

# EECS402 Compiling and Running

Andrew M. Morgan

#### M

### Compiler/Linker Used For This Course

- There are many compilers available
- For this course, we use a compiler named "g++", available on the UNIX operating system
- Usage:
  - g++ -Wall filePrefix.cpp -o filePrefix
    - · -Wall means to display all warnings detected (some are suppressed by default)
    - -o <fileName> specifies the name of the resulting output (executable) file
- Example:
  - g++ -Wall genResults.cpp -o genResults
  - Compiles and links the C++ source code in a file named genResults.cpp and creates an executable file named genResults
- Output executable is only created if no compile or link errors are found!

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```
Example Program
    #include <iostream>
    using namespace std;
    void swap(int val1, int &val2);
                                                                  Compile Command
    int main()
                                               [8] temp -: g++ -Wall myProgram.cpp -o myProgram
7
                                               myProgram.cpp: In function `int main()':
                                              myProgram.cpp:16: error: `cour' undeclared (first use this function)
myProgram.cpp:16: error: (Each undeclared identifier is reported only once for
each function it appears in.)
8
       int y = 30;
                          My UNIX Prompt
10
                                               myProgram.cpp:18: error: syntax error before `return'
11
       if (y < x)
                                               myProgram.cpp: In function `void swap(int&, int&)':
myProgram.cpp:26: error: `val3' undeclared (first use this function)
12
13
          swap(x, y);
                                             9] temp -:
14

    Line Number
    Error Description

15
      cour << "Min: " << x << " Max: " << y << endl
16
17
18
       return (0);
19
20
21
    void swap(int &val1, int &val2)
22
       int temp;
23
24
      temp = val1;
25
      val1 = val2;
       val3 = temp;
26
27
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```



## Fixing Compile Errors

- ALWAYS start with the first error!!
  - Later errors are often a result of the compiler getting confused from earlier errors
- Usually try to fix the first error and then re-compile
  - Don't try to track down the first 10 errors without compiling in between
  - Since later errors often result from prior errors, you could be looking for an error that isn't really there
- The line number provided by the compiler is an indication of where the problem is
  - The error is actually often one or more lines prior to the line number reported

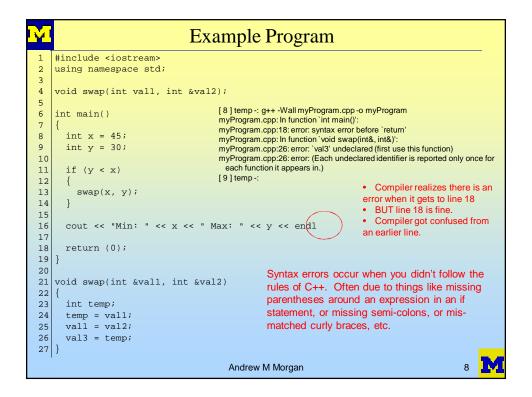
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```
Example Program
    #include <iostream>
    using namespace std;
    void swap(int val1, int &val2);
5
                                               [7] temp -: !g
g++ -Wall myProgram.cpp -o myProgram
6
    int main()
7
                                               myProgram.cpp: In function `int main()':
                                               myProgram.cpp:16: error: `cour' undeclared (first use this function)
myProgram.cpp:16: error: (Each undeclared identifier is reported only once for
each function it appears in.)
8
       int x = 45;
       int y = 30;
10
                                               myProgram.cpp:18: error: syntax error before `return'
11
       if (y < x)
                                               myProgram.cpp: In function`void swap(int&, int&)': myProgram.cpp:26: error: `val3' undeclared (first use this function)
12
13
         swap(x, y);
14
15
      cour << "Min: " << x << " Max: " << y << endl
16
17
18
       return (0);
19
20
                                                           This error usually means you forgot to declare
    void swap(int &val1, int &val2)
21
                                                           a variable OR mistyped the identifier of the
22
                                                           variable you intended to reference
       int temp;
23
       temp = val1;
24
      val1 = val2;
25
26
       val3 = temp;
27
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```

```
Example Program
    #include <iostream>
    using namespace std;
    void swap(int val1, int &val2);
4
                                             [7] temp -: !g
g++-Wall myProgram.cpp -o myProgram
myProgram.cpp: In function `int main()':
myProgram.cpp:16: error: `cour' undeclared (first use this function)
6
7
8
      int x = 45;
      int y = 30;
9
                                             myProgram.cpp:16: error: (Each undeclared identifier is reported only once for
                                             each function it appears in.)
myProgram.cpp:18: error: syntax error before `return'
10
11
       if (y < x)
                                             myProgram.cpp: In function `void swap(int&, int&)':
12
                                              myProgram.cpp:26: error: `val3' undeclared (first use this function)
13
         swap(x, y);
                                             [8] temp -:
14
15
16
       cour < "Min: " << x << " Max: " << y << endl
17
18
      return (0);
19
20
                                                          This error usually means you forgot to declare
    void swap(int &val1, int &val2)
21
                                                          a variable OR mistyped the identifier of the
22
                                                          variable you intended to reference
23
      int temp;
24
      temp = val1;
      val1 = val2;
25
      val3 = temp;
26
27
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```

