Q1. Explain why we have to use the Exception class while creating a Custom Exception. Note: Here Exception class refers to the base class for all the exceptions.

We have to use the Exception class while creating a Custom Exception because : Exception class ensures that your custom exception is part of the standard exception hierarchy in Python. It makes clear to other developers reading your code that your class represents an exception.

Q2. Write a python program to print Python Exception Hierarchy.

In [1]:
```python
import inspect

def treeClass(cls, ind = 0):


        print ('-' * ind, cls.__name__)


        for i in cls.__subclasses__():
                treeClass(i, ind + 3)

print("Hierarchy for Built-in exceptions is : ")

inspect.getclasstree(inspect.getmro(BaseException))

treeClass(BaseException)
```

```
Hierarchy for Built-in exceptions is : 
 BaseException
--- Exception
------ TypeError
--------- FloatOperation
--------- MultipartConversionError
------ StopAsyncIteration
------ StopIteration
------ ImportError
--------- ModuleNotFoundError
--------- ZipImportError
------ OSError
--------- ConnectionError
------------ BrokenPipeError
------------ ConnectionAbortedError
------------ ConnectionRefusedError
------------ ConnectionResetError
--------------- RemoteDisconnected
--------- BlockingIOError
--------- ChildProcessError
--------- FileExistsError
--------- FileNotFoundError
--------- IsADirectoryError
--------- NotADirectoryError
--------- InterruptedError
------------ InterruptedSystemCall
--------- PermissionError
--------- ProcessLookupError
--------- TimeoutError
--------- UnsupportedOperation
--------- itimer_error
--------- herror
--------- gaierror
--------- SSLError
------------ SSLCertVerificationError
------------ SSLZeroReturnError
------------ SSLWantWriteError
------------ SSLWantReadError
------------ SSLSyscallError
------------ SSLEOFError
--------- Error
------------ SameFileError
--------- SpecialFileError
--------- ExecError
--------- ReadError
--------- URLError
------------ HTTPError
------------ ContentTooShortError
--------- BadGzipFile
------ EOFError
--------- IncompleteReadError
------ RuntimeError
--------- RecursionError
--------- NotImplementedError
------------ ZMQVersionError
------------ StdinNotImplementedError
--------- _DeadlockError
--------- BrokenBarrierError
--------- BrokenExecutor
------------ BrokenThreadPool
--------- SendfileNotAvailableError
--------- ExtractionError
--------- VariableError
------ NameError
--------- UnboundLocalError
------ AttributeError
--------- FrozenInstanceError
------ SyntaxError
--------- IndentationError
------------ TabError
------ LookupError
--------- IndexError
--------- KeyError
------------ NoSuchKernel
------------ UnknownBackend
--------- CodecRegistryError
------ ValueError
--------- UnicodeError
------------ UnicodeEncodeError
------------ UnicodeDecodeError
------------ UnicodeTranslateError
--------- UnsupportedOperation
--------- JSONDecodeError
--------- SSLCertVerificationError
--------- Error
--------- UnsupportedDigestmodError
--------- IllegalMonthError
--------- IllegalWeekdayError
--------- ParserError
--------- ClassNotFound
--------- ClipboardEmpty
--------- MessageDefect
------------ NoBoundaryInMultipartDefect
------------ StartBoundaryNotFoundDefect
------------ CloseBoundaryNotFoundDefect
------------ FirstHeaderLineIsContinuationDefect
------------ MisplacedEnvelopeHeaderDefect
------------ MissingHeaderBodySeparatorDefect
------------ MultipartInvariantViolationDefect
------------ InvalidMultipartContentTransferEncodingDefect
------------ UndecodableBytesDefect
------------ InvalidBase64PaddingDefect
------------ InvalidBase64CharactersDefect
------------ InvalidBase64LengthDefect
------------ HeaderDefect
--------------- InvalidHeaderDefect
--------------- HeaderMissingRequiredValue
--------------- NonPrintableDefect
--------------- ObsoleteHeaderDefect
--------------- NonASCIILocalPartDefect
--------------- InvalidDateDefect
--------- MacroToEdit
--------- InvalidFileException
--------- UnequalIterablesError
--------- InvalidVersion
--------- _InvalidELFFileHeader
--------- InvalidWheelFilename
--------- InvalidSdistFilename
--------- InvalidSpecifier
--------- InvalidMarker
--------- UndefinedComparison
--------- UndefinedEnvironmentName
--------- InvalidRequirement
------------ RequirementParseError
--------- InvalidVersion
------ AssertionError
------ ArithmeticError
--------- FloatingPointError
--------- OverflowError
--------- ZeroDivisionError
------------ DivisionByZero
------------ DivisionUndefined
--------- DecimalException
------------ Clamped
------------ Rounded
--------------- Underflow
--------------- Overflow
------------ Inexact
--------------- Underflow
--------------- Overflow
------------ Subnormal
--------------- Underflow
------------ DivisionByZero
------------ FloatOperation
------------ InvalidOperation
--------------- ConversionSyntax
--------------- DivisionImpossible
--------------- DivisionUndefined
--------------- InvalidContext
------ SystemError
--------- CodecRegistryError
------ ReferenceError
------ MemoryError
------ BufferError
------ Warning
--------- UserWarning
------------ GetPassWarning
------------ FormatterWarning
--------- EncodingWarning
--------- DeprecationWarning
