

Lecture 31

I - O Stream - II



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OBJECT ORIENTED PROGRAMMING WITH JAVA

Input-Output Handling in Java – II

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Usage of I-O Stream Classes



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Get input using DataInputStream class

Calculator Program

```
import java.io.*;
class InterestCalculator
{
    public static void main(String args[ ] )
    {
        Float principalAmount = new Float(0);
        Float rateOfInterest = new Float(0);
        int number_of_Years = 0;

        DataInputStream in = new
        DataInputStream(System.in);
        String tempString;
        System.out.print("Enter Principal
Amount: ");
        System.out.flush();
        tempString = in.readLine();
        principalAmount =
        Float.valueOf(tempString);
        System.out.print("Enter Rate of
Interest: ");
```





Get input using DataInputStream class

Calculator Program

```
import java.io.*;
class InterestCalculator
{
    public static void main(String args[])
    {
        Float principalAmount = new Float(0);
        Float rateOfInterest = new Float(0);
        int numberofYears = 0;

        DataInputStream in = new
        DataInputStream(System.in);
        String tempString;
        System.out.print("Enter Principal
Amount: ");
        System.out.flush();
        tempString = in.readLine();
        principalAmount =
        Float.valueOf(tempString);
        System.out.print("Enter Rate of
Interest: ");
```

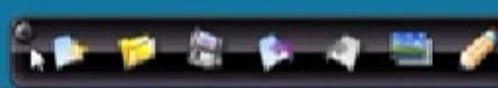
```
System.out.flush();
tempString = in.readLine();
rateOfInterest =
Float.valueOf(tempString);
System.out.print("Enter Number of Years:");
System.out.flush();
tempString = in.readLine();
numberofYears =
Integer.parseInt(tempString);
// Input is over: calculate the interest
int interestTotal =
principalAmount*rateOfInterest*numberofYears;
System.out.println("Total Interest = " +
interestTotal);
}
```



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Files Handling in Java



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Java File I/O

Java provides [java.io](#) package which includes numerous class definitions and methods to manipulate file and flow of data (called File I/O streams)

There are
four major
classes:

[File](#)

[InputStream](#)

[OutputStream](#)

[RandomAccessFile](#)



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Using class File



Opening a File object

- There are three constructors

- Way 1:

- File myFile;
 - myFile = new File(fileName); // Constructor 1

- Way 2:

- File myFile;
 - myFile = new File (pathName, filename); // Constructor 2

- Way 3:

- File myFile;
 - File myFile = new File(myDir, fileName); // Cons





Using class File



Opening a File object

- There are three constructors

- Way 1:

- File myFile;
 - myFile = new File(fileName); // Constructor 1

- Way 2:

- File myFile;
 - myFile = new File (pathName, filename); // Constructor 2

- Way 3:

- File myFile;
 - File myFile = new File(myDir, fileName); // Cons



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Using class File



Dealing with file names

- String getName()
- String getPath()
- String getAbsolutePath()
- String getParent()
- boolean renameTo(File newfilename)



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Using class File



Testing a file

- boolean exists()
- boolean canWrite()
- boolean canRead()
- boolean isFile()
- boolean isDirectory()
- boolean isAbsolute()



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Using class File



Getting file information

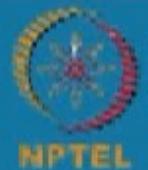
- long lastModified()
- long length()
- boolean delete()

Directory utilities

- boolean mkdir(File newDir)
- boolean mkdirs(File newDir)
- String [] list()



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Checking Status of a File

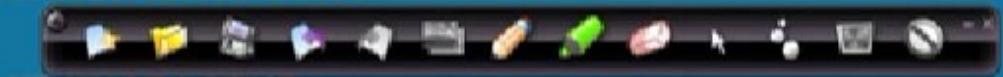


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Using class File: An example

```
import java.io.File  
class FileTest {  
    public static void main (String args [ ] ) throws IOException {  
        File fileToCheck;  
        if (args.length > 0 ) {  
            for (int i = 0; i < args.length;i++ ) {  
                fileToCheck = new File(args[ i ]);  
                getPaths(fileToCheck);  
                getInfo(fileToCheck);  
            }  
        }  
        else  
            System.out.println (" Usage : Java file test <filename (s)  
    }  
}
```

```
public static void getPaths (File f) throws IOException {  
    System.out.println ("Name : " + f.  
    getParent());  
    System.out.println ("Path : " + f.  
    getPath());  
    System.out.println ("Parent : " +  
    f.getParent());  
}  
public static void getInfo (File f) throws IOException {  
    if (f.exists ()) {  
        System.out.println ("File exists");  
        System.out.println (f.lastModified());  
        System.out.println ("and is readable" : " " +  
        f.canRead());  
        System.out.println ("and is writable" : " " +  
        f.canWrite());  
        System.out.println ("File is last  
modified : " + f.lastModified());  
        System.out.println ("File is " +  
        f.length () + "bytes");  
    }  
    else  
        System.out.println (" File does not  
exist.");  
}
```



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Using class File: An example

```
import java.io.File;
class FileClass {
    public static void main (String args[]) throws IOException {
        File fileObject;
        String length;
        long size;
        System.out.println("File object created");
        fileObject = new File("C:\\Users\\Dell\\Desktop\\test.txt");
        if (fileObject.exists()) {
            System.out.println("File exists");
            System.out.println("Name : " + fileObject.getName());
            System.out.println("Path : " + fileObject.getPath());
            System.out.println("Parent : " + fileObject.getParent());
        } else {
            System.out.println("File does not exist");
        }
    }
}
```

```
public static void getPaths (File f ) throws IOException {
    System.out.println ("Name : " + f.getName( ) );
    System.out.println ("Path : " + f.getPath ( ) );
    System.out.println ("Parent : " + f.getParent ( ) );
}

public static void getInfo (File f ) throws IOException {
    if (f.exists) {
        System.out.print ("File exists ");
        System.out.println (f.canRead( ) ? "and is readable" : "");
        System.out.println ( f.canWrite( ) ? "and is writable" : "");
        System.out.println ("File is last modified : " + f.lastModified( ) );
        System.out.println ("File is " + f.length( ) + "bytes" );
    }
    else
        System.err.println (" File does not exist." );
}
}
```



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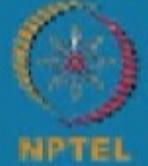




Reading a File

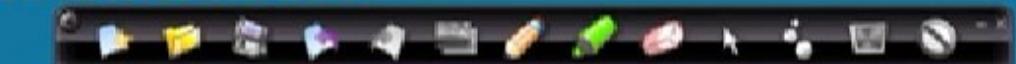


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Example: class `FileInputStream`

```
class InputStreamTest {
    public static void main (String args [ ] ) {
        int size;
        // To open a file input stream.
        FileInputStream fin;
        fin = new FileInputStream (" C:\WINDOWS\SYSTEM\SYSTEM.INI");
        size = fin.available();
        // returns the number of bytes available
        System.out.println("Total bytes ::" + size);
        System.out.println (" First ¼ is displayed : Using read( )");
        for (int i = 0; i < size /4 ; i++ ) {
            System.out.println ((char) fin.read( ) );
        }
    }
}
```

```
/* Remaining bytes := file.available() */
System.out.println("Want to be displayed : Using read( b[ ])");
new byte[(size/8)];
int i := b.length;
System.err.println("File reading error : ");
temp = new String( b, 0, i, b.length );
// Convert the bytes into
b.out.println(temp);

