1. For the query show the average price for each car model within each company

EXPLAIN ANALYZ

SELECT company.company\_name, CarModels.Model, AVG(CAST(CarModels.price AS DECIMAL(10,2))) AS average\_price

FROM CarModels

JOIN company ON CarModels.company\_id = company.company\_id

GROUP BY company.company\_name, CarModels.Model

ORDER BY company.company\_name, average\_price DESC;

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Description automatically generated

1. For indexing, firstly I tried using CREATE INDEX idx\_car\_models\_model ON CarModels(Model); then the output is: A black screen with white text

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Although the time is decrement, but the cost still not change.

1. For query that a specific user can search a specific car model and brand by distance. close to far.

EXPLAIN ANALYZ SELECT company.company\_name AS Brand, CarModels.Model, car\_location.city\_name AS CarLocation, SQRT(POW(user\_location.latitude - car\_location.latitude, 2) + POW(user\_location.longitude - car\_location.longitude, 2)) AS Distance FROM users INNER JOIN location AS user\_location ON users.location\_id = user\_location.locationID INNER JOIN CarModels ON CarModels.location\_id IS NOT NULL INNER JOIN location AS car\_location ON CarModels.location\_id = car\_location.locationID INNER JOIN company ON CarModels.company\_id = company.company\_id WHERE users.UserID = 1000 AND company.company\_name = 'Honda' AND CarModels.Model = 'Civic' ORDER BY Distance;

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Description automatically generated

1. For indexing, firstly I try : CREATE INDEX idx\_company\_name ON company(company\_name);A black and white text

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The output looks good, cost decrement a lot. Then I will try use another indexing.

2) CREATE INDEX idx\_car\_models\_model ON CarModels(Model);

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Cost decrement more, looks good, then we should keep these two indexes.

1. For query that : For a specific car model list the milege from low to high with price:

EXPLAIN ANALYZE

SELECT company.company\_name AS Brand, CarModels.Model, CarModels.miles, CarModels.price FROM CarModels INNER JOIN company ON CarModels.company\_id = company.company\_id WHERE CarModels.Model = 'Civic' AND company.company\_name = 'Honda' ORDER BY CAST(CarModels.miles AS UNSIGNED) ASC, CAST(CarModels.price AS DECIMAL(10,2)) ASC; A screenshot of a computer

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1. Since CREATE INDEX idx\_car\_models\_model ON CarModels(Model);

CREATE INDEX idx\_company\_name ON company(company\_name); are already creater, no more indexing I can do.

1. For a Query that for given carid if it has recall give details, if not say no;

EXPLAIN ANALYZE

SELECT CarModels.CarID, CASE WHEN recall.recallID IS NOT NULL THEN 'Yes' ELSE 'No' END AS HasRecall, recall.reason, recall.report\_received\_date, recall.consequence\_summary, recall.component FROM CarModels LEFT JOIN recall ON CarModels.CarID = recall.CarID WHERE CarModels.CarID = 1613;A black screen with white text

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1. CREATE INDEX idx\_recall\_carid ON recall(CarID);A black screen with white text

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The cost is not change at all, so no need for indexing.