CISC 3115 TY2

Writing Java Programs from Command Line

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Outline

- Authoring Java programs
- Compiling and running Java programs from command line
- Submitting class Journal (using git and Github classroom)
- CodeLab

Review: Authoring a Java Program

- Let's consider the following 5 components
  - Requirement
  - Design
  - Implementation
  - Verification (commonly, testing)
  - Validation
- Call them 5 components instead of 5 steps, because it is not necessary to follow them in the above order

Requirements

- About answering question:
- What does the “customer” want? Call the answer the requirement.
  - In the class:
    - What does the instructor want?
  - For your own exploration:
    - What do I want?

Design

- About answering question:
- What is the program supposed to do to meet the requirement? Call the answer the specification.
  - What is the functionality? How should the program “behave”?
  - What data structures should I use?
  - What is the algorithm?
  - Additionally,
    - Is there any limitation on where the program is supposed to run? e.g., how much memory do I have? how fast should the program run? what programming language(s) must I use?

Implementation

- About writing the code as specified
- For simple Java programs,
  - Create and edit Java program files
  - Compile the program, revise it if error
  - Run it, revise the program/find a way to run it if error

Verification and Testing

- About answering the question:
- Does the implementation meet the specification? (Am I *building the thing right*?)
  - Commonly via testing
    - Develop test cases: the scenarios under which the program produces intended result
      - Input, output, and interaction
    - Run test cases and verify the output is identical to the intended one specified in the test cases
    - Revise design and/or implementation till all test cases pass

Validation

- About answering question:
- Do the design and implementation meet the requirements? (Am I *building the right thing*?)

Questions?

- What are major components when authoring a program?

Review: Authoring a Java Program

- Requirement: write a shortest java program, and compile and run it.
- Design: a Java program that prints out “Hello, World!” on a terminal window
- Implement and test
  - Create a HelloWorld.java using an editor
    - Recommend: the Atom editor, the Visual Studio Code, notepad++ for Windows; SlickEdit ($$$) for Mac OS X
    - The instructor will use Atom for demo in class, and recommend strongly that you use Atom.
  - Compile and run the program
  - Test the program

Demo for Authoring a Java Program

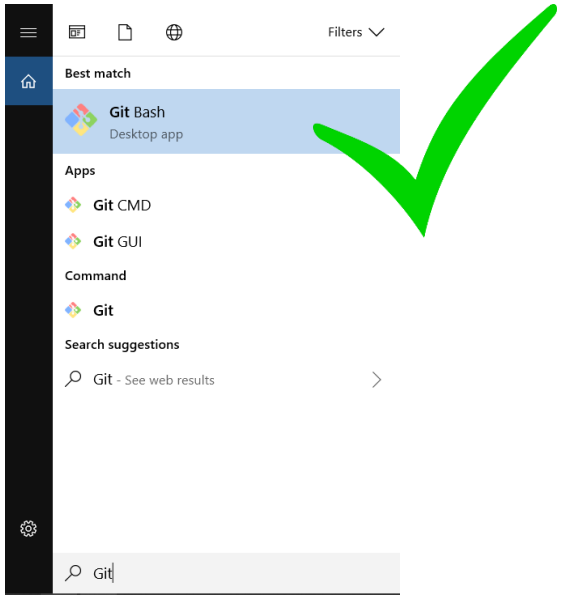
1. Prepare the working environment
   a) Install the git client (if not already installed)
   b) Install the Atom editor (if not already installed)
2. Create HelloWorld.java using the Atom editor
3. Compile and run the program

