High-Level Technical Architecture – GoM Hybrid Cloud Infrastructure

MITA's Hybrid Cloud is a mix of on-premise and public cloud services based on the Microsoft Azure platform. The on-premise part operates Microsoft Azure stack and offers IaaS, Storage as a Service, Application Platform as a Service and SQL database as a Service. The public part is serviced from the Azure Public cloud, offering all services included in Azure Service catalog.

The two cloud-setups are connected to provide a single enterprise environment, therefore allowing services offered from the on-premise cloud to integrate with public cloud services (and vice-versa), and scalable across clouds.

The main services that are part of the hybrid cloud are listed in Table 1: Main Services and depicted in Figure 1 below.

Table 1: Main Services

Mandatory Service	Service Model	On-Premise	Public Cloud
Virtual Machines	IaaS	✓	✓
Storage as a Service	PaaS	✓	✓
Application Platform (App Platform) as a Service	PaaS	✓	✓
Relational Database (Db) as a Service	PaaS	✓	✓
NoSQL Database (Db) as a Service	PaaS		✓
Identity Aggregation and Federation as a Service	PaaS		✓
Integration Platform as a Service	PaaS		✓
API Management as a Service	SaaS		✓
Blockchain as a Service	PaaS		✓
Mobile Backend as a Service	PaaS		✓

The hybrid cloud provides, as depicted in Figure 2, the infrastructure (e.g. VPN) for connecting On-Premise and Public Cloud resources via a secure tunnel (On-Premise Cloud -> internet link(s) (provided by MITA) -> Public Cloud) to facilitate the creation of a single enterprise environment.

The implementation for the On-Premise IaaS and PaaS allows the customer to Lift-and-Shift workloads from the On-Premise part of the Solution to the Public Cloud.

