

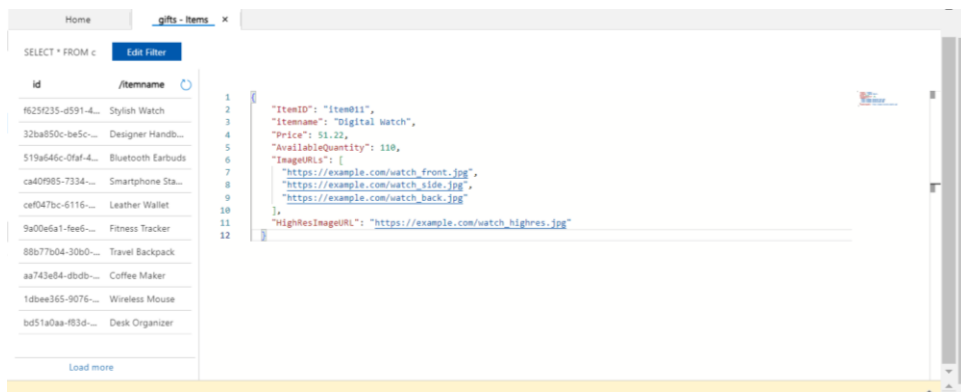
IT457 Cloud Computing

Lab 4: Cosmos DB and ASP.NET.

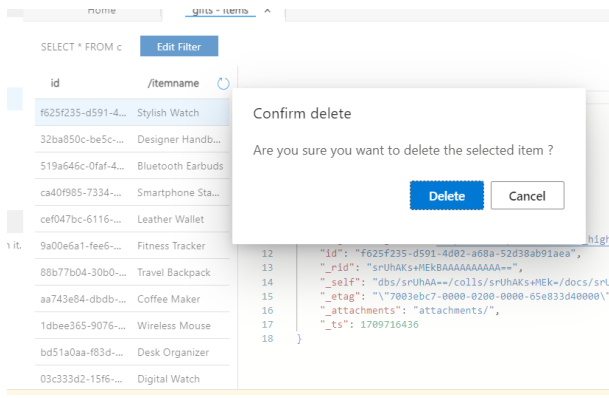
Akshar Panchani (ID - 202101522)

Question – 1

Inserting Item and inserted list: -



Deleting item and deleted items: -



Updating item: -

SELECT FROM

Smartphones

id	/itemname
32ba850c-be5c-4716-b1...	Designer Handbag
519a646c-0faf-47ad-bb...	Bluetooth Earbuds
ca40f985-7334-4690-87...	Smartphone Stand
cef047bc-6116-4fda-a68...	Leather Wallet
9a00e6a1-fee6-4794-86...	Fitness Tracker
88b77b04-30b0-43a7-b...	Travel Backpack
aa743e84-dbdb-4b85-a...	Coffee Maker
1dbee365-9076-4fd0-93...	Wireless Mouse
bd51a0aa-f83d-4f71-82...	Desk Organizer
03c333d2-15f6-4c73-a1...	Digital Watch

Load more

```

1 {
2   "ItemID": "item004",
3   "itemname": "Smartphone Stand",
4   "Price": 15.99,
5   "AvailableQuantity": 100,
6   "ImageURLs": [
7     "https://example.com/stand_front.jpg",
8     "https://example.com/stand_side.jpg",
9     "https://example.com/stand_back.jpg"
10  ],
11  "HighResImageURL": "https://example.com/stand_highres.jpg",
12  "id": "ca40f985-7334-4690-87ed-d5e07d05ee81",
13  "_rid": "srUuAKs+MEKEAAAAAAAAA==",
14  "_self": "dbs/srUuAA==/colls/srUuAKs+MEK=/docs/srUuAKs+MEKEAAAAAAAAA/",
15  "_etag": "\"700309c8-0000-0200-0000-65e837c80000\"",
16  "_attachments": "attachments/",
17  "_ts": 1709717448
18 }

```

Query Execution: -

Results

Query Stats

1 - 10

```

{
  {
    "itemname": "Designer Handbag"
  },
  {
    "itemname": "Bluetooth Earbuds"
  },
  {
    "itemname": "Smartphone Stand"
  },
  {
    "itemname": "Leather Wallet"
  },
  {

