



Windows Azure for G Cloud

Service Description

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1. Service Definition

Windows Azure Platform is a **Public Cloud** service as per the G-Cloud phase 2 deployment model definitions. Windows Azure is a predominantly a Cloud Platform as a Service (PaaS) as defined by the NIST definition, however it does include Infrastructure as a Service (IaaS) elements including Compute, Storage and Content Delivery Network services as specified in Lot 1, as well as some additional elements defined in "other". Windows Azure is only accessible through the public Internet and is not connected to any other government networks.

1.1 An overview of the Windows Azure G-Cloud Service

The Windows Azure platform is an Internet-scale computing platform as a service platform hosted in Microsoft data centres. The Windows Azure platform includes the foundation layer of Windows Azure as well as a set of developer services which can be used individually or together.

Windows Azure provides compute power, storage, and automated service management, as well as easy connectivity to other applications and access control to provide secure authorization and authentication of access to cloud resources. Also hosted in the Windows Azure platform is Microsoft SQL Azure, providing relational database services and automated management.

Underlying the Windows Azure platform is a collection of virtual machines providing compute and storage resources. This collection of virtual machines is called the fabric. Fabric is managed by the fabric controller which monitors and manages every virtual machine, starting, stopping and restarting VM's as necessary.

The following illustration shows the products and components that are part of the Windows Azure platform.

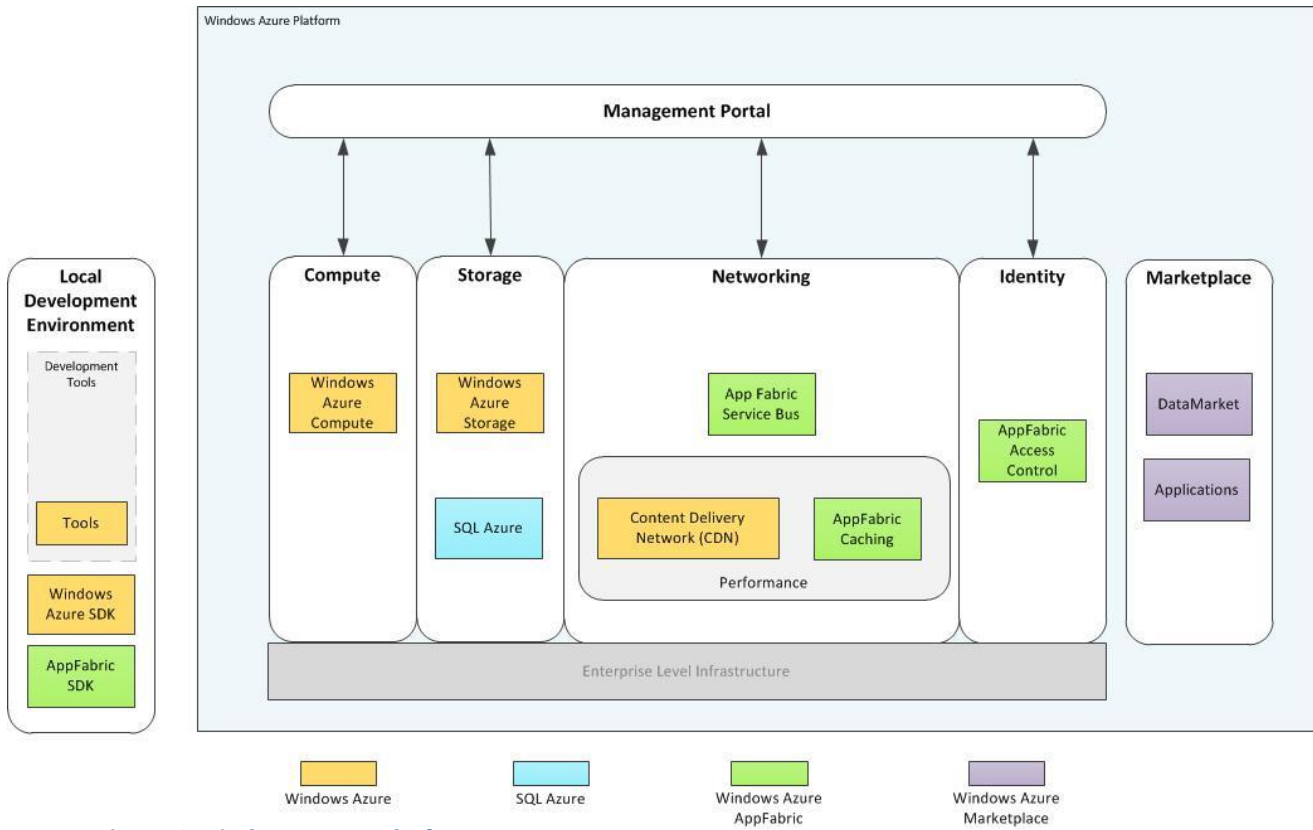


Figure 1 Windows Azure Platform

1.2 Windows Azure Compute Service

Windows Azure compute provides developers a platform to host and manage applications in Microsoft's data centers across the globe. A Windows Azure application is built from one or more components called 'roles.' Roles come in three different types: Web role, Worker role, and Virtual Machine (VM) role.

- A **web role** handles HTTP request via a specialized version of IIS. This is how Windows as your services interact with end users, devices, and Web services. A Windows Azure application can have multiple distinct Web roles, for example when handling admin requests and one handling user requests, as well as multiple distinct worker roles. A web role is supported by Internet Information Services (IIS) 7 and ASP.NET. A load balancer is built into the Windows Azure fabric to appropriately split incoming TCP requests across Web roles as needed.
- A **worker role** is useful for generalized development, and is commonly used to perform background processing for a web role. The Worker role does not typically interact with end users or devices.
- A **virtual machine (VM)** role provides a user-customized image to make it easier to move existing Windows Server applications to the Windows Azure hosting environment. The VM role runs a virtual hard drive (VHD) image of a Windows Server 2008 R2 virtual machine. This VHD is created using an on-premises Windows Server machine and then uploaded to Windows Azure.

A hosted service may be comprised of any combination of role types, and may include multiple roles of each type.

Developers are free to use the .NET framework or other software that runs on Windows with the Worker role or Web role.

Benefits of Windows Azure compute

A great application hosting environment

Since the Windows Azure Web role is pre-configured with IIS7, it's easy to create applications using ASP.NET, Windows Communication Foundation (WCF) or other web technologies. Developers can also create applications using languages such as PHP and Java.

Focus on the application, not the operational constraints

The automated service management provided by Windows Azure offers customers the benefits of:

- Administration: Windows Azure automatically takes care of things such as load balancing and failover thereby reducing the effort and cost of administering the application environment.

- **Availability:** Windows Azure is designed to let developers build applications that are continuously available, even in the face of software upgrades and hardware failures.
- **Scalability:** Windows Azure enables developers to build scalable applications that run in Microsoft's global data centres. It also allows developers to scale down applications when necessary, letting them use just the resources they need.

Flexible instances sizes to meet your application needs

The table below summarizes the resources provided by each instance size. Each Windows Azure compute instance represents a virtual server. Although many resources are dedicated to a particular instance, some resources associated to I/O performance are shared among the compute instances on the same physical host. During periods when a shared resource is not fully utilized, you are able to utilize a higher share of that resource. The different instance types will provide minimum performance from the shared resources depending on their size. Compute instance sizes with a high I/O performance indicator as noted in the table will have a larger allocation of the shared resources. Having a larger allocation of the shared resource will also result in more consistent I/O performance.

Extra Small	Shared	768 MB
Small	1	1.75 GB
Medium	2	3.5 GB
Large	4	7 GB
Extra Large	8	14 GB

Details on the Virtual machine sizes can be found [here](#)

A role may interact with the runtime environment by using the Windows Azure Managed API.

Pricing and Metering for Windows Azure Compute:

Windows Azure compute hours are charged only when your application is deployed. Compute hours are billed based on the number of clock hours your service was deployed multiplied by the number of compute instances. If you have two tenants deployed for a hosted service, one for staging and one for production, both will be charged as both are utilizing Windows Azure platform resources. Suspending your deployment will still result in compute charges since the compute instances are still allocated to you. When developing and testing your application remove the compute instances that are not being used to

minimize compute hour billing. All compute hours, except for extra small compute instances which are billed separately, are converted into small instance hours when presented on your bill.

- To learn about using role types: <http://msdn.microsoft.com/en-us/library/windowsazure/gg432976.aspx>
- To learn about managing applications: <http://msdn.microsoft.com/en-us/library/windowsazure/gg433038.aspx>

1.3 Windows Azure VM Role

The Windows Azure Virtual Machine (VM) role enables you to deploy a custom Windows Server 2008 R2 (Enterprise or Standard) image to Windows Azure. The VM role runs a virtual hard drive (VHD) image of a Windows Server 2008 R2 virtual machine. This VHD is created using an on-premises Windows Server machine and then uploaded to Windows Azure. The Windows Azure VM role is in Beta, however applications using VM Role during the Beta time period are fully supported and we guarantee our existing SLA (Windows Azure's Service Level Agreement) for these applications.

Highlights of VM Role

- Customers can configure and maintain the OS and use Windows Services, scheduled tasks etc. in the VM role.
- Once stored in the cloud, the VHD can be loaded on demand into a VM role and executed. The VHD can be used as the base image for all instances of a VM Role. The Windows Azure VM role supports Windows Server 2008 R2 Hyper-V VHDs.
- Customers can domain join Windows Azure VM role instances to an on-premises Active Directory implementation using Windows Azure Connect.

Benefits of VM Role

Gain control over application environment

Developers can use the VM role when the customizations that you require are large in number or cannot be automated. When developers use the VM role, they retain most benefits of automated service management (load balancing and failover) with the exception of Guest OS patching. A VM role differs from a web role and a worker role, because with these roles, you focus on creating and running your code in an operating system that is managed by Windows Azure; for the VM role, you provide a preconfigured operating system image. Developers have full control of the operating system image. Administrators can remote into the virtual machine of all roles to perform maintenance and troubleshooting tasks.

Migrate easily to the cloud

The Windows Azure application programming model is a more efficient way to develop and manage applications because it offers customers compelling agility, simplicity and cost advantages over previous development models. However, for many customers, the move from traditional, on-premises applications to the cloud services model can be intimidating. VM role functionality makes the process of migrating existing Windows Server applications to Windows Azure easier and faster. In the future, we will enable support for Windows Server 2008 SP2, Windows Server 2003 and constructing VM role images in the cloud.

Persistence Model

The Windows Azure VM Role provides a **Non Persistent** model for Compute as defined by the g-cloud ITT. With the Windows Azure platform, an application would be expected to utilize a persistence storage such as Windows Azure Storage or SQL Azure to meet non transient storage requirements.

In the future Microsoft plans to add Persistent Virtual Machine functionality to Windows Azure to expand the set of existing applications that can be run on it. This Virtual Machine deployment functionality will enable developers to run a wide range of Windows applications in Windows Azure, while taking full advantage of the built-in automated service management.

Hypervisor

The Hypervisor underpinning the Windows Azure Platform and hosting uploaded VM Roles is a cloud optimised derivative of Microsoft's Hyper-V. For more information see

<http://download.microsoft.com/download/6/0/2/6028B1AE-4AEE-46CE-9187-641DA97FC1EE/Windows%20Azure%20Security%20Overview%20v1.01.pdf>

Guest Images

The Windows Azure Virtual Machine (VM) role enables you to deploy a custom Windows Server 2008 R2 (Enterprise or Standard) image to Windows Azure. The service supports Windows Server 2008 R2 Hyper-V VHDs.

Customer images can be uploaded, while it is not possible to download an image once deployed to Azure. However as the VM Role has a non-persistence storage model the image is always identical to the original image created by the customer.

For more information see <http://www.windowsazure.com/en-us/home/tour/virtual-machines/>

Pricing and Metering for VM Role

Pricing for the VM Role is identical to Compute. You are charged at an hourly rate depending on the compute instance size. The Windows Azure fee for running the VM role – whether consumption or commitment based – includes the Windows Server licensing costs.

Customers may use bits obtained through volume licensing (physical or electronic) to create the image. During the beta release of the VM role, you can use the 64-bit version of Windows Server 2008 R2 for production services. Other Microsoft software acquired through an active MSDN® license or subscription can be run in the VM role for development and test purposes only. Use of any third party software in the VM role will be governed by use rights for that software. There is no requirement for Windows Server Client Access Licenses (CALs) to connect to the VM role. There is also no transfer of use rights from any existing Windows Server 2008 R2 license acquired through any other licensing program to the VM role nor are rights from the VM role transferable to any other device.

1.4 Windows Azure Storage Service

Windows Azure gives you four core storage services that are secure, scalable and easy to access that remain persistent and durable storage in the cloud. Blobs, Tables, and Queues are all available as part of the Windows Azure Storage account, and provide durable storage on the Windows Azure platform. Unlike local storage, blobs, tables, and queues are accessible by multiple applications or application instances simultaneously, and represent dedicated storage instead of temporary. The capabilities provided by the Windows Azure Storage Service include:

- **Binary Large Object (BLOB) Service**, the simplest way to store text or binary data with Windows Azure.
- **Table Service** is better for large amounts of data that need additional structure, which works exceptionally well with applications that need to work with data in a very detailed manner via queries.
- **Queue Service** for reliable, persistent messaging between Web and Worker role instances.
- **Windows Azure Drive** allows Windows Azure applications to mount a Page Blob, which is a single volume NTFS VHD. This allows applications to upload/download VHDs via blob.

All your content stored on Windows Azure is replicated three times. No matter which storage service you use, your data will be replicated on different fault domains (guaranteed different storage racks) thereby making it much more fault tolerant. The Windows Azure Content Delivery Network (CDN) offers 1-click integration with our Storage services. The CDN dramatically boosts performance by automatically storing content near where it is most frequently accessed.

In addition Windows Azure Geo-replication replicates Windows Azure Blob and Table data, at no additional cost, between two locations hundreds of miles apart within the same region (i.e., between North and South US, between North and West Europe, and between East and Southeast Asia). Geo-replication is provided for additional data durability in case of a major data centre disaster. The location where your data is geo-replicated is referred to as the secondary location. The secondary location is automatically determined based on the location of the primary, e.g. Western Europe is the secondary location for the Northern Europe data centre. If you do not want your data geo-replicated you can disable geo-replication for your account.

The storage services are all accessible through a REST API enabling their content to be accessed from a wide variety of platforms and devices.

Blobs

Blobs provide a way to store large amounts of unstructured, binary data, such as video, audio, images, etc. In fact, one of the features of blobs is streaming content such as video or audio. There are two types of blob storage available, each provides specific functionality:

Block Blob

- Optimized for streaming (upload and download)
- Composed of blocks up to 4MB (largest block that can be submitted in one operation)
- Allows blocks to be uploaded before being committed
- Maximum size of 200GB (50,000 blocks)

Page Blob

- Optimized for random access
- Composed of pages that are referenced by offsets from the beginning of the blob
- Maximum size of 1TB, which can be composed of multiple pages, or a single 1TB page

Blob storage provides options for storing metadata for each blob and for taking snapshots of blobs for backups. Blobs can also leverage the Content Delivery Network (CDN,) which can be used to cache blobs at a data centre located near your customers to ensure fast access to the data stored in the blob.

Queues

Queues provide storage for passing messages between applications. Messages stored to the queue are limited to a maximum of 8KB in size, and are generally stored and retrieved on a first in, first out (FIFO,) basis; however FIFO is not guaranteed.

Processing messages from a queue is a two stage process, which involves getting the message, and then deleting the message after it has been processed. This pattern allows you to implement guaranteed message delivery by leaving the message in the queue until it has been fully processed. If the application processing the message fails before it has completed processing, the message is left in the queue and can be processed by another application. To prevent the message from being processed by multiple applications simultaneously, getting the message cause it to be marked as invisible when it is first read and remains invisible until it is either deleted or a specified time interval has passed.

Tables

Table storage is a collection of row like entities, each of which can contain up to 255 properties; however unlike tables in a database, there is no schema that enforces a certain set of values on all the rows within a table. And while a table stores structured data, it does not provide any way to represent relationships between data. Windows Azure Storage tables are more like rows within a spreadsheet application such as

Excel than rows within a database such as SQL Azure, in that each row can contain a different number of columns, and of different data types, than the other rows in the same table.

While table storage does support basic operations such as insert, update, delete, and select, it does not support joins, foreign keys, stored procedures, triggers, or any processing on the storage engine side, such as SQL Azure does. Queries returning a large number of results, or queries that time out, return partial results along with a continuation token that allows the query to be resumed.

Pricing and Metering for Windows Azure Storage

Windows Azure Storage utilization is calculated based on your average usage during a billing period of blob, table, queue, and Windows Azure Drive storage. For example, if you consistently utilized 10GB of storage for the first half of the month and none for the second half of the month, you would be billed for your average usage of 5GB of storage.

