

The future of NANO server

Thorsten Butz

#PSUGH> 'PowerShell Saturday Hannover (2017-08-26)'

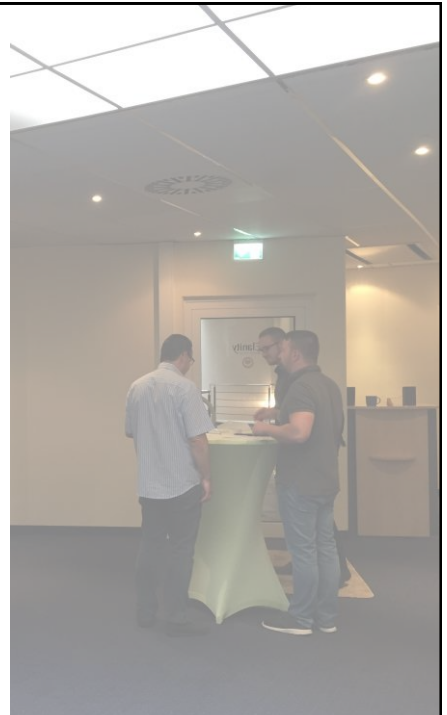
Thanks to the sponsors & organisers

#PSUGH>



Netz-Weise
Lernen von den Besten.

Elanity
Network Partner



Podcast: Sliding Windows



www.slidingwindows.de/?feed=slw-mp3

Get-Guest

- Bruce Payette
- Bartek Bielawski, Joey Aiello
- Rolf Masuch

(..)



The future of nano server in a nutshell



Nano

Chapter 1

Dont look back in anger: NANO (initial release)

```
# Path to extracted Windows Server 2016 ISO image
$mediapath = 'c:\ws2016\'

# Load module
Import-Module `
"$mediapath\NanoServer\NanoServerImageGenerator\NanoServerImageGenerator.psm1"

# Create
New-NanoServerImage -MediaPath $mediapath -Edition 'Datacenter' `
  -DeploymentType Guest -MaxSize 100GB -TargetPath 'c:\nano1.vhdx'
```



Nano Server in v1607 (initial release of WS 2016)



- Install image NanoServer: 169 MB
- "Zero foot print": no roles and features onboard
- Main purpose: "Compute clusters"
 - Hyper-V-Host
 - Storage: SoFS, etc.
- Purpose 2: "born-in-the-cloud" application
- Usage: physical, virtual, container
- Headless, no local logon
- Only 64-bit applications
- PowerShell Core
- Limited roles (e.g. no dc)
- No activation required/supported
- Manual windows updates
- CBB (only)
- Must be provisioned

Footprints (WS 2016 RTW)

| ImageName | ImageSize(Byte) | ImageSize(GB) | FileCount | |
|---|--------------------|---------------|---------------|--------|
| Windows Server 2012 R2 SERVERSTANDARDCORE | 6897618255 | 6,42 | 70229 | |
| Windows Server 2012 R2 SERVERSTANDARD | 12069723893 | 11,24 | 89410 | |
| Windows Server 2012 R2 SERVERDATACENTERCORE | 6876269628 | 6,4 | 70120 | |
| Windows Server 2012 R2 SERVERDATACENTER | 12066707039 | 11,24 | 89288 | |
| Windows Server 2016 SERVERSTANDARDCORE | 9353610808 | 8,71 | 67418 | 60,6% |
| Windows Server 2016 SERVERSTANDARD | 15433268353 | 14,37 | 113677 | 100,0% |
| Windows Server 2016 SERVERDATACENTERCORE | 9353315396 | 8,71 | 67092 | 60,6% |
| Windows Server 2016 SERVERDATACENTER | 15440147913 | 14,38 | 113554 | 100,0% |
| Windows Server 2016 SERVERSTANDARDNANO | 800233355 | 0,75 | 8182 | 5,2% |



Windows as a Service

Chapter 2

Prelude: Windows as a Service



Windows 10

- Version **1507** (initial release, Threshold 1), Build 10240
- Version **1511** (November update, Threshold 2, Build 10586)
- Version **1607** (Anniversary update, Redstone 1, Build 14393)
- Version **1703** (Creators Update, Redstone 2, Build 15063)
- Version **1709** (Fall Creators Update, Redstone 3)
- Version **1803** ...

