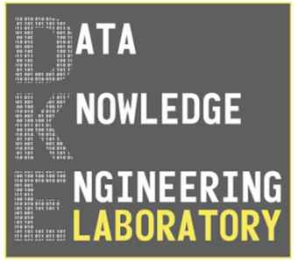
COMP322003 Introduction to Database (Fall 2018)



LAB 10: DATABASE INDEX

Prof. Young-Kyoon Suh

Indexes on Oracle (and Other DBMSes)

- Are automatically created without any explicit declaration of creating indexes
  - If you specify primary key or UNIQUE key attribute(s) in a DDL, then Oracle will automatically create the primary index.
- Of course, an index can be created for users' needs.
  - E.g., if you often refer to `EMPLOYEE`'s `FNAME` and/or `LNAME` rather than SSN, then you may create a secondary index for `FNAME` and/or `LNAME`.
    - You can explicitly create that index to speed up your queries.

Creating Index on Oracle

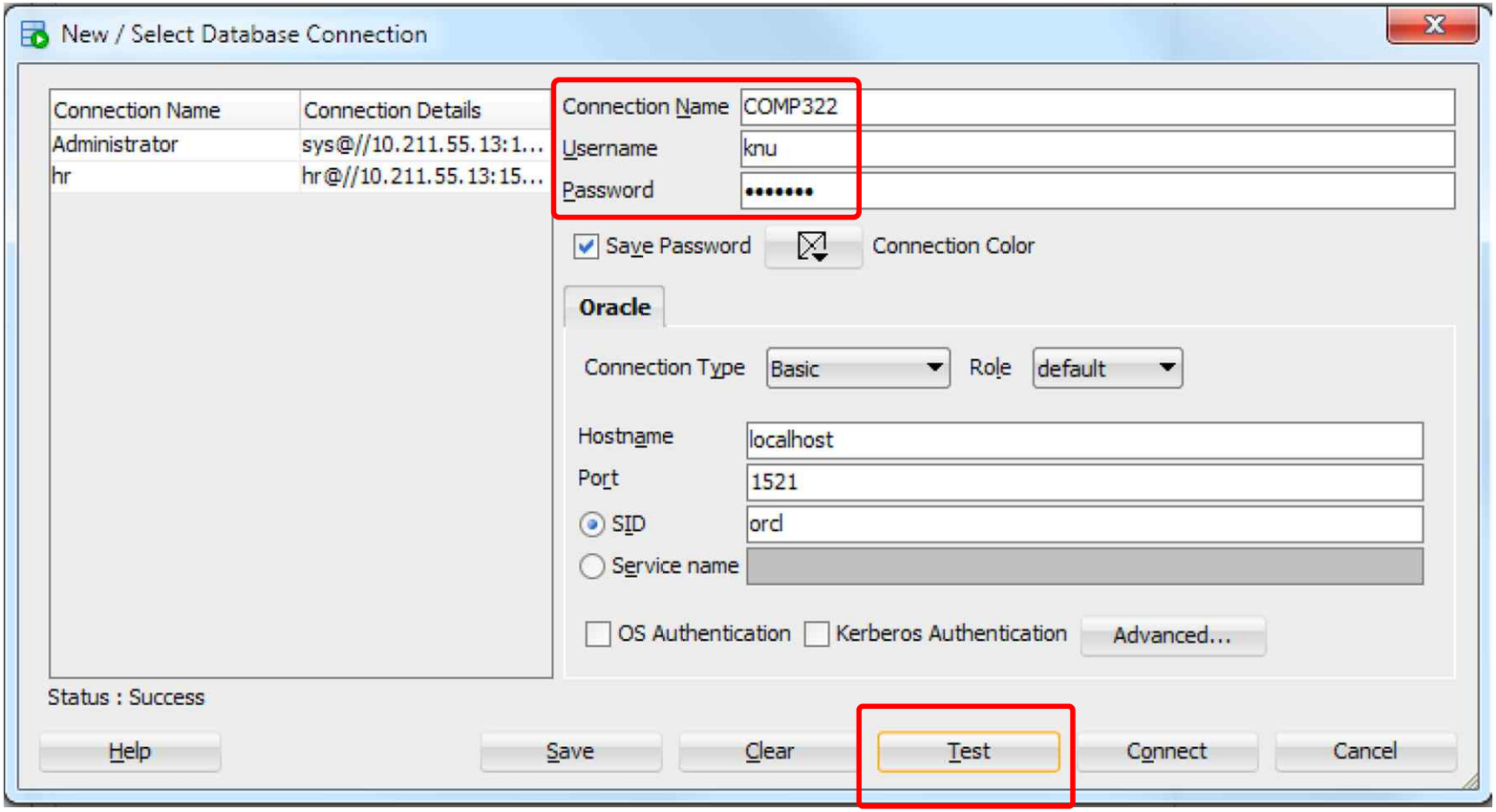
- Basic syntax below

Syntax
CRAETE [**UNIQUE**] INDEX *Index_name* ON *Table_name* (*Column_name (field_name)*[, *Column_name*, ...]);

