



A STUDY OF WINDOWS SERVER 2016

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ABSTRACT

Windows Server 2016 is latest server operating system which was designed and given by Microsoft to general public as part of the Windows NT family of operating systems, developed in combination with Windows 10. The early preview version (Technical Preview) was available on 2014, 1st October to be used together with the first technical preview of System Center. The latest Windows Server 2016 was released on 26 September 2016 at Microsoft's Ignite conference with beta versions and became generally available on 12 October 2016 as complete general usage server. It has two successors namely

- *Windows Server 2019*
- *Windows Server Semi-Annual Channel, which excludes the graphical user interface (GUI) with many other older components.*

The present paper studies the basic difference between windows server and Linux server. The paper also talks about the architecture of Windows Server 2016. In the end paper contains the features of Windows Server 2016.

KEY WORDS: Windows Server, Linux, AD, DHCP

INTRODUCTION

Windows Server

Microsoft Corporation released WindowsServer is the product name for group of server operating systems, containing all Windows operating systems that are branded under "Windows Server", but not any other Microsoft product. Windows Server 2003 was the first Windows server edition released under the brand Microsoft in year 2003. Whereas, the first server edition of Windows was Windows NT 3.1 Advanced Server, trailed by Windows NT 3.5 Server, Windows NT 4.0 Server, and Windows 2000 Server and the latter was the first server edition to include DNS Server, Group Policy, DHCP Server, Active Directory, RDC, VPN, Proxy Server as well as many other popular features used today.

Why Windows Server

Going for windows server beneficial in following ways:

1. It is developed and offered by Microsoft hence no headache of support and update
2. People who are familiar to windows operating systems find it easy to operate
3. Number of users utilizing the Microsoft server hosting uses the Active Server Pages (ASP) terminology

OBJECTIVES OF STUDY:

The present study has been geared to achieve the following objectives;

1. To study the difference between windows server and Linux server
2. To study the architecture of Windows Server 2016
3. To study the features of Windows Server 2016

Difference between windows Server and Linux Server

When it comes to the difference between types of servers the Linux servers are relatively preferred more than window. Some of the major aspects of differences are

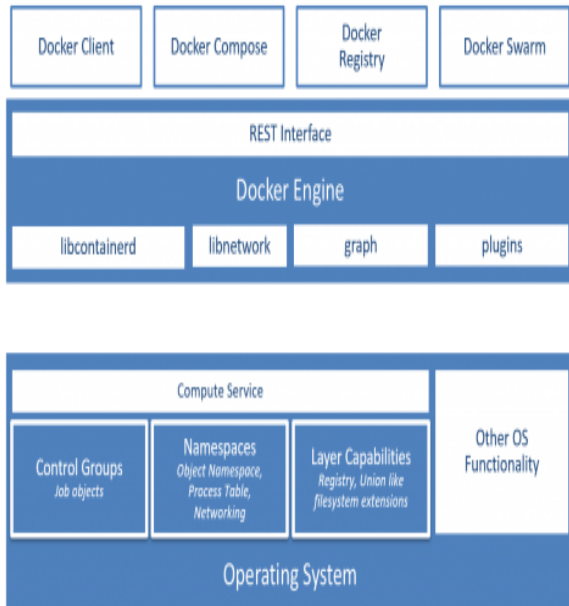
1. Linux Servers can have one and only administrator or root user where in windows server many administrators can be managed even a group of administrator can be managed, hence security is more in Linux Servers.

2. Linux Servers are more stable as they can be last long for years without any failure whereas windows server are not as reliable and stable as Linux server.
3. When it comes to hardware windows require regular hardware updates whereas Linux server do not require any updations
4. Windows servers are quiet more costly over Linux servers
5. In Linux servers the user have freedom to choose what work is best for its business where as windows have many limitation in same regard.

