Object Oriented Programming

Class

- Class:
  - Template or definition for a collection of objects (not a single one)
  - These objects have a common set of properties and share the same data attributes and methods
- Object:
  - An instance of a class
  - Has its own values for each fo the data attributes
- Class Methods:
  - Public functions
  - Includes parameter self
  - Accesses class data attributes
- Encapsulation
  - Combining methods and attributes as a single object type
- Inheritance
  - Ability to create new classes (subclasses) which possess ALL data attributes and methods of the existing parent class (superclass)
- Polymorphism
  - Ability of different classes to respond to same methods in different ways
  - Methods have the same name
  - Subclass method overrides superclass method
- Method overloading
  - Methods / functions of the same name
  - Different number of parameters / different types of parameters

Data Attributes

- Data attributes / Properties:
  - Private data
    - Starts with "__"
      - E.g.self. __*name = name*
  - Prevents external functions from accessing
  - Only accessed by class methods

- Data hiding
    - Achieved by declaring data members to be private
    - Can only be accessed through public methods
- Reusability
    - Software components can be used in many different applications without having to modify code in the component
    - Reliability
        - Already tested and debugged
        - Developed by specialists
    - Saves time in software development
        - Decreases maintenance
- Advantages:
    - Ability to hide data
    - Reusability
    - Methods can be changed without affecting how they are used

Class Methods:

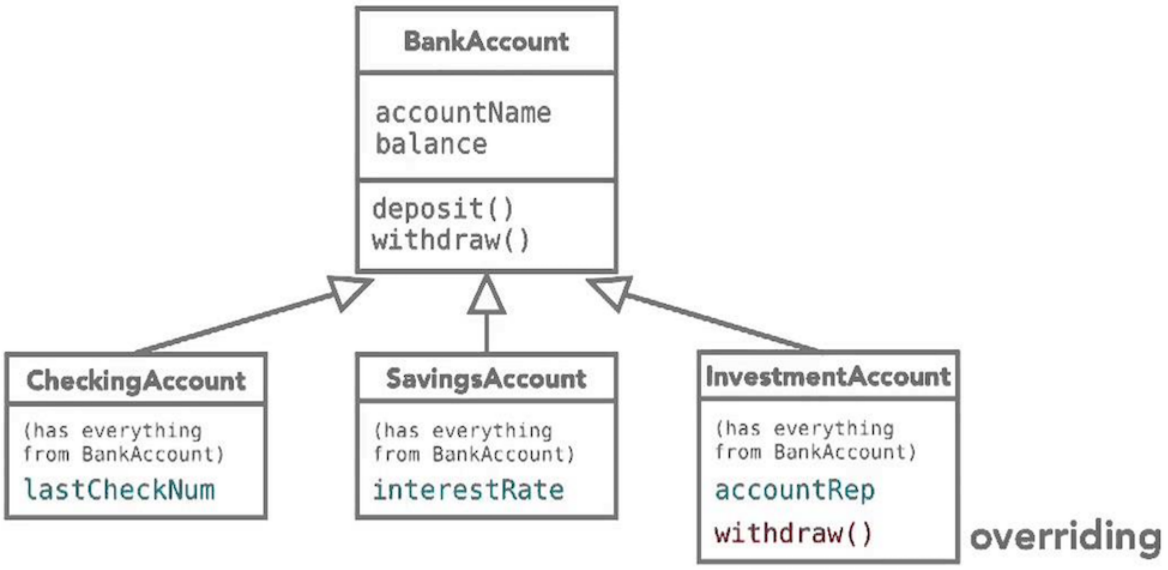
- Initialising class:

```
class ABC:
  def __init__(self, data1, data2):
     self.data1 = data1
     self.data2 = data2

  def display(self):
     print(self.data1)
     print(self.data2)
```

- Subclass inheritance & polymorphism:

```
class DEF(ABC):
  def __init__(self, data1, data2, data3):

     # initialise superclass
     super().__init__(data1, data2)

     self.data3 = data3

  # polymorphism (same name as function in
superclass)
      # overrides function superclass
      def display(self):
         print(self.data3)

      # output: data3
```

Inheritance Diagram:


BankAccount
accountName
balance
deposit()
withdraw()
CheckingAccount
(has everything from BankAccount)
lastCheckNum
SavingsAccount
(has everything from BankAccount)
interestRate
InvestmentAccount
(has everything from BankAccount)
accountRep
withdraw()
overriding