

CW5-2: OOP – Composition

4. University Management System

User

- `__init__(self, username, password)`: Initialize the attributes of a user with the provided username and password.
- `change_password(self, new_password)`: Change the user's password to a new one.
- `reset_password(self)`: Generate and reset the user's password to a random one.
- `change_username(self, new_username)`: Change the user's username to a new one.

Staff (inherits from User)

- `staff_id (string)`: representing the unique identifier of the staff member, that must be generated automatically.
- `department (string)`: representing the department where the staff member works.
- `salary (float)`: representing the salary of the staff member.
- `tax (float)`: representing the tax rate applied to the staff member's salary.
- `__init__(self, username, password, department, salary, tax)`: Initialize the attributes of a staff member with the provided username, password, department, salary, and tax.
- `display_info(self)`: Display the staff member's username, staff ID, department, salary, and tax.
- `validate_salary(self, salary)`: Validate the salary value to be a positive float.
- `validate_tax(self, tax)`: Validate the tax value to be a non-negative float.
- `change_salary(self, new_salary)`: Change the staff member's salary to a new value.
- `calculate_net_salary(self)`: Calculate and return the staff member's net salary after deducting tax.

Student (inherits from User)

- `student_id` (string): representing the unique identifier of the student, that must be generated automatically.
- `major` (string): representing the major of the student.
- `academic_year` (int): representing the current academic year of the student.
- `__init__(self, username, password, major)`: Initialize the attributes of a student with the provided username, password, and major.
- `display_info(self)`: Display the student's username, student ID, major, and academic year.
- `change_major(self, new_major)`: Change the student's major to a new one.
- `update_academic_year(self)`: Increment the student's academic year by 1.

Teacher (inherits from Staff):

- `teacher_id` (string): representing the unique identifier of the teacher, that must be generated automatically.
- `subject` (string): representing the subject taught by the teacher.
- `__init__(self, username, password, department, salary, tax, subject)`: Initialize the attributes of a teacher with the provided username, password, department, salary, tax, and subject.
- `display_info(self)`: Display the teacher's username, staff ID, department, title, salary, tax, and subject.
- `change_subject(self, new_subject)`: Change the subject taught by the teacher to a new one.

Course

- `course_code` (string): representing the unique code of the course, that must be generated automatically.
- `course_name` (string): representing the name of the course.
- `teacher` (Teacher object): representing the teacher assigned to the course.
- `students` (list of Student objects): representing the students enrolled in the course.
- `__init__(self, course_name)`: Initialize the attributes of a course with the provided course name. The course code will be generated automatically.
- `add_students(self, students)`: Add multiple students to the course.
- `remove_students(self, students)`: Remove multiple students from the course.
- `clear_students(self)`: Remove all students from the course.
- `get_students(self)`: Return the list of students enrolled in the course.
- `set_teacher(self, teacher)`: Assign a teacher to the course.
- `display_info(self)`: Display the course information, including course code, course name, teacher's name, and the list of students enrolled.