Cheat Sheet

Errors & Exceptions

There are two major kinds of errors:

1. Syntax Errors
2. Exceptions

Syntax Errors

Syntax errors are parsing errors which occur when the code is not adhering to **Python Syntax**.

Code

PYTHON

```
1  if True print("Hello")
```

Output

```
SyntaxError: invalid syntax
```

When there is a syntax error, the program will **not** execute even if that part of code is not used.

Code

PYTHON

```
1  print("Hello")
2
3  def greet():
4      print("World"
```

Output

```
SyntaxError: unexpected EOF while parsing
```

Notice that in the above code, the syntax error is inside the `greet` function, which is not used in rest of the code.

Exceptions

Even when a statement or expression is **syntactically correct**, it may cause an **error** when an attempt is made to execute it.

Errors detected during execution are called **exceptions**.

Example Scenario

We wrote a program to download a Video over the Internet.

- Internet is disconnected during the download
- We do not have space left on the device to download the video

Example 1

Division Example

Input given by the user is not within expected values.

Code

PYTHON

```python
def divide(a, b):
    return  a / b

divide(5, 0)
```

Output

```
ZeroDivisionError: division by zero
```

Example 2

Input given by the user is not within expected values.

Code

PYTHON

```python

def divide(a, b):
    return  a / b

divide("5", "10")
```

Output

```
TypeError: unsupported operand type(s) for /: 'str' and 'str'
```

Example 3

Consider the following code, which is used to update the quantity of items in store.

Code

PYTHON

```python
class Store:
    def __init__(self):
        self.items = {
        "milk" : 20, "bread" : 30, }

    def add_item(self, name, quantity):
       self.items[name] += quantity

s = Store()
s.add_item('biscuits', 10)
```

Output

```
KeyError: 'biscuits'
```

Working With Exceptions

What happens when your code runs into an exception during execution?

The application/program crashes.

End-User Applications

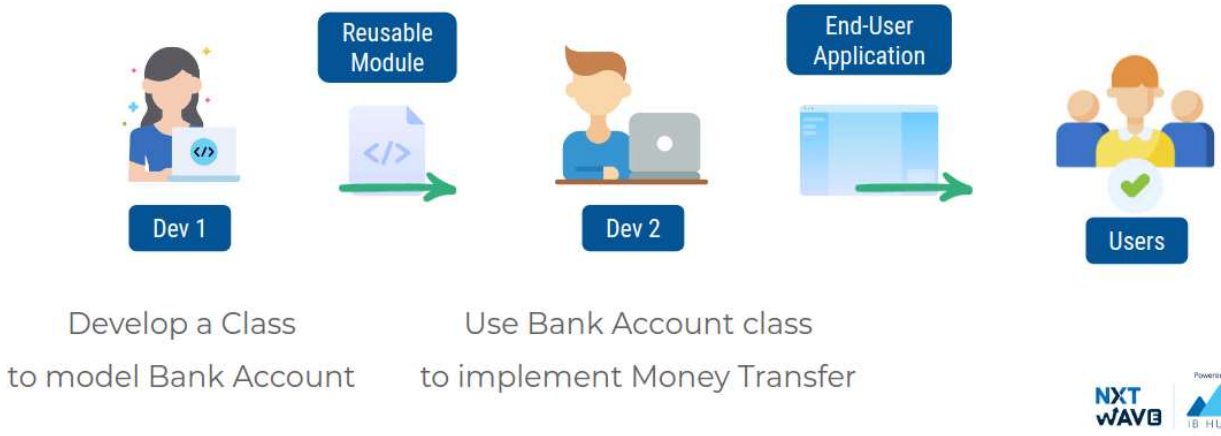
When you develop applications that are directly used by end-users, you need to **handle different possible exceptions** in your code so that the application will not crash.

Reusable Modules

When you develop modules that are used by other developers, you should **raise exceptions** for different scenarios so that other developers can handle them.