```



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Example: class FileInputStream

```
class InputStreamTest {
    public static void main (String args [ ] ) {
        int size;
        // To open a file input stream.
        FileInputStream fin;
        fin = new FileInputStream (" C:\WINDOWS\SYSTEM\SYSTEM.INI");
        size = fin.available();
        // returns the number of bytes available
        System.out.println("Total bytes ::" + size);
        System.out.println ( " First ¼ is displayed : Using read( )");
        for (int i = 0; i < size /4 ; i++ ) {
            System.out.println ((char) fin.read());
        }
    }
}
```

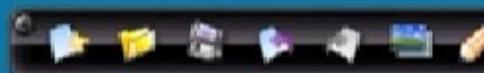
```
" Remaining bytes ::" + fin.available() );
println ("First ¼ is displayed : Using read( )");
new byte[size/4];
i (i) <= b.length )
System.err.println ("File reading error : ");
temp = new String (b, 0, i, b.length );
// Convert the bytes into
System.out.println (temp );
System.out.println (" Still available:" + fin.available());
System.out.println (" skipping ¼ : Using skip");
fin.skip (size/4);
System.out.println (" File remaining for read");
fin.close ();
// Close the stream
```



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Example: class FileInputStream

```
class InputStreamTest {
    public static void main (String args [] ) {
        int size;
        // To open a file input stream.
        FileInputStream fin;
        fin = new FileInputStream ("C:\\Windows\\System32\\version.ini");
        size = fin.available();
        // returns the number of bytes available
        System.out.println ("Total bytes :: " + size);
        System.out.println ("First 4 is displayed : Using read( b[ ] )");
        byte b[] = new byte [size/4];
        if (fin.read (b) != b.length )
            System.out.println ("File reading error : ");
        else {
            for (int i = 0; i < size /4; i++)
                System.out.print (b[i] );
        }
    }
}
```

```
System.out.println (" Remaining bytes :: " + fin.available() );
        System.out.println ("Next 4 is displayed : Using read( b[ ] )");
        byte b[] = new byte [size/4];
        if (fin.read (b) != b.length )
            System.out.println ("File reading error : ");
        else {
            String temp = new String (b, 0, 0, b.length );
            // Convert the bytes into string
            System.out.println (temp);
            // display text string.
            System.out.println (" Still available:" + fin.available());
            System.out.println (" skipping 4 : Using skip ( ) ");
            fin.skip(size/4);
            System.out.println (" File remaining for read :: "
                    + fin.available());
        }
        fin.close (); // Close the input stream
    }
}
```



Example: class FileInputStream

```
class InputStreamTest {
    public static void main (String args [] ) {
        String file;
        // To open a file input stream.
        FileInputStream fin;
        file = new FileInputStream ("C:\\Windows\\System32\\version.ini");
        size = fin.available();
        // returns the number of bytes available
        System.out.println ("Total bytes ::" + size);
        System.out.println ("First 4 is displayed : Using read( b[ ])");
        byte b[] = new byte [size/4];
        if (fin.read (b) != b.length )
            System.out.println ("File reading error : ");
        else {
            for (int i = 0; i < size /4; i++)
                System.out.print (b[i] );
        }
    }
}
```

```
System.out.println (" Remaining bytes ::" + fin.available() );
        System.out.println ("Next 4 is displayed : Using read( b[ ])");
        byte b[] = new byte [size/4];
        if (fin.read (b) != b.length )
            System.out.println ("File reading error : ");
        else {
            String temp = new String (b, 0, 0, b.length );
            // Convert the bytes into string
            System.out.println (temp);
            // display text string.
            System.out.println (" Still available:" + fin.available());
            System.out.println (" skipping 4 : Using skip ( )");
            fin.skip (size/4);
            System.out.println (" File remaining for read ::"
                    + fin.available());
        }
        fin.close (); // Close the input stream
    }
}
```



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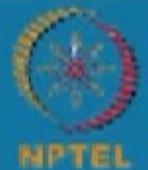




Writing into a File



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Example: Writing bytes into file

```
import java.io.*;
class WriteBytes {
    public static void main(String args[]) {
        cities[]={ 'D', 'E', 'L', 'H', 'I', '\n', 'M', 'A', 'D', 'R', 'A', 'S', '\n', 'L', 'O', 'N', 'D', 'O',
        'N', '\n'}; //Declare and initialize a byte array byte
        FileOutputStream outfile=null; //create an output file stream
        try {
            outfile = new FileOutputStream("city.txt");
            // Connect the outfile stream to "city.txt"
            outfile.write(cities); //Write data to the stream
            outfile.close();
        }
        catch(IOException ioe) {
            System.out.println(ioe);
            System.exit(-1);
        }
    }
}
```





Reading from a File



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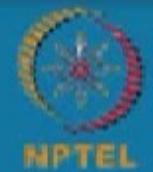


Example: Reading bytes from file

```
import java.io.*;
class ReadBytes {
    public static void main (String args[]) {
        FileInputStream infile = null; // Create an input file stream
        int b;
        try {
            infile = new FileInputStream(args[0]);
            // Connect infile stream to the required file
            while((b = infile.read()) != -1) {
                System.out.print((char)b); // Read and display data
            }
            infile.close();
        }
        catch(IOException ioe) {
            System.out.println(ioe);
        }
    }
}
```



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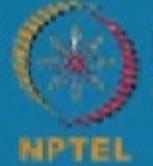




Copy a File into Other File (CharacterStream Class)

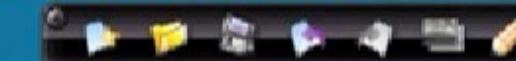


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Example: Reading/ writing characters

```
//Copying characters from one file into another
import java.io.*;
class CopyCharacters
{
    public static void main (String args[])
    {
        //Declare and create input and output files
        File inFile = new File("input.dat");
        File outFile = new File("output.dat");
        FileReader ins = null; // Creates file stream ins
        FileWriter outs = null;
        // Creates file stream outs
        try {
            ins = new FileReader (inFile) ;
            // Opens inFile
            outs = new FileWriter (outFile) ;
            // Opens outFile
            int ch; // Read and write till the end
```

```
while ((ch = ins.read()) != -1)
{
    outs.write(ch) ;
}
catch(IOException e) {
    System.out.println(e);
    System.exit(-1);
}
finally //Close files
{
    try {
        ins.close();
        outs.close();
    }
    catch (IOException e) { }
}
} // main
} // class
```



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Copying a File into Other File (ByteStream Class)



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Example: Copying bytes from one file to another

```
try {
    //Connect infile to in.dat
    infile = new
    FileInputStream("in.dat");
    //Connect outfile to out.dat
    outfile = new
    FileOutputStream("out.dat");
    //Reading bytes from in.dat
    //and writing to out.dat
}

import java.io.*;
class CopyBytes
{
    public static void main (String args[])
    {
        //Declare input and output file streams
        FileInputStream infile = null;
        //Input stream \
        FileOutputStream outfile = null;
        //Output stream
        //Declare a variable to hold a byte
        byte byteRead;
```





