


Oracle: Performance Problems Due to Index Not Used

 This page explains the **SQL Adapter** in Bridge context. If you were looking for the same information regarding the [PAS Designer](#), refer to [SQL Adapter](#) in the Designer guide.

If some SQL requests with a `WHERE` clause are slow in **Oracle** databases, this may be a character encoding issue. In some situations, Unicode mode together with usage of US2 may prevent the Oracle query planner using indexes.
You can use the following example to test the effects on your oracle instance.

Example File (Builder projectAdd-ons/SQL):



<your example path>\Add-ons\SQL\uml\oracleIndexUse.xml

On this Page:

- [Database Setup](#)
- [Query Tests](#)
 - [Inspecting the Query Plan](#)
 - [How to Suggest The Usage of a Specific Index?](#)

Related Pages:

- [SQL Adapter](#)
- [Troubleshooting the SQL Adapter](#)

Database Setup

1. Open model **oracleIndexUse** to setup the database preferences of you oracle instance in the component diagram:
 - dbConnectionString
 - user credentials
2. Compile and run the model.
3. Run the prepared test cases **createTable** and **insertBooks** to create test data. **createTable** creates a database table to store books and some indexes, **insertBooks** inserts some test data into the table of books.

Query Tests

Now you can try out querying the database with divergent settings in the database alias:

| Unicode Mode | UseUCS2 |
|--------------|---------|
| non-Unicode | False |
| non-Unicode | True |
| Unicode | False |
| Unicode | True |

To apply these settings go to the component diagram and edit the specification of the database alias. To change the unicode mode, change tagged value **Unicode Mode**. To change the usage of UCS2, set the following option in tagged value **Options**:

UseUCS2=True or UseUCS2=False

The example model comes with **Unicode Mode = Platform Default** and **Options = UseUCS2=True**.

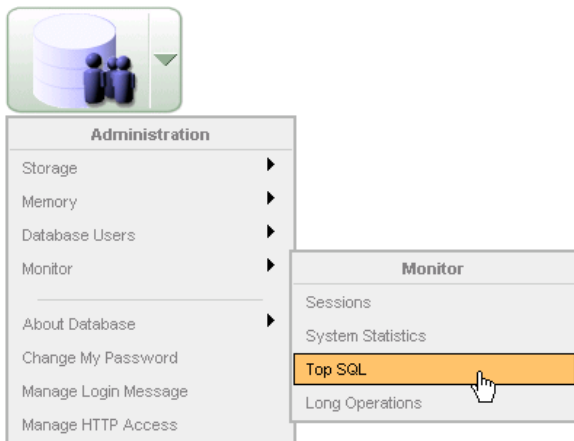
To be able to find the SQL statements in the Oracle database monitor (see [Inspecting the Query Plan](#)) that correspond to your settings, we recommend to add a comment to the SQL statement in activity diagram **Select Books**. Just replace the comment template by your comment.

Run test cases with operation `selectByTitlefor` each setting and check the query plan on the Oracle database whether the index that has been created in step 4 of the database setup, has been used. By setting **indexHint** to true, you can give an index hint to Oracle (see [How to Suggest The Usage of a Specific Index?](#)).

Inspecting the Query Plan

You can inspect the query plan Oracle used to access the database table via the web interface from **Administration > Monitor > Top SQL**. On Oracle Database 10g Express this looks like:

Figure: Accessing the Oracle Query Plan in Oracle 10g Express



A list of performed SQL statements will appear:

| Time In Seconds | Reads | Executions | Buffer Gets / Rows | Module | SQL Text |
|-----------------|-------|------------|--------------------|------------------|--|
| 0.00 | 0 | 4 | 17 | bridgeserver.exe | SELECT INTO BOOKS (ISBN, AUTHOR_FIRST_NAME, AUTHOR_LAST_NAME, TITLE) VALUES (1, 1, 1, 1) |
| 0.00 | 0 | 2 | 12 | bridgeserver.exe | SELECT ISBN, AUTHOR_FIRST_NAME, AUTHOR_LAST_NAME, TITLE FROM BOOKS WHERE TITLE = 10 |
| 0.00 | 0 | 2 | 8 | bridgeserver.exe | SELECT ISBN, AUTHOR_FIRST_NAME, AUTHOR_LAST_NAME, TITLE FROM BOOKS |

