CSE332: Data Abstractions

Section 1

Hye In Kim

Fall 2013

Section Agenda

- Introduction
- Generics
- Project 1
- Eclipse Tutorial

Introduction

Introduction - Me

- Hye In (Han) Kim
- From Korea
- 5th year Master's student
- BS in Biology & CSE at UW
- Teaching section AA & AB & AC
  - Office hour: Friday 10:30 ~ 11:30, CSE 220
  - Email: kainby87@uw.edu

Introduction - You

- Name
- Year
- Home Town
- Interesting Fact about yourself
- What you did over the summer

Generics

Generics

- **What is generics?**

  - Technique of writing class/Interface without specifying type of data it uses

  - Idea: class/interface can have type parameter
    Usually denoted as T or E

Generics

- **Want a Bag class to store Items**

```
public class Bag {                    // Stores String
        private String item;
        public void setItem(String x) {  item = x;  }
        public String getItem( )  {  return item;  }
    }

public class Bag {                    // Stores Book
        private Book item;
        public void setItem(Book x) {  item = x;  }
        public Book getItem( )  {  return item;  }
    }
```

- **Problem**? Don't want to make Bag class for all kind of fields.

Generics

- **Want a Bag class to store Items**

```
public class Bag<E> {
        private E item;
        public void setItem(E x) {  item = x;  }
        public E getItem( )  {  return item;  }
}
public interface List <E> {        // Example in Java library
          public void add(E x);
          …
 }
```

- Can we accomplish same effect without using generics?

Generics

- **Want a Bag class to store Items**

  - Pre Java 5: Objects

```
public class Bag {
        private Object item;

        public void setItem(Object x ) {   item = x;   }
        public Object getItem() {  return item;  }
}

Bag b = new Bag();
b.setItem("How about that?”);
String contents = (String) b.getItem();
```

Generics

- **Why generics?**

```
Bag b = new Bag();                                  // Object Bag
b.setItem( "How about that?" );
String contents = (String) b.getItem();             // Ok
double contents = (double) b.getItem();             // Error (Runtime)

Bag b = new Bag<String>();                          // Generic Bag
b.setItem( "How about that?" );
String contents = b.getItem();                      // Ok
double contents = b.getItem();                      // Error (Compile time)
```

Generics

- **Why generics?** Type Safe Containers

  - Main advantage: compile-time type checking

  - Generics: Ensure correct type at compile time
    No need for cast or Type checking

* **Important**: Cannot create generic array!

```
E[] myArray = new E[INITIAL_SIZE];                  // Error
E[] myArray = (E[]) new Object[INITIAL_SIZE];       // Ok
```

Generics

- **More Generics: References**

  - Generics & Inheritance
  - Wild cards

http://www.cs.washington.edu/education/courses/cse332/12sp/section/week1/GenericsAndJUnit.pdf

http://www.cs.washington.edu/education/courses/cse332/12sp/section/week1/Bag.java

http://www.cs.washington.edu/education/courses/cse332/12sp/section/week1/Tuple.java

Textbook 1.4 ~ 1.5

Project 1

Project 1

- **Sound Blaster!**

  - Part A: Due next Wednesday, 11pm
    Part B: Due Tuesday October 8th, 11pm

  - Personal Project: No partners!

Collaboration Policy
http://www.cs.washington.edu/education/courses/cse332/13au/policies.shtml

Grading Policy
http://www.cs.washington.edu/education/courses/cse332/13au/grading-policies.shtml

Programming Guidelines
http://www.cs.washington.edu/education/courses/cse332/13au/programming-guidelines.shtml

Project 1

- **Phase A**
  - Implement Stack ADT: Stores double
    - Implement DStack
    - Using Array (ArrayStack)
    - Using Linked List (ListStack)
- **Phase B**
  - Implement Stack ADT: Use generic
    - Implement GStack
    - Using Array (GArrayStack)
    - Using Linked List (GListStack)

Project 1

- **Reverse.java**

  - Handles all music stuff
  - No need to edit for part A
  - Reverses in.dat file and writes it to out.dat
  - Accepts 4 command line parameters

    Stack Implementation: array or list
    Content type: double or generic
    Input file name: ex) in.dat
    Output file name: ex) out.dat

Project 1

- **Sound Exchange (SOX)**

  - Converts .wav file to .dat file & vice versa
    Reverse.java needs .dat file
    You need .wav file to play sound
  - Installed on lab machines
  - Use in command prompt / terminal
    ex) sox secret.wav secret.dat
  - Can also do what Reverse.java does
    ex) sox secret.wav secret_rev.wav reverse

Style Guide

- **Style Points are up to 1/3 of your grade!!**
  - Grade breakdown: ~1/3 correctness, ~1/3 write up, ~1/3 style

- **Make sure you read style guides**
  - Style guide: http://www.cs.washington.edu/education/courses/cse332/13au/projects/style.txt
  - Comment guide: http://www.cs.washington.edu/education/courses/cse332/13au/projects/commenting.pdf
  - Java Convention: http://www.oracle.com/technetwork/java/codeconvtoc-136057.html

We DO take points off for style!

