

2021

Formative Assessment 2



Thato legoale

CSAS632

5557

Table of Contents

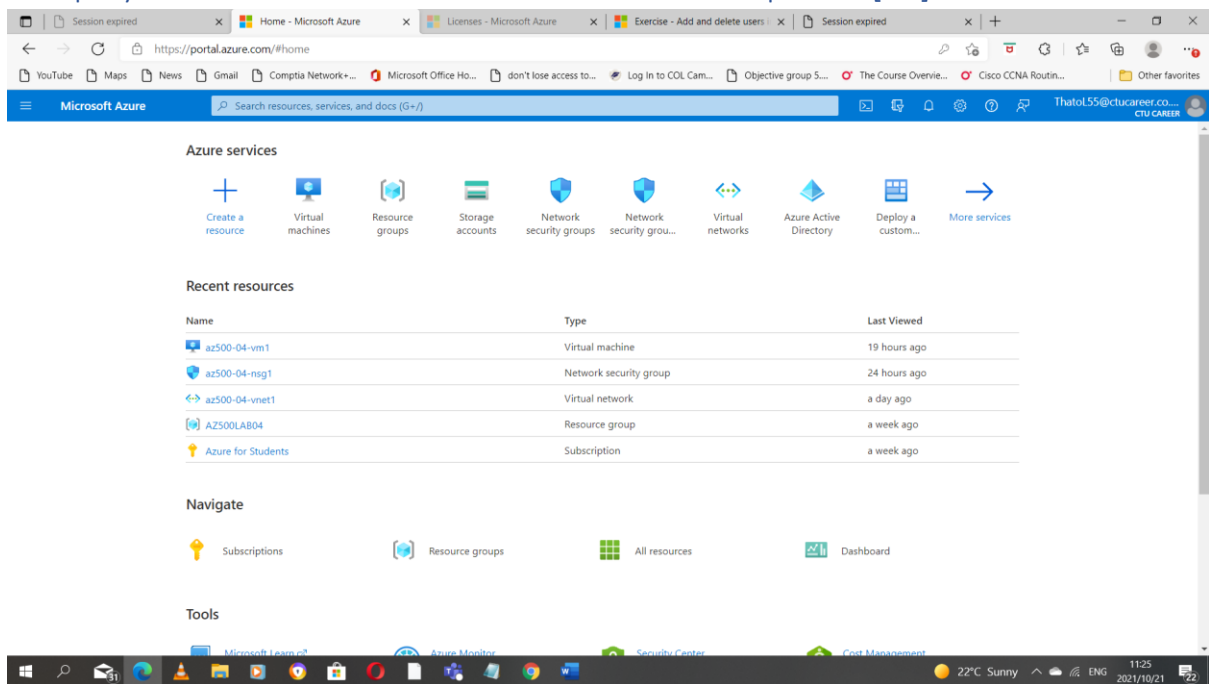
Project	2
• Creating an Azure key vault and storing keys and secrets in the vault.	2
• Create a SQL Database and encrypting content of columns in database tables by using Always Encrypted.....	2
• Deploy the base infrastructure from an ARM template - [25]	2
• Configure the Key Vault resource with a key and a secret - [25]	6
Task 1: Create and configure a Key Vault	7
Task 2: Add a key to Key Vault	10
Task 3: Add a Secret to Key Vault	14
• Configure an Azure SQL database and a data-driven application- [20].....	16
Task 1: Enable a client application to access the Azure SQL Database service.	17
Task 2: Create a policy allowing the application access to the Key Vault.....	21
Task 3: Retrieve SQL Azure database ADO.NET Connection String	23
Task 4: Log on to the Azure VM running Visual Studio 2019 and SQL Management Studio 2018	25
Task 5: Create a table in the SQL Database and select data columns for encryption	26
Task 1: Run a data-driven application to demonstrate the use of Azure Key Vault in encrypting the Azure SQL database	35
Conclusion.....	43

Formative Assessment 2 CSAS62

Screenshots

Project

- Creating an Azure key vault and storing keys and secrets in the vault.
- Create a SQL Database and encrypting content of columns in database tables by using Always Encrypted.
- Deploy the base infrastructure from an ARM template - [25]



Session expired x Custom deployment - Microsoft x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#create/Microsoft.Template

Microsoft Azure Search resources, services, and docs (G+)

Home >

Custom deployment

Deploy from a custom template

Select a template Basics Review + create

Automate deploying resources with Azure Resource Manager templates in a single, coordinated operation. Create or select a template below to get started. [Learn more about template deployment](#)

[Build your own template in the editor](#)

Common templates

- Create a Linux virtual machine
- Create a Windows virtual machine
- Create a web app
- Create a SQL database
- Azure landing zone

Start with a quickstart template or template spec

Template source Quickstart template Template spec

Quickstart template (disclaimer)

22°C Sunny 11:26 2021/10/21

Session expired x Edit template - Microsoft Azure x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#create/Microsoft.Template

Microsoft Azure Search resources, services, and docs (G+)

Home > Custom deployment >

Edit template

Edit your Azure Resource Manager template

+ Add resource ↑ Quickstart template ↑ Load file ↓ Download

Parameters (0)
Variables (0)
Resources (0)

```
1 {
2   "$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentTemplate.json#",
3   "contentVersion": "1.0.0.0",
4   "parameters": {},
5   "resources": []
6 }
```

Save Discard

22°C Sunny 11:26 2021/10/21

Session expired x Edit template - Microsoft Azure x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#create/Microsoft.Template

Microsoft Azure Search resources, services, and docs (G+)

Home > Custom deployment >

Edit template

Edit your Azure Resource Manager template

+ Add resource ↑ Quickstart template ↑ Load file ↓ Download

- Parameters (2)
- Variables (24)
- Resources (7)
 - StorageAccount (Microsoft.Storage/storageAccount)
 - PublicIPAddress (Microsoft.Network/publicIPAddresses)
 - VirtualNetwork (Microsoft.Network/virtualNetworks)
 - NetworkInterface (Microsoft.Network/networkInterfaces)
 - JumpVM (Microsoft.Compute/virtualMachines)
 - Variables (networkSecurityGroups) (Microsoft.Network/networkSecurityGroups)
 - SqlServer (Microsoft.Sql/servers)

```

1  {
2  "$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentTemplate.json#",
3  "contentVersion": "1.0.0.0",
4  "parameters": {
5    "adminUsername": {
6      "type": "string",
7      "minLength": 1,
8      "defaultValue": "Student",
9      "metadata": {
10     "description": "Username for the Virtual Machine."
11   }
12 },
13   "adminPassword": {
14     "type": "securestring",
15     "defaultValue": "Pa55w.rd1234",
16     "metadata": {
17       "description": "Password for the Virtual Machine."
18     }
19   }
20 },
21 },
22 },
23 "variables": {

```

Save Discard

22°C Sunny 11:42 2021/10/21

Session expired x Custom deployment - Microsoft Azure x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#create/Microsoft.Template

Microsoft Azure Search resources, services, and docs (G+)

Home >

Custom deployment

Deploy from a custom template

Select a template Basics Review + create

Template

Customized template 7 resources

Edit template Edit parameters Visualize

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * Azure for Students

Resource group * Create new

Instance details

Region * East US

Admin Username Student

Admin Password

Review + create < Previous Next: Review + create >

22°C Sunny 11:43 2021/10/21

Session expired x Custom deployment - Microsoft x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x

https://portal.azure.com/#create/Microsoft.Template

Microsoft Azure Search resources, services, and docs (G+)

Custom deployment

Deploy from a custom template

Select a template Basics Review + create

Template

Customized template 7 resources

Edit template Edit parameters Visualize

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * Azure for Students

Resource group * (New) AZ500LAB10

Instance details

Region * East US

Admin Username * Student

Admin Password *

Review + create < Previous Next: Review + create >

22°C Sunny 11:45 2021/10/21

Session expired x Custom deployment - Microsoft x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x

https://portal.azure.com/#create/Microsoft.Template

Microsoft Azure Search resources, services, and docs (G+)

