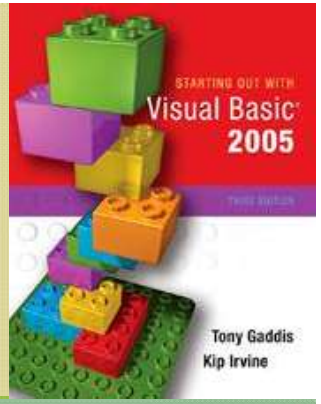
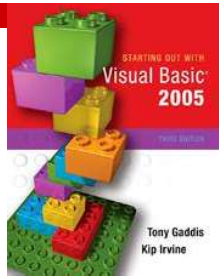


9.4 Structures

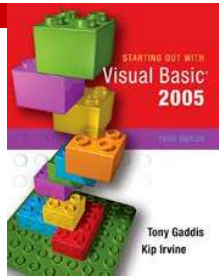
Visual Basic Allows You to Create Your Own Data Types, in Which You May Group Multiple Data Fields

Structures vs. Arrays



- Arrays:
  - Multiple fields in one array
  - All of the same data type
  - Distinguished by a numerical index
- Structures
  - Multiple fields in one structure
  - Can be of differing data types
  - Distinguished by a field name

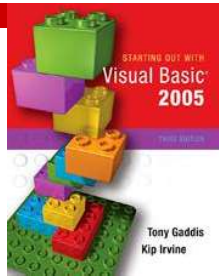
Syntax for Declaring a Structure




```
[AccessSpecifier] Structure StructureName
        FieldDeclarations
End Structure
```

- ***StructureName*** is a name that identifies the structure itself
- ***FieldDeclarations*** are the declarations of the individual fields within the structure

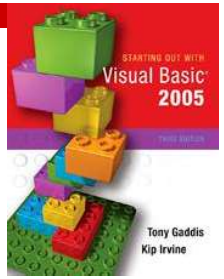
Structure Declaration Example



- Following declares a structure with six fields intended to record employee payroll data
- Structure name is *EmpPayData*

```
Structure EmpPayData
        Dim empNumber As Integer
        Dim firstName As String
        Dim lastName As String
        Dim hours As Single
        Dim payRate As Decimal
        Dim grossPay As Decimal
End Structure
```

Creating and Initializing a Structure

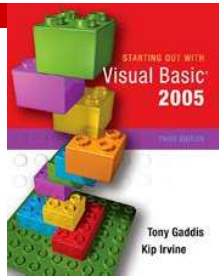


- Using the *EmpPayData* structure just defined
  - Define variable *deptHead* of type *EmpPayData*
  - *deptHead* contains the six fields in the structure
  - Access each field using *varName.fieldName*

```
Dim deptHead As EmpPayData

deptHead.empNumber = 1101
deptHead.firstName = "Joanne"
deptHead.lastName = "Smith"
deptHead.hours = 40
deptHead.payRate = 25
deptHead.grossPay = deptHead.hours * deptHead.payRate
```

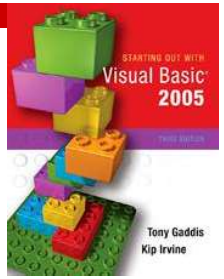
Passing Structure Variables to Procedures and Functions



- Structures can be passed to procedures and functions like any other variable
- The data type to use in the specification is the name of the structure

```
Sub CalcPay(ByRef employee as EmpPaydata)
    ' This procedure accepts an EmpPayData variable
    ' as its argument.  The employee's gross pay
    ' is calculated and stored in the grossPay
    ' field.
   With employee
      .decGrossPay = .sngHours * .decPayRate
   End With
End Sub
```

Structures Containing Arrays

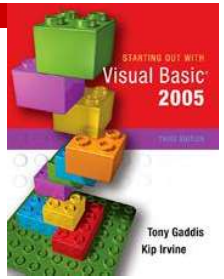


- Structures can contain arrays
- Must ReDim after declaring structure variable

```
Structure StudentRecord
      name As String
      testScores() As Single
End Structure

Dim student As StudentRecord
ReDim student.TestScores(4)
student.name = "Mary McBride"
student.testScores(0) = 89
student.testScores(1) = 92
student.testScores(2) = 84
student.testScores(3) = 96
student.testScores(4) = 91
```

Arrays Containing Structures



- Can declare an array of structures
- Example below declares *employees* as an array of type *EmpPayData* with 10 elements
- Can refer to each field using the format

  arrayName(index).fieldName

```
Dim employees(9) As EmpPayData

' Refer to the empNumber of the first employee
employees(0).empNumber = 1101
```

- Tutorial 9-6 examines an application with a structure