



**DBADuck**  
ben miller

**Big Mountain Data - Utah Geek Events**

# More SQL Development through Behavior Analysis

Ben Miller, SQL Architect  
DBADuck Consulting

**Microsoft**  
CERTIFIED

*Master*

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## SQL Server Certified Master

The first MCM in Utah. Has been working with SQL Server since 4.2, even on O/S2.

## Microsoft Data Platform MVP

Awardee since 2009 for SQL Server. Contributes to Experts-Exchange and SQLServerCentral forums. Speaker at many SQL Saturdays around the country. I have led local PASS Chapters as well as founded the Virtual PowerShell Group.

## PowerShell DBA

I have always loved automation and have used PowerShell since v1.0 I have spent many years using SMO and love to automate anything that I can to get the computer to do my work. I even wrote a chapter for the PowerShell Deep Dives book. On the Quest to become a PowerShell DBA.

# Agenda

- Variables
- Assignment Statements
- Data Types
- Partitioning Fun
- Where Clause
- Foreign Keys
- Indexing
- Statistics Fun

# Variables

- Variable definition and use

```
DECLARE @string1 varchar(35) = 'This is a string'  
DECLARE @string2 nvarchar(35) = N'This is a string'
```

Parameters:

```
@param1 varchar(5) = 'This is a string'
```

What happens?

# Assignment Statements

- SET vs. SELECT for assignments
  - SET is for a single assignment
  - SELECT is for multiple assignments (are you sure)
- DECLARE @var int = 5 (2008+)
- UPDATE statement for setting values
- Consistency is the most important

# Data Types

- One of the most important topics!
- Every Column has one
- How do compare a Lemon to a Lime (hint: You can't)
- Isn't VARCHAR the same as NVARCHAR?
- Comparison (<, >, =) requires like datatype, REQUIRES
- Data Type Precedence
  - <http://technet.microsoft.com/en-us/library/ms190309.aspx>

# PARTITIONING FUN

- Partitioning Reasons
  - Date based partitions
  - Simpler Archiving
  - Available in lower Editions since SQL 2016 SP1+
- Gains and Losses
  - Rebuild Partitions instead of the entire Index
  - Creating or rebuilding an index only does a default sample instead of FULLSCAN on statistics build



# PARTITIONING FUN

- How do I get more from Partitioning
  - Including partitioning key in WHERE clause for partition elimination
  - Leveraging different compression schemes for partitions
  - Partition switching for moving data / archiving
- Partitioning Key
  - Must be in each index if it is to be aligned

# WHERE Clause

- WHERE clause can change the performance of all your queries
- Functions in the WHERE clause will scan tables
- D.Column1 = ISNULL(c.Column1, 0)
- COALESCE, CONCAT, etc.
- IN vs. EXISTS

# Foreign Keys

- Unindexed Foreign Keys
  - Invites Scans on deletes
- CASCADE is for Access, do not use it for SQL tables
  - Write the updates and deletes for these

# IN vs. EXISTS

- **IN is optimized into OR clauses**
- **NOT IN is more intensive, avoid if you can**
- **EXISTS can be optimized into a JOIN (a lot of time, Anti-Semi Join)**
  - If even one is matched, it can exit and be true without materializing all rows
- **NOT EXISTS can be optimized into an Anti-Semi Join as well**
  - If even one is matched it exits and that row is false

# Indexes

- How many is too many?
  - Keep it below 8 if you can. Every insert, update, delete affects every index
- What should be the key order?
  - Typically the most selective key first. Sometimes you do something different
  - Keys that are in the WHERE clause or JOIN clauses are good ones
  - Keys for = should be before the > < or inequality
  - Keep it to 4 keys or less. Much overhead in sorting when rebuilding, etc.
- What are Includes?
  - Columns in the SELECT statement or keys that just don't fit in sorting
- Clustered and Non-Clustered?
- Should I use ColumnStore?

# Statistics Fun

- Histogram
  - Do you know how to read them?
  - Key to understanding estimates in query plans
- Columns – Only the first column is in the histogram. Others are in density.
- Sample
  - How much data is read to create the statistics, more rows less sample
- Modification Counter
  - Modifications to the statistic (underlying data for index or columns)
- Updating Statistics
  - Have you heard that statistics increase performance and when things are slow, you just need to update stats?

# Much More ...

- There is always more to see and do in SQL Server for behavior analysis
- Query Plans, Query Store, Overindexing, Underindexing
- Performance Counters

# Questions?

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# THANK YOU!