Mahindra École Centrale
COLLEGE OF ENGINEERING

Object Oriented Programming JAVA

Dr. Prafulla Kalapatapu
Computer Science Engineering
Mahindra Ecole Centrale
prafulla.kalapatapu@mechyd.ac.in

Mahindra
École Centrale
COLLEGE OF ENGINEERING

LANGUAGE FUNDAMENTALS

Prafulla Kalapatapu

Language Fundamentals

Mahindra École Centrale
COLLEGE OF ENGINEERING

1. Identifiers
2. Reserved words
3. Data Types
4. Literals
5. Arrays
6. Type of Variables

Array Construction

Mahindra École Centrale
COLLEGE OF ENGINEERING

- Every array in java is an object, hence we can create by using ‘new’ operator.

  Ex: int[] a = new int[3];

- For every array type corresponding classes are available, but these classes are not applicable for programmer level.

Array Type	Corresponding class name
int []	[I@hashcode
int [][]	[[I@hashcode
double []	[D@hashcode
---	---
---	---

- Hash code is a hexadecimal number

- At the time of construction compulsory we should specify the size otherwise we will get compile time error.

  Ex: int[] a = new int[]; N

  int[] a = new int[6]; Y

- It is legal to have an array with size '0' in java.

  Ex: int[] a = new int[0]; (it is legal)

- If we are specifying array size as -ve int value, we will get runtime exception saying NegativeArraySizeException

  Ex: int[] a = new int[-6];

- To specify array size, the allowed data types are byte, short, int, char. If we are using any other type, we will get compile time error.

  Ex: int a[] = new int['a']; Y

  byte b = 10; int a[] = new int[b]; Y

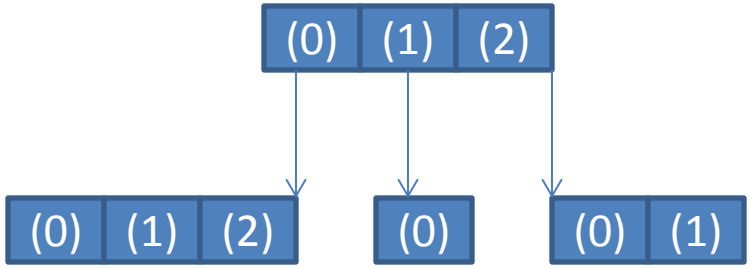
Creation of 2D array

- In java, multi dimensional array are not implemented in matrix form.They were implemented using "array of arrays" concept.

- Advantage

  Memory utilization will be improved.

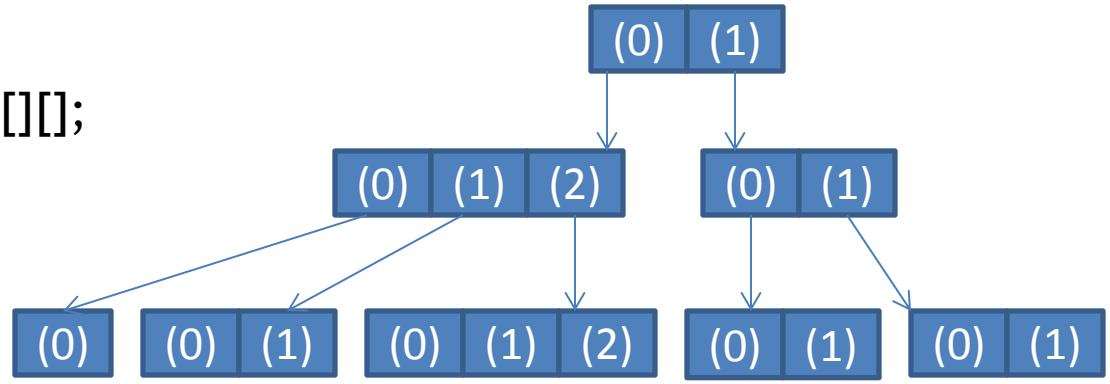
Ex: int[][] a = new int[3][];
a[0] = new int[3];
a[1] = new int[1];
a[2] = new int[2];



Creation of 3D array

Ex:

```
int[][][]  a = new  int[2][][];
a[0] = new  int[3][];
a[0][0] = new  int[1];
a[0][1] = new  int[2];
a[0][2] = new  int[3];
a[1] = new  int[2][2];
```



Examples

Mahindra École Centrale
COLLEGE OF ENGINEERING

Which of the following array declarations are valid ?