Prepare the Working Environment

1. Install the git client (if not already installed)
2. Install the Atom editor (if not already installed)

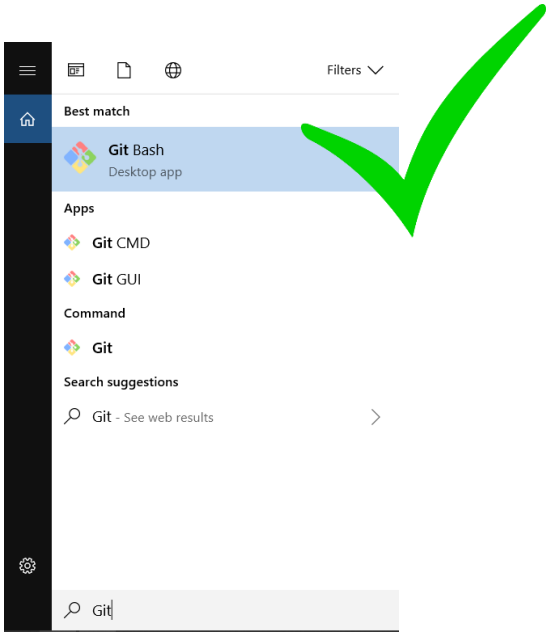
Verify Whether You Have Git Client

- Verify if you have had the Git client installed already
- Windows
  - Attempt to run “Git Bash”
- Unix (OS X or Linux):
  - Open a terminal window
  - Run “git --version”, i.e., type “git --version“ (without quotes) and hit the Enter key



Have I Had Git Client Installed?

- Windows and Unix




```
$ git --version
git version 2.17.1
```

- If not, download and install it

Download Git Client

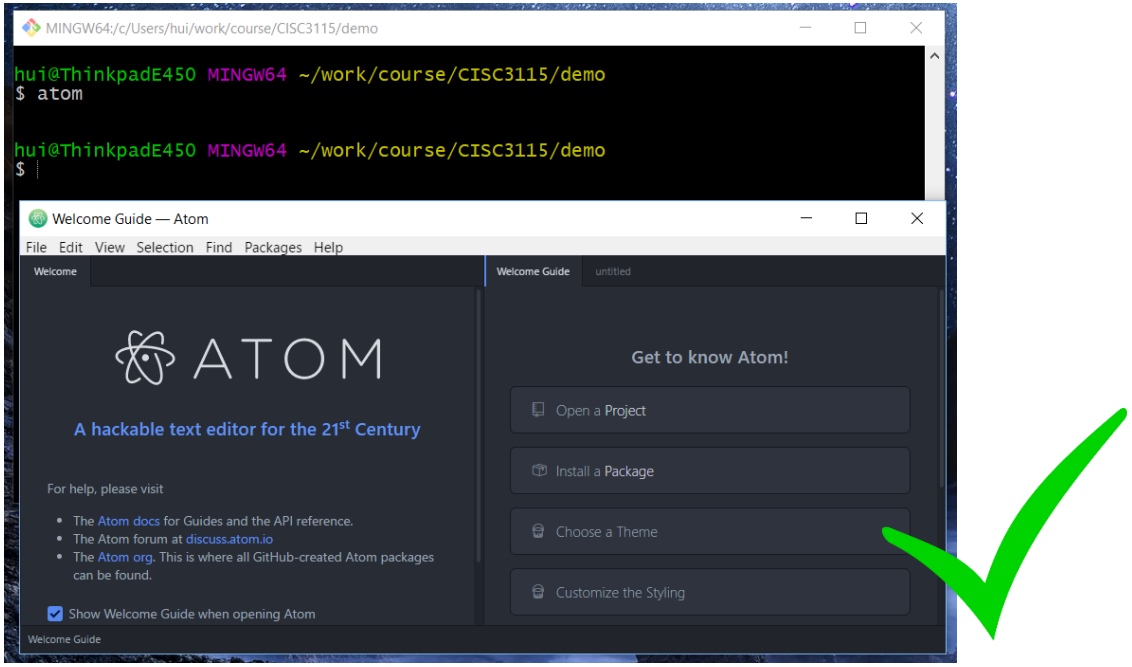
- Visit https://git-scm.com/downloads using your favorite Web browser

