



Microsoft

# SCAsia Supercomputing 2019

Gathering the **Best of HPC** in Asia

March 11–14, 2019  
Singapore



# Cloud Security Alliance

Is Secured High Performance Computing Possible?

Jeffery Tay  
Solution Architect



# Let Researchers be Researchers

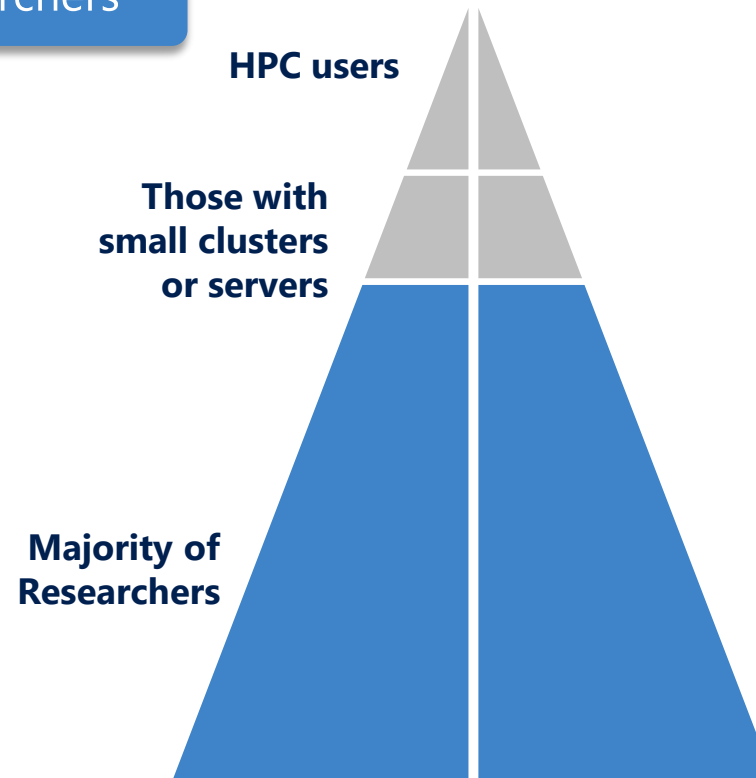
Today

Majority of Researchers

Use laptops &  
desktop computers

Overwhelmed by  
data

Finding analysis  
ever more difficult;  
sharing even  
harder



# Let Researchers be Researchers

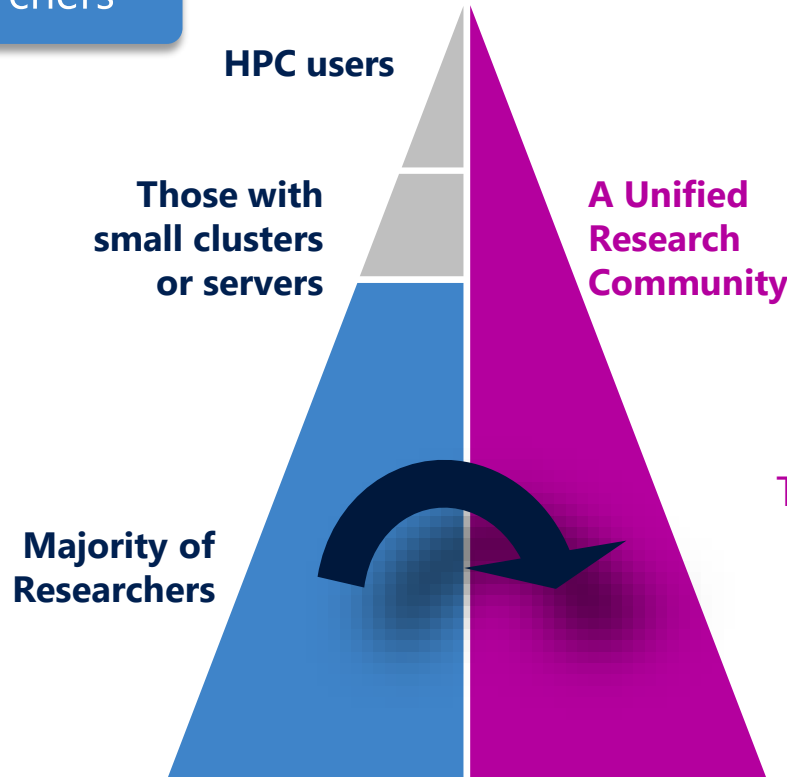
Today

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Tomorrow?

