BAHRIA UNIVERSITY (KARACHI CAMPUS)

Assignment-03

(Big Data Analytics)

Class: **BSE [4]-7 (B)** **(Morning)**

Course Instructor: **Dr. Salahuddin Shaikh** Submission Date: **23/12/2024**

Date: **12/12/2024)** Max Marks**:** **10 M (CLO2-3)**

Student's Name: _____ Reg. No: _____

MongoDB Task: Advanced Student Management System

Consider a MongoDB collection named **"students"** that stores information about students enrolled in a university. Each document represents a student and contains the following fields:

- **_id**: Unique identifier for the student.
- **name**: Full name of the student.
- **age**: Age of the student.
- **department**: Department the student belongs to (e.g., Computer Science, Business, Engineering).
- **gpa**: Current GPA of the student.
- **courses**: An array containing the list of courses the student is enrolled in. Each course includes:
  - **course_name**: Name of the course.
  - **grade**: Grade obtained in the course.

Tasks for Applying Advanced MongoDB Queries:

1. Insert five new student documents, ensuring at least one student has a GPA of exactly 4.0 and at least three courses. Verify the insertions by retrieving the students with the highest GPA.
2. Retrieve all students from the "Computer Science" department who have taken more than two courses and a GPA greater than 3.5.
3. Update all students aged 22 or below by increasing their GPA by 0.3 **and** adding a new course titled "Ethics" with a grade of "A".
4. Remove the lowest grade from the courses array **and** reduce the GPA by 0.1 for students who have more than three courses.
5. Find the student with the highest total grades across all courses **and** add a new course titled "Leadership" with a grade of "A".
6. Calculate the average GPA of students grouped by their department **and** include the total number of students in each department.
7. Retrieve the names of students enrolled in exactly two courses **and** sort them by GPA in descending order.

8. Find and update the student with the lowest GPA by adding a new course titled "Programming Basics" with a grade of "A" **and** setting their GPA to at least 2.5 if it's currently below that.
9. Delete students from the "Business" department whose average course grade is below "C" **and** have fewer than three courses.
10. Retrieve students aged between 20 and 25 who have taken at least one course containing the word "Math" in its name, sorted by age in ascending order.
11. Update all students in the "Engineering" department by increasing their GPA by 0.2 **and** removing any courses with grades below "B".
12. Calculate the total number of courses taken by all students grouped by department **and** find the department with the maximum courses.
13. Retrieve the top three students with the highest GPA **and** display their names, GPAs, and the total number of courses they are enrolled in.
14. Remove students who are not enrolled in any courses **and** sort the remaining students by age in descending order.
15. Find students with "Ali" in their name who are in the "Mathematics" department **and** have taken at least one course, then update their age to 21.
16. Calculate the average GPA **and** the average number of courses taken by students in each department.
17. Find and delete the course with the lowest grade for the student with the highest number of courses **and** update their GPA by decreasing it by 0.2.
18. Retrieve the names and GPAs of students aged 20 or above who have a total GPA greater than 10 when summed across all their courses.
19. Add a new student named "Sara Khan" to the "Mathematics" department, aged 22, with a GPA of 3.7 and three courses. Then, retrieve all students sorted by their total number of courses in ascending order.
20. Retrieve students, grouping them by department, and calculate the **maximum GPA** and **total number of students** within each department.

Submission Deadline: 23rd December 2024