Chapter 23

API & API Documentation

- In this chapter, You will learn
  - Need of this chapter
  - What are API and API Documentation?
  - API and API Documentation file formats
  - Need of *javadoc* tool.
  - Generating API Documentation for our own class
  - Developing new classes by following API Documentation file
  - Differences between API and API Documentation
  - Learning Java SE API Documentation structure and Usage
  - Developing new classes by following Java SE API Doc files
- By the end of this chapter- you will learn the usage of Java API Documentation file of predefined classes given by SUN and given by other team members in your company.

Interview Questions

By the end of this chapter you can answer all below Interview Questions

1. What is an API, what is the use of it, what will it containing?
2. What is an API Documentation, what is the use of it, what will it containing?
3. Can we call every class as an API?
4. When a class can be called as an API?
5. What is the procedure to create a class as an API?
6. List out all differences between API & API documentation?
7. Why API documentation file format is *.html* file?
8. What is the use of *javadoc* command?
9. What type of comment we should use to add description to a class to be published in API Documentation file?
10. The description placed in single line comment and multiline comment, will they included in API documentation file?
11. How API is distributed with software?
12. How API Documentation is distributed?
13. For whom sake API and API documentation files are generated?
14. What files should be updated in classpath environment variable?
15. Should we update API Documentation files in classpath?
16. What is the command and syntax to generate API documentation for our classes?
17. Should we compile source file to generate API Documentation file?
18. Can we generate API documentation for non-public class?
19. What members of the class are included in API documentation?
20. Why we cannot generate API Documentation for non-public classes?
21. Why private & default members of the class are not included in API documentation?
22. What are the different points we must follow to create a class as API?
23. Create the class Addition as API with some methods on your choice, generate API Documentation file. Explain how to develop a class Calculator by reusing the functionality given in Addition class by using its API Documentation file?
24. Can you explain API Documentation file structure?
25. How many html files are generated by javadoc tool for the given class?
26. Explain Java SE API Documentation folder structure?
27. Develop some test program to perform different operations on String data using the methods given String class? Clue: For developing this application, you must use String class API documentation file to know different methods available in in String class?
28. In a project assume you need to work with some new technology which you do not know anything about it. Then how can you know this new technology supplied classes, interfaces, constructors and methods for invoking them from your project?

API and API Documentation

In this chapter you will learn generating API Documentation file (.html file) for a given class.
In previous chapters you learnt developing 3 different types of classes such as super class- for declaring object operations, sub classes-for implementing object operations and user class-for invoking methods and executing object operations from the given subclass.

Well, I hope you remember one important point that is; in your practice sessions you yourself will develop all these three types of classes, then you only will compile and execute all three types of classes and you only will test functionalities.

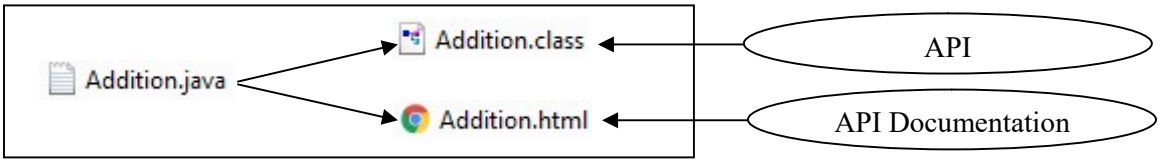
But in company in projects development, all these three classes are not developed by single developer. All these three types of classes are developed by different developers in parallel. First super class is developed by one developer; generally super class is developed by Team Lead/manager. Then remaining two types of classes sub classes and user class are developed by other team developers in parallel.
Hence the point we must ***note*** here is- in every company in projects development one programmer developed classes must be accessed from other programmer developing classes.
Ok fine, here I have one question- ***How one programmer developed class and its members details are known to other programmer***? The details like class name, its methods and constructors signature, returning value type, throwing exception type, the need/functionality of this class methods and constructor, if all these details are know then only one programmer can access methods of another programmer given class.

> To get the information of other programmer given classes we will take the help of a special file called API Documentation.

