

Cloud Computing

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Outline

- Cloud Overview
- Comparison of Cloud Providers
- Windows Azure Architecture
- Azure AppFabric
- Project Dallas

Overview of Cloud

- Term *Cloud* over-applied

- **Definition:**

A utility computing environment where the developer can treat compute and storage resources as infinite.

- **Define utility computing**

- Like electricity, water, gas utilities
- Pay per use, rarely think about use far before need

Services on Cloud Providers

- **Web application hosting**
- **Worker tasks**
- **File storage**
- **SQL Database**
- **NoSQL Database**
- **Security**
- **Differentiators**
 - Sales Platforms
 - Customer Relationship Management
 - Hosted Applications
 - etc.

A Sampling of Choices



and many more!!!

Decisions Cloud Platforms Remove

- **Research theoretical maximum load**
- **Replication strategy**
- **When to use a content distribution network (CDN)**
- **Platform patching/maintenance strategy**
 - Not true on Amazon's offering
- **Storage 'head room'**
- **Data center setup**
 - Redundant power
 - Redundant cooling
 - Redundant Internet connectivity
 - Connectivity within data center

Decisions You Still Own

- Data storage: NoSQL style or SQL style
- Maximum concurrency in application
- If SQL storage: sharding?
- If NoSQL: partition and row keys?
- Programming Language
- Monitoring software
- When to adjust capacity

Windows Friendly Cloud Providers

- Amazon Web Services
- Rackspace Hosting
- Microsoft Azure

Windows Azure Architecture

- Microsoft SQL Azure
- Windows Azure
- Windows Azure Platform AppFabric
- Microsoft Codename *Dallas*

Microsoft SQL Azure

- 1 GB (Web Edition) or 10-50 GB (Business Edition) database
- Highly Available
- Replicated
- Maintained/patched
- Offers 99.9% availability/month (~43 minutes of downtime/month)
- Microsoft gets 10 hours of scheduled downtime/year that, when announced, doesn't count against SLA.

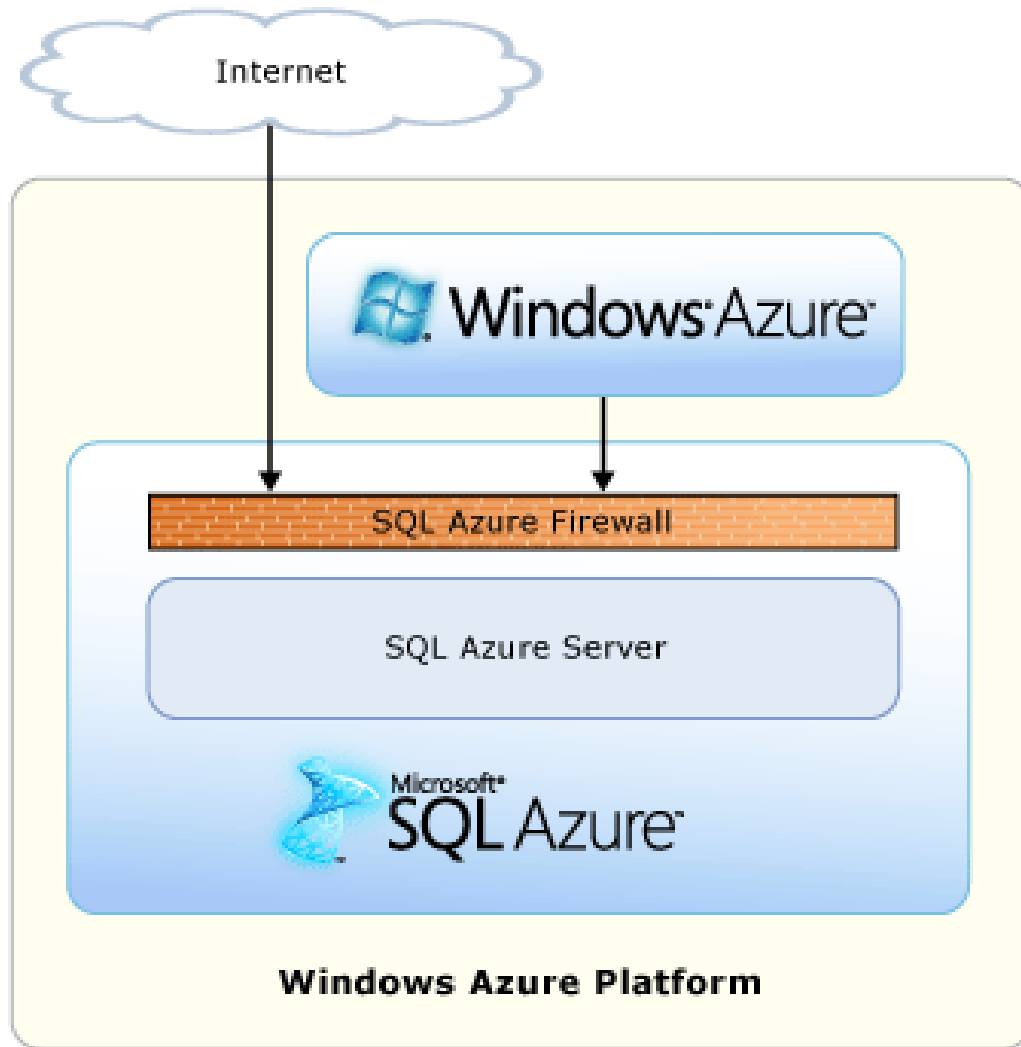
What is different about SQL Azure?

