Altera and Microsoft Azure

Ascending to new heights in healthcare

Tim O'Brien, Vice President, Global Hosting

August 2022

Housekeeping

Recorded session, listening-only mode, lines are muted

Ask questions via Q&A panel

Watch for follow-up email containing webinar recording

Agenda

August 4, 2022

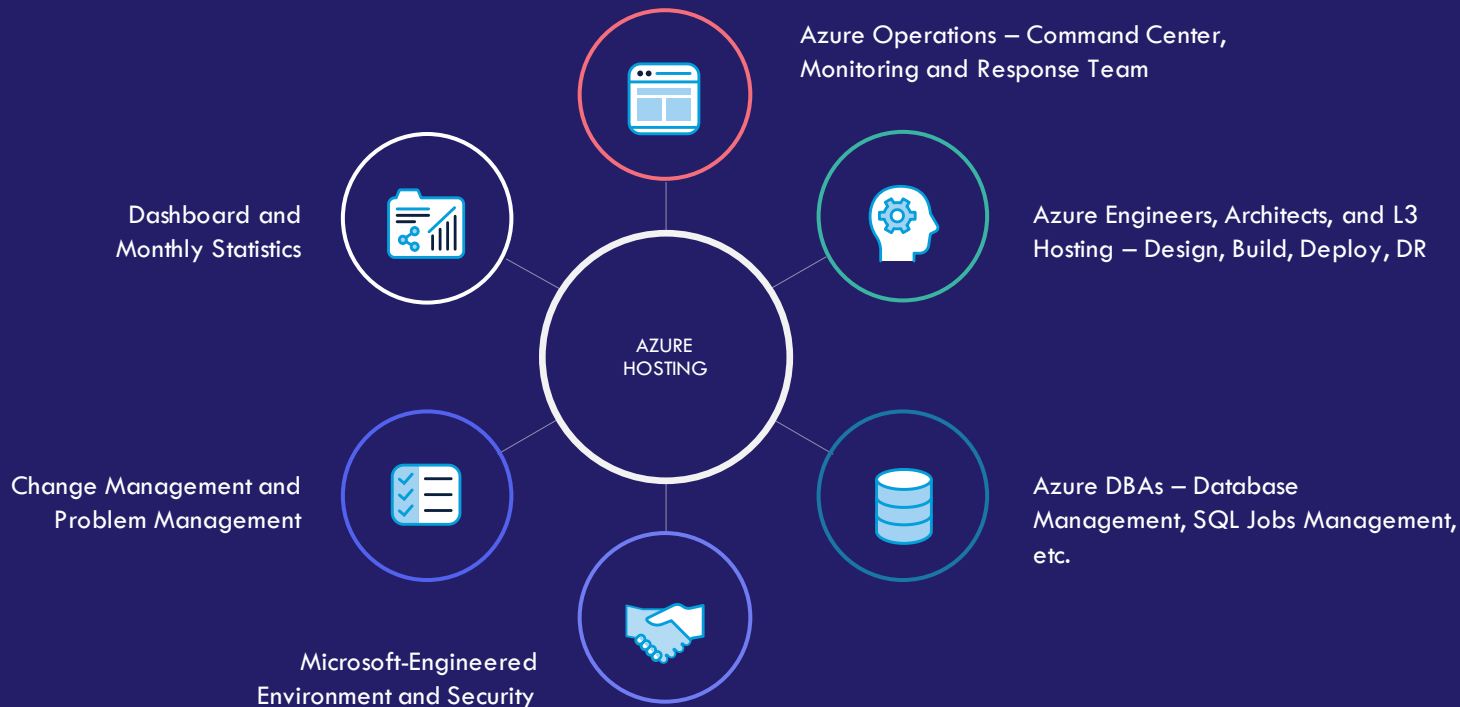**01** What is Altera Hosting?

02 Why is Altera in the Cloud?

03 Why Microsoft Azure?

04 Q&A

What is Altera Hosting?

Altera Azure Hosting – Tools and Policies

Azure Operations – Command Center, Monitoring and Response Team

Azure Engineers, Architects, and L3 Hosting – Design, Build, Deploy, DR

Azure DBAs – Database Management, SQL Jobs Management, etc.

Microsoft-Engineered Environment and Security

Change Management and Problem Management

Dashboard and Monthly Statistics

AZURE HOSTING

Altera Azure Hosting – People and Team

Application Experts

Product Function Team

Technical Support

L3 Hosting Liaison

Incident Management

Technical Account Manager

AZURE SUPPORT

Introduction to the Cloud

Common Baseline Terms

- Cloud
  - Generally, "the Cloud" refers to servers that are accessed over the Internet, and the software and databases that run on those servers. Cloud servers are located in data centers all over the world. Often this also means the servers are run and managed by someone else, not the user's organization.

- Private Cloud
  - A "cloud" environment where resources and infrastructure are dedicated to a single organization. Altera Hosting in the Atos data centers is a close example.

- Public Cloud
  - A "Cloud" environment where multiple organizations consume the same services running on common infrastructure. An example would be Office 365. This can often be referred to as multi-tenant as well as public.

- Hybrid Cloud
  - Hybrid Cloud is an environment in which components of Private and Public clouds are used.

