MVA Microsoft Virtual Academy

Handling errors
try except

Microsoft

Susan Ibach | Technical Evangelist
Christopher Harrison | Content Developer

Even the best laid plans sometimes go wrong

- You create a shopping list then when you get to the grocery store realize you left the list at home
- You want to buy a pair of shoes, but your size is out of stock
- You need to call someone and your cell phone battery is dead

Things go wrong in programs as well

- A program cannot find a file it needs
- A user enters a date in the wrong format
- You try to divide a number by zero

MVA Microsoft Virtual Academy

Error types

Microsoft

Syntax errors are errors that the development tool can detect

- Visual Studio highlights syntax errors with the red squiggle

```
print(Hello World')
```

Sometimes typing mistakes can't be detected until you run the program

```
prnit('Hello World')
```

```
prnit('Hello World')
```

NameError occurred

name 'prnit' is not defined

Troubleshooting tips:

Get general help for exceptions.

Search for more Help Online...

Exception settings:

☐ Break when this exception type is thrown

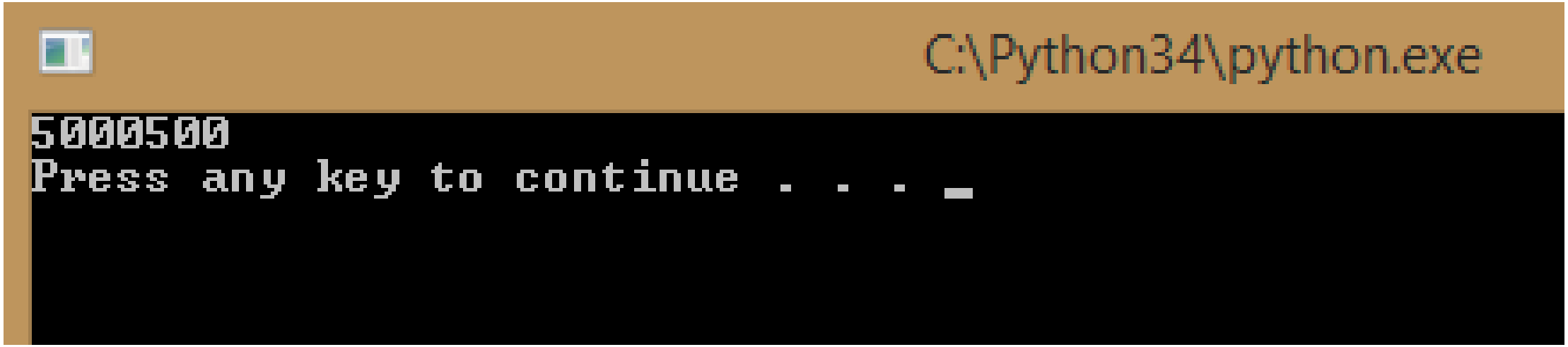
Actions:

Copy exception detail to the clipboard

Open exception settings

Logic errors are syntactically correct, but the program doesn't do what we want it to do

```
salary = '5000'
bonus = '500'
payCheck = salary + bonus
print(payCheck)
```



MVA Microsoft Virtual Academy

DEMO

Syntax and runtime errors

MVA Microsoft Virtual Academy

Gracefully handling errors

Microsoft

Runtime errors occur when the code basically works but something out of the ordinary ‘crashes’ the code

- You write a calculator program and a user tries to divide a number by zero
- Your program tries to read a file, and the file is missing
- Your program is trying to perform a date calculation and the date provided is in the wrong format

Having your code crash is a very poor experience for the user

- You can add error handling to your code to handle runtime errors gracefully

Let's create a calculator program that will take two numbers and divide them for the user

