

DeepSeek Chat

now I want it for lecture 20. This is my practice for Lecture 20 in Java, I want you to make me simple notes based on these notes at first . second I want you to collect a list of questions and answers that I can put into kahoot to practice the answers and not forget the quirks of Lecture 20 in Java . I want you to not miss out on including any code that I have written by the way , mention it all

ARRAY

=====

Java says arrays are objects in Java .

They are created dynamically .

The Objects are made with new keyword .

Arrays are also made with the new keyword .

Array reference points to the Array object in Memory .

1. In Java , just like C and C++ the array is a collection of similar kinds of data elements stored at continuous memory locations .

But in Java there are few points which make arrays different than arrays of C/C++

In Java Arrays are Objects

Because of this we must remember few points about arrays .

1.Since arrays are treated as objects in Java , so they are also ALWAYS CREATED dynamically .

2. TO create an array we use the keyword new , just like we use it to create an object .

3. Since they are dynamically created they live in HEAP AREA. (HEAP IS AT RUNTIMR)

4. Because they are dynamic, they don't have any name, so they require a reference to be connected to them

This reference is called ARRAY REFERENCE

Syntax of Creating an Array in Java

=====

Since arrays are objects, they are created in 2 steps:

1. Creating array reference

<datatype> [] <array_ref_name>; // This is recommended

OR

<datatype> <array_ref_name>[]; // This is Not Recommended

2. Creating the Real/Actual Array

<array_ref_name> = new <data_type> [size]; //size can both be a variable or an int literal

DIAGRAM IN DETAIL HOW TO READ ARRAYS

=====

STEP 1:

int [] arr; // arr is a reference to an array of integers

STEP 2:

arr = new int[10]; //Now java goes to the heap, and it creates an object, an array object.

//the reference will store the address of the array object where it is saved in the HEAP.

//and the array reference is in the stack area of the memory if it is inside a method.

//by default, all the cells inside the array are 0, stored by new keyword.

// we can also merge the above 2 lines into one line also:

//new puts 0 inside the array cells by default, the compiler does default initialization in the

initialization in the

objects made with new. Remember this.

```
int [] arr = new int[10]; //Recommended
```

OR

```
int arr[] = new int[10];
```

Q. Are `int[] arr` and `int arr[]` exactly the same in Java?

A.

For a single reference they are the same:

```
int[] arr;
```

OR

```
int arr[];
```

They both are doing the same thing.

But if we make multiple references then they are different.

```
int [] arr,brr; // all are references
```

```
//both point to an array
```

vs

```
int arr[],brr; // only arr is a reference , brr is a variable , you would need to add  
[] after every variable declaration like arr[], brr[]
```

both here do not point to an array...

The first statement is going to create two array references called as `arr` and `brr`.

The second statement is gonna make 1 reference called `arr` and the `brr` is just an int variable.

Accessing an Array

=====

Syntax:

```
<array_refname>[index_no] = value;  
<var_name> = <array_ref_name>[index_no];
```

Example :

```
int [] arr = new int[5];
```

```
arr[0] = 10;
```

```
arr[1] = 10;
```

```
arr[2] = 10;
```

```
....
```

```
System.out.println (arr[0]);
```

```
System.out.println (arr[1]);
```

```
System.out.println (arr[2]);
```

//WAP to create an integer array of size 'n' should be taken from the user.

Then ask the user to input 'n' elements in the array and display all the elements along with their sum and average .

```
import java.util.Scanner ;
```

```
public class Main
```

```
{
```

```
    public static void main(String [] args) {
```

```
        Scanner sc = new Scanner (System.in);
```

```
        System.out.print ("SumandAvgOfArray \nEnter the array size: ");
```

```
        int arrlen = sc.nextInt ();
```

```
        int [] arr = new int[arrlen];
```

```
        int sum;
```

```
        float avg;
```

```
        avg = sum = 0;
```

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

```
        for(int i = 0; i<arr.length; i++){
```

```
            System.out.print ("Enter the " + (i+1) +"th number: ");
```

```
            arr[i] = sc.nextInt ();
```

```
            sum+=arr[i];
```

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

```

    }
    avg = (float)sum/arr.length ;
    System.out.println ("The sum and average of the numbers of the
array is:");
    System.out.println ("Sum of Array Elements: " + sum);
    System.out.println ("Average of Array Elements: "+ avg);
    }
}

//THERE IS NO NULL value IN THE ARRAY IN JAVA EVEN IN CHAR ARRAYS

```



Simple Notes for Lecture 20 : Arrays in Java

Arrays in Java

- **Definition** : An array is a collection of similar data elements stored in contiguous memory locations .
 - **Key Points**:
 - Arrays in Java are **objects** .
 - They are created **dynamically** using the `new` keyword .
 - Arrays reside in the **heap memory** .
 - Arrays are accessed using a **reference variable** .
-

Syntax for Creating Arrays

1. Declare an Array Reference :

```

java                                                                    Copy
datatype[] arrayRefName; // Recommended
OR
datatype arrayRefName[]; // Not Recommended

```

2. Create the Array Object:

```

java                                                                    Copy
arrayRefName = new datatype[size];

