Notes:

- String (object):String Pool ,immutable
- StringBuffer (object): mutable

access modifiers:

- public: anywhere in project
- private: over class
- protected: over the package & (subclasses -> between packeges using inheritance)
- default : in the package

- final: keyword -> using with classes & methods
- finally: block -> try... catch , always executed evenif handle Exception
- finalize: method -> garbage collection (cleanup activity is implemented)

static:

-> method : can't be overridden

-> variable : can't be reintialized

-> class : inner class ->StaticNestedClass

constructor :

- no return datatype , initialize the object state
- constructor name== class name
- can't be marked as final
- when can be private?singleton(one static instance can created form class),factory static method , unitity class-> only contain static methods

super , this ?

- this:Keyword -> refer to the current instance of class
- super:keyword ->
  - refer to superclass of current instance
  - call superclass constructor (Default) into subclass constructor (METHOD)

Stack , Heap ?

- Stack (LIFO): local & temporary variables and function call , fast
  - limited size,Managed automatically by the system

- Heap: dynamic memory allocation using objects ,DS like Arrays&linkedList
  - manage by garbage collector -> slow,Large size

shallow copy , deep copy ?

- Shallow copy : copy refrences to nested objects
  - changchanges in nested objects are reflected
  - in both the original and copied objects.
- Deep copy :changes in nested objects do not affect each other
  - between the original and copied objects. -> create new object reference

throw , throws?

- throw : throw Exception if something wrong has occurred
- throws: the type of Exception like "FileNotFoundException"

composition, aggregation ?

- composition: relation between objects -> one contain(Own) anthor (object part of anthor)
    - containing object cannot exist without objects it contains
    - containing object is destroyed ->contained objects are also destroyed.
    - like (car & engine)

- aggregation: relation between objects -> one contain(Own) anthor
    - the contained object can exist independently of the containing object
    - like(University & department)

System.out.println()?

- print in the Console ->
- Java.lang package -> System->PrintStream -> static variables like(out),methodslike (println())

* java 8 ->stream ,lambda ,static&default methods in interface

concepts of oop?

Inhertance:-

- Allows subclasses to inherit behaviors and properties from another class (superclass).
- Enables code reuse and extension without rewriting existing code.

Abstraction:-

- abstract class : at least one abstract method
- -interface: all methods are abstract by default but befor Java-8 default & static methods with implementation
- Hides complex implementation details and shows only essential features of an object
- Methods without implementation

Polymorphism:-

- override ->methods in subclass with a different implementation
- Overloading ->methods with the same name but differnt parameters type or number
- Enables methods to be called on objects of different classes executing different behaviors based on the object type

Encapsulation:-

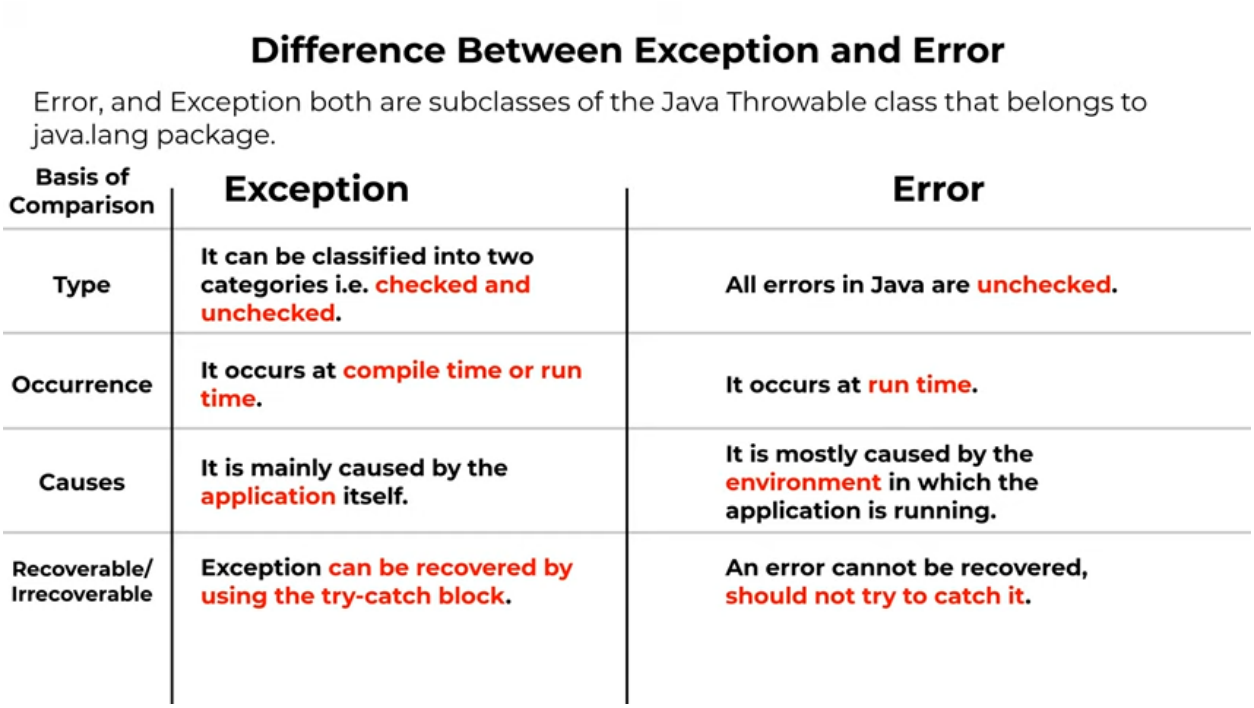
- hide data
- direct access to some of an object's components and protects its internal state.
- private to variables , public to classes (setters & getters)