Example: Copying bytes from one file to another

```
import java.io.*;
class CopyBytes
{
    public static void main (String args[])
    {
        //Declare input and output file
        streams
        FileInputStream infile = null;
        //Input stream
        FileOutputStream outfile = null;
        //Output stream
        //Declare a variable to hold a
        byte
        byte byteRead;
    }
}
```

```
try {
    //Connect infile to in.dat
    infile = new
    FileInputStream("in.dat");
    //Connect outfile to out.dat
    outfile = new
    FileOutputStream("out.dat");
    //Reading bytes from in.dat
    and writing to out.dat
    do {
        byteRead = (byte) infile.read()
        outfile.write(byteRea           d);
    }
    while (byteRead != - 1);
}
```

```
    catch (FileNotFoundException e) {
        System.out.println("File not
        found");
    }
    catch (IOException e) {
        System.out.println(e.
        getMessage());
    }
}
```

```
    Close files
    infile.close();
    outfile.close();
}
```





Example: Copying bytes from one file to another

```
import java.io.*;
class CopyBytes
{
    public static void main (String args[])
    {
        //Declare input and output file
        streams
        FileInputStream infile = null;
        //Input stream
        FileOutputStream outfile = null;
        //Output stream
        //Declare a variable to hold a
        byte
        byte byteRead;
```

```
try {
    //Connect infile to in.dat
    infile = new
    FileInputStream("in.dat");
    //Connect outfile to out.dat
    outfile = new
    FileOutputStream("out.dat");
    //Reading bytes from in.dat
    //and writing to out.dat
```

```
    catch(FileNotFoundException e) {
        System.out.println("File not
        found");
    }
    catch(IOException e) {
        System.out.println(e.
        getMessage());
    }
    finally      //Close files
    {
        try {
            infile.close();
            outfile.close();
        }
        catch(IOException e){}
    }
}
```



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Storing Data into a File



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Example: Storing and reading data

```
import java.io.*;
class ReadWritePrimitive
{
    public static void main (String args[]) throws IOException
    {
        File primitive = new File("prim.dat");
        FileOutputStream fos = new FileOutputStream(primitive);
        DataOutputStream dos = new DataOutputStream(fos);

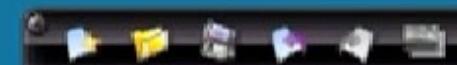
        //Write primitive data to the "prim.dat"file
        dos.writeInt(1999);
        dos.writeDouble(375.85);
        dos.writeBoolean(false);
        dos.writeChar('X');
    }
}
```



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Example: Storing and reading data

```
import java.io.*;
class ReadWritePrimitive
{
    public static void main (String args[]) throws IOException
    {
        File primitive = new File("prim.dat");
        FileOutputStream fos = new FileOutputStream(primitive);
        DataOutputStream dos = new DataOutputStream(fos);

        //Write primitive data to the "prim.dat"file
        dos.writeInt(1999);
        dos.writeDouble(375.85);
        dos.writeBoolean(false);
        dos.writeChar('X');
    }
}
```

```
dos.close();
fos.close();
//Read data from the "prim.dat" file
FileInputStream fis = new FileInputStream(primitive);
DataInputStream dis = new DataInputStream(fis);
System.out.println(dis.readInt());
System.out.println(dis.readDouble());
System.out.println(dis.readBoolean());
System.out.println(dis.readChar());

dis.close();
fis.close();
}
}
```



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Example: Storing and reading data

```
import java.io.*;
class ReadWritePrimitive
{
    public static void main (String args[]) throws IOException
    {
        File primitive = new File("prim.dat");
        FileOutputStream fos = new FileOutputStream(primitive);
        DataOutputStream dos = new DataOutputStream(fos);

        //Write primitive data to the "prim.dat"file
        dos.writeInt(1999);
        dos.writeDouble(375.85);
        dos.writeBoolean(false);
        dos.writeChar('X');
    }
}
```

```
dos.close();
fos.close();
//Read data from the "prim.dat" file
FileInputStream fis = new FileInputStream(primitive);
DataInputStream dis = new DataInputStream(fis);
System.out.println(dis.readInt());
System.out.println(dis.readDouble());
System.out.println(dis.readBoolean());
System.out.println(dis.readChar());

dis.close();
fis.close();
}
}
```



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Example: Storing and reading data in same file

```
import java.io.*;
class ReadWriteIntegers
{
    public static void main (String
args[])
    {
        DataInputStream dis = null;
        //Input stream
        DataOutputStream dos = null;
        //Output stream
        File intFile = new
        File("rand.dat");      //Construct a file
        //Writing integers to rand.dat file
        try
        {
            //Create output stream for intFile file
            dos = new DataOutputStream(new FileOutputStream(intFile));
            for(int i=0;i<100;i++)
                dos.writeInt((int)(Math. random () *100));
            System.out.println("Written successfully");
        }
        catch (IOException local)
        {
            System.out.println("An error occurred");
        }
        finally
        {
            if(dos != null)
                dos.close();
        }
    }
}
```

```
dos = new DataOutputStream(new FileOutputStream(intFile));
dos.writeInt ((int)(Math. random () *100));
}
finally
{
if(dos != null)
    dos.close();
}
```

```
try {
    dis = new DataInputStream(
    FileInputStream(intFile)); //Create input stream for intFile file
    for(int i=0;i<100; i++)
        inc = dis.readInt();
    System.out.println(i + " : " + inc);
}
catch (IOException local)
{
    System.out.println("An error occurred");
}
```



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Example: Storing and reading data in same file

```
import java.io.*;
class ReadWriteIntegers
{
    public static void main (String
    args[])
    {
        DataInputStream dis = null;
```

```
basecamp  
File and  
File("run  
./Writing integers  
C:\Windows\...\
```

卷之三

```
DataOutputStream dos = new FileOutputStream(intFile);
for(int i=0;i<20;i++)
    dos.writeInt ((int) (Math.random () *100));
catch(IOException ioe)
{
    System.out.println(ioe.getMessage());
}
finally {
    try {
        dos.close();
    }
    catch(IOException ioe) { }
}
//Reading integers from rand.dat file
```

```

try {
    dis = new DataInputStream(new
        FileInputStream("testfile.txt"));
    //Create input stream for testfile file

    for(int i=0;i<10;i++) {
        int n = dis.readInt();
        System.out.print(n + " ");
    }
    catch (IOException ioe) {
        System.out.println(ioe.
            getMessage());
    }
}

```

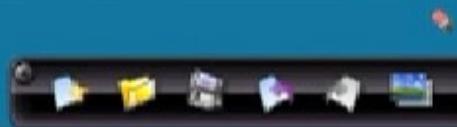
• 2008 年 1 月刊第 10 期总第 10 期 • 103-104



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Example: Storing and reading data in same file

```
import java.io.*;
class ReadWriteIntegers
{
    public static void main( String args[])
    {
        DataInputStream
        DataOutputStream
        File intFile
        FileInputStream
        //Writing integers
        //Create output
        try {
            dis = new DataInputStream(new
            FileInputStream(intFile)); //Create input stream for intFile file
            for(int i=0;i<20;i++) {
                int n = dis.readInt();
                System.out.print(n + " ");
            }
            catch(IOException ioe) {
                System.out.println(ioe.
                getMessage());
            }
        finally {
            try {
                dis.close();
            }
            catch(IOException ioe){ }
        }
    }
}
```



