

F# - STRUCTURES

http://www.tutorialspoint.com/fsharp/fsharp_structures.htm

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A structure in F# is a value type data type. It helps you to make a single variable, hold related data of various data types. The **struct** keyword is used for creating a structure.

Syntax

Syntax for defining a structure is as follows –

```
[ attributes ]
type [accessibility-modifier] type-name =
    struct
        type-definition-elements
    end
// or
[ attributes ]
[<StructAttribute>]
type [accessibility-modifier] type-name =
    type-definition-elements
```

There are two syntaxes. The first syntax is mostly used, because, if you use the **struct** and **end** keywords, you can omit the **StructAttribute** attribute.

The structure definition elements provide –

- Member declarations and definitions.
- Constructors and mutable and immutable fields.
- Members and interface implementations.

Unlike classes, structures cannot be inherited and cannot contain let or do bindings. Since, structures do not have let bindings; you must declare fields in structures by using the **val** keyword.

When you define a field and its type using **val** keyword, you cannot initialize the field value, instead they are initialized to zero or null. So for a structure having an implicit constructor, the **val** declarations be annotated with the **DefaultValue** attribute.

Example

The following program creates a line structure along with a constructor. The program calculates the length of a line using the structure –

```
type Line = struct
    val X1 : float
    val Y1 : float
    val X2 : float
    val Y2 : float

    new (x1, y1, x2, y2) =
        {X1 = x1; Y1 = y1; X2 = x2; Y2 = y2;}
end
let calcLength(a : Line)=
    let sqr a = a * a
    sqrt(sqr(a.X1 - a.X2) + sqr(a.Y1 - a.Y2) )

let aLine = new Line(1.0, 1.0, 4.0, 5.0)
let length = calcLength aLine
printfn "Length of the Line: %g " length
```

When you compile and execute the program, it yields the following output –

```
Length of the Line: 5
```

