



Windows Azure Platform



Giordano Tamburrelli, PhD

giotam@microsoft.com

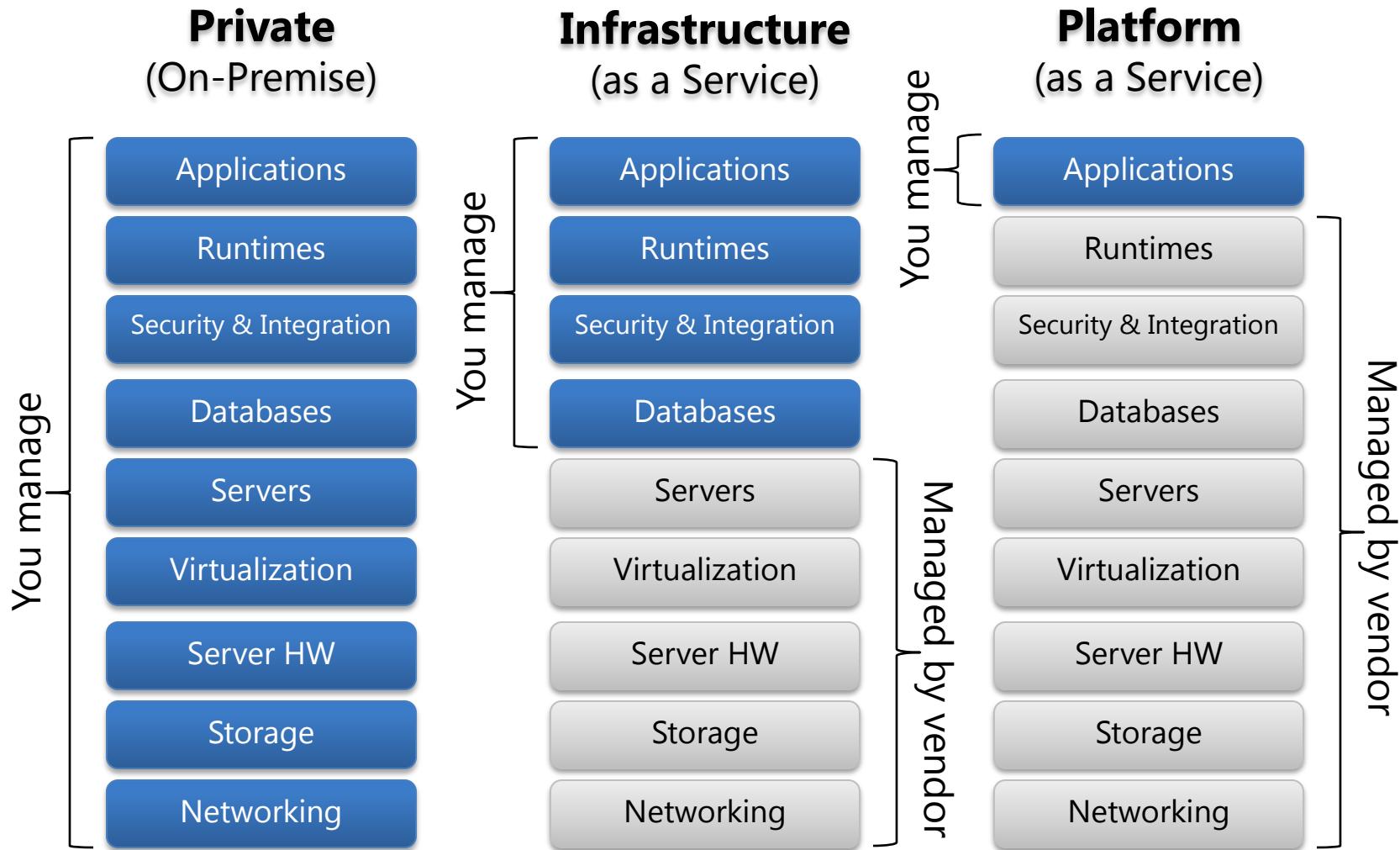
Academic Developer Evangelist

Slides by David Chou



Microsoft

Types of Clouds



Types of Clouds

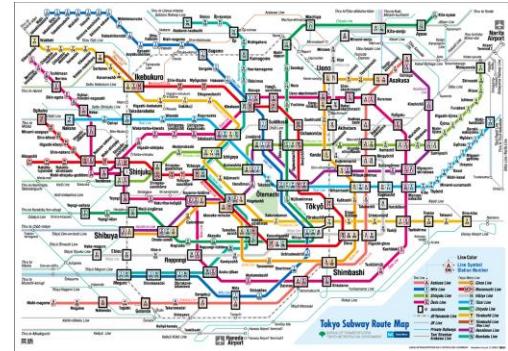
Private
(On-Premise)



