

Lecture 1 - Java Project Introduction

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CSC-1004: Computational Laboratory Using Java
Course Page: [\[Click\]](#)

Outline

- About the Course
- Java Project Topics
- Java IDEs
- Java Project Management Tools
- Git Commands



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Course Introduction

This course is a computational lab course for the purpose of strengthening programming skill. As a laboratory course, CSC-1004 will be delivered in the format of finishing projects. Self-teaching is especially important for succeeding in this course. Each student is expected to individually implement:

- A medium-sized java project (2000-5000 lines of code).
- A smaller python project (around 500 lines of code).



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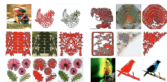
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Course Introduction

Goals: To strengthen programming skills:

- *Preparing for the following courses.* E.g., Data Structure, Machine Learning, etc.
- *Collecting project experience.* E.g., the project could appear on your resume or CV for finding an internship.

OTHER PROJECTS



1. Paper-cutting Artwork Generation based on unpaired-training GAN. 2019

Traditional way to produce 2D paper-cutting artworks is quite time-consuming and labor-intensive. Therefore, in this project, we design a new deep learning framework based on CycleGAN, which is trained in an unpaired manner, to automatically synthesize high-quality artistic paper-cuttings from scratch.



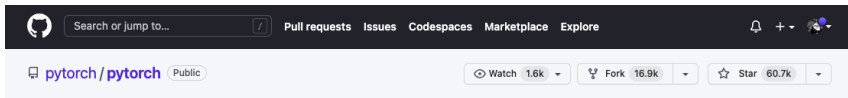
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Course Introduction

Goals: To strengthen programming skills:

- *Preparing for the following courses.* E.g., Data Structure, Machine Learning, etc.
- *Collecting project experience.* E.g., the project could appear on your resume or CV for finding an internship.
- *Building up your code base.* E.g., Open Source on Github.



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Course Introduction

Scoring Schema:

- *Java Project (60%)*. Basic functions, advanced functions, and documentation.
- *Python Project (20%)*. Code filling into a machine learning project.
- *Bi-weekly Reports (10%)*. Report your progress every **two weeks**.
- *GitHub Repository (5%)*. Create a GitHub repository for your Java and Python projects.
- *Course Evaluation (5%)*. Finish the course evaluation.



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What NOT to Expect

What Not to Expect:

- *Lecture and TAs will teach me how to code line by line or class by class.*
- *Lecture and TAs will design the project for me and tell me what to be included.*
- *If I cannot finish the project by myself, I can ask other people to code for me.*
- *I can get a full score by going over the slides taught in class.*

Self-learning skills are extremely important for success in CSC 1004.



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What to Expect

What to Expect:

- *Lecture and TAs will introduce the core techniques for programming the project.*
- *Lecture and TAs will introduce only general requirements, leaving sufficient space for adding your designs.*
- *Every student must individually finish a project **without forming any team.***
- *Students must learn how to collect and learn the materials by themselves.*

Self-learning skills are extremely important for success in CSC 1004.



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Lectures and Tutorials

Lectures:

- *Introduce the basic Java Knowledge for project writing.*
- *Introduce some advanced Java features to improve your project.*

The lecture covers the main idea, how to utilize these ideas in your project is your work

Tutorials:

- *Go over the code of some example projects with you.*
- *The code of these example projects can be shared at your request.*
- *Question answering.*

TAs will not debug for you or write any code for you.



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Java Project Topics

Pick **one** from the following topics

(For more details, please check the course page [\[Click\]](#)):

- *Java Movie Management System* (Check [this page](#).) You are expected to write a movie management system in Java. The basic features include:
 1. User and Manager Systems.
 2. Login System.
 3. Java GUI.



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Java Project Topics

Pick **one** from the following topics

(For more details, please check the course page [\[Click\]](#)):

- *Java Movie Management System* (Check [this page](#).)
- *Java Chat Room* (Check [this page](#).) You are expected to write a chat room with Java. The basic features include:
 1. Multi-Client Chat.
 2. Login System.
 3. Java GUI.