```

Items uploaded in modules container:

Home
modules - lte... x

SELECT * FROM c
Edit Filter

id	/ModuleName
08c9a843-9c77-46d4-a17f-a...	Introduction to Company Cul...
2730c023-e252-438d-ac24-3...	Employee Handbook
49d55371-e1d6-4f78-98de-1...	Effective Communication Skills
0058c04b-6a0f-4294-a1b4-e...	Cybersecurity Basics
84341f7d-6726-4bcb-b5e4-1...	Project Management Principl...
afcbcf3a-67f1-48a9-8c22-d8...	Time Management Techniques
e36cff4b-42ab-4750-b029-2...	Diversity and Inclusion Traini...
ae3cefe-6fcf-4bc8-929e-bb...	Leadership Essentials
bcad6ceb-4074-4fdb-b15a-a...	Team Collaboration Strategies
efd725e-ee31-4e54-9fb1-d3...	Health and Safety Guidelines

Load more

```

1
2
3
4
5
6
7
8
9
10
11
12
13
{
  "ModuleID": "module001",
  "ModuleName": "Introduction to Company Culture",
  "ModuleType": "Video",
  "Status": "Not Covered",
  "ContentURL": "https://example.com/intro_video.mp4",
  "id": "08c9a843-9c77-46d4-a17f-a01c930824e5",
  "_rid": "woH+ALD2hrcBAAAAAAAAA==",
  "_self": "dbs/woH+AA=/colls/woH+ALD2hrc+/docs/woH+ALD2hrcBAAA",
  "_etag": "\"fe013c93-0000-0200-0000-65e844130000\"",
  "_attachments": "attachments/",
  "_ts": 1709720595
}

```

Inserting Item and inserted item: -

Home
modules - lte... x

SELECT * FROM c
Edit Filter

id	/ModuleName
08c9a843-9c77-46d4-a17f-a...	Introduction to Company Cul...
2730c023-e252-438d-ac24-3...	Employee Handbook
49d55371-e1d6-4f78-98de-1...	Effective Communication Skills
0058c04b-6a0f-4294-a1b4-e...	Cybersecurity Basics
84341f7d-6726-4bcb-b5e4-1...	Project Management Principl...
afcbcf3a-67f1-48a9-8c22-d8...	Time Management Techniques
e36cff4b-42ab-4750-b029-2...	Diversity and Inclusion Traini...
ae3cefe-6fcf-4bc8-929e-bb...	Leadership Essentials
bcad6ceb-4074-4fdb-b15a-a...	Team Collaboration Strategies
efd725e-ee31-4e54-9fb1-d3...	Health and Safety Guidelines

Load more

```

1
2
3
4
5
6
7
{
  "ModuleID": "module011",
  "ModuleName": "Company Values",
  "ModuleType": "Video",
  "Status": "Not Covered",
  "ContentURL": "https://example.com/intro_video2.mp4"
}

```

Item deleted and Updating item: -

Home
modules - lte... x

SELECT * FROM c
Edit Filter

id	/ModuleName
2730c023-e252-438d-ac24-3...	Employee Handbook
49d55371-e1d6-4f78-98de-1...	Effective Communication Skills
0058c04b-6a0f-4294-a1b4-e...	Cybersecurity Basics
84341f7d-6726-4bcb-b5e4-1...	Project Management Principles
afcbcf3a-67f1-48a9-8c22-d82...	Time Management Techniques
e36cff4b-42ab-4750-b029-2d...	Diversity and Inclusion Training
ae3cefe-6fcf-4bc8-929e-bb...	Leadership Essentials
bcad6ceb-4074-4fdb-b15a-a...	Team Collaboration Strategies
efd725e-ee31-4e54-9fb1-d3...	Health and Safety Guidelines
8990f833-9d24-4c04-a212-5...	Company Values

