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UID :- 2023301005.
BRANCH :- Comps -B. **BATCH:** B.
EXPERIMENT 7: To perform aggregate function, group by and having clause for university database.
SUBJECT :- DBMS (DATABASE MANAGEMENT SYSTEM)

1. **Count:**

Query:

```
SELECT dept_name, COUNT(*) AS num_courses
FROM course
GROUP BY dept_name;
```

Output:

dept_name	num_courses
Biology	3
Comp. Sci.	5
Elec. Eng.	1
Finance	1
History	1
Music	1
Physics	1

2. **Sum:**

Query:

```
SELECT SUM(budget) AS total_budget
FROM department;
```

Output:

total_budget
595000.00

3. **Avg:**

Query:

```
SELECT AVG(salary) AS avg_salary
FROM instructor
WHERE dept_name = 'Comp. Sci.';
```

Output:

	avg_salary
▶	77333.333333

4. **Max:**

Query:

```
SELECT building, MAX(capacity) AS max_capacity
FROM classroom
GROUP BY building;
```

Output:

	building	max_capacity
▶	Packard	500
	Painter	10
	Taylor	70
	Watson	50

5. **Min:**

Query:

```
SELECT dept_name, MIN(credits) AS min_credits,
MAX(credits) AS max_credits
FROM course
GROUP BY dept_name;
```

Output:

	dept_name	min_credits	max_credits
▶	Biology	3	4
	Comp. Sci.	3	4
	Elec. Eng.	3	3
	Finance	3	3
	History	3	3
	Music	3	3
	Physics	4	4

Group by Having clause:

1) List departments with an average instructor salary greater than $70,000.

2) Show courses with an average grade greater than or equal to 'B' (grade code).

3) List instructors who have taught at least 2 courses.

4) Find departments with an average budget greater than $80,000.

Query 1:

```
SELECT dept_name, AVG(salary) AS avg_salary
FROM instructor
GROUP BY dept_name
HAVING AVG(salary) > 70000;
```

Output:

dept_name	avg_salary
Biology	72000.000000
Comp. Sci.	77333.333333
Elec. Eng.	80000.000000
Finance	85000.000000
Physics	91000.000000

Query 2:

```
SELECT course_id, AVG(CASE WHEN grade >= 'B' THEN 1 ELSE 0 END)
AS avg_grade
FROM takes
GROUP BY course_id
HAVING avg_grade >= 0.8;
```

Output:

course_id	avg_grade
EE-181	1.0000
FIN-201	1.0000
HIS-351	1.0000
PHY-101	1.0000

Query 3:

```
SELECT ID, COUNT(*) AS num_courses_taught
FROM teaches
GROUP BY ID
HAVING num_courses_taught >= 2;
```

Output:

ID	num_courses_taught
10101	3
45565	2
76766	2
83821	3

Query 4:

```
SELECT dept_name, AVG(budget) AS avg_budget
FROM department
GROUP BY dept_name
HAVING AVG(budget) > 80000;
```

Output:

dept_name	avg_budget
Biology	90000.000000
Comp. Sci.	100000.000000
Elec. Eng.	85000.000000
Finance	120000.000000

Conclusion: Hence by completing this experiment I came to perform aggregate function, group by and having clause for university database.