

# Introduction to Computing (SE-101)

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Questions from previous lecture?

Programming Languages and the  
Programming Process

Lecture # 11

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# Programming Languages Categories

- Hundreds of languages around
- Specialized and General purpose
- Obsolete and new languages
- PLs Can be grouped in many ways, e.g., scientific and business etc.
- Usually grouped by evolutionary history

# Three Programming Categories Based on Evolution

- Machine languages
- Assembly languages
- Higher-level languages

# Programming Language Generations

- Machine languages: first generation
- Assembly languages: second generation
- Higher-level languages: third generation (3GLs)

# Machine language

- Programmer creates instructions using 1s & 0s
- Defined by hardware design
- Different for every CPU
- A PC understand only its native machine language (instruction set)

# Assembly language

- Use short English-like abbreviations for machine code
- Program stored as text is converted to object code using assembler
- Easier to write code than using machine language
- Used to write efficient and fast code
- Still used to optimize video games

# Assembly language

```
;CLEAR SCREEN USING BIOS
CLR: MOV AX,0600H      ;SCROLL SCREEN
      MOV BH,30        ;COLOUR
      MOV CX,0000      ;FROM
      MOV DX,184FH     ;TO 24,79
      INT 10H          ;CALL BIOS;

;INPUTTING OF A STRING
KEY: MOV AH,0AH        ;INPUT REQUEST
      LEA DX,BUFFER    ;POINT TO BUFFER WHERE STRING STORED
      INT 21H          ;CALL DOS
      RET              ;RETURN FROM SUBROUTINE TO MAIN PROGRAM;

; DISPLAY STRING TO SCREEN
SCR: MOV AH,09         ;DISPLAY REQUEST
      LEA DX,STRING    ;POINT TO STRING
      INT 21H          ;CALL DOS
      RET              ;RETURN FROM THIS SUBROUTINE;
```

# Higher-level languages

- Developed to make programming easier
- Syntax is more like human language
- Hence easier to understand program written in higher-level languages
- Code needs to be converted into machine language for execution
- Usually one line of code is translated to many lines of machine code

# Third-Generation Languages (3GL)

- First higher level language
- Supports structured and OOP
  - Code is reusable
  - Code is portable
- Typically written in an IDE
- C/C++ creates games and applications
- Java creates web applets
- ActiveX creates Web and Windows applets

# Fading Third-Generation Languages

- FORTRAN (FORmula TRANslator)
- COBOL (COmmon Business Oriented Language)
- BASIC (Beginner's All-Purpose Symbolic Instruction Code)
- Pascal

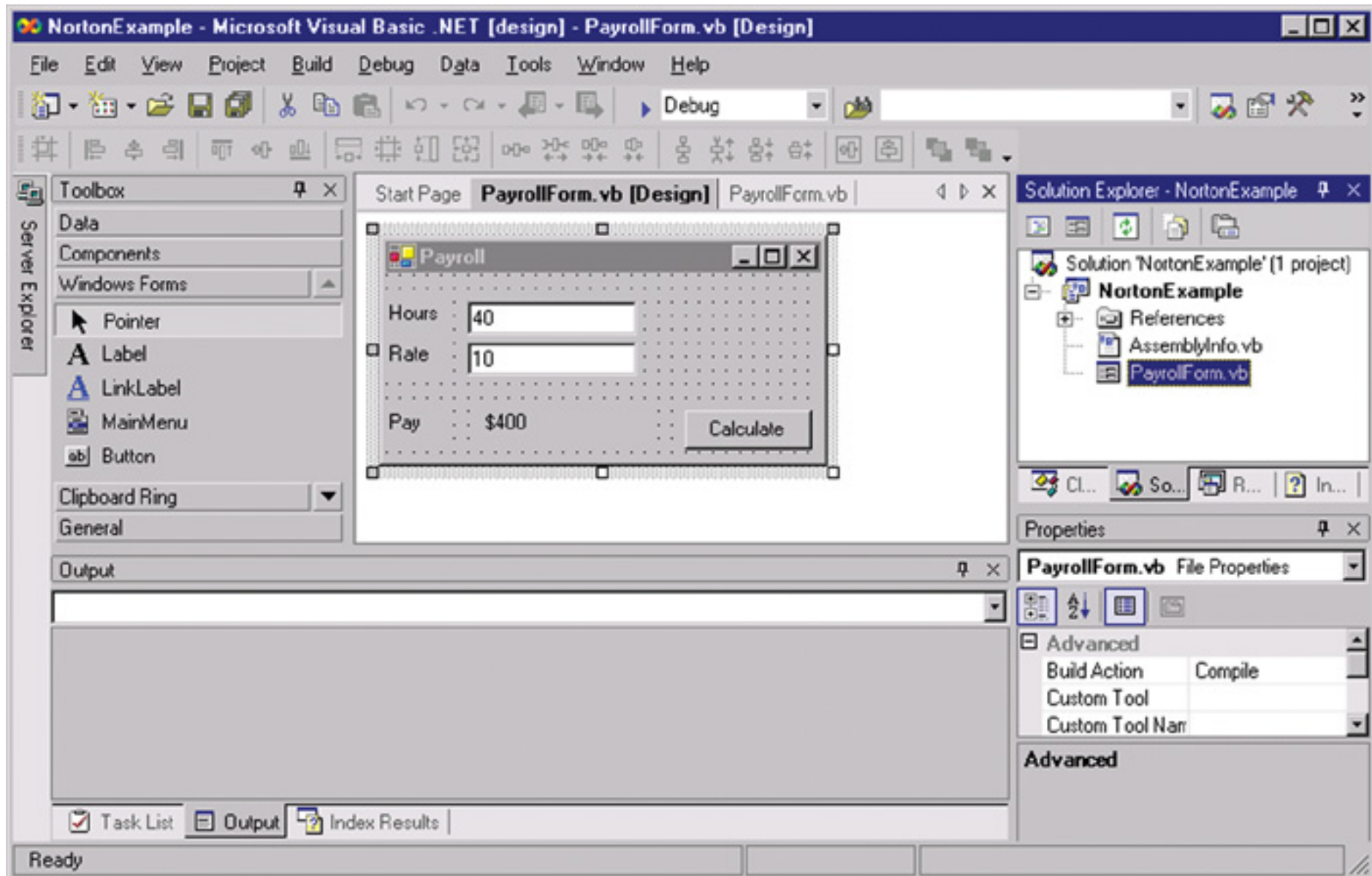
# Fourth-Generation Languages (4GLs)