Exception Handling?...

Checked exceptions (Compile-time exceptions)

- is checked (notified) by the compiler at compilation-time,also called as compile time exceptions.
- cannot simply be ignored, the programmer should take care of (handle) these exceptions.

Exception & error?



Difference Between Exception and Error

Error, and Exception both are subclasses of the Java Throwable class that belongs to java.lang package.

Basis of Comparison	Exception	Error
Type	It can be classified into two categories i.e. checked and unchecked.	All errors in Java are unchecked.
Occurrence	It occurs at compile time or run time.	It occurs at run time.
Causes	It is mainly caused by the application itself.	It is mostly caused by the environment in which the application is running.
Recoverable/ Irrecoverable	Exception can be recovered by using the try-catch block.	An error cannot be recovered, should not try to catch it.

Design pattern:

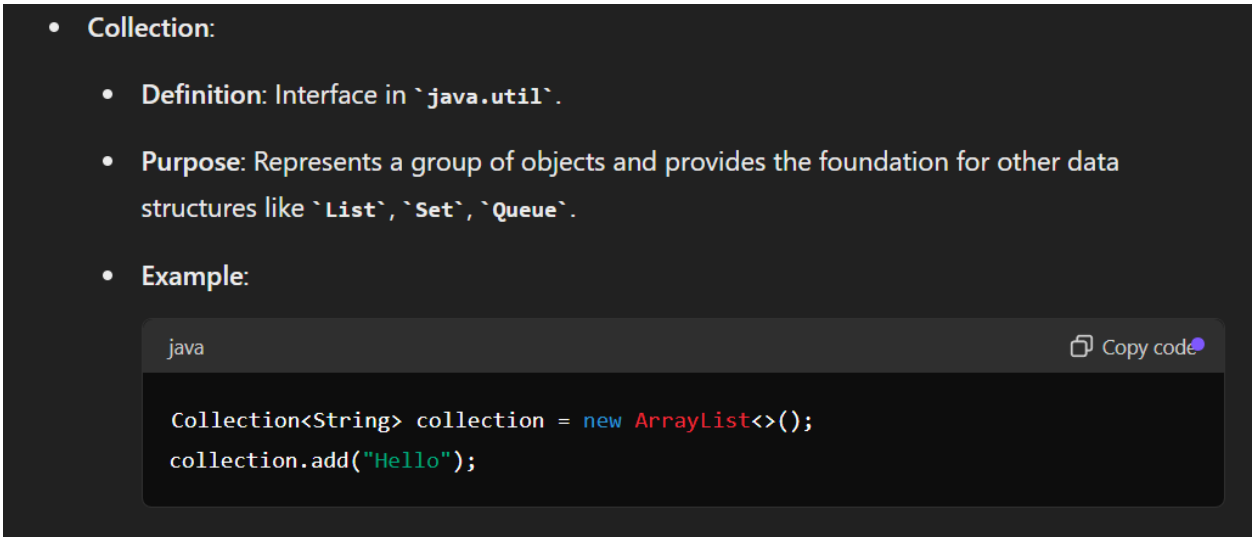
-creational: singleton ,factory method

-structural: adaptor , proxy , facade

-behavioral: observer , strategy ,command

collection/s :