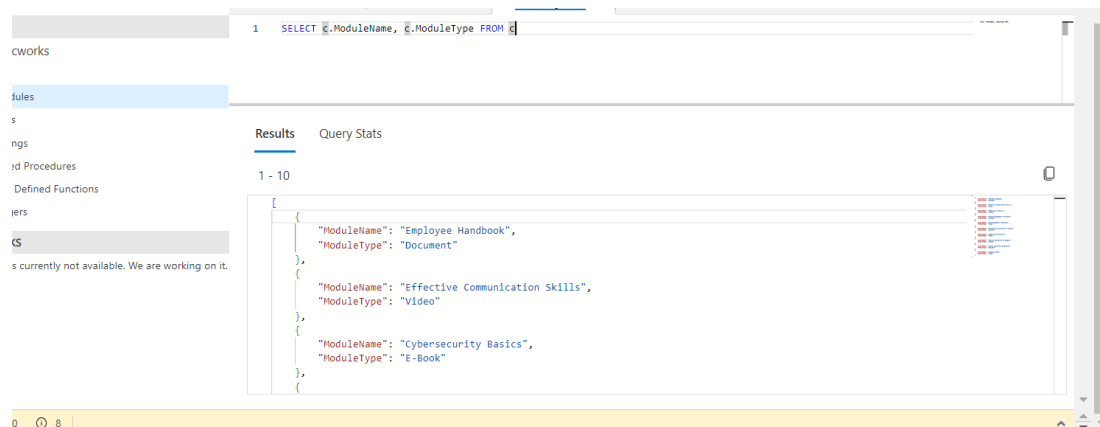
c023-e252-438d-ac24-322160fcf6d4

```

1
2
3
4
5
6
7
8
9
10
11
12
13
{
  "ModuleID": "module002",
  "ModuleName": "Employee Handbook",
  "ModuleType": "Document",
  "Status": "Covered",
  "ContentURL": "https://example.com/employee_handbook.pdf",
  "id": "2730c023-e252-438d-ac24-322160fcf6d4",
  "_rid": "woH+ALD2hrcCAAAAAAAAAA==",
  "_self": "dbs/woH+AA=/colls/woH+ALD2hrc+/docs/woH+ALD2hrcCAA",
  "_etag": "\"fed199af-0000-0200-0000-65e844f30000\"",
  "_attachments": "attachments/",
  "_ts": 1709720819
}

