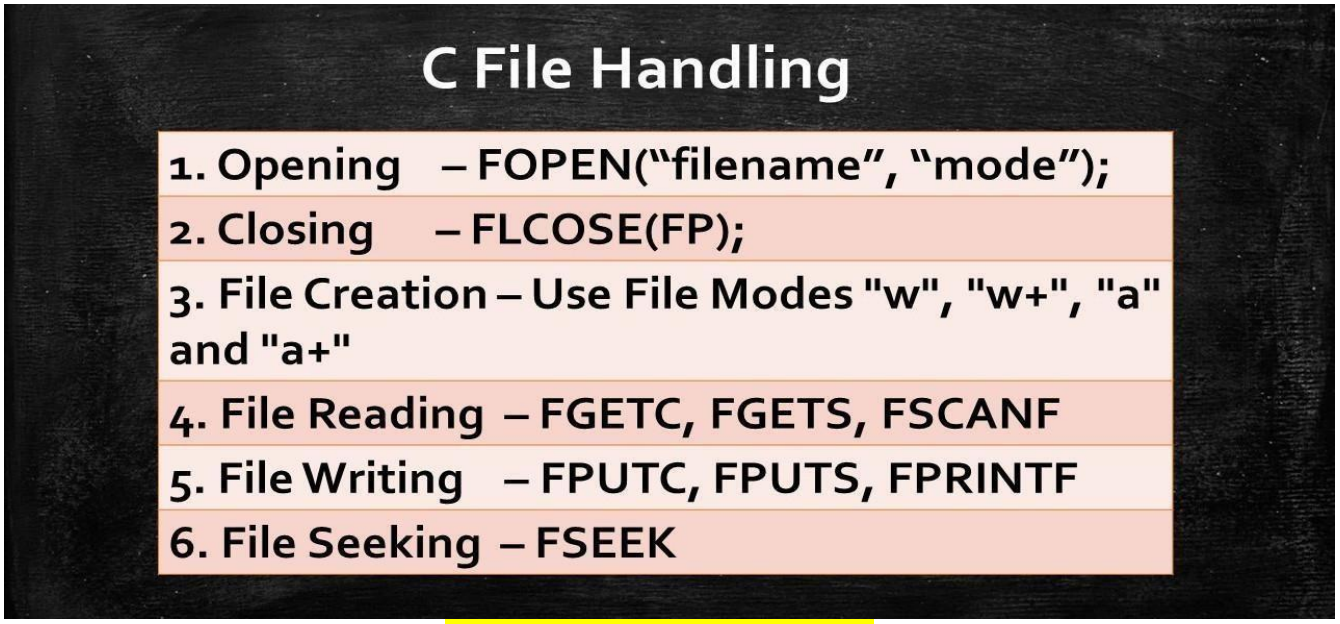

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1		Text file & Binary file
2	To write data to the particular file , the filemust be open in_____mode.	Write (w)
3	_____is used to indicate end of the file	feof()
4	_____is used to set the file position to thebeginning of the file.	Rewind()
5	_____ function is used to return currentfile position.	Ftell()
6	_____ is used to return file position togiven location of the file.	Fseek()
7	_____is used to flushes all the filestreams.	Fflush()

Q-11 Explain different file modes.

