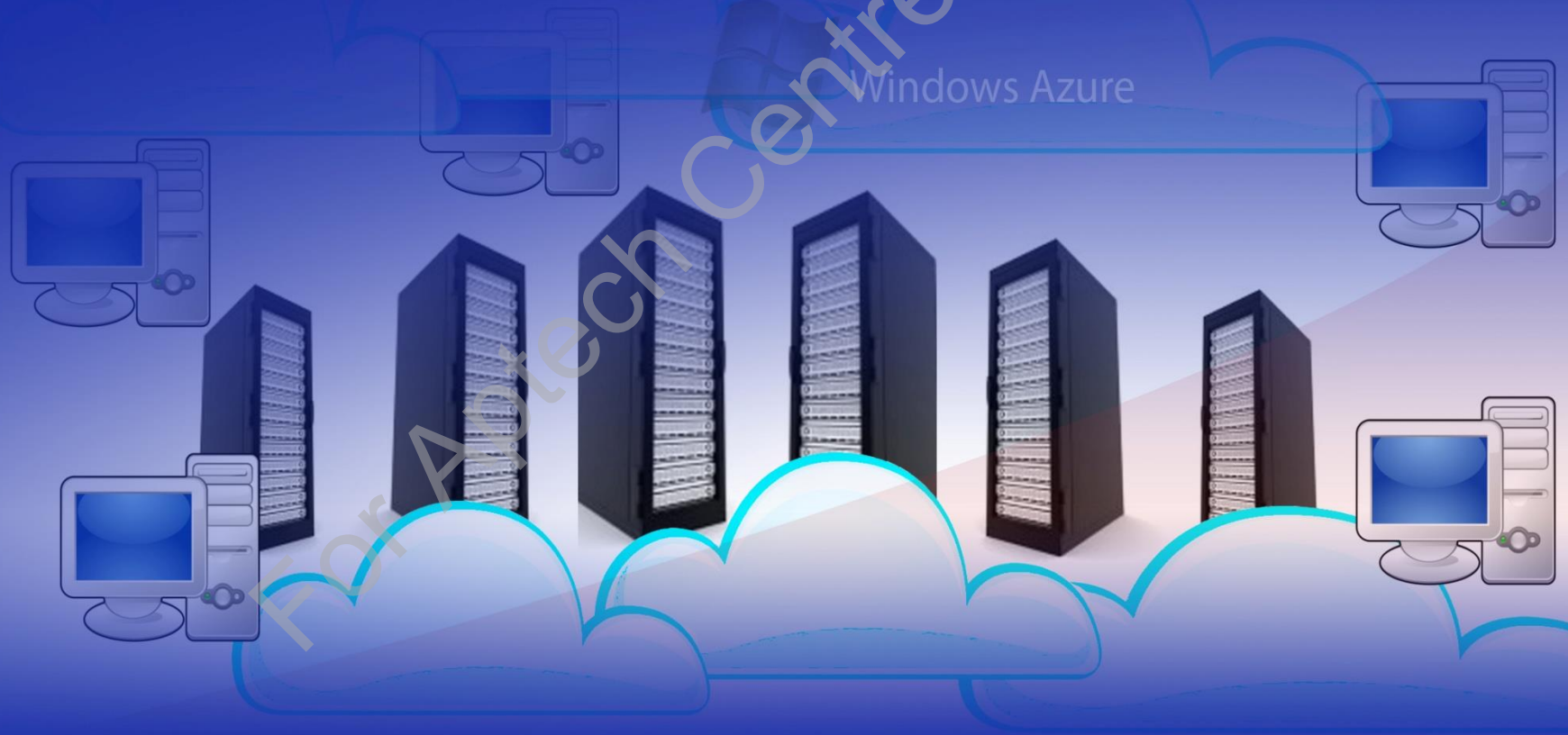
Enterprise Application Development Using Windows Azure and Web Services

Session 7

Windows Azure Storage



Learning Objectives

- Describe the characteristics of Windows Azure Storage
- Understand Azure Storage Services
- Explain how to use storage accounts
- Explain routing requests
- Describe URL patterns

Characteristics of Windows Azure Storage 1-7

- Windows Azure offers a number of characteristics such as:

- Distribution of data and services

- Scalability across multiple systems

- Replication based on primary and secondary locations

- The use of HTTP APIs with RESTful APIs

- To use Windows Azure storage, create a storage account.