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Java Project Topics

Pick **one** from the following topics

(For more details, please check the course page [\[Click\]](#)):

- *Java Movie Management System* (Check [this page](#).)
- *Java Chat Room* (Check [this page](#).)
- *Java Games* (Check [this page](#).) You are expected to write a game with Java. The basic features include:
 1. New Game Designs.
 2. Login System.
 3. Java GUI.



Java IDEs

Popular **I**ntegrated **D**evelopment **E**nvironment (**IDE**) for Java includes:

- *Eclipse* (*Not Recommended!*). ([Official Site](#)) It is a Java-based open-source platform that enables us to create highly customized IDEs from Eclipse members' plug-in components.



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Java IDEs

Popular **Integrated Development Environment (IDE)** for Java includes:

- *Eclipse* (*Not Recommended!*). ([Official Site](#))
- *NetBeans* (*Not Recommended!*). ([Official Site](#)) NetBeans is a Java-based IDE and basic application platform framework. Besides Java, JavaScript and JavaFX, NetBeans supports PHP, C/C++, Groovy, and HTML5 languages.



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Java IDEs

Popular **Integrated Development Environment (IDE)** for Java includes:

- *Eclipse* (*Not Recommended!*). ([Official Site](#))
- *NetBeans* (*Not Recommended!*). ([Official Site](#))
- *IntelliJ IDEA* (*Recommended!*). ([Official Site](#)) It is a free and open-source commercial Java IDE. It has several features to make programming easier, like code completion, **debugging**, XML editing support, code refactoring, code checks, unit testing, etc.



IntelliJ IDEA

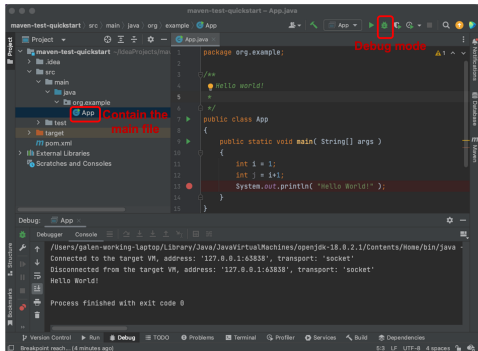


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Debugging with IntelliJ IDEA.

1. Download the **Ultimate** version of **IntelliJ IDEA** (register with your school's email). Find the main file and open the debug mode.

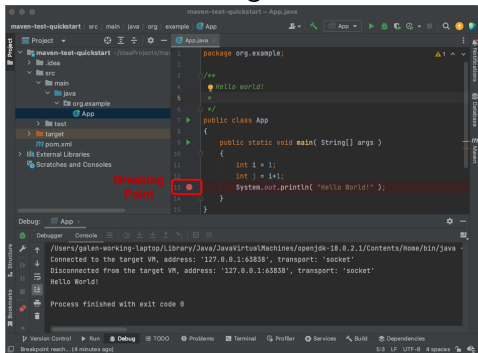


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Debugging with IntelliJ IDEA.

1. Download the **Ultimate** version of *IntelliJ IDEA* (register with your school's email).
2. *Breakpoints* allows stopping program execution at certain point. Breakpoints are set by hovering the mouse over the gutter area and clicking on it.

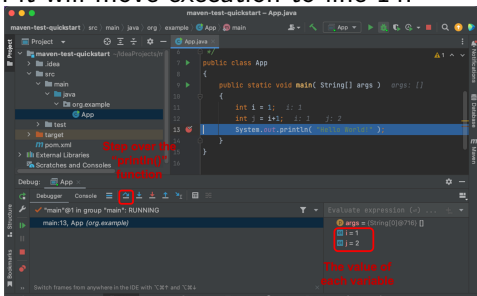


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Debugging with IntelliJ IDEA.

