CSCI1300 - Introduction to Computer Programming
Instructor: Dr. Knox

Recitation 4: While Loops and Debugging

While Loops

Loops allow us to run a section of code multiple times. They will repeat execution of a single statement or group of statements as long as a specified condition continues to be satisfied. If the condition is not true, then the statement will not be executed.

Syntax and Form:

```
while (condition)
{
        //statement to do something;
}
```

where *while* is a C++ reserved word, *condition* is a boolean-expression that will evaluate to a true or false statement, and *statement to do something* is enclosed by curly brackets. If the condition is true, the specified statement within the loop is executed. After running once, the boolean-expression is then re-evaluated. If the statement is true, then it is executed again. This process of evaluation and execution is repeated until the condition becomes false.

Example 1:

```
Int userChoice = 1;
while (userChoice!=0)
{
        cout << “Do you want to see this question again? Press 0 for no, any other number for
        yes.”;
        cin >> userChoice;
}
```

Entering ‘0’ will terminate the loop, but any other number will cause the loop to run again. Note how we have to initialize the condition before the loop starts. Setting *userChoice* equal to 1 ensures that the while loop will run at least once.

Example 2:

```
int i = 0
while (i < 5)
{
        cout<< i << endl;;
        i = i + 2;
}
```

Notice how you must manually initialize *i* to equal 0 and then manually increment i by 2. Inserting print statements into your loops is a quick way to debug your code if something isn't working.

Debugging

Debugging and Working with Error Messages

For the remainder of this recitation, you will gain experience working through common syntax and coding mistakes and learning how to read error messages. When writing code, it is important to compile often so that you can quickly catch mistakes before too many accumulate! For this recitation you will be working with the file **recitation4primes.cpp.** In this file a number of errors have been built into the program intentionally, and it is your job to correct the syntax errors **AND** correct the code to print out the loops properly.

In the code, you will have 3 functions to debug. This program simulates many things that can go wrong with your code if you don't compile and debug systematically! **Don't forget, for this recitation you'll not only be fixing syntax errors, but you'll also be modifying the code to make the functions work properly!**

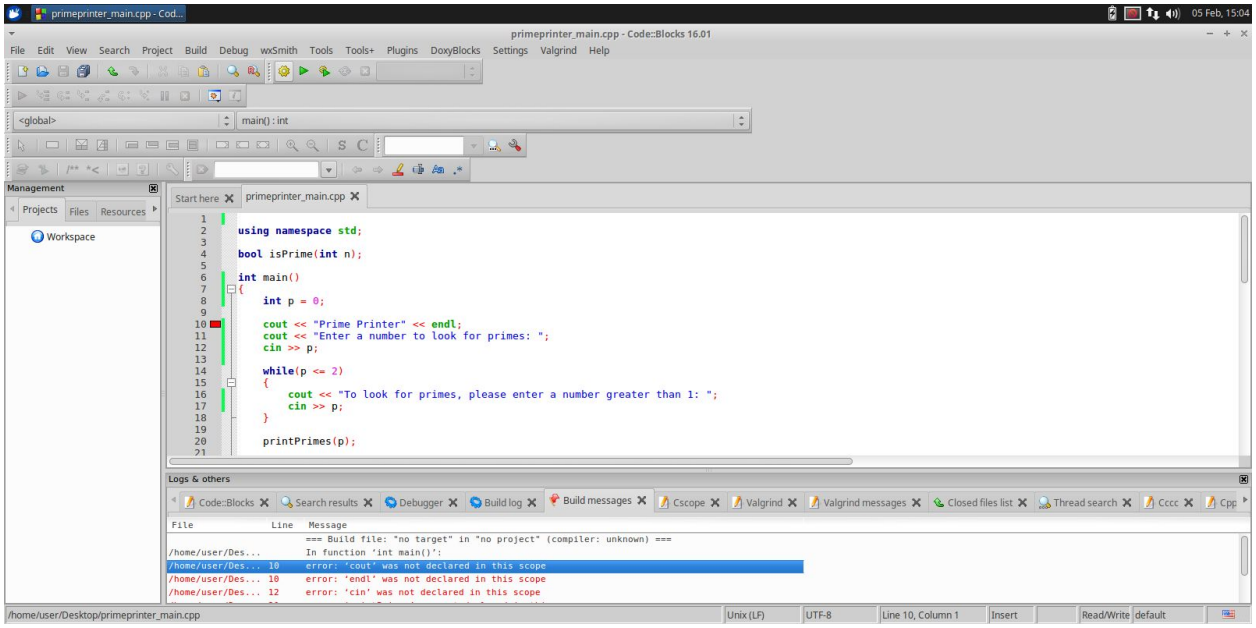
Getting Started

1) Download the **recitation4primes.cpp** file from Moodle and save it to one of your directories.
2) Open the file in Code::Blocks - File → Open... → **recitation4primes.cpp** → Open
3) Look over the code to get a sense of what the program is trying to do
4) Compile(Build) and Run the code...You should see the following error below:

You will see a number of errors pop up on the Build Messages tab. The first error will be highlighted in red and this is the error that you should focus on correcting first. The way to read

this error is to look at the line the error is occurring on or above it.

