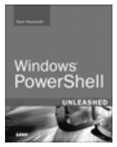
Introduction To: Microsoft Windows PowerShell



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Slides and Video of seminars up on
http://www.cco.com/online.htm

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Agenda

- Introduction
- What is PowerShell?
- Understanding PowerShell
- Scripting with PowerShell
- PowerShell Best Practices
- Questions and Answers

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Convergent Computing

- Lead Author for Sams Publishing "Unleashed"- series (books on Windows, Exchange, SharePoint, ISA, MOM)
- Series Editor for Sams Publishing "Administration and Management"-series (books on Vista, SQL 2005, OpsMgr 2007)
- Head Judge – Imagine Cup 2005, 2006, 2007, and now 2008! (Int'l IT competition for college students (www.imaginecup.com))

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- Practice Lead – CCO Security Solutions
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- Specialist in Active Directory, Group Policy, Windows scripting, Windows Rights Management Services, PKI, and IT security practices
- CISSP, GSEC, GCIH, and MCSE Security

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Convergent Computing (CCO)

- **Entering our 22nd year in business**
- **65-consultants (32 published authors)**
- **Work with technology products 2-3 yrs before the products release**
- **Design planning, migration and implementation assistance, knowledge transfer, and support**

CCO Publications
A few of the books we've written lately…

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What is Windows PowerShell?

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Windows PowerShell Overview…

- Microsoft's new command line shell and scripting language
- Built on the .NET Framework
- Easy to use, adopt, and learn
- Scripting language is Perl-ish and C#-ish
- Meant to be readable
- Designed from the ground up to simplify routine tasks without the overhead of the GUI…

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The future of PowerShell…

- Already has been adopted by a number of product groups
  - Exchange Server 2007
  - System Center Operations Manager 2007
  - System Center Data Protection Manager V2
  - System Center Virtual Machine Manager
  - *** Windows Server 2008 ***
- Many more product groups are working to adopt and integrate PowerShell into their applications

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Windows Management Dark Ages

The Frustrated Admin

A bunch of different scripting languages	A bunch of different command line tools	A bunch of different management GUIs

Windows and Server Products

WMI	COM	APIs	.NET	…

Task Completion

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Windows Management Renaissance

The Happy Admin

Still has the old interfaces	**PowerShell Console**	**PowerShell Driven MMC**	**PowerShell Scripts**

Windows and Server Products

WMI	COM	APIs	.NET	…

Task Completion

What is the difference?

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PowerShell is the Difference!

PowerShell will become the foundation for all Windows and Server product management…

MMC	Scripts	Console	GUIs

PowerShell

Common Interfaces	.NET Framework

Windows and Server Products

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Example – Exchange Server 2007

All aspects of management are driven by PowerShell!

Setup EMS EMC

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Understanding Windows PowerShell

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The PowerShell cmdlets

- Pronounced "command-let“
- The smallest unit of PowerShell functionality (aka like a command)
- Are always named in a verb-noun format
- PowerShell comes with 130 cmdlets (more can be “snapped in”)
- Are instances of .NET classes, not stand-alone executables
- Are just compiled DLL files that are loaded into the PowerShell process at startup

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Demos

One:

- Using the PowerShell console show the get-process cmdlet.
- Then show the get-command cmdlet. ***Note how many cmdlets there are.***

Two:

- Load the ESM, and again use the get-command cmdlet. Note how there are now more cmdlets.
- Run the get-pssnapin cmdlet and show the Exchange Management Shell snap-in.

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Other cmdlet Tidbits

- Typically, written using C# (but VB can be used)
- Parsing, error presentation, and output formatting are typically handled by the Windows PowerShell runtime (not a cmdlet)
- cmdlets process a single record at a time

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Executing cmdlets

- Verb-Noun
  - Verb-Noun –FirstP Val –SecondP Val, Val –ThirdP: Val
- You can alias
  - Set-Alias abc Verb-Noun
- Parameters/arguments can be positional
  - Verb-Noun Val
- Many arguments can be wild carded
  - Verb-Noun V*
- Partial parameter names allowed
  - Verb-Noun –P Val

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Demo

One:

get-process -name powerpnt

get-process -name powerpnt,powershell

get-process -name:powerpnt

Two:

gps

Three:

get-process powerpnt

Four:

get-process p*

Five:

get-process -n powerpnt

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What about existing interfaces?