- **Make sure your code compiles!!**
  - No correctness points if your code doesn't compile
  - Use default package or be sure to **take out package statement**

- **Comment your code**

- **Use descriptive variable / method names**
  - If variable points to beginning of queue, name it 'front', not 'f' or 'g'
- **Use visibility specifiers (private/public etc.)**
  - On every classes, methods, fields. Do not just omit this!

- **Initialize all non-static fields in constructor**

```
private int size = 0; //☹
private int size; public Queue() { size = 0; } //☺
```

- **Make your code as concise as possible**

```
end = end + 1;   // ☹ ☹ ☹
```

```
end ++; // ☺ ☺ ☺
```

```
this.isEmpty();
```

```
isEmpty();
```

- **Use @Override when overriding**
- **Do not leave warning-generating code**
  - Unless you know why it is there and why it is unavoidable
  - Suppress warnings on method/variable, but not on whole class

- **Use constants for fixed constants**

```
private static final int INITIAL_CAPACITY = 10;
private static final int RESIZE_FACTOR = 2;
```

- **Use Boolean zen**

```
if(size==0){ return true; }else{ return false; }//☹
return size == 0;    //☺
```

- **Maximize code reuse, minimize redundancy**

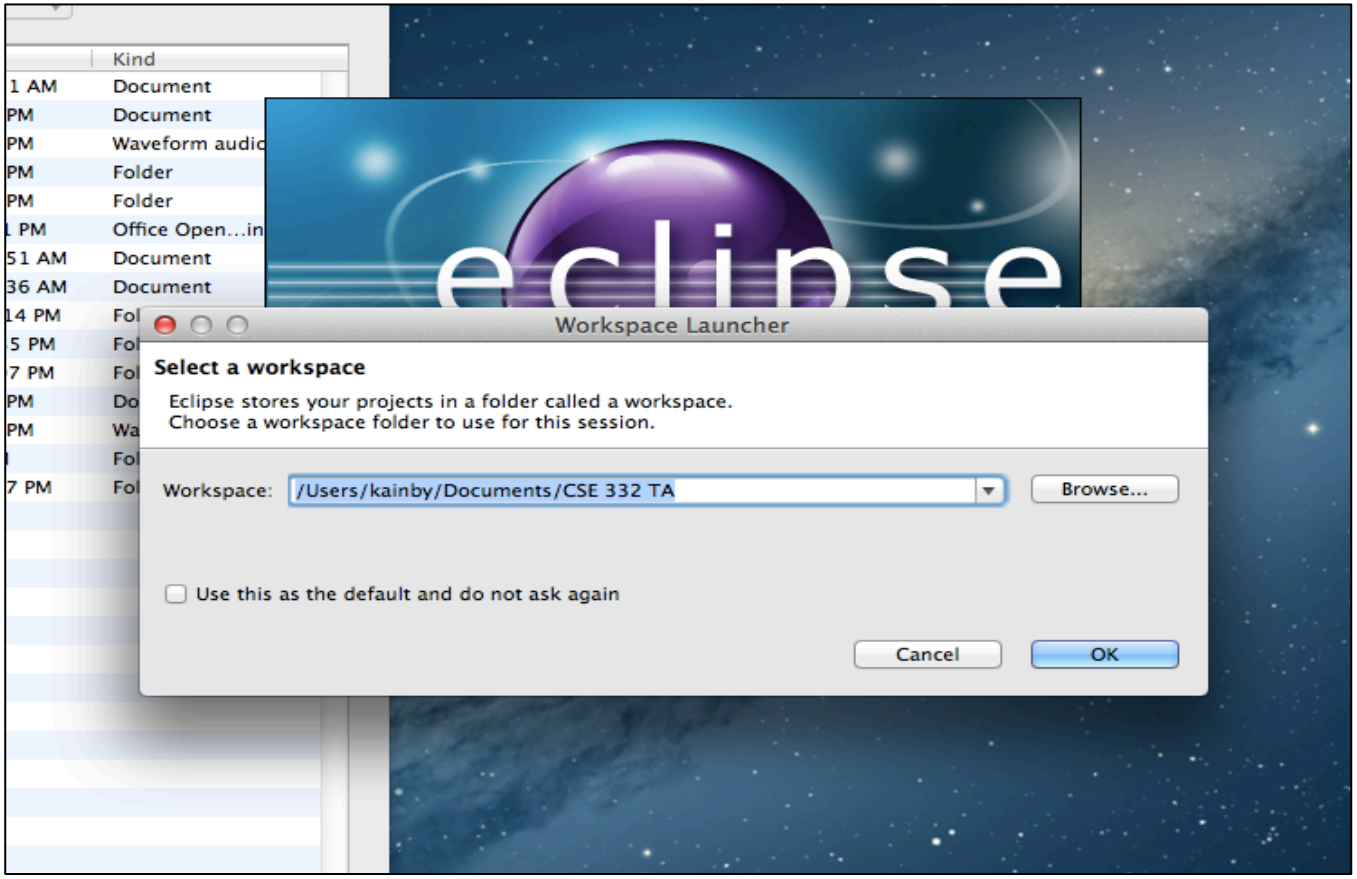
- e.g. Re-use methods like `isEmpty()` instead of directly testing if size == 0 or whatever `isEmpty()` does – also improves readability

Note: a good compiler/run-time will **in-line** short methods so there is no loss in efficiency in doing this and it makes the code more readable.