For Windows Azure Drive storage, you will be billed only for the storage space used by the page blob and the read/write transactions to the page blob. You will not be charged for read transactions that utilize the local drive cache. Windows Azure Drive usage is billed at the same rates as standard Windows Azure Storage and is included in these totals on your bill. There will not be a separate line item for Windows Azure Drive on your bill.

- To learn about storing and accessing data: <http://msdn.microsoft.com/en-us/library/windowsazure/gg433040.aspx>
- To learn about the data storage offerings: <http://social.technet.microsoft.com/wiki/contents/articles/data-storage-offerings-on-the-windows-azure-platform.aspx>

1.5 Windows Azure Content Delivery Network

The Windows Azure content delivery network (CDN) enhances end user performance and reliability by placing copies of data closer to users. By caching your applications static objects at strategically placed locations, the Windows Azure CDN provides the best experience for delivering your content to users.

The Windows Azure CDN today delivers many Microsoft products – such as Windows Update, Zune videos, and Bing Maps - which customers know and use every day. By adding the CDN to Windows Azure capabilities, we've now made this large-scale network available to all our Windows Azure customers.

Benefits of CDN

Content closer to end-users

The Windows Azure CDN can deliver content from a number of Windows Azure resources including Windows Azure storage and Windows Azure compute roles. Content types include web objects (e.g. JPG, CSS, and JavaScript), downloadable objects (media files, software, and documents), applications, real time media streams, and other components of Internet delivery (DNS, routes, and database queries). Plus it's completely integrated with Windows Azure Storage services, so it just takes a click to enable CDN delivery through the Windows Azure platform Management Portal.

24 physical nodes globally

Located in the United States, Europe, Asia, Australia and South America, the Windows Azure CDN offers developers a global solution for delivering high-bandwidth content. A Windows Azure CDN customer's traffic may not be served out of the physically "closest" node; many factors are involved including routing and peering, Internet "weather", and node capacity and availability. There are 24 CDN locations globally, including London in the UK. For a current list of CDN node locations, see Windows Azure CDN Node Locations <http://msdn.microsoft.com/en-us/library/windowsazure/gg680302.aspx>. We are continually grooming our network to meet our Service Level Agreements and our customers' requirements.

Smooth streaming capability

This enables developers to deliver video to Silverlight as well as iOS and Android Honeycomb clients without any software development, management or configuration. Developers can do this by uploading IIS Smooth Streaming-encoded video to a CDN-enabled Windows Azure Storage account. The Windows Azure CDN scales as needed, so developers don't need to spend time setting up servers, worrying about capacity, or grappling with spikes in demand. Microsoft will release a CTP for the Windows Azure CDN by the end of 2011. Additional information on applying for this CTP will be available on the Beta Programs section of the Windows Azure Platform Management Portal.

The Windows Azure Content Delivery Network (CDN) caches Windows Azure blobs and the static content output of compute instances at strategically placed locations to provide maximum bandwidth for delivering content to users. You can enable CDN delivery for your content providers using the Windows Azure Platform Management Portal. CDN is an add-on feature to your subscription and has a separate billing plan.

Capabilities

The Windows Azure CDN can deliver content from a number of Windows Azure resources including Windows Azure storage and Windows Azure compute roles. Content types include web objects (e.g. JPG, CSS, and JavaScript), downloadable objects (media files, software, and documents), applications, real time media streams, and other components of Internet delivery (DNS, routes, and database queries). Plus it's completely integrated with Windows Azure Storage services.

When a request for an object is first made to the CDN, the object is read retrieved directly from the Blob service or from the hosted service. When a request is made using the CDN syntax, the request is redirected to the CDN endpoint closest to the location from which the request was made to provide access to the object. If the object is not found at that endpoint, then it is retrieved from the service and cached at the endpoint, where a time-to-live setting is maintained for the cached object.

Pricing and Metering for CDN

CDN charges are incurred for data requests it receives and for the data it transfers out to satisfy these requests. Windows Azure CDN charges will not include fees associated with transferring this data from Windows Azure Storage to CDN. Any data transfers and storage transactions incurred to get data from Windows Azure Storage to the CDN will be charged separately at our normal Windows Azure Storage rates.

For further information see <http://msdn.microsoft.com/en-us/library/windowsazure/ee795176.aspx>

1.6 SQL Azure

Microsoft SQL Azure is a highly available and scalable cloud database service built on SQL Server technologies. With SQL Azure, developers do not have to install, setup, and patch or manage any software. High availability and fault tolerance is built-in and no physical administration is required. Additionally, developers can get productive on SQL Azure quickly by using the same familiar T-SQL based relational model and the same powerful development and management tools used for on-premises databases.

Benefits of SQL Azure

No physical administration required: spend your time designing, optimizing and enabling solutions

Because SQL Azure is a managed service, you do not have to install, set up, patch or manage hardware or software. There is no need to create or manage your own virtual machines or roll your own high availability. Every SQL Azure database has built-in high-availability, failover, and redundancy.

Scale On-Demand to meet your business needs

SQL Azure gives you the flexibility to scale out depending on your needs while paying only for what you use. Rely on business-ready SLAs and global datacenters to offer highly available services to your users or to build out your own multi-tenant offerings.

Innovate faster by extending existing applications to the cloud and build innovative, new data solutions which take advantage of the cloud scale

SQL Azure does not require new skillsets, programming models or tools. Use an existing ecosystem of developer and management tools. Enable new scenarios with services like Data Sync and Reporting to connect to mobile devices, HTML5 web applications, and location-aware services. Consume or monetize premium datasets from commercial data providers and government sources with Windows Azure DataMarket.

SQL Azure Database

SQL Azure Database will seem very familiar to developers and administrators because data is stored in SQL Azure Database just like it is stored in SQL Server, by using Transact-SQL. Conceptually similar to an on-premise instance of SQL Server, a SQL Azure server is logical group of databases that acts as an authorization boundary.

Within each logical SQL Azure server, you can create multiple databases that have tables, views, stored procedures, indices, and other familiar database objects. This data model makes good use of your existing relational database design and Transact-SQL programming skills, and simplifies the process of migrating existing on-premise database applications to SQL Azure Database.

When developers create on-premise applications that use SQL Server, they use client libraries that use the tabular data stream (TDS) protocol to communicate between client and server. SQL Azure Database provides the same TDS interface as SQL Server so that you can use the same tools and libraries to build client applications for data that is stored in SQL Azure Database.

In a traditional on-premise application, the application code and database are located in the same physical data center. SQL Azure and the Windows Azure platform offer many alternatives to that architecture. The following diagram demonstrates two generalized alternatives available for how your application can access data with SQL Azure Database.

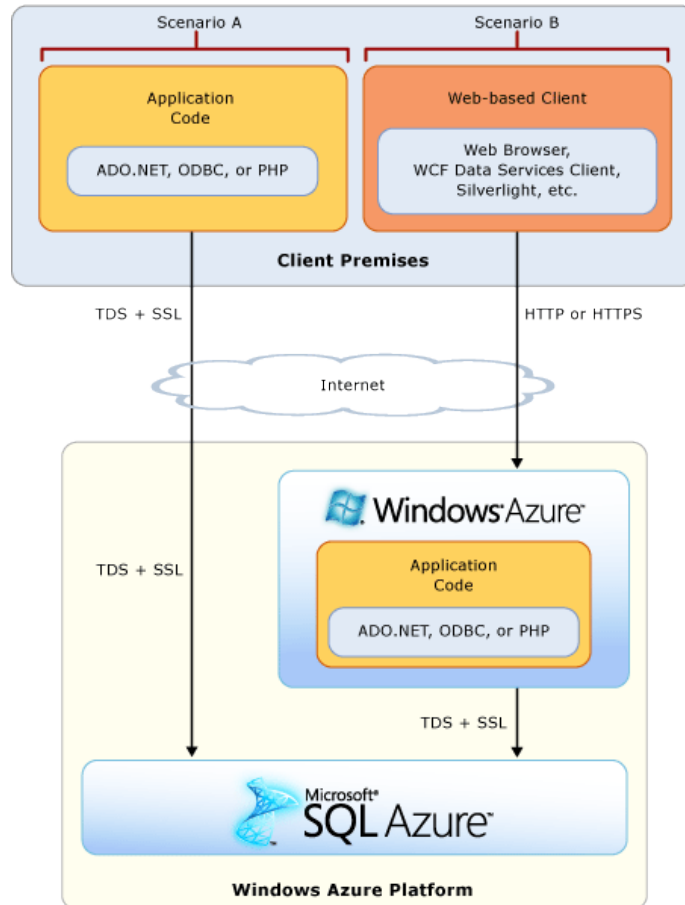


Figure 2 SQL Azure Client Access

In Scenario A on the left, your application code remains on the premises of your corporate data centre, but the database resides in SQL Azure Database. Your application code uses client libraries to access your database(s) in SQL Azure Database. In Scenario B on the right, your application code is hosted in the Windows Azure and your database resides in SQL Azure Database. Your application can use the same client libraries to access your database(s) in SQL Azure Database as are available in Scenario A. The Scenario B client premises may represent an end user's Web browser that is used to access your Web application.

Logical Administration vs. Physical Administration

Although SQL Azure Database plays an active role in managing the physical resources of the database, the Database Administrators (DBA) plays a very important role in administering SQL Azure-based database applications. Using SQL Azure Database, DBAs manage schema creation, statistics management, index tuning, query optimization, and security administration (logins, users, roles, and so on).

Database administration in SQL Azure Database differs most from SQL Server in terms of physical administration. SQL Azure Database automatically replicates all data to provide high availability. SQL Azure Database also manages load balancing and, in case of a server failure, transparent fail-over.

To provide this level of physical administration, you cannot control the physical resources of SQL Azure Database. For example, you cannot specify the physical hard drive or file group where a database or index will reside. Because the computer file system is not accessible and all data is automatically replicated.

Provisioning

When preparing an on-premises SQL Server deployment, it may be the role of the DBA or IT department to prepare and configure the required hardware and software. When using SQL Azure Database, these tasks are performed by the SQL Azure provisioning process.

You can begin provisioning your SQL Azure databases after you create a Windows Azure platform account. Each SQL Azure subscription may be bound to one or more SQL Azure servers at the Microsoft data centre.

Transact-SQL Support

The Transact-SQL is an extension of the language defined in the SQL standards published by the International Standards Organization (ISO) and the American National Standards Institute (ANSI). For more information about Transact-SQL, see Transact-SQL Reference (Database Engine) in SQL Server Books Online.

Microsoft SQL Azure Database supports a subset of Transact-SQL for SQL Server. While most statements are supported the primary differences are in statements related to the underlying file system and groups. The subset of statements supported is documented within MSDN <http://msdn.microsoft.com/en-us/library/windowsazure/ee336250.aspx>

SQL Azure Database does not support all of the features and data types found in SQL Server. Analysis Services, Replication, and Service Broker are not currently provided as services on the Windows Azure platform.

SQL Azure Management Portal

The Management Portal for SQL Azure is a lightweight and easy-to-use database management tool. It allows you to conveniently manage your SQL Azure databases and to quickly develop, deploy, and manage your data-driven applications in the cloud.

The Management Portal for SQL Azure is part of the Windows Azure Platform Management Portal experience. The Management Portal for SQL Azure supports database development tasks, schema modification, Transact-SQL, and extract/deploy operations with data-tier applications.

Specific features supported in this release include:

- **Database Schema and Data workspace** – Enables connecting to databases to create, alter or update tables, views, and stored procedures. The Schema and Data workspace also includes a query editor for working with Transact-SQL queries.
- **Database Life Cycle workspace** – Enables creating and dropping databases, extracting a data-tier application from an existing SQL Server database, and deploying a data-tier packages to create a new database.

For further information see

- <http://msdn.microsoft.com/en-us/library/windowsazure/gg619386.aspx>

Pricing and metering for SQL Azure Database

SQL Azure utilizes a flexible subscription-based pricing model and supports free, commitment-based, and pay-as-you-go offers. SQL Azure can be purchased independently or with other Windows Azure platform products. You can provision multiple SQL Azure databases for your application(s). You can use Web or Business Edition databases. A single Web Edition databases can support up to 5 GB of data, and uses billing increments of 1GB and 5GB. A Business Edition database will support up to 150 GB, and uses 10 GB billing increments.

We charge a monthly fee for each SQL Azure database, but we amortize that database fee over the month and calculate your fee on a daily basis. This daily fee is dependent on the database type (e.g., 1 GB Web Edition, 10 GB Business Edition, etc.), peak database size rolled up to the next billing increment, and number of databases you use. For example, if you utilized three 10 GB Business Edition databases for 1 day during a billing month, your daily usage for that day would show a little less than 0.1 10 GB Business Edition database (3 databases / 31 days).

All usage for each Web Edition database is converted into the 1 GB size and all usage for each Business Edition database is converted into the 10 GB size, rounded up to the next discrete billing increment. For example, if the peak size of your Business Edition database was 45 GB for a particular day, your usage for determining your charges would be considered 50 GB for that database for that day.

SQL Azure Features (currently in CTP)

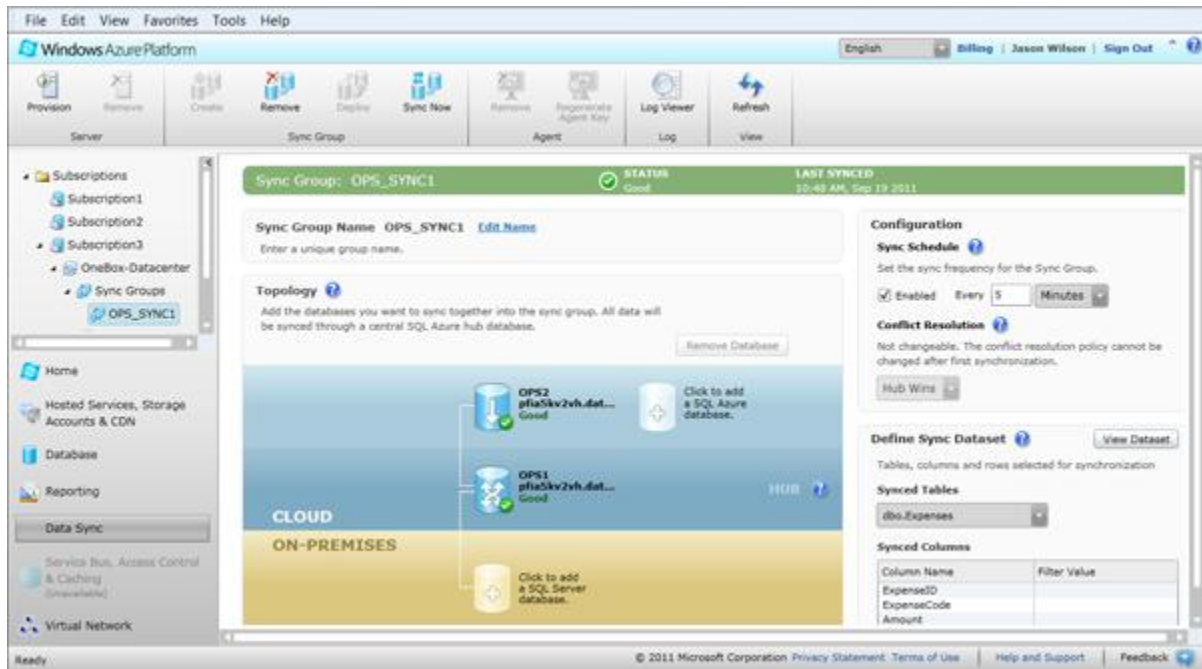
To provide an insight to the SQL Azure roadmap, SQL Azure also includes two additional future features which are currently available in Community Technology Preview form (CTP), Microsoft's pre-production test release. These features are:

SQL Azure Data Sync (CTP)

Microsoft SQL Azure Data Sync is a cloud-based data synchronization service. It provides uni-directional and bi-directional data sync, allowing data to be easily shared between SQL Azure and on-premises SQL Server databases as well as between multiple SQL Azure databases, within the same or different data centres.

SQL Azure Data Sync provides the following capabilities:

- **Managed Service:** Data Sync is a fully managed cloud-based service. There is no need to write complex database logic to synchronize and transfer data between databases. Instead, simply use the point-and-click portal to quickly configure and schedule synchronization.
- **On-Premises and Cloud:** Enables multiple synchronization scenarios spanning both cloud and on-premises databases. Now it is easy to enable one-way as well as bi-directional data movement across SQL Azure and on-premises SQL Server databases.
- **Cloud-to-Cloud Synchronization:** Data can be shared between multiple databases, irrespective of whether the databases are in the same data center or span multiple geographic regions.
- **Control Synchronization:** Specify exactly what tables and columns to synchronize, setup filters to sync only a subset of rows, set your conflict resolution policy for two-way sync, and specify how frequently data should be synchronized.