Public vs. Private vs. Hybrid Cloud

Public Cloud

- Multi-tenant environment operated by a third-party service provider
- The maintenance is completed and mandated by the service provider
- Generally, "Pay-As-You-Go"= Less IT overhead
- Potential lesser security as the platform is shared
- Less individual flexibility and control over the cloud environment

Hybrid Cloud

- Mix of Public and Private Cloud environments offering the "Best of Both Worlds"
- Greater flexibility and more deployment options
- Cloud bursting is possible, much higher capacity ceiling
- Greater resilience to outages
- Pay model options, lower IT overhead
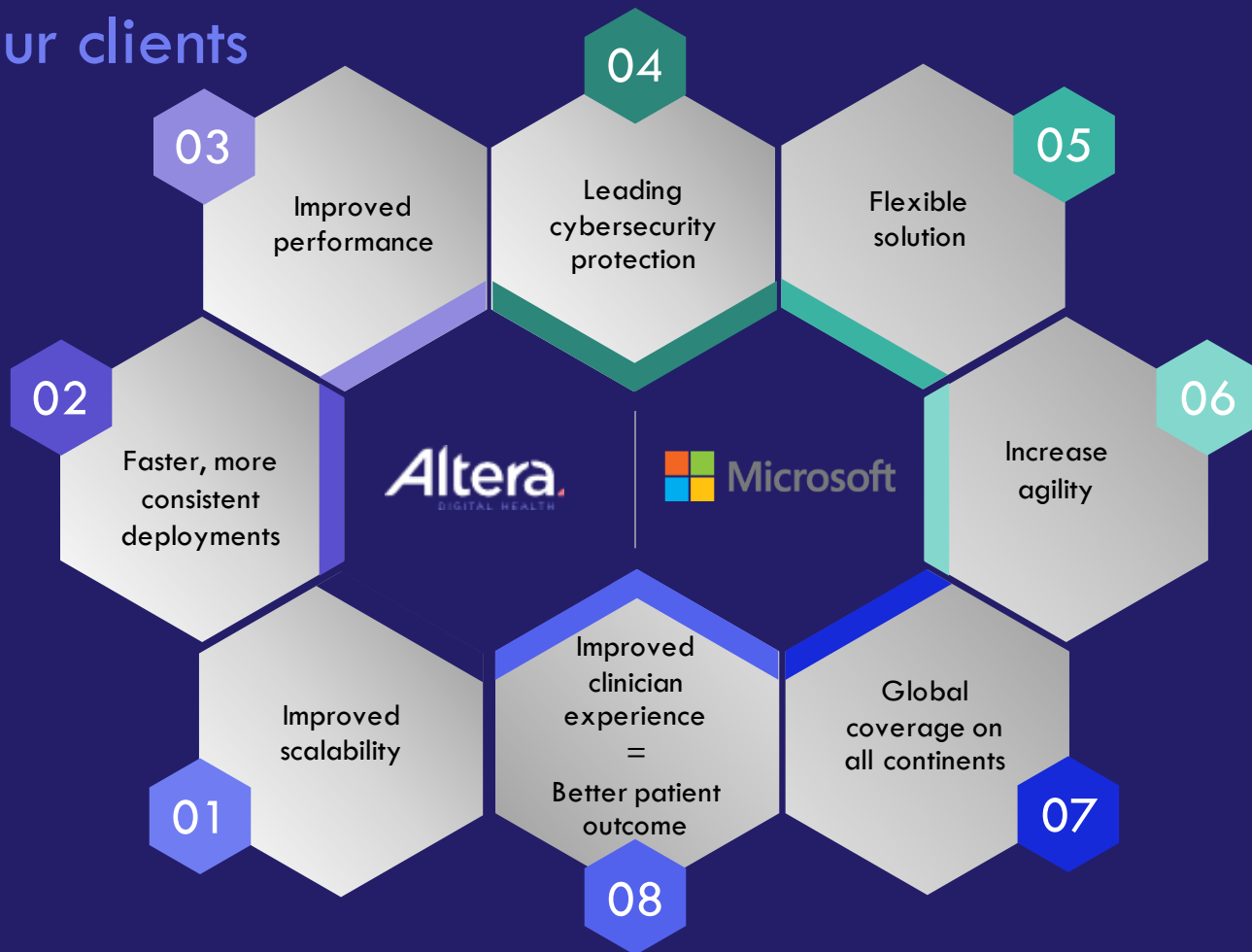- Without proper planning, can present compliance issues

Private Cloud

- Single-tenant environments with full control and responsibility borne by single organization
- Dedicated (HW/SW) to a single organization
- Greater flexibility but less deployment options
- Capital expenses and commitment to infrastructure investments
- Potential to be most expensive option

Why is Altera in the Cloud?

Benefits to our clients

- **04** Leading cybersecurity protection
- **03** Improved performance
- **05** Flexible solution
- **02** Faster, more consistent deployments
- **06** Increase agility
- **01** Improved scalability
- **08** Improved clinician experience = Better patient outcome
- **07** Global coverage on all continents

Altera DIGITAL HEALTH

Microsoft

Benefits to our clients

Improved Scalability

- Grow dynamically either immediately (unexpected load)
- Grow Vertically or Horizontally
- On-demand

03 — Improved performance

04 — Leading cybersecurity protection

05 — Flexible solution

02 — Faster, More Consistent Deployments

Altera DIGITAL HEALTH

Microsoft

06 — Increase agility

01 — Improved scalability

08 — Improved clinician experience = better patient outcome

07 — Global coverage on all continents

Benefits to our clients

Faster, More Consistent Deployments

- Automation drives speed and consistency
- Infrastructure in hours
- Virtual Machines in minutes
- Applications in days

03 Improved performance

04 Leading cybersecurity protection

05 Flexible solution

02 Faster, More Consistent Deployments

Altera DIGITAL HEALTH

Microsoft

06 Increase agility

01 Improved scalability

08 Improved clinician experience = better patient outcome

07 Global coverage on all continents

Benefits to our clients

Improved Performance

- Profile by need
- New technology without investment
- Oversize when needed

03 Improved performance

04 Leading cybersecurity protection

05 Flexible solution

02 Faster, More Consistent Deployments

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Microsoft

06 Increase agility

01 Improved scalability

Improved clinician experience = better patient outcome

07 Global coverage on all continents

08

Database server generation update

- Standard_E16_v3 to Standard_E16ds_v5
  - Identical vCPU/RAM
  - Chipset clock-speed improvement (2.1/2.3GHz to 3.5GHz)