Custom deployment

Deploy from a custom template

Validation Passed

Select a template Basics Review + create

Summary

Customized template 7 resources

Terms

Azure Marketplace Terms Azure Marketplace

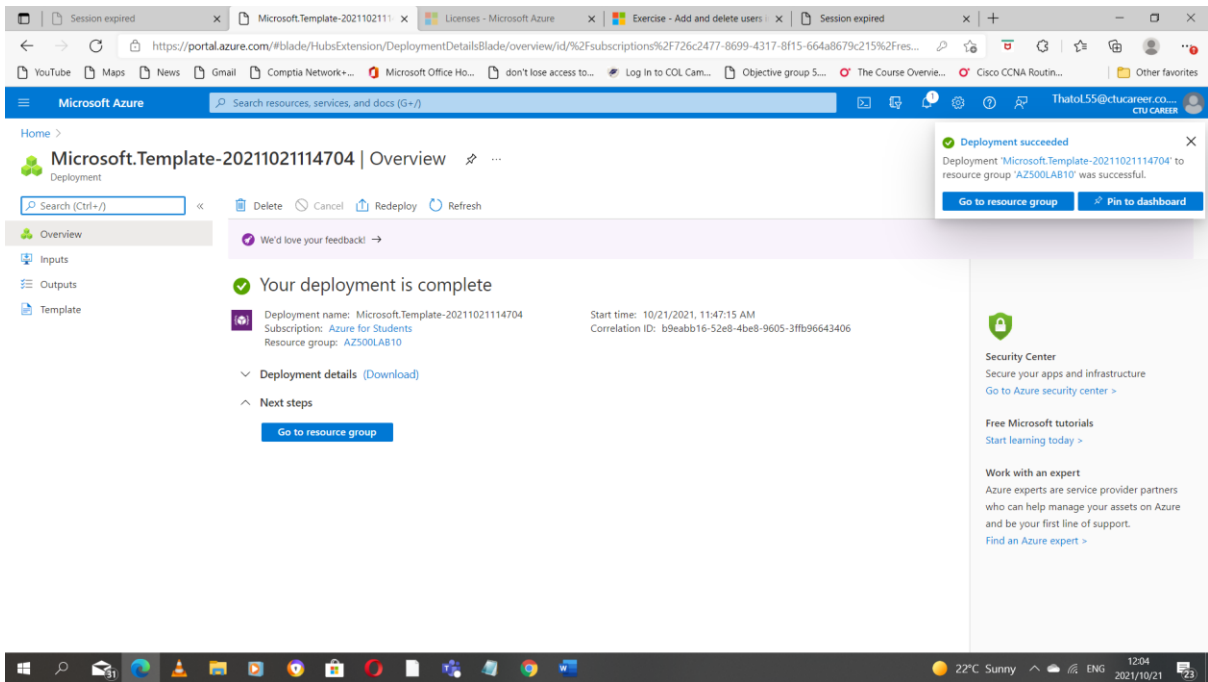
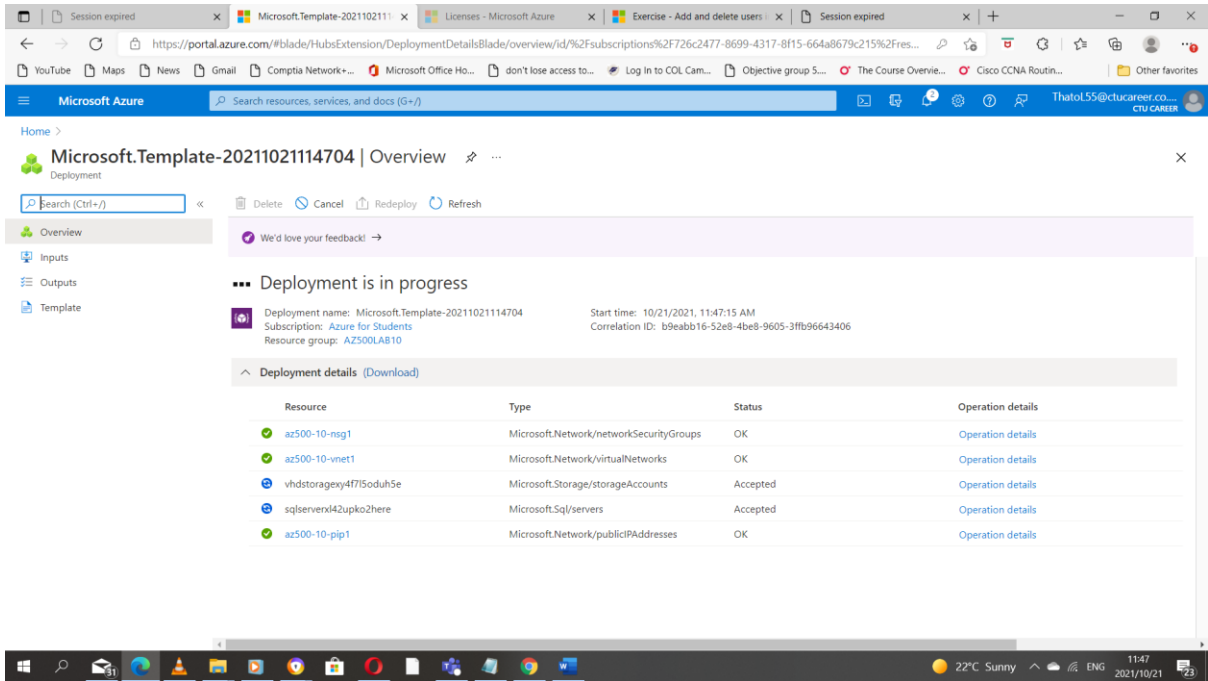
By clicking "Create," I (a) agree to the applicable legal terms associated with the offering; (b) authorize Microsoft to charge or bill my current payment method for the fees associated with the offering(s), including applicable taxes, with the same billing frequency as my Azure subscription, until I discontinue use of the offering(s); and (c) agree that, if the deployment involves 3rd party offerings, Microsoft may share my contact information and other details of such deployment with the publisher of that offering.

Microsoft assumes no responsibility for any actions performed by third-party templates and does not provide rights for third-party products or services. See the [Azure Marketplace Terms](#) for additional terms.

Deploying this template will create one or more Azure resources or Marketplace offerings. You acknowledge that you are responsible for reviewing the applicable pricing and legal terms associated with all resources and offerings deployed as part of this template. Prices and associated legal terms for any Marketplace offerings can be found in the [Azure Marketplace](#); both are subject to change at any time prior to deployment.

Create < Previous Next

22°C Sunny 11:46 2021/10/21



- Configure the Key Vault resource with a key and a secret - [25]

Task 1: Create and configure a Key Vault

Microsoft Azure | Microsoft.Template-20211021114704 | Overview

Your deployment is complete

Deployment name: Microsoft.Template-20211021114704
Subscription: Azure for Students
Resource group: AZ500LAB10

Start time: 10/21/2021, 11:47:15 AM
Correlation ID: b9eabb16-52e8-4be8-9605-3ff696643406

Security Center
Secure your apps and infrastructure
[Go to Azure security center >](#)

```
PowerShell | Requesting a Cloud Shell.Succeeded.  
Connecting terminal...  
  
[]
```

Microsoft Azure | Microsoft.Template-20211021114704 | Overview

Your deployment is complete

Deployment name: Microsoft.Template-20211021114704
Subscription: Azure for Students
Resource group: AZ500LAB10

Start time: 10/21/2021, 11:47:15 AM
Correlation ID: b9eabb16-52e8-4be8-9605-3ff696643406

Security Center
Secure your apps and infrastructure
[Go to Azure security center >](#)

```
PowerShell | Connecting terminal...  
  
MOTD: Read more about PowerShell in CloudShell: https://terminal.container/button/shell/docs  
  
VERBOSE: Authenticating to Azure ...  
VERBOSE: Building your Azure drive ...  
PS /home/thato> $kvName = 'az500kv' + $(Get-Random)  
PS /home/thato> $location = (Get-AzResourceGroup -ResourceGroupName 'AZ500LAB10').Location  
PS /home/thato> New-AzKeyVault -VaultName $kvName -ResourceGroupName 'AZ500LAB10' -Location $location
```

Microsoft.Template-20211021114704 | Overview

```

PowerShell
PS /home/thato> $kvName = 'az500kv' + $(Get-Random)
PS /home/thato> $location = (Get-AzResourceGroup -ResourceGroupName 'AZ500LAB10').Location
PS /home/thato> New-AzKeyVault -VaultName $kvName -ResourceGroupName 'AZ500LAB10' -Location $location

Vault Name                : az500kv1995630201
Resource Group Name       : AZ500LAB10
Location                  : eastus
Resource ID                : /subscriptions/726c2477-8699-4317-8f15-664a8679c215/resourceGroups/AZ500LAB10/providers/Microsoft.KeyVault/vaults/az500kv1995630201
Vault URI                 : https://az500kv1995630201.vault.azure.net/
Tenant ID                 : f5ea3467-a1df-4d7e-a894-9a0c66d9b19e
SKU                       : Standard
Enabled For Deployment?   : False
Enabled For Template Deployment? : False
Enabled For Disk Encryption? : False
Enabled For RBAC Authorization? : False
Soft Delete Enabled?     : True
Soft Delete Retention Period (days) : 90
Purge Protection Enabled? :
Access Policies           :
Network Rule Set         :
                          Default Action          : Allow
                          Bypass                 : AzureServices
                          IP Rules              :
                          Virtual Network Rules  :
  
```

Resource groups

Showing 1 to 4 of 4 records.

Name	Subscription	Location
AZ500LAB04	Azure for Students	East US
AZ500LAB10	Azure for Students	East US
cloud-shell-storage-westurope	Azure for Students	West Europe
NetworkWatcherRG	Azure for Students	East US

Session expired x AZ500LAB10 - Microsoft Azure x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#@ctucareer.co.za/resource/subscriptions/726c2477-8699-4317-8f15-664a8679c215/resourceGroups/AZ500LAB10/overview

Microsoft Azure Search resources, services, and docs (G+)

Home > Resource groups > AZ500LAB10

Resource groups

CTU Career

+ Create Manage view

Filter for any field...

