# IST769 Homework 4 Submission

## Basic Information

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Date Due: 10/28/2021  
Homework #: 4

## QUESTIONS:

1. Create a non-clustered index on the **timesheets** table in the **demo** database. The index you create should be designed to improve the following query:

select employee\_id, employee\_firstname, employee\_lastname, sum(timesheet\_hourlyrate\*timesheet\_hours)

from timesheets

group by employee\_id, employee\_firstname, employee\_lastname;

1. Write an SQL Select query which uses the index you created in the first question but does an index seek instead of an index scan.
2. Create a single columnstore index on the **timesheets** table in the **demo** database which will improve the following queries:

select employee\_department, sum(timesheet\_hours)

from timesheets group by employee\_department

select employee\_jobtitle, avg(timesheet\_hourlyrate)

from timesheets group by employee\_jobtitle

1. Create an indexed view named **v\_employees** on the **timesheets** table in the **demo** database which lists the employee id, first name, last name, job title, and department columns values and one row per employee (essentially re-building the employee table). Then set a unique clustered index on the view and finish by writing an SQL Select query which uses the indexed view.
2. Output the following query in JSON format: Display the employee id, first name, last name, count of timesheets, total hours worked, and average timesheet hourly rate.

## ANSWERS:

### **ANSWER 1**

1. Query in the question uses the index scan based on the index created

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| CODE |
| USE demo;  GO  DROP INDEX IF EXISTS IX\_Time\_Sheet\_Payroll ON dbo.timesheets  GO  -- Create the index  CREATE NONCLUSTERED INDEX IX\_Time\_Sheet\_Payroll  ON dbo.timesheets (employee\_id)  INCLUDE (employee\_firstname, employee\_lastname, timesheet\_hourlyrate, timesheet\_hours);  GO  -- Select statement to use the created index  SELECT employee\_id,  employee\_firstname,  employee\_lastname,  sum(timesheet\_hourlyrate\*timesheet\_hours) as total\_pay  FROM dbo.timesheets  GROUP BY employee\_id, employee\_firstname, employee\_lastname; |

ScreenShots Execution plan to show index scan:

Graphical user interface, text, application

Description automatically generated

Screenshot about data:

Graphical user interface, text, application

Description automatically generated

### **ANSWER 2:**

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| Code |
| --Q2 to leverage index seek  SELECT employee\_id,  employee\_firstname,  employee\_lastname,  sum(timesheet\_hourlyrate\*timesheet\_hours) AS total\_pay  FROM dbo.timesheets  WHERE employee\_id = 1  GROUP BY employee\_id, employee\_firstname, employee\_lastname; |

Screenshot for index seek:

Graphical user interface, text, application

Description automatically generated

### **ANSWER 3:**

Query optimization using column store index

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| --- |
| CODE |
| CREATE NONCLUSTERED COLUMNSTORE INDEX IX\_Dept\_JobTitle  ON dbo.timesheets (employee\_department,employee\_jobtitle, timesheet\_hours, timesheet\_hourlyrate)  WITH ( DROP\_EXISTING = ON)  SELECT employee\_department,  SUM(timesheet\_hours) AS total\_hours  FROM timesheets  GROUP BY employee\_department  SELECT employee\_jobtitle,  AVG(timesheet\_hourlyrate) AS avg\_hourly\_rate  FROM dbo.timesheets  GROUP BY employee\_jobtitle |

Screen shot for both queries using the column store index scan:

Graphical user interface

Description automatically generated

**Query results:**

Graphical user interface, text, application

Description automatically generated

### **ANSWER 4:**

Creation of view with index. And use a query to demonstrate index seek on the created index.

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| CODE |
| --Q4 indexed view  DROP VIEW IF EXISTS dbo.v\_employees  GO  CREATE VIEW dbo.v\_employees  WITH SCHEMABINDING  AS  SELECT COUNT\_BIG(\*) as record\_count,  employee\_id,  employee\_firstname,  employee\_lastname,  employee\_jobtitle,  employee\_department  FROM dbo.timesheets  GROUP BY employee\_id,  employee\_firstname,  employee\_lastname,  employee\_jobtitle,  employee\_department  GO  CREATE UNIQUE CLUSTERED INDEX IX\_v\_employees  ON v\_employees (  employee\_id  )  GO  -- Query to use view index to use index seek  SELECT \* from dbo.v\_employees  WHERE employee\_id = 2 |

**Screenshot for indexed view and the unique index created on view**

Graphical user interface, text

Description automatically generated

**Screenshot for query to use view index seek:**

Graphical user interface, text

Description automatically generated

### **ANSWER 5:**

JSON output of SQL Query

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| CODE |
| ---- Q5  SELECT employee\_id,  employee\_firstname,  employee\_lastname,  COUNT(\*) as total\_timesheets,  SUM(timesheet\_hours) as total\_hours\_worked,  AVG(timesheet\_hourlyrate) avg\_timesheet\_hourly\_rate  FROM dbo.timesheets  GROUP BY employee\_id, employee\_firstname, employee\_lastname  FOR JSON AUTO |

**Screenshot from query execution:**

Graphical user interface, text, application

Description automatically generated

**Screenshot from json formatter:**

Graphical user interface, text

Description automatically generated