CS2110, Recitation 2

Arguments to method main
Packages
APIspecs
Characters
Strings

Demo: Create application

To create a new project that has a method called main with a body that contains the statement

```
System.out.println("Hello World");
```

do this:

- Eclipse: File -> New -> Project
- File -> New -> Class
- Check the method main box
- In the class that is created, write the above blue statement in the body of main
- Hit the green play button or do menu item Run -> Run

Java Application

public static void main(String[] args) { … }

Parameter: String array

A Java program that has a class with a static procedure main, as declared above, is called an application.

The program, i.e. the application, is run by calling method main. Eclipse has an easy way to do this.

Method main and its parameter

public static void main(String[] args) { … }

Parameter: String array

In Eclipse, when you do menu item

Run -> Run (or click the green Play button)

Eclipse executes the call main(array with 0 arguments);

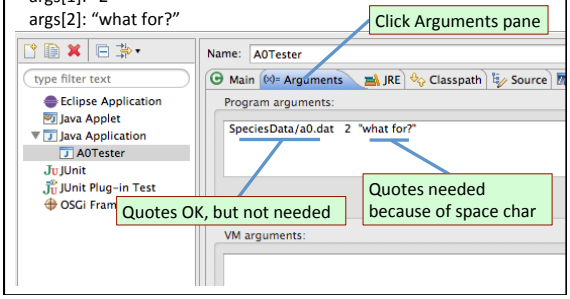
To tell Eclipse what array of Strings to give as the argument, start by using menu item

Run -> Run Configurations…

(see next slide)

Window Run Configurations

This Arguments pane gives argument array of size 3:
args[0]: "SpeciesData/a0.dat"
args[1]: "2"
args[2]: "what for?"



DEMO: Giving an argument to the call on main

Change the program to print the String that is in args[0], i.e. change the statement in the body to

```
System.out.println(args[0]);
```

Then

- Do Run -> Run Configurations
- Click the Arguments tab
- In the Program field, type in "Haloooo there!"
- Click the run button in the lower right to execute the call on main with an array of size 1 …

PACKAGES AND THE JAVA API

Package: Collection of Java classes and other packages.

See JavaSummary.pptx, slide 20

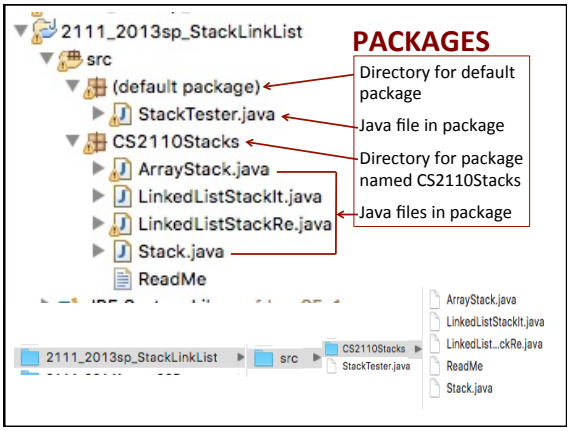
Available in the course website in the following location:
http://www.cs.cornell.edu/courses/CS2110/2016sp/links.html

Three kinds of packages

(1) The default package: in project directory /src

(2) Java classes that are contained in a specific directory on your hard drive (it may also contain sub-packages)

(3) Packages of Java classes that come with Java, e.g. packages java.lang, javax.swing.



Importing the package

Every class in package pack1 (in directory pack1) must start with the package statement

```
package pack1;

public class C {

   ...

}
```

Every class outside the package should import its classes in order to use them

```
import pack1.*;

public class Rec02 {

   ...
}
```

Importing API packages

You can do this:

```
public class C {
  ...
  javax.swing.JFrame jf= new javax.swing.JFrame();
  ...
}
```

Or this:

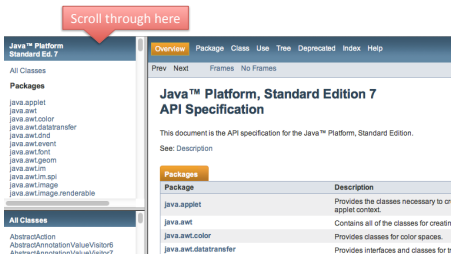
```
import javax.swing.JFrame;

public class C {
  ...
  JFrame jf= new JFrame();
  ...
}
```

To import all classes in package javax.swing, use

```
import javax.swing.*;
```

Finding package documentation



Package java.lang vs. other packages

You can use any class in package java.lang. Just use the class name, e.g.

Character

To use classes in other API packages, you have to give the whole name, e.g.

javax.swing.JFrame

So you have to write:

```
javax.swing.JFrame  jf=  new javax.swing.JFrame();
```

Use the import statement!

To be able to use just JFrame, put an import statement before the class definition:

```
import javax.swing.JFrame;

public class  C {
   ...
   public void m(...) {
      JFrame  jf=  new JFrame();
      ...
   }
}
```

Imports only class JFrame. Use the asterisk, as in line below, to import all classes in package:

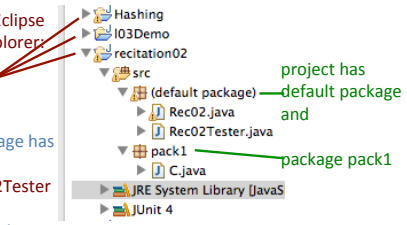
```
import javax.swing.*;
```

Other packages on your hard drive

One can put a bunch of logically related classes into a package, which means they will all be in the same directory on hard drive. Reasons for doing this? We discuss much later.

