# CSC 115 JEOPARDY

M. Storey, Fall 2002

# Round 1

#### Round 1

00	Java	Swing	Testing	SENG	Linked Lists
100	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
200	<u>200</u>	200	<u>200</u>	<u>200</u>	<u>200</u>
<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>

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• It is a software bundle of variables and related methods, and is an instance of a class

• What is an object?



• It defines the name and parameters (but **not** the return type) of a method.

• What is a method signature?

Can we have two methods with the same signature but different return types???



• It means that a subclass can redefine a superclass method by using the same signature

• What does "overriding" mean?

The method in the superclass is completely hidden...



• A program can have multiple of these methods – each class should have one to enable unit testing.

• What is a main method?

Each class can have its own main method – thus enabling unit testing of each class.... Also make use of the toString method for each class



• This operator allocates storage for the object on the *heap* and returns a reference to the object



• This class defines methods for a buffered output stream where the characters are put in a temporary location called a buffer, which is then emptied into the Java console window

• What is the 'PrintStream' class?

The PrintStream class defines methods for a buffered output stream where the characters are put in a temporary location called a buffer, which is then emptied into the Java console window System.out is a static object of type java.io.PrintStream



• It was the original Java toolkit for developing user interface. Swing is a set of mostly lightweight components built on top of it.

• What is the AWT?

Swing is a set of mostly lightweight components build on top of the AWT. Swing can take on the look and feel of components on different platforms



• This architecture was designed for applications that need to provide multiple views of the same data

• What is the Model View Controller architecture for?



 It is the ancestor class for all Swing lightweight components. It can contain other AWT and Swing components.

• What is a JComponent?





• The practice of testing a single method or class, separately from the overall program in which it is used

#### • What is unit testing?

I mportant things to test for

∠API of a class (methods, parameters)

∠Proper initialization of fields

Boundary conditions (e.g., array bounds, off by one)

*⊯*Error conditions

«Execution paths (statement coverage)



• In this testing approach, you look at the actual code and consider how it works

• What is "white-box" testing?

With black box testing you don't know how it works, just have the specification which specifies the inputs and expected outputs (says nothing about how it does what it does)



• It is the statement of a fact that should be true at a given point in the execution of a program

#### • What is an assertion?

e.g. **assert n > 0 : n;** // prints "n" same as: if (n<=0) throw new AssertionError(n);



• It is a term used to describe software that can handle unexpected user inputs and does redundancy checks

• What is **robust** software?



• This term means that there are many dependencies between subsystems

• What does the term "strong coupling" mean in software engineering?

Weak cohesion means that operations within a class are not dependent on one another....



• It is a design principle which describes how we should hide information inside classes so that the implementation of a class can be varied without affecting other classes that use the changed class.

• What does encapsulation mean?



#### Linked Lists 100

• This data structure consists of nodes, where each node has a next reference to a node, a prev reference to a node and a data reference of type Object.

#### Linked Lists 100

• What is a doubly linked list?



#### Linked Lists 200

• This data structure has the following methods: pop(), push(), top() and isEmpty().
#### Linked Lists 200

• What is a stack?



#### Linked Lists 500

• This data structure has the following operations: insertFirst, insertLast, deleteFirst, deleteLast, isEmpty.

#### Linked Lists 500

• What is a deque?



## Round 2

#### Round 2

00	Hashing/ Heaps	Iterators/ Exceptions	Recursion	Analysis	Vectors/ Trees
<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
<u>200</u>	200	200	200	<u>200</u>	<u>200</u>
<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>	<u>500</u>

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 It is a variable that is associated with its class, is shared by all objects of its class, and its storage exists once (i.e., with the class rather than all the objects)

• What is a "static variable"?



 It is a class with only **final** instance variables and only **abstract** methods

• What is an "interface"?



 It refers to when you have a method in the same class or a subclass with the same name but different signature

• What is " Overloading "?



 It is an unordered container that contains keyelement pairs.

• What is a dictionary?

Dictionaries can be implemented using Log files and Hash Tables



 It is a collision resolution scheme for hashtables which stores all elements which map to the same location in a linked list

• What is separate chaining?



The running time of this sorting algorithm is
 O(n log n) given that insert() and deleteMin()
 both take O(log n) time

• What is HeapSort?

Fundamental result of computing science.... Sorting is O(n log n)



#### Iterators / Exceptions 100

 It is an object that allows us to enumerate or go through all the elements of a collection or a data structure

## Iterators / Exceptions 100

• What is an iterator?



#### Iterators/Exceptions 200

It is preferable to implement these using inner classes.

## Iterators/Exceptions 200

• Iterators can be implemented in 2 ways, which is the best way?

It is a better strategy to define the iterator as an inner class of the data structure. As a result, the iterator is intimately tied to the data structure and the implementation details are nicely hidden



#### Iterators /Exceptions 500

• All exception classes inherit from this class.

### Iterators /Exceptions 500

• What is the Throwable class?



A method that is partially defined in terms of itself.

#### •A recursive algorithm consists of

*⊯*a base case

∠a recursive call (with smaller or simpler arguments)

•Very important to ensure that the recursion terminates... that the base case is always reached for any input



 Each number in this sequence is the addition of the previous two numbers.

• What is the fibonacci sequence?

int F(int n) { if (n==0 || n==1) return 1; else return F(n-1)+F(n-2); }



You can compute this recursively as follows:

```
int answer(int k) {
    if (k==1) return 1;
    else return answer(k-1) + k;
```

• What is the sum of 1..k?

What is the running time of this algorithm?



 It is a function of the size of the input data with units such as comparisons, assignments, arithmetic operations, trigonometric operations.

• What is the running time of an algorithm?



 This searching algorithm has to look at every element in the array and takes O(n) time to find an element in the worst case.

• What is Linear Search?

```
int linearSearch(int[] a,
    int x) {
    int k = 0;
    while (k<a.length) {
        if (a[k] == x) return k;
            k = k + 1;
        }
    }
}</pre>
```

 This searching algorithm searches a sorted array, and halves the search space with each iteration therefore only requiring O(log n) work in the worst case.

• What is Binary Search?

```
int binarySearch(int[] a, int x) {
    int l = 0;
    int r = a.length -1;
    while (l<=r) {
        int m = (l+r)/2;
        if (a[m] == x) return m;
        else if (x < a[m]) r = m-1;
        else l = m+1;
    }
    return -1;
}</pre>
```

#### Vectors/Trees 100

 It describes the fact that k elements come before element e in a vector.
• What is the rank of an element in a vector?

We can think of vectors as extended, resizeable arrays



 This traversal visits all nodes on each level before progressing to the next level.

• What is an level order traversal for a tree?



It is a binary tree in which the nodes are labelled with elements of a set such that all elements in the left subtree of a node labelled x are less than or equal to x and all the elements in the right subtree are greater than x.

• What is a binary search tree?