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Example: Storing and reading data in same file

```
import java.io.*;
class ReadWriteIntegers
{
    public static void main( String args[])
    {
        DataInputStream
        DataOutputStream
        File intFile
        FileInputStream
        FileOutputStream
        //Create output
        //Create input
        try {
            dis = new DataInputStream(new
            FileInputStream(intFile)); //Create input stream for intFile file
            for(int i=0;i<20;i++) {
                int n = dis.readInt();
                System.out.print(n + " ");
            }
            catch(IOException ioe) {
                System.out.println(ioe.
                getMessage());
            }
        finally {
            try {
                dis.close();
            }
            catch(IOException ioe){ }
        }
    }
}
```





Merging two Files into a File



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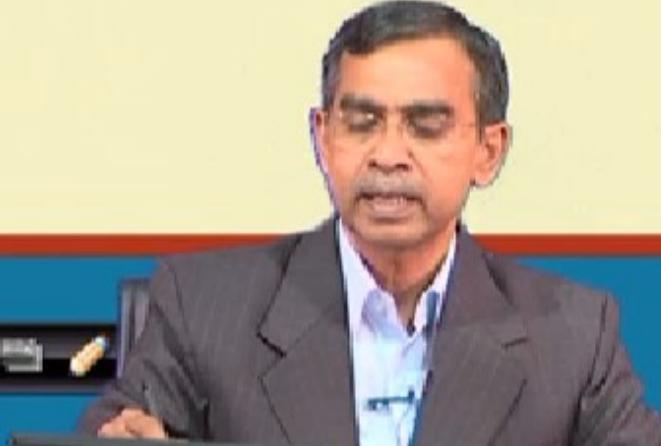


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Example: Concatenation and buffering

```
import java.io.*;
class SequenceBuffer
{
    public static void main (String args[]) throws
        IOException
    {
        //Declare file streams
        FileInputStream file1 = null;
        FileInputStream file2 = null;

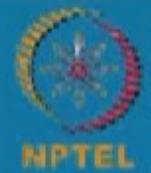
        SequenceInputStream file3 = null;
        //Declare file3 to store combined files
        file1 = new FileInputStream("text1.dat");
        //Open the files to be concatenated
        file2 = new FileInputStream("text2.dat");
        //Open the files to be concatenated
        file3 = new SequenceInputStream(file1,file2) ;
        //Concatenate file1 and file2
```

```
//Create buffered input and output streams
        BufferedInputStream inBuffer = new
            BufferedInputStream(file3);
        BufferedOutputStream outBuffer = new
            BufferedOutputStream(System.out);

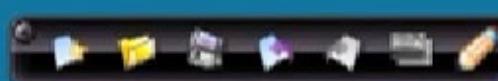
        //Read and write till the end of buffers
        int ch;
        while((ch = inBuffer.read()) != -1)
            outBuffer.write((char)ch);
        inBuffer.close();
        outBuffer.close();
        file1.close();
        file2.close();
    }
}
```



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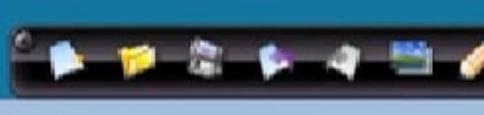
Example: Concatenation and buffering

```
import java.io.*;
class SequenceBuffer
{
    public static void main (String args[]) throws
        IOException
    {
        //Declare file streams
        FileInputStream file1 = null;
        FileInputStream file2 = null;

        SequenceInputStream file3 = null;
        //Declare file3 to store combined files
        file1 = new FileInputStream("text1.dat");
        //Open the files to be concatenated
        file2 = new FileInputStream("text2.dat");
        //Open the files to be concatenated
        file3 = new SequenceInputStream(file1,file2) ;
        //Concatenate file1 and file2
```

```
//Create buffered input and output streams
        BufferedInputStream inBuffer = new
            BufferedInputStream(file3);
        BufferedOutputStream outBuffer = new
            BufferedOutputStream(System.out);

        //Read and write till the end of buffers
        int ch;
        while((ch = inBuffer.read()) != -1)
            outBuffer.write((char)ch);
        inBuffer.close();
        outBuffer.close();
        file1.close();
        file2.close();
    }
```





Lecture 32

I - O Stream - III

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OBJECT ORIENTED PROGRAMMING WITH JAVA

Input-Output Handling in Java - III

Debasis Samanta

Department of Computer Science & Engineering
Indian Institute of Technology Kharagpur





Random Access Files in Java



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Use of class RandomAccessFile

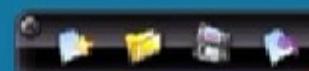
- As the name implies the class **RandomAccessFile** allows us to handle a file **randomly** in contrast to sequentially in **InputStream** or **OutputStream** classes.
- It allows to move file pointer randomly.
- Moreover, it allows read or write or read-write simultaneously.



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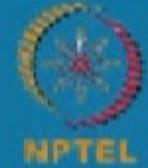


Use of class RandomAccessFile

- As the name implies the class **RandomAccessFile** allows us to handle a file **randomly** in contrast to sequentially in **InputStream** or **OutputStream** classes.
- It allows to move file pointer randomly.
- Moreover, it allows read or write or read-write simultaneously.