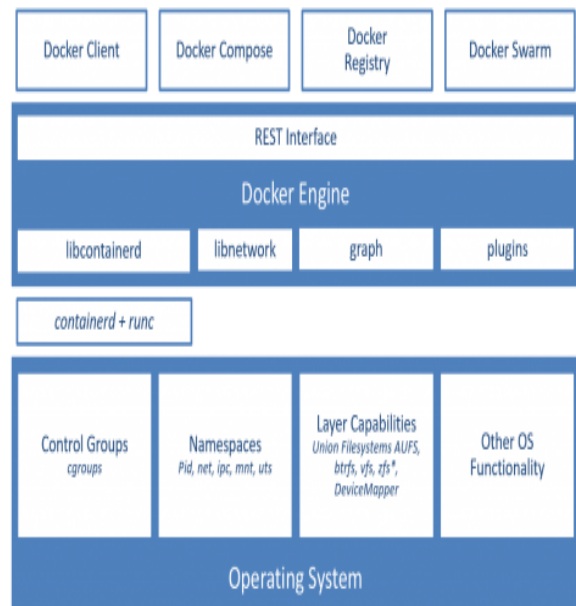
Even after so many drawbacks of windows server in compare to Linux server, it is popular because of its feature richness like inbuilt backups, GUI (graphical User Interface), as easy as windows OS.

Windows	Linux
Closed Source	Open Source
Costly	Free
Software also needs to be purchased	Free Software
No CD distribution	Live CD Distribution
Insecure	Secure
High hardware cost	Low hardware cost
Customization not possible	Customizable Features
Stable but not most	Full stability
Malware may arise	No malware can enter

Architecture In Windows



Architecture In Linux



Long Term Servicing Channel (LTSC)

LTSC is meant to be supported by Microsoft for 10 years i.e., with five years of mainstream support and an additional five years of extended support to the user regarding technical aspect. The announcement also offers a complete GUI desktop experience, laterally with GUI-less setups such as Nano Server and Server Core for announcements that support them.

The channel includes the below released systems

1. Windows Server 2003
2. Windows Server 2003 R2(Redefined)
3. Windows Server 2008
4. Windows Server 2008 R2(Redefined)
5. Windows Server 2012
6. Windows Server 2012 R2(Redefined)
7. Windows Server 2016
8. Windows Server 2019 (Expected to launch in 2019)

Semi-Annual Channel (SAC)

Windows Server operating system released under the Semi-Annual Channel are supported by Microsoft for 1 year and 6 months. Microsoft aims to release two Windows Server per year under this channel. These releases do not offer any GUI desktop environments support but Nano Server setups offered during installation. Operating systems from the channel are available as part of subscription facilities, Software Declaration, Azure Marketplace including Visual Studio subscriptions.

The channel contains the below operating systems:

1. Windows Server (version 1709)
 - The version was originally available with active Windows Server 2016 license for Microsoft Software Assurance customers.
2. Windows Server (version 1803)
3. Windows Server (version 1809)

Many editions of Windows Server have a personalized name and look, for example, editions of Windows Server up to the date had a Windows Storage Server edition. Primarily with Windows Server 2012 data center R2, Windows Storage Server become obsolete as Microsoft combined the editions to Datacenter and Standard editions. More examples to this series are

- Windows HPC Server
- Windows Home Server.

Microsoft produced Windows Server Essential called

- Windows Small Business Server Edition

It discontinued Windows Essential Business Server the software bundles which include a somewhat partial Windows Server operating system and some other Microsoft Server products.

Windows Server 2016

Windows server 2016 is the latest release of Microsoft server version introduced in September 2016 with 64 bit architecture as well as 86 bit architecture and it was released in two editions as

1. Standard (With Limited Features)
2. Datacenter (With Advance Features)

Windows Server 2016 Editions		
	Datacenter	Standard
Core functionality of windows server	Yes	Yes
OSEs/ Hyper V Containers*	Unlimited	2
Windows server containers	Unlimited	Unlimited
Nano Server	Yes	Yes
New Storage Features	Yes	No
New Shielded Virtual Machine and Host guardianservice	Yes	No
New networking Stack	Yes	No
Subscription	Around \$6000	Around \$900