- Past client experiences have proven significant reductions in CPU Usage and transaction durations

Example Client

Example Client
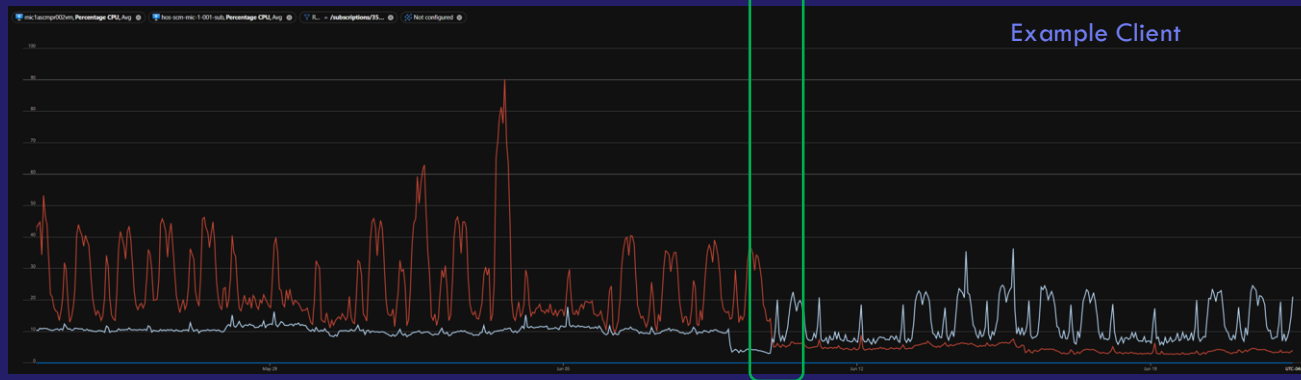
Citrix server configuration modifications

- Standard_E4_v3 to Standard_E4ds_V5
  - Identical vCPU/RAM
  - Chipset clock-speed improvement (2.1/2.3GHz to 3.5GHz)

- Standard HDD to Premium SSD disks

- Future Citrix Cloud and Ephemeral disk
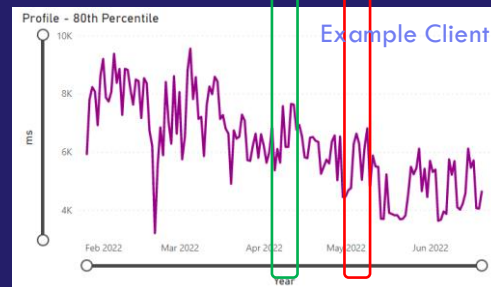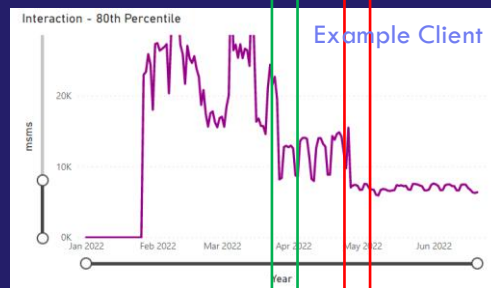
Benefits to our clients

Leading Cybersecurity Protection

- CIA Triad (Confidentiality, Integrity, Availability)
- Proven DR through Azure Site Recovery
- Ransomware Safe Back-ups
- Zero Trust Model
- High Availability Options

04 Leading cybersecurity protection

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Companies are under constant attack

Security breaches have increased by **11%** since 2018 and **67%** since 2014.

(Accenture)

62% of businesses experienced phishing and social engineering attacks in 2018

(Cybint Solutions)

68% of business leaders feel their cybersecurity risks are increasing.

