

Java Collection Framework – Complete Notes

What is Java Collection Framework?

The Java Collection Framework (JCF) is a set of interfaces and classes in `java.util` package used to store and manipulate groups of objects efficiently.

Main Interfaces

- 1 Iterable – Root interface
- 2 Collection – Parent of List, Set, Queue
- 3 List – Allows duplicates, maintains order
- 4 Set – Does not allow duplicates
- 5 Queue – FIFO structure
- 6 Map – Key-value pairs (not child of Collection)

Collection Hierarchy

Iterable → Collection → List / Set / Queue
Map is separate hierarchy

List Implementations

ArrayList, LinkedList, Vector, Stack

- Allows duplicates
- Maintains insertion order
- Index based access

Set Implementations

HashSet, LinkedHashSet, TreeSet

- No duplicates
- TreeSet stores sorted data

Map Implementations

HashMap, LinkedHashMap, TreeMap, Hashtable, ConcurrentHashMap

- Stores key-value pairs
- Duplicate keys not allowed

Thread Safety

Vector, Hashtable, ConcurrentHashMap are thread-safe.
ArrayList, HashMap, HashSet are not thread-safe.

Fail-Fast vs Fail-Safe

Fail-Fast: ArrayList, HashMap (throws exception)
Fail-Safe: ConcurrentHashMap (no exception)

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