

JAVA Collection Framework.

Interface Queue

Java collection
framework

Hierarchy
of
coll. frame
class

list

Set

These are the 3 different data structures, so how we are going to structure the data in List, Queue & Set.

These are fundamental classes through which we can create the data structures, so we will see how to implement

To start,

Collections: are the containers that group multiple items in single unit. Multi-valued containers - dynamic containers i.e. add/remove data at runtime. If provides an interface where you can store an object or

we can use built-in function libraries.

Using collections, operations can be performed like search, sort, insertion, manipulation etc.

In traditional data structures, we used to write methods ourselves, here you get methods for the same.

JCF provides us interfaces & classes to support this.

So, JCF hierarchy starts with Interface.

Interface



collection



queue

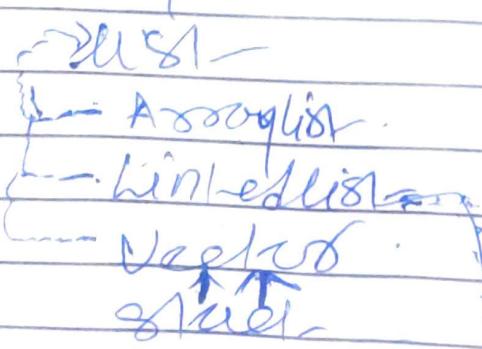


Priority Queue

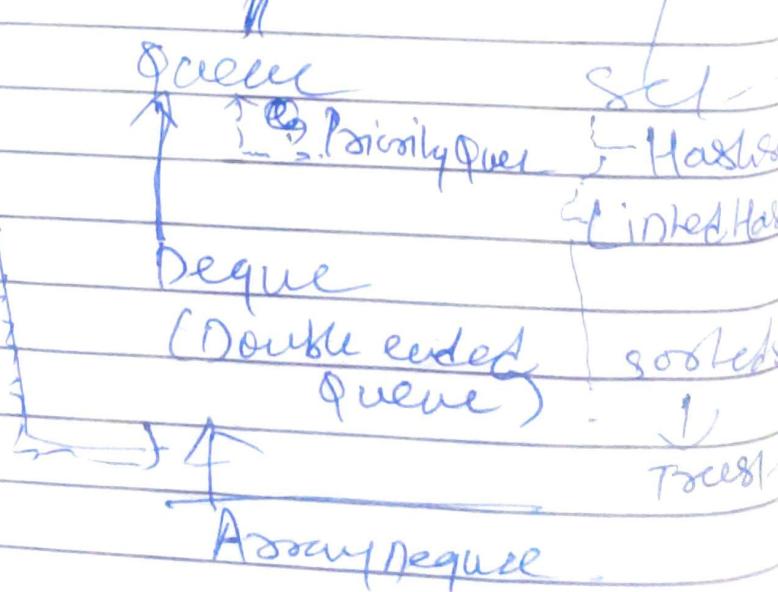
Set

Hash

Linked Hash



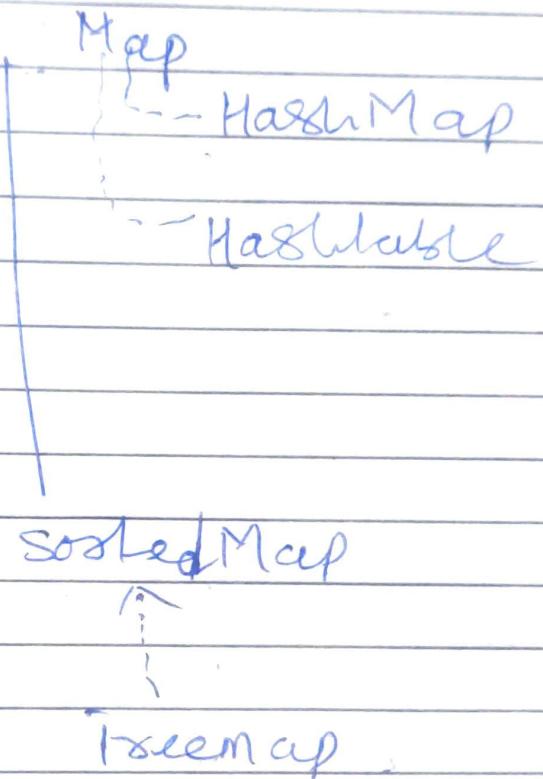
(Stacks inherited from vector.)