Eclipse

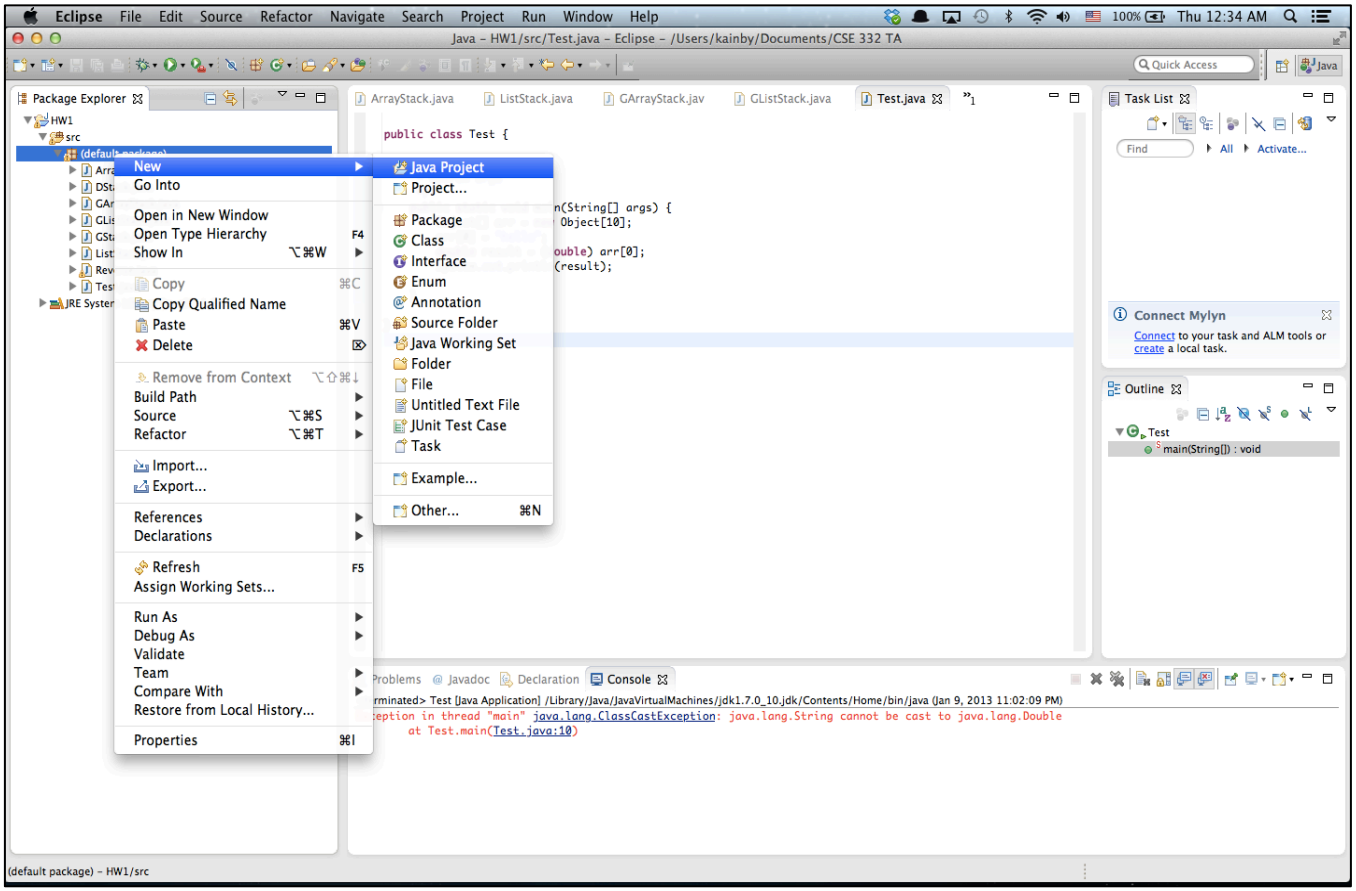
Eclipse Tutorial

- **Select WorkSpace**



Eclipse Tutorial

- **Create Project**



Eclipse Tutorial