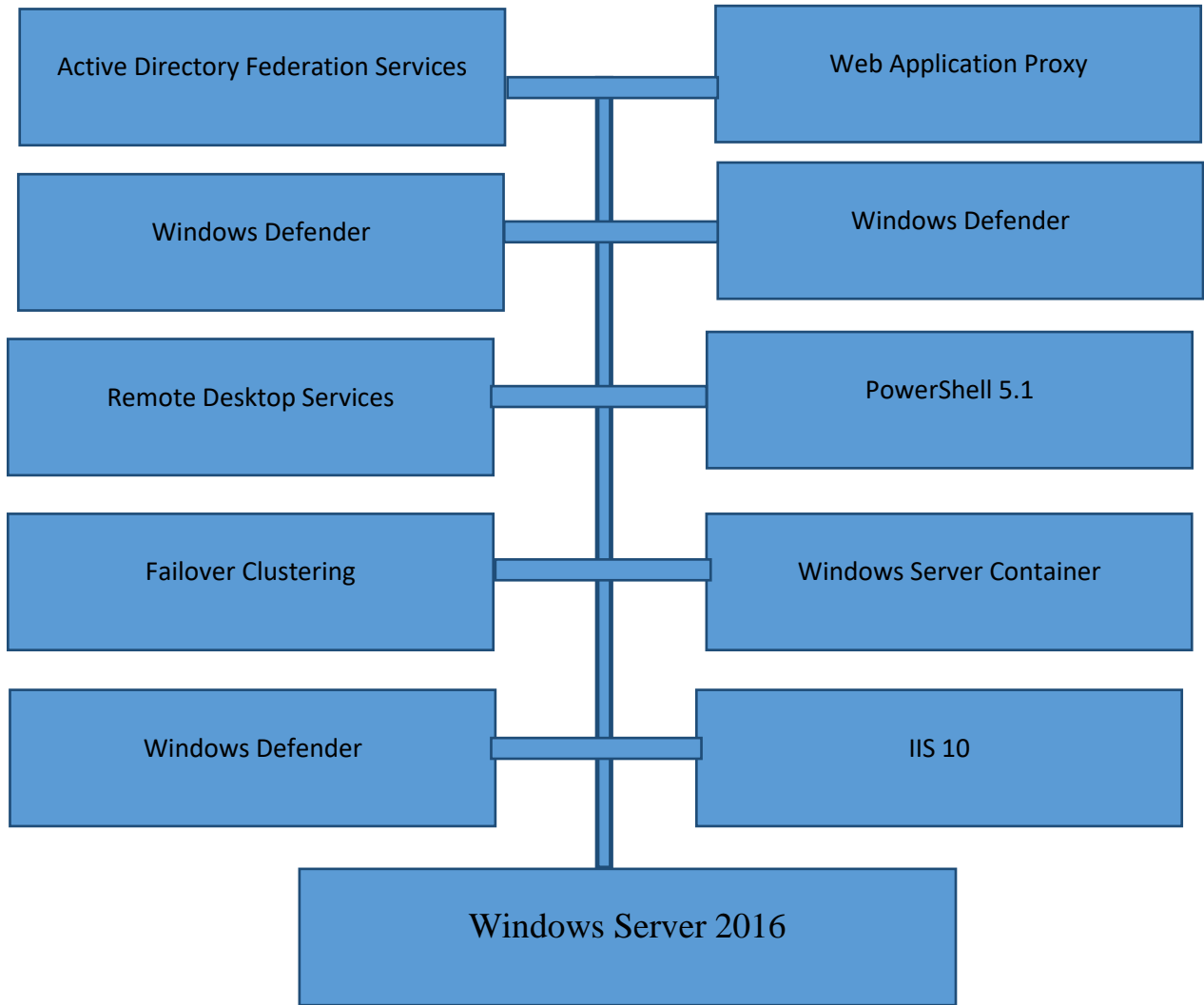
Windows server 2016 in a glance

Kernal type	Hybrid (Windows NT kernal)
Default user interface	Windows shell(Graphical), Microsoft PowerShell(Command Line)
Preceded by	Windows server 2012R2
Succeeded by	Windows server 2019
Platforms	X86, x64
Developer	Microsoft
OS Family	Microsoft windows