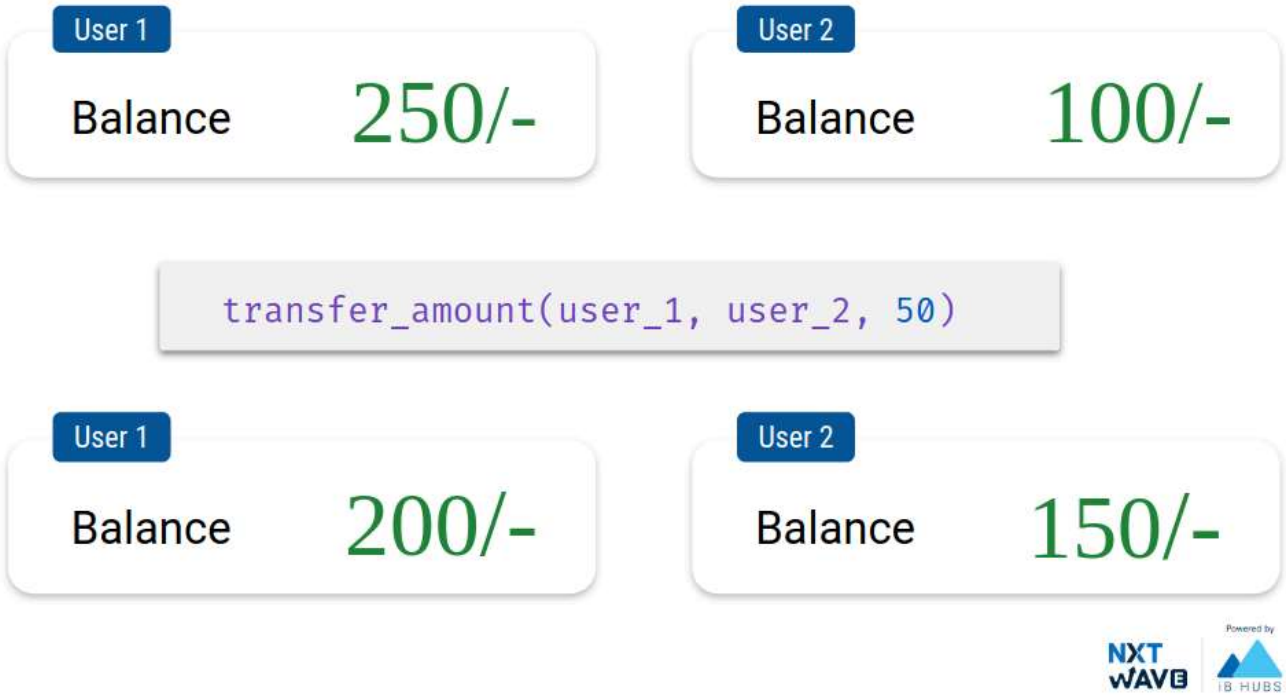
Money Transfer App Scenario

Let's consider we are creating an app that allows users to transfer money between them.



Bank Account Class

Example 1



Code

PYTHON

```python
class BankAccount:
    def __init__(self, account_number):
        self.account_number = str(account_number)
        self.balance = 0

    def get_balance(self):
        return self.balance
```