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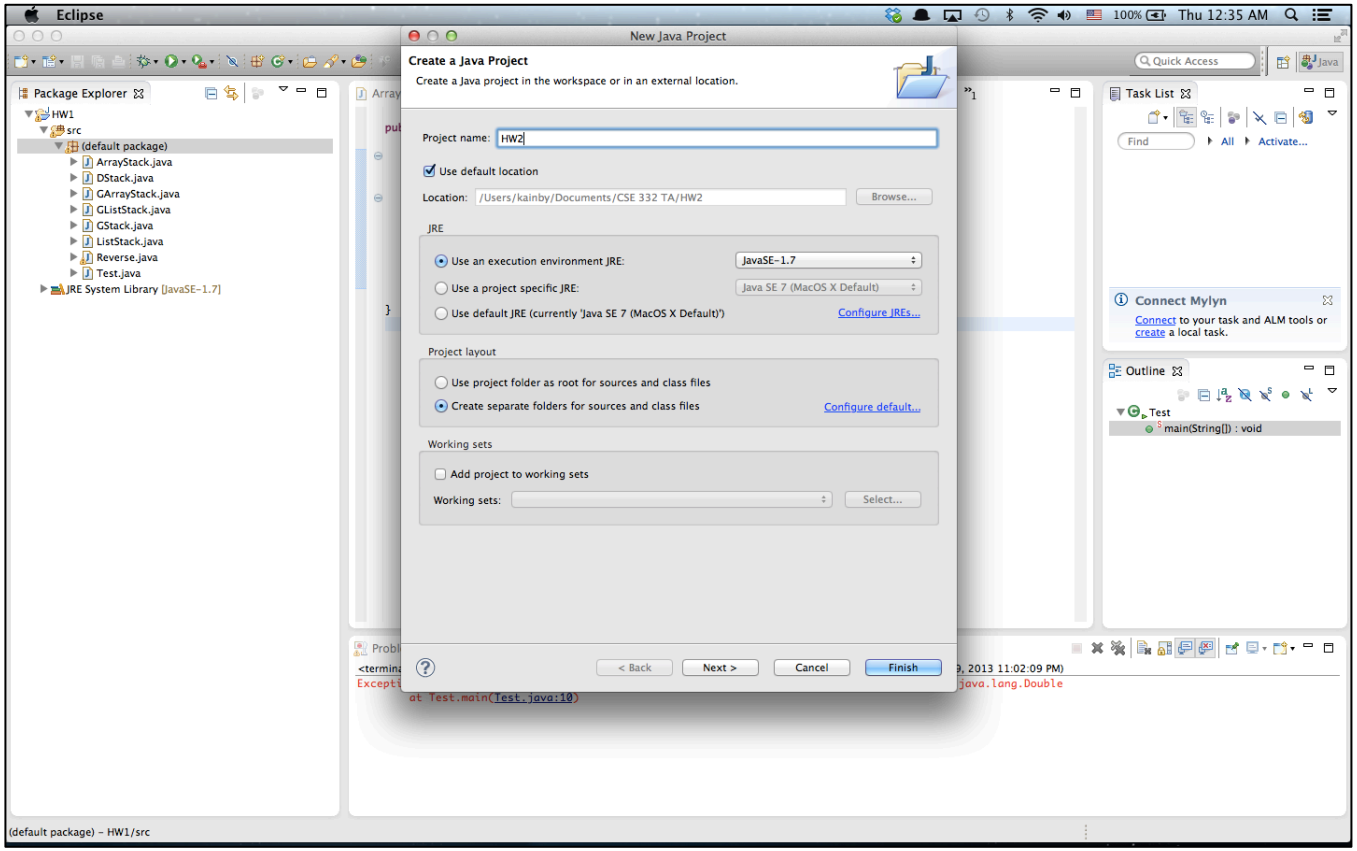
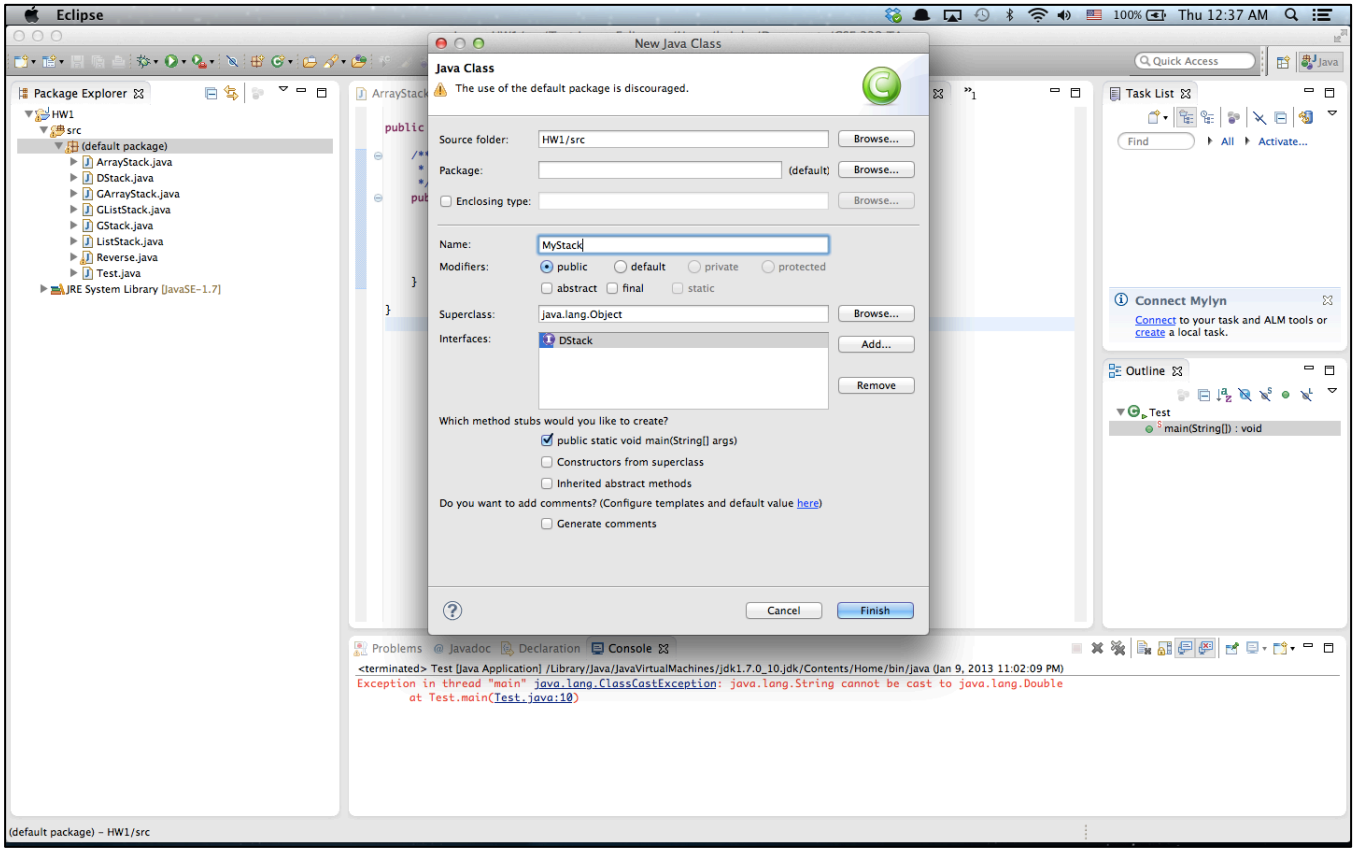