Paradigm Shift

Powerful tools

Data and analysis tools in the cloud  
Cycles, storage, support

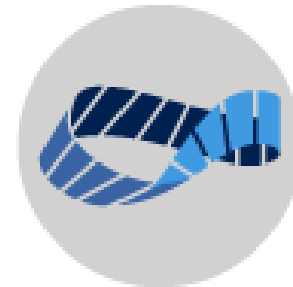
Building communities around research results

The ability to marshal needed resources on demand  
Without caring or knowing how it gets done...

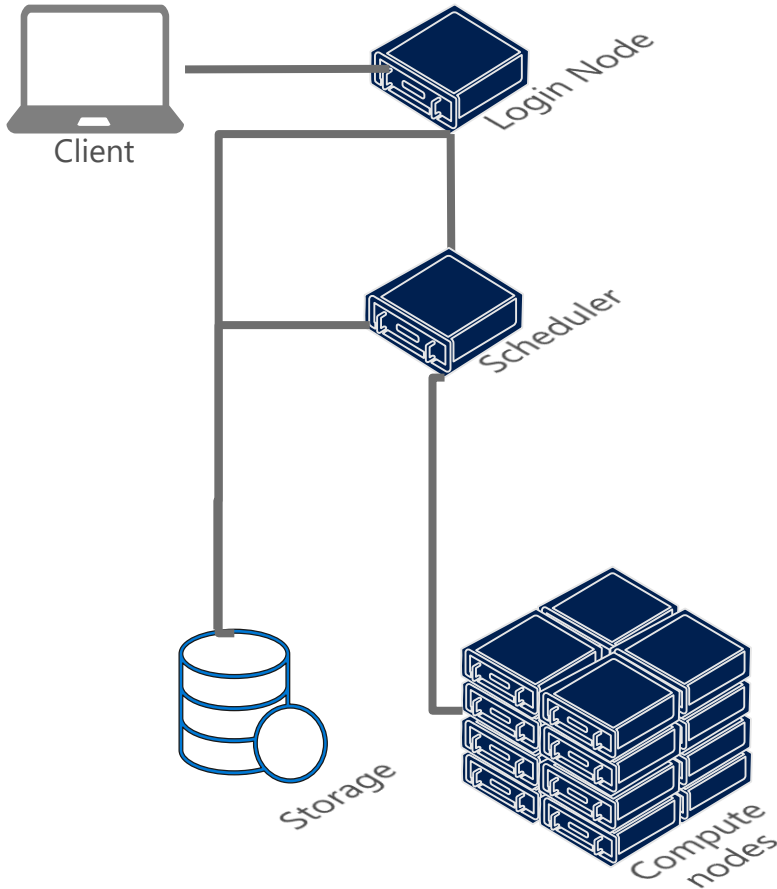
Accelerating discovery

# What is High Performance Computing

Any **heavy compute** workloads on-premise or in the cloud, regardless of the underlying interconnect and compute technologies.



# Bane or Necessity



Security  Performance 

# Security in the Cloud



Cloud Infrastructure

- Physical Assets
- Datacenter Operations
- Resource Isolation



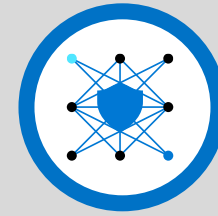
Identity & Access

- Leaked credentials
- Behavioral Analytics



Information Protection

- Discover
- Classify
- Protect
- Monitor



Sentinel

- Collect
- Detect
- Investigate
- Respond



Regulatory Compliance

- Global
  - NIST
  - CIS
  - ISO
- Industry: HIPAA
- Regional: GDPR

And many more..