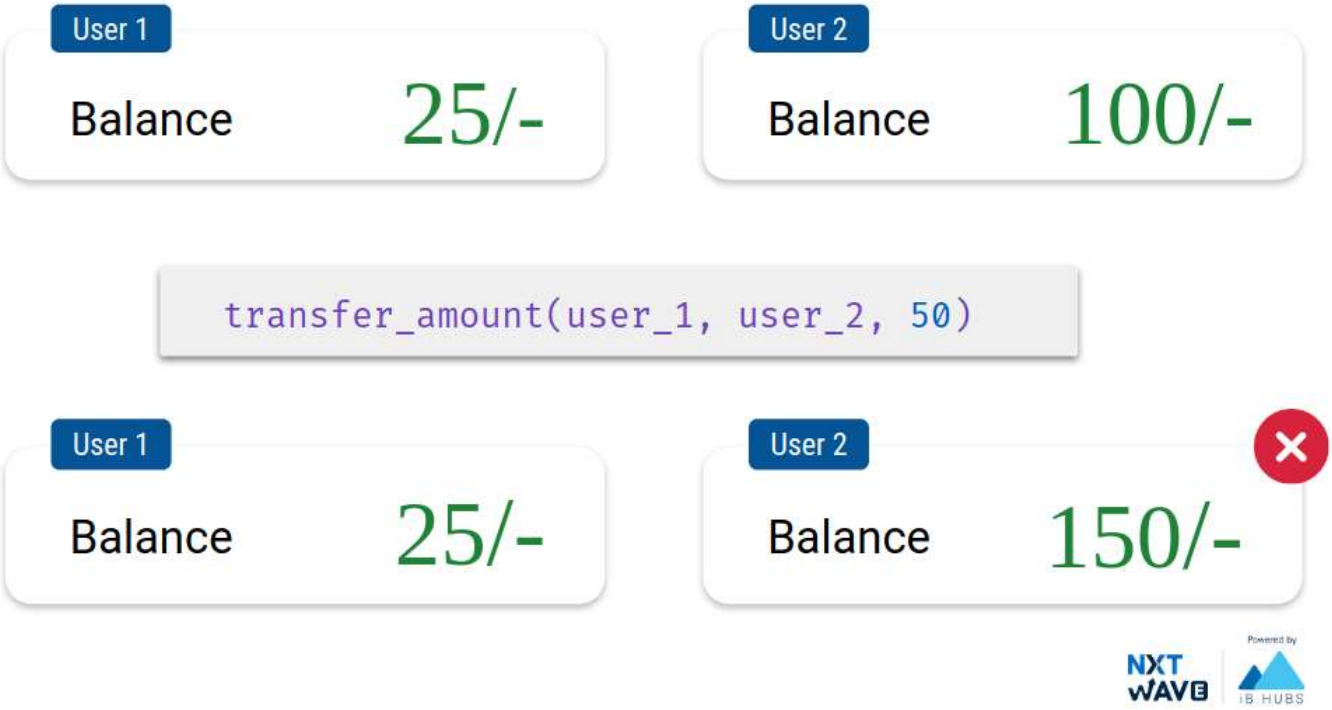
```
    def withdraw(self, amount):
        if self.balance >= amount:
            self.balance -= amount
        else:
            print("Insufficient Funds")

    def deposit(self, amount):
        self.balance += amount


def transfer_amount(acc_1, acc_2, amount):
    acc_1.withdraw(amount)
    acc_2.deposit(amount)


user_1 = BankAccount("001")
user_2 = BankAccount("002")
user_1.deposit(250)
user_2.deposit(100)

print("User 1 Balance: {}/-".format(user_1.get_balance()))
print("User 2 Balance: {}/-".format(user_2.get_balance()))
transfer_amount(user_1, user_2, 50)
print("Transferring 50/- from User 1 to User 2")
print("User 1 Balance: {}/-".format(user_1.get_balance()))
print("User 2 Balance: {}/-".format(user_2.get_balance()))
```

Collapse

Output

```
User 1 Balance: 250/-
User 2 Balance: 100/-
Transferring 50/- from User 1 to User 2
User 1 Balance: 200/-
User 2 Balance: 150/-
```

Example 2



Code

PYTHON

```python
class BankAccount:
    def __init__(self, account_number):
        self.account_number = str(account_number)
        self.balance = 0

    def get_balance(self):
        return self.balance

    def withdraw(self, amount):
        if self.balance >= amount:
            self.balance -= amount
        else:
            print("Insufficient Funds")

    def deposit(self, amount):
        self.balance += amount


def transfer_amount(acc_1, acc_2, amount):
    acc_1.withdraw(amount)
    acc_2.deposit(amount)


user_1 = BankAccount("001")
user_2 = BankAccount("002")
user_1.deposit(25)
user_2.deposit(100)

print("User 1 Balance: {}/-".format(user_1.get_balance()))
```

```
print("User 2 Balance: {}/-".format(user_2.get_balance()))
transfer_amount(user_1, user_2, 50)
print("Transferring 50/- from User 1 to User 2")
print("User 1 Balance: {}/-".format(user_1.get_balance()))
print("User 2 Balance: {}/-".format(user_2.get_balance()))
```

Collapse

Output

```
User 1 Balance: 25/-
User 2 Balance: 100/-
Insufficient Funds
Transferring 50/- from User 1 to User 2
User 1 Balance: 25/-
User 2 Balance: 150/-
```

Raising Exceptions

When your code enters an unexpected state, **raise** an exception to communicate it.

Built-in Exceptions

Different **exception classes** which are raised in different scenarios.

You can use the built-in exception classes with **raise** keyword to **raise an exception** in the program.

Code

We can pass message as **argument** .