Scenarios

Cloud To Cloud Synchronization

- Geographically co-locate data with applications around the world to provide the most responsive experience for your users. Use it in conjunction with Windows Azure Traffic Manager.
- Create one or more copies of data for scale-out. For example, separate your cloud-based reporting workload from your OLTP workload.

Enterprise (On-Premises) With Cloud

- Produce hybrid applications, extending on-premises applications with cloud applications and allowing data to be shared.
- Share data between branch or worldwide offices through the cloud.
- Aggregate data in the cloud from distributed offices to provide cross-location insight and operations.
- Make data collected or aggregated in the cloud available to on-premises applications.

For further information on the SQL Azure Data Sync see <http://msdn.microsoft.com/en-us/library/windowsazure/hh456371.aspx>

SQL Azure Reporting (CTP)

Microsoft SQL Azure Reporting is a cloud-based reporting service for the Windows Azure Platform built on SQL Server Reporting Services technologies. SQL Azure Reporting provides many benefits, including rapid provisioning, cost-effective scalability, high availability, reduced management overhead and secure access for viewing and managing reports. SQL Azure Reporting offers the following capabilities:

- Host operational reports based on report data from existing SQL Azure databases. Operational reports are report definition language (RDL) reports.
- The Business Intelligence Design Studio (BIDS) and SQL Server Data Tools (in SQL Server 2012) offer a consistent report authoring experience that make your reports rich with visualizations – maps, charts, gauges, sparklines and more.
- Embed the Visual Studio Report Viewer AJAX control in on-premise Web applications or cloud-based Windows Azure applications to add rich reporting to custom applications. The Report Viewer control points to reports hosted on report servers.
- Users can view reports hosted in SQL Azure Reporting using just a browser. The Reporting Services URL access syntax makes it easy for users to render a specific report.
- Export reports to various popular file formats, including Excel, Word, HTML, PDF, XML, CSV and ATOM feeds.
- Scale and flex to meet elastic demand. Our cloud services platform automatically scales up and down to meet demand and has built-in high availability and fault tolerance.

For further information on the SQL Azure Reporting see <http://msdn.microsoft.com/en-us/library/windowsazure/gg430130.aspx>

1.7 Windows Azure Service Bus

The Service Bus provides secure connectivity and messaging capabilities that enable building distributed and loosely coupled applications in the cloud, as well as hybrid applications across both on-premises and the cloud. It enables a variety of communication and messaging protocols and patterns, and eliminates the need for the developer to worry about delivery assurance, reliable messaging and scale.

Benefits of Service Bus

- Expose apps and services through firewalls, NAT gateways, and other problematic network boundaries.
- Lower barriers to building loosely-coupled applications by exposing endpoints easily.
- Lightweight developer friendly programming model that supports standard protocols and extends similar standard bindings for Windows Communication Foundation programmers.
- Helps block malicious traffic and shields your services from intrusions and denial-of-service attacks.

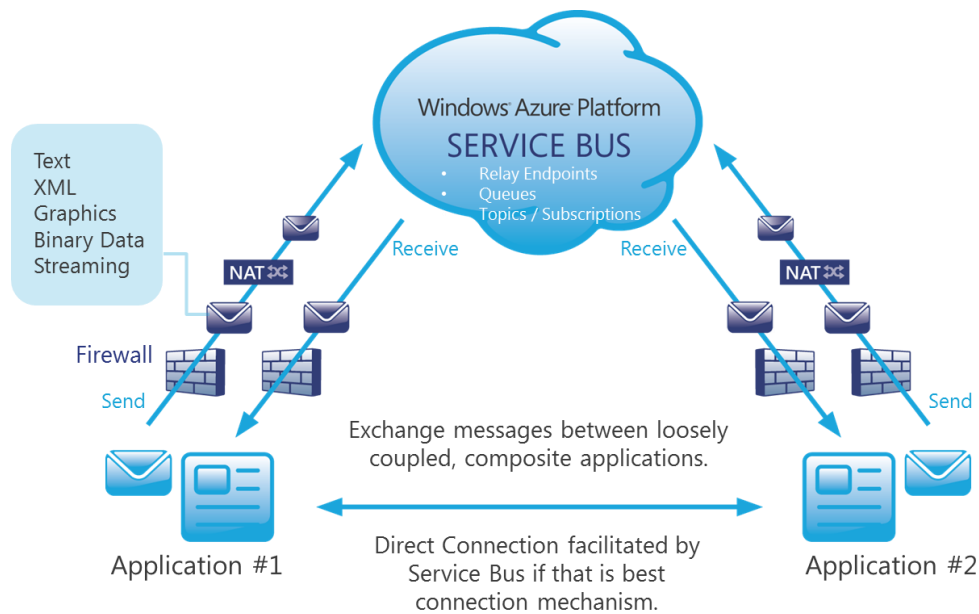


Figure 3 Azure Service Bus

The Windows Azure Service Bus provides a hosted, secure, and widely available infrastructure for widespread communication, large-scale event distribution, naming, and service publishing. The Service Bus provides connectivity options for Windows Communication Foundation (WCF) and other service endpoints – including REST endpoints -- that would otherwise be difficult or impossible to reach. Endpoints can be located behind network address translation (NAT) boundaries, or bound to frequently-changing, dynamically-assigned IP addresses, or both.

The Service Bus provides both “relayed” and “brokered” messaging capabilities.

- **Relayed Messaging** In the relayed messaging pattern, the relay service supports direct one-way messaging, request/response messaging, and peer-to-peer messaging. Relayed messaging enables an on-premise web service to be exposed to the public Internet through a stable, internet-accessible URL, regardless of location, traversing NAT and firewall boundaries.
- **Brokered Messaging** Brokered messaging provides durable, asynchronous messaging components such as Queues, Topics, and Subscriptions, with features that support publish-subscribe and temporal decoupling: senders and receivers do not have to be online at the same time; the messaging infrastructure reliably stores messages until the receiving party is ready to receive them.

Highlights of Service Bus

- Services discovered through a stable, internet-accessible URL, regardless of location.
- One-way messaging between sender and listener supports unicast and multicast datagram distribution.
- A centralized, load-balanced “relay” service running in the cloud that supports a variety of different transport protocols and Web services standards, including SOAP, WS-*, and REST.
- Temporally decoupled messaging between sender and receiver enables asynchronous messaging exchange – the client and server do not need to both be online at the same time.
- Decoupling of message senders and receivers, enabling publish/subscribe messaging capabilities.
- Full-duplex connection-oriented sessions between sender and listener support bi-directional communication.
- Full-duplex, connection-oriented peer-to-peer sessions with network-boundary traversal create direct end-to-end connectivity through NAT.
- Multiple publishers and multiple subscribers can simultaneously use the service’s topic management and event distribution system.
- Support of REST and HTTP Access from non-.NET platforms.
- Global hierarchical namespaces that are DNS- and transport-independent.
- Anonymous access to services is supported only if you permit it.

For further information see <http://msdn.microsoft.com/en-us/library/windowsazure/ee732537.aspx>

Pricing and Metering for Service Bus

Messages are charged based on the number of messages sent to, or delivered by, the Service Bus during the billing month. This includes delivery of "null" messages in response to receive requests against empty queues/subscriptions. Messages over 64KB in size will be charged an additional message for each additional 64KB of data (rounded up).

Relay hours will be charged from the time of creation to deletion (from when the first listener opens to when the last listener closes on the endpoint) and rounded up to the next whole hour. There is no relay hour charge if you are only using Service Bus Queues and Topics.

In addition to the prices noted above for Service Bus, you will also be charged for the associated data transfers for egress outside the data centre that your app is provisioned in.

1.8 Access Control Service

Windows Azure Access Control Service (ACS) is a cloud-based service that provides an easy way of authenticating and authorizing users to gain access to your web applications and services while allowing the features of authentication and authorization to be factored out of your code. Instead of implementing an authentication system with user accounts that are specific to your application, you can let ACS orchestrate the authentication and much of the authorization of your users. ACS integrates with standards-based identity providers, including enterprise directories such as Active Directory, and web identities such as Windows Live ID, Google, Yahoo!, and Facebook.

ACS enables authorization decisions to be pulled out of the application and into a set of declarative rules that can transform incoming security claims into claims that applications and services understand. These rules are defined by using a simple and familiar programming model, resulting in cleaner code.

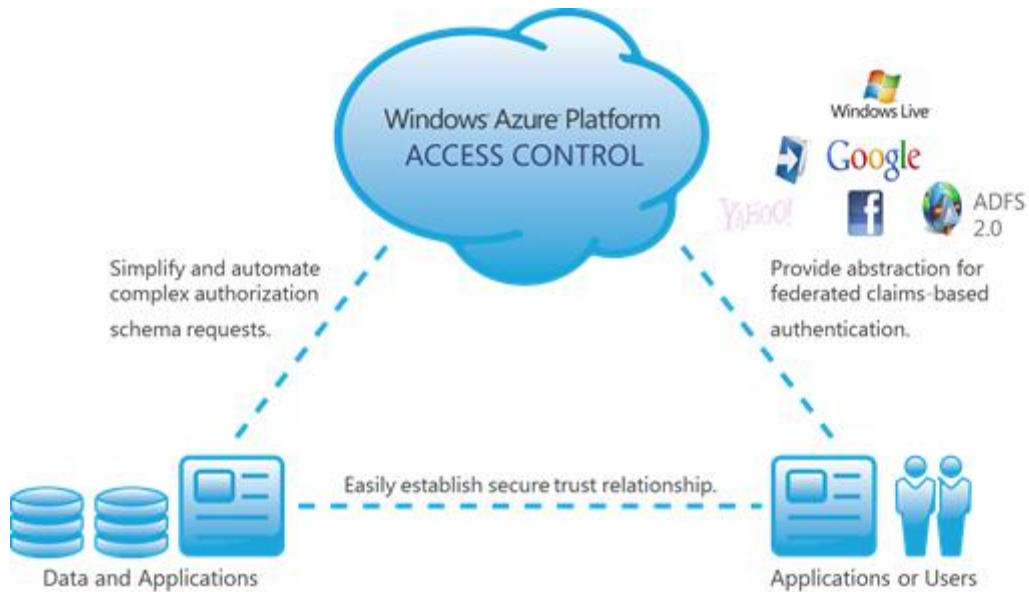


Figure 4 Azure Access Control Service

ACS can also be used to manage client permissions, thus saving the effort and complexity of developing these capabilities.

ACS is compatible with most popular programming and runtime environments, and supports many protocols including Open Authorization (OAuth), OpenID, WS-Federation, and WS-Trust.

The following features are available in ACS:

- Out-of-the-box support for popular web identity providers including Windows Live ID, Google, Yahoo, and Facebook
- Out-of-the-box support for Active Directory Federation Services (AD FS) 2.0
- Support for OAuth 2.0 (draft 10), WS-Trust, and WS-Federation protocols
- Support for the SAML 1.1, SAML 2.0, and Simple Web Token (SWT) token formats
- Integrated and customizable Home Realm Discovery that allows users to choose their identity provider
- An Open Data Protocol (OData)-based management service that provides programmatic access to the ACS configuration
- Integration with Windows Identity Foundation (WIF)
- A browser-based management portal that allows administrative access to the ACS configuration

ACS is compatible with virtually any modern web platform, including .NET, PHP, Python, Java, and Ruby

For further information see <http://msdn.microsoft.com/en-us/library/windowsazure/hh147631.aspx>

1.9 Azure Caching Service

Caching provides a distributed, in-memory, application cache service for Windows Azure and SQL Azure applications. It provides applications with high-speed access and scale to application data. These capabilities are provided entirely as a service (no installation or management of instances, dynamically increase/decrease cache size as needed).

Windows Azure Caching enables you to easily provision a cache in the cloud to be used from any applications or services that could benefit from caching. This includes a very common scenario of session state and output caching in ASP.NET. Caching increases performance by temporarily storing information from other backend sources. High performance is achieved by maintaining this cache in-memory across multiple cache servers. For a Windows Azure solution, caching can reduce the costs associated with database transactions in the cloud.

The key benefits of the Azure Caching Service are:

- **Provided entirely as a service - no installation or management of instances required** Because it is delivered as a true service, caching has a very simple provisioning model – there is no complex infrastructure to install, set up or manage. This is performed for you by the service itself. There are only two things to configure: the data that you want to store and how large a cache you need.
- **Flexible management - dynamically increase/decrease cache size as needed** As the needs of your application grow or decrease, you can dynamically change the size of the elastic cache based on your needs.
- **Integrates easily with existing ASP.NET web applications** ASP.NET developers can use the caching service without code changes, as pre-built session state and output caching providers enable you to activate with simple configuration changes. Caching capabilities are also directly available using a simple API for even more flexible and customized application use. At runtime, the Cache service transparently distributes ASP.NET session/output cache data or .NET Framework objects stored in the cache across the elastic, scale-out infrastructure.

The Azure cache is built-on the Windows Server AppFabric cache technology and provides a consistent development model across both Windows Azure and Windows Server AppFabric. The service is secured access and authorization provided by the Access Control service.

For further information see, <http://msdn.microsoft.com/en-us/library/windowsazure/gg278356.aspx>

Pricing and Metering for Caching

Caching is priced per cache size per month, no matter how much cache you actually end up using. In addition to the prices noted above for Caching, you will also be charged for the associated data transfers, for ingress and egress outside the data centre that your app is provisioned.

Once you provision a cache of a certain size, the service limits the amount of data you put in the cache to that size. Your application might temporarily have more data in the cache than the size for which you signed up, but the system will soon take corrective action and delete data from your cache to keep your cache size within the provisioned size.

In order to make sure there is fair usage of resources, the service might enforce limitations based on the number of transactions being made against the cache, the total data transfer being consumed, or the number of concurrent connections being used. If you exceed the limitations enforced by the service, your application will be notified by receiving an exception specifying the specific quota limit you have reached.

1.10 Windows Azure Marketplace

The Windows Azure Marketplace is a global online market for customers and partners to share, buy, and sell finished SaaS applications and premium datasets. Whether you are looking for new customers for your Windows Azure-based application or data, or are seeking new Windows Azure solutions to power your business, the Windows Azure Marketplace is a one-stop location supported by Microsoft to help you succeed. The data section of the Windows Azure Marketplace includes data, imagery, and real-time web services from leading commercial data providers and authoritative public data sources. The application section of the Windows Azure Marketplace contains valuable finished applications to help power your business, all built on the Windows Azure Platform.

The Windows Azure Marketplace is an information and application marketplace that simplifies publishing and consuming data of all types and Windows Azure applications – whether or not they consume Marketplace data. The Marketplace enables developers and information workers to easily discover, purchase, and manage premium data subscriptions. The Marketplace provides both trusted public domain and premium commercial data via integrated consumption experiences and easy data discovery, exploration, and purchase on any platform. In addition, the Marketplace provides a centralized location where you can market or find and subscribe to Windows Azure applications.

If you own/publish data or a Windows Azure application, the Marketplace extends the reach of your content through Microsoft's global developer and information worker community. No matter what format you use to publish data, the Marketplace publishes it as OData feeds so the ISV can concentrate on using your data rather than coding to a different data format for each data provider.

OData is an open data protocol, free API specification supported by Microsoft, SAP, IBM and others with multi-platform Enterprise applications and mobile SDK's for iOS (iPhone/iPad), Windows Phone, Android mobile devices. Please see <http://www.odata.org>. Windows Azure Marketplace for data is <http://datamarket.azure.com/>

Windows Azure Marketplace provides a destination in the cloud for Windows Azure-based partner applications. This will make it easy for organisations to find various types of applications. The Windows Azure Marketplace has pre-built integration with Office, SQL Server, and Bing enabling information Workers to find Data and services from within the applications they use every day. A free OData plug-in to Microsoft Excel is provided for end-user analysis of Windows Azure datasets in Datamarket.

Windows Azure Marketplace is a curated marketplace for applications and data from trusted Microsoft partners. It provides an easy interface allowing you to discover and subscribe to applications and data.

The marketplace is built on a secure commerce platform with integrated billing and reporting. It also provides consistent, flexible and context optimized APIs to access data and web services.

Pricing and Metering for the Windows Azure Marketplace

Free Government licensed data on data.gov.uk for example can be on Datamarket for up to 50GB in total space and up to 1Tb of network bandwidth.

1.11 Futures: Windows Azure Virtual Network (CTP)

To provide visibility of future roadmap capabilities within the Windows Azure platform, Microsoft is introducing a range of networking functionality that will be offered under the Windows Azure Virtual Network name. Windows Azure Connect is the first Windows Azure Virtual Network feature enabled, with Windows Azure Traffic Manager following both available currently in Community Technology Preview (CTP) form.

