

# CLDV6212

PoE

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## Part A: List the Azure Components utilised thus far

Component	Technology Choice	Hosting Model
Azure SQL Database	Data Storage	PAAS
HTTP Trigger (Azure Functions)	Compute	PAAS
Queue Trigger (Azure Functions)	Compute	PAAS
Azure Queue Storage	Data Storage	PAAS

## Part B: Motivation for needed change

There are many factors to consider when changing an Azure SQL Database to an Azure Table Storage such the data model, scalability, the performance, the cost, and the features. below is a summary of some of the reasons why I would change the component to an Azure Table Storage:

1. **Cost-effectiveness:** Azure Table Storage is cheaper than using Azure SQL Database. Azure Table Storage is a more cost-effective solution for storing large amounts of data. (Rwakatungu, 2011)
2. **Data model:** Azure storage table is a wide column store that stores data in key-value pairs without any schema or relations. Azure SQL database is a relational DBMS that stores data in tables with predefined schema and supports relations, indexes, constraints. (DB-Engines, unknown)
3. **Scalability:** Azure storage table can scale up to 100 TB of data and handle large volumes of semi-structured or unstructured data. Azure SQL database has a limit of 150 GB for the business edition and 5 GB for the web edition and is more suitable for structured data. (Patel, 2021)
4. **Performance:** Azure storage table can provide faster access to data if the queries are simple and based on the partition key or row key. Azure SQL database can provide more complex queries and transactions using SQL but may have higher latency and lower throughput. (DB-Engines, unknown)
5. **Cost:** Azure storage table is cheaper than Azure SQL database for storing large amounts of data. Azure storage table charges based on the amount of data stored, the number of transactions, and the bandwidth used. Azure SQL database charges based on the database size, the number of databases, and the service tier. (DB-Engines, unknown)
6. **Features:** Azure storage table supports features such as geo-replication, optimistic concurrency, and RESTful API. Azure SQL database supports features such as Transact-SQL, triggers, foreign keys, ACID transactions, and server-side scripts. (Patel, 2021)

In conclusion, the choice between Azure storage table and Azure SQL database depends on the type and size of data, the query and transaction requirements, the budget and the desired features. Azure storage table is better for storing large volumes of non-relational data that can be accessed quickly and cheaply, which meets the primary requirement of Aweh Productions.

## Part C: Implement necessary change to Part 2

Screenshot of the function code:

```
using System;
using System.Globalization;
using System.Security.Cryptography;
using System.Text;
using System.Threading.Tasks;
using Microsoft.Azure.Cosmos.Table;
using Microsoft.Azure.Storage.Blob.Protocol;
using Microsoft.Azure.WebJobs;
using Microsoft.Azure.WebJobs.Host;
using Microsoft.Extensions.Logging;

namespace ST10108243_AwehProd_QueueTriggerUpdated
{
    public class Function1
    {
        [FunctionName("TableStorage")]
        public async Task Run([QueueTrigger("vaccination-queue", Connection =
"CONNECTION_STRING")] string myQueueItem,
        [Table ("Message", Connection = "CONNECTION_STRING")] CloudTable
cloudTable, ILogger log)
        {
            try
            {
                string sEncodeMessage =
Convert.ToBase64String(Encoding.UTF8.GetBytes(myQueueItem));
                // encodes the message to a 64 byte.
                // the line of code was taken and adapted from StackOverflow.
                // https://stackoverflow.com/questions/11743160/how-do-i-encode-and-
decode-a-base64-string
                // Zegeist
                // https://stackoverflow.com/users/2649698/zegeist

                string[] messageParts =
Encoding.UTF8.GetString(Convert.FromBase64String(sEncodeMessage)).Split(':');
                // seperates the string when ever there is a ':'.
                // the line of code above was taken and adapted from Microsoft
Documentenets.
                // https://learn.microsoft.com/en-
us/dotnet/api/system.convert.frombase64string?view=net-7.0

                //assumptions
```

```

//if else first element is 13 or 10 then it first format else its the second format
string sID = "";
string sCenter = "";
string sVaccination_Date = "";
string sSerial_Number = "";

if (messageParts[0].Length == 13 || messageParts[0].Length == 10)
{
    // format 1- Id:VaccinationCenter:VaccinationDate:VaccineSerialNumber
    sID = messageParts[0];
    sCenter = messageParts[1];
    sVaccination_Date = messageParts[2];
    sSerial_Number = messageParts[3];
}
else
{
    // format 2- VaccineBarcode:VaccinationDate:VaccinationCenter:Id
    sID = messageParts[3];
    sCenter = messageParts[2];
    sVaccination_Date = messageParts[1];
    sSerial_Number = messageParts[0];
}
// assigns the columns into the array elements.

//CREATE A NEW MESSAGE ENTITY:
MessageEntity messageEntity = new
MessageEntity(sID,sCenter,sVaccination_Date,sSerial_Number);
// create a MessageEntity object that passes in the values.

//CREATE A TABLE OPERATION TO INSERT THE ENTITY:
TableOperation insertOperation = TableOperation.Insert(messageEntity);
// inserts the messages from the MessageEntity object.

//EXECUTE THE INSERT OPERATION:
await cloudTable.ExecuteAsync(insertOperation);
// executes the insertoperation.

log.LogInformation($"Queue message has been stored successfully in the
database ID = {sID}, Center = {sCenter}, Vaccination_Date = {sVaccination_Date},
Serial_Number = {sSerial_Number} ");
}
catch (Exception ex)

