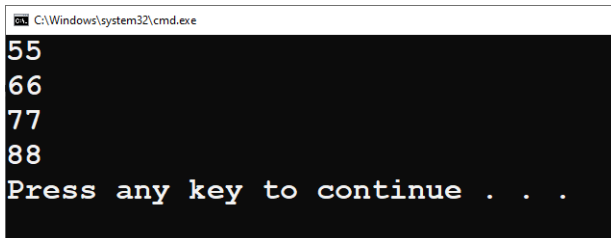# Java Lab – Arrays in Java

Exercise 1

Create a four-element array using an ***array literal*** as shown below.

```
//Create an integer array with 4 elements
int[] myArray = {55, 66, 77, 88};
```

Output each array element value to verify that the array was successfully created:

```
//Output/access each array element
System.out.println(myArray[0]);
System.out.println(myArray[1]);
System.out.println(myArray[2]);
System.out.println(myArray[3]);
```

```
C:\Windows\system32\cmd.exe
55
66
77
88
Press any key to continue . . .
```

Change the 3rd array element (index 2) to 99, and output that array element to confirm that the value has changed, eg:

```
myArray[2] = 99;
System.out.println(myArray[2]);
```

Exercise 2

Create an array that will hold five elements without assigning any value yet, eg:

```java
//Create an integer array with 5 elements
int[] numbers = new int[5];
```

Assign a value to each element by specifying the array name and the index number, eg:

```java
numbers[0] = 234;
numbers[1] = 345;
numbers[2] = 456;
numbers[3] = 789;
numbers[4] = 987;
```

Output each array value to the console, eg:

```java
//Output/access each array element
System.out.println(numbers[0]);
System.out.println(numbers[1]);
System.out.println(numbers[2]);
System.out.println(numbers[3]);
System.out.println(numbers[4]);
```

Exercise 3

Create an array of 3 doubles using an ***array literal***, as shown below:

```java
//Create an array containing 3 doubles
double[] ex3array = {23.45, 45.44, 67.12};
```

Next, calculate the sum of all 3 doubles stored in the array. You can create a double variable to store the result:

```java
//output the sum of all values in the array
//double value will hold the total
double sum;
```

Add the three array values and store them into the sum variable:

```java
//Calculate the sum
sum = ex3array[0] + ex3array[1] + ex3array[2];
```

Add the three array values and store them into the sum variable:

```java
//Output the result
System.out.println("The sum of all 3 values is :" + sum);
```

Exercise 4

Create an integer array that stores 10 different values – 5, 6, 7, 8, 9, 10, 11, 12, 13, 14.

Add all the array values and output the result, eg:

```
C:\Windows\system32\cmd.exe
The sum of all 10 values is :95
Press any key to continue . . . _
```

Output the sum of the first 5 values (index 0 to 4) and the last 5 values (index 5 to 9) on separate lines, eg:

```
C:\Windows\system32\cmd.exe
The sum of all 10 values is :95
The sum of the first 5 values is :35
The sum of the last 5 values is :60
Press any key to continue . . . _
```

Exercise 5

Create an int array called ex5Array that stores 5 different values – 34, 27, 45, 68, 98

Using the length property, output the length of the array:

```
System.out.println(ex5Array.length);
```

This should output a value of 5.

Using a for loop, output each value to the console, eg:

```
System.out.println("Array Values are: ");

for(int i = 0; i <= 4; i++)
{
    System.out.println(ex5Array[i]);
}
```

Note that the for loop above has a specific value in the test expression: `i <= 4;`

The length attribute could be used here instead, eg:

```
for(int i = 0; i < ex5Array.length; i++)
{
     System.out.println(ex5Array[i]);
}
```