Infrastructure
(as a Service)



Platform
(as a Service)



A Hybrid World

Consistency & Control

Private Cloud
(on-premise)

Scalability & Availability

Public Cloud
(off-premise)

Real-Time Performance
Security & Privacy
Customizability
Physical Resources
Heterogeneity

Redundancy & Resiliency
Global Reach
Ease of Provisioning
Abstract Resources
Homogeneity

State of Cloud Computing

> Perceptions

- “The end of software”
- On-demand infrastructure
- Cheaper and better

> Reality

- Hybrid world; not “all-or-nothing”
- Leverage existing IT skills and investments
- Seamless user experiences
- Evolutionary; not revolutionary

> Drivers

- Ease-of-use, convenience
- Product effectiveness
- Simplify IT, reduce costs

> Types

- Public
- Private
- Internal
- External
- Hybrid

> Categories

- SaaS
- PaaS
- IaaS



The Microsoft Cloud

Globally Distributed Data Centers



Quincy, WA



Chicago, IL



San Antonio, TX



Dublin, Ireland



Generation 4 DCs



The Microsoft Cloud

Categories of Services

Application Services



Software Services



Platform Services

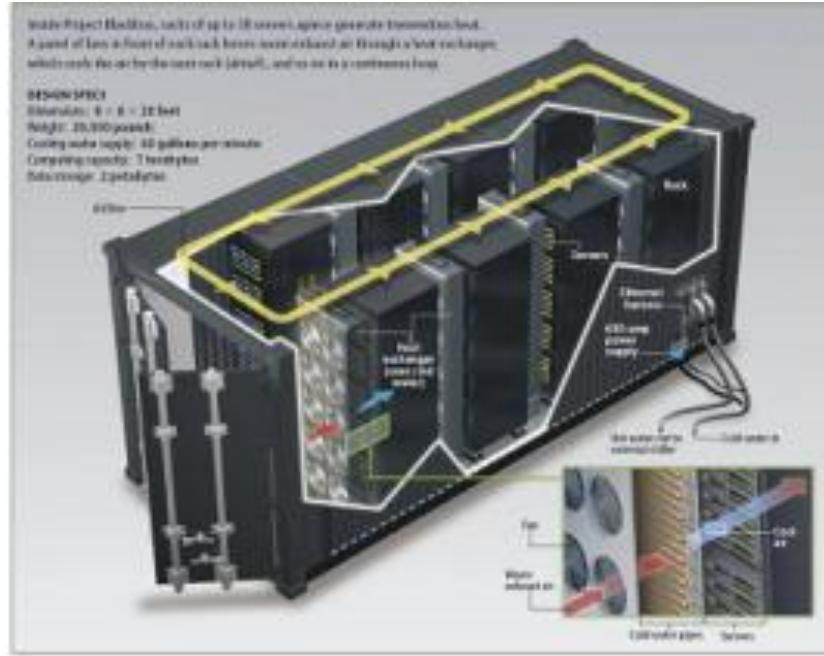


Infrastructure Services

The Microsoft Cloud

Data Center Infrastructure

- > Purpose-built data centre to accommodate containers at large scale
 - Cost \$500 million, 100,000 square foot facility (10 football fields)
- > 40 foot shipping containers can house as many as 2,500 servers
 - Density of 10 times amount of compute in equivalent space in traditional data centre
- > Can deliver an average PUE of 1.22
 - Power Usage Effectiveness benchmark from The Green Grid™ consortium on energy efficiency