Git Bash on Windows

- Provides a terminal where you can run Unix commands
- The instructor shall use the Git Bash from now on so that the instructions are identical to both Windows and Unix (e.g., OS X) users
- Window users: Use the Git Bash terminal
- Unix users: just use a terminal (e.g., the terminal on OS X)

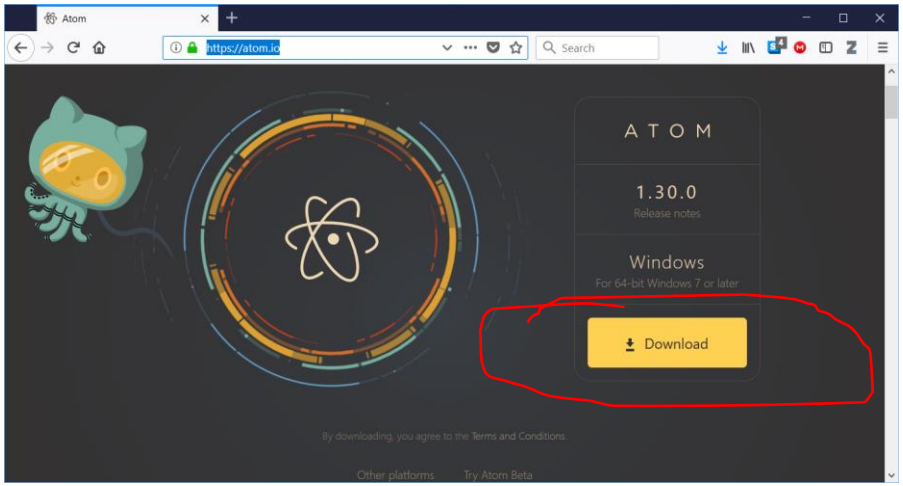
Verify Whether You Have Atom Installed

- Verify if you have had the Atom editor installed already
  - Type atom on the Command Line



