02

JAVA 8

* Java 8 Features
* Lambda Expressions
* Interfaces Changes
* Functional Interfaces
* Stream API
* Optional Class
* Method References and Constructor References
* Date And Time API Changes

What are the java8 Features?

* Lambda expression
* Default method
* static method
* Functional Interfaces
* Method Reference
* Constructor Reference
* Stream API
* Foreach
* Optional class
* Collectors class

What is Lambda expression?

* A Lambda is a function
  + no name
  + no modifier
  + no return types

Why to use lambda expression?

* To write functional programming in java
* To write more readable, maintainable and concise code

What are new changes in Interface or why required default method in interface?

* Till the java7 definition of method not allowed
* If a added new method in interfaces child must be override that method this problem identify by java and in the java8 version allow method with default keyword
* Why default keyword because by default interfaces method are public to declare default modifier java8 introduce default keyword explicitly
* We can write multiple default methods in interface

Static Method Interface

1. Java interface static method is part of interface, we can’t use it for implementation class objects.
2. Java interface static methods are good for providing utility methods, for example null check, collection sorting etc.
3. Java interface static method helps us in providing security by not allowing implementation classes to override them.
4. We can’t define interface static method for Object class methods, we will get compiler error as “This static method cannot hide the instance method from Object”. This is because it’s not allowed in java, since Object is the base class for all the classes, and we can’t have one class level static method and another instance method with same signature.

Is functional interfaces available in java7 if yes give

* **Runnable –>** This interface only contains the run() method.
* **Comparable –>** This interface only contains the compareTo() method.
* **ActionListener –>** This interface only contains the actionPerformed() method.
* **Callable –>** This interface only contains the call() method.
* **Comparator->**  it contains compare method

What is Functional Interfaces?

* If an interface contains only one single abstract method, then it is called as functional interface.
* Functional interface is used to invoke lambda expression
* Functional interface can contain default and static method
* To represent our interface as functional interface we use @FunctionalInterface to make sure only one SAM

Below are the most used built in functional interfaces

All the functional interfaces available in java.util.function package

* + - Function
    - Supplier
    - Consumer
    - Predicate

What is Function Interface?

* A function is a type of functional interface in Java it receives only a single argument and returns a value after the required processing.
* It has 4 methods

Table

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What is Consumer Functional Interface or explain scenario

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What is Supplier Interface?

A supplier is any method which takes no arguments and returns a value. Its job is to supply an instance of an expected class.

It represents a function which does not take in any argument but produces a value of

**T get()**: This abstract method does not accept any argument but instead returns newly generated values

What is Predicate?

It is a functional interface which represents a predicate (boolean-valued function) of one argument.

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What Method Reference?

Method reference is used to refer method of functional interface.

It is compact and easy form of lambda expression.

Each time when you are using lambda expression to just referring a method, you can replace your lambda expression with method reference.

Types of Method References

There are following types of method references in java:

1. Reference to a static method.

ContainingClass::staticMethodName

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1. Reference to an instance method.

We can refer non-static method using object.

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1. Reference to a constructor.

You can refer a constructor by using the new keyword.

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What Is Stream in Java

* Sequence of data element
* Can be performed either sequentially or parallel
* Lazy access support
* Design for lambdas
* Each intermediate operation return a stream result
* A stream is not a data structure instead it takes input from the Collections, Arrays or I/O channels.
* Streams don’t change the original data structure; they only provide the result as per the pipelined methods.
* Streams don’t change the original data structure; they only provide the result as per the pipelined methods.
* Each intermediate operation is lazily executed and returns a stream as a result, hence various intermediate operations can be pipelined. Terminal operations mark the end of the stream and return the result.

How to create data to stream?

