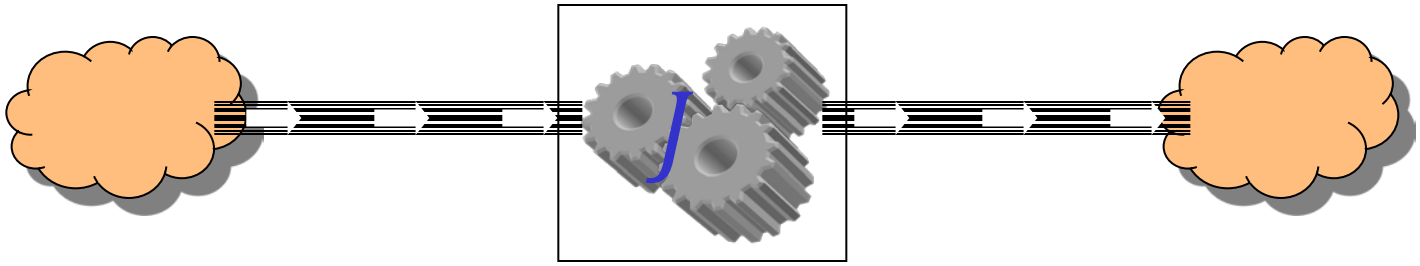
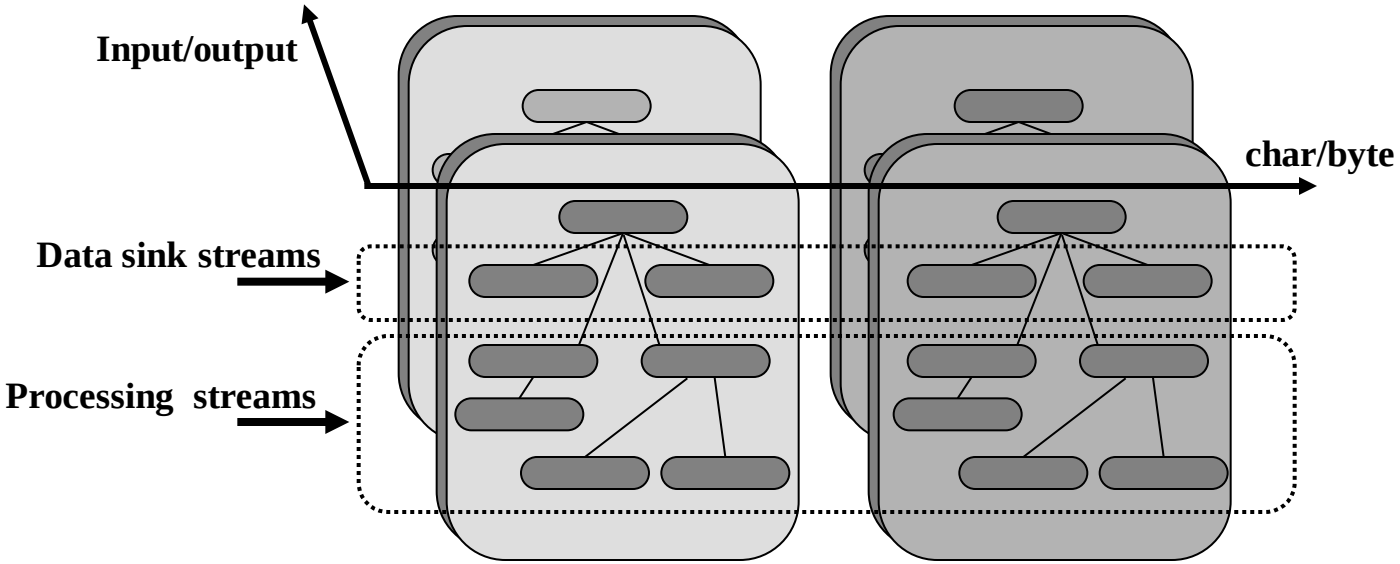