Characteristics of Windows Azure Storage 2-7

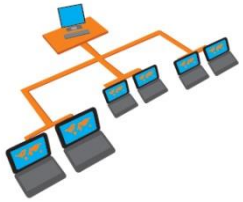
Space Management:

- One of the key characteristics of Windows Azure is space management.
- When a database is configured on a local system, there are space limitations.

However, with Windows Azure, space is not a constraint - the Business Edition Database supports upto 150 GB as the size.	As a customer, a developer only pays for what is being used. In the backend, the data may be distributed across multiple racks, datacenters, and geographical locations. However, to the user in the front-end, the data is fetched and displayed.

Characteristics of Windows Azure Storage 3-7

Distribution:



- Windows Azure:

Uses distributed software techniques to manage the services and its data across a number of systems.

The data is scattered over multiple systems in the backend.

Distributed software techniques are used to manage the services and its data to prevent from failure.

Characteristics of Windows Azure Storage 4-7

Scalability:

- Windows Azure offers unlimited scalability.
- Typically, with the locally hosted applications, when the load increases, the performance of the application goes down.

- However, Windows Azure storage can be configured to offer scalability without impacting the performance.
- Two most common methods are as follows:
  - Using multi-level hot data caching
  - Using multiple copies of the data

Characteristics of Windows Azure Storage 5-7

Replication:

- Reasons for replicating are:

The primary reason for replicating data from one system to another system is to ensure that there is a redundant copy of the data.

The secondary copy of the data is useful when the primary copy of the data becomes unavailable.

Windows Azure storage replicates the data from the primary to the secondary location.

This way, the customer does not have to worry about primary data being unavailable because the secondary data is readily available.

Windows Azure offers a special method for replicating blob and table data. This method is known as Geo-Replication.

Characteristics of Windows Azure Storage 6-7

- Following table shows the primary and their secondary locations:

Primary	Secondary
North Central US	South Central US
South Central US	North Central US
East US	West US
West US	East US
North Europe	West Europe
West Europe	North Europe
South East Asia	East Asia
East Asia	South East Asia

Characteristics of Windows Azure Storage 7-7

HTTP APIs with RESTful APIs:

- HTTP APIs with RESTful APIs are meant to be used when you want to host a number of services in your own datacenters and then use selective services somewhere else, such as Microsoft datacenters.
- The RESTful APIs are supported by a number of languages, such as:

Python | Ruby | Erlang

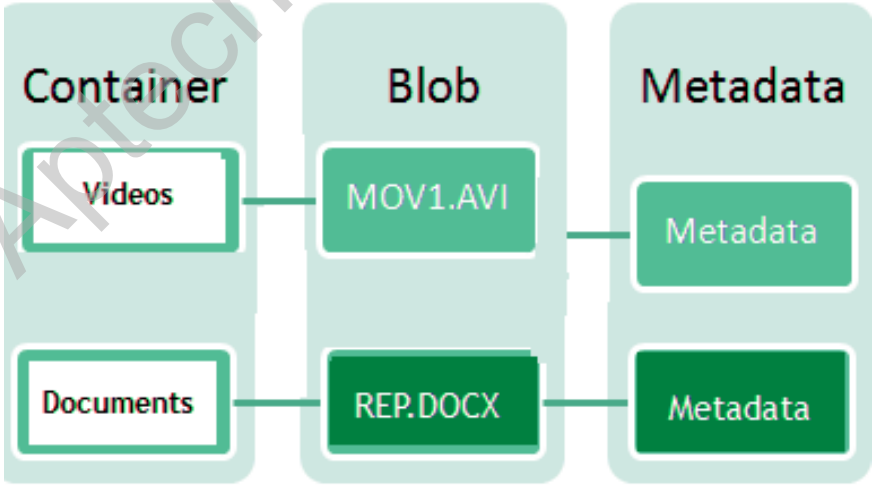
Azure Storage Services 1-7

- Four types of storage in Azure Storage Services are:
  - Blobs
  - Tables
  - Queues
  - Database

Azure Storage Services 2-7

Blob Storage

- Blobs can store a variety of data, such as images, video, and code, which may typically be large in size.
- The data stored in blobs can be structured or unstructured.
- The blobs are stored in a container, which is similar to a directory on a file system.
- A container can hold a large number of blobs.
- A container is mainly used for creating the security boundaries for blob and blob storage.