```

```

    {
        log.LogError($"Error in processing the queue message: {ex.Message}");
    }
}

public class MessageEntity : TableEntity
{
    public MessageEntity(string sID, string sCenter, string sVaccination_Date,
string sSerial_Number)
    {
        PartitionKey = "Incoming";
        RowKey = Guid.NewGuid().ToString();
        ID = sID;
        Center = sCenter;
        Vaccination_Date = sVaccination_Date;
        Serial_Number = sSerial_Number;
    }
    // gives the Message entity column headings.

    public MessageEntity() { }

    public string ID { get; set; }
    public string Center { get; set; }
    public string Vaccination_Date { get; set; }
    public string Serial_Number { get; set; }
    // getters and setter for each of the columns in the MessageEntity.

}
}
}

```

Screenshot of 5 messages in the Azure Portal:

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View all

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Message

View all

+ Add message

Dequeue message

Clear queue

Refresh

Edit columns

Queues > vacination-queue

Authentication method: Access key (Switch to Microsoft Entra user account)

Showing all 5 items

Message text	Id	Insertion time	Expiration time	Dequeue count
9405105021537HealthClinic1:21-08-2023:VSNVAR2102023	5e54c2a2-5240-4556-af...	2023/11/10, 10:38:41	2023/11/17, 10:38:41	0
A274914658HealthClinic2:21-08-2023:VSNVAR21082023	98bb809b-6c7a-4fba-a6...	2023/11/10, 10:38:41	2023/11/17, 10:38:41	0
VBNVAR21082023:21-08-2023:HealthClinic3:6285429502175	cde7792f-acb5-4fc8-aa3...	2023/11/10, 10:38:41	2023/11/17, 10:38:41	0
VBNVAR21082025:21-08-2023:HealthClinic4:A285936254	b434db9a-8d1c-4ccf-a2...	2023/11/10, 10:38:41	2023/11/17, 10:38:41	0
VBN261947621-08-2023:HealthClinic5:2741037572539	edf1a692-5822-4bec-bf...	2023/11/10, 10:38:42	2023/11/17, 10:38:42	0

Screenshots of the corresponding messages in the changed component (Azure Table Storage):

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vacination-queue

View all

Tables

Message

View all

+ Add entity

Refresh

Delete

Edit columns

Tables > Message

Authentication method: Access key (Switch to Microsoft Entra user account)

Add filter

Advanced filters

Showing all 5 items

PartitionKey	RowKey	Timestamp	ID	Center	Vaccination_Date
Incoming	0144d775-955c-45de-8...	2023-11-10T08:39:15.59...	VBN2619476	21-08-2023	HealthClinic5
Incoming	943fe472-c59d-4e14-b5...	2023-11-10T08:39:15.59...	9405105021537	HealthClinic1	21-08-2023
Incoming	fd1d30a-134e-4376-9e...	2023-11-10T08:39:15.59...	6285429502175	HealthClinic3	21-08-2023
Incoming	f4f7bbdf-5ad0-4dea-ac...	2023-11-10T08:39:15.59...	A285936254	HealthClinic4	21-08-2023
Incoming	f9637c3a-7424-486f-b2...	2023-11-10T08:39:15.59...	A274914658	HealthClinic2	21-08-2023



## Part D: Testing

### Screenshots of the console application (Part 2) running:

```
Microsoft Visual Studio Debu: X + v
Creating the queue vaccination-queue

Adding the messages to vaccination-queue.
Execution Completed

C:\Varsity\2023\Semester 2\CLDV6212\Part 3\ST10108243_NikkiGordhan_CLDV6212_Part2_GR2\ST10108243_CLDV6212_PoE_Part2_QueueTrigger\bin\Debug\net6.0\ST10108243_AwehProd_Producer.exe (process 48480) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .
```

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View all

+ Add message Dequeue message Clear queue Refresh Edit columns

Queues > vaccination-queue

Authentication method: Access key (Switch to Microsoft Entra user account)