- **Things that cause a connection to close early**
 - Excessive resource usage (ex. lots of memory)
 - Long running queries
 - Long running single transaction
 - Idle connection
- **No support for RESTORE**
- **No attaching a database to the SQL Azure Server**
- **No distributed transactions**
- **Collation only available at the column or expression level**

What is different about SQL Azure? (cont'd)

- Tables **MUST** have a clustered index before you can insert data
- 150 Databases/SQL Azure Server, including Master.
- Cannot use the following user names: admin, administrator, guest, root, sa

SQL Azure Security



SQL Azure Security Architecture

- **Connections only over port 1433**
- **Access off by default**
- **Need to explicitly allow connections by IP Range**
 - Windows Azure is 0.0.0.0 to 0.0.0.0

Windows Azure

- Full simulation environment available for local development
- Contains two types of service: Operating System and storage
- All services available over REST
- All storage type services (blob, table, queue) use shared key authentication
- CPU resources are authenticated when you interact with the service (via upload, control panel, through REST APIs)

Windows Azure

- Two roles: Web, Worker
- Web: IIS7
- Worker: General processing
- Runs on a Windows VM: Normal access to:
 - WMI
 - Perf Counters
 - File System (temp storage only)
- Supports .NET and native code.

Blob Storage: Containers

- **Folder for blobs, other containers**
- **May contain metadata**
- **Security:**
 - Public browse of container
 - Public read for blobs only
 - Account owner only
 - Shared Access Signature URL: URL good for URL holder for fixed period of time. Can grant Read, Write, Delete, and List permissions at container and blob level

Blob Storage

- **Block Blobs**
 - Blocks are 4 MB in size
 - Maximum blocks per blob 50000 (200GB)
- **Page Blobs**
 - Align on 512 byte boundaries
 - In place updates
 - Maximum size: 1TB
- **Dev Storage limited to 2GB**
- **Blobs can have metadata**

Table Storage

- Supports CRUD operations. The U has both Update and Merge options.
- Natural fit to Entity Data Model
- Each entity must have a partition and row key
- May query against partition/row key or generic queries
- Queries return in 30 seconds. 5 seconds allocated for query execution.
- Max of 1000 entities per response (or 5 seconds search). Uses continuation tokens.

