BUGS AND DEBUGGING

If debugging takes bugs out of a program,

programming must put bugs into a program

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BUG CLASSES

• Syntax	incorrect sequence of keywords, punctuation, etc.
• Assembly	linker or loader unable to create a final executable
• Logical	programmer didn't correctly solve the problem
• Run-time	program fails by crashing or never completing
• Task synchronization	multiple tasks do not coordinate correctly
• Heisenbug	program behaves differently while being debugged

SYNTAX AND SYNTAX ERRORS

- Programs consist of a sequence
  - Keywords
  - Symbols
  - Identifiers
- Syntax
  - Rules specifying the correct sequences or patterns of programming elements

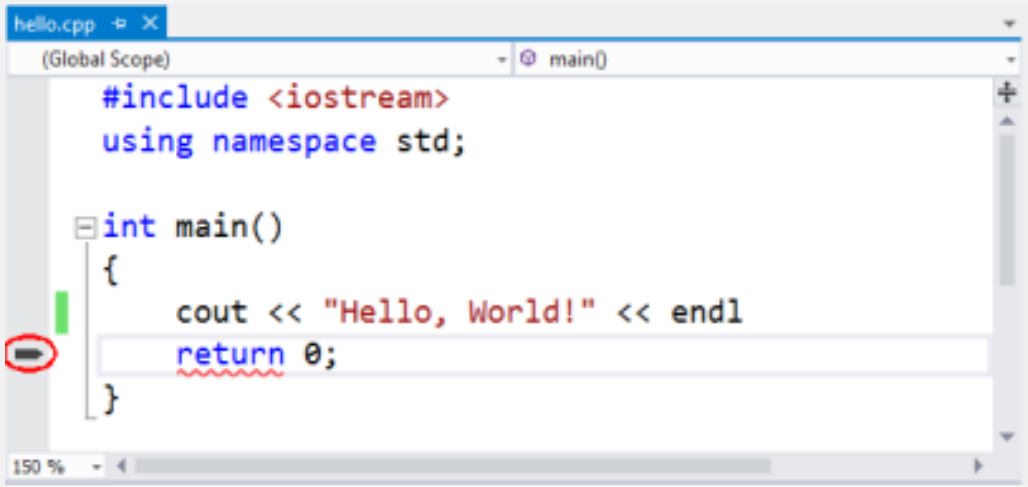
- Invalid sequence or pattern of programming elements
  - Wrong order
  - Missing
  - Extraneous

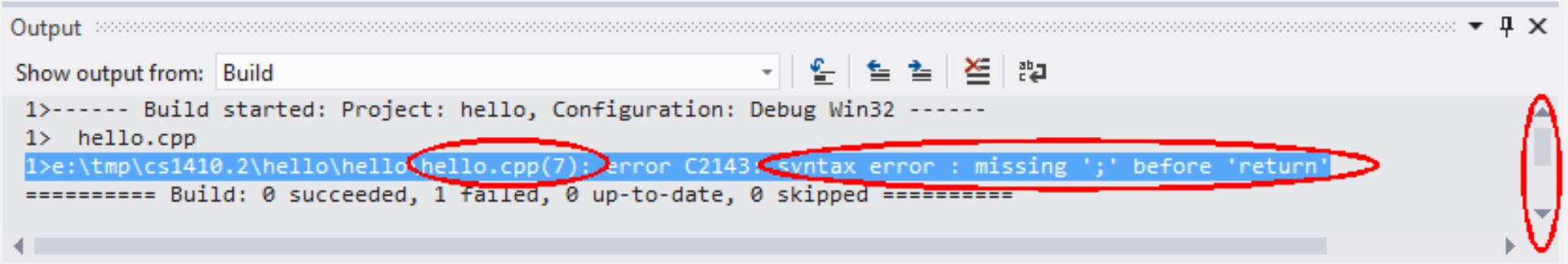
COMMAND-LINE COMPILER

```
dab@Neptune:/tmp$ g++ hello.cpp
hello.cpp: In function 'int main()':
hello.cpp:6:40: error: expected ';' before 'return'
    6 |         cout << "Hello, World!" << endl
      |                                        ^
      |                                        ;
    7 |         return 0;
      |         ~~~~~~
```

- Function
- File
- Line and column
- Error
- Error location
- Syntax checking end

