Chapter Five: Conditionals and Loops

CTEC 150, Fall 2019

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Overview

- **5.1: Boolean Expressions**
- 5.2: The `if` Statement
- 5.3: Comparing Data
- 5.4: The `while` Statement
- 5.5: Iterators
- 5.6: The `ArrayList` Class

5.1 Boolean Expressions

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```
if (happiness <= 0){
    System.out.println("I'm sad face.");
}else if(happiness > 0 && happiness < 100){
    System.out.println("Somewhere in between");
}else{
    System.out.println("I'm ecstatic!!!!!");
}
```

Boolean Expressions

Equality or relational operators return boolean results (true or false)

== equal to
!= not equal to
< less than
> greater than
<= less than or equal to
<= greater than or equal to

Reminder

Note the difference between the equality operator (==) and the assignment operator(=)

Logical Operators

- Logical NOT is a unary operator
- Logical AND and OR are binary operators

!	Logical NOT
&&	Logical AND
||	Logical OR

a	!a
true	false
false	true

Truth Table

- A truth table shows all possible true-false combinations
- There are four possible combinations for two variables

a	b	a && b	a || b
true	true	true	true
true	false	false	true
false	true	false	true
false	false	false	false

5.2: The `if` Statement

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- **5.2: The `if` Statement**
- 5.3: Comparing Data
- 5.4: The `while` Statement
- 5.5: Iterators
- 5.6: The `ArrayList` Class

The if Statement

Structure of the if Statement

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if( condition ){
    statement;
}
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- If the condition is true, then the statement is executed

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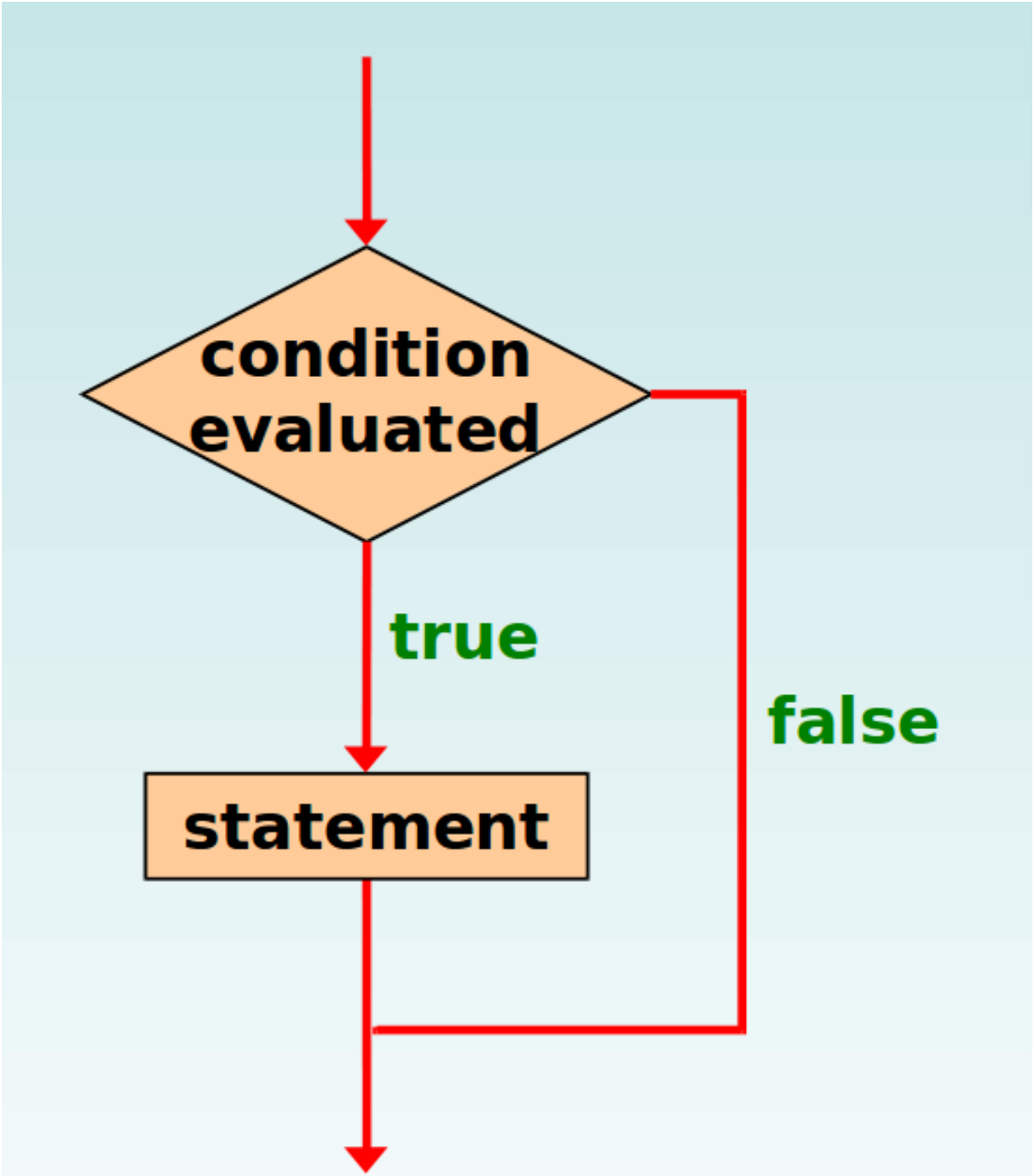
- The condition must be a boolean expression
- If the condition is true, then the statement is executed
- If the condition is false, the statement is skipped


condition
evaluated
true
false
statement

Review

1