Select module **bridgeserver.exe** to filter the list for E2E Bridge requests. If the list is still to long, you can additionally filter for SQL text **ISBN**. Click on the magnifier icon of the SQL statement you want to inspect. The database monitor will show the query plan:

Figure: Oracle Query Plan Without Index Usage

| | | | |
|---------------------------------|--------------------------|-------------------------------------|---|
| Module: bridgeserver.exe | | CPU Time (Seconds): 0.0 | Buffer Gets / Rows Processed: 12 |
| Action: | Disk Reads: 0 | Buffer Gets / Executions: 12 | |
| Executions: 2 | Rows Processed: 2 | Buffer Gets: 24 | |

| Operation | Options | Object | Rows | Cost | Time | Bytes | Filter Predicates * | Access Predicates |
|------------------|---------|--------|------|------|------|-------|-------------------------|-------------------|
| SELECT STATEMENT | | | 3 | | | | | |
| TABLE ACCESS | FULL | BOOKS | 1 | 3 | 1 | 148 | SYS_OP_CQ("TITLE") = 10 | |

* Unindexed columns are shown in red

SQL Text

```
SELECT
ISBN,
AUTHOR_FIRST_NAME,
AUTHOR_INITIALS,
AUTHOR_LAST_NAME,
TITLE
FROM
BOOKS
WHERE
TITLE = 10
```


| Owner | Table Name | Index Name | Used In Plan | Columns | Uniqueness | Index Type | Status |
|-------------|------------|-----------------------------|--------------|-------------------|------------|------------|--------|
| E2E_EXAMPLE | BOOKS | SYS_C00141035 | | ISBN | UNIQUE | NORMAL | VALID |
| | | IDX_BOOKS_AUTHOR_FIRST_NAME | | AUTHOR_FIRST_NAME | NONUNIQUE | NORMAL | VALID |
| | | IDX_BOOKS_AUTHOR_LAST_NAME | | AUTHOR_LAST_NAME | NONUNIQUE | NORMAL | VALID |
| | | IDX_BOOKS_TITLE | | TITLE | NONUNIQUE | NORMAL | VALID |

| Table Owner | Table Name | Column Name | Data Type |
|-------------|------------|-------------|-----------|
| E2E_EXAMPLE | BOOKS | ISBN | NVARCHAR2 |

Although an index **IDX_BOOKS_TITLE** is available, it has not been used. This may be caused by the encoding used to access the database.

Whereas if the index is used, the query plan should look like:

| Owner | Table Name | Index Name | Used In Plan | Columns | Uniqueness | Index Type | Status |
|-------------|------------|-----------------------------|--------------|-------------------|------------|------------|--------|
| E2E_EXAMPLE | BOOKS | SYS_C00141035 | | ISBN | UNIQUE | NORMAL | VALID |
| | | IDX_BOOKS_AUTHOR_FIRST_NAME | | AUTHOR_FIRST_NAME | NONUNIQUE | NORMAL | VALID |
| | | IDX_BOOKS_AUTHOR_LAST_NAME | | AUTHOR_LAST_NAME | NONUNIQUE | NORMAL | VALID |
| | | IDX_BOOKS_TITLE | ✓ | TITLE | NONUNIQUE | NORMAL | VALID |

By this procedure, you can test Oracle's reaction to the different database preferences, find a set-up that uses the index, and thus improve the performance.

How to Suggest The Usage of a Specific Index?

Last but not least: By an addition to your SQL statement, you can suggest to Oracle the usage of a specific index.

```
SELECT /*+ INDEX(BOOKS IDX_BOOKS_TITLE) */
      ISBN,
      AUTHOR_FIRST_NAME ,
      AUTHOR_INITIALS,
      AUTHOR_LAST_NAME ,
      TITLE
FROM BOOKS
WHERE TITLE = :0
```

E.g. by adding `/*+ INDEX(BOOKS IDX_BOOKS_TITLE) */` to your select statement, you can suggest to use the index **IDX_BOOKS_TITLE**. This is called "giving an index hint". In most cases Oracle will follow the hint, but not always.