These capabilities together with the other features currently in CTP (SQL Azure Reporting and SQL Azure Data Sync) will be made available in a production form in the future.

Windows Azure Connect (CTP)

Windows Azure Connect provides a simple and easy-to-manage mechanism to setup IP-based network connectivity between on-premises and Windows Azure resources. This capability makes it easier for an organization to migrate their existing applications to the cloud by enabling direct IP-based network connectivity with their existing on-premises infrastructure.

Developers can setup direct connectivity to their cloud-hosted virtual machines, enabling remote administration and troubleshooting using the same tools that they use for on-premises applications.

With Windows Azure Connect, you can use a simple user interface to configure IPsec protected connections between computers or virtual machines (VMs) in your organization's network, and roles running in Windows Azure. After you configure these connections, role instances in Windows Azure use IP addressing like that of your other networked resources, rather than having to use some form of external virtual IP addressing. Windows Azure Connect makes it easier to do tasks such as the following:

You can configure and use a distributed application that uses roles in Windows Azure (for example, a Web role) together with servers in your organization's network (for example, a SQL Server and associated network infrastructure). The distributed application could be one that you are reworking to include not only resources in your network, but also one or more Windows Azure roles, such as a Web role.

Many combinations are possible between Windows Azure roles (Web roles, Worker roles, or VM roles) and your networked resources (including servers or VMs for file, print, email, database access, Web communication, collaboration, and so on).

You can join Windows Azure role instances to your domain, so that you can use your existing methods for domain authentication, name resolution, or other domain-wide maintenance actions. For diagrams that help describe this configuration, first see the basic diagram in Elements of a configuration in Windows Azure Connect, later in this topic, and then see Overview of Windows Azure Connect When Roles Are Joined to a Domain.

For more information see <http://msdn.microsoft.com/en-us/library/windowsazure/gg433122.aspx>

Azure Traffic Manager (CTP)

Windows Azure Traffic Manager enables you to manage and distribute incoming traffic to your Windows Azure hosted services whether they are deployed in the same data center or in different centers across the world. Traffic Manager is a load balancing solution that enables the distribution of incoming traffic among different hosted services in your Windows Azure subscription, regardless of their physical location. Traffic routing occurs as a result of policies that you define and that are based on one of the following criteria:

- Performance – traffic is forwarded to the closest hosted service in terms of network latency
- Round Robin – traffic is distributed equally across all hosted services
- Failover – traffic is sent to a primary service and, if this service goes offline, to the next available service in a list

Traffic Manager will monitor each collection of hosted service on any http or https port. If it detects the service is offline Traffic Manager will send traffic to the next best available service. By using this new feature businesses will see increased reliability, availability and performance in their applications.

2. Windows Azure Resource Model

As defined by the resource definition in the G-Cloud ITT, the Windows Azure Compute resources are **Elastic** as additional resources must be requested using by a user through the Service Management Portal or programmatically through the Windows Azure Service Management API. The control of resources remains within the control of the subscriber of the service.

Burst Style capabilities can be incorporated for example through the Autoscaling Application Block from the Microsoft Patterns and Practices group <http://entlib.codeplex.com/releases/view/74618>. This code block reduces the amount of manual work involved in dynamically scaling an application. It can do this in two different ways: either pre-emptively by adjusting the number of role instances based on a timetable, or reactively by adjusting the number of role instances in response to some counter or measurement that you can collect from your application or from the Windows Azure environment.

2.1 Local Development Environment

The tools included in the Windows Azure SDK enable you to run, test, debug, and fine-tune your application before you deploy it as a hosted service to Windows Azure.

Windows Azure Tools for Microsoft Visual Studio extend Visual Studio to enable the creation, building, debugging, running and packaging of scalable web applications and services on Windows Azure.

- To learn about the Windows Azure SDK Tools: <http://msdn.microsoft.com/en-us/library/windowsazure/gg433055.aspx>
- To learn about the Windows Azure Tools for Visual Studio: <http://msdn.microsoft.com/en-us/library/windowsazure/ee405484.aspx>

2.2 Guaranteed Resources

The Windows Azure platform generally provides a **Non-Guaranteed** resource model as re definition in the G-Cloud ITT.

For customers who purchase Azure through an Attachment to an Enterprise Agreement (see Ordering and Invoicing Process), by making a commitment to Compute resources Microsoft in return provides a guarantee commitment for the Windows Azure Compute of 125% of estimated compute resource in the commitment. If Microsoft fails to meet the compute resource commitment the customer will receive a credit equal to 25% of the monetary value of the unavailable Windows Azure Computer Service at the Commitment rate. Details of the commitment are shown below:

d. Compute Resource Commitment. For Windows Azure Compute, Microsoft agrees to provide entity with a Compute Resource Commitment. The Compute Resource Commitment will be the greater of (1) 50 concurrent small compute instances per month, or (2) 125% of entity's Estimated Compute Use.

Estimated Compute Use is calculated by dividing entity's Upfront Commitment by the number of months covered by that Upfront Commitment (either 12 months or the number of months remaining in entity's Enrollment, depending on whether entity chooses the One-Year Subscription Option or the Co-Terminus Option below), and dividing that figure by the Commitment Rate for Windows Azure Compute. If entity adds funds to its Upfront Commitment during the Enrollment term, the Estimated Compute Use will be recalculated accordingly. If entity's remaining Upfront Commitment falls below the monetary value of the Estimated Compute Use, the Estimated Compute Use will be reduced proportionally such that the remaining Upfront Commitment equals the monetary value of the Estimated Compute Use.

If Microsoft fails to meet the Compute Resource Commitment, entity will receive a credit equal to 25% of the monetary value of the unavailable Windows Azure Compute service at the Commitment Rate. This credit will not exceed the total monetary value of entity's remaining Upfront Commitment. If such unavailability also qualifies entity for a Service Credit under the Service Level Agreement, entity will only receive the remedy with the highest monetary value.

All usage of Windows Azure Compute above the Compute Resource Commitment will be consumed on an "as available" basis. All usage of any Platform Service other than Windows Azure Compute will be consumed on an "as available" basis.

2.3 Managed Application Platform

Microsoft believes the Windows Azure Platform provides both a managed server components and a Managed application deployment platform as defined by the G-Cloud ITT. Components can be deployed individually or grouped at an Application Platform level, i.e. an Azure Hosted Service could include a number of different web roles, worker roles and VM Role components forming the application, which is deployed and managed as a single entity.

3. Windows Azure API

The Windows Azure SDK provides several APIs for programming in the Windows Azure environment:

- The **Windows Azure Managed Library** is a .NET library that contains classes for interacting with the Windows Azure compute or runtime environment; for managing Windows Azure Diagnostics; and for accessing the Windows Azure storage services, which include the Blob, Queue, and Table services.
- The **Windows Azure Native Library** is a native code library for interacting with the Windows Azure runtime environment.
- The **Windows Azure Storage Services API** is a REST API for accessing the Windows Azure storage services.
- The **Windows Azure Service Management API** is a REST API for managing your service deployments and storage accounts.

The libraries are all fully documented and supported, for further details see: API References for Windows Azure <http://msdn.microsoft.com/en-us/library/windowsazure/ff800682.aspx>

3.1 Windows Azure Platform: An Open and Interoperable Approach

As an open platform, the Windows Azure platform allows developers to use multiple languages and development tools to build applications. With its standards-based and interoperable approach, the Windows Azure platform supports multiple Internet protocols including HTTP, XML, SOAP and REST.

Cloud platforms should support commonly used industry standards so as to facilitate interoperability with other software and services that support the same standards. New standards may be developed where existing standards are insufficient for emerging cloud platform scenarios. Microsoft is engaged with the many Standards Organizations related to Cloud Computing including International Organization for Standardization, World Wide Web Consortium and OpenID Foundation, a full list can be found here: <http://cloudinteropelements.cloudapp.net/Microsoft-Engagement-With-Standards-Organizations.aspx>

Standards and Developer Choice

Cloud Platforms should support commonly accepted standards and may lead to the creation of new standards. Windows Azure platform provides a standards-based environment in that any of the Windows Azure platform services can be called from other platforms and programming languages:

1. Service Access by providing these Open Standards: REST, SOAP and XML
2. Service Authentication by providing these Federated Identity Standards: SAML and OAuth
3. Data Portability by supporting web protocols and open specifications like: OData and TDS
4. Programming Languages and Runtimes: .NET, Java, PHP, and Ruby
5. Developer tools : Visual Studio, Eclipse and command-line tools for PHP

6. Windows Azure platform SDKs for multiple languages:
 - a. NET languages including C#, F#, Visual Basic .NET, and Managed C++.
 - b. Other languages including PHP, Java, and Ruby

REST-Based APIs

Windows Azure platform supports REST-Based APIs, thus facilitating broad access.

Windows Azure Storage Services may be accessed from within a service running in Windows Azure, or directly over the Internet from any application that can send an HTTP/HTTPS request and receive an HTTP/HTTPS response.

The REST APIs for Windows Azure Storage Services exposes Storage Account, Blob Service, Queue Service, and Table Service.

Open Data Protocol OData

The Open Data Protocol (OData) is a web protocol for querying and updating data over the Web. OData is a REST-based protocol whose core focus is to maximize the interoperability between data services and clients that wish to access that data. It is thus being used to expose data from a variety of sources, from relational databases and file systems to content management systems and traditional websites.

OData targets Web applications, regardless of implementation technology. OData is supported by many Microsoft products, including Windows Azure Storage, SQL Server 2008 R2, Excel 2010, SharePoint 2010, and WCF Data Services.

For example, Open Data Protocol (OData) client libraries are available for:

- .NET, Silverlight,
- AJAX,
- PHP (via OData SDK for PHP)
- Java (via Restlet Extension for OData)

Execute Native Code

Windows Azure platform computing paradigm is based on the exchange and execution of arbitrary code written using non-Microsoft programming languages with Full-Trust. In a full-trust environment, any code the developer compiles is allowed to run on the local computer.

Windows Azure platform supports running the code in your Web roles under Full-Trust. This capability unlocks a number of compelling scenarios such as use native code via spawning processes or Platform

Invoke (P/Invoke), use .NET Libraries that require Full Trust, provide Inter-process Communication via Named Pipes.

FastCGI

The FastCGI protocol support in Windows Azure hosting environment enables developers to run web applications that are written using dynamic programming languages (e.g., PHP, Ruby).

For more information, see Interoperability Elements of a Cloud Platform

<http://www.microsoft.com/cloud/interop/>

4. Windows Azure Platform: Open Source Usage

Although open source software is not used within the implementation of the Windows Azure platform itself, Windows Azure does support deployment of open source solutions onto the platform. In addition Microsoft has supported a number of open source initiatives to extend and enhance the core platform. For example, Microsoft has partnered with Soyatec on the creation of Windows Azure tools for Eclipse (see <http://www.windowsazure4e.org>). The Windows Azure tools for Eclipse extension builds upon the PHP Development Toolkit (PDT) and integrates Web Tools Platform (WTP) to provide a complete toolkit for Windows Azure web application development. The open source extensions to the Azure Platform include:

- Windows Azure Plug-in for Eclipse with Java-
<http://java.interoperabilitybridges.com/articles/deploying-a-java-application-to-windows-azure-with-eclipse>
- Windows Azure Plug-in for Eclipse with PHP -
<http://azurephp.interoperabilitybridges.com/downloads/windows-azure-tools-for-eclipse>
- Windows Azure Toolkit for iOS <https://github.com/microsoft-dpe/wa-toolkit-ios/tree/master/library>
- Windows Azure Starter Kit for Java <http://wastarterkit4java.codeplex.com/>
- Windows Azure Toolkit for Android <https://github.com/microsoft-dpe/wa-toolkit-android>
- Windows Azure Toolkit for Windows Phone 7 <http://watwp.codeplex.com/>
- Windows Azure Command-Line Tools for PHP Developers
<http://azurephp.interoperabilitybridges.com/articles/deploying-your-first-php-application-with-the-windows-azure-command-line-tools-for-php>

The Azure SDK is available for many languages including open source

- [Windows Azure SDK for Java](#) The Source code for the Windows Azure client libraries for Java is available on GitHub and released under an open source license.
- [Windows Azure SDK for PHP](#) Source code for the Windows Azure SDK for PHP is available on CodePlex and released under an open source license.
- [Windows Azure SDK for Node.js](#) Source code for the Windows Azure Node.js client libraries is available on GitHub and released under an open source license.

5. Information Assurance

The service is not currently accredited, we have a target to achieve IL2 for Confidentiality and Integrity and will enter that process as we achieve our ISO-27001 certification which is scheduled be within the life of this framework.

5.1 Safe Harbour Framework

Microsoft abides by the Safe Harbour framework as set forth by the U.S. Department of Commerce regarding the collection, use, and retention of data from the European Union, the European Economic Area, and Switzerland. See http://www.microsoft.com/online/legal/en-us/Azure_privacy_statement.htm

5.2 Data Centre Locations

The Windows Azure Platform (compute and storage) is hosted within 6 Microsoft data centres as follows:

Europe

- North Europe - Dublin, Ireland
- West Europe - Amsterdam, Netherlands

North America

- North-central US - Chicago, IL
- South-central US - San Antonio, TX

Asia

- East Asia - Hong Kong, China
- South East Asia - Singapore

When creating a hosted service in Azure, an attribute of this service is the user selected region which determines the location of the deployed service. The location of the deployed service applies to both compute, storage and SQL Azure.

Azure Content Delivery Network (CDN)

The Azure Content Delivery Network (CDN) is available in the following 24 locations:

EMEA	US	Asia-Pacific/Rest of World
Amsterdam, NL	Ashburn, VA	Hong Kong, HK
Doha, QT NEW	Bay Area, CA	São Paulo, BR
Dublin, IE	Chicago, IL	Seoul, KR
London, GB	San Antonio, TX	Singapore, SG
Moscow, RU	Los Angeles, CA	Sydney, AU
Paris, FR	Miami, FL	Taipei, TW
Stockholm, SE	Newark, NJ	Tokyo, JP
Vienna, AT	Seattle, WA	
Zurich, CH		

5.3 Environmental Focus

Microsoft helped develop the EU Code of Conduct for Data Centres, a voluntary commitment to implement energy efficiency best practices and use energy-efficient equipment. Microsoft's data centres adhere to this Code of Conduct. By using cutting-edge sensor and monitoring equipment, new high-efficiency container-based datacentre designs and air cooling systems that reduce the need for mechanical chillers, Microsoft's new datacentres consume 50 per cent less energy for the same level of output than datacentres built just three years ago.

Microsoft's recent datacentre designs in Dublin, Ireland build upon these innovations. They eliminate the chillers and refrigeration systems by using airside economization. The Dublin facility maintains an average 1.25 in Power Use Effectiveness (PUE), an industry metric of datacentre energy efficiency where 1 represents optimal energy use. (The datacentre industry average for PUE is 2; Microsoft datacentres as a whole currently average 1.53.) It is also improving energy efficiency by approximately 50 percent and using only 1 per cent of the annual water consumption of a traditional industry datacentre. Our datacentre in Dublin is officially recognized by the European Commission's Sustainable Energy Europe Campaign as a best practice for energy efficiency. See

<http://www.microsoft.com/presspass/features/2011/apr11/04-19GreenDatacenters.aspx>

Microsoft's new, fully modular datacenter in Quincy takes the best practices gained from research and development further and maintains a PUE of 1.15-1.2, while reducing the typical datacenter construction time of two years by half. Both facilities rely on 100 percent renewable power sources (hydropower in Quincy and wind power in Dublin) to decrease its carbon footprint as well.

Microsoft and the industry aren't just stopping at measuring and driving greater power efficiencies. Under development are two new metrics called Carbon Usage Effectiveness (CUE), which looks at carbon emissions relative to IT power consumption, and Water Usage Effectiveness (WUE), which looks at water consumption relative to IT power consumption

For Further Information see: <http://www.globalfoundationservices.com/environment/index.html>

5.4 Data Centre Tier

While Microsoft supports the spirit of the Uptime Institute's Availability classifications, which are prescriptive-based for easy adoption by the industry as a whole, we have chosen to use a more performance-based approach that uses science to match the SLAs to the customer need. Microsoft's data centers are engineered to provide 99.999% availability to meet our customer's SLAs and service needs. Microsoft invests significantly in the global operations, management, networks, and sustainability of our facilities that deliver over 200 online services 24 x 7 x 365. Some of those services you may already know and use today like Bing, Hotmail, MSN, Office 365, Xbox Live and Windows Live, which hosts more than half a billion active IDs each day, in 59 markets and is localized in 36 languages.