```

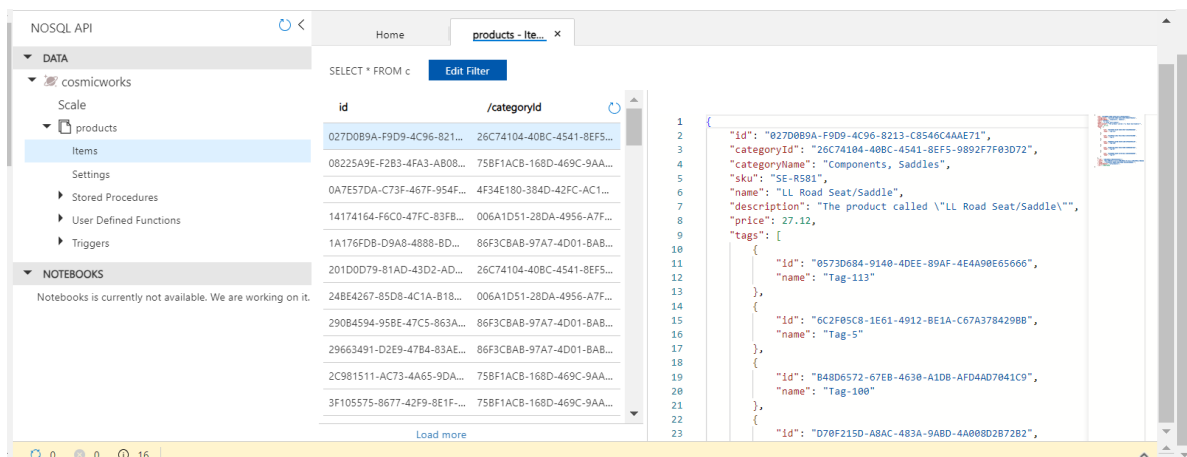
Query Execution: -



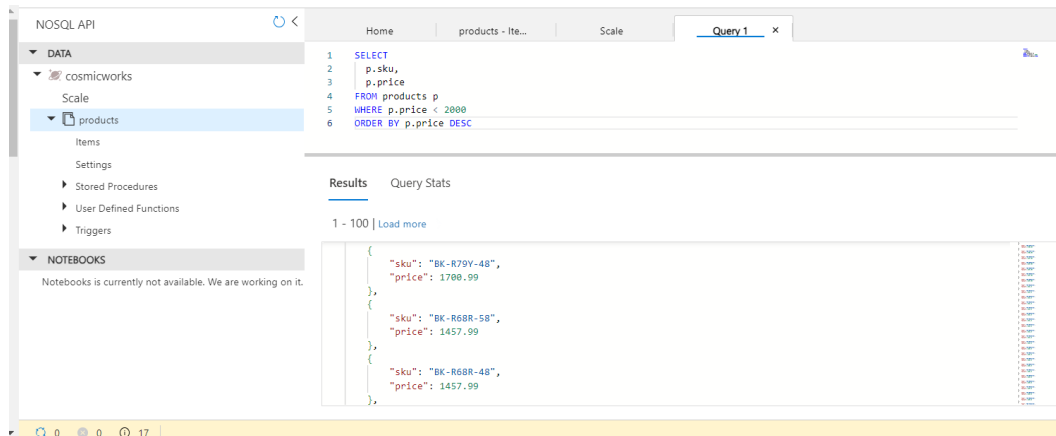
Question - 2

Develop an ASP.NET web application with Azure Cosmos DB for NoSQL

Data Population: -



Query Executions: -



Building and running application:-

```

E:\Acads\Sem 6\IT457 Cloud Computing\Labs\Lab4\Code>dotnet new cosmosdbnosql-webapp
The template "Azure Cosmos DB for NoSQL Tutorial - ASP.NET project template" was created successfully.

E:\Acads\Sem 6\IT457 Cloud Computing\Labs\Lab4\Code>dotnet run
info: Microsoft.AspNetCore.DataProtection.KeyManagement.XmlKeyManager[63]
      User profile is available. Using 'C:\Users\Akshar2\AppData\Local\ASP.NET\DataProtection-Keys' as key
Windows DPAPI to encrypt keys at rest.
info: Microsoft.AspNetCore.DataProtection.KeyManagement.XmlKeyManager[58]
      Creating key {9e3dcb9c-e30d-4a82-88dd-b25648d2b7b1} with creation date 2024-03-02 11:14:08Z, activati
0-02 11:14:08Z, and expiration date 2024-05-31 11:14:08Z.
info: Microsoft.AspNetCore.DataProtection.Repositories.FileSystemXmlRepository[39]
      Writing data to file 'C:\Users\Akshar2\AppData\Local\ASP.NET\DataProtection-Keys\key-9e3dcb9c-e30d-4a
12b7b1.xml'.
info: Microsoft.Hosting.Lifetime[14]
      Now listening on: http://localhost:5000
info: Microsoft.Hosting.Lifetime[14]
      Now listening on: https://localhost:5001
info: Microsoft.Hosting.Lifetime[0]
      Application started. Press Ctrl+C to shut down.
info: Microsoft.Hosting.Lifetime[0]
      Hosting environment: Production
info: Microsoft.Hosting.Lifetime[0]
      Content root path: E:\Acads\Sem 6\IT457 Cloud Computing\Labs\Lab4\Code\
  
```

Adding code and running the application: -

```

7 public class CosmosService : ICosmosService
10 public CosmosService()
11 {
12     _client = new CosmosClient(
13         connectionString: "AccountEndpoint=https://storage1.documents.azure.com:443/;AccountKey=30
14     );
15 }
16 2 references
17 private Container _container
18 {
19     get => _client.GetDatabase("cosmicworks").GetContainer("products");
20 }
21 2 references
22 public async Task<IEnumerable<Product>> RetrieveAllProductsAsync()
23 {
24     var queryable = _container.GetItemQueryQueryable<Product>();
25     using FeedIterator<Product> feed = queryable
26         .Where(p => p.price < 2000m)
27         .OrderByDescending(p => p.price)
28         .ToFeedIterator();
29     List<Product> results = new();
30     while (feed.HasMoreResults)
31     {
32         var response = await feed.ReadNextAsync();
33         foreach (Product item in response)
34         {
35             results.Add(item);
36         }
37     }
38     return results;
39 }

