

C Library
Functions

OS

Disk

Data Files

Er. Shiva K. Shrestha (HoD)

Department of Computer Engineering,
Khwopa College of Engineering

Introduction

2



Er. Shiva K. Shrestha (HoD, Computer Dept)
2/10/2019

	Record I/O	Formatted I/O	String I/O	Character I/O
Standard I/O	fread()	fscanf()	fgets()	fgetc()
	fwrite()	fprintf()	fputs()	fputc()
System I/O	fread()	-	-	-
	fwrite()	-	-	-

File Operations

3



Library Functions for Reading/Writing from/to a File

Er. Shiva K. Shrestha (HoD, Computer Department)
2/10/2019

<code>fopen()</code>	• Opens a file
<code>fclose()</code>	• Closes a file
<code>putc()</code>	• Writes a character to a file
<code>fputc()</code>	• Same as <code>putc()</code>
<code>getc()</code>	• Reads a character from a file
<code>fgetc()</code>	• Same as <code>getc()</code>
<code>fgets()</code>	• Reads a string from a file
<code>fputs()</code>	• Writes a string from a file
<code>fseek()</code>	• Seeks to a specified byte in a file
<code>ftell()</code>	• Returns the current file position
<code>fprintf()</code>	• Is to a file what <code>printf()</code> is to the console
<code>fscanf()</code>	• Is to a file what <code>scanf()</code> is to the console
<code>feof()</code>	• Return true if end-of-file is reached
<code>ferror()</code>	• Return true if an error has occurred
<code>rewind()</code>	• Resets the file position indicator to the beginning
<code>remove()</code>	• Erases a file
<code>fflush()</code>	• Flushes a file