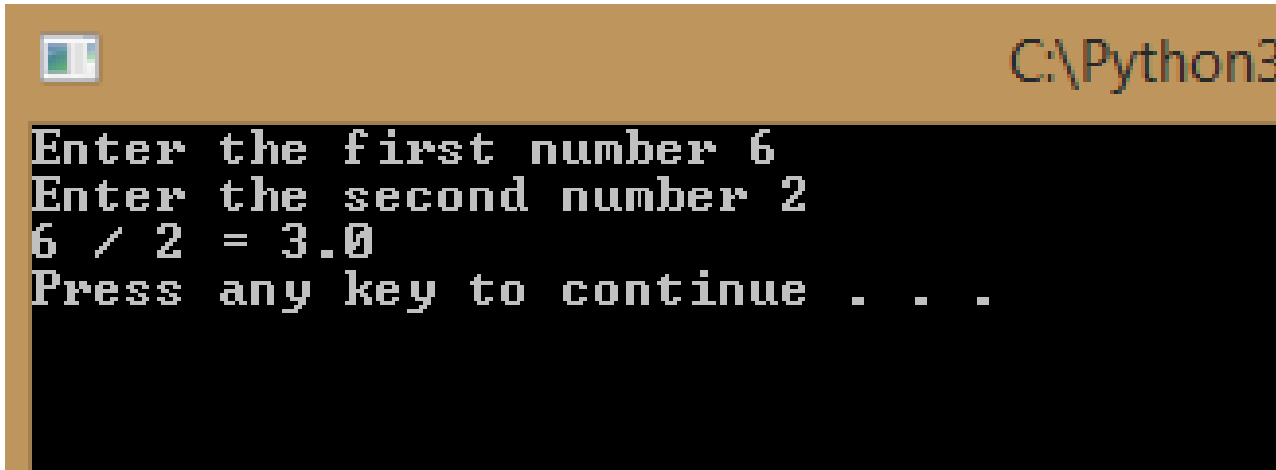
```
first = input("Enter the first number ")
second = input("Enter the second number ")

firstNumber = float(first)
secondNumber = float(second)

result = firstNumber / secondNumber

print (first + " / " + second + " = " + str(result))
```

- We test it and it works!