```
Example Program
    #include <iostream>
    using namespace std;
    void swap(int val1, int &val2);
5
                                           [ 8 ] temp -: g++ -Wall myProgram.cpp -o myProgram myProgram.cpp: In function `int main()':
6
    int main()
7
                                           myProgram.cpp:18: error: syntax error before `return
8
                                           myProgram.cpp: In function `void swap(int&, int&)': myProgram.cpp:26: error: `val3' undeclared (first use this function)
      int y = 30;
                                           myProgram.cpp:26: error: (Each undeclared identifier is reported only once for
10
                                             each function it appears in.)
11
      if (y < x)
                                           [9] temp -:
12
13
         swap(x, y);
14
15
      cout << "Min: " << x << " Max: " << y << endl
16
17
      return (0);
18
19
20
                                                       Syntax errors occur when you didn't follow the
    void swap(int &val1, int &val2)
21
                                                       rules of C++. Often due to things like missing
22
                                                       parentheses around an expression in an if
      int temp;
23
                                                       statement, or missing semi-colons, or mis-
24
      temp = val1;
                                                       matched curly braces, etc.
      val1 = val2;
25
      val3 = temp;
26
27
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```



```
Example Program
    #include <iostream>
    using namespace std;
    void swap(int val1, int &val2);
5
                                                 [4] temp-: g++-Wall myProgram.cpp-o myProgram
myProgram.cpp: In function `void swap(int&, int&)':
myProgram.cpp:26: error: `val3' undeclared (first use this function)
myProgram.cpp:26: error: [Each undeclared identifier is reported only once for
6
    int main()
7
8
       int y = 30;
                                                   each function it appears in.)
10
                                                 [5] temp -:
11
       if (y < x)
12
13
          swap(x, y);
14
15
       cout << "Min: " << x << " Max: " << y << endl;
16
17
18
       return (0);
19
20
                                                               Just keep fixing errors until there are no more..
    void swap(int &val1, int &val2)
21
22
       int temp;
23
       temp = val1;
val1 = val2;
24
25
26
       val3 = temp;
27 }
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```

```
Example Program
    #include <iostream>
    using namespace std;
    void swap(int val1, int &val2);
                                              [4] temp -: g++ -Wall myProgram.cpp -o myProgram
6
    int main()
                                              myProgram.cpp: In function `void swap(int&, int&)':
myProgram.cpp:26: error: `val3' undeclared (first use this function)
myProgram.cpp:26: error: (Each undeclared identifier is reported only once for
7
      int x = 45;
int y = 30;
8
9
                                                each function it appears in.)
                                              [5] temp -:
10
11
       if (y < x)
12
13
         swap(x, y);
14
15
16
       cout << "Min: " << x << " Max: " << y << endl;
17
18
      return (0);
19
20
                                                          Just keep fixing errors until there are no more..
    void swap(int &val1, int &val2)
21
22
23
       int temp;
24
      temp = val1;
      vall = val2;
25
       val3 = temp;
26
27
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```

```
Example Program
    #include <iostream>
   using namespace std;
   void swap(int val1, int &val2);
5
                                       [3] temp -: g++ -Wall myProgram.cpp -o myProgram /tmp/ccCqT5PG.o(.text+0x31): In function `main':
6
   int main()
7
                                        : undefined reference to `swap(int, int&)'
8
      int x = 45;
                                        collect2: Id returned 1 exit status
      int y = 30;
                                        [4] temp -:
10
11
      if (y < x)
12
13
        swap(x, y);
14
15
     cout << "Min: " << x << " Max: " << y << endl;
16
17
18
      return (0);
                                                   As the compiler gets farther along, newly
19
                                                   discovered errors may turn up.
20
   void swap(int &val1, int &val2)
21
                                                   This error is a linker error, so it looks different
22
                                                   than a compiler error. No line numbers, etc
      int temp;
23
24
      temp = val1;
                                                   Linker errors usually involve missing function
      val1 = val2;
25
26
      val2 = temp;
                                                   bodies, inconsistent function signatures, etc..
27
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                                                                                              11
```

```
Example Program
    #include <iostream>
   using namespace std;
   void swap(int val), int &val2);
4
                                        [3] temp -: g++ -Wall myProgram.cpp -o myProgram
6
    int main()
                                        /tmp/ccCqT5PG.o(.text+0x31): In function `main'
7
                                        : undefined reference to `swap(int, int&)' collect2: Id returned 1 exit status
     int x = 45;
int y = 30;
8
9
                                        [4] temp -:
10
11
      if (y < x)
12
13
        swap(x, y);
14
15
16
      cout << "Min: " << x << " Max: " << y << endl;
17
      return (0);
18
                                                   As the compiler gets farther along, newly
19
                                                   discovered errors may turn up.
20
21
   void swap(int &val)
1, int &val2)
                                                   This error is a linker error, so it looks different
22
                                                   than a compiler error. No line numbers, etc
23
      int temp;
24
     temp = val1;
                                                   Linker errors usually involve missing function
     val1 = val2;
25
26
     val2 = temp;
                                                   bodies, inconsistent function signatures, etc..
27
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```

