Sri SAI RAM ENGINEERING COLLEGE
INSTITUTE OF TECHNOLOGY
West Tambaram, Chennai - 44

SAIRAM DIGITAL RESOURCES

YEAR II SEM III

CS8392

OBJECT ORIENTED PROGRAMMING
(Common to CSE, EEE, EIE, ICE, IT)

UNIT NO 2

EXCEPTION HANDLING AND I/O

3.7 Character Stream in Java

COMPUTER SCIENCE & ENGINEERING

UNIT - III
Character Stream in Java

TOPICS PLAN

- Introduction of Java I/O
- What is Stream?
- Types of Stream
- Character Stream classes
- Java Reader
- Hierarchy of Reader
- Constructors and Methods
- Example of Java Reader class
- Java Writer
- Hierarchy of Java Writer
- Constructors and Methods
- Example of Java Writer class
- Video Link
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Introduction of Java I/O

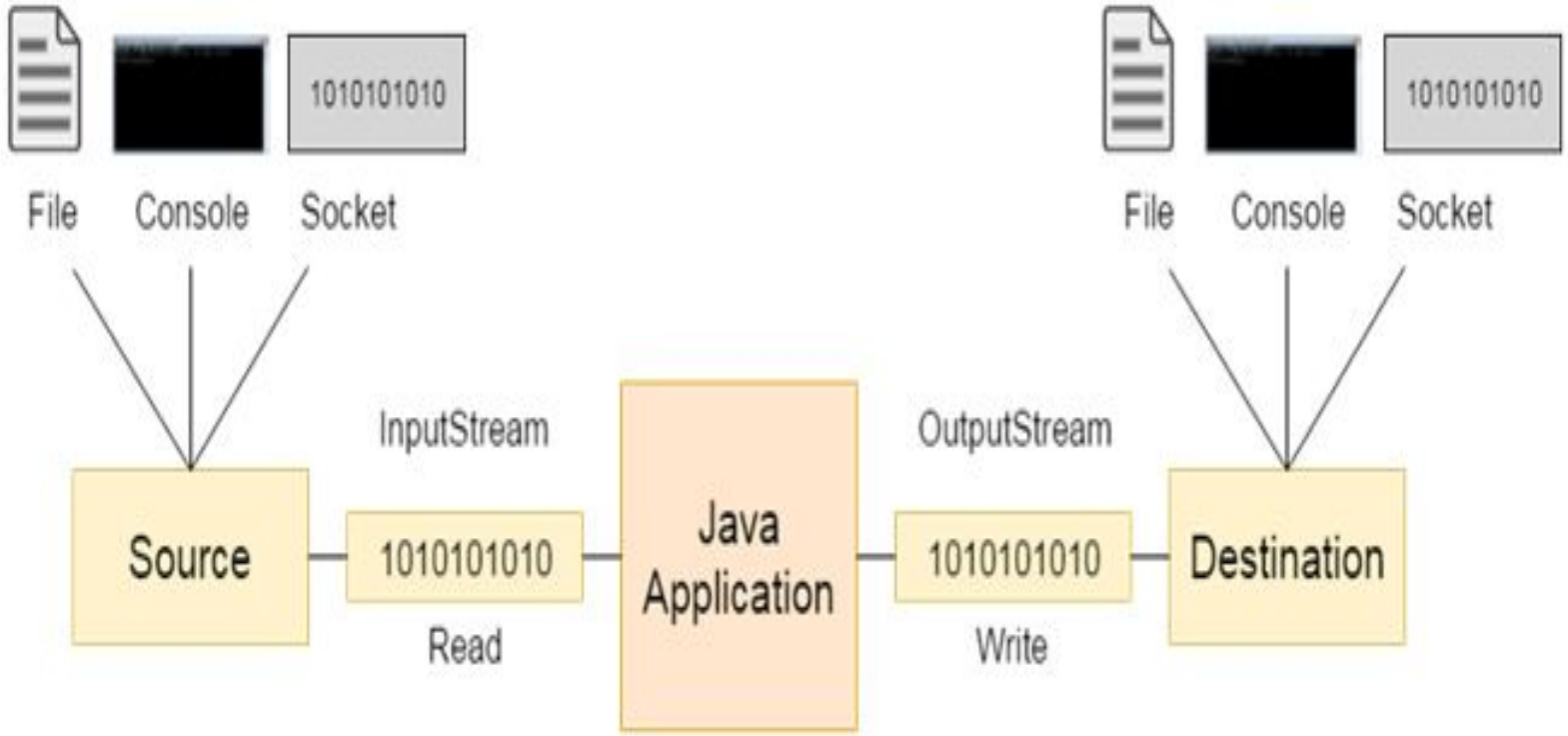
- Java I/O (Input and Output) is used *to process the input* and *produce the output*.
- Java I/O stream is the flow of data that you can either read from, or you can write to.
- Java uses the concept of a stream to make I/O operation fast. The java.io package contains all the classes required for input and output operations.
- Java.io package provides classes for system input and output through files, network streams, memory buffers, etc.
- Some input-output stream will be initialized automatically by the JVM and these streams are available in System class as in, out, and err variable.
  - In reference refers to the default input device, i.e. keyboard.
  - Out and err refers to the default output device, i.e. console.