Remote Server Administration Tools for Windows 10

| | |
|-------------------------------|-----------------|
| Version: | Date Published: |
| 1.2 | 10/12/2016 |
| File Name: | File Size: |
| WindowsTH-RSAT_WS2016-x64.msu | 92.3 MB |
| WindowsTH-RSAT_WS2016-x86.msu | 69.5 MB |

Windows Server 2016

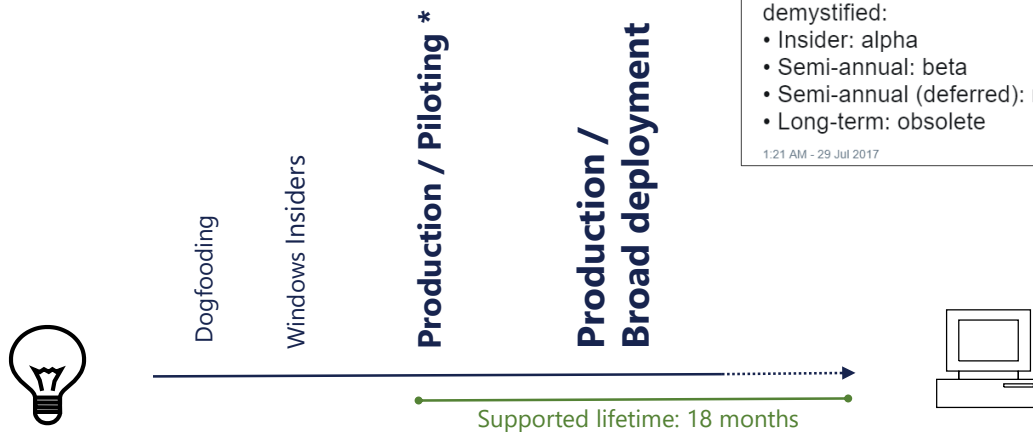
- Version **1607** (Redstone 1, Build 14393)
- Version **1709** (Redstone 3)

Paid Upgrade

Servicing branches: Lifecycle (prior to July 2017)



Semi-Annual Channel: Lifecycle (July 2017)



Helge Klein
@HelgeKlein

New servicing channel terminology demystified:

- Insider: alpha
- Semi-annual: beta
- Semi-annual (deferred): release
- Long-term: obsolete

1:21 AM - 29 Jul 2017

* also referred to as "targeted deployment"

Windows Server 2016: Releases, Branches, Installation Options

- v1607:
 - Core: LTSC
 - Desktop Experience: LTSC
 - Nano: CBB
- v1709 (insider preview, build 1627)
 - Core: Semi-annual

1st preview: build 16237
2nd preview: build 16257
3rd preview: build 16267

AUGUST 22, 2017 10:31 AM

Announcing Windows Server Insider
Preview Build 16267

By [Dona Sarkar](#) / Software Engineer, Windows and Devices Group

Delivering continuous innovation with Windows Server

Erin Chapple (General Manager, Windows Server), 2017-06-15:

"Based on that feedback, we are making an important change to Nano Server. This next release will focus on making Nano Server the very best container image possible. From these changes, customers will now see the Nano Server images shrink in size by more than 50 percent, further decreasing startup times and improving container density. As part of this effort to focus on containers, we will be removing the functionality for infrastructure-related roles. "



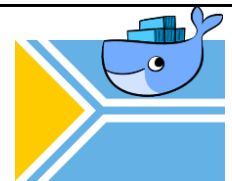
Ryan Yates 90

Basically you need to forget about it being a Developer only focused world (because it still is far from that) and bring back the infrastructure roles to Nano Server.

This is just a HUGE step backwards in innovation.