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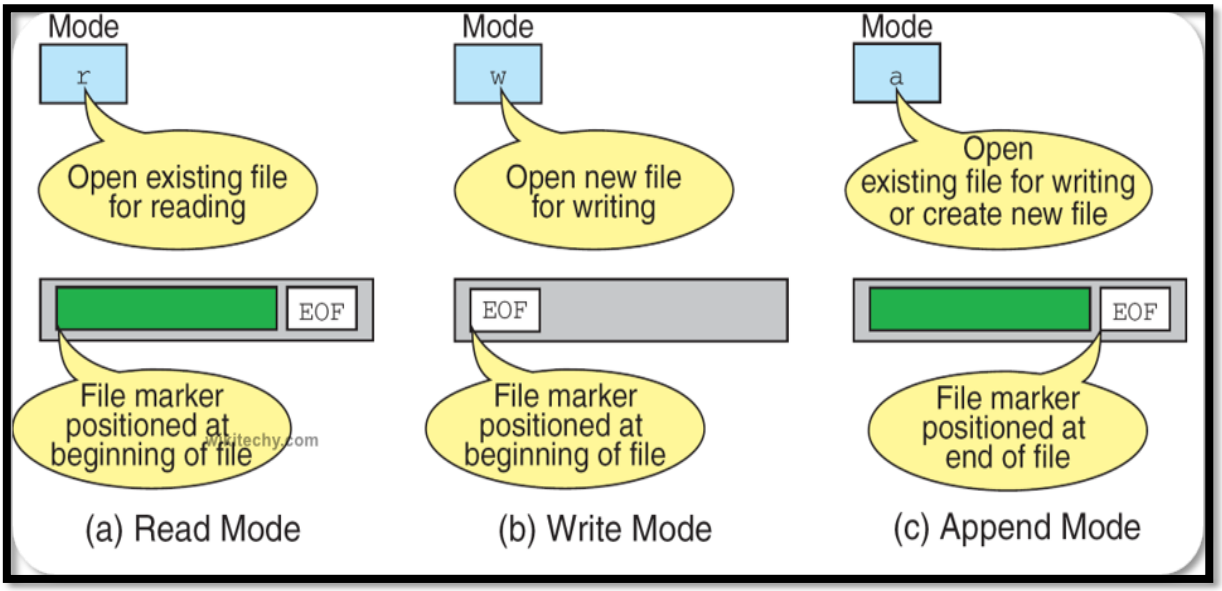

File Opening Modes

Mode	Meaning	Description
r	Read	Only reading possible. Not create file if not exist
w	Write	Only writing possible. Create file if not exist otherwise erase the old content of file and open as a blank file
a	Append	Only writing possible. Create file if not exist, otherwise open file and write from the end of file (do not erase the old content)
r+	Reading + Writing	R & W possible. Create file if not exist. Overwriting existing data. Used for modifying content
w+	Reading + Writing	R & W possible. Create file if not exist. Erase old content.
a+	Reading + Appending	R & W possible. Create file if not exist. Append content at the end of file

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Detail :-

- When user want to open any file , at that time following file opening modes are available for different purpose.

(1) "r" (read mode) :-

- This mode search particular file.
- If the file exist then load into the memory and read data from it.
- If file does not exist then it will return "null".

(2) "w" (write mode) :-

- This mode search particular file.
- If the file exist then load into the memory and write data to it.
- If file does exist then it will create new file automatically.

(3) "a" (append mode) :-

- This mode search particular file.
- If file exist then load into the memory and append it.
- Otherwise it will create new file automatically.

(4) "r+" (Read & Write mode) :-

- This mode search particular file.
- If file exist then load into memory and allow you to read data firat and write new data.
- Otherwise it will create new file automatically.

(5) "w+" (Write & Read mode) :-

- This mode search particular file.
- If file exist then load into the memory and allow you to write new data first and then read it.
- Otherwise it will create new file automatically.

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(6) "a+" (Read , Write ,append & modify) :-

- This mode search particular file.
- If file exist then load into the memory and allow you to read , write ,append and modity.Otherwise it will create new file automatically.

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1		Text file & Binary file
2	To write data to the particular file , the file must be open in_____mode.	Write (w)
3	_____is used to indicate end of the file	feof()
4	_____is used to set the file position to the beginning of the file.	Rewind()
5	_____ function is used to return current file position.	Ftell()
6	_____ is used to return file position to given location of the file.	Fseek()
7	_____is used to flushes all the file streams.	Fflush()

Q-12 Explain different file handling functions.

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Detail :-

File operation functions in C:

Function Name	Operation
fopen()	Creates a new file for use Opens a new existing file for use
fclose	Closes a file which has been opened for use
getc()	Reads a character from a file
putc()	Writes a character to a file
fprintf()	Writes a set of data values to a file
fscanf()	Reads a set of data values from a file
getw()	Reads a integer from a file
putw()	Writes an integer to the file
fseek()	Sets the position to a desired point in the file
ftell()	Gives the current position in the file
rewind()	Sets the position to the begining of the file

❖ File handling support mainly following functions.