Your output should be similar to as shown below:

```
C:\Windows\system32\cmd.exe
5
Array Values are:
34
27
45
68
98
Press any key to continue . . .
```
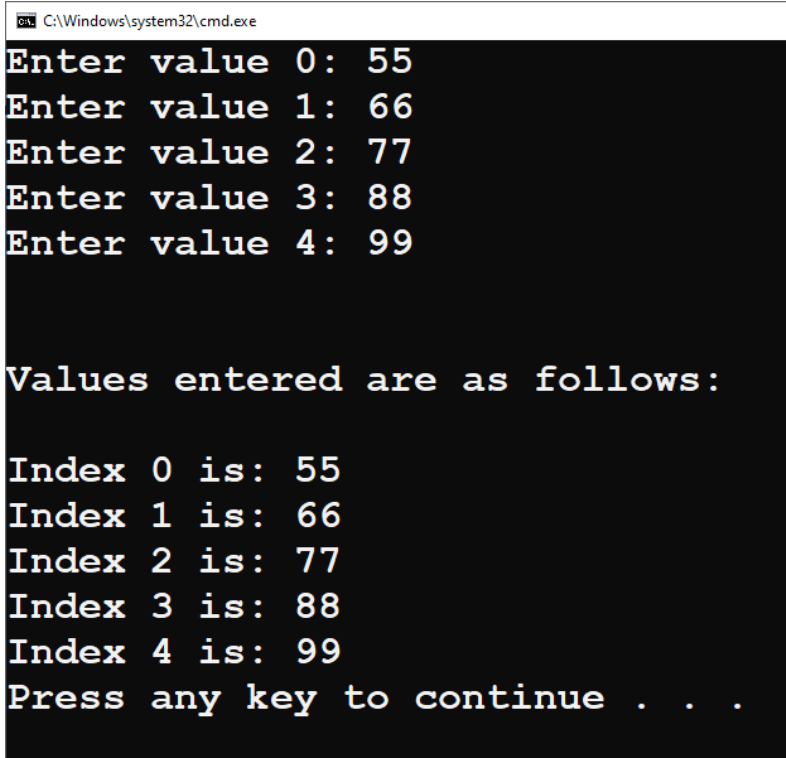
Exercise 6

Create a double array called ex6Array that stores 10 different values, eg: – 32.55, 45.88, 125.21, 456.5, 1.25, 4.1, 89.6, 78.2, 97.2354, 665.01

Use a for loop to output each value to the console – your output should be similar to as shown below:

```
C:\Windows\system32\cmd.exe
The array Values are as follows:
32.55
45.88
125.21
456.5
1.25
4.1
89.6
78.2
97.2354
665.01
Press any key to continue . . . _
```

Amend your code so that the output is as follows:

```
C:\Windows\system32\cmd.exe
The array Values are as follows:
Index 0 value is :32.55
Index 1 value is :45.88
Index 2 value is :125.21
Index 3 value is :456.5
Index 4 value is :1.25
Index 5 value is :4.1
Index 6 value is :89.6
Index 7 value is :78.2
Index 8 value is :97.2354
Index 9 value is :665.01
Press any key to continue . . . _
```

