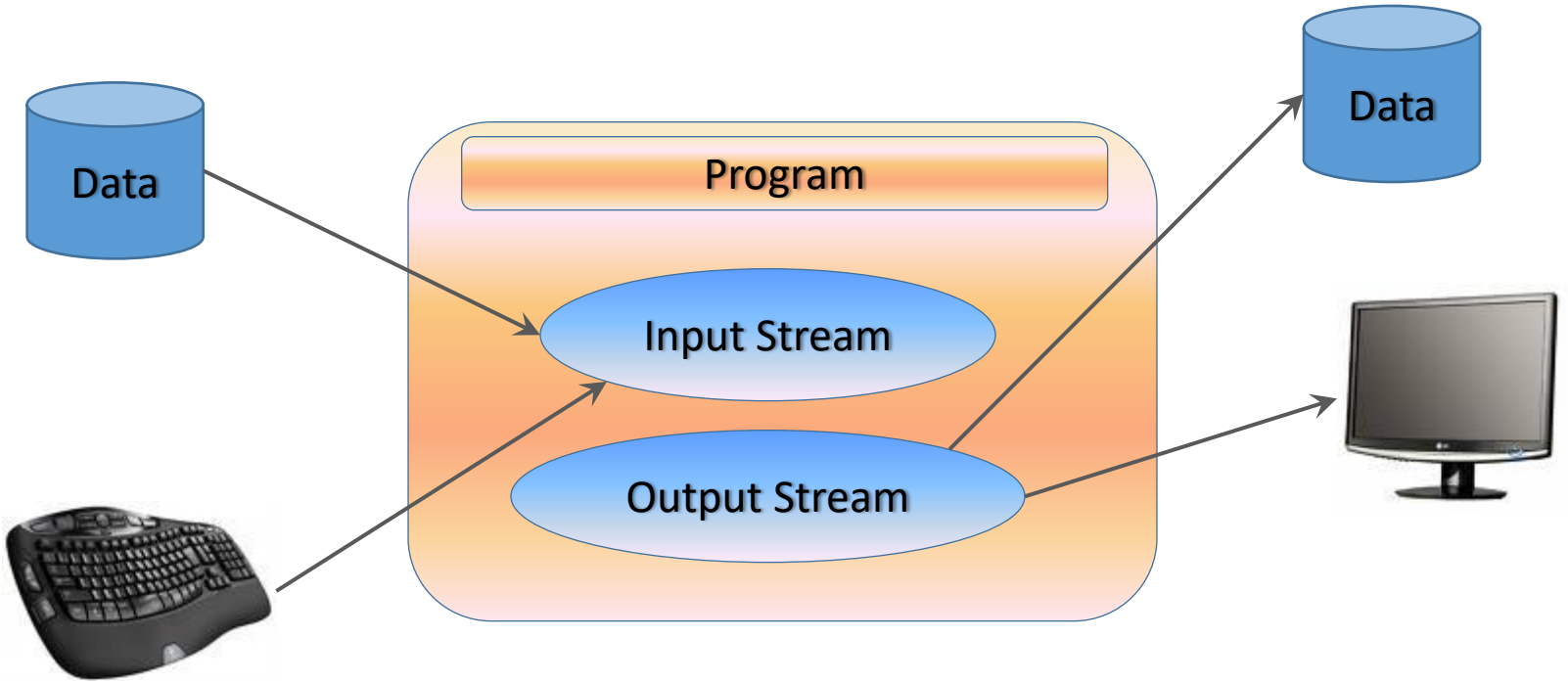
File Handling, Exception Handling

File Handling with Python

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();

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.

Python pickle Example(pickling)


```
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)


```
import pickle

file=open('data.pickle', 'rb')

print("data from file:")

data = pickle.load(file)

file.close()

print(data)
```

Error & Exception Handling in Python

Errors and Exception Handling

✓ **What is an Exception?**

- An Exception is an error that happens during execution of a program. When that error occurs, Python generates an exception that can be handled, which avoids your program to crash.

✓ **Why use Exceptions?**

- Exceptions are convenient in many ways for handling errors and special conditions in a program. When you think that you have a code which can produce an error then you can use exception handling

Where Exception may Occur?

- **Hardware/operating system level.**
  - Arithmetic exceptions; divide by 0, under/overflow.
  - Memory access violations, stack over/underflow.
- **Language level.**
  - Bounds violations: illegal indices.
  - Value Error: invalid literal, improper casts.
- **Program level.**
  - User defined exceptions.

Exception Handling Keywords

try

except

raise

else

finally

Common Exception/Errors in Python

- ✓ IOError: If the file cannot be opened
- ✓ ImportError: If Python cannot find the module
- ✓ ValueError: Raised when a built-in operation or function receives an argument that has the right type but an inappropriate value
- ✓ EOFError: Raised when one of the built-in functions (input()) hits an end-of-file condition (EOF) without reading any data

try…except…else…finally clause

```
try:
        data = something_that_can_go_wrong
except  ValueError :
        handle_the_exception_error
else:
        doing_different_exception_handling
finally:
        executes_under_all_circumstances
```

✓ The else clause in a **try, except** statement must follow all except clauses

✓ It is useful for code that must be executed if the try clause does not raise an exception

Note 1: Exceptions in the else clause are not handled by the preceding except clauses.

Note 2: Make sure that the else clause is executed before the finally block

Assert Statement

- ✓ The assert statement is intended for debugging statements
- ✓ It raises an exception as soon as the condition is False
- ✓ The caller gets an exception which will go into **stderr** or **syslog**

Assert <some_test>, <message>

- ✓ The line above can be "read" as: If <some_test> evaluates to False, an exception is raised and <message> will be output

Example:

```
while (True):
    try:
        x=int( input("input value for x:\n"))
        assert(x>500) ,  "Value must be greater than 500"
        y=int (input ("input value of y:\n"))
        z=x/y
        print("result is:"+str(z))
    except (ZeroDivisionError ,ValueError,AssertionError ) as v:
        print(v)
    else:
        break
```

Custom/User Defined Exceptions

#Creating Custom Exception:

```
class MyException(Exception):
    def __init__(self,message="Salary must be greater than 10000"):
        self.message=message

#Raising Custom Exception:

def inputSalary(sal):
    if sal<10000:
        raise MyException()
    print("salary is:"+str(sal))

#Using Custom Exception:

try:
    sal=int(input("Input your salary:\n"))
    inputSalary(sal)
except MyException as e:
    print(e.message)
```

THANK YOU!!