Double ended Queue

* means implements

So, like we got List, Queue & Set as Data structures, we also have Map.



But, as of now, we focus on List, Queue &

- * What - are interfaces in java
 - Rule book
 - Reference types, similar to classes but contains only abstract methods.

is implemented
by a class

can extend
multiple interfaces

Interface - contains only
abstract methods

do not contain
constructors or
instance fields -

cannot be
instantiated

Coming back to collection framework

Iterators - provides the facility of
iterating the elements only in
forward direction

(methods - hasNext() next() remove())

Iterable - is root interface
for all collection classes. The
interface along with
all the subclasses also implement
the iterable interface.

which gives us method
Iterator LT iterator()

Collection is also an interface that is implemented by all the classes in collection framework & declare the methods that every collection will contain.

It helps to achieve runtime polymorphism.

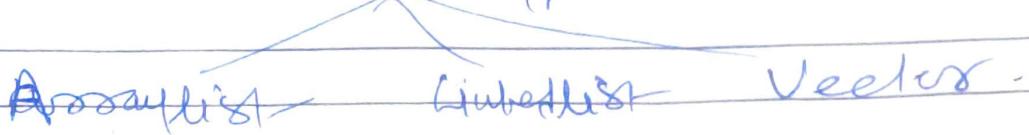
so methods like add, addAll, clear, similar methods you will find in various APIs of the collection.

Now, Data structures -

① Lists -

List - extends collection framework and stores the element in indexed approach and also allows duplicates.

List types



(List - suppose secondary).

ArrayList → implementation of list-interface where we can dynamically add or remove from the list.

Hence, the data is added in an indexed approach

0 1 2 3 4 5 6 ... n

The size of list is increased dynamically if the elements are added more than the initial size.

ArrayList object = new ArrayList()

java.util.ArrayList

team.add (obj c)

void add (int index,
object element)

void
clear()

lastIndexof / object.clone ()

length ()

Similarly many more methods in the ~~new~~ ArrayList.

Linkedlist

is a sequence of links which contain items.

Each link contains a connection to another link.

linkedlist object = new linkedlist()

Two types

singly
linked
list

Double linked
list

↳ Two references
(one ~~of~~ to next node
and other one to previous node)

Each node in this
list stores the
data of the node
and pointers or references
to next node in list.

Head

head
o

↳ P[Node] → {Backward} → NULL

{P[Node]}

{P[Node]}

so each node has reference to
next node & previous node

java.util.LinkedList

boolean contains(obj o)

add

Last but not least

common methods ArrayList, LinkedList
Vector.

Vectors → Has API which implements List interface.

Vectors are similar to arrays whose elements of Vector object can be accessed via an index into the vector.

Vector implements a dynamic array and is not limited to a specific size and is synchronized. The difference is that it is synchronized means it is thread safe.

Vector object = new Vector (size, increment)

0 | 1 | 2 | 3 | 4 | 5 | 6 ... n.

synchronized version of ArrayList
Same methods.

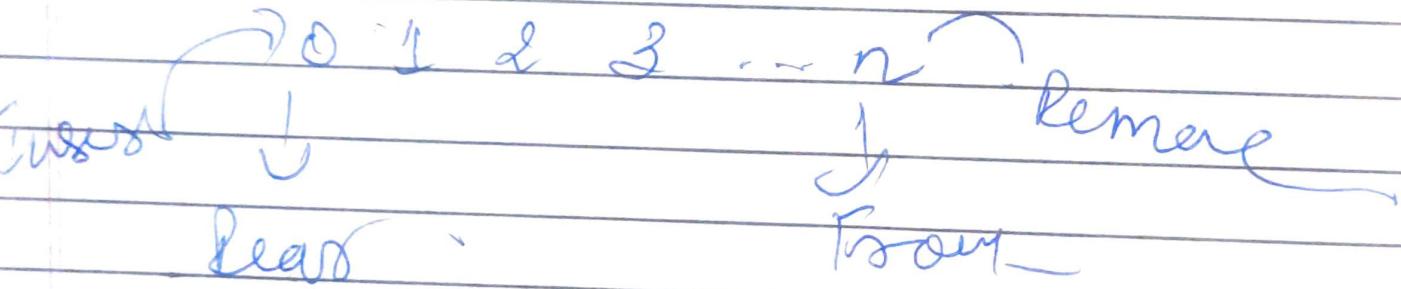
Now, eq. of ArrayList.