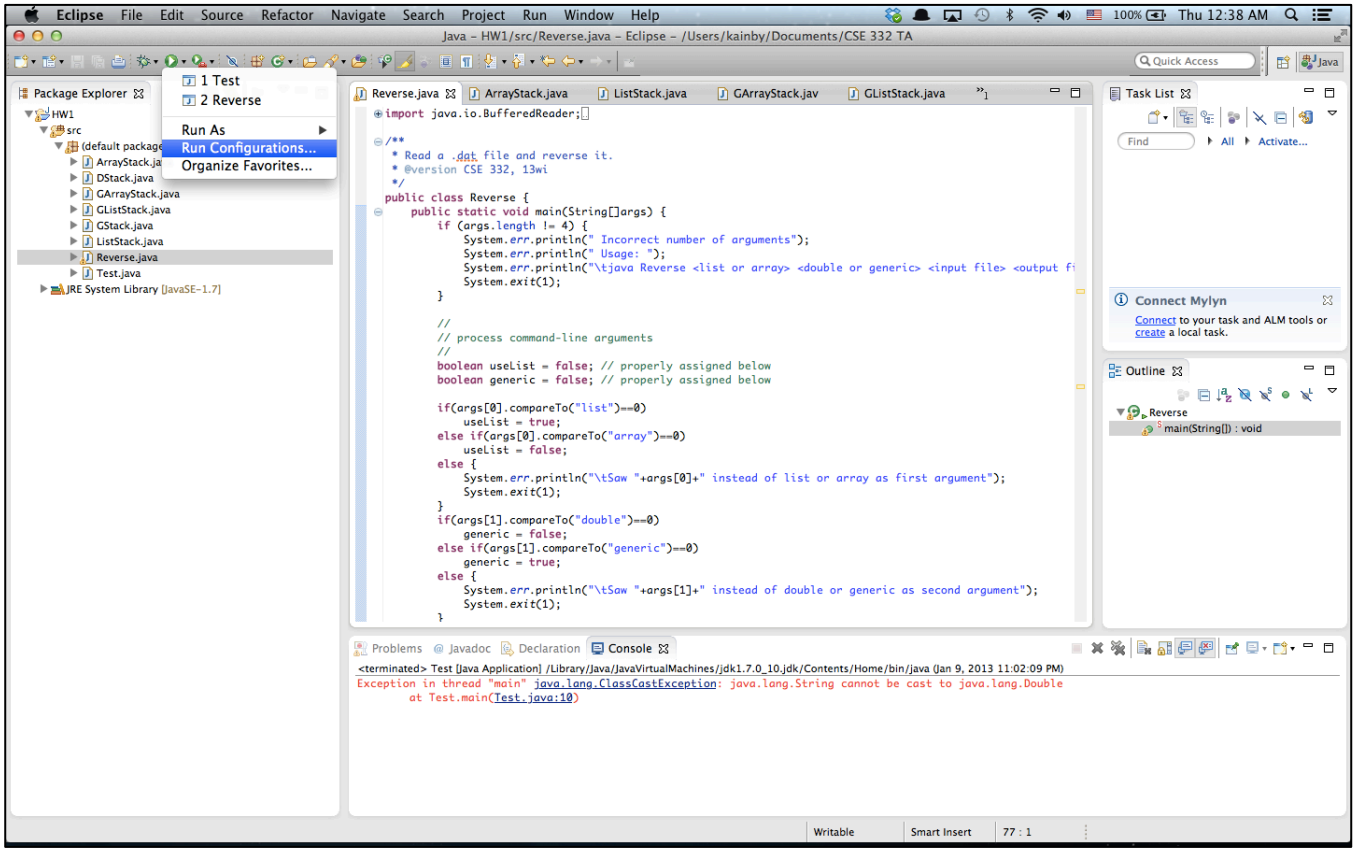
Eclipse Tutorial

- **Create Class**



Eclipse Tutorial

- **Run Configuration (Command line Args)**