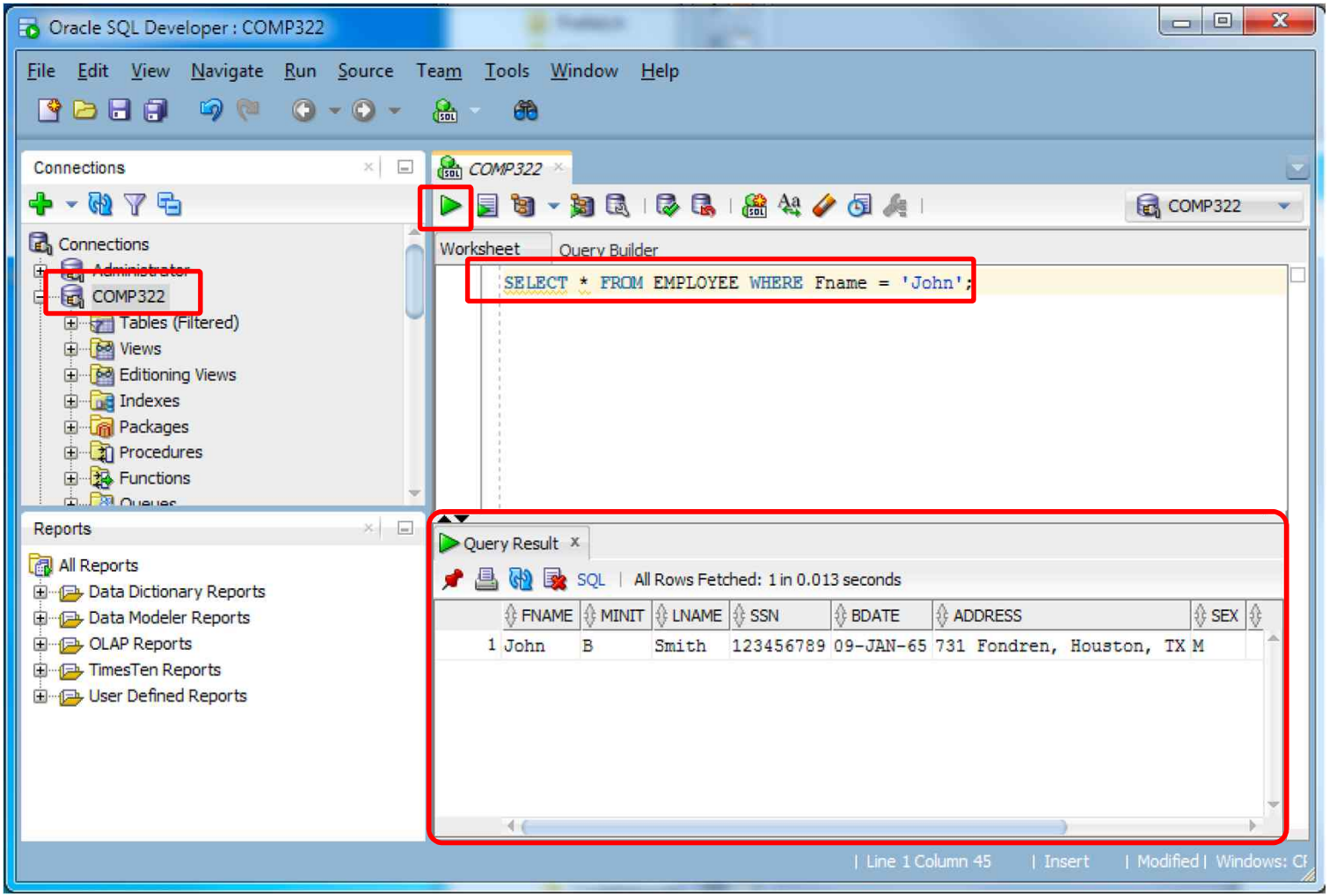
UNIQUE shouldn't be specified for *any* column that may potentially have duplicate values.

Database Connection on SQLDeveloper

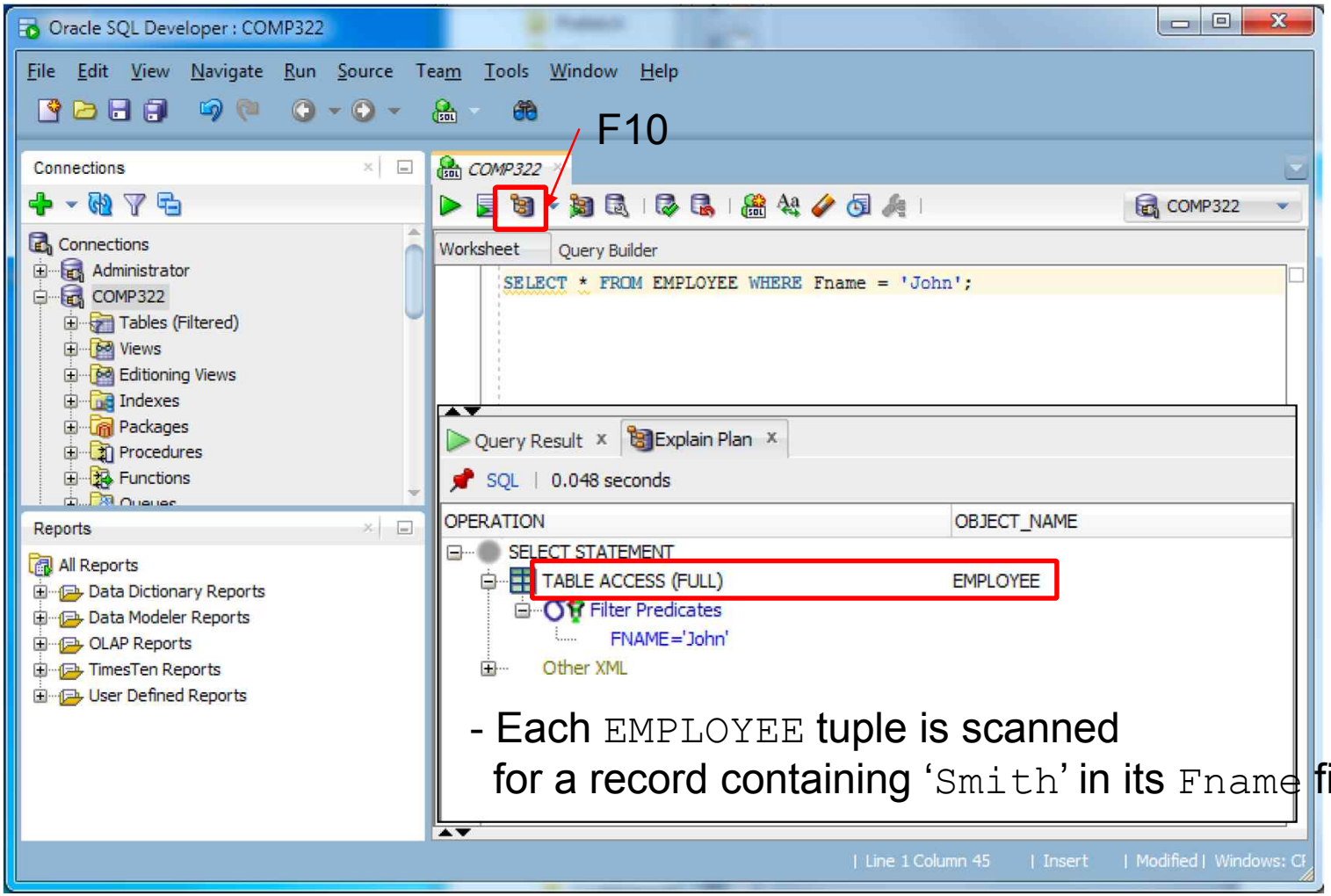
- New Connection: named "`COMP322`"
  - Username/password: `knu`/`comp322`