The Microsoft Cloud

Data Center Infrastructure



The Microsoft Cloud

Data Center Infrastructure



The Microsoft Cloud

Server Container Deployment



The Microsoft Cloud

Server Container Deployment



The Microsoft Cloud

Server Container Deployment



The Microsoft Cloud

Server Container Deployment



The Microsoft Cloud

Server Container Deployment



The Microsoft Cloud

Server Container Deployment



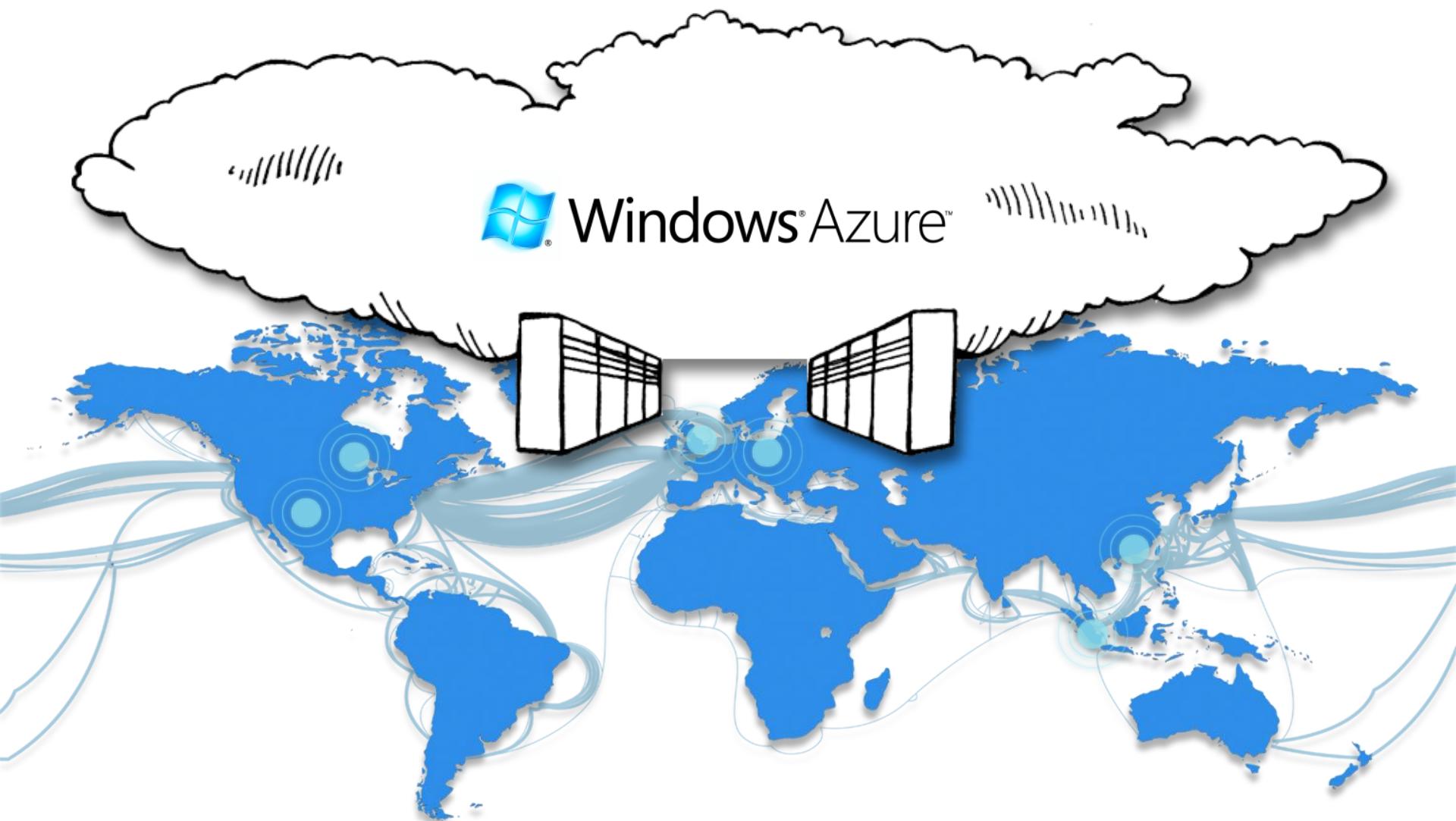
The Microsoft Cloud

Server Container Deployment



The Microsoft Cloud

Highly available, scalable, and consistent application fabric environment



The Microsoft Cloud

Categories of Services

Application Services



Software Services



Platform Services



Infrastructure Services

Windows Azure Platform

- Internet-scale, highly available cloud fabric
- Globally distributed Microsoft data centers (ISO/IEC 27001:2005 and SAS 70 Type I and Type II certified)
- Consumption and usage-based pricing; enterprise-class SLA commitment



- **Compute** – auto-provisioning 64-bit application containers in Windows Server VMs; supports a wide range of application models
- **Storage** – highly available distributed table, blob, queue, & cache storage services
- **Languages** – .NET 3.5 (C#, VB.NET, etc.), IronRuby, IronPython, PHP, Java, native Win32 code



- **Data** – massively scalable & highly consistent distributed relational database; geo-replication and geo-location of data
- **Processing** – relational queries, search, reporting, analytics on structured, semi-structured, and unstructured data
- **Integration** – synchronization and replication with on-premise databases, other data sources