As most data center operators know, the physical design of the facility is only part of the equation; Microsoft has invested over \$3 billion in building our global facilities and networks and over \$9 billion in research and development to continue to build innovation and efficiency in our IT solutions. As a result, Microsoft's data centers are evolving at a more rapid pace than many facilities in the industry and thus do not follow the guidelines outlined by Uptime Institute's tier classifications. Therefore, we do not pursue Uptime certification of our facilities. In addition to the wealth of operational insight that comes with running one of the world's largest data center portfolios, Microsoft uses IEEE Gold Book data and third party reliability simulation software to continuously improve our data center design standards. Microsoft's global data center portfolio enables us to deliver the right data center capability at the right time to match the specific service needs of our every day.

Generation 1, 2 and 3 facilities are designed to deliver 99.999% availability to meet our customer's SLAs and service needs. These facilities are fault tolerant and currently maintainable – meaning that while critical components are being maintained, we can still absorb an outage of another critical component. These data centers include:

- Amsterdam (Generation 2)
- Chicago Colocation Rooms (Generation 3)
- Dublin 3 (Generation 3)
- Japan (Generation 1)
- San Antonio 1&2 (Generation 2)
- Quincy 1&2 (Generation 2)

Generation 4 facilities are designed to deliver 99.999% availability. They significantly reduce infrastructure and IT complexity, and allow us to compartmentalize risk depending on application priorities. If an outage occurs simultaneously with maintenance, we have built capabilities into the distribution that limit potential server failure to a subset of one colocation area. Considerable engineering effort has gone into our Generation 4 facilities to simplify operation and minimize opportunities for human error. These data centers include:

- Boynton 1 (Generation 4)
- Dublin 4 (Generation 4)
- Des Moines 1 (Generation 4)

6. Backup/restore and Disaster Recovery

Backup and recovery is an automated process in Windows Azure . All your content stored on Windows Azure is replicated three times. When you create, update, or delete data in the storage service, the transaction is fully replicated on three different storage nodes across three fault domains and upgrade domains inside the primary location, then success is returned back to the client. If there is any failure or corruption of the primary copy of the data the storage services automatically recovers from one of the two additional copies of the data. The recovery is transparent to the consumer of the data.

6.1 SQL Azure Backup

SQL Azure also provides a user initiated backup capability, allowing users to back-up a database by copying it to a new database in SQL Azure. The new database that is created from the copy process is a fully functioning database, independent of the source database once the copy is complete. The new database will have the same edition and maximum size as the source database.

Databases are copied asynchronously, so a connection to the SQL Azure server is not needed for the full duration of the process. The copy is initiated by the Transact-SQL CREATE DATABASE statement with the AS COPY OF clause. Then, you can monitor the copy process by using the sys.dm_database_copies and sys.databases views on the destination server.

In addition as SQL Azure is accessed through the standard TDS protocol, standard SQL Server on-premise database tools can copy and synchronise the database to maintain a backup copy on-premise for disaster recovery purposes.

6.2 Disaster Recovery

Disaster recovery capabilities for Azure Storage (blobs, tables, queues) are provided through Windows Azure Geo-replication. With Geo replication after the initial commit of the transaction, the primary location asynchronously replicates the recently committed transaction to the secondary location. That transaction is then made durable by fully replicating it across three different storage nodes in different fault and upgrade domains at the secondary location.

Our goal is to keep the data durable at both the primary and secondary location. This means we keep enough replicas in both locations to ensure that each location can recover by itself from common failures (e.g., disk, node, rack, TOR switch failing, etc), without having to talk to the other location. The two locations only have to talk to each other to geo-replicate the recent updates to storage accounts. They do not have to talk to each other to recover data due to common failures. This is important, because it means that if we had to failover a storage account from the primary to the secondary, then all the data that had been committed to the secondary location via geo-replication will already be durable there.

With this first release of geo-replication, we do not provide an SLA for how long it will take to asynchronously geo-replicate the data, though transactions are typically geo-replicated within a few minutes after they have been committed in the primary location.

In the event of a major disaster that affects the primary location, we will first try to restore the primary location. Dependent upon the nature of the disaster and its impacts, in some rare occasions, we may not be able to restore the primary location, and we would need to perform a geo-failover. When this happens, affected customers will be notified via their subscription contact information (we are investigating more programmatic ways to perform this notification). As part of the failover, the customer's "account.service.core.windows.net" DNS entry would be updated to point from the primary location to the secondary location. Once this DNS change is propagated, the existing Blob and Table URIs will work. This means that you do not need to change your application's URIs – all existing URIs will work the same before and after a geo-failover.

After the failover occurs, the location (what used to be the secondary) that is accepting traffic is considered the new primary location for the storage account. This location will remain the primary location unless another geo-failover was to occur. For further information on Geo-replication see <http://blogs.msdn.com/b/windowsazurestorage/archive/2011/09/15/introducing-geo-replication-for-windows-azure-storage.aspx>

7. On-boarding and Off-boarding Processes

There are two variations in the on-board processes depending how you purchase Azure, either through the Microsoft Online Services Customer Portal (MOCP) or for customers who purchase Azure through an attachment to an Enterprise Agreement there is an enhanced on-boarding process.

7.1 Microsoft Online Services Customer Portal (MOCP)

The Microsoft Online Services Customer Portal (MOCP) handles all Windows Azure account management and billing. Through the MOCP, you can sign up for Windows Azure services, add additional services such as SQL Azure and create new instances of existing services (referred to as subscriptions).

Subscriptions are really the “billing boundary” for Windows Azure services. You’ll want to maintain separate subscriptions for each application (or collection of applications) that require a different billing structure. For example, you can create separate subscriptions with individual billing details if you have different departments all hosting applications on Windows Azure, but requiring separate billing.

You’ll need to identify an “account owner” account and a “service administrator” account for each subscription. Each of these accounts is associated with a Windows Live ID. The account owner is responsible for managing the subscription and billing through the MOCP. The account admin has to manage the technical aspects of the subscription, including the creation of hosted services, through the Windows Azure Management Portal.

Once you’ve created a subscription, your account administrators can manage hosted services through the Windows Azure Management Portal. They can access this using the service administrator account credentials. See Deploying Hosted Services (Applications) below.

Purchasing Subscriptions

The Microsoft Online Services Customer Portal is where you purchase subscriptions to the Windows Azure platform and to other Microsoft Online Services. Before you can purchase a subscription in the Customer Portal, you need to have a Windows Live ID and a Customer Portal account.

To create an account in the Customer Portal

1. Go to the [Customer Portal](#).
2. In the upper-right corner, click Sign in.
3. You are prompted by the Customer Portal to sign in or sign up.
 - If you already have a Windows Live ID, enter your Windows Live ID as prompted and then click Sign in.
 - If you do not have a Windows Live ID, click Sign up to create an account.

4. After you have signed in to the Customer Portal for the first time, the My Profile Wizard prompts you to create a profile. Fill out the required information and complete the wizard.

To purchase a subscription

1. In the Customer Portal, click the Services tab.
2. In the Services Filter pane, click Windows Azure Platform.
3. Locate the special offer or service that you want.
4. Click Rate Plan to review the pricing structure.
5. Click Buy now to add the subscription to the Shopping cart.
6. In the Shopping Cart, enter the desired number in Qty and review the details of your subscription.
7. When you are satisfied with your changes, click Checkout to launch the Billing Information Wizard.
8. Complete the steps of the Billing Information Wizard. The billing can be setup for purchasing on a credit card or through an invoicing model, see [Steps to Set-up Invoicing](#) for further details
<http://www.microsoft.com/windowsazure/invoicing/>

For further information see:

http://www.microsoft.com/online/help/en-us/help/howto/f9a74cd3-c940-4946-9095-433708a74552.htm#BKMK_ChooseSubscription

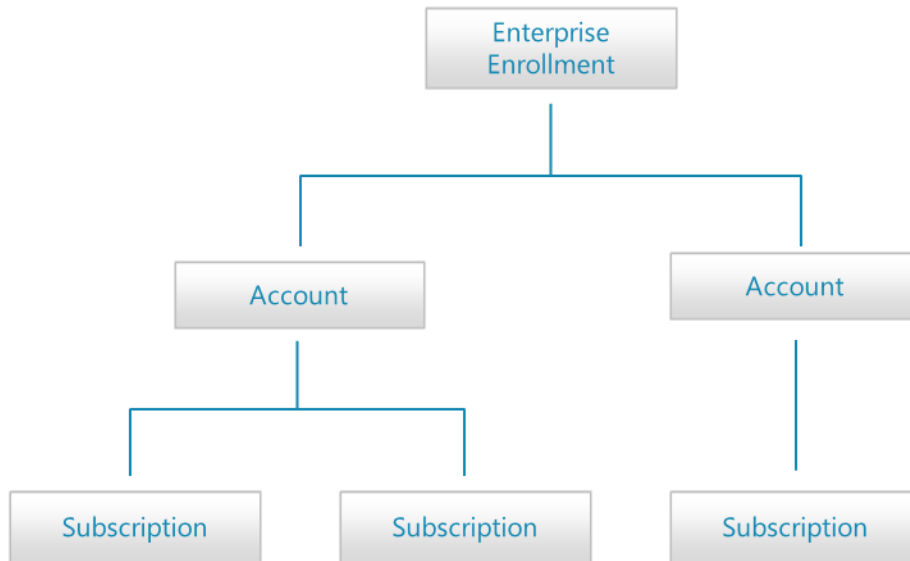
7.2 Enterprise Enrolment On-boarding

Customers who purchase Azure through the Attachment to an Enterprise Agreement (see Ordering and Invoicing Process) have access to an additional enterprise portal through which accounts and subscriptions can all be managed through a central point with the ability to have billing information aggregated across accounts.

To administer your Windows Azure services under an Enterprise Enrollment, there are three distinct administrative roles:

- **Enterprise Administrator** The Enterprise Administrator has the ability to add or associate Microsoft Online Customer Service Portal (MOCP Accounts) to the Enrollment, add or delete Enterprise Administrators and can view usage data across all MOCP Accounts associated to the Enrollment.
- **Account Owner** The Account Owner can add MOCP Subscriptions for their MOCP Account, update the Service Administrator for an individual MOCP Subscription and view usage data for their MOCP Account.

- **Service Administrator** The Service Administrator has the ability to access and manage MOCP Subscriptions and development projects within the Windows Azure platform development portal. The Service Administrator does not have access to the Enterprise Portal.



Choosing the right account set up methodology for your organization is an important first step in setting up your MOCP Accounts. How you set up your MOCP Accounts and MOCP Subscriptions will impact how they are administered and how they are reflected on your invoices and reports. Examples of typical set up methodologies include structuring by Functional, Departments or Geography.

You may create a new MOCP Account or associate an existing MOCP Account to your Enrollment as long as it has not yet been associated to another Enrollment. Creating a new MOCP Account or associating an existing MOCP Account requires confirmation of account ownership. Therefore the owner of the WLID provided in the above step will receive a notification that they have been invited to associate their existing MOCP Account with the Enrollment. To finish associating the account and begin receiving discounted rates, the owner of the WLID must confirm ownership of the MOCP Account by signing into the Enterprise Portal.

MOCP Subscriptions can be used to provide access to development projects and environments to different teams within your organization. Creating different MOCP Subscriptions for each environment for your application and assigning a different Service Administrator WLID for each subscription is a good way to help secure each environment.

A subscription may have any combination of services associated to it. The Account Owner has the ability to create MOCP Subscriptions within their MOCP Account.

7.3 Deploying Hosted Services (Applications)

For developers, building a Windows Azure application looks much like building a traditional Windows or Web based application. The obvious difference is that the Windows Azure applications are deployed to the Microsoft data centres and will be managed automatically by the Windows Azure fabric controller. Applications deployed to Windows Azure are known as Hosted Services and the Azure platform formalises how these services are defined, configured and how the code (binaries) is packaged.

Whether an application runs in the cloud or in your data centre, it can almost certainly be divided into logical parts. Windows Azure formalizes these divisions into roles. A role includes a specific set of code, such as a .NET assembly or Java JAR file, and it defines the environment in which that code runs. The roles supported today are Web, Worker and VM Role as introduced in the overview. The definition of how the overall service (or application) is assembled from individual roles is specified by a service definition. This is an XML file that defines the roles that comprise a service, options for these roles (virtual machine size, whether native code execution is supported), end points, optional local storage resources, configuration settings, and certificates for SSL endpoints. The service definition is specified when building the service and cannot be changed dynamically when the application is running. Supporting the service definition is a service configuration which is used to define configuration attributes that can be changed when the service is running, for example the number of instances of a particular role, diagnostic settings, and general configuration settings.

When a developer wishes to deploy an application to Azure for the first time, a hosted service is created either through the Azure Management portal or programmatically via the Service Management API. The developer then gives Windows Azure an application to run, they provide the code for the application's roles together with the service definition and service configuration files for this application. Tools to support the definition, packaging and deployment of Azure applications are provided through Visual Studio, Windows Azure Tools for Eclipse or the Windows Azure SDK. In addition we provide a compute and storage emulator which of Windows Azure, so that you can build and test your application within a developer workstation before deploying it to Windows Azure.

Windows Azure hosted service provides production and staging environments within which you can create a service deployment. Typically a service is deployed to the staging environment to test it before deploying the service to the production environment. When it is time to promote the service in staging to the production environment, you can do so without redeploying the service. This can be done by swapping the deployments. The deployments can be swapped by calling the Swap Deployment Service Management API or by swapping the VIPs in the portal.

Microsoft does not provide any SLA for the provisioning of hosted services to the Azure platform. There are a number of variables that can impact the time taken to deploy, including application start-up time, application VHD size. Typical application deployments to the Azure platform range from 6 to 12 minutes.

For more details on deploying and managing Azure hosted services see

- Planning and Designing Applications for Windows Azure <http://msdn.microsoft.com/en-us/library/windowsazure/gg615406.aspx>
- Developing Applications for Windows Azure <http://msdn.microsoft.com/en-us/library/windowsazure/gg433098.aspx>
- Managing Hosted Services in Windows Azure <http://msdn.microsoft.com/en-us/library/windowsazure/gg433038.aspx>
- Migrating Applications to Windows Azure <http://msdn.microsoft.com/en-us/library/windowsazure/gg186051.aspx>

7.4 Migrating Databases to SQL Azure

To migrate an existing SQL Server database to SQL Azure Database, you export the database's schema and then transfer the data from the database to SQL Azure Database. There are three alternative mechanisms available to this

- Migrating Databases to SQL Azure by Generating a Script of an Existing Database
- Migrating Databases to SQL Azure Using Microsoft Sync Framework
- Migrating Databases to SQL Azure by Using Data-tier Application Export and Import

Migrating Databases to SQL Azure by Generating a Script of an Existing Database

To migrate an existing SQL Server database to SQL Azure you can export the schema as a Transact-SQL script and then execute that script against SQL Azure Database as follows:

- Export a script from SQL Server Management Studio and set the appropriate export options. Because SQL Azure Database supports a subset of features found in SQL Server, you may have to make some modifications to the script before you are able to execute it in the cloud.
- Execute the script to create the schema in SQL Azure Database.

You can use the Generate and Publish Scripts Wizard to transfer a database from a local computer to SQL Azure Database. The Generate and Publish Scripts Wizard creates Transact-SQL scripts for your local database. The wizard uses them to publish database objects to SQL Azure Database.

Migrating Databases to SQL Azure Using Microsoft Sync Framework 2.1

Microsoft Sync Framework 2.1 provides synchronization capabilities between on-premise and SQL Azure servers, as well as between two or more SQL Azure databases in the same or different data centers. Using Sync Framework 2.1, you can extend the schema and data within your SQL Server database or SQL Azure database to SQL Azure data centers around the world to provide geo-available data access. For more information, see Synchronizing SQL Azure and Microsoft Sync Framework 2.1 Software Development Kit (SDK).

Migrating Databases to SQL Azure by Using Data-tier Application Export and Import

You can perform a Data-tier Application (DAC) export to migrate both the definition of the objects in a database and the data from the user tables into a DAC export file (BACPAC). You can then copy the BACPAC file into the Windows Azure blob storage service, and perform a DAC import to create a new database containing all of the objects and data.

7.5 Moving Data into SQL Azure

As SQL Azure supports the standard SQL tabular data stream (TDS) protocol; all the standard tools used for moving data to SQL Server can be used to move data into and out of SQL Azure. SQL Azure supports the use of SQL Server Integration Services. SQL Server Integration Services is a convenient way to move data into and out of SQL Azure. Alternatively, you can transfer data to SQL Azure by using the bulk copy utility (bcp.exe).

SQL Server Integration Services

You can transfer data to SQL Azure Database by using SQL Server 2008 Integration Services. In SQL Server 2008 R2 or later, the Import and Export Data Wizard provides support for SQL Azure. You can use this tool to migrate on-premise databases to SQL Azure Database. For more information, see How to: Run the SQL Server Import and Export Wizard in SQL Server Books Online.

