

# CS 115 - Introduction to Programming in Python

## Lab Guide 07

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### Lab Objectives: Classes and Inheritance

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- a) Create a class, **Employee**, with the following data members and methods. Note all data members and class variables should be private (`__`).

#### Data Members:

- **tax\_rate**: class variable, same for all Employees, which is set to 30%.
- **emp\_name**: string name of the Employee.
- **id\_num**: identification number of the Employee (int).
- **wage**: the wage of the Employee (float).

#### Methods:

- **\_\_init\_\_()**:
  - takes an employee name, id number and wage, and using the set methods, sets the attributes to the given values.
- Get methods for all data members.
- Set methods for all data members implemented according to the following:
  - Employee name must consist of only alphabetic or space characters. If there is any other character, such invalid characters should be removed. See the sample run for an example.
  - Id number should be converted to an integer value. If the id number cannot be converted to an integer, set to the default, 11111111.
  - Wage must be a positive value. If the value is negative, set the wage to zero.
- **calculate\_salary()**: returns the salary, which is the wage minus the tax (using tax\_rate value)
- **\_\_lt\_\_()**: an Employee is less than another if their surname is less. If the surnames are equal, compare the alphabetic first names. Note: You may assume that all Employees have at least one name, and one surname. The surname will always be after the final space in the name.
- **\_\_eq\_\_()**: Employee objects are equal if their id numbers are equal.
- **\_\_repr\_\_()**: returns a string representation of an Employee object. See the sample run for formatting.

- b) Create a subclass of `Employee`, **Manager**, with the following data members and methods. Note all data members should be private (`__`).

#### Data Members:

- **bonus**: the bonus of the Manager (float).

### Methods:

- `__init()`: takes the employee name, id number, wage, and bonus. Calls the Employee init, to initialize the inherited data members, and sets the bonus to the value passed as a parameter.
- **Get** method for bonus.
- `calculate_salary()`: returns the salary of the manager. Managers make 10% extra salary in addition to the bonus than a regular employee. They also pay tax at the same rate.
- `__repr()`: returns a string representation of a Manager object. The method should call the Employee `__repr__` to get the Employee data, and append the Manager data, formatted as shown in the sample run.

c) Write a script `Lab07.py` with the following functions:

- **read\_employees()**: takes a string filename and reads the file with the given name, and returns a list of Employees created using data from the file. If there is an employee with the same id in the list of employees, new employee should not be added. See the sample run for an example duplicate employee id.
- **The script** should do the following:
  - o Get a list of Employees from the file `employees.txt`, using the function defined above.
  - o Sort the list of Employees.
  - o Display the sorted list of Employees.
  - o Display the calculated salary of all Employees.
  - o Display the average calculated salary for Managers.

### Sample Run:

Duplicate employee id:

Name: Kemal Oran                      Employee ID: 87261 Wage: 200000.0  
not added

Duplicate employee id:

Name: Veli Sucu                      Employee ID: 72314 Wage: 350000.0  
not added

Sorted List:

```
[
Name: Ali Aksu                      Employee ID: 87134 Wage: 280000.0,
Name: Canan Aksu                   Employee ID: 11111111 Wage: 250000.0,
Name: Hakan Arslan                  Employee ID: 918236 Wage: 300000.0 Bonus: 600000.0,
Name: Ekrem Bal                     Employee ID: 87261 Wage: 300000.0,
Name: Zehra Esra Zengin             Employee ID: 72314 Wage: 350000.0,
Name: Zeynep Eda Zengin             Employee ID: 81214 Wage: 250000.0 Bonus: 500000.0]
```

Salary of all employees:

Ali Aksu salary after tax: 196000.0

Canan Aksu salary after tax: 175000.0  
Hakan Arslan salary after tax: 651000.0  
Ekrem Bal salary after tax: 210000.0  
Zehra Esra Zengin salary after tax: 245000.0  
Zeynep Eda Zengin salary after tax: 542500.0

Average Salary for Managers: 596750.0