Eclipse Tutorial

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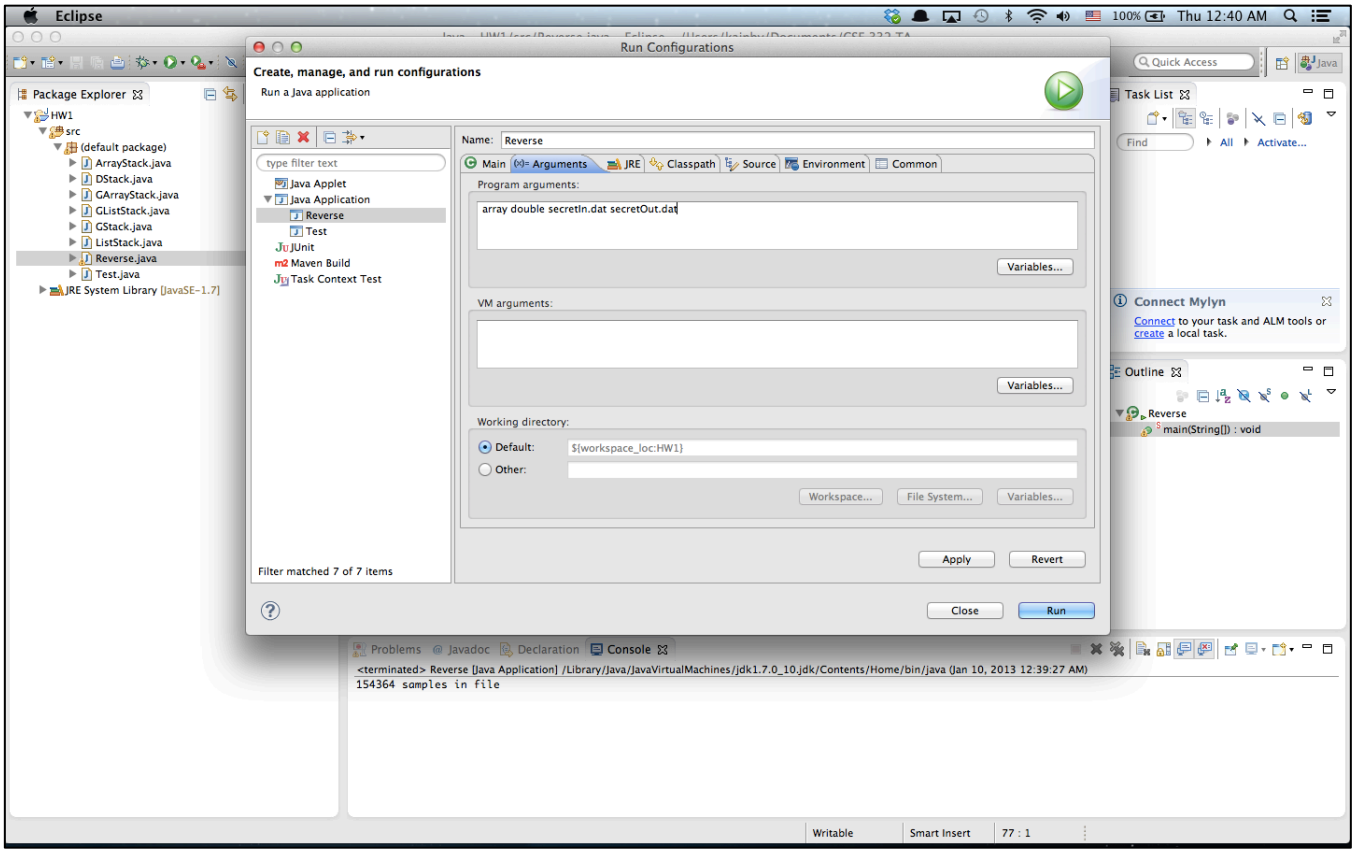
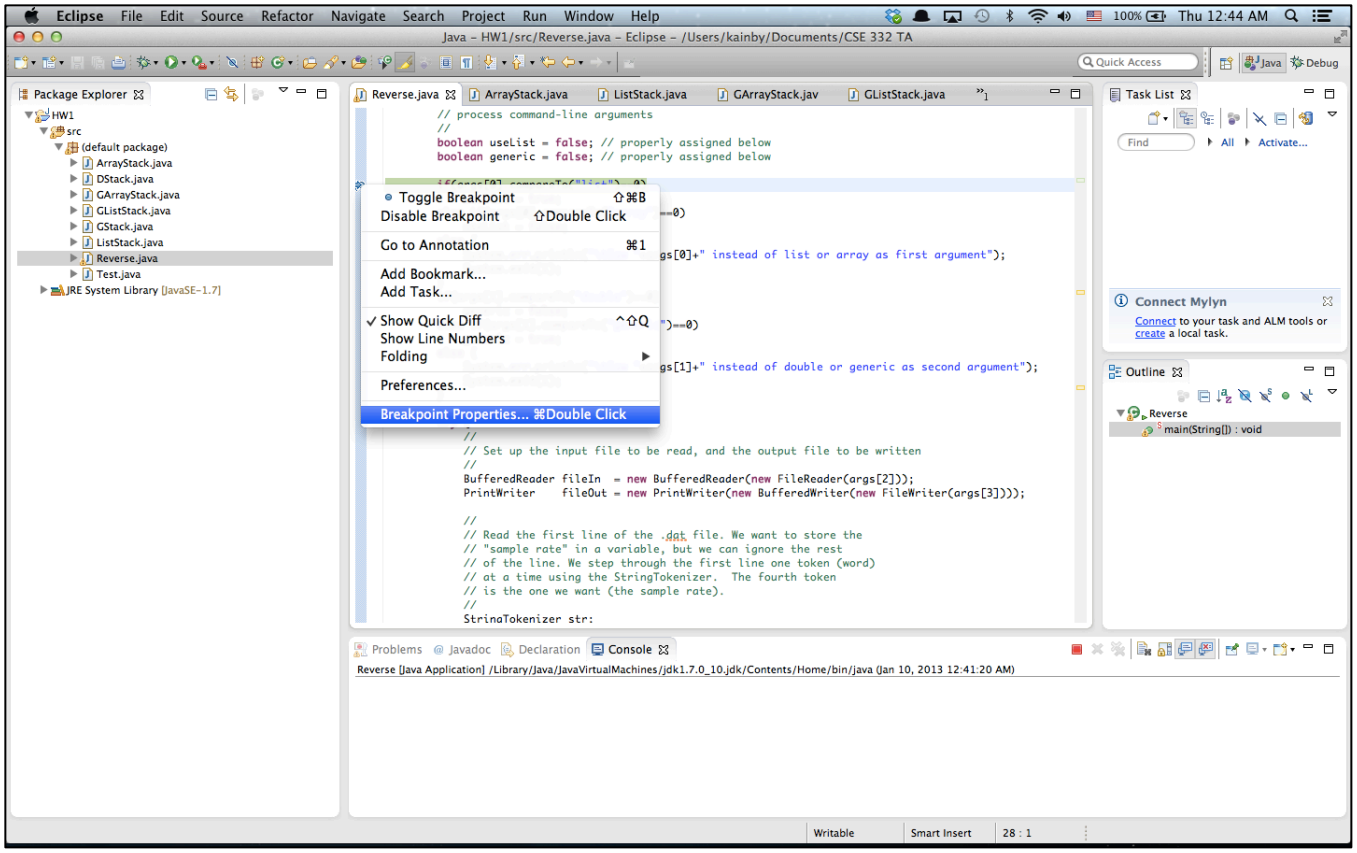