- **Service Bus** – connectivity to on-premises applications; secure, federated fire-wall friendly Web services messaging intermediary; durable & discoverable queues
- **Access Control** – rules-driven federated identity; AD federation; claims-based authorization
- **Workflows** – declarative service orchestrations via REST-based activities

Pricing



| | | |
|---|--|--|
| <input type="checkbox"/> Compute <ul style="list-style-type: none">• \$0.12 / CPU hour | <input type="checkbox"/> Web Edition (1GB) <ul style="list-style-type: none">• \$9.99 / month | <input type="checkbox"/> Service Bus <ul style="list-style-type: none">• \$0.15 / 100k messages |
| <input type="checkbox"/> Storage <ul style="list-style-type: none">• \$0.15 / GB / month• \$0.01 / 10k transactions / month | <input type="checkbox"/> Business Edition (10GB) <ul style="list-style-type: none">• \$99.99 / month | <input type="checkbox"/> Access Control <ul style="list-style-type: none">• \$0.15 / 100k tokens |
| <input type="checkbox"/> Bandwidth <ul style="list-style-type: none">• \$0.10 in / GB• \$0.15 out / GB | <input type="checkbox"/> Bandwidth <ul style="list-style-type: none">• \$0.10 in / GB• \$0.15 out / GB | <input type="checkbox"/> Bandwidth <ul style="list-style-type: none">• \$0.10 in / GB• \$0.15 out / GB |

► Virtual Machine instances

| | |
|--------------------------|------------------------------------|
| Host OS | Windows Server 2008 x64 |
| Guest OS | Windows Server 2008 Enterprise x64 |
| Hypervisor | Hyper-V |
| CPU | 1.5 - 1.7 GHz x64 equivalent |
| Memory | 1.7GB |
| Network | 100Mbps |
| Transient storage | 250GB |

► Load balancers, routers, etc.

► Automated service management

- Fabric controller operations
(deploy/upgrade/delete/scale)
- Load balancer programming