PYTHON

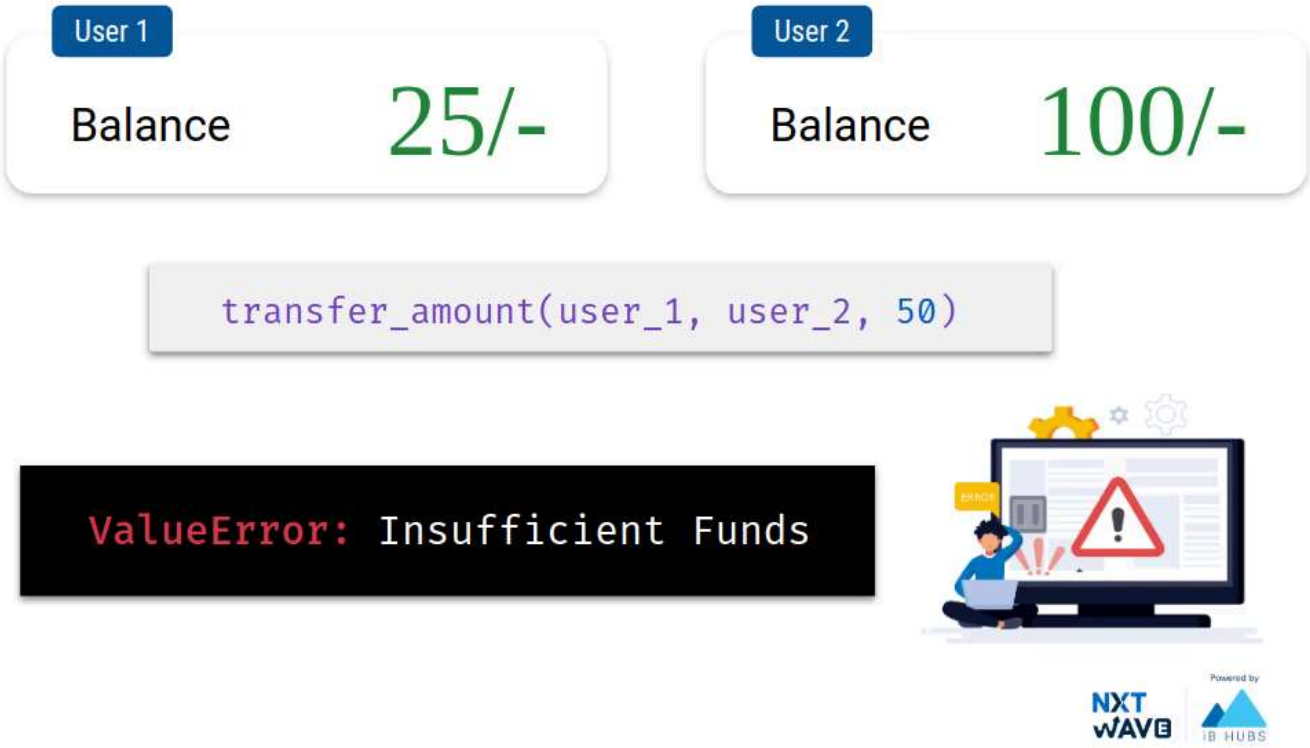
```
raise ValueError("Unexpected Value!!")
```

Output

```
ValueError:Unexpected Value!!
```

Bank Account Class

Example 1



Code

PYTHON

```python
class BankAccount:
    def __init__(self, account_number):
        self.account_number = str(account_number)
        self.balance = 0

    def get_balance(self):
        return self.balance

    def withdraw(self, amount):
        if self.balance >= amount:
            self.balance -= amount
        else:
            raise ValueError("Insufficient Funds")

    def deposit(self, amount):
        self.balance += amount


def transfer_amount(acc_1, acc_2, amount):
    acc_1.withdraw(amount)
    acc_2.deposit(amount)


user_1 = BankAccount("001")
user_2 = BankAccount("002")
user_1.deposit(25)
user_2.deposit(100)
```

```
print("User 1 Balance: {}/-".format(user_1.get_balance()))
print("User 2 Balance: {}/-".format(user_2.get_balance()))
transfer_amount(user_1, user_2, 50)
print("Transferring 50/- from User 1 to User 2")
print("User 1 Balance: {}/-".format(user_1.get_balance()))
print("User 2 Balance: {}/-".format(user_2.get_balance()))
```

Collapse

Output

```
User 1 Balance: 25/-
User 2 Balance: 100/-

ValueError: Insufficient Funds
```

Handling Exceptions

Python provides a way to **catch** the exceptions that were raised so that they can be properly handled.

