PowerShell Cardiff User Group

Ways to run code in parallel with little effort

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@GetPSugUK

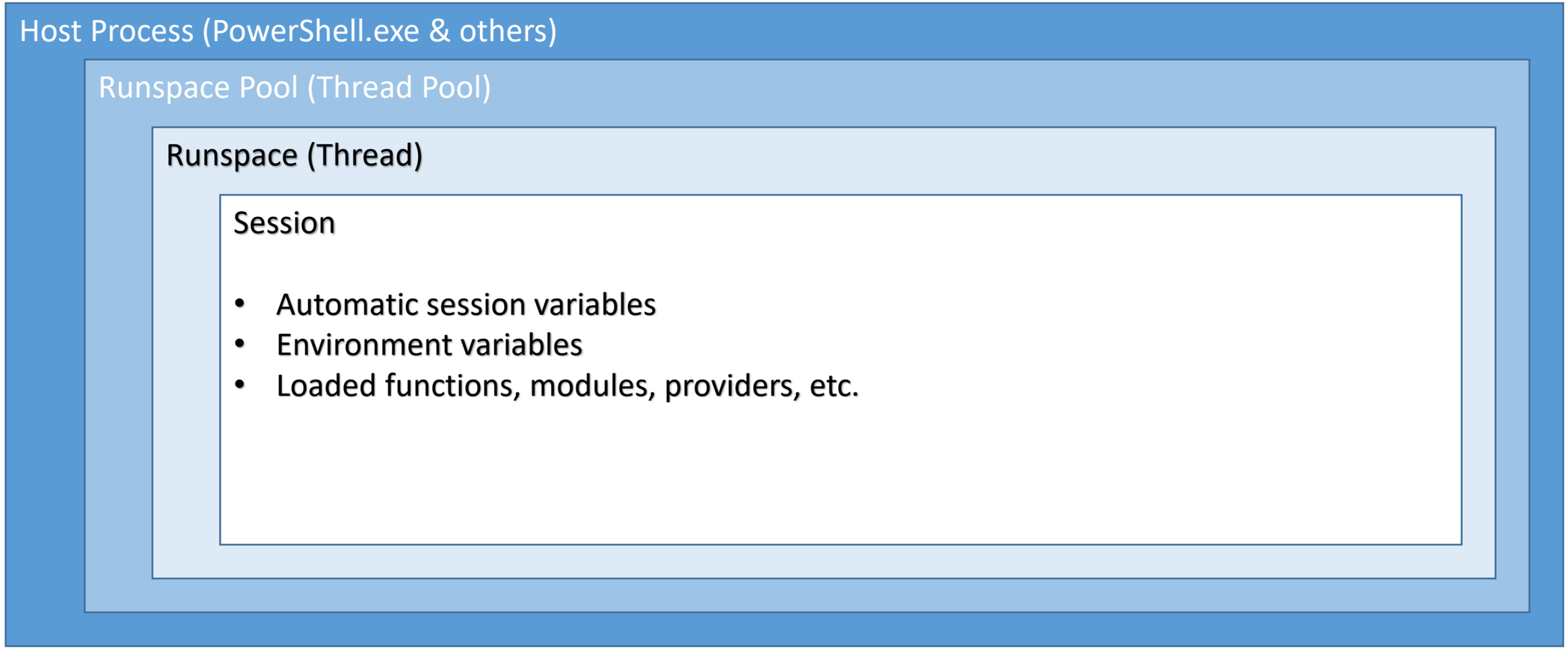
Inspiration

A friend, Martynas Valkunas, asked me about how to execute code in parallel in PowerShell. He was developing an clean-up script for Azure Resource Groups.

What is available to us?

