

Data Centre Virtualization-Service Providers

Investigation

Ion Gabriel Matei

Data Centre Virtualisation (ACUA6001_LON)

Introduction

- ▶ Cloud computing technology enables global users to access applications and facilities delivered as services by different companies, known as “Service Providers”. These companies are holding or lease-holding data centre infrastructure where are hosted complex network architecture or simply remote server-storage units, able to access and process data [1], [2].
- ▶ Virtualisation concept was introduced in data centres as an “abstract layer”, in order to simplify user interface and to reduce system complexity, as immediate result was registered increasing demand for services and applications, running simultaneously[1].
- ▶ The investigation propose an overview of data centres owned by major service providers where different network architectures and virtualisation solutions are implemented: VMware, vSphere 7.0, Windows VMs, Hyper-V, AZURE, Citrix, Citrix Workspace.

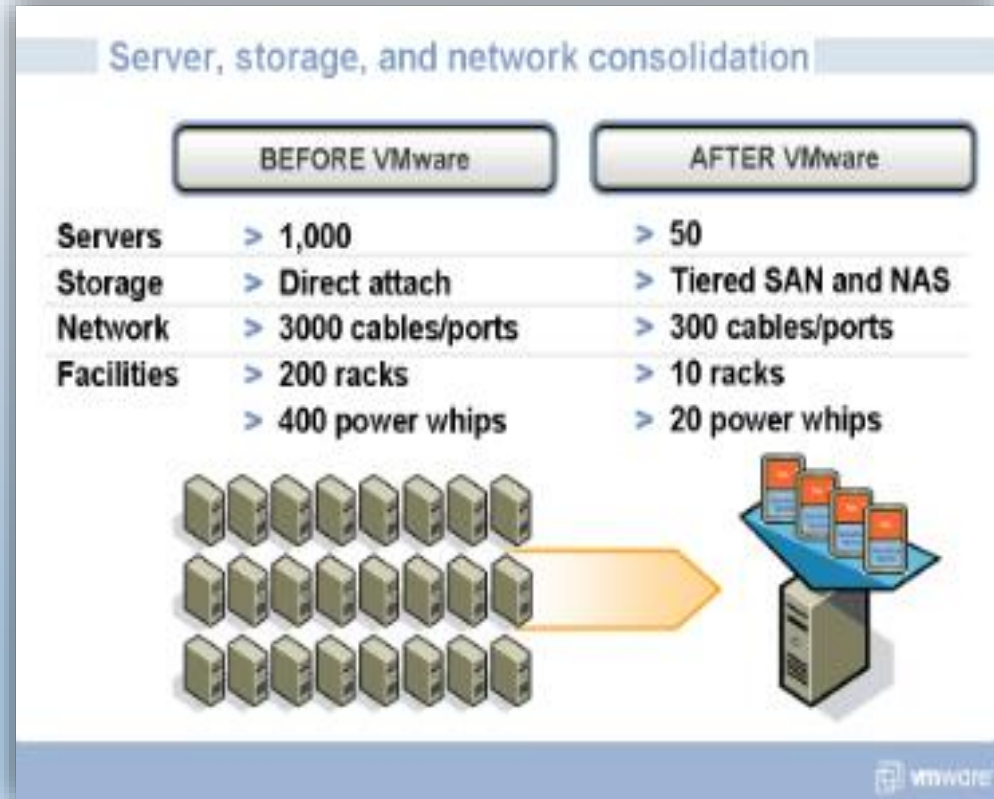


Figure: VMware Virtualisation

VMware

Virtual Machine and Hypervisor

- ▶ “Virtual machine” or VM is an individualised software layer located into a host-system, containing its own operating system and applications [3], [4].
- ▶ These unique capability enables multiple VM’s to run multiple operating systems, multiple applications, over a single physical server [3],[4].
- ▶ Another software layer known as “hypervisor” is created in order to select VM’s from their hosts and to control resources allocation for a better distribution and optimisation [3], [4].
- ▶ Type I hypervisor is located on physical host, directly connected to internal hardware, mainly utilised on servers and represents optimal solution for desktop and application virtualizations: Microsoft Hyper-V, VMware ESXi [5].
- ▶ Type II hypervisor is located on top of the operating system that intermediates hardware utilisation and is specialised for end-user applications such as deployments, analysis or testing environments: VMware Workstation [5],[6].