------------ ProvisionalWarning
--------- PendingDeprecationWarning
--------- SyntaxWarning
--------- RuntimeWarning
------------ ProactorSelectorThreadWarning
------------ UnknownTimezoneWarning
------------ PEP440Warning
--------- FutureWarning
------------ ProvisionalCompleterWarning
--------- ImportWarning
--------- UnicodeWarning
--------- BytesWarning
--------- ResourceWarning
--------- DeprecatedTzFormatWarning
--------- PkgResourcesDeprecationWarning
------ _OptionError
------ _Error
------ error
------ Verbose
------ Error
------ SubprocessError
--------- CalledProcessError
--------- TimeoutExpired
------ TokenError
------ StopTokenizing
------ ClassFoundException
------ EndOfBlock
------ TraitError
------ Error
------ Error
--------- CancelledError
--------- TimeoutError
--------- InvalidStateError
------ _GiveupOnSendfile
------ error
------ Incomplete
------ TimeoutError
------ InvalidStateError
------ LimitOverrunError
------ QueueEmpty
------ QueueFull
------ Empty
------ Full
------ ArgumentError
------ ZMQBaseError
--------- ZMQError
------------ ContextTerminated
------------ Again
------------ InterruptedSystemCall
--------- ZMQBindError
--------- NotDone
------ PickleError
--------- PicklingError
--------- UnpicklingError
------ _Stop
------ ArgumentError
------ ArgumentTypeError
------ ConfigError
--------- ConfigLoaderError
------------ ArgumentError
--------- ConfigFileNotFound
------ ConfigurableError
--------- MultipleInstanceError
------ ApplicationError
------ error
------ TimeoutError
------ error
------ ReturnValueIgnoredError
------ KeyReuseError
------ UnknownKeyError
------ LeakedCallbackError
------ BadYieldError
------ ReturnValueIgnoredError
------ Return
------ InvalidPortNumber
------ error
------ LZMAError
------ RegistryError
------ _GiveupOnFastCopy
------ Error
--------- NoSectionError
--------- DuplicateSectionError
--------- DuplicateOptionError
--------- NoOptionError
--------- InterpolationError
------------ InterpolationMissingOptionError
------------ InterpolationSyntaxError
------------ InterpolationDepthError
--------- ParsingError
------------ MissingSectionHeaderError
------ NoIPAddresses
------ BadZipFile
------ LargeZipFile
------ BadEntryPoint
------ NoSuchEntryPoint
------ DuplicateKernelError
------ ErrorDuringImport
------ NotOneValueFound
------ CannotEval
------ OptionError
------ BdbQuit
------ Restart
------ ExceptionPexpect
--------- EOF
--------- TIMEOUT
------ PtyProcessError
------ FindCmdError
------ HomeDirError
------ ProfileDirError
------ IPythonCoreError
--------- TryNext
--------- UsageError
--------- StdinNotImplementedError
------ InputRejected
------ GetoptError
------ ErrorToken
------ PrefilterError
------ AliasError
--------- InvalidAliasError
------ Error
--------- InterfaceError
--------- DatabaseError
------------ InternalError
------------ OperationalError
------------ ProgrammingError
------------ IntegrityError
------------ DataError
------------ NotSupportedError
------ Warning
------ SpaceInInput
------ DOMException
--------- IndexSizeErr
--------- DomstringSizeErr
--------- HierarchyRequestErr
--------- WrongDocumentErr
--------- InvalidCharacterErr
--------- NoDataAllowedErr
--------- NoModificationAllowedErr
--------- NotFoundErr
--------- NotSupportedErr
--------- InuseAttributeErr
--------- InvalidStateErr
--------- SyntaxErr
--------- InvalidModificationErr
--------- NamespaceErr
--------- InvalidAccessErr
--------- ValidationErr
------ ValidationError
------ EditReadOnlyBuffer
------ _Retry
------ InvalidLayoutError
------ HeightIsUnknownError
------ ParserSyntaxError
------ InternalParseError
------ _PositionUpdatingFinished
------ SimpleGetItemNotFound
------ UncaughtAttributeError
------ HasNoContext
------ ParamIssue
------ _JediError
--------- InternalError
--------- WrongVersion
--------- RefactoringError
------ OnErrorLeaf
------ InvalidPythonEnvironment
------ MessageError
--------- MessageParseError
------------ HeaderParseError
------------ BoundaryError
--------- MultipartConversionError
--------- CharsetError
------ Error
------ HTTPException
--------- NotConnected
--------- InvalidURL
--------- UnknownProtocol
--------- UnknownTransferEncoding
--------- UnimplementedFileMode
--------- IncompleteRead
--------- ImproperConnectionState
------------ CannotSendRequest
------------ CannotSendHeader
------------ ResponseNotReady
--------- BadStatusLine
------------ RemoteDisconnected
--------- LineTooLong
------ InteractivelyDefined
------ KillEmbedded
------ Error
--------- NoSuchProcess
------------ ZombieProcess
--------- AccessDenied
--------- TimeoutExpired
------ _Ipv6UnsupportedError
------ QueueEmpty
------ QueueFull
------ DebuggerInitializationError
------ ExpatError
------ Error
--------- ProtocolError
--------- ResponseError
--------- Fault
------ ParseBaseException
--------- ParseException
--------- ParseFatalException
------------ ParseSyntaxException
------ RecursiveGrammarException
------ ResolutionError
--------- VersionConflict
------------ ContextualVersionConflict
--------- DistributionNotFound
--------- UnknownExtra
------ _Error
------ UnableToResolveVariableException
------ InvalidTypeInArgsException
--- GeneratorExit
--- SystemExit
--- KeyboardInterrupt
--- CancelledError
--- AbortThread
```

