



CMSC 106

Lecture Set #12 - Structures

Set Started:

Tuesday, November 20, 2007



Structured Types

- **array**- composite variable, all elements have same type.
- **structure** (or **struct**)- composite variable with components (called members or fields) which can be different types.



parallel arrays

```
char month[][4] = {"Feb", "Feb", "Mar"};
```

```
int day[] = {17, 25, 4};
```

```
int year[] = {1998, 1998, 1998};
```

```
printf("%s %d %d", month[1], day[1], year[1]);
```



structure

```
struct date {  
    char month[4];  
    int day;  
    int year;  
};
```

- 3 fields or members:
 - an array of 4 characters named month,
 - an int named day,
 - an int named year
- date = structure tag or the name of this type of structure
 - month, day, and year are not individual variables, but part of a larger object
 - Structure field names can be the same as individual variables or the same as field names in other structures without conflict.
- Declaring a variable
 - struct date myDay;
 - struct date d1, d2;



typedef

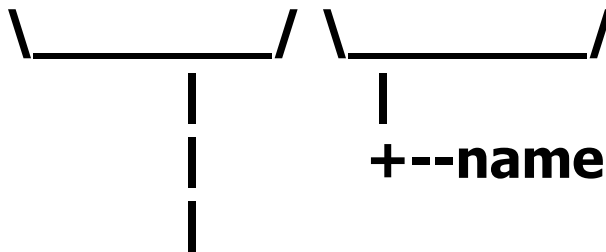
```
typedef struct {  
    char month[4];  
    int day;  
    int year;  
} Date;  
main() {  
    Date d1, d2;
```

- Defines a type named Date (and you don't have to use the keyword "struct" with its tag).



The . (dot) operator

- **structurevar.fieldname**



+--name of field

+ -name of structure variable

- Structures of the same type can be assigned: `d2= d1;`
- Fields of a structure can be assigned : `d1.day = 21;`
- Structure fields can be used like other variables of that type:
 - `d1.day++;`
 - `diff= 2000 - d2.year;`
- Entire structures CAN NOT be read or printed
- Entire structures CAN NOT be compared



Structure Initializers

- values listed in braces
- fields initialized in the order they appear in the structure definition
- if too few values, remaining fields initialized to 0

Date birthday = {"Dec", 25, 1964};



Arrays of Structures

```
Date duedates[PROJCOUNT];
strcpy(duedates[0].month, "Feb");
duedates[0].day= 17;
duedates[0].year= 1998;
strcpy(duedates[1].month, "Feb");
duedates[1].day= 25;
duedates[1].year= 1998;
... etc.

int i;
for (i = 0; i < PROJCOUNT; i++){
    printf("%s %d %d", duedates[i].month,
           duedates[i].day, duedates[i].year);
}
```



Passing Structures, structure references and arrays of structures as parameters

■ Like Arrays

- they are a composite type
- you can pass the whole or pass just a part
- they can be initialized using {} as they first come into existence
- they can't be compared using the == operator (or <, >, !=)
- you can compare/process individual members one by one

■ Unlike Arrays

- they don't have to have all parts be of the same type
- you must use the name of each part rather than the index
- names of structures are not references
- you must use & to get its address
- a structure can be the return value of a function
- they can be assigned using the = (assignment operator)