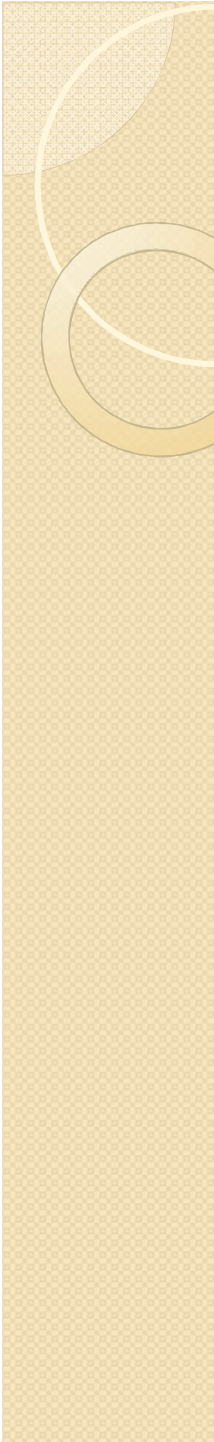




**Course Name:**  
**Advanced Java**



# Lecture 10

## Topics to be covered

- I/O streams (Continued)
  - BufferedInputStream
  - DataInputStream
  - Output Streams
  - FileOutputStream
  - ByteArrayOutputStream
  - FilterOutputStream
  - BufferedOutputStream
  - DataOutputStream

# BufferedInputStream

- A buffered input stream maintains a buffer in the memory to store bytes of data read from an input stream.
- Storing a number of bytes in the buffer allows you to perform input operations on a range of data types at a time. This increases the efficiency of input operations.
- The BufferedInputStream class allows you to add a buffer to any input stream.
- To create a buffered input stream, the BufferedInputStream class defines two types of constructors.

# Cont..

## BufferedInputStream(InputStream inStream)

This constructor creates an object of the `BufferedInputStream` class that adds a buffer of default size, 512 bytes to the input stream. This input stream is specified as a parameter in the constructor.

## BufferedInputStream(InputStream inStream, int len)

This constructor creates an object of the `BufferedInputStream` class that adds a buffer of a specified size to an input stream. The input stream is specified as a parameter in the constructor. The size of the buffer is specified as the second parameter to the constructor and `reset()` methods.

# PushBackInputStream

- This class is used to create an input stream that enables you to read one or more bytes from the stream.
- This class can be used for organizing the contents of a file.
- The bytes read from the input stream are stored in a memory buffer called pushback buffer until they are pushed back into the stream.
- To create an input stream, the PushBackInputStream class defines the two types of constructors.

# Cont...

## `PushBackInputStream(InputStream inStream)`

This constructor creates an object of the `PushBackInputStream` class that reads a single byte of data from an input stream. In this case, the pushback buffer can contain only a single byte. The source input stream is specified as a parameter in the constructor.

## `PushbackInputStream(InputStream inStream, int len)`

This creates an object that can read multiple bytes of data from input stream. The first parameter to the constructor specifies the source input stream and the second parameter specifies the length or the number of bytes to be read from the input stream.

# DataInputStream

- This class is used to filter an existing input stream in order to read binary representation of primitive java data types from the underlying input stream.
- To create a DataInputStream, you can use the following constructor:

## DataInputStream(InputStream inStream)

This constructor creates a DataInputStream object that reads the binary representation of the primitive data types from the underlying stream. The input stream to be filtered is specified as a parameter to the constructor.



# DataInputStream methods

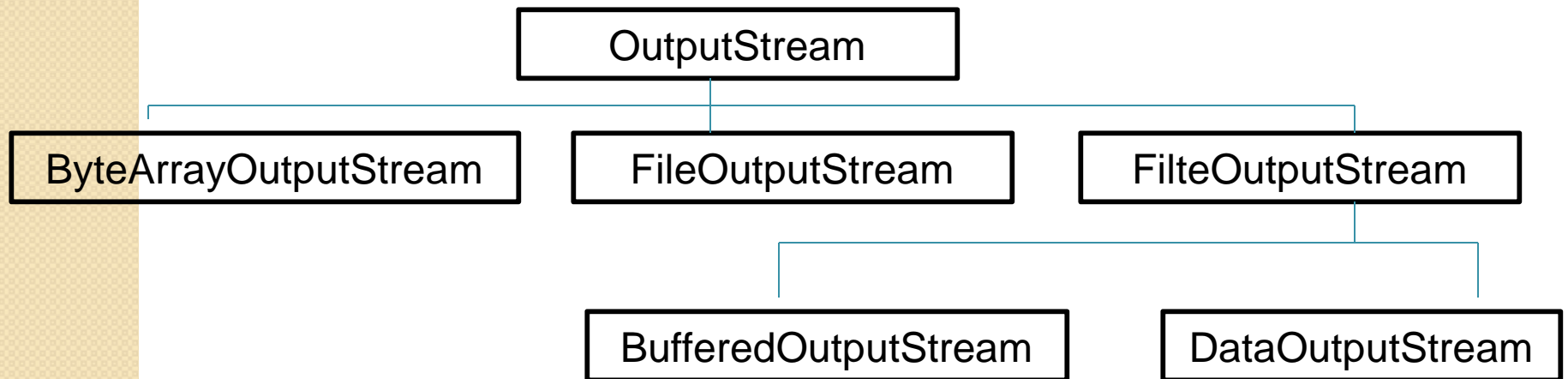
- This class defines a range of methods to read data in various formats from an input stream.

