



The slide features the TechEd 2013 logo on the left and the session code "DBI-B203" on the right. The main title "Manage SQL Server System and Performance Data with PowerShell" is centered in a blue box. Below the title, the speaker's information is listed: Allen White, UpSearch, with email "allen.white@upsearch.com" and handle "@SQLRunr". To the right of the speaker info is a green globe graphic. The Microsoft logo is at the bottom left.



DBI-B203

Manage SQL Server System and Performance Data with PowerShell

Allen White
UpSearch
allen.white@upsearch.com
@SQLRunr



 Microsoft

About Me

Practice Manager at UpSearch
Over 35 years in IT
Career covered multiple disciplines – operations, development, telecommunications, network design/administration and database design and administration
Started using Sybase in 1992, MS SQL Server in 1995
Microsoft Certified IT Professional: Database Administrator and Database Developer, Microsoft Certified Trainer (MCT)
Awarded Microsoft MVP Award for SQL Server for last 6 years



PowerShell – the Administrator's Tool

Windows Management Framework

WinRM – SOAP-based Protocol for Managing Servers

BITS – Background File Transfer Service

PowerShell

WMF 3.0 released with Windows Server 2012

Part of Microsoft's Common Engineering Criteria (CEC)

Why Use PowerShell to Manage SQL Server

Lightweight Access to Server Management

Repeatable Management through Scripting

Access both Windows and SQL Server Properties

"PowerShell is a Core IT Skill – Learn it or be Left Behind"

Jeffrey Snover - Lead Architect for Windows Server & System Center Datacenter

Environment & Security

Command Line

Tab completion auto completes commands, etc.

Get-History returns previously run commands

Up/Down arrows scrolls through previously run commands

Integrated Scripting Environment – ISE (PS 2.0+)

Scripts allow you to batch commands together

You must include the path to the script to run it

By requiring the path, prevents scripts from "hijacking" operating system commands

By default you cannot run scripts

Set-ExecutionPolicy set by default to Restricted

Change to RemoteSigned to run local scripts

NOT the case for sqlps.exe, though

PowerShell Language

PowerShell is an Object-Based Language

Not Object-Oriented

Cmdlets are Command-Line Utilities built into PowerShell

They use a Verb-Noun Naming Convention

Get-Process

Stop-Service

Three most important cmdlets

Get-Help

Get-Command

Get-Member

PowerShell Language

Assignment Operators

=, +=, -=

Comparison Operators

-eq, -ne, -lt, -le, -gt, -ge, -and, -or, -not, -like

Variables

Begin with a \$ character

Are .NET objects

Use Get-Member to see variable type, methods, properties

Demo

Why Maintain a Server Inventory

Need an overview of your Domain

Allows you to identify outliers

You can see resource usage

How much are you using now?

What's the growth rate?

Reports help you justify new resources

What Data Do You Collect?

Computer Name, Domain, Make, Model

Operating System Versions and Patch Levels

Total Physical Memory

Local Disk (SAN storage is local)

SQL Server Instance Information

Version, Edition, Service Pack

Default Data, Log, Backup Location

Configuration Options

Databases with files and sizes

Logins and Users

A Little Bit about WMI

WMI - Windows Management Instrumentation

Provides Access to All Windows System Information

Information Grouped into Classes

Win32_ComputerSystem

provides computer name and model, number of processors, etc.

Win32_OperatingSystem

provides OS type, service pack installed, etc.

Win32_PhysicalMemory

provides physical memory device, and capacity, etc.

Win32_LogicalDisk

provides local storage size, free space, etc.

Getting WMI Data

PowerShell V2 and V1 – Get-WMIObject

PowerShell V3+ – Get-CimInstance

Get-WMIObject is Deprecated

Uses remote procedure calls (RPCs)