- Builds programs with a front end (IDE), which is an interface that hides much of the program from the user
- Provides prototypes, which are samples of the finished programs
- Easier to use than 3GL
- Tools reduce the amount of code
- Object oriented programming

# Examples of Fourth-Generation Languages

- Visual Basic (VB), Visual C++
- .NET (C#, VB, J# etc)
- Authoring environments (e.g., Macromedia Director)
- Sun Studio One

# Microsoft.NET



# Fifth-Generation Languages (5GLs)

- Advanced authoring environments considered by some to be 5GLs
- Mystery language
- May not be created yet
- Will create software automatically

# WWW Development Languages

- HyperText Markup Language (HTML)
- Extensible Markup Language (XML)
- Wireless Markup Language (WML)
- Dreamweaver
- Flash
- Director

# WWW Development Languages

- Markup languages
  - Describe how the text is formatted
- Hyper Text Markup Language (HTML)
  - Basis of all web pages
  - Defines web structure using tags
  - Easy to learn and use
  - Created with a text editor

# WWW Development Languages

- Extensible Markup Language (XML)
  - Stores data in a readable format
  - Looks like HTML
  - Allows developers to create tags
  - Depends on HTML for formatting

# XML

```
<?xml version="1.0" ?>
- <testbank>
  - <question>
    <query>Arithmetic operations that take
      two arguments are said to be ____
      operators.</query>
    <choice1>unary</choice1>
    <choice2>binary</choice2>
    <choice3>summary</choice3>
    <choice4>boolean</choice4>
    <correct>1</correct>
  </question>
  - <question>
    <query>An if statement inside of another if
      statement is known as __.</query>
    <choice1>nested</choice1>
    <choice2>double selection</choice2>
    <choice3>dual alternate slection</choice3>
    <choice4>ugly</choice4>
    <correct>0</correct>
  </question>
  - <question>
```

# WWW Development Languages

- Extensible HTML (XHTML)
  - Newer version of HTML
  - Stricter rules
  - Based on XML rules

# WWW Development Languages

- Extensible Style Sheet Language (XSL)
  - Format and displays XML documents
  - Rules that dictate formatting
  - Create a standard web page

# WWW Development Languages

- Extensible HTML Mobile Profile
  - XHTML MP
  - Initially Wireless Markup Language (WML)
  - Creates pages viewable on a handheld

# WWW Development Languages

- Cascading Style Sheets (CSS)
  - Format HTML, XHTML and XSL
  - Applies consistent formatting to all pages

# WWW Development Languages

- Web authoring environments
  - Reduces tedium for creating pages
  - Tools that simplify web site creation
  - Macromedia Dream weaver
    - Simplifies large sites
    - CSS support is exceptional
  - Microsoft FrontPage simplifies large sites
  - Macromedia Flash creates web animations

# Scripting Languages

- HTML is for static web pages
- Use scripting language for dynamic web pages
  - Change based on user input
  - Page is generated as needed
- JavaScript
  - Designed to work within HTML
  - Page verification and simple animation
  - No link to Java
  - Can run in almost any browser

# Scripting Languages

- Active Server Pages (ASP)
  - Developed by Microsoft
  - Based on Visual Basic
  - Good at connecting to Microsoft databases
  - Runs only on Microsoft servers