(Accenture)
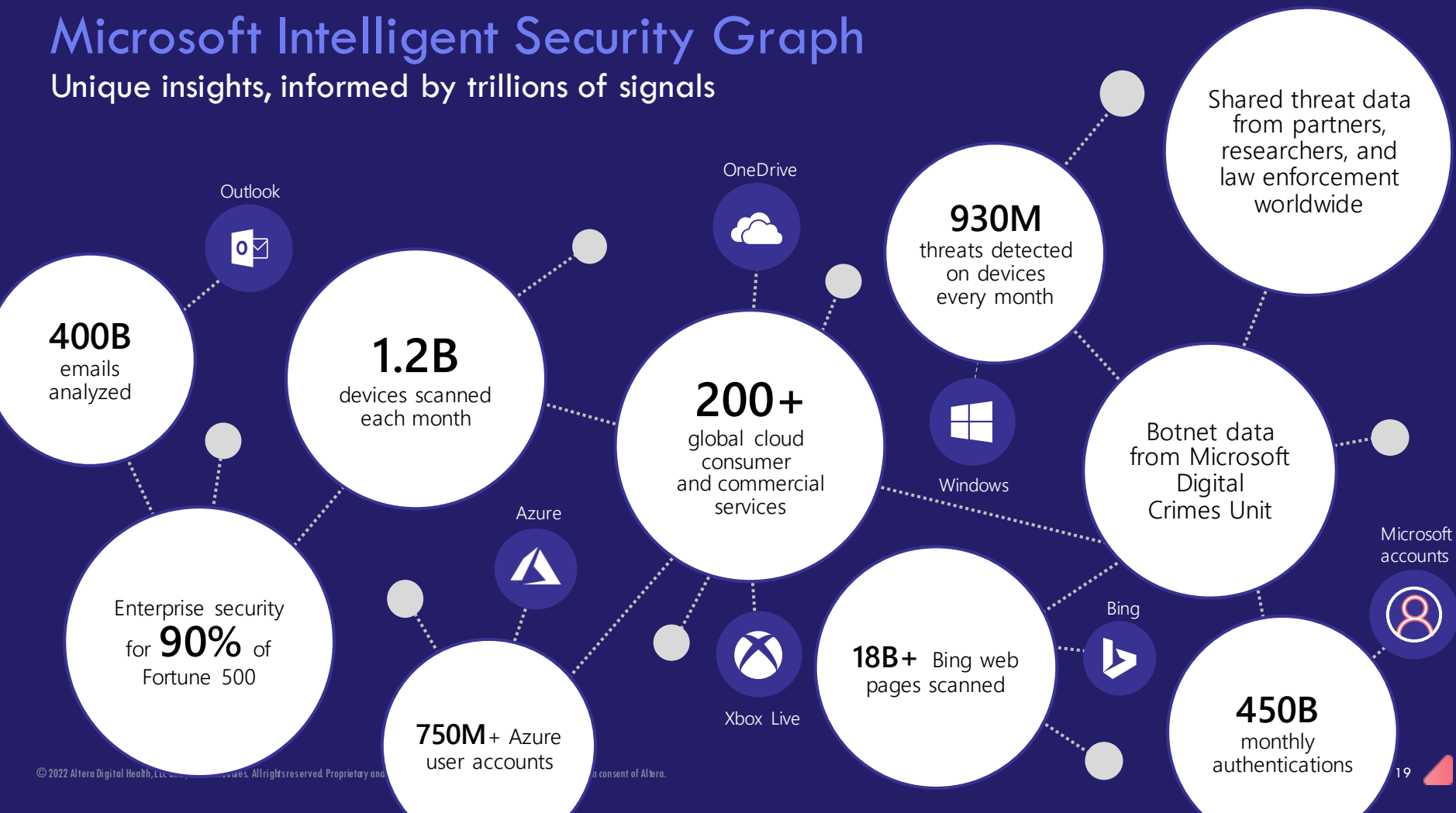
Data breaches exposed **4.1B** records in the first half of 2019.

(RiskBased)

- 52% of breaches featured hacking
- 28% involved malware
- 32–33% included phishing or social engineering, respectively.
  - (Verizon)

Microsoft Intelligent Security Graph

Unique insights, informed by trillions of signals

Outlook

OneDrive

Shared threat data from partners, researchers, and law enforcement worldwide

930M threats detected on devices every month

400B emails analyzed

1.2B devices scanned each month

200+ global cloud consumer and commercial services

Windows

Botnet data from Microsoft Digital Crimes Unit

Microsoft accounts

Azure

Enterprise security for **90%** of Fortune 500

750M+ Azure user accounts

Xbox Live

18B+ Bing web pages scanned

Bing

450B monthly authentications

Benefits to our clients

Flexible Solution And Agility

- No commitment to a specific infrastructure approach
- Consume services needed, wanted
- Supports and drives product innovation

04

03 Improved performance

Leading cybersecurity protection

05 Flexible solution

02

Faster, More Consistent Deployments

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Increase agility

06

01

Improved scalability

Improved clinician experience = better patient outcome

Global coverage on all continents

07

08

Benefits to our clients

Global Coverage

- 65+ regions worldwide in 140 countries
- Largest geographical footprint of any cloud provider
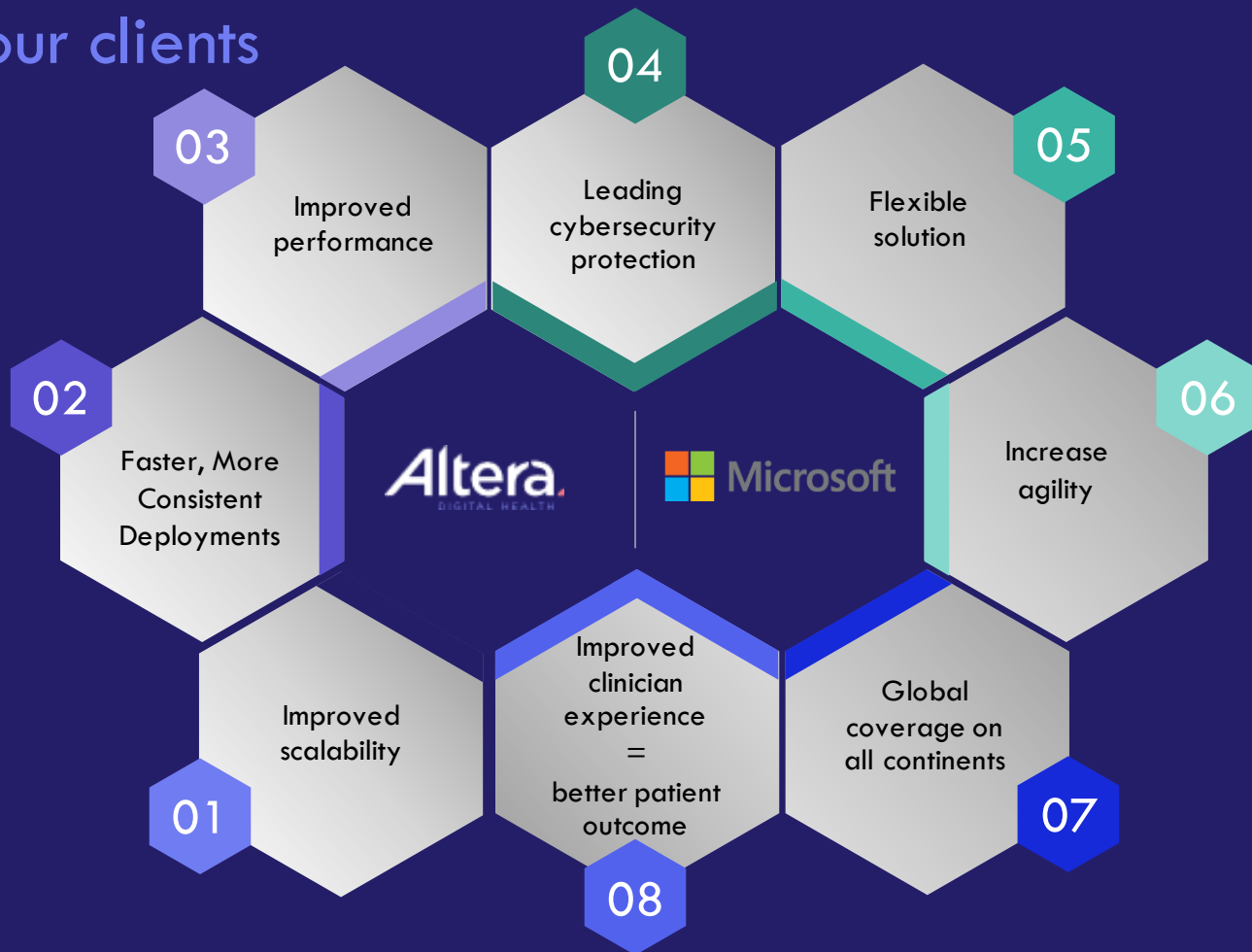- Geo-redundant datacenters and data replication