Migrating Databases to SQL Azure by SQL Azure Migration Wizard

The SQL Azure Migration Wizard walks you through the selection of your SQL objects, creates SQL scripts suitable for SQL Azure, and allows you to migrate data between on-premise SQL Server 2005 or 2008 and SQL Azure servers, as well as between two or more SQL Azure databases in the same or different data centers. For more information, see SQL Azure Migration Wizard on Codeplex.

The bcp Utility

The bcp utility can be used to import large numbers of new rows into SQL Server tables or to export data out of tables into data files.

For more details of migrating database or data to SQL Azure see

- Migrating Databases to SQL Azure <http://msdn.microsoft.com/en-us/library/ee730904.aspx>

8. Off Boarding Applications

Azure Hosted services, storage accounts and SQL Azure database can be simply off boarded and deleted either through the Windows Azure Management Portal or programmatically through the Service Management API.

The major process steps for deleting an Azure hosted service are:

1. Log into the Windows Azure Platform Management Portal.
2. Select the required hosted service. Before you can delete the service, you must delete all current deployments of the service.
3. If needed, delete each service deployment for the service. To delete a service deployment:
 - a. Stop the service deployment if it is running. Then wait until the service deployment's status changes to Stopped.
 - b. Select the service deployment and select Delete. The deletion process might take several minutes to complete.
4. Finally delete the service

The above steps can also be completed programmatically. For further information see

- How to Delete a Hosted Service from Windows Azure <http://msdn.microsoft.com/en-us/library/windowsazure/hh531565.aspx>
- Delete Storage Account <http://msdn.microsoft.com/en-us/library/windowsazure/hh264517.aspx>

8.1 Data extraction/removal:

The Windows Azure Platform's two data storage mechanisms are Windows Azure Storage and SQL Azure.

Windows Azure Storage

The 3 data services held in Windows Azure Storage Blobs, Queues and Tables are fully accessible through either the Windows Azure Managed Library or Windows Azure Storage Services REST API. A consumer of the service can therefore always access the data held within Azure storage through the public Internet. The extraction of data held within Azure storage is the responsibility of the consumer of the service to extract the data through these storage APIs to migrate the data to another service.

The data standards used to host the data are driven by the consumer in that the format of the data placed within the service is under their control. Data is accessed through open standards of HTTP and REST.

Microsoft does not provide any additional data extract tools outside the storage APIs.

The costs for extraction are the standard consumption costs to call the storage APIs to extract the required data, i.e the Data Transfer costs plus the storage transaction cost (cost per 10,000 storage transactions).

SQL Azure

The data extraction from SQL Azure is largely the reverse process to “Moving Data into SQL Azure” as discussed above. As SQL Azure supports the standard SQL tabular data stream (TDS) protocol all the standard tools used for moving data from SQL Server can be used to move data out of SQL Azure. SQL Azure supports the use of SQL Server Integration Services. SQL Server Integration Services is a convenient way to move data out of SQL Azure. Alternatively, you can transfer data to SQL Azure by using the bulk copy utility (bcp.exe) or extract Migrating Databases to SQL Azure by Using Data-tier Application Export, see <http://msdn.microsoft.com/en-us/library/windowsazure/hh335292.aspx>

The metadata for the database namely the schema can be extracted using extract by Using Data-tier Application Export or using an on-premise SQL Server Management Studio, or 3rd party SQL Server tool.

The data standards used within the service are Transact-SQL and can be accessed for data extraction through the standard client library protocols of ADO.NET, ODBC, and OLEDB.

The costs for extraction are the standard consumption charges and comprises of the Data Transfer costs (see Pricing).

8.2 Media Disposal

Upon systems end-of-life, Microsoft operational personnel follow rigorous data handling procedures and hardware disposal processes. See http://www.globalfoundationservices.com/security/documents/WindowsAzureSecurityOverview1_0Aug2010.pdf

9. Pricing

A summary of all Azure Service Elements and unit pricing as outlined in the G-Cloud AWARD Questions spreadsheet is summarised in Table 1.

Windows Azure – Service Components	Most Common Configuration	G-Cloud Price	Categories to which Office 365 Service Component can be used as defined in G-Cloud AWARD xls
Windows Azure Compute Service	Azure Small Instance	£ 0.0641 per hour	Lot 1 - Compute
Windows Azure VM Role	Azure Small Instance	£ 0.0641 per hour	Lot 1 - Other
Windows Azure Storage Service	Azure Storage	£ 0.0747 per GB per month	Lot 1 - Storage
SQL Azure	Business Edition	£ 53.3315 per Month per 10GB of database	Lot 1 - Other
Windows Azure Service Bus	Per 10k Messages	£ 0.0088 per 10k msgs	Lot 1 - Other
Windows Azure Access Control Service	Per 100k Transactions	£ 1.0615 per 100k tx	Lot 1 - Other
Windows Azure Caching Service	128 MB Cache	£ 24.0016 per month	Lot 1 - Other
Windows Azure Marketplace	50GB Gov Open Data	£0.0000 up to 50GB	Lot 1 - Other
Windows Azure Content Delivery Network	Azure CDN Zone 1	£ 0.0801 per Gb per month	Lot 1 - CDN

TABLE 1.

Additional Options are available for each of the Azure Service Components and these are outlined with their functionality and pricing in the following Tables 2-7.

9.1 Windows Azure : Component Pricing – Lot 1

Windows Azure Compute Service & VM Role

Compute Service & VM Role	Unit	Unit Price
Extra Small	Per Hour	£0.02136
Small instance (default)	Per Hour	£0.0641
Medium instance	Per Hour	£0.1280
Large instance	Per Hour	£0.2561
Extra-large instance	Per Hour	£0.5121

TABLE 2a.

Compute hours are calculated based on the number of hours that your application is deployed. Details on different compute sizes are summarized in the table below.

Compute Instance Size	CPU	Memory	Instance Storage	I/O Performance
Extra Small ¹	1 GHz	768 MB	20 GB	Low
Small	1.6 GHz	1.75 GB	225 GB	Moderate
Medium	2 x 1.6 GHz	3.5 GB	490 GB	High
Large	4 x 1.6 GHz	7 GB	1,000 GB	High
Extra large	8 x 1.6 GHz	14 GB	2,040 GB	High

TABLE 2b.

Table 2c illustrate the above pricing when applied to the standard configuration defined within the G-Cloud AWARD Questions Q-LOT1-5.

Type	Value	Units	Windows Azure Equivalent	Unit	Unit Price
Processor	1	Equivalent of the Amazon EC2 Compute Unit (ECU) ²	Small Instance 1.6 GHz	Per Hour	£0.0641
Memory	1.7-2	GB	1.75 GB		
Storage	160	GB	225 GB		

TABLE 2c.

¹ Available in Beta

² http://aws.amazon.com/ec2/faqs/#What_is_an_EC2_Compute_Unit_and_why_did_you_introduce_it

Windows Azure Storage Service

Storage	Unit	Unit Price
Azure Storage : per GB stored per month	Per GB Per Month	£0.0747
per 10,000 storage transactions	Per 10k tx	£0.0054

TABLE 3a.

Table 3b illustrate the above pricing when applied to the standard configuration defined within the G-Cloud AWARD Questions Q-LOT1-14.

Type	Value	Units	Windows Azure Equivalent	Unit Price	Configuration Price
Size	1	Per GB per Month	Persistent object storage	£0.0747 + £0.0054 per 10,000 storage transactions	£0.0801
Data Durability and Reliability	>1	Copies of data held	6 copies 3 in primary location (+ 3 in secondary geo-replication)		

TABLE 3b.

Windows Azure CDN

Content Delivery Network (CDN)	Unit	Unit Price
CDN Zone 1 : per GB for data transfers under Zone 1	per GB	£0.0801
CDN Zone 2 : per GB for data transfers under Zone 2	Per GB	£0.1067
per 10,000 transactions	Per 10k tx	£0.0054

TABLE 4a.

Table 4b illustrate the above pricing when applied to the standard configuration defined within the G-Cloud AWARD Questions Q-LOT1-21.

Type	Windows Azure Equivalent	Unit	Unit Price	Configuration price
Azure CDN Zone 1 and 10k Transactions	1 x Windows Azure CDN Zone 1 + 10k Tx only	Per GB per Month and max 10k Tx	£0.0801 + £0.0054 per 10,000 storage transaction	£0.0855

TABLE 4b.

Windows Azure CDN data transfer charges are based on the data centre location from where the traffic was served, not based on the end user's location. CDN data transfers are charged at the standard data transfer rates. Table 4c maps the data centre locations to the appropriate zone for which they belong for billing purposes.

Billing Region	Geographic Location
Zone 1	North America
	Europe
Zone 2	Asia Pacific
	Latin America
	Middle East / Africa

TABLE 4c.

Windows Azure Access Control, Service Bus and Caching

Access Control		
per 100,000 transactions	per 100k tx	£1.0615
Service Bus		
per 10,000 messages	Per 10K msgs	£0.0088
per 100 relay hours (this only applies when using the Service Bus Relay capability)	Per 100 hours	£0.0880
Caching		
128 MB cache	Per month	£24.0016
256 MB cache	Per month	£29.3352
512 MB cache	Per month	£40.0026
1 GB cache	Per month	£58.6705
2 GB cache	Per month	£96.0062
4 GB cache	Per month	£173.3446

TABLE 5.

SQL Azure

SQL Azure		
SQL Azure	Unit	Unit Price
<i>Web Edition</i>	Per 1 GB of database per Month	£5.3284
database (up to 5 GB)		
<i>Business Edition</i>	Per 10 GB of database per Month	£53.3315 <small>(Maximum charge of £266.6573 per database). This maximum amount is calculated based on the accumulated charges for each database you deploy over the entire billing month.</small>
database (up to 150 GB)		

TABLE 6a.

Data Transfer Details (except for CDN)

Microsoft data transfer rates are determined by the region in which your solution is deployed. Data transfers between Azure Services located within the same sub region are not subject to charge. Data transfers between sub regions are charged at normal rates on both sides of the transfer. A sub region is the lowest level geo-location that you may select to deploy your applications and associated data. Below is a list of our regions and sub regions:

Data Transfers		
Zone 1 per GB out	Per GB	£0.0801
Zone 2 per GB out	Per GB	£0.1067

TABLE 6b.

Regions	Sub Regions
Zone 1	North Europe
	Western Europe
	North Central US
	South Central US
Zone 2	East Asia
	Southeast Asia

TABLE 6c.

Windows Azure Marketplace

Marketplace	Unit	Unit Price
Gov Open Data	50GB Max and up to 1Tb of network bandwidth	£0.0000 G-Cloud free offer to PS customers

TABLE 7.

9.2 Windows Azure : Common Configuration Pricing – Lot 2

Each component can be purchased as a standalone offering as highlighted above in Lot 1, or can be purchased to create a Platform as a Service as defined by Lot 2 of the G-Cloud Framework.

PaaS Common Configuration – Managed Components

Service and Resource	Unit	Cost Breakdown	Cost
Compute (Web Role/Small Instance)	2	2 X £0.0641 /hr * 24 hours * 30 days	£92.304
Compute (Worker Role/Small Instance)	2	2 X £0.0641 /hr * 24 hours * 30 days	£92.304
Windows Azure Storage (10 GB) 100,000 storage transactions	1	10 x £0.0747 + 10 x £0.0054	£0.801
SQL Azure 10 GB Database	1	1 x £53.3315	£53.3315
Data Transfer Out (15GB)	1	15 x £0.0801	£1.2015
Total Monthly Cost			£239.94

PaaS Common Configuration - Managed Application Deployment Platform

Service and Resource	Unit	Cost Breakdown	Cost
Compute (Web Role/Small Instance)	2	2 X £0.0641 /hr * 24 hours * 30 days	£92.304
Compute (Worker Role/Small Instance)	2	2 X £0.0641 /hr * 24 hours * 30 days	£92.304
Windows Azure Storage (10 GB) 100,000 storage transactions	1	10 x £0.0747 + 10 x £0.0054	£0.801
SQL Azure 10 GB Database	1	1 x £53.3315	£53.3315
Data Transfer Out (15GB)	1	15 x £0.0801	£1.2015
Total Monthly Cost			£239.94

There are two different ways to order the service (see Ordering and Invoicing Process)

- Directly through the Microsoft Online Services Customer Portal (MOCP), pay-as-you-go service.
- Attachment to an Enterprise Agreement (EA), consumption commitment. This includes additional discounts and resource guarantees.

Further information can be found

<http://www.microsoft.com/windowsazure/offers/MS-AZR-0003P?currency-locale=en-gb>

10. Windows Azure Service Management

Windows Azure services can be managed through a user interface known as the Windows Azure Platform Management Portal or programmatically through the Windows Azure REST Management API. The Service Management API provides programmatic access to much of the functionality available through the Management Portal. Using the Service Management API, you can manage your storage accounts and hosted services, your service deployments, and your affinity groups.

The Service Management API is a REST API. All API operations are performed over SSL and mutually authenticated using X.509 v3 certificates. The management service may be accessed from within a service running in Windows Azure, or directly over the Internet from any application that can send an HTTPS request and receive an HTTPS response.

For a detailed reference to the management API see the documented API reference at <http://msdn.microsoft.com/en-us/library/windowsazure/ee460799.aspx>

10.1 Managing Windows Azure Subscriptions

A Windows Azure subscription is a unique user account in Windows Azure. All resources available via the Service Management API are organized beneath the subscription.

When you create a Windows Azure subscription, it is uniquely identified by a subscription ID. The subscription ID forms part of the URI for every call that you make to the Service Management API. See [Addressing Service Management Resources](#) for information about how to construct URIs for Service Management operations.

Once you have a subscription, you can create one of two types of services:

- **Hosted Services.** A hosted service contains deployments of your web, worker, and virtual machine roles in the Windows Azure environment.
- **Storage Accounts.** A storage account provides access to storage via the Windows Azure Blob, Queue, and Table services.

10.2 Managing Hosted Services

A hosted service is a container for your service deployments in Windows Azure. You can create a hosted service from within the Management Portal or by calling the Create Hosted Service operation. The name that you give your hosted service must be unique across Windows Azure. This name forms part of the URI for calls that you make to the Service Management API to act on this hosted service.

Actions that you can perform using the API include listing the hosted services in your subscription; creating, updating, and deleting hosted services; returning properties for a hosted service; updating and managing deployments of your hosted service, to the staging and production environments; and upgrading your hosted service. For a complete list of the operations on hosted services available through the API see <http://msdn.microsoft.com/en-us/library/windowsazure/ee460812.aspx>

10.3 Managing Storage Accounts

A storage account is a unique endpoint for the Windows Azure Blob, Queue, and Table services.

You must create a storage account in the Management Portal to use the Blob, Queue, and Table services. The name you give your storage account becomes the host name within the URI that you use to address Blob, Queue, or Table resources. For example, to address a container resource in the Blob service, you use a URI like the following, where <storage-account> refers to the name of your storage account:

```
http://<storage-account>.blob.core.windows.net/mycontainer
```

Each storage account has two associated access keys, a primary access key and a secondary access key. These keys are used to authenticate requests against the storage account.

You can use the Service Management API to manage an existing storage account. The API includes operations to list the storage accounts within your subscription, to return storage account properties, to retrieve the primary or secondary access key, and to regenerate the keys. See [Operations on Storage Accounts](http://msdn.microsoft.com/en-us/library/windowsazure/ee460790.aspx) for a complete list of API operations <http://msdn.microsoft.com/en-us/library/windowsazure/ee460790.aspx>

10.4 Deployments and Deployment Environments

When you deploy your service to Windows Azure, the Windows Azure fabric initiates the service lifecycle. The fabric initializes and then starts the roles that make up the service. Once deployed, your service is available via the role endpoints that you've defined in your service definition file.

A service can be deployed to one of two deployment environments: staging or production. The staging environment serves as a testing ground for your service, so that you can see it running in the fabric before moving it to production. When you are ready for your service to go live, you can move it to the production environment.

10.5 Managing Certificates

You can upload management certificates to the Windows Azure certificate store for your subscription, using the Management Portal. Certificates are now packaged and uploaded separately from the binaries for your service. This means that certificates may now be managed by someone other than the developer, such as an IT manager. The service definition file specifies a logical name for the certificate and the name and location of the local store where it may be found, and associates the certificate with a service endpoint. The service configuration file associates the logical name of the certificate with its thumbprint.

See [Operations on Certificates](#) for a complete list of API operations.

10.6 Locations and Affinity Groups

When you create a hosted service or a storage account, you must specify a geographical location for it. You can do this either by specifying a data centre location or by specifying that the service or storage account should be part of an affinity group.