Q3. What errors are defined in the ArithmeticError class? Explain any two with an example.

The two common exceptions derived from ArithmeticError are ZeroDivisionError, OverflowError ZeroDivisionError : This exception is raised when you attempt to divide a number by zero, which is mathematically undefined. OverflowError : This exception is occurs when an arithmetic operation exceeds the limits of the numerical data type.

In [1]:
```python
#ZeroDivisionError

try:
    result = 10 / 0
except ZeroDivisionError as e:
    print(f"Error: {e}")
```

```
Error: division by zero
```

In [ ]:
```python
# OverflowError

j = 5.0

for i in range(1, 1000):
    j = j**i
    print(j)
```

Q4. Why LookupError class is used? Explain with an example KeyError and IndexError.

LookuoError class involves indexing or key-based access to data structures like lists, dictionaries, or sequences. It serves as a parent class for exceptions that occur when you try to access an element that does not exist in the data structure. KeyError : It occurse when we try to access a dictionary element using a key that does not exist in the dictionary. IndexError. : It occurs when we try to access a sequence (e.g., list or tuple) element using an index that is out of range.

In [6]:
```python
# KeyError
my_dict = {"apple": 3, "banana": 5, "cherry": 2}
try:
    value = my_dict["grape"]
except KeyError as e:
    print(f"Error: {e}")
```

```
Error: 'grape'
```

In [7]:
```python
# IndexError
my_list = [10, 20, 30, 40, 50]
try:
    value = my_list[10]
except IndexError as e:
    print(f"Error: {e}")
```

```
Error: list index out of range
```

Q5. Explain ImportError. What is ModuleNotFoundError?

ImportError : It occurs when a module, or member of a module, cannot be imported. There are a two conditions where an ImportError might be raised. ModuleNotFoundError : This error occurs when you try to import a module that is not installed or not found in the Python path.

In [9]:
```python
# ModuleNotFoundError
import sys
try:
    from exception import myexception
except Exception as e:
    print(e)
    print(sys.exc_type)
```

```
No module named 'exception'
---------------------------------------------------------------------------
ModuleNotFoundError                       Traceback (most recent call last)
Cell In[9], line 4
      3 try:
----> 4     from exception import myexception
      5 except Exception as e:

ModuleNotFoundError: No module named 'exception'

During handling of the above exception, another exception occurred:

AttributeError                            Traceback (most recent call last)
Cell In[9], line 7
      5 except Exception as e:
      6     print(e)
----> 7     print(sys.exc_type)

AttributeError: module 'sys' has no attribute 'exc_type'
```

Q6. List down some best practices for exception handling in python.

Some best practices for exception handling are : Use always a specific exception Print always a valid message Always try to log Always avoid to write a multiple exception handling Cleanup all the resources