(1) Fopen() :-

- It is used to open any particular file.
  Syntax :- fopen (“filename” , “filemode”)
- In first argument , we have to provide file name.
- In second argument , we have to provide file modes like read , write and append.
  Example :- fopen(“c:\\hi.txt”,”r”)

(2) Fclose() :-

- It is used to close currently opened file.
  Syntax :- fclose(<file pointer>)
  Example :- fclose(fp)

(3) Fprintf() :-

- It is used to print particular value to the file.
- It have three arguments :

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File pointer
Control
String
variable
Syntax :- fprintf ("filepointer" , "control string",variable)
Example :- fprintf(fp,"%c",a)

(4) Fscanf() :-

- It is used to read value for standard input.
- It have three arguments :
  File pointer
  Control
  String
  variable
  Syntax :- fscanf ("filepointer" , "control string",variable)
  Example :- fscanf(fp,"%c",a)

(5) getw() :-

- It is used to get or read an integer value. [only work with integer data]
  Syntax :- getw(<file pointer>)
  Example :- getw(fp)

(6) Putw():-

- It is used to write an integer value to the file. [only work with integer data]
  Syntax :- putw(<int>,<file pointer>)
  Example :- putw(num,fp)

(7) fseek() :-

- It is used to set file position means that it is used to move file position to given location in the file.
  Syntax :- fseek(<file pointer> , <off set> , <position>)
  Example :- fseek(fp , s,seek_set)

  0- SEEK_SET -> beginning of the

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file1- SEET_CUR -> Current position
2- SEEK_END -> end of the file

(8) Rewind() :-

- It is used to set file position to beginning of the file or starting of the file.

  Syntax :- rewind(<file pointer>)
  Example :- rewind(fp)

(9) Ftell() :-

- It is used to return current file position of given file.

  Syntax :- ftell(<file pointer>)
  Example :- ftell(fp)

(10) Remove() :-

- It is used to remove particular file by providing file name.

  Syntax :- remove(<file name>)
  Example :- remove("myfile.txt")

(11) Feof() :-

- It is used to indicate end of the file.

  Syntax :- feof(<file pointer>)
  Example :- feof(fp)

(12) Rename() :-

- It is used to change from old file name to new file name.

  Syntax :- int rename (char * old file name ,char * new file name)
  Example :- rename("abc.txt" , "jkl.txt")

(13) Ferror() :-

- It is used to check if the file opened successfully or not ,otherwise it returns error.

  Syntax :- ferror(< file pointer>)

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Example :- ferror(fp)

(14) Fflush() :-

- It is used to flush the stream,It is used to clean input buffer aswell as output buffer.
  Syntax :- fflush(< file pointer>)
  Example :- fflush(fp)

1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1		Text file & Binary file
2	To write data to the particular file , the filemust be open in_____mode.	Write (w)
3	_____is used to indicate end of the file	feof()
4	_____is used to set the file position to thebeginning of the file.	Rewind()
5	_____ function is used to return currentfile position.	Ftell()
6	_____ is used to return file position togiven location of the file.	Fseek()
7	_____is used to flushes all the filestreams.	Fflush()

Q-11 Explain different I/O operations.

Detail :-

- ❖ I/O stands for input and output.
- ❖ It suppor following functions for input(read) & output(write).