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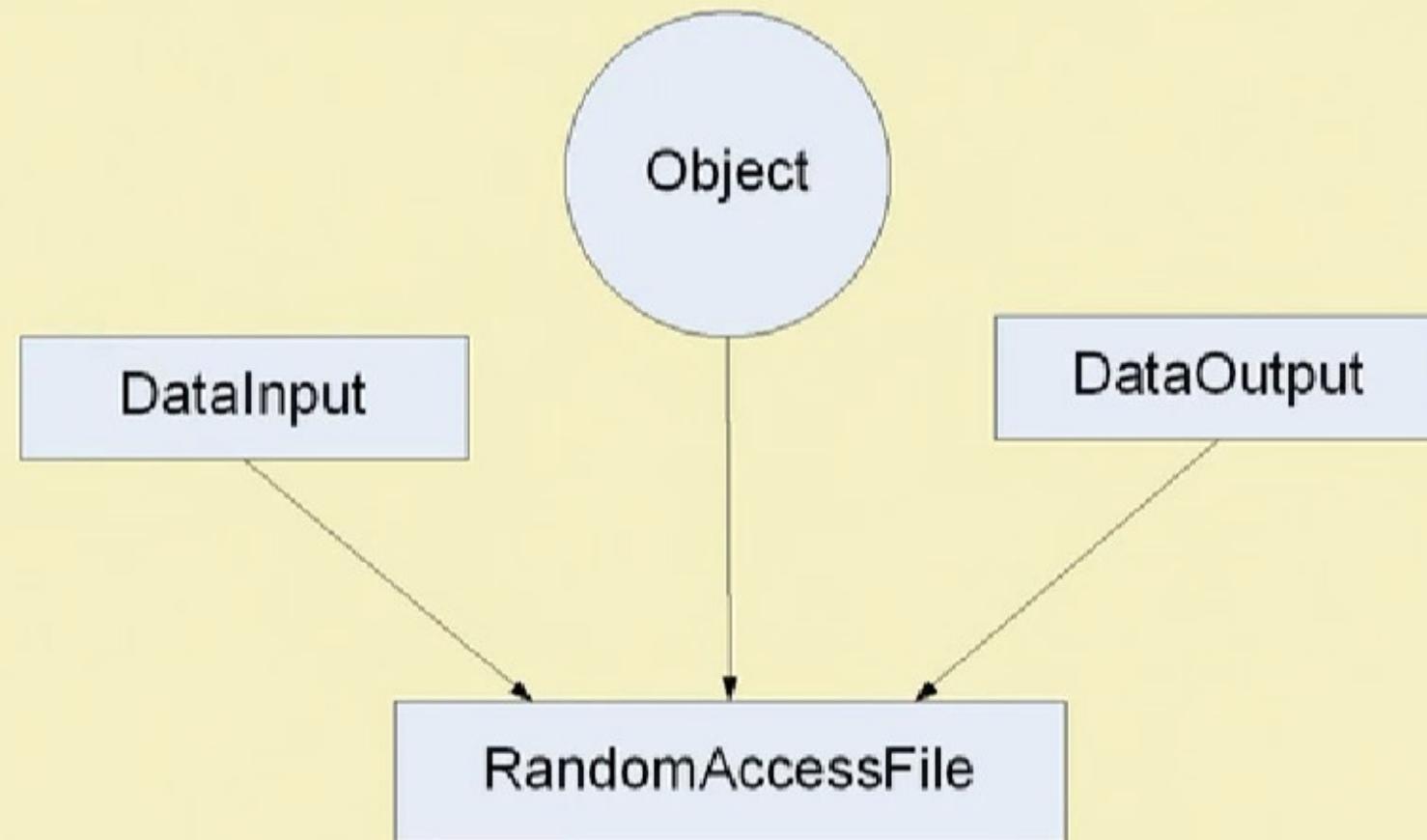


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Class: RandomAccessFile



Example: RandomAccessFile

```
import java.io.*;
class RandomIO
{
    public static void main (String args[])
    {
        RandomAccessFile file = null;
        try {
            file = new
                RandomAccessFile("rand.dat","rw");
            // Writing to the file
            file.writeChar('X');
            file.writeInt(555);
            file.writeDouble(3.1412);
            file.seek (0);
            // Go to the beginning
            // Reading from the file
            System.out.println(file.readChar());
        }
```

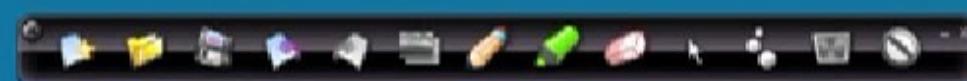
```
        System.out.println(file.readInt());
        System.out.println(file.readDouble());
        file.seek(2); // Go to the second item
        System.out.println(file.readInt());
        // Go to the end and append false to
        // the file
        file.seek(file.length());
        file.writeBoolean(false);
        file.seek(4) ;
        System.out.println(file.readBoolean());
        file.close();
    }
    catch(IOException e)
    {
        System.out.println(e);
    }
}
```



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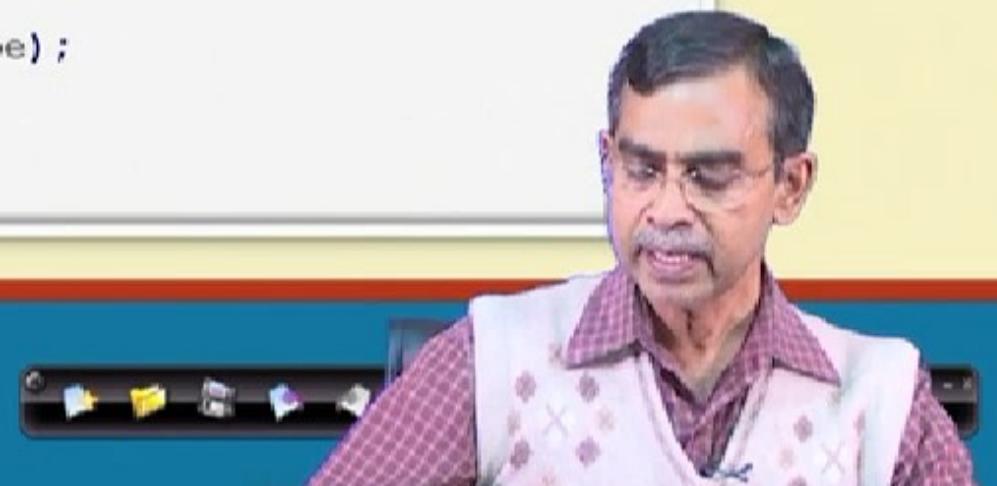




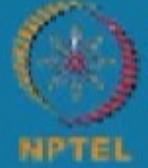
Example: Appending to a RAF

```
import java.io.*;
class RandomAccess
{
    static public void main(String args[])
    {
        RandomAccessFile rFile;
        try
        {
            rFile = new RandomAccessFile("city.txt","rw");

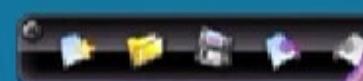
            rFile.seek(rFile.length()); // Go to the end
            rFile.writeByte("MUMBAI\n"); //Append MUMBAI
            rFile.close();
        }
        catch(IOException ioe)
        {
            System.out.println(ioe);
        }
    }
}
```



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Example: Appending to a RAF

```
import java.io.*;
class RandomAccess
{
    static public void main(String args[])
    {
        RandomAccessFile rFile;
        try
        {
            rFile = new RandomAccessFile("city.txt", "rw");

            rFile.seek(rFile.length()); // Go to the end
            rFile.writeByte("MUMBAI\n"); //Append MUMBAI
            rFile.close();
        }
        catch(IOException ioe)
        {
            System.out.println(ioe);
        }
    }
}
```





Interactive Input-Output



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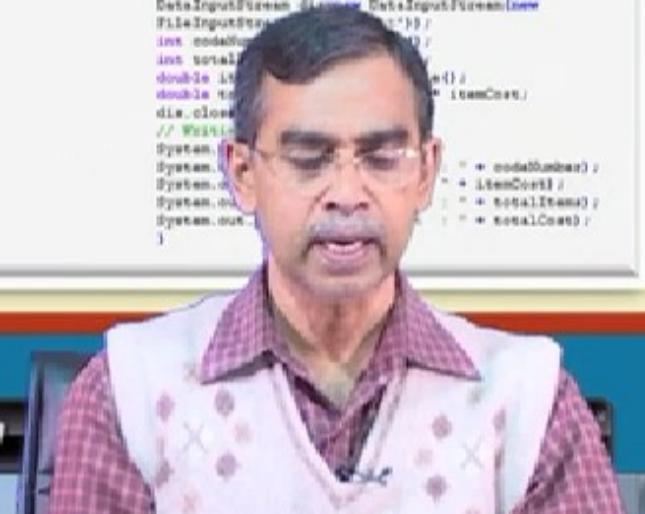