Azure Storage Services 3-7

Blob Storage

There are two ways in a blob can be accessed:

1) Using the container name in the URL. An example of this method of blob is as follows:

```
http(s):// <client-account-
name>.blob.core.windows.net/<container>/<blob name>
```

2) Referencing the root container in the blob URL. An example of this method of blob is as follows:

```
http://<client-account-name>.blob.core.windows.net/$root/<blob
name>
```

Azure Storage Services 4-7

Blob Storage

Two types of blobs are:

Block blob

Each blob is capable of storing upto 200 GB of data and is divided into blocks that can be up to 4 MB in size.

These types of blobs are used for streaming workloads.

Page blob

Each blob can have maximum size of 1 TB.

These types of blobs are optimized for random access read/write input/output operations.

It is important to note that the blobs can be managed through REST API. A developer can create, update, or delete blobs using the REST API.

Azure Storage Services 5-7

Table Storage

Table storage in Windows Azure is used for storing structured data.

In Windows Azure, tables are linked with a specific storage account that work with entities.

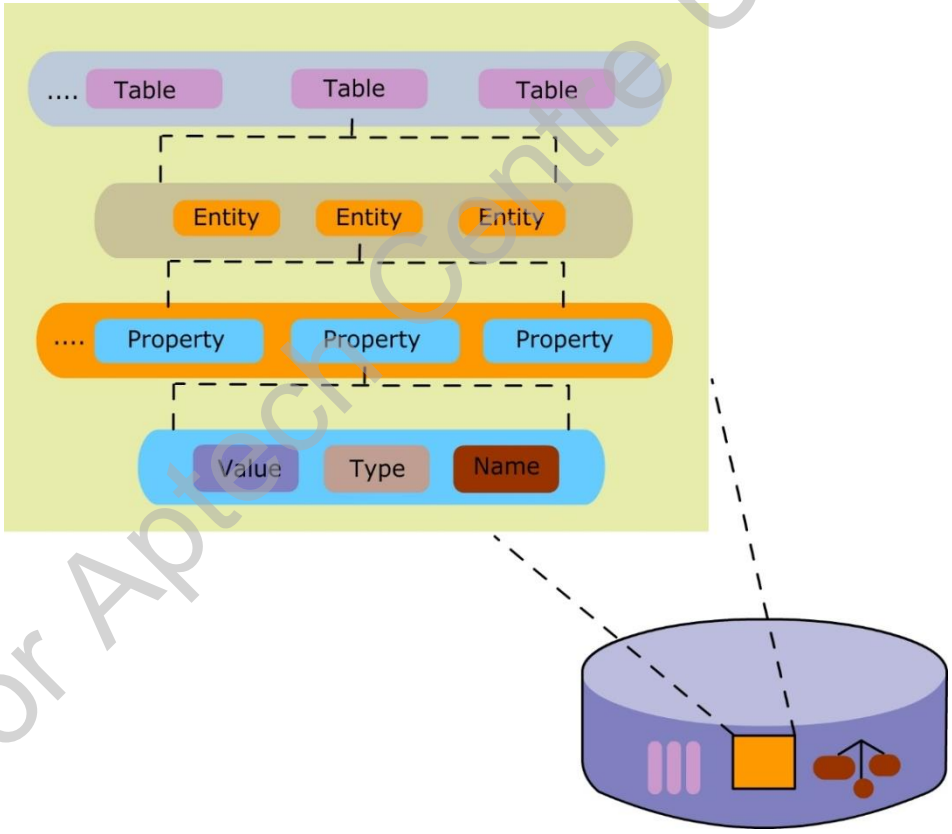
Each entity in a table in Windows Azure has three key properties:

PartitionKey	RowKey	LastUpdate
• This is used for physically partitioning the data. The PartitionKey is also used for ensuring the related entities are always bound together.	• When combined with PartitionKey, it is used for uniquely identifying the entities in a table.	• This is a system-controlled property.