Showing all 5 items

Message text	Id	Insertion time	Expiration time	Dequeue count
9405105021537HealthClinic1:21-08-2023:VSNVAR2102023	289199f1-5c27-4097-b1...	2023/11/10, 10:40:40	2023/11/17, 10:40:40	0
A274914658HealthClinic2:21-08-2023:VSNVAR21082023	0d53a9e7-ba25-4f31-94...	2023/11/10, 10:40:40	2023/11/17, 10:40:40	0
VBNVAR21082023:21-08-2023HealthClinic3:6285429502175	793143cb-664f-427a-b0...	2023/11/10, 10:40:40	2023/11/17, 10:40:40	0
VBNVAR21082025:21-08-2023HealthClinic4:A285936254	c2e01be3-5c20-43cc-82...	2023/11/10, 10:40:40	2023/11/17, 10:40:40	0
VBN2619476:21-08-2023HealthClinic5:2741037572539	d93300a3-1f5f-4b65-ac...	2023/11/10, 10:40:40	2023/11/17, 10:40:40	0

```
C:\Users\triso\AppData\Local
92789-7463-40f3-b3d8-5ef9b45f7ed3)
[2023-11-10T08:43:17.864Z] Trigger Details: MessageId: c2e01be3-5c20-43cc-8237-93928288e8cf, DequeueCount: 1, InsertionTime: 2023-11-10T08:40:40.000+00:00
[2023-11-10T08:43:17.863Z] Trigger Details: MessageId: 0d53a9e7-ba25-4f31-9434-7e55ca3477cd, DequeueCount: 1, InsertionTime: 2023-11-10T08:40:40.000+00:00
[2023-11-10T08:43:17.863Z] Trigger Details: MessageId: d93300a3-1f5f-4b65-ac4b-aeee4f8b5b30, DequeueCount: 1, InsertionTime: 2023-11-10T08:40:40.000+00:00
[2023-11-10T08:43:17.862Z] Executing 'TableStorage' (Reason='New queue message detected on 'vaccination-queue'.', Id=9b67035f-7ad1-4068-a24e-6538f8faf89f)
[2023-11-10T08:43:17.863Z] Trigger Details: MessageId: 793143cb-f64f-427a-b0af-7bdf0a8a31b3, DequeueCount: 1, InsertionTime: 2023-11-10T08:40:40.000+00:00
[2023-11-10T08:43:17.865Z] Trigger Details: MessageId: 289199f1-5c27-4097-b115-734f9bdf0fffd, DequeueCount: 1, InsertionTime: 2023-11-10T08:40:40.000+00:00
[2023-11-10T08:43:17.922Z] Queue message has been stored successfully in the database ID = A274914658, Center = HealthClinic2, Vaccination_Date = 21-08-2023, Serial_Number = VSNVAR21082023
[2023-11-10T08:43:17.922Z] Queue message has been stored successfully in the database ID = 6285429502175, Center = HealthClinic3, Vaccination_Date = 21-08-2023, Serial_Number = VBNVAR21082023
[2023-11-10T08:43:17.922Z] Queue message has been stored successfully in the database ID = VBN2619476, Center = 21-08-2023, Vaccination_Date = HealthClinic5, Serial_Number = 2741037572539
[2023-11-10T08:43:17.922Z] Queue message has been stored successfully in the database ID = A285936254, Center = HealthClinic4, Vaccination_Date = 21-08-2023, Serial_Number = VBNVAR21082025
[2023-11-10T08:43:17.922Z] Queue message has been stored successfully in the database ID = 9405105021537, Center = HealthClinic1, Vaccination_Date = 21-08-2023, Serial_Number = VSNVAR21082023
[2023-11-10T08:43:17.942Z] Executed 'TableStorage' (Succeeded, Id=9b67035f-7ad1-4068-a24e-6538f8faf89f, Duration=380ms)
[2023-11-10T08:43:17.942Z] Executed 'TableStorage' (Succeeded, Id=82f3f1b8-fb8b-4737-8cd5-0669652719b0, Duration=264ms)
[2023-11-10T08:43:17.943Z] Executed 'TableStorage' (Succeeded, Id=29192789-7463-40f3-b3d8-5ef9b45f7ed3, Duration=266ms)
[2023-11-10T08:43:17.943Z] Executed 'TableStorage' (Succeeded, Id=1c40e5b0-c535-4834-963b-efa0d27c66a0, Duration=270ms)
[2023-11-10T08:43:17.942Z] Executed 'TableStorage' (Succeeded, Id=d494dc72-1064-4b69-8760-aef3b1bd221ee, Duration=268ms)
[2023-11-10T08:43:22.162Z] Host lock lease acquired by instance ID '0000000000000000000000000000000092A6C5E9'.
```