Stream

- Streams are the sequence of bits(data).
- In Java, a stream is composed of bytes. It's called a stream because it is like a stream of water that continues to flow.
- There are two types of streams:
  - Input Streams
  - Output Streams
- Input Streams: Input streams are used to read the data from various input devices like keyboard, file, network, etc.
- Output Streams: Output streams are used to write the data to various output devices like monitor, file, network, etc.

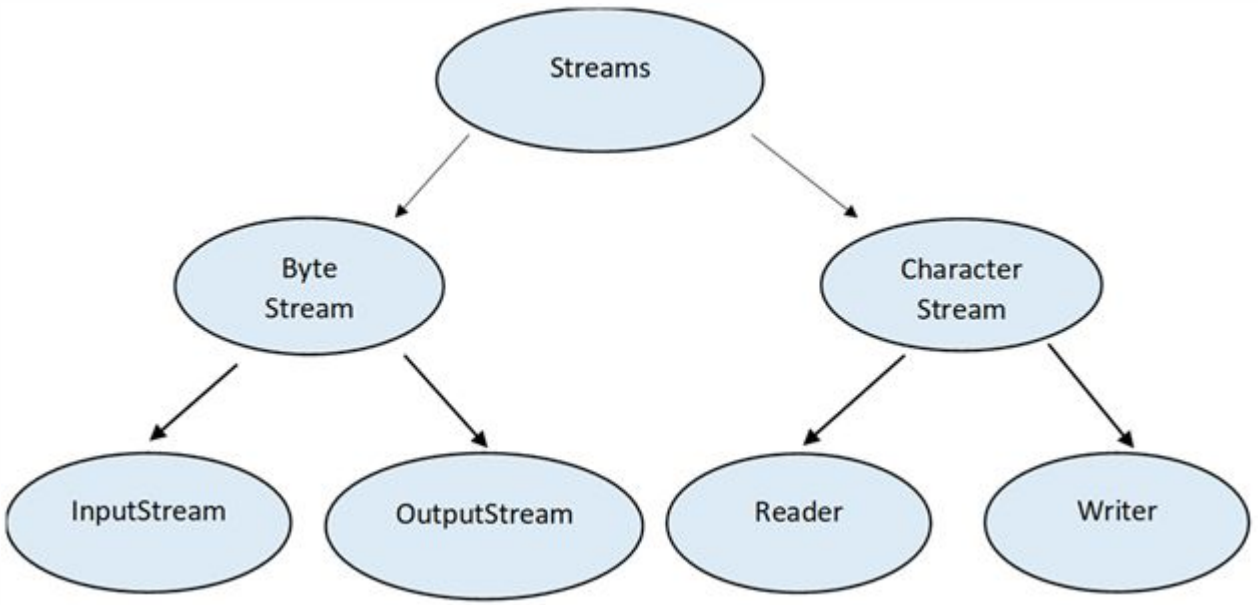
working method of OutputStream and InputStream

Let's understand the working of Java OutputStream and InputStream by the figure given below.



Types of Stream based on data

- There are two types of streams based on data:
- Byte Stream: used to read or write byte data.
- Character Stream: used to read or write character data.