# Cloud Security is a Shared Responsibility

## MICROSOFT COMMITMENT

## JOINT RESPONSIBILITY

Securing and managing the cloud foundation

Securing and managing your cloud resources



Physical assets



Virtual machines



Datacenter operations



Applications & workloads



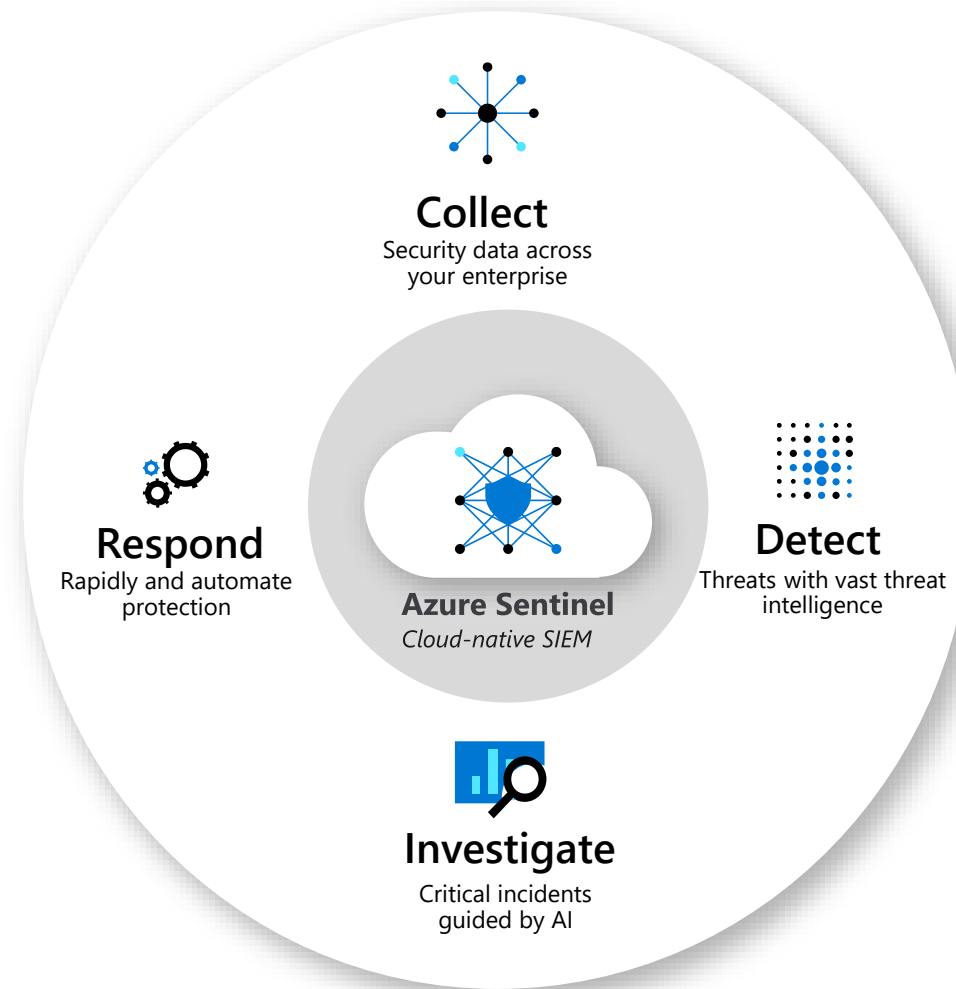
Cloud infrastructure



Data



# Azure Sentinel



# Trust & Compliance



## The future is in the Trusted Cloud

We built our Trusted Cloud on four foundational principles: security, privacy, compliance, and transparency.

Azure covers over **91** compliance offerings

# Enabling Transformational Research

## Cluster on the cloud

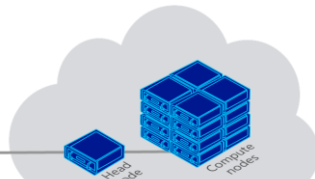
Provision one (or more) new clusters in minutes

