- **CSCI 361**
- Course run by Prof. Sterling and Prof. Boranbayev
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Objectives

- Discuss teams for the project
- Complete some basic exercises with our software tools
  - Maven
  - JUnit

Course Projects

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- Should determine teams (between 5 and 6 people)
- There will be a number of milestones for the team project
  1. Selection of partners
  2. Selection of project
  3. Requirements Gathering meeting
  4. ...
- The result of the requirements meeting will be some documentation: use cases according to a template (to be discussed)
- Prepare the team members form (moodle) over the weekend and submit to lecture next Monday (Aug. 20)

Parameters of the Course Projects

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- Software stacks such as the MEAN stack and LAMP stack are commonly used to build web applications
- Projects should be "full stack" (in the Java ecosystem), i.e. the projects should meet the following description
  - Dynamic front end
  - Run on servers that implement Java EE specifications
  - Interface to a DB system (not SQLite)
- We will post project ideas next week but teams with their own ideas may also submit a proposal
  - Proposals should be consistent with the parameters stated above
  - Proposals should not duplicate work from another class

Maven

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- Maven is a tool for building and managing Java-based projects
- Provides easy access to a large repository of useful java code
  - For example, the apache commons libraries
  - The library that we will use in the exercise today is `commons-cli` [1]
- Configuration details are stored in a special xml file called `pom.xml` (project object model)
- Different goals (e.g. compilation, running tests, packaging) are executed using the command `mvn <goal>`

[1] https://commons.apache.org/proper/commons-cli/

Maven Dependencies


```
<dependencies>
  <dependency>
    <groupId>commons-cli</groupId>
    <artifactId>commons-cli</artifactId>
    <version>1.4</version>
  </dependency>
  <dependency>
    <groupId>org.apache.commons</groupId>
    <artifactId>commons-text</artifactId>
    <version>1.2</version>
  </dependency>
</dependencies>
```

- Dependencies in Maven can be pulled into the project by adding the appropriate XML (as shown above)
- At minimum, we need to include the group and artifact ids and the version number

The maven project structure

- The structure of a typical maven project is shown below
- `pom.xml` is the *project object model*, the main configuration for your project

```
/Project Root/
  |--/src/
  |     |--/main/
  |     |     |--/java/
  |     |     |--/webapp/
  |     |--/test/java/
  |--README.txt
  |--LICENSE.txt
  |--NOTICE.txt
  |--pom.xml
```

Unit Testing

- A *unit test* is a check of the smallest piece of functionality in a software project: usually a single method or function
- There are different types of tests that vary in scope
  - Integration Test: run on a set of interacting objects
  - Acceptance Test: run on full systems
- In JUnit, a unit test is just a java class containing annotated methods
- In Maven, unit tests are typically placed under `/src/main/test/`

Creating a simple unit test in JUnit


```
import static org.junit.Assert.*;

import org.junit.Test;
import org.junit.*;

public class CalculatorTest {
   @Test
   public void testAdd() {
      Calculator calculator = new Calculator();
      double result = calculator.add(12,8);
      assertEquals(20,result,0);
   }
}
```

- Tests are marked using `@Test`
- Results are sent to the environment using different assertion statements
- `assertEquals` checks for equality of the first two arguments

Creating a simple unit test in JUnit

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```
public class CalculatorTest {

            private Calculator calculator;

            @Before
            public void setUp() throws Exception {
                        calculator = new Calculator();
            }

            @Test
            public void testAdd() {
                        // Calculator calculator = new Calculator();
                        double result = calculator.add(12, 8);
                        assertEquals(20,result,0);

            }

            @Test
            public void testAdd1() {
                        // Calculator calculator = new Calculator();
                        double result = calculator.add(32, 1);
                        assertEquals(33,result,0);
            }
}
```

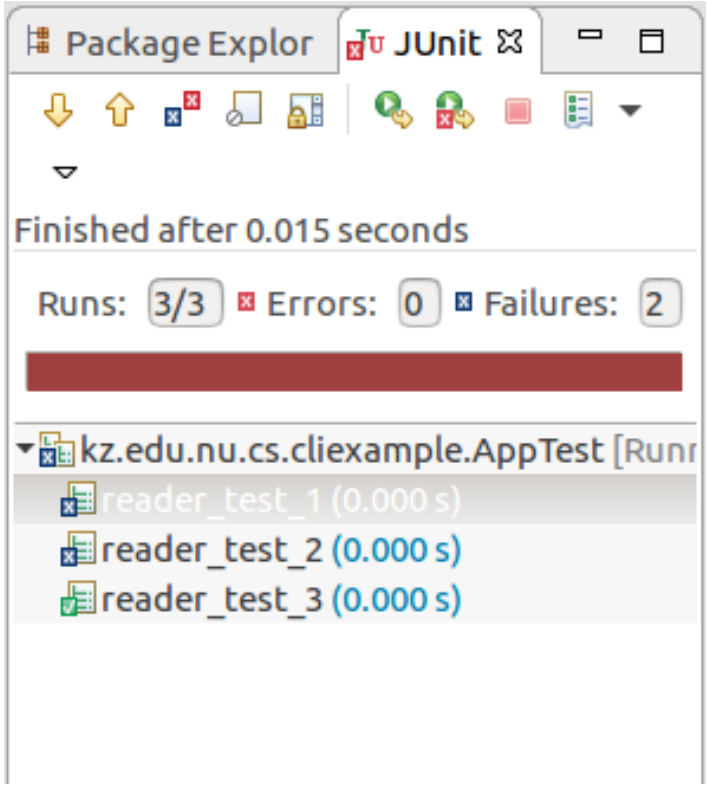
- Multiple tests that share some common setup
- Define a private instance of the object under test and include the allocation in the `setUp` method

Other Types of Assertions

- `assertArrayEquals("String",A,B)`: checks the equality of the arrays
- `assertSame("String",A,B)`: checks that the objects A and B are the same
- `assertTrue("String",condition)`: asserts that condition is true
- `fail("String")`: always cause a failure, can be used to indicate an incomplete test
- other assertions can be found at the documentation for JUnit `http://junit.sourceforge.net/javadoc/`

JUnit's Bar

- Shown at right is an example of running a unit-test in Eclipse
- A green bar is displayed when all unit tests pass, a red bar is shown if any of the tests fail
- Unit tests are, themselves, a form of documentation



Task

- You all should have installed the appropriate software by now
- Clone (copy) the repository that is available at the URL `https://github.com/marks1024/test-cli-repository-361`
- Import the cloned project into your IDE and complete the following 2 tasks
  - Complete the implementation of the static method `wordcount` so that the provided unit tests all pass
  - Edit the main application (`App`) so that it accepts a string as a command line argument, passes the string to `wordcount`, and prints the result to the console
  - For example, given the arguments `-s "The cat is orange."` the application should output "4" to the console
  - In Eclipse you can set command line arguments in "Run Configurations"
  - Upload to the **Lecture** moodle as a zip file