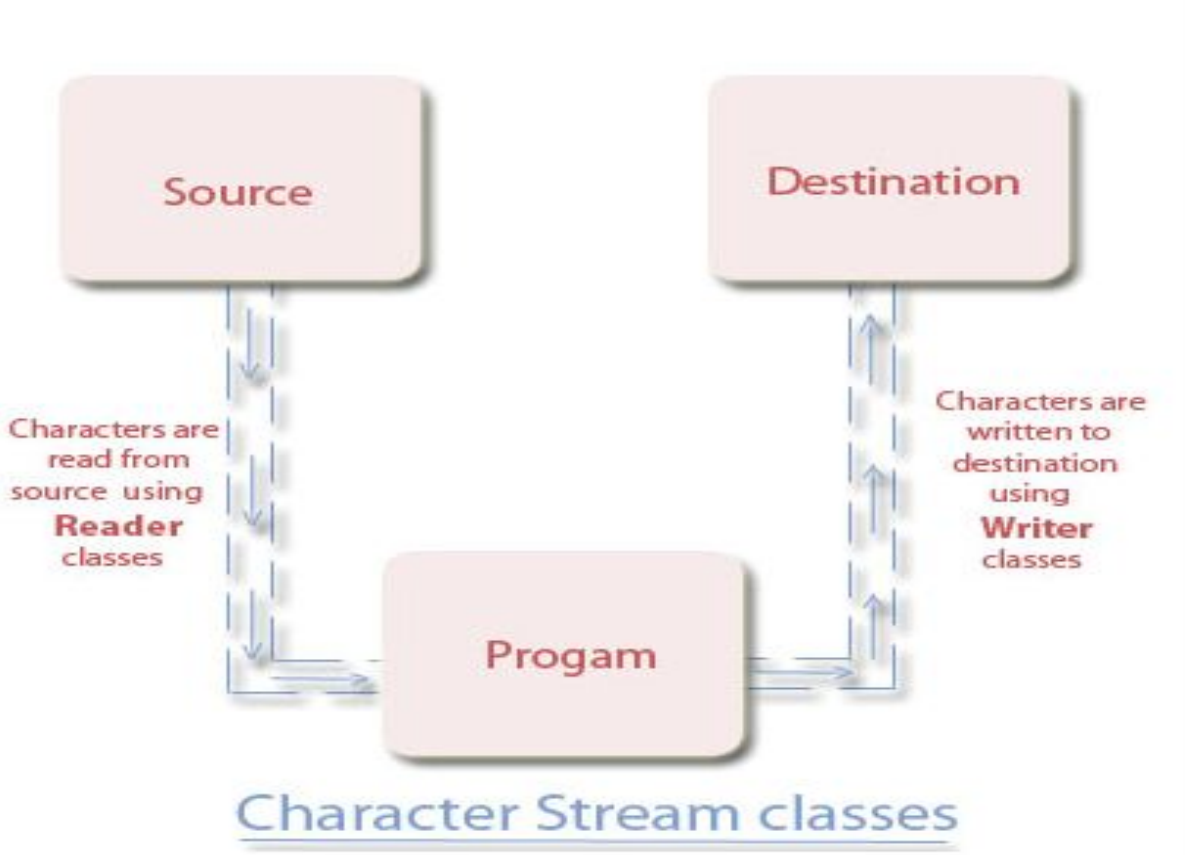
Character Stream Classes

Character Stream Classes are used to read characters from the source and write characters to destination.

There are two kinds of Character Stream classes - Reader classes and Writer classes.

- Reader Classes - These classes are subclasses of an abstract class, Reader and they are used to read characters from a source(file, memory or console).
- Writer Classes - These classes are subclasses of an abstract class, Writer and they used to write characters to a destination(file, memory or console).