I hope now you realized the importance of this chapter☺ Without having knowledge of this chapter you cannot develop projects by using other programmer developed classes, interfaces and their methods. So learn and practice this chapter's all points thoroughly.
For quick understanding you can remember

> API is a .class file and API Documentation file is .html file both are generated from the same .java file(source file)

Observe below diagram you will get some idea on this chapter



In this chapter we will learn all details about API and API Documentation.
The most important points like

1) What is API, What is API Documentation?
2) How to generate API and API Documentation files?
3) What will API contain and API Documentation contain?
4) Who will use API and who will use API Documentation?
5) API and API documentation file structure
6) Complete list of differences between API and API Documentation
7) How to use SUN given and other team programmers given **API** by following its API documentation file

etc.. many other points we will learn.

Let us start this chapter with

Q) What is API?

- **API** stands for **A**pplication **P**rogramming **I**nterface.
- A class using which we develop other classes is called API.
- In simple terms we can say API is nothing but *a reusable* class.

For example:

1) Addition class is an API for the class Calculator:
   In developing Calculator class we will invoke Addition class methods in Calculator class. So we can say Addition class is an API for the class Calculator.
2) BankAccount class is an API for Bank class:
   In developing Bank class we will invoke BankAccount class object and its methods in Bank class. So we can say BankAccount class in an API for the class Bank.
3) Similarly, the predefined classes String, System, Thread, Exception are API for developing new classes
4) JDBC Technology provides an API for developing DB interaction applications
5) Servlet and JSP Technologies provide an API for developing web applications

Q) From above examples you must get one doubt that is how do we know the constructors, methods available in Addition class, String class, Servlet class and what are their purpose?
A) By using ***API Documentation*** file.

Every developer will supply a *special file* with all details of a class they developed. This file contains a class declaration and its members' declarations along with their description placed in source file. This special file is technically called ***API Documentation*** file. The required description about class and its members is placed by using java doc comment /** */.

Q) What is API documentation & what is the use of it?
API Documentation is a documentation file of a class. It is an html file. It contains a class and its members' declarations along with their documentation given its source file.
By following API documentation file other programmer will get the class and its constructors and its methods information. With this information other programmer will create object of a class using available constructors and invokes available methods.

Q) What will API Documentation file contain ?
API documentation file will contain only declarations of class and its constructors and methods. It will not contain the logic implemented in constructors and methods. After all API Documentation file is meant for only giving information to other programmer for invoking constructors and methods, only their declaration details are sufficient, no need to provide method logic details. Hence API Documentation file will contain only class and its members' declarations; it will not contain logic details.

In the next pages we will learn generating API documentation file for a given class

Q) How can we generate API documentation file for a class?

By using ***javadoc*** tool we can generate API documentation file for a given class.

Like *javac*, *java, javap* tools javadoc is also jdk software binary file. It is also available in jdk\bin folder. Open jdk\bin folder, please check the file javadoc.exe is available or not.

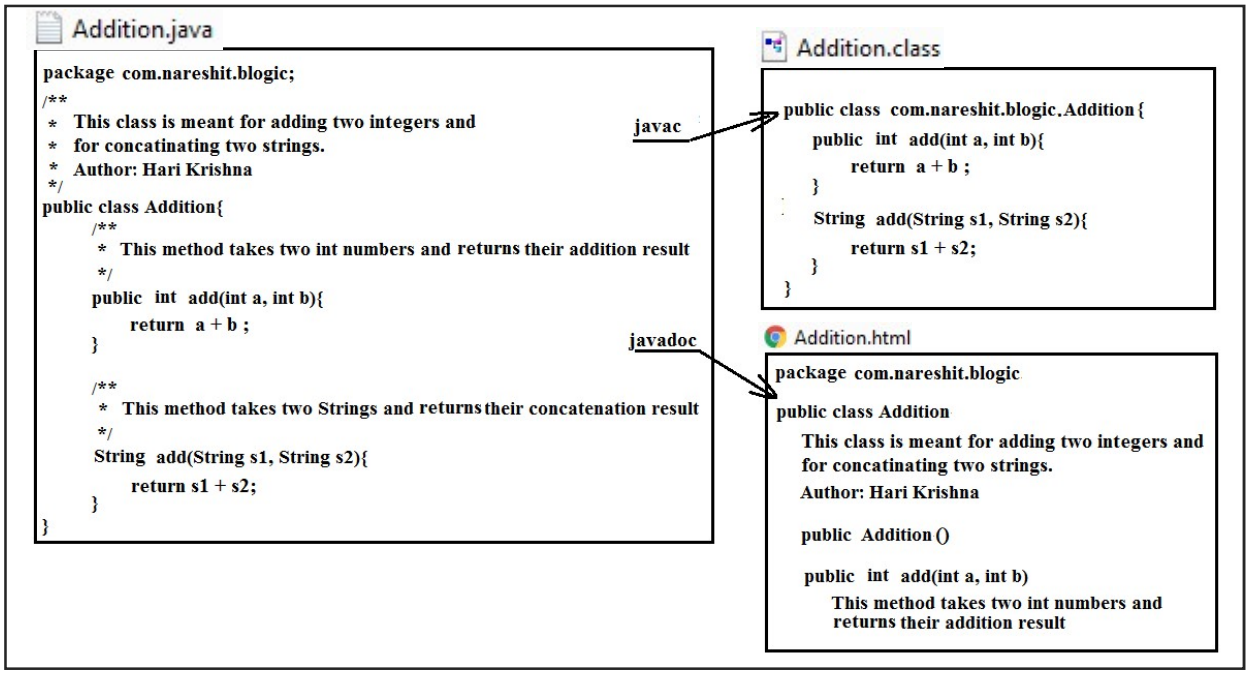
Syntax:

>javadoc source file

For example:

>javadoc Addition.java

Below diagram will show you developing API (.class file) and API Documentation (.html fie) for the class Addition



Rules:

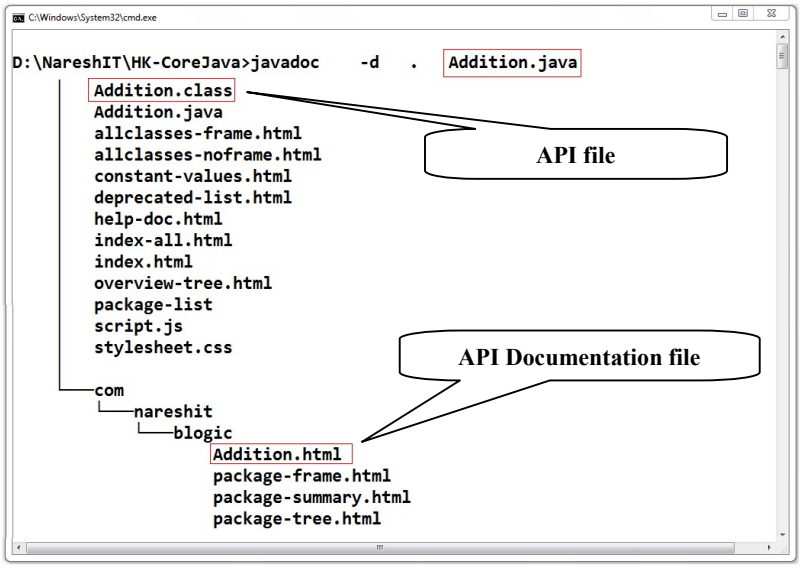
1. We can develop API Documentation only for public class
2. Only protected and public members will be included in API documentation file.
   In above class, second method add(String, String) is not protected and public, so it is not included in html file.

Steps to develop API documentation for Addition class

1. Save **Addition.java** file in a new folder **D:\CoreJava\API** folder
2. Open cmd prompt
3. Change to directory path to **D:\CoreJava\API** folder
4. Execute below command
   - **javadoc –d . Addition.java**

     In the current directory you will find many html files and other directories. Among them open "**Addition.html**" file to find Addition class documentation.

javadoc tool will create below folder structure and generates API Documentation file for the class Addition

