

CISC 3115 EWQ6

Writing Java Programs from Command Line

Hui Chen

Department of Computer & Information Science

CUNY Brooklyn College

Outline

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

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

1. **Requirement:** write a shortest java program, and compile and run it.
2. **Design:** a Java program that prints out “Hello, World!” on the standard output
3. **Implement**
 - A. Create/Revise a HelloWorld.java using an editor
 - A. Using: the Atom editor, the Visual Studio Code, notepad++ for Windows; SlickEdit (\$\$\$) for Mac OS X, ...
 - B. The instructor will use Atom for demo in class.
 - B. Compile the program, if error, go to step A
4. **Test**
 - Test the program, if failed, go to step 2 (can also be steps 1 and 3)

Demo for Authoring a Java Program

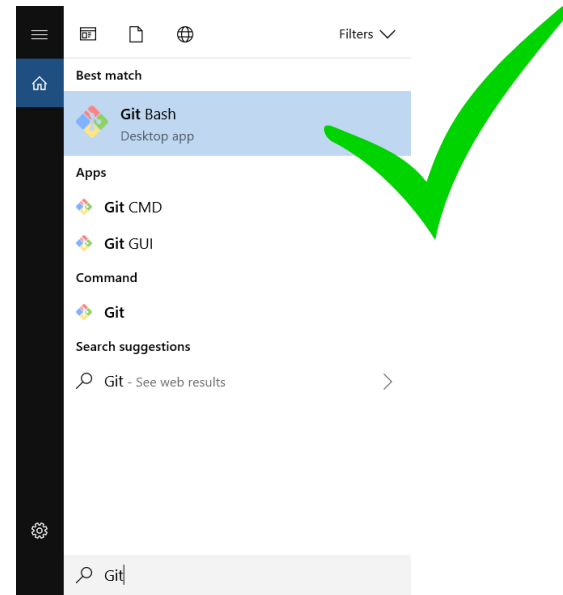
1. Prepare the working environment
 - a) Install the git client (if not already installed)
 - b) Install the Atom editor (if not already installed)
2. Create HelloWorld.java using the Atom editor
3. Compile the program
4. Test the program

Prepare the Working Environment

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

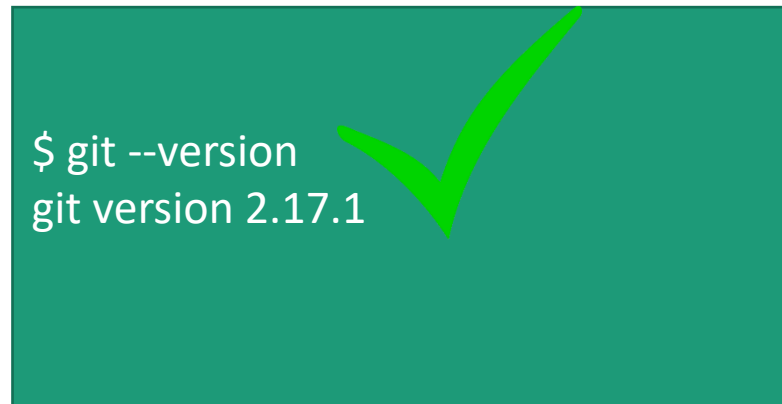
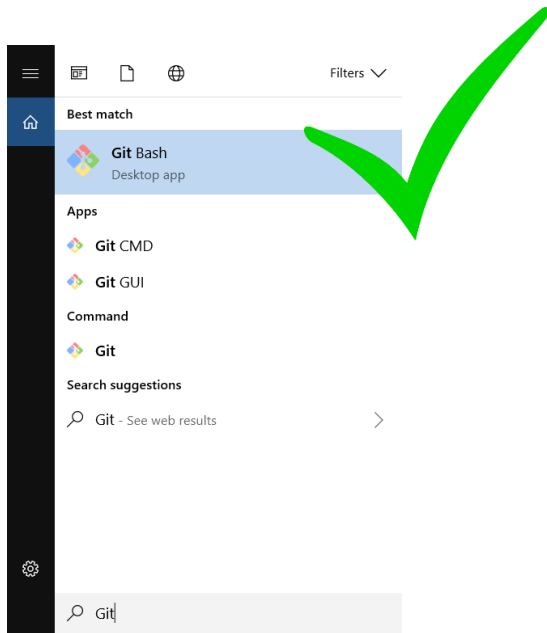
Verify Whether You Have Git Client