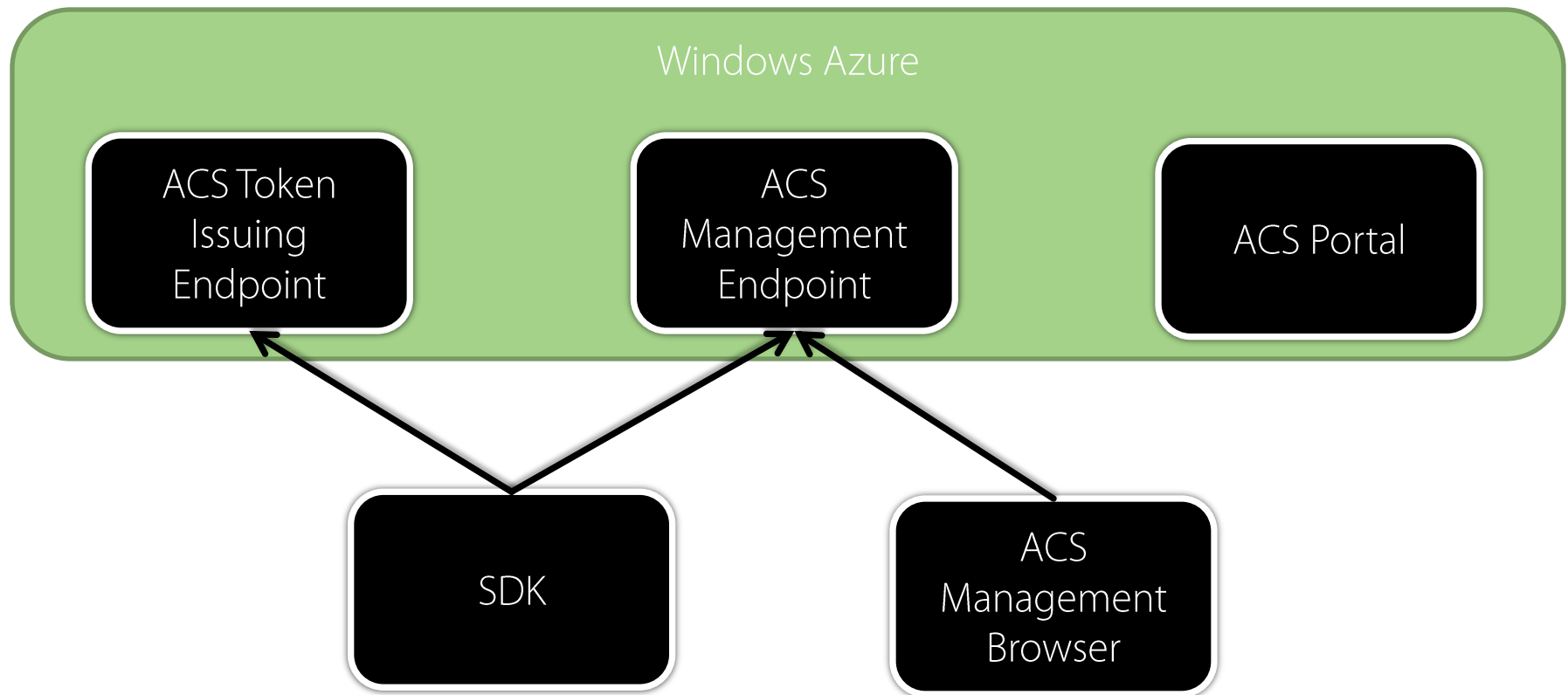
Queue Storage

- Communication between web/worker roles
- Contain metadata
- Supports Get, Put, Peek, Delete
- Put: Add work to queue
- Get: Make work invisible. Default: 30 seconds. Maximum, 2 hours. Test that this works. Can retrieve up to 32 messages at once.
- Delete: Mark work complete.
- Peek: Look at work.

Azure AppFabric

- Do not confuse with Server AppFabric
- Two main services:
 - Access Control Service
 - Service Bus