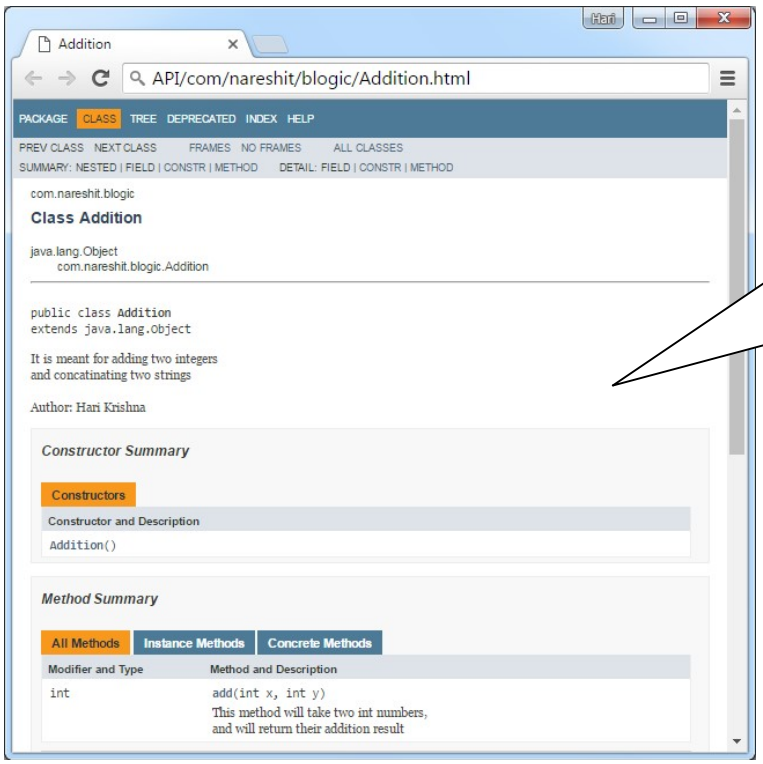


API Documentation file sturucture

Javadoc command will preprate API Doc file in the below manner

1. First it will place **pacakge** name
2. Then next **class** declaration with it comment
3. Then **Fields** declaration
4. Then **Constructors** declaration
5. Then **Methods** declaration
6. Finally the **methods inherited** from super class

as shown below



By looking into this Addition class API Documentation file other programmer will develop Calculator class by invoke constructor for creating object and further he will invoke add() method for adding given two int numbers as shown below

```
class Calculator{
  public static void main(String[] args){
        Addition a = new Addition();
        int res = a.add(10, 20);
        System.out.println( res );
  }
}
```

So far we have learnt how to generate API documentation file for our own class and also we have learnt building other classes by invoking constructors and methods of a class by looking into its API Documentation file.

Now Let us learn all differences between API(class file) and API Documentation file(html file)

Differences between API and API Documentation

S.No	API	API Documentation
1	API stands for Application Programming Interface. It is a reusable class.	API Documentation stands for Application Programming Interface Documentation. It is an html file.
2	API is generated by using javac command form the given source file.	API documentation is generated by using javadoc tool from the same source file.
3	API is available in the format of byte code, means API is a .class file	API Documentation is available in the format of html, means it is a .html file
4	API is a class it contains fields, constructors and methods with logic those can be reusable to develop new classes by using its functionality. It does not contain doc comments.	API documentation is html file it contains only declarations of a class, and its fields, methods and constructors with their doc comments. It does not contain logic.
5	API .class file will contains all 4 types of members private, default, protected, and public members.	API documentation .html file will contain only protected and public members.
6	API file(.class file) will be used by compiler and JVM	API Documentation file(.html file) will be used by Developer.
7	Compiler and JVM will use API .class file to find the invoked constructors and methods declarations and then execute their logic from .class file.	Developers will use API documentation file to find constructors and methods available in this class, and then will invoke them in their classes.
8	We must set API class file path in classpath, because compiler and JVM will find classes using classpath env variable.	No need to set API Documentation file in classpath
9	API classes are distributed using jar file. So we must set API classes jar file in classpath	API documentation file is distributed using zip file
10	We will get API jar files 100% with software installation, and it is available in lib folder. (Ex: jdk\jre\lib\rt.jar file is the java s/w API jar file)	But API Documentation files may or may not come with software installation. If it is not distributed with software installation you must download its zip file separately from its software home website.