<https://blogs.technet.microsoft.com/hybridcloud/2017/06/15/delivering-continuous-innovation-with-windows-server/>

Nano Server in v1709 (2nd release of WS 2016)



- > 50% in size compared to previous
- No infrastructure roles
- No hyper-V, SoFS
- Main purpose: Support of .NET Core applications
- Usage: container, IoT Core installations
- Windows PowerShell, .NET Core, WM: no longer included by default (can be included when building a container)
- No install image, no servicing stack included (anymore); instead: docker hub

SMT: Server Management Tools

Device Manager
10.0.0.5 - PREVIEW
Refresh

7 device(s) require attention

- Computer
- Disk drives
- DVD/CD-ROM drives
- IDE ATA/ATAPI controllers
- Keyboards
- Network adapters
 - Microsoft Hyper-V Network Adapter
 - Microsoft Kernel Debug Network Adapter
- Other devices
- Processors
 - Intel(R) Xeon(R) CPU E5-2673 v3 @ 2.40GHz
- Storage controllers
 - Microsoft Hyper-V SCSI Controller
 - Microsoft Hyper-V SCSI Controller (1)
 - Microsoft Storage Spaces Controller
- Storage volumes
- System devices

Intel(R) Xeon(R) CPU E5-2673 v3...
PREVIEW

| | |
|-----------------|---|
| PROCESSOR | Intel(R) Xeon(R) CPU E5-2673 v3 @ 2.40GHz |
| MANUFACTURER | Intel |
| DRIVER DATE | 21.04.2009 |
| DRIVER VERSION | 10.0.10586.0 |
| DRIVER PROVIDER | Microsoft |

SMT preview service is being retired on June 30, 2017

Thank you for participating in the preview of Server management tools (SMT) in Azure. Your feedback is pivotal to how we are modernizing the server management experience. Today, we are announcing our plan to discontinue the SMT preview service in Azure on June 30, 2017. Customers have provided us consistent feedback that while they very...

May 17, 2017 By [Samuel Li \(MSFT\)](#)

Container

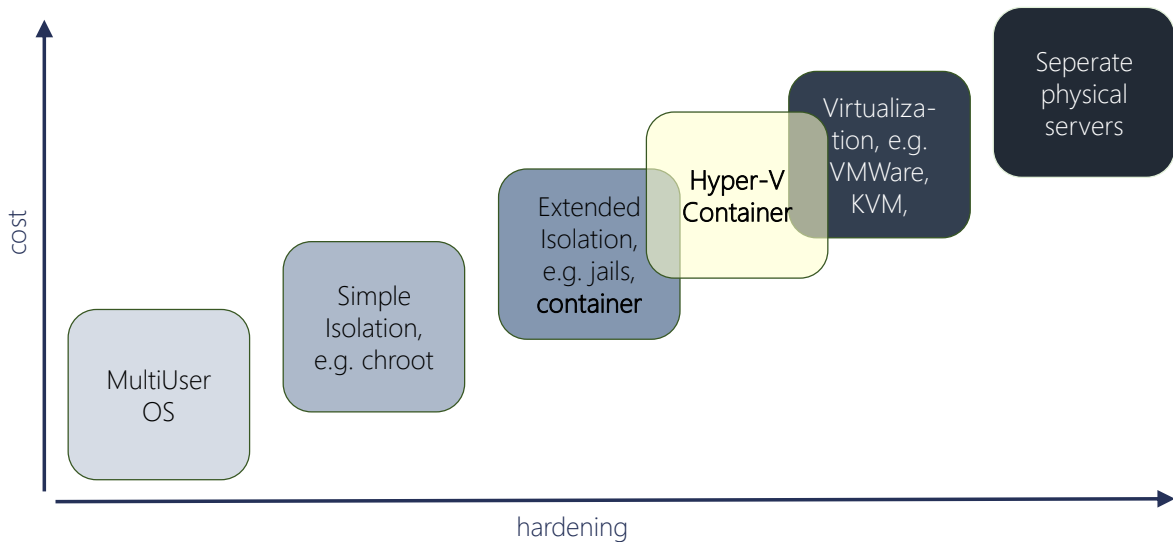
Chapter 3

Container

- Linux Container: docker.com
- Container in Windows Server
 1. Windows Server Container
Hyper-V not required
 2. Hyper-V Container
requires Hyper-V
 3. LinuxKit
Announced at DockerCon 2017
- Desktop solutions (Win 10, MacOS ..)