Azure Storage Services 6-7

Table Storage

Following figure shows the relationship between table, entities, and properties:



Azure Storage Services 7-7

Queues

- Queues in Windows Azure are mainly used for:
  - Notifications and task scheduling
  - Persistent asynchronous messaging
  - Each generated message can be maximum of 8 KB in size
  - REST API

- A developer can access and manage queues through the Internet.

Using a Storage Account 1-11

- Before beginning with a Windows Azure application, the developer must complete two tasks:

Create a storage account (optional, if no data needs to be stored)

Create a Windows Azure account

- To be able to store data and files in the Blob, Table, and Queue services, the developer must create a storage account.
- Depending upon where the data needs to be stored, the developer must create the storage account in that specific geographic region.

Using a Storage Account 2-11

Setting Up a Storage Account:

- Following steps are used to set up a storage account:

Step 1

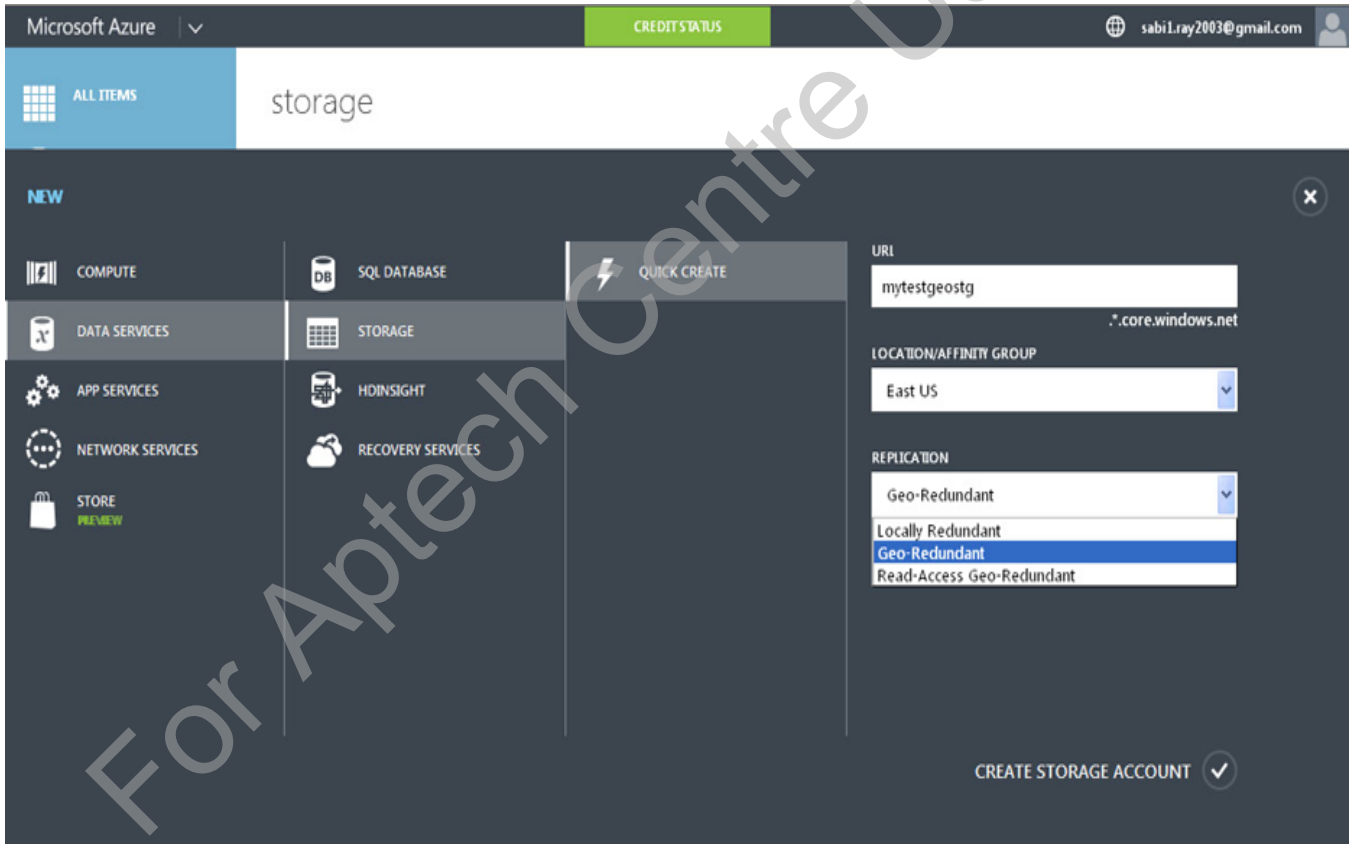
- Log on to the Windows Azure account, which can be done through the Management Portal.