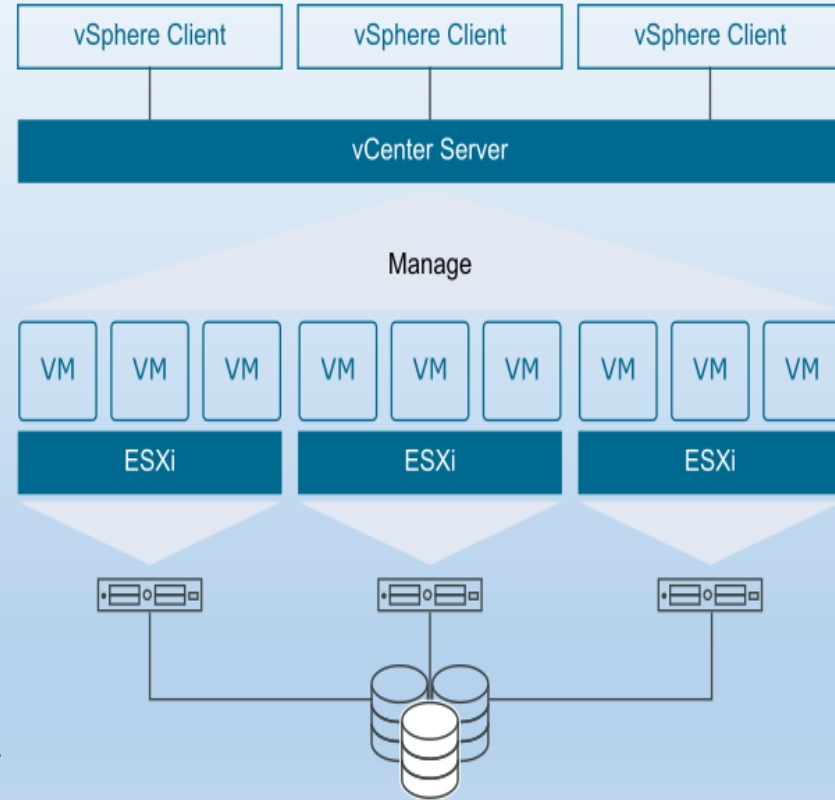


Figure: ESXi VMware virtualisation, [5].

VM categories

Hypervisor types and the workloads divides VM's in two categories:

- ▶ Process VMs- are lifetime limited by the process and are running as simple application without platform support. Abstract and complex, process VM is running on top of operating system which controls the hardware system, example: Java Virtual Machine for Java and Common Language Runtime for .NET Framework.
- ▶ System VMs-are running on its operating systems and are hosted by servers. A complete virtualised environment for applications and services is provided and managed by hypervisor, example: VMware vSphere and Microsoft Hyper-V.

