



# **CLOUD COMPUTING APPLICATIONS**

IaaS Providers: Microsoft

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# Microsoft

- Cloud first, mobile first
- Virtualization provided by Hyper-V to rival VMWare
- Microsoft Azure is IaaS and PaaS
- Office 365 and Office for iPad
- SharePoint
- Yammer (social and collaboration)
- Exchange (primary competitor Google Gmail)
- Dynamics CRM

# PaaS vs. IaaS

- An app that must serve a variety of purposes for the long term may be better developed on IaaS
- If you need flexibility to change development tools and languages, then an IaaS may be better
- A large software development team may have the resources to optimize and monitor an IaaS system

# Microsoft Azure

- It was launched by Microsoft in 2010
- It provides both PaaS and IaaS services
- It is like a hybrid Cloud provider that tries to do multiple things

# Uses of Azure

- Can be used for anything since it provides IaaS services that can host virtual machines
- However, its PaaS services have been known to host web sites that may receive a lot of traffic
- Good for .NET developers

# Azure Cloud

- Microsoft developed their own operating system called Windows Azure, which is used for their data center cluster
- Uses Hyper-V, a windows server – Hypervisor – that can run virtual machines

# Windows Server

- Has support for Windows server
- Can provision and manage virtual machines
- Can attach and manage disks

# Windows Azure

- Windows Azure is the OS for the data center
  - Model: Treat the data center as a machine
  - Handles resource management, provisioning, and monitoring
  - Manages application lifecycle
  - Allows developers to concentrate on business logic
- Provides shared pool of compute, disk, and network
  - Virtualized storage, compute, and network
  - Illusion of boundless resources
- Provides common building blocks for distributed applications
  - Reliable queuing, simple structured storage, SQL storage
  - Application services such as access control and connectivity



# Windows Azure Components

	Windows Azure PaaS
Applications	Windows Azure Service Model
Runtimes	.NET 3.5/4, ASP .NET, PHP
Operating System	Windows Server 2008/R2-Compatible OS
Virtualization	Windows Azure Hypervisor
Server	Microsoft Blades
Database	SQL Azure
Storage	Windows Azure Storage (Blob, Queue, Table)
Networking	Windows Azure-Configured Networking

# Modeling Cloud Applications

- A Cloud application is typically made up of different components, with multiple instances of each for scalability and availability. For example,
  - Front end: load-balanced stateless web servers
  - Middle worker tier: order processing, encoding
  - Backend storage: SQL tables or files

# The Windows Azure Service Model

- A Windows Azure application is called a “service”
  - Definition information
  - Configuration information
  - At least one “role”
- Roles are like DLLs in the service “process”
  - Collection of code with an entry point that runs in its own virtual machine
- There are currently three role types:
  - Web Role: IIS7 and ASP.NET in Windows Azure-supplied OS
  - Worker Role: arbitrary code in Windows Azure-supplied OS
  - VM Role: uploaded VHD with customer-supplied OS

# Role Contents

- Definition
  - Role name
  - Role type
  - VM size (e.g., small, medium)
  - Network endpoints
- Code
  - Web/worker role: hosted DLL and other executables
  - VM role: VHD
- Configuration
  - Number of instances
  - Number of update and fault domains