`int[] a = new int[];`	N
`int[][] a = new int[3][2];`	Y
`int[][] a = new int[3][];`	Y
`int[][] a = new int[][2];`	N
`int[][][] a = new int[3][4][5];`	Y
`int[][][] a = new int[3][4][];`	Y
`int[][][] a = new int[3][][5];`	N

Array Intialization

Mahindra École Centrale
COLLEGE OF ENGINEERING

- Whenever we are creating an array automatically every element is initialized with default value.

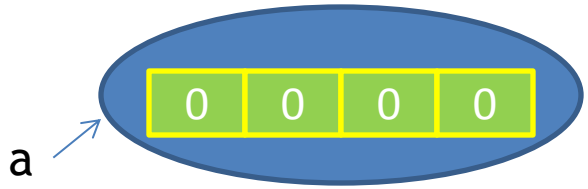
Ex1: int[] a = new int[4];

System.out.println(a);

o/p: [I@hashcode

System.out.println(a[0]);

o/p: 0



Ex2: int[][] a = new int[3][2];

System.out.println(a);

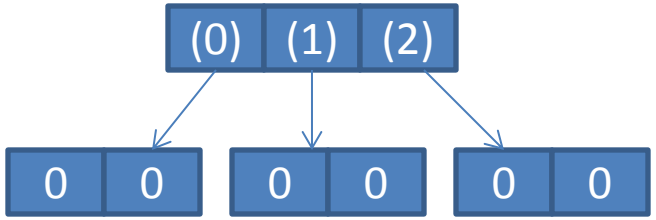
o/p: [[I@hashcode

System.out.println(a[0]);

o/p: [I@hashcode

System.out.println(a[0][0]);

o/p: 0



Ex3: int[][] a = new int[3][];

System.out.println(a);

o/p: [[I@hashcode

System.out.println(a[0]);

o/p: null

System.out.println(a[0][0]);

o/p: NullPointerException

- Once we created an array,every element by default initialized with default values. If we are not satisfied with those default values, then we can assign those with our customized values.

Ex4: int a[] = new int[5];

a[0] = 10;

a[2] = 20;

Ex: int a[] = new int[5];

a[-20] = 30;

Run-time exception : ArrayIndexOutofBoundException

a[10.5] = 20;

Compile-time error : Possible loss of precision(PLP)

- Note: if we are trying to access an array with outof range index, we will get run time exception saying ArrayIndexOutofBoundException.

Array declaration, construction, initialization in a single line

Mahindra École Centrale
COLLEGE OF ENGINEERING

Ex: 1D Array

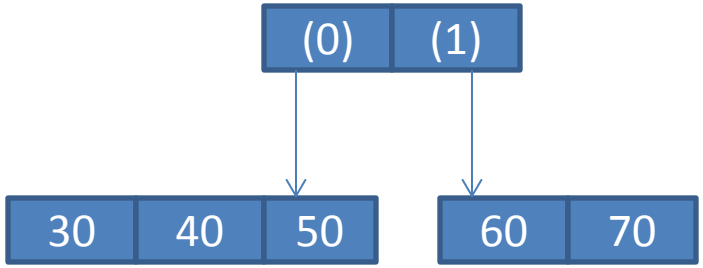
```
int[]  a;            // declaration
a=new  int[3];       // construction
a[0]= 10;
a[1]= 20;            // intialization
a[3]= 30;
```

```
int[]  a = {10, 20, 30};
```


```
char  []a = {'a', 'b', 'c', 'd'};
```