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What is are the operations in stream api

1. Intermediate Operation -Java 8 Stream intermediate operations return another Stream which allows you to call multiple operations in a form of a query. Stream intermediate operations do not get executed until a terminal operation is invoked. All Intermediate operations are lazy, so they’re not executed until a result of a processing is needed.
   * 1. filter()
        1. The filter method is used to filter out elements from a stream, depending upon some condition.
        2. The filter method accepts a Predicate as an argument.
        3. A Predicate is a function that returns boolean.
        4. The filter method returns a stream containing the elements matching to the given predicate
     2. map () - map is intermediate operation
        1. Transform one type to another type
        2. It is no Map Collection

Graphical user interface, text, application

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* + 1. flatMap()
       1. The flatMap transforms each element of a stream into another form (just like map), and generates sub streams of the newly formed elements.
       2. it flattens all of the sub streams into a single stream of elements.

Text

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* + 1. distinct ()
       1. The function distinct returns a stream containing unique elements only.
       2. This is a very easy way to remove duplicates from a collection.
       3. The distinct method uses equals method for checking the equality and the custom objects would require an implementation of the equals method.
    2. sorted()
       1. the sort method does’t take any parameter here,
       2. it will sort the list in natural order.
    3. peek()
       1. This method exists mainly to support debugging
    4. limit()
       1. The limit method is used to limit the number of elements in a stream.
       2. Number of required elements is passed to the limit function as an argument.
       3. The limit is a short circuiting operation, the stream is just skipped, once the limit condition is satisfied.
    5. skip()
       1. The skip method is used to skip the given number of elements from the stream.
       2. The skipped elements will not be a part of the returning stream.
       3. If number of elements in the stream are less than or equal to the number of elements to be skipped, an empty stream is returned.

1. Terminal Operation- Java-8 Stream terminal operations produce a non-stream, result such as primitive value, a collection or no value at all.
   1. anyMatch()
      1. When we want to check if at least one element is present in the given stream that matches to the given predicate, we can use anyMatch function.
      2. This function returns a boolean value.
   2. allMatch()
      1. the anyMatch when we want to check if all of the elements in a stream match with the provided predicate.
      2. This method also returns a boolean.
   3. noneMatch()
      1. The noneMatch function returns true if none of the elements in a given stream matches with the given predicate.
   4. collect()
   5. count()
   6. findAny()
      1. The findAny() method returns any element from a Stream but there might be a case where we require the first element of a filtered stream to be fetched.
      2. This is a short-circuit operation because it just needs **‘any’** first element to be returned and terminate the rest of the iteration.
   7. findFirst()
      1. The findFirst() method finds the first element in a Stream. So, we use this method when we specifically want the first element from a sequence.
      2. When there is no encounter order, it returns any element from the Stream. According to the java.util.streams package documentation, “Streams may or may not have a defined encounter order. It depends on the source and the intermediate operations.”
   8. forEach() -
      1. Java provides a new method forEach() to iterate the elements.
      2. It is defined in Iterable and Stream interface.
      3. It is a default method defined in the Iterable interface. Collection classes which extend Iterable interface can use forEach loop to iterate elements.
   9. min()
      1. returns the minimum element of the stream based on the provided Comparator.
      2. A Comparator is a comparison function, which imposes a total ordering on some collection of objects.
      3. min() is a ***terminal operation*** which combines stream elements and returns a summary result.
   10. max()
       1. returns the maximum element of the stream based on the provided Comparator.
       2. A Comparator is a comparison function, which imposes a total ordering on some collection of objects.
       3. max() is a terminal operation which combines stream elements and returns a summary result.
   11. reduce ()
       1. Reducing is **the repeated process of combining all elements**. reduce operation applies a binary operator to each element in the stream where the first argument to the operator is the return value of the previous application and second argument is the current stream
       2. reducing is a terminal operation that **aggregates a stream into a type or a primitive type**.
   12. toArray()

What is flat map?

1. Transform one type to another type
2. Used to flattern a stream of collections
3. Applying one to many transformation to the element
4. Create a new stream once flatten the elements

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