

Lab 1: Silver Dollar

Due 11:59 pm **Wed**, Feb 20, 2008

1 Assignment

1. Complete the “The Silver Dollar Game” from *Java Structures*, Chapter 3.10 pages 66—67 for $n < 10$
2. You must use `java.util.ArrayList` as the only data structure in your implementation (e.g., do not use Java arrays, linked lists, etc.)
 - a. You must use Java generic syntax: `ArrayList<Type>` for your arrays
3. Include detailed comments describing:
 - a. The merits of your design decisions about how to represent state in the game
 - b. The asymptotic behavior of your methods

Come to your lab session already having read the assignment and prepared to work on it. We will discuss the problem together in lab and then you will begin the assignment on your own. You will probably need additional time outside of the scheduled lab to complete the assignment. For this lab, plan on spending about one hour designing beforehand and one hour debugging and testing afterward for every one hour of implementation (in your computer science career you’ll find that’s a very low ratio—I spend twenty times or more on design and testing as implementation for most of my projects.)

As for every assignment in CS136: Use Javadoc comments for all classes and methods. Use `structure5.Assert` pre-, post-, and general assertions (or Java `assert`) wherever merited to detect corrupt state or illegal arguments. Make methods and fields private/protected and/or static wherever merited.

When complete, clean up your directory (see the `clean136` script) and then submit your solution using the command:

```
turnin -c 136 Silver.java
```

For this lab, your solution should be a single file named “Silver.java”. Do not submit files ending in “.class” or “~”. Do not submit written answers to the thought questions (do think about them, though...this is fair game for a future quiz or exam!)

2 Evaluation

The grading guidelines for this assignment are:

Correctness	5
Satisfies the specification	
Readability	10
Comments, whitespace, variable names, helper methods, choice of Java features	
Design	10
Useful public <i>and</i> private helper and accessor methods. State representation is well-suited to problem.	
Efficiency	5
Total	30

3 Suggestions

If your solution is not between 150 and 300 lines of code that might be a sign that something is wrong with it. My solution is about 190 lines of code and comments. I introduced many helper methods. Here’s one

helper that I used inside toString. The comments, assertions, and design are demonstrative of the kind of code you should be writing. (You may use this helper if you like.)

```
/** Used by spaces() */
static private final String BIG_SPACE = "                ";

/** Returns a string of k spaces. Assumes k >= 0. Technically, this takes O(k)
    time and space, however for small k (the common case!) it performs only
    one memory allocation, so it is fast.
 */
private static String spaces(int k) {
    Assert.pre(k >= 0, "k must be non-negative: k = " + k);

    String s = null;

    if (k <= BIG_SPACE.length()) {
        // This performs at most one allocation, regardless of the
        // size of k.
        s = BIG_SPACE.substring(0, k);

    } else {
        // This recursive case is slow because of both recursion
        // *and* string append, however we don't expect it to
        // happen often.
        s = BIG_SPACE + spaces(k - BIG_SPACE.length());
    }

    Assert.post(s.length() == k, "Computed string had the wrong length");
    return s;
}
```

I'm out of town on Monday, February 18th, so I moved the due date to that Wednesday and will hold extra office hours on Tuesday, February 19th from 1pm-3pm.

Midnight Rider

by The Allman Brothers from Idlewild South, 1970

I got to run to keep from hiding
And I'm bound to keep on riding
And I've got one more silver dollar
But I'm not gonna let 'em catch me, no
Not gonna let 'em catch the midnight rider

And I don't own the clothes I'm wearing
And the road goes on forever
And I've got one more silver dollar
But I'm not gonna let 'em catch me, no
Not gonna let 'em catch the midnight rider

I've gone past the point of caring
Some old bed I'll soon be sharing
And I've got one more silver dollar

But I'm not gonna let 'em catch me, no
Not gonna let 'em catch the midnight rider
Repeat twice more