cse15l-lab-reports

Lab Report 3 - Bugs and Commands

Part 1 - Bugs

We exame the bug in the reverseInPlace method.

JUnit Test of failure inducing input

```
@Test
public void testFailureInducing() {
    int[] input1 = { 1 };
    assertArrayEquals(new int[] { 1 }, ArrayExamples.reversed(input1));
}
```

JUnit Test of non-failure inducing input

```
@Test
public void testNonFailureInducing() {
  int[] input1 = { };
  assertArrayEquals(new int[]{ }, ArrayExamples.reversed(input1));
}
```

The Symptom

We can see the symptom of this bug by running these two JUnit tests:

```
(base) oriel@Oriels-MacBook-Air lab3 % bash test.sh
JUnit version 4.13.2
..E
Time: 0.005
There was 1 failure:
1) testFailureInducing(ArrayTests)
arrays first differed at element [0]; expected:<1> but was:<0>
        at org.junit.internal.ComparisonCriteria.arrayEquals(ComparisonCriteria.java:78)
        at org.junit.internal.ComparisonCriteria.arrayEquals(ComparisonCriteria.java:28)
        at org.junit.Assert.internalArrayEquals(Assert.java:534)
        at org.junit.Assert.assertArrayEquals(Assert.java:418)
        at org.junit.Assert.assertArrayEquals(Assert.java:429)
        at ArrayTests.testFailureInducing(ArrayTests.java:9)
        ... 30 trimmed
Caused by: java.lang.AssertionError: expected:<1> but was:<0>
        at org.junit.Assert.fail(Assert.java:89)
        at org.junit.Assert.failNotEquals(Assert.java:835)
        at org.junit.Assert.assertEquals(Assert.java:120)
        at org.junit.Assert.assertEquals(Assert.java:146)
        at org.junit.internal.ExactComparisonCriteria.assertElementsEqual(ExactComparisonCriteria.java:8)
        at org.junit.internal.ComparisonCriteria.arrayEquals(ComparisonCriteria.java:76)
        ... 36 more

FAILURES!!!
Tests run: 2,  Failures: 1

(base) oriel@Oriels-MacBook-Air lab3 %
```

The Bug: Before and After

Before

```
    static int[] reversed(int[] arr) {
      int[] newArray = new int[arr.length];
      for(int i = 0; i < arr.length; i += 1) {
        arr[i] = newArray[arr.length - i - 1];
      }
      return arr;
    }
```

After

```
  static int[] reversed(int[] arr) {
      int[] newArray = new int[arr.length];
      for (int i = 0; i < arr.length; i += 1) {
        newArray[i] = arr[arr.length - i - 1];
      }
      return newArray;
    }
```

In the original Java code, a logic error occurs where the method, meant to reverse an array, mistakenly overwrites the elements of the input array `arr` with zeros from a new, uninitialized array `newArray`. The corrected version resolves this by properly reversing the array: it assigns the elements of `arr` into `newArray` in reverse order and returns `newArray`, thereby preserving the original array `arr` and accurately creating a reversed copy.

Part 2 - Researching Commands - `grep`

All option descriptions come from `man grep`.

command line option 1: `grep -r`

The `grep -r` command in Unix/Linux recursively searches for a specified pattern in all files within a given directory and its subdirectories. This feature is highly useful for comprehensive searches across multiple files and directories, particularly in large projects or complex directory structures, enabling efficient pattern finding without manually checking each file.

example 1:

```
$ grep -r "legal aid lawyers" technical/

technical/government/Media/RoanokeTimes.txt:Many viewed the early legal aid lawyer
technical/government/Media/RoanokeTimes.txt:In the 1960s, Harley said, legal aid l
```

example 2:

```
$ grep -r "United States Congress" technical/

technical/plos/pmed.0010060.txt:        September 2004, an AMA trustee testified i
technical/911report/preface.txt:                the President of the United States
technical/911report/chapter-1.txt:    Tuesday, September 11, 2001, dawned temperat
technical/government/About_LSC/Strategic_report.txt:LSC is committed to providing
```

command line option 2: `grep -i`

The `grep -i` command in Unix/Linux is used for case-insensitive searching of a specified pattern within files. This option is useful because it allows the command to match the pattern regardless of case, making searches more flexible and comprehensive, especially in scenarios where the exact case of the text is unknown or varied.

