

CISC 3115 TY3
C02a: Programming
Environment

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Outline

- Last class (08/28)
 - Get around in Operating Systems
 - Unix-like: Unix, Linux, OS X
 - Windows
 - Terminal and command line
 - JRE and JDK
- Authoring Java programs
- Compiling and running Java programs
- Git and individual & team assignment submission
- CodeLab and Blackboard online exercise
- Assignments

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?
 - 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?

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:
 - Create a HelloWorld.java using an editor
 - Recommend: notepad++ for Windows; SlickEdit (\$\$\$) for Mac OS X; or the Atom editor for both; or the Visual Studio Code for both
 - 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

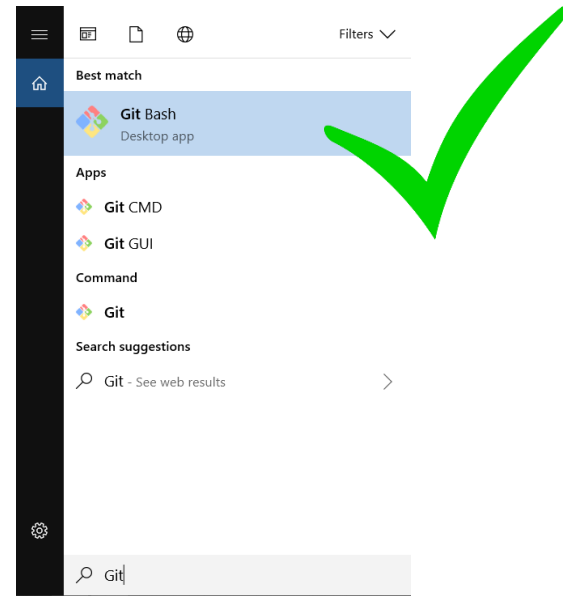
- Verify if you have had the Git client installed already

- 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



- If not, download and install it

Download Git Client

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

The screenshot shows the 'Downloads' section of the Git website. It features three platform-specific download buttons: 'Mac OS X', 'Windows', and 'Linux/Unix'. A large green checkmark is placed over these buttons. To the right, a computer monitor displays the 'Latest source Release 2.18.0' with a 'Download 2.18.0 for Windows' button, also marked with a green checkmark. Below the download buttons, there is a note about older releases and the GitHub repository. At the bottom, there are two sections: 'GUI Clients' and 'Logos', both of which are crossed out with a large red 'X'.

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 →](#)

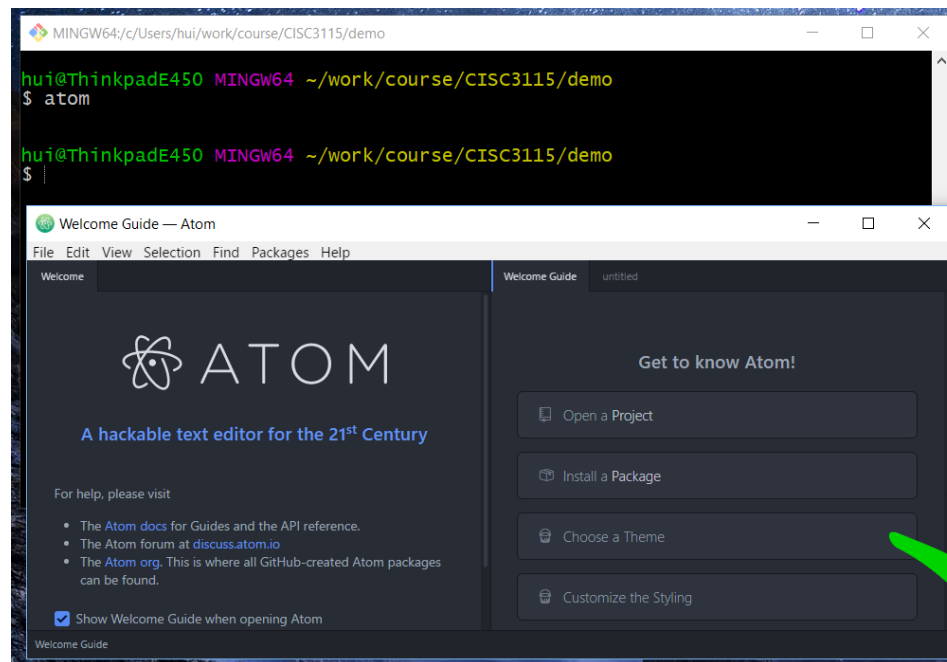
Logos
Various Git logos in PNG (bitmap) and EPS (vector) formats are available for use in online and print projects.
[View Logos →](#)

