

Precept Activity Instructions

Work in small groups:

- 1) If you were to design a validation module for `Stackao`, what invariants would you have to check? (Invariants are things that you know must be true. That is, they cannot vary or something is wrong. In the context of a validation module, invariants are constraints on values of individual state variables or relationships between state variables.)
- 2) Review the structure of the validation module (`stackaochecker.h` and `stackaochecker.c`). Are all the invariants from part 1) present?
- 3) Review how the validation module is called from the implementation code in a version with hooks to do so (`stackaochecked.c`) – notice how validation happens on every return path from every mutator function.
- 4) Log into armlab and copy all files into your directory on armlab:
`cp -r /u/cos217/PreceptDemos/stackao .`
Build and run the correct (`stackaochecked.c`) and buggy (`stackaocheckedbad.c`) hooked versions. Compare the outputs. Find the bug in `stackaocheckedbad.c`.

Precept Activity Answers

1) The following cases indicate the state of the data structure is invalid:

Case 1. `iInitialized` is 0, but `pdArray` is not NULL, or `uTop` is not 0, or `uPhysLength` is not 0.

Case 2. `iInitialized` is 1, but `pdArray` is NULL, or `uPhysLength` is 0.

Case 3. `uTop` > `uPhysLength`.

2) They should be.

3) The checker function is called before every return statement in every non-static function that changes the state of the abstract object.

4) `stackaochecked` output:

```
3.3
2.2
1.1
6.6
5.5
4.4
```

`stackaocheckedbad` output:

```
Next push would be OOB of storage array
teststackbad: stackaocheckedbad.c:107: Stack_push: Assertion
`isValid(pdArray, uTop, uPhysLength, iInitialized)' failed.
Aborted (core dumped)
```

Why do we get this error message?

Because, in `Stack_push()` the condition for calling the `Stack_grow()` function is incorrect. Should be `if (uTop == uPhysicalLength)`