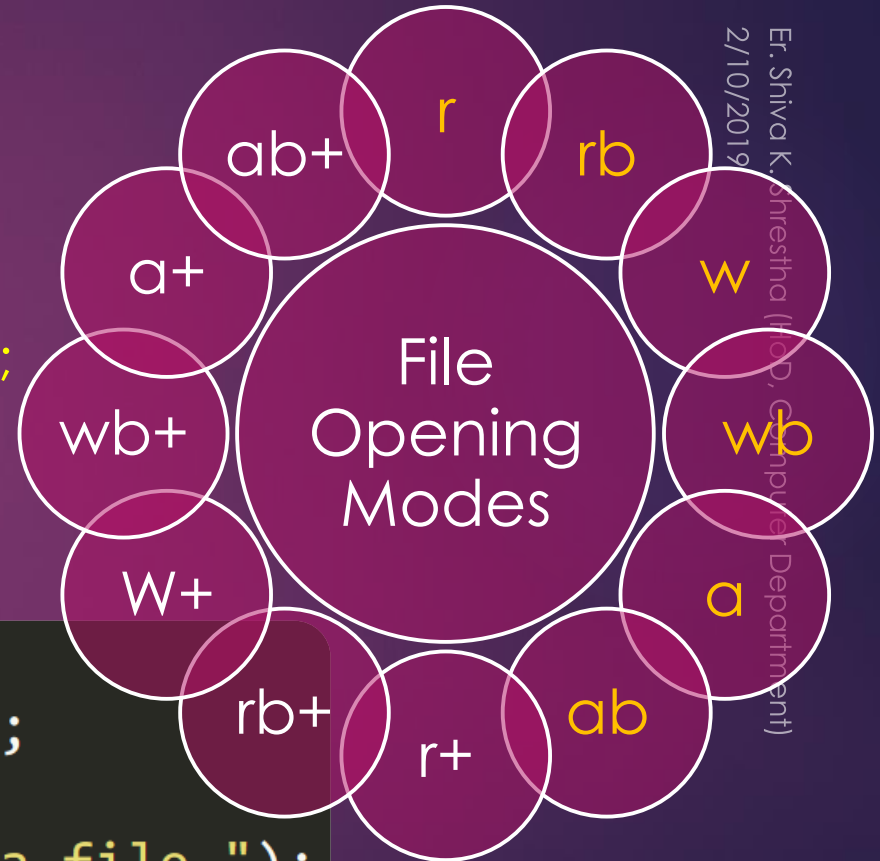
File Opening Modes

File Mode	Meaning of Mode	During Inexistence of file
r	Open for reading.	If the file does not exist, fopen() returns NULL.
rb	Open for reading in binary mode.	If the file does not exist, fopen() returns NULL.
w	Open for writing.	If the file exists, its contents are overwritten. If the file does not exist, it will be created.
wb	Open for writing in binary mode.	If the file exists, its contents are overwritten. If the file does not exist, it will be created.
a	Open for append. i.e, Data is added to end of file.	If the file does not exist, it will be created.
ab	Open for append in binary mode. i.e, Data is added to end of file.	If the file does not exist, it will be created.
r+	Open for both reading and writing.	If the file does not exist, fopen() returns NULL.
rb+	Open for both reading and writing in binary mode.	If the file does not exist, fopen() returns NULL.
w+	Open for both reading and writing.	If the file exists, its contents are overwritten. If the file does not exist, it will be created.
wb+	Open for both reading and writing in binary mode.	If the file exists, its contents are overwritten. If the file does not exist, it will be created.
a+	Open for both reading and appending.	If the file does not exist, it will be created.
ab+	Open for both reading and appending in binary mode.	If the file does not exist, it will be created.

Error Handling

```
FILE *fp; // fp is file_pointer
fp=fopen(file_name, mode);
if(fp == NULL){
    printf("Cannot open a file.");
    fclose(fp);
}
```

```
FILE *fp;
fp=fopen("kce.txt", "a+");
if(fp == NULL){
    printf("Cannot open a file.");
    fclose(fp);
}
```



Writing to a Text File

7

Er. Shiva K. Shrestha (HoD, Computer Department)
2/10/2019

```
FILE_1.C x
1  #include <stdio.h>
2  #include <conio.h>
3  int main(){
4      int num;
5      FILE *fptr;
6      fptr = fopen("program.txt","w");
7
8      if(fptr == NULL){
9          printf("Error!");
10     }
11     printf("Enter num: ");
12     scanf("%d",&num);
13
14     fprintf(fptr,"%d",num);
15     fclose(fptr);
16     getch();
17     return 0;
18 }
```

DOSBox 0.74, Cpu
Enter num: 777

program.txt x
1 777

Reading from a Text File

8

Er. Shiva K. Shrestha (HoD, Computer Department)
2/10/2019

```
FILE_2.C
1 #include <stdio.h>
2 #include <conio.h>
3 int main(){
4     int num;
5     FILE *fptr;
6     if ((fptr = fopen("program.txt","r")) == NULL){
7         printf("Error! opening file");
8     }
9     fscanf(fptr,"%d", &num);|
10
11     printf("Value of n=%d", num);
12     getch();
13     return 0;
14 }
```

D:\[C]\Ch10_Data_Files\FILE_2.exe

Value of n=777_

program.txt

```
1 777|
```


Writing to a Binary File

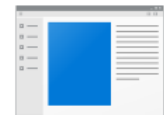
`fwrite(address_data, size_data, numbers_data, pointer_to_file);`

```
FILE_3.C
1 #include <stdio.h>
2 #include <conio.h>
3 struct Num{
4     int n1, n2, n3;
5 };
6 int main(){
7     int i;
8     struct Num n;
9     FILE *fptr;
10    if ((fptr=fopen("program.bin","wb")) == NULL){
11        printf("Error! opening file");
12    }
13    for(i=1; i<5; i++){
14        n.n1 = i;
15        n.n2 = i*i;
16        n.n3 = i*i*i;
17        fwrite(&n, sizeof(struct Num), 1, fptr);
18    }
19    fclose(fptr);
20    getch(); return 0;
21 }
```