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Authentication method: Access key (Switch to Microsoft Entra user account)

Add filter

Advanced filters

Showing all 5 items

PartitionKey	RowKey	Timestamp	ID	Center	Vaccination_Date	
<input type="checkbox"/>	Incoming	19bf8043-3b14-4b03-a5...	2023-11-10T08:43:17.98...	A274914658	HealthClinic2	21-08-2023
<input type="checkbox"/>	Incoming	4d54c1f7-68df-4947-93...	2023-11-10T08:43:17.98...	9405105021537	HealthClinic1	21-08-2023
<input type="checkbox"/>	Incoming	858b6bd5-3d72-4e5c-8...	2023-11-10T08:43:17.98...	6285429502175	HealthClinic3	21-08-2023
<input type="checkbox"/>	Incoming	a3bf52da-0940-4737-b1...	2023-11-10T08:43:17.98...	A285936254	HealthClinic4	21-08-2023
<input type="checkbox"/>	Incoming	b166c134-2da5-413a-8...	2023-11-10T08:43:17.98...	VBN2619476	HealthClinic5	

Message 1:

Message text	Id	Insertion time	Expiration time	Dequeue count
9405105021537:HealthClinic1:21-08-2023:VSNVAR2102023	289199f1-5c27-4097-b1...	2023/11/10, 10:40:40	2023/11/17, 10:40:40	0

<input type="checkbox"/>	PartitionKey	RowKey	Timestamp	ID	Center	Vaccination_Date	Serial_Number	
<input type="checkbox"/>	Incoming	19bf8043-3b14-4b03-a5...	2023-11-10T08:43:17.98...	A274914658	HealthClinic2	21-08-2023	VSNVAR21082023	...
<input checked="" type="checkbox"/>	Incoming	4d54c1f7-68df-4947-93...	2023-11-10T08:43:17.98...	9405105021537	HealthClinic1	21-08-2023	VSNVAR2102023	...
<input type="checkbox"/>	Incoming	858b6bd5-3d72-4e5c-8...	2023-11-10T08:43:17.98...	6285429502175	HealthClinic3	21-08-2023	VBNVAR21082023	...
<input type="checkbox"/>	Incoming	a3bf52da-0940-4737-b1...	2023-11-10T08:43:17.98...	A285936254	HealthClinic4	21-08-2023	VBNVAR21082025	...
<input type="checkbox"/>	Incoming	b166c134-2da5-413a-8...	2023-11-10T08:43:17.98...	VBN2619476	HealthClinic5		2741037572539	...

Message 2:

A274914658:HealthClinic2:21-08-2023:VSNVAR21082023		Od53a9e7-ba25-4f31-9434-7e55ca3477cd		2023/11/10, 10:40:40	2023/11/17, 10:40:40	0	
<input type="checkbox"/>	PartitionKey	RowKey	Timestamp	ID	Center	Vaccination_Date	Serial_Number
<input checked="" type="checkbox"/>	Incoming	19bf8043-3b14-4b03-a5...	2023-11-10T08:43:17.98...	A274914658	HealthClinic2	21-08-2023	VSNVAR21082023

Message 3:

<a href="#">VBNVAR21082023:21-08-2023:HealthClinic3:6285429502175</a>		793143cb-f64f-427a-b0af-7bdf0a8a31b3		2023/11/10, 10:40:40	2023/11/17, 10:40:40	0	
<input checked="" type="checkbox"/>	Incoming	858b6bd5-3d72-4e5c-8...	2023-11-10T08:43:17.98...	6285429502175	HealthClinic3	21-08-2023	VBNVAR21082023

Message 4:

<a href="#">VBNVAR21082025:21-08-2023:HealthClinic4:A285936254</a>		c2e01be3-5c20-43cc-8237-93928288e8cf		2023/11/10, 10:40:40	2023/11/17, 10:40:40	0
<hr/>						
<input checked="" type="checkbox"/>	Incoming	a3bf52da-0940-4737-b1...	2023-11-10T08:43:17.98...	A285936254	HealthClinic4	21-08-2023
VBNVAR21082025						

Message 5:

<a href="#">VBN2619476:21-08-2023:HealthClinic5:2741037572539</a>		d93300a3-1f5f-4b65-ac4b-ae4f8b5b30		2023/11/10, 10:40:40	2023/11/17, 10:40:40	0
<input checked="" type="checkbox"/>	Incoming	b166c134-2da5-413a-8...	2023-11-10T08:43:17.98...	VBN2619476	HealthClinic5	2741037572539

GitHub Link:

<https://github.com/IIEWFL/cldv6212-poe-nikkigordhan.git>

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