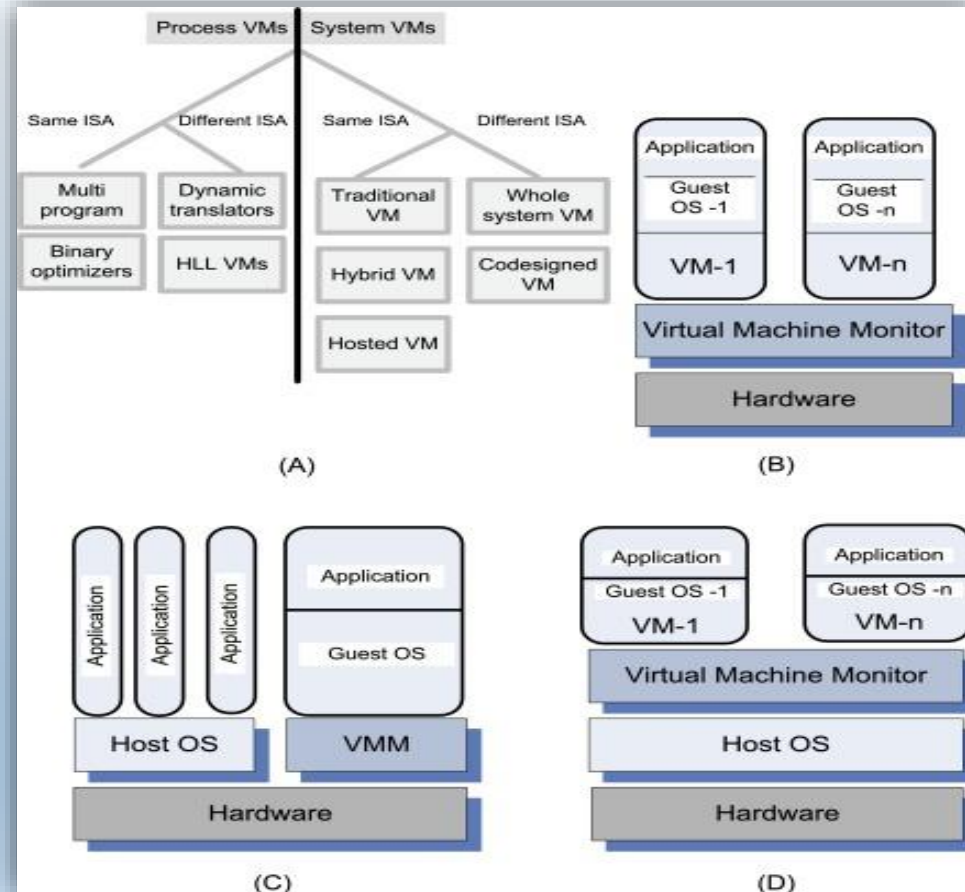


Figure: Process and System VM's

VM Properties

- ▶ Partitioning-a single host support multiple operating systems and resources are distributed optimal between VM's: VMware cloud on Dell EMC is fully managed service, VMware Cloud Foundation is unified cloud support solution [7], [8].
- ▶ Isolation-mitigate faults and security issues, increase performance: vRealize Cloud Management platform [7], [8].
- ▶ Encapsulation-provides safety features, easy copy entire virtual environment [8].
- ▶ Hardware Independence-provisioning and migrating any VM's to any destination host: vSphere cloud infrastructure for public cloud [7], [8].