Interactive input and output

```
import java.util.*; // For using StringTokenizer class
import java.io.*;
class Inventory {
    static DataInputStream din = new DataInputStream(System.in);
    static StringTokenizer st;
    public static void main (String args[]) throws IOException
    {
        DataOutputStream dos = new DataOutputStream(new
FileOutputStream("invent.dat"));
        // Reading from console
        System.out.println("Enter code number");
        st = new StringTokenizer(din.readLine());
        int code = Integer.parseInt(st.nextToken());
        System.out.println("Enter number of items");
        st = new StringTokenizer(din.readLine());
        int items = Integer.parseInt(st.nextToken());
        System.out.println("Enter cost");
        st = new StringTokenizer(din.readLine());
        double cost = new Double(st.nextToken()).doubleValue();
```

```
// Writing to the file "invent.dat"
dos.writeInt(code);
dos.writeInt(items);
dos.writeDouble(cost);
dos.close();
// Processing data from the file
DataInputStream din = new DataInputStream(
FileInputStream("invent.dat"));
int code;
int items;
double cost;
// Writing
System.out.println("+" + code);
System.out.println("+" + items);
System.out.println("+" + cost);
System.out.println("+" + cost);
```



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Interactive input and output

```
import java.util.*; // For using StringTokenizer class
import java.io.*;
class Inventory {
    static DataInputStream din = new DataInputStream(System.in);
    static StringTokenizer st;
    public static void main( String args[] ) throws
    IOException {
        DataOutputStream dos = new DataOutputStream(new
        FileOutputStream("invent.dat"));
        // Reading from console
        System.out.println("Enter code number");
        st = new StringTokenizer(System.in.readLine());
        int code = Integer.parseInt(st.nextToken());
        System.out.println("Enter number of items");
        st = new StringTokenizer(System.in.readLine());
        int items = Integer.parseInt(st.nextToken());
        System.out.println("Enter cost");
        st = new StringTokenizer(System.in.readLine());
        double cost = new
        Double(st.nextToken()).doubleValue();
    }
}
```

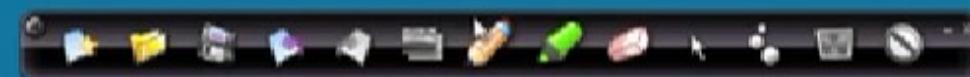
```
// Writing to the file "invent.dat"
dos.writeInt(code);
dos.writeInt(items);
dos.writeDouble(cost);
dos.close();
// Processing data from the file
DataInputStream dis=new DataInputStream(new
FileInputStream("invent.dat"));
int codeNumber = dis.readInt();
int totalItems = dis.readInt();
double itemCost = dis.readDouble();
double totalCost = totalItems * itemCost;
dis.close();
// Writing to console
System.out.println();
System.out.println("Code Number : " + codeNumber);
System.out.println("Item Cost : " + itemCost);
System.out.println("Total Items : " + totalItems);
System.out.println("Total Cost : " + totalCost);
}
}
```



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Interactive input and output

```
import java.util.*; // For using StringTokenizer class  
import java.io.*;  
class Inventory {  
    static DataInputStream dis = new DataInputStream(System.in);  
    static StringTokenizer st;  
    public static void main (String args[]) throws IOException  
    {  
        DataOutputStream dos = new DataOutputStream(new  
FileOutputStream("invent.dat"));  
        // Reading from console  
        System.out.println("Enter code number");  
        st = new StringTokenizer(dis.readLine());  
        int code = Integer.parseInt(st.nextToken());  
        System.out.println("Enter number of items");  
        st = new StringTokenizer(dis.readLine());  
        int items = Integer.parseInt(st.nextToken());  
        System.out.println("Enter cost");  
        st = new StringTokenizer(dis.readLine());  
        double cost = new  
Double(st.nextToken()).doubleValue();  
    }
```

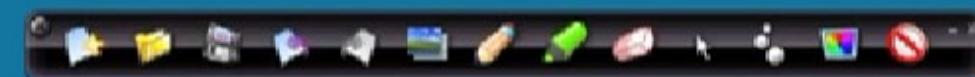
```
// Writing to the file "invent.dat"  
dos.writeInt(code);  
dos.writeInt(items);  
dos.writeDouble(cost);  
dos.close();  
// Processing data from the file  
DataInputStream dis=new DataInputStream(new  
FileInputStream("invent.dat"));  
int codeNumber = dis.readInt();  
int totalItems = dis.readInt();  
double itemCost = dis.readDouble();  
double totalCost = total Items * itemCost;  
dis.close();  
// Writing to console  
System.out.println();  
System.out.println("Code Number : " + codeNumber);  
System.out.println("Item Cost : " + itemCost);  
System.out.println("Total Items : " + totalItems);  
System.out.println("Total Cost : " + totalCost);  
}  
}
```



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Graphical Input-Output



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Graphical input and output

 Create Student File

Roll Number	<input type="text"/>
Student Name	<input type="text"/>
Marks	<input type="text"/>

ENTER **DONE**



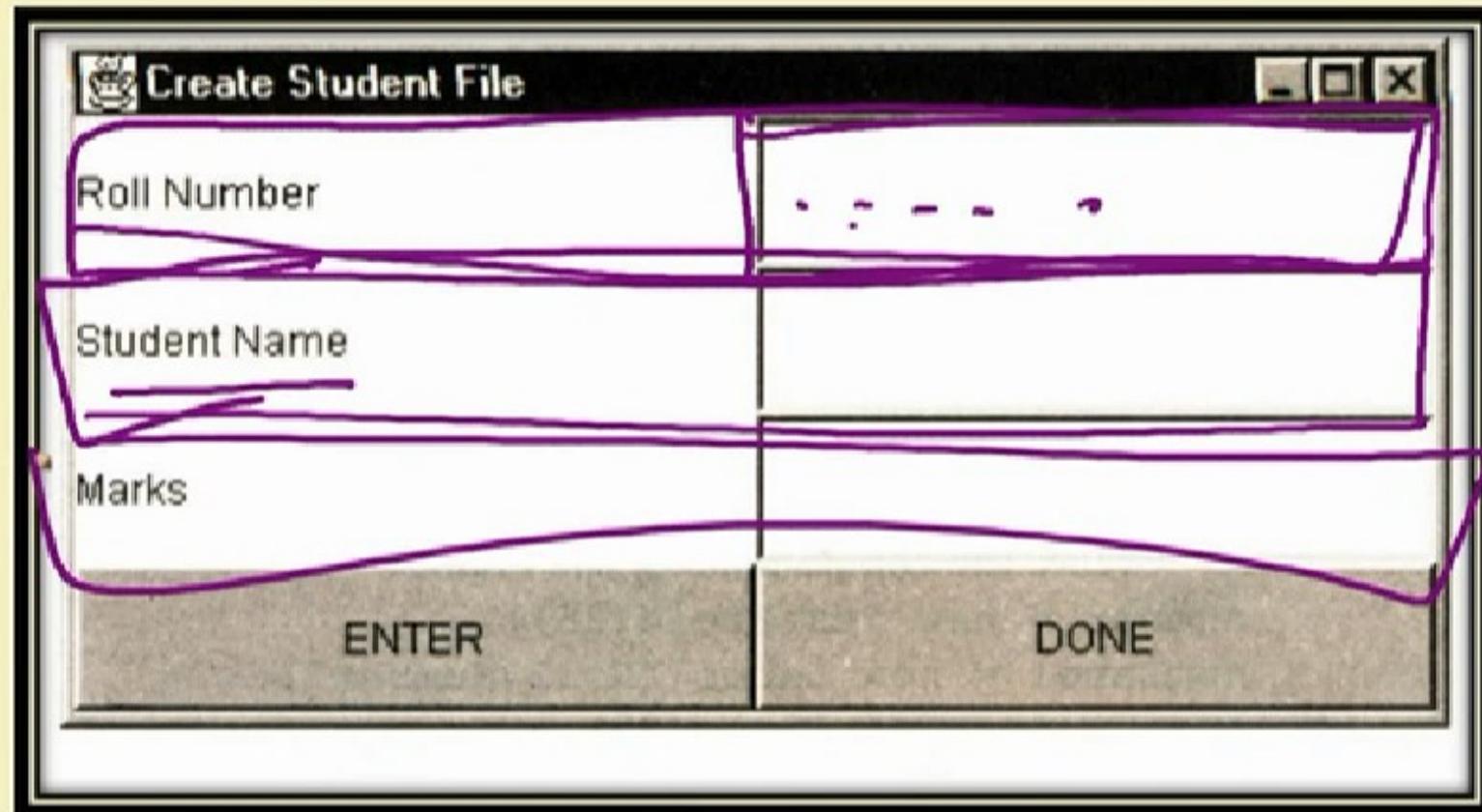
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Graphical input and output