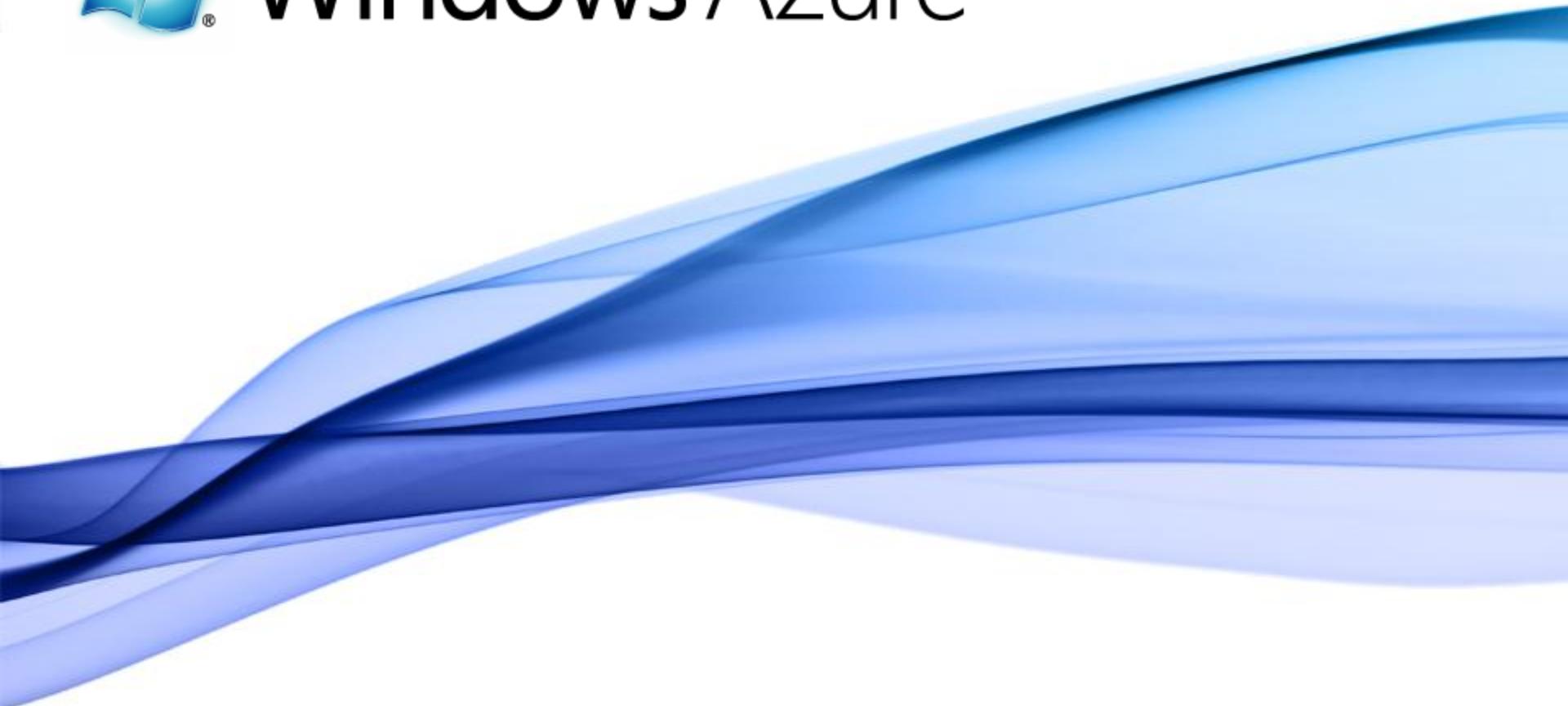
► Blob Storage

- Table Storage
- Multiple replicas

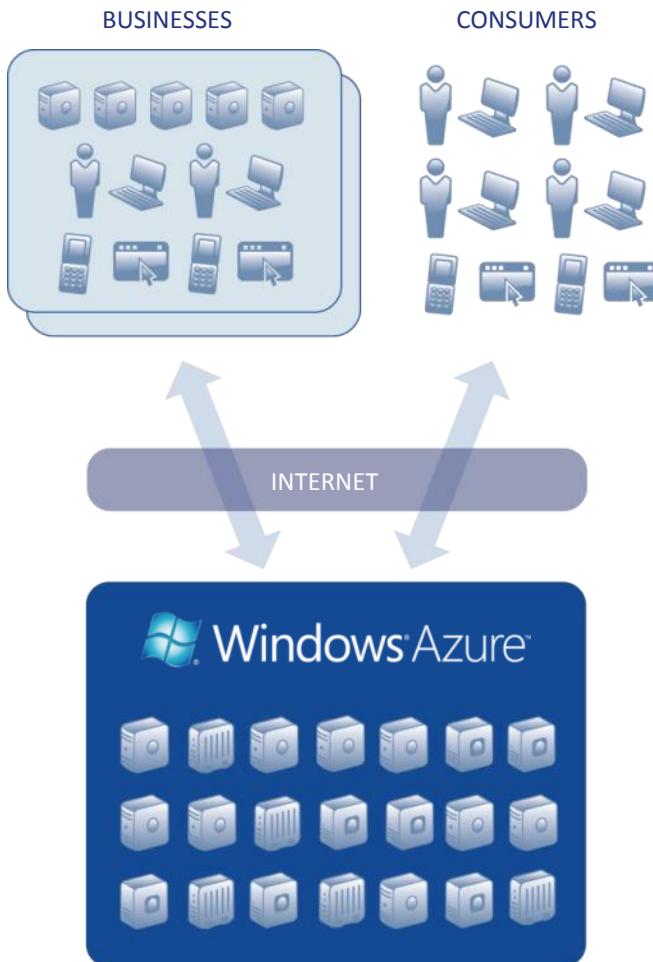
► Ingress/Egress (to/from internet only)



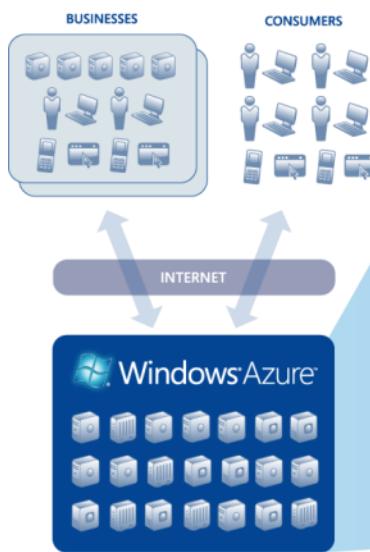
Windows® Azure™



Windows Azure Architecture

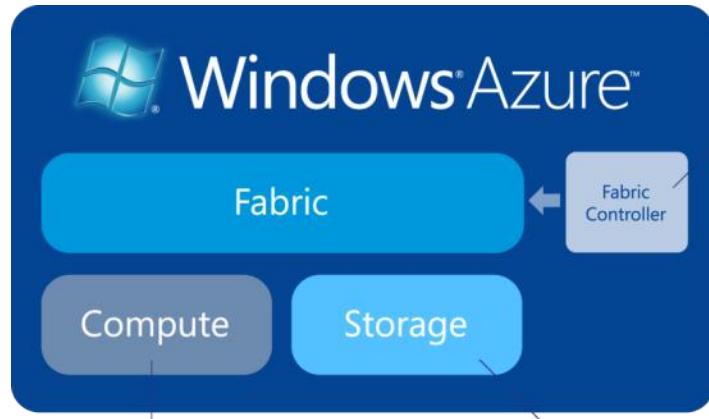


Windows Azure Architecture



The **Fabric Controller** communicates with every server within the Fabric. It manages Windows Azure, monitors every application, decides where new applications should run – optimizing hardware utilization.