03 Improved performance

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06 Increase agility

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07 Global coverage on all continents

Global Coverage with Azure

- **65** regions existing or planned

- More than **140** countries

- All continents covered

Available region
Announced region
Availability Zones available
Announced Availability Zones
Announced region with Availability Zones

West US 2
West Central US
West US
US Gov Arizona
West US 3
US Gov Texas
Mexico Central

Central US
US DoD Central
South Central US
East US
East US 2
US Gov Virginia
North Central US
Canada Central
Canada East

Brazil Southeast
Brazil South
Chile North Central

West Europe
UK South
North Europe
UK West
France Central
France South
Spain Central
Switzerland West
Switzerland North

Norway West
Norway East
Sweden Central
Denmark East
Germany North (Public)
Germany Northeast (Sovereign)
Poland Central
Austria East
Germany Central (Sovereign)
Germany West Central (Public)
Italy North
Greece South

Israel Central

Qatar Central
UAE Central
UAE North

US DoD East

South Africa North
South Africa West

West India
Central India
South India

Southeast Asia

China North
China North 2
Korea Central
Korea South
China East 2
China East
East Asia
Japan East
Japan West
Taiwan North

Australia East
New Zealand North
Australia Central
Australia Central 2
Australia Southeast

Benefits to our clients

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Azure Subscription Architecture/Design

Position Statement

This architectural position and the standards herein are based on best practice recommendations from Altera in collaboration with our partners. As the requirements of Altera applications change over time, the architecture methods and approaches will be reviewed and updated. While it is recommended that the positions demonstrated in this document are followed, it is understood client requirements can change. This overview aligns with Altera Hosting requirements while also meeting our clients' needs.

Common baseline terms

- Azure Tenant
  - Logical Organization definition with Microsoft Azure. Altera maintains a single tenant for Hosting services but has several tenants for other uses (internal, development, etc.).

- Subscription
  - A logical container used to provision resources in Azure. It holds the details of all your resources like virtual machines (VMs), databases, and more. When you create an Azure resource like a VM, you identify the subscription it belongs to. A subscription belongs to a single tenant.

- Application Security Group (ASG)
  - A logical group which enable you to configure network security as a natural extension of resources function, allowing you to group virtual machines and define network security policies based on those groups.

- Network Security Group (NSG)
  - A set of access control rules that describe traffic filters. These can be associated with an NSG, a virtual machine or a subnet in the same region. The rules defined in the Network Security Group act as filters. On the ingress path they are applied before traffic enters the VM.

- Zero Trust
  - A strategic approach to cybersecurity that secures an organization by eliminating implicit trust and continuously validating every stage of a digital interaction.

- Azure Site Recovery
  - Site Recovery replicates workloads running on physical and virtual machines (VMs) from a primary site to a secondary location.

Azure subscription design (Overview)

- All clients are deployed on dedicated subscriptions with an Operations tenant under the Altera Microsoft Enterprise Agreement
  - One each for Prod and Non-prod
  - Provide segregation across clients

- Altera deploys a management subscription in each region
  - Centralized management and monitoring tools
 - Aggregation of performance, stability and security monitoring data

Azure Services

Tenant: Operations

Azure Active Directory — Sentinel

Azure AD Domain Services — Lighthouse

Log Analytics Workspace — DevOps

Security Center — Defender

F5 Servers — Monitor

Subscription: Customer 1 — Customer Specific Azure Resources

Subscription: Customer 2 — Customer Specific Azure Resources

Subscription: Customer X — Customer Specific Azure Resources

Azure subscription design (Client-specific)

- Servers are placed in the specific subnet based on their role

- High availability for the servers is maintained through Availability Sets with an option for availability zones

- ASGs are used within an NSG
  - Applies a network security rule to a specific workload or group of VMs
  - Creates granular security traffic controls to improve isolation of workloads and can protect them individually