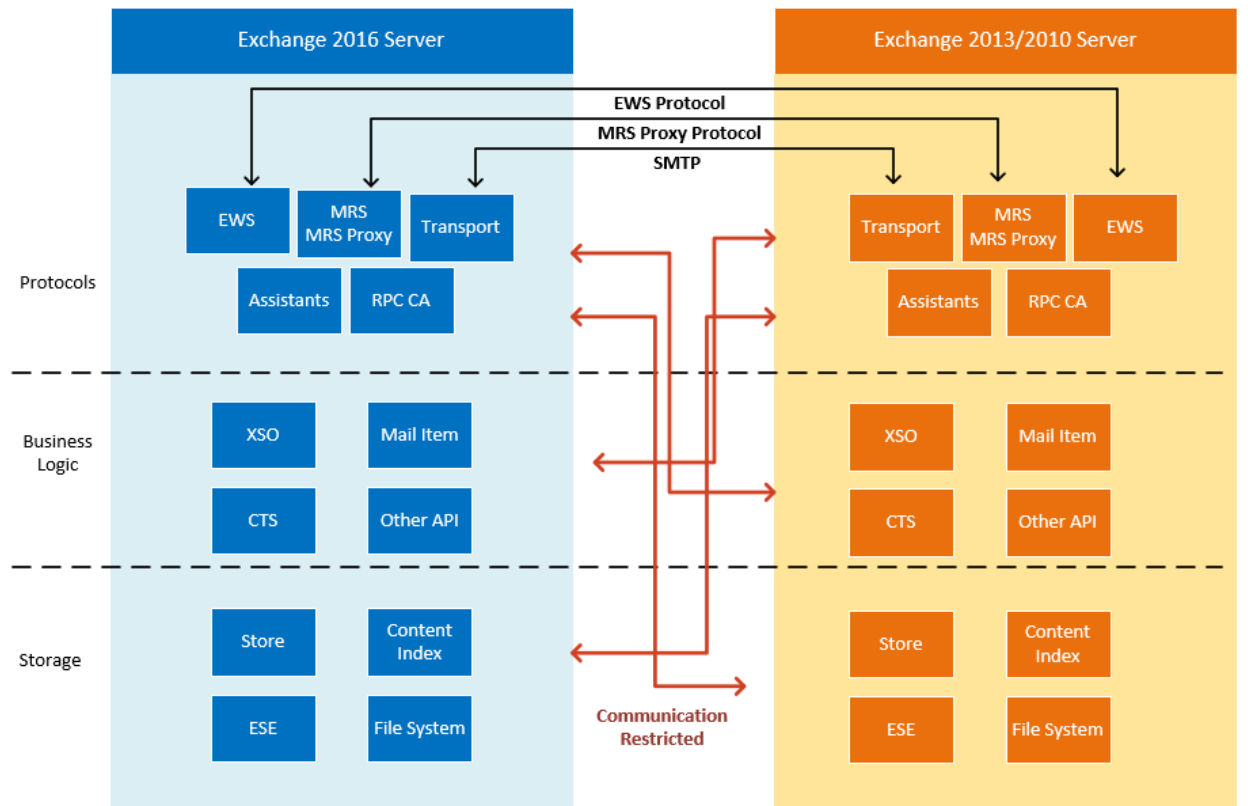
Update methods available for Windows server 2016

1. Windows Update
2. Windows server update services
3. SCCM

Features of Windows server 2016



1. Active Directory Federation Service is used to configure Active Directory FS to authenticate users stored in non-AD directories such as X.500 compliant Lightweight Directory Access Protocol (LDAP) directories and SQL databases of the server
2. Windows Defender is Windows Server Antimalware and threat detector as well as remover which is installed and enabled by default without the GUI, which is an installable Windows feature in server 2016



Exchange 2016 vs Exchange 2013

3. Remote Desktop Service is the feature that Support for OpenGL 4.4 and OpenCL 1.1, stability and performance improvement that are Multipoint Services role that helps accessing the system which is located physically
4. Storage Facilities in windows server 2016 are Central Storage QoS(Storage quality of service) Policies Storage Replicas (storage-agnostic, volume-based, block-level, asynchronous and synchronous replication using SMB3 between servers for disaster and

emergency recovery).this replicates blocks instead of files because files may be in use. It's not one-to-many and not transitive, not multi-master. It occasionally replicates screenshots, and at the same time the replication direction can be changed.

5. Failover Clustering, it is Cluster operating system rolling upgrade and Storage Replicas
6. Web Application Proxy, it is Preauthentication for HTTP Basic application publishing, , Propagation of client IP address to backend applications, wildcard domain publishing of applications, HTTP to HTTPS redirection
7. IIS 10 which Support for HTTP/2
8. Windows PowerShell 5.1 (New and Improved)
9. Server Containers