Windows Azure Architecture



Computation provides application scalability. Developers can build a combination of web and worker roles. Those roles can be replicated as needed to scale the applications and computational processing power.

Storage Services allow customers to scale to store large amounts of data – in any format – for any length of time, only paying for what they use or store.

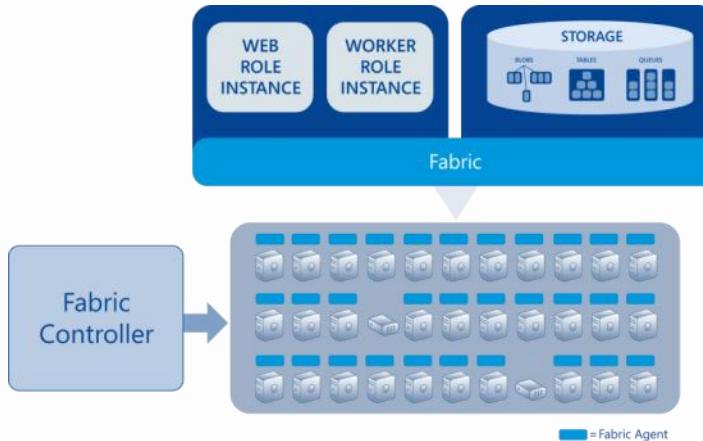
The Fabric Controller automates load balancing and computes resource scaling

Security and Control Features include storage encryption, access authentication, and over-the-wire encryption using HTTPS. Industry certification is part of the Windows Azure roadmap.

Geographically distributed, state-of-the-art data centers host your applications and data, internet-accessible from everywhere you choose to allow.

Windows Azure Architecture

Fabric Controller



- ▶ Interacts with a “Fabric Agent” on each machine
- ▶ Monitors every VM, application and instance
- ▶ Performs load balancing, check pointing and recovery

Windows Azure Architecture

Compute

GOAL:

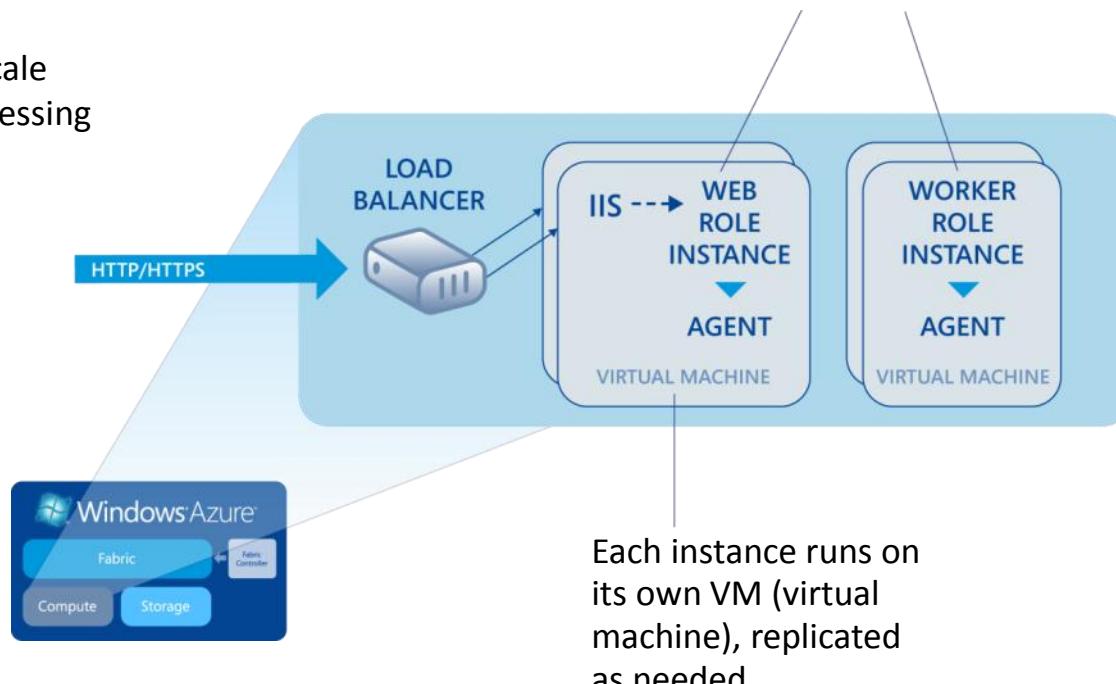
SCALABILITY

Scale out by replicating worker instances as needed.

