1. What are Java I/O Streams?

In Java, I/O streams are a mechanism for reading and writing data. They abstract the complexities of reading and writing data from different sources, such as files, network connections, or even memory. Streams provide a common interface to work with data, making it easier to manage I/O operations.

2. Why Use Java I/O Streams?

Abstraction: I/O streams provide a high-level abstraction for reading and writing data, making it easier to work with various data sources and destinations.

Efficiency: Streams are efficient because they often buffer data, reducing the number of direct I/O operations and improving performance.

Flexibility: Streams can be used for various data types (bytes or characters) and different sources (files, network sockets, etc.).

Consistency: A common API for all types of I/O operations simplifies the code and ensures consistency.

3. When to Use Java I/O Streams?

You should use Java I/O streams when:
Reading from or writing to files or network connections.
Parsing structured data from a source.
You need to work with text data or binary data.

4. Where to Use Java I/O Streams?

Java I/O streams are used in various scenarios, such as:
File I/O: Reading from and writing to files.
Network communication: Reading from and writing to network sockets.
Input from keyboard: Reading user input from the console.
Output to the console: Writing data to the screen.
Serialization: Storing and retrieving objects to/from files or databases.

5. How to Use Java I/O Streams with Examples

Let's look at a few common scenarios with examples:

- Reading from a Text File (FileReader and BufferedReader)

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```
try {
   FileReader fileReader = new FileReader("input.txt");
   BufferedReader bufferedReader = new BufferedReader(fileReader);
   String line;
   while ((line = bufferedReader.readLine()) != null) {
      System.out.println(line);
   }
   bufferedReader.close();
} catch (IOException e) {
   e.printStackTrace();
}
```

- Writing to a Text File (FileWriter and BufferedWriter)

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```
try {
   FileWriter fileWriter = new FileWriter("output.txt");
   BufferedWriter bufferedWriter = new BufferedWriter(fileWriter);
   bufferedWriter.write("Hello, World!");
   bufferedWriter.newLine(); // Writes a newline character
   bufferedWriter.close();
} catch (IOException e) {
   e.printStackTrace();
}
```

Reading Binary Data from a File (FileInputStream)

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```
try {
   FileInputStream fileInputStream = new FileInputStream("data.bin");
   int data;
   while ((data = fileInputStream.read()) != -1) {
      // Process binary data
   }
   fileInputStream.close();
} catch (IOException e) {
   e.printStackTrace();
}
```

- Writing Binary Data to a File (FileOutputStream)

javaCopy code

```
try {
   FileOutputStream fileOutputStream = new
FileOutputStream("data.bin");
   byte[] data = {0x48, 0x65, 0x6C, 0x6C, 0x6F}; // "Hello" in bytes
   fileOutputStream.write(data);
   fileOutputStream.close();
} catch (IOException e) {
   e.printStackTrace();
}
```

These examples illustrate how to use Java I/O streams for common tasks. Always handle exceptions properly and close streams to ensure resource management and data integrity.