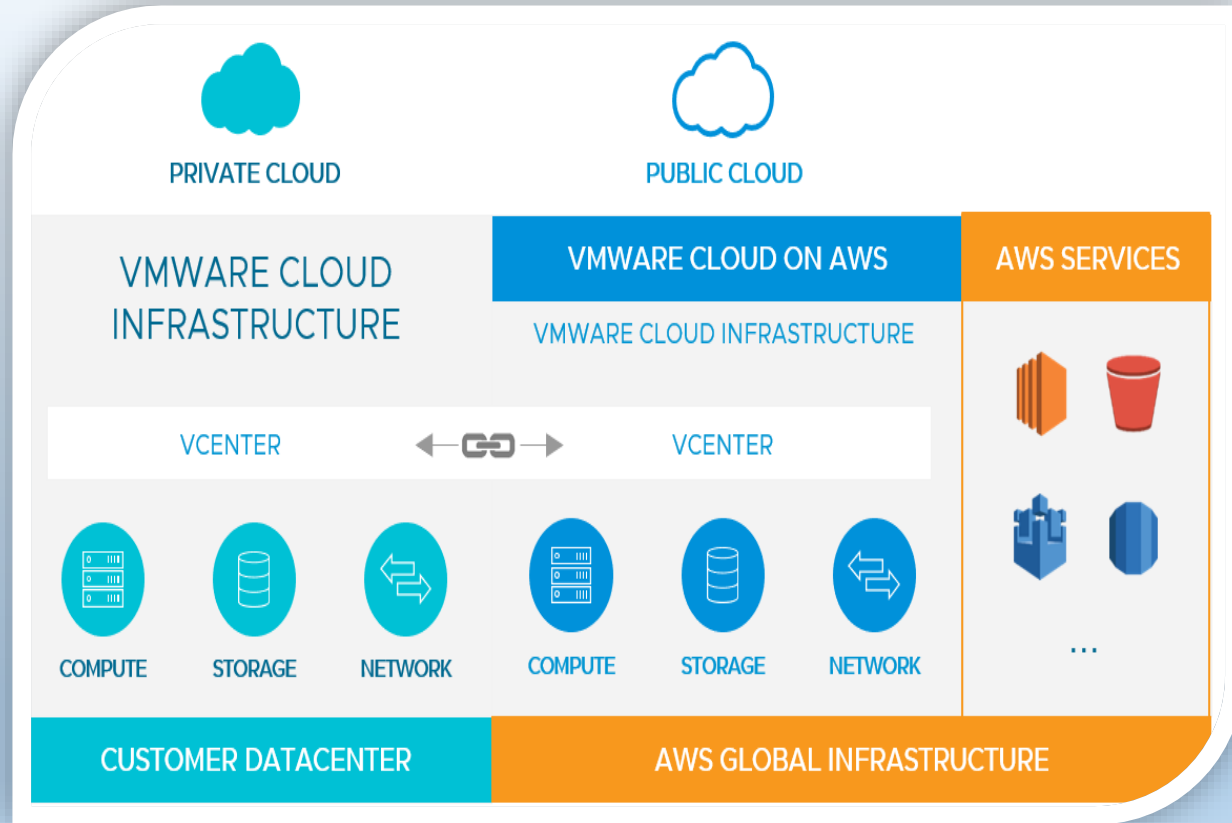


Figure: VMware Cloud on Amazon Web Services

VSphere 7.0

Virtualization platform are created in order to facilitate users experience while setting up different VM's.

- ▶ vSphere is a virtualisation platform developed by VMware able to deliver high performance in support for traditional and modern workloads [9].
- ▶ Highly scalable, support applications such as SAP HANA , a multi cloud and on premises database solution [9].
- ▶ Secure accounts management with multi-factor authentication, artificial intelligence and machine learning features [9].
- ▶ With vSphere, an admin can create a VM from a template or clone or create a single VM from scratch by using VM wizard [9].