```

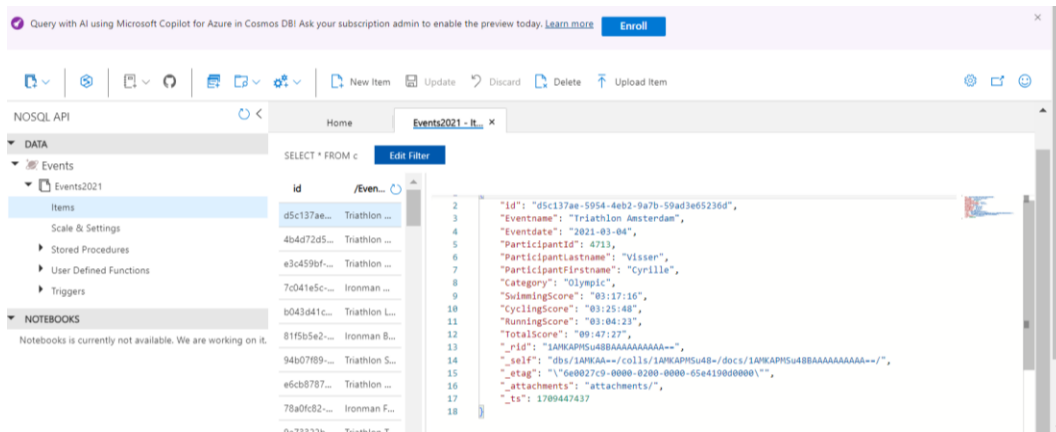
PROBLEMS DEBUG CONSOLE OUTPUT TERMINAL PORTS AZURE
 Executed an implicit handler method, returned result Microsoft.AspNetCore.Mvc.RazorPages.PageResult.
 info: Microsoft.AspNetCore.Mvc.RazorPages.Infrastructure.PageActionInvoker[4]
 Executed page /Index in 1506.6176ms
 info: Microsoft.AspNetCore.Routing.EndpointMiddleware[1]
 info: Microsoft.AspNetCore.Hosting.Diagnostics[2]
 Request finished HTTP/1.1 GET http://localhost:5000/ - - - 200 - text/html; charset=utf-8 1507.2470ms
 info: Microsoft.AspNetCore.Hosting.Diagnostics[1]
 Request starting HTTP/1.1 GET http://localhost:5000/favicon.ico - -
 info: Microsoft.AspNetCore.StaticFiles.StaticFileMiddleware[6]
 The file /favicon.ico was not modified
 nm

Updated list of products from the Azure Cosmos DB database with prices descending

Legend					
Standard price					
High price [> ₹ 1,000.00]					
Low price [< ₹ 100.00]					
ID	Name	SKU	Category	Description	Price
C461038A-6DB6-4EC7-924F-ECA906259A6E	Road-350-W Yellow, 42	BK-R79Y-42	Bikes, Road Bikes	The product called "Road-350-W Yellow, 42"	₹ 1,700.99
9E5C74FD-F685-45AE-A799-D67EFB5C28A1	Road-350-W Yellow, 40	BK-R79Y-40	Bikes, Road Bikes	The product called "Road-350-W Yellow, 40"	₹ 1,700.99
4F9FC42A-F43F-4C13-92FC-ADF701F48C36	Road-350-W Yellow, 44	BK-R79Y-44	Bikes, Road Bikes	The product called "Road-350-W Yellow, 44"	₹ 1,700.99
063F1A00-8CA1-4DB9-8298-BEAC4B8CC238	Road-350-W Yellow, 48	BK-R79Y-48	Bikes, Road Bikes	The product called "Road-350-W Yellow, 48"	₹ 1,700.99
F1AA8B6D-4CF2-4DB2-BB17-997C2BD1A6AC	Road-450 Red, 58	BK-R68R-58	Bikes, Road Bikes	The product called "Road-450 Red, 58"	₹ 1,457.99
E2FD2420-B084-4764-8BC4-94574DFF1AC6	Road-450 Red, 48	BK-R68R-48	Bikes, Road Bikes	The product called "Road-450 Red, 48"	₹ 1,457.99
D616598D-3159-4616-BF9D-5022C6F57321	Road-450 Red, 60	BK-R68R-60	Bikes, Road Bikes	The product called "Road-450 Red, 60"	₹ 1,457.99