Run a Sample Query

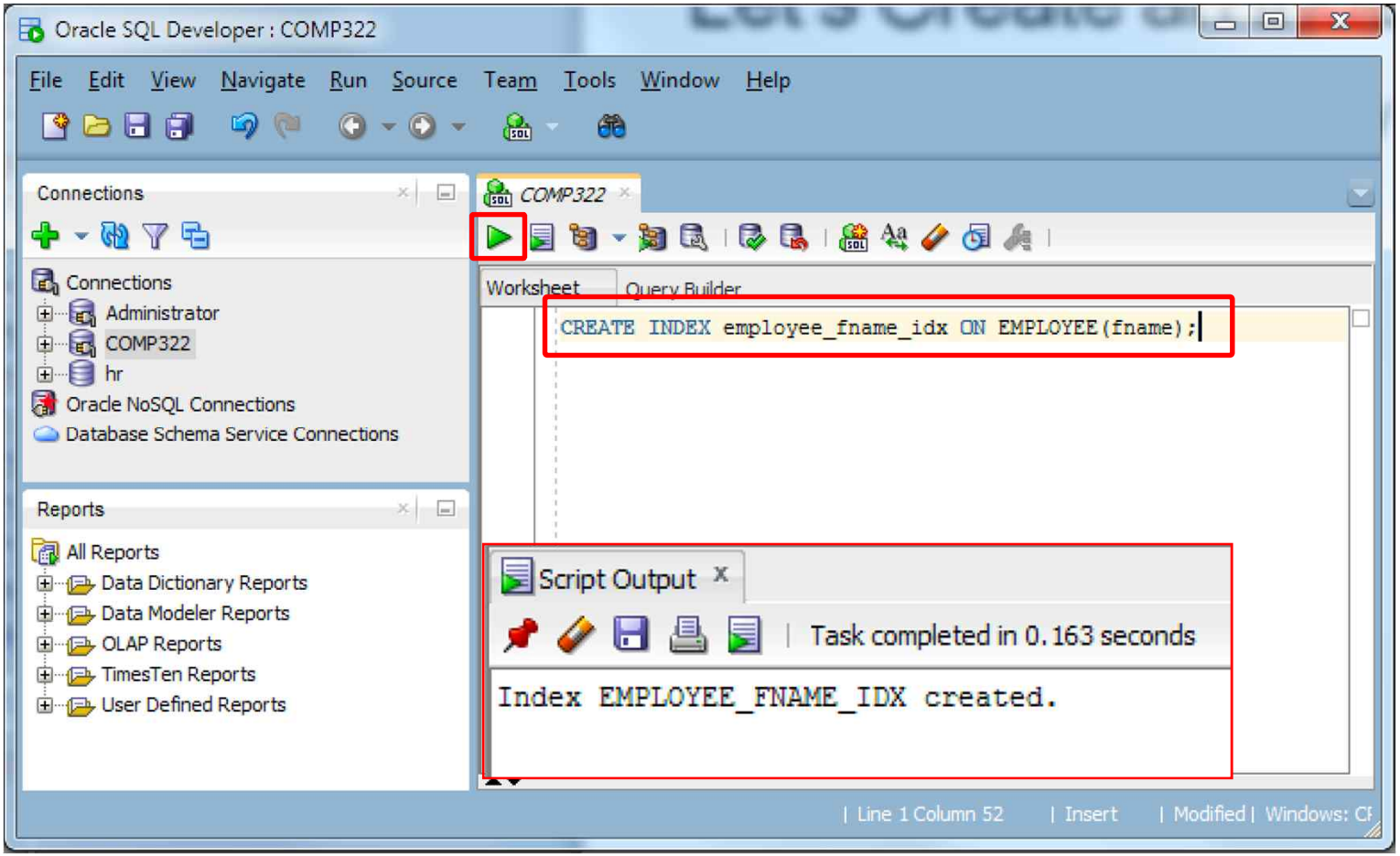


“View Execution Plan” – Table Full Scan



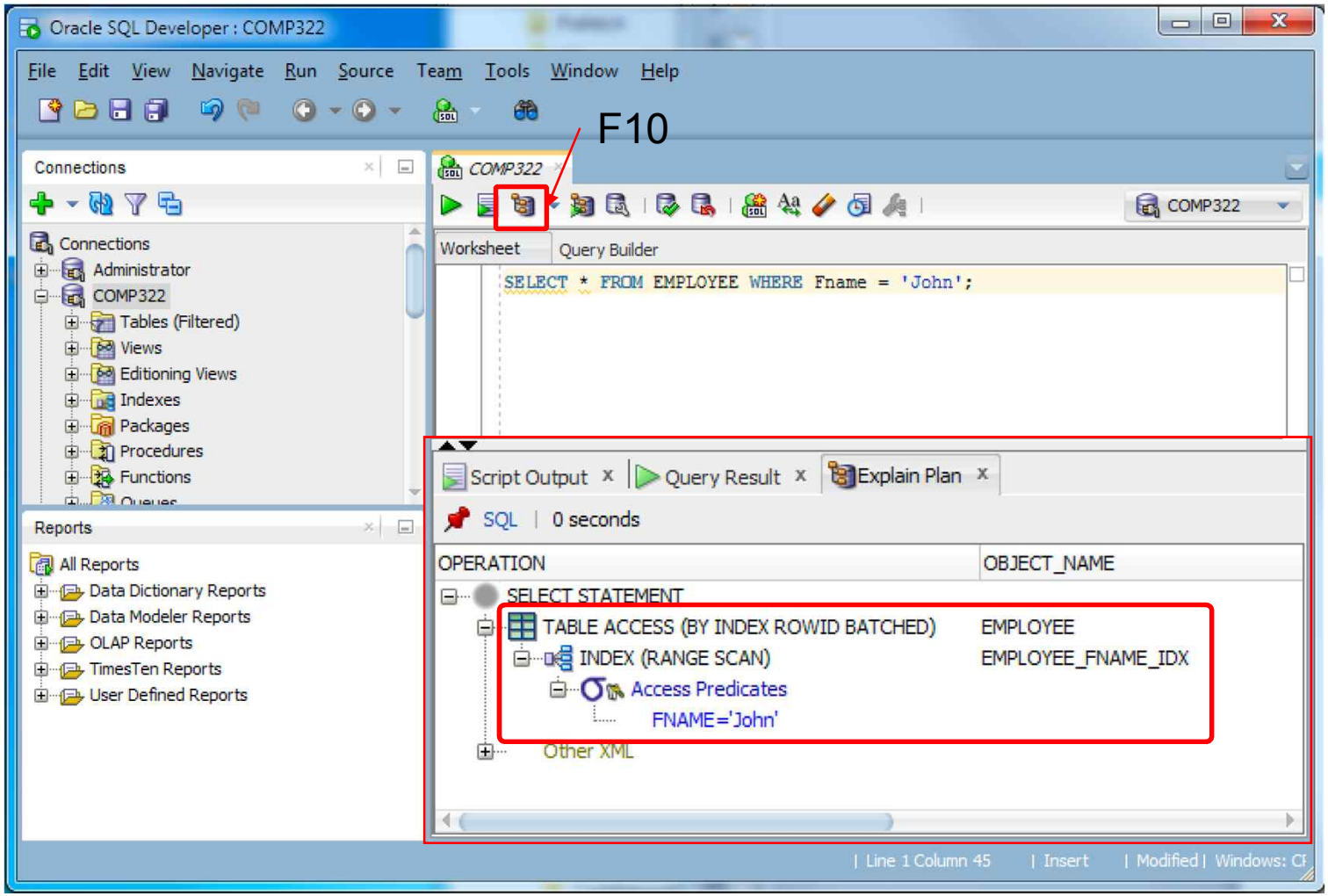
Let's Create an Index for `Fname`.