Error 1:

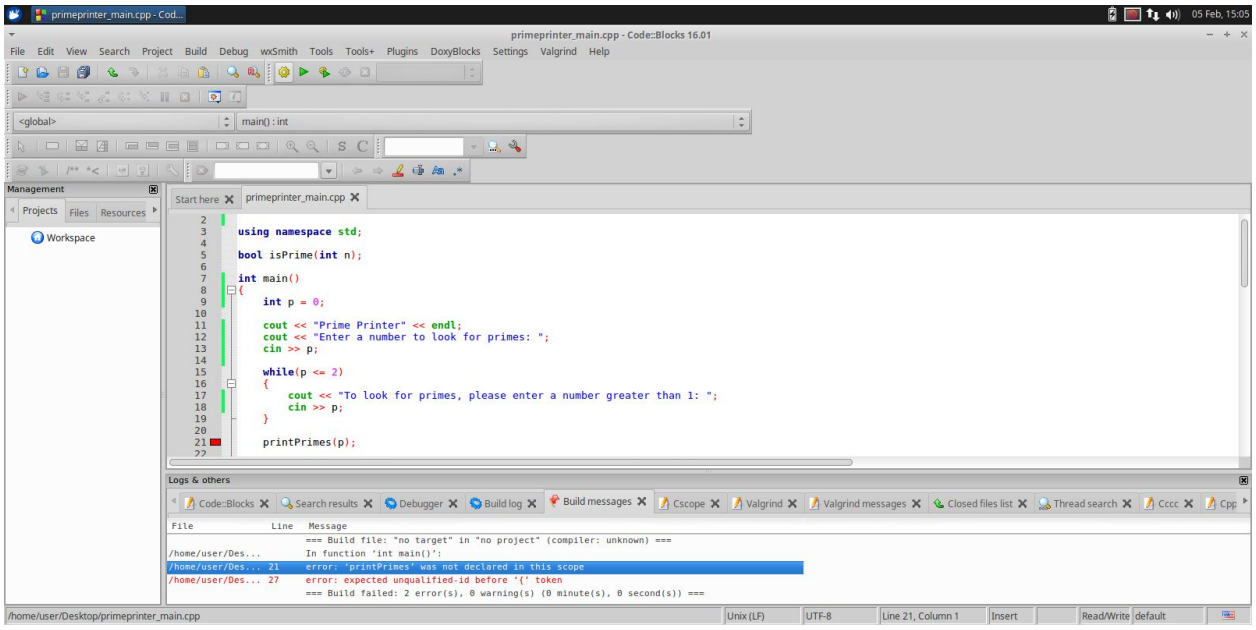


In this case the code is breaking at **line 10.** The error message displayed on the highlighted line is:

error: ‘cout’ was not declared in this scope

This error deals with declaration of cout. ‘cout’ is an object made available through the iostream library. However, even after we import the library in the header we still see this error. This is because ‘cout’ needs to be initialized. What kinds of other scoping parameters are needed for c++? Can you think of anything that should be in the header that currently isn’t there? Hint: it is important to make sure to declare the appropriate libraries.
In this case the code is breaking at **line 7.** The error message displayed on the highlighted line is:

Error 2:

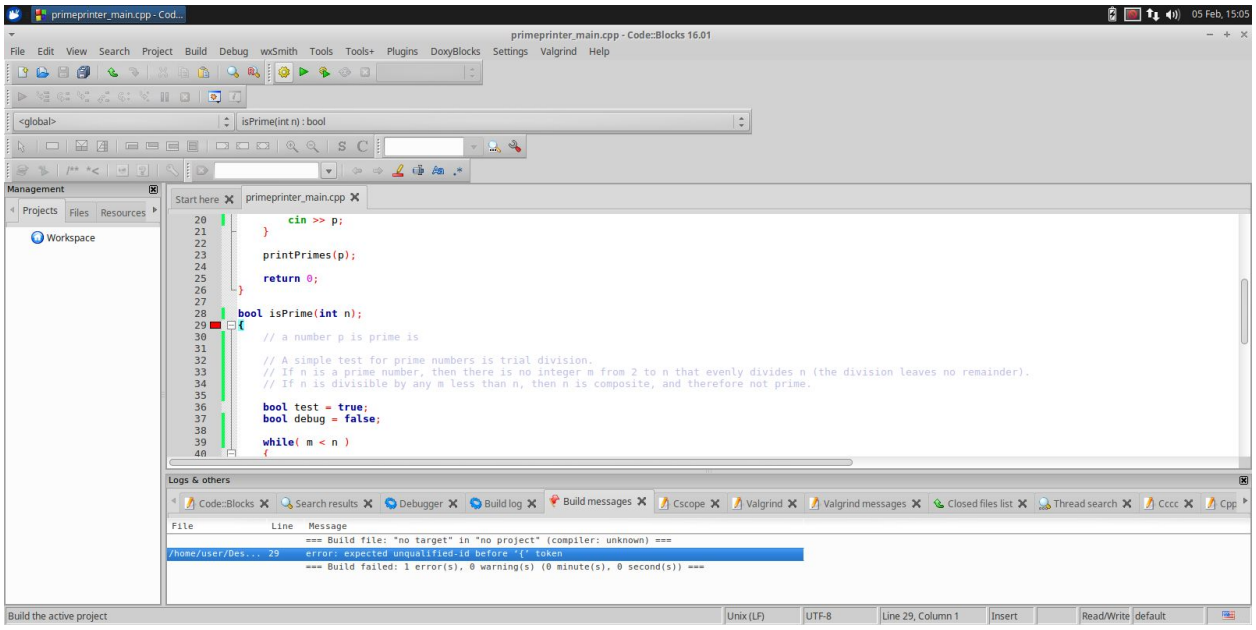


What is happening with this error? What line is it on?

Here we see the error message:
error: ‘printPrimes’ was not declared in this scope

This error is indicating that the printPrimes function is not declared. What does this mean? Where should you declare your functions? Working through this error means that you will have to initialize the function in the proper location so that your program recognizes printPrimes as being within the scope!

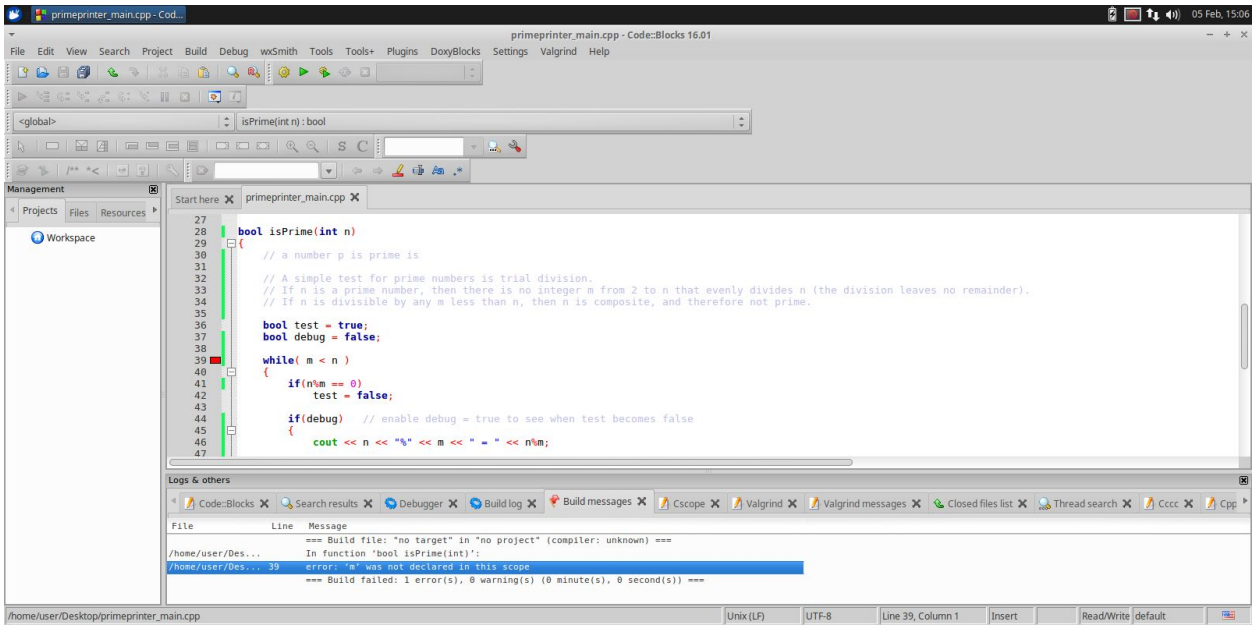
Error 3:



error: expected unqualified-id before ‘{‘ token

What does this error mean? Try googling the error to see why this has occurred. Take a look at **line 29**. This error indicates that a syntax problem is related to this line. Try looking at the line immediately before this error to find the problem.

Error 4:



error: ‘m’ was not declared in this scope

What does this error mean? This error indicates that your program is expecting ‘m’ to be declared prior to being used. What does this mean? Where should you declare your variables? Your variables should always be declared above the line of usage.

At this point you may encounter a few more errors that you need to continue to debug to make the program run.

Some Takeaways:

1.) If you have a syntax error on a certain line sometimes the error actually occurred on the line BEFORE where your code is breaking.
2.) Scoping errors require you include the proper libraries and namespaces in your source file. This kind of error lets you know to always look back and check which libraries you’ve imported.
3.) Make sure to declare variables and functions prior to using and include the appropriate libraries.

Once you have finished debugging your program and completed all errors, verify that the

program is running and its output is correct. Upload your **recitation4primes.cpp** file to Moodle at the Recitation 4 Submit. **Make sure** your name, recitation section, and TA are commented in the header or points will be deducted.