An affinity group groups your services together in Windows Azure data centers. If services in your subscription need to work together – for example, if your hosted service stores data in the Blob or Table service or relies on the Queue service for workflow – then you can organize your hosted service and storage account within an affinity group for optimal performance.

You can use the Service Management API to create, list, delete, update, and get properties of an affinity group within your subscription.

10.7 Subscription History

You can view subscription history for a specified timeframe by using the Service Management API. For example, you can list all hosted services that were created in the past month.

For a complete list of API commands available for viewing a subscription history see <http://msdn.microsoft.com/en-us/library/windowsazure/gg715315.aspx>

10.8 3rd Party Monitoring Access

The open Service Management API enables Azure to be monitored externally from 3rd party monitoring solutions. Including

- Cerebrata Azure Diagnostic Manager
<http://www.cerebrata.com/Products/AzureDiagnosticsManager/>
- Quest Spotlight on Azure <http://communities.quest.com/docs/DOC-9906>

In addition an on-premise deployment of Microsoft System System Center operations manager can be used to monitor an Azure Hosted Service. A Windows Azure Monitoring Management Pack is provided that enables you to monitor the availability and performance of applications that are running on Windows Azure. After configuration, the Windows Azure Monitoring Management Pack offers the following functionality:

- Discovers Windows Azure applications.
- Provides status of each role instance.
- Collects and monitors performance information.
- Collects and monitors Windows events.
- Collects and monitors the .NET Framework trace messages from each role instance.
- Grooms performance, event, and the .NET Framework trace data from Windows Azure storage account.
- Changes the number of role instances via a task.

For further information see: <http://pinpoint.microsoft.com/en-us/applications/windows-azure-application-monitoring-management-pack-release-candidate-12884907699>

10.9 Service Availability to Suppliers

The Windows Azure platform is fully available to other suppliers so they can use them to provide services to government. An example of this is Love Clean Streets which mobile and cloud based service built on the Windows Azure Platform by the supplier bbits. Using the service local authorities can allow citizens can report environmental crime such as graffiti, fly-tipping or potholes through their mobile phones; authorities can manage and respond through the integrated services. The service pioneered in Lewisham has been used across the country including its London branded form Love Clean London.

11. Service Constraints

Windows Azure does not have scheduled downtimes. Windows Azure SLA for compute is 99.95%, for storage is 99.9%. To qualify for SLA each role must have a minimum of 2 instances.

Microsoft does enforce constraints on the guest operating systems and their compatibility to Azure SDKs. To ensure that your service works as expected, you must deploy it to a release of the Windows Azure guest operating system that is compatible with the version of the Windows Azure SDK with which you developed it. A list of all the versions and also a compatibility matrix is available here :

<http://msdn.microsoft.com/en-us/library/windowsazure/ee924680.aspx>

12. Service Levels

Windows Azure has different service level agreements for each of the services; these agreements are centred on availability and connectivity to the service. Microsoft does not provide any service level agreements on the performance of the underlying services.

12.1 Windows Azure SLA

Windows Azure has separate SLA's for compute and storage. For compute, we guarantee that when you deploy two or more role instances in different fault and upgrade domains your Internet facing roles will have external connectivity at least 99.95% of the time. Additionally, we will monitor all of your individual role instances and guarantee that 99.9% of the time we will detect when a role instance's process is not running and initiate corrective action.

Windows Azure Compute SLA is available here: <http://go.microsoft.com/fwlink/p/?LinkId=159704>

For storage, we guarantee that at least 99.9% of the time we will successfully process correctly formatted requests that we receive to add, update, read and delete data. We also guarantee that your storage accounts will have connectivity to our Internet gateway.

Windows Azure Storage SLA is available here: <http://go.microsoft.com/fwlink/p/?LinkId=159705>

12.2 SQL Azure SLA

SQL Azure customers will have connectivity between the database and our Internet gateway. SQL Azure will maintain a "Monthly Availability" of 99.9% during a calendar month. "Monthly Availability Percentage" for a specific customer database is the ratio of the time the database was available to customer to the total time in a month. Time is measured in 5-minute intervals in a 30-day monthly cycle. Availability is always calculated for a full month. An interval is marked as unavailable if the customer's attempts to connect to a database are rejected by the SQL Azure gateway.

SQL Azure SLA is available here: <http://go.microsoft.com/fwlink/p/?LinkId=159706>

12.3 Service Bus and Access Control SLA

Uptime percentage commitments and SLA credits for Service Bus and Access Control are similar to those specified above in the Windows Azure SLA. Due to inherent differences between the technologies, underlying SLA definitions and terms differ for the Service Bus and Access Control services. Using the Service Bus, customers will have connectivity between a customer's service endpoint and our Internet gateway; when our service fails to establish a connection from the gateway to a customer's service endpoint, then the service is assumed to be unavailable. Using Access Control, customers will have connectivity between the Access Control endpoints and our Internet gateway. In addition, for both Service Bus and Access Control, the service will process correctly formatted request for the handling of messages and tokens; when our service fails to process a request properly, then the service is assumed to be unavailable. SLA calculations will be based on an average over a 30-day monthly cycle, with 5-minute time

intervals. Failures seen by a customer in the form of service unavailability will be counted for the purpose of availability calculations for that customer.

Service Bus SLA is available here: <http://go.microsoft.com/fwlink/p/?LinkId=159707>

12.4 Content Delivery Network (CDN) SLA

We guarantee that at least 99.9% of the time Windows Azure CDN will respond to client requests and deliver the requested content without error. We will review and accept data from any commercially reasonable independent measurement system that you choose to monitor your content. You must select a set of agents from the measurement system's list of standard agents that are generally available and represent at least five geographically diverse locations in major worldwide metropolitan areas (excluding PR of China).

Windows Azure CDN SLA is available here: <http://go.microsoft.com/fwlink/p/?LinkID=195943>

13. Support

Azure support is provided in three forms

- Community Support
- Self -Support
- Assisted Support

13.1 Community Support

Community support is provided in the form of a number of Azure blogs provided by the various product teams and a collection of public on-line forums dedicated to Windows Azure. Microsoft has dedicated staff responding to questions raised in the forums. There are individual forums dedicated to the following topic areas:

- Windows Azure Platform Development
- Windows Azure Platform Troubleshooting, Diagnostics & Logging
- Windows Azure Storage, CDN and Caching
- SQL Azure
- Connectivity and Messaging
- Managing Services on the Windows Azure
- Security for the Windows Azure Platform
- Windows Azure Platform Purchasing, Pricing & Billing.

See the following for further information <http://social.msdn.microsoft.com/Forums/en-US/category/windowsazureplatform/>

13.2 Self- Support

Microsoft provides a number of self-support services including:

- **Azure Service Dashboard** – Where you can get the current status on the health of the Windows Azure platform, subscribe to the respective RSS feeds to receive notifications for interruptions to any of the services.
- **Known Issues in Windows Azure**- Review a list of the known issues for Windows Azure.
- **Guest Operating System Updates** Subscribe to the RSS feed to receive notifications for Guest Operating System updates.
- **Windows Azure Platform Frequently Asked Questions** Provides answers to frequently asked questions across all aspects of the Windows Azure Platform, including General topics, Windows Azure Platform services and features, partnering, and commerce and billing topics.

Azure Service Dashboard

Current status on the health of the Windows Azure platform is available on an online through the Azure service dashboard. The dashboard includes both the current status and a historic status of the availability of the service. If you wish to receive notifications for interruptions to any of the services, through an RSS feed. A detailed incident report for a service that is not running normally is provided through the dashboard.

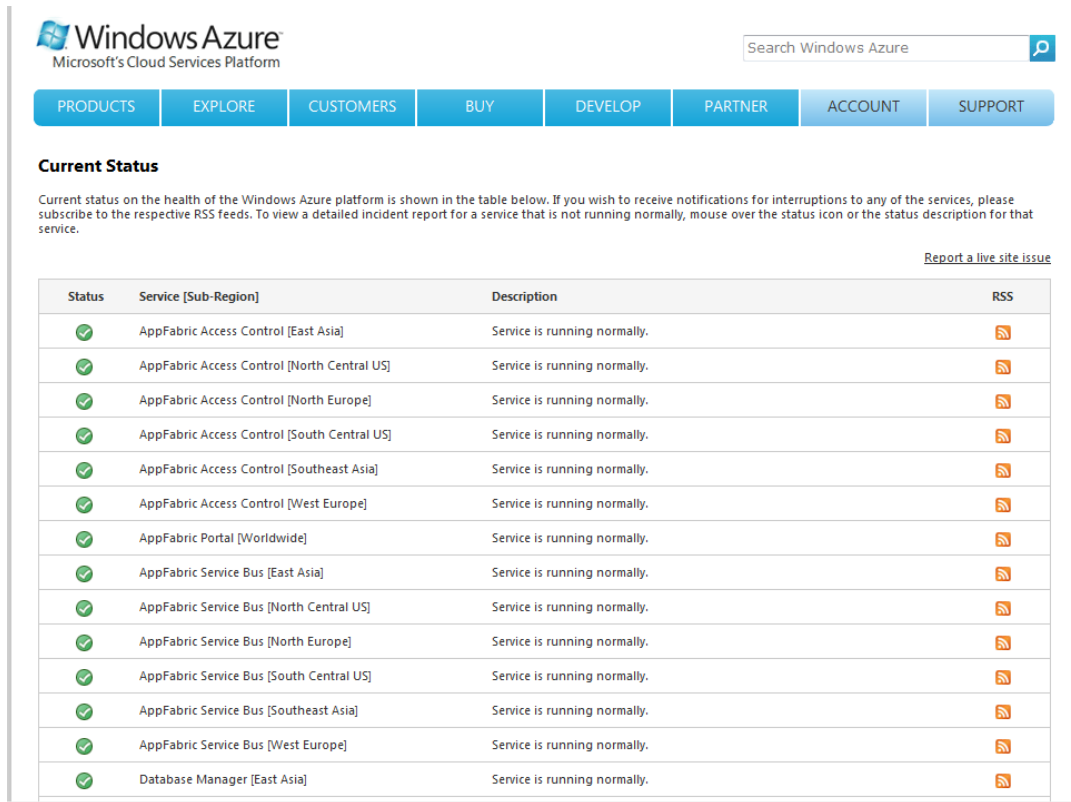


Figure 5 Azure Service Dashboard

The Azure Service dashboard is available here:

<http://www.microsoft.com/windowsazure/support/status/servicedashboard.aspx>

13.3 Assisted Support

Provided through the Azure subscription you have access to a support phone number (24 x 7) and web portal to report potential issues with the Windows Azure platform service. Issues with the platform will be escalated to the Windows Azure platform operations team to investigate and correct. You can also call at any time for developer support to assist you with your application. Developer support is charged on a per incident basis. Premier customers, MSDN subscribers and MPN members can leverage support incidents and support hours provided as part of these program benefits. We will also continue to provide moderated forum support at no charge. The standard Windows Azure support issue initial response time is four hours.

- Support contact telephone numbers are available here
<http://www.microsoft.com/online/help/en-us/helphowto/0d8eb4c2-77c5-4dd8-b66c-9f1de7451e24.htm>
- The web portal for requesting support can be found here
<https://support.microsoft.com/oas/default.aspx?gpid=14918&st=1&wfxredirect=1&sd=gn>

Premier Support for Azure

Microsoft's paid for Premier Support Contract customers also have full coverage for Azure. Premier Support takes the support experience to the next level. With Premier Support, you will gain a seamless, managed support experience that spans both your on-premises and cloud-based solutions, enabling you to develop and deliver upon a single, cohesive support strategy. Helping to improve overall IT health and operations, Premier Support includes a complete range of services, including:

- **Proactive Services.** Engage in developer workshops and leverage application consulting services delivered by an Azure expert. You will optimize your technology and processes while building and enhancing the knowledge and skills of your team.
- **Service Management.** Benefit from an account representative who will help to alleviate any issues that may arise. Your Account Manager will facilitate your involvement in an ongoing program to effectively utilize the Azure platform, and build efficient and secure applications.
- **Problem Resolution Services.** Receive prioritized, 24x7 problem-resolution support with an escalation path all the way to the product development and operations teams, as well as upper management at Microsoft.

For further information Premier Support for Microsoft Azure Platform.

http://download.microsoft.com/download/0/0/B/00BB2908-0FC2-4CDE-B370-B9D70C7A84FC/05b_Premier_Support_Azure_Datasheet.pdf

14. Financial recompense model

The financial recompense model for Windows Azure is through a service credit model. SLA Credits are calculated as a percentage of the bill for that service in the month the SLA was missed and then applied to the next month's bill. Details are as below:

- Compute connectivity: 10% credit if we fall below 99.95%, 25% credit if we fall below 99%.
- Compute Role Instance Monitoring: 10% credit if we fall below 99.95%, 25% credit if we fall below 99%.
- Storage: 10% credit if we fall below 99.9%, 25% credit if we fall below 99%,

Real time access to Windows Azure SLA metrics are available at the following url
<http://www.microsoft.com/windowsazure/support/status/servicedashboard.aspx>

15. Training

Microsoft provides many training vehicles to support the Azure platform including:

- Official Curriculum Training
<http://www.microsoft.com/learning/en/us/Course.aspx?ID=50466B&Locale=en-us>
- Free Training Kits
- Certification Exams, *PRO: Designing and Developing Windows Azure Applications*
<http://www.microsoft.com/learning/en/us/exam.aspx?ID=70-583>
- Microsoft Developer Network website contains all the documentation related with Windows Azure <http://msdn.microsoft.com/en-us/library/windowsazure/dd163896.aspx>
- Microsoft Press Books, e.g. "Windows Azure Step by Step"

Many 3rd party organisations also provide training for Azure including DevelopMentor, QA and Pluralsight.

Windows Azure Training Kit

The Windows Azure Platform Training Kit includes:

- Hands-on labs
- Demos
- Samples
- Presentations & Videos

This training kit covers all the services included in the Windows Azure Platform

Additionally there are specific training kits for learning how to use the Windows Azure services from other technologies like:

- SharePoint and Windows Azure Development Kit :
<http://www.microsoft.com/download/en/details.aspx?id=24398>
- Windows Azure Toolkit for Windows Phone : <http://watwp.codeplex.com/>

16. Ordering and Invoicing Process

There are two different ways to order the service :

- Directly through the Microsoft Online Services Customer Portal. The are two billing options for this approach is :
 - Monthly using a credit card.
 - Monthly using an invoice : You can see all the details for setting an invoice billing here : <http://www.microsoft.com/windowsazure/invoicing/>
- Attachment to an Enterprise Agreement.

Further details of billing can be found here

<http://www.microsoft.com/windowsazure/support/understandbill/>

16.1 Attachment to an Enterprise Agreement

Customers are now also able to purchase Windows Azure platform services through the EA program by signing an amendment to their EA enrollment. Customers in the Direct EA program can make an upfront annual monetary commitment and receive our discounted commitment rates against any usage until this upfront monetary commitment is exhausted. Any usage in excess of this will be charged at their consumption rates. The customer's commitment and consumption rates reflect their online services level discount and the commitment rates also include an additional commitment discount. The customer can increase their monetary commitment at any time. In exchange for the significant commitment discounts, we do require the customer to provide a flat monthly forecast of their monetary commitment.

We only guarantee available capacity to 125% of their monthly forecast. Amounts greater than the guaranteed capacity are available to the customer to the extent we have available capacity. The customer can now flexibly use their commitment across months and for different resources. This major change in our EA offering enables customers to commit more upfront with much less worry that they will lose their investment if their forecast is incorrect.

Each calendar month their usage is applied against their monetary commitment balance at the discounted commitment rates. Once the balance is exhausted, overage is calculated on the excess usage at the consumption rates. We invoice the customer for their overage on their enrollment's quarterly anniversary dates.

Key Benefits

Some of the key benefits of purchasing in EA include:

- An additional discount for all Azure services
- Standardise the procurement process to match your other Microsoft software and services
- A consolidated reporting interface for all Azure projects helps internal cross-charging

Customers will also be able to aggregate and have visibility of all their usage across all of their MOCP accounts and subscriptions. This includes a single annual bill for commitment and quarterly bills for overage. This compares to the MOSP program where the customer receives separate monthly bills for each individual subscription. Customers will also be able to sign up to receive periodic notifications of their unbilled balance at whatever frequency they desire (daily, weekly or monthly). Customers can also download usage data that spans their entire organization.

Who's Eligible to Purchase in EA?

Any commercial customer from a Direct EA country that is willing to make a minimum annual commitment of at least \$36,000 over a three year coterminous subscription or \$12,000 if a one year subscription can purchase via a desktop EA enrolment. There is an exception process if a customer does not want to make a desktop commitment but still wants to purchase the Windows Azure platform in EA. There is a similar exception process if you have a prospective customer that cannot meet the \$10,000 annual minimum commitment.