- 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



- If not, download and install it

Download Git Client

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

The image shows a screenshot of the Git Downloads page. The page is titled "Downloads" and features three main sections: "Mac OS X", "Windows", and "Linux/Unix". A large green checkmark is placed over the "Windows" section. To the right of the navigation bar is a monitor displaying the "Latest source Release 2.18.0" and a button labeled "Download 2.18.0 for Windows", also marked with a green checkmark. Below the navigation bar, there is a note: "Older releases are available and the Git source repository is on GitHub." At the bottom of the page, there are two sections: "GUI Clients" and "Logos". Both sections are crossed out with a large red X. The "GUI Clients" section includes the text: "Git comes with built-in GUI tools (git-gui, gitk), but there are several third-party tools for users looking for a platform-specific experience." and a link "View GUI Clients →". The "Logos" section includes the text: "Various Git logos in PNG (bitmap) and EPS (vector) formats are available for use in online and print projects." and a link "View Logos →".

Downloads

Mac OS X Windows Linux/Unix

Latest source Release
2.18.0
Release Notes (2018-06-21)
Download 2.18.0 for Windows

Older releases are available and the Git source repository is on GitHub.

GUI Clients
Git comes with built-in GUI tools (git-gui, gitk), but there are several third-party tools for users looking for a platform-specific experience.
[View GUI Clients →](#)

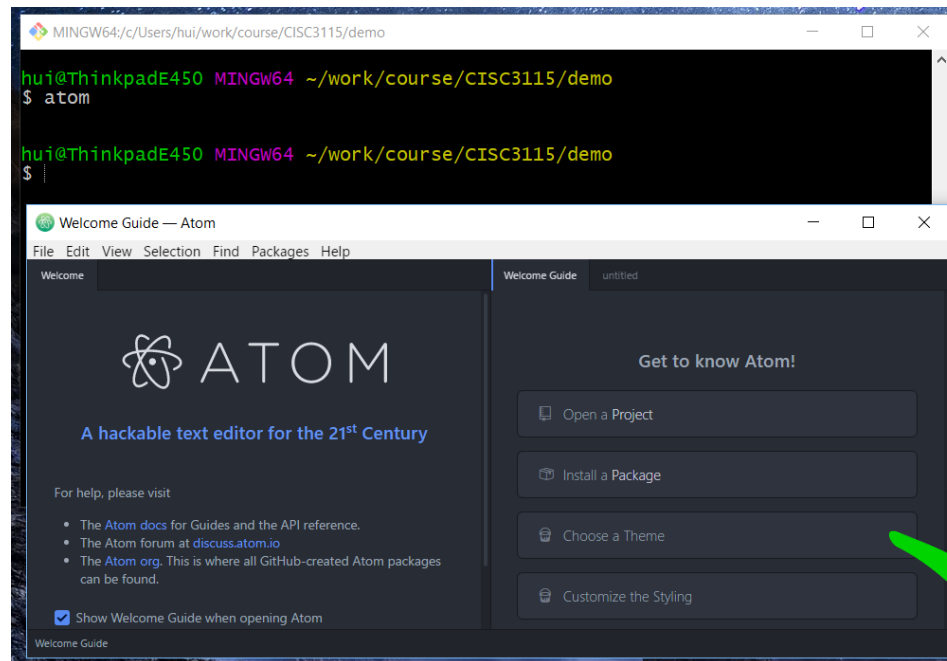
Logos
Various Git logos in PNG (bitmap) and EPS (vector) formats are available for use in online and print projects.
[View Logos →](#)

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)

