

Collection Framework

collection - group of things

Collection Framework is a well designed set of interface and classes for storing and manipulating group of data as a single unit, a collection.

CF contains

1. interface
2. implemented classes / implementation
3. Algorithm / algorithm based method

our normal array -

`int a[];` $\left\{ \begin{array}{l} \text{int a[];} \\ \times \end{array} \right. \quad \left\{ \begin{array}{l} \text{int a[];} \\ \text{a = new int[100];} \end{array} \right. \quad \left\{ \begin{array}{l} \text{int a[] = new int[100];} \end{array} \right.$

Problems 1. size, we can not shrink and grow array dynamically

2. Array is collection of homogeneous data, Array does not provide facility to store heterogeneous data.

3. Operation (insertion, remove, sort, searching), for this operations it does not have specific methods

→ that's why we introduce Framework

its classes are ADT

Abstract data type



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2023/04/21 01:50

Framework

it provides a lot of inbuild methods through which we can do tasks (i.e. sorting, maxelement, minelement) very easily, just by calling that methods.

Then the question is 😊? \Rightarrow इन्हें लिखने lengthy & complex programs - like insertion sort, bubble sort, ..., maxvalutind, mintind, searching.
ये अब क्यों किया, जब हम directly इसकी methods के use कर सकते हैं तो।

through framework \Rightarrow space complexity reduces ↓
But time complexity increases?

If we use dynamic array \Rightarrow our program will execute a little bit slower in comparison of our program which have used normal array.

in the program where we have confirmation of Array size then we must use normal array.

Interface List allows duplicate value.

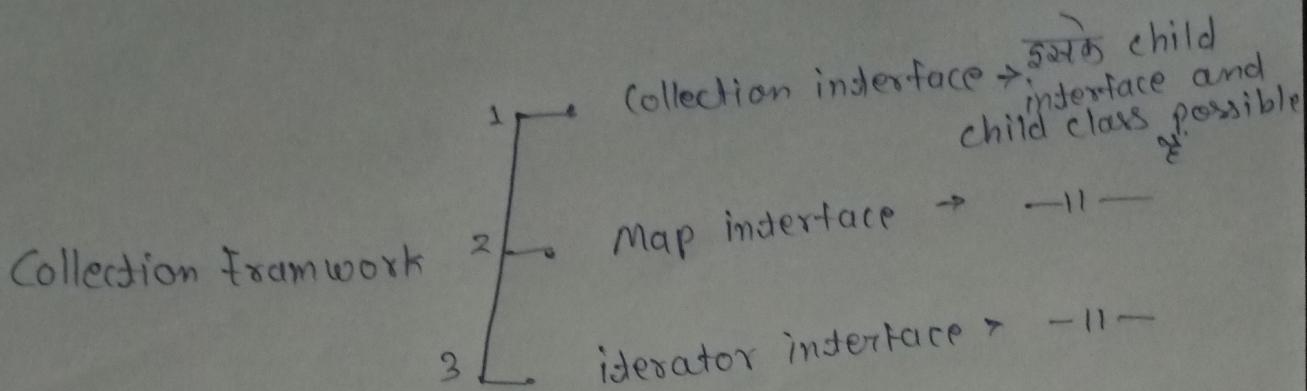
Set interface does not allow duplicate value.



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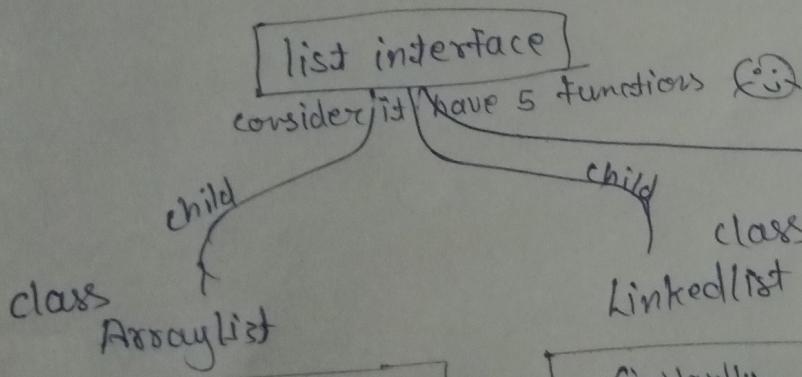
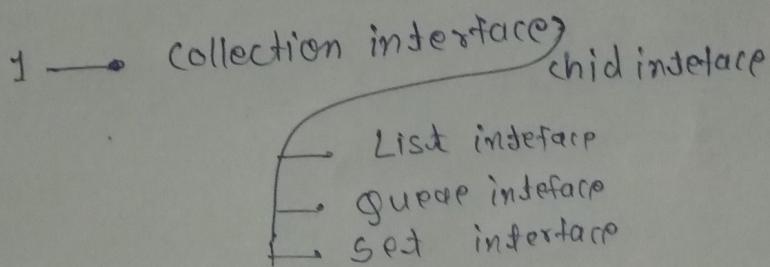
2023/04/21 01:50

Collection Framework contains three Interfaces



for collection hierarchy
visit java note

collection.docx



5 functions के name वही रहेंगे
ये अपनी ओर से
उन्हें अलग defn. देगी,

for e.g.

~~sort();~~ sort();

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Similarly
this class
will give
defn. to that fun

Similarly
child class भी
5 function को
override करेगी

sort();

या उपने according
definition होती है।

या name
तो जबकि पर
होती है।

sort();

vector
class और
acc. def. होती है।

2023/04/21 01:50

Date - 14/04/2023

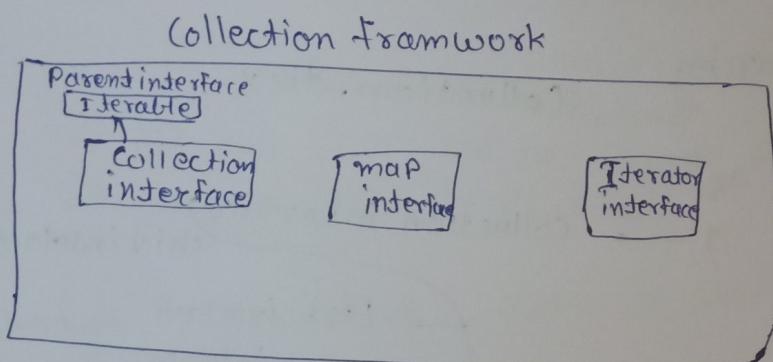
2023/04/22 10:19

Collection does notes

read notes line by line.

Confusing point 1.

- What is the difference between collection framework and collection interface.



Collection interface
is part of
collection
interface.

Confusing point 2 \Rightarrow Iterable interface / Iterator interface

Iterable interface
is a part of parent
interface of collection
interface.

Iterator interface is
a root interface of
collection framework.

Map interface \Rightarrow

Collection interface \Rightarrow data stores in collection interface in form of index.

data	Raj	Kiran	Shanu
index	0	1	2

pairing \rightarrow index to value. in coll. Inter. index is already available. we just only give values.

ADT have structure for this values,
how the values will be stored.

