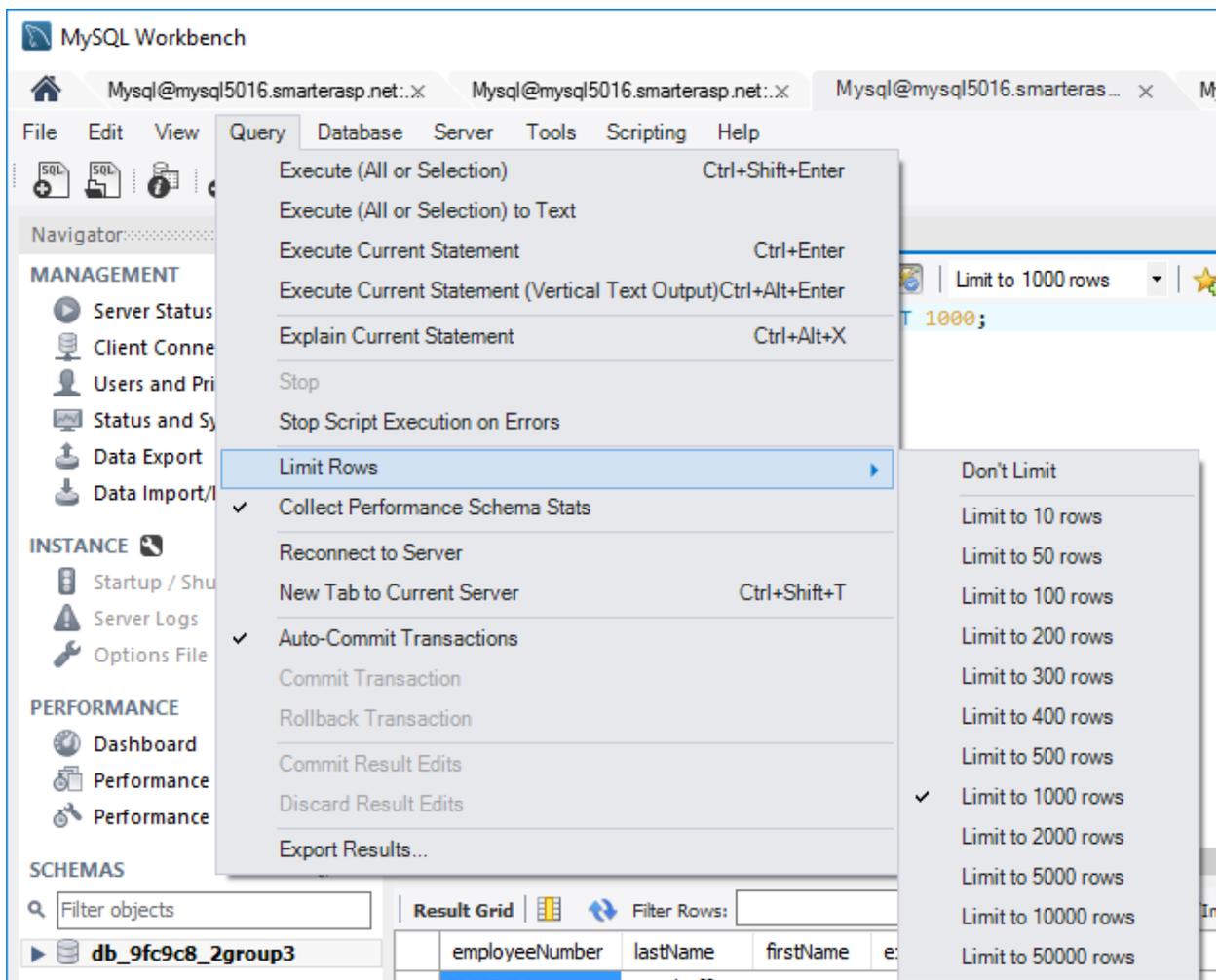


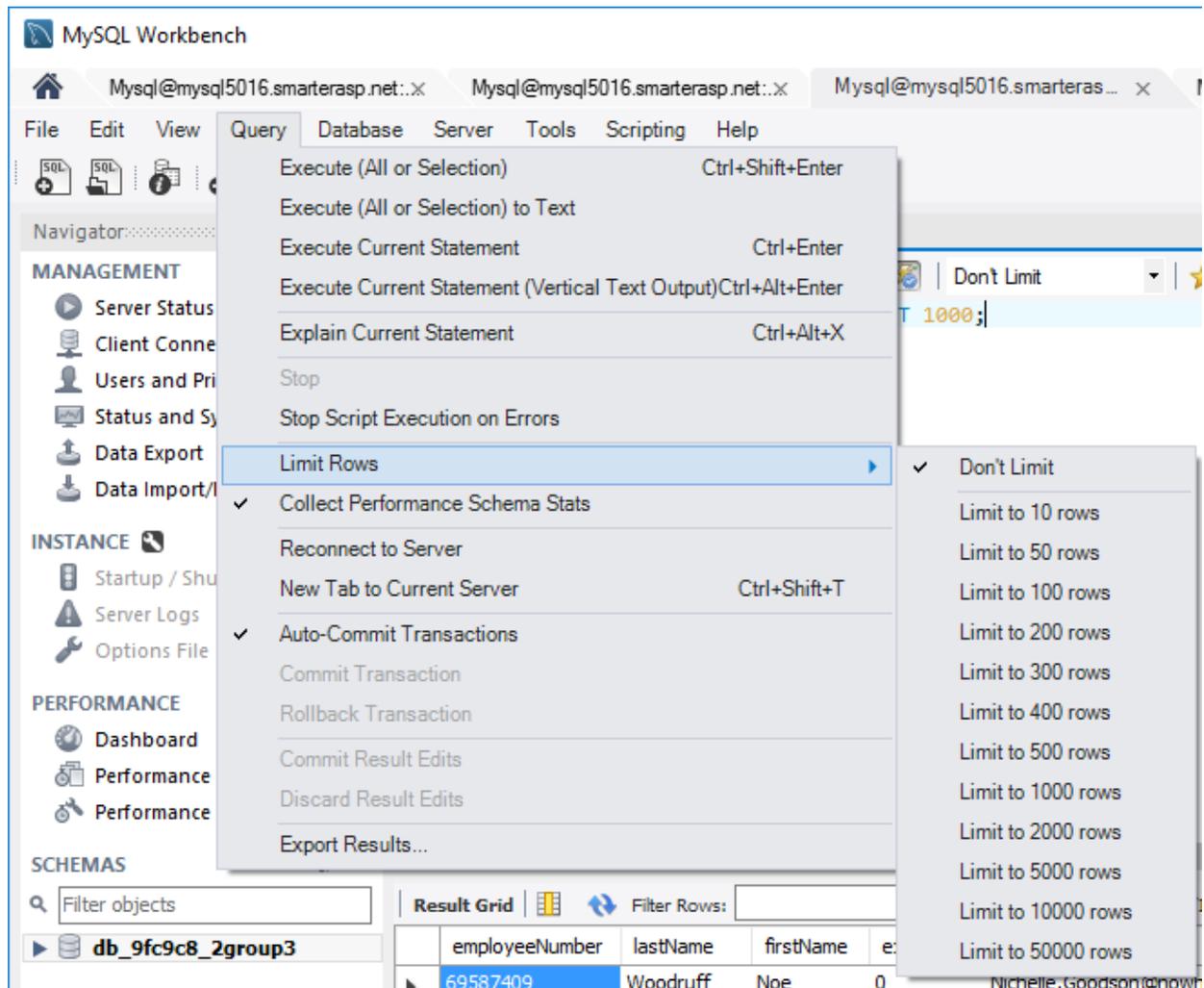
## SQL Indexes

Remove the option of LIMITING SELECT queries to 1000 rows.

**Go to Query -> Limit Rows**



## Select Don't Limit



Take the following queries:

1. **SELECT \* FROM employees where extension < 5000 and jobTitle like 'S%'**
  2. **SELECT \* FROM employees where extension < 5000 and jobTitle like 'Sec%'**
  3. **SELECT \* FROM customers where creditLimit > 0 and creditLimit < 1000;**
  4. **SELECT \* employees e join customers c on e.employeeNumber = c.salesRepEmployeeNumber where c.creditLimit > 0 and c.postalCode > 3000;**
- a. Remove any indexes from all tables
  - b. Write down the time taken to execute each query without the index.
  - c. Choose one single index (index on one column) that is mostly likely to speed up the queries.
  - d. Add the index to the appropriate table.
  - e. Write down the time taken to execute the query with the new index.

