

Fortran 77: User-defined Functions

It has always been good programming practice to divide a computer program up into blocks of code that were as independent of each other as possible. These blocks were termed modules and the division of code in this way is often called procedural programming or *modular programming*¹. In Fortran modules are collectively termed *subprograms* and there are two main types of subprogram; a *subroutine* which carried out a defined task and a *function*, which carried out a task but with a purpose of returning a value. In this document we consider the use of functions in Fortran.

There are already a number of pre-defined functions in Fortran². User-defined functions have a similar format to predefined functions, in that they require a set of values as input and return an output value, but they must be either written by the programmer or be supplied by an external library. Note that in Fortran 77 only a single value of any data type can be returned from a function; it is not possible to return an array.

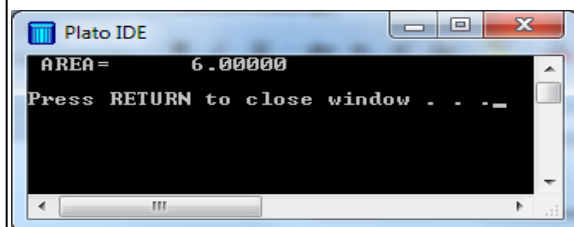
A function declaration is of the following form.

```
<return type> <function identifier>(<arguments>)  
<delaration of arguments>  
:  
<function identifier> = <expression>  
END
```

The return type is required only if the function identifier's type is not implicitly defined³. But it is good practice to state the return type in all function calls. In the body of the function the arguments are declared. Usually at the end of the coding for the function, the return value is assigned to the function identifier.

When the function is called, the types of the function identifier must be declared if it is not implicitly defined. The types of the arguments must also match those in the function declaration. A typical function for calculating the area of a rectangle is defined here, and a call to the function from a main program and the output is shown.

```
C Functions demo  
PROGRAM AREADEMO  
REAL*4 ALENGTH, AWIDTH  
ALENGTH=3.0  
AWIDTH=2.0  
WRITE(*,*) 'AREA= ',AREA(ALENGTH,AWIDTH)  
END  
  
C Function RECAREA returns the area of a rectangle  
C given its length and width  
REAL*4 FUNCTION AREA(LENGTH,WIDTH)  
REAL*4 LENGTH,WIDTH  
AREA=LENGTH*WIDTH  
END
```



¹ [Modular Programming](#)

² [Intrinsic Functions](#)

³ [Variables and Identifiers](#)