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INPUT	OUTPUT
Fread()	Fwrite()
Fgets()	Fputs()
Fgetc()	Fputc()
Fscanf()	Fprintf()

❖ INPUT FUNCTIONS :-

(1) Fgets() :-

- It is used to get a string.
- It have three arguments

  Address of String
  Maximum length
  File pointer

Syntax :- fgets(char *s , int n , <file pointer>)

Example :- fgets(s,80,fp)

(2) Fgetc() :-

- It is used to get a single character from the file.
- It have two arguments

  Character variable
  File pointer

Syntax :- fgetc(<char variable> , <file pointer>)
Example :- fgetc(ch , fp)

(3) Fread() :-

- It is same as fscanf() , but fread() also read data from binary file.
- It have four arguments

  Address of variable

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Size of data
Number of values to be readFile pointer

Syntax :- fread(v,s,n,fp)

Reading data from a File

There are three different functions dedicated to reading data from a file

- **fgetc(file_pointer):** It returns the next character from the file pointed to by the file pointer. When the end of the file has been reached, the EOF is sent back.
- **fgets(buffer, n, file_pointer):** It reads n-1 characters from the file and stores the string in a buffer in which the NULL character '\0' is appended as the last character.
- **fscanf(file_pointer, conversion_specifiers, variable_adresses)**: It is used to parse and analyze data. It reads characters from the file and assigns the input to a list of variable pointers variable_adresses using conversion specifiers. Keep in mind that as with scanf, fscanf stops reading a string when space or newline is encountered.

❖ **OUTPUT FUNCTIONS :-**

(1) Fputs() :-

- It is used to print a string to the file.
- It have two arguments

String
variableFile
pointer

Syntax :- fgets(<string variable> , <file pointer>)
Example :- futs(str,fp)

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(2) Fputc() :-

- It is used to print a single character to the file.
- It have two arguments

Character variable
File pointer

Syntax :- fputc(<character variable> , <file pointer>)

Example :- futc(ch,fp)

(3) Fwrite() :-

- It is same as fprintf() , but the difference is fwrite() can also write binary data.
- It have four arguments
  - Address of variable
  - Size of data
  - Number of values to be read
  - File pointer

Syntax :- fwrite(v,s,n,fp)

Writing to a File

In C, when you write to a file, newline characters '\n' must be explicitly added.The stdio library offers the necessary functions to write to a file:

- **fputc(char, file_pointer)**: It writes a character to the file pointed to by file_pointer.
- **fputs(str, file_pointer)**: It writes a string to the file pointed to by file_pointer.
- **fprintf(file_pointer, str, variable_lists)**: It prints a string to the file pointed to by file_pointer. The string can optionally include format specifiers and a list of variables variable_lists.

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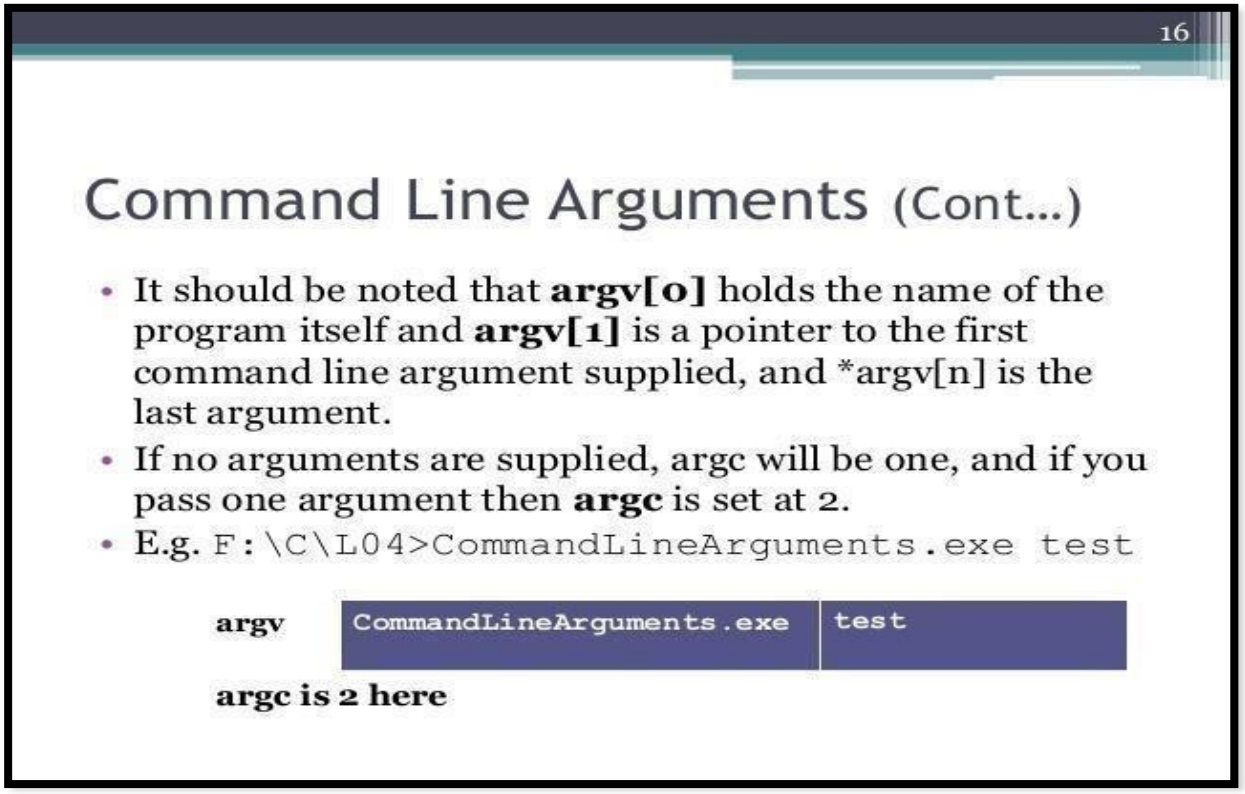
1 Word Question – Answer