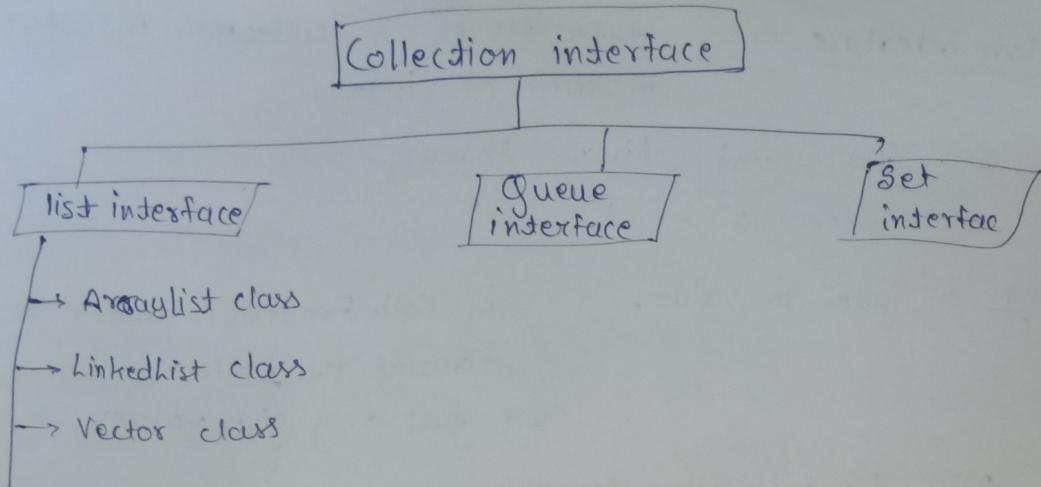
Map interface \Rightarrow in map interface

we provide index (key) as well as value. we provide both

pairing \rightarrow
key-value

data (value)	Indore	Bhopal	Ujjain
key (index)	city 1	city 2	city 3

Iterator interface \Rightarrow this interface helps to both collection interface and map interface.



in list \Rightarrow we can store heterogeneous data

JavaFolder / Java Collections \star Collection1.java

- \star Collection2.java methods \Rightarrow add method
 iterator method
- \star CollectionMthds3.java

ArrayList - it uses a dynamic array to store the duplicate element of different data types.

most important

Iterator method \Rightarrow returns object of Iterator interface

with this object

we can iterate all the elements of our list

Collaboration

here collection interface & Iterator interface

Exception handling

WrapperE1.java

Collection1.java

justemor.java

WrMethods.java

```

1
2 package JavaCollections;
3 import java.util.*;
4 class Collection1{
5
6     public static void main(String[] args)
7     {
8         ArrayList<String> list=new ArrayList<String>(); /Collection1.java:6:
9
10        list.add("Rvi");                                // Adding object in arraylist
11
12        list.add("Ajay");
13        list.add("Ravi");
14        list.add("Vijay");
15
16        // Traversing list through iterator
17
18        Iterator itr = list.iterator();
19        while(itr.hasNext())
20        {
21            System.out.println(itr.next());
22        }
23
24    }
25 }
```

Command Prompt

symbol: class Collection1
location: class Collection1.java:6: Collection1

symbol: class ArrayList
location: class Collection1.java:16: ArrayList

symbol: class Iterator
location: class Collection1.java:16: Iterator

C:\Users\Shubhams-PC\JavaCollections\src\JavaCollections\Collection1.java:2: error: package JavaCollections does not exist
^
1 error

C:\Users\Shubhams-PC\JavaCollections\src\JavaCollections\Collection1.java:2: error: package JavaCollections does not exist

C:\Users\Shubhams-PC\JavaCollections\src\JavaCollections\Collection1.java:2: error: package JavaCollections does not exist
Rvi
Ajay
Ravi
Vijay

C:\Users\Shubhams-PC\JavaCollections\src\JavaCollections\Collection1.java:2: error: package JavaCollections does not exist



```
Collection1.java x | Collection1.java x | Collection2.java x | JustError.java x

package JavaCollections;
import java.util.*;

class Collection2{
    public static void main(String[] args)
    {
        List<Integer>numbers = new ArrayList();
        numbers.add(1);
        numbers.add(2);
        numbers.add(3);
        System.out.println("List:" + numbers);

        int number = numbers.get(2);
        System.out.println("Accessed Element :" + number);

        int removedNumber = numbers.remove(1);
        System.out.println("Removed element : " + removedNumber);
    }
}
```

Methods of List

CollectionMthds3.java

add() ↽

notes → Collection.docx

addAll() ↽

get() ↽

all the methods are used

iterator() ↽

in collectionMthds3.java

set() ↽

remove() ↽

and you can understand it
through notes. collection.docx

removeAll() ↽

clear() ↽

size() ↽

toArray() ? ↽

contains() ↽

Date - 20/04/2022

we can use toArray() method by two ways.

1. with parameter (recommended)

2. without parameter

File CollectionMthds4.java

```
String arr[] = new String [l2.size()];
```

l2.toArray(arr);

here l2 is our source array (dynamic array / list)

and arr is our destination array (natural array)

here our result
save in arr

files? collectionMthds4-1.java
collectionMthds4-2.java



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2023/04/28 08:05

```

public static void main(String[] args)
{
    List<Integer>numbers = new ArrayList(); // Integer == WrapperClass ,
    List<Integer>numbers2 = new ArrayList(); //here instance is of List interface and object is of ArrayList (l
// add() method
    numbers.add(1);numbers.add(2);numbers.add(3);
    System.out.println("List:" + numbers);
// addAll() method
    numbers2.addAll(numbers);
    System.out.println("List 2 : " + numbers2);
//use of size method
    System.out.println("The length of our second list is " + numbers2.size());
// get method
    int number = numbers.get(2);
    System.out.println("Accessed Element :" + number);
// contains() method
    System.out.println("is your list contains 99 ? Ans = " + numbers2.contains(99));
// set() method
    numbers2.set(2,66);
// iterator() method
    Iterator it = numbers2.iterator();
    System.out.println("your second list is now after set() method ");
    while(it.hasNext())
        System.out.println(it.next());
// remove() method
    int removedNumber = numbers.remove(1);
    System.out.println("Removed element : " + removedNumber);
// removeAll() method
    numbers2.removeAll(numbers2);
    System.out.println("After removeAll() our list 2 is " + numbers2);
}

```

Command Prompt

Note: CollectionMthds3.java uses L
Note: Recompile with -Xlint:unchecked
C:\Users\Shubhams-PC\Desktop\javafol
List:[1, 2, 3]
List 2 : [1, 2, 3]
The length of our second list is 3
Accessed Element :3
is your list contains 99 ? Ans = f
your second list is now after set()
1
2
66
Removed element : 2
After removeAll() our list 2 is []

CollectionMthds3.java

CollectionMthds3.java

untitled

Mainover.java

CollectionMthds4.java

```

1 package JavaCollections;
2 import java.util.ArrayList;
3 class CollectionMthds4{
4
5     public static void main(String[] args)
6     {
7         ArrayList<String> l2 =new ArrayList<>();
8         // Add elements in the ArrayList
9         l2.add("Rikky");
10        l2.add("Sourabh");
11        l2.add("nidhi");
12        System.out.println("ArrayList : " +l2);
13
14        // create a new array of String type
15        // size of array is same as the ArrayList
16        //use any 1 of following two ways
17        // String arr[] = new String[l2.size()];
18        // or a little easy way
19        String arr[] = new String[l2.size()];
20        // convert ArrayList into an array;
21        l2.toArray(arr);
22
23        // print all elements of the array
24        System.out.println("my new Array : ");
25
26        for(String item:arr)
27            System.out.println(item);
28
29    }
30
31 }
```

Command Prompt

Microsoft Windows [Version 10.0.18362]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Shubhams-PC>cd C:\Users\Shubhams-PC\Desktop\javafolder

C:\Users\Shubhams-PC\Desktop\javafolder>javac CollectionMthds4.java
error: file not found: CollectionMthds4.java
Usage: javac <options> <source files>
use --help for a list of possible options

C:\Users\Shubhams-PC\Desktop\javafolder>

C:\Users\Shubhams-PC\Desktop\javafolder>java CollectionMthds4
ArrayList : [Rikky, Sourabh, nidhi]
my new Array :
Rikky
Sourabh
nidhi

C:\Users\Shubhams-PC\Desktop\javafolder>

Line 25, Column 1



Type here to search



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1

2

3

\$ 4

% 5

6

& 7

8

9

0

2023/04/20 14:48

Second way not recommended

file - collectionMthd5.java

Object[] obj = l.toArray();

without parameters

Object type or array

Object[] obj

Object data type means ⇒

it does not have any specific
data type .(like Integer, Float ...)