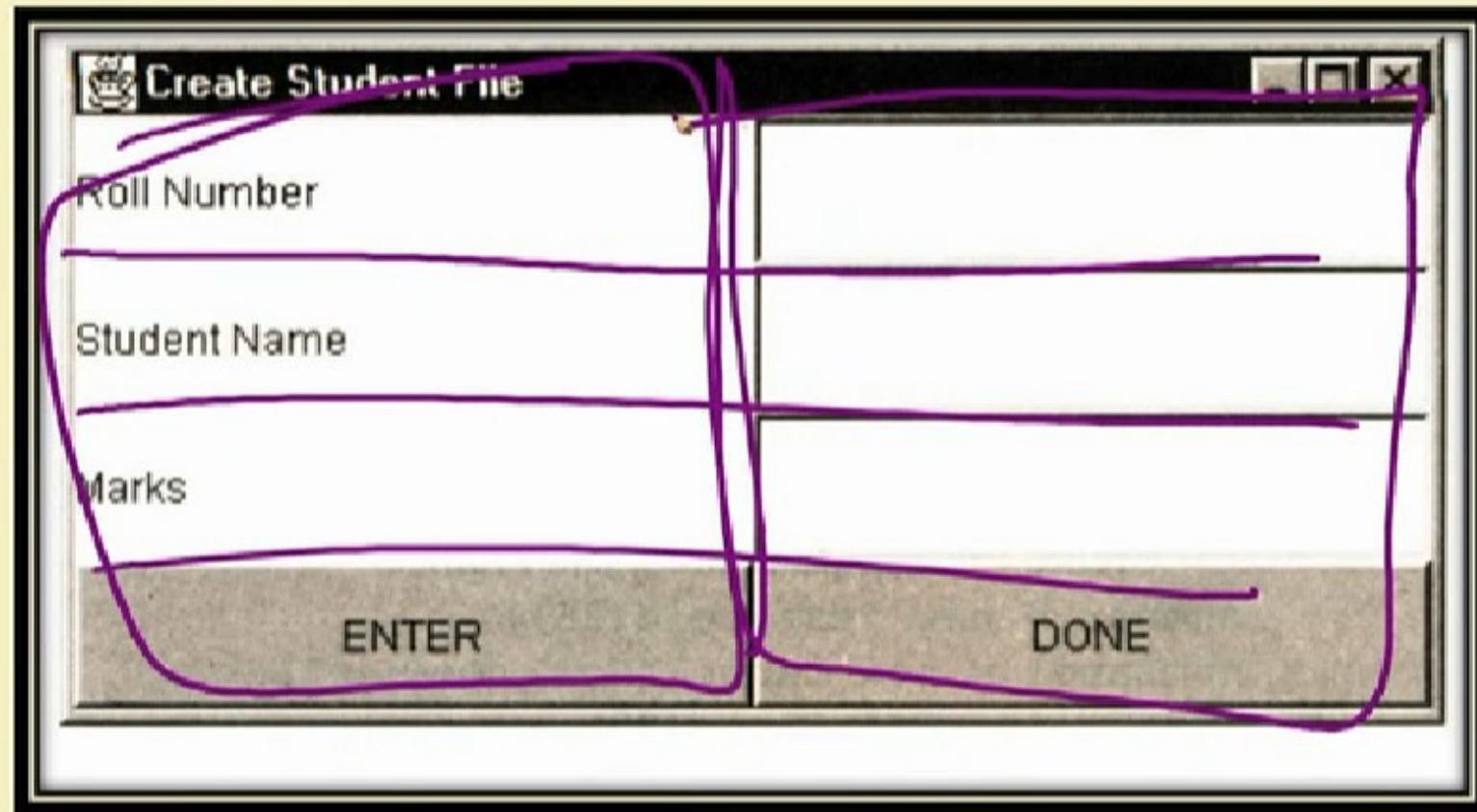
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Graphical input and output



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Graphical input and output

```
import java.io.*;
import java.awt.*;
class StudentFile extends Frame
{
    // Defining window components
    TextField number, name, marks;
    Button enter, done;
    Label numLabel, nameLabel, markLabel;
    DataOutputStream dos;

    // Initialize the Frame
    public StudentFile()
    {
        super("Create Student File");
    }
    // Setup the window
    public void setup()
    {
        resize(400, 200);
        setLayout(new GridLayout(4,2));
        // Create the components of the Frame
```

```
number = new TextField(25);
numLabel = new Label("Roll Number");
name = new TextField(25);
nameLabel = new Label ("Student Name");
marks = new TextField(25);
markLabel = new Label("Marks");
enter = new Button("ENTER");
done = new Button("DONE");
// Add the components to the Frame
add(numLabel);
add(number);
add(nameLabel);
add(name);
add(markLabel);
add(marks);
add(enter);
add(done);
// Show the Frame
show();
```



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Graphical input and output

```
import java.io.*;
import java.awt.*;
class Studentfile extends Frame
{
    // Defining window components
    TextField number, name, marks;
    Button enter, done;
    Label numLabel, nameLabel, markLabel;
    DataOutputStream dos;

    // Initialize the Frame
    public Studentfile()
    {
        super("Create Student File");
    }
    // Setup the window
    public void setup()
    {
        resize(400, 200);
        setLayout(new GridLayout(4,2));
        // Create the components of the Frame
```

```
number = new TextField(25);
numLabel = new Label("Roll Number");
name = new TextField(25);
nameLabel = new Label ("Student Name");
marks = new TextField(25);
markLabel = new Label("Marks");
enter = new Button("ENTER");
done = new Button("DONE");
// Add the components to the Frame
add(numLabel);
add(number);
add(nameLabel);
add(name);
add(markLabel);
add(marks);
add(enter);
add(done);
// Show the Frame
show();
```