Summary:

1) API stands for Application Programming Interface. The class that is reused for developing a new class is called API. This new class can again be reused for developing other classes. So generally set of ".class" files is called API.
2) The documentation given for the API class is called API Documentation. This documentation is provided by using the documentation comment "/** */"
3) In projects, from every .java file we will develop two files ".class" file and ".html" file.
4) API is available in the format of bytecodes, means .class file
5) API documentation is available in the format of HTML, means .html file
6) .class files are generated by using "javac" command from java file.
7) .html files are generated by using "javadoc" command from the same java file.

```
>javac Additon.java
        |-> Addition.class

   >javadoc Addition.java
        |-> Addition.html
```

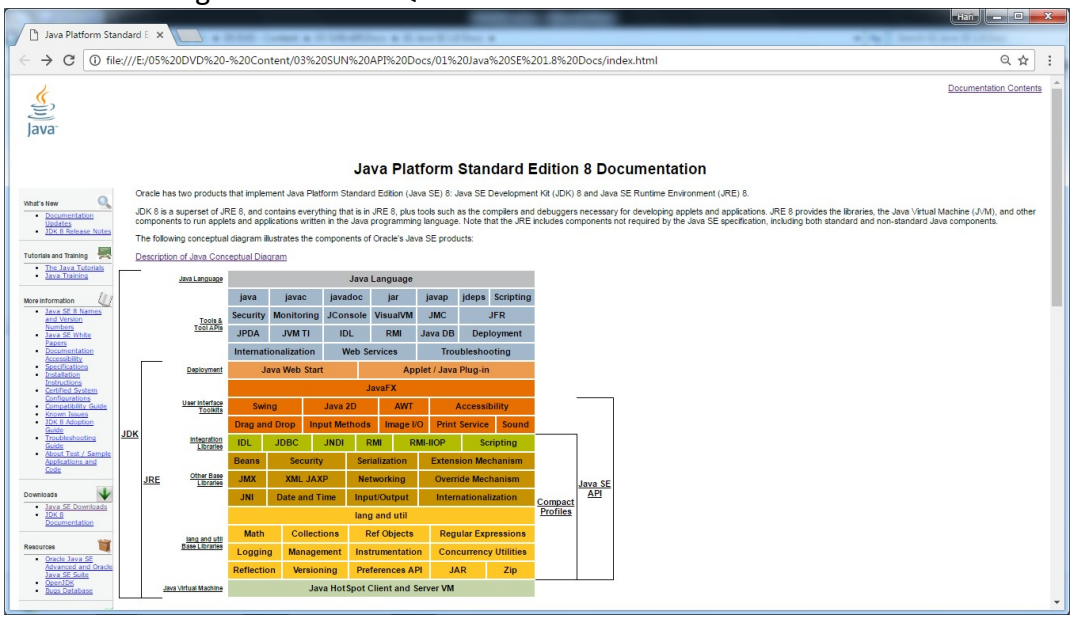
8) .class file contains a class and its private, default, protected, public fields, constructors, and methods definitions with logic. It does not contain java doc comments.
9) .html files contains only public class and its protected and public fields, constructors, and methods declarations with their java doc comments
10) API (.class files) is required for compiler and JVM to compile and execute new classes.
11) API documentation (.html files) is required for developer for developing new classes by using existing classes functionality.
12) API is distributed as jar file, and is available in our system by installing the software.
13) API documentation is distributed as zip file. It may or may not be distribute with software installer (.exe, .bin). If it is not distributed with that software, we must download it from that software vendor home site.
14) We must update *API jar* file in classpath to be used by Compiler and JVM.
15) We no need to update API documentation zip file in classpath as it is used by developer.

In the next pages we will learn about Java SE API and API Documentation files, and building applications using Java API functionality.

Java SE API Documentation folder structure

You must download "Java SE" API documentation zip file from Oracle.com
Visit **hkprogrammingworld.com** for downloading link.

1) After downloading Java SE documentation, extract zip file into D:\ drive
2) After extracting you will find a folder with name **docs** in D:\ drive,
3) Rename this folder name to ***Java SE API Docs*** for easy reading purpose
4) Open "Java SE API docs" folder
5) You will find below folders
   - api
   - Images
   - jdk
   - jre
   - legal
   - platform
   - technotes
   - index.html
6) To get quick access on all Java SE concepts and its API documentation files, open "index.html" file, and you will find a big diagram with all concepts names as hyperlinks. This diagram is called "Quick Launcher".



Click on the hyperlink of the concept that you want to learn

The other way to open API Documentation files is:

1. Open "api" folder
2. You will find below folders "*java* and *javax*"and a file "index.html"
3. Open index.html, you will see all Java SE packages as a list.
4. Click on the required package hyperlink.
5. You will find all interfaces, classes, Exceptions, Errors, Enum and Annotations defined in that package.