Name ↑

- AZ500LAB04
- AZ500LAB10**
- cloud-shell-storage-westeurope
- NetworkWatcherRG

Overview

- Activity log
- Access control (IAM)
- Tags
- Resource visualizer
- Events

Settings

- Deployments
- Security
- Policies
- Properties
- Locks

Cost Management

- Cost analysis
- Cost alerts (preview)
- Budgets

Essentials

Subscription (Move): Azure for Students

Deployments: 1 Succeeded

Subscription ID: 726c2477-8699-4317-8f15-664a8679c215

Location: East US

Tags (Edit): Click here to add tags

Resources

Filter for any field... Type == all Location == all Add filter

Showing 1 to 9 of 9 records. Show hidden types No grouping List view

Name	Type	Location
az500-10-nic1	Network interface	East US
az500-10-nsg1	Network security group	East US
az500-10-pip1	Public IP address	East US
az500-10-vm1	Virtual machine	East US
az500-10-vnet1	Virtual network	East US

Page 1 of 1

26°C Sunny 12:11 2021/10/21

Session expired x az500kv1995630201 - Microsoft Azure x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#@ctucareer.co.za/resource/subscriptions/726c2477-8699-4317-8f15-664a8679c215/resourceGroups/AZ500LAB10/providers/Microsoft.KeyVault/keyVaults/az500kv1995630201

Microsoft Azure Search resources, services, and docs (G+)

Home > Resource groups > AZ500LAB10 > az500kv1995630201

az500kv1995630201

Key vault

Delete Move Refresh Open in mobile

Overview

- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Events

Settings

- Keys
- Secrets
- Certificates
- Access policies
- Networking
- Security
- Properties
- Locks

Monitoring

Essentials

Resource group (Move): AZ500LAB10

Location: East US

Subscription (Move): Azure for Students

Subscription ID: 726c2477-8699-4317-8f15-664a8679c215

Tags (Edit): Click here to add tags

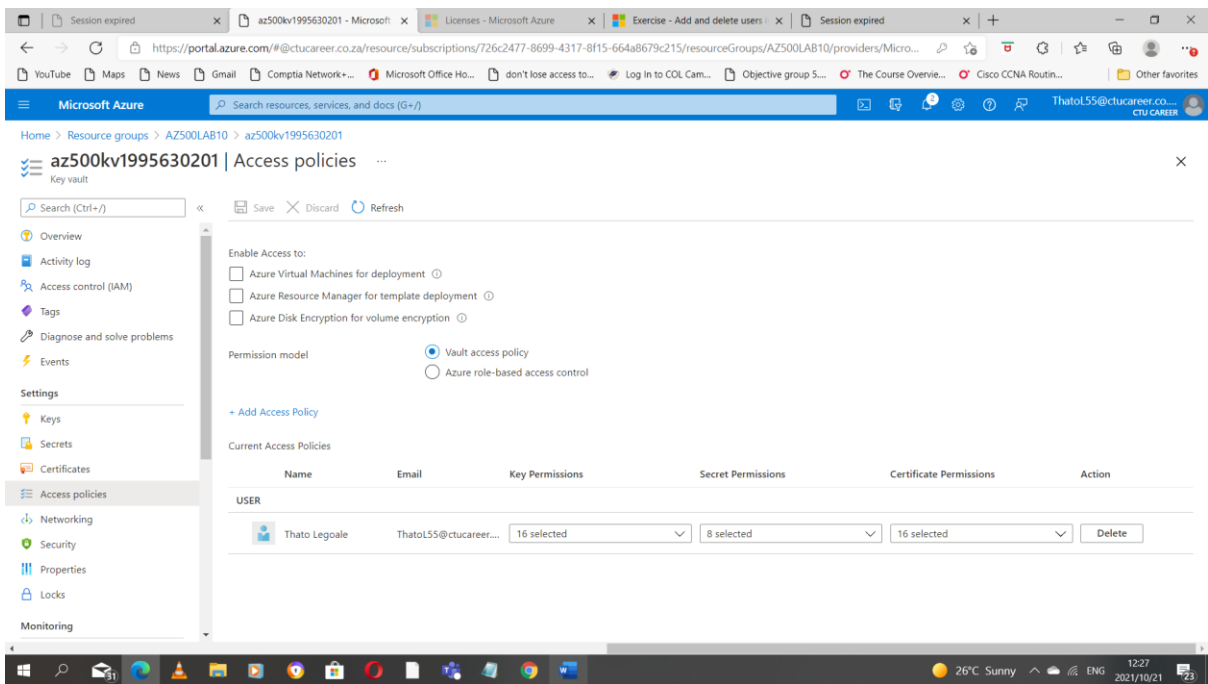
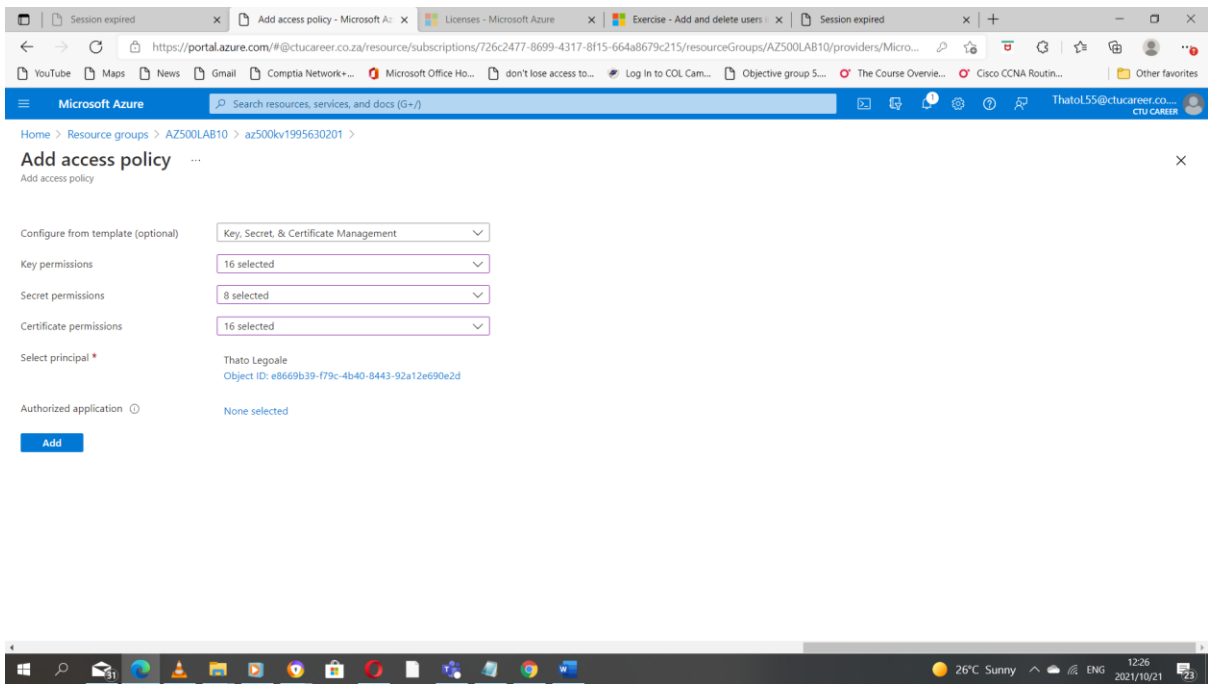
Get started Monitoring Tools + SDKs Tutorials

Manage keys and secrets used by apps and services

Our recommendation is to use a vault per application per environment (Development, Pre-Production and Production). This helps you to not share secrets across environments and also reduces the threat in case of a breach.

- Control access to key vault**
Assign access policy and determine whether a given random principal can use an application or service to access your vault.
- Enable logging and set up alerts**
Enable logging to monitor how, when and by whom your secrets are accessed. Monitor for suspicious activity.
- Turn on recovery options**
For protection against accidental or malicious deletion, soft-delete is enabled. Turn on purge protection to prevent permanent deletion of secrets.

26°C Sunny 12:16 2021/10/21



Task 2: Add a key to Key Vault

Microsoft Azure

Home > Resource groups > AZ500LAB10 > az500kv1995630201

az500kv1995630201 | Access policies

Key vault

```
PowerShell
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

MOTD: Cmdlet help is available: help <cmdlet name>

VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/thato>
```

Microsoft Azure

Home > Resource groups > AZ500LAB10 > az500kv1995630201

az500kv1995630201 | Access policies

Key vault

```
PowerShell
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

MOTD: Cmdlet help is available: help <cmdlet name>

VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/thato> $kv = Get-AzKeyVault -ResourceGroupName 'AZ500LAB10'
PS /home/thato>
PS /home/thato> $key = Add-AzKeyVaultKey -VaultName $kv.VaultName -Name 'MyLabKey' -Destination 'Software'
PS /home/thato>
```

Terminal container button

Session expired x az500kv1995630201 - Microsoft x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#@ctucareer.co.za/resource/subscriptions/726c2477-8699-4317-8f15-664a8679c215/resourceGroups/AZ500LAB10/providers/Micro...

Microsoft Azure Search resources, services, and docs (G+)

Home > Resource groups > AZ500LAB10 > az500kv1995630201

az500kv1995630201 | Keys

Key vault

Search (Ctrl+J) < + Generate/Import Refresh Restore Backup Manage deleted keys

Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems

Name	Status	Expiration date
MyLabKey	✓ Enabled	

PowerShell

```

Requesting a Cloud Shell.Succeeded.
Connecting terminal...

MOTD: Cmdlet help is available: help <cmdlet name>

VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/thato> $kv = Get-AzKeyVault -ResourceGroupName 'AZ500LAB10'
PS /home/thato>
PS /home/thato> $key = Add-AzKeyVaultKey -VaultName $kv.VaultName -Name 'MyLabKey' -Destination 'Software'
PS /home/thato>
  
```

26°C Sunny 12:31 2021/10/21

Session expired x az500kv1995630201 - Microsoft x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#@ctucareer.co.za/resource/subscriptions/726c2477-8699-4317-8f15-664a8679c215/resourceGroups/AZ500LAB10/providers/Micro...

