Lab 5: Indices

Objective
The objective of this lab is an introduction to indices. You will learn what indices are and how to create and manage indices.

Required Materials
SQL Server Management Studio must be installed on your computer. You should have a connection to the DYKNOW.CS database from a previous lab.

Related Reading
- Indices reading in your text book.
- Look up CREATE INDEX in Books Online

Assignment Details
Before beginning, please check the turn-in instructions at the end of the lab.

(1) Introduction (In this lab you will be answering some questions and recording some data. Please do this in a single text file for submission. *Hint*: Some people find it helpful to switch to displaying results as text in Management Studio. See Query → Results when you have a query editor window open.)

a. SQL Server Management Studio and create a new query.
b. Run the sp_help stored procedure for the Employees on your copy of the Northwind database.
c. Scroll down the results to the grid with first column titled index_name
d. Record the index_name and index_keys of each entry
e. In a new query window run this query (make sure to use your copy of Northwind):

```
USE <your Northwind>
GO

SELECT t.name AS [Table Name], i.name AS [Index Name], i.*
FROM sysobjects AS t JOIN sysindexes AS i ON t.id = i.id
WHERE t.id > 100
ORDER BY t.name
```

f. Revise the query from 1.e to return the number of indices on the Customers table. Copy both the query text and the resulting number of indices to a text file for submission at the end of the lab.
g. Revise the query from 1.e to return the names of the indices on the Suppliers table. Copy both the query text and the Index Names of the indices in this table into your answers text file.

(2) Creating Indices

a. Still using your copy of the Northwind database, write a new SQL script that will create a nonclustered index named Orders_Customers_link on the CustomerID column in the Orders table with a fill factor of 75%.
b. Using the sp_help stored procedure, verify that you've created the Orders_Customer_link index properly.
c. Copy your script from part a into your answers file.

d. Write a Transact-SQL statement that will create a nonclustered index called Products_SupplierID_link in the Products table on SupplierID with a fillfactor of 100%.
e. Using the sp_help stored procedure on Products, verify that you've created the index properly.
f. Copy your script from part d into your answers file.

(3) Query The Products Table

a. Currently there is no index on the Products table for unit price.
b. Write two queries on the Products table as follows:
    i. Write a query that gives the name and unit price of every product that costs more than $10 per unit. Sort the results with the most expensive item first.
    ii. Write a query that updates the unit price of every product, increasing the price by 2%.

   Copy your queries into the text file of answers for this lab.
c. Use Query → Execution Plan to answer the following questions in your answers file:
    i. What are the steps in the plan for your query from 3.b.i?
    ii. What is the most expensive step in the plan?
    iii. Why do you think this is the most expensive step?
    iv. What are the steps in the plan for your query from 3.b.ii?
    v. What is the most expensive step in the plan?
    vi. Why do you think this is the most expensive step?
d. Create an index for the Products table based on unit price. You can use a script to do this, but you might want to try doing it using Management Studio to see if you like that approach better.
e. Update the execution plan for your queries by choosing Query → Execution Plan again. Answer the following questions in your answers file:
    i. Did the execution plan change for the 3.b.i query? If so, what are the new steps?
    ii. Why do you think this is the case? (Feel free to ask for help if you don't have a good idea.)
    iii. Did the execution plan change for the 3.b.ii query? If so, what are the new steps?
    iv. Why do you think this is the case?
    v. What is the most expensive step in the plan for 3.b.ii now?

(4) Follow-up

a. In your own words, describe what indices are and why they are useful.
b. When is it appropriate to use an index?
c. When is it not appropriate to use an index?
d. What is the difference between a clustered and nonclustered index? Describe a situation where you'd use each type.
e. What is a fillfactor?

f. Make sure to complete the Lab 5 Feedback survey, located in the Lab 5 folder in Angel.

Turn-in Instructions

Answers from all sections go in the same text document. Please number and letter which questions you are answering. Submit your answers file to the Lab 5 drop box on Angel.

Please complete the anonymous lab feedback survey on Angel under Materials -> Lab Feedback. Your feedback will help us improve the labs for future students.

Revision History

Dec. 21, 2006	Clarifying part 3 – Curt Clifton
Dec. 11, 2006	Updates for SQL 2005 by Michelle Lisse
Dec. 19, 2005	Clarified submission instructions—Curt Clifton and Steve Chenoweth.
Jan. 2, 2005:	Updated by Pat Roby.
Jan. 5, 2005:	Reviewed and edited by Andy Cooper. Modified 2.c by removing the instruction to create a clustered index. The products table already has a clustered index for the primary key.
Dec. 12, 2004:	Created by Pat Roby.