Chap9 Exceptions

第9章 异常

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9.1 PYTHON中的异常

程序设计错误

- 语法错误
- 运行时错误
- 逻辑错误

```
6 = x * 2
```

```
x = 3 / 0
```

```
area = 2 * 3.14 * 3
```

异常（Exception）

Source

```
>>> 1 / 0
```

```
Traceback (most recent call last):
  File "<pyshell#0>", line 1, in <module>
    1/0
ZeroDivisionError: division by zero
```

Source

```
>>> y = x + 1
```

```
Traceback (most recent call last):
  File "<pyshell#1>", line 1, in <module>
    y = x + 1
NameError: name 'x' is not defined
```

用异常对象（exception object）表示异常情况

异常

查看异常

dir(__builtins__)

类名	描述
BaseException	所有异常的基类
Exception	常规异常的基类
AttributeError	对象不存在此属性
IndexError	序列中无此索引
IOError	输入/输出操作失败
KeyboardInterrupt	用户中断执行(通常输入Ctr-C)
KeyError	映射中不存在此键
NameError	找不到名字（变量）
SyntaxError	Python 语法错误
TypeError	对类型无效的操作
ValueError	传入无效的参数
ZeroDivisionError	除(或取模)运算的第二个参数为0

异常处理

```
if y != 0:
    print(x / y)
else:
    print('division by zero')
```

VS

try-except
异常处理语句

9.2

捕捉异常

异常

File

```python
# Filename: prog9-1.py
num1 = int(input('Enter the first number: '))
num2 = int(input('Enter the second number: '))
print(num1 / num2)
```

```
Enter the first number: a
Traceback (most recent call last):
  File "C:\Python\programs\prog9-1.py", line 1, in <module>
    num1 = int(input('Enter the first number: '))
ValueError: invalid literal for int() with base 10: 'a'
```

9.2.1 try-except语句

try-except语句

File

```
# Filename: prog9-2.py
try:
    num1 = int(input('Enter the first number: '))
    num2 = int(input('Enter the second number: '))
    print(num1 / num2)
except ValueError:
    print('Please input a digit!')
```

```
try:
    被检测的语句块
except Exception:
    异常处理语句块
```

try-except语句

File

```
# Filename: prog9-3.py
try:
    num1 = int(input('Enter the first number: '))
    num2 = int(input('Enter the second number: '))
    print(num1 / num2)
except ZeroDivisionError:
    print('The second number cannot be zero!')
```

9.2.2 多个except子句和一个except块捕捉多个异常

多个except子句

File

```
# Filename: prog9-4.py
try:
    num1 = int(input('Enter the first number: '))
    num2 = int(input('Enter the second number: '))
    print(num1 / num2)
except ValueError:
    print('Please input a digit!')
except ZeroDivisionError:
    print('The second number cannot be zero!')
```

一个except块捕捉多个异常

File

```
# Filename: prog9-5.py
try:
    num1 = int(input('Enter the first number: '))
    num2 = int(input('Enter the second number: '))
    print(num1 / num2)
except (ValueError, ZeroDivisionError):
    print('Invalid input!')
```

空except子句

File

```
# Filename: prog9-6.py
try:
    num1 = int(input('Enter the first number: '))
    num2 = int(input('Enter the second number: '))
    print(num1 / num2)
except:
    print('Something went wrong!')
```

一了百了：except

as子句

File

```
# Filename: prog9-7.py
try:
    num1 = int(input('Enter the first number: '))
    num2 = int(input('Enter the second number: '))
    print(num1 / num2)
except Exception as err:
    print('Something went wrong!')
    print(err)
```

as子句

```
try:
    被检测的语句块
except 异常类名 as 错误原因名:
    异常处理语句块
     print(错误原因名)
```

9.2.3 ELSE子句

else子句

File

```
# Filename: prog9-8.py
try:
    num1 = int(input('Enter the first number: '))
    num2 = int(input('Enter the second number: '))
    print(num1 / num2)
except(ValueError, ZeroDivisionError):
    print('Invalid input!')
else:
    print('Haha, I am smart.')
```

```
Enter the first number: 3
Enter the second number: 5
0.6
Aha, I am smart.
```