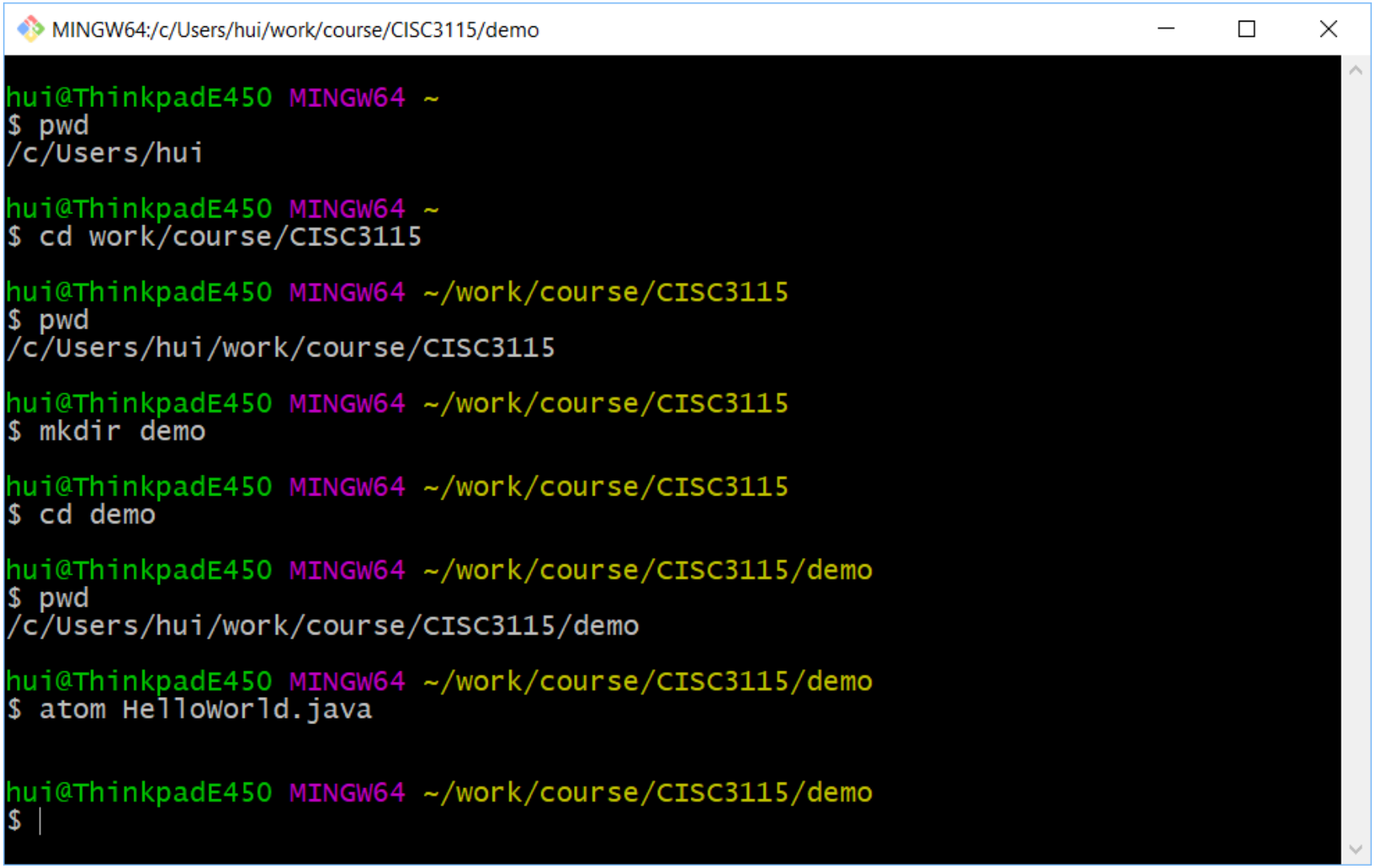
Download and Install the Atom Editor

- If you have not had the Atom Editor installed, download and install the Atom editor
- Visit https://atom.io/ using your favorite Web browser



Implement the HelloWorld Java Program

- Open a terminal Window
- (Optional) Create a subdirectory under a desired directory
- Run “atom HelloWorld.java” from the Command Line at the subdirectory
- Type the code
- Save the file


MINGW64:/c/Users/hui/work/course/CISC3115/demo
hui@ThinkpadE450 MINGW64 ~
$ pwd
/c/Users/hui
hui@ThinkpadE450 MINGW64 ~
$ cd work/course/CISC3115
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115
$ pwd
/c/Users/hui/work/course/CISC3115
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115
$ mkdir demo
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115
$ cd demo
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ pwd
/c/Users/hui/work/course/CISC3115/demo
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ atom HelloWorld.java
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$

HelloWorld.java — C:\Users\hui\work\course\CISC3115\de...

