# *Programming II (420-B20-HR)*

# *Lab 11 –Searching*

Date assigned: Wednesday, April 6, 2016

Date due: **Wednesday, April 6, 2016**

**Learning Objectives**

At the end of this lab, the student will be able to:

1. use a linear search to locate a value in an array.
2. use a binary search to locate a value in an array

**To Be Handed In:**

1. The ***username*\_B20\_L11\_Project** folder should be copied to your **ToMark** folder.
2. The lab 11 review sheet.

**To Start:**

1. Download and unzip the folder **B20\_L11\_Project** from the **Moodle**. Rename it to ***username*\_B20\_L11\_Project**.
2. Start **Eclipse**.
3. Open your **Labs** workspace in your **420-B20** folder.
4. Create a new **Java Project** called ***username*\_B20\_L11\_Project**.

# A Linear Search

***Purpose:*** Learn to use a linear search to find a given value in a numeric array.

***To Do:***

## Add a public method called **findProduct()** to the **Inventory** class to do a linear search of the inventory items to find a match for a product number, **productNum**. The IPO diagram for the method follows.

|  |  |  |
| --- | --- | --- |
| **Input** | **Process** | **Output** |
| the product number to search for, productNum | Declare Product foundProduct  Declare numeric count   1. count = 0 2. foundProduct = null 3. loop while count < numProducts and foundProduct= null   if productNum = productNumber of product[count]  foundProduct = product[count]  end if  count = count + 1  end loop   1. return foundProduct | The product object for the product (null if the product was not found) |

## Code the **fldProductNumber\_actionPerformed()** method in the **InventoryReportsFrame** class:

### If the **fldProductNumber** text field is empty, display an appropriate message in a JOptionPane.

### Otherwise,

#### call the **findProduct()** method of the **inventory** object, passing the product number from the **fldProductNumber** text field to the method. Store the returned value in a local **Product** object.

#### If the product was found, display the product information in the display text area. If the product is a **Movie**, include the director in the display. If the product is a **Game**, include the platform in the display. The following is an example of a **Movie** display:

Product Type: Movie

Product Number: M1007

Title: Psycho

Category: Horror

Format: DVD

Year Made: 1960

Director: Hitchcock, Alfred

#### Otherwise if the product was not found, display an appropriate message in a JOptionPane.

## Test your changes.

# The Binary Search

***Purpose:*** Learn to use a binary search to locate an element in an array.

***To Do:***

## Open the **CustomerList** class.

## Create the **findCustomer()** method using the algorithm in the following IPO diagram.

|  |  |  |
| --- | --- | --- |
| **Input** | **Process** | **Output** |
| searchNumber | Declare numeric foundIndex, top, bottom, middle, custNum, count   1. count = 0 2. bottom = 0 3. top = numCustomers - 1 4. foundIndex = -1 5. loop while bottom <= top and foundIndex = -1    1. middle = (bottom + top) /2    2. custNum = customer[middle].getCustomerNumber()    3. if searchNumber = custNum then       1. foundIndex = middle    4. else if searchNumber < custNum then       1. top = middle – 1    5. else if searchNumber > custNum then       1. bottom = middle + 1    6. count = count + 1   end loop   1. print "Number of compares using binary search is " count 2. if foundIndex = -1    1. return null 3. else    1. return customer[foundIndex] | Customer object |

## Uncomment the **TestCustomerFind** program in **B20\_L11\_Project** project folder. Find the following customers: 1000, 1001, 1002, 1006, 1012, 1023, 1028 and 1034 and one not in the Inventory, 1075.

## Code the **findCustomerLinear()** method in **CustomerList** to use a linear search to find the customer.

## Run **TestCustomerFind** again. Complete the table in question 1 of the review sheet and answer question 2 on the review sheet.

# Homework

## No homework quiz this week. Instead, do the Test 2 review quiz to prepare for your test.