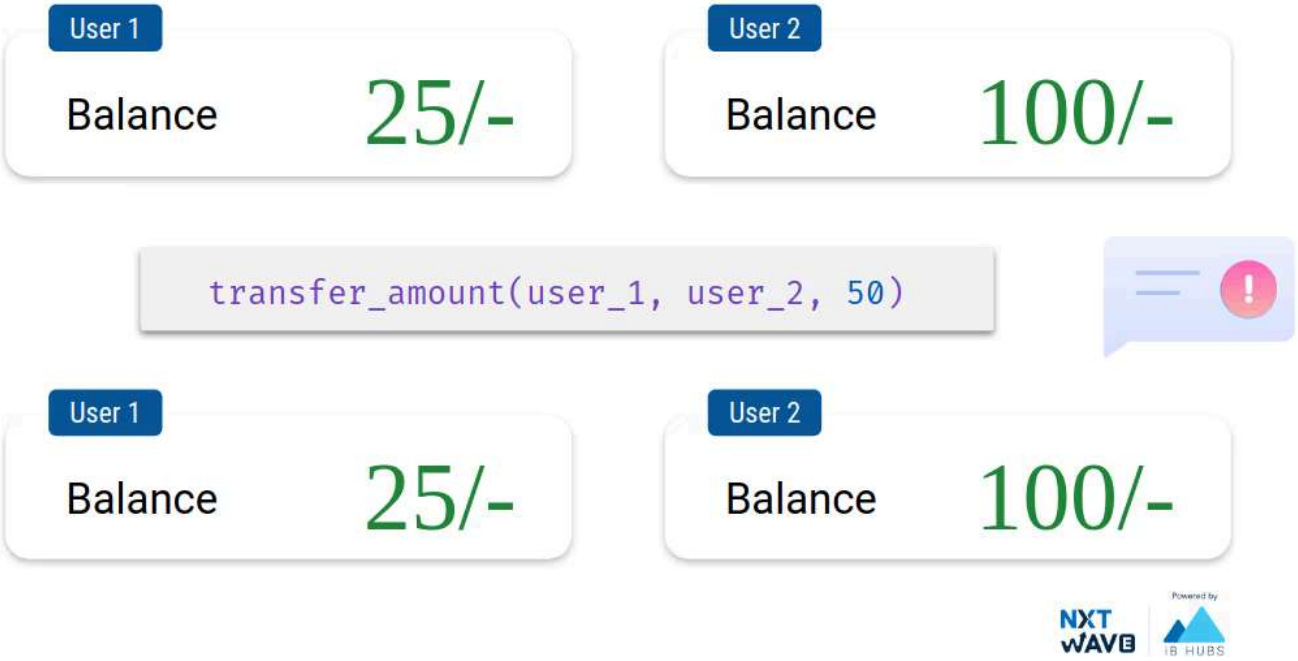
- Exceptions can be handled with **try-except** block.
- Whenever an exception occurs at some line in try block, the execution stops at that line and jumps to except block.

PYTHON

```
try:
 # Write code that
 # might cause exceptions.
except:
 # The code to be run when
 # there is an exception.
```

Transfer Amount

Example 1



Code

PYTHON

```python
class BankAccount:
    def __init__(self, account_number):
        self.account_number = str(account_number)
        self.balance = 0

    def get_balance(self):
        return self.balance

    def withdraw(self, amount):
        if self.balance >= amount:
            self.balance -= amount
        else:
            raise ValueError("Insufficient Funds")

    def deposit(self, amount):
        self.balance += amount


def transfer_amount(acc_1, acc_2, amount):
    try:
        acc_1.withdraw(amount)
        acc_2.deposit(amount)
        return True
    except:
        return False


user_1 = BankAccount("001")
user_2 = BankAccount("002")
user_1.deposit(25)
```

```
user_2.deposit(100)

print("User 1 Balance: {}/-".format(user_1.get_balance()))
print("User 2 Balance: {}/-".format(user_2.get_balance()))
print(transfer_amount(user_1, user_2, 50))
print("Transferring 50/- from User 1 to User 2")
print("User 1 Balance: {}/-".format(user_1.get_balance()))
print("User 2 Balance: {}/-".format(user_2.get_balance()))
```

Collapse

Output

```
User 1 Balance: 25/-
User 2 Balance: 100/-
False
Transferring 50/- from User 1 to User 2
User 1 Balance: 25/-
User 2 Balance: 100/-
```

Summary

Reusable Modules

- While developing reusable modules, we need to raise Exceptions to stop our code from being used in a bad way.