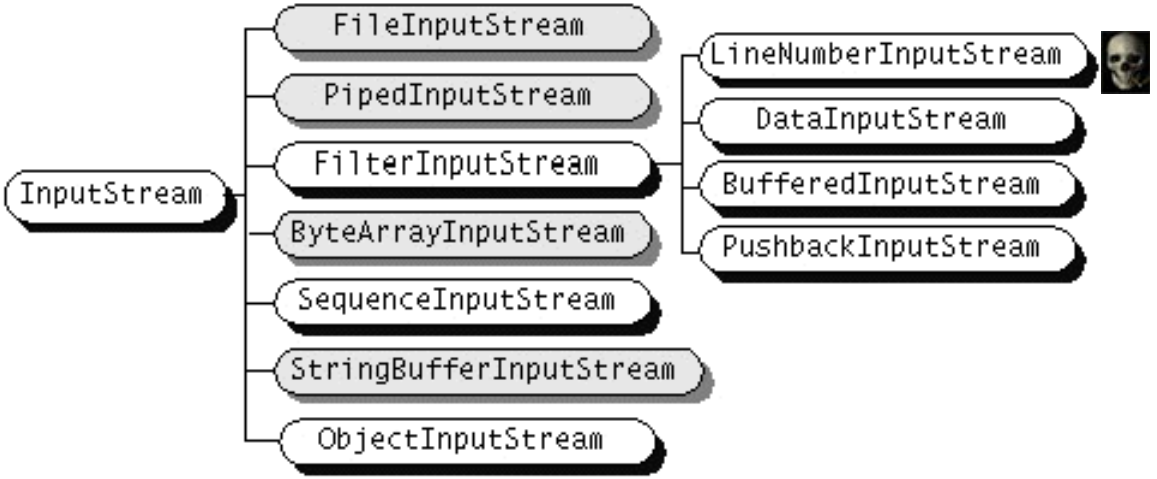

Input/output
char/byte
Data sink streams
Processing streams

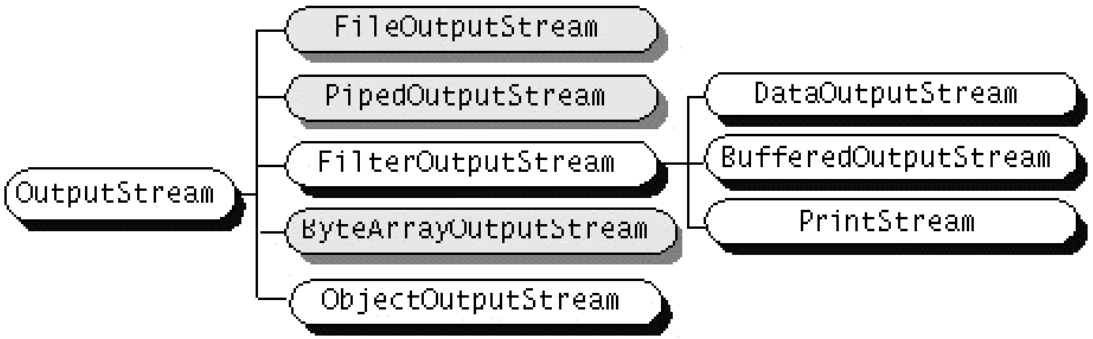
Origen/Destino	Streams de caracteres	Streams de Bytes
Memoria	`CharArrayReader` `CharArrayWriter`	`ByteArrayInputStream` `ByteArrayOutputStream`
	`StringReader` `StringWriter`	`StringBufferInputStream`
“Pipes”	`PipedReader` `PipedWriter`	`PipedInputStream` `PipedOutputStream`
Ficheros	`FileReader` `FileWriter`	`FileInputStream` `FileOutputStream`

Procesamientos	Streams de caracteres	Streams de Bytes
Conversión de bytes a caracteres	`InputStreamReader` `OutputStreamWriter`	
Buffering	`BufferedReader` `BufferedWriter`	`BufferedInputStream` `BufferedOutputStream`
Filtrado	`FilterReader` `FilterWriter`	`FilterInputStream` `FilterOutputStream`
Concatenación		`SequenceInputStream`
Conversión de datos		`DataInputStream` `DataOutputStream`
Conteo	`LineNumberReader`	`LineNumberInputStream`
Peeking Ahead	`PushbackReader`	`PushbackInputStream`
Impresión	`PrintWriter`	`PrintStream`
Serialización de objetos		`ObjectInputStream` `ObjectOutputStream`