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2023/04/28 08:05

```
1 package JavaCollections;
2 import java.util.ArrayList;
3
4 public class CollectionMthds5{
5
6     public static void main(String[] args)
7     {
8         ArrayList<String> l1 = new ArrayList<>();
9
10    // Add elements in the ArrayList
11    l1.add("rikky");
12    l1.add ("sourabh");
13    l1.add("nidhu");
14    System.out.println("ArrayList : "+l1);
15    // convert Arraylist into an array
16    // the method has no parameter
17
18    Object obj[] =l1.toArray();
19
20    // print all elements of the array
21    System.out.println("my new Array : ");
22    for(Object item : obj)
23        System.out.println(item);
24
25    }
26 }
```

9th Command Prompt

```
ArrayList : [Rikky, Sourabh, n  
my new Array :  
Rikky  
Sourabh  
nidhi
```

```
C:\Users\Shubham-PC\Desktop\java  
CollectionMthds5.java:18: error:  
    Object obj[] = l1.toArray();
```

1 error

```
C:\Users\Shubham-PC\Desktop\javafe  
CollectionMthds5.java:21: error: ca  
    System.out.println("my new Arra
```

```
symbol: method println(String)
location: variable out of type Pri
1 error
```

```
C:\Users\Shubhams-PC\Desktop\javafolder  
C:\Users\Shubhams-PC\Desktop\javafolder  
ArrayList : [rikky, sourabh, nidhu]  
my new Array :  
rikky  
sourabh  
nidhu
```

C:\Users\Shubhams-PC\Desktop\javafolder>

Line 19, Column 1



R

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2023/04/20 15:03

Methods of collection class → sort, max, min

Collectionmethd.java

```
class _____  
{ psvm _____ }
```

```
List <String> list = new ArrayList();
```

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

```
for ( int i=0 ; i<5 ; i++ )
```

```
{ list.add ( sc.nextLine() ); }
```

```
sop ("Our list is :" + list );
```

```
Collections.sort ( list );
```

```
Collections.sort ( list , Collections.reverseOrder() );
```

```
S.O.P ( "Sorted List :" + list );
```

```
S.O.P ( "max element :" + Collections.max ( list ) );
```

```
S.O.P ( "min element :" + Collections.min ( list ) );
```

collections is a class

- * sorting by default based on bubblesort.



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2023/04/28 08:08

```
File Edit Selection Find View Goto Tools Project Preferences Help  
CollectionMthds3.java > Collectionmthd.java  
  
1 package JavaCollections;  
2 import java.util.*;  
3 class Collectionmthd{  
4  
5     public static void main(String[] args)  
6     {  
7  
8         List <String> list = new LinkedList();  
9         Scanner sc = new Scanner (System.in);  
10        System.out.println( "Enter list elements ");  
11        for(int i = 0;i< 3 ; i++ )  
12        {  
13            // String s1 = s.nextLine();  
14            list.add(sc.nextLine());  
15        }  
16  
17        System.out.println("List : " + list);  
18        // will sort the String in assending order  
19        Collections.sort(list);  
20        Collections.sort(list,Collections.reverseOrder());  
21  
22        System.out.println("Sorted List : " + list);  
23        System.out.println("max element : "+ Collections.max(list));  
24        System.out.println("min element : "+ Collections.min(list));  
25  
26    }  
27 }
```

Command Prompt

```
location: class Collectionmthd  
Note: Collectionmthd.java uses unchecked  
Note: Recompile with -Xlint:unchecked  
2 errors
```

```
C:\Users\Shubham-PC\Desktop\javafolder  
Collectionmthd.java:15: error: cannot -  
list.add(sc.nextLine());
```

```
symbol:   method nextLine()
location: variable sc of type Scanner
Note: Collectionmthd.java uses unchecked
Note: Recompile with -Xlint:unchecked
1 error
```

```
C:\Users\Shubhams-PC\Desktop\javafold  
Note: Collectionmthd.java uses unche  
Note: Recompile with -Xlint:unchecked
```

```
C:\Users\Shubhams-PC\Desktop\javafold  
Enter list elements  
Raj  
er Radha
```

Rani
List : [Raj , Radha, Rani]
Sorted List : [Rani, Raj , Radha]
max element : Rani
min element : Radha

C:\Users\Shubham-PC\Desktop\javafo]



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28 / APR / 2022

Important methods of Collections class

- ↳ sort - by default follows bubble sort Algorithm
 - ↳ min
 - ↳ max
 - ↳ binarySearch -
 - ↳ copy - # CollectionsClsmethd.java
- * Collection. copy (destinationlist , sourcelist);
- as a argument we are passing a list and after process our result is also stored in that list

binarySearch method \Rightarrow

CollectionsClsmethd.java
CollectionsClsmethd2.java (Mod)

Collections. binarySearch (arraylist , keyelement)

if our arraylist is $\Rightarrow [32, 67, 98, 100]$

when we pass 67 we will get index number 1 , for 100 $\Rightarrow 3$
similarly for 98 $\Rightarrow 2$, for 32 $\Rightarrow 0$

But what happen when we pass a element that is not present in arraylist .

for binary search we give a sorted arraylist

if we pass value that is not present in arraylist then it provides a special value with (-) sign .

for eg if we give 97 .

and our list = $[32, 67, 98, 100]$

if 97 was present its deserving index would be 2 , but not present so take

add -1 in it after put a (-) sign always (-) do des. index + 1 then

$$-2 + (-1) \Rightarrow -2 - 1$$

$$-3$$

$$2 + 3$$

$$3$$

$$-3$$

another way to simply calculate

$$\text{for } 20 \Rightarrow -0 - 1 = -1$$

$$\text{for } 99 \Rightarrow -3 - 1 = -4$$

$$\text{for } 95 \Rightarrow -2 - 1 = -3$$

$$\text{for } 100 \Rightarrow -1 - 1 = -2$$

AI DUAL CAMERA
Shot by Nidhu - 4 + -1 = -5

2023/04/29 00:12

```
CollectionMthds3.java x CllctionsCIsMthd.java Collectionmthd.java | ArraysMthd.java x | CollectionMthds4.java | CollectionMthds4.java  
package JavaCollections;  
import java.util.*;  
public class CllctionsCIsMthd{  
  
    public static void main(String[] args){  
        // create object of ArrayList  
        ArrayList<Integer> arrLis = new ArrayList<>();  
  
        //Add elements  
        arrLis.add(32) ;  
        arrLis.add(67);  
        arrLis.add(98);  
        arrLis.add(100);  
  
        // print ArrayList  
        System.out.println("ArrayList :" +arrLis);  
        // Get the element of the arraylist  
  
        int index = Collections.binarySearch(arrLis, 67);  
  
        System.out.println("Element at index - " + index);  
    }  
}
```

Command Prompt

```
Microsoft Windows [Version 10.0.18362.1256]  
(c) 2019 Microsoft Corporation. All rights reserved.  
C:\Users\Shubhams-PC>cd C:\Users\Shubhams-PC>  
C:\Users\Shubhams-PC\Desktop\javafolder>java  
error: no source files  
C:\Users\Shubhams-PC\Desktop\javafolder>java  
error: no source files  
C:\Users\Shubhams-PC\Desktop\javafolder>java  
error: invalid flag: -  
Usage: javac <options> <source files>  
use --help for a list of possible options  
C:\Users\Shubhams-PC\Desktop\javafolder>java  
C:\Users\Shubhams-PC\Desktop\javafolder>java  
ArrayList :[32, 67, 98, 100]  
Element at index - 1  
C:\Users\Shubhams-PC\Desktop\javafolder>
```

```

1 package JavaCollections;
2 import java.util.*;
3
4 class CollectionsClsMthds{
5
6
7     public static void main(String[] args)
8     {
9         List<String> list = new ArrayList(3);
10        List<String> list2 = new ArrayList(3);
11
12        Scanner sc = new Scanner (System.in);
13        System.out.println("Enter first list elements ");
14
15        for(int i=0;i<3;i++)
16            list.add(sc.nextLine());
17
18        list2.add("Rikky");
19        list2.add("hritik");
20        list2.add("tiger");
21
22        System.out.println("list = " +list);
23        System.out.println("2nd list = "+list2);
24        // will sort the string in ascending order
25        Collections.sort(list);
26        Collections.sort(list , Collections.reverseOrder());
27        Collections.copy(list , list2);
28
29        System.out.println("Sorted List : "+list);
30        System.out.println("max element " + Collections.max(list));
31        System.out.println("updated list 1 = "+list);