Microsoft Azure Search resources, services, and docs (G+)

Home > Resource groups > AZ500LAB10 > az500kv1995630201

az500kv1995630201 | Keys

Key vault

Search (Ctrl+J) < + Generate/Import Refresh Restore Backup Manage deleted keys

Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems

Name	Status	Expiration date
MyLabKey	✓ Enabled	

PowerShell

```

PS /home/thato> $key = Add-AzKeyVaultKey -VaultName $kv.VaultName -Name 'MyLabKey' -Destination 'Software'
PS /home/thato> Get-AzKeyVaultKey -VaultName $kv.VaultName

Vault/HSM Name : az500kv1995630201
Name            : MyLabKey
Version         :
Id              : https://az500kv1995630201.vault.azure.net:443/keys/MyLabKey
Enabled         : True
Expires        :
Not Before     :
Created        : 10/21/2021 10:30:12 AM
Updated        : 10/21/2021 10:30:12 AM
Recovery Level : Recoverable+Purgeable
Tags           :
  
```

Terminal container button

26°C Sunny 12:32 2021/10/21

Session expired x az500kv1995630201 - Microsoft x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#@ctucareer.co.za/resource/subscriptions/726c2477-8699-4317-8f15-664a8679c215/resourceGroups/AZ500LAB10/providers/Micro...

Microsoft Azure Search resources, services, and docs (G+)

Home > Resource groups > AZ500LAB10 > az500kv1995630201

az500kv1995630201 | Keys

Key vault

Search (Ctrl+J) < + Generate/Import Refresh Restore Backup Manage deleted keys

Overview
Activity log
Access control (IAM)

Name	Status	Expiration date
MyLabKey	✓ Enabled	

PowerShell

```

PS /home/thato>
PS /home/thato> $key = Add-AzKeyVaultKey -VaultName $kv.VaultName -Name 'MyLabKey' -Destination 'Software'
PS /home/thato> Get-AzKeyVaultKey -VaultName $kv.VaultName

Vault/HSM Name : az500kv1995630201
Name           : MyLabKey
Version        :
Id             : https://az500kv1995630201.vault.azure.net:443/keys/MyLabKey
Enabled        : True
Expires        :
Not Before     :
Created        : 10/21/2021 10:30:12 AM
Updated        : 10/21/2021 10:30:12 AM
Recovery Level : Recoverable+Purgeable
Tags           :

PS /home/thato> $key.key.kid
https://az500kv1995630201.vault.azure.net/keys/MyLabKey/11b901b769194457988e76a04aec81c
PS /home/thato>
  
```

Terminal container button

26°C Sunny 12:32 2021/10/21

Session expired x az500kv1995630201 - Microsoft x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#@ctucareer.co.za/resource/subscriptions/726c2477-8699-4317-8f15-664a8679c215/resourceGroups/AZ500LAB10/providers/Micro...

Microsoft Azure Search resources, services, and docs (G+)

Home > Resource groups > AZ500LAB10 > az500kv1995630201

az500kv1995630201 | Keys

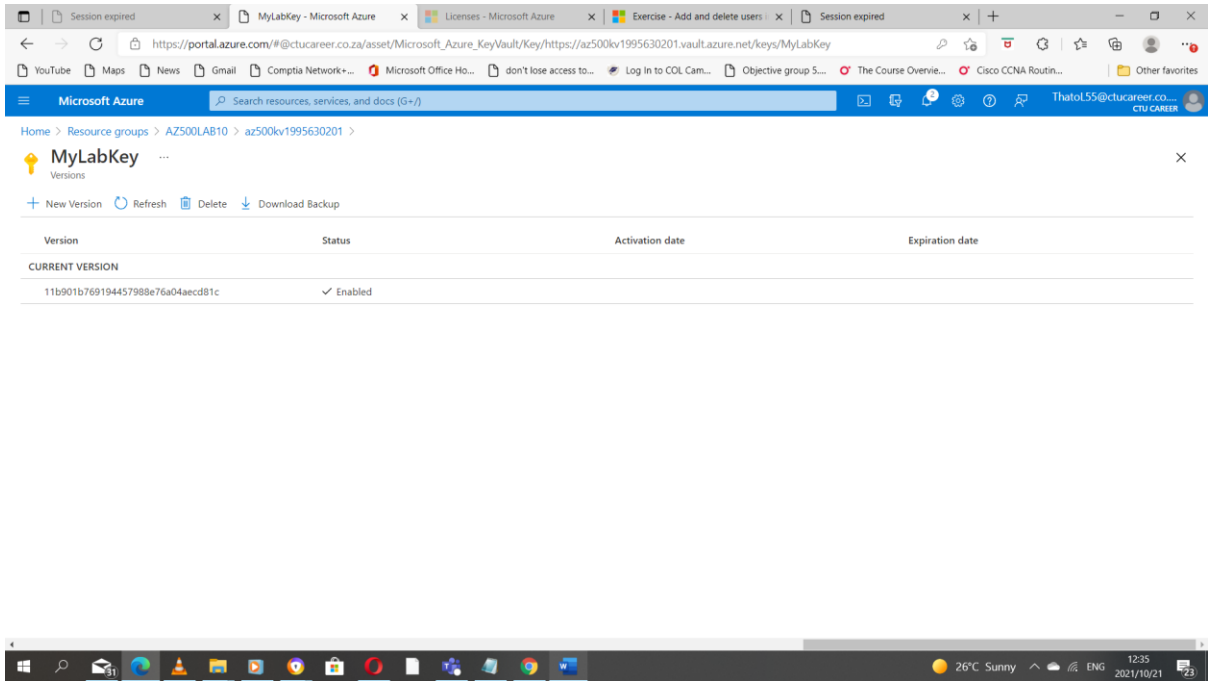
Key vault

Search (Ctrl+J) < + Generate/Import Refresh Restore Backup Manage deleted keys

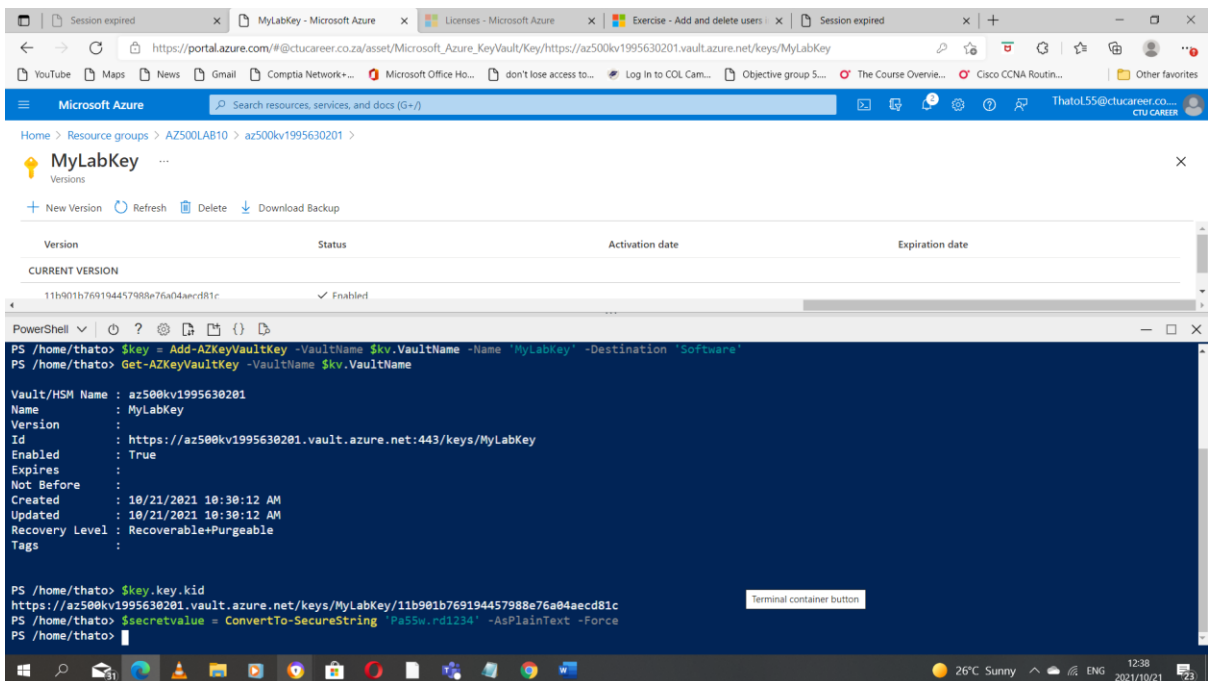
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Events
Settings
Keys
Secrets
Certificates
Access policies
Networking
Security
Properties
Locks
Monitoring

Name	Status	Expiration date
MyLabKey	✓ Enabled	

26°C Sunny 12:33 2021/10/21



Task 3: Add a Secret to Key Vault



Session expired x MyLabKey - Microsoft Azure x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#@ctucareer.co.za/asset/Microsoft_Azure_KeyVault/Key/https://az500kv1995630201.vault.azure.net/keys/MyLabKey

Microsoft Azure Search resources, services, and docs (G+)

