STRUCTURES

A **structure** is a collection of values of different data types.

Structure declaration – forms the template that may be used to create structure variable.
Structure elements/components – are variables that make up the structure.

SYNTAX:
struct structure_tag_name {
data_type_1 variable_1;
data_type_2 variable_2;
…
data_type_n variable_n;
} structure_variable(s);

structure_tage_name is the name of the structure template, **NOT** a variable name.

structure_variable(s) is/are a comma separated list of variable names.

4 DIFFERENT WAYS TO DECLARE STRUCTURE VARIABLES:

1. WITH tagname, WITHOUT structure variables

   Example:
   struct Name {
   char Fname[20];
   char Mname[20];
   char Lname[20];
   };

   Actual variable declaration:
   struct Name Person1, Person2;

2. WITHOUT tagname, WITH structure variables

   Example:
   struct {
   char Fname[20];
   char Mname[20];
   char Lname[20];
   } Person1, Person2; ➔ Variables already

3. WITH tagname, WITH structure variables

   Example:
   ```
   struct Name{
   char Fname[20];
   char Mname[20];
   char Lname[20];
   }Person1, Person2;
   ```
   ➔ Variables already

   ```
   struct Name BankMgr, BankTeller;
   ```
   ➔ These are also variables

4. Using **typedef**

   Example:
   ```
   typedef struct{
   char Fname[20];
   char Mname[20];
   char Lname[20];
   }Fullname;
   ```

Actual variable declaration:
```
Fullname Person1, Person2;
```

Note: Fullname is not a variable

Referencing Structure Elements/Components

To access individual components, the **dot** notation is used. (The dot is called the **member operator).**

HOW TO:
```
structure_variable.element_name;
```

Example:
```
typedef struct{
  char name[20];
  int age;
  float scores[3];
}Info;

main(){
  Info Person1;
  scanf("%s", Person1.name);
  scanf("%d", &Person1.age);
  scanf("%f", &Person1.scores[0]);
  scanf("%f", &Person1.scores[1]);
  scanf("%f", &Person1.scores[2]);
}
```

ARRAY OF STRUCTURES:

Examples:
```
typedef struct{
  char name[20];
  int age;
  float scores[3];
}Info;

main(){
Info students[10]; ➔ declares 10 structures

}
```

Components of students[10]:
`students[0].name` ➔ string variable of 1st student
`students[1].name` ➔ string variable of 2st student
…

STRUCTURE WITHIN A STRUCTURE:

Examples:

```
typedef struct{
  char Fname[20];
  char Mname[20];
  char Lname[20];
}Fullname;

typedef struct{
  Fullname name; ➔ The structure within a structure
  int age;
  float scores[3];
}Info;

main(){
Info student;

}
```

Components of student:

`student.name.Fname` ➔ string
`student.name.Mname` ➔ string
`student.name.Lname` ➔ string