File Edit View Selection Find Packages Help

demo

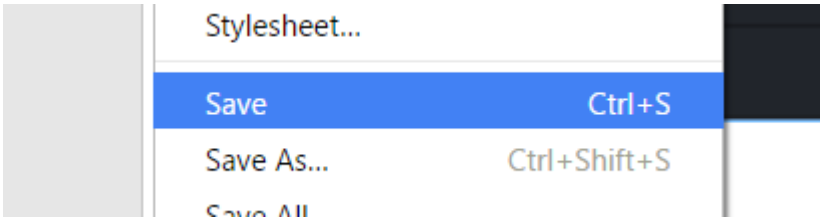
HelloWorld.java

HelloWorld.java

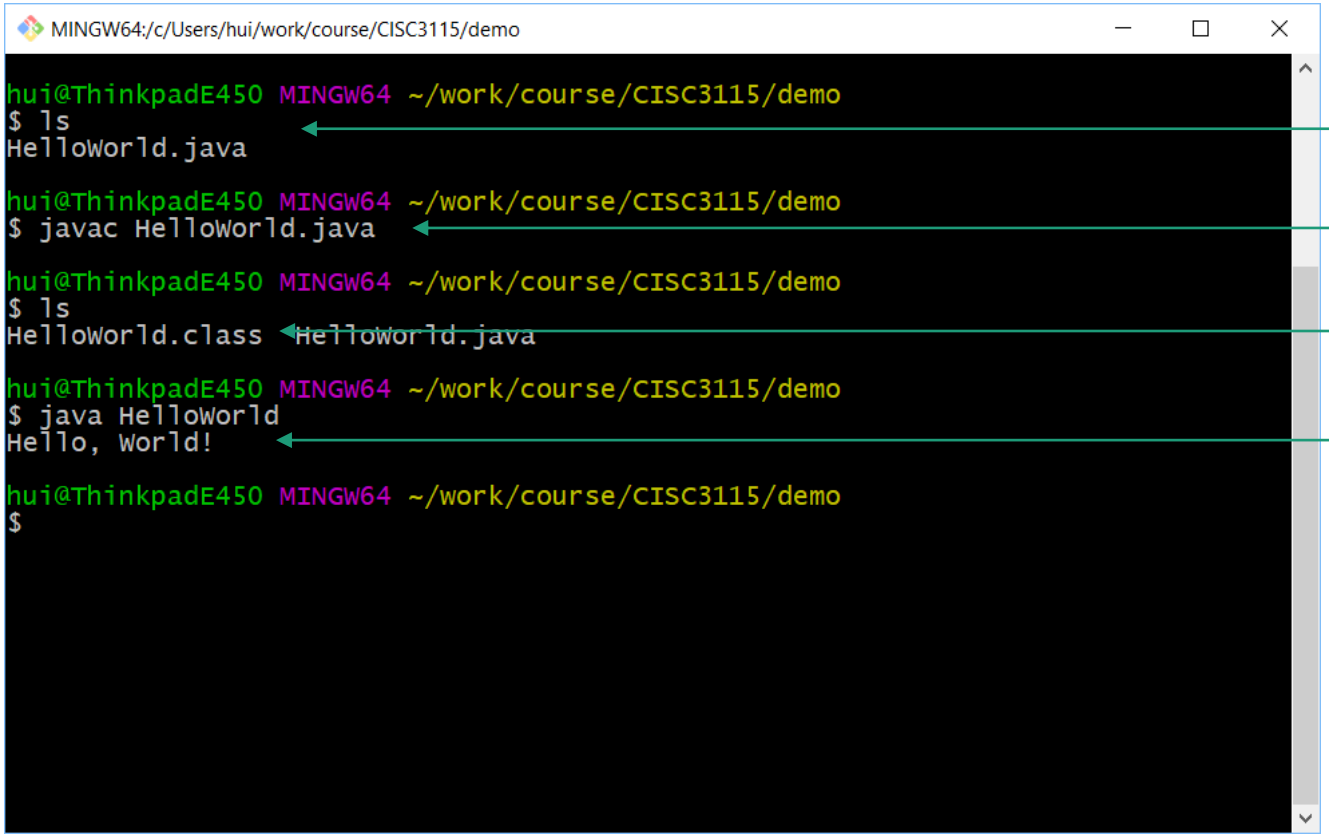
```
1  class HelloWorld {
2    public static void main(String[] args) {
3      System.out.println("Hello, World!");
4    }
5  }
6
```