Eclipse Tutorial

- **Conditional Debugging**



Eclipse Tutorial

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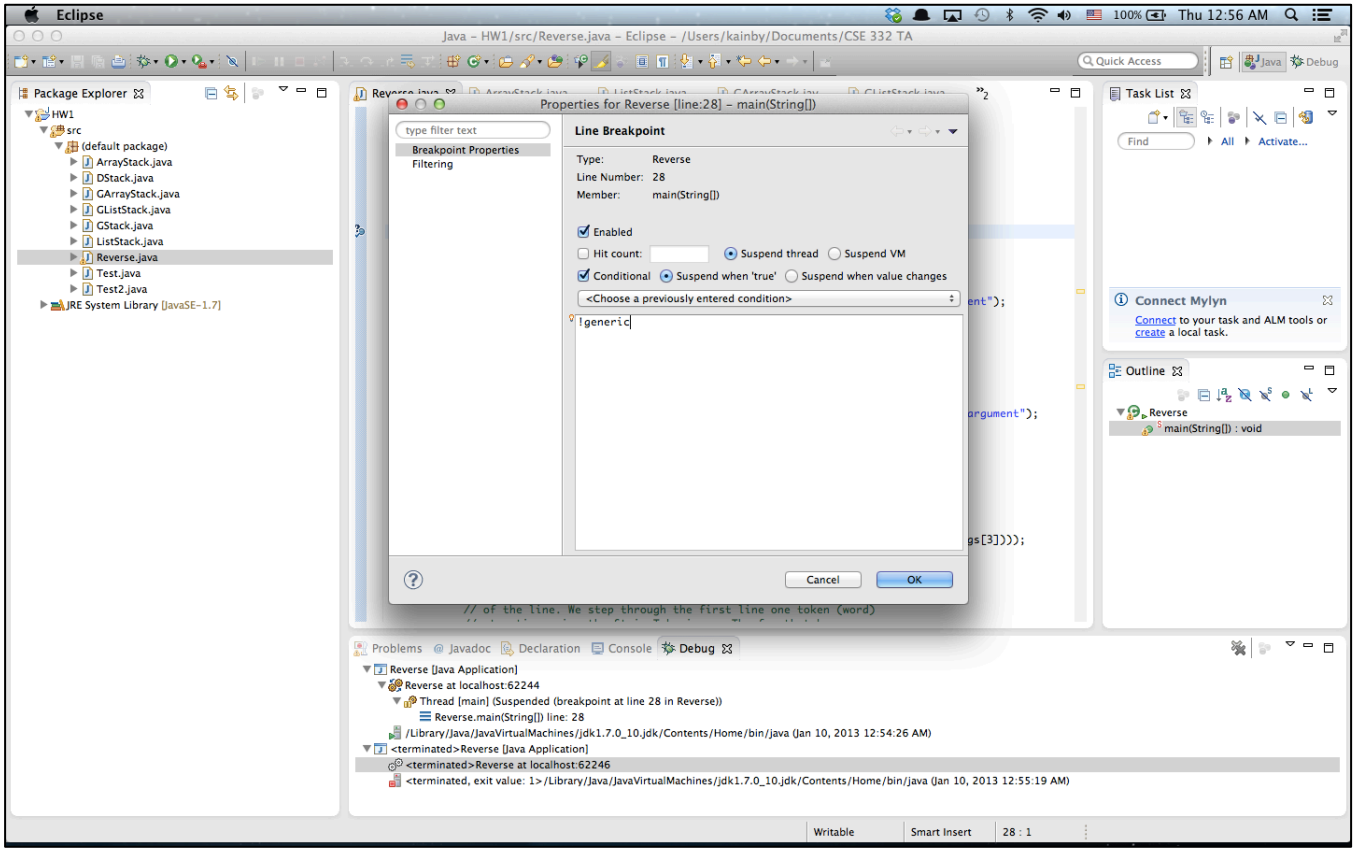