```

Command Prompt

Caused by: java.lang.ClassNotFoundException: Ja
C:\Users\Shubhams-PC\Desktop\javafolder>java Ja
Enter first list elements
5
44
76
list = [5, 44, 76]
2nd list = [Rikky, hritik, tiger]
Sorted List : [Rikky, hritik, tiger]
max element tiger
updated list 1 = [Rikky, hritik, tiger]



if our arraylist is

$$[-34, -13, -12, -1]$$

sorted list in ascending order.

you pass value -35 then $-0 + -1 \Rightarrow -1$

-34 then 1

-10 then $-3 + -1 = -4$

-5 then $-3 + -1 = -4$

5 then $-4 + -1 = -5$

if our arraylist is

$$[-1, -39, -55, -111]$$

sorted list in descending order

and you pass key value

$$-222 \Rightarrow -4 + -1 = -5$$

$$33 \Rightarrow -0 + -1 = -1$$

$$-44 \Rightarrow -2 + -1 = -3$$



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2023/04/29 00:12

CollectionMthds CllectionsClsMthd.java

CllectionsClsMthd2.java

CollectionsClsMthds.java

Collectionmthd.java

ArraysMthd.java

CollectionMthds4.java

```

package JavaCollections;
import java.util.*;
public class CllectionsClsMthd2{

    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        List<Integer> list = new ArrayList(5);
        System.out.println("Enter list's 5 elements of integer type ");
        for(int i = 0 ;i<5;i++)
        {
            list.add(sc.nextInt());
        }
        // using binarySearch();, for this we need sorted list so
        Collections.sort(list);

        System.out.println("Enter the element that you want to search");
        int x = sc.nextInt();
        int y = Collections.binarySearch(list , x);

        if(y>=0)
            System.out.println("The index of your searching element "+x+" is "+y);
        else
            System.out.println("the element "+x+" is not present in the our list ");

    }
}

```

Command Prompt

Note: Recompile with -Xlint:unchecked for detail

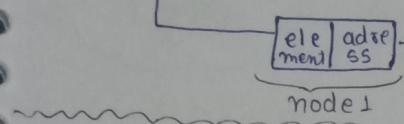
C:\Users\Shubhams-PC\Desktop\javafolder>java Ja
Enter list's 5 elements of integer type
4
53
44
2
5

Enter the element that you want to search
7
the element 7 is not present in the our list

C:\Users\Shubhams-PC\Desktop\javafolder>

LinkedList

head node
/variable
start

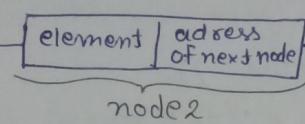
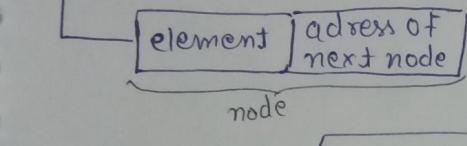


variable/Hn.

start

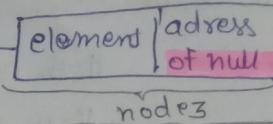
variable/Hn.

start



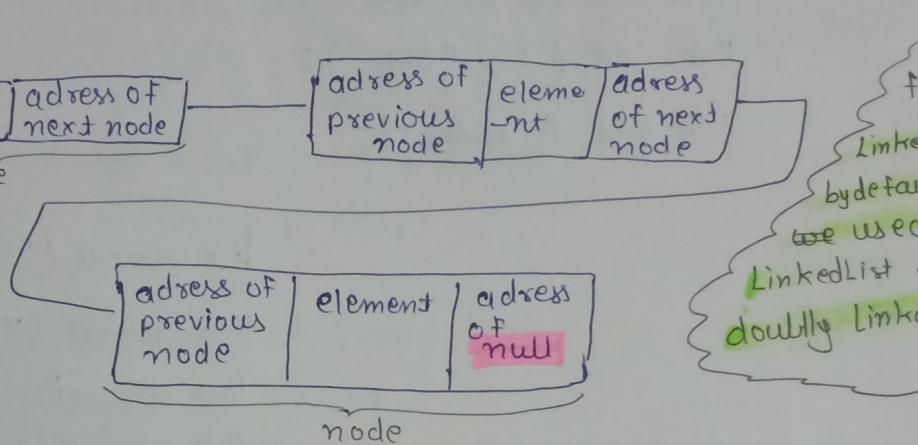
Singly linkedlist

node2



node3

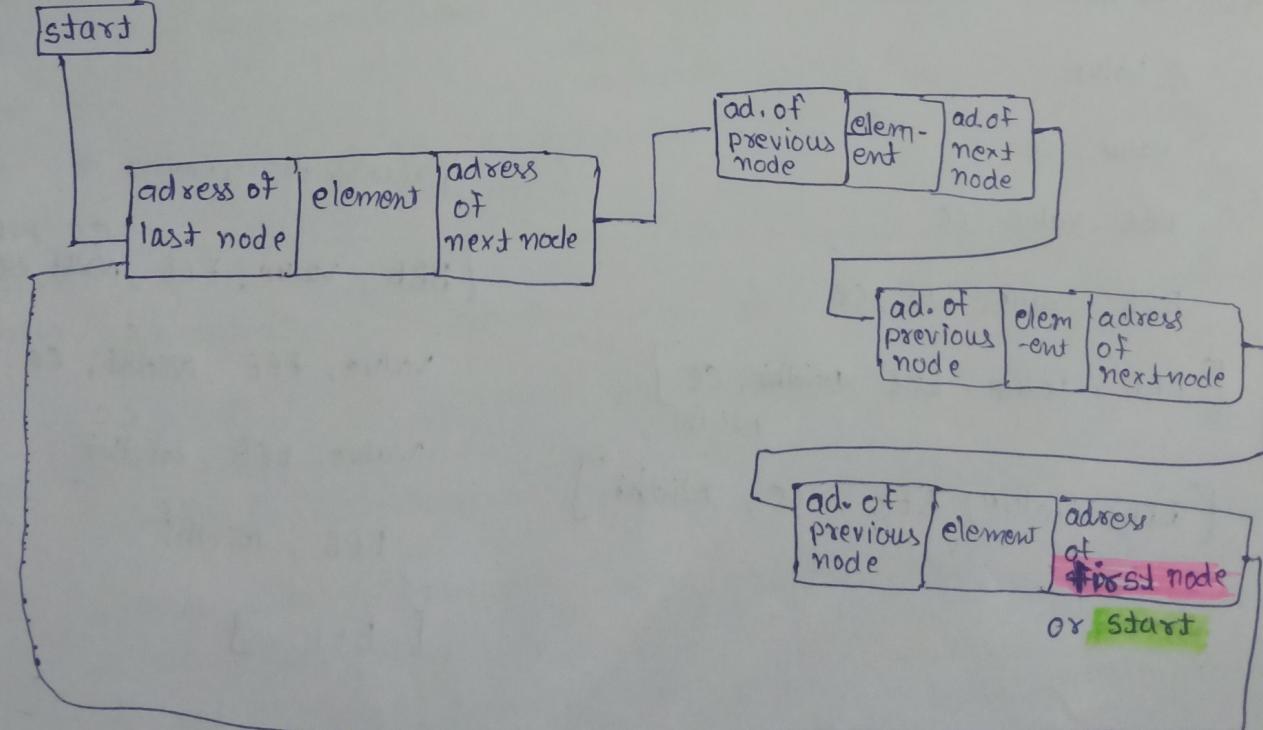
doubly linkedlist



for
LinkedList
by default
are used
LinkedList is
doubly linkedlist

Head node/variable

start



Circular Linkedlist

why doubly ? in collection framework.