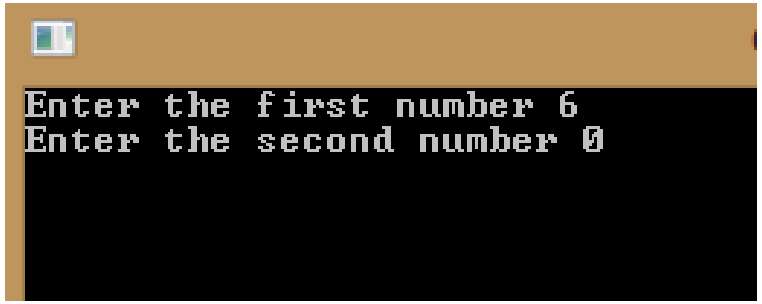


MVA Microsoft Virtual Academy

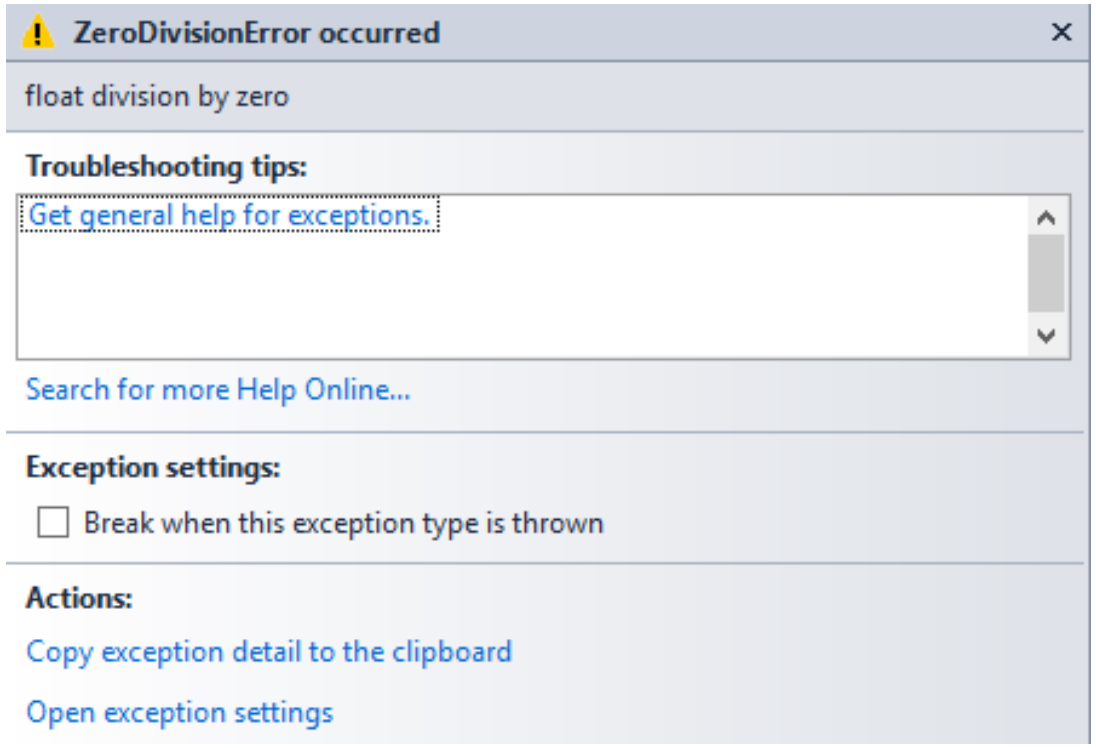
DEMO

Create a calculator

What happens you enter 0 as the second number



- You get an error at runtime



Which line of code generated the error message?

```
first = input("Enter the first number ")
second = input("Enter the second number ")

firstNumber = float(first)
secondNumber = float(second)

result = firstNumber / secondNumber

print (first + " / " + second + " = " + str(result))
```

You can add a **try/except** around the code that generates the error to handle it gracefully

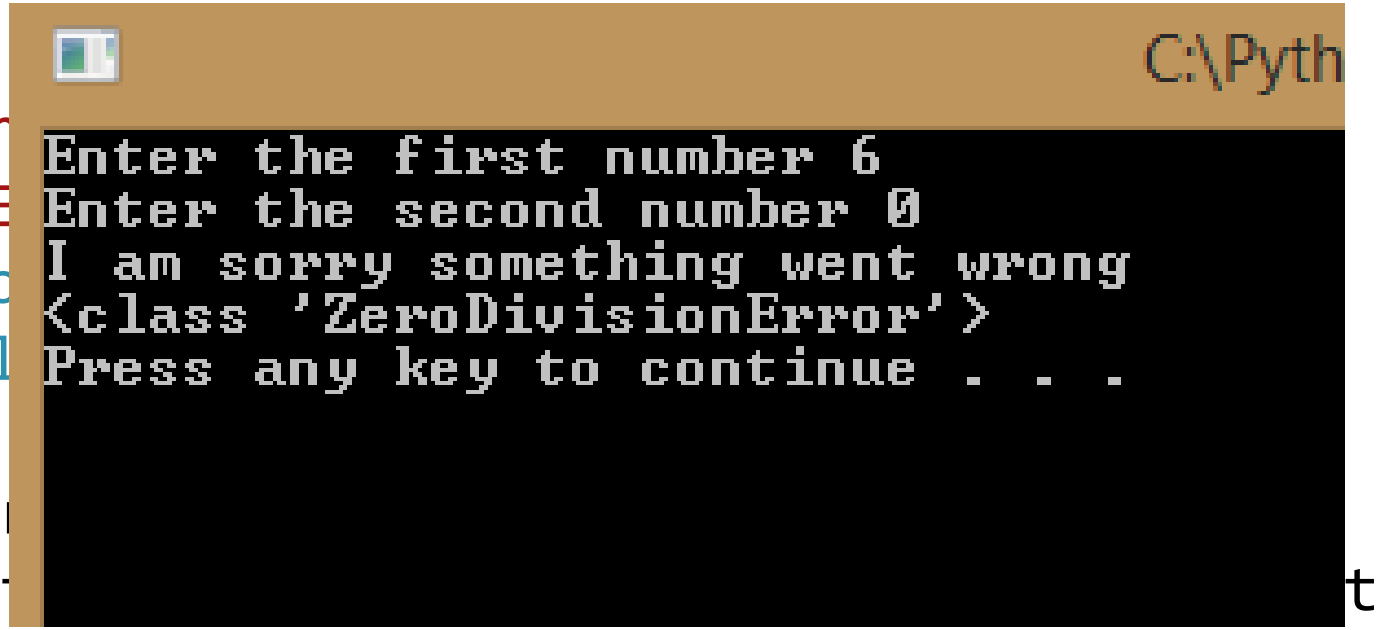
```
first = input("Enter the first number ")
second = input("Enter the second number ")
firstNumber = float(first)
secondNumber = float(second)
try :
     result = firstNumber / secondNumber
     print (first + " / " + second + " = " + str(result))
except :
     print("I am sorry something went wrong")
```