- f. See if you can speed up the query by choosing any single or multiple column index. Write down that time.

For the following queries write down:

1. **SELECT \* FROM customers where creditLimit > 0 and creditLimit < 100;**
  2. **SELECT \* FROM customers where creditLimit > 0 and creditLimit < 1000;**
- Remove all indexes
    - o Write down the time taken to execute each query
    - o Write down the number of rows returned
  - Add the appropriate index that will speed up the queries
    - o What was the difference between the time taken to execute each query with the appropriate index?

Without using indexes, what are other ways we can speed up the queries above?

The following query returns 1,000,000 rows.

1. `SELECT * FROM employees`
  - Write down how long this query takes to execute.
  - If you were displaying these results to a user, you would have two problems. First, the user would have to scroll through a large amount of results to find what he/she needs. Second, it the user would be waiting a large amount of time to see results.
    - o Without using indexes, how could we solve this problem?

So far, we have seen how much time, these queries take to execute on the database server. Now, let's add in your browser, an application server, and php to see how long it takes.

## PHP and SQL

1. Create a PHP file for each of the following queries and display all of the information on the select clause.
  - **SELECT \* FROM employees where extension < 5000 and jobTitle like 'S%'**
  - **SELECT \* FROM employees where extension < 5000 and jobTitle like 'Sec%'**
  - **SELECT \* FROM customers where creditLimit > 0 and creditLimit < 1000;**
  - **SELECT \* employees e join customers c on e.employeeNumber = c.salesRepEmployeeNumber where c.creditLimit > 0 and c.postalCode > 3000;**
  - **SELECT \* FROM customers where creditLimit > 0 and creditLimit < 100;**
2. Write down how much time it takes for each file to execute.
  - a. To determine the amount of time it takes, we will use the following code in your php file.

```
//place this before any script you want to calculate time
$time_start = microtime(true);
// your script code goes here
```

```
// your php code goes here
```

Put this at the end of your php file:

```
// Display Script End time
$time_end = microtime(true);

//dividing with 60 will give the execution time in minutes other wise
seconds
$execution_time = ($time_end - $time_start)/60;

//execution time of the script
echo '<b>Total Execution Time:</b> '.$execution_time.' Mins'
```

3. Create the following html and php files.

### HTML and PHP Files

- **GetEmployeeExtensionAndJobTitle.html, GetEmployeeExtensionAndJobTitle.php**
- **GetCustomersCreditLimitLessThan1000.html, GetCustomersCreditLimitLessThan1000.php**
- **GetCustomersSalesRep.html, GetCustomersSalesRep.php**
- **GetCustomersCreditLimitLessThan100.html, GetCustomersCreditLimitLessThan100.php**

### Instructions

- **GetEmployeeExtensionAndJobTitle.html** contains a form with a search box that enables a user to enter a job title. It will submit a get request to **GetEmployeeExtensionAndJobTitle1.php** which will display the correct information and output the time taken to execute each script.
  - Write down 5 job titles of your choosing (can be partial), and how much time the script takes to execute.
  
- **GetCustomersCreditLimitLessThan1000.html** contains a form with a search box that enables a user to enter a credit limit. It will submit a get request to **GetCustomersCreditLimitLessThan1000.php** which will:
  - Take the user entered information and replace the number 1000 in the following query: **SELECT \* FROM customers where creditLimit > 0 and creditLimit < 1000;**
  - Display the correct information and output the time taken to execute each script.
  - Write down 5 credit limits and how much time the script takes to execute.
  
- **GetCustomersSalesRep.html** contains a form with a search box that enables a user to enter a postal code. It will submit a get request to **GetCustomersSalesRep.php** which will :
  - Take the user entered information and replace the number 3000 in the following query: **SELECT \* employees e join customers c on e.employeeNumber = c.salesRepEmployeeNumber where c.creditLimit > 0 and c.postalCode > 3000;**
  - Write down 5 postal codes and how much time the script takes to execute.