- Start-Process cmdlet without –Wait switch
- Invoke-Command
- PowerShell Workflow
- PowerShell Background Jobs
- 3rd-party modules (PowerShell Gallery):
  - **PSParallel (only contains Invoke-Parallel cmdlet)**
  - **PoshRSJobs**
  - ThreadJob
  - SplitPipeline
  - PForEach
  - Jojoba (dependency on PoshRSJobs)

Basic anatomy of PowerShell host process



Start-Process

```powershell
$data | ForEach-Object {
    Start-Process `
        -FilePath 'powershell.exe' `
        -ArgumentList @(
            '-File', 'C:\Scripts\Azure\ResourceGroupJanitor.ps1',
            '-Subscription', $PSItem['SubscriptionId'],
            '-ResourceGroup', $PSItem['ResourceGroupName']
        ) `
        -WindowStyle Hidden `
        # -Wait
}
```

Invoke-Command

```powershell
$minDays = 35

Invoke-Command `
    -ComputerName $serverList `
    -ThrottleLimit 365 `
    -ScriptBlock {
        param (
            [Int]
            $MinimumDays
        )
        # ...
    } `
    -ArgumentList $minDays
```

```powershell
$minDays = 35

Invoke-Command `
    -ComputerName $serverList `
    -ThrottleLimit 365 `
    -FilePath 'C:\Scripts\ProfileCleanup.ps1'
    -ArgumentList $minDays
```

Windows PowerShell Workflow – parallel {}

```
workflow Get-InventoryData {

    parallel {
        Get-CimInstance -ClassName Win32_ComputerSystem
        Get-CimInstance -ClassName Win32_BIOS
    }
}

Get-InventoryData -PSComputerName 'srv01', 'srv02', 'srv03'
```

Windows PowerShell Workflow – foreach –parallel

```
workflow Get-InventoryData {
    param (
        [String[]]
        $ComputerName
    )

    foreach -parallel ($Name in $ComputerName) {
        Get-WmiObject -Class Win32_BIOS -PSComputerName $Name
        Get-WmiObject -Class Win32_ComputerSystem -PSComputerName $Name
    }
}
```

Windows PowerShell Workflow – sequence {}

```
workflow Get-InventoryData {

    parallel {
        Get-CimInstance -ClassName Win32_ComputerSystem
        Get-CimInstance -ClassName Win32_BIOS

        sequence {
            Get-Process
            Get-Service
        }
    }
}

Get-InventoryData -PSComputerName 'srv01', 'srv02', 'srv03'
```

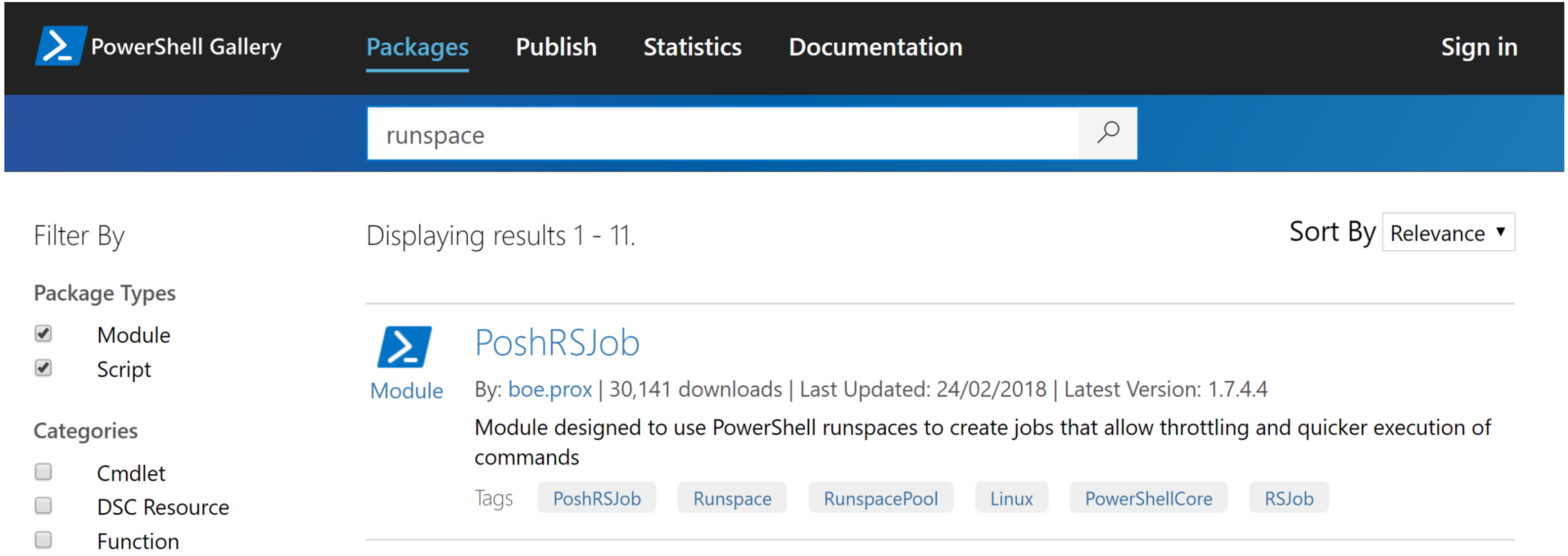
Windows PowerShell Workflow – InlineScript {}

```
workflow InvokeMe {

    # Execute any standard PowerShell code
    InlineScript {
        Get-AWSRegion
    }

    Get-ChildItem -Path 'C:\Users\' -Directory:$true |
        ForEach-Object {
            InlineScript {
                # Does not work inside ForEach-Object
            }
        }
}
```