Er. Shiva K. Shrestha (HoD, Computer Department)
2/10/2019



FILE_9.C



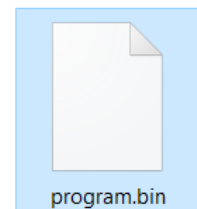
FILE_9.exe



FILE_10.C



myname.txt



program.bin



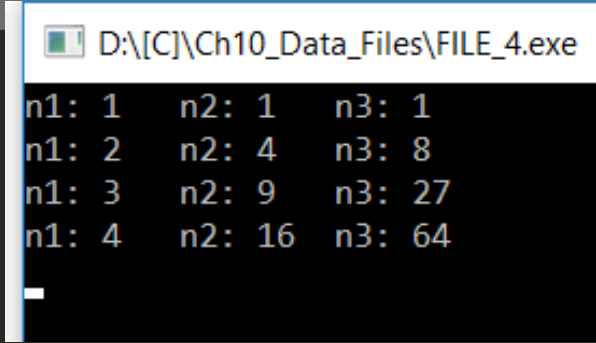
program.txt

Reading from a Binary File

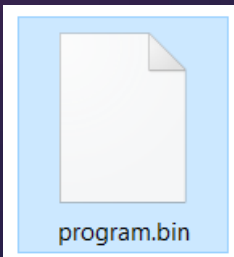
10

fread(address_data, size_data, numbers_data, pointer_to_file);

```
FILE_4.C
1  #include <stdio.h>
2  #include <conio.h>
3  struct Num{
4      int n1, n2, n3;
5  };
6  int main(){
7      int i;
8      struct Num n;
9      FILE *fptr;
10     if ((fptr=fopen("program.bin","rb")) == NULL){
11         printf("Error! opening file");
12     }
13     for(i=1; i<5; ++i){
14         fread(&n, sizeof(struct Num), 1, fptr);
15         printf("n1: %d\tn2: %d\tn3: %d\n", n.n1, n.n2, n.n3);
16     }
17     fclose(fptr);
18     getch();
19     return 0;
20 }
```



Er. Shiva K. Shrestha (HoD, Computer Department)
2/10/2019



End of File (EOF)

11

Er. Shiva K. Shrestha (HoD, Computer Department)
2/10/2019

EOF

```
char ch;
FILE *fp;
fp=fopen("kce.txt","r");

if(fp == NULL){
    printf("Cannot open a file.");
    fclose(fp);
}

while((ch=getc(fp)) != EOF){
    printf("%c",ch);
}
```

feof()

- ▶ The function feof() determines when the end of the file has been encountered. The feof() function has this prototype:
 - ▶ int feof(FILE *fp);
- ▶ feof() returns true(1) if the end of the file has been reached; otherwise, it returns 0
- ▶ e.g. while(!feof(fp))

Using rewind() Function

- ▶ The `rewind()` function resets the file position indicator to the beginning of the file specified as its arguments. That is, it "rewinds" the file. Its prototype is
 - ▶ `void rewind(FILE *fp);`
- ▶ where, `fp` is a valid file pointer.

Character I/O Functions in File getc(), putc(), fgetc(), & fputc()

13

Er. Sh
2/10/

```
FILE_5.C
1  #include<stdio.h>
2  #include<conio.h>
3  #include<stdlib.h>
4  #include<ctype.h>
5  int main(){
6      char ch; FILE *fp;
7      fp=fopen("kce.txt","a+");
8      if(fp==NULL){
9          printf("cannot open file"); fclose(fp);
10     }
11     do{
12         ch=toupper(getchar());
13         putc(ch,fp);
14     }while(ch!='\n');
15     printf("\nText from file kce.txt ...\n");
16     rewind(fp);
17     while((ch=getc(fp)) != EOF){
18         printf("%c",ch);
19     }
20     fclose(fp); getch(); return 0;
21 }
```

kce.txt - Notepad

File Edit Format View Help

Welcome!
Dept. of Computer Engg.
Khwopa College of Engineering

D:\[C]\Ch10_Data_Files\FILE_5.exe

Namaste World!

Text from file kce.txt ...
Welcome!
Dept. of Computer Engg.
Khwopa College of Engineering

NAMASTE WORLD!

kce.txt - Notepad

File Edit Format View Help

Welcome!
Dept. of Computer Engg.
Khwopa College of Engineering

NAMASTE WORLD!

