Windows Server 2016 Primer

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In A Nutshell

- Licensing
- NanoServer
- Containers
- Software Defined “Everything”
- Clusters
- Remote Desktop Services
- AD Security & Identity
- PowerShell
- Hyper-V
- Linux
- Azure

But First… Cool Tools

SMT
Server Management Tools

WMIX

Evolution

Windows Server 2008 R2 System Center 2007 R3	Windows Server 2012 System Center 2012	Windows Server 2012 R2 System Center 2012 R2 Microsoft Azure	Windows Server 2016 System Center 2016 Microsoft Azure
Introduced virtualization platform/ management	Industry-leading scale and performance	Azure as design point	Cloud-first innovation: Infrastructure and application platform

Trivia

Total number of *Major Server OS Revisions released?

- 12
- NT3.1, NT3.5, NT3.51, NT4, 2k, 2k3, 2k3R2, 2k8, 2k8R2, 2k12, 2k12R2, 2016

When was Windows NT3.1 released?

- July 1993

What does “NT” stand for?

- New Technology

How many lines of source code in Server 2012?

- 2008R2 had ~60 million
- Shy of 40m

The Cloud Connection

Advanced multi-layer security	Azure-inspired, software-defined	Cloud-ready application platform
Shielded VMs & Host Guardian Service Privileged Access Workstations Just Enough Administration Breach resistance	Built-in compute, storage and networking virtualization Software-Defined Datacenter Hyper-Converged to Hyper-Scale	Traditional & cloud-native apps Containers & microservices Azure Hybrid Use Benefit

Windows Server 2016

The operating system that powers Azure & your business

“Hardware is already becoming a commodity. Soon, it will no longer matter.”

GUI

- Full GUI is optional and not the default install
- Look & Feel of GUI install is *almost* the same as Win 10 *(Desktop Experience)*
- ServerCore is minimal GUI
- NanoServer has no GUI
- GUI = nice & easy but…
- GUI = 60%+ larger attack surface, 40%+ more patches

Server 2016 Licensing

Datacenter, Standard (Essentials)

Per Physical Core licensing

- Sold in 2 core packs
- Previously Per Socket
- Required to license 2 processors (even with only 1 processor)
- Required minimum 8 core license required per physical socket
- Minimum 16 cores required to be licensed for servers with one Proc

‘8’ & ‘16’ are the magic numbers

- Cost stays if 16 cores or less on single server
- More than 16 cores, must buy another core license
- Example: Server with 2 Proc’s with 8 cores each = same cost
- Example: Server with 2 proc’s with 16 cores each = cost is ~doubled~

Windows Server 2016 Editions		
	Datacenter	**Standard**
Core functionality of Windows Server	•	•
OSEs / Hyper-V containers*	Unlimited	2
Windows Server containers	Unlimited	Unlimited
Nano Server	•	•
New storage features including Storage Spaces Direct and Storage Replica+	•	
New Shielded Virtual Machines and Host Guardian Service+	•	
New networking stack+	•	
Price**	$6,155	$882

OSE: Operating System Environment

*Standard Edition permits use of up to 2 OSEs or 2 Hyper-V containers. Datacenter permits unlimited OSEs and Hyper-V containers on a server.