- We'll try to speed up query response time.



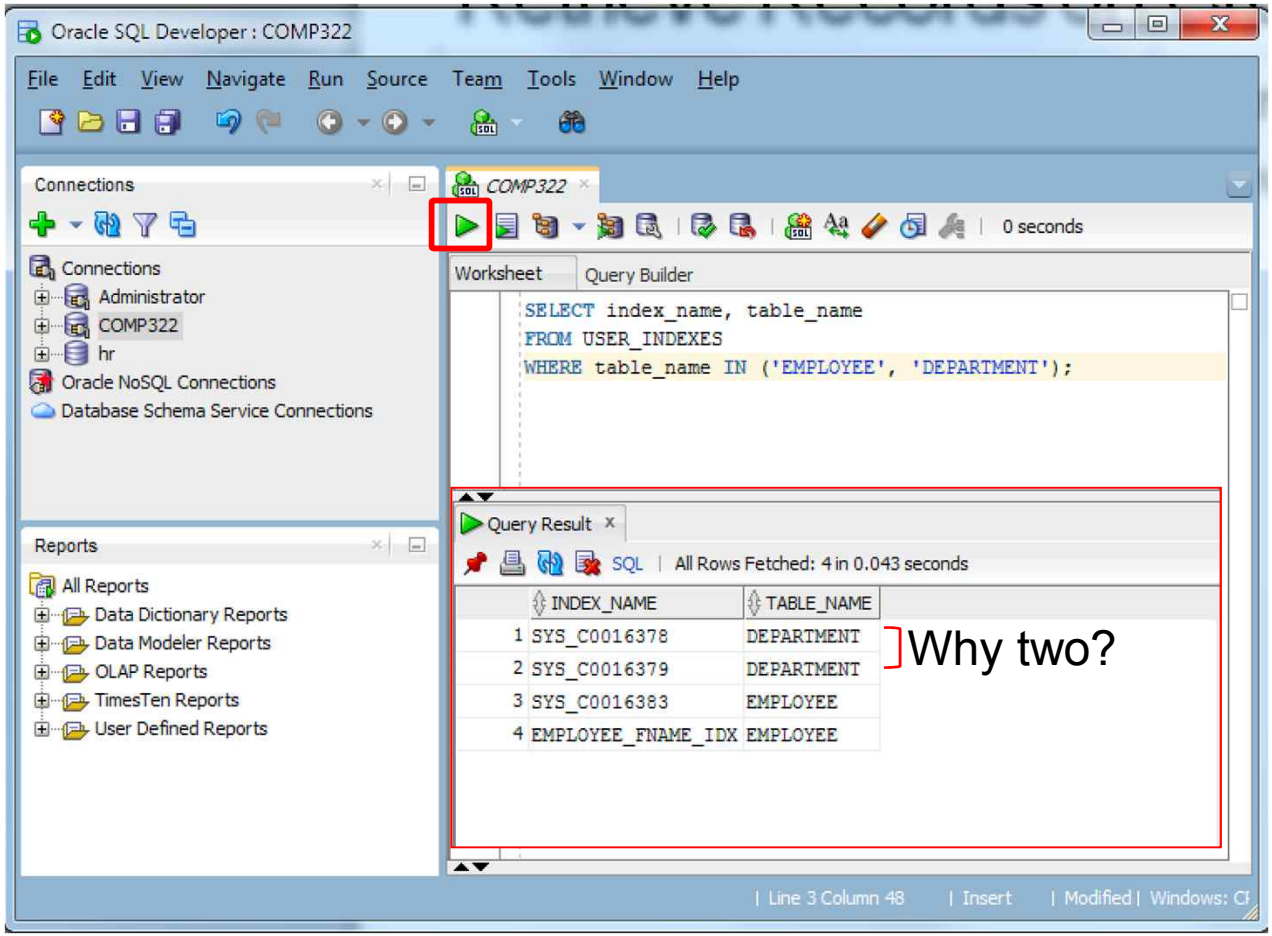
Let's Create an Index for `Fname`. (Cont'd)

- Revisit the previous query and view its query execution plan.