Home > Resource groups > AZ500LAB10 > az500kv1995630201 >

MyLabKey

Versions

+ New Version Refresh Delete Download Backup

Version	Status	Activation date	Expiration date
CURRENT VERSION			
11b901b769194457988e76a04aec81c	Enabled		

```

PowerShell
PS /home/thato> Get-AZKeyVaultKey -VaultName $kv.VaultName

Vault/HSM Name : az500kv1995630201
Name           : MyLabKey
Version        :
Id             : https://az500kv1995630201.vault.azure.net:443/keys/MyLabKey
Enabled        : True
Expires        :
Not Before     :
Created        : 10/21/2021 10:30:12 AM
Updated        : 10/21/2021 10:30:12 AM
Recovery Level : Recoverable+Purgeable
Tags           :

PS /home/thato> $key.key.kid
https://az500kv1995630201.vault.azure.net/keys/MyLabKey/11b901b769194457988e76a04aec81c
PS /home/thato> $secretvalue = ConvertTo-SecureString 'Pa55w.rd1234' -AsPlainText -Force
PS /home/thato> $secret = Set-AZKeyVaultSecret -VaultName $kv.VaultName -Name 'SQLPassword' -SecretValue $secretvalue
PS /home/thato>
  
```

26°C Sunny 12:38 2021/10/21

Session expired x MyLabKey - Microsoft Azure x Licenses - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#@ctucareer.co.za/asset/Microsoft_Azure_KeyVault/Key/https://az500kv1995630201.vault.azure.net/keys/MyLabKey

Microsoft Azure Search resources, services, and docs (G+)

Home > Resource groups > AZ500LAB10 > az500kv1995630201 >

MyLabKey

Versions

```

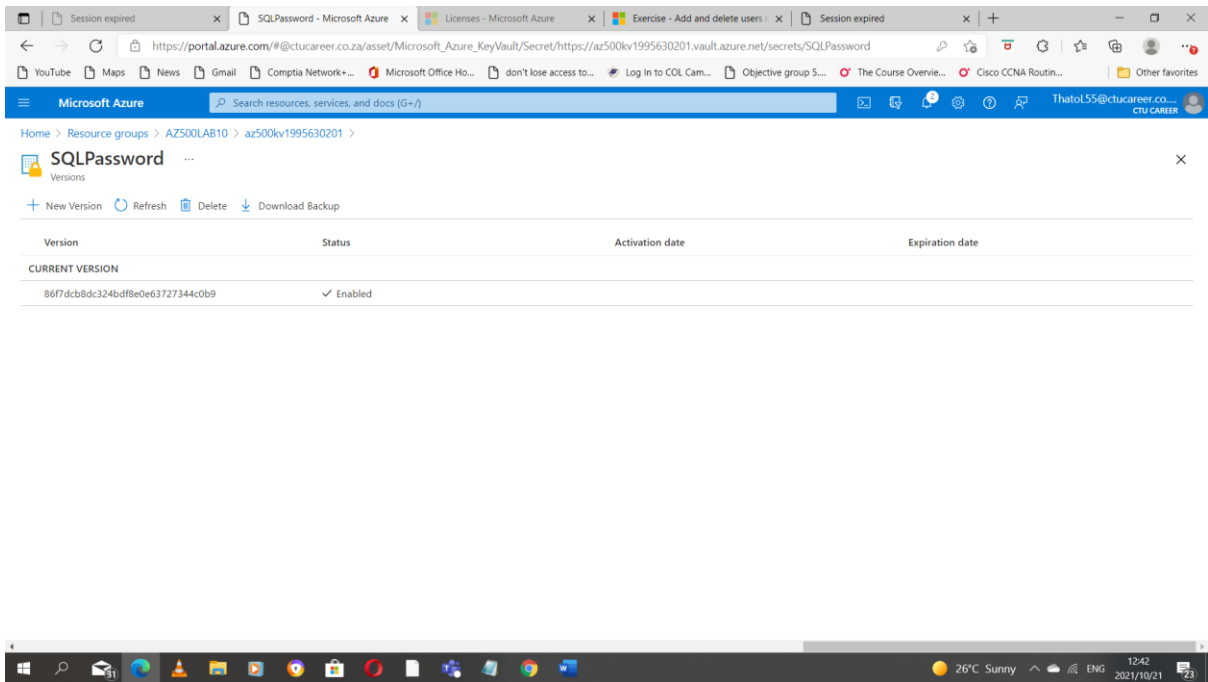
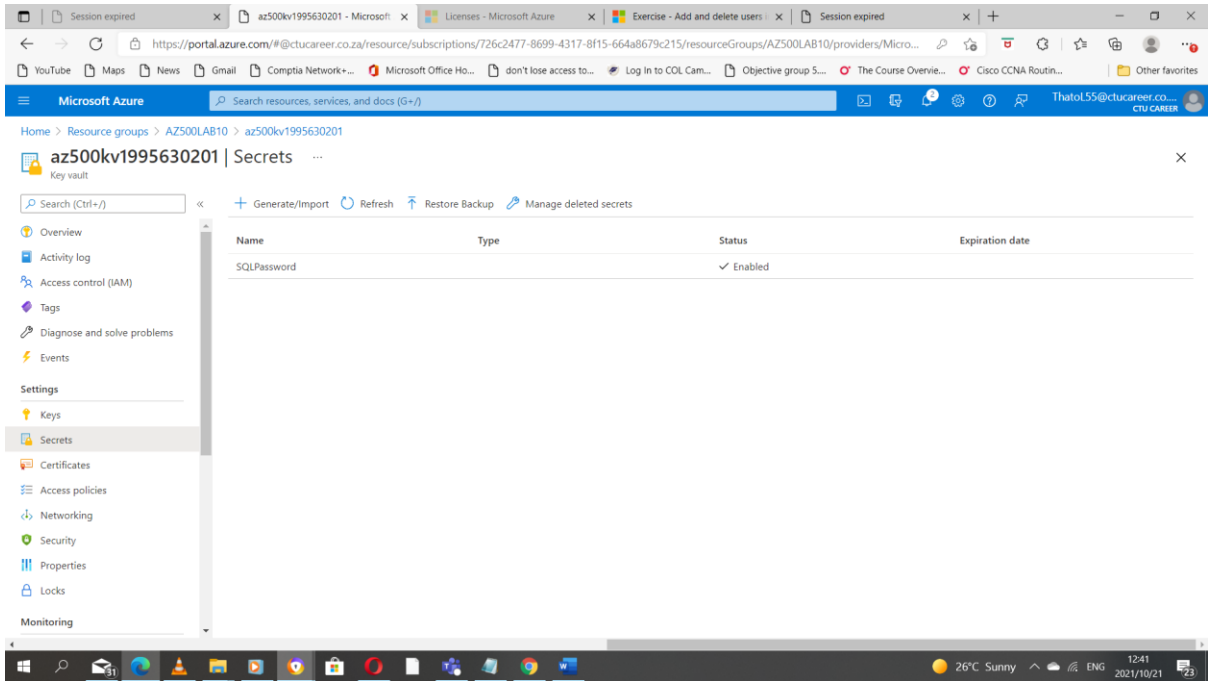
PowerShell
Created      : 10/21/2021 10:30:12 AM
Updated      : 10/21/2021 10:30:12 AM
Recovery Level : Recoverable+Purgeable
Tags         :

PS /home/thato> $key.key.kid
https://az500kv1995630201.vault.azure.net/keys/MyLabKey/11b901b769194457988e76a04aec81c
PS /home/thato> $secretvalue = ConvertTo-SecureString 'Pa55w.rd1234' -AsPlainText -Force
PS /home/thato> $secret = Set-AZKeyVaultSecret -VaultName $kv.VaultName -Name 'SQLPassword' -SecretValue $secretvalue
PS /home/thato> Get-AZKeyVaultSecret -VaultName $kv.VaultName

Vault Name : az500kv1995630201
Name       : SQLPassword
Version    :
Id         : https://az500kv1995630201.vault.azure.net:443/secrets/SQLPassword
Enabled    : True
Expires    :
Not Before :
Created    : 10/21/2021 10:38:55 AM
Updated    : 10/21/2021 10:38:55 AM
Content Type :
Tags       :

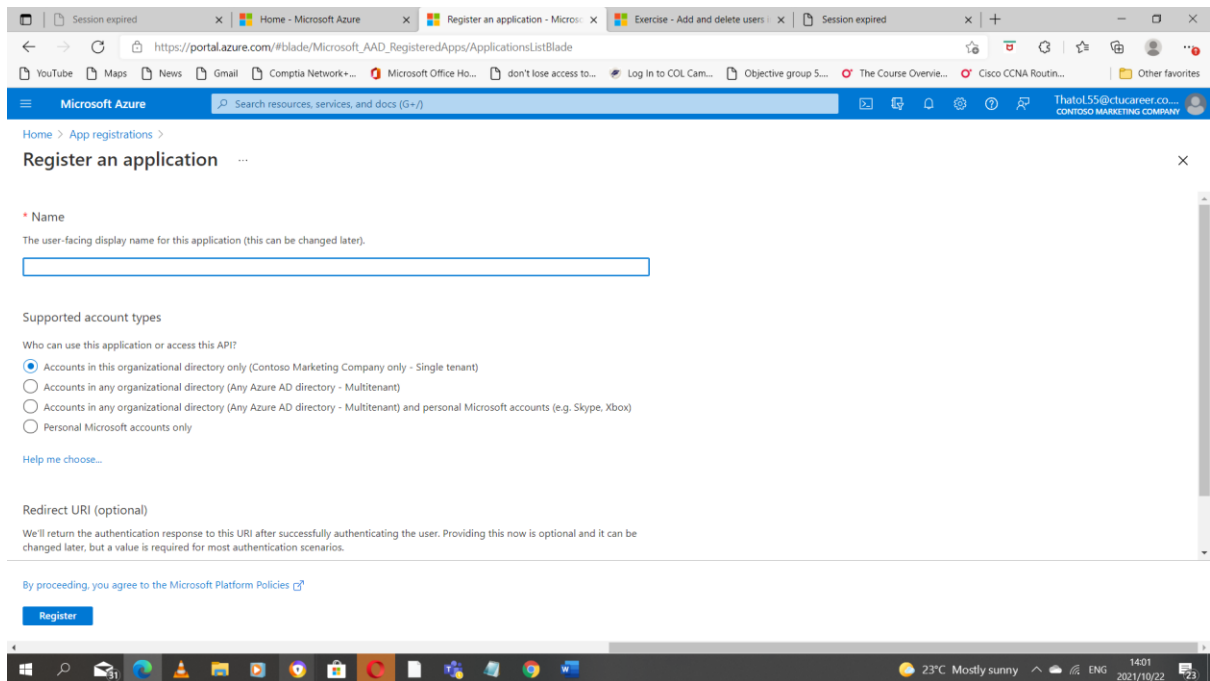
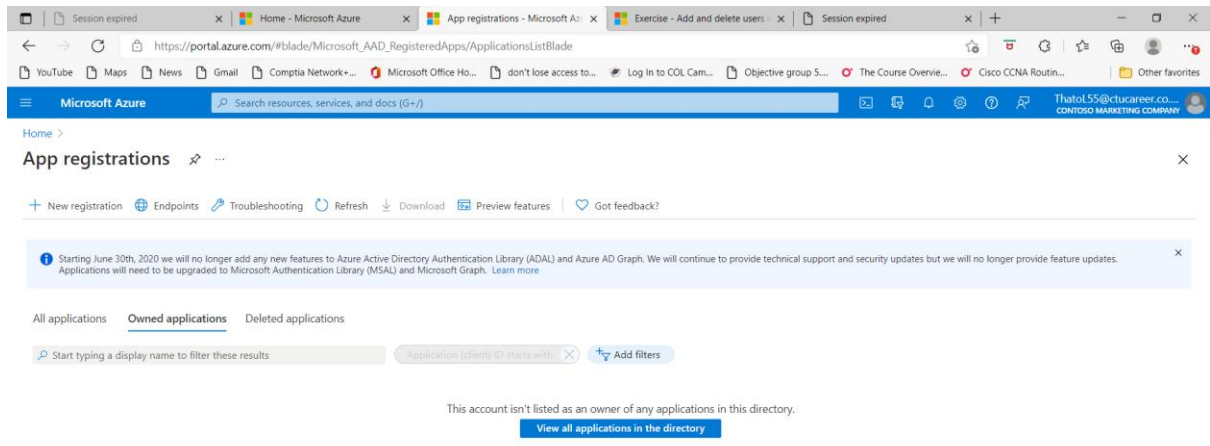
PS /home/thato>
  