# Scripting Languages

- Hypertext Preprocessor (PHP)
  - Very popular, Runs on Unix/Linux/Windows
  - Open source, i.e. free to use
  - Good to learn for web developers
- Practical Extraction and Reporting Language(Perl)
  - First scripting language ,
  - Originated on Unix
  - Open source
  - Found on all Windows and Linux servers
  - Excellent web scripting language

# Systems Development Life Cycle for Programming

- SDLC -- Organized way to build programs
- Consists of five phases
- Phase 1: Needs analysis
- Phase 2: Program design
- Phase 3: Development (also called coding)
- Phase 4: Implementation
- Phase 5: Maintenance

# Systems Development Life Cycle

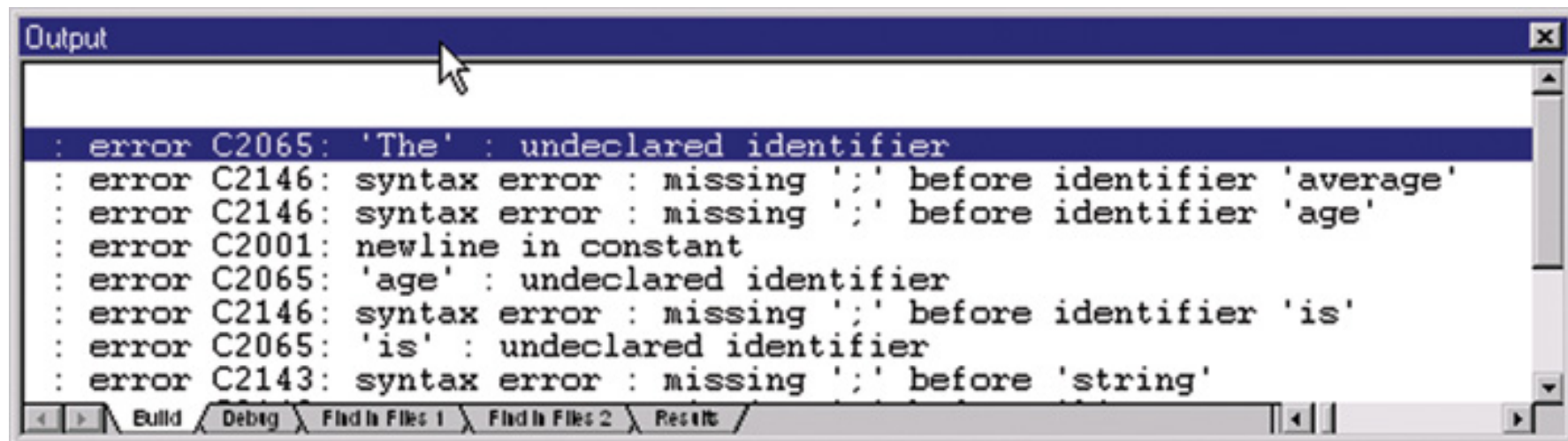
- Phase 1: Needs Analysis
  - Users identify a need
  - Need is clearly defined using tools

# Systems Development Life Cycle

- Phase 2: Systems design
  - Solution to the need is defined
  - Many tools are used
  - Prototypes of the solution are built

# Systems Development Life Cycle

- Phase 3: Development
  - Solution to the problem is built
  - Programmers write the solution
  - Technical writers document the process
  - Solution is continually tested



```
Output
: error C2065: 'The' : undeclared identifier
: error C2146: syntax error : missing ';' before identifier 'average'
: error C2146: syntax error : missing ';' before identifier 'age'
: error C2001: newline in constant
: error C2065: 'age' : undeclared identifier
: error C2146: syntax error : missing ';' before identifier 'is'
: error C2065: 'is' : undeclared identifier
: error C2143: syntax error : missing ';' before 'string'
```

The screenshot shows a Windows-style window titled "Output" with a mouse cursor pointing to the title bar. The window contains a list of compiler error messages. The messages are as follows:

- : error C2065: 'The' : undeclared identifier
- : error C2146: syntax error : missing ';' before identifier 'average'
- : error C2146: syntax error : missing ';' before identifier 'age'
- : error C2001: newline in constant
- : error C2065: 'age' : undeclared identifier
- : error C2146: syntax error : missing ';' before identifier 'is'
- : error C2065: 'is' : undeclared identifier
- : error C2143: syntax error : missing ';' before 'string'

At the bottom of the window, there is a status bar with buttons for "Build", "Debug", "Find in Files 1", "Find in Files 2", and "Results".

# Systems Development Life Cycle

- Phase 4: Implementation
  - The solution is installed
  - Users are converted to the new system
  - Trainers are important in this phase

# Systems Development Life Cycle

- Phase 5: Maintenance
  - IT professionals monitor the product
  - Bugs are found and fixed
  - New features are added

Questions?

If you have any query please feel free to ask

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# Reference

- The slides were taken from the book:
  - “Introduction to computing” by Peter Norton