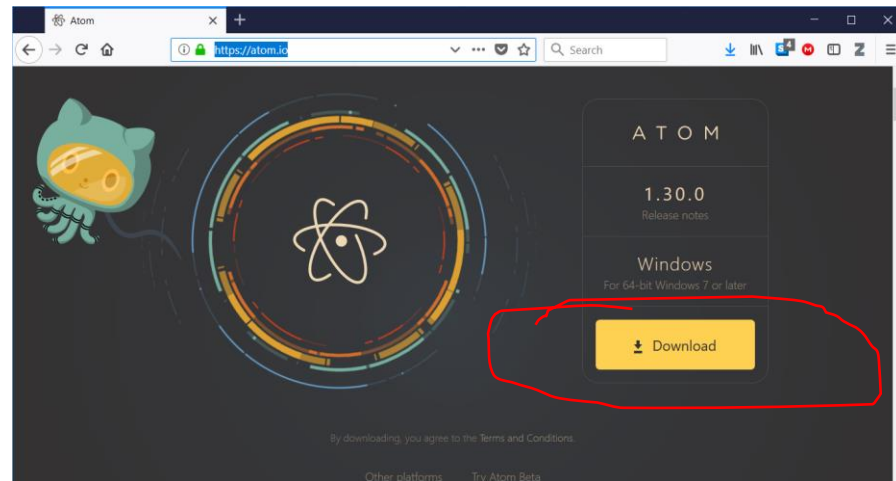
Verify Whether You Have Atom Installed

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



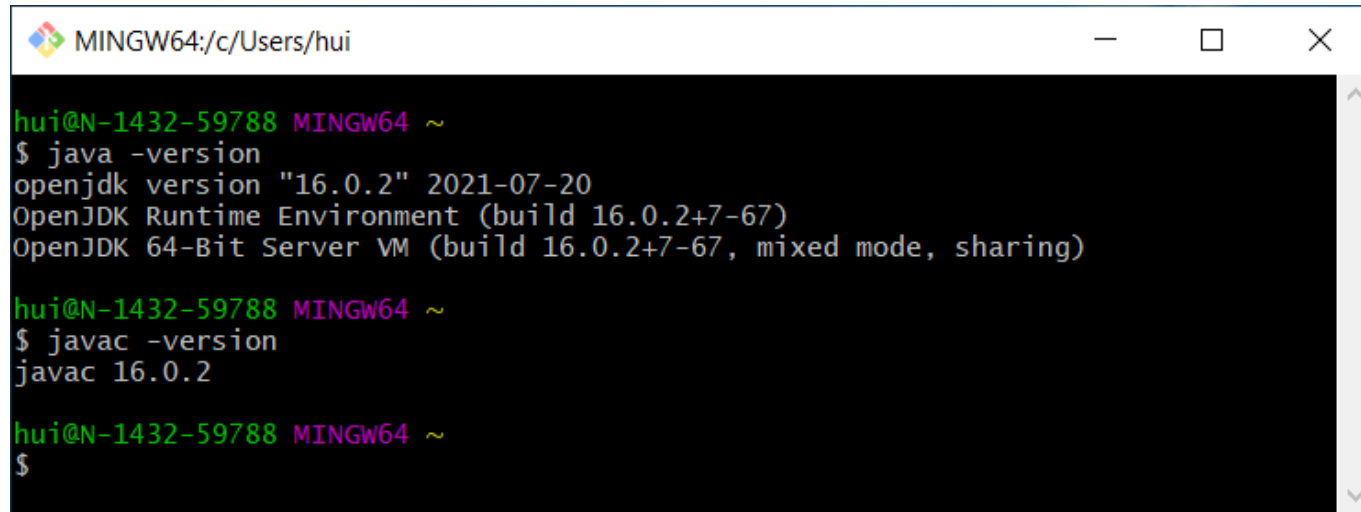
Download and Install the Atom Editor

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



Checking on Java and Javac

- Check whether both java & javac are found, and have an identical version. Otherwise, next slide