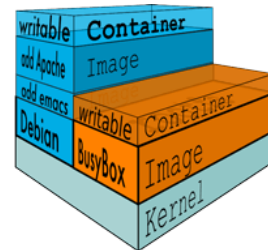
Basic principles



docker.com

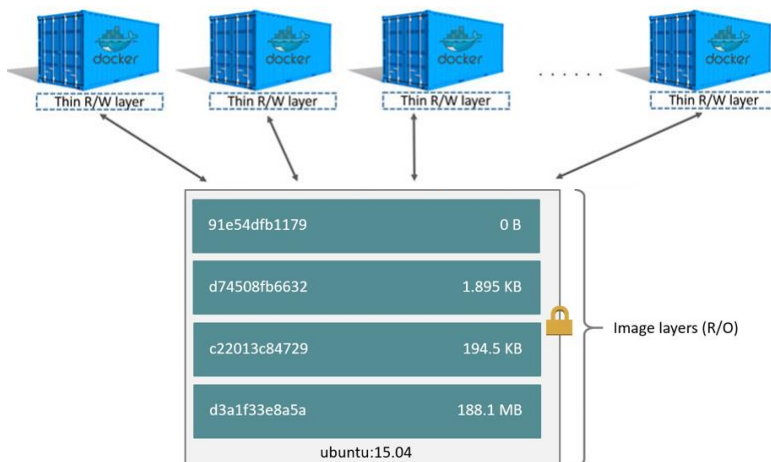


- Founded 2013
- Initially built upon "Linux Containers" (LXC), since v0.9: libcontainer
- Requires Linux 3.8 or later, using "Control Groups" (Cgroups), "Namespaces"
- Unifying FS: AUFS, OverlayFS, ZFS ..



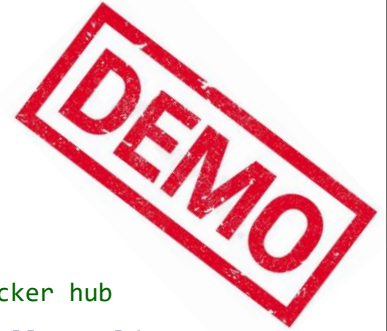
Figures: www.docker.com/what-docker

docker: Images and layers



<https://docs.docker.com/engine/userguide/storagedriver/imagesandcontainers/>

Setup docker (Ubuntu, Debian)



Install, verify

```
apt-get install docker.io
docker version
docker info
```

List containers

```
docker ps
```

List images

```
docker images
```

Search the docker hub

```
docker search hello-world
docker run hello-world
```

```
root@yakkety:~# docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
hello-world    latest    48b5124b2768   6 weeks ago   1.84 kB
root@yakkety:~# docker ps -a
CONTAINER ID   IMAGE     COMMAND   CREATED   STATUS    PORTS   NAMES
1b853698b126   hello-world  "/hello"   5 minutes ago   Exited (0) 5 minutes ago           happy_bardeen
root@yakkety:~#
```

From drawbridge to Hyper-V containers

- 2008: Hyper-V

Support for Legacy OS, enlightening modern OS

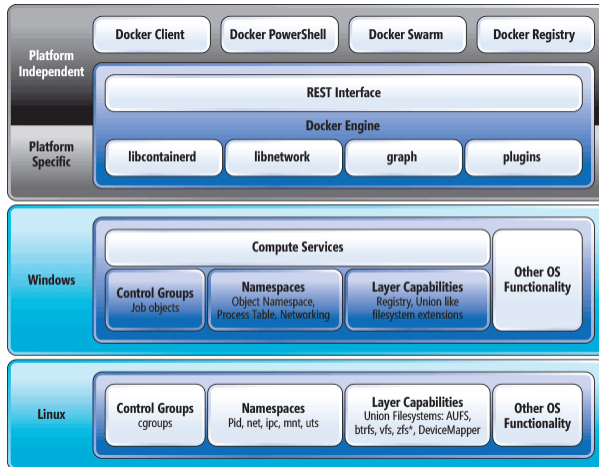
- 2011: Research project "[Drawbridge](#)"

Process isolation container technology for Azure

- 2013: Microsoft & Docker partnering

Development of a common management interface

Containers: Linux vs. Windows



"Comparing the Basic Architecture of Containers and Docker Across Windows and Linux",
<https://msdn.microsoft.com/en-us/magazine/mt797649.aspx>