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2023/04/29 00:12

LinkedList does not use index.

address is used.

methods of LinkedList

```
listt.add ("value");
listt.addLast ("CC");
listt.addFirst ("BBB");
listt.add (2, "EEE");
listt.add ("Nidhi");
```

addFirst allowed only in
addLast Linklist
why?

```
listt.remove ("BBB");
listt.remove (3);
listt.removeFirst();
listt.removeLast();
```

Process \Rightarrow Add

Value

value, CC

BBB, value, CC

BBB, value, EEE, CC

[BBB, value, EEE, ~~Nidhi~~, CC]
Nidhi

[BBB, value, EEE, CC, Nidhi]

Process \Rightarrow remove \Rightarrow

[BBB, value, EEE, ~~CC~~, ~~Nidhi~~]

value, EEE, ~~CC~~, ~~Nidhi~~, CC

Value, EEE, ~~CC~~, ~~Nidhi~~

EEE, ~~CC~~, ~~Nidhi~~

[EEE]

```
1 import java.util.*;
2
3 // Main class
4 public class A{
5
6     // Driver code
7     public static void main(String args[])
8     {
9         // Creating object of the
10        // class linked list
11        LinkedList<String> ll = new
12        LinkedList<String>();
13
14        // Adding elements to the linked list
15        ll.add("A");
16        ll.add("B");
17        ll.addLast("C");
18        ll.addFirst("D");
19        ll.add(2, "E");
20
21        System.out.println(ll);
22
23        ll.remove("B");
24        ll.remove(3);
25        ll.removeFirst();
26        ll.removeLast();
27
28        System.out.println(ll);
29    }
30
31 }
```

C:\Users\Shubhams-PC\Desktop\javafolder\ClLaddremove.java - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

CollectionMthds3.java ClLaddremove.java

```
package ClcsnLinkedList;
import java.util.*;

class ClLaddremove{

    public static void main(String[] args)
    {
        // object of linkedList class , referece of it's parent interface List
        LinkedList<String> ll = new LinkedList<>();

        // diff add methods of LinkedList class
        ll.add("am");
        ll.addFirst("i");
        ll.addLast("yadav");
        ll.add(2,"Er.");
        ll.add("Nidhi");

        // printing list through iterator method
        Iterator itr = ll.iterator();
        while(itr.hasNext())
            System.out.print(itr.next() + " ");
        System.out.println();

        // diff remove methods of LinkedList class
        ll.remove("am");
        ll.removeFirst();
        ll.remove(0);
        ll.removeLast();

        Iterator it = ll.iterator();
        while(it.hasNext())
            System.out.print(it.next());
    }
}
```

Command Prompt

C:\Users\Shubhams-PC\Desktop\javafolder>java ClcsnLinkedList

i am Er. yadav Nidhi

C:\Users\Shubhams-PC\Desktop\javafolder>

Line 30, Column 33



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2023/04/23 11:47

24/4/23

Collection Framework, is a framework which have lots of classes, methods, interfaces.

API → Application Programming Interface

GUI → Graphical user interface.

CLI → Command Line interface (Program that we made by jdk are CLI based)

GUI के ~~through~~ based java programs बनाने के लिए
we use netbeans, eclips.

API is a concept of Java, that merge our program to the external concept.

External concept
means coll. from.

we use some
classes &
interfaces

in our program

Application ⇒ lots of, Programs
| classes,

ArrayList - Dynamic Array ←

Dynamic mean expandable
we have no need to
give size.

LinkedList - Dynamic List/Array ←

Generally in Data Structure LinkedList do not use indexing.

but in collection framework, we positioned elements ← according to the index. why we use here, bcoz address का use नहीं हो सकते (security purpose) & so we can not reveal address of any node.

In CL.FR. we use various inbuild methods

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In DS we don't need it. 2023/04/29 00:13

CLLmethget.java package - Cllcslinkedlist

list = [Har Har Mahadev]

for (int i=0; i < list.size(); i++)

s.o.p (list.get(i) + " ");

} it will display
list
through for loop

for (String str = : list)

s.o.p (str + " ");

} through for
each loop
display list.

str is reference variable/object,
contains one value at one time, bcz of for each loop
str will point next element

CLLmethdtoArray.java

CLLtoArrayp.java

toArray method
available in two
variant → • recommended
• with parameter

Integer[] arr = new Integer[list.size()]; • without parameter

list.toArray (arr);

Object[] a = list.toArray ();

after converting - into array we can still use iterator
method

CLLtoArrayp.java

C:\Users\Shubhams-PC\Desktop\javafolder\CLLtoArrapp.java - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

CLLaddremove.java CLLmthtoArray.java CLLBook.java CLhasset.java HashSet1.java HashSet2.java HashSet3.java

```
1 package ClcsnLinkedList;
2 import java.util.*;
3 class CLLtoArrapp{
4
5     public static void main(String[] args)
6     {
7         LinkedList<Integer> list = new LinkedList();
8         list.add(123);
9         list.add(12);
10        list.add(11);
11        list.add(1134);
12        System.out.println("our LinkedList : "+list);
13
14    // toArray() method with parameter , it is a method of List interface;
15    Integer[] arr = new Integer[list.size()];
16    list.toArray(arr);
17    System.out.println("After converted LInkedList to Arraay : ");
18    for(int element : arr)
19        System.out.println(element+ " ");
20    }
21 }
```

Command Prompt

```
C:\Users\Shubhams-PC\Desktop\javafolder>java ClcsnLinkedList
our LinkedList : [123, 12, 11, 1134]
After converted LInkedList to Arraay :
123
12
11
1134
```

```
C:\Users\Shubhams-PC\Desktop\javafolder>javac -d . CLLtoArrapp
Note: CLLtoArrapp.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.
```

```
C:\Users\Shubhams-PC\Desktop\javafolder>java ClcsnLinkedList.CLL
our LinkedList : [123, 12, 11, 1134]
After converted LInkedList to Arraay :
123
12
11
1134
```

```
C:\Users\Shubhams-PC\Desktop\javafolder>
```

Activate Window
Go to Settings to activate

Line 18, Column 10:



Type here to search



if we want to traverse elements in reverse order.

```
Iterator itr = list.descendingIterator();
while (itr.hasNext())
    System.out.println(itr.next());
```

? Iterator is an interface & hasNext() and next() are it's methods

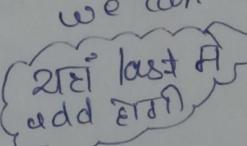
उपरोक्त interface के, तो उसमें तो इन methods की defn. नहीं हो सकती।
 लेकिन उनकी इन methods को अन classes ने override किया होता,
 जिनमें Iterator interface को implement किया है।

मात्रता collection interface की सभी classes
 list interface की ArrayList, LinkedList
 set interface की HashSet, LinkedHashSet
 जैसी ने इन methods
 को override करा होता।

CLLmethdadd.java

if we has three lists \Rightarrow l1, l2, l3

we can add a particular element l1.add("Nidhi");


 * we can add complete list l1.addAll(l2);

* we can add complete list at or from particular index l1.addAll(1, 13);

* addLast("yadav"), addLast("nidhiyaclar");

CILaddremove.java

CLLmthdtoArray.java

CLLBook.java

CLhasset.java

HashSet1.java

HashSet2.java

```
1 package ClcsnLinkedList;
2 import java.util.*;
3 class CLLitrdesmthd{
4
5     public static void main(String[] args)
6     {
7         LinkedList<String> ll = new LinkedList();
8         ll.add("rikky");
9         ll.add("nikky");
10        ll.add(" cikky");
11        // Traversing the list of elements in reverse order
12
13        Iterator itr = ll.descendingIterator();
14        while (itr.hasNext())
15            System.out.println(itr.next());
16    }
17
18 }
```

Command Prompt

C:\Users\Shubhams-PC\Desktop\javafolder>javac
Note: CLLitrdesmthd.java uses unchecked or un
Note: Recompile with -Xlint:unchecked for det.

