

10B. Comparing Objects

- Objectives - when we have completed this set of notes, you should be familiar with:
 - Defining the natural ordering of objects
 - Implementing the Comparator interface
 - Sorting a list of objects
 - Using the Collections class
 - Sorting an array of objects
 - Using the Arrays class

Natural Ordering

- Often a class has an attribute that defines the order of objects:
 - Strings objects are ordered based on lexicographic order
 - Integer objects are ordered based on value
 - An Employee object might be ordered based on ID number or last name
- Implementing the Comparable interface defines the natural order of objects

Natural Ordering

- Recall that when you implement the Comparable interface, you must define the compareTo method

```
obj1.compareTo(obj2)
```

- The compareTo method defines the natural ordering by returning
 - A negative int value if $\text{obj1} < \text{obj2}$
 - Zero if obj1 is equal to obj2
 - A positive int value if $\text{obj1} > \text{obj2}$

Natural Ordering

- Suppose that you would like to use the name of products to define the natural order of Product objects
- Implement the Comparable interface and then define the compareTo method
- In [Product.java](#), the compareTo method orders Product objects based on alphabetical order (ignoring case)

Sorting

- Now that you have defined the way that objects are ordered, you can use classes and methods from the Java API to sort objects
- The Collections class has a static sort method that takes a List of objects
 - Polymorphism via interface: List is an interface implemented by ArrayList, Vector, LinkedList, etc
- When you define the natural ordering of objects, you can use the sort method
- See [ProductList.java](#)

Sorting

- Use the static sort method in the Arrays class if you have an array of objects
 - Polymorphism via inheritance: The sort class takes an array of Object types; all classes extend object
- See [ProductArray.java](#)

Alternate Ordering

- What if you wanted to define an alternate order to objects?
 - Suppose you built an e-mail system and defined sent date as the natural ordering of Email objects.
 - Some users, however, might want to sort Email objects based on sender's name
- The Comparator interface defines an alternate way of sorting objects.

Alternate Ordering

- Create a separate class that implements `java.util.Comparator`
- Define the *compare* method in the class: takes two object parameters `obj1` and `obj2`
- The return value for *compare* is similar to *compareTo* in Comparable interface:
 - A negative int value if `obj1 < obj2`
 - Zero if `obj1` is equal to `obj2`
 - A positive int value if `obj1 > obj2`

Alternate Ordering

- Suppose that you wanted an alternate ordering for Product objects based on base price
- Create a class that implements Comparator (see [BasePriceComparator.java](#))
- You can create additional classes that implement Comparator
- See [TotalPriceComparator.java](#)

Alternate Ordering

- The Collections and Arrays class have overloaded the sort method to take a set of objects AND a Comparator object
- See Java API documentation for Collections and Array
- [ProductArraySorts.java](#)