- The code in the except only runs if there is an error generated when executing the code in the try

If you want to know what the error was, you can use the function sys.exc_info()

```
import sys

first = input("Er
second = input("E
firstNumber = flo
secondNumber = fl
try :
      result = fi
      print (firs                                    t))
except :
      error = sys.exc_info()[0]
      print("I am sorry something went wrong")
      print(error)
```



If you know exactly what error is occurring, you can specify how to handle that exact error

```
first = input("Er
second = input("E
firstNumber = flo
secondNumber = fl
try :
      result = fi
      print (first
except ZeroDivisionError :
      print("The answer is infinity")
```

```
C:\Python34
Enter the first number 6
Enter the second number 0
The answer is infinity
Press any key to continue . . .
```

Ideally you should handle one or more specific errors and then have a generic error handler as well

```
first = input("Enter the first number ")
second = input("Enter the second number ")
firstNumber = float(first)
secondNumber = float(second)
try :
      result = firstNumber / secondNumber
      print (first + " / " + second + " = " + str(result))
except ZeroDivisionError :
      print("The answer is infinity")
except :
      error = sys.exc_info()[0]
      print("I am sorry something went wrong")
      print(error)
```

MVA Microsoft Virtual Academy

DEMO

Trapping errors

Any code you place after the try except will always execute

```
first = input("Enter the first number ")
second = input("Enter the second number ")
firstNumber = float(first)
secondNumber = float(second)
try :
      result = firstNumber / secondNumber
      print (first + " / " + second + " = " + str(result))
except ZeroDivisionError :
      print("The answer is infinity")
except :
      error = sys.exc_info()[0]
      print("I am sorry something went wrong")
      print(error)
print("This message always displays!")
```

How can I force my program to exit if an error occurs and I don't want to continue?

- You can use the function sys.exit() in the sys library

```
try :
      result = firstNumber / secondNumber
      print (first + " / " + second + " = " + str(result))
except ZeroDivisionError :
      print("The answer is infinity")
      sys.exit()
print("This message only displays if there is no error!")
```

You can also use variables and an if statement to control what happens after an error

```
try :
      result = firstNumber / secondNumber
      print (first + " / " + second + " = " + str(result))
      errorFlag = False
except ZeroDivisionError :
      print("The answer is infinity")
      errorFlag = True
if not errorFlag :
      print("This message only displays if there is no error!")
```

MVA Microsoft Virtual Academy

DEMO

Controlling execution after an error

Is there any other code in our program that might give us an error at runtime?

```
first = input("Enter the first number ")
second = input("Enter the second number ")

firstNumber = float(first)
secondNumber = float(second)

result = firstNumber / secondNumber

print (first + " / " + second + " = " + str(result))
```

There are a lot of different situations that can raise errors in our code

- Converting between datatypes
- Opening files
- Mathematical calculations
- Trying to access a value in a list that does not exist

How do you know what errors will be raised?

- You can test it yourself and when an error occurs use the sys.exc_info() function to get the name of the error
- There is a list of standard Python errors
  - https://docs.python.org/3/c-api/exceptions.html#standard-exceptions

The most important thing to do is to test!

1. Execute your code with everything running normally
2. Execute your code with incorrect user input
   - Enter letters instead of numbers
   - Enter 0 or spaces
   - Enter a value in the wrong format (e.g. dates)
3. Try other error scenarios such as missing files
4. Try anything you can think of that might crash your code
   - Entering really big numbers
   - negative numbers

Do I need to handle EVERY possible error?

- Sometimes writing the code to handle the errors takes more time than writing the original program!
- Whether it is necessary to handle EVERY error depends on how the code will be used
- If you are writing a system for air traffic control I would want very thorough error handling!
- If you are writing a fun little app to tweet when your plant needs water, I wouldn’t worry about it too much

Your Challenge

- Write code to open and read a file
- Allow the user to specify the file name
- Add error handling to provide a suitable error message if the file specified by the user could not be found

Congratulations

- You can now handle errors gracefully so your code doesn’t crash