Step 2

- After a successful log on, click **New**, **Storage**, and then click **Quick Create**.

Using a Storage Account 3-11

- Following figure shows the **Windows Azure Storage Account Creation** page:



Using a Storage Account 4-11

Queue Storage

Step 3

- In the right column, note that there are three fields in which the data needs to be populated. In the **URL** field, enter a name for the subdomain. This defined subdomain name is used as the storage account URL.

Step 4

- In the **Location/Affinity Group** field, select either a region or an affinity group. Depending upon the requirement for storage, the developer may choose to select either of them.

Step 5

- If there is more than one subscription, the developer needs to select the appropriate subscription to which the storage account needs to be linked with.

Step 6

- In the **Replication** field, select level of replication for the storage account. By default, replication is configured to be **Geo-Redundant**.

Using a Storage Account 5-11

Queue Storage

Step 7

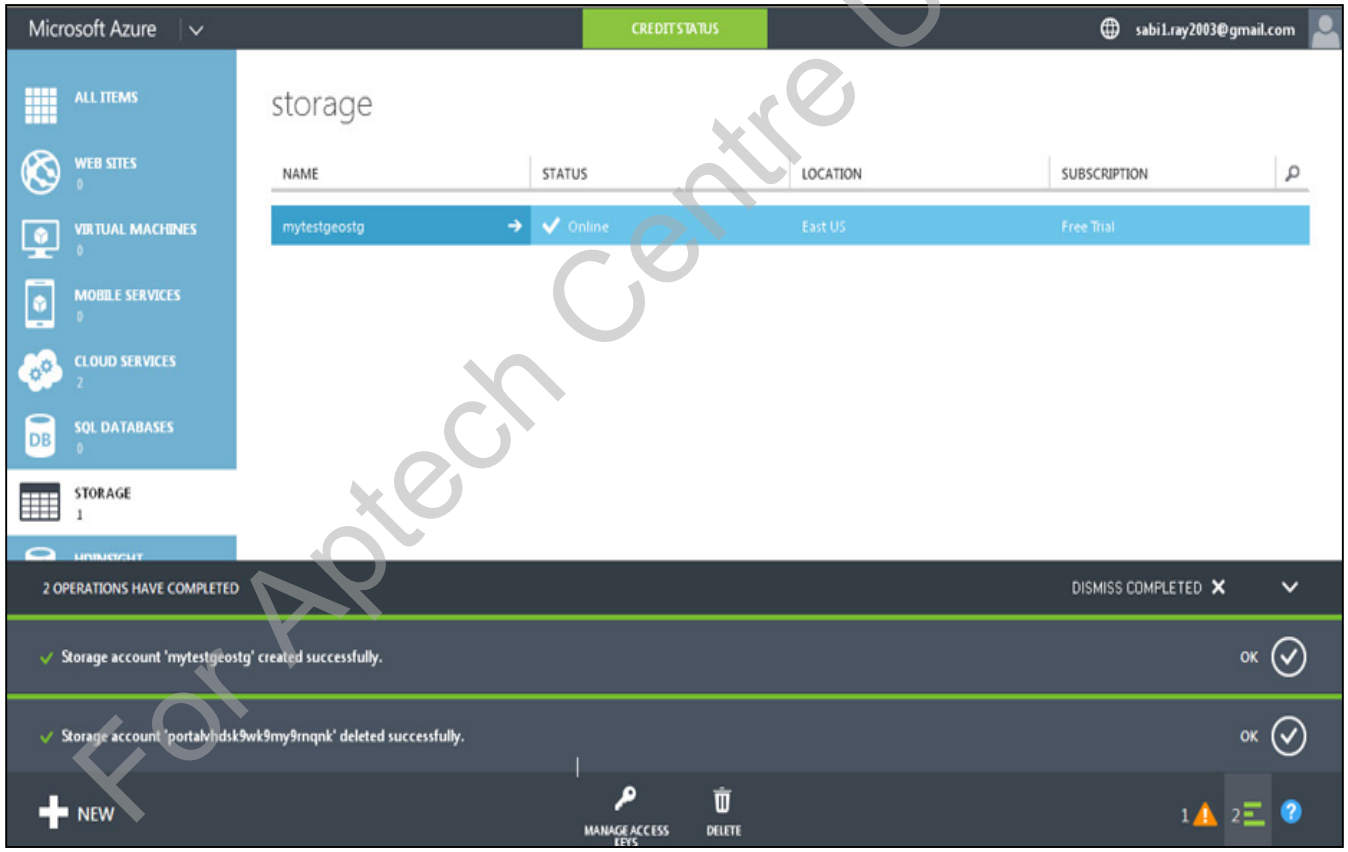
- Click **Create Storage Account** to create the storage account for the subscription.