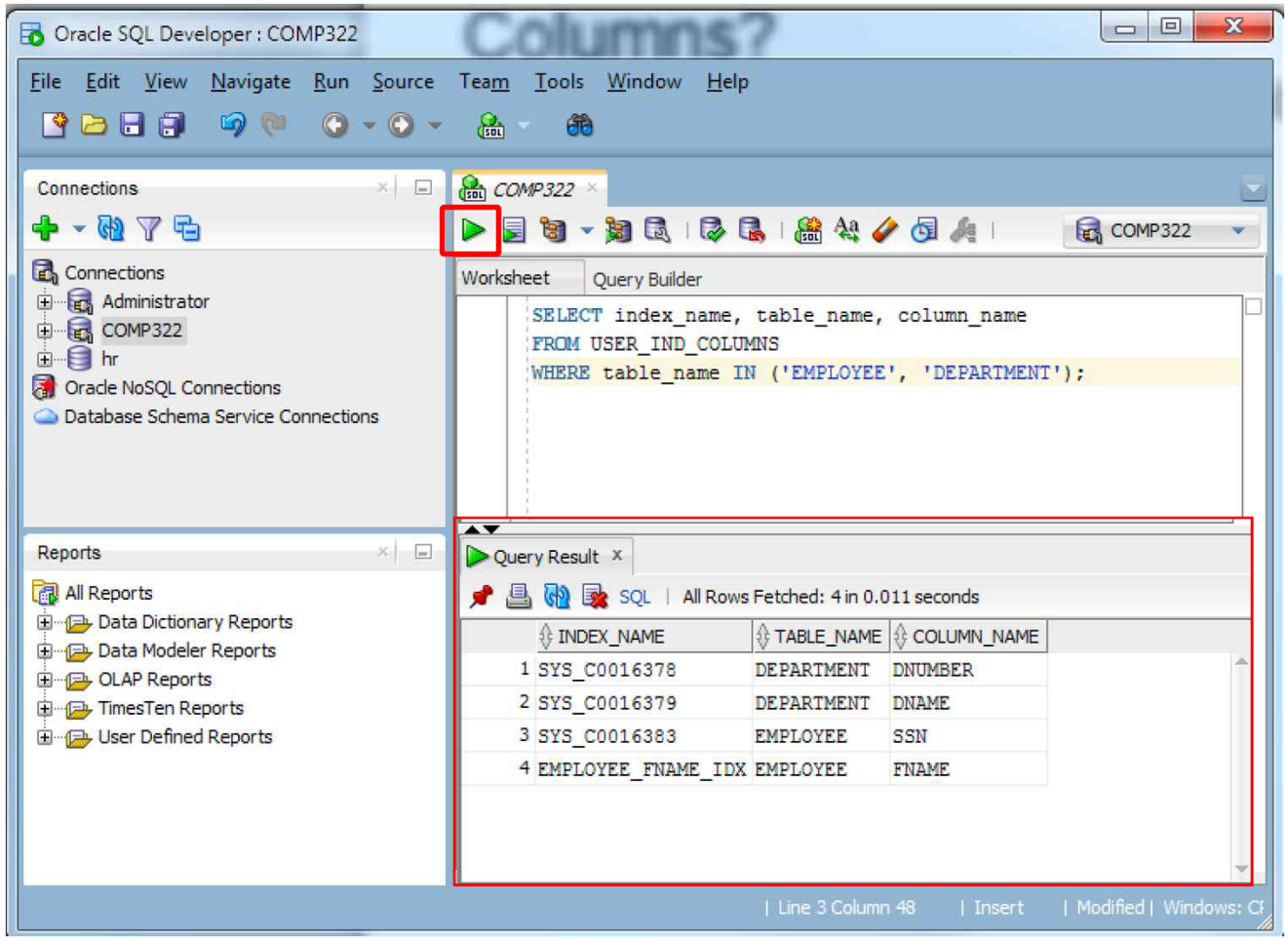
How to Examine *What Indexes Are Created*?

- Use the `USER_INDEXES` table.
  - The metadata of the indexes is stored into the table in data dictionary.



How to Examine *What Indexes on Which Columns*?

- Use the `USER_IND_COLUMNS` table.

