Intro to Java Development

CSCI 4448/5448: Object-Oriented Analysis & Design
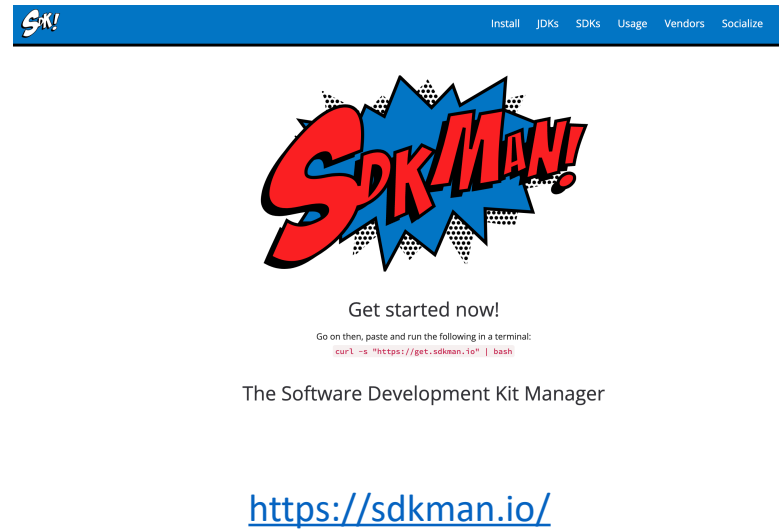
Goals of the Lecture

- Getting Java development tools installed
- Explaining the flow of development
- Building and testing

Installing and Managing Java Versions

- Use Java version 23
- jenv
- sdkman

Get started now!

Go on then, paste and run the following in a terminal:

`curl -s "https://get.sdkman.io" | bash`

The Software Development Kit Manager

https://sdkman.io/

Installing Java

```
> sdk list java


================================================================================
Available Java Versions for macOS ARM 64bit
================================================================================
 Vendor        | Use | Version      | Dist    | Status  | Identifier
--------------------------------------------------------------------------------
 Corretto      |     | 21.0.2       | amzn    |         | 21.0.2-amzn
               |     | 21.0.1       | amzn    |         | 21.0.1-amzn
               |     | 17.0.10      | amzn    |         | 17.0.10-amzn
               |     | 17.0.9       | amzn    |         | 17.0.9-amzn
               |     | 11.0.22      | amzn    |         | 11.0.22-amzn
               |     | 11.0.21      | amzn    |         | 11.0.21-amzn
               |     | 8.0.402      | amzn    |         | 8.0.402-amzn
               |     | 8.0.392      | amzn    |         | 8.0.392-amzn
 Gluon         |     | 22.1.0.1.r17 | gln     |         | 22.1.0.1.r17-gln
               |     | 22.1.0.1.r11 | gln     |         | 22.1.0.1.r11-gln
 GraalVM CE    |     | 21.0.2       | graalce |         | 21.0.2-graalce
               |     | 21.0.1       | graalce |         | 21.0.1-graalce
               |     | 17.0.9       | graalce |         | 17.0.9-graalce
 GraalVM Oracle|     | 21.0.2       | graal   |         | 21.0.2-graal
               |     | 21.0.1       | graal   |         | 21.0.1-graal
               |     | 17.0.10      | graal   |         | 17.0.10-graal
               |     | 17.0.9       | graal   |         | 17.0.9-graal
 Java.net      |     | 23.ea.5      | open    |         | 23.ea.5-open
               |     | 23.ea.4      | open    |         | 23.ea.4-open
               |     | 23.ea.3      | open    |         | 23.ea.3-open
               |     | 23.ea.2      | open    |         | 23.ea.2-open
               |     | 23.ea.1      | open    |         | 23.ea.1-open
               |     | 22.ea.31     | open    |         | 22.ea.31-open
               |     | 22.ea.30     | open    |         | 22.ea.30-open
               |     | 22.ea.29     | open    |         | 22.ea.29-open
               |     | 22.ea.28     | open    |         | 22.ea.28-open
               |     | 22.ea.27     | open    |         | 22.ea.27-open
               |     | 22.ea.26     | open    |         | 22.ea.26-open
               |     | 21.ea.35     | open    |         | 21.ea.35-open
               |     | 21.0.2       | open    |         | 21.0.2-open
 JetBrains     |     | 17.0.9       | jbr     |         | 17.0.9-jbr
               |     | 11.0.14.1    | jbr     |         | 11.0.14.1-jbr
 Microsoft     |     | 21.0.1       | ms      |         | 21.0.1-ms
               |     | 17.0.9       | ms      |         | 17.0.9-ms
               |     | 11.0.21      | ms      |         | 11.0.21-ms
 Oracle        |     | 21.0.2       | oracle  |         | 21.0.2-oracle
               |     | 21.0.1       | oracle  |         | 21.0.1-oracle
               |     | 17.0.10      | oracle  |         | 17.0.10-oracle
               |     | 17.0.9       | oracle  |         | 17.0.9-oracle
 SapMachine    |     | 21.0.2       | sapmchn |         | 21.0.2-sapmchn
               |     | 21.0.1       | sapmchn |         | 21.0.1-sapmchn
               |     | 17.0.10      | sapmchn |         | 17.0.10-sapmchn
```

```
wiwr1803@engr2-2-72-217-dhcp ~ % sdk install java

Downloading: java 21.0.2-tem

In progress...

##################################################

Repackaging Java 21.0.2-tem...

Done repackaging...
Cleaning up residual files...

Installing: java 21.0.2-tem
Done installing!


Setting java 21.0.2-tem as default.
wiwr1803@engr2-2-72-217-dhcp ~ %
```