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 instructors are (more or less) identical to both Windows and Unix (e.g., OS X) users
- Window users: Use the Git Bash terminal
- Unix users: just use your terminal

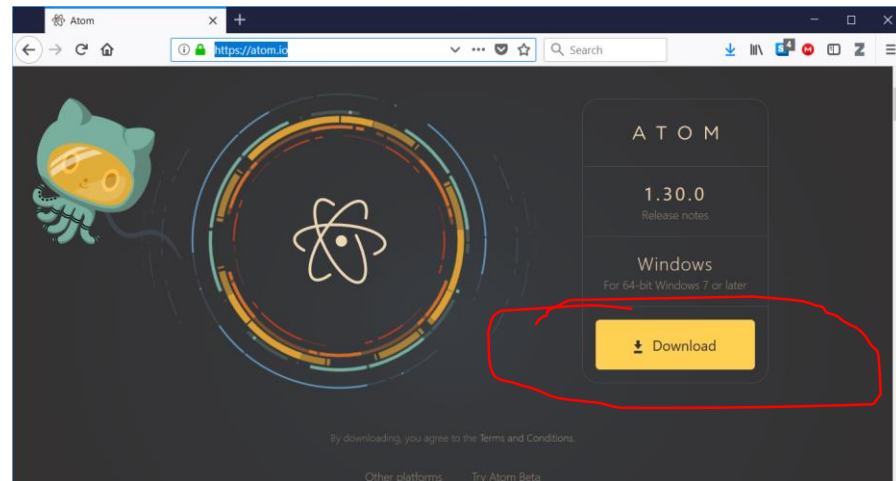
Verify Whether You Have Atom Installed

- 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

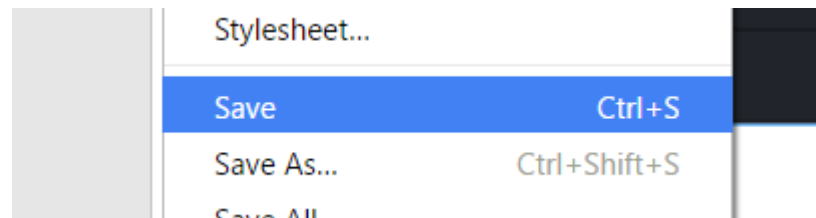
hui@ThinkpadE450 MINGW64 ~/work/course/CISC3115/demo
$ |
```

Screenshot of an IDE window titled "HelloWorld.java — C:\Users\hui\work\course\CISC3115\de...". The window shows a file explorer on the left with a folder named "demo" containing "HelloWorld.java". The main editor area displays 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

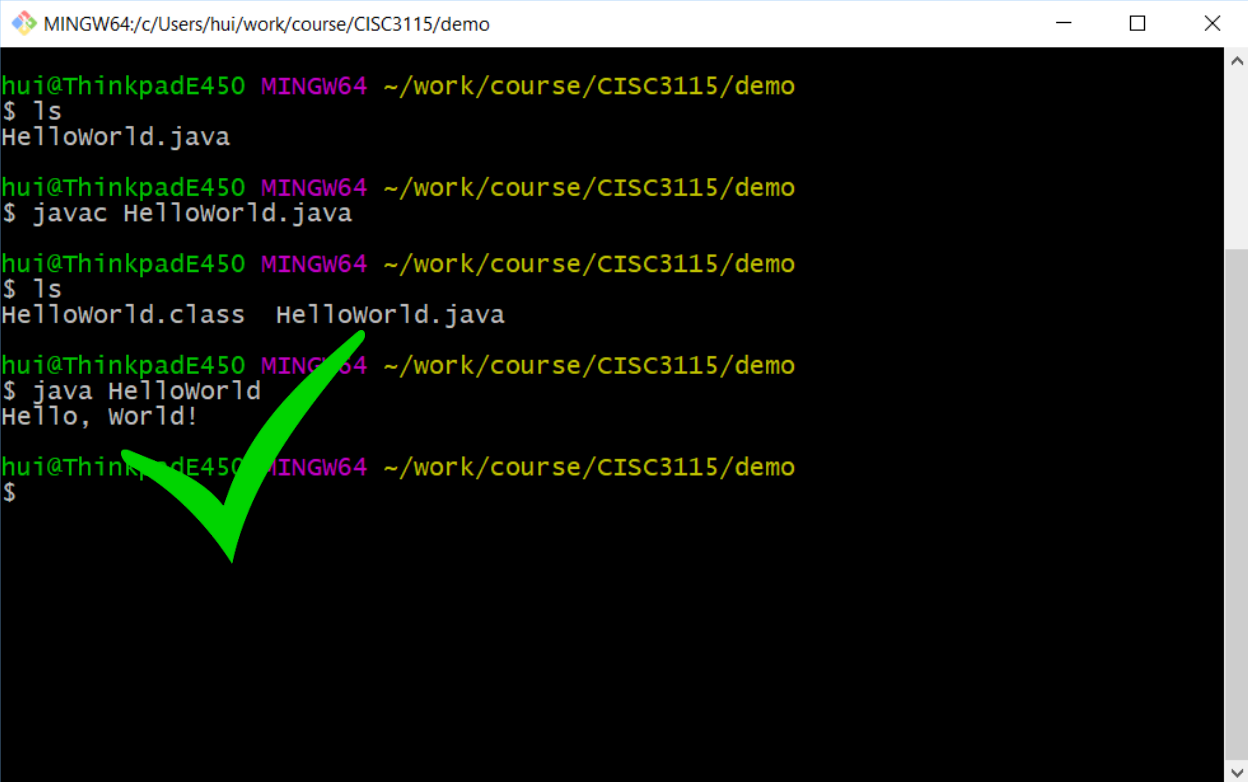