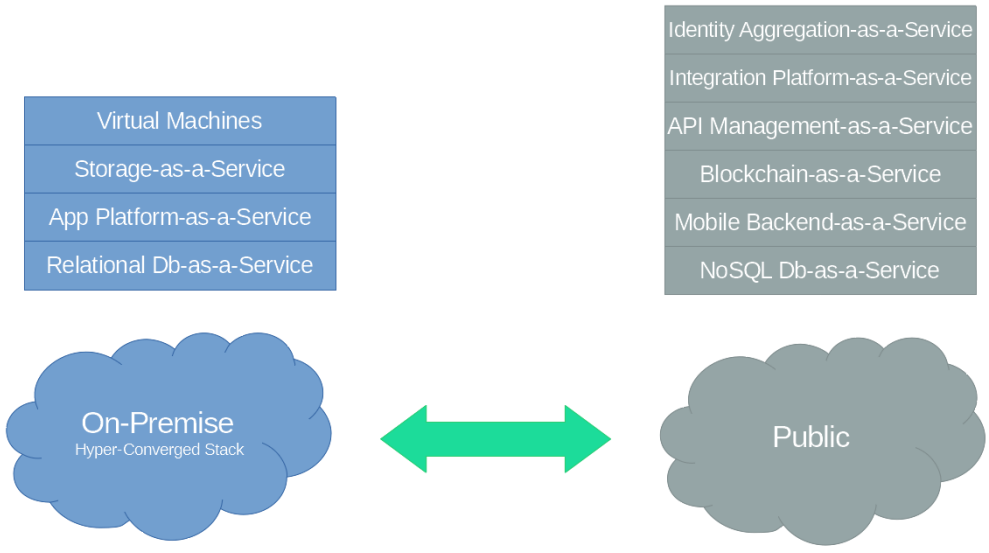

Figure 1: Hybrid Cloud enabling Infrastructure and Services

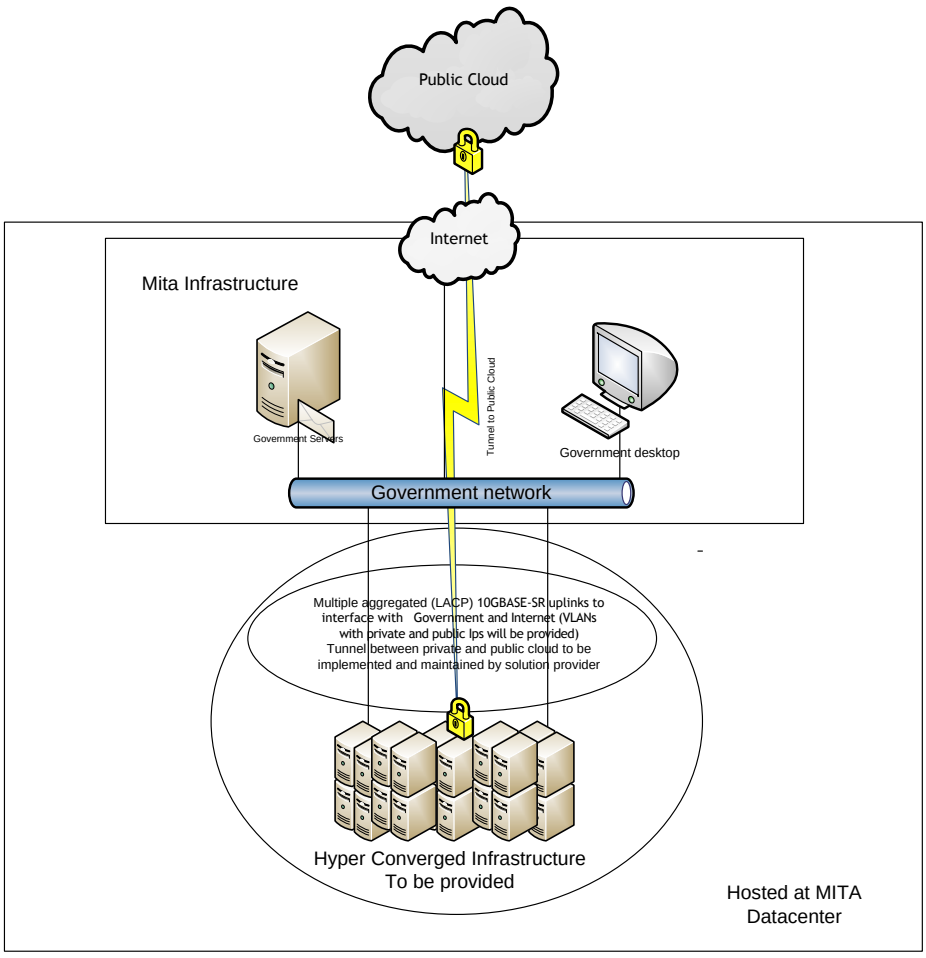

Figure 2: Connectivity between Clouds

Description of of Services

Hybrid Cloud

A cloud utilizing the combination of the On-Premise (private) and Public Clouds. The hybrid cloud is a composition of an on-premise cloud, a public cloud and integration between the clouds that remain as distinct entities but are bound together by standardized or proprietary technology that enables data and application portability.

On-Premise Cloud

A dedicated On-Premise multi-tenant cloud consisting of compute, network and storage (based upon a hyper-converged infrastructure). The On-Premise cloud gives a single Cloud Consumer's organization the exclusive access to and usage of the infrastructure and computational resources.

Public Cloud

The Public Cloud is intended as a shared multi-tenant infrastructure in which the cloud infrastructure and computing resources are made available to MITA for consumption.

Hyper-converged Infrastructure

The hyper-converged infrastructure (HCI) is a fully software-defined IT infrastructure that virtualizes all of the elements of conventional "hardware-defined" systems i.e. compute, storage, network, server virtualisation.

The combination of storage, compute and networking into a single software defined system is designed to reduce Data Centre complexity and silos thus increase scalability. Hyper-converged platforms include a hypervisor for virtualized computing, software-defined storage, and virtualized networking, and run on standard, off-the-shelf servers. Multiple nodes can be clustered together to create pools of shared compute, networking and storage resources.

Infrastructure as a Service (IaaS)[1]

The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).

Platform as a Service (PaaS)[1]

The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.

Software as a Service (SaaS)[1]

The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user specific application configuration settings.

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[1] https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf

Virtual Machines

This is a standardized, highly automated offering, where compute resources, complemented by storage and networking capabilities are available on-demand and even through self-provisioning. All components are software defined.

Storage as a Service

This service provides an API first storage service exposing different types of storage.

