Component 4/Unit 5-2

VBA Code

```
1    Dim HoursWorked As Single
2    Dim PayRate As Currency
3    Dim GrossPay As Currency
4  Private Sub cmdTotalPay_Click()
5    PayRate = txtPayRate.Text
6    HoursWorked = txtHrsWrkd.Text
7    GrossPay = PayRate * HoursWorked
8    lblGrossPay.Caption = GrossPay
9  End Sub
```


The Program Language Solution

- Storage of data (Variables, Arrays, Constants)
- Categories of source code
- Logic constructs (Sequence, Alternation, Iteration, Concurrency, Recursion)
- Modularity (Conditional Vs Unconditional Branching, Passing variables between modules)
- Strong Cohesive code/Loose coupling
- Classes/Objects/Attributes/Methods

Translation Into Machine Code

- Source Code
- Executable Code/Machine Code
- Compiler
  ("Clean Compile")
- Interpreter
- Just-In-Time
  (JIT) complier

Component 4/Unit 5   Health IT Workforce Curriculum
Version 1.0/Fall 2010   4
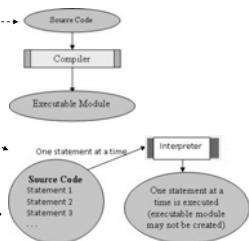
Errors Detected During Translation to Machine Code

- Syntax Errors
  - incorrect spelling of keywords
  - incorrect use of keywords
  - missing keywords
- Logic Errors (may need to go back to the logic design to fix)
  - instructions that derive the wrong results
  - instructions that cause the program to terminate (Abend)
  - instructions that are not in the proper sequence
  - infinite loops

Component 4/Unit 5   Health IT Workforce Curriculum
Version 1.0/Fall 2010   5

Testing Doesn't Catch All Errors

- Between 1985 and 1987 a Therac-25 radiation machine exposed 6 patients to massive overdoses (approximately 100 times the intended dose). Three of the six died.[1]
- On Oct. 26, 1992 a computer-aided dispatch system for ambulances in London had a software failure that resulted in 46 deaths that might have been prevented if ambulances had arrived on time.[2]

Component 4/Unit 5   Health IT Workforce Curriculum
Version 1.0/Fall 2010   6

Software Cannot Catch All Errors

- ". . . Ross Koppel at the University of Pennsylvania, listed over twenty ways that CPOE made medical errors *more* likely to happen. In particular, medicines could be ordered for the wrong patient, sent to the wrong place, or delayed for more than 24 hours."[3]
  – CPOE is Computerized physician order entry
- ". . . in failing to take seriously some by now well-recognized features of health care work, *some PCISs" (patient care information systems) "are designed or implemented in such a way that error can arguably be expected to result.* "[4]
  – PCISs are patient care information systems
- On the other hand . . . "Patients living in long-term-care facilities often have compromised kidney function. Since their kidneys cannot process medications properly, these individuals are at increased risk for adverse drug events. Using computer systems to calculate appropriate dosing of medications can improve physician drug prescribing for these patients . . . "[5]

Component 4/Unit 5 Health IT Workforce Curriculum Version 1.0/Fall 2010 7

Topic IV
Components of a Programming Language

- Storage of Data
- Data type
- Constants
- Categories of Source Code
- Logic Constructs (Sequence, Alternation, Iteration, Concurrency, Recursion)

Component 4/Unit 5 Health IT Workforce Curriculum Version 1.0/Fall 2010 8

Storage of Data

- Variables/data names
  – Primary data (Given data. Example: Customer name)
  – Secondary data
    - Accumulators (Sum of repair charges for an automobile)
    - Counters (The number of deposit transactions at a branch of a bank during one day's processing)
    - Calculated (A function of two or more other values. Gross pay is equal to pay rate times the number of hours worked)
    - Interpreted (If salesperson's total sales exceeds $10,000 in a month they receive a 5% commission rate and if less than or equal to $10,000 they receive a 3% commission rate. The commission rate is interpreted from the total sales figure.)

Component 4/Unit 5 Health IT Workforce Curriculum Version 1.0/Fall 2010 9

Storage of Data (continued)

- Memory location/Address
  - All variable values are stored in a memory location
  - Stored values are retrieved from memory using the variable name
- Array
  - Used for storing data that is repetitive (as a table of values)
    - Examples
      - Exchange rates for US dollars with all other currencies in the world, Bloomberg
      - Us Government GS pay scale, US Office of Personnel Mngt

Component 4/Unit 5

Health IT Workforce Curriculum
Version 1.0/Fall 2010

10