

## Procedures

**FIT  
100**

Procedures are familiar in everyday life -- they are a standard process for achieving some objective. Procedures in computers are similar: They are a standard process of computing some result. Procedures encapsulate computation.

© 2001, University of Washington

**FIT  
100**

## Scenario ...

- ❖ You are reading email from a friend in another country who complains that the temperature is 38°
- ❖ The temp is Celsius, but what is it in Fahrenheit?
- ❖ Why doesn't your computer have a temperature converter?



- ❖ This is a common situation -- there is some functionality that computers should have that they do not ... the solution is to write a procedure

Application vs Procedure: The application is the entire facility (GUI + computation). The procedure is just the computation

© 2001, University of Washington

**FIT  
100**

## Procedures Structure

- ❖ Procedures encapsulate, i.e. package up, a computation to be used anywhere, anytime
- ❖ Parts of a procedure specification ...
  - ❑ Name -- term used to refer to the computation, e.g. convertC2F
  - ❑ Definition -- the program steps to compute the result, e.g.  
 $\text{templnF} = 9 * \text{templnC} / 5 + 32$
  - ❑ Parameters -- the names of the input data and output results  
e.g. templnC As Integer, templnF As Integer
  - ❑ Declaration -- the packaging of the name, definition and parameters

**Procedure Declaration**

```
Private Sub convertC2F (templnC As Integer, templnF As Integer)  
    templnF = 9 * templnC / 5 + 32  
End Sub
```

© 2001, University of Washington**FIT  
100**

## Example: Body Mass Index

- ❖ The body mass index is defined as 4.89 times weight in lbs divided by height in feet squared ( $\text{kg}/\text{m}^2$ )
- ❖ What is the body mass index procedure?
  - ❑ Name --
  - ❑ Definition --
  - ❑ Parameters --
  - ❑ Declaration --

Hint: Use height in inches rather than feet and inches

© 2001, University of Washington

**FIT  
100**

## Example: Body Mass Index

- ❖ The body mass index is defined as 4.89 times weight in lbs divided by height in feet squared ( $\text{kg}/\text{m}^2$ )
- ❖ What is the body mass index procedure?
  - Name -- findBMI
  - Definition --  $4.89 * \text{weightLBS} / ((\text{heightIN} / 12) ^ 2)$
  - Parameters -- weightLBS, heightIN, bodyMass
  - Declaration --

```
Private Sub findBMI(weightLBS As Integer, heightIN As Integer, _  
                    bodyMass As Double)  
    bodyMass = 4.89 * weightLBS / ((heightIN / 12) ^ 2)  
End Sub
```

© 2001, University of Washington

**FIT  
100**

## Calling A Procedure

- ❖ The procedure declaration only specifies how a procedure works -- must be given once
- ❖ The procedure call says when, where and with what values the procedure will be performed (executed) -- given many places wherever affect is needed
- ❖ Call `convertC2F(38, degreesF)` is a VB procedure call specifying the procedure to be executed (`convertC2F`) and the values to be used (38 is the C temperature input and `degreesF` is the variable for the result)
- ❖ The call says: "Just do it!"

```
Private Sub convertC2F (tempInC As Integer, tempInF As Integer)  
    tempInF = 9 * tempInC / 5 + 32  
End Sub
```

© 2001, University of Washington

**FIT  
100**

## Parameter Correspondence

- ❖ The parameters name the input values and the output results to the procedure
- ❖ The number of parameters in the declaration must match the number of parameters in the call, and they correspond one-to-one
- ❖ The parameters are referred to by separate names
  - Formal parameters are parameters of the declaration
  - Actual parameters are parameters of the call

Call convertC2F(38, degreesF)

```
Private Sub convertC2F (tempInC As Integer, tempInF As Integer)
    tempInF = 9 * tempInC / 5 + 32
End Sub
```

© 2001, University of Washington

**FIT  
100**

## Calling the Body Mass Procedure

- ❖ How do we compute the body mass for PJ who weighs 149 lbs and is 5' 7" tall?

```
Private Sub findBMI(weightLBS As Integer, heightIN As Integer, _
    bodyMass As Double)
    bodyMass = 4.89 * weightLBS / ((heightIN / 12) ^ 2)
End Sub
```

© 2001, University of Washington

**FIT  
100**

## Calling the Body Mass Procedure

- ❖ How do we compute the body mass for PJ who weighs 149 lbs and is 5' 7" tall?
- ❖ Call findBMI (149, 67, pjBMI)

```
Private Sub findBMI(weightLBS As Integer, heightIN As Integer, _  
                    bodyMass As Double)  
    bodyMass = 4.89 * weightLBS / ((heightIN / 12) ^ 2)  
End Sub
```

© 2001, University of Washington

**FIT  
100**

## What Happens ...

- ❖ A procedure call “makes it happen”
- ❖ Substitution Rule: The procedure call operates as if the definition replaced the call and the actual parameters replace the formal parameters

```
Private Sub convertC2F (tempInC As Integer, tempInF As Integer)  
    tempInF = 9 * tempInC / 5 + 32  
End Sub
```

Code of a VB program

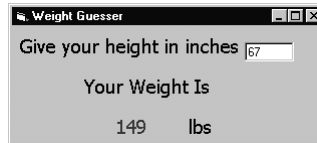
```
...  
Call convertC2F(38, degreesF)    degreesF = 9 * 38 / 5 + 32  
...
```

© 2001, University of Washington

**FIT  
100**

## Adding BMI to Weight Guesser

- ❖ Option Explicit
- ❖ Dim guess As Integer
- ❖ Dim increment As Integer
- ❖ Private Sub cmdMore\_Click()  
    guess = guess + increment  
    lblLBS.Caption = guess + increment  
End Sub
- ❖ Private Sub cmdLess\_Click()  
    increment = increment \ 10  
    lblLBS.Caption = guess + increment  
    If increment = 0 Then  
        cmdMore.Visible = False  
        cmdLess.Visible = False  
        lblIs.Visible = False  
        lblThan.Visible = False  
        lblYour.Visible = True  
    End If  
End Sub
- ❖ Private Sub Form\_Load()  
    guess = -100  
    increment = 100  
End Sub



© 2001, University of Washington

**FIT  
100**

## Summary

- ❖ Procedure declarations encapsulate name, parameters and definition
- ❖ Procedure calls cause the procedure to be executed
- ❖ Parameters must match in number and order
- ❖ The Substitution Rule defines how procedures work

© 2001, University of Washington