**Binary Search Project**

**Summary**

You will write two programs, a command line binary search program and an animated GUI program. Each will demonstrate through output how a binary search works each iteration.

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| --- | --- |
| Minor | Command line binary search program |
| Daily | Sketch of animated binary search screen |
| Major | Animated binary search program |

**Command Line Binary Search Program**Minor grade

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| --- |
| BinarySearch |
| int values[]  int searchValue  int low  int high  int midpoint |
| void fillArray()  void runSearch |

Write a class with variables and methods as shown. Methods should perform as described below. The output should be similar to that below.

**fillArray()** Fills the int array with 100 random values in the range of 1-100 and sorts them. (You may use Arrays.sort().)

**runSearch()** Performs the binary search on the array: Generates a random search value. Executes a binary search. Outputs to the screen the ongoing status of the search, including the search values, each low, high, and midpoint value, and the outcome of the search (whether the value was found and at what index).

*Sample Output*

**Searching for 65**

**Iteration #1**

**low: index 0, value 3**

**high: index 99, value 100**

**midpoint: index 49, value 46**

**Iteration #2**

**low: index 50, value 53**

**high: index 99, value 100**

**midpoint: index 74, value 78**

**Iteration #3**

**low: index 50, value 53**

**high: index 73, value 78**

**midpoint: index 61, value 65**

**65 found at index 61**

*Command Line Rubric*

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| --- | --- |
| The method fillArray fills array with random values 1-100 and sorts it | 50 points |
| Array is filled and sorted. Search result is accurate. | 80 points |
| Array is filled and sorted. Search result is accurate. Output is complete with all data. | 100 points |

**Animated Binary Search Program**Major and Daily Grades

Write a program that visually shows how a binary search works. First, draw a sketch of what your GUI will look like. The sketch is a daily grade. Include the following data:

* Title (Ex: “Binary Search”)
* Bar chart which represents the 100 values in the array.
* Status text (Ex: “Searching for 22”, “22 found at index 18”)
* High, low, and midpoint values as text
* High, low, and midpoint markers which indicate location on the bar chart

Program the binary search program. Markers should indicate which index they are pointing at. Bars in the bar chart should be grayed-out once they are eliminated from the search. Text labels should update as well. A sample project is shown below.

*Animation Rubric*

|  |  |
| --- | --- |
| All elements are present, but not animated. | 70 points |
| All elements are present. Animation is basic. | 90 points |
| Effort exceeds expectations | 100 points |