Compile the program

Verify the class file was created

Run the program

Verification

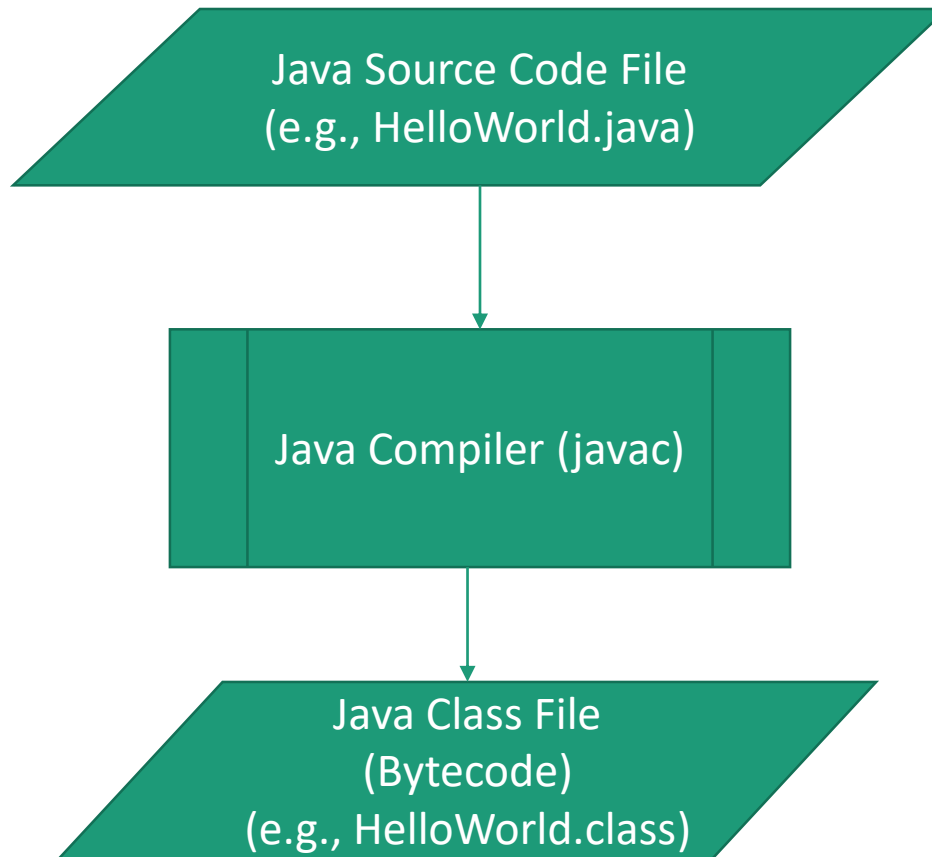
- Do I see "Hello, World!" when I run the program?



```
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 white text. The window title is "MINGW64:/c/Users/hui/work/course/CISC3115/demo". The terminal shows a series of commands and their outputs. A large green checkmark is drawn over the output "Hello, world!".

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 quite accurate at pinpoint where an error is found.
- 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 C02a-1

- Verify you have git client. If not, install it
- Verify you have Atom. If not, install it
- 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