IDE
VISUAL STUDIO





DEBUGGING SYNTAX ERRORS

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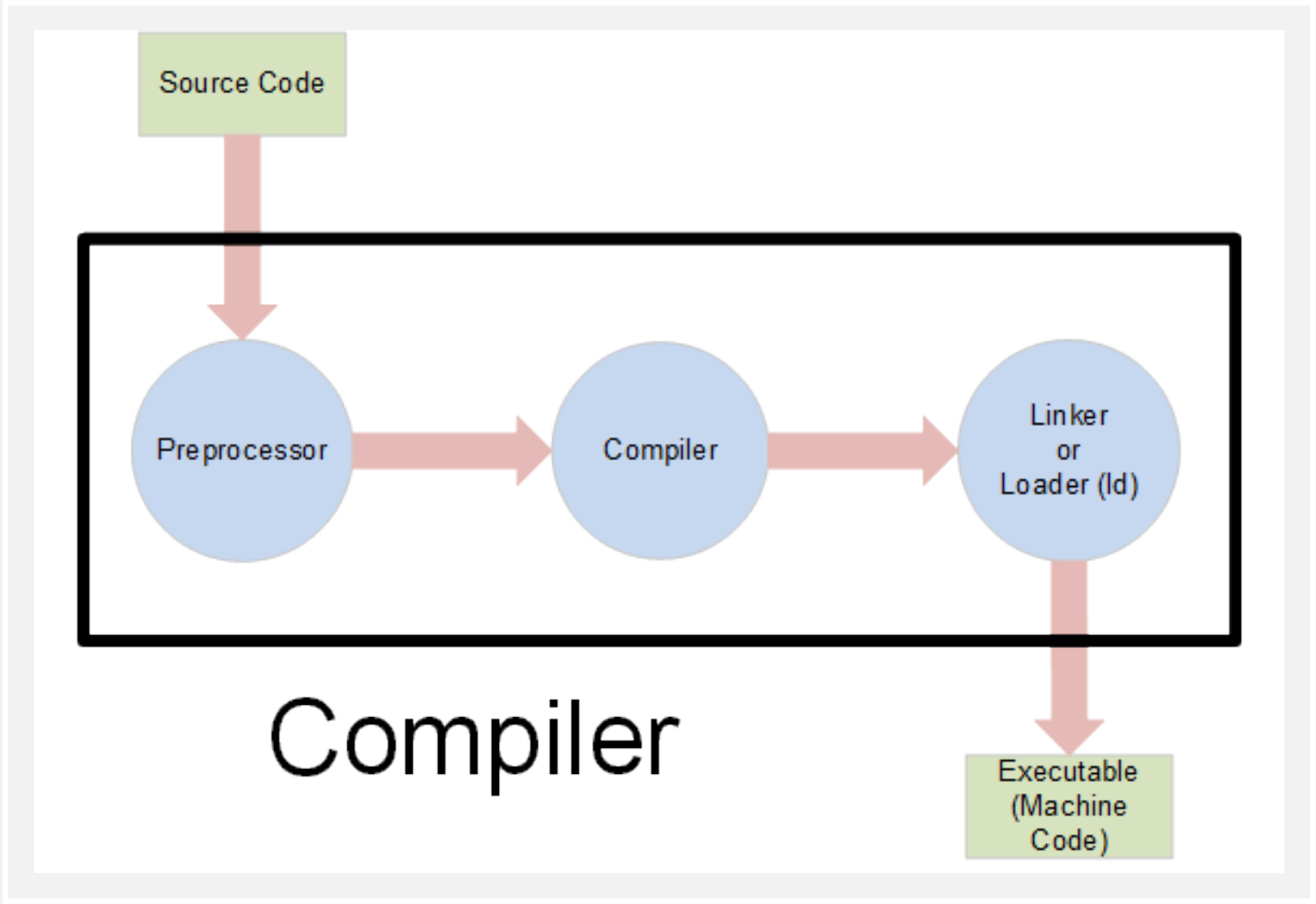
2. Be aware of "Error Recovery"
3. Recognize how the compiler impacts diagnostic order and error correction
4. Understand syntax rather than relying on obscure error codes

THE COMPILER SYSTEM



ASSEMBLY (WINDOWS LINKER) ERROR

```
1>------ Rebuild All started: Project: Error3, Configuration: Debug Win32 ------
1>C:\Program Files (x86)\MSBuild\Microsoft.Cpp\v4.0\V110\Microsoft.CppClean.targets(75,5):
      warning : Access to the path 'E:\TMP\CS1410 PAST\ERROR3\DEBUG\ERROR3.EXE' is denied.
1>C:\Program Files (x86)\MSBuild\Microsoft.Cpp\v4.0\V110\Microsoft.CppClean.targets(75,5):
      warning : Access to the path 'E:\tmp\cs1410 past\Error3\Debug\Error3.exe' is denied.
1>  Error3.cpp
1>LINK : fatal error LNK1104: cannot open file '***************.exe'
========== Rebuild All: 0 succeeded, 1 failed, 0 skipped ==========
```