File Copy Program

14

```
FILE_6.C
1 #include<stdio.h>
2 #include<conio.h>
3 #include<stdlib.h>
4 #include<ctype.h>
5 int main(){
6     char ch;
7     FILE *fs,*ft;
8     fs=fopen("file1.txt","r");
9     if(fs==NULL){
10         printf("Cannot open source file."); fclose(fs);
11     }
12     ft=fopen("file2.txt","w");
13     if(ft==NULL){
14         printf("Cannot open target file."); fclose(ft);
15     }
16     while((ch=fgetc(fs))!=EOF){
17         fputc(ch,ft);
18     }
19     fclose(fs); fclose(ft);
20     getch(); return 0;
21 }
```

file1.txt - Notepad

File Edit Format View Help

Khwopa College of Engineering
Libali - 8, Bhaktapur

file2.txt - Notepad

File Edit Format View Help

Khwopa College of Engineering
Libali - 8, Bhaktapur

String I/O Function in File

fputs() & fgets()

15

Er. Sh
2/10/

Department)

```
FILE_7.C
1 #include<stdio.h>
2 #include<conio.h>
3 #include<stdlib.h>
4 #include<string.h>
5 int main(){
6     char s[25]; FILE *fp;
7     fp=fopen("console2file.txt","a+");
8     if(fp==NULL){
9         puts("Cannot open file"); fclose(fp);
10    }
11    do{
12        printf("Enter a string to store in data file:");
13        gets(s); strcat(s,"\n"); fputs(s,fp);
14    }while(*s!='\n');
15    rewind(fp);
16    while(!feof(fp)){
17        fgets(s,2,fp); puts(s);
18    }
19    fclose(fp);
20    getch(); return 0;
21 }
```

D:\[C]\Ch10_Data_Files\FILE_7.exe

```
Enter a string to store in data file:Nepal
Enter a string to store in data file:State 3
Enter a string to store in data file:Bhaktapur District
Enter a string to store in data file:Bhaktapur Municipality
Enter a string to store in data file:KCE
Enter a string to store in data file:
N
e
p
a
l
```

console2file.txt - Notepad

File Edit Format View Help

```
Nepal
State 3
Bhaktapur District
Bhaktapur Municipality
KCE
```

Formatted Disk I/O Functions in File fscanf() & fprintf()

16

```
FILE_8.C
1 #include<stdio.h>
2 #include<conio.h>
3 #include<stdlib.h>
4 int main(){
5     char choice; char name[40]; int age; float height; FILE *fp;
6     fp=fopen("student.txt","w+");
7     do{
8         printf("Enter Name: "); scanf("%s",name); fflush(stdin);
9         printf("Enter Age: "); scanf("%d",&age); fflush(stdin);
10        printf("Enter Height: "); scanf("%f",&height); fflush(stdin);
11        printf("\nDo you wish to continue ('y/n')? ");
12        scanf("%c",&choice);
13        fprintf(fp,"%s\t%d\t%f",name,age,height);
14    }while(choice=='Y' || choice=='y');
15    rewind(fp);
16    while(!feof(fp)){
17        fscanf(fp,"%s%d%f",name,&age,&height);
18        printf("\n%s\t%d\t%.2f",name,age,height);
19    }
20    fclose(fp); getch(); return 0;
21 }
```

student.txt - Notepad

Kareena	18	5.700000	Sushant	17	5.800000
---------	----	----------	---------	----	----------

D:\[C]\Ch10_Data_Files\FILE_8.exe

```
Enter Name: Kareena
Enter Age: 18
Enter Height: 5.7

Do you wish to continue ('y/n')? y
Enter Name: Sushant
Enter Age: 17
Enter Height: 5.8

Do you wish to continue ('y/n')? n

Kareena 18      5.70
Sushant 17      5.80
```


Record I/O Functions in File fread() & fwrite()

17

```
FILE_9.C
1 #include<stdio.h>
2 #include<conio.h>
3 #include<stdlib.h>
4 struct Employee{
5     char name[40]; int age; float sal;
6 };
7 int main(){
8     struct Employee e;
9     FILE *fp; char choice;
10    fp=fopen("employee.txt","a+b");
11    if(fp==NULL){ printf("Cannot open the file!"); }
12    do{
13        printf("Enter Name, Age, & Basic Salary:\n");
14        scanf("%s%d%f", e.name, &e.age, &e.sal);
15        fwrite(&e, sizeof(e), 1, fp);
16        fflush(stdin); printf("Add another record(y/n)? ");
17        scanf("%c", &choice);
18    }while(choice=='Y' || choice=='y');
19    rewind(fp); //Moves file pointer to starting
20    while(!feof(fp)){
21        fread(&e, sizeof(e), 1, fp);
22        printf("\n%s\t%d\t%f", e.name, e.age, e.sal);
23    }
24    fclose(fp); getch(); return 0;
25 }
```