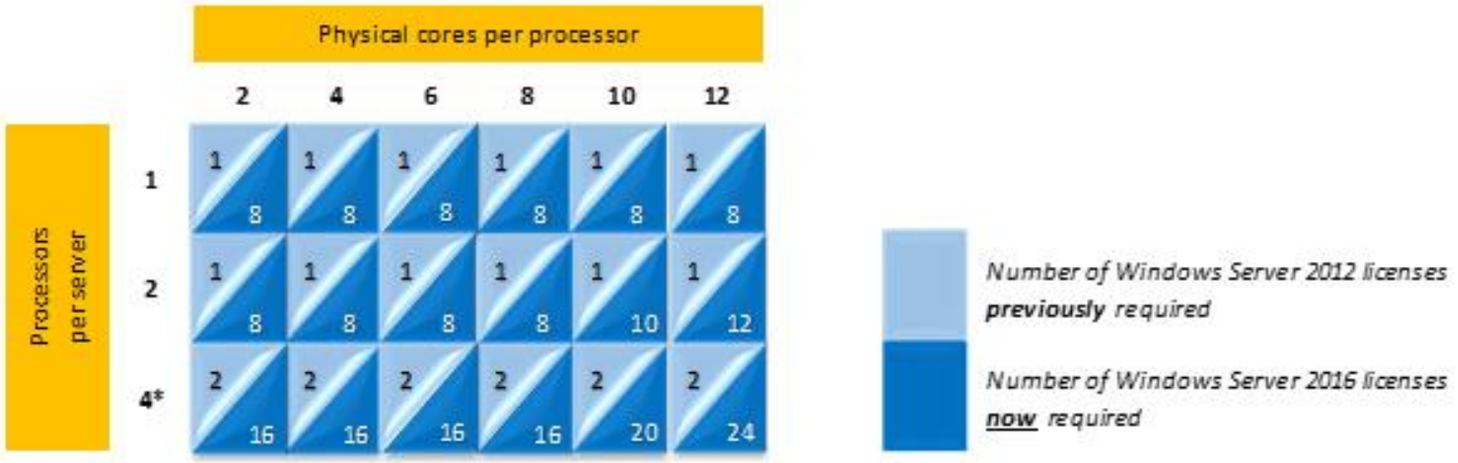
**Pricing for Open (NL) ERP license for 16 core licenses. Actual customer prices may vary.

+ Azure-inspired features for advanced software-defined scenarios.

- Same base licensing cost as 2012R2
- CAL requirements & licensing does not change from 2012R2
- VD licensing is not *expected* to change. SA still covers the VDA. Thin clients that do not run Win OS will require non-SA VDA purchase.
- Nested Virtualization requires Datacenter edition.

Licensing Cost Comparison – 2012R2 vs 2016

Number of Windows Server 2016 2-core pack licenses required
(Minimum of 8 cores per processor or 16 cores per server)



* *Standard Edition may require additional licensing*

Number of 2-core pack licenses needed

(Mininum 8 cores/proc; 16 cores/server)

