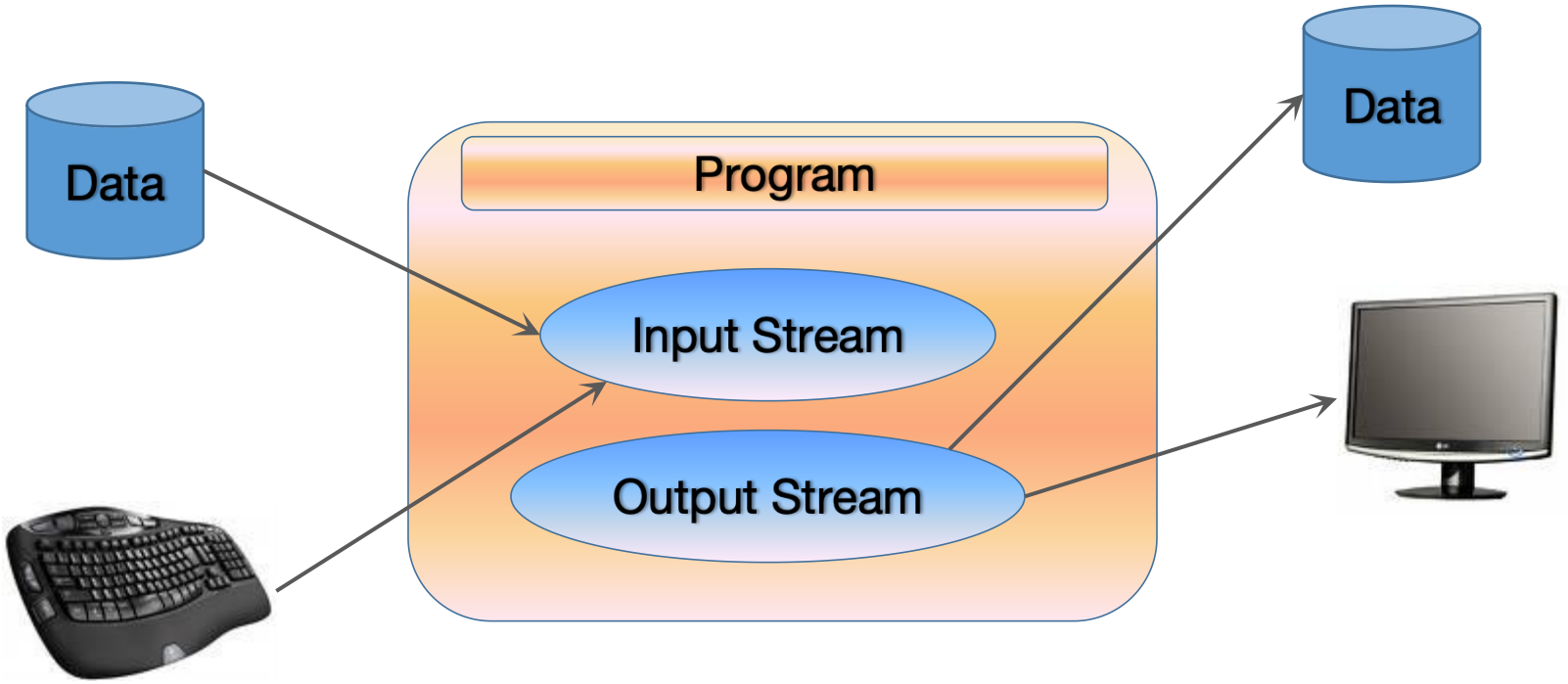
File Handling

Stream

- A stream is simply a sequence of bytes that flows into or out of our program.
- It's an abstract representation of an input or output device.



Input & Output Streams

Input Stream : Any stream, the data can be read from.

Output stream : Any stream, the data can be written to.

Types of Streams :

Binary or Byte Streams: While writing data to a Binary Stream, the data is written as a series of bytes, exactly as it appears in the memory. No data transformation takes place.

Character Streams: With character streams, program reads and writes Unicode characters, but the stream will contain characters in the equivalent character encoding used by the local computer.

Working with File

- ✓ Files are storage compartments on your computer that are managed by operating system
- ✓ Python built-in `open()` function creates a Python file object, which serves as a link to a file residing on your machine

```
fileObj = open(file_name, access_mode,encoding)
```

```
>>> # Creating a new file and opening it in writing mode
>>> newFile = open("test.txt" , "w",)
```

```
>>> # Opening a file in a read mode
>>> newFile = open("test.txt","r")
```

Mode of Opening a File

Mode	Meaning
r	Opens a file for reading only.
w	Create a file for writing only.
a	Append to a file.
rb	Open a binary file for reading.
wb	Create a binary file for writing.
ab	Append to a binary file.
r+	Opens a file for read/write.
w+	Create a file for write/read.
a+	Append or create a file for read/write.
rb+	Open a binary file for read/write.
wb+	Create a binary file for read/write.
ab+	Append or create a binary file for read/write.

File Handling

Attribute	Description
file.closed	Returns true if file is closed, false otherwise
file.mode	Returns access mode with which file was opened
file.name	Returns name of the file

Common File Methods

✓ write()

- The write() method writes any string to an open file. It is important to note that Python strings can have binary data and not just text.

  Syntax: fileObj.write(string);

✓ read()

- The read() method reads a string from an open file.

  Syntax: fileObj.read([count]);

✓ close()

- The close() method of a file object flushes any unwritten information and closes the file object, after which no more writing can be done.
- Python automatically closes a file when the reference object of a file is reassigned to another file.

  Syntax: fileObj.close();

Serialization

- In the context of web development, serializers refer to a mechanism used to convert complex data structures, such as Python objects or Django models, into a format that can be easily transmitted over the network, typically in the form of JSON or XML.

- In Python's pickle module, serializers refer to the mechanisms that convert (serialize) Python objects into a byte stream for storage/transfer and later reconstruct (deserialize) them back into objects.

Python pickle Package

- Pickle is used to serialize and deserialize a python object structure. Any object on python can be pickled so that it can be saved on disk.
- Pickle first serialize the object and then converts the object into a character stream so that this character stream contains all the information necessary to reconstruct(deserialize) the object in another python script.

- Use `pickle.dump(object,file,protocol)` function to store the object data to the file.
- Use `pickle.load(file)` to retrieve pickled data.

Protocols

Protocol	Python Versions	Description
0	All	Human-readable (ASCII), slowest and largest output
1	All	Binary format, more efficient than 0.
2	Python 2.3+	Supports class instances and new-style objects.
3	Python 3.0+ (default)	Optimized for Python 3, cannot be unpickled in Python 2.
4	Python 3.4+	Supports very large objects (like numpy arrays) and more data types.
5	Python 3.8+	Adds out-of-band data and performance optimizations (requires pickle5).

Python Version	pickle.HIGHEST_PROTOCOL
Python 3.8+	5
Python 3.4–3.7	4
Python 3.0–3.3	3
Python 2.x	2

Python pickle Example (pickling)

- The process of converting a Python object into a binary format is called "pickling".
- Example:

```
import pickle
data = {
          'a': [1, 2.5, 3, 4 + 6j],
          'b': ("character string"),
          'c': {None, True, False}
        }
file=open('data.pickle', ‘wb')
pickle.dump(data, file, pickle.HIGHEST_PROTOCOL)
file.close()
print("data written")
```

Python pickle Example (unpickling)

- The process of reconstructing the original Python object from the binary format is called "unpickling".
- Example:

```
import pickle
file=open('data.pickle', 'rb')
print("data from file:")
data = pickle.load(file)
file.close()
print(data)
```

Thank You :)