On-premises



Client

All HPC resources in the cloud



## HPC as a service

Run at scale without worrying about managing resource

On-premises

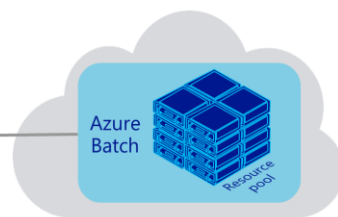


Client



Client App or Web portal

All HPC resources in the cloud



## Remote workstations

Deploy powerful remote desktops with or without GPUs

On-premises



Tablet



Mobile device

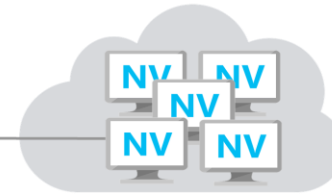


Laptop

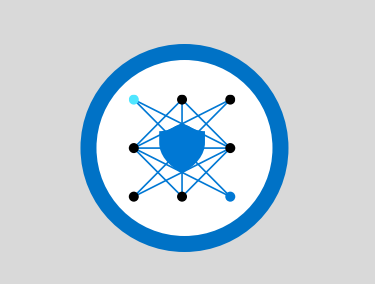


Zero client

Remote workstations on the cloud



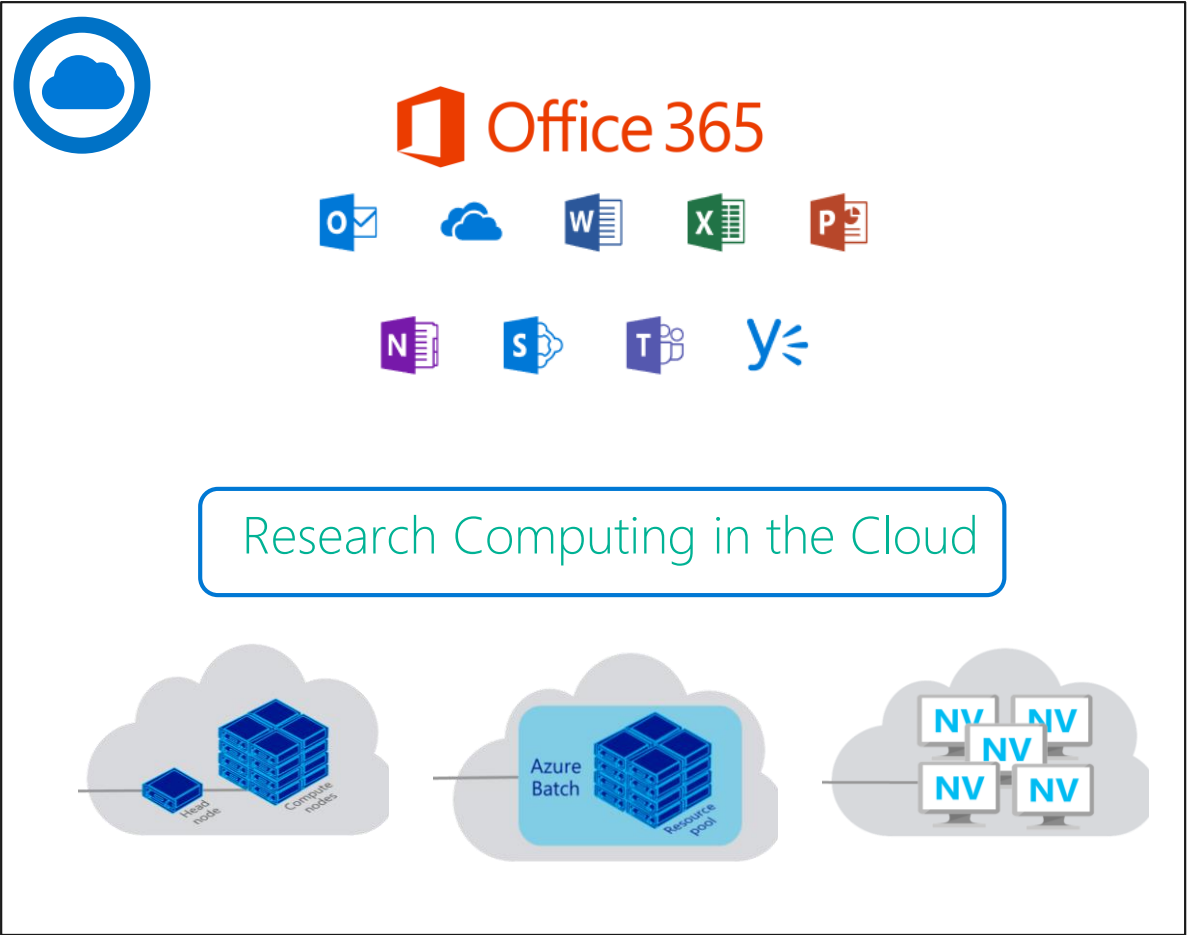
# Securing Collaborative & Transformational Research