Windows isolation modes

- Windows supports:
 - (default)
 - process
 - hyperv
- Hyper-V Container (Hyper-V must be enabled):
 - VM worker process "vmwp" on host, each container has it's own csrss process

```
C:\>docker info | findstr Isolation
Default Isolation: hyperv

C:\>docker run --interactive --isolation process --tty microsoft/nanoserver
docker: Error response from daemon: Windows client operating systems only support Hyper-V containers.
See 'docker run --help'.
```

Setup Windows Server Containers



```
# Enable Windows feature(s)
Install-WindowsFeature -Restart -Name Containers
Install-WindowsFeature -Restart -Name Hyper-V # Optional

# Get docker
Install-Module -Name DockerMsftProvider -Repository PSGallery
Install-Package -Name docker -ProviderName DockerMsftProvider

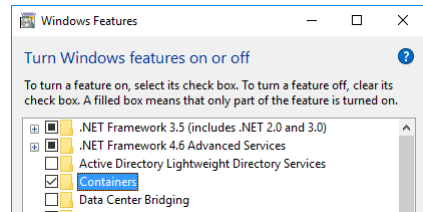
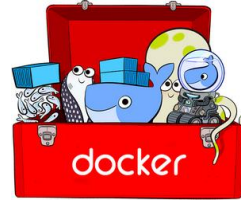
# Reboot
Restart-Computer

# Verify setup
Get-ComputeProcess
docker version
docker info
```

The screenshot shows the Docker Hub interface for the 'microsoft/nanoserver' repository. The browser address bar shows 'hub.docker.com/r/microsoft/nanoserver'. The page header includes 'PUBLIC REPOSITORY', the repository name 'microsoft/nanoserver' with a star icon, and 'Last pushed: 7 days ago'. Below this, there are tabs for 'Repo Info' and 'Tags'. The main content area is divided into two columns. The left column contains a 'Short Description' box with the text 'Windows Server 2016 Nano Server base OS image for Windows containers' and a 'Full Description' box with a paragraph about Nano Server and a link to the Getting Started Guide. The right column contains a 'Docker Pull Command' box with the command 'docker pull microsoft/nanos' and an 'Owner' box showing the Microsoft logo and name.

Dazed and confused ..

- a) Docker Toolbox
Legacy: "older Mac + Windows OS",
uses Virtualbox
- b) Docker for Windows
uses Hyper-V + Windows Containers
Linux + Windows Containers
- c) Containers for Windows
native Windows Containers,
no (G)UI, Isolation: Hyper-V



Install "Docker for Windows" (on Win 10)

#Requires -RunAsAdministrator

Enable-WindowsOptionalFeature -Online -NoRestart

-FeatureName 'Microsoft-Hyper-V-All', 'Containers'

Invoke-WebRequest

-uri 'https://download.docker.com/win/stable/InstallDocker.msi'

-OutFile 'c:\InstallDocker.msi'

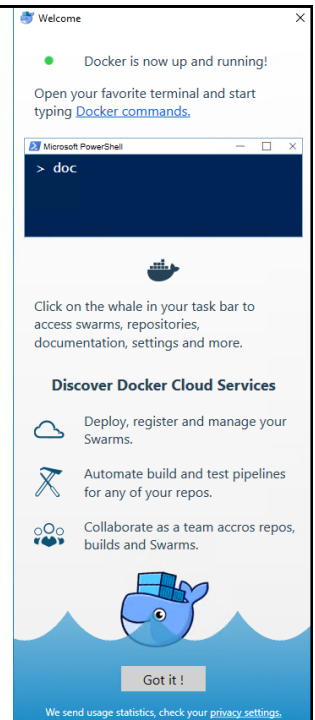
msiexec.exe /i 'c:\InstallDocker.msi' /passive /forcerestart