1. Download the **Ultimate** version of *IntelliJ IDEA* (register with your school's email).
2. Breakpoints
3. Step into.
4. Step over. The Step over action does not enter into function instead, it will jump to the next line of code. For instance, if you are at line 13 and execute the step over action then it will move execution to line 14.

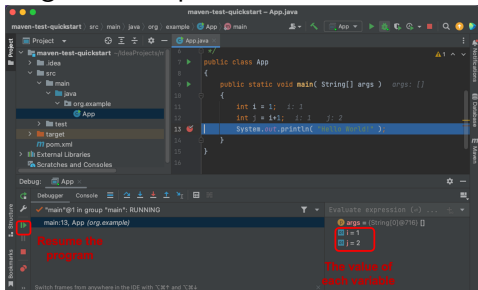


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Debugging with IntelliJ IDEA.

1. Download the **Ultimate** version of *IntelliJ IDEA* (register with your school's email).
2. Breakpoints
3. Step into.
4. Step over.
5. Resume Program. The Resume Program action will continue the execution of the program by ignoring the breakpoint.



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Debugging with IntelliJ IDEA.

1. Download the **Ultimate** version of [IntelliJ IDEA](#) (register with your school's email).
2. Breakpoints
3. Step into.
4. Step over.
5. Resume Program.
6. For more examples. ,please go over the videos [here](#)(Please focus on the first video.).



Java Project Management Tools

Maven is a powerful project management tool that is based on POM (project object model). It is used for project build, dependency, and documentation.

The main functions include:

- *Adding a set of Jars in each project.*
- *Creating the right project structure.*
- *Building and Deploying the project.*



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Git Commands

What is Git?

- Git is an open-source **distributed version control system**. It is designed to handle minor to major projects with high speed and efficiency.
- Git is the foundation of many services like **GitHub** and GitLab, but we can use Git without using any other Git services. Git can be used privately and publicly.



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Git Commands

Basic Git commands

1. **Git Init.** The `git init` command is used to create a new blank repository. It is used to make an existing project as a Git project.

```
HiManShU@HiManShU-PC MINGW64 ~/Desktop (master)
$ git init
Initialized empty Git repository in c:/Users/HiManShU/Desktop/.git/

HiManShU@HiManShU-PC MINGW64 ~/Desktop (master)
$
```



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Git Commands

Basic Git commands

1. Git Init.
2. Git Add. The `git add` command is used to add file contents to the Index (Staging Area).

```
HiManshu@HiManshu-PC MINGW64 ~/Desktop/NewDirectory (master)
$ touch newfile.txt

HiManshu@HiManshu-PC MINGW64 ~/Desktop/NewDirectory (master)
$ git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        newfile.txt

nothing added to commit but untracked files present (use "git add" to
HiManshu@HiManshu-PC MINGW64 ~/Desktop/NewDirectory (master)
$ git add newfile.txt
```

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Git Commands

Basic Git commands

1. Git Init.
2. Git Add.
3. **Git Commit.** The `git commit` command is used to record the changes in the repository. It is the next command after the git add. Every commit contains the index data and the commit message.

```
HiManshu@HiManshu-PC MINGW64 ~/Desktop/NewDirectory (master)
$ git commit -m "Introduced newfile4"
[master 64d1891] Introduced newfile4
1 file changed, 0 insertions(+), 0 deletions(-)
create mode 100644 newfile4.txt
```



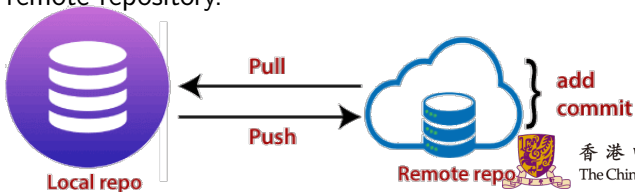
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Git Commands

Basic Git commands

1. **Git Init.**
2. **Git Add.**
3. **Git Commit.**
4. **Git Push.** The `git push` term refers to uploading local repository content to a remote repository. Pushing is an act of transferring commits from your local repository to a remote repository.



