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AIM:	Apply the concepts of structures/union to solve a given problem.
Program 1	
PROBLEM STATEMENT :	A men's sports club keeps elaborate computerized records of all its members. The records contain typical information such as age, address, etc. of each person. But there is also information about whether a member is an active playing members, about whether he is married, and so on; if he is married the record contains information about his wife's name, the no. of children and their names. Write a program which demonstrates how such a system might be implemented. Show how the names of the wives of all active playing members might be printed.
ALGORITHM:	1. START 2. Define structure family with char array wife name, integer number of children and 2-D char array names as variables 3. Define union details with structure family and char array hobbies as variables 4. Define structure member with char array name, integer age, char array address characters active and married and union det as variables 5. Define void input function with member array c as variable 6. Loop from I = 0 to 1 Input all variables of members c[i] If c[i].married is equal to 'Y': Input all details of c[i].det.fam Else Input c[i].hobbies 7. Define function int main() 8. Declare variable c[i] of data type member 9. Call input(c) 10. Loop from I = 0 to 1 if c[i].married is equal to Y and c[i].active is equal to Y

	print c[i].name and c[i].det.fam.wife_name 11. STOP

PROGRAM:	#include<stdio.h>
	typedef struct family
	{
	char wife_name[20];
	int n_child;
	char child_names[10][20];
	}family;
	typedef union details
	{
	family fam;
	char hobby[30];
	}details;
	typedef struct member
	{
	char name[20];
	int age;
	char addr[100];
	char active,married;
	details det;
	
	}member;
	void input(member c[2])
	{
	for(int i=0;i<2;i++)
	{
	printf("\n\nEnter the name of the member: ");
	scanf(" %s",c[i].name);
	printf("Enter their age: ");
	scanf("%d",&c[i].age);
	printf("Enter their address: ");
	scanf(" %[^\n]",c[i].addr);
	printf("Enter active status (Y/N): ");
	scanf(" %c",&c[i].active);
	printf("Enter Marital Status (Y/N): ");
	scanf(" %c",&c[i].married);
	if(c[i].married=='Y')
	{

```
            printf("Enter name of the wife: ");
            scanf(" %s",c[i].det.fam.wife_name);
            printf("Enter the number of children: ");
            scanf("%d",&c[i].det.fam.n_child);
            for(int i=0;i<c[i].det.fam.n_child;i++)
            {
                printf("Enter name of the children: ");
                scanf(" %s",c[i].det.fam.child_names[i]);
            }
        }
        else
        {
            printf("Enter the hobby of the member: ");
            scanf(" %[^\n]",c[i].det.hobby);
        }
    }
}
int main()
{
    member c[2];
    input(c);
    printf("The list of married active players and their wives is as
follows:\n");
    printf("Name\tWife");
    for(int i=0;i<2;i++)
    {
        if(c[i].active=='Y' && c[i].married=='Y')
            printf("%s\t%s",c[i].name,c[i].det.fam.wife_name);
    }
    return 0;
}
```

RESULT:

```
D:\Studies\Programs\Assignment 8>gcc -o hello As8_1.c

D:\Studies\Programs\Assignment 8>hello


Enter the name of the member: Vineet
Enter their age: 18
Enter their address: Dahisar
Enter active status (Y/N): Y
Enter Marital Status (Y/N): N
Enter the hobby of the member: Coding


Enter the name of the member: Udit
Enter their age: 24
Enter their address: Borivali
Enter active status (Y/N): Y
Enter Marital Status (Y/N): Y
Enter name of the wife: Anjali
Enter the number of children: 2
Enter name of the children: Rahul
Enter name of the children: Ram
The list of married active players and their wives is as follows:
Name    Wife
Udit    Anjali
D:\Studies\Programs\Assignment 8>
```

Program 2	
PROBLEM STATEMENT :	An airline reservation system maintains records for possible flights consisting of STARTING POINT 3 character code DESTINATION 3 character code STARTING TIME integer on scale (0001 – 2400) ARRIVAL TIME integer on scale (0001 – 2400) SEATS positive integer in suitable range. Your program is to read 20 such records followed by queries of the form STARTING POINT– DESTINATION, one to a line. For each query find whether there is a possible flight with a seat available; if so reduce the number of seats by one and print out the flight details (or an apology).
ALGORITHM:	1. START 2. Define structure airline_t with char array src, dest, integers start, arrive, seats and counts as variables 3. Define void function reset with airline_t variable c[] 4. Loop from I = 0 to 4