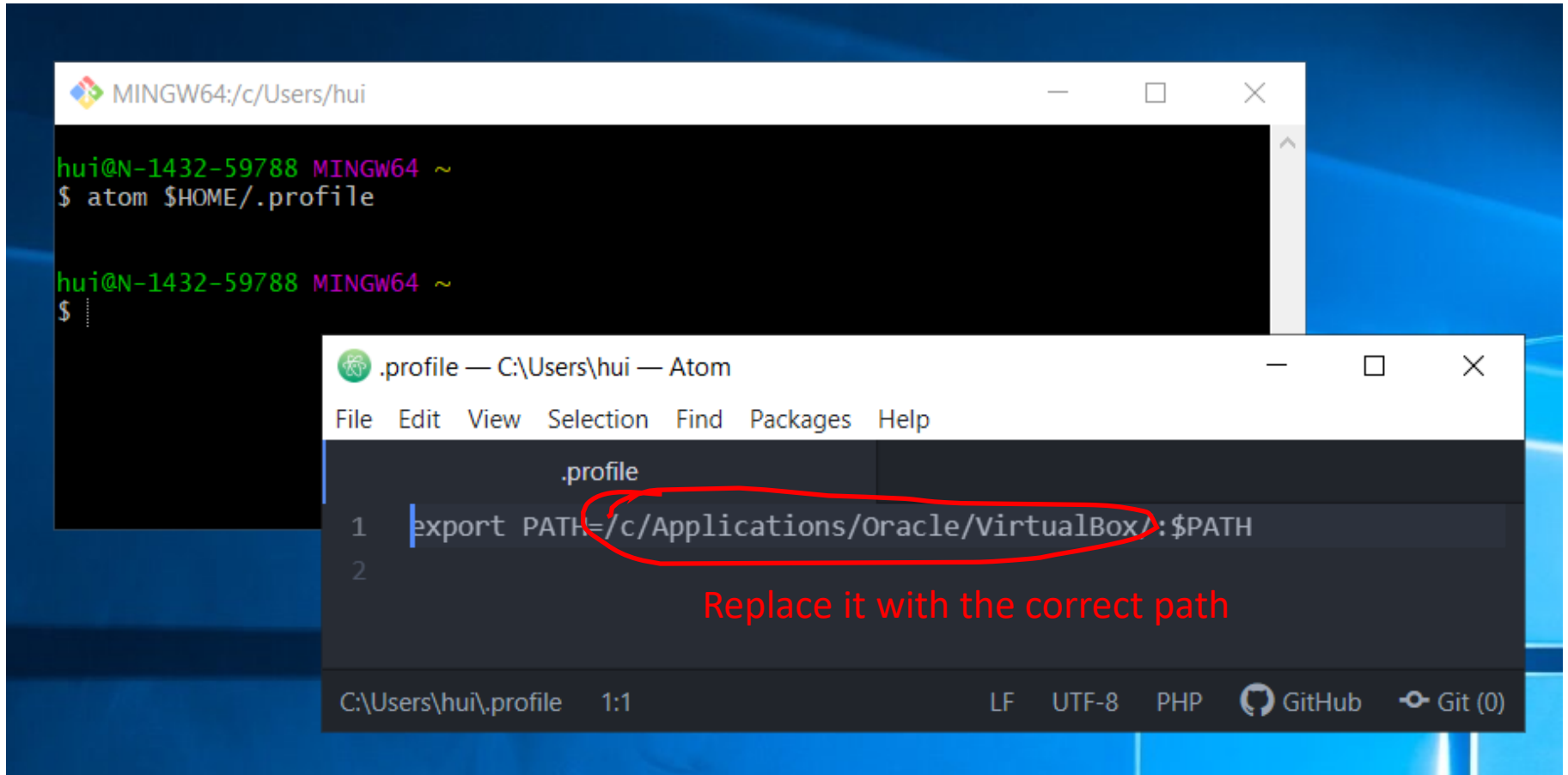
A terminal window titled 'MINGW64:/c/Users/hui' with standard window controls. The terminal shows three commands and their outputs: 1. '\$ java -version' outputs 'openjdk version "16.0.2" 2021-07-20', 'OpenJDK Runtime Environment (build 16.0.2+7-67)', and 'OpenJDK 64-Bit Server VM (build 16.0.2+7-67, mixed mode, sharing)'. 2. '\$ javac -version' outputs 'javac 16.0.2'. 3. '\$' with no output, indicating the prompt is ready for the next command.

```
hui@N-1432-59788 MINGW64 ~  
$ java -version  
openjdk version "16.0.2" 2021-07-20  
OpenJDK Runtime Environment (build 16.0.2+7-67)  
OpenJDK 64-Bit Server VM (build 16.0.2+7-67, mixed mode, sharing)  
  
hui@N-1432-59788 MINGW64 ~  
$ javac -version  
javac 16.0.2  
  
hui@N-1432-59788 MINGW64 ~  
$
```

Setting up Search Path for Java and Javac

- Sometimes we also need to do this step:
 - In “Git Bash” terminal, create (if not already exists) or edit the .profile file on your “home directory” (see next slide)
 - Then, restart “Git Bash” terminal, and check accessibility and versions of Java and Javac