Queue

Queue follows a fifo approach.

First element is removed first & last element is removed in end.

Queue (Integers) $q = \text{new linkedlist}()$



Methods in Queue

add

remove

Peek()

poll()

(Programme - - -)

Next Data Structure is
Set() in java.

Set is a collection which
focuses on uniqueness.

In List, you can add duplicate
elements but in Set you
cannot.

- Set refers to collection that
cannot contain duplicate
elements.

Mainly used to model the
mathematical set abstraction.

It uses hashing technique by
which achieves uniqueness.

Set has implementation in
Various classes.

Hashset linkedHashset TreeSet



Hashset :

Java Hashset extends a collection that uses a hash table for storage or contains hashing to store objects.

- * Hashset - only contains unique elements and inherits the AbstractSet class and implements Set interface.

Ass Hashing to store the elements

- i) Hashcode.

so, HashSet<String> a1 = new

Hashset()

similar methods like
add, remove, contains,
isempty,
size, iterator.

e.g. _____

Linked HashSet

It is a class which is going to be a hashable and linked list implementation.

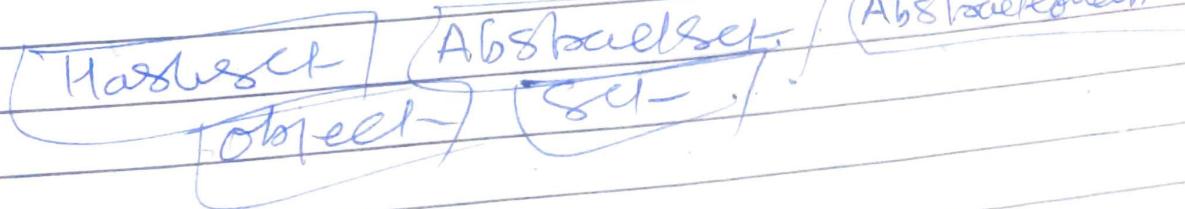
It contains only unique elements.

Hence, it provides all optional set operations and maintains insertion order.

So linked hashset will maintain how the data is getting inserted because the hash set will not be able to do that.

LinkedHashSet (String) also New linked HashSet()

This class inherits methods from other classes like



TreeSet

Sorted interface

Date-Time API in JAVA 8

Java Time -

Local Zoned

In java 8, updated Date API,
which is better than previous
Previous issues

① Date API existed in
2 packages

* util

DB

J
dedicated for MySQL

② Format:

↳ you need to import one
more package → `java.time`

③ All they use not thread safe

* New DateThe Apt

- it is immutable
if you are changing it will
create a new object

22/11/19

Packages in java

- festival → Diwali → give some sweets
- & crackers
- (Do you mix crackers & sweets in 1 box)

Group of related things you pack in real world

OOP -

Packages are group of related classes.

e.g. I develop for database

developing Banking system

Groups

Credit
Control
Dept

Bank
Debit
Control
Dept

admin

So, Group related classes together for easier access

Package called .

Package is packing group of related classes .

- why

Programmers can easily determine these classes are related

- Names won't conflict

- find similar types

- can define access types

Java package has a mechanism organizing java class into namespaces .

PRO:

Can access each others package
access nested .

Packages are written in lower case

Project → use → com → myproject
myclass.java

Advantages

Threads in Java

Java provides built-in support for multithreading programming. e.g. A multi-threaded program contains threads which can concurrently execute. Each part of such prog. is called Thread & each thread defines a separate path of execution. Multithreading is specialized form of multitasking.

States of Threads

New - When we create an instance of Thread class

Runnable - Thread in running state

Suspended - Running thread can be suspended & which temporarily suspends its activity

Blocked - Can be blocked when waiting for

Terminated - A thread can resource be terminated which halts its execution immediately & cannot be resumed

(New)

↓
Runnable

Non-runnable
(Blocked)

Running

sun() method

exit()

sleep, block on I/O, wait
for lock, suspend, exit

↓
Terminated

(Thread life cycle)