DAY-19

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MULTI-DIMENSIONAL ARRAY

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Multi\_dimensional arrays are such arrays whose data can be stored in multiple row/columns.

1D array: single row/column

Multi-dimensional arrays are classified into two types:

1. 2-Dimensional array [2D array]

2. 3-Dimensional array [3D array]

2D array [refer the diagram]

Declaring the 2D array:

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int a[][];

int [][]a;

int[][] a;

int[] []a;

int[] a[];

note: all the above combinations are valid.

1. int[] a,b; a->1D b->1D

2. int a[],b; a->1D b-> it is just a variable

3. int a[],b[]; a->1D b->1D

4. int[] a[],b[]; a->2D b->2D

5. int[][] a[],b; a->3D b->2D

6. int[][] []a,b[]; a->3D b->3D

7. int[][] []a,[]b; compilation error

Creation of 2D array:

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declaration : int a[][];

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

initilize : a[0][0] = 10;

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

a[0][1]=20;

Single line(declare,Create, initilize)

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int a[][] ={{10,20,30},{40,50,60}};

2D arrays are classified into two types:

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1. 2D regular array

2. 2D jagged array

1. 2D regular array:

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In this regular array all the rows will have same number of columns.

example:1

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WAP to store and print the marks of students from 3 class rooms where in each class 5 students are presents.

import java.util.\*;

class Demo

{

public static void main(String[] args)

{

int a[][] = new int [3][5];

Scanner sc = new Scanner(System.in);

for (int i=0;i<=2;i++)

{

for (int j=0;j<=4;j++)

{

System.out.println("Enter the marks of student " + j +"of classroom "+i);

a[i][j]= sc.nextInt();

}

}

for (int i=0;i<=2;i++)

{

for (int j=0;j<=4;j++)

{

System.out.print(a[i][j] + " ");

}

System.out.println(" ");

}

}

}

output:

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10 20 30 40 50

60 70 80 90 100

110 120 130 140 150

NOTE:

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int a[] = new int[5];

a.length -> 5

int a[][] = new int[3][5];

a.length ->3

a[i].length ->5

int a[][][] = new int[3][4][5];

a.length -> 3

a[i].length -> 4

a[i][j].length ->5

2. 2D jagged array:

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If the number of columns is not same in each rows then it is called as Jagged array.

2D regular array: 2D jagged array:

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co -> s0 s1 s2 s3 s4 c0 -> s0 s1 s2

c1 -> s0 s1 s2 s3 s4 c1 -> s0 s1

c2 -> s0 s1 s2 s3 s4 c2 -> s0 s1 s2 s3

example for 2D jagged array:

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import java.util.\*;

class Demo

{

public static void main(String[] args)

{

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

a[0] = new int[3];

a[1] = new int[2];

a[2] = new int[4];

Scanner sc = new Scanner(System.in);

for (int i=0;i<=a.length-1;i++)

{

for (int j=0;j<=a[i].length-1;j++)

{

System.out.println("Enter the marks of student " + j +"of classroom "+i);

a[i][j]= sc.nextInt();

}

}

for (int i=0;i<=a.length-1;i++)

{

for (int j=0;j<=a[i].length-1;j++)

{

System.out.print(a[i][j] + " ");

}

System.out.println(" ");

}

}

}

output:

-------

10 20 31

41 51

61 71 81 91

example:

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class Demo1

{

public static void main(String[] args)

{

int a[][]= new int [3][5];

System.out.println(a.length); --> 3

System.out.println(a[0].length); --> 5

System.out.println(a[1].length); --> 5

System.out.println(a[0][0].length); --> error

}

}

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3 Dimensional array [3D array]

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Declaration of 3D array:

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int [][][] a;

int a[][][];

int[][] a[];

int[] [][]a;

int[] []a[];

note: all the above mentioned declarations are valid.

Creation of 3D array:

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Declaration : int a[][][];

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

initilize : a[0][0][0]=10;

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

single line(declare, create , initilize)

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int a[][][] = {{{10,20},{30,40},{50,60}} ,{{70,80},{90,100},{110,120}} ,{{130,140},{150,160},{170,180}}}

example for 3D regular array:

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import java.util.\*;

class Demo

{

public static void main(String[] args)

{

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

Scanner sc = new Scanner(System.in);

for (int i=0;i<=a.length-1;i++)

{

for (int j=0;j<=a[i].length-1;j++)

{

for (int k=0;k<=a[i][j].length-1;k++)

{

System.out.println("Enter the marks of student " + k +"of the classroom "+j+" from the school " +i);

a[i][j][k]= sc.nextInt();

}

}

}

for (int i=0;i<=a.length-1;i++)

{

for (int j=0;j<=a[i].length-1;j++)

{

for (int k=0;k<=a[i][j].length-1 ;k++ )

{

System.out.print(a[i][j][k] + " ");

}

System.out.println(" ");

}

}

}

}

output:

------

10 20 30

40 50 60

70 80 90

100 11 12

13 14 15

16 17 18

example for 3D jagged arrary:

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import java.util.\*;

class Demo

{

public static void main(String[] args)

{

int a[][][] = new int [2][][];

a[0] = new int[3][];

a[0][0] = new int[2];

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

a[0][2] = new int[2];

a[1] = new int[2][];

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

a[1][1] = new int[4];

Scanner sc = new Scanner(System.in);

for (int i=0;i<=a.length-1;i++)

{

for (int j=0;j<=a[i].length-1;j++)

{

for (int k=0;k<=a[i][j].length-1;k++)

{

System.out.println("Enter the marks of student " + k +"of the classroom "+j+" from the school " +i);

a[i][j][k]= sc.nextInt();

}

}

}

for (int i=0;i<=a.length-1;i++)

{

for (int j=0;j<=a[i].length-1;j++)

{

for (int k=0;k<=a[i][j].length-1 ;k++ )

{

System.out.print(a[i][j][k] + " ");

}

System.out.println(" ");

}

}

}

}

output:

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10 20

30 40 50

60 70

80 90 100

110 120 130 140

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