InputStream

```
int read()
int read(byte cbuf[])
int read(byte cbuf[], int offset, int length)
```



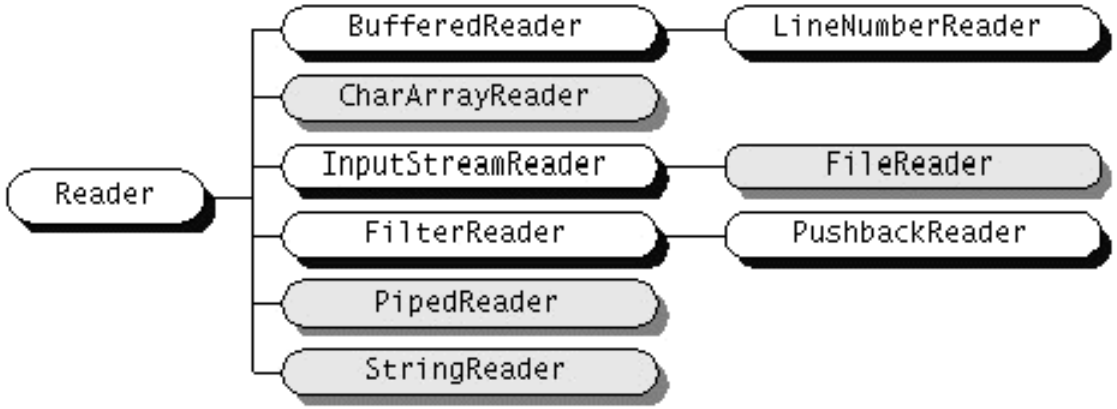


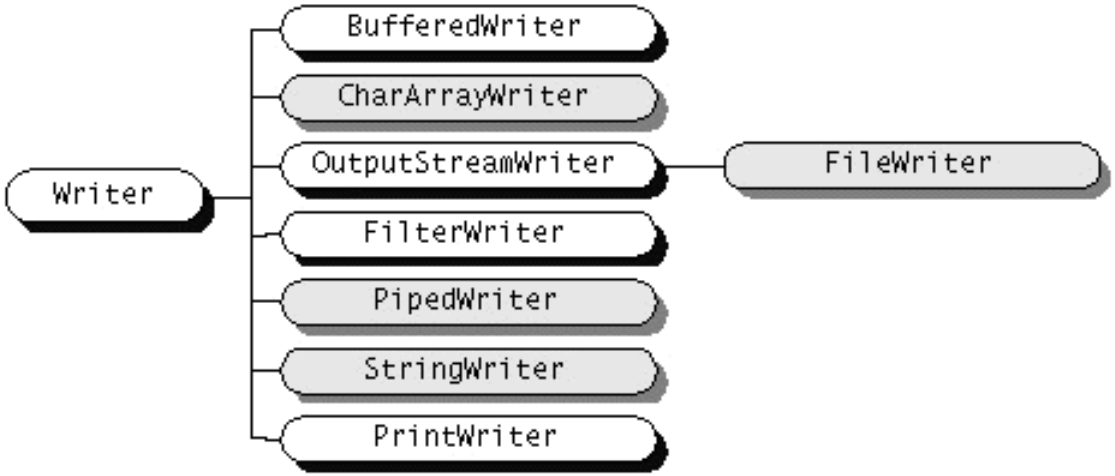
OutputStream

```
int write(int c)
int write(byte cbuf[])
int write(byte cbuf[], int offset, int length)
```

Reader

```
int read()
int read(char cbuf[])
int read(char cbuf[], int offset, int length)
```





Writer

```
int write(int c)
int write(char cbuf[])
int write(char cbuf[], int offset, int length)
```

