

CMSC 132:

Object-Oriented Programming II



Java I/O

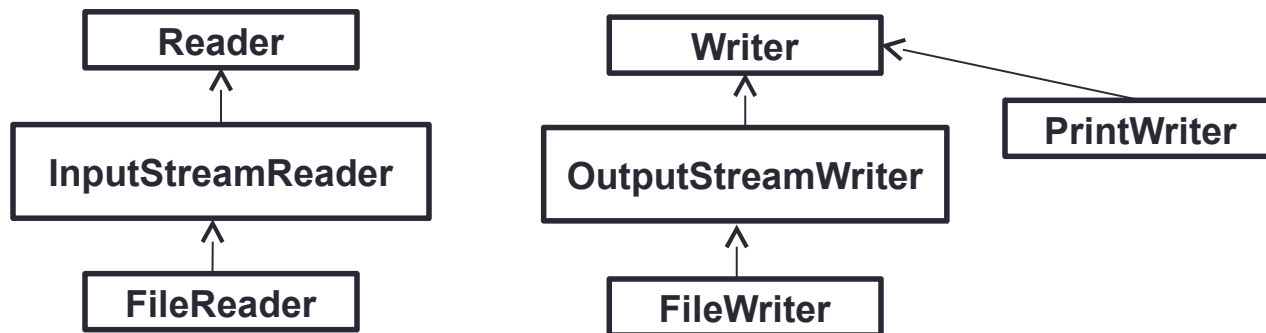
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Storing Data

- Approaches to store file data
 - Text files
 - Data represented in human-readable form
 - Example: Java source programs
 - Use text editor to manipulate the data
 - Binary files
 - Data represented as a sequence of bytes
 - Designed to be read by programs
 - More compact
 - More efficient to process (no encoding/decoding required)
- Keep in mind all files are stored in binary format
- Text I/O provides a level of abstraction to encode/decode characters

Input/Output in Java

- Two sets of classes
 - Readers and Writers □ deal with text data
 - Responsible for converting between characters and bytes
 - Streams □ deal with binary data
- Relying on java.io.*
- Readers/Writers



File Class

- Encapsulates the properties of a file or directory
- Does not provide methods to read/write from/to a file
- Example: `File f = new File("data.txt");`
- Methods
 - `exists()` □ tests whether file/directory exists
 - `delete()` □ deletes file/directory
 - others

Text Files Input Classes

- **FileReader**

- read method □ returns a character or -1 (end of stream)
- close method □ closes the stream and releases any system resources
- **Example:** FileReaderEx.java

- **BufferedReader**

- Reads text from character-input stream, buffering characters for efficiency
- readLine method □ reads a line of text
- **Example:** BufferedReaderEx.java

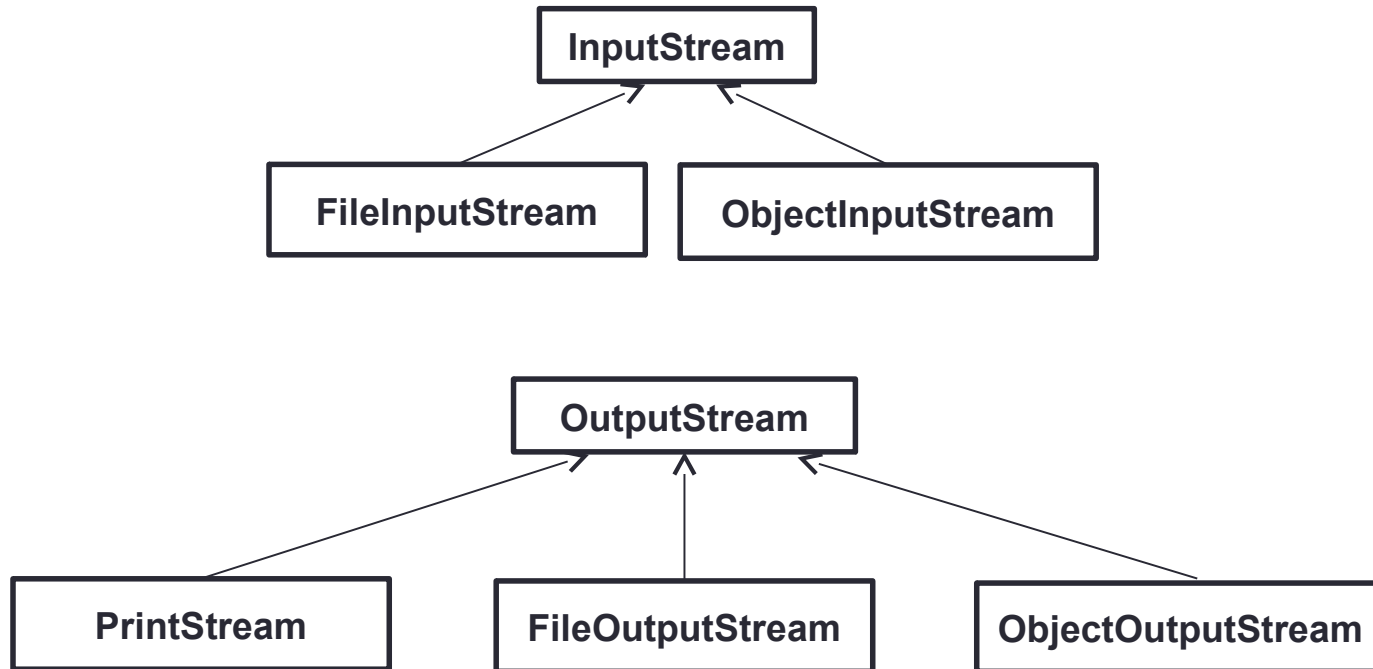
- **Scanner**

- Breaks input into tokens delimited by whitespace
- Methods: hasNext(), nextInt(), nextDouble(), next(), Others
- **Example:** ScannerEx*.java

Text Files Output Classes

- **FileWriter**
 - write(int c) method □ writes a single character
 - close method □ closes the stream and releases any system resources
 - **Example:** FileWriterEx.java
- **BufferedWriter**
 - Writes text to a character-output stream, buffering characters for efficiency
 - **Example:** BufferedWriterEx.java
- **PrintWriter**
 - print method
 - println method
 - printf method
 - **Example:** PrintWriterEx.java, FileReadWriteEx.java

Binary Data Input/Output Classes



Standard Input/Output

- **Standard I/O**
 - Provided in System class in java.lang
 - System.in
 - An instance of InputStream
 - System.out
 - An instance of PrintStream
 - System.err
 - An instance of PrintStream
- We can use the Scanner class with System.in

Binary Data Examples

- Files

- Output

- **FileOutputStream** □ for writing bytes to a file
 - **BufferedOutputStream** □ adds a buffer
 - **DataOutputStream** □ converts primitive type values or strings into bytes and outputs them to the stream
 - **Example:** BinaryFileWriterEx.java

- Input

- **FileInputStream** □ for reading bytes from a file
 - **BufferedInputStream** □ adds a buffer
 - **DataInputStream** □ reads data from a stream and converts data into appropriate primitive type or strings
 - **Example:** BinaryFileReaderEx.java

- **Example:** CopyingBytes.java

- Object Streams

- Driver.java, Phonebook.java

- Network

- WebSiteContents.java