```

26°C Sunny 12:39 2021/10/21



- Configure an Azure SQL database and a data-driven application- [20]

Task 1: Enable a client application to access the Azure SQL Database service.



Session expired x Home - Microsoft Azure x Register an application - Micro... x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#blade/Microsoft_AAD_RegisteredApps/ApplicationsListBlade

Microsoft Azure Search resources, services, and docs (G+)

Home > App registrations >

Register an application

sqlApp

Supported account types

Who can use this application or access this API?

- Accounts in this organizational directory only (Contoso Marketing Company only - Single tenant)
- Accounts in any organizational directory (Any Azure AD directory - Multitenant)
- Accounts in any organizational directory (Any Azure AD directory - Multitenant) and personal Microsoft accounts (e.g. Skype, Xbox)
- Personal Microsoft accounts only

[Help me choose...](#)

Redirect URI (optional)

We'll return the authentication response to this URI after successfully authenticating the user. Providing this now is optional and it can be changed later, but a value is required for most authentication scenarios.

Web https://sqlapp

Register an app you're working on here. Integrate gallery apps and other apps from outside your organization by adding from [Enterprise applications](#).

By proceeding, you agree to the [Microsoft Platform Policies](#)

[Register](#)

23°C Mostly sunny 1402 2021/10/22

Session expired x Home - Microsoft Azure x sqlApp - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#blade/Microsoft_AAD_RegisteredApps/ApplicationMenuBlade/Overview/appId/cccc43b0-34db-4359-a1ea-699e1dd495b2/objectId/780ff...

Microsoft Azure Search resources, services, and docs (G+)

Home > App registrations >

sqlApp

Search (Ctrl+J) Delete Endpoints Preview features

Overview

- Quickstart
- Integration assistant
- Manage
 - Branding
 - Authentication
 - Certificates & secrets
 - Token configuration
 - API permissions
 - Expose an API
 - App roles
 - Owners
 - Roles and administrators | Preview
 - Manifest
- Support + Troubleshooting

Get Started Documentation

Got a second? We would love your feedback on Microsoft identity platform (previously Azure AD for developer). →

Essentials

Display name	: sqlApp	Client credentials	: Add a certificate or secret
Application (client) ID	: cccc43b0-34db-4359-a1ea-699e1dd495b2	Redirect URIs	: 1 web, 0 spa, 0 public client
Object ID	: 780ffa3a-054b-48d3-8b25-24845cc14642	Application ID URI	: Add an Application ID URI
Directory (tenant) ID	: ca37d636-a885-4f16-b0cd-ba1c4e9c0d1b	Managed application in L...	: sqlApp

Supported account types: [My organization only](#)

Welcome to the new and improved App registrations. Looking to learn how it's changed from App registrations (Legacy)? [Learn more](#)

Starting June 30th, 2020 we will no longer add any new features to Azure Active Directory Authentication Library (ADAL) and Azure AD Graph. We will continue to provide technical support and security updates but we will no longer provide feature updates. Applications will need to be upgraded to Microsoft Authentication Library (MSAL) and Microsoft Graph. [Learn more](#)

Build your application with the Microsoft identity platform

The Microsoft identity platform is an authentication service, open-source libraries, and application management tools. You can create modern, standards-based authentication solutions across and between Azure, and add sign-in for users and systems from Microsoft.

23°C Mostly sunny 1403 2021/10/22

Session expired x Home - Microsoft Azure x sqlApp - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#blade/Microsoft_AAD_RegisteredApps/ApplicationMenuBlade/Overview/appld/cccc43b0-34db-4359-a1ea-699e1dd495b2/objectid/780ff...

Microsoft Azure Search resources, services, and docs (G+)

Home > App registrations > sqlApp

Overview Quickstart Integration assistant Manage Branding Authentication Certificates & secrets Token configuration API permissions Expose an API App roles Owners Roles and administrators | Preview Manifest Support + Troubleshooting

Delete Endpoints Preview features

Got a second? We would love your feedback on Microsoft identity platform (previously Azure AD for developer). →

Essentials

Display name : sqlApp Client credentials : Add a certificate or secret

Application (client) ID : cccc43b0-34db-4359-a1ea-699e1dd495b2 Redirect URIs : 1 web, 0 spa, 0 public client

Object ID : 780ffa3a-054b-48d3-8b25-24845cc14642 Application ID URI : Add an Application ID URI

Directory (tenant) ID : ca37d636-a885-4f16-b0cd-ba1c4e9c0d1b Managed application in I... : sqlApp

Supported account types : My organization only

Welcome to the new and improved App registrations. Looking to learn how it's changed from App registrations (Legacy)? Learn more

Starting June 30th, 2020 we will no longer add any new features to Azure Active Directory Authentication Library (ADAL) and Azure AD Graph. We will continue to provide t but we will no longer provide feature updates. Applications will need to be upgraded to Microsoft Authentication Library (MSAL) and Microsoft Graph. Learn more

Get Started Documentation

Build your application with the Microsoft identity platform

The Microsoft identity platform is an authentication service, open-source libraries, and application management tools. You can create

23°C Mostly sunny 1404 2021/10/22

Session expired x Home - Microsoft Azure x sqlApp - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#blade/Microsoft_AAD_RegisteredApps/ApplicationMenuBlade/Credentials/appld/cccc43b0-34db-4359-a1ea-699e1dd495b2/objectid/780ff...

Microsoft Azure Search resources, services, and docs (G+)

Home > App registrations > sqlApp

sqlApp | Certificates & secrets

Search (Ctrl+J) Got feedback?

Overview Quickstart Integration assistant Manage Branding Authentication Certificates & secrets Token configuration API permissions Expose an API App roles Owners Roles and administrators | Preview Manifest Support + Troubleshooting

Credentials enable confidential applications to identify themselves to the authentication service when receiving tokens at a web addressable location (using an HTTPS scheme). For a higher level of assurance, we recommend using a certificate (instead of a client secret) as a credential.

Certificates

Certificates can be used as secrets to prove the application's identity when requesting a token. Also can be referred to as public keys.

Upload certificate

Thumbprint	Start date	Expires	Certificate ID
No certificates have been added for this application.			

Client secrets

A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.

New client secret

Description	Expires	Value	Secret ID
No client secrets have been created for this application.			

https://portal.azure.com/#blade/Microsoft_AAD_RegisteredApps/ApplicationMenuBlade/Call...

23°C Mostly sunny 1406 2021/10/22

Session expired x Home - Microsoft Azure x Add a client secret - Microsoft A... x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#blade/Microsoft_AAD_RegisteredApps/ApplicationMenuBlade/Credentials/appld/cccc43b0-34db-4359-a1ea-699e1dd495b2/objectid/78...

Microsoft Azure Search resources, services, and docs (G+)

Home > App registrations > sqlApp

sqlApp | Certificates & secrets

Search (Ctrl+J) Got feedback?