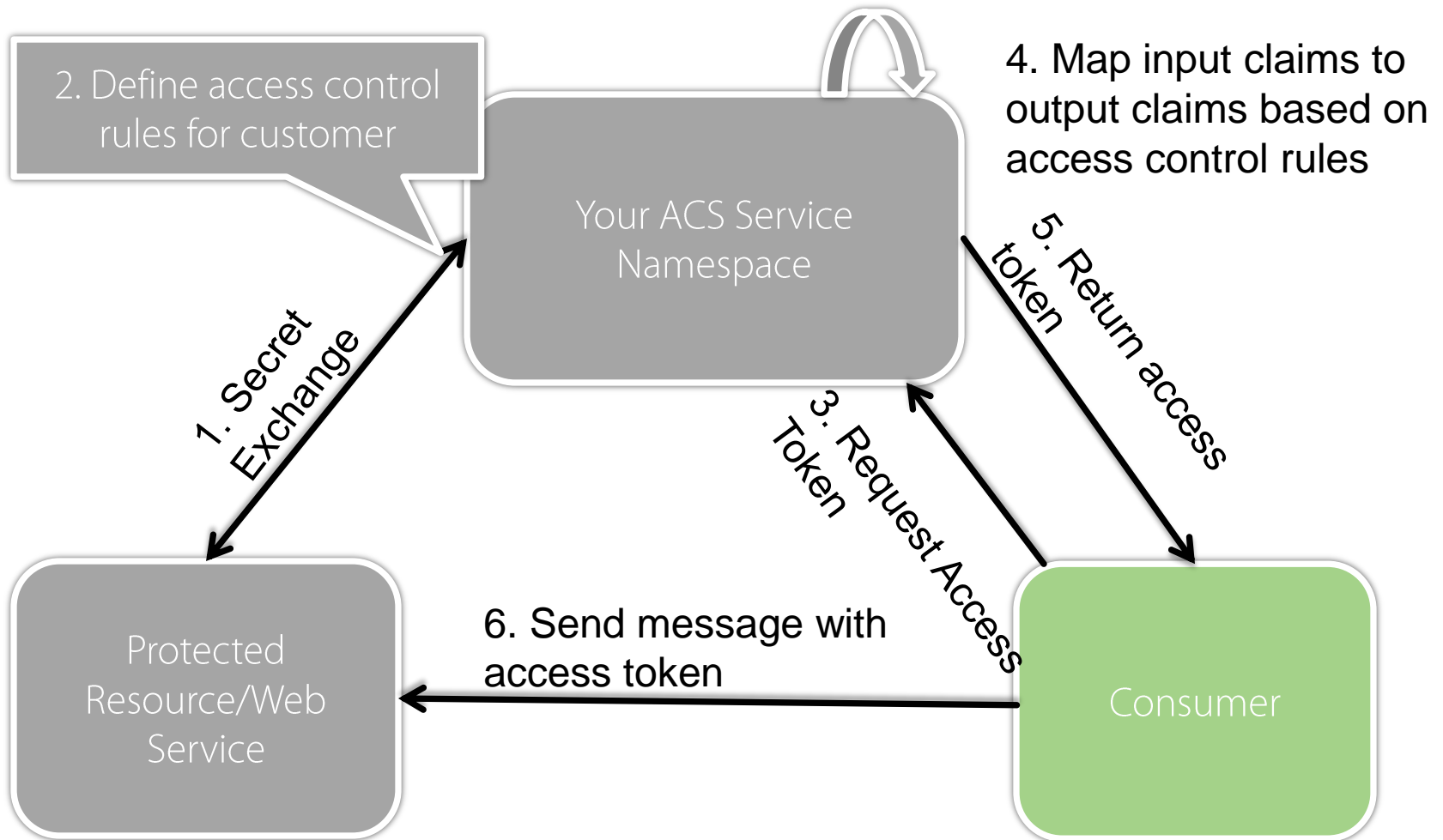
Access Control Service Diagram



Access Control Service

- **Request token**
 - Plaintext
 - Signed token (HMAC SHA256 required)
 - ADFSv2 SAML bearer token (enterprise integration) (Use Windows Identity Framework here)
 - Always return Simple Web Token
- **Uses OAuth WRAP**

