

CSSE 220 Day 25

Strategy Pattern, Search, Mobile Game
Development

Checkout *TextTwisterMIDlet* project from SVN

Questions

Makeup Exam

- ▶ Makeup for questions 3 and 4 of paper part and all of computer part of Exam 2
 - Can re-do one or two or all questions
 - Will only increase your grade
- ▶ Thursday, 7:00–9:00 p.m.
- ▶ Room O267

Sorting Review

▶ Selection Sort

- Find the **smallest item** in the unsorted part
- **Move it to the end of the sorted part**, by swapping it with the first item in the unsorted part

▶ Insertion Sort

- Take the **first item** in unsorted part
- **Slide it down to the correct place** in the sorted part

▶ Merge Sort

- Size 0 or 1, then done
- Otherwise:
 - Divide list in half, recursively sort each half
 - Merge two halves

Strategy Design Pattern

- »» An application of function objects

Design Pattern

- ▶ A *named* and *well-known* problem–solution pair that can be applied in a new context.

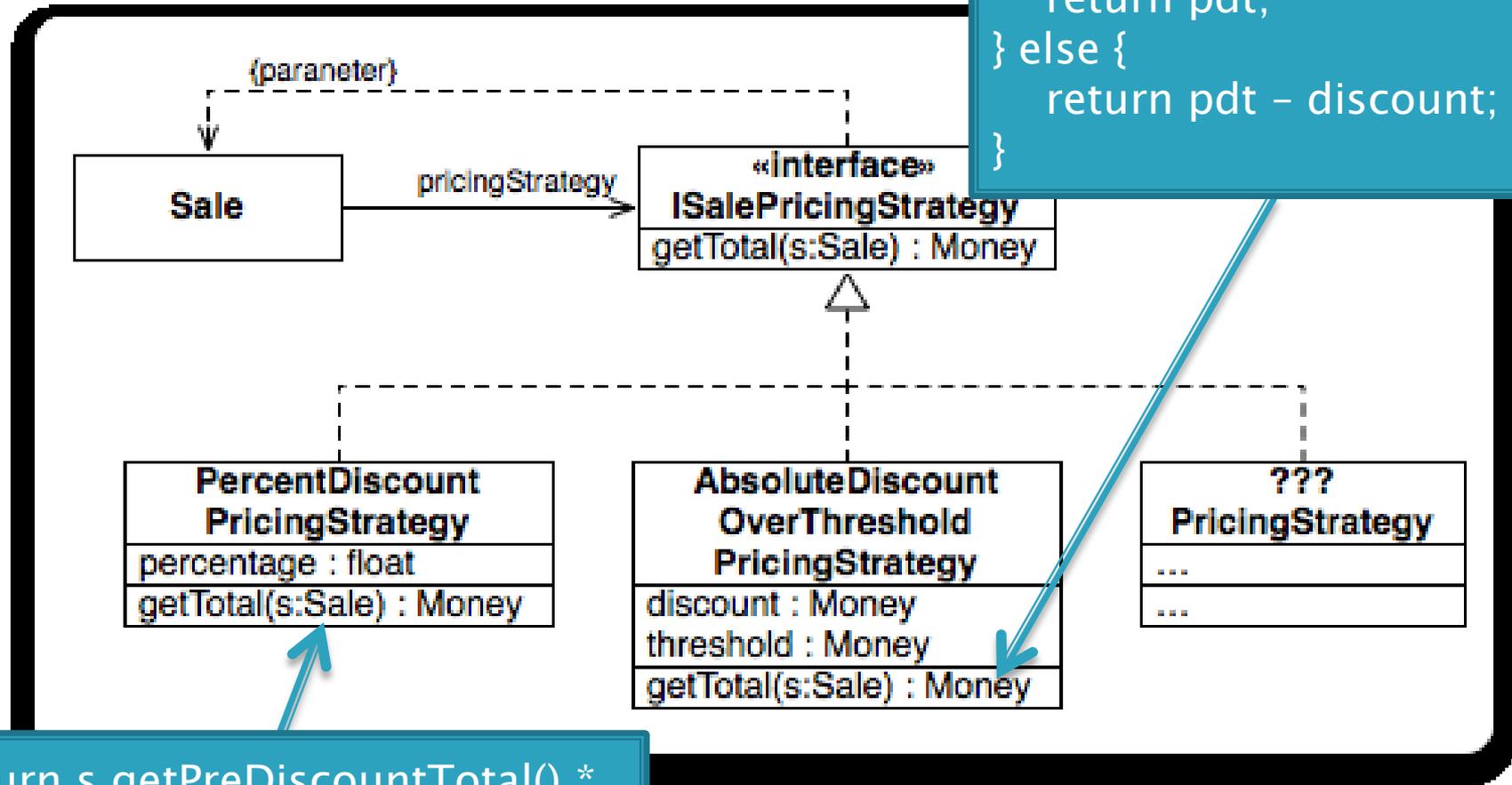
History

- ▶ *A Pattern Language: Towns, Building, Construction*
 - Alexander, Ishikawa, and Silverstein
- ▶ Kent Beck and Ward Cunningham at Tektronik
- ▶ *Design Patterns: Elements of Reusable Object-Oriented Software*
 - Gamma, Helm, Johnson, Vlissides

Strategy Pattern

- ▶ **Problem:** How do we design for varying, but related, algorithms or policies?
 - ▶ **Solution:** Define each algorithm or policy in a separate class with a common interface
- 

Strategy Example



```
double pdt =
s.getPreDiscountTotal();
if (pdt < this.threshold) {
    return pdt;
} else {
    return pdt - discount;
}
```

```
return s.getPreDiscountTotal() *
this.percentage;
```

Search Review

»» Linear vs. Binary Search

Searching

- ▶ Consider:
 - Find Cary Laxer's number in the phone book
 - Find who has the number 232-2527
 - ▶ Is one task harder than the other? Why?
 - ▶ For searching unsorted data, what's the worst case number of comparisons we would have to make?
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Binary Search of Sorted Data

- ▶ A **divide and conquer** strategy
- ▶ Basic idea:
 - Divide the list in half
 - Decide whether result should be in upper or lower half
 - Recursively search that half

Analyzing Binary Search

- ▶ What's the best case?
- ▶ What's the worst case?

Other Search Algorithms

- ▶ Search by Hashing
 - ▶ haystack search