Azure Cosmos DB – end to end example:

Storage account, database, container, and items: -



Executing query: -

Home	Query 1
1 SELECT * FROM c	
2 WHERE c.Eventname = 'Triathlon Amsterdam'	
3 ORDER BY c.TotalScore asc	

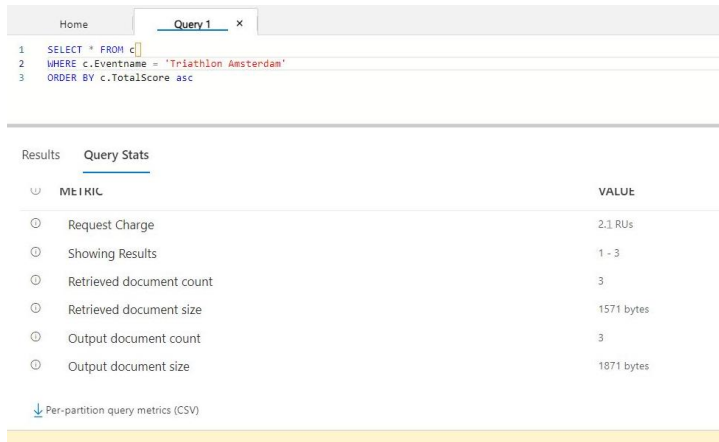
Results	Query Stats
Metrics	VALUE
Request Charge	2.9 RUs
Showing Results	1 - 3
Retrieved document count	3
Retrieved document size	1571 bytes
Output document count	3
Output document size	1871 bytes

Per-partition query metrics (CSV)

New indexing policy: -

Scale	Settings	Indexing Policy	Partition Keys
1	{		
2	"indexingMode": "consistent",		
3	"automatic": true,		
4	"includedPaths": [
5	{		
6	"path": "/Eventname/?"		
7	},		
8	{		
9	"path": "/Eventdate/?"		
10	},		
11	{		
12	"path": "/ParticipantId/?"		
13	},		
14	{		
15	"path": "/TotalScore/?"		
16	}		
17],		
18	"excludedPaths": [

Optimized querying: -



The screenshot shows the Azure Cosmos DB Query Studio interface. At the top, there's a tab labeled 'Query 1'. Below it, a SQL query is displayed:

```
1 SELECT * FROM c
2 WHERE c.Eventname = 'Triathlon Amsterdam'
3 ORDER BY c.TotalScore asc
```

Below the query, there's a section for 'Query Stats' with a table of metrics:

METRIC	VALUE
Request Charge	2.1 RU/s
Showing Results	1 - 3
Retrieved document count	3
Retrieved document size	1571 bytes
Output document count	3
Output document size	1871 bytes

At the bottom, there's a link to 'Per-partition query metrics (CSV)'.

