Computer Science 136
Data Structures
Lecture #5 (September 20, 2021)

1. Announcements:

   (a) We'll start to make use of the resources from the text. Assuming you're `22xyz3`, you can clone these from

   `ssh://22xyz3@lohani.cs.williams.edu/~bailey/js.git`

   into your `cs136` directory. There are instructions (`INSTALL.txt`) in the repository for telling Java about these classes.

   (b) We'll be doing a lab related to the *Silver Dollar Game* (see text).

   (c) Questions?

2. Carefully designing a useful, random `Die`.

   (a) Constructor forms.

   (b) Mutators and accessors.

   (c) Instance variables vs. global variables.

   (d) Hiding instance variables: `protected` vs `private`.

   (e) Controlled independent randomness.

      i. Key: `System.currentTimeMillis()`. A constantly changing integer.

      ii. Attempt: Every die gets a dedicated generator.

      iii. Attempt: Allow rolls of the dice to replay.

      iv. Attempt: Dice share generators.

3. Vectors. Analysis of an *existing* class.

   (a) Found in `js/src/structure/Vector.java`.

   (b) Abstract concept: the extensible array; grows and shrinks as needed.

   (c) Rough sketch (try: `javap structure.Vector`):

      i. Based on storing `Object` types; requires casting when we access a value in the `Vector`.

      ii. Uses methods `get/set/add`, not square-bracket indexing.

      iii. Is extended with `add` (two arguments) and `remove`.

      iv. Utility methods: `isEmpty` and `size` (only `String` and arrays use `length`).

      v. Extensibility:

         A. Internally, we manually keep track of size (`elementCount`), capacity (array length)

         B. Double array length when necessary.

   (d) Performance analysis on Wednesday.