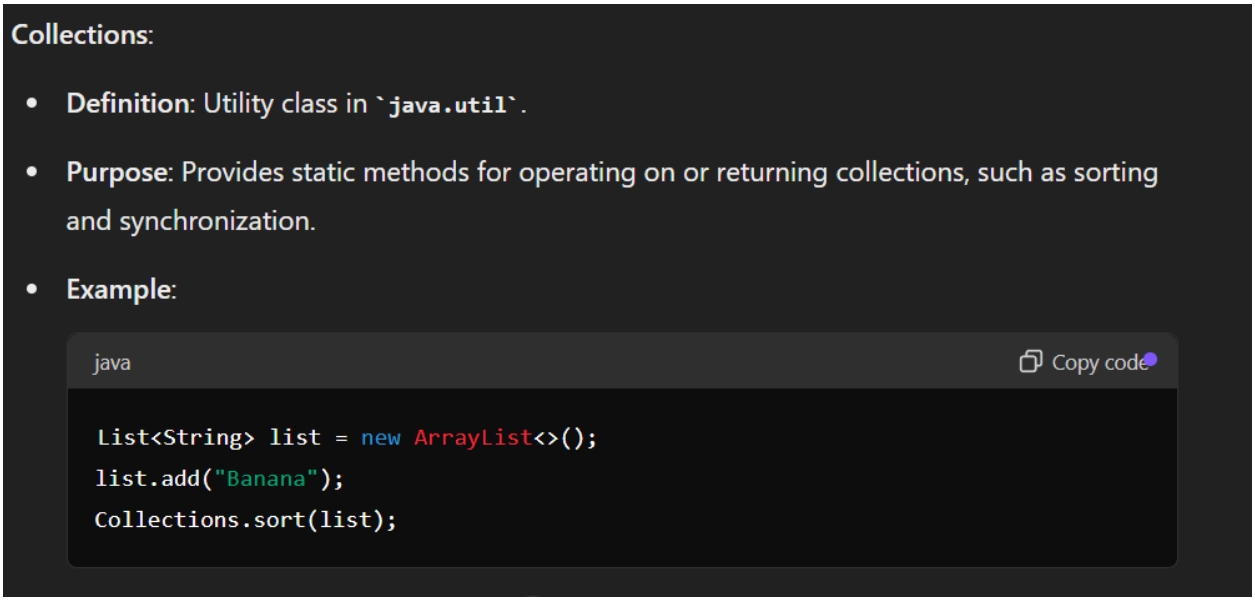
- Collection:



- **Collection**:
  - **Definition**: Interface in `java.util`.
  - **Purpose**: Represents a group of objects and provides the foundation for other data structures like `List`, `Set`, `Queue`.
  - **Example**:

```java
Collection<String> collection = new ArrayList<>();
collection.add("Hello");
```

- Collections:



Collections:

- **Definition**: Utility class in `java.util`.
- **Purpose**: Provides static methods for operating on or returning collections, such as sorting and synchronization.
- **Example**:

```java
List<String> list = new ArrayList<>();
list.add("Banana");
Collections.sort(list);
```

- array , arraylist , Linkedlist :

  - Array:
  - ArrayList
  - LinkedList

List ,Map, Set

Feature	List	Set	Map
Interface	`java.util.List`	`java.util.Set`	`java.util.Map`
Allows Duplicates	Yes	No	Keys: No, Values: Yes
Maintains Order	Yes	No (unless `LinkedHashSet`)	Yes (unless `HashMap`)
Random Access	Yes	No	Yes (for keys)
Access Time	O(1) for `ArrayList`, O(n) for `LinkedList`	O(1) for `HashSet`, O(log n) for `TreeSet`	O(1) for `HashMap`, O(log n) for `TreeMap`
Null Handling	Allows multiple null elements	Allows a single null element (for `HashSet` and `LinkedHashSet`)	Keys: Allows one null key (for `HashMap`), Values: Multiple null values
Typical Use Cases	Ordered lists, frequent read access by index	Unique elements, fast lookup and deletion	Key-value pairs, fast lookup by key
Memory Usage	Depends on implementation, generally lower than `Set`	Higher memory usage due to storage of elements without duplicates	Higher memory usage due to storage of key-value pairs
Performance	Fast random access, slower insertions/deletions for `ArrayList`; consistent time for `LinkedList`	Fast access, insertion, and deletion for `HashSet`; sorted access for `TreeSet`	Fast access, insertion, and deletion for `HashMap`; sorted access for `TreeMap`