加入循环

File

```
# Filename: prog9-9.py
while True:
    try:
        num1 = int(input('Enter the first number: '))
        num2  = int(input('Enter the second number: '))
        print(num1 / num2)
    except ValueError:
        print('Please input a digit!')
    except ZeroDivisionError:
        print('The second number cannot be zero!')
    else:
        break
```

```
Enter the first number: a
Please input a digit!
Enter the first number: 3
Enter the second number: 0
The second number cannot be zero!
Enter the first number: 3
Enter the second number: 5
0.6
```

改写9-9

```
# File e: prog9-10.py
while True:
    try:
        num1 = int(input('Enter the first number: '))
        num2 = int(input('Enter the second number: '))
        print(num1 / num2)
    except Exception as err:
        print(err)
    else:
        break
```

break语句的位置

File

```
# Filename: prog9-11.py
while True:
    try:
        num1 = int(input('Enter the first number: '))
        num2 = int(input('Enter the second number: '))
        print(num1 / num2)
        break
    except Exception as err:
        print(err)
```

break语句的位置

```
# Filename: prog9-12.py
aList = [1, 2, 3, 4, 5]
i = 0
while True:
    try:
        print(aList[i])
    except IndexError:
        print('index error')
        break
    else:
        i += 1
```

9.2.4 finally子句

finally子句

```
# Filename: prog9-13.py
def finallyTest():
    try:
        x = int(input('Enter the first number: '))
        y = int(input('Enter the second number: '))
        print(x / y)
        return 1
    except Exception as err:
        print(err)
        return 0
    finally:
        print('It is a finally clause.')
result = finallyTest()
print(result)
```

```
Enter the first number: 3
Enter the second number: 5
0.6
It is a finally clause.
1
```

```
Enter the first number: 3
Enter the second number: 0
division by zero
It is a finally clause.
0
```

提取文本中的数字字符串转化成浮点数

File

```
# Filename: prog9-14.py
def isfloat(s):
    if s[-1] == '.':
        s = s.strip('.')
    try:
        float(s)
    except ValueError:
        return 'False'
    return float(s)
if __name__ == '__main__':
    text = input('Please input the strings:\n')
    for ch in text:
        if ch in ',':
            text = text.replace(ch, '')
```

```
words = text.split()
found = 0
for word in words:
    if isfloat(word) != 'False':
        print('-', isfloat(word))
        found = 1
if found == 0:
    print('Not Found!')
```

assert（断言）语句

- assert 表达式
- 执行

```
>>> assert 1==1
>>> assert 1==2
Traceback (most recent call last):
  File "<ipython-input-18-730332727407>", line 1, in <module>
    assert 1==2
AssertionError
```

raise语句

File

```
class Empty(Exception):
        pass
class Process:
        def __init__(self, lst):
                self.lst = lst
                self.length = len(lst)
        def poping(self):
                if self.length == 0:
                        raise Empty('the list is empty')
                return self.lst.pop()

lst = [1, 3, 5, 8]
x = Process(lst)
print(x.poping())
```

9.3

上下文管理器和 WITH语句

上下文管理器（Context Manager）和with语句

File

```
# Filename: prog9-15.py
try:
    f = open('data.txt')
    for line in f:
        print(line, end = '')
except IOError:
    print('Cannot open the file!')
finally:
    f.close()
```

上下文管理器（Context Manager）和with语句

上下文管理器

- 定义和控制代码块执行前的准备动作及执行后的收尾动作
- 通过with语句在支持上下文管理协议的对象（如文件对象）上方便地进行使用

File

```
# Filename: prog9-15.py
with open('data.txt') as f:
    for line in f:
        print(line, end='')
```

```
with 上下文管理表达式 as 变量:
    语句序列
```

例：计算一个文件的行数

File

```
# Filename: prog9-17.py
def countLines(fname):
    count = 0
    for line in fp:
        count += 1
    print(fp.name + ' has ' + str(count) + ' lines')
if __name__ == ' __main__ ' :
    fname = 'data.txt'
    try:
        with open(fname) as fp:
            countLines(fp)
    except FileNotFoundError:
        print(fname + 'does not exist')
```

9.4 小结

小结

- 异常
- try-except语句
- try-except-else语句
- try-finally语句
- raise语句
- with语句