



PowerShell for Beginners

Basics and Complex Exercises

© Julius Angres 2023

Table of Contents

- ▶ Introduction
- ▶ Presentation PowerShell
- ▶ PowerShell Basics (Cmdlets, self-help)
- ▶ Pipeline, manage processes and services
- ▶ Users and groups, user profiles
- ▶ File system and NTFS-permissions, shares, network drives
- ▶ Network configuration
- ▶ Server modules, log analysis, web access, jobs
- ▶ Programming with PowerShell (ps1-scripts, accessing .NET objects)
- ▶ Create and present exams and complex exercises with PowerShell

About the Speaker

- ▶ Julius Angres, julius.angres@outlook.de
- ▶ Studies of mathematics and applied computer science in Mannheim und Kiel
- ▶ Software developer at IBM Research Lab Böblingen
- ▶ Vocational school teacher for Information Technology and Mathematics in Neumünster (SH)
- ▶ Main focus on operating systems and networks

Introduction of Participants

- ▶ Who am I ?
- ▶ Where / What do I teach ?
- ▶ Why am I here ?
- ▶ My current PowerShell skill level is...



This Course...

- ▶ ... requires no previous knowledge in PowerShell.
- ▶ ... shall teach basics using the PowerShell.
- ▶ ... is based on more than 250 slides 😊
- ▶ ... introduces several areas of work that we as educators can work with our students in.
- ▶ ... is pleasing in the best case and endurable in the worst case.
- ▶ ... will probably not satisfy all participants' desires.

PowerShell – first Impression

Background and Motivation

An Administrator's Tale...

- ▶ `cat file.txt | grep | tr | sed | awk | grep | cut | grep | ...`
- ▶ `for usebackq /f "tokens=* delims=" %%i do for /L %%j do ...`
- ▶ `icacls %basedir% /inheritance:r /remove:g SYSTEM /grant "Benutzer(OI)(CI)M"`
- ▶ **My Windows Server does not have a GUI → HELP!**
- ▶ **Why is .NET so deeply integrated into the OS ?**
- ▶ **What this batch file do ???**
- ▶ ***Ntdll.dll missing***
→ would not have happened with Linux ;-)

An Administrator's Tale

- ▶ *Hands-on:*
- ▶ I am looking for all DLL-files located directly in the Windows folder System32 whose name starts with ,n' and whose size is bigger than 1 MB.
- ▶ *Bonus:* Which of those files has the oldest last write time timestamp?
- ▶ *Time:* 3 min
- ▶ Use tools of your choice (CLI or GUI) to find those files.
- ▶ Use the GUI to check your results!
(How long does that take using the GUI ?)

Why PowerShell?

- ▶ Flexibility through cross-platform implementations
- ▶ Uses objects instead of plain text output
- ▶ Interaction with .NET framework resp. C# programming
- ▶ Since Build 14791 of Windows 10 PowerShell is the Windows default shell
 - ▶ → Right click on the Windows icon shows default shell
- ▶ Command prompt (cmd.exe) is no longer in development
 - ▶ → Transition of legacy scripts etc.

Definition PowerShell

- ▶ PowerShell is a cross-platform framework from Microsoft
- ▶ PowerShell consists of a command line interpreter (CLI) and a script language