Eclipse Tutorial

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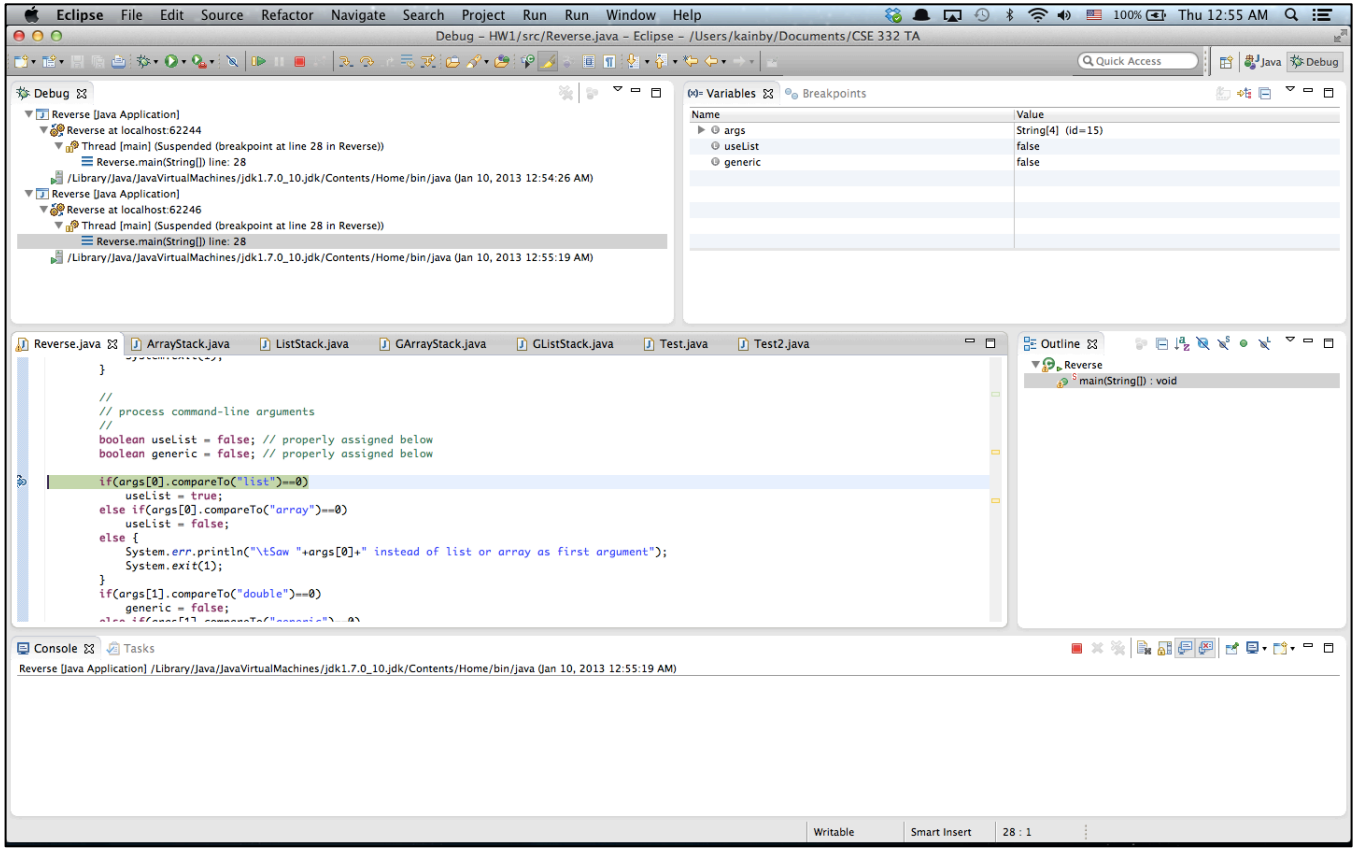

Eclipse Tutorial

- **More Tutorials**

  - Written Tutorial

    http://www.vogella.com/articles/Eclipse/article.html

  - Video Tutorial

    http://eclipsetutorial.sourceforge.net/totalbeginner.html

  - Eclipse Shortkeys

    http://www.rossenstoyanchev.org/write/prog/eclipse/eclipse3.html