Once this has been done, customers can access the Windows Azure Enterprise Portal to manage their accounts.

16.2 Usage Reporting

Using the Microsoft Online Services Customer Portal you can view past and current bills and usage. The bills include:

- **Recurring Charges** the flat monthly charges for your base units if you purchased a commitment offer. These recurring charges are billed in advance for your next month's service.
- **Usage Charges** Monthly charges for the usage that surpasses the amount included with your offer. You are billed in arrears for your past month's usage.

The usage charges are broken down at the following level:

- Name of Service
- Type – variant of service e.g. database size variant.
- Region - Indicates which region the usage applies and primarily relates to data transfers, since these rates can vary by region
- Resource - Identifies the unit of measure for the resource being consumed, resources include:
 - Compute Hours, Access Control Transactions (in 100,000s), Cache Memory (MB/month), Data Transfer GB (except for CDN), Data Transfer (CDN), Database (db/month), Service Bus Connections (cxns/month), Storage (GB/month) and Storage Transactions (in 10,000s)
- Consumed - Contains the amount of the resource that has been consumed during the billing period.
- Included - Identifies the amount that is included each month with your offer

- Billable - If the Consumed amount exceeds the Included amount, this column displays the difference
- Rate - s the rate you are charged per billable unit.
- Amount the result of multiplying the Billable column by the Rate column

Depending on your usage, there can be thousands of rows of daily usage data. If you want to analyse this data, you can export the data to a comma-separated variable file (CSV), which can then be viewed in Microsoft Office Excel and other programs.

For Further information on billing and usage reporting see "Read a Bill for Windows Azure Platform"
<http://www.microsoft.com/windowsazure/support/understandbill/>

17. Termination Terms

Your use of the Windows Azure platform services is governed by the terms and conditions of the agreement(s) under which you purchased the services. For customers who purchased online directly from Microsoft, this is the [Microsoft Online Subscription Agreement](#), which incorporates the [Microsoft Online Services Use Rights](#). For customers who purchased through [Microsoft Volume Licensing](#), you can obtain a copy of your agreement(s) by contacting your Microsoft account representative or [volume licensing](#).

Extracted from the [Online Subscription Agreement](#)

4. Term, Suspension, Cancellation and Termination.

- a. **Agreement term and termination.** This agreement will remain in effect unless it is terminated by Customer in writing with 30 days' prior written notice and subject to the terms of this Section. For Committed Offerings, termination will only terminate the right to renew Subscriptions under an existing Order or place new Orders for additional Products under this agreement. Termination will not affect any Subscription not otherwise cancelled or terminated and this agreement shall remain in effect for such Subscription for the remainder of the Term. For Consumption Offerings, termination will end Customer's right to use the Product.
- b. **Cancellation of a Subscription by Customer.** Customer may cancel a Subscription as follows:
 - i. For Consumption Offerings, Customer may cancel at any time.
 - ii. For Committed Offerings, if Customer cancels a Subscription within 30 days of the date on which the Order was submitted, Customer shall be relieved from any obligation to make payments for the remainder of the Subscription with the exception that Customer must pay for the initial 30 days of the Subscription. If Customer chooses to terminate a Subscription after the initial 30-day cancellation period but before the end of the initial Term, Customer must pay for the remainder of the Term.

After the initial Term, renewed Subscriptions must be cancelled at least 30 days before the monthly anniversary of the Order submittal. For example, if Customer's Subscription renewed on July 10th and Customer cancelled the Subscription on September 20th, the Subscription would terminate on November 9th. Customer must pay amounts due for the Subscription until the Subscription termination is effective.

Notwithstanding the foregoing, for Windows Azure Platform Committed Offerings, Customer may cancel the Online Services within 30 days of the initial Term and within 30 days of the beginning of any renewal Term. If Customer cancels within the initial 30 day cancellation period, Customer will pay for only the initial 30 day period. If Customer chooses to cancel a Subscription after the initial 30-days of any Term, Customer must pay for the full Term.

- c. **Effect of Cancellation or Expiration on Licensed Software.** Customer must contact Microsoft customer service (see contact information on the Microsoft Online Services Customer Portal) to terminate the agreement or cancel a Subscription. If the agreement or an applicable Subscription is terminated or expires, and Customer does not exercise an available buy-out option, then all copies of Licensed Software licensed under this agreement and its associated media must be deleted and destroyed. Microsoft may request written certification of the deletion and destruction.

18. Data Restoration / Service migration

The Windows Azure platform guarantees data availability, but in case the consumer wants to be protected against application or user errors, the following techniques can be followed:

18.1 SQL Azure

Microsoft SQL Azure Database is the relational database service on the Windows Azure platform. Once you have created a database in SQL Azure, you can back up that database by copying it to a new database. The new database that is created from the copy process is a regular database: fully functional and independent of the source database. For more information, see [Copying Databases in SQL Azure](#).

Additionally, you can export your database to Azure Storage using Data-Tier applications. A data-tier application (DAC) export copies the object definitions from a SQL Azure database to a DAC export (BACPAC) file, and then bulk copies the data from the user tables to the export file. You can then use the DAC import operation to recreate the database and data on another SQL Azure server, or an instance of the SQL Server Database Engine. You can use the DAC export and import operations to copy databases between SQL Azure servers, or to migrate databases between the SQL Server Database Engine and SQL Azure. The process is fully described here : <http://msdn.microsoft.com/en-us/library/windowsazure/hh335292.aspx>

Also available is the SQL Azure Migration Wizard (SQLAzureMW) which is designed to help you migrate your SQL Server 2005/2008 databases to SQL Azure. SQLAzureMW will analyze your source database for compatibility issues and allow you to fully or partially migrate your database schema and data to SQL Azure.

SQL Azure Migration Wizard (SQLAzureMW) is an open source application that has been used by thousands of people to migrate their SQL database to and from SQL Azure. SQLAzureMW is a user interactive wizard that walks a person through the analysis / migration process and is also available as a command line tool. For further information see <http://sqlazuremw.codeplex.com/>

18.2 Azure Storage

Azure storage does not have any automated backup and restore capability and it is a consumer responsibility to provide this. The core capabilities to snapshot blobs to implement a backup and restore strategy is provided by the platform . An example of a backup strategy is explained here : <http://blogs.msdn.com/b/windowsazurestorage/archive/2010/04/30/protecting-your-blobs-against-application-errors.aspx>

19. Consumer Responsibilities

As a Platform as a Service (PaaS) Microsoft is responsible for managing the platform and the consumer is responsible for managing the application and data. The Consumer also has the optional choice if Microsoft will automatically patch the underlying operating system for security patches. If this option is not selected the consumer has the responsibility for manually selecting the operating system and patch level to keep the application at the latest security patch level.

20. Technical Requirements

For the development of applications for the Windows Azure platform requires a client SDK to support the packaging of solutions for deployment to the Azure platform. There are two ways to install the Windows Azure SDK. You can download and install everything using the Microsoft Web Platform Installer or you can install the standalone version of the SDK.

Using the Microsoft Web Platform Installer automatically installs:

1. Windows Azure Tools for Microsoft Visual Studio
2. Windows Azure SDK
3. Visual Web Developer 2010, if you do not have Visual Studio 2010
4. Required IIS feature settings
5. Required hot fixes

The SDK is available in a 64-bit version and a 32-bit version.

- The 64-bit (x64) version of the SDK requires a 64-bit version of Windows 7, Windows Vista Service Pack 2 or greater, or Windows Server 2008 SP2 or greater.
- The 32-bit (x86) version of the SDK requires a 32-bit version of Windows 7, Windows Vista Service Pack 2 or greater, or Windows Server 2008 SP2 or greater.

The Windows Azure Tools for Eclipse also provides the availability to develop Windows Azure Services using Eclipse. All the prerequisites are available here <http://www.windowsazure4e.org/download/#Prerequisites>

21. Trial Services

Microsoft allows a 90 day free trial of the Windows Azure Platform, the trial service includes includes the following services:

- Compute: 750 hours of a Small Compute Instance
- Storage: 20GB with 50k Storage transactions
- Data Transfers: 20GB out / Unlimited inbound data transfer
- Relational Database: 1GB Web Edition SQL Azure database
- Access Control: 100,000 transactions
- Service Bus: 2 connections
- Caching: 128MB cache

Further details can be found here : <http://www.microsoft.com/windowsazure/free-trial/>

If the customer has a **MSDN** subscription, there are additional free offers :

Subscription Level	Visual Studio Ultimate with MSDN (BizSpark Users)	Visual Studio Premium with MSDN	Visual Studio Professional with MSDN
Compute*	1,500 hours of the Small Instance	750 hours of the Small Instance	375 hours of the Small Instance
Storage	30 GB	25 GB	20 GB
Storage Transactions	2,000,000	1,000,000	250,000
SQL Azure	5 GB	1 GB	1 GB
Access Control Transactions**	500K	200K	100K
Service Bus Connections	5	5-	2
Caching	128 MB cache	128 MB cache	128 MB cache
Data transfers (WW)	35GB Out Free In	30GB Out Free In	25GB Out Free In
Annual Savings***	\$3,500	\$1,800	\$1,300

To protect you from accidentally incurring charges for usage beyond the included offer amount, we have introduced the Spending Limit feature. All new customers that sign up for the 90-day trial offer or one of our member offers (e.g., MSDN offer) will now, by default, have a Spending Limit of \$0 (USD).

When your usage exhausts the monthly amounts included in your offer, we will disable your service for the remainder of that billing month, which includes removing any hosted services that you may have deployed. The data in your storage accounts and databases will be accessible in a read-only manner. At the beginning of the next billing month, your subscription will be re-enabled and you can re-deploy your hosted service(s) and have full access to your storage accounts and databases.

Further information can be found here:

<http://www.microsoft.com/windowsazure/msdn-benefits/>

22. G-Cloud Award Question Cross Reference

The following section provides a cross reference to the Award Questions into respective sections within the service definition.

22.1 Generic Questions

Q-G06	Networks to which the service is connected (directly)?	Internet
Q-G07	'API' access available, documented and supported?	See Windows Azure API
Q-G08	Open Standards supported and documented?	See Windows Azure Platform: An Open and Interoperable Approach
Q-G09	Open source software used and documented?	See Windows Azure Platform: Open Source Usage

22.2 Service Management

Q-G10	Technical boundaries/interfaces of the service documented?	See Windows Azure API
Q-G11	Services available to other suppliers so they can use them to provide services to government ?	See Service Availability to Suppliers
Q-G12	on-boarding process e.g. moving on to the service?	See On-boarding and Off-boarding Processes
Q-G13	off-boarding process e.g. moving off the service?	See On-boarding and Off-boarding Processes
Q-G14	Data extraction/removal criteria met?	See Data extraction/removal:
Q-G15	Data processing and storage locations defined?	See Data Centre Locations
Q-G16	Data location option can be defined by user?	See Data Centre Locations
Q-G17	Data held in Safe Harbour (if applicable)?	See Safe Harbour Framework
Q-G18	Data centre(s) used adhere to best practices described by the EU Code of Conduct for Data Centre Operations?	See Environmental Focus
Q-G19	Data centre tier?	See Data Centre Tier
Q-G20	Support boundaries/interfaces of the service documented?	See Support
Q-G21	Service roadmap provided?	See Futures: Windows Azure Virtual Network (CTP)

Q-G22	Performance attributes defined and documented?	See Service Levels
Q-G23	Backup & Disaster Recovery?	See Backup/restore and Disaster Recovery
Q-G24	Is a support service provided and documented?	See Support
Q-G25	'Real time' management information available?	See Usage Reporting
Q-G26	Reports include each billed unit?	See Usage Reporting
Q-G27	Self service provisioning/de-provisioning?	See On-boarding and Off-boarding Processes
Q-G28	Indicative time for provisioning/de-provisioning documented?	See On-boarding and Off-boarding Processes
Q-G29	3rd party service monitoring tool access?	See 3rd Party Monitoring Access
Q-G30	Service Desk can be used by 3rd party suppliers for their services - e.g. small SaaS provider?	No

22.3 IAAS Questions

Generic

Q-LOT1-1	What IaaS Services do you provide?	Windows Azure Platform
Q-LOT1-2	Elastic/burstable resources defined?	See Windows Azure Resource Model
Q-LOT1-3	Guaranteed/non-guaranteed resources defined?	See Windows Azure Resource Model
Q-LOT1-4	Persistence/non-persistence of storage defined?	See Persistence Model

Compute

Q-LOT1-5	What is the name for the service (if different from response in "About your Services" section)?	Windows Azure Compute Service
Q-LOT1-6	Price for standard compute configuration (or closest fit from suppliers existing offerings)?	See Pricing
Q-LOT1-7	Minimum service unit pricing interval?	See Pricing
Q-LOT1-8	Is the service Public or Private?	Public

Q-LOT1-9	Impact Levels (ILs) at which the service is accredited to process and/or store information (actual or target)?	See Information Assurance
Q-LOT1-10	Has the service been accredited?	See Information Assurance
Q-LOT1-11	Type of Hypervisor that will be in use documented?	See Windows Azure VM Role
Q-LOT1-12	Type of virtual machine images supported documented?	See Windows Azure VM Role
Q-LOT1-13	Customer uploading/downloading of virtual machine images supported?	See Windows Azure VM Role

Storage

Q-LOT1-14	What is the name for the service (if different from response in "About your Services" section)?	Windows Azure Storage Service
Q-LOT1-15	Price for standard storage configuration (or closest fit from suppliers existing offerings)?	See Pricing
Q-LOT1-16	Minimum service unit pricing interval?	See Pricing
Q-LOT1-17	Is the service Public or Private?	Public
Q-LOT1-18	Impact Levels (ILs) at which the service is accredited to process and/or store information (actual or target)?	See Information Assurance
Q-LOT1-19	Has the service been accredited?	See Information Assurance

CDN

Q-LOT1-20	What is the name for the service (if different from response in "About your Services" section)?	Windows Azure Content Delivery Network
Q-LOT1-21	Price for standard CDN configuration (or closest fit from suppliers existing offerings)?	See Pricing
Q-LOT1-22	Minimum service unit pricing interval?	See Pricing
Q-LOT1-23	Is the service Public or Private?	Public

Q-LOT1-24	Impact Levels (ILs) at which the service is accredited to process and/or store information (actual or target)?	See Information Assurance
Q-LOT1-25	Has the service been accredited?	See Information Assurance

22.4 PAAS Questions

Q-LOT2-1	What PaaS Services do you provide?	Windows Azure Platform
Q-LOT2-2	Elastic/burstable resources defined?	See Windows Azure Resource Model
Q-LOT2-3	Guaranteed/non-guaranteed resources defined?	See Windows Azure Resource Model
Q-LOT2-4	Persistence/non-persistence of storage defined?	See Persistence Model
Q-LOT2-5	What is the name for the service (if different from response in "About your Services" section)?	
Q-LOT2-6	Price for most common configuration (i.e. Supplier's best selling or expected best selling configuration)?	See Pricing
Q-LOT2-7	Minimum service unit pricing interval?	See Pricing
Q-LOT2-8	Is the service Public or Private?	Public
Q-LOT2-9	Impact Levels (ILs) at which the service is accredited to process and/or store information (actual or target)?	See Information Assurance
Q-LOT2-10	Has the service been accredited?	See Information Assurance
Q-LOT2-11	Application languages supported (if applicable)?	.NET Languaged (including C#, F#, Visual Basic .NET, and Managed C++), SDK support for Java, PHP and Ruby
Q-LOT2-12	Application libraries that are required to make use of the platform are defined and documented?	See Windows Azure API
Q-LOT2-13	Operating system components offered?	Compute, Storage
Q-LOT2-14	Database components offered?	SQL Azure Database
Q-LOT2-15	Application Server components offered?	Azure Service Bus, Caching, Access Control Service

Q-LOT2-16	Web Server components offered?	Web Role (IIS 7)
Q-LOT2-17	Rules Engine components offered?	None
Q-LOT2-18	Other components offered?	Marketplace
Q-LOT2-19	What is the name for the service (if different from response in "About your Services" section)?	Windows Azure Platform
Q-LOT2-20	Price for most common configuration (i.e. Supplier's best selling or expected best selling configuration)?	See Pricing
Q-LOT2-21	Minimum service unit pricing interval?	See Pricing
Q-LOT2-22	Is the service Public or Private?	Public
Q-LOT2-23	Impact Levels (ILs) at which the service is accredited to process and/or store information (actual or target)?	See Information Assurance
Q-LOT2-24	Has the service been accredited?	See Information Assurance
Q-LOT2-25	Application languages supported (if applicable)?	.NET Languaged (including C#, F#, Visual Basic .NET, and Managed C++), SDK support for Java, PHP and Ruby
Q-LOT2-26	Application libraries that are required to make use of the platform are defined and documented?	See Windows Azure API