```
int total = 34;
int stock = 24;
int warehouse = 8;
if( total != stock + warehouse ){
    inventoryError = true;
}
```

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```
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int stock = 24;
int warehouse = 8;
if( total != stock + warehouse ){
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}
```

2

```
boolean found = false;
boolean done = true;
if( found || !done ){
    inventoryError = true;
}
```

The `if - else` Statement

Structure of the if-else Statement

```
if( condition ){
    statement1;
}else{
    statement2;
```

The `if - else` Statement

Structure of the if-else Statement

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if( condition ){
    statement1;
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    statement2;
```

- If the condition is true, statement1 is executed

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Structure of the if-else Statement

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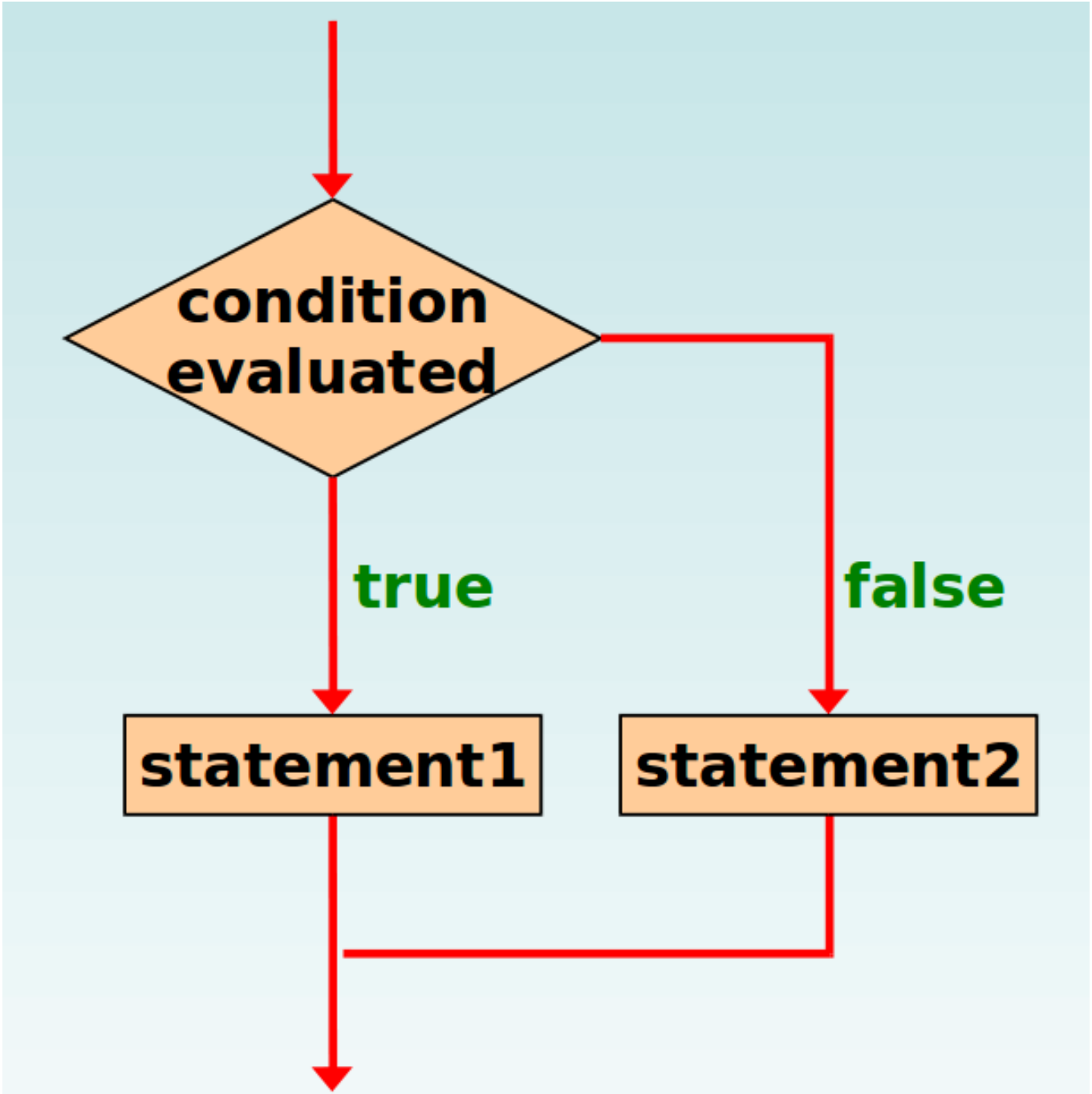
if( condition ){
    statement1;
}else{
    statement2;
```