Procedure to Open individual classes' API documentation file

If you want to open individual class's html file, open "java" folder, you will find its sub packages. Inside those sub packages you will find individual html file of every Java class.

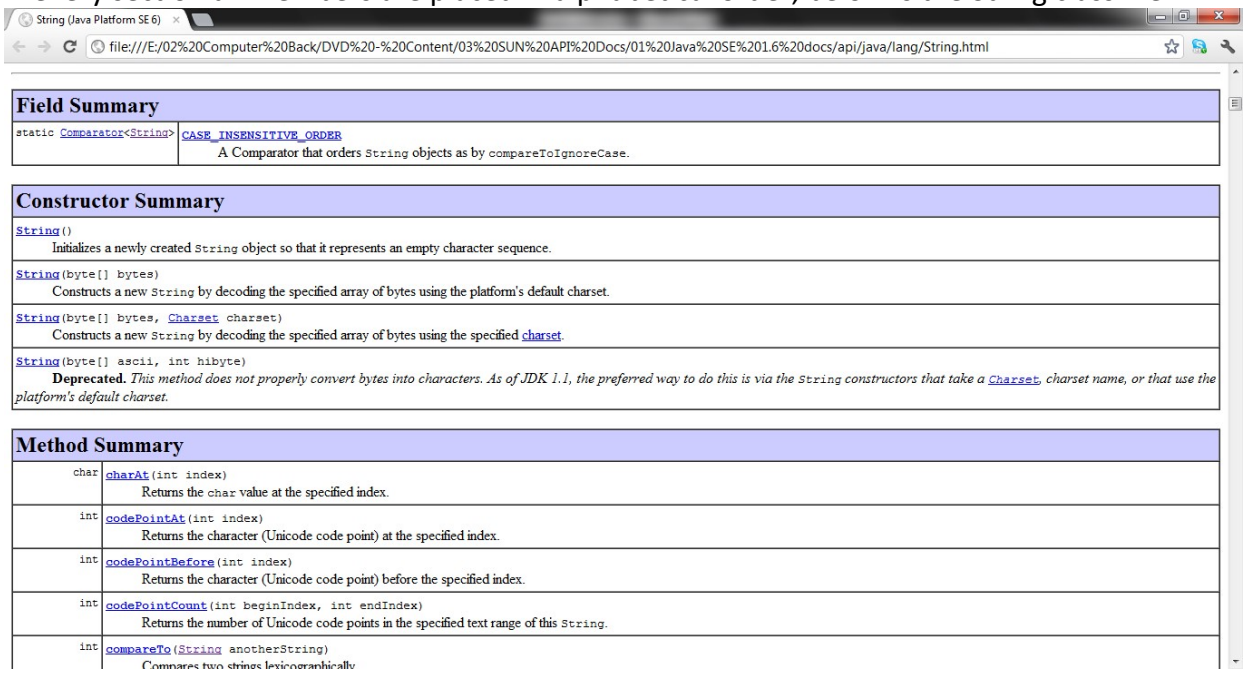
For example to open "String" class's html file open String.html from below path

"Java SE API Docs\api\java\lang\String.html"

In that class's html file you will find its protected and public members in the below order

1. static final variables - these are placed under Fields section
2. constructors - these are placed under Constructors section
3. methods - these are placed under Methods section.

In every section all members are placed in alphabetical order, below is the String class file



That's all about ***API and API Documentation*** Chapter, I hope you enjoyed in learning in-depth content on API an API Documentation☺.

Wait, wait, wait…. this chapter is not completed; just introduction to API & API Documentation is completed. We will continue learning API and API Documentation in next chapters too.

In next chapters we will learn Oracle (SUN) given Java SE predefined classes' functionality. Without using Java SE API Documentation how can we know class name, its constructors and methods signature for invoking them from our class? Hence for using Java SE classes, we must continue learning the usage of API Documentation☺.

To become comfortable with API Documentation file structure and its usage, please do revision by following the *Interview Questions* given in second page of this chapter. After completing revision then only continue reading next chapters.

For video classes on this chapter visit ***www.youtube.com/nareshit*** channel

☺ All the Best ☺