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Instantiation

- With the class/design in hand, an actual automobile can be made on an assembly line (instantiated), or a patient can be checked into the hospital. Instantiation is the word used for the creation of an object of the class.
- In programming too, objects are instantiated in the program when they are created or defined.

Objects, Attributes and Methods

- Objects are instances of a class
- Objects have specific attribute values (descriptors of the object)
- Objects have methods (things that they can do)

An Example Object

UML diagram for a
car produced from
an assembly line
(showing data for a
specific car)

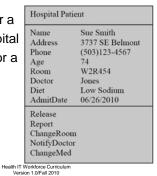| Automobile	
Make	Subaru
Model	Forester
Year	2003
Weight	1823
Length	175.2
Height	62.6
EngineType	EJ251
SeatCap	4
Interior	Leather
...	
MoveForward	
MoveBackward	
Start	
Stop	
OpenDoor	
...	

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An Example Object

UML diagram for a
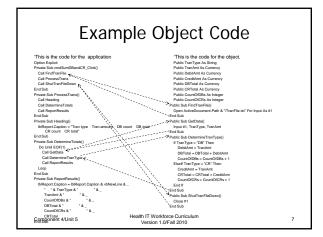patient in a hospital
(showing data for a
specific patient)

Hospital Patient	
Name	Sue Smith
Address	3737 SE Belmont
Phone	(503)123-4567
Age	74
Room	W2R454
Doctor	Jones
Diet	Low Sodium
AdmitDate	06/26/2010
Release	
Report	
ChangeRoom	
NotifyDoctor	
ChangeMed	

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One More UML Example

Transaction
TranType
TranAmt
DebitAmt
CreditAmt
DBTotal
CRTotal
CountOfDBs
CountOfCRs
FindTranFile
GetData
DetermineTranType
ShutTranFileDown

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Example Object Code

```
'This is the code for the application
Option Explicit
Private Sub cmdSumDBandCR_Click()
    Call FindTranFile
    Call ProcessTrans
    Call ShutTranFileDown
End Sub
Private Sub ProcessTrans()
    Call Heading
    Call DetermineTotals
    Call ReportResults
End Sub
Private Sub Heading()
    lblReport.Caption = "Tran type   Tran amount   DB count   DB total   "
        CR count   CR total"
End Sub
Private Sub DetermineTotals()
    Do Until EOF(1)
        Call GetData
        Call DetermineTranType
        Call ReportResults
    Loop
End Sub
Private Sub ReportResults()
    lblReport.Caption = lblReport.Caption & vbNewLine & _
        "   " & TranType & "        " & _
        TranAmt & "          " & _
        CountOfDBs & "          " & _
        DBTotal & "        " & _
        CountOfCRs & "         " & _
        CRTotal
End Sub
```

```
'This is the code for the object.
Public TranType As String
Public TranAmt As Currency
Public DebitAmt As Currency
Public CreditAmt As Currency
Public DBTotal As Currency
Public CRTotal As Currency
Public CountOfDBs As Integer
Public CountOfCRs As Integer
Public Sub FindTranFile()
    Open ActiveDocument.Path & "/TranFile.txt" For Input As #1
End Sub
Public Sub GetData()
    Input #1, TranType, TranAmt
End Sub
Public Sub DetermineTranType()
    If TranType = "DB" Then
        DebitAmt = TranAmt
        DBTotal = DBTotal + DebitAmt
        CountOfDBs = CountOfDBs + 1
    ElseIf TranType = "CR" Then
        CreditAmt = TranAmt
        CRTotal = CRTotal + CreditAmt
        CountOfCRs = CountOfCRs + 1
    End If
End Sub
Public Sub ShutTranFileDown()
    Close #1
End Sub
```

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Summary

- Programming languages provide instructions for the computer hardware so that it knows what to do.
- Programming languages vary from machine code to many higher levels. All higher levels must be translated into machine code.
- Structured solutions for computer problems are best when they are designed using some formal design tool.
- Designing software is but one of multiple steps in the creation of a program in what is called the Software Development Life Cycle (SDLC).

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Summary Continued

- Software errors can cause horrendous problems especially in the health care field.
- There are three commonly used logic constructs in programming (sequence, alternation and iteration).
- A Program's code is often broken up into modules, creating as much strong cohesive code as possible so that the code can migrate to become part of an object.
- From a class, objects can be instantiated that contain attributes and methods providing storage locations and program code to many other applications.

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