



PowerShell for Beginners

Basics and Complex Exercises

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Network Tools and Configuration

Old tools and new Cmdlets

Flashback to Command Prompt

- ▶ Information / Debugging
 - ▶ `ping, tracert, ipconfig, netstat`
- ▶ Network Configuration
 - ▶ `netsh`

- 👍 well-known and established (some even cross-OS)
- 🚫 complicated syntax, few structure, text based

PowerShell to the Rescue



Quelle: <https://www.kino.de/artikel/pj-masks-namen--p8j587qhv5>

Information / Debugging

- ▶ Connectivity hosts, network path to a host
- ▶ *ping* becomes...
- ▶ `Test-Connection`
- ▶ *tracert* (*tracert*) becomes...
- ▶ `Test-NetConnection -TraceRoute <Host>`

Information / Debugging

- ▶ IP configuration, adapter information (*ipconfig /all*)
 - `Get-NetIPConfiguration`
 - `Get-NetAdapter`
- ▶ Routes and connections (*netstat*)
 - `Get-NetTCPConnection`
 - `Get-NetRoute`
- ▶ Miscellaneous other Cmdlets available for detailed configuration
 - `*-NetIPAddress`

IP Configuration of a Network Adapter

- ▶ Cmdlets from the `NetIPAddress` family
- ▶ Manual configuration of the default gateway
- ▶ **Caution:**
for DNS server settings, we have to use
`Set-DnsClientServerAddress`

Further Hints

- ▶ Network configuration is very diverse.
- ▶ Serves well as building block or entry point for PS exercises.
- ▶ Link to network technology lessons
(emphasize transition cmd → PowerShell)
- ▶ Maybe even Cisco Packet Tracer will soon feature a PowerShell tile (?)

Access to remote Systems

Executing command from remote, execute jobs

Executing Commands over the Network

- ▶ Administrators often execute commands on remote systems
- ▶ Establishing an RDP or SSH session is too laborious
- ▶ Simply execute commands in PowerShell with `Invoke-Command`
 - Execute remote command with `-ScriptBlock`
 - Remotely execute PowerShell script with `-FilePath`

Invoke-Command

Example

- ▶ List running services on a remote system
 - By executing a command (a pipeline)

```
PS C:\Windows\System32> Invoke-Command -ComputerName localhost -ScriptBlock {  
Get-Service | Where-Object { $_.Status -eq "Running" } }
```

- By executing a script *RunningServices.ps1*

```
PS C:\Users\anr> Invoke-Command -ComputerName localhost -FilePath ".\RunningS  
ervices.ps1"
```

☞ The content of the script file actually is the script block ;-)

Invoke-Command

► Problem:

- Commands on remote computers that have long runtimes
- PowerShell session is blocked during execution

► Solution:

- Let command `Invoke-Command` run as (background) job
- Append parameter `-AsJob`
- Job runs in the background, PS session is available in the meantime
- Roughly equivalent to `--daemon` option (resp. `&`) under GNU/Linux

Windows Features

Install and manage features and capabilities

Installing Windows Features

- ▶ Features are extensions that are present, but inactive
- ▶ Examples:
 - Telnet client, TFTP client
 - OpenSSH client / server,
 - Misc. Remote Server Administration Tools (RSAT)
- ▶ Management possible through GUI as well as PowerShell
- ▶ PowerShell Cmdlets replace program *Deployment Image Servicing and Management*, in short `dism`

Windows Features

- ▶ Windows differentiates (at a workstation) *feature* and *capability*, just like a Windows Server differentiates *roles* and *features*
- ▶ Cmdlets from the families
 - `WindowsOptionalFeature`
 - `WindowsCapability`

Windows Features

- ▶ Management of features is more of a server specific topic
 - May be prepared during lessons using a client (workstation)
 - e.g. configuration of an SSH client
 - Interfaces and links to network technology lessons

Exercises PS61, PS62

Windows Features, Network Configuration

- ▶ Install features und capabilities (PS61)
- ▶ Retrieve network configuration
- ▶ Investigate network connections
- ▶ Execute commands on remote systems