```

3. Combined Declaration and Creation :

3. Combined Declaration and Creation :

java

Copy

```
datatype[] arrayRefName = new datatype[size];
```

Example:

java

Copy

```
int[] arr; // Step 1: Declare array reference
arr = new int[10]; // Step 2: Create array object
```

Accessing Array Elements

• Syntax :

java

Copy

```
arrayRefName[index] = value; // Assign value
int value = arrayRefName[index]; // Retrieve value
```

• Example:

java

Copy

```
int[] arr = new int[5];
arr[0] = 10; // Assign value
System.out.println(arr[0]); // Retrieve value
```

Default Values in Arrays

- When an array is created using `new`, all elements are initialized to default values :

- `int` : `0`
- `float` : `0.0`
- `boolean` : `false`
- `char` : `'\u0000'` (null character)
- Object references : `null`

Array Length

- Use the `length` property to get the size of an array.

- **Example:**

```
java                                                                    Copy

int[] arr = new int[10];
System.out.println(arr.length); // Output: 10
```

Example Program: Sum and Average of Array Elements

```
java                                                                    Copy

import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter the array size: ");
        int arrlen = sc.nextInt();
        int[] arr = new int[arrlen];
        int sum = 0;
        float avg;

        System.out.println();
        for (int i = 0; i < arr.length; i++) {
            System.out.print("Enter the " + (i + 1) + "th number: ");
            arr[i] = sc.nextInt();
            sum += arr[i];
        }

        avg = (float) sum / arr.length;
        System.out.println("The sum and average of the numbers of the array is:");
        System.out.println("Sum of Array Elements: " + sum);
        System.out.println("Average of Array Elements: " + avg);
    }
}
```

Common Mistakes and Fixes

1. Null Values in Arrays:

- Java arrays do not have `null` values for primitive types (e.g., `int`, `char`).
- For object arrays (e.g., `String[]`), elements are initialized to `null`.

2. Array Index Out of Bounds:

- Accessing an index outside the array size throws `ArrayIndexOutOfBoundsException`.

- Always ensure the index is within the range `[0, length-1]`.

3. Multiple Array References :

- Declare multiple array references correctly :

```
java                                                                    Copy

int[] arr, brr; // Both are array references
int arr[], brr; // Only arr is an array reference , brr is an int variable
```

Kahoot Questions and Answers

Array Basics

1. **Q:** How do you declare an array reference in Java?
 - **A:** `datatype[] arrayRefName;`.
2. **Q:** What is the default value of an `int` array element?
 - **A:** `0`.
3. **Q:** What is the output of the following code?

```
java                                                                    Copy

int[] arr = new int[5];
System.out.println(arr[0]);
```

- **A:** `0`.
4. **Q:** How do you get the length of an array?
 - **A:** Use the `length` property (e.g., `arr.length`).
 5. **Q:** What is the output of the following code?

```
java                                                                    Copy

int[] arr = new int[3];
arr[0] = 10;
arr[1] = 20;
System.out.println(arr[2]);
```

- **A:** `0`.

Array Operations

6. **Q:** What is the output of the following code?

java

Copy

```
int[] arr = {1, 2, 3};  
System.out.println(arr.length);
```

◦ A: 3 .

7. Q: What is the output of the following code ?

java

Copy

```
int[] arr = new int[5];  
arr[5] = 10;
```

◦ A: ArrayIndexOutOfBoundsException .

8. Q: What is the output of the following code ?

java

Copy

```
int[] arr = {10, 20, 30};  
int sum = 0;  
for (int i = 0; i < arr.length; i++) {  
    sum += arr[i];  
}  
System.out.println(sum);
```

◦ A: 60 .

9. Q: What is the output of the following code ?

java

Copy

```
int[] arr = new int[3];  
arr[0] = 10;  
arr[1] = 20;  
arr[2] = 30;  
System.out.println(arr[1]);
```

◦ A: 20 .

10. Q: What is the output of the following code ?

java

Copy

```
int[] arr = new int[5];  
System.out.println(arr[3]);
```

◦ A: 0 .

Advanced Array Concepts

11. **Q:** What is the output of the following code ?

```
java Copy

int[] arr = {1, 2, 3};
int[] brr = arr;
brr[0] = 10;
System.out.println(arr[0]);
```

◦ **A:** 10 .

12. **Q:** What is the output of the following code ?

```
java Copy

int[] arr = new int[3];
arr[0] = 10;
arr[1] = 20;
arr[2] = 30;
System.out.println(arr[arr.length - 1]);
```

◦ **A:** 30 .

13. **Q:** What is the output of the following code ?

```
java Copy

int[] arr = {1, 2, 3};
System.out.println(arr[arr.length]);
```

◦ **A:** ArrayIndexOutOfBoundsException .

14. **Q:** What is the output of the following code ?

```
java Copy

int[] arr = new int[5];
System.out.println(arr[2]);
```

◦ **A:** 0 .

15. **Q:** What is the output of the following code ?

```
java Copy

int[] arr = {10, 20, 30};
int sum = 0;
for (int num : arr) {
    sum += num;
}
System.out.println(sum);
```

```
System.out.println(sum);
```

◦ **A:** 60 .

These notes and questions are designed to help you understand and retain the concepts of arrays in Java. Use the Kahoot questions to test your knowledge ! 😊