SR.NO.	QUESTION	ANSWER
1	_____is used to write character to the file pointed by file pointer	Fputc()
2	_____is used to read whole string from particular file.	Fgets()
3	_____is used to print different values to the file.	Fprintf()
4	_____is used to perform I/O operations for binary file.	Fwrite()

Q-12 Explain Command Line Arguments with suitable example.



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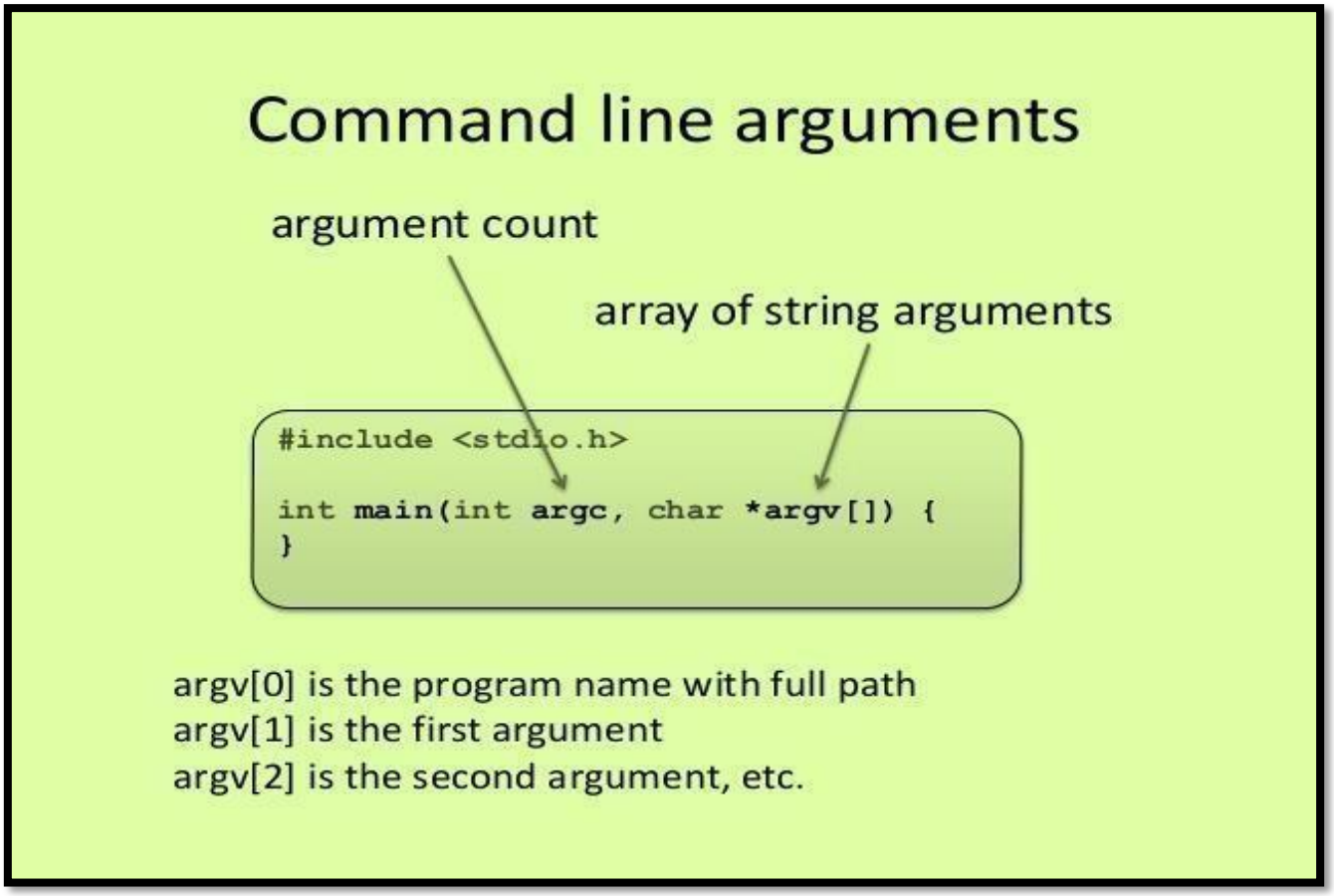