Method	Explanation
boolean readBoolean()	Returns a boolean value from the input stream.
char readChar()	Returns a unicode character value from the input stream.
int readInt()	Returns an integer value from the input stream.
long readLong()	Returns a long integer value from the input stream.
float readFloat()	Returns a float type value from the input stream.
int readByte()	Reads a byte from the input stream. The byte is contained in the lower order byte of the returned integer value.



# Output Streams

- Output streams enable you to write bytes of data from an application to various output devices.
- The java.io package includes a range of classes that can be used to create and manage output streams.
- These classes are arranged in a hierarchy:



## Cont...

- At the top of the hierarchy is the `OutputStream` class, which is the superclass for the rest of the classes in the hierarchy.
- The `Output Stream` class is an abstract class and it defines the basic functionality required for data output.
- This functionality is inherited by the subclasses of the `OutputStream` class.

# Methods in OutputStream Class

- OutputStream class defines a range of methods that can be used to write data to an output stream. These methods are inherited by the subclasses in the hierarchy when they extend the OutputStream class.

Method	Explanation
void write(int n)	Writes the specified byte of data to the output stream.
void write(byte[] b)	Writes an array of bytes to the output stream.
void write(byte[] b, int off, int len)	Writes a segment of an array to the output stream.
void flush()	Forces write operation whenever the data accumulates in the output stream.
void close()	Causes the output stream to close and releases all the resources associated with it.

# FileOutputStream class

- This class is used to create a stream that writes bytes of data to a file.
- To create an output stream, the FileOutputStream class defines the following constructors:

## FileOutputStream(String fPath)

This constructor creates an object of the FileOutputStream class that uses a file as the destination.

## FileOutputStream(File fObj)

This constructor creates a FileOutputStream object that uses a file as the data destination and it is specified as an object of the File class.

# ByteArrayOutputStream

- This class creates an output stream using a byte array in the memory buffer.
- The output stream created using this class is complementary to the input stream created using the `ByteArrayInputStream`.
- It uses the byte array as a destination to store data.
- To create an output stream, we can use two types of constructors.

# Cont...

- `ByteArrayOutputStream()`

This constructor creates a `ByteArrayOutputStream` object that uses an array of bytes in memory as the data destination. By default, the size of the buffer array is equal to 32 bytes.

## `ByteArrayOutputStream(int bufLen)`

This constructor creates a `ByteArrayOutputStream` object that uses buffer array of a specified size as the destination. The size of the array is specified as a parameter in the constructor.

# ByteArrayOutputStream class methods

Method	Explanation
write To()	Writes the contents of a byte array output stream to the specified output stream.
size()	Obtains the number of bytes that have been writing to the output stream.
reset()	Clears the buffer array so that you can start writing at the beginning of the buffer.
toByteArray()	Stores the data from the buffer of the output stream to a byte array.



# FilterOutputStream

- This class defines the functionality to filter bytes written to an output stream.
- It has two subclasses that defines the filtering operations that can be performed on the bytes of data written to the data destination.

The subclasses are:

- BufferedOutputStream
- DataOutputStream

# BufferedOutputStream

- This class allows you to create a buffered stream from any output stream.
- You can accumulate multiple bytes of data from the output stream in the buffer.
- These accumulated bytes can be sent to the data destination in a single output operation rather than one byte at a time. This increases the efficiency of output operations.
- To create buffered output stream object, the BufferedOutputStream class defines two types of constructors.

## Cont...

`BufferedOutputStream(OutputStream outputStream)`

This constructor creates an object of the `BufferedOutputStream` class that adds a buffer of 512 bytes to an output stream.

`BufferedOutputStream(OutputStream outputStream, int len)`

This constructor creates a buffered stream that adds a buffer of a specified size to an output stream.

# DataOutputStream class

- This class is used to filter an existing output stream to write binary representation of primitive java data type values to the output stream.
- To create a `DataOutputStream`, you can use the following constructor.

## `DataOutputStream(OutputStream outputStream)`

This creates a `DataOutputStream` object that enables you to write values in the form of data types to an existing output stream.