- Management domain is created for each client

- Client Identity management is implemented by configuring one-way trust from Management domain to on-prem client domain.
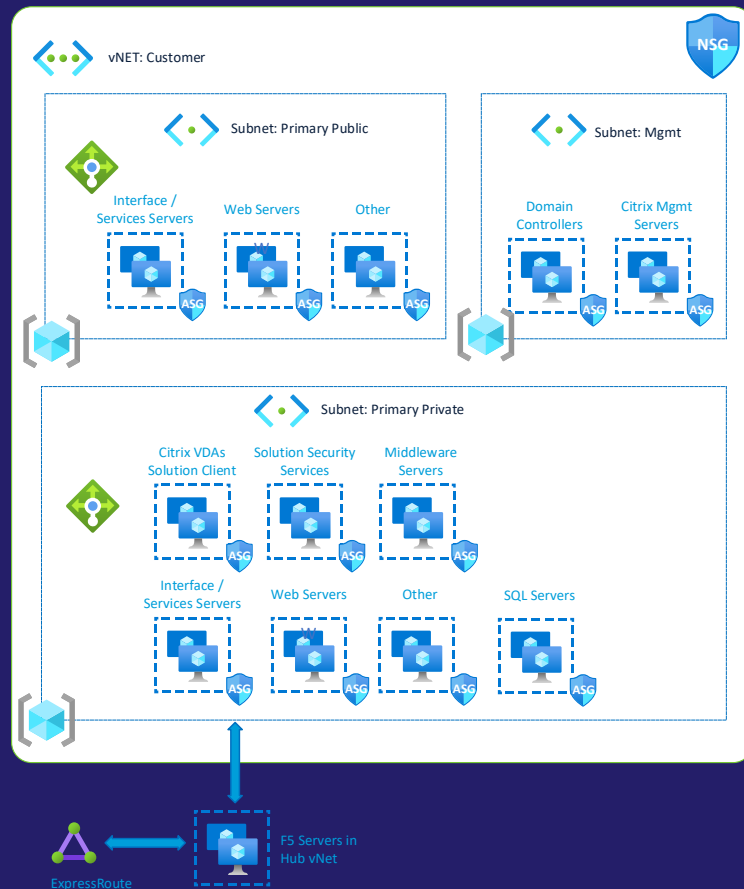
Azure subscription design (Disaster recovery)

- Azure Site Recovery is used as a disaster recovery platform

- ASR is used for all the Sunrise™ servers

- Near-constant data replication process makes sure copies are in sync

- Replicated data is stored in Azure storage, which is resilient by default
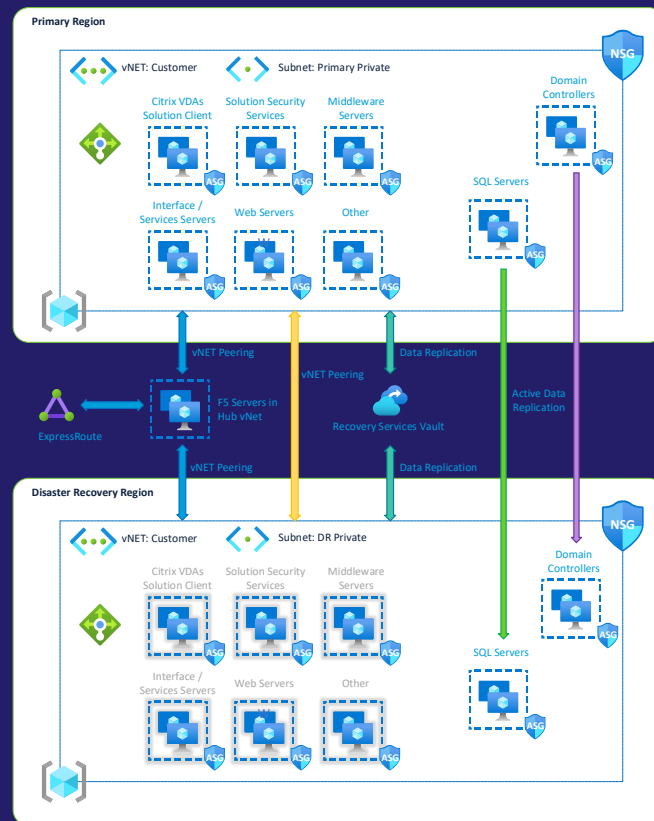
Azure subscription design details

General

- All clients are deployed in dedicated subscriptions under the Altera Tenant and Microsoft Enterprise Agreement
- An Altera management subscription is used for shared infrastructure tools (Monitoring, Patch Management, Security Analytics, etc.)
- All pre-requisite/ infrastructure software is licensed to Altera and included within the Client Hosting Agreement

Segregation

- Clients are deployed in an Altera-approved region specific to their geographic and/or geo-political locations
- Dedicated Production and non-Production subscriptions are used
- Within each subscription, Network Security Groups (NSGs) provide functional segregation

Disaster Recovery

- Each primary region is paired with a secondary region
- Primary means of data replication is via Azure Site Recovery (ASR)

Availability

- High Availability solutions are dependent on component
- High Availability/ Failover configured for Production Environments Only
- Production environments deployed in Availability Sets with an option for Availability Zones depending on requirement and capability of the specific Azure region

Questions?