Character Stream Classes

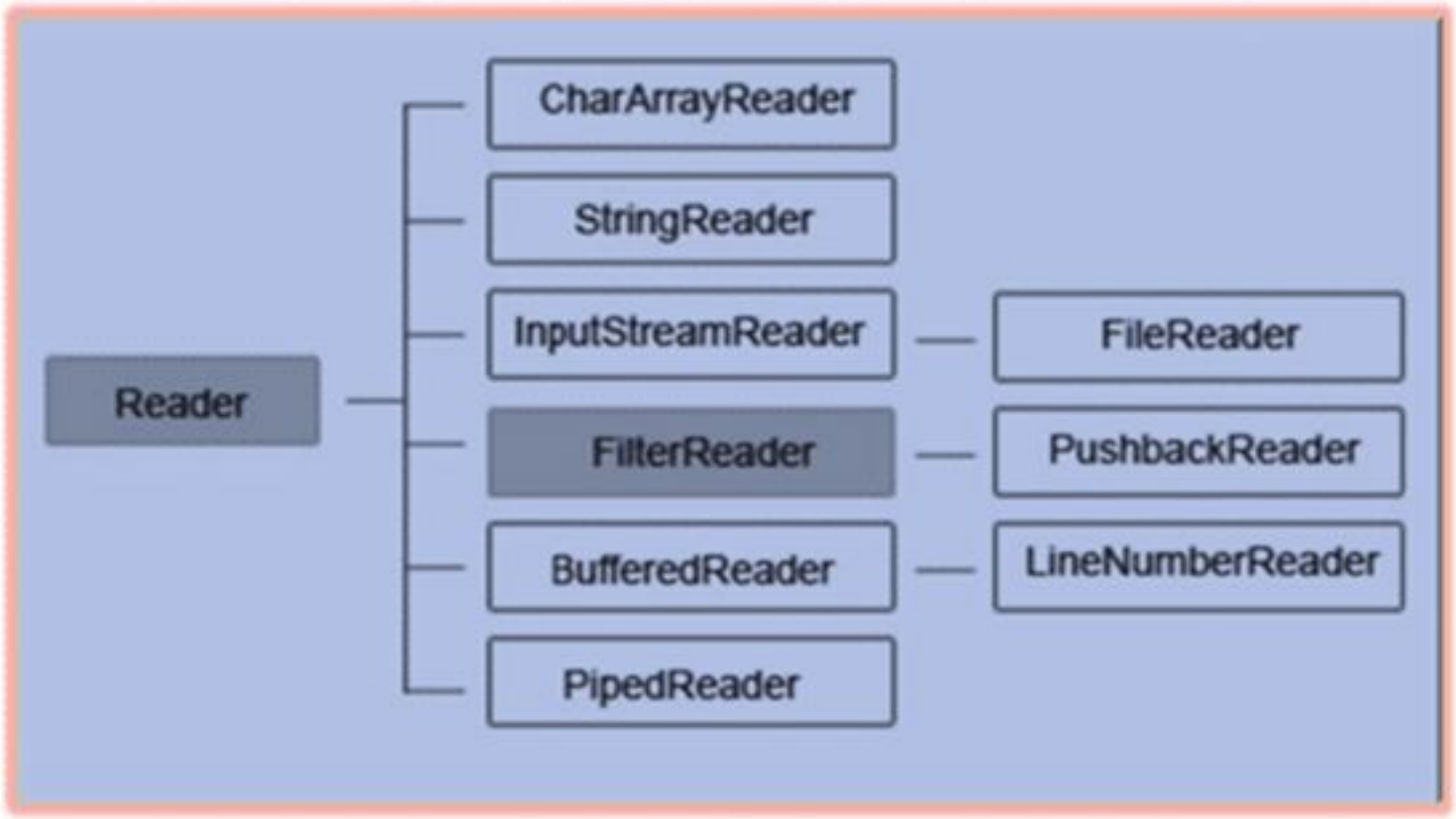


Java Reader

- Java Reader is an abstract class for reading character streams
- Reader class and its subclasses are used to read characters from source.
- Reader class is a base class of all the classes that are used to read characters from a file, memory or console. Reader is an abstract class and hence we can't instantiate it but we can use its subclasses for reading characters from the input stream.
- The only methods that a subclass must implement are read(char[], int, int) and close(). Most subclasses, however, will override some of the methods to provide higher efficiency, additional functionality, or both.
- Some of the implementation class are:

  BufferedReader, CharArrayReader, FilterReader, InputStreamReader, PipedReader, StringReader

Hierarchy of Java Reader



Constructor in Reader Class

Modifier	Constructor	Description
protected	Reader()	It creates a new character-stream reader whose critical sections will synchronize on the reader itself.
protected	Reader(Object lock)	It creates a new character-stream reader whose critical sections will synchronize on the given object.

Methods in Reader Class

Method	Description
close()	It closes the stream and releases any system resources associated with it.
read()	It reads a single character.
read(char[] cbuf)	It reads characters into an array.
read(char[] cbuf, int off, int len)	It reads characters into a portion of an array.
read(CharBuffer target)	It attempts to read characters into the specified character buffer.
ready()	It tells whether this stream is ready to be read.
reset()	It resets the stream.
skip(long n)	It skips characters.

Implementation of Reader Class

```
import java.io.*;
public class ReaderExample {
   public static void main(String[] args) {
      try {
         Reader reader = new FileReader("file.txt");
         int data = reader.read();
         while (data != -1) {
            System.out.print((char) data);
            data = reader.read();
         }
         reader.close();
      } catch (Exception ex) {
         System.out.println(ex.getMessage());
      }
   }
}
```

file.txt:

