

CSCE 146 Lecture 3 Object Oriented Programming

- Summary of OOP Intro. from Last Time
 - Object- a collection of data and methods that manipulate the data
 - An object is a variable where the data type is a class.
 - instance variable
 - methods
 - private/public access modifiers
 - packages
 - importing packages
 - Invoking a method: objRef.methodName(parameters)
 - Lab PreQuiz, Throttle class, emacs, javadoc
- Throttle.java p 46
 - constructor builds and initializes an instance of an object
 - no argument constructors
 - default constructor : if no constructor Java will supply one
- Accessor Methods
 - readers, getFlow()
- Modification Methods
 -
- Creating Objects
 - `Throttle control = new Throttle(100);`
- Reference Variables
 - a variable that refers to an instance of an object.
- Null references

```
Throttle control;  
:  
control = new Throttle(100);  
  
control = null;
```
- Garbage Collection
 - after all references to an object are released
 - space can then be reclaimed by the garbage collector

- NullPointerException

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- Assignment of Reference Variables

```
Throttle t1, t2;
t1 = new Throttle(100);
:
t2 = t1;           // make t2 refer to
                   the same object that t1 refers to
// two variables one object
t1.shift(35);
t2.getFlow();
```

- Clones

–

- Testing for Equality

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- “The Throttle t” versus “The Throttle that t refers to”

–

- Pop Quiz

– no. 9, no. 11

- Packages

– a group of related classes

- Declaring a Package

```
– package edu.colorado.simulations;
– import edu.colorado.simulations.Throttle;
– import edu.colorado.simulations.*;
```

- Setting up to use packages

```
– create classes directory
– set CLASSPATH = H:\Courses\146\classes
– download ThrottleDemonstration
–
–
–
```

- Java Class Libraries (JCL)
 - libraries of well designed classes
 - java.lang automatically imported
 - URL
 - Appendix D
- Location Class
 - Data: x,y coordinates
 - Methods: constructor, clone, distance, getX, getY, midpoint, rotate90, shift, toString
- Passing Objects as parameters
 - objects are passed by reference
 - parameters of variables of built-in data types are passed by Value
 - 8 primitives types: byte, short, int, long, char, float, double, boolean
- Equals Method
 - == between objects checks for the same object, not equal objects
 - typecasts


```
public boolean equals(Object obj)
                    if (obj instanceof Location)
```
- Cloning Steps
 - Modify class head


```
public class location implements Cloneable
```
 - Use super.clone() to make a copy


```
answer = (Location) super.clone();
```
 - Make any necessary modifications