Una simple copia de ficheros

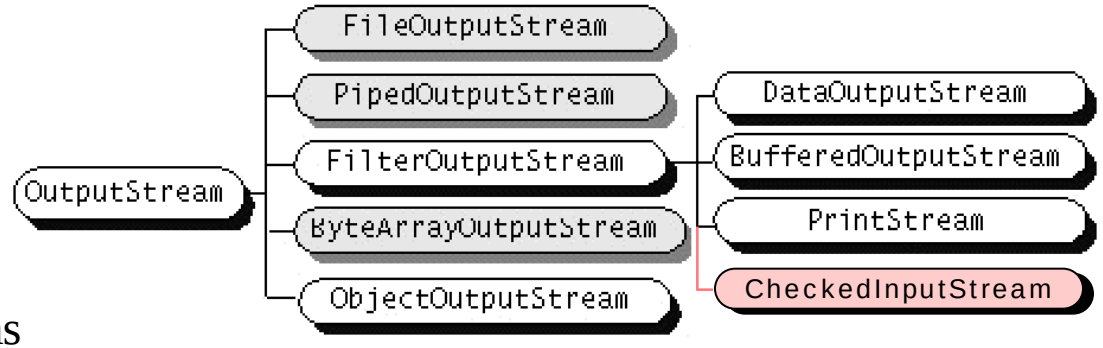
```
import java.io.*;

public class Copy {
    public static void main(String[] args) throws IOException {
          File inputFile = new File("Entrada.txt");
          File outputFile = new File("Salida.txt");

        FileReader in = new FileReader(inputFile);
        FileWriter out = new FileWriter(outputFile);
        int c;

        while ((c = in.read()) != -1)
           out.write(c);

        in.close();
        out.close();
    }
}
```

Ejercicio:
Tomar nombres de ficheros
de la línea de invocación
del programa
(p.ej. java copy origen.zip destino.zip)

E/S de objetos

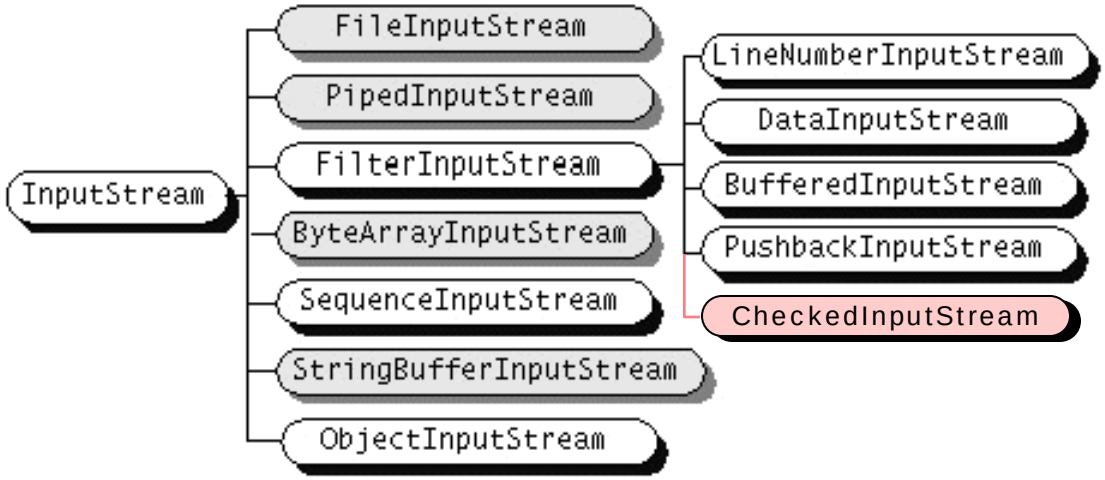
Tema:serialización

```
FileOutputStream out = new FileOutputStream("Tiempos");
ObjectOutputStream s = new ObjectOutputStream(out);
s.writeObject("Today");
s.writeObject(new Date());
s.flush();
-------------------------------------------------------
FileInputStream in = new FileInputStream("Tiempos");
ObjectInputStream s = new ObjectInputStream(in);
String today = (String)s.readObject();
Date date = (Date)s.readObject();
```