Altera in Azure SLAs results in a co-engineered solution between Altera and Microsoft

2020 Azure results

99.995% uptime in Shared and Dedicated for the year

2021 Azure through June results
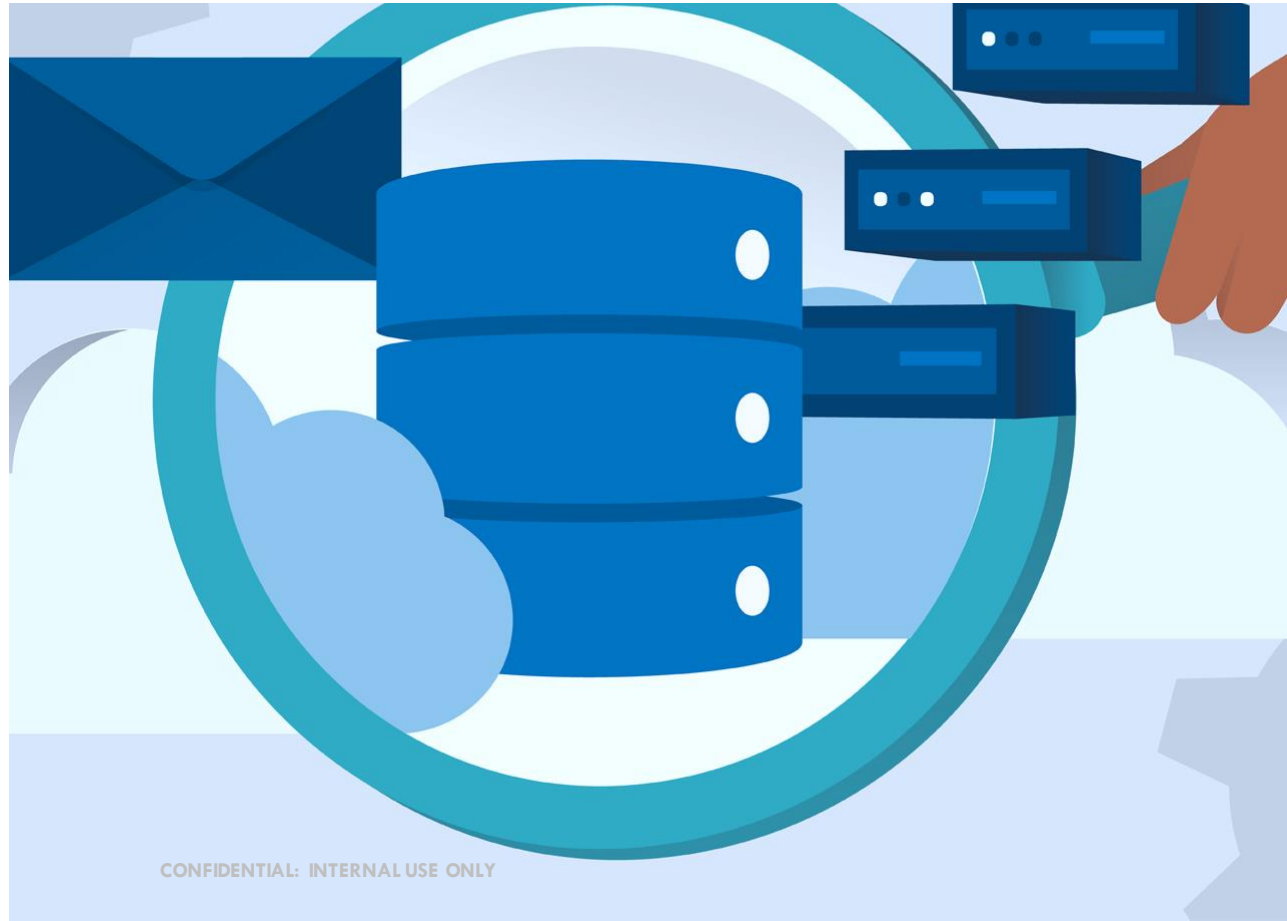
All Shared client base **100%** uptime
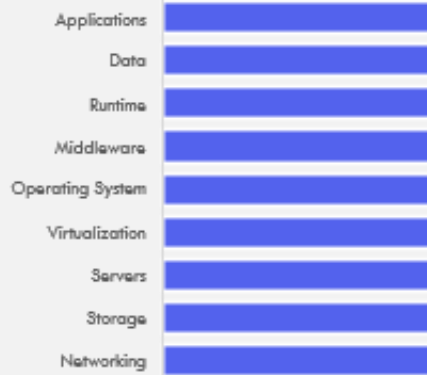One Dedicated **99.9%** uptime

