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| **Name** | **Hatim Yusuf Sawai** |
| **UID no.** | **2021300108** |
| **Experiment No.** | 8 |

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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 wifename[20];      int nc;      char childnames[10][20];  }family;  typedef union details  {      family f;      char hobby[30];  }details;  typedef struct member  {      char name[30];      char adr[30];      char active,married;      int age;      details det;  }member;  void input(int n, member m[n])  {      for (int i=0;i<n;i++)      {          printf("\nEnter the name of the member: ");          scanf(" %s", m[i].name);          printf("Enter the age: ");          scanf("%d", &m[i].age);          printf("Enter the address: ");          scanf(" %[^\n]s", m[i].adr);          printf("Enter Active status (y/n): ");          scanf(" %c", &m[i].active);          printf("Enter Marital Status (y/n): ");          scanf(" %c", &m[i].married);          if (m[i].married == 'y')          {              printf("Enter name of the wife: ");              scanf(" %s", m[i].det.f.wifename);              printf("Enter the number of children: ");              scanf("%d", &m[i].det.f.nc);              for (int j=0;j<m[i].det.f.nc;j++)              {                  printf("Enter name of the children: ");                  scanf(" %s", m[i].det.f.childnames[i]);              }          }          else          {              printf("Enter the hobby of the member: ");              scanf(" %[^\n]s", m[i].det.hobby);          }      }  }  int main()  {      int i,n;      printf("How many records do you want to enter: ");      scanf("%d",&n);      member m[n];      input(n,m);      printf("\nActive players and their wives' records:\n");      printf("Name\tWife\n");      for(i=0;i<n;i++)      {          if (m[i].active == 'y' && m[i].married == 'y')              printf("%s\t%s", m[i].name, m[i].det.f.wifename);      }      return 0;  } |
| **RESULT:** | |
| **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:** | 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 flight  {      char strt[4];      char dest[4];      int start;      int arrival;      int seats;      int count;  }flight;  void reset(int n,flight f[n])  {      for(int i=0;i<n;i++)          f[i].count=0;  }  void input(int n,flight f[n])  {      for(int i=0;i<n;i++)      {          printf("\nEnter start: ");          scanf("%s", f[i].strt);          printf("Enter destination: ");          scanf("%s", f[i].dest);          printf("Enter departure time: ");          scanf("%d", &f[i].start);          printf("Enter arrival time: ");          scanf("%d", &f[i].arrival);          printf("Enter number of seats: ");          scanf("%d", &f[i].seats);          f[i].count = 0;      }  }  int main()  {      int i,j,n,flag=1,temp=0,c=1,ns,nf;      printf("How many records do you want to enter: ");      scanf("%d",&n);      flight f[n];      input(n,f);      char stp[4],des[4];      do      {          printf("Enter your starting point: ");          scanf("%s",stp);          printf("Enter your destination: ");          scanf("%s",des);          printf("\nStart\tEnd\tSeats\n");          for(i=0;i<n;i++)          {              if(strcmp(f[i].strt, stp) == 0 && strcmp(f[i].dest, des) == 0 && f[i].seats>0)              {                  printf("%d\t%d\t%d\n", f[i].start, f[i].arrival, f[i].seats);                  f[i].count = c;                  c++;                  temp++;              }          }          if(temp==0)              printf("Sorry we do not have any available flights.");          else          {              printf("Enter flight number: ");              scanf("%d",&nf);              printf("Enter no. of seats to be booked: ");              scanf("%d",&ns);              for(j=0;j<n;j++)              {                  if(nf==f[j].count)                  {                      if(f[j].seats - ns >= 0)                      {                          f[j].seats -= ns;                          printf("Your flight has been booked succesfully!\n");                          printf("Flight Details:\nSource: %s\nDestination: %s\n", f[j].strt, f[j].dest);                          printf("Departure Time: %d\nArrival Time: %d", f[j].start, f[j].arrival);                          printf("Seats: %d", ns);                      }                      else                      {                          printf("The flight does not have %d seats available", ns);                          printf("\nPlease select a different flight.");                      }                  }              }          }          printf("\nEnter 1 to continue booking or 0 to exit: ");          scanf("%d", &flag);          reset(n,f);      } while (flag==1);      return 0;  } |
| **RESULT:** | |
| **Program 3** | |
| **PROBLEM STATEMENT:** | A structure “Cricket” consisting of following: i) Player name ii) name of the country number of matches played iii) number of hundreds scored Make a programme to read records n players and to prepare list according to: i) players name ii) countries name iii) number of matches played iv) number of hundreds Scored |
| **ALGORITHM:** | 1. START 2. Define a structure “cricket” with char player[20], char country[20], int matches and int hundreds 3. Define void input(n, cricket c[n]) 4. For i=0;i++] 5. Input c[i].player, c[i].country, c[i].matches, c[i].hundreds 6. Repeat step 5 till i<n 7. Define int main() 8. Input n 9. Initialize cricket c[n] 10. Input(n,c) 11. For i=0;i++ 12. Output c[i].player, c[i]country, c[i].matches, c[i].hundreds 13. Repeat step 12 till i<n 14. STOP |
| **PROGRAM:** | #include<stdio.h>  typedef struct cricket  {      char player[20];      char country[20];      int matches;      int hundreds;  }cricket;  void input(int n,cricket c[n])  {      for(int i=0;i<n;i++)      {          printf("\nRecord #%d",i+1);          printf("\nPlayer's Name: ");          scanf("%s",c[i].player);          printf("Country Name: ");          scanf(" %s",c[i].country);          printf("No. of matches played: ");          scanf("%d",&c[i].matches);          printf("No. of hundreds scored: ");          scanf("%d",&c[i].hundreds);      }  }  int main()  {      int i,n;      printf("How many records do you want to enter: ");      scanf("%d",&n);      cricket c[n];      input(n,c);      printf("Player\tCountry\tMatches\tHundreds\n");      for (int i = 0; i < n; i++)          printf("%s\t%s\t%d\t%d\n", c[i].player, c[i].country, c[i].matches, c[i].hundreds);      return 0;  } |
| **RESULT:** | |
| **CONCLUSION:** | We learnt how to define structures and unions and use them to store records and develop database like programs. We learnt how to use typedef to define our own types and use variables/Arrays of those types in our program. |