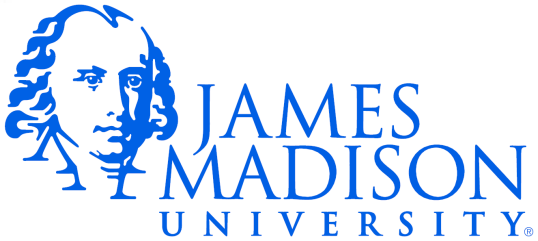
CS 149

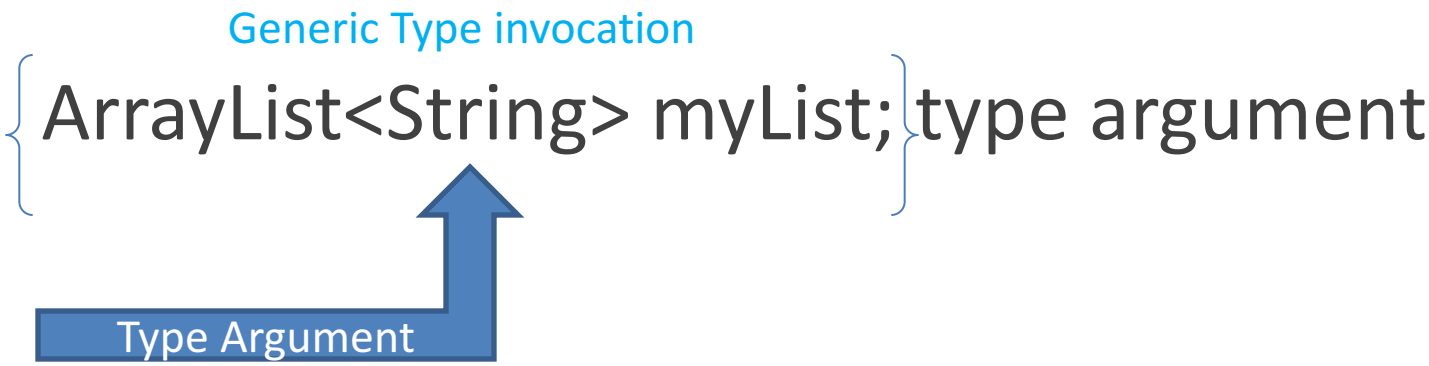
Professor: Alvin Chao

CS149 – Arraylists



Declaring an ArrayList

- ArrayList is a generic type.
  Declaration determines the type of object it will store.
- Also referred to as type-safe.
  Declaring an ArrayList to store String objects:



Instantiating an ArrayList

```
ArrayList<String> myList;  // Declaring.

myList = new ArrayList<String>();  // Instantiating.
```

OR we can leave out the type argument during initialization...

```
myList = new ArrayList<>(); // Instantiating.
```

Don't forget the parentheses!
We are calling the constructor method of the ArrayList class.

ArrayLists and Primitive Types

- ArrayLists can only store reference types, not primitive types

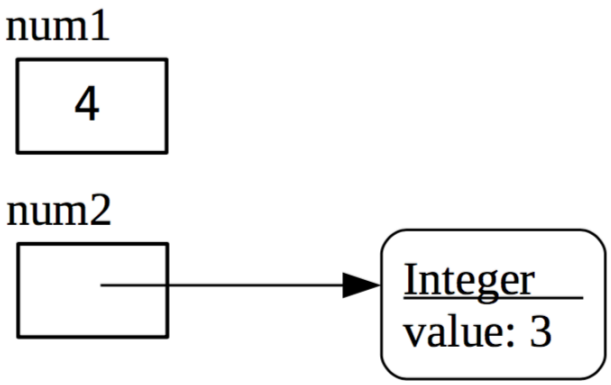
```
ArrayList<int> myList = new ArrayList<int>();
```

ArrayLists and Primitive Types: Solution

- Each primitive type has a wrapper class that can be used instead.

```
int num1;
Integer num2;

num1 = 4;
num2 = new Integer(3);
```



ArrayLists and Primitive Types: Solution

- Each primitive type has a wrapper class that can be used instead.
- Java converts back and forth as needed: autoboxing

```
ArrayList<Integer> myInts = new ArrayList<Integer>();

myInts.add(3);

int num = myInts.get(0);
```

Arrays vs. ArrayList

Arrays vs. ArrayList

Arrays		ArrayList	
`array.length`	The *capacity* of the array.	`list.size()`	The number of elements stored in the ArrayList.
`String val = array[0];`		`String val = list.get(0);`	
`array[0] = "HI";`		`list.set(0, "HI");`	
	Not possible to resize array.	`list.add("Bob");`	Adds a new element at the end of the list. (This changes the size.)
	Not possible to resize array.	`list.remove(4);`	Removes the element at index 4. (all elements after 4 shift left.)

What will be printed by the following code?

```
ArrayList<String> letters = new ArrayList<String>();

letters.add("A");
letters.add("B");
letters.add("C");
letters.remove(1);
System.out.println(letters.size());
for (String letter : letters) {
        System.out.println(letter);
}
for (int i = 0; i < letters.size(); i++) {
        System.out.println(letters.get(i));
}
```

What will be printed by the following code? Solution

```
   ArrayList<String> letters = new
ArrayList<String>();

   letters.add("A");
   letters.add("B");
   letters.add("C");
   letters.remove(1);

   System.out.println(letters.size());

   for (String letter : letters) {
      System.out.println(letter);
   }

   for (int i = 0; i < letters.size(); i++) {
      System.out.println(letters.get(i));
   }
```

Output:

```
2
A
C
A
C
```

- **Acknowledgements**

Parts of this activity are based on materials developed by Chris Mayfield and Nathan Sprague.

</end>