C:\Users\Shubhams-PC\Desktop\javafolder>java C
cikky
nikky
rikky

C:\Users\Shubhams-PC\Desktop\javafolder>

```
action Find View Goto Tools Project Preferences Help
remove.java CLLmthdtoArray.java CLLmthdadd.java CLL Command Prompt
put
1 error
C:\Users\Shubhams-PC\Desktop\javafolder>javac -d . CLLmthdadd.java
Note: CLLmthdadd.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.
C:\Users\Shubhams-PC\Desktop\javafolder>java ClcsnLinkedList.CLLmthdadd
Initial list of elements []
After invoking add method [Ravi, Vijay, Ajay]
now ll is [Ravi, Gorav, Vijay, Ajay]
After addAll method our ll is [Ravi, Gorav, Vijay, Ajay, Aditi, Chinky]
After invoking addAll() method 2nd time our ll is [Ravi, kajal , anisha , Gorav, Vijay,
Ajay, Aditi, Chinky]
After addFirst methos [Lokesh, Ravi, kajal , anisha , Gorav, Vijay, Ajay, Aditi, Chinky]
After invoking addLast method [harsh, Lokesh, Ravi, kajal , anisha , Gorav, Vijay, Ajay,
Aditi, Chinky]
C:\Users\Shubhams-PC\Desktop\javafolder>
Activate Windows
Go to Settings to activate Windows
Tab Size: 4
11:43:44 PM
4/23/2023
```

Java code demonstrating the use of the `addAll()` method on a `LinkedList`. The code creates three `LinkedList` objects: `ll1`, `ll2`, and `ll3`. It adds elements to `ll1` and then adds all elements from `ll2` and `ll3` to it, printing the state of `ll1` after each operation.

```
package ClcsnLinkedList;
import java.util.*;
class CLLmthdadd{
    public static void main(String[] args){
        LinkedList<String> ll1 = new LinkedList();
        System.out.println("Initial list of elements " +ll1);
        ll1.add("Ravi");
        ll1.add("Vijay");
        ll1.add("Ajay");
        System.out.println("After invoking add method " +ll1);
        //Adding an element at the specific position
        ll1.add(1,"Gorav");
        System.out.println("now ll is "+ ll1);
        LinkedList<String> ll12 = new LinkedList();
        ll12.add("Aditi");
        ll12.add("Chinky");
        // Adding second list elements to the first list
        ll1.addAll(ll12);
        System.out.println("After addAll method our ll is "+ ll1);
        LinkedList<String> ll13 = new LinkedList();
        ll13.add("kajal ");
        ll13.add("anisha ");
        // Adding third list element to first list at specific position
        ll1.addAll(1, ll13);
        System.out.println("After invoking addAll() method 2nd time our ll is "+ll1);
        // adding an element at first position
        ll1.addFirst("Lokesh");
        System.out.println("After addFirst methos " + ll1 );
        ll1.addFirst("harsh");
        System.out.println("After invoking addLast method " + ll1);
    }
}
```

अग्नी तक हमने - add method में normally.

- * कोई object value pass की ll.add("Raj");

- * या user से लेकर पास की string s = sc.nextInt();
ll.add(s);

- * या direct user से ले ll.add(sc.nextInt());

- * या हमने कोई पुरी लिस्ट पास कर दी ll.add(112);

पर अब हम चाहते हैं कि class का पुरा data हम list से pass कर दे।

2 CLLBook.java

अग्नी तक जो हमने लिखा

```
List <String> list1 = new LinkedList();
```

```
List <Integer> list2 = new LinkedList();
```

here ⇒ String and Integer ⇒ are inbuild classes. उनी बनायी class.

सर अब हम इसे add करो या list1.add("Aahw");
यहाँ object/ ref. के throw करते हैं या string st = "Radha";
जी कहता वाकते हैं (e.g. st)

या (e.g. num) Integer num = 25;

```
list2.add(num);
```

या lis2.add(29);

But we are writing here

```
List <Book> list3 = new LinkedList
```

here Book is a class but it is user define class
we will create a class Book and pass its reference variables
to the add method ,

```
import java.util.*;  
  
class Book {  
    int id ;  
    String name ;  
    Book (int id , String name )  
    {  
        this . id = id ;  
        this . name = name ;  
    }  
}
```

CLLBook.java

```
class CLLBook {  
    P.S.V. m ( ~~~~ )  
{  
    List < Book > list = new LinkedList ();
```

// creating books | or ref/obj. of Book class.

```
Book b1 = new Book ( 101 , "Let us C" );  
Book b2 = new Book ( 102 , " Java" );  
Book b3 = new Book ( 103 , " C++ book" );
```

```
list . add ( b1 );  
list . add ( b2 );  
list . add ( b3 );
```

}} we are passing ref. variable of class
Book into add method's parameter .

// Now if we directly print list we will get hash value

```
for ( Book item : list )  
S.O.P. ( item.id + " " + item.name );
```

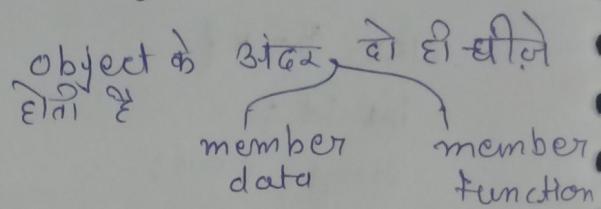
(If we can write directly
SOP (b1.id + " " + b1.name);
SOP (b2.id + " " + b2.name);
SOP (b3.id + " " + b3.name);

or you can do override toString method .

becz of for each
loop item firstly will
be b1 so b1.id , b1.name
b2 → b2.id , b2.name
b3 → b3.id , b3.name

reference variable इसलिए बनाते हैं ताकि class के अंदर की value को (.) operator के through access कर पाए।

reference variable refers to any object और



- reference variable को direct print करता हो तो, hashvalue मिलेगी (for security purpose)
- ref. var. के through से किसी class के Print (.) operator लगाना होता है।
// mem.data. refvariable . variable ;
// fun. refvariable . f() ;
- so we can use toString method, & can override it.
- जिन class का reference variable है, उसमें toString method को override करना होता है।

#CLLBook.java

CLLaddremove.java

CLLmthdtoArray.java

CLLBook.java

CLLmthdget.java

```
import java.util.*;  
class Book {  
    int id ;  
    String name,author,publisher;  
    int quantity;  
    Book(int id, String name, String author, String publisher, int quantity)  
    {  
        this.id = id;  
        this.name = name;  
        this.author = author;  
        this.publisher = publisher;  
        this.quantity = quantity;  
    }  
}  
  
Class CLLBook {  
    public static void main(String[] args)  
    {  
        List<Book> list = new LinkedList<Book>();  
        //creating books  
        Book b1 = new Book(101 , "let us c" , "Yashwanat kanetkar","BpB", 8);  
        Book b2 = new Book(102 , "Data Communication" , "forouzan","Mc Graw hill", 4);  
        Book b3 = new Book(103 , "Operating System" , "Galvin","Wiley", 6);  
        //adding books to list  
        list.add(b1);  
        list.add(b2);  
        list.add(b3);  
        //Traversing list  
        for(Book b:list)  
            System.out.println(b.id + " "+b.name+" "+b.author+" "+b.publisher+" "+b.quantity)  
    }  
}
```

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Shot by Nidhu

2023/04/24

```
1 import java.util.*;
2 class Book {
3     int id ;
4     String name;
5     Book(int id, String name)
6     {
7         this.id = id;
8         this.name = name;
9     }
10    }
11    public String toString()
12    {
13        System.out.println("my id="+id);
14        System.out.println("my name="+name);
15        return "";
16        // return id+" "+name; //more suitable here
17    }
18 }
19
20 class A
21 {
22     public static void main(String[] args)
23     {
24         List<Book> list = new LinkedList<Book>();
25         //creating books
26         Book b1 = new Book(101 , "let us c");
27         Book b2 = new Book(102 , "Data Communication");
28         Book b3 = new Book(103 , "Operating System");
29         //adding books to list
30         list.add(b1);
31         list.add(b2);
32         list.add(b3);
33         System.out.println(list);
34         //Traversing list
35         /* for(Book b:list){
36             System.out.println(b.id +" "+b.name+" ");
37         }*/
38     }
39 }
```