	c[i].count is equal to 0 5. Define void function input with airline_t variable c[] 6. Loop from I = 0 to 4 Input all details of c[i] 7. Define int main() 8. Initialize airline_t variable c[5] 9. Call function input(c) 10. Do a. Input source and destination b. Flag = 0, D = 1 c. Loop from I = 0 to 4 If strcmp(c[i].src and source_) is equal to 0 and if strcmp(c[i].dest and dest) I. print c[i].start, c[i].arrive and c[i].seats II. c[i].count = d III. d++ IV. temp++ d.If temp is equal to 0 print sorry no flights available else I. input choice and number of seat II. Loop from 0 to 4 if n is equal to c[i].count if c[i].seats – seat >=0 c[i].seats -= seat print Booked and remaining seats else print Seats not available e. Input flag f. call reset(c) while flag is equal to 0 11. Return 0 12. STOP
PROGRAM:	#include<stdio.h> #include<string.h> typedef struct air { char src[4]; char des[4];

```
    int start;
    int arrive;
    int seats;
    int count;
}airline_t;
void reset(airline_t c[5])
{
    for(int i=0;i<5;i++)
        c[i].count=0;
}
void input(airline_t c[5])
{
    for(int i=0;i<5;i++)
    {
        printf("\nEnter the source: ");
        scanf("%s",c[i].src);
        printf("Enter the destination: ");
        scanf("%s",c[i].des);
        printf("Enter the starting time: ");
        scanf("%d",&c[i].start);
        printf("Enter the arriving time: ");
        scanf("%d",&c[i].arrive);
        printf("Enter the number of seats: ");
        scanf("%d",&c[i].seats);
        c[i].count=0;
    }
}
int main()
{
    int d=1,temp=0,n,flag=0,seat;
    airline_t c[5];
    input(c);
    char source[4], dest[4];
    do
    {
        printf("\nEnter your source: ");
        scanf("%s",source);
        printf("Enter your destination: ");
        scanf("%s",dest);
        printf("\nStart\tEnd\tSeats\n");
```

```
      for(int i=0;i<5;i++)
      {
         if(strcmp(c[i].src,source)==0 && strcmp(c[i].des,dest)==0 &&
c[i].seats>0)
         {
            printf("%d\t%d\t%d\n",c[i].start,c[i].arrive,c[i].seats);
            c[i].count=d;
            d++;
            temp++;
         }
      }
      if(temp==0)
      {
         printf("\nSorry we dont have any flights available");
      }
      else
      {
         printf("Enter the number of flight you want to take: ");
         scanf("%d",&n);
         printf("Enter the number of seats you want to book: ");
         scanf("%d",&seat);
         for(int i=0;i<5;i++)
         {
            if(n==c[i].count)
            {
               if(c[i].seats - seat >= 0)
               {
                  c[i].seats -= seat;
                  printf("Your flight has been booked for %s to
%s",c[i].src,c[i].des);
                  printf("\nTimings are follows: %d to
%d",c[i].start,c[i].arrive);
                  printf("\nNo of seats remaining: %d",c[i].seats);
               }
               else
               {
                  printf("The flight does not have %d seats available",seat);
                  printf("\nPlease select a different flight.");
               }
            }
```

```
            }
        }
        printf("Enter 0 to continue booking or any other number to exit");
        scanf("%d",&flag);
        reset(c);
    } while (flag==0);
    return 0;
}
```

RESULT:

```
D:\Studies\Programs\Assignment 8>gcc -o hello As8_2.c

D:\Studies\Programs\Assignment 8>hello

Enter the source: BOM
Enter the destination: DEL
Enter the starting time: 1
Enter the arriving time: 3
Enter the number of seats: 23

Enter the source: BOM
Enter the destination: DEL
Enter the starting time: 4
Enter the arriving time: 5
Enter the number of seats: 3

Enter the source: BOM
Enter the destination: BLR
Enter the starting time: 7
Enter the arriving time: 9
Enter the number of seats: 54

Enter the source: BOM
Enter the destination: DEL
Enter the starting time: 12
Enter the arriving time: 13
Enter the number of seats: 0

Enter the source: BOM
Enter the destination: DEL
Enter the starting time: 20
Enter the arriving time: 21
Enter the number of seats: 34

Enter your source: BOM
Enter your destination: DEL

Start   End     Seats
1       3       23
4       5       3
20      21      34
Enter the number of flight you want to take: 2
Your flight has been booked for BOM to DEL timings are as follows: 4 to 5. Number of seats remaining: 2
```

Program 3

PROBLEM STATEMENT:	A record in an organization's payroll consists of one line for each employee consisting of: NAME (20 characters), GENDER (1 character M or F), SALARY (integer), DATE OF BIRTH (3 integers YEAR MONTH

	DAY). Write a program which will input 10 such records. Your program must then take in 5 amendments in the record set which will be in the same form as the record structure itself. The amendments can contain new employees to be added (name different from existing ones), employees left (salary given as 0) and update of salary(more or less). Your program must then incorporate these amendments and also remove those employees who have reached retirement age(Age 60).