Detail :-

- Command line arguments are the argument that are pass when the program isexecute.
- In command line argument , main() also take argument from the user.
- Main() take two arguments
  (i) Argc – It indicate number of arguments to be passed
  (ii) Argv[] – It is pointer array which point to each argument that is passedwith the main().

  (iii) main() takes two arguments:

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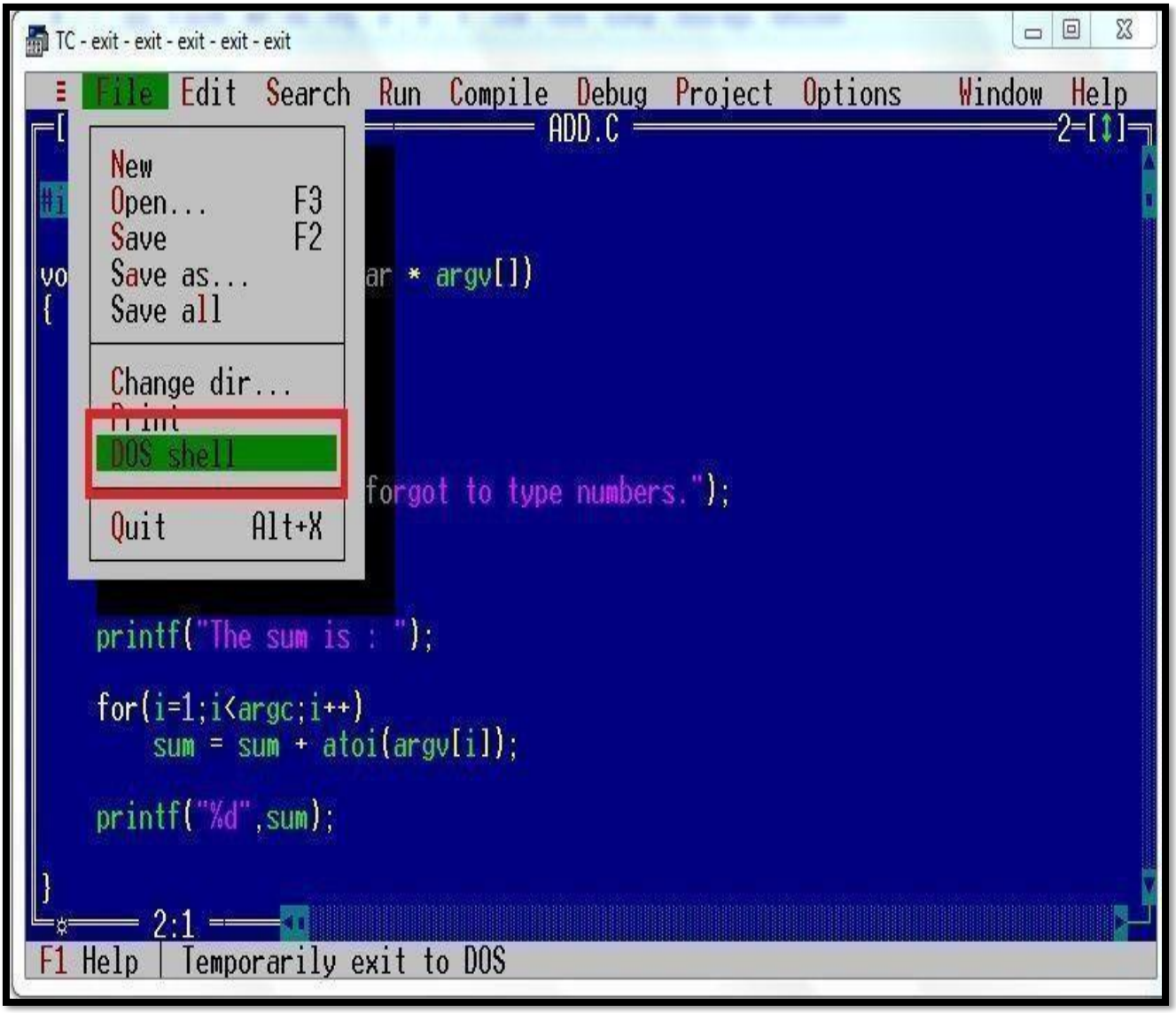
i. argc → Number of arguments passed
ii. argv[] → pointer array which points to each argument whichis passed to main().