CLBook.java

HashSet1.java

HashSet2.java

HashMap1.java

```
package ClcsnLinkedList;
import java.util.*;
class Book {
    int id ;
    String name,author,publisher;
    int quantity;
    Book(int id, String name, String author, String publisher, int quantity)
    {
        this.id = id;
        this.name = name;
        this.author = author;
        this.publisher = publisher;
        this.quantity = quantity;
    }
    public String toString()
    {
        return id + " " + name + " " + author + " " + publisher + " " + quantity; }
}
class CLLBook {
    public static void main( String[] args )
    {
        List<Book> list = new LinkedList<Book>();
        //creating books
        Book b1 = new Book(101 , "let us c" , "Yashwnat kanetkar","BpB" , 8);
        Book b2 = new Book(102 , "Data Communication" , "forouzan","Mc Graw hill" , 4);
        Book b3 = new Book(103 , "Operating System" , "Galvin","Wiley" , 6);
        //adding books to list
        list.add(b1);
        list.add(b2);
        list.add(b3);
        for( Book b : list)
        { System.out.println(b); }
```

Command Prompt

```
C:\Users\Shubhams-PC\Desktop\javafolder>java ClcsnLinkedList.CLLBook
101 let us c Yashwnat kanetkar BpB 8
102 Data Communication forouzan Mc Graw hill 4
103 Operating System Galvin Wiley 6
```

```
C:\Users\Shubhams-PC\Desktop\javafolder>
```

C:\Users\Shubhams-PC\Desktop\javafolder\HashSetBook.java - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

CLLBook.java HashSetBook.java HashSet1.java CLLmthdadd.java HashSet2.java HashSet3.java HashSet4.java CLLtoArrapp.java

```
1 package ClcsnHashset;
2 import java.util.*;
3 class Book {
4     int id ;
5     String name,author,publisher;
6     int quantity;
7     Book(int id, String name, String author, String publisher, int quantity)
8     {
9         this.id = id;
10        this.name = name;
11        this.author = author;
12        this.publisher = publisher;
13        this.quantity = quantity;
14    }
15    class HashSetBook {
16        public static void main( String[] args )
17        {
18            HashSet<Book> list = new HashSet<Book>();
19            //creating books
20            Book b1 = new Book(101 , "let us c" , "Yashwnat kanetkar","BpB" , 8);
21            Book b2 = new Book(102 , "Data Communication" , "forouzan","Mc Graw hill" , 4);
22            Book b3 = new Book(103 , "Operating System" , "Galvin","Wiley" , 6);
23            //adding books to list
24            list.add(b1);
25            list.add(b2);
26            list.add(b3);
27            //Traversing list
28            for(Book b:list) // bcz of foreach loop we are element will be b1 , b2, b3 ; // means we can change these lines by 31
29                System.out.println(b.id + " "+b.name+" "+b.author+" "+b.publisher+" "+ b.quantity);
30            /*System.out.println ( "another way " );
31            System.out.println(b1.id + " "+b1.name+" "+b1.author+" "+b1.publisher+" "+ b1.quantity);
32            System.out.println(b2.id + " "+b2.name+" "+b2.author+" "+b2.publisher+" "+ b2.quantity);
33            System.out.println(b3.id + " "+b3.name+" "+b3.author+" "+b3.publisher+" "+ b3.quantity); */
34        // or we can override toString() method , // if in sop we write b (object)then toString will be called and we will get has
```

Command Prompt

```
C:\Users\Shubhams-PC\Desktop\javafolder>javac -d . HashSetBook
C:\Users\Shubhams-PC\Desktop\javafolder>java ClcsnHashset.HashSetBook
101 let us c Yashwnat kanetkar BpB 8
103 Operating System Galvin Wiley 6
102 Data Communication forouzan Mc Graw hill 4
```

```
C:\Users\Shubhams-PC\Desktop\javafolder>
```



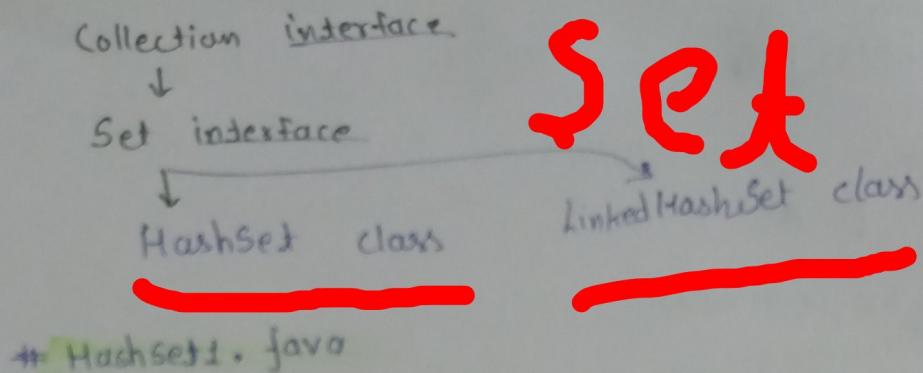
AI DUAL CAMERA

Shot by Nidhu

Type here to search



2023/04/27 23:47



Set

HashSet.java

- here duplicate value is not allowed.
- here insertion order is not preserved.

Hashing process → it uses a Hash table.
it randomly assign key values
to the values/object.

and provide output in random sequence order.
So, it does not preserve insertion order.

```
? #     Iterator itr = set.iterator();  
        while (itr.hasNext())  
            s.o.p(itr.next());
```

Iterator interface है, उसका पार्थी reference variable जाता है।
यह, and All the collection interface's classes which
implements Iterator interface, उन सभी classes ने Iterator
की वारी methods (hasNext(), next()) को define करके लिया है।

LinkedHashSet class

LinkedHashSet.java

- here duplicate value is not allowed.
- but here insertion order is preserved.

C:\Users\Shubhams-PC\Desktop\javafolder\HashSet1.java - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

CLLaddremove.java x | CLLmthdtoArray.java x | CLLBook.java . | CLhasset.java . | HashSet1.java x | untitled . | CLLmthditrtr.java

```
1 package ClcsnHashset;
2 import java.util.*;
3 class HashSet1{
4
5     public static void main(String args[]){
6         // creating hasset and adding elements
7         HashSet<String> set = new HashSet<String>();
8         set.add("Rikky");
9         set.add("Chikky");
10        set.add("nikky");
11        set.add("Rikky");
12        // Travelling elements
13        Iterator itr = set.iterator();
14        while (itr.hasNext())
15            System.out.println(itr.next());
16    }
17 }
```

Command Prompt

```
Microsoft Windows [Version 10.0.18362.1256]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Shubhams-PC>cd C:\Users\Shubhams-PC\Desktop\javafolder

C:\Users\Shubhams-PC\Desktop\javafolder>javac -d . ClcsnHashset.java
error: file not found: ClcsnHashset.java
Usage: javac <options> <source files>
use --help for a list of possible options

C:\Users\Shubhams-PC\Desktop\javafolder>javac -d . HashSet1.java

C:\Users\Shubhams-PC\Desktop\javafolder>java ClcsnHashset.HashSet1
nikky
Rikky
Chikky

C:\Users\Shubhams-PC\Desktop\javafolder>
```

CLLBook.java

HashSetBook.java

HashSet1.java

CLLmethdadd.java

HashSet2.java

HashSet3.java

CLLtoArrayp.java

```
1 package ClcsnHashset;
2 import java.util.*;
3 class LinkedHashSet1{
4
5     public static void main(String args[]){
6         // creating hasset and adding elements
7         LinkedHashSet<String> set = new LinkedHashSet<String>();
8         set.add("Rikky");
9         set.add("Chikky");
10        set.add("nikky");
11        set.add("Rikky");
12        // Travelling elements
13        Iterator itr = set.iterator();
14        while (itr.hasNext())
15            System.out.println(itr.next());
16    }
17 }
```

Command Prompt

C:\Users\Shubhams-PC\Desktop\javafolder>javac -d . LinkedHashSet1.java

C:\Users\Shubhams-PC\Desktop\javafolder>java ClcsnHashset.LinkedHashSet1
Rikky
Chikky
nikky

C:\Users\Shubhams-PC\Desktop\javafolder>javac -d . HashSetBook.java

C:\Users\Shubhams-PC\Desktop\javafolder>java ClcsnHashset.HashSetBook
101 let us c Yashwanth kanetkar BpB 8
103 Operating System Galvin Wiley 6
102 Data Communication forouzan Mc Graw hill 4



AI DUAL CAMERA

Shot by Nidhu

Line 13, Column 35

2023/04/27 23:48

HashSet2.java

list = [A C K]

we are passing list in HashSet

```
HashSet<String> set = new HashSet(list);  
set.add("P");
```

} list यहाँ पास
दुई तो अब
इस HashSet
की तरह
insertion order
preserve
नहीं होता।

output random

A K P C
P C A K
K P A C
.....