Overview Quickstart Integration assistant

Manage Branding Authentication Certificates & secrets Token configuration API permissions Expose an API App roles Owners Roles and administrators | Preview Manifest Support + Troubleshooting

Add a client secret

Description

Expires

Cancel Add

Credentials enable confidential applications to identify themselves to the authentication service when receiving token scheme. For a higher level of assurance, we recommend using a certificate (instead of a client secret) as a credential.

Certificates

Certificates can be used as secrets to prove the application's identity when requesting a token. Also can be referred to as public keys.

Upload certificate

Thumbprint	Start date	Expires
No certificates have been added for this application.		

Client secrets

A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.

New client secret

Description	Expires	Value
No client secrets have been created for this application.		

23°C Mostly sunny 1407 2021/10/22

Session expired x Home - Microsoft Azure x sqlApp - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#blade/Microsoft_AAD_RegisteredApps/ApplicationMenuBlade/Credentials/appld/cccc43b0-34db-4359-a1ea-699e1dd495b2/objectid/78...

Microsoft Azure Search resources, services, and docs (G+)

Home > App registrations > sqlApp

sqlApp | Certificates & secrets

Search (Ctrl+J) Got feedback?

Overview Quickstart Integration assistant

Manage Branding Authentication Certificates & secrets Token configuration API permissions Expose an API App roles Owners Roles and administrators | Preview Manifest Support + Troubleshooting

Certificates

Certificates can be used as secrets to prove the application's identity when requesting a token. Also can be referred to as public keys.

Upload certificate

Thumbprint	Start date	Expires	Certificate ID
No certificates have been added for this application.			

Client secrets

A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.

New client secret

Description	Expires	Value	Secret ID
Key1	10/22/2022	gHU7Q~QXl05wZBH-DNGDhvhiaNYwt9...	3bea1adf-28af-44b1-a4f5-3b5ce29e8496

23°C Mostly sunny 1407 2021/10/22

Microsoft Azure portal interface showing the 'Azure services' section with icons for 'Create a resource', 'Subscriptions', 'App registrations', 'Resource groups', 'Deploy a custom...', 'Virtual machines', 'Storage accounts', 'Network security groups', and 'More services'. Below this is a PowerShell terminal window with the following output:

```
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

MOTD: Connect to a remote Azure VM: Enter-AzVM

VERBOSE: Authenticating to Azure ...
VERBOSE: Build $applicationId = '<Azure_AD_Application_ID>'
PS /home/thato>
```

Microsoft Azure portal interface showing the 'Azure services' section. Below this is a PowerShell terminal window with the following output:

```
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

MOTD: Connect to a remote Azure VM: Enter-AzVM

VERBOSE: Authenticating to Azure ...
VERBOSE: Build $kvName = (Get-AzKeyVault -ResourceGroupName 'AZ500LAB10').VaultName
az500kv1995630201
PS /home/thato>
```

Terminal container button

The screenshot shows the Microsoft Azure portal interface. At the top, there are navigation tabs for 'Home - Microsoft Azure', 'sqlApp - Microsoft Azure', and 'Exercise - Add and delete users'. The main header includes a search bar and user profile information for 'Thato155@ctucareer.co.za'. Below the header, there are icons for various Azure services: Create a resource, Subscriptions, App registrations, Resource groups, Deploy a custom..., Virtual machines, Storage accounts, Network security groups, and Network security grou... A PowerShell terminal window is open in the foreground, displaying the following text:

```

PowerShell
Requesting a Cloud Shell.Succeeded.
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

MOTD: Connect to a remote Azure VM: Enter-AzVM

VERBOSE: Authz Set-AzKeyVaultAccessPolicy -VaultName $KeyName -ResourceGroupName AZ590LAB10 -ServicePrincipalName $ApplicationId -PermissionsToKeys get,wrapKey,unwrapKey,sign,verify,list Set-AzKeyVaultAccessPolicy -VaultName $KeyName -ResourceGroupName AZ590LAB10 -ServicePrincipalName $ApplicationId -PermissionsToKeys get,wrapKey,unwrapKey,sign Set-AzKeyVaultAccessPolicy: Cannot find the Active Directory object '' in tenant 'f3ee3467-21df-427e-a894-3a8c66d9b19e'. Please make sure that the user or application service principal you are authorizing is registered in the current subscription's Azure Active directory. The TenantID displayed by the cmdlet 'Get-AzContext' is the current subscription's Azure Active directory.
PS /home/thato>

```

Task 3: Retrieve SQL Azure database ADO.NET Connection String

The screenshot shows the Microsoft Azure portal interface for 'SQL databases'. The page title is 'SQL databases' and the user is 'Thato155@ctucareer.co.za'. Below the title, there are navigation options: Create, Reservations, Manage view, Refresh, Export to CSV, Open query, Assign tags, Delete, and Feedback. A filter bar shows 'Subscription == all', 'Resource group == all', and 'Location == all'. The page indicates 'Showing 1 to 1 of 1 records'. Below this, there is a table with the following data:

Name	Server	Replica type	Pricing tier	Location	Subscription
medical (sqlservnx42upko2here/medical)	sqlservnx4...	--	Basic: 5 DTUs	East US	Azure for Students

At the bottom of the page, there is a pagination control showing 'Page 1 of 1'.

Microsoft Azure portal showing the overview of a SQL database named "medical (sqlserverx42upko2here/medical)".

Essentials:

- Resource group (Move): AZ500LAB10
- Status: Online
- Location: East US
- Subscription (Move): Azure for Students
- Subscription ID: 726c2477-8699-4317-8f15-664a8679c215
- Tags (Edit): displayName: Database
- Server name: sqlserverx42upko2here.database.windows.net
- Elastic pool: No elastic pool
- Connection strings: Show database connection strings
- Pricing tier: Basic
- Earliest restore point: 2021-10-21 10:43 UTC

Compute utilization:

Show data for last: 1 hour | 24 hours | 7 days | Aggregation type: Max

Database data storage: 0.2% USED SPACE

Settings: Compute + storage, Connection strings, Properties, Locks

Microsoft Azure portal showing the connection strings for the "medical (sqlserverx42upko2here/medical)" SQL database.

ADO.NET | JDBC | ODBC | PHP | Go

ADO.NET (SQL authentication)

```
Server=tcp:sqlserverx42upko2here.database.windows.net,1433;Initial Catalog=medical;Persist Security Info=False;User ID=Student;Password={your_password};MultipleActiveResultSets=False;Encrypt=True;TrustServerCertificate=False;Connection Timeout=30;
```

[Download ADO.NET driver for SQL server](#)

Settings: Compute + storage, Connection strings, Properties, Locks

Task 4: Log on to the Azure VM running Visual Studio 2019 and SQL Management Studio 2018

The screenshot shows the Microsoft Azure portal interface. The browser address bar displays the URL: `https://portal.azure.com/#blade/HubsExtension/BrowseResource/resourceType/Microsoft.Compute%2FVirtualMachines`. The page title is "Virtual machines" for the user "CTU Career (ctucareer.co.za)".

At the top, there are navigation options: "Create", "Switch to classic", "Reservations", "Manage view", "Refresh", "Export to CSV", "Open query", "Assign tags", "Start", "Restart", "Stop", "Delete", "Services", and "Maintenance".

Below the navigation, there is a filter bar with "Filter for any field..." and filters for "Subscription == all", "Resource group == all", and "Location == all". There are also "Add filter" and "No grouping" options.

The main content area shows a table of virtual machines with the following columns: Name, Subscription, Resource group, Location, Status, Operating system, Size, Public IP address, and Disks. Two VMs are listed:

Name	Subscription	Resource group	Location	Status	Operating system	Size	Public IP address	Disks
az500-04-vm1	Azure for Students	AZ500LAB04	East US	Running	Windows	Standard_DS2s_v3	52.191.69.179	1
az500-10-vm1	Azure for Students	AZ500LAB10	East US	Running	Windows	Standard_DS2_v2	52.191.112.225	1

At the bottom, there is a pagination control showing "Page 1 of 1" and a Windows taskbar with the system tray showing "27°C Mostly cloudy" and the date "2021/10/22".

The screenshot shows the Microsoft Azure portal interface with the details of the virtual machine "az500-10-vm1" selected. The browser address bar displays the URL: `https://portal.azure.com/#@ctucareer.co.za/resource/subscriptions/726c2477-8699-4317-8f15-664a8679c215/resourceGroups/AZ500LAB10/providers/Micro...`

The page title is "Virtual machines" for the user "CTU Career (ctucareer.co.za)". The selected VM is "az500-10-vm1".

At the top, there are navigation options: "Create", "Switch to classic", "Connect", "Start", "Restart", "Stop", "Move", "Delete", "Refresh", "Open in mobile", and "Feedback".

Below the navigation, there is a search bar and a list of tabs: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Settings, Networking, Connect, Windows Admin Center (preview), Disks, Size, Security, Advisor recommendations, Extensions, Continuous delivery, and Availability + scaling.

The main content area shows the details of the virtual machine "az500-10-vm1". A notification states: "az500-10-vm1 is not using Managed Disks. Migrate to Managed Disks to get more benefits." There is a "JSON View" link.

Under the "Essentials" section, the following information is displayed:

- Resource group (Move): AZ500LAB10
- Operating system: Windows (Windows Server 2019 Datacenter)
- Status: Running
- Size: Standard DS2_v2, 7.5 GiB memory
- Location: East US
- Public IP address: 52.191.112.225
- Virtual network/subnet: az500-10-vnet1/subnet0
- Subscription (Move): Azure for Students
- DNS name: Not configured
- Subscription ID: 726c2477-8699-4317-8f15-664a8679c215
- Tags (Edit): displayName : JumpVM

Below the Essentials section, there are tabs for "Properties", "Monitoring", "Capabilities (8)", "Recommendations (1)", and "Tutorials".