Allow applications to scale user and compute processing independently.

Two instance types: Web Role & Worker Role

Windows Azure applications are built with web role instances, worker role instances, or a combination of both.



Windows Azure Architecture

Storage

GOAL:

SCALABLE, DURABLE STORAGE

Windows Azure storage is an application managed by the Fabric Controller

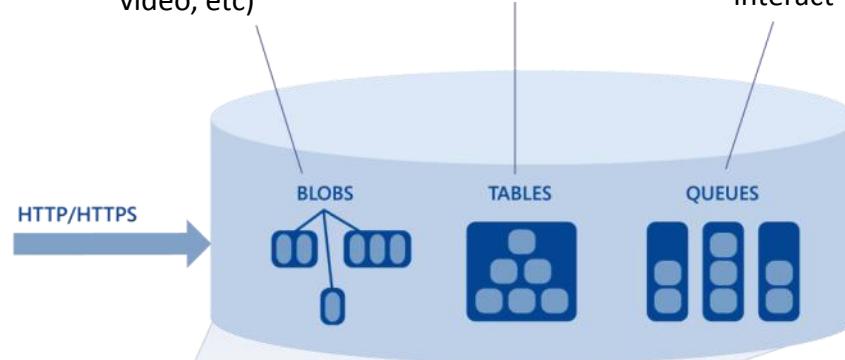
Windows Azure applications can use native storage or SQL Azure

Application state is kept in storage services, so worker roles can replicate as needed

Blobs: large, unstructured data (audio, video, etc)

Tables: simply structured data, accessed using ADO.NET Data Services

Queues: serially accessed messages or requests, allowing web-roles and worker-roles to interact