Installing Gradle

```
> sdk list gradle

================================================
Available Gradle Versions
================================================
     8.6-rc-2           6.9
     8.6-rc-1           6.8.3
     8.5                6.8.2
 > * 8.4                6.8.1
     8.3                6.8
     8.2.1              6.7.1
     8.2                6.7
     8.1.1              6.6.1
     8.1                6.6
     8.0.2              6.5.1
     8.0.1              6.5
     8.0                6.4.1
     7.6.3              6.4
     7.6.2              6.3
     7.6.1              6.2.2

================================================
Available Gradle Versions
================================================
     8.6-rc-2           6.9
     8.6-rc-1           6.8.3
 > * 8.5                6.8.2
   * 8.4                6.8.1
     8.3                6.8
     8.2.1              6.7.1
     8.2                6.7
     8.1.1              6.6.1
     8.1                6.6

* - installed
> - active
```

```
> sdk install gradle

Downloading: gradle 8.5

In progress...

###########################################################
################################## 100.0%

Installing: gradle 8.5
Done installing!

Do you want gradle 8.5 to be set as default? (Y/n): Y

Setting gradle 8.5 as default.
```

Use Intellij

- Everything else is not as good
- Good to know command line as well
- Learn the debugger
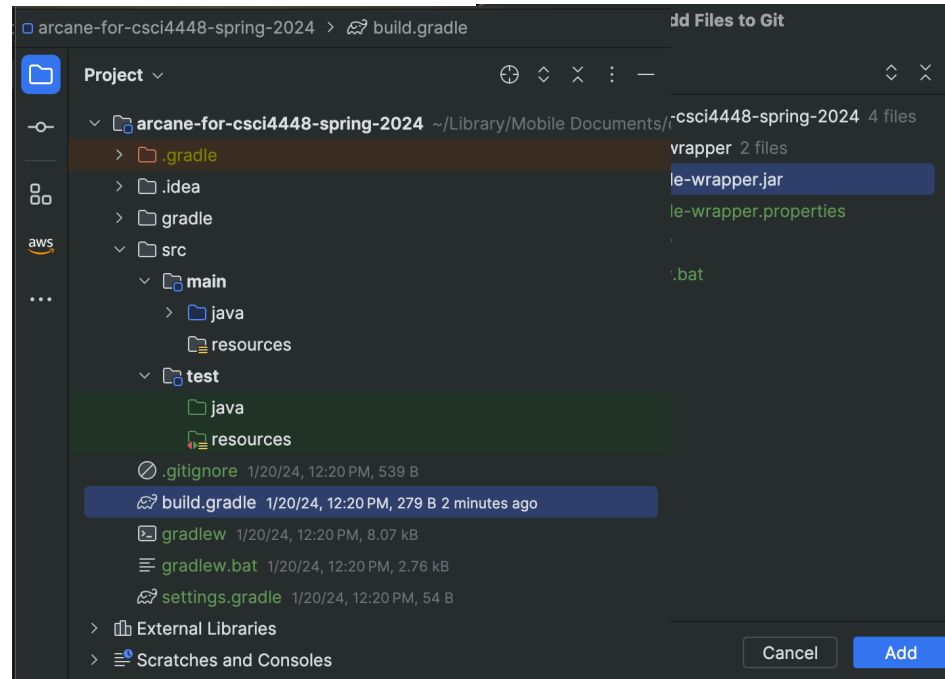- Setup it to work with GitHub — ssh key
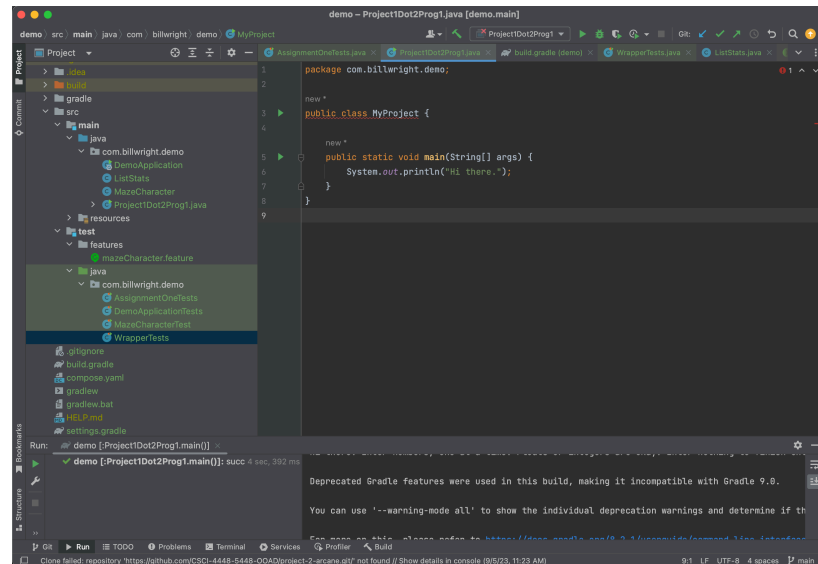
The most important part of your development environment is your debugger. Make sure you know how to use it.
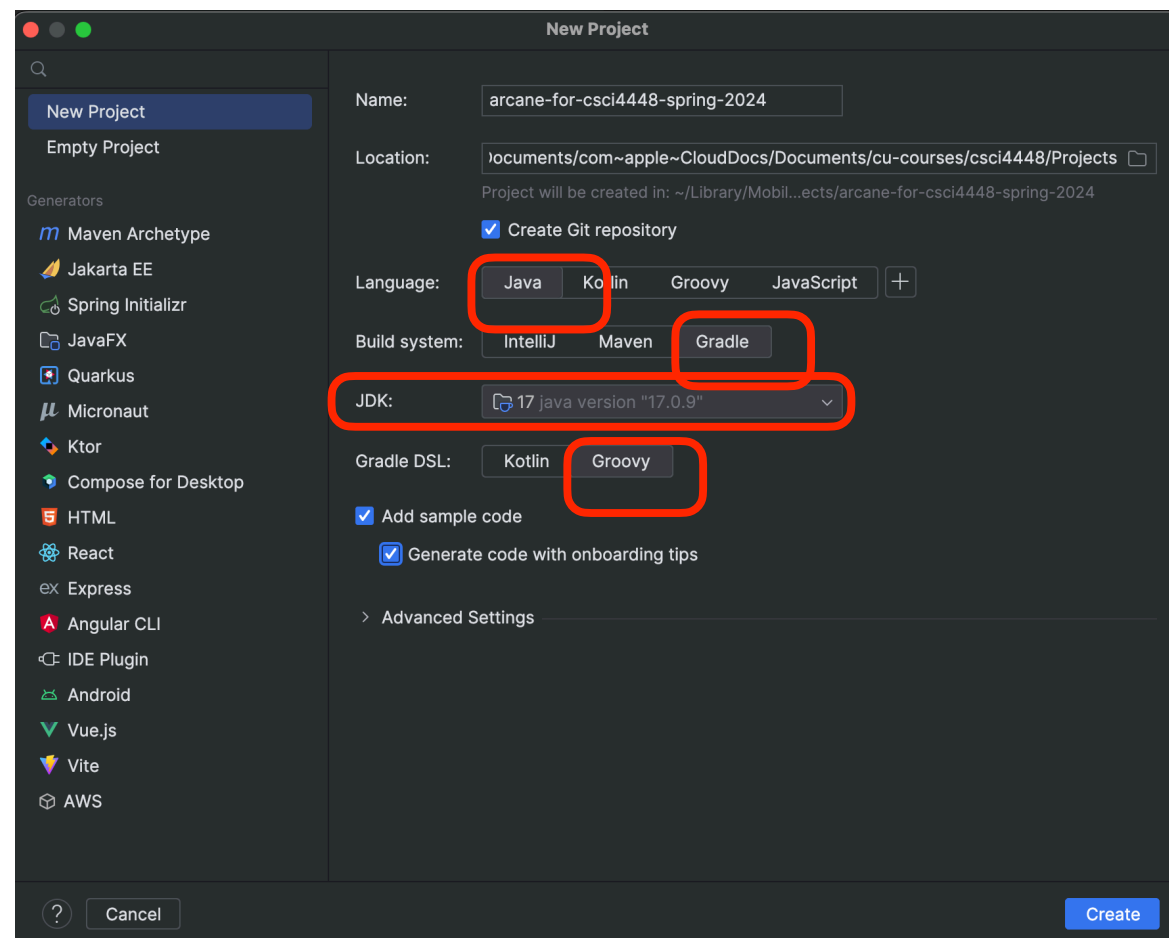
Project Structure

