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Document description	:	This document contains the supporting topic: “Exception handling”
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Supporting topic description:

Introduction:
In Python, exceptions are unexpected events that can happen during the execution of a program, disrupting the normal flow of code. These can include errors like attempting to access a non-existent file. To handle these exceptions and prevent the program from crashing, Python provides a mechanism called the try-except block. The code that might raise an exception is placed inside the try block. If an exception occurs within the try block, Python immediately jumps to the corresponding except block, where the specific exception can be caught and handled gracefully. This allows developers to predict potential errors and define appropriate responses, ensuring the program can continue running smoothly even when unexpected issues arise. Using try-except blocks enhances the robustness of Python programs by providing a way to manage errors and prevent them from causing the entire program to terminate abruptly.

- Perform a brief research about exception handling in Python.
- Implement a simple example with an intentional error, like trying to open a file with a wrong name. Run the program and see what will be the result of the execution.
- Improve your program by adding try-except block.
- Raised exceptions are object instances. They expose methods to detect their types and messages. Use these object instances to print proper error messages to the user when an exception occurs.
- Improve the code given above for code analysis with exception handling.

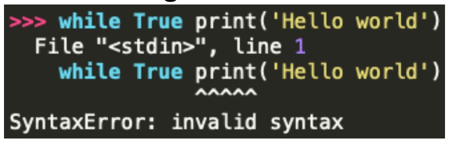
Code:

```
class TemperatureDataAnalyzer:
    def __init__(self, file_path):
        self.file_path = file_path
        self.temperature_data = []
    # Method to open the file and load lines as an attribute
    def load_data(self):
        with open(self.file_path, 'r') as file:
            data = [line.strip().split() for line in file]
            self.temperature_data = [list(map(int,d[:-1]))+[float(d[len(d)-1])] for d in data]
    # Method to perform the analysis and construct the list
    def construct_temperature_list(self):
        temperature_list = []
        for data in self.temperature_data:
            month, day, year, temperature = data[:]
            if year not in [item[0] for item in temperature_list]:
                temperature_list.append((year, {}))
            if month not in temperature_list[-1][1]:
                temperature_list[-1][1][month] = 0.0
            temperature_list[-1][1][month] = max(temperature , temperature_list[-1][1][month])
        return temperature_list

def main():
    file_path = './temps.txt'
    analyzer = TemperatureDataAnalyzer(file_path)
    analyzer.load_data()
    temperature_list = analyzer.construct_temperature_list()
    print(temperature_list)

if __name__ == '__main__':
    main()
```

- Perform a brief research about exception handling in Python.

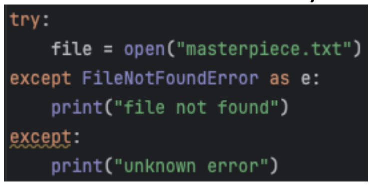
Exceptions are unexpected events in a python script.
This also known as errors.

When an exception or error takes place the program will immediately crash and report the offending line like this:



```
>>> while True print('Hello world')
  File "<stdin>", line 1
    while True print('Hello world')
                   ^^^^^
SyntaxError: invalid syntax
```

These exceptions can be caught by using a try-except structure. This will catch the error and run the code you set in the except when an exception takes place:



```
try:
    file = open("masterpiece.txt")
except FileNotFoundError as e:
    print("file not found")
except:
    print("unknown error")
```

These are some of the important built-in exceptions/error's:

Exception	Description
AssertionError	Raised when the assert statement fails.
AttributeError	Raised on the attribute assignment or reference fails.
EOFError	Raised when the input() function hits the end-of-file condition.
FloatingPointError	Raised when a floating point operation fails.
GeneratorExit	Raised when a generator's close() method is called.
ImportError	Raised when the imported module is not found.
IndexError	Raised when the index of a sequence is out of range.
KeyError	Raised when a key is not found in a dictionary.
KeyboardInterrupt	Raised when the user hits the interrupt key (Ctrl+c or delete).
MemoryError	Raised when an operation runs out of memory.
NameError	Raised when a variable is not found in the local or global scope.
NotImplementedError	Raised by abstract methods.
OSError	Raised when a system operation causes a system-related error.
OverflowError	Raised when the result of an arithmetic operation is too large to be represented.
ReferenceError	Raised when a weak reference proxy is used to access a garbage collected referent.
RuntimeError	Raised when an error does not fall under any other category.