Exercise 7

Create an integer array called ex7Array that will allow for the storage of 5 different values. This program should prompt the user to input each value via the console, and then output all values. Your output should be similar to as shown below:

```
C:\Windows\system32\cmd.exe
Enter value 0: 55
Enter value 1: 66
Enter value 2: 77
Enter value 3: 88
Enter value 4: 99


Values entered are as follows:

Index 0 is: 55
Index 1 is: 66
Index 2 is: 77
Index 3 is: 88
Index 4 is: 99
Press any key to continue . . .
```
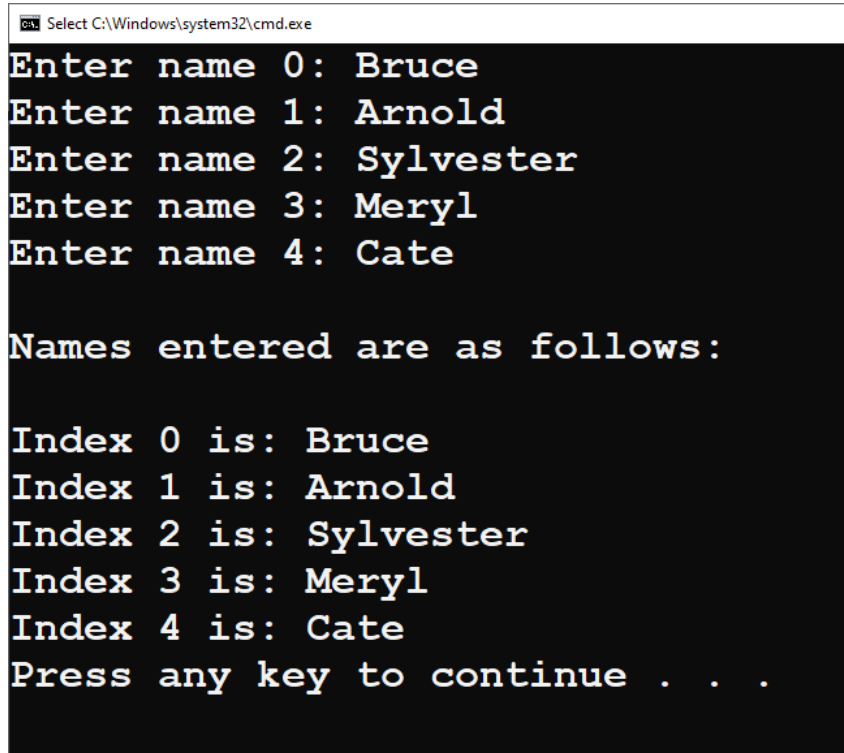
Using the length property, output the length of the array:

```java
System.out.println(ex5Array.length);
```

This should output a value of 5.

Exercise 8

Create a String array called *names* that will allow for the storage of 5 different values. This program should prompt the user to input each value (a name) via the console, and then output all values. Your output should be similar to as shown below:

```
Select C:\Windows\system32\cmd.exe
Enter name 0: Bruce
Enter name 1: Arnold
Enter name 2: Sylvester
Enter name 3: Meryl
Enter name 4: Cate

Names entered are as follows:

Index 0 is: Bruce
Index 1 is: Arnold
Index 2 is: Sylvester
Index 3 is: Meryl
Index 4 is: Cate
Press any key to continue . . .
```

Exercise 9

Create a program with an array of 12 doubles that will store monthly sales for every month from January to December. The program should prompt the user to input sales for each month. The program then outputs all the values entered, and displays the total sales for the year, and the average monthly sales figure. Your output should be similar to as shown below:

```
C:\Windows\system32\cmd.exe

Enter sales for month 3: 100
Enter sales for month 4: 125
Enter sales for month 5: 125
Enter sales for month 6: 125
Enter sales for month 7: 150
Enter sales for month 8: 150
Enter sales for month 9: 150
Enter sales for month 10: 100
Enter sales for month 11: 100
Enter sales for month 12: 100

NSales per month were as follows:

Month 1 is: 100.0
Month 2 is: 100.0
Month 3 is: 100.0
Month 4 is: 125.0
Month 5 is: 125.0
Month 6 is: 125.0
Month 7 is: 150.0
Month 8 is: 150.0
Month 9 is: 150.0
Month 10 is: 100.0
Month 11 is: 100.0
Month 12 is: 100.0
Total sales for the year: 1425.0
Average monthly sales for the year: 118.75
Press any key to continue . . .
```

Exercise 10

Create a program with a String array called *list*. The array will hold a list for first names. The program should prompt the user as to how many names will be entered, eg:

```
How many names do you wish to enter?: 5
```

After a value has been specified, the user is then prompted to enter the required number of names, eg:

```
How many names do you wish to enter?: 5
Enter name for index 0: Alice
Enter name for index 1: Bob
Enter name for index 2: Charlie
Enter name for index 3: David
Enter name for index 4: Eve
```

The list of names should then be displayed as shown:

```
How many names do you wish to enter?: 5
Enter name for index 0: Alice
Enter name for index 1: Bob
Enter name for index 2: Charlie
Enter name for index 3: David
Enter name for index 4: Eve


NAMES ENTERED

Name index 0 Alice
Name index 1 Bob
Name index 2 Charlie
Name index 3 David
Name index 4 Eve
```