Step 8

- After the storage account is created, the new storage account is listed on the **Management Portal** with the **Online** status.

Using a Storage Account 6-11

- Following figure shows the **Windows Azure Storage Account Listing** page:



Using a Storage Account 7-11

Selecting the Geographical Location:

- When creating a storage account, a developer can choose:
  - The geographical location where the customers are located. For example, if the customer is located in an Asian country, then the developer should opt for selecting **Anywhere in Asia or Southeast Asia** depending on the location of the customer in the Asian region.
  - A specific geographical location is the compliance with the regulatory requirements.

Using a Storage Account 8-11

Following table shows the list of geographical locations. Each geographical location is shown with the Geo and Region:

GEO	REGION
United States	US East (Virginia)
	US West (California)
	US North Central (Illinois)
	US South Central (Texas)
Europe	Europe North (Ireland)
	Europe West (Netherlands)
Asia Pacific	Asia Pacific East (Hong Kong)
	Asia Pacific Southeast (Singapore)
Japan	Japan East (Saitama Prefecture)
	Japan West (Osaka Prefecture)

Using a Storage Account 9-11

Selecting Affinity Group:

When a developer creates a service and places it one location and then the storage account in another location, there is a high possibility of increased cost and latency.

When the developer chooses to put both of them in the same location, there is no guarantee that service and storage account will still be together even within a single datacenter.

To tie them together in something like a container or cluster, it is better to put them in an affinity group, which ensures both these elements are always together.

- With the use of affinity group, you can ensure increased performance with reduced latency and cost.

Using a Storage Account 10-11

Pricing Model:

- Windows Azure pricing depends on the following:

Storage capacity	• Total amount of storage consumed
Storage transactions	• Number of read/write operations performed on storage
Data transfer	• Data transferred out from the Windows Azure datacenters

Using a Storage Account 11-11

- The pricing is available in two different models:

Pay-as-you-go Plans	6 or 12-month Plans
• Total amount of storage consumed	• Number of read/write operations performed on storage

- For both the pricing models, the pricing is available per region and currency. The developer can choose a specific region and then a specific currency from the available options.

Summary 1-2

- Windows Azure offers a number of characteristics, such as space management, distribution of data, scalability across multiple systems, and replication of data across primary and secondary locations.
- There are four types of Windows Azure Storage Services, namely, blobs, tables, queues, and databases.
- Blobs can store a variety of data, such as images, video, documents, and code, which may typically be large in size.
- The table storage in Windows Azure is used for storing the structured data.

Summary 2-2

- The queues in Windows Azure are mainly used for notifications and task scheduling.
- Windows Azure can utilize a database storage, which is Microsoft SQL Server running in a cloud.
- A Windows Azure application developer needs to have access to the Windows Azure.
- Windows Azure pricing depends upon Storage capacity, Storage transactions, and Data transfer.