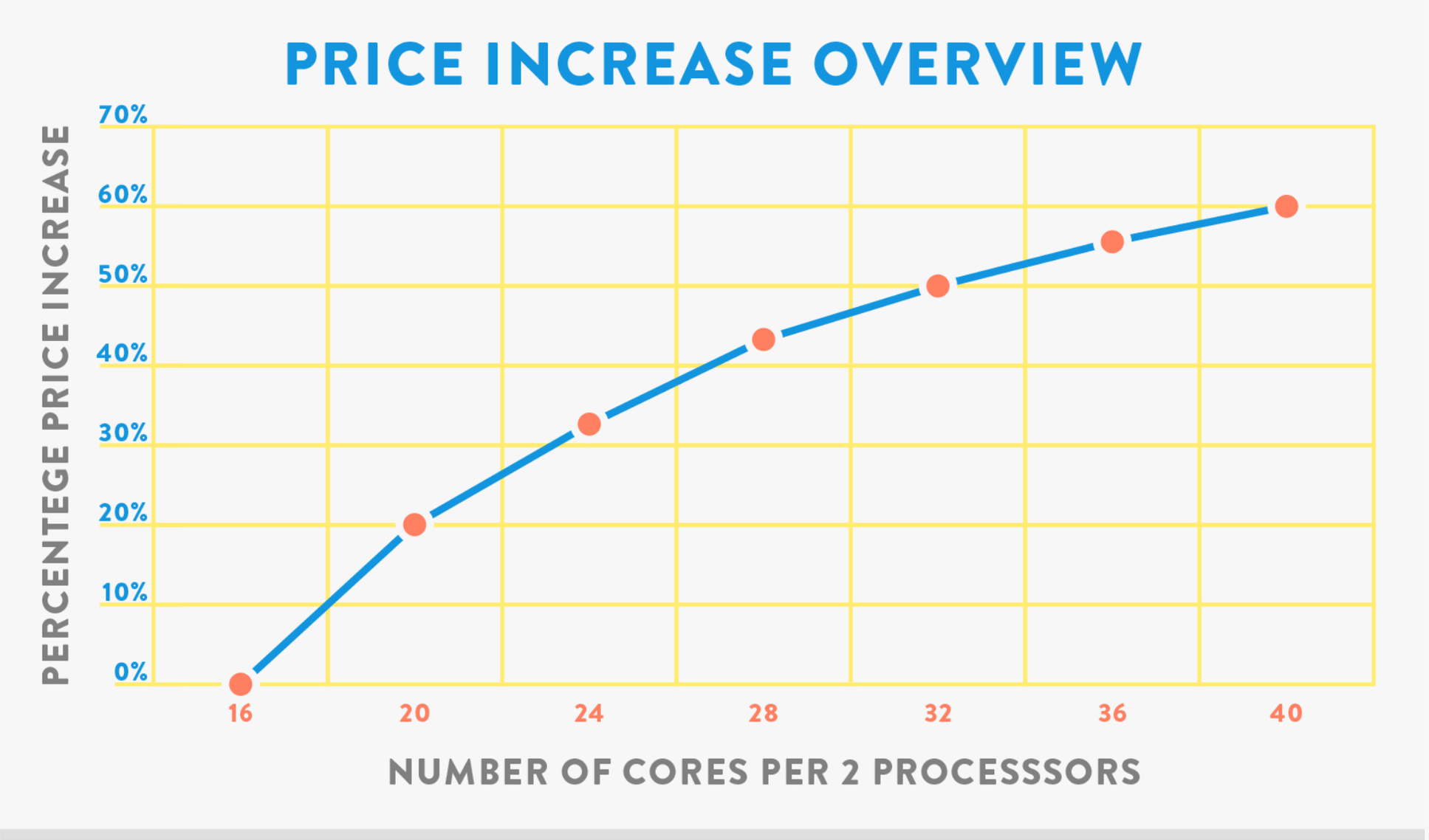
Procs per server	Physical cores per processor: 2	4	6	8	10
1	8	8	8	8	8
2	8	8	8	8	10
4*	16	16	16	16	20

