Lecture 26: Collections

Last time:
1. Exceptions

Today
1. Collections: Stack
Collections in Java

- Arrays are **collections**
  - Arrays are objects
  - Arrays are sequences of elements in base type
  - These elements are collected together in one object: the array
- Java includes many other collection mechanisms
  - Arrays good for some applications (fixed-length sequences), not others (varying-length sequences)
  - Other collections tuned for different purposes
- General observation holds, however:
  - Collections are objects …
  - … that contain other objects in a given type
- We’ll study two (more in CMSC132): **Stack**, **ArrayList**
Stacks in Java

- Recall: a **stack** is a data structure (“device” for holding values) – FILO (First In, Last Out)
- Typical operations on a stack
  - **push**: add a new value into the stack
  - **pop**: remove the most recently added value still in stack
  - **top**: return the most recently added value in stack
    Note: Java calls this “peek”
  - **is empty**: returns true if the stack is currently empty or false otherwise
Example of stack concept (not Java specific)

- Stack s
- s.isempty() == ?? true
- s.push (3);
- s.isempty() == ?? false
- s.push (4);
- s.peek == ?? 4
- s.pop ();
- s.push (5);
- s.peek == ?? 5
Stacks in Java (cont.)

- Java includes a **generic** class for stack objects
  - Stack objects contain other objects
  - All objects in stack must have same type
  - Only objects may be stored in stacks (no primitive-type values)
- **Syntax:**  
  
  ```java
  Stack<E>
  ```

  - `Stack<E>` is a generic class
    - `E` is a class variable representing the base type
    - Replace `E` by a specific type to get a stack of that type of elements
  - Class is in `java.util` package
- **Documentation:**  
  [http://java.sun.com/j2se/1.5.0/docs/api/java/util/Stack.html](http://java.sun.com/j2se/1.5.0/docs/api/java/util/Stack.html)
- **See example:**  
  ```java
  Stack<String> stack = new Stack<String>();
  ```

  Creates a stack of strings
  - extend this to be stack of cats
  - extend this to be stack of integer values