- **You can still use them!**
- PowerShell is fully backward compatible
- Other command lines tools still work
- All other interfaces also still work
  - Windows Management Instrumentation (WMI)
  - Active Directory Services Interface (ADSI)
  - Microsoft .NET Framework and COM

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Demo

One:

```
ipconfig
```

Two:

```
get-wmiobject
    Win32_NetworkAdapterConfiguration
```

Three:

```
$User =
    [ADSI]"LDAP://CN=user1,OU=Accounts,DC=companyabc,DC=com"
```

Four

```
$IE = new-object -com
    InternetExplorer.Application
$IE.visible = $True
```

Five

```
$Ping = new-object
    Net.NetworkInformation.Ping
$Ping.send("host1")
```

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Getting Help

- Man-page style help on language and commands
  - Help
  - Help <command>
  - <command> -?
  - Help About_While
  - Get-Help * | Where {$_.Synopsis -match "process"}
- Finding Commands
  - Get-Command get*
  - Get-Command –Noun Process
  - Get-Command –Type {Alias | Function | Filter | Cmdlet | ExternalScript | Application | Script | All }

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Demo

One:

help get-process

help get-process -full

Two:

Help about_Escape_character

These are located at…

C:\Windows\System32\WindowsPowerShell\v1.0\en-US

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PowerShell Tab Completion

- Works with files and folders
- **But wait there is more!**
  - cmdlets
  - parameters
  - variable attributes

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Demo

Demo:

C:\progra[tab]

get-p[tab]

get-process –n[tab]

$ie.v[tab]

Note: The IE object should still present from past demo (do not close open console).

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Variables

- Names begin with $
- Can contain objects not just values
- Can contain a collection of objects
  - $users[0], $users[1], etc.
- Can be used directly from the command line
- Can be declared as an object type
  - [int]myinteger
- Keep variable names simple without special characters and spaces (- or _ is ok)
- ***Current pipeline object is the $_ variable***

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Demo

One (string):
$MyVar = "mystring"

Two (array):
$MyVar = "a","b","c","d"

Three (object collection):
$MyVar = get-process

Four:
get-service | where {$_.status -eq "Running" }

Aliases

- Used to simulate existing shell commands
  - Set-Location = cd
  - Get-Childitem = dir
- Use them to reduce typing
- You can create your own
  - Set-Alias
- **But watch out!**
  - Don't use cryptic aliases (you may forget)
  - The same may not be used by others

Demo

One:
get-alias

Two:
set-alias myalia get-item
myalia

PowerShell is Object Based!

- A PowerShell cmdlet returns an object collection
- Objects in these collections have:
  - Methods
  - Properties
- **Hurray!** - Traditional text parsing is now replaced with direct object manipulation
- Objects can be looked at, piped, modified, manipulated, and so on
- **Get-Member** - "Reflect" on an object to learn more about it

Demo

One:
get-service
Notice the default view!

Two:
get-service | gm
Notice the different attributes of the resulting object collection…

The Pipeline

- Just like any other shell pipeline
- **Except!** - it works with objects (not just text)
- All PowerShell commands execute within a pipeline
- Use the | to pipe information (text + objects) between commands
- All pipelines end with the Out-Default cmdlet
  - It selects a set of properties and their values
  - Then displays those values in a list or table
- **PowerShell also gives you a nice default view…**

Demo

One:

ipconfig | select-string “IPv4 Address”

Two:

get-process | where-object {$_.Company -match ".*Microsoft*"}

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Demo

Three:

get-process | where-object {$_.Company -match ".*Microsoft*"} | select Name, ID, Path

Four:

get-process | where-object {$_.Company -match ".*Microsoft*"} | select Name, ID, Path | convertto-html > report.html

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Objects in the Pipeline

What is so cool about objects in the pipeline?