HelloWorld.java 3:41 CRLF UTF-8 Java

- Press “CTRL-S” or click “Save” from the “File” menu to save the file



Compile and Run the Program



Verify the program file exists

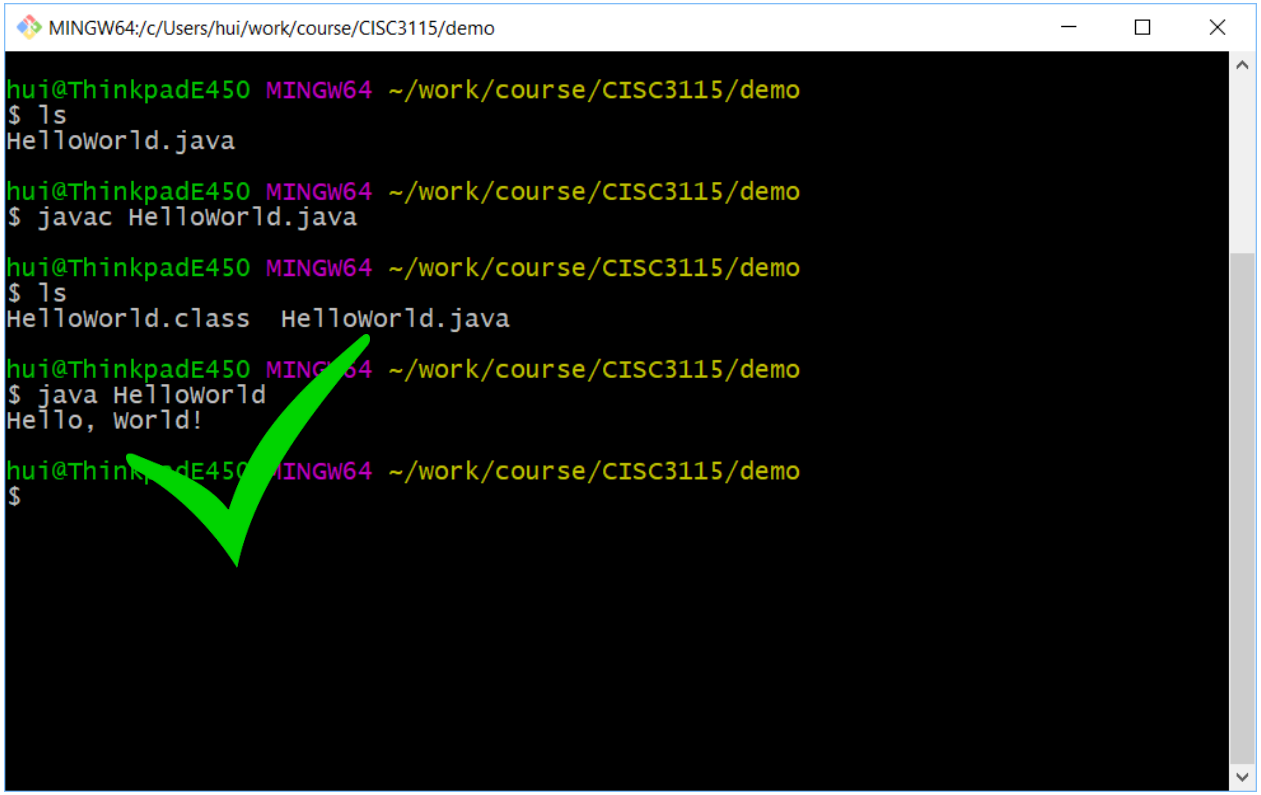
Compile the program

Verify the class file was created

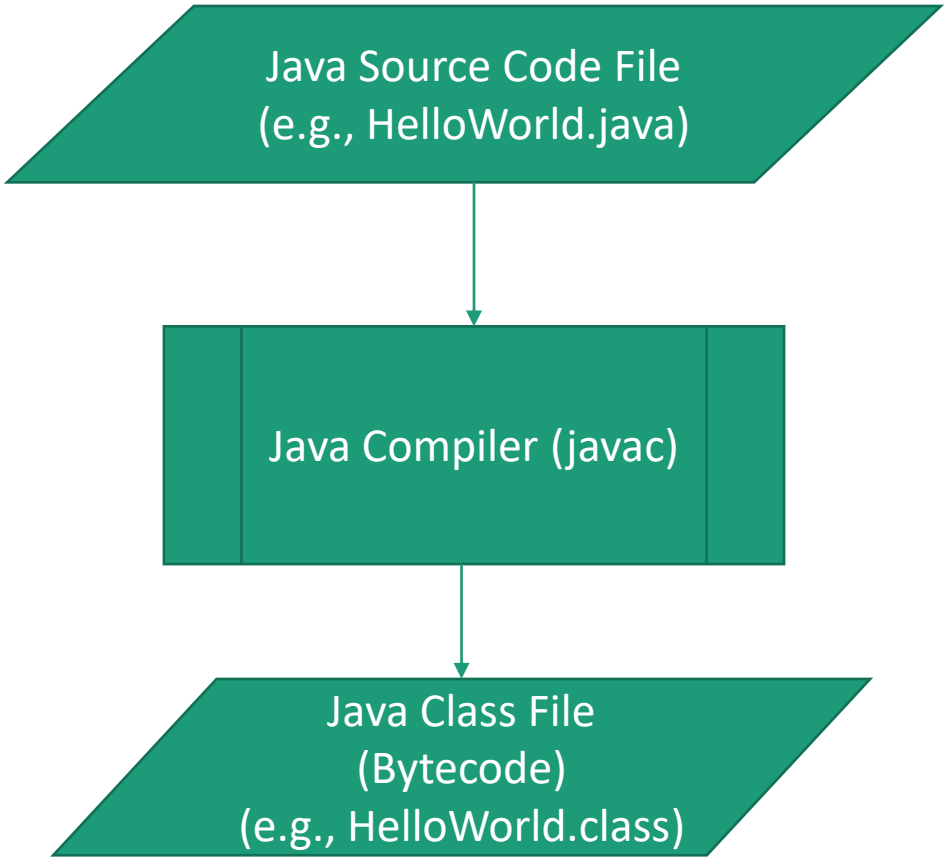
Run the program

Verification

- Do I see “Hello, World!” when I run the program?



Compilation



Running Java Program

- You are running Java class files containing Java bytecode
- Example: java HelloWorld
  - The java program launches a Java Virtual Machine (JVM)
  - load the HelloWorld.class (and its dependencies), and start executing the bytecode in the class files

Troubleshooting

- Read the compilation error message carefully
  - Caveat:
    - The error message sometimes is accurate about what went wrong; sometimes not.
    - The compiler is more accurate at pinpointing where an error was found than telling what went wrong.
- Figure out what might be wrong, revise and compile it again
- Best practice: save often, compile often, don’t have to wait.

Questions

- Prepare the environment to write Java programs
  - Git and Git Bash
  - Atom (or other your favorite editors)
  - In this class, the instructor prefer not to use an Integrated Developer Environment software (IDE, e.g., Net Beans, Eclipse, IntelliJ)
- Review the process of authoring a simple Java program

Exercise

- This is a group exercises. You must record this in the class journal.
- Verify you have git client. If not, install it
- Verify you have Atom. If not, install it
- Create a folder C0901 in the journal directory
- In C0901, Create, compile and run the HelloWorld Java program
- Copy HelloWorld.java to HelloTeam.java, and revise “HelloTeam.java”, and let it print “Hello, Team!” instead
- Compile and run the HelloTeam.java
- If you haven’t encountered any compilation error, introduce one
    - Examples:
        - Misspell “class”, “main” etc deliberately, compile and observe error message
        - Remove a “;” deliberately, compile and observe error message
        - Remove a parenthesis, i.e., (or), or a brace, i.e., { or } deliberately, compile and observe error message

Questions?

- Write, compile, and run Java programs
- Remove compilation errors

Pushing the Journal to Github

- A student volunteer will make the demo following the instructor's instructions.

Exercise

- Students submit the class journal by pushing the journals to Github

Question?

- What about new journal content/entry?

CodeLab Registration and Assignment

- Course Section Code is in Blackboard
- Assignment 1