HashSet3.java

```
methods set1.add();  
set1.addAll(set2);  
set1.remove("A");  
set1.removeAll(set2);  
set1.clear();
```

```
CLLaddremove.java x | CLLmthdtoArray.java x | CLLBook.java . | CLhasset.java . | HashSet1.java x | HashSet2.java  
package ClcsnHashset;  
import java.util.*;  
class HashSet2{  
  
    public static void main(String[] args )  
    {  
        ArrayList<String> list = new ArrayList<String>();  
        list.add("A");  
        list.add("C");  
        list.add("K");  
  
        HashSet<String> set = new HashSet(list);  
        set.add("p");  
        Iterator<String> i = set.iterator();  
        while (i.hasNext())  
        {  
            System.out.println(i.next());  
        }  
    }  
}
```

Command Prompt

Note: Recompile with -Xlint:unchecked
1 error

C:\Users\Shubhams-PC\Desktop\javafolder>
Note: HashSet2.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked

C:\Users\Shubhams-PC\Desktop\javafolder>
Error: Could not find or load main class HashSet2
Caused by: java.lang.ClassNotFoundException: HashSet2

C:\Users\Shubhams-PC\Desktop\javafolder>
p
A
C
K

C:\Users\Shubhams-PC\Desktop\javafolder>

C:\Users\Shubhams-PC\Desktop\javafolder\HashSet3.java - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

CLLaddremove.java | CLLmthdtoArray.java | CLLBook.java | CLhasset.java | HashSet1.java | HashSet2.java | HashSet3.java | HashSet3.java | unti... | CLLBook.java

```
1 package ClcsnHashset;
2 import java.util.*;
3 class HashSet3{
4     public static void main(String args[])
5     { HashSet<String> set = new HashSet<String>();
6         set.add("R");
7         set.add("V");
8         set.add("A");
9         set.add("S");
10
11        System.out.println("An initial list of elements: "+set);
12        //Removing specific element from HashSet
13        set.remove("R");
14        System.out.println("After invoking remove(object) method: "+set);
15        HashSet<String> set1 = new HashSet();
16
17        set1.add("Rikky");
18        set1.add("Nikky");
19        set1.addAll(set1);
20
21        System.out.println("Updated List: "+set);
22
23        //Removing all the new elements from HashSet
24
25        set.removeAll(set1);
26        System.out.println("After invoking removeAll(set1) "+set);
27
28        //Removing elements on the basis of specified condition
29        //Removing all the elements available in the
30        set.clear();
31        System.out.println("After invoking clear()method:"+set);
32 }
```

AI DUAL CAMERA Shot by Nidhu

Activate Window Go to Settings to...

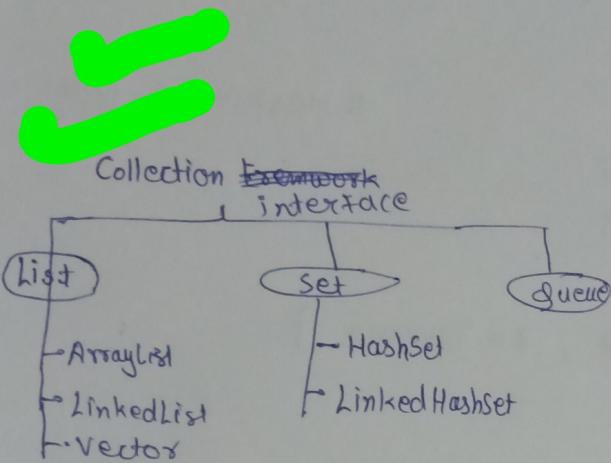
2023/04/27 00:28

0% Command Prompt

C:\Users\Shubhams-PC\Desktop\javafolder>java ClcsnHashset.HashSet3
An initial list of elements: [A, R, S, V]
After invoking remove(object) method: [A, S, V]
Updated List: [A, S, V]
After invoking removeAll(set1) [A, S, V]
After invoking clear()method:[]
C:\Users\Shubhams-PC\Desktop\javafolder>

date 28/9/23

→ toString method 2 page before describe ←
class CLLBook.java



Arrays class

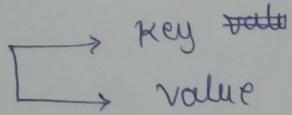
Collections class (5 methods)

Map interface

map interface uses

user have to provide

key-value pair.



value "Bhopal"
key "city1"

"Indore" "Gwalior"
"city2" "city3"

MapInterface

HashMap is a class of

HashMap1.java
HashMap2.java

indexing is not used here.
और सारी methods भी अलग होती हैं।

iterator method हैं
नहीं होती हैं
HashMap1.java
error
we can simply print or
here two methods
are used
EntrySet & keySet

C:\Users\Shubhams PC\Desktop\javafolder\HashMap1.java - Su INREGIST

Edit Selection Find View Goto Tools Project Preferences Help

CLLBook.java

HashSetBook.java

HashSet.java

HashSet2.java

x HashMap1.java

HashMap2.java

```
1
2 package ClcsnHashMap;
3 import java.util.*;
4 class HashMap1
5 {
6     public static void main(String[] args)
7     {
8         HashMap<Integer, String> map = new HashMap<Integer , String>();
9
10        map.put(1, "Mango");
11        map.put(2, "Apple");
12        map.put(3, "Banana");
13        map.put(4 , "Grapes");
14
15        // System.out.println("Iterating Hashmap ... "+map);
16
17        Iterator itr = map.iterator();
18        while(itr.hasNext())
19            System.out.println(itr.next());
20
21    }
22 }
```

Command Prompt

symbol: method iterator()
location: variable map of type HashMap<Integer, String>
HashMap1.java:19: error: cannot find symbol
 while(itr.hasNext())
 ^

symbol: method hasNext()
location: variable itr of type Iterator
2 errors

C:\Users\Shubhams-PC\Desktop\javafolder>

in HashMap class duplicate key is not allow,
if we do this thing , it replaces the value.

```
map.put ( 1 , "Mango" );  
map.put ( 2 , "Apple" );  
map.put ( 3 , "Banana" );  
map.put ( 1 , "Grapes" );
```

#HashMap2.java

output { 1=Grapes , 2=Apple , 3=Banana }

C:\Users\Asus Laptop\Desktop\Programmes\JAVA\collection fram\HashMapExample2.java - Sublime Text (UNREGISTERED)

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ClcitionsClisMthd book.java x | untitled . | HashSet2.java x | HashSet4.java x | HashSet3.java x | var.java x | obj.java x | add.java x | dllr.java x | HashMapExample.java x

```
1 import java.util.*;
2 class HashMapExample2 {
3     public static void main(String[] args) {
4         HashMap<Integer, String> map = new HashMap<Integer, String>();
5         map.put(1, "Mango");
6         map.put(2, "Apple");
7         map.put(3, "Banana");
8         map.put(1, "Grapse");
9         System.out.println("Iterating Hashmap..." + map);
10    }
11 }
12 }
```

Command Prompt

```
C:\Users\Asus Laptop\Desktop\Programmes\JAVA\collection fram>javac HashMapExample2.java
C:\Users\Asus Laptop\Desktop\Programmes\JAVA\collection fram>java HashMapExample2
Iterating Hashmap...{1=Grapse, 2=Apple, 3=Banana}
C:\Users\Asus Laptop\Desktop\Programmes\JAVA\collection fram>
```