Benefits to our clients

04 — Leading cybersecurity protection

03 — Improved performance

05 — Flexible solution

02 — Faster implementations and upgrades

06 — Increase business agility

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01 — Improved scalability

08 — Global coverage on all continents

07 — Improved clinician experience = Better patient outcome

Cloud Fundamentals

- Desktop Applications

- Web Applications

- Databases

- Servers

- Cloud Storage

- Big Data

- Internet of Things

- Mobile Applications

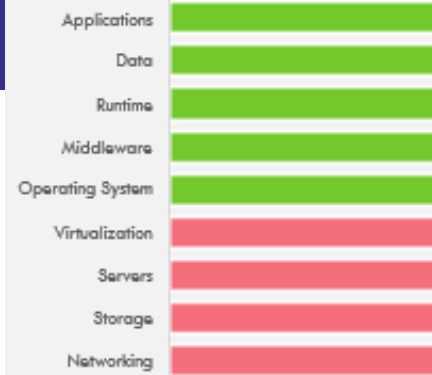# Hosting Infrastructure Models

On-premise

- Applications
- Data
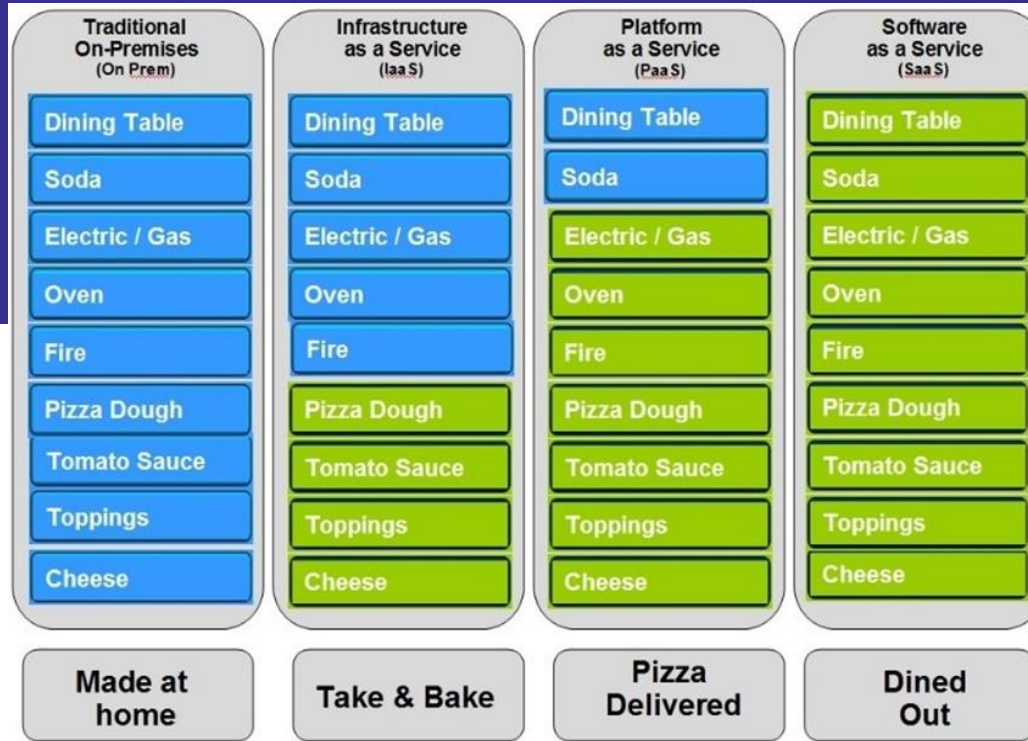- Runtime
- Middleware
- Operating System
- Virtualization
- Servers
- Storage
- Networking

Infrastructure as a Service

- Applications
- Data
- Runtime
- Middleware
- Operating System
- Virtualization
- Servers
- Storage
- Networking

Software as a Service

- Applications
- Data
- Runtime
- Middleware
- Operating System
- Virtualization
- Servers
- Storage
- Networking
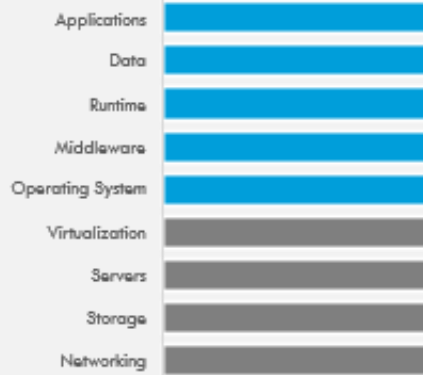
● You ● You/Third-party Manage ● Altera/MSFT Manage

Pizza as a Service

Cloud Fundamentals — Benefits

BENEFITS

- **Mirrors traditional onsite infrastructure**
  Data center in the "Cloud" including Servers, Databases, Storage, Networking, Load Balancers, etc.

- **On-demand scalability**
  Unlike fixed onsite infrastructure, cloud offers scalability and elasticity of capacity to match demand

- **Reliability/Business continuity**
  Cloud infrastructure has built in regional and global redundancy

- **Management**
  Servers, Storage, Operating Systems and infrastructure managed by owner including Upgrades and Maintenance

- **Security**

  Leverage cloud providers scale and intelligence for security

Continuous Availability

Worldwide

- 60+ regions worldwide in 140 countries
- Largest geographical footprint of any cloud provider

Georedundancy

- Multiple data centers in each region
- Replication of Data Across Regions

Disaster Recovery

- Regional and global fail-over options
- Active-Active, Azure Site Recovery (ASR) and Azure Backup models

Flexible Technology

Speed and Agility

- Spin up new systems in minutes instead of hours or days

- Adjust infrastructure as needs change

- Enables different server types for different purposes

Always Up to Date

- Azure Update Management keeps environments up to date without the need for monthly maintenance cycles

- Reduces impact on IT and Staff

Automation

- Process automation for frequent, time-consuming, and error-prone tasks

- Reduces the manual time and effort costs in maintaining a system

Financial Stability

Reliable Cost

- Shift from software and data-center costs being a capital expense to an operating expense

Optimized

- Aligned and growth for what you use

Resources

- Enables resources to focus on business-critical needs instead of maintaining legacy infrastructure

IaaS vs. PaaS vs. SaaS

On Premise		Infrastructure as a Service	Platform as a Service	Software as a Service
Within the App		Within the App	Within the App	Within the App
Software		Software	Software	Software
Data		Data	Data	Data
Runtime		Runtime	Runtime	Runtime
Middleware		Middleware	Middleware	Middleware
O/S		O/S	O/S	O/S
Virtualization		Virtualization	Virtualization	Virtualization
Servers		Servers	Servers	Servers
Storage		Storage	Storage	Storage
Networking		Networking	Networking	Networking

Altera Hosting Services

On Premise	Infrastructure as a Service	Platform as a Service	Software as a Service		
Within the App	Within the App	Within the App	Within the App	Client	
Software	Software	Software	Software		
Data	Data	Data	Data	Altera	Altera
Runtime	Runtime	Runtime	Runtime		
Middleware	Middleware	Middleware	Middleware		
O/S	O/S, VM's	O/S, VM's	O/S, VM's		
Virtualization	Virtualization	Virtualization	Virtualization	Microsoft	
Servers	Physical Servers	Physical Servers	Physical Servers		
Storage	Storage	Storage	Storage		
Networking	Networking	Networking	Networking		

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