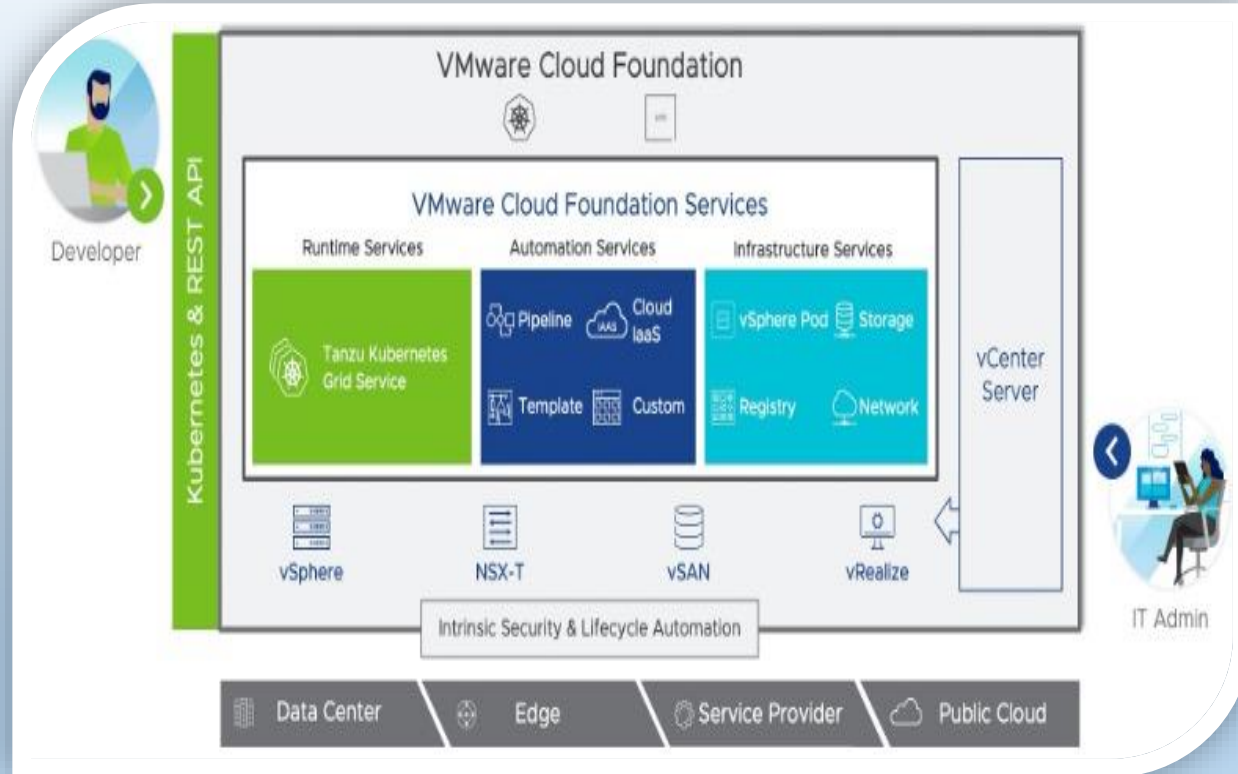


Figure: VMware Cloud Foundation, [9].

Windows VMs

- ▶ Windows Server virtualisation is a large customizable software infrastructure that follows networking and storage virtualization features in order to deliver the flexibility and efficiency of workloads [10].
- ▶ Hyper-V is a Windows Server solution for VM's deployment and management and is integrated in Windows Server platform for a faster implementation [10].
- ▶ Windows and Linux VMs can be copied, distributed or migrated under same Hyper-V management, improving business continuity and extending compatibility [10].

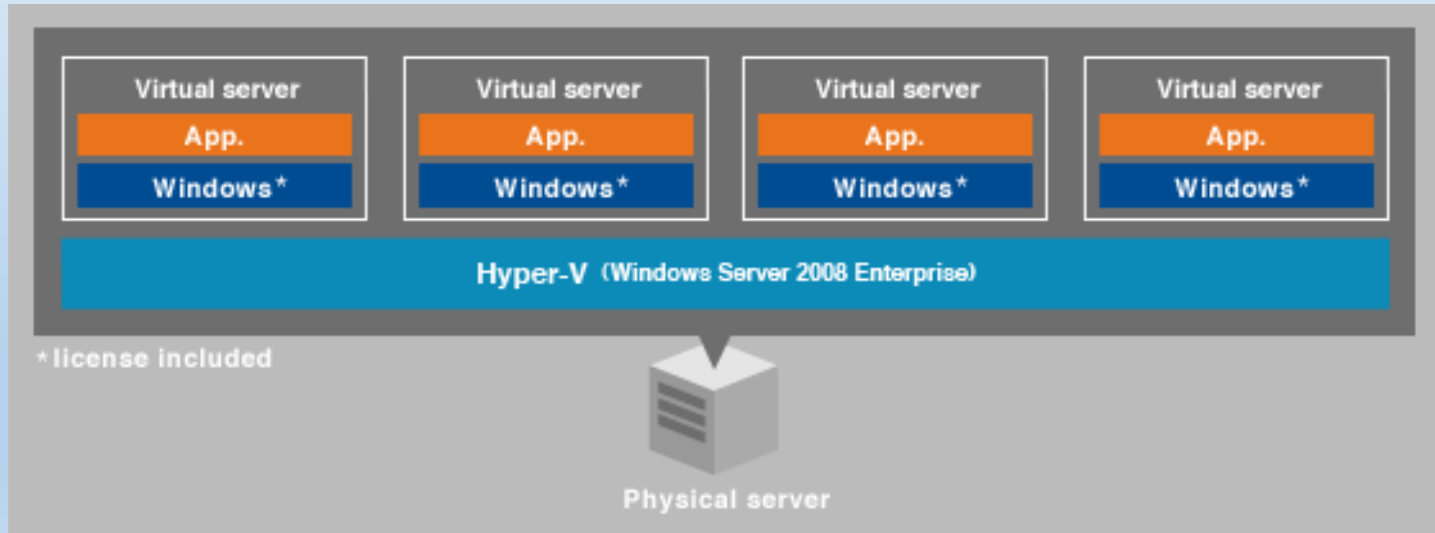


Figure: Hyper-V, [10].

Hyper-V benefits

Performance

- ▶ Optimising hardware resources and power consume by introducing consolidate servers and structured workloads onto less but more powerful physical computers, Virtual Desktop Infrastructure (VDI) as a centralized solution to ensure system efficiency, applications management and data security [11].
- ▶ With Hyper-V and Remote Desktop Virtualization Host (RDVH) can be customised virtual desktops or virtual desktop pools (identically configured VM's) [11].