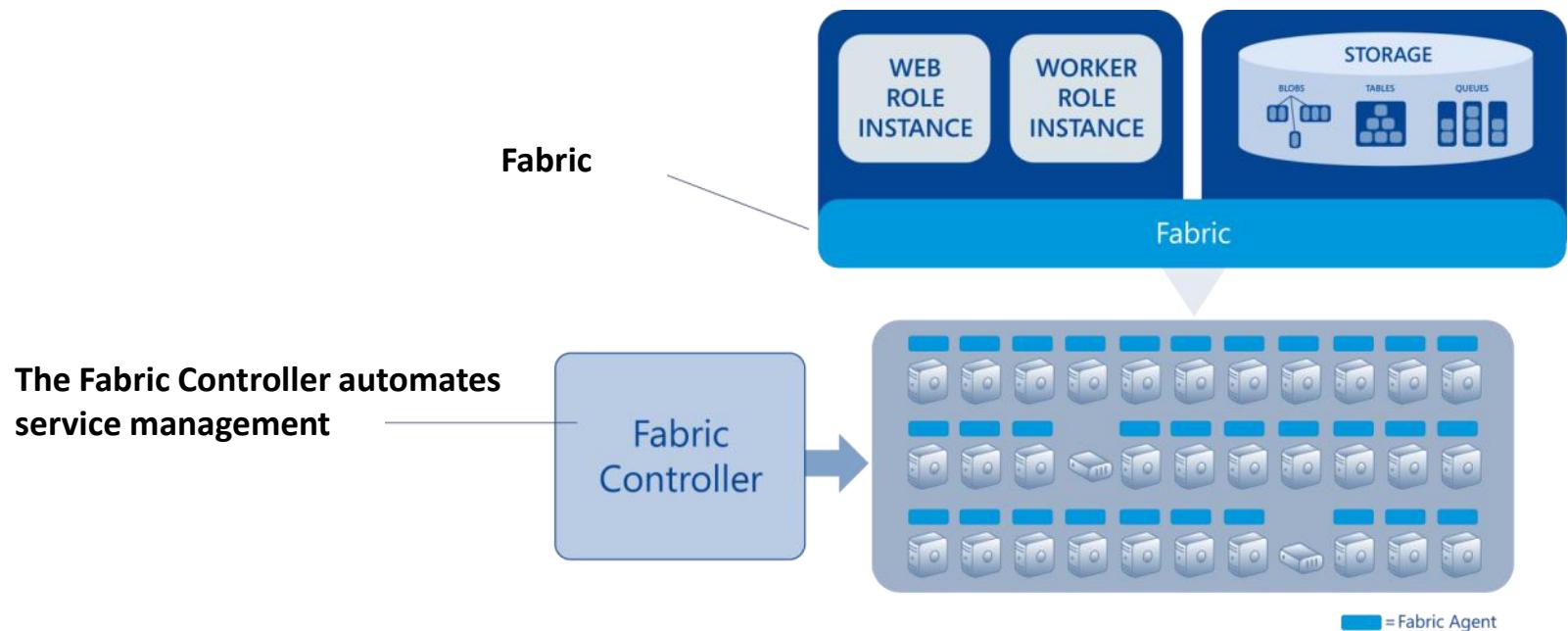


Windows Azure Architecture

Services Management

GOAL:

AUTOMATED APPLICATION MANAGEMENT AND CONTROL



3 Key Takeaways

- > Platform-as-a-service fabric cloud
- > Hybrid on-premise software and cloud services platform
- > Consistent programming model and tools

<http://www.azure.com>

Sign up at the Windows Azure Platform developers' portal

- ▶ Windows Azure access
- ▶ Developer tools
- ▶ White papers
- ▶ Sample applications

Plan pilot applications, proofs of concept, and architectural design sessions with Windows Azure partners

Windows Azure™ Platform

Products

Resources

Evidence

Pricing

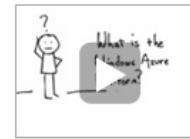
Developers

Partners

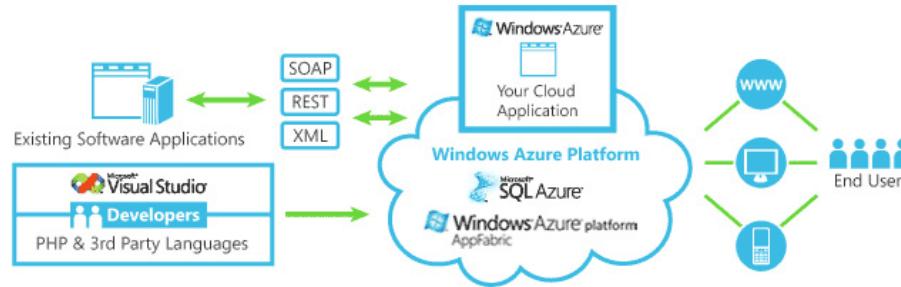
Overview

The Windows Azure platform is a set of cloud computing services that can be used **together** or **independently** that enable:

- **Developers** use existing skills and familiar tools to develop cloud applications
- **ISVs and System Integrators** rapidly reach market and pay as you go
- **IT Managers** gain access to a new set of resources without adding complexity
- **Businesses of all sizes** to quickly respond as business needs change



What is the Windows Azure Platform?



The Platform Products

Windows Azure

Windows Azure provides a scalable environment with compute, storage, hosting, and management capabilities. It links to on-premises applications with secure connectivity, messaging, and identity management.

[Learn more about Windows Azure](#)

SQL Azure

SQL Azure is a Relational Database for the Cloud. Your Data: Anyplace, anytime. SQL Azure is a full relational database in the cloud.

[Learn more about SQL Azure](#)

Windows Azure platform AppFabric

AppFabric provides Network Services for the Cloud. AppFabric offers identity management and firewall friendly messaging to protect your assets by enabling secure connectivity and messaging between on-premises IT applications and cloud-based services.

[Learn more about AppFabric](#)

Search Microsoft.com

bing Web

[Account](#) | [Support](#)

Get Started Now

The Windows Azure platform gives you:

- A **familiar** development experience
- On-demand **scalability**
- **Reduced time-to-market** for your applications

[Learn More](#)

[Get Tools & SDK](#)

Thank you

A large, abstract graphic of blue and white waves occupies the right side of the slide, extending from the bottom left towards the top right.

Your potential. Our passion.[™]
Microsoft®

© 2009 Microsoft Corporation. All rights reserved. Microsoft, Windows, Windows Vista and other product names are or may be registered trademarks and/or trademarks in the U.S. and/or other countries. The information herein is for informational purposes only and represents the current view of Microsoft Corporation as of the date of this presentation. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information provided after the date of this presentation.
MICROSOFT MAKES NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, AS TO THE INFORMATION IN THIS PRESENTATION.

Giordano Tamburrelli, PhD
giotam@microsoft.com
Academic Developer Evangelist
Slides by David Chou