Licensing costs are same as 2012 R2

Additional licensing required

* *Standard Edition may need additional licensing*

Incremental Core Cost Increase



Licensing Server 2016 in ESXi

Standard edition allows for 2 OSE's

Datacenter edition is unlimited OSE's

You license the cores – 1 license covers 2 cores

For 8 VM's, 4 x Standard 2-core pack licenses required

~14 VM's is breakpoint between Standard & DC

vMotion (DRS/HA) must be accounted for

Nano Server

Just enough OS

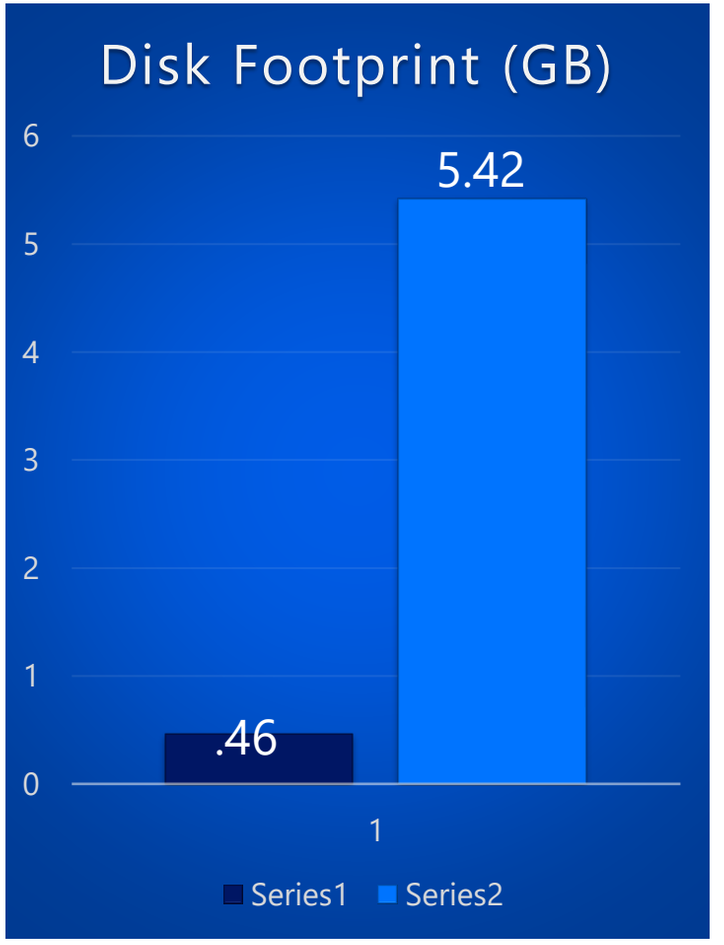
Different, yet familiar

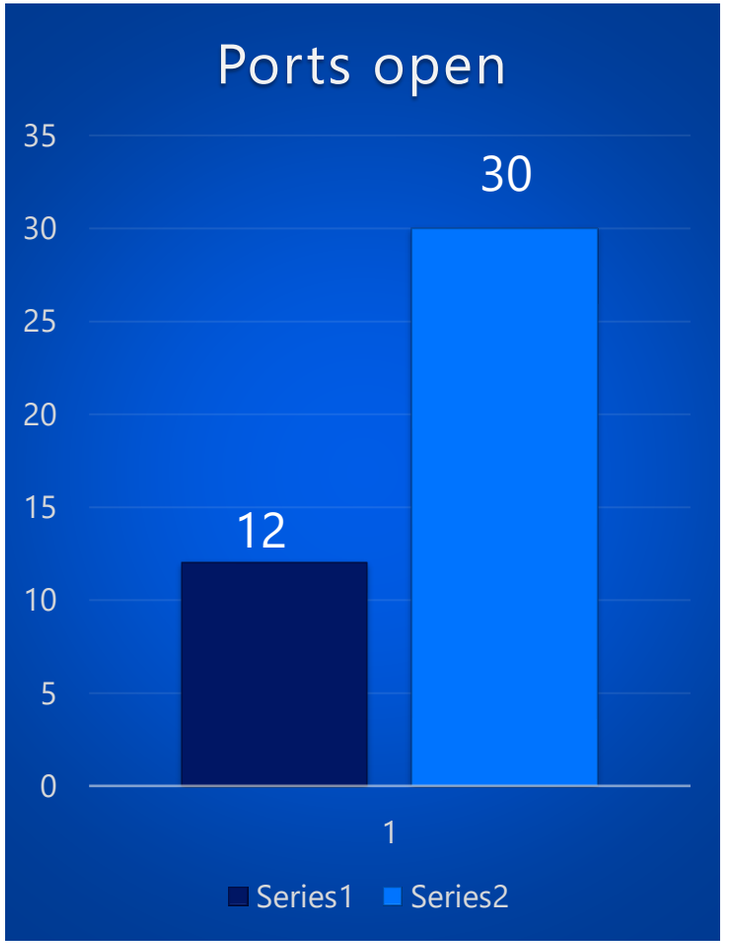
Reduced attack surface and servicing requirements - patching

Full Windows Server PnP driver support

Antimalware optional package

System Center VMM and OM agents available





Nano Server

- No GUI – CLI, PoSH, Web, WMI, etc.
- Rescue Console (console & EMS) login only
- No RDP
- No 32bit support
- No MSI installer (full AppX coming)
- “Refactored” (i.e. Restructured) Server code
- It Powers Azure
- Install is very different & very fast! Boot time is <5 seconds*
- No upgrade path from Nano to Core or GUI
- Requires SA

Containers

- Windows Containers
- Hyper-V Containers (nested virtualization – secure)
- Docker & PowerShell management
- Portable between On-Premises & Azure (&…?)
- Cross-Platform containers may be coming soon to a Server OS near you ;-)