You can create extremely powerful “one-liners”!

import-csv .\users.csv | foreach {Get-ADObject -filter "(&(samAccountName=$($_.employeeID)))"} | select @{name='Name';Expression={$_.cn} },@{ name='Accountname'; Expression={$_.sAMAccountName} },@{ name='Mail'; Expression={$_.mail}} | export-csv results.csv

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Demo (EMS)

Create Mailbox:

new-mailbox -alias tyson -name tyson -database "Mailbox Database" -org Users -UserPrincipalName tyson@companyabc.com

Move Mailbox:

move-mailbox tyson -targetdatabase “db2"

Move a whole bunch of mailboxes:

get-mailbox -server dc01 | move-mailbox -targetdatabase “db3“

Create a mailbox report:

get-mailbox | export-csv report.csv

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Providers

- Provides access/interface to a hierarchical stored data
- Treated as “Drives” in PowerShell
  - Filesystem, Registry, Alias, Certs, Env, Functions, Variables, etc.
- Drives and their items are navigated accessed just like the hard disk

Get-ChildItem	dir	ls
Get-Location	cd	pwd
Get-Content	type	cat
New-Item –type Directory	mkdir	mkdir
Set-Location	cd	cd

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Demo

get-psdrive
cd function:
dir
get-content elevate
cd c:\
dir
cd hkcu:
dir
get-itemproperty “Console”

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Extended Type System (ETS)

- **PowerShell is almost typeless!**
- Common interfaces for operating on pipeline objects independent of type (for example .NET, WMI, XML, ADO, ADSI etc)
  - Every object is a [psobject]
- Allows you to transparently extend objects
  - Aliases, Notes, Properties, Methods, PropertySets, etc..
- Type extensions can be defined via Types.ps1xml configuration files
  - **DO NOT MODIFY DEFAULT Types.ps1xml!**
- Or objects can be manipulated interactively using the Add-Member cmdlet

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Demo

One:

```
$ProcList = get-process "Power*"
$ProcList | add-member -Type scriptProperty "RunTime"
    {return ((date) - ($this.starttime))}
$Proclist | select Name, @{name='RunTime';
    Expression={"{0:n0}" -f $_.RunTime.TotalMinutes}}
```

Two:

```
$mystring = [string]”This is a string”
$mystring
$mystring.gettype()
```

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Demo

Three:

```
$myarray = [array]”This is an array”
$myarray
$myarray.gettype()
```

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Scopes

- **Global**
  - Created when the Windows PowerShell starts.
  - Visible from all child scopes.
- **Local**
  - Always the Current Scope.
  - A new local scope is created whenever you run a function, script, or start a new instance of the Windows PowerShell.
- **Script**
  - Created when script is started and removed when script is finished.
  - Only visible why script is running.
- **Private**
  - Is similar to a local scope.
  - With one key difference, definitions in the private scope aren’t inherited by any child scopes

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Demo

One:

```
function scope {
  $mymessage = “Hi!”
  write-host $mymessage
  write-host $mystring
  write-host “Done”
}

scope
$mymessage
```

Two:

```
function scope {
  $Global:mymessage = “Hi!”
  write-host $mymessage
  write-host $mystring
  write-host “Done”
}

scope
$mymessage
```

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Scripting Security

Shell Defaults

- Scripts do not run
- PowerShell files are associated with Notepad
- Must provide a path to a script file or executable in order to run it

You Can Configure

- ExecutionPolicy
  - Restricted
  - AllSigned
  - RemoteSigned
  - Unrestricted (No!!!)
- Centrally configurable via Group Policy

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Other Notables

- You can have your own startup profile:
  - <My Docs>\WindowsPowerShell\profile.ps1
- You can create command aliases
- “Pimp your Prompt”
- Many preferences are controllable via variables

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Demo

One:

```
function prompt {
  return “Its PowerShell:"
 }
```

Variable Preferences:

```
dir Variable:*preference*
dir Variable:Maximum*
dir Variable:Report*
```

Three:

Show PSCX profile.

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Scripting with Windows PowerShell

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Script Files

- Scripts are just plain .ps1 text files (can’t be executed)
- Scripts are just a collection of commands
- Scripts are good for repeatable automation tasks
- Scripting tasks and console tasks are interchangeable
- Scripts are also great as “Dot Sourced” libraries
  - . .\cool-functions.ps1

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```
[illegible] companyabc.com "OU=Accounts,DC=com [illegible]
[illegible]
Checking OU Name          [OK]
Checking Import File      [OK]
Please enter password: ********
```

ProvisionExchangeUsers.ps1
Uses a csv based import file to provision mail-enabled users into an Exchange Server 2007 environment.

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```
[illegible] .ps1 "OU=Servers,OU=Managed Objects,DC= [illegible]
[illegible] - Administrator
[illegible]
Checking OU Name          [OK]
Do you want me to generate a random password?
[Y] Yes  [N] No  [?] Help (default is "Y"): N
Then please enter a password: ****************
Getting Server Info       [DONE]
Getting Status Info       [DONE]
Changing Passwords
```

ChangeLocalAdminPassword.ps1
Allows an Administrator to change the local Administrator password for all machines in an OU.