The program should then prompt the user on whether they would like to amend any of the names entered. The name to be changed/amended can be specified by entering the index number. The current value is displayed and the user can enter a new name:

```
How many names do you wish to enter?: 5
Enter name for index 0: Alice
Enter name for index 1: Bob
Enter name for index 2: Charlie
Enter name for index 3: David
Enter name for index 4: Eve


NAMES ENTERED

Name index 0 Alice
Name index 1 Bob
Name index 2 Charlie
Name index 3 David
Name index 4 Eve
Amend name entered? (Enter index to change or enter minus 1 to end):
0
Current name at index 0 is: Alice
Enter new value: Andy
```

This process can continue until the user enters a value of minus 1:

```
C:\Windows\system32\cmd.exe
How many names do you wish to enter?: 5
Enter name for index 0: Alice
Enter name for index 1: Bob
Enter name for index 2: Charlie
Enter name for index 3: David
Enter name for index 4: Eve


NAMES ENTERED

Name index 0 Alice
Name index 1 Bob
Name index 2 Charlie
Name index 3 David
Name index 4 Eve
Amend name entered? (Enter index to change or enter minus 1 to end):
0
Current name at index 0 is: Alice
Enter new value: Andy
Amend name entered? (Enter index to change or enter minus 1 to end):
4
Current name at index 4 is: Eve
Enter new value: Jane
Amend name entered? (Enter index to change or enter minus 1 to end):
-1
Changes complete.
```

Finally, the program will output the contents of the array with the new values:

```
C:\Windows\system32\cmd.exe
How many names do you wish to enter?: 5
Enter name for index 0: Alice
Enter name for index 1: Bob
Enter name for index 2: Charlie
Enter name for index 3: David
Enter name for index 4: Eve


NAMES ENTERED

Name index 0 Alice
Name index 1 Bob
Name index 2 Charlie
Name index 3 David
Name index 4 Eve
Amend name entered? (Enter index to change or enter minus 1 to end):
0
Current name at index 0 is: Alice
Enter new value: Andy
Amend name entered? (Enter index to change or enter minus 1 to end):
4
Current name at index 4 is: Eve
Enter new value: Jane
Amend name entered? (Enter index to change or enter minus 1 to end):
-1
Changes complete.


NAMES ENTERED

Name index 0 Andy
Name index 1 Bob
Name index 2 Charlie
Name index 3 David
Name index 4 Jane
Press any key to continue . . .
```

Exercise 11

Create a program that will contain an array called names. In Moodle, copy and paste the array data with the girls names (200 names in total) into your program. These names are the 200 most popular girls names in the US last year. Your program should allow the user to enter a name and check if that names appears on the list. If it does, the program will output and appropriate message, similar to as shown below, for example:

```
C:\Windows\system32\cmd.exe
Check if name is on list:
Sofia
Sofia is number 73 on the list
Press any key to continue . . . _
```

Or

```
C:\Windows\system32\cmd.exe
Check if name is on list:
Meryl
The name Meryl is not on the list
Press any key to continue . . .
```

Amend your program so the second array of most popular boys names is also included as a second array (also provided on Moodle). The user should be able to enter a boy's name, a girl's name, or both, and the program will display messages indicating whether the names were among the most popular.

Exercise 12

Create a program that will display information about 4 companies – this program will use the following 3 arrays:

company – This array will hold the names of each company
Microsoft, Apple, Oracle, Amazon

name – This array will hold the names of the company founders
Bill Gates, Steve Jobs, Larry Ellison, Jeff Bezos

employees – This array will hold the number of employees each company has
166475, 147000, 135000, 1298000

Note that the arrays are related to each other – for example, the values stored in index 0 in each of the arrays relate to Microsoft (Microsoft, Bill Gates, 166475), the values stored in index 1 in each of the arrays relate to Apple (Apple, Steve Jobs, 147000) and so on.