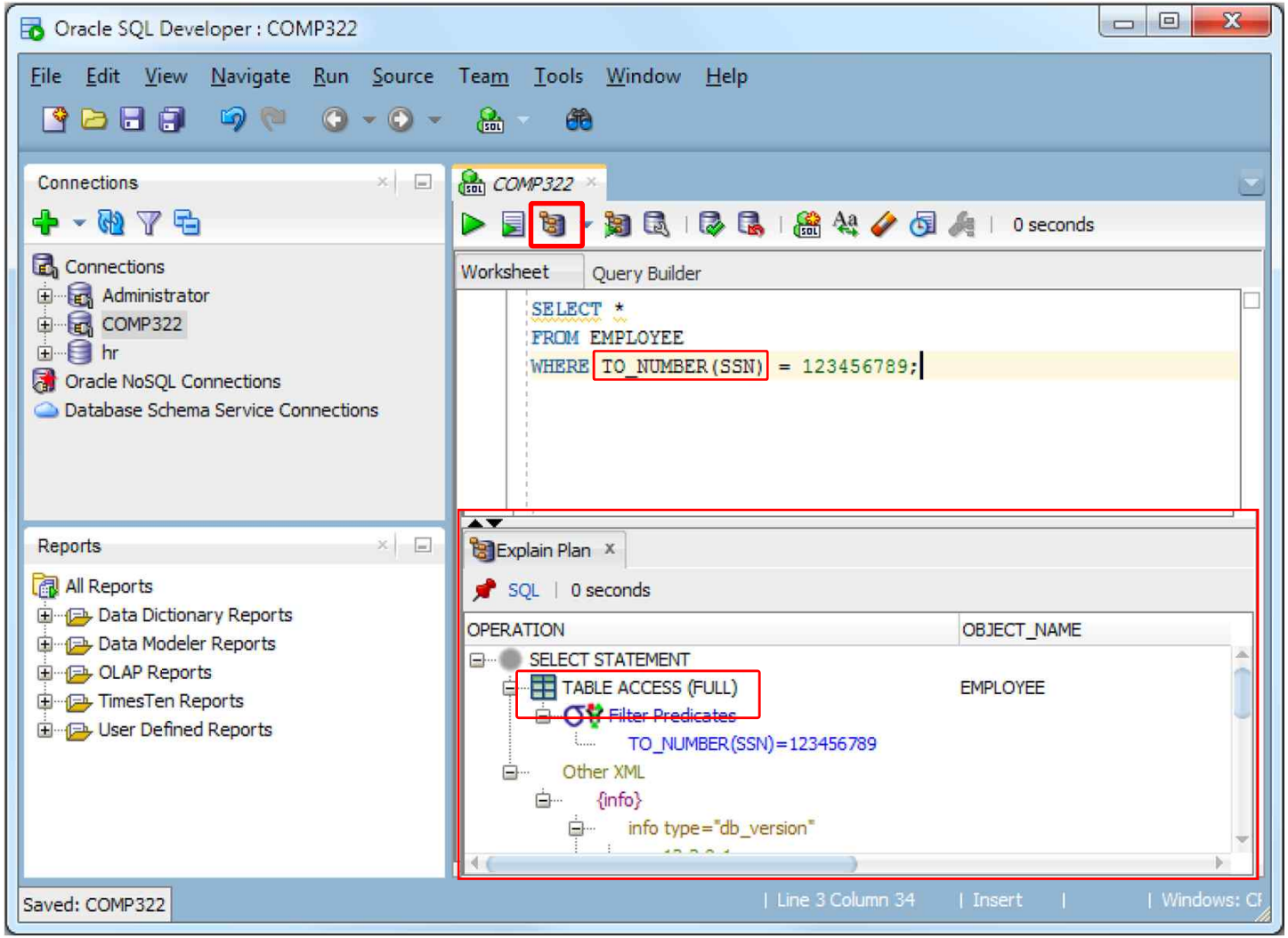


When to Apply Index?

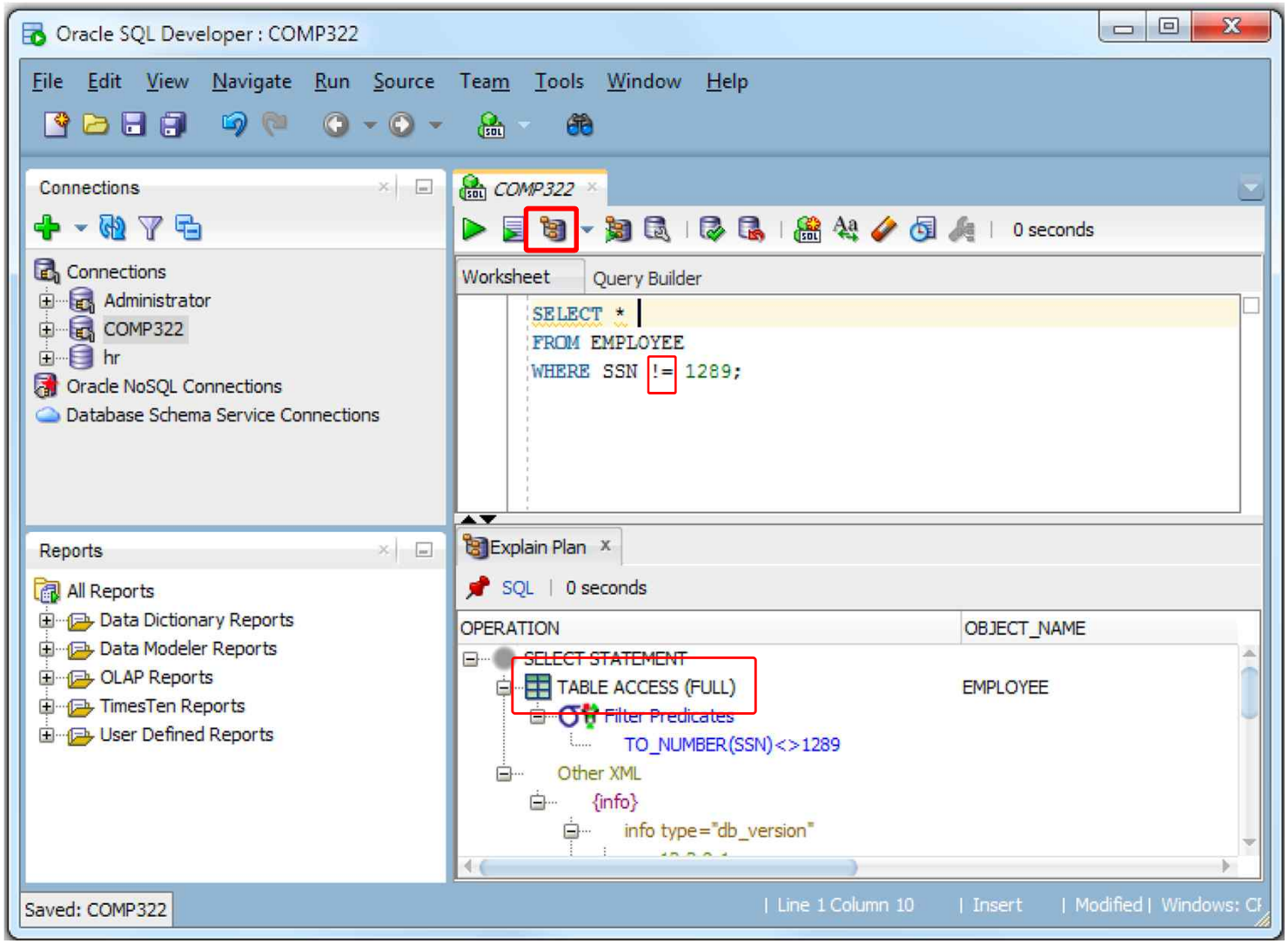
- When indexes are used, we can expect some speedups of query.
- But it's **NOT** always recommended to use the indexes.
- Here are some recommendations for you.

When to Use Index	When Not to Use Index
- Too many tuples in table - A wide range of column values - Columns referenced in `WHERE` clause (for selection) or JOIN - 2% ~ 4% of total tuples retrieved by query - Many columns with `NULL` (NULL values not part of index)	- Too few tuples in table - Columns seldom referenced in `WHERE` clause (for selection) or JOIN - 10% ~ 15% of total tuples retrieved by query - Too many updates on table - Index field used with function or NOT operator