Directory structure here is required, as gradle assumes this structure. Gradle uses a philosophy of "convention over configuration"

These wrapper files and executable files allow another teammate to download the project and build it, even if they don't have gradle installed, as this will install it.

build.gradle

```gradle
plugins {
    id 'java'
}

java {
    sourceCompatibility = '17'
}

group = 'csci.arcane'
version = '1.0.0-SNAPSHOT'

repositories {
    mavenCentral()
}

dependencies {
    testImplementation platform('org.junit:junit-bom:5.9.1')
    testImplementation 'org.junit.jupiter:junit-jupiter'
}

test {
    useJUnitPlatform()
}
```
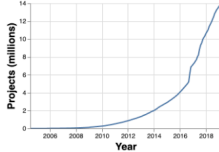
The platform() function is used to declare a dependency on a platform. A platform is a special kind of software component that doesn't contain any sources: it is only used to reference other libraries, so that they play well together during dependency resolution.

Java Library Repository

Search for Library

JUnit Jupiter API

JUnit Jupiter is the API for writing tests using JUnit 5.

License	EPL 2.0
Categories	Testing Frameworks & Tools
Tags	quality · junit · testing · api
Ranking	**#23 in MvnRepository** (See Top Artifacts) **#3 in** Testing Frameworks & Tools
Used By	**14,634 artifacts**

Central (65) · Redhat GA (3) · Redhat EA (1) · ICM (2)

	Version		Vulnerabilities	Repository	Usages	Date
5.10.x	5.10.1			Central	1,314	Nov 05, 2023
	5.10.0			Central	1,634	Jul 23, 2023
	5.10.0-RC2			Central	10	Jul 19, 2023
	5.10.0-RC1			Central	115	Jul 06, 2023
	5.10.0-M1			Central	99	May 13, 2023
5.9.x	5.9.3			Central	1,695	Apr 26, 2023
	5.9.2			Central	1,943	Jan 10, 2023
	5.9.1			Central	1,827	Sep 20, 2022
	5.9.0			Central	1,185	Jul 26, 2022

No need to download yourself — just add to Gradle dependencies

JUnit Jupiter API » 5.10.1

JUnit Jupiter is the API for writing tests using JUnit 5.

License	EPL 2.0
Categories	Testing Frameworks & Tools
Tags	quality junit testing api
HomePage	https://junit.org/junit5/
Date	Nov 05, 2023
Files	pom (3 KB) jar (206 KB) View All
Repositories	Central Cloudera Pub
Ranking	#23 in MvnRepository (See Top Artifacts) #3 in Testing Frameworks & Tools
Used By	14,634 artifacts

Maven	Gradle	Gradle (Short)	Gradle (Kotlin)	SBT	Ivy	Grape	Leiningen	Buildr

```
// https://mvnrepository.com/artifact/org.junit.jupiter/junit-jupiter-api
testImplementation 'org.junit.jupiter:junit-jupiter-api:5.10.1'
```

Build Directory