You program should create these 3 arrays and produce an output similar to as shown below:

```
C:\Windows\system32\cmd.exe
VIEW COMPANY INFORMATION
============================
COMPANY: Microsoft
FOUNDER: Bill Gates
NUMBER OF EMPLOYEES: 166475
============================

============================
COMPANY: Microsoft
FOUNDER: Bill Gates
NUMBER OF EMPLOYEES: 166475
============================

============================
COMPANY: Microsoft
FOUNDER: Bill Gates
NUMBER OF EMPLOYEES: 166475
============================

============================
COMPANY: Microsoft
FOUNDER: Bill Gates
NUMBER OF EMPLOYEES: 166475
============================
Press any key to continue . . .
```

Add an additional array that stores the year the company was founded, and include that in your output. Use the information to also include the number of years the company has been active:

```
C:\Windows\system32\cmd.exe
COMPANY: Microsoft
FOUNDER: Bill Gates
YEAR FOUNDED: 1975
YEARS ACTIVE: 46
NUMBER OF EMPLOYEES: 166475
============================

============================
COMPANY: Microsoft
FOUNDER: Bill Gates
YEAR FOUNDED: 1976
YEARS ACTIVE: 45
NUMBER OF EMPLOYEES: 166475
============================

============================
COMPANY: Microsoft
FOUNDER: Bill Gates
YEAR FOUNDED: 1977
YEARS ACTIVE: 44
NUMBER OF EMPLOYEES: 166475
============================

============================
COMPANY: Microsoft
FOUNDER: Bill Gates
YEAR FOUNDED: 1998
YEARS ACTIVE: 23
NUMBER OF EMPLOYEES: 166475
============================
Press any key to continue . . .
```

Amend your program so that the user is presented with information and a menu choice when the program runs, eg:

```
VIEW COMPANY INFORMATION
CHOOSE FROM ONE OF THE OPTIONS BELOW
Index 0: Microsoft
Index 1: Apple
Index 2: Oracle
Index 3: Amazon
Enter option: 2
```

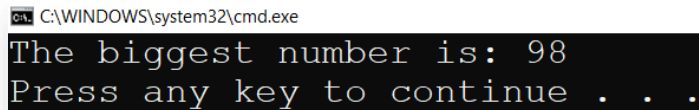The user can choose from one of the options provided and the program should display the relevant information, eg:

```
VIEW COMPANY INFORMATION
CHOOSE FROM ONE OF THE OPTIONS BELOW
Index 0: Microsoft
Index 1: Apple
Index 2: Oracle
Index 3: Amazon
Enter option: 2
============================
COMPANY: Oracle
FOUNDER: Larry Ellison
YEAR FOUNDED: 1977
YEARS ACTIVE: 44
NUMBER OF EMPLOYEES: 135000
============================
CHOOSE FROM ONE OF THE OPTIONS BELOW
Index 0: Microsoft
Index 1: Apple
Index 2: Oracle
Index 3: Amazon
Enter option: 3
============================
COMPANY: Amazon
FOUNDER: Jeff Bezos
YEAR FOUNDED: 1998
YEARS ACTIVE: 23
NUMBER OF EMPLOYEES: 1298000
============================
CHOOSE FROM ONE OF THE OPTIONS BELOW
Index 0: Microsoft
Index 1: Apple
Index 2: Oracle
Index 3: Amazon
Enter option: -1
Press any key to continue . . . _
```

If the user enters -1 (minus 1) as the choice, the program terminates, otherwise the user can continue to choose options.
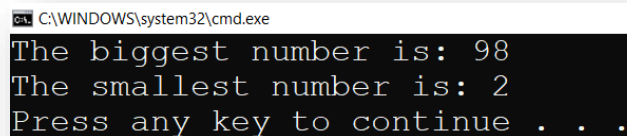
Exercise 13

Write a program using an integer array that will find the largest number in the following set of values:

2, 4, 6, 23, 67, 75, 45, 67, 78, 65, 45, 45, 43, 98, 09, 8, 9, 12

```
C:\WINDOWS\system32\cmd.exe
The biggest number is: 98
Press any key to continue . . .
```
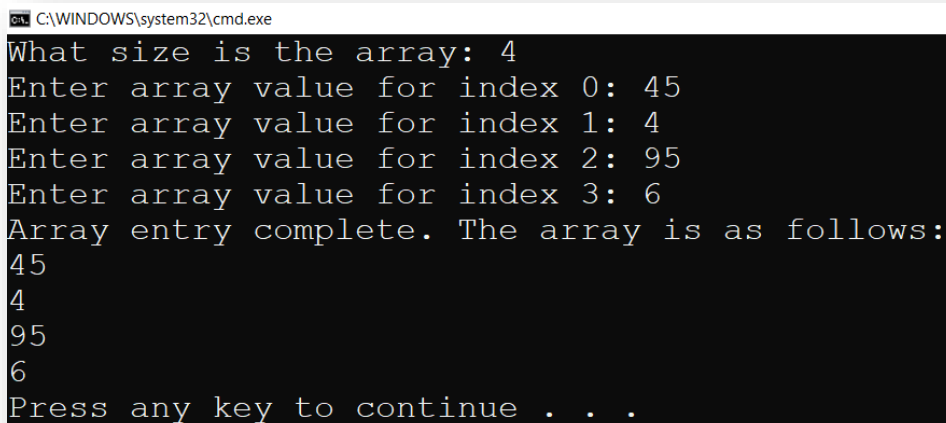
Amend your program so that it also outputs the lowest number, eg:

```
C:\WINDOWS\system32\cmd.exe
The biggest number is: 98
The smallest number is: 2
Press any key to continue . . .
```

Exercise 14

Write a program that will prompt the user to enter a size for an array. The user will then be asked to input numbers for each element of the array. Finally, all the numbers in the array are output to the console. Your output should be similar to as shown below:

```
C:\WINDOWS\system32\cmd.exe
What size is the array: 4
Enter array value for index 0: 45
Enter array value for index 1: 4
Enter array value for index 2: 95
Enter array value for index 3: 6
Array entry complete. The array is as follows:
45
4
95
6
Press any key to continue . . .
```

Amend your program so that it also outputs the biggest number, the smallest number, and the average entered:

```
C:\WINDOWS\system32\cmd.exe
What size is the array: 6
Enter array value for index 0: 22
Enter array value for index 1: 46
Enter array value for index 2: 36
Enter array value for index 3: 45
Enter array value for index 4: 22
Enter array value for index 5: 44
Array entry complete. The array is as follows:
22
46
36
45
22
44
The biggest number is: 46
The smallest number is: 22
The average input is : 35
Press any key to continue . . .
```

Exercise 15

Write a Payroll program that uses the following arrays as fields:

• employeeId. An array of seven integers to hold employee identification numbers.
The array should be initialized with the following numbers:
5658845 4520125 7895122 8777541 8451277 1302850 7580489

• hours. An array of seven integers to hold the number of hours worked by each employee

• wages. An array of seven doubles to hold each employee's gross wages

The program should relate the data in each array through the indexes. For example, the number in element 0 of the hours array should be the number of hours worked by the employee whose identification number is stored in element 0 of the employeeId array. That same employee's pay rate should be stored in element 0 of the payRate array.

Your program should allow the user to specify values for number of hours worked for each employee, the pay rate for each employee, and the wages should contain the hours multiplied by the wages.

```
C:\Windows\system32\cmd.exe

Employee ID 0: 5658845
Employee ID 1: 4520125
Employee ID 2: 7895122
Employee ID 3: 8777541
Employee ID 4: 8451277
Employee ID 5: 1302850
Employee ID 6: 7580489
Choose an index to edit:
2
Employee ID: 7895122
Enter hours worked:
30.5
Enter hourly pay rate:
25.10


Employee ID: 7895122
Hours Worked: 30.5
Pay Rate: 25.1
Wages: 765.5500000000001
Edit another? Y or N?
n
Press any key to continue . . .
```