Some other more helpful features of Windows Server 2016 are

Networking features

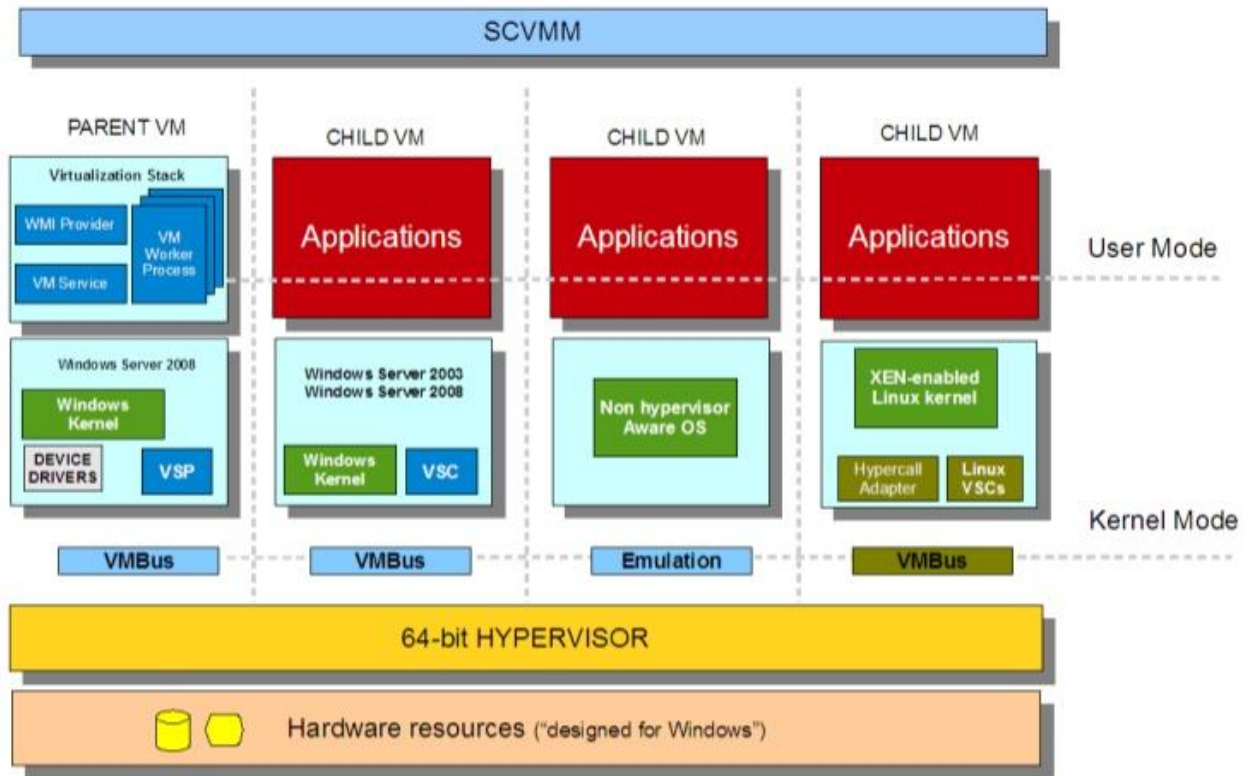
- DHCP is a Network Access Protection called dynamic host configuration protocol was initially deprecated in Windows Server 2012 R2 datacenter, in Windows Server 2016 the DHCP role no longer supports NAP technology
- DNS:
 - DNS(Domain Name Service) client: Service binding – enhanced support for computers with more than one network interface
 - DNS(Domain Name Service) Server: DNS policies, parameters, DNS record types (SPF,TLSA and unknown records), PowerShell cmdlets etc.
- Generic Routing Encapsulation (GRE) tunnels are now supported by Windows Server Gateway
- IP(Internet Protocol) address management (IPAM): Support for /31, /32, and /128 subnets:domain-joined DNS servers, discovery of file-based: new DNS functions, better integration of DNS, DHCP, and IP Address (DDI) Management
- A new server role to configure called network controller is used to manage, monitor, and troubleshoot virtual(VPN) and physical network devices and services in the windows server datacenter

- Hyper VNetwork virtualization is a Programmable Hyper-V switch, new building block of Microsoft's software defined networking solution, which supports Microsoft Software Load Balancer interoperability and encapsulation as well as the better IEEE Ethernet compliance standard.