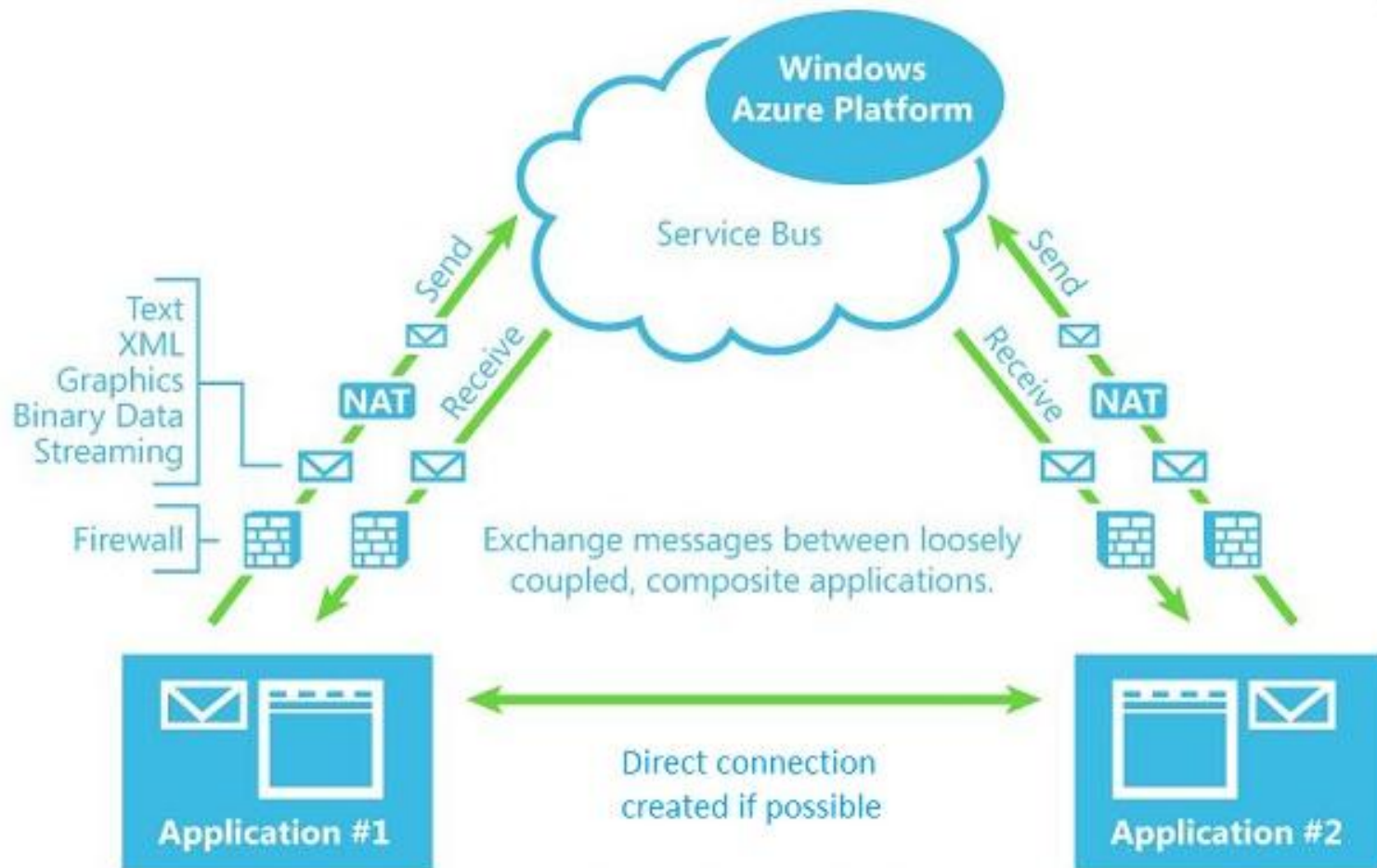
Access Control Service



Service Bus

- Supports HTTP, TCP
- Event Relay binding: 1-way multicast
- Use for eventing
- Service Remoting
- Tunneling traffic over Service Bus

ServiceBus: Integration with on premises systems



Dallas

- OData based feeds for everything
- NASA Mars images
- Food and Agriculture Data
- UNESCO Institute of Statistics
- World Health Organization
- Navteq fuel prices
- UN Info

Summary

- **Cloud Overview**
- **Comparison of Cloud Providers**
 - Many providers out there
 - Three support Windows Development: Azure, Amazon, Rackspace
- **Windows Azure Architecture**
 - SQL Azure
 - Storage
 - Web/Workers
 - Service Bus
 - Project Dallas

Resources

- Azure: www.microsoft.com/windowsazure/
- Talks: www.microsoftpdc.com

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