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Graphical input and output

```
// Open the file
try {
    dos = new DataOutputStream( new
        FileOutputStream("student.dat") );
}
catch(IOException e) {
    System.err.println(e.toString());
    System.exit(1);
}

// Write to the file
public void addRecord() {
    int num;
    Double d;
    num = (new
        Integer(number.getText())).intValue();
    try {
        dos.writeInt(num);
        dos.writeUTF(name.getText());
        d = new Double(marks.getText());
        dos.writeDouble(d.doubleValue());
    }
}
```

```
catch(IOException e) {
    // Clear the text fields
    number.setText(" ");
    name.setText(" ");
    marks.setText(" ");
}

// Adding the record and clearing the
// TextFields
public void cleanup()
{
    if(!number.getText().equals(" "))
        addRecord();
}

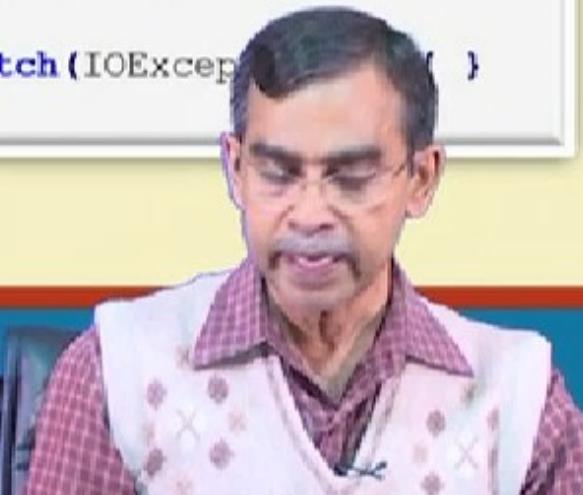
try {
    dos.flush();
    dos.close();
}
catch(IOException e) { }
```



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Graphical input and output

```
// Open the file
try {
dos = new DataOutputStream( new
FileOutputStream("student.dat"));
}
catch(IOException e) {
System.err.println(e.toString());
System.exit(1);
}

// Write to the file
public void addRecord() {
int num;
Double d;
num = (new
Integer(number.getText())).intValue();
try {
dos.writeInt(num);
dos.writeUTF(name.getText());
d = new Double(marks.getText());
dos.writeDouble(d.doubleValue());
}
```

```
catch(IOException e) { }
// Clear the text fields
number.setText(" ");
name.setText(" ");
marks.setText(" ");
}

// Adding the record and clearing the
TextFields
public void cleanup()
{
if(!number.getText().equals(" "))
addRecord();
}

try {
dos.flush();
dos.close();
}

catch(IOException e) { }
```



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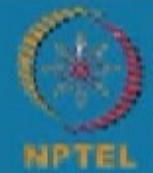
Graphical input and output

```
// Processing the event
public boolean action(Event
event, Object o)
{
    if(event.target instanceof
        Button)
        if(event.arg.equals("ENTER")) {
            addRecord();
            return true;
        }
    return super.action(event, o);
}
public boolean handleEvent(Event
event)
```

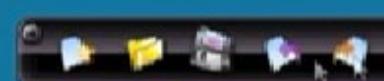
```
if(event.target instanceof Button)
    if(event.arg.equals("DONE")) {
        cleanup();
        System.exit(0);
        return true;
    }
    return super.handleEvent(event);
}
// Execute the program
public static void main (String args[])
{
    StudentFile student = new StudentFile();
    student.setup();
}
```



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Another graphical Input/Output

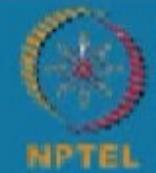
```
import java.io.*;
import java.awt.*;
class ReadStudentFile extends Frame
{
    // Defining window components
    TextField number, name, marks;
    Button next, done;
    Label numLabel, nameLabel, markLabel;
    DataInputStream dis;
    boolean moreRecords = true;

    // Initialize the Frame
    public ReadStudentFile()
    {
        // Setup the window
        public void setup()
        {
            resize(400,200);
            setLayout(new
GridLayout(4,2));
            // Create the components of the Frame
```

```
number = new TextField(25);
numLabel = new Label ("Roll Number");
name = new TextField(25);
nameLabel = new Label ("Student Name");
marks = new TextField(25);
markLabel = new Label("Marks");
next new Button("NEXT");
done = new Button("DONE");
// Add the components to the Frame
add(numLabel);
add(number);
add(nameLabel);
add(name);
add(markLabel);
add(marks);
add(next);
add(done);
// Show the Frame
show();
// Open the file
```



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Another graphical Input/Output

```
try {
    dis = new DataInputStream(new
        FileInputStream("student.dat"))
    }
    catch(IOException e)
    {
        System.err.println(e.toString());
        System.exit(1);
    }
}
// Read from the file
public void readRecord()
{
    int n;
    String s;
    double d;
    try {
        n = dis.readInt();
    }
    catch(IOException e)
    {
        System.err.println(e.toString());
        System.exit(1);
    }
}
```

```
s = dis.readUTF();
d = dis.readDouble();
number.setText(String.valueOf(n));
name.setText(String.valueOf(s));
marks.setText(String.valueOf(d));
}
catch(IOException ioe) {
    System.out.println("IO ErrorN");
    System.exit(1);
}
}
// Closing the input file
public void cleanup()
{
    try
    {
        dis.close();
    }
    catch(IOException ioe)
    {
        System.out.println("IO ErrorN");
        System.exit(1);
    }
}
```



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Another graphical Input/Output

```
// Processing the event
public boolean action(Event event, Object o)
{
    if(event.target instanceof Button)
        if(event.arg.equals("NEXT"))
            readRecord();
    return true;
}

public boolean handleEvent(Event event)
{
    if(event.target instanceof Button)
        if (event.arg.equals ("DONE") || moreRecords ==
false) {
            cleanup();
            System.exit(0);
            return true;
        }
    return super.handleEvent(event);
}
```

```
// Execute the program
public static void main (String args[])
{
    ReadStudentFile student =
new ReadStudentFile();
    student.setup();
}
```



Question to think...

- How Java helps programmers to develop GUIs?
- How one can develop programs like Google?





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OBJECT ORIENTED PROGRAMMING WITH JAVA

I-O Stream: Demonstration - XII

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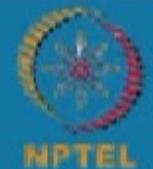


In today's demonstration ...

1. How to create, open and close a file.
2. Use of DataInputStream class to read from a file.
3. Use of DataOutputStream to write into a file.
4. Use of CharacterStream classes to read and write into files
5. File handling in Java.
6. Example of BufferedOutputStream class.
7. Example of Java BufferedInputStream.
8. Example of Java SequenceInputStream.



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