Sentinel



Identity & Access

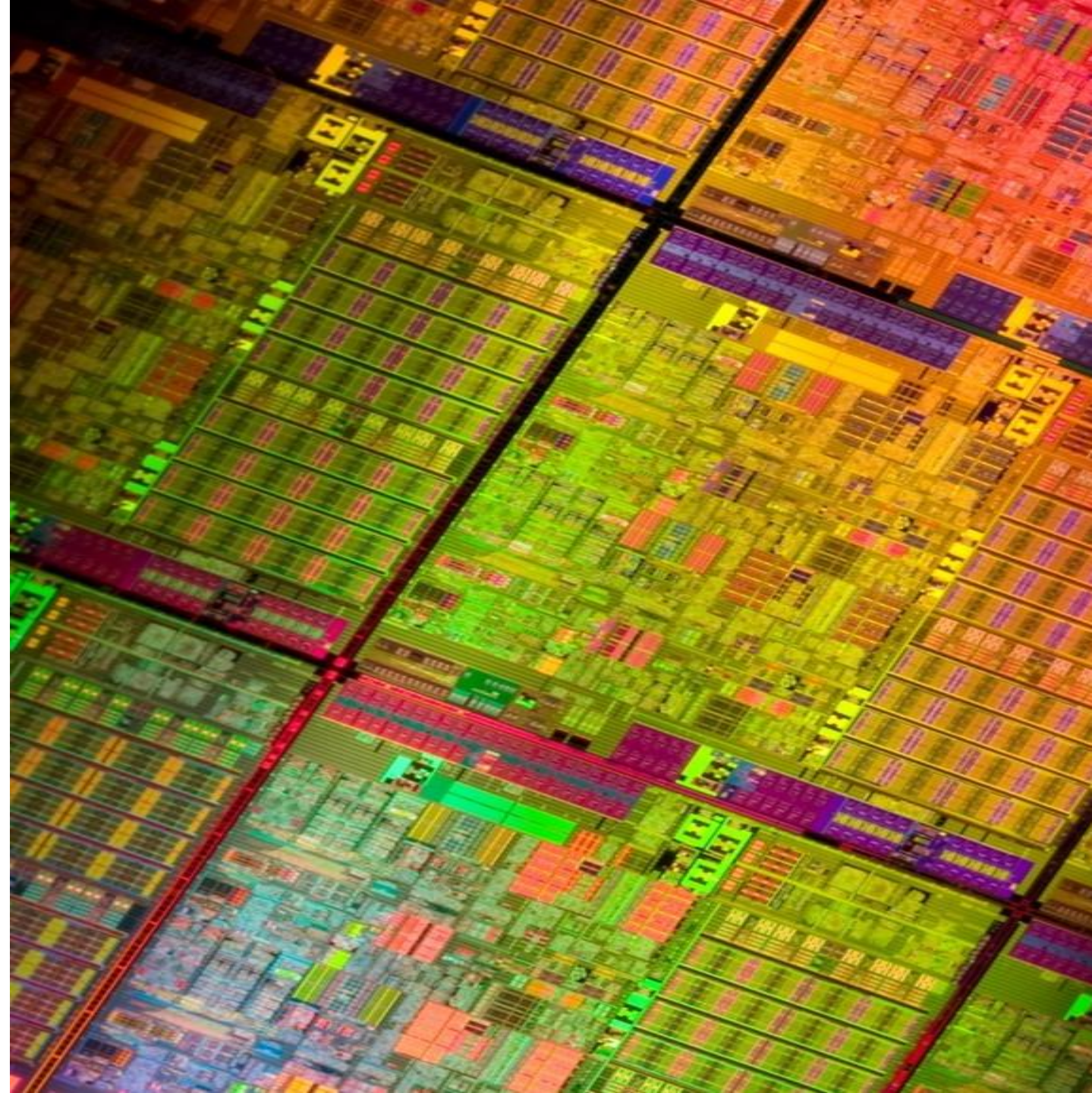


Information Protection

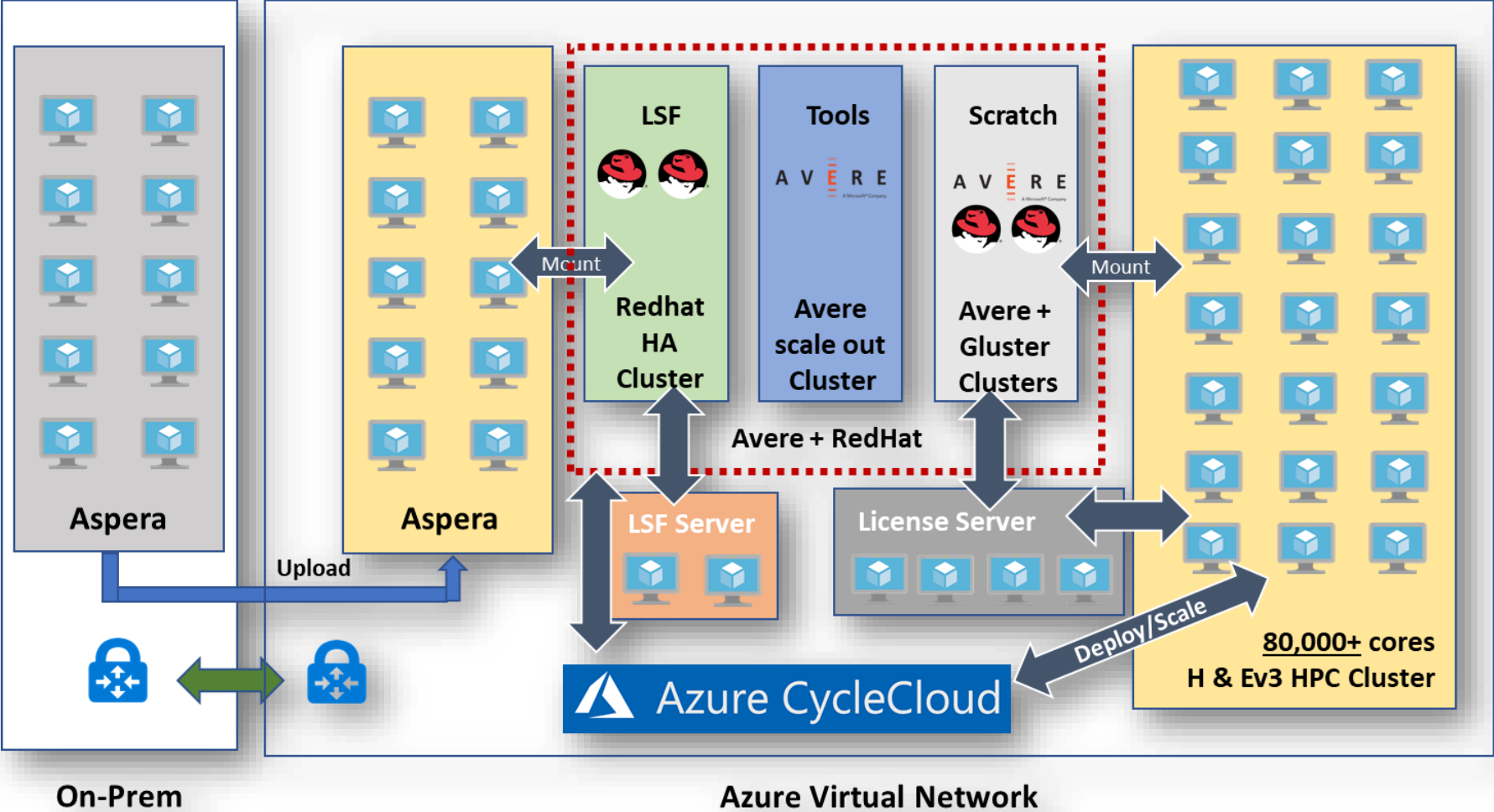


Regulatory Compliance

# Customer stories



# Supercomputing in the Cloud



# Newcastle U – Petascale Cloud Supercomputing

## Petascale Cloud Supercomputing for Terapixel Visualization of a Digital Twin

**Abstract— Background—**Photo-realistic terapixel visualization is computationally intensive and to date there have been no such visualizations of urban digital twins, the few terapixel visualizations that exist have looked towards space rather than earth. **Objective—**our aims are: creating a scalable cloud supercomputer software architecture for visualization; a photo-realistic terapixel 3D visualization of urban IoT data supporting daily updates; a rigorous evaluation of cloud supercomputing for our