D:\[C]\Ch10_Data_Files\FILE_9.exe

Enter Name, Age, & Basic Salary:
Ramesh 27 40000
Add another record(y/n)? y
Enter Name, Age, & Basic Salary:
Udaya 34 80000
Add another record(y/n)? n

Ramesh	27	40000.000000
Udaya	34	80000.000000

Why?

employee.txt - Notepad

File Edit Format View Help

Ramesh y" " " " " "

@GUdaya y" " " " " "

@œG

Reading & writing arrays with record I/O functions

18

Er. Shiva K. Shreshth
2/10/2019

```
FILE_10.C
1  #include<stdio.h>
2  #include<conio.h>
3  #include<stdlib.h>
4  int a[10]={1,2,3,4,5,6,7,8,9,10}, b[10];
5  int main(){
6      FILE *ftp;
7      int i;
8      ftp=fopen("integer.txt","wb+");
9      if(ftp==NULL){
10         printf("Cannot open a file.");
11     }else{
12         fwrite(a,sizeof(a),1,ftp);
13     }
14     printf("Data has been written on a file.\n");
15     rewind(ftp);
16     while(!feof(ftp))
17         fread(b,sizeof(b),1,ftp);
18
19     for(i=0;i<10;i++){
20         printf("%-4d",b[i]);
21     }
22     fclose(ftp);
23     getch(); return 0;
24 }
```

D:\[C]\Ch10_Data_Files\FILE_10.exe

Data has been written on a file.

1 2 3 4 5 6 7 8 9 10

integer.txt - Notepad

File Edit Format View Help

FILE_10.C integer.txt

```
1 0100 0000 0200 0000 0300 0000 0400 0000
2 0500 0000 0600 0000 0700 0000 0800 0000
3 0900 0000 0a00 0000
```

Using ftell() Function

19

Er. Shiva K. Shrestha (HoD, Computer Department)
2/10/2019

```
FILE_11.C
1  #include<stdio.h>
2  #include<conio.h>
3  int main(){
4      FILE *stream;
5      stream = fopen("khwopa.txt", "w+");
6      fprintf(stream, "This is a test ...");
7      printf("The file pointer is at byte %ld\n", ftell(stream));
8      fclose(stream);
9      getch();
10     return 0;
11 }
```

D:\[C]\Ch10_Data_Files\FILE_11.exe

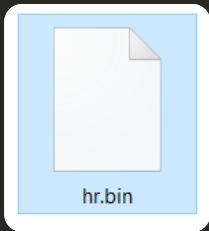
The file pointer is at byte 18

khwopa.txt - Notepad

File Edit Format View Help

This is a test ...

```
FILE_12.C x
1 #include<stdio.h>
2 #include<conio.h>
3 struct HR{
4     char name[10]; char address[15];
5     long int phone; char qualification[10];
6 }e,h[5]={
7     {"Ramesh","Samjur",9849761940,"SLC"},
8     {"Dinesh","Majhgaun",9801061940,"SEE"},
9     {"Harish","Pokhara",9811111111,"ME"},
10    {"Pawan","Bandipur",9822222222,"MSc"},
11    {"Sushmita","Dumre",9833333333,"PhD"},
12 };
13 int main(){
14     int end_pos, current_pos, total, n, i;
15     char choice;
16     FILE *f;
17     f = fopen("hr.bin","ab+");
18     for(i=0;i<5;i++){
19         fwrite(&h[i],sizeof(struct HR),1,f);
20     }
21     rewind(f);
22     fseek(f,0,SEEK_END);
23     end_pos=ftell(f);
24     total=end_pos/sizeof(struct HR);
25     do{
26         printf("There are %d structures, which you want to view? ",total);
27         scanf("%d",&n);
28         current_pos=(n-1)*sizeof(struct HR);
29         fseek(f,current_pos,SEEK_SET);
30         fread(&e,sizeof(struct HR),1,f);
31         printf("\nThe name is %s.\n",e.name);
32         printf("The address is %s.\n",e.address);
33         printf("The phone no is %ld.\n",e.phone);
34         printf("The qualification is %s.\n",e.qualification);
35         fflush(stdin);
36         printf("Do you want to see some other records(y/n)? ");
37         scanf("%c",&choice);
38     }while(choice=='Y' || choice=='y');
39     fclose(f); getch(); return 0;
40 }
```



```
D:\[C]\Ch10_Data_Files\FILE_12.exe
There are 5 structures, which you want to view? 1
The name is Ramesh.
The address is Samjur.
The phone no is 1259827348.
The qualification is SLC.
Do you want to see some other records(y/n)? y
There are 5 structures, which you want to view? 3
The name is Harish.
The address is Pokhara.
The phone no is 1221176519.
The qualification is ME.
Do you want to see some other records(y/n)? y
There are 5 structures, which you want to view? 5
The name is Sushmita.
The address is Dumre.
The phone no is 1243398741.
The qualification is PhD.
Do you want to see some other records(y/n)? n
```