- If the condition is true, statement1 is executed
- If the condition is false, statement2 is executed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Indentation

Warning - Bad Practice

```
if(depth >= UPPER_LIMIT)
    delta = 100;
else
    System.out.println("Reseting Delta");
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Block Statements

```
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5.3: Comparing Data

- 5.1: Boolean Expressions
- 5.2: The `if` Statement
- **5.3: Comparing Data**
- 5.4: The `while` Statement
- 5.5: Iterators
- 5.6: The `ArrayList` Class

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- Tolerance could be set to 0.000001

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Characters	Unicode Values
0 – 9	48 through 57
A – Z	65 through 90
a – z	97 through 122

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- returns 0 if name1 and name2 are equal
- returns negative value if name1 is less than name2
- returns positive value if name1 is greater than name2
- This is based on the order of characters or lexicographic ordering
- The string "Great" comes before the string "fantastic" because all of the uppercase letters come before all of the lowercase letters in Unicode

5.4: The `while` Statement

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- Statement is executed repeatedly until condition becomes false

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- Statement is executed repeatedly until condition becomes false
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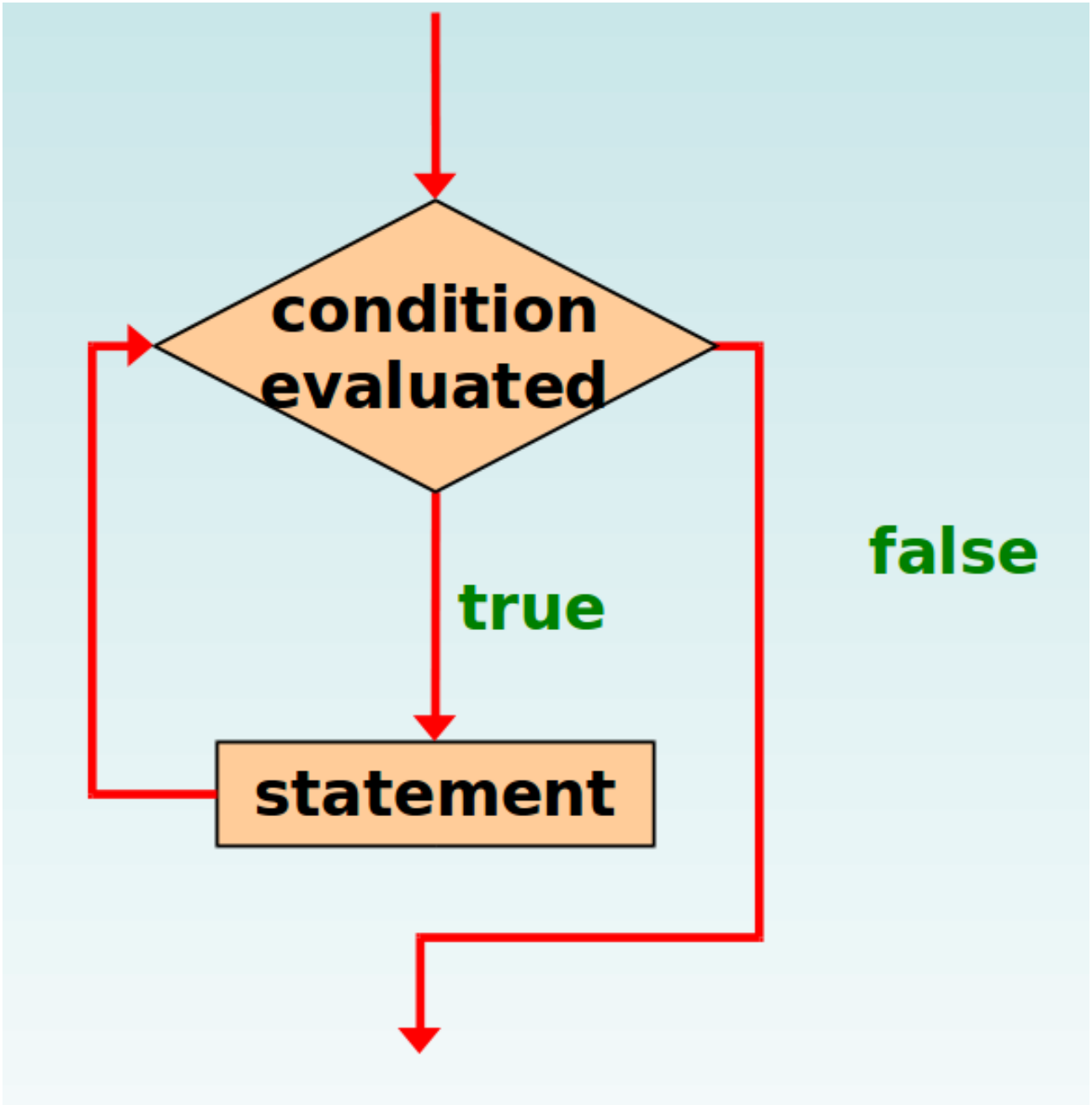
- Referred to as loops
- Controlled by boolean expressions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Example of `while` loop

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```
int count = 1;
while (count <= 5){
    System.out.println(count);
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}
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- If the condition is false initially, the statement never gets executed

Example of `while` loop

Structure of the `while` Statement

```
int count = 1;
while (count <= 5){
    System.out.println(count);
    count++;
}
```

- If the condition is false initially, the statement never gets executed
- The body of a `while` loop will execute zero or more times

Infinite Loops

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Infinite Loop Example

```
int count = 1;
while (count <= 25){
    System.out.println(count);
    count= count - 1;
}
```

Nested Loop Example

How many times will "Here" be printed?

```
count1 = 1;
while (count1 <= 10){
    count2 = 1;
    while (count2 < 20){
     System.out.println("Here");
     count2++;
    }
    count1++;
}
```

Nested Loop Example

How many times will "Here" be printed?

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count1 = 1;
while (count1 <= 10){
     count2 = 1;
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     }
     count1++;
}
```

10 * 19 = 190 times

5.5: Iterators

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- `Scanner` class is an iterator

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- Lets you step through each item in turn
- An iterator has an `hasNext` method that returns true if there is at least one more item to process
- The `next` method returns the next item
- `Scanner` class is an iterator
- Particularly useful when reading input from a file (URLDissector.java)

5.6: The `ArrayList` Class

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- **5.6: The `ArrayList` Class**

The ArrayList Class

- Stores a list of objects

Methods

```
boolean add(E obj)
void add(int index, E obj)
Object remove(int index)
Object get(int index)
boolean isEmpty()
int size()
```

The ArrayList Class

- Stores a list of objects
- Part of the `java.util` package

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The ArrayList Class

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- You can reference each object in list using a numeric index starting at 0 (not 1)
- Grows and shrinks as needed; adjusting capacity as necessary

Methods

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boolean add(E obj)
void add(int index, E obj)
Object remove(int index)
Object get(int index)
boolean isEmpty()
int size()
```

The ArrayList Class

- Stores object of any class, but cannot store primitive data types (`int`,`float`,`double`)

Creating ArrayList

```
ArrayList<String> names = new ArrayList<String>();
ArrayList<Book> list = new ArrayList<Book>();
```

QUESTIONS ???