Añadiendo nuestros propios streams

```
import java.io.*;
public class CheckedOutputStream extends FilterOutputStream {
private Checksum cksum;

public CheckedOutputStream(OutputStream out, Checksum cksum) { super(out); this.cksum = cksum; }

public void write(byte b) throws IOException {
    out.write(b); cksum.update(b); }

public void write(byte[] b) throws IOException {
    out.write(b, 0, b.length); cksum.update(b, 0, b.length); }

public void write(byte[] b, int off, int len) throws IOException {
    out.write(b, off, len); cksum.update(b, off, len); }

public Checksum getChecksum() {
return cksum;
}
}
```




```
import java.io.*;

public class CheckedInputStream extends FilterInputStream {
private Checksum cksum;

public CheckedInputStream(InputStream in, Checksum cksum) {super(in); this.cksum = cksum; }

public int read() throws IOException {
    int b = in.read();
    if (b != -1) {cksum.update(b);}
    return b; }

public int read(byte[] b) throws IOException {
    int len;
    len = in.read(b, 0, b.length);
    if (len != -1) {cksum.update(b, 0, len);}
    return len; }

public int read(byte[] b, int off, int len) throws IOException {
    len = in.read(b, off, len);
    if (len != -1) {cksum.update(b, off, len);}
    return len; }

public Checksum getChecksum() {return cksum; }
}
```

RandomAccessFile

Constructor Summary

```
RandomAccessFile(File file, String mode)
RandomAccessFile(String name, String mode)
```

Method Summary

```
void close()
FileDescriptor getFD()
long getFilePointer()
long length()
int read()
int read(byte[] b)
int read(byte[] b, int off, int len)
boolean readBoolean()
byte readByte()
char readChar()
double readDouble()
float readFloat()
void readFully(byte[] b)
void readFully(byte[] b, int off, int len)
int readInt()
String readLine()
long readLong()
short readShort()
int readUnsignedByte()
```

Method Summary (cont.)

```
int readUnsignedShort()
String readUTF()
void seek(long pos)
void setLength(long newLength)
int skipBytes(int n)
void write(byte[] b)
void write(byte[] b, int off, int len)
void write(int b)
void writeBoolean(boolean v)
void writeByte(int v)
void writeBytes(String s)
void writeChar(int v)
void writeChars(String s)
void writeDouble(double v)
void writeFloat(float v)
void writeInt(int v)
void writeLong(long v)
void writeShort(int v)
void writeUTF(String str)
```

Serialización

```
package java.io;
public interface Serializable {
    // there's nothing in here!
};
-------------------------------------------------------------
public class MySerializableClass implements Serializable
    ...
}
```

```
private void writeObject(ObjectOutputStream s)
                         throws IOException {
    s.defaultWriteObject();
    // customized serialization code
}
-------------------------------------------------------------
private void readObject(ObjectInputStream s)
                        throws IOException  {
    s.defaultReadObject();
    // customized deserialization code
    ...
    // followed by code to update the object, if necessary
}
```

Palabras reservadas en Java

abstract	assert***	boolean	break	byte
case	catch	char	class	const*
continue	default	do	double	else
enum***	extends	final	finally	float
for	goto*	if	implements	import
instanceof	int	interface	long	native
new	package	private	protected	public
return	short	static	strictfp**	super
switch	synchronized	this	throw	throws
transient	try	void	volatile	while

Only the identity of the class of an Externalizable instance is written in the serialization stream and it is the responsibility of the class to save and restore the contents of its instances. The writeExternal and readExternal methods of the Externalizable interface are implemented by a class to give the class complete control over the format and contents of the stream for an object and its supertypes. These methods must explicitly coordinate with the supertype to save its state. These methods supercede customized implementations of writeObject and readObject methods.

Object Serialization uses the Serializable and Externalizable interfaces. Object persistence mechanisms can use them as well. Each object to be stored is tested for the Externalizable interface. If the object supports Externalizable, the writeExternal method is called. If the object does not support Externalizable and does implement Serializable, the object is saved using ObjectOutputStream.

When an Externalizable object is reconstructed, an instance is created using the public no-arg constructor, then the readExternal method called. Serializable objects are restored by reading them from an ObjectInputStream.

An Externalizable instance can designate a substitution object via the writeReplace and readResolve methods documented in the Serializable interface.

```
package java.io;
public interface Externalizable extends Serializable
{
    public void writeExternal(ObjectOutput out)
                               throws IOException;
    public void readExternal(ObjectInput in)
                             throws IOException,
                             java.lang.ClassNotFoundException;
}
```