application. **Method—**We migrated the Blender Cycles path tracer to the public cloud within a new software framework designed to scale to petaFLOP performance. **Results—**we demonstrate we can compute a terapixel visualization in under one hour, the system scaling at 98% efficiency to use 1024 public cloud GPU nodes delivering 14 petaFLOPS. The resulting terapixel image supports interactive browsing of the city and its data at a wide range of sensing scales. **Conclusion—**The GPU compute resource available in the cloud is greater than anything available on our national supercomputers providing access to globally competitive resources. The direct financial cost of access, compared to procuring and running these systems, was low. The indirect cost, in overcoming teething issues with cloud software development, should reduce significantly over time.

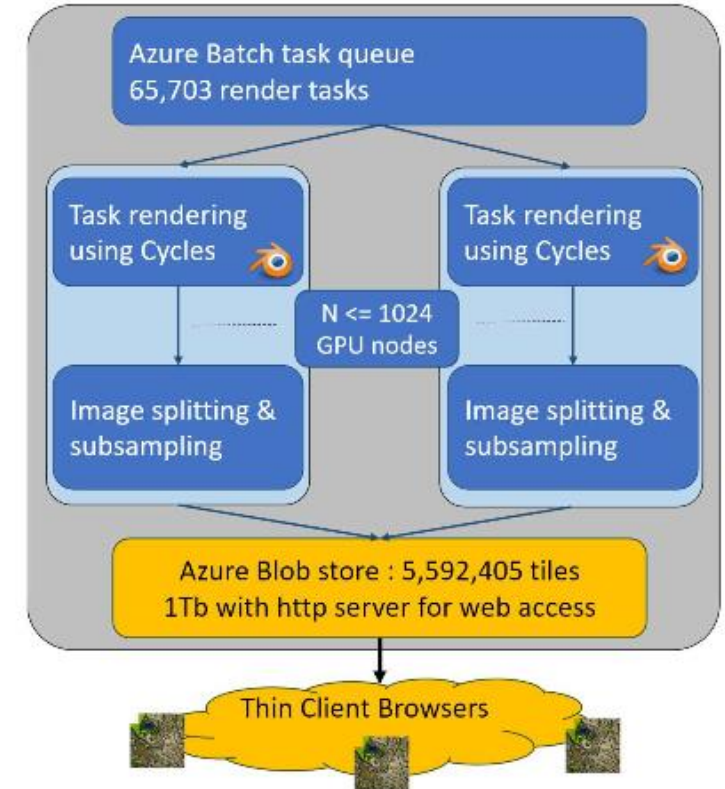


Fig. 3. Cloud supercomputing system architecture, constructed over Azure™ public cloud IaaS.

# Cray in Azure: A Unique Offering

**Dedicated & customized Cray**, directly connected to Azure:

- Mission-critical Supercomputing directly connected to your data in Azure
- Custom-configured, bare-metal HPC cluster to supercomputer scale in Azure
- Solve today's simulation needs, while future-proofing for AI, IOT challenges
- Scale with Cray beyond anything else available in the cloud
- No Data movement! Your Cray HPC storage is on the same Azure network as elastic Azure RDMA, GPU, FPGA VMs
- Gain capital efficiencies, get more agility, capacity, science per pound
- Reduce risk with Cray administered & managed system leveraging Microsoft engineering & resources

**Sentinel Pilot System** for Private Invite-only Preview





# Q&A