Application Platform as a Service

This service offers development and deployment environments for application services, for example using containers, web applications and web services. As a minimum .Net and Java are to be supported.

Relational Database as a Service

This is a fully managed database service that provides the capabilities to set-up, managed and administer relational databases based on Microsoft SQL Service (MSSQL).

Identity Aggregation and Federation as a Service

An identity federation and brokering service with key management, capable of integrating different identity providers through standard identity protocols and provisioning of API keys.

Integration Platform as a Service

Integration Platform as a Service enables development, execution, and governance of integration workflows among On-Premise or cloud-based applications as well as traditional and modern data protocols.

API Management as a Service

A service which assists the creation, publishing, discovery, caching and securing of APIs.

Blockchain as a Service

Provides a quick way to create private blockchain networks that support smart contracts.

Mobile Backend as a Service

Provides services for cross platform and native mobile development, notifications and integrations.

NoSQL Database as a Service

The NoSQL/Schemaless Database as a service supports at least 2 of the 4 basic types of NoSQL Models, i.e. key-value, graph, document data and column-family.

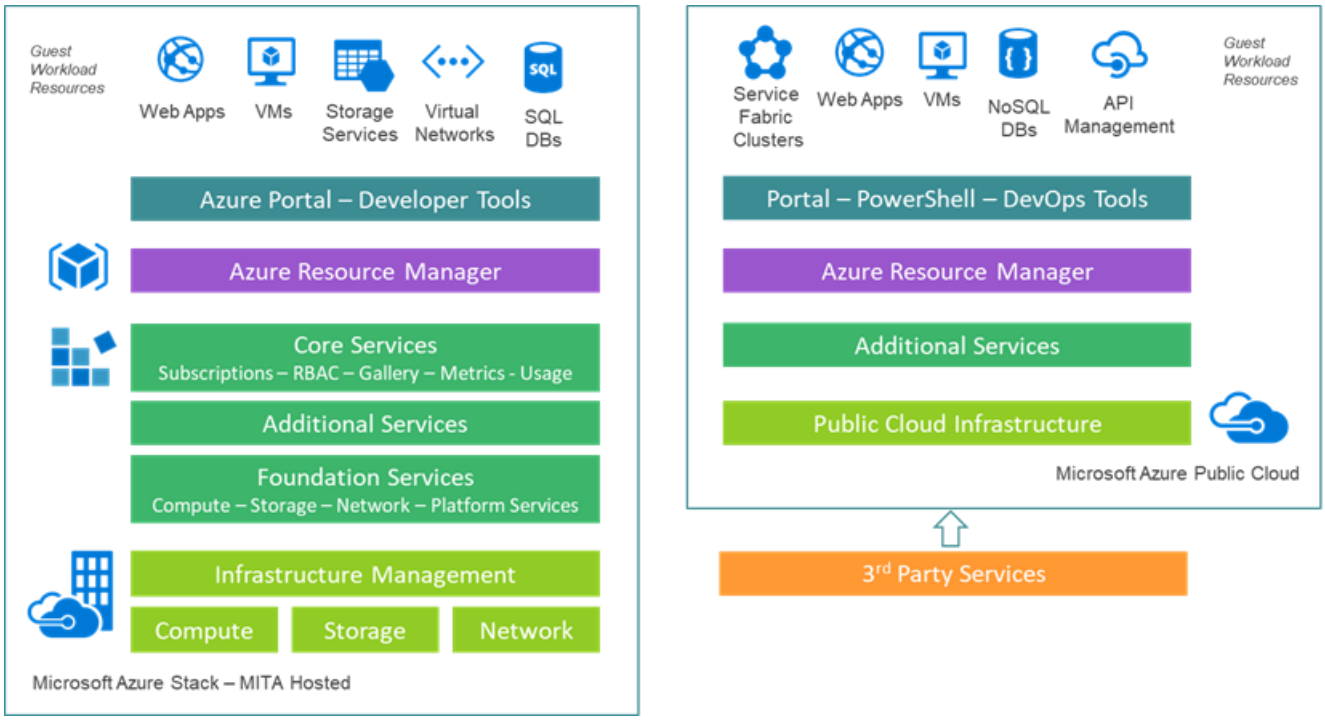

Figure 3 Hybrid Cloud High level logical setup