hr.bin - Notepad

1	5261	6d65	7368	0000	0000	5361	6d6a	7572
2	0000	0000	0000	0000	0000	0000	9470	174b
3	534c	4300	0000	0000	0000	0000	4469	6e65
4	7368	0000	0000	4d61	6a68	6761	756e	0000
5	0000	0000	0000	0000	3456	3048	5345	4500
6	0000	0000	0000	0000	4861	7269	7368	0000
7	0000	506f	6b68	6172	6100	0000	0000	0000

1	Ramesh	Samjur	"pKSLC
1	Dinesh	Majhgaun	4VOHSEE
1	Harish	Pokhara	Ç-ÉHME
1	Pawan	Bandipur	Ž7sIMSc
1	Sushmita	Dumre	UÂJPhD

Task

- Modify Program# 12 to take input from user using structure to store information of HR. User should view any information of saved HRs.

```
15     for(i=0;i<5;i++){
16         printf("Enter Name: ");
17         scanf("%s",h[i].name);
18         printf("Enter Address: ");
19         scanf("%s",h[i].address);
20         printf("Enter Phone No.: ");
21         scanf("%ld",&h[i].phone);
22         printf("Enter Qualification: ");
23         scanf("%s",h[i].qualification);
24         fwrite(&h[i],sizeof(struct HR),1,fptr);
25         //clrscr();
26     }
```

D:\[C]\Ch10_Data_Files\FILE_12_2.exe

```
Enter Name: Sundar
Enter Address: Bandipur
Enter Phone No.: 9849761940
Enter Qualification: ISc
Enter Name: Laxmi
Enter Address: Chitwan
Enter Phone No.: 9801061940
Enter Qualification: SLC
Enter Name: Shiva
Enter Address: Samjur
Enter Phone No.: 9849761940
Enter Qualification: ME
Enter Name: Abinash
Enter Address: Pokhara
Enter Phone No.: 9811111111
Enter Qualification: BBS
Enter Name: Rajin
Enter Address: Kathmandu
Enter Phone No.: 9822222222
Enter Qualification: BEd
There are 10 structures, which you want to view? 8
```

```
The name is Shiva.
The address is Samjur.
The phone no is 1259827348.
The qualification is ME.
Do you want to see some other records(y/n)? y
There are 10 structures, which you want to view? 10
```

```
The name is Rajin.
The address is Kathmandu.
The phone no is 1232287630.
The qualification is BEd.
Do you want to see some other records(y/n)? y
There are 10 structures, which you want to view? 1
```

```
The name is Ramesh.
The address is Samjur.
The phone no is 1259827348.
The qualification is SLC.
Do you want to see some other records(y/n)? y
There are 10 structures, which you want to view? 5
```

```
The name is Sushmita.
The address is Dumre.
The phone no is 1243398741.
The qualification is PhD.
Do you want to see some other records(y/n)?
```

Text Mode vs. Binary Mode

22

Er. Shiva K. Shrestha (HoD, Computer Department)
2/10/2019

Imp Examples

23

Er. Shiva K. Shrestha (HoD, Computer Department)
2/10/2019

Q/A?

24

Thank You!

Er. Shiva K. Shrestha

computer.khwopa@gmail.com

Er. Shiva K. Shrestha (HoD, Computer Department)
2/10/2019