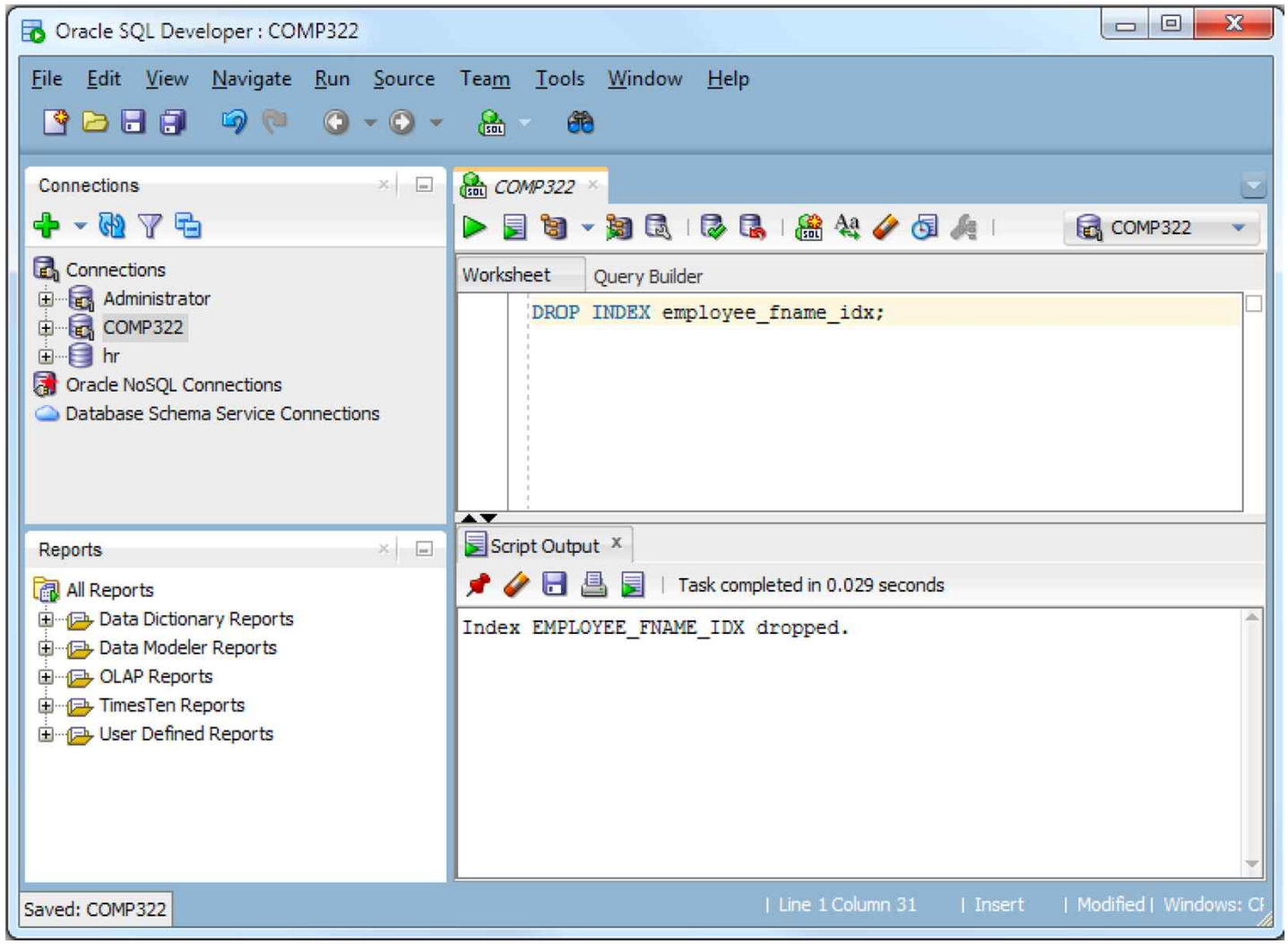
When Index is Not Used by Function



When Index is Not Used by NOT Operator



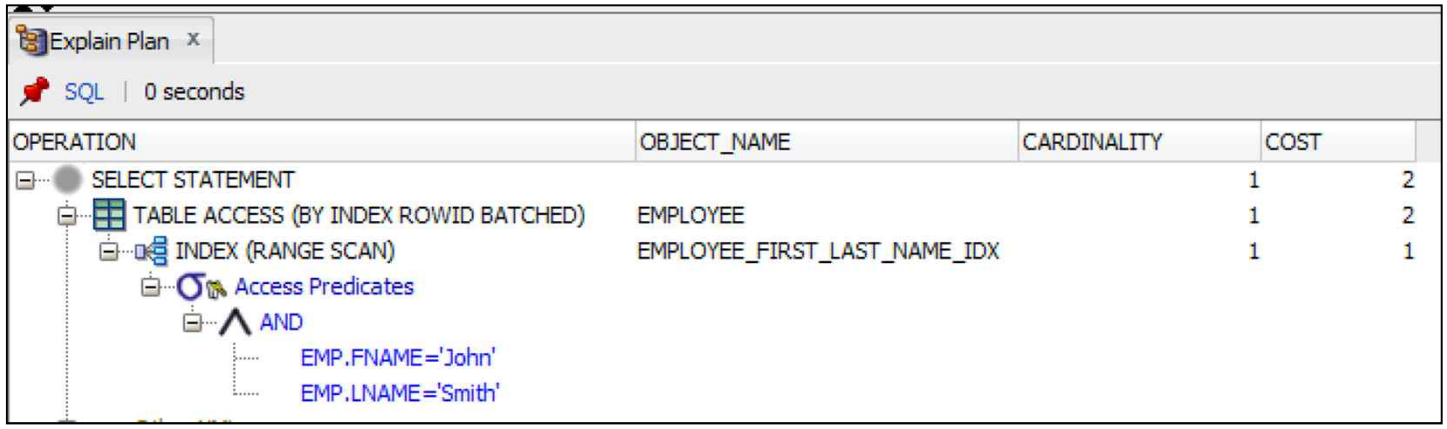
Drop Index: `DROP INDEX` *index_name*



Lab #10: Playing with Indexes on COMPANY

1) Create an index, named employee_first_last_name_idx, on multiple columns of Fname and Lname on EMPLOYEE.

- Show your execution plan using that index for a proper query referencing those two columns (Fname, Lname).
  - Capture your output as shown below:



Lab #10: Playing with Indexes on COMPANY (Cont'd)

2) Create an index, named dept_dname_mgrssn_idx, on multiple columns of Dname and Mgr_ssn on DEPARTMENT.

- Write your query of retrieving a record(s) with Dname = 'Administration' and to_number(Mgr_ssn) = 987654321 in DEPARTMENT.
- Show your execution plan using that index for the written query. What is your result? Capture your output.

Lab #10: Playing with Indexes on COMPANY (Cont'd)

3) Write your query to view all the indexes created for the PROJECT table.