Edit/Create .profile File



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

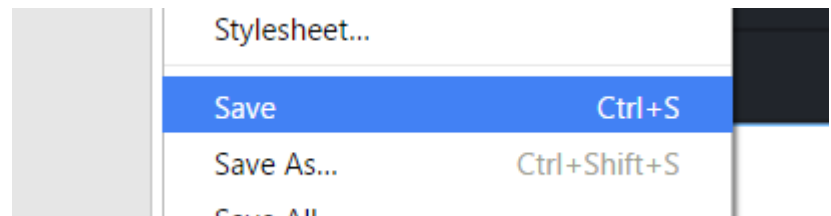
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ |
```

A screenshot of an IDE window titled "HelloWorld.java — C:\Users\hui\work\course\CISC3115\de...". The window has a menu bar with "File", "Edit", "View", "Selection", "Find", "Packages", and "Help". On the left, a file explorer shows a "demo" folder containing "HelloWorld.java". The main editor area shows the following Java code:

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

The status bar at the bottom indicates "HelloWorld.java 3:41" and "CRLF UTF-8 Java".

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



Compile and Run the Program

```
MINGW64:/c/Users/hui/work/course/CISC3115/demo
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ ls
HelloWorld.java
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ javac HelloWorld.java
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ ls
HelloWorld.class HelloWorld.java
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ java HelloWorld
Hello, world!
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$
```

Verify the program file exists

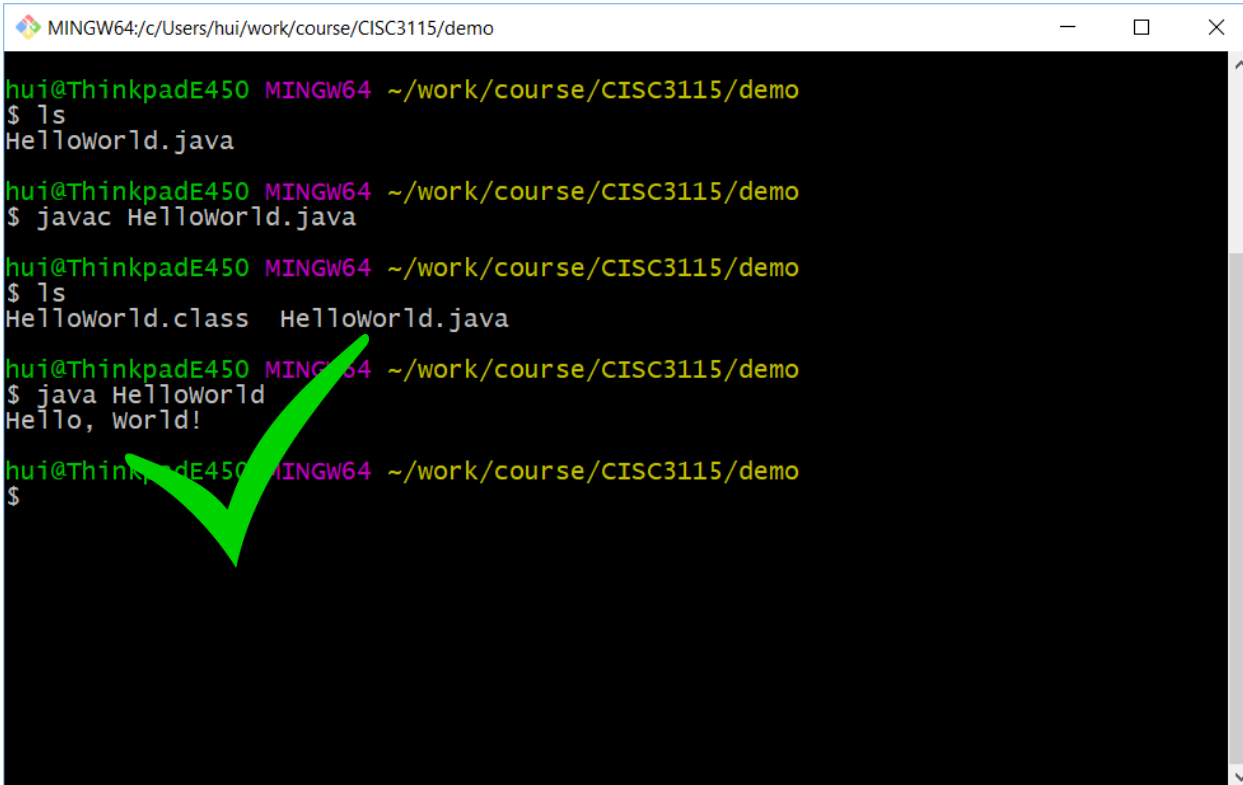
Compile the program

Verify the class file was created

Run the program

Verification

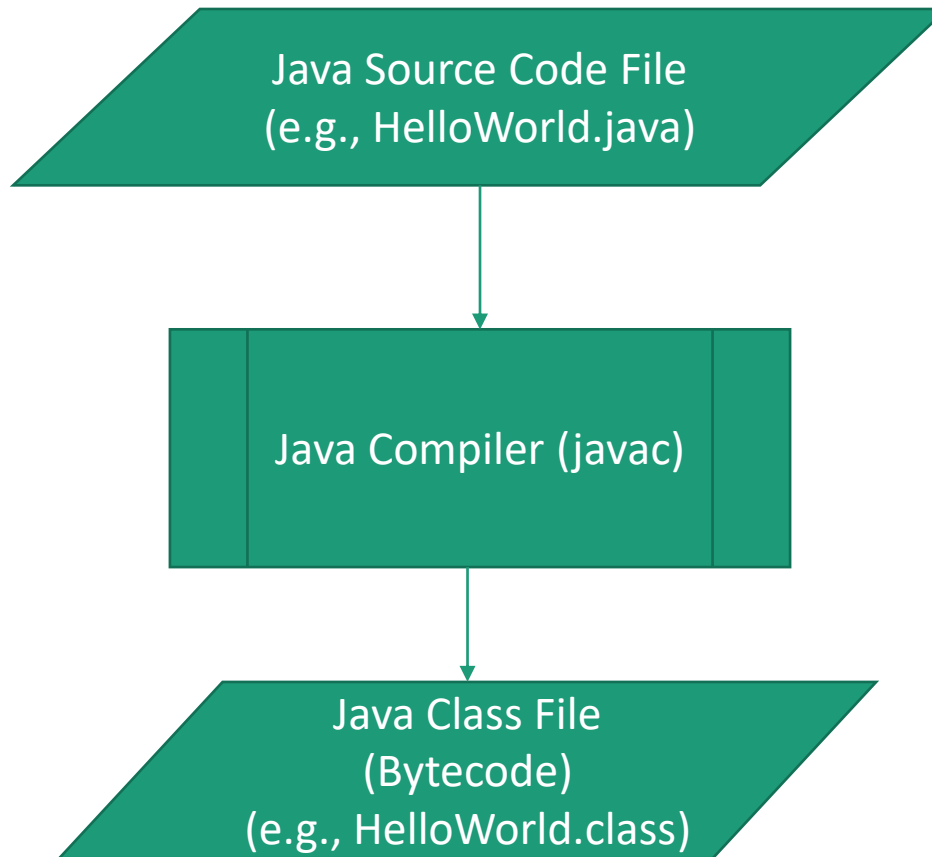
- Do I see “Hello, World!” when I run the program?



```
MINGW64:/c/Users/hui/work/course/CISC3115/demo
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ ls
HelloWorld.java
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ javac HelloWorld.java
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ ls
HelloWorld.class HelloWorld.java
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ java HelloWorld
Hello, world!
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$
```

A terminal window with a black background and yellow text. The window title is "MINGW64:/c/Users/hui/work/course/CISC3115/demo". The terminal shows the following sequence of commands and outputs:
1. Command: `ls`, Output: `HelloWorld.java`
2. Command: `javac HelloWorld.java`
3. Command: `ls`, Output: `HelloWorld.class HelloWorld.java`
4. Command: `java HelloWorld`, Output: `Hello, world!`
5. Command: `$` (no output)
A large green checkmark is drawn over the output of the `java HelloWorld` command.

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 is often inaccurate about what went wrong.
 - 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

In-Class Exercise

- Verify you have git client. If not, install it
- Verify you have Atom. If not, install it
- Create a folder C0831 in the journal directory
- In C0831, 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

CodeLab Registration and Assignment

- Course Section Code is in Blackboard
- Assignment 1