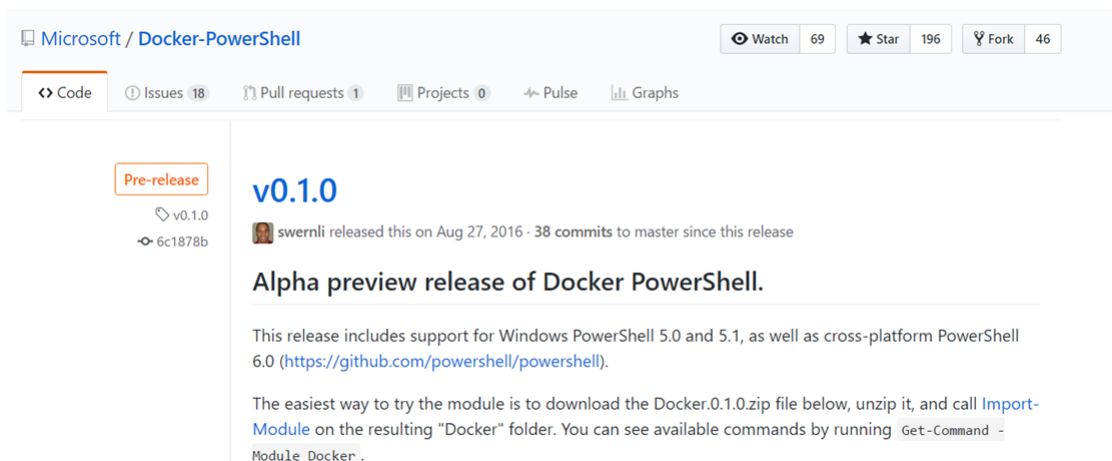
Docker is starting...
This will only take a few seconds
Docker for Windows

"Docker on Windows" (April 2017)

- "Community Edition"
- **docker version:**
Version 17.03.1-ce (Client, Server)
- Supports Windows Containers,
Hyper-V isolation only
- Supports Linux Containers
via Alpine Linux VM in Hyper-V

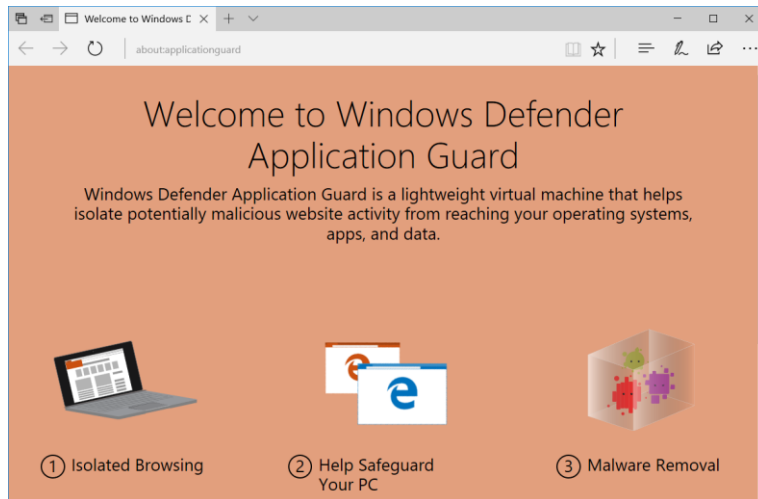


PowerShell Cmdlets for Docker (April 2017)



<https://github.com/Microsoft/Docker-PowerShell/releases>

What's beyond ...



Project Barcelona,
Windows 10 v1703

The future of nano server

?

2016



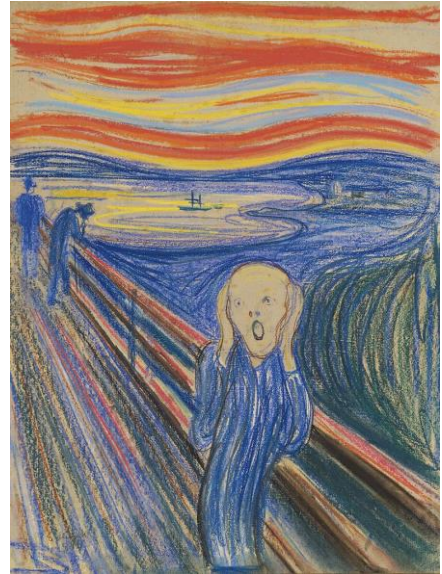
jsnover
@jsnover

Make no mistake about it
Nano Server is the
future of the datacenter

<https://blogs.technet.microsoft.com/windowsserver/2016/02/10/exploring-nano-server-for-windows-server-2016/>

11:24 PM - 10 Feb 2016

2017



KEEP
CALM
AND
ENJOY THE
CONFERENCE