ALGORITHM:	1. START
	2. Define structure employee with char array name, char gender, integers salary, day, month, year, age as variables
	3. Define main function
	4. Define employee variable c[10]
	5. Define char array name[5][20]
	6. Loop from I = 0 to 4
	Input details of c[i] except age
	c[i].age = 2022 – c[i].year
	7. Loop from k = 0 to 4
	A. input name[k]
	B. Loop from j = 0 to 9
	I. if strcmp(c[i].name and name[k]) is equal to 0
	a. input choice
	b. if choice is equal to 1
	c[j].salary is equal to 0
	else
	input c[j].salary
	c. flag = 1
	d. break
	II. If flag is equal to 0
	input all details of c[i]
	c[i].age = 2022 – c[i].year
	8. Loop from k = 0 to I
	If(c[k].age is less than 60 and c[k].salary is greater than 0)
	print all details of c[k]
	9. Return 0
	10. STOP

PROGRAM:	#include<stdio.h> #include<string.h> typedef struct employee

```
{
    char name[20];
    char gender;
    int salary;
    int day;
    int month;
    int year;
    int age;
}employee;
int main()
{
    employee c[10];
    int i;
    char name[5][20];
    for(i=0;i<5;i++)
    {
        printf("Enter the name: ");
        scanf(" %s",c[i].name);
        printf("Enter the gender (M/F): ");
        scanf(" %c",&c[i].gender);
        printf("Enter the salary: ");
        scanf("%d",&c[i].salary);
        printf("Enter the Date of Birth (DD MM YYYY): ");
        scanf("%d %d %d",&c[i].day,&c[i].month,&c[i].year);
        c[i].age = 2022 - c[i].year;
        printf("\n");
    }
    printf("Amendments: ");
    for (int k=0;k<5;k++)
    {
        int flag=0;
        printf("\nEnter the name: ");
        scanf(" %s",name[k]);
        for(int j=0;j<10;j++)
        {
            if(strcmp(c[j].name,name[k])==0)
            {
                int choice;
                printf("Enter 1 if employee has left and 2 if employee if the
salary is to be modified: ");
```

```
            scanf("%d",&choice);
            if(choice ==  1)
               c[j].salary = 0;
            else if(choice == 2)
            {
               printf("Enter the new salary: ");
               scanf("%d",&c[j].salary);
            }
            flag = 1;
            break;
         }
      }
      if(flag == 0)
      {
         strcpy(c[i].name,name[k]);
         printf("Enter the gender of the employee (M/F): ");
         scanf(" %c",&c[i].gender);
         printf("Enter the salary of the employee: ");
         scanf("%d",&c[i].salary);
         printf("Enter the date of birth (DD MM YYYY) : ");
         scanf("%d %d %d",&c[i].day,&c[i].month,&c[i].year);
         c[i].age = 2022 - c[i].year;
         i++;
      }
   }
   printf("Name\tGender\tSalary\tDate of Birth");
   for(int k=0;k<i;k++)
   {
      if(c[k].age <60 && c[k].salary != 0)
      printf("\n%s\t%c\t%d\t%d %d
%d",c[k].name,c[k].gender,c[k].salary,c[k].day,c[k].month,c[k].year);
      }
   return 0;
}
```

RESULT:

```
D:\Studies\Programs\Assignment 8>gcc -o hello As8_3.c

D:\Studies\Programs\Assignment 8>hello
Enter the name: Vineet
Enter the gender (M/F): M
Enter the salary: 10000
Enter the Date of Birth (DD MM YYYY): 08 12 2003

Enter the name: Vanshi
Enter the gender (M/F): F
Enter the salary: 10000
Enter the Date of Birth (DD MM YYYY): 08 12 1950

Enter the name: Udit
Enter the gender (M/F): M
Enter the salary: 10000
Enter the Date of Birth (DD MM YYYY): 08 12 2003

Enter the name: Onam
Enter the gender (M/F): M
Enter the salary: 10000
Enter the Date of Birth (DD MM YYYY): 08 12 2003

Enter the name: Virinchi
Enter the gender (M/F): M
Enter the salary: 10000
Enter the Date of Birth (DD MM YYYY): 08 12 2003

Amendments:
Enter the name: Virinchi
Enter 1 if employee has left and 2 if employee if the salary is to be modified: 1

Enter the name: Omkar
Enter the gender of the employee (M/F): M
Enter the salary of the employee: 10000
Enter the date of birth (DD MM YYYY) : 08 12 2003

Enter the name: Vineet
Enter 1 if employee has left and 2 if employee if the salary is to be modified: 2
Enter the new salary: 20000
```

```
Enter the name: Udit
Enter 1 if employee has left and 2 if employee if the salary is to be modified: 2
Enter the new salary: 8000

Enter the name: Hatim
Enter the gender of the employee (M/F): M
Enter the salary of the employee: 10000
Enter the date of birth (DD MM YYYY) : 08 12 2003
Name    Gender  Salary  Date of Birth
Vineet  M       20000   8 12 2003
Udit    M       8000    8 12 2003
Onam    M       10000   8 12 2003
Omkar   M       10000   8 12 2003
Hatim   M       10000   8 12 2003
D:\Studies\Programs\Assignment 8>
```

CONCLUSION :	In this experiment, we learnt the basic definitions of structures and unions and how they are helpful in some many ways. We also learned how structures and unions can be called within each other. Furthermore, we learned about how unions saves memory space and lastly we coded 3 programs using the concepts learned above