I love my country

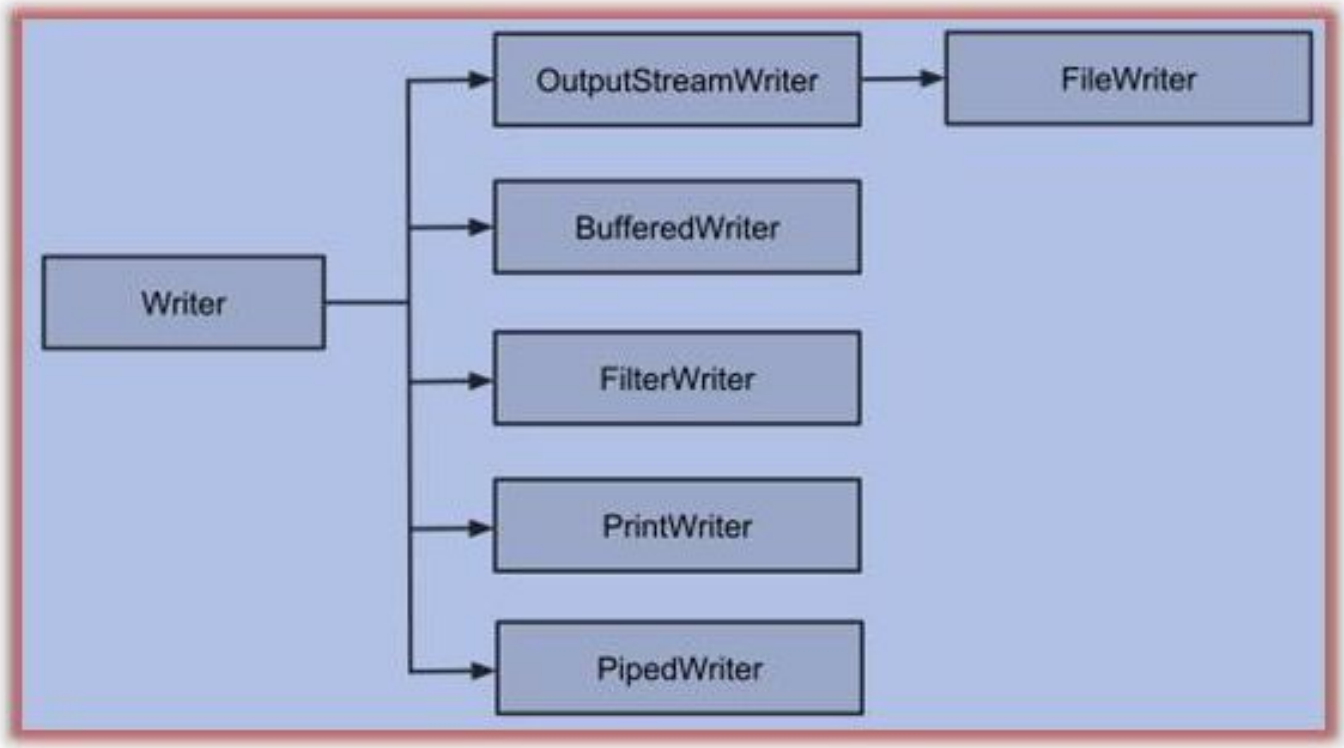
Output:

I love my country

Java Writer class

- It is an abstract class for writing to character streams. The methods that a subclass must implement are write(char[], int, int), flush(), and close().
- Most subclasses will override some of the methods defined here to provide higher efficiency, functionality or both.Writer class and its subclasses are used to write characters to a file, memory or console.
- Writer is an abstract class and hence we can't create its object but we can use its subclasses for writing characters to the output stream}

Hierarchy of Java Writer class



Constructors of Writer Class

Modifier	Constructor	Description
protected	Writer()	It creates a new character-stream writer whose critical sections will synchronize on the writer itself.
protected	Writer(Object lock)	It creates a new character-stream writer whose critical sections will synchronize on the given object.

methods of Writer Class

Method	Description
append(char c)	It appends the specified character to this writer.
append(CharSequence csq)	It appends the specified character sequence to this writer
append(CharSequence csq, int start, int end)	It appends a subsequence of the specified character sequence to this writer.
close()	It closes the stream, flushing it first.

methods of Writer Class

Method	Description
flush()	It flushes the stream.
write(char[] cbuf)	It writes an array of characters.
write(char[] cbuf, int off, int len)	It writes a portion of an array of characters.
write(int c)	It writes a single character.
write(String str)	It writes a string.
write(String str, int off, int len)	It writes a portion of a string.

Implementation of Writer Class

```
import java.io.*;
public class WriterExample {
    public static void main(String[] args) {
        try {
            Writer w = new FileWriter("output.txt");
            String content = "I love my country";
            w.write(content);
            w.close();
            System.out.println("Done");
        } catch (IOException e) {
            e.printStackTrace();
        }
    }
}
```

Output:

Done

output.txt:

I love my country

VIDEO LINK

VIDEO LINK FOR CHARACTER STREAM:

- https://www.youtube.com/watch?v=OioUUNlJ8Ng

MCQ LINK

MCQ LINK FOR CHARACTER STREAM

- https://forms.gle/VPh5NMh6KwFDxmnZA