End-User Applications

- While developing end-user applications, we need to handle Exceptions so that application will not crash when used.

Handling Specific Exceptions

We can specifically mention the **name of exception** to catch all exceptions of that specific type.

Syntax

PYTHON

```
try:
    # Write code that
    # might cause exceptions.
except Exception:
```

```
5       # The code to be run when
6       # there is an exception.
```

Example 1

Code

PYTHON

```python
try:
    a = int(input())
    b = int(input())
    c = a/b
    print(c)
except ZeroDivisionError:
    print("Denominator can't be 0")
except:
    print("Unhandled Exception")
```

Input

```
5
0
```

Output

```
Denominator can't be 0
```

Example 2

Code

Input given by the user is not within expected values.

PYTHON

```python
try:
    a = int(input())
    b = int(input())
    c = a/b
    print(c)
except ZeroDivisionError:
```

```
    print("Denominator can't be 0")
except:
    print("Unhandled Exception")
```

Input

```
12
a
```

Output

```
Unhandled Exception
```

We can also access the handled exception in an **object**.

Syntax

PYTHON

```
try:
    # Write code that
    # might cause exceptions.
except Exception as e:
    # The code to be run when
    # there is an exception.
```

Code

PYTHON

```
class BankAccount:
    def __init__(self, account_number):
        self.account_number = str(account_number)
        self.balance = 0

    def get_balance(self):
        return self.balance

    def withdraw(self, amount):
        if self.balance >= amount:
            self.balance -= amount
```

```
        else:
            raise ValueError("Insufficient Funds")

    def deposit(self, amount):
        self.balance += amount


def transfer_amount(acc_1, acc_2, amount):
    try:
        acc_1.withdraw(amount)
        acc_2.deposit(amount)
        return True
    except ValueError as e:
        print(str(e))
        print(type(e))
        print(e.args)
        return False

user_1 = BankAccount("001")
user_2 = BankAccount("002")
user_1.deposit(25)
user_2.deposit(100)

print("User 1 Balance: {}/-".format(user_1.get_balance()))
print("User 2 Balance: {}/-".format(user_2.get_balance()))
print(transfer_amount(user_1, user_2, 50))
print("Transferring 50/- from User 1 to User 2")
print("User 1 Balance: {}/-".format(user_1.get_balance()))
print("User 2 Balance: {}/-".format(user_2.get_balance()))
```

Collapse

Output

```
User 1 Balance: 25/-
User 2 Balance: 100/-
Insufficient Funds
<class 'ValueError'>
('Insufficient Funds',)
False
Transferring 50/- from User 1 to User 2
User 1 Balance: 25/-
User 2 Balance: 100/-
```

Handling Multiple Exceptions

We can write **multiple exception blocks** to handle different types of exceptions differently.

Syntax

PYTHON

```python
try:
    # Write code that
    # might cause exceptions.
except Exception1:
    # The code to be run when
    # there is an exception.
except Exception2:
    # The code to be run when
    # there is an exception.
```

Example 1

Code

PYTHON

```python
try:
    a = int(input())
    b = int(input())
    c = a/b
    print(c)
except ZeroDivisionError:
    print("Denominator can't be 0")
except ValueError:
    print("Input should be an integer")
except:
    print("Something went wrong")
```

Collapse

Input

```
5
0
```

Output

```
Denominator can't be 0
```

Example 2

Code

PYTHON

```python
try:
    a = int(input())
    b = int(input())
    c = a/b
    print(c)
except ZeroDivisionError:
    print("Denominator can't be 0")
except ValueError:
    print("Input should be an integer")
except:
    print("Something went wrong")
```

Collapse

Input

```
12
a
```

Output

```
Input should be an integer
```

Submit Feedback