Hyper-V

- Rolling Hyper-V cluster update is not like upgrading clusters from Windows 2008 R2 to 2012 level but instead Windows Server 2016 cluster nodes can be added to a Hyper-V Cluster with the nodes running Windows Server 2012 R2. Cluster will last to function at Windows Server 2012 R2 feature level until functional level in the cluster not been upgraded and the cluster's all the nodes has been upgraded too.
- Storage quality of service (QoS) works to end-to-end storage performance as well as centrally controlled and create policies using Hyper-V and Scale-Out File Servers
- New more efficient binary virtual machine(Vmware) configuration format (.VMCX extension for virtual machine configuration data and the .VMRS extension for runtime state data)
- Production checkpoints
- Hyper-V Manager supports in
 - Alternative credentials support
 - down-level management
 - WS-Management protocol
- Combination of services for Windows guests distributed through Windows timely Updates
- Hot add and remove for network adapters (for generation 2 virtual machines) and memory (for generation 1 and generation 2 virtual machines)
- Secure Linux boot
- Connected Standby compatibility with other machines
- The feature of Storage Resiliency of Hyper-V is designed by detecting transitory loss of connectivity to VM(Virtual Machine) storage. VMs got paused until connectivity is re-established or when connectivity lost.
- Inbuilt RDMA compatible Virtual Switch

Hyper-V Server Architecture



Graphic by David Ramirez

Hyper-V Architecture

Nano Server

This is the new installation option defined by Microsoft Corporation called Nano Server, which offers a minimal-footprint headless version of Windows Server. It excludes the graphical user interface(GUI), WoW64 (support for 32-bit version software) and Windows Installer. It also does not support console login, either locally or via Remote Desktop Connection(RDC). All management is performed remotely via Windows PowerShell, Remote Server Management Tools (group of web-based GUI and command line tools), Windows Management Instrumentation (WMI). However, in Technical Preview Microsoft has re-added the ability to administer Nano Server locally through Windows PowerShell. According to Microsoft official, Nano server has these specific benefits as below

- It has fewer critical security advisories upto 92% in comparison to windows
- Size of VHD is decreased by 93% comparing to windows
- It reboots 80% less than Windows Server.

Nano Server is only available to cloud computing platforms as well as Microsoft Software Assurance customers such as Amazon Web Services and Microsoft Azure.

With the new feature release by Windows Server version 1709 initially, container host will contain all installations of nano server.

Development

Reorganized by Satya Nadella the CEO of Microsoft, putting the Server and System Center teams together. Previously, and after that the Server team was more closely aligned with the Windows client team. The Azure team is also working closely with the Server team. In March 2017, Microsoft confirmed to reveal an internal version of Server 2016 running on the ARMv8-A architecture structure. It was also reported that Microsoft was working with Qualcomm Centriq and Cavium ThunderX2 chips. James Vincent of *The Verge* stated that, this decision put in danger Intel's dominance of the server CPU market. Though, later declared by Microsoft that this version of Windows Server is only for specific internal use and will only impact the subscribers and users of Microsoft Azure services.

Public Release

Windows Server 2016 was officially declared at Microsoft's Ignite Conference on 2016, September 26. Dissimilar to its predecessors, Windows Server 2016 is licensed by the number of CPU cores not by the number of CPU sockets a modification that has likewise been adopted by BizTalk Server 2013 and SQL Server 2014. After development of windows server 2016 Microsoft also update its licensing structure with new way, CPU socket licensing model in that now the volume of cores covered under single license is limited. Windows Server 2016 Standard as well as Datacenter core licensing are now covers a minimum of 8 core licenses for which each physical processor and a minimum of 16 core licenses for each server. Core licenses are sold in packs of two with Standard Edition providing the familiar rights to run 2 virtualized OS environments at the same time. Additional licenses will be required with Windows Server 2016 if the server goes over 16 core licenses for a 2 processor servers.

Preview Releases

The beta version of Windows Server 2016, initially for testing (which was known as *vNext*) branded as "Windows Server Technical Preview(WSTP)" was released on 1 October 2014, the technical preview builds are targeted toward enterprise clients. The first Technical Preview which was set to expire on 2015, 15th April but Microsoft later released a tool to extend the expiry date of same version which was a good step by the corporation, to last until the second tech preview of the OS in May 2015. The second beta version of same series named as, "Technical Preview 2", was released on 4 May 2015. Third preview version named as "Technical Preview 3" was released on 19 August 2015. "Technical Preview 4" which was released on 19 November 2015. After that "Technical Preview 5" which was released in 2016, 27th April. Insider Preview of Windows Server 2016 Build 16237 was released to Windows Insiders on 13 July 2017.

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