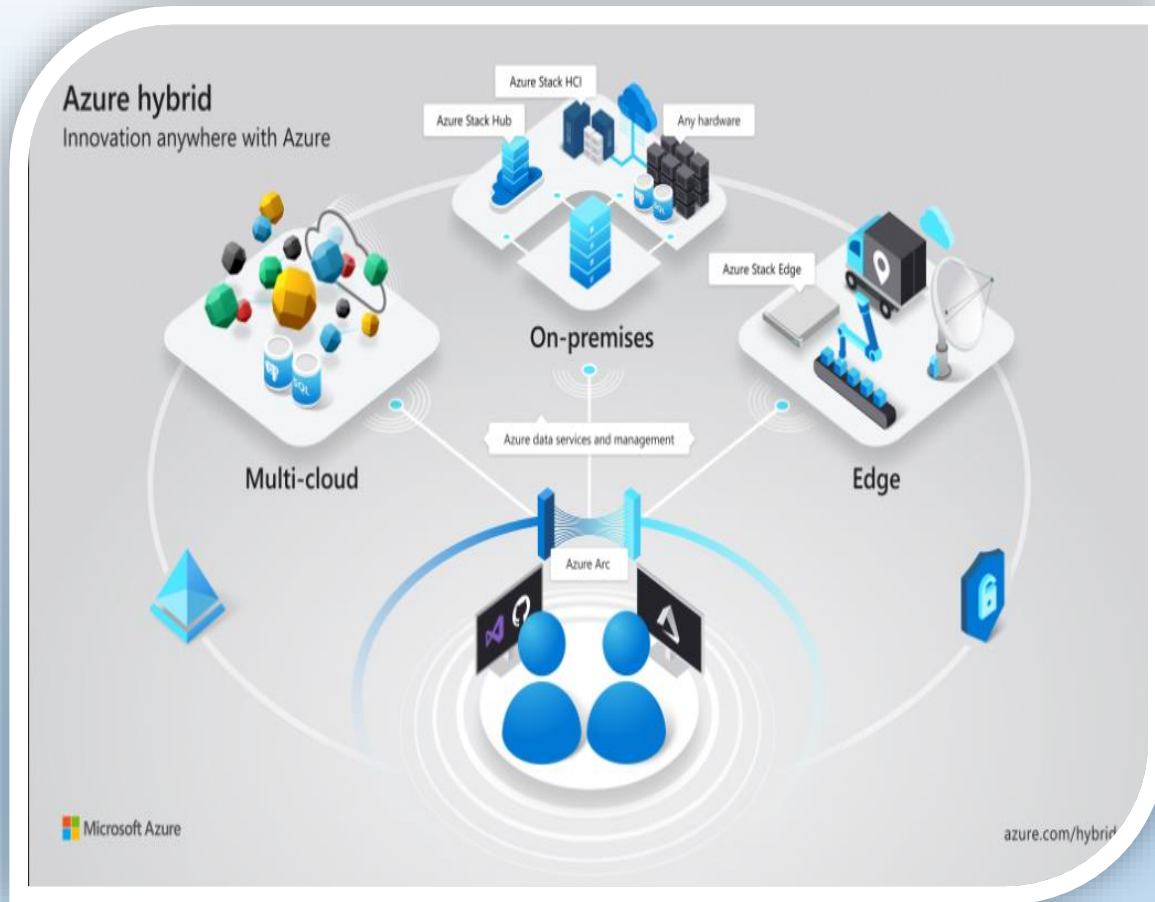
Economy

- ▶ Benefits of organization through virtualization contains in reduced expenses for IT development and maintenance, reduced data loss and downtime [12].
- ▶ Improve support being “hypervisor agnostic”-which means that retains data from applications and workload running over other hypervisors [12].
- ▶ Self-management, remote access facilities, remote server recovery for increasing operability and cost predictability, as well organizational and environmentally friendly business [12].