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ServiceNow-Replication.ps1
Allows an administrator to check if a list of users are members of a specified Active Directory group.

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Scripting Best Practices

- Always plan your scripts out
- Try to always sign your scripts
- Try not to use Aliases
- Write scripts using PowerShell long hand
- Always include comments in your scripts
- For large complex scripts provide documentation
- Test, test, test…

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Seminar Wrap-up

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PowerShell Resources

Microsoft
- http://www.microsoft.com/powershell

Blogs
- http://blogs.msdn.com/PowerShell/
- http://thepowershellguy.com/blogs/posh
- http://www.leeholmes.com/blog/
- http://www.networkworld.com/community/?q=kopczynski -or-
- http://www.taosage.net

Others
- http://www.microsoft.com/technet/scriptcenter/hubs/msh.mspx
- http://www.codeplex.com/PowerShellCX/

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Convergent Computing Services

- “Automation (Admin/Ops Tasks) Health Check” – Review the level of automation within an organization on routine administrative and operational tasks, and provide a 5-7 page write-up on ways the organization can simplify these tasks through scripts
- CCO can come in and build-out Scripts to Meet Specific Requirements
- CCO can cross-train and knowledge transfer automation scripting knowledge by showing you how to Create Scripts, Understand Best Practices, and CCO can Provide Sample Code
- Some combination inbetween that meets your needs

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Next Seminar

- “High Availability and Disaster Recovery of a Windows Networking Environment” (Windows, Exchange, SQL)
  - Dec 4th (Tues), 9am-11:30am (San Francisco Hyatt)
  - Dec 6th (Thurs), 9am-11:30am (Santa Clara Marriott)
  - Dec 11th (Tues), 9am-11:30am (Sacramento Hyatt)
- Details:
  - Free
  - To Register for this Seminar:
    - Email - seminar@cco.com
    - --or--
    - Call – (510) 444-5700 x179 (Seminar Registrations)
    - --or--
    - Write – “HA and DR Seminar {location}” on today's seminar eval form

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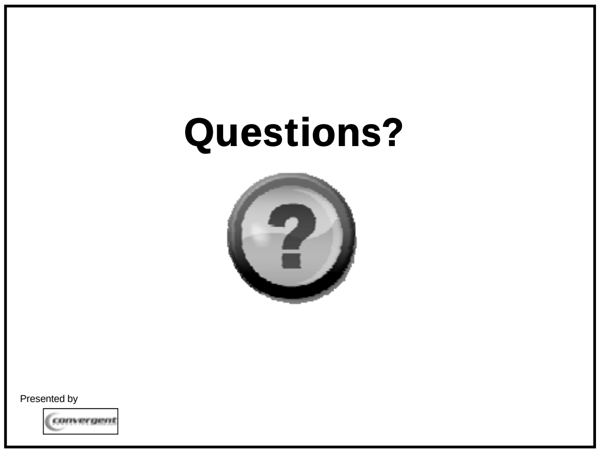

Questions?

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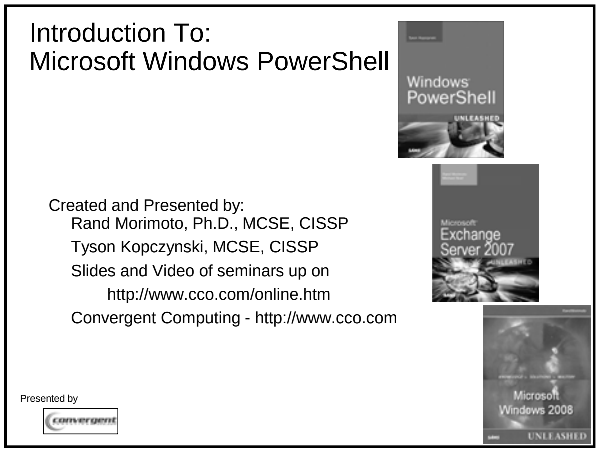

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