```
Example Program
   #include <iostream>
   using namespace std;
   void swap(int val1, int &val2);
                                    [5] temp -: g++ -Wall myProgram.cpp -o myProgram [6] temp -:
   int main()
     int x = 45;
8
     int y = 30;
10
11
     if (y < x)
12
13
       swap(x, y);
14
15
     cout << "Min: " << x << " Max: " << y << endl;
16
17
     return (0);
                                              No more compile or link errors!!!
18
19
20
                                              You can now run the executable file created to
21
   void swap(int vall, int &val2)
                                             check its results!
22
     int temp;
23
     temp = val1;
val1 = val2;
24
25
     val2 = temp;
27
                                                                                     13
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```



## **Executing Your Program**

- To run your program:
  - In the directory containing the executable, type a dot, a slash, and the name of the executable
  - The "./" tells the computer to run the executable with the name provided in the current directory
  - Without the "./" a different executable with the same name may be executed and the results can be confusing
- Examples:
  - ./myProgram
  - ./runTheProgram

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```
Back to the Example
   #include <iostream>
   using namespace std;
   void swap(int val1, int &val2);
                                              [ 10 ] temp -: g++ -Wall myProgram.cpp -o myProgram
6
   int main()
                                              [ 11 ] temp -: ./myProgram
7
                                              Min: 45 Max: 45
8
     int x = 45;
                                              [ 12 ] temp -:
     int y = 30;
10
11
     if (y < x)
12
13
       swap(x, y);
14
15
     cout << "Min: " << x << " Max: " << y << endl;
16
17
18
     return (0);
                                             NOTE: Results are not what we expected!
19
20
   void swap(int val1, int &val2)
                                             No compile/link errors does NOT imply the
21
22
                                             program is correct!
     int temp;
23
     temp = val1;
val1 = val2;
24
                                             This type of error is called a logic error.
25
26
     val2 = temp;
27
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                                                                                  15
```

```
Back to the Example
   #include <iostream>
   using namespace std;
   void swap(int va)1, int &val2);
                                              [ 10 ] temp -: g++ -Wall myProgram.cpp -o myProgram
6
   int main()
                                              [ 11 ] temp -: ./myProgram
7
                                              Min: 45 Max: 45
     int x = 45;
int y = 30;
8
                                              [ 12 ] temp -:
9
10
11
     if (y < x)
12
13
       swap(x, y);
14
15
16
     cout << "Min: " << x << " Max: " << y << endl;
17
     return (0);
18
                                             NOTE: Results are not what we expected!
19
20
                                             No compile/link errors does NOT imply the
21
   void swap(int val1, int &val2)
22
                                             program is correct!
23
     int temp;
24
     temp = val1;
                                             This type of error is called a logic error.
     val1 = val2;
25
26
     val2 = temp;
27 }
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```

```
Back to the Example
   #include <iostream>
   using namespace std;
   void swap(int &val1, int &val2);
                                                [ 10 ] temp -: g++ -Wall myProgram.cpp -o myProgram
[ 11 ] temp -: ./myProgram
Min: 30 Max: 45
6
   int main()
7
     int x = 45;
int y = 30;
8
                                                 [ 12 ] temp -:
10
11
     if (y < x)
12
13
       swap(x, y);
14
15
16
     cout << "Min: " << x << " Max: " << y << endl;
17
18
     return (0);
                                                NOTE: Results are not what we expected!
19
20
                                                No compile/link errors does NOT imply the
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   void swap(int &val1, int &val2)
22
                                                program is correct!
23
     int temp;
     temp = val1;
val1 = val2;
24
                                                This type of error is called a logic error.
25
26
     val2 = temp;
27 }
                                                                                        17
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```