- What is the index name(s) of the PROJECT table?
- What column(s) is used for creating the indexes?
- Show your output.

Lab #10: Playing with Indexes on COMPANY (Cont'd)

4) How many indexes are created for the WORKS_ON and DEPT_LOCATIONS tables, respectively?

- Tell the number of the indexes for each of the two tables.
- What query did you use? Show your query.
- Show your output of the query.

Lab #10: Playing with Indexes on `COMPANY` (Cont'd)

5) Create an index for the `Relationship` column in the `DEPENDENT` table.

- Write a proper query to reference that column.
- Capture the output of showing the execution plan of the query and check if your index is used or not.

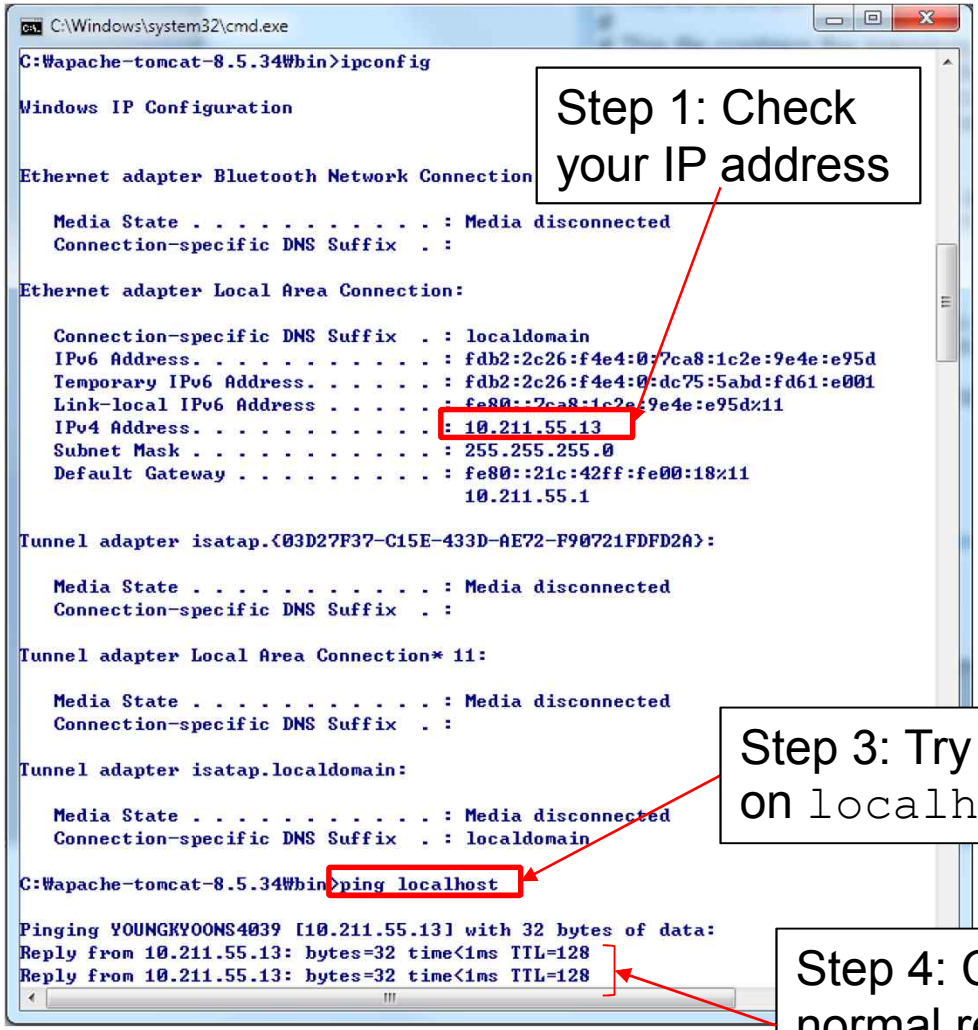
Lab #10: Playing with Indexes on COMPANY (Cont'd)

[Submission]

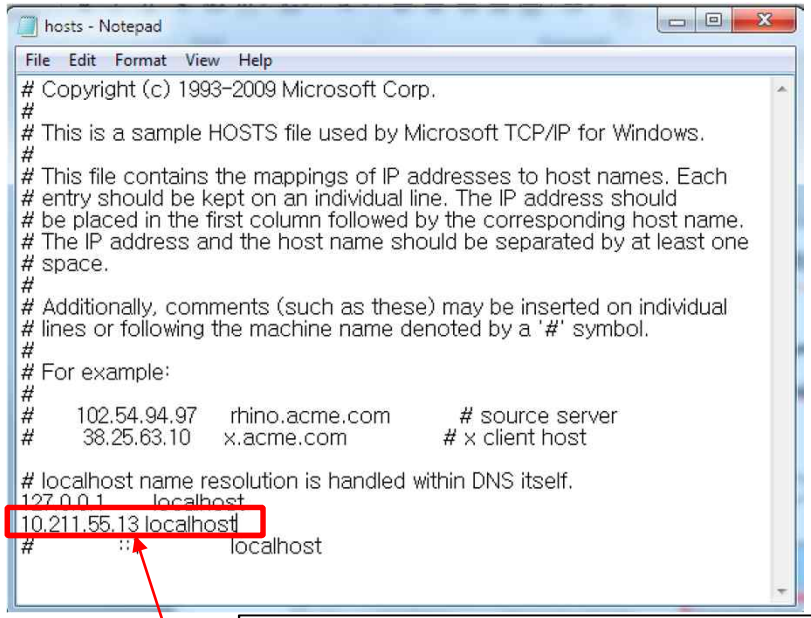
- Deadline: **Sunday midnight** (11/18/2018)
- Name your file like:
  - 'lab10-Your_Student_ID.sql'
  - Put each answer into this sql file. If your answer should be written in plain text, then just comment that line.
    - "-- 10-4) # of indexes for WORKS_ON: …"
  - Save as image file captured output.
- Zip the sql and any screenshot image files.
- Upload the zip file into LMS.

APPENDIX

Configuration of `localhost` on Your Machine



Step 1: Check your IP address



Step 2: Add an entry like this in `C:\Windows\System32\drivers\etc\hosts`.
- Note that you should be able to edit the hosts file. (Run `notepad` as administrator.)

Step 3: Try ping on `localhost`.

Step 4: Check the normal response from localhost.