It's not just about DevOps anymore…

Active Directory

- *Privileged Access Management (PAM)*
  - Creates bastion AD forest w PAM trust to existing forest
  - "Clean" forest with isolation for privileged accounts
- *Conditional Access Control (CAC)*
  - auth strength for MFA, device compliance, user identity, etc. set on per-app basis
- LDAPv3, OpenID & OAuth support for ADFS
- *Azure AD Join*
- *Azure AD Connect Health*
- *Group membership expirations*
- Passport
  - Biometric or PIN
  - One Time password (OTP), Phone-factor, or other
- Domain time sync enhancements
- 2003 server domain join warnings (may not allow join)

Remote Desktop Services

- *App-V Native – Client already in Win10*
- *Shared Desktop Workspaces*
- Multipoint Services
- vGPU enhancements – OpenGL & OpenCL
  - Multiple sessions can access Direct Device Assignments (DDA) – mainly video
- *Concurrent connection storms*
  - 10k+ concurrent connection requests without failure)
- *HA Connection broker with shared SQL backend*
- *Azure AD integration*

Server Management & PowerShell

- *Automate Everything*
- *PowerShell DSC – big improvements & expansion*
- *PowerShell is Open Source*
  - Gallery & PowerShell GitHub
- Granular role-based management
- *PowerShell Just Enough Administration (JEA)*
- *Cloud-based Server Management Tools*
  - Manage any Windows servers, anywhere
  - Integrated with Azure
- *SC** in the Cloud (OMS)*
- OMS major revisions in-step with server releases

Clustering

- *Clusters without domains*
  - Independent of domain topology - Can be mixed between domains
  - Can be domain members or workgroup members
- *Rolling upgrades with 2012R2 in same cluster*
- *Full, Core, or Nano mix*
- *Storage Replica for Clusters*
  - Any type of storage
  - Auto-failover for fast RTO
- Node Fairness
- Site Awareness
  - Grouping of nodes in stretched cluster which correspond to physical location
  - Instances auto failover to node in same site first, different site second
- *Cloud Witness*
  - Utilize Azure blob for cluster resiliency
- *Stretch to Cloud*
- Node quarantine
  - Stops flapping nodes

File Services & Storage

- *ReFS (Resilient File System) starts replacing NTFS*
- *Deduplication*
  - Still post-process
  - No ReFS support initially
- *Storage Spaces Direct (EoS – MS SDS)*
  - Cluster with no tiered storage – can do 2 node (not a typo)
  - No single point of failure
  - Commodity hardware, no external enclosures
  - NVMe SSD's, SATA, SAS, Spindles, Flash, DAS, etc.
  - SMB v3 (SMB v4)
- *Storage Replica*
  - End-to-End DR solution
  - Server-to-server, cluster-to-cluster
  - Volume level replication between any storage
  - Sync or Async replication
  - Auto-Failover for Clusters

File Services & Storage

- Storage QOS
- *SMB Multi-Channel*
- StorSimple Appliance – On-Prem & Azure
- *Health Service*
  - Physical disk lifecycle automation
    - Retire, un-retire, remove, balance operations
  - Storage "Allow List"
    - XML list – allows for quarantine for rogue storage
  - Drive firmware orchestration
  - Storage Maintenance Mode

Networking

- *IPAM 2016*
  - DR, multiple instance, cross AD support
  - Tracking activity, utilization & trend, audit
  - Granular DNS properties, single console across all DC's
- *Network Function Virtualization*
  - VA's for FW/Anti-Virus/WAN Optimize/S2S/L2-L3 gateways/LB's/Routers/Switches/NAT/Proxy, etc.
- Switch-embedded teaming (Hyper-V & SDN)
- PacketDirect
  - NDIS to the next level (100G+)
- *Network controller*
  - Single central point of automation for any virtual any physical network in DC
  - Firewall mgmt., fabric mgmt., network monitoring, service chaining, SLB, VPN, etc.
- Shielded VM's
- Host Guardian
- *SDN stack that works with Azure*

Hyper-V

- Nested virtualization (huge step)
- Direct Device Assignments (DDA) - video
- Hot add NIC's and RAM
- VM Resiliency (BSOD recovery)
- Shielded VM's
- Host Guardian

Linux Subsystem

- WSL – Windows Subsystem for Linux
- Not an “emulated” Linux kernel
- Ubuntu Bash shell
- User & kernel mode
- Limited & a bit flakey so far

Thank you!
Q&A