AZURE

- ▶ Azure cloud platform contains cloud services and features dedicated for applications deployment and management, virtualisation and implementation on multi-cloud environment [13].
- ▶ “Security and privacy are foundational for Azure”, ensure Microsoft in its own intention to deliver trustful solutions and compliance for any cloud service provider [13].
- ▶ Open-source technologies are compatible with Azure and that enables virtualisation using personal data sources and software disponible on private devices [13].

Figure: Azure delivers hybrid cloud, [14].



Citrix Workspace

- ▶ Citrix Workspace platform is recognised in the market as “first unified digital workspace” and can be utilised for Software as a Service applications, mobile applications, desktop and files management[15].
- ▶ Citrix application offer tools and framework to create digital workspace experience and to connect with existing enterprise services, desktops or database: Citrix Receiver core, HDX engine, Browser engine, file view and aggregation for mobile applications [15].
- ▶ Citrix Hypervisor is created on Citrix Xen Server as open-source hypervisor compatible to work with desktop workloads, Windows and Linux virtual servers [15].

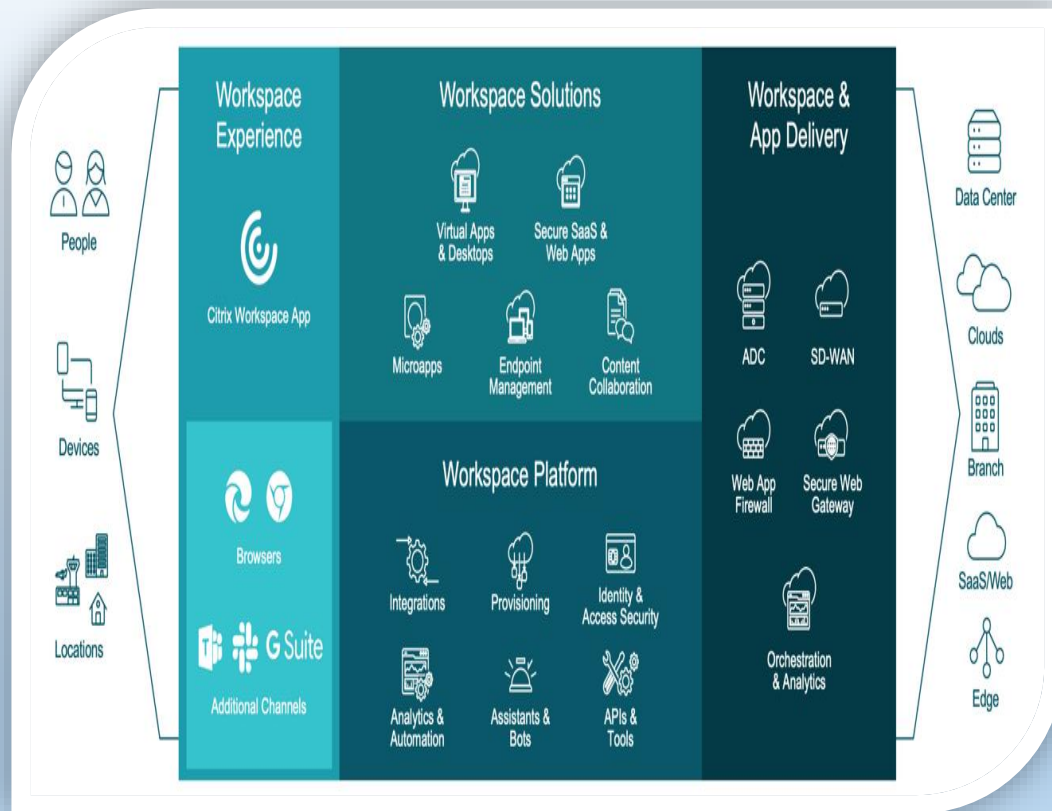


Figure: Citrix Workspace, [15].

Citrix Workspace

Key capabilities

- ▶ Diverse architecture and personalisation [16].
- ▶ Integration feature for open-source tools [16].
- ▶ Proxy server selection and API security-rate limiting the authentication and authorization of users, services, and requests [16].
- ▶ Traffic control and “canary deployment” for making staged releases of updates [16].
- ▶ Unified framework for application delivery [16].
- ▶ Graphic visualisation of system health [16].

Figure: Workspace apps and services,[16].



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