Git Commands

Basic Git commands

1. Git Init.
2. Git Add.
3. Git Commit.
4. Git Push.
5. More about Git.

Please come to the tutorial!



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Java Project Management Tools: Maven

Create a Maven Project with IntelliJ IDEA

1. *Make sure you have downloaded the **Ultimate** version of [IntelliJ IDEA](#) (see above).*

IntelliJ IDEA supports a fully-functional integration with Maven that helps you automate your building process. You can easily create a new Maven project, open and sync an existing one, add a Maven support to any existing IntelliJ IDEA project, configure and manage a multi-module project.



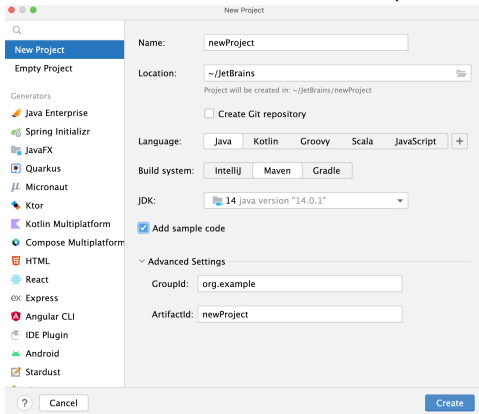
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Java Project Management Tools: Maven

Create a Maven Project with IntelliJ IDEA

1. Make sure you have downloaded the **Ultimate** version of *IntelliJ IDEA* (see above).
2. Create a new Maven project (check [this page](#) for the detailed step).



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Java Project Management Tools: Maven

Create a Maven Project with IntelliJ IDEA

1. *Make sure you have downloaded the **Ultimate** version of [IntelliJ IDEA](#) (see above).*
2. *Create a new Maven project (check [this page](#) for the detailed step).*
3. *(optional) Change the Maven Repository.*

A maven repository is a **directory of packaged JAR file** with pom.xml file.

Maven searches for dependencies in the repositories (check [this page](#) for the detailed step).



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Maven *pom.xml* file.

POM is an acronym for *Project Object Model*. The *pom.xml* file contains information of project and configuration information for the maven to build the project.

1. Elements of maven *pom.xml* file.

Element	Description
project	It is the root element of <i>pom.xml</i> file.
modelVersion	It specifies the <i>modelVersion</i> . It should be set to 4.0.0.
groupId	It specifies the id for the project group.
artifactId	It specifies the id for the artifact (project). An artifact is something that is either produced or used by a project.
version	It is the sub element of project. It specifies the version of the artifact under given group.



Maven *pom.xml* file.

POM is an acronym for *Project Object Model*. The *pom.xml* file contains information of project and configuration information for the maven to build the project.

1. Elements of maven *pom.xml* file.

Element	Description
packaging	defines packaging type such as jar, war etc.
name	defines name of the maven project.
url	defines url of the project.
dependencies	defines dependencies for this project.
dependency	defines a dependency. It is used inside dependencies.
scope	defines scope for this maven project. It can be compile, provided, runtime, test and system.



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An Example of *pom.xml* file.

```
<project xmlns="http://maven.apache.org/POM/4.0.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://maven.apache.org/POM/4.0.0
    http://maven.apache.org/xsd/maven-4.0.0.xsd">

  <modelVersion>4.0.0</modelVersion>

  <groupId>com.javatpoint.application1</groupId>
  <artifactId>my-application1</artifactId>
  <version>1.0</version>
  <packaging>jar</packaging>

  <name>Maven Quick Start Archetype</name>
  <url>http://maven.apache.org</url>
```

```
<dependencies>
  <dependency>
    <groupId>junit</groupId>
    <artifactId>junit</artifactId>
    <version>4.8.2</version>
    <scope>test</scope>
  </dependency>
</dependencies>

</project>
```



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