StopIteration	Raised by the next() function to indicate that there is no further item to be returned by the iterator.
SyntaxError	Raised by the parser when a syntax error is encountered.
IndentationError	Raised when there is an incorrect indentation.
TabError	Raised when the indentation consists of inconsistent tabs and spaces.
SystemError	Raised when the interpreter detects internal error.
SystemExit	Raised by the sys.exit() function.
TypeError	Raised when a function or operation is applied to an object of an incorrect type.
UnboundLocalError	Raised when a reference is made to a local variable in a function or method, but no value has been bound to that variable.
UnicodeError	Raised when a Unicode-related encoding or decoding error occurs.
UnicodeEncodeError	Raised when a Unicode-related error occurs during encoding.
UnicodeDecodeError	Raised when a Unicode-related error occurs during decoding.
UnicodeTranslateError	Raised when a Unicode-related error occurs during translation.
ValueError	Raised when a function gets an argument of correct type but improper value.
ZeroDivisionError	Raised when the second operand of a division or module operation is zero.

Sources		URL
Python official documentation	:	https://docs.python.org/3/tutorial/errors.html
TutorialsTeacher	:	https://www.tutorialsteacher.com/python/error-types-in-python

- Implement a simple example with an intentional error, like trying to open a file with a wrong name. Run the program and see what will be the result of the execution.

Code:

```
File = open(“masterpiece.txt”)
```

Error:

```
Traceback (most recent call last):
  File "/Users/dannydesnoo/Documents/GitHub/HR.Basecamp/A3/Learning activities/Supporting topic - Exception handling/example1.py", line 1, in <module>
    file = open("masterpiece.txt")
           ^^^^^^^^^^^^^^^^^^^^^^^
FileNotFoundError: [Errno 2] No such file or directory: 'masterpiece.txt'
```

- Improve your program by adding try-except block.

Code:

```
try:
    file = open("masterpiece.txt")
except:
    print("An error has occurred")
```

Console:

```
An error has occurred

Process finished with exit code 0
```

- Raised exceptions are object instances. They expose methods to detect their types and messages. Use these object instances to print proper error messages to the user when an exception occurs.

Code:

```
try:
    file = open("masterpiece.txt")
except FileNotFoundError as e:
    print("file not found")
except:
    print("unknown error")
```

Console:

```
file not found

Process finished with exit code 0
```

- Improve the code given above for code analysis with exception handling.

Improved code:

```
class TemperatureDataAnalyzer:
    def __init__(self, file_path):
        self.file_path = file_path
        self.temperature_data = []
    # Method to open the file and load lines as an attribute
    def load_data(self):
        with open(self.file_path, 'r') as file:
            data = [line.strip().split() for line in file]
            self.temperature_data = [list(map(int,d[:-1]))+[float(d[len(d)-1])] for d in data]
    # Method to perform the analysis and construct the list
    def construct_temperature_list(self):
        temperature_list = []
        for data in self.temperature_data:
            month, day, year, temperature = data[:]
            if year not in [item[0] for item in temperature_list]:
                temperature_list.append((year, {}))
            if month not in temperature_list[-1][1]:
                temperature_list[-1][1][month] = 0.0
            temperature_list[-1][1][month] = max(temperature , temperature_list[-
1][1][month])
        return temperature_list

def main():
    try:
        file_path = './temps.txt'
        analyzer = TemperatureDataAnalyzer(file_path)
        analyzer.load_data()
        temperature_list = analyzer.construct_temperature_list()
        print(temperature_list)
    except FileNotFoundError:
        print("File not found")
    except TypeError:
        print("Invalid data")
    except ZeroDivisionError:
        print("Invalid data")
    except:
        print("An unknown error has occurred")

if __name__ == '__main__':
    main()
```