Types of Clouds

- **Private (On-Premise)**
  - You manage
  - Applications
  - Runtimes
  - Security & Integration
  - Databases
  - Virtualization
  - Servers
  - Server HW
  - Storage
  - Networking

- **Infrastructure (as a Service)**
  - You manage
  - Applications
  - Runtimes
  - Security & Integration
  - Databases
  - Virtualization
  - Servers
  - Server HW
  - Storage
  - Networking

- **Platform (as a Service)**
  - Managed by vendor
  - Applications
  - Runtimes
  - Security & Integration
  - Databases
  - Virtualization
  - Servers
  - Server HW
  - Storage
  - Networking
Types of Clouds

- **Private**
  (On-Premise)

- **Infrastructure**
  (as a Service)

- **Platform**
  (as a Service)
A Hybrid World

Consistency & Control
- Real-Time Performance
- Security & Privacy
- Customizability
- Physical Resources
- Heterogeneity

Scalability & Availability
- 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

> Types
  • Public
  • Private
  • Internal
  • External
  • Hybrid

> Categories
  • SaaS
  • PaaS
  • IaaS

> Drivers
  • Ease-of-use, convenience
  • Product effectiveness
  • Simplify IT, reduce costs
The Microsoft Cloud
Categories of Services

Application Services
- bing
- Windows Live
- Office Live
- HealthVault
- Advertising
- XBOX LIVE

Software Services
- Exchange Online
- SharePoint Online
- Office Communications Online
- Dynamics CRM Online

Platform Services
- SQL Azure
- .NET Services
- Live Services
- SharePoint Services
- Dynamics CRM 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
Server Container Deployment
The Microsoft Cloud
Server Container Deployment
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The Microsoft Cloud
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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
  - bing
  - Windows Live
  - Office Live
  - HealthVault
  - Advertising
  - XBox Live

- Software Services
  - Exchange Online
  - SharePoint Online
  - Office Communications Online
  - Dynamics CRM Online

- Platform Services
  - SQL Azure
  - Windows Azure AppFabric
  - Live Services
  - SharePoint Services
  - Dynamics CRM 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

**Windows Azure**

- **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

**SQL Azure**

- **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

**.NET Services**

- **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

### Compute
- $0.12 / CPU hour

### Storage
- $0.15 / GB / month
- $0.01 / 10k transactions / month

### Bandwidth
- $0.10 in / GB
- $0.15 out / GB

### Web Edition (1GB)
- $9.99 / month

### Business Edition (10GB)
- $99.99 / month

### Bandwidth
- $0.10 in / GB
- $0.15 out / GB

### Service Bus
- $0.15 / 100k messages

### Access Control
- $0.15 / 100k tokens

### Bandwidth
- $0.10 in / GB
- $0.15 out / GB

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- **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/upgradedelete/scale)
  - Load balancer programming

- **Blob Storage**
- **Table Storage**
- **Multiple replicas**

- **Ingress/Egress**
  - (to/from internet only)
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.
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.

The Fabric Controller automates load balancing and computes resource scaling.

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.

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
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.

Each instance runs on its own VM (virtual machine), replicated as needed.
Windows Azure Architecture

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.
GOAL:
AUTOMATED APPLICATION MANAGEMENT AND CONTROL

Windows Azure Architecture
Services Management

The Fabric Controller automates service management
3 Key Takeaways

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

http://www.azure.com

Windows Azure Platform

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

Get Started Now

The Windows Azure platform gives you:

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

The Platform Products

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.

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

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.
Thank you