Azure Cosmos DB for Table for .NET

Creating Cosmos DB account using Azure PowerShell:

```
PS /home/akshar2 > # Variable for resource group name
PS /home/akshar2 > $RESOURCE_GROUP_NAME = "msdocs-cosmos-quickstart-rg"
PS /home/akshar2 > $LOCATION = "West US"
PS /home/akshar2 >
PS /home/akshar2 > # Variable for account name with a randomly generated suffix
PS /home/akshar2 > $SUFFIX = Get-Random
PS /home/akshar2 > $ACCOUNT_NAME = "msdocs-$SUFFIX"
PS /home/akshar2 > $parameters = @{
>>     Name = $RESOURCE_GROUP_NAME
>>     Location = $LOCATION
>> }
PS /home/akshar2 > New-AzResourceGroup @parameters

ResourceGroupName : msdocs-cosmos-quickstart-rg
Location           : westus
ProvisioningState  : Succeeded
Tags               :
ResourceId         : /subscriptions/97e43b90-2dab-44c3-a90a-fa73529dceac/resourceGroups/msdocs-cosmos-quickstart-rg
```



```

PS /home/akshar2> New-AzCosmosDBAccount @parameters

Id                : /subscriptions/97e43b90-2dab-44c3-a90a-fa73529dceac/resourceGroups/msdocs-cosmos-quickstart-rg/providers/Microsoft.DocumentDB
Name              : msdocs-1162849875
Location          : West US
Tags              : {}
EnableCassandraConnector : 
EnableMultipleWriteLocations : False
VirtualNetworkRules : {}
FailoverPolicies   : {msdocs-1162849875-westus}
Locations          : {msdocs-1162849875-westus}
ReadLocations      : {msdocs-1162849875-westus}
WriteLocations     : {msdocs-1162849875-westus}
Capabilities       : {EnableTable}
ConsistencyPolicy   : Microsoft.Azure.Management.CosmosDB.Models.ConsistencyPolicy
EnableAutomaticFailover : False
IsVirtualNetworkFilterEnabled : False
IpRules            : {}
DatabaseAccountOfferType : Standard
DocumentEndpoint    : https://msdocs-1162849875.documents.azure.com:443/
ProvisioningState    : Succeeded
Kind                : GlobalDocumentDB
ConnectorOffer      : 
DisableKeyBasedMetadataWriteAccess : False
PublicNetworkAccess : Enabled
KeyVaultKeyUri      : 
PrivateEndpointConnections : 
EnableFreeTier      : False
ApiProperties        : Microsoft.Azure.Commands.CosmosDB.Models.PSApiProperties
EnableAnalyticalStorage : False
EnableBurstCapacity : False

```

Getting document endpoints: -

```

PS /home/akshar2> $parameters = @{
>> ResourceGroupName = $RESOURCE_GROUP_NAME
>> Name = $ACCOUNT_NAME
>> Type = "ConnectionStrings"
>> }
PS /home/akshar2> Get-AzCosmosDBAccountKey @parameters | Select-Object -Property "Primary Table Connection String"

Primary Table Connection String
-----
DefaultEndpointsProtocol=https;AccountName=msdocs-1162849875;AccountKey=rCsCkdV8P0j3k8MfQh8qMjMAOXqM1Dd8Kx5qpsIu6JpuM45QwMZEhRAh6MwehoGNIj

```

Code: -

```

var product = await tableClient.GetEntityAsync<Product>(
    rowKey: "68719518388",
    partitionKey: "gear-surf-surfboards"
);
Console.WriteLine("Single product:");
Console.WriteLine(product.Value.Name);

// Read multiple items from container
var prod2 = new Product()
{
    RowKey = "68719518390",
    PartitionKey = "gear-surf-surfboards",
    Name = "Sand Surfboard",
    Quantity = 5,
    Sale = false
};

await tableClient.AddEntityAsync<Product>(prod2);

var products = tableClient.Query<Product>(x => x.PartitionKey == "gear-surf-surfboards");

Console.WriteLine("Multiple products:");
foreach (var item in products)
{
    Console.WriteLine(item.Name);
}

```

Output: -

```

PS E:\Acads\Sem 6\IT457 Cloud Computing\Labs\Lab4\Code\myApp> dotnet run
Single product:
Ocean Surfboard
Multiple products:
Ocean Surfboard
Sand Surfboard

```

Output on Azure portal: -

ta Explorer ☆ ...

Query Text Run Query Add Entity Edit Entity Delete Entities

Home Entities x

Action	And/Or	Field	Type	Operator	Value
+ ×	<input type="checkbox"/>	PartitionKey	String	=	gear-surf-surfboards
+ ×	<input type="checkbox"/> And	RowKey	String	=	68719518388

+ Add new clause

Advanced Options

ng on it.

PartitionKey	RowKey	Timestamp	Name	Quantity	Sale
gear-surf-surfboards	68719518388	Sun, 03 Mar 2024 09:06:17 GMT	Ocean Surfboard	8	true
gear-surf-surfboards	68719518390	Sun, 03 Mar 2024 09:06:18 GMT	Sand Surfboard	5	false