PowerShell Gallery



PowerShell Background Jobs – Start-Job …

```powershell
Get-ChildItem -Path 'C:\Users\' -Directory |
    ForEach-Object {
        Start-Job
            -Name $PSItem.Name `
            -ScriptBlock {
                param (
                    [String]
                    $UserPath
                )
                # Do work
            } -ArgumentList $PSItem.FullName
    }
```

```powershell
$functionName = 'Function:Start-Cleanup'
$scriptBlock = Get-Item $functionName |
    Select-Object -ExpandProperty ScriptBlock

Get-ChildItem -Path 'C:\Users\' -Directory |
    ForEach-Object {
        Start-Job -Name $PSItem.Name `
            -ScriptBlock $scriptBlock `
            -ArgumentList $PSItem.FullName
    }
```

PowerShell Background Jobs - Cmdlets

```
... = ... | Start-Job ... | Wait-Job | Receive-Job

... = ... | Start-Job ... | Wait-Job | Receive-Job -Keep

# Background Job cmdlets
Debug-Job
Get-Job
Receive-Job
Remove-Job
Resume-Job
Start-Job
Stop-Job
Suspend-Job
Wait-Job
```

PoshRSJobs – Start-RSJob …

```powershell
Get-ChildItem -Path 'C:\Users\' -Directory |
    ForEach-Object {
        Start-RSJob
            -Name $PSItem.Name `
            -ScriptBlock {
                param (
                    [String]
                    $UserPath
                )
                # Do work
            } `
            -ArgumentList $PSItem.FullName `
            -Throttle 32 # PoshRSJobs feature
    }
```

```powershell
$functionName = 'Function:Start-Cleanup'
$scriptBlock = Get-Item $functionName |
    Select-Object -ExpandProperty ScriptBlock

Get-ChildItem -Path 'C:\Users\' -Directory |
    ForEach-Object {
        Start-RSJob -Name $PSItem.Name `
            -ScriptBlock $scriptBlock `
            -ArgumentList $PSItem.FullName `
            -Throttle 13
    }
```

PoshRSJobs - Cmdlets

```
... = ... | Start-RSJob ... | Wait-RSJob | Receive-RSJob

... = ... | Start-RSJob ... | Wait-RSJob | Receive-RSJob -Keep

# PoshRSJobs cmdlets
Get-Job
Receive-Job
Remove-Job
Start-Job
Stop-Job
Wait-Job
```

Invoke-Parallel

```powershell
Get-ChildItem -Path 'C:\Users\' -Directory |
    Invoke-Parallel `
        -ScriptBlock {
            param (
                [DirectoryInfo]
                $Directory
            )
            # Do work
        } -ThrottleLimit 128
```

```powershell
$functionName = 'Function:Start-Cleanup'
$scriptBlock = Get-Item $functionName |
    Select-Object -ExpandProperty ScriptBlock

Get-ChildItem -Path 'C:\Users\' -Directory |
    Invoke-Parallel `
        -ScriptBlock $scriptBlock `
        -ThrottleLimit 128
```

Thank you / Questions ?!?

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