Under the "Virtual machine" section, the following information is displayed:

- Computer name: az500-10-vm1
- Health state: -
- Operating system: Windows (Windows Server 2019 Datacenter)
- Public IP address: 52.191.112.225
- Public IP address (IPv6): -
- Private IP address: 10.110.0.4

At the bottom, there is a pagination control showing "Page 1 of 1" and a Windows taskbar with the system tray showing "27°C Mostly cloudy" and the date "2021/10/22".

Task 5: Create a table in the SQL Database and select data columns for encryption

The screenshot shows the Microsoft Azure portal interface for an Azure SQL Database instance named 'medical'. The instance is located in the East US region and is currently online. The 'Essentials' section displays the following details:

- Resource group (Move): AZ500LAB10
- Status: Online
- Location: East US
- Subscription (Move): Azure for Students
- Subscription ID: 726c2477-8699-4317-8f15-664a8679c215
- Tags (Edit): displayName: Database
- Server name: sqlservxl42upko2here
- Elastic pool: No elastic pool
- Connection strings: Show database connection strings
- Pricing tier: Basic
- Earliest restore point: 2021-10-21 10:43 UTC

The 'Compute utilization' chart shows a line graph with a y-axis from 0% to 100% and an x-axis for time. The 'Database data storage' section shows a donut chart with 0% used space. The left sidebar contains navigation options such as Overview, Activity log, Tags, Diagnose and solve problems, Quick start, Query editor (preview), Power Platform, Settings, and Data management.

This screenshot shows the same Azure SQL Database instance 'medical' after some data has been added. The 'Essentials' section details are identical to the previous screenshot. The 'Database data storage' section now shows 0.2% used space, which is 4 MB. A 'Copied' tooltip is visible over the server name 'sqlservxl42upko2here.database.windows.net'. The 'Compute utilization' chart remains empty. The left sidebar and overall interface are consistent with the previous screenshot.

Session expired x Firewall settings - Microsoft Azure x sqlApp - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#@ctucareer.co.za/resource/subscriptions/726c2477-8699-4317-8f15-664a8679c215/resourceGroups/AZ500LAB10/providers/Micro...

Microsoft Azure Search resources, services, and docs (G+)

Home > medical (sqlserver42upko2here/medical) >

Firewall settings

sqlserver42upko2here (SQL server)

Save Discard + Add client IP

Deny public network access Yes No

Click here to create a new private endpoint.
Create Private Endpoint

Minimum TLS Version 1.0 1.1 1.2

Connection Policy Default Proxy Redirect

Allow Azure services and resources to access this server Yes No

Client IP address 102.252.66.203

Rule name	Start IP	End IP
<input type="text"/>	<input type="text"/>	<input type="text"/>

No firewall rules configured.

Virtual networks
+ Add existing virtual network + Create new virtual network

Rule name	Virtual network	Subnet	Address Range	Endpoint status
No vnet rules for this server.				

27°C Mostly cloudy 14:32 2021/10/22

Session expired x Firewall settings - Microsoft Azure x az500-10-vm1 - Microsoft Azure x sqlApp - Microsoft Azure x Exercise - Add and delete users x Session expired x +

https://portal.azure.com/#@ctucareer.co.za/resource/subscriptions/726c2477-8699-4317-8f15-664a8679c215/resourceGroups/AZ500LAB10/providers/Micro...

Microsoft Azure Search resources, services, and docs (G+)

Home > medical (sqlserver42upko2here/medical) >

Firewall settings

sqlserver42upko2here (SQL server)

Save Discard + Add client IP

Deny public network access Yes No

Click here to create a new private endpoint.
Create Private Endpoint

Minimum TLS Version 1.0 1.1 1.2

Connection Policy Default Proxy Redirect

Allow Azure services and resources to access this server Yes No

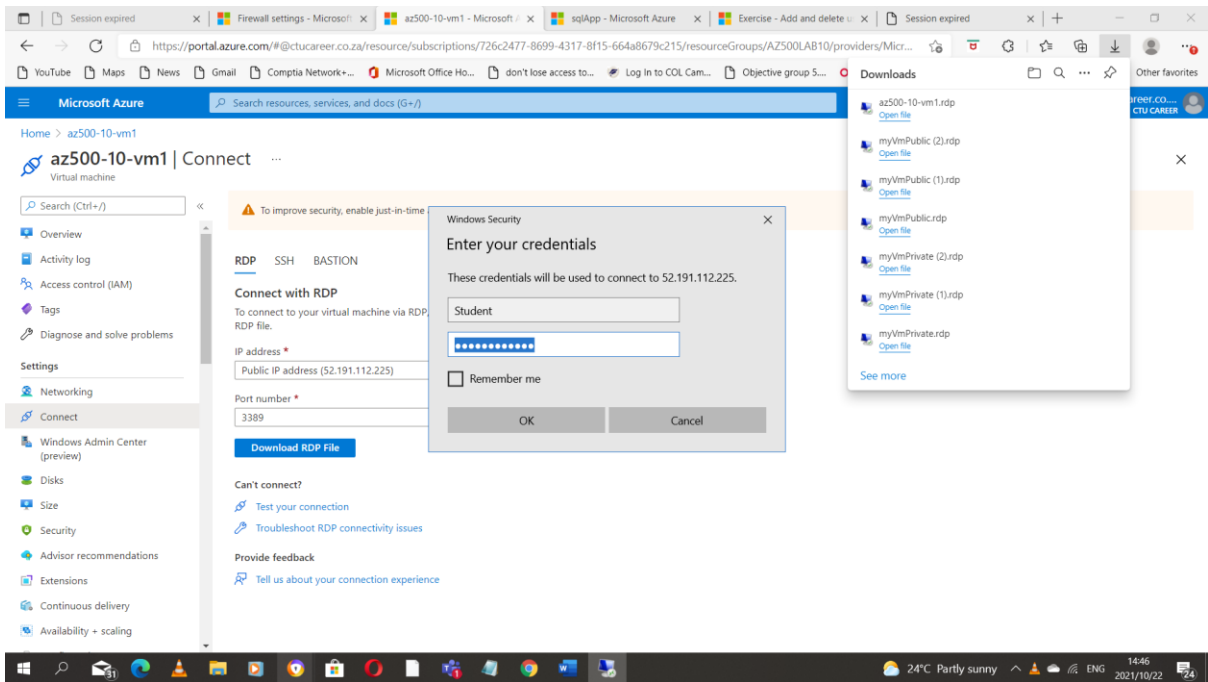
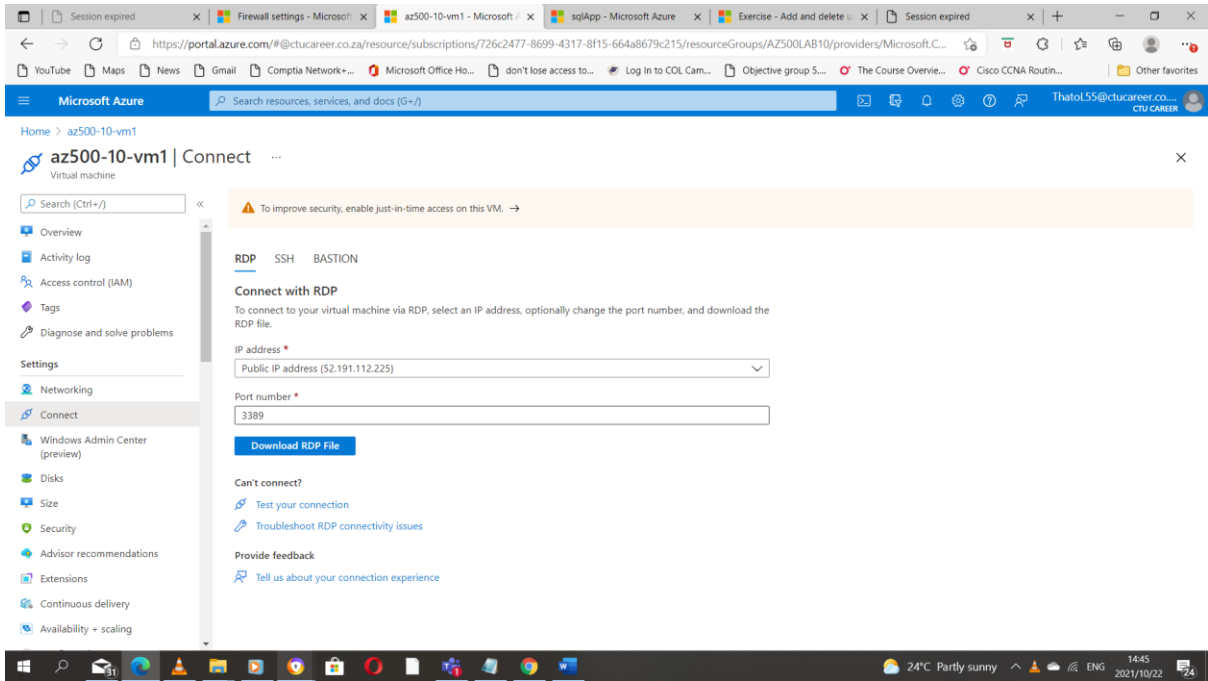
Client IP address 102.252.66.203

