

9.1 Advanced Structures

Advanced structures are a C++ feature that allows one to put functions as field elements into a structure. Consider the datatype from before.

```
Struct datatype
{
    int    month;
    int    day;
    int    year;
};

struct datatype    date;

date.month = 7;
date.day = 23;
date.year = 2003;
```

Now we want to add a function to this structure that will initialize the structure and another function to print the structure. We may then have:

```
Struct datatype
{
    char    month[12];
    int    day;
    int    year;

    void    init(char m, int d, int y)
    {
        strcpy (month, m);
        day = d;
        year = y;
    }

    void    print()
    {
        printf("%10s/%2d/%2d",month, day, year);
    }
};

struct datatype    date;
```

Now to initialize the structure instead of doing:

```
Strcpy(date.month, "July");
date.day = 23;
date.year = 2003;
```

We now simply use:

```
date.init("July", 23, 2003);
```

And to print a the structure we use:

```
date.print();
```

This reduces the effort on using the structure but more importantly the user of the structure does not need to worry about how to initialize or point the data in the structure since a function to do this is included in the structure.

Note in the following program that since struct DOB in part of struct records we simply call DOB's init and print function from the records init and print function.

The following function is similar to the previous one but uses the included functions.

```
#include "stdio.h"
#include "string.h"

struct date
{
    char    month[10];
    int     day;
    int     year;
    void    init(char *m, int d, int y)
    {
        strcpy (month, m);
        day = d;
        year = y;
    }

    void    print()
    {
        printf("%10s/%2d/%2d",month, day, year);
    }
};

struct record
{
    char    name[80];
    double  pay;
    date    DOB;
    void    init(char *n, double p, char *m, int d, int y)
    {
        strcpy (name, n);
        pay = p;
        DOB.init(m,d,y);
    }

    void    print()
    {
        printf("%10s $%10.2lf ",name, pay);
        DOB.print();
        printf("\n");
    }
};

record TheRecords[100] =
    { {"bill", 42000, {"July", 23, 1978} },
      {"Fred", 12000, {"May", 19, 1956} },
      {"Tom", 76000, {"April", 5, 1932} },
      {"Sam", 123000, {"March", 12, 1981} },
```

```

        {"Carlos",56000, {"June", 25, 1965} },
        {"Ali", 32500, {"Decamber", 19, 1987} },
        {"Chen", 26750, {"October", 23, 1977} },
        {"Gary", 76800, {"May", 8, 1983} },
        {"Anna", 145500, {"August", 14, 1964} } };

void printrecords(record r[100], int n)
{
    int i;

    for (i = 0; i < n; i++)
        r[i].print();
}

void get_new_record(int i)
{
    char    name[80],
           month[12];
    int     day,
           year;
    double  pay;

    printf("enter person's name\n");
    scanf("%s",name);

    printf("enter person's pay\n");
    scanf("%lf", &pay );

    printf("enter person's DOB month\n");
    scanf("%s",month);

    printf("enter person's DOB day\n");
    scanf("%d", &day );

    printf("enter person's DOB year\n");
    scanf("%d", &year );

    TheRecords[i].init(name,pay,month,day,year);
}

int main()
{
    printrecords(TheRecords,9);
    get_new_record(9);
    printrecords(TheRecords,10);
    return 0;
}

```