Note:- argv[0] → name of the program that is exevuted.
argv[1] → First argument
argv[2] Second argument



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1 Word Question – Answer

SR.NO.	QUESTION	*ANSWER*
1	In Command Line Arguments main () takes ____arguments.	*2(Two)*
2	argc stands for _____	*Argument count*
3	_____is pointer array which points toeach argument which is passed to main().	*Argv[]*
4	_____holds name of the program	*Argv[0]*
5	**To execute command line program , go to filemenu and select _____**	***Dos Shell***

Q-13 Give difference between Text file and Binary file.

Detail :-

Text File	***Binary File***
1) Text file is the file created by user. 2) The extension of text file may be .txt, .c etc. 3) In text file, there is special character ('\0') which indicates end of file. 4) In text file, data is stored in text format, so if we have integer value 1234 then it will require 5 bytes (1234\0)	1) Binary file is the file created by the computer. 2) The extension of binary file may be .exe, .obj etc. 3) In binary file there is no such special character that indicates end of file. 4) In binary file, data is stored in the format of main memory. So if we have integer value 1234 then it will require only 2 bytes.

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SUMMARY QUESTIONS OF CHAPTER -5

ONE - MARK QUESTIONS

- ✓ Which Keyword is used to declare Structure?
- ✓ What is Union?
- ✓ Write down Syntax for declaring Structure.
- ✓ How to declare union ?
- ✓ What is Data File?

TWO - MARK QUESTIONS

- ✓ Explain Pointer to Structure with Example.
- ✓ Explain Pointer within Structure by Example.
- ✓ Write note on Nested Structure.
- ✓ Give difference between Structure and Union.
- ✓ Explain different file modes.
- ✓

THREE - MARK QUESTIONS

- ✓ Explain Command Line Argument with Example.
- ✓ Explain Fopen() , Fclose() and Fseek() with Example.
- ✓ Explain any three I/O operations functions with Example.
- ✓ Explain Union with Example.

FIVE - MARK QUESTIONS

- ✓ Explain File Handling in Detail.
- ✓ Explain Structure with Example.
- ✓ Write note on UDF with Structure by Example.
- ✓ List out different File Handling Functions and explain any five with Example.