Windows PowerShell



Azure Shell

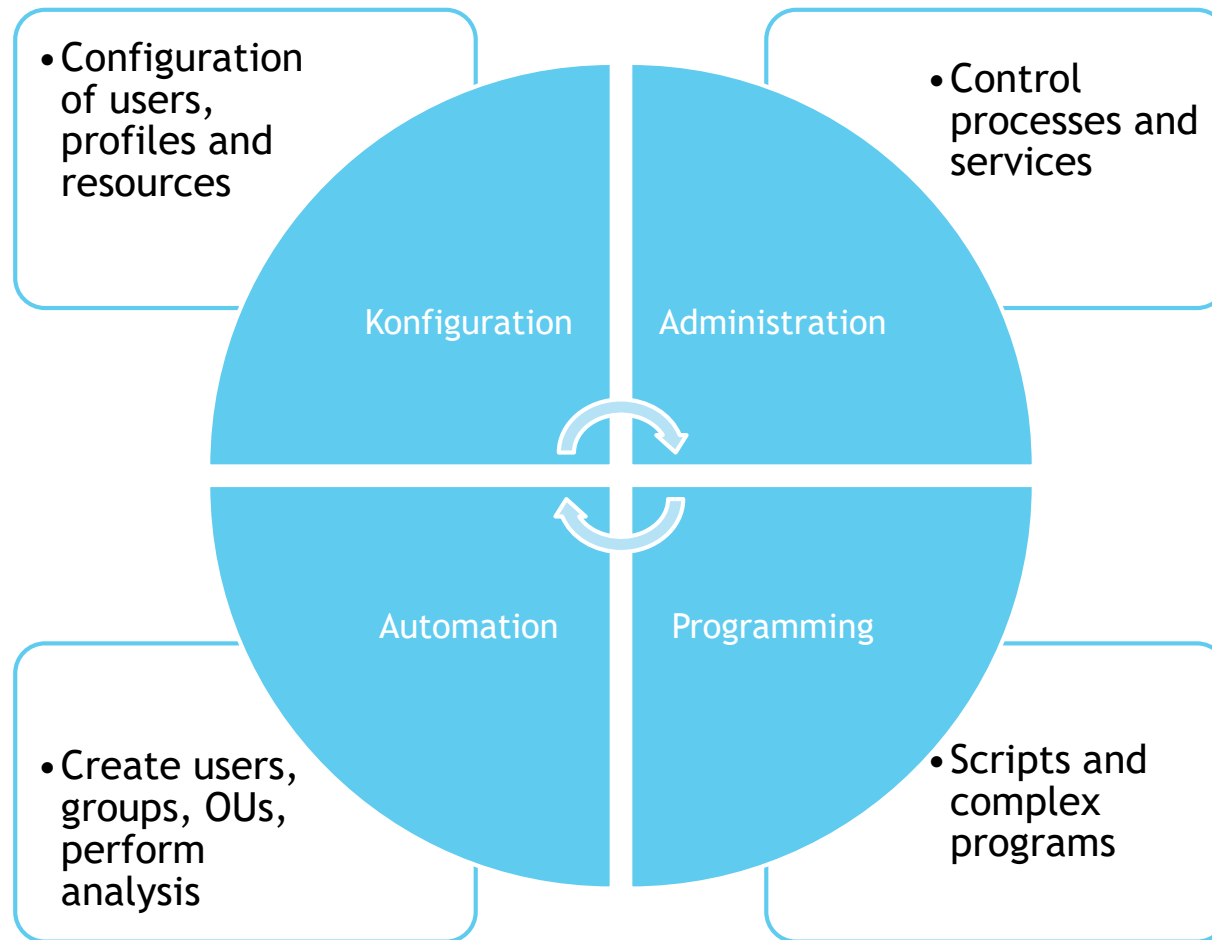


GNU/Linux PowerShell (pwsh)



macOS PowerShell

The Power of ~~Love~~ PowerShell



PowerShell vs. CMD

Command Prompt



- ▶ Based on commands (programs)
- ▶ Processes strings
- ▶ Grown structure in Windows environments
- ▶ Scripts in batch language (*.bat)

PowerShell



- ▶ Based on Cmdlets (Commandlets)
- ▶ **Processes objects**
- ▶ Newly developed since Windows 7
- ▶ **Integrated into .NET framework**
- ▶ Scripts in PS language (*.ps1)
- ▶ **Core is cross-platform**

PowerShell vs. CMD

Command Prompt

- ▶ Stopping the Windows-Audio (AudioSrv) service and setting startup type to *disabled*.

C:\> Administrator: Eingabeaufforderung

```
C:\Windows\system32>net stop Windows-Audio
Windows-Audio wird beendet.
Windows-Audio wurde erfolgreich beendet.

C:\Windows\system32>sc config AudioSrv start= disabled
[SC] ChangeServiceConfig ERFOLG

C:\Windows\system32>_
```

PowerShell

- ▶ Stopping the Windows-Audio (AudioSrv) service and setting startup type to *disabled*.

Administrator: Windows PowerShell

```
PS C:\Windows\system32> Stop-Service Windows-Audio
PS C:\Windows\system32> Set-Service -Name AudioSrv -StartupType Disabled
PS C:\Windows\system32>
```

Getting started with PowerShell

Start, Installation, Upgrade, Update

Starting PowerShell

- ▶ Open search bar (Windows + S) and enter *PowerShell* or right click on the Windows icon in the bottom left corner
- ▶ Run as administrator with elevated privileges (needed for system changes due to UAC)
- ▶ On Windows Server the user *Administrator* generally enjoys elevated privileges.

Update or install PowerShell

- ▶ Installation of newest version (7.3.4) via github (also as deb- and rpm-package):

<https://github.com/PowerShell/PowerShell>

- ▶ Installation of Windows Terminal via Microsoft Store:

<https://apps.microsoft.com/store/detail/windows-terminal/9N0DX20HK701?hl=de-de&gl=de>

Update or install PowerShell

► Update: Start PowerShell

PowerShell 7.3.3


A new PowerShell stable release is available: v7.3.4
Upgrade now, or check out the release page at:
<https://aka.ms/PowerShell-Release?tag=v7.3.4>

We are going to write a function searching for updates later on.

```
PS> winget search Microsoft.PowerShell
```

```
PS> winget install --id Microsoft.PowerShell --source winget
```

Exercises in this Course

- ▶ Usually at the end of a unit or chapter
 - ▶ Exercises provide examples for the specific topics
 - ▶ Can be mostly used as introduction for students
 - ▶ Feel free to further explore and „play“
 - ▶ Exercises with the  icon can also be solved under GNU/Linux
 - program names or paths must sometimes be adjusted accordingly
- 👉 After finishing the course you will be provided all exercises in the student version under a CC BY-NC-SA license

Exercise PS11, PS12

Gathering system information

- ▶ Get accustomed to the PowerShell
- ▶ Find similarities and differences to `cmd.exe`
- ▶ Read out a computer's hardware configuration