Can cause problems with access, firewall issues

Get-CimInstance uses WinRM

Demo

Access SQL Server via SMO

SMO – Server Management Objects

Redesigned from predecessor – DMO

Distributed Management Objects – SQL 2000 and earlier

Provides a SQL Server Management API

You can manage SQL Server via VB.Net, C# and PowerShell

Provides access to properties not available in T-SQL

Loaded via DLLs installed with Client tools

C:\Program Files\Microsoft SQL Server\110\SDK\Assemblies

Microsoft.SqlServer.Smo.dll

Microsoft.SqlServer.SmoExtended.dll

Microsoft.SqlServer.SqlWmiManagement.dll

Connect to the Server

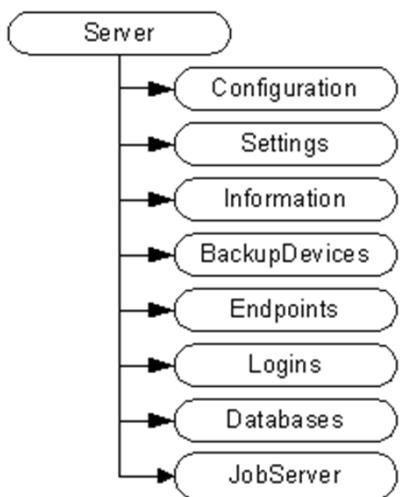
Connect to SQL Server by instantiating a Server object

```
$svr = New-Object ('Microsoft.SqlServer.Management.Smo.Server')  
'SQLTBWS\INST01'
```

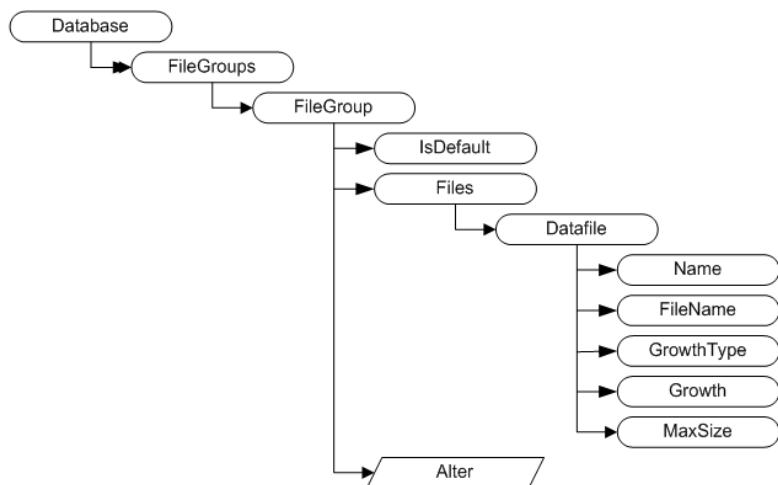
Access the SQL Server WMI objects by instantiating a ManagedComputer object at the Windows server level

```
$mgt = New-Object  
('Microsoft.SqlServer.Management.Smo.WMI.ManagedComputer') 'SQLTBWS'
```