Image of Eclipse Package Explorer:

3 projects:



project has default package and

package pack1

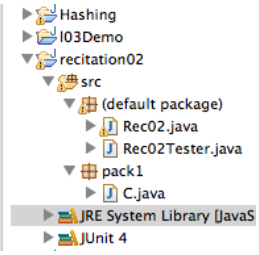
Default package has 2 classes: Rec02, Rec02Tester

pack1 has 1 class: C

Hard drive

Eclipse
- Hashing
- l03Demo
- recitation02
  - src
    - Rec02.java
    - Rec02Tester.java
    - pack1
      - C.java

Eclipse Package Explorer



Eclipse does not make a directory for the default package; its classes go right in directory src

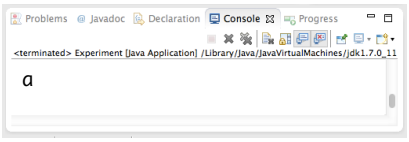
CHAR AND CHARACTER

Primitive type char

Use single quotes

Unicode: 2-byte representation
Visit www.unicode.org/charts/ to see all unicode chars

```
char fred= 'a';
char wilma= 'b';
System.out.println(fred);
```



Special chars worth knowing about

- ' ' - space
- '\t' - tab character
- '\n' - newline character
- '\'' - single quote character
- '\"' - double quote character
- '\\' - backslash character
- '\b' - backspace character - NEVER USE THIS
- '\f' - formfeed character - NEVER USE THIS
- '\r' - carriage return - NEVER USE THIS

Backslash, called the escape character

Casting char values

Cast a char to an **int** using unary prefix operator (**int**),
Gives unicode representation of char, as an **int**

(**int**) 'a' gives 97

(**char**) 97 gives 'a'

(**char**) 2384 gives '॓'

Om, or Aum, the sound of the universe (Hinduism)

No operations on **char**s (values of type char)! **BUT**, if used in a relation or in arithmetic, a **char** is automatically cast to type **int**.
Relations < > <= >= == != ==

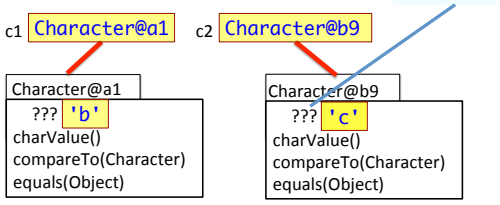
```
'a' < 'b'      same as     97 < 98, i.e. false
'a' + 1        gives       98
```

Class Character

An object of class Character wraps a single **char**
(has a field that contains a single **char**)

```
Character c1= new Character('b');
Character c2= new Character('c');
```

Don't know field name

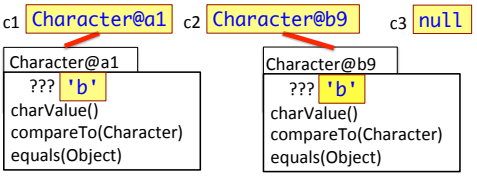


== versus equals

```
c1 == c2          false
c3 == c1          false
c1 == c1          true
c1.equals(c2)     true
c3.equals(c1)     Error!!!
```

true iff c1, c2 contain same values

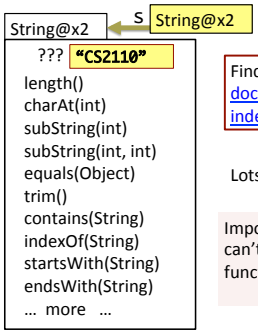
true iff c2 is also a Character object and contains same char as c1



STRING

Class String

```
String s= "CS2110";
```



String: special place in Java: no need for a new-expression. String literal creates object.

Find out about methods of class String: docs.oracle.com/javase/8/docs/api/index.html?java/lang/String.html

Lots of methods. We explain basic ones

Important: String object is immutable: can't change its value. All operations/ functions create new String objects

Operator +

+ is overloaded

```
"abc" + "12$"   evaluates to   "abc12$"
```

If one operand of concatenation is a String and the other isn't, the other is converted to a String.
Sequence of + done left to right

```
1 + 2  + "ab$"   evaluates to   "3ab$"

"ab$" + 1 + 2    evaluates to   "ab$12"
```

Watch out!

Operator +

```
System.out.println("c is: " + c +
                   ", d is: " + d +
                   ", e is: " + e);
```

Using several lines increases readability

Can use + to advantage in println statement. Good debugging tool.

- Note how each output number is annotated to know what it is.

Output:

c is: 32, d is: -3, e is: 201

c 32 d -3 e 201

Picking out pieces of a String

s.length(): number of chars in s — 5

01234 Numbering chars: first one in position 0

"CS 13"

s.charAt(i): char at position i

s.substring(i): new String containing chars at positions from i to end — s.substring(2) is '13'

s.substring(i,j): new String containing chars at positions i..(j-1) — s.substring(2,4) is '13'

Be careful: Char at j not included!

String@x2

? "CS 13"

length()
charAt(int)
subString(int)
subString(int, int)
... more ...

s String@x2