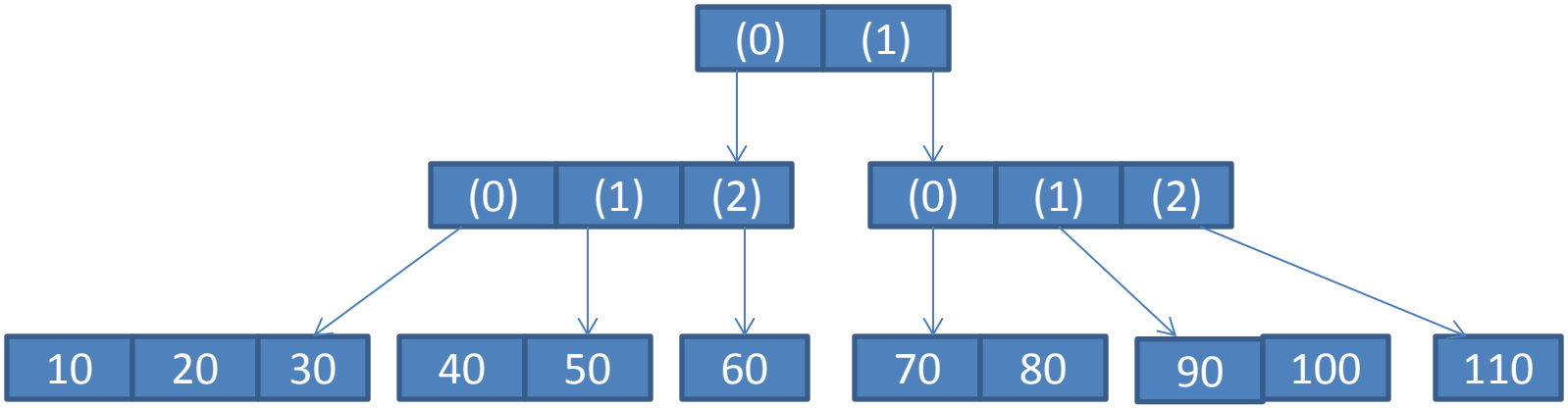
Ex: 2D Array

```
int[][]  a = {{30,40,50},{60,70}};
```



Ex: 3D Array

```
int[][][]  a = { { {10,20,30}, {40,50}, {60} }, { {70,80}, {90,100}, {110} } };
```



Ex:

System.out.println(a[1][2][3]);	N	AIOBE
System.out.println(a[0][1][0]);	Y	40
System.out.println(a[1][0][2]);	N	AIOBE
System.out.println(a[1][1][0]);	Y	90
System.out.println(a[1][1][1]);	Y	100
System.out.println(a[0][0][1]);	Y	20

Note:

- If we want to use short cut, compulsory we should perform declaration, construction and initialization in a single line.
- If we are using multiple lines, we will get compile time error.

Ex: int x;
x=10;
or
int x=10;

} Both valid

int x[] = {10,20,30}; valid

int []x ;
x[] = {10,20,30};

} CE: illegal start of expression

length vs length()

Mahindra École Centrale
COLLEGE OF ENGINEERING

length:

- It is a variable applicable only for arrays
- It represents the size of the array

Ex: int a[]=new int[5];

System.out.println(a.length);

o/p: 5

System.out.println(a.length());

Compile time error

length():

- It is applicable only for String objects

Ex: String s1[]={“hello”,”hi”,”welcome”};

System.out.println(s1.length);

o/p: 3

System.out.println(s1[2].length());

o/p: 7 (“welcome”)

Note:

- In multidimensional array length variable represents only base size, but not total size.

Ex:

```
int[][]  a = new int[6][3];
System.out.println(a.length);
```

o/p: 6

```
System.out.println(a[0].length);
```

o/p: 3

Anonymous Array:

- We can create an array without the name also
- Nameless arrays are called Anonymous arrays

Ex: new int[] {10,20,30,40};

- At the time of Anonymous array creation, we cant specify the size, otherwise we will get compile time error.

Ex: new int[4] {10,20,30,40};
not valid