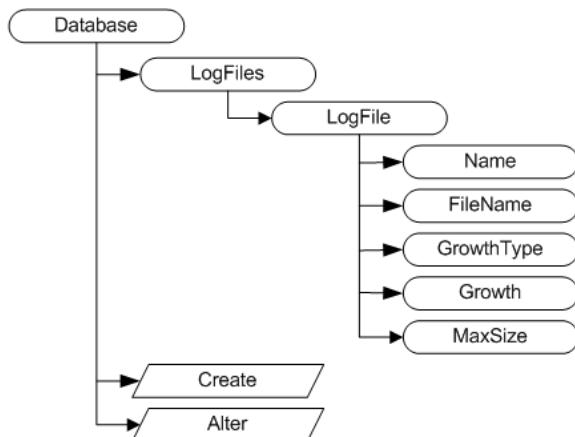
The SMO Object Model



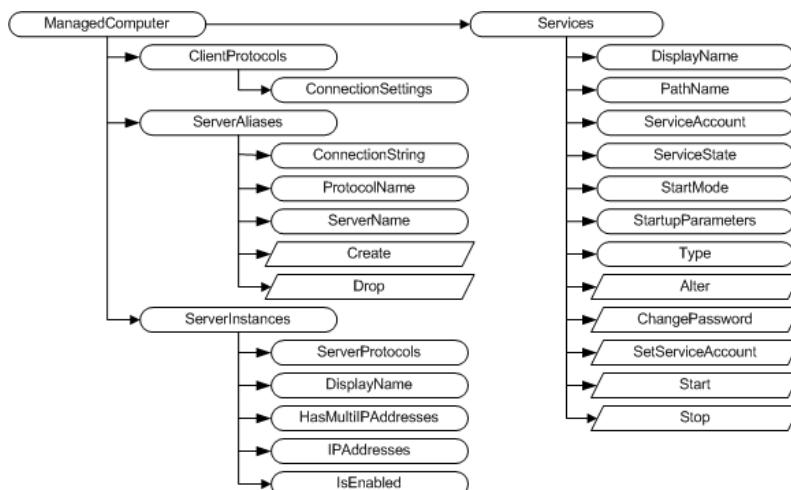
The Database Object



The Database Object



ManagedComputer Object



Demo

Capture Performance Baseline

Baseline shows normal performance

Deviations from Baseline require investigation

Frequency of Data Capture is important

- Too often impacts performance

- Too seldom can miss important events

- Balance comes with experience

Key Performance Indicators

Which counters show us system health

There's no "right" answer

These are my choices

Operating System Counters

Object	Counter	Look For
Processor	% Processor Time	<= 80%
Memory	Available MBytes	Low Memory, Server Paging
Paging File(_Total)	% Usage	Should be < 70%
PhysicalDisk(*)	Avg. Disk Sec/Read	Latency. Avg time to read data (<.02)
PhysicalDisk(*)	Avg. Disk Sec/Write	Latency. Avg time to write data (<.02)
System	Processor Queue Length	> 10 threads/proc and CPU > 80%

SQL Server Counters

Object	Counter	Look For
Access Methods	Forwarded Records/sec	< 10 per 100 batch requests/sec
Access Methods	Page Splits/sec	<20 per 100 batch requests/sec
Buffer Manager	Buffer cache hit ratio	below 90% is bad
Buffer Manager	Page life expectancy	>= (DataCacheSize/4*300)
General Statistics	Processes blocked	Baseline, check for changes
SQL Statistics	Batch Requests/sec	> 1000 is busy system
SQL Statistics	SQL Compilations/sec	<10% of batch requests/sec
SQL Statistics	SQL Re-Compilations/sec	<10% of compilations/sec

Scripting the Data Capture

Capture the counter data

```
# Initialize Perfcounters
$ppt = new-object System.Diagnostics.PerformanceCounter
$ppt.CategoryName = 'Processor'
$ppt.CounterName = '% Processor Time'
$ppt.InstanceName = '_Total'
$pptv = $ppt.nextvalue()
```

Insert into Performance Database

Wait defined interval and do it again

Pull Counters from Perfmon Log

```
$logcntr = import-counter 'C:\Perfmon\SQLTBWS_SQLPerf.blg'  
foreach ($cntr in $logcntr) {  
    $dtm = $cntr.Timestamp  
    $clist = $cntr.CounterSamples  
    foreach ($sample in $clist) {  
        switch -wildcard ($sample.Path) {  
            '*% Processor Time*' { $ppt = $sample.CookedValue }  
            '*Available MBytes*' { $mab = $sample.CookedValue }  
            ...  
            '*Buffer cache hit ratio*' { $bch = $sample.CookedValue }  
            '*Page life expectancy*' { $ple = $sample.CookedValue }  
            '*SQL Compilations/sec*' { $cmp = $sample.CookedValue }  
            '*SQL Re-Compilations/sec*' { $rcm = $sample.CookedValue }  
        }  
    }  
}
```

Demo

References

Learn Windows PowerShell 3 in a Month of Lunches, Second Edition,
Don Jones and Jeff Hicks

<http://www.manning.com/jones3/>

Understanding and Using PowerShell Support in SQL Server 2008

<http://msdn.microsoft.com/en-us/library/dd938892.aspx>

Let PowerShell do an Inventory of your Servers

<http://www.simple-talk.com/sql/database-administration/let-powershell-do-an-inventory-of-your-servers/>

SQL Server & Windows Documentation Using Windows PowerShell

<http://sqlpowerdoc.codeplex.com/>

Related content

④ Breakout Sessions

MDC-B400 - Advanced Automation Using Windows PowerShell

Don Jones, Jeffrey Snover

La Nouvelle Ballroom C

June 4, 2013 from 1:30PM to 2:45PM

DBI-B205 - Microsoft SQL Server Management Basics for Non-DBAs

Denny Cherry

New Orleans Theater B

June 4, 2013 from 5:00PM to 6:15PM

MDC-B326 - Integrating with Microsoft System Center 2012 and Windows PowerShell

Sean Kearney

New Orleans Theater B

June 5, 2013 from 1:30PM to 2:45PM

Track resources

- ④ Resource 1
- ④ Resource 2
- ④ Resource 3
- ④ Resource 4

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