example 1:

```
$ grep -r -i "legal aid lawyers" technical/

technical/government/Media/Anthem_Payout.txt:Legal aid lawyers in Kentucky have pu
technical/government/Media/NJ_Legal_Services.txt:Four former Passaic Legal Aid law
technical/government/Media/Legal_Aid_in_Clay_County.txt:But even though Legal Aid
technical/government/Media/Funding_cuts_force.txt:about 24,000 low-income people a
technical/government/Media/Marylands_Legal_Aid.txt:managing) attorneys around the
technical/government/Media/RoanokeTimes.txt:Many viewed the early legal aid lawyer
technical/government/Media/RoanokeTimes.txt:In the 1960s, Harley said, legal aid l
technical/government/About_LSC/reporting_system.txt:child care services. Legal aid
```

example 2:

```
$ grep -r -i "united states congress" technical/

technical/plos/pmed.0010060.txt:        September 2004, an AMA trustee testified i
technical/911report/preface.txt:                the President of the United States
technical/911report/chapter-1.txt:    Tuesday, September 11, 2001, dawned temperat
technical/government/About_LSC/Strategic_report.txt:LSC is committed to providing
```

command line option 3: `grep -c`

The `grep -c` command in Unix/Linux counts the number of lines in a file that match a specified pattern. This functionality is useful for quickly determining the frequency of a pattern's occurrence in a file, which is particularly beneficial for analyzing and summarizing large datasets or logs.

example 1

```
$ grep -r -c "legal aid lawyers" technical/

...
technical/911report/chapter-8.txt:0
technical/911report/chapter-5.txt:0
technical/911report/preface.txt:1
technical/911report/chapter-9.txt:0
technical/911report/chapter-13.3.txt:0
technical/911report/chapter-1.txt:1
technical/911report/chapter-13.1.txt:0
technical/911report/chapter-13.4.txt:0
technical/911report/chapter-11.txt:0
...
```

example 2

```
$ grep -r -i -c "united states congress" technical/

....
technical/government/About_LSC/commission_report.txt:0
technical/government/About_LSC/Strategic_report.txt:1
technical/government/About_LSC/LegalServCorp_v_VelazquezOpinion.txt:0
technical/government/About_LSC/Comments_on_semiannual.txt:0
```

command line option 4: `grep -n`

The `grep -n` command in Unix/Linux adds line numbers to the output of a search, showing where each match is found within the file. This feature is particularly useful for pinpointing the exact location of matches, which is crucial for debugging, editing, or analyzing data within larger files.

example 1

```
$ grep -r -i -n "legal aid lawyers" technical/

technical/government/Media/Anthem_Payout.txt:30:Legal aid lawyers in Kentucky have
technical/government/Media/NJ_Legal_Services.txt:93:Four former Passaic Legal Aid
technical/government/Media/Legal_Aid_in_Clay_County.txt:13:But even though Legal A
technical/government/Media/Funding_cuts_force.txt:11:about 24,000 low-income peopl
```

```
technical/government/Media/Marylands_Legal_Aid.txt:70:managing) attorneys around t
technical/government/Media/RoanokeTimes.txt:29:Many viewed the early legal aid law
technical/government/Media/RoanokeTimes.txt:42:In the 1960s, Harley said, legal ai
technical/government/About_LSC/reporting_system.txt:208:child care services. Legal
```

example 2

```
$ grep -r -i -n "united states congress" technical/

technical/plos/pmed.0010060.txt:28:        September 2004, an AMA trustee testifie
technical/911report/preface.txt:6:                the President of the United Stat
technical/911report/chapter-1.txt:6:    Tuesday, September 11, 2001, dawned temper
technical/government/About_LSC/Strategic_report.txt:495:LSC is committed to provid
```