 - ▶ Using heap data structures
 - ▶ ...
-
- ▶ Know the **run-time efficiency** of each
 - ▶ Know the **best and worst case** inputs for each

J2ME and MIDlet

- »» Have you installed a Java Wireless Toolkit?
Have you considered Eclipse for J2ME development?

J2ME Development

▶ J2ME

- Java Platform, Micro Edition or Java ME
- Java platform designed for embedded systems
- Target devices
 - industrial controls
 - **mobile phones**
- Java ME devices implement a *profile*.
 - e.g., MIDP

J2ME MIDlet Development

▶ J2ME

- Library is limited in many respects,
- Need to install a Java Wireless Toolkit
- Can configure Eclipse for J2ME development

What is a MIDlet

- ▶ Application that uses the (MIDP) of the (CLDC) for the J2ME environment.
- ▶ There are three possible states in a MIDlet's life-cycle:
 - *paused* – The MIDlet instance has been constructed and is inactive.
 - *active* – The MIDlet is active.
 - *destroyed* – The MIDlet has been terminated and is ready for reclamation by the garbage collector.

A sample MIDlet application

```
public class MyMIDlet extends MIDlet {  
    public MyMIDlet() { }  
  
    // Called when MyMIDlet is constructed or  
    // restarted  
    public void startApp() { }  
  
    // Called to pause the MyMIDlet  
    public void pauseApp() { }  
  
    // Called to terminate the MyMIDlet  
    public void destroyApp(boolean unconditional) { }  
}
```

Putting It All Together

- » Representing search algorithms using strategy pattern in TextTwisterMIDlet

Game description

- ▶ The game Text Twister is a word-building game where the user is given a 6-letter word with the letters scrambled.
 - ▶ In order to get to the next level of the game, the user must unscramble the 6-letter word.
 - A user can also gain bonus points by creating 3-, 4, and 5-letter words with the letters provided.
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Problem Description

- ▶ Only scrambled 6-letter words will be included in the implementation.
- ▶ You might want to extend this game to include 8-letter words.
 - 8-letter words will require a larger number of (3-, 4-, 5-, 6-, 7-letter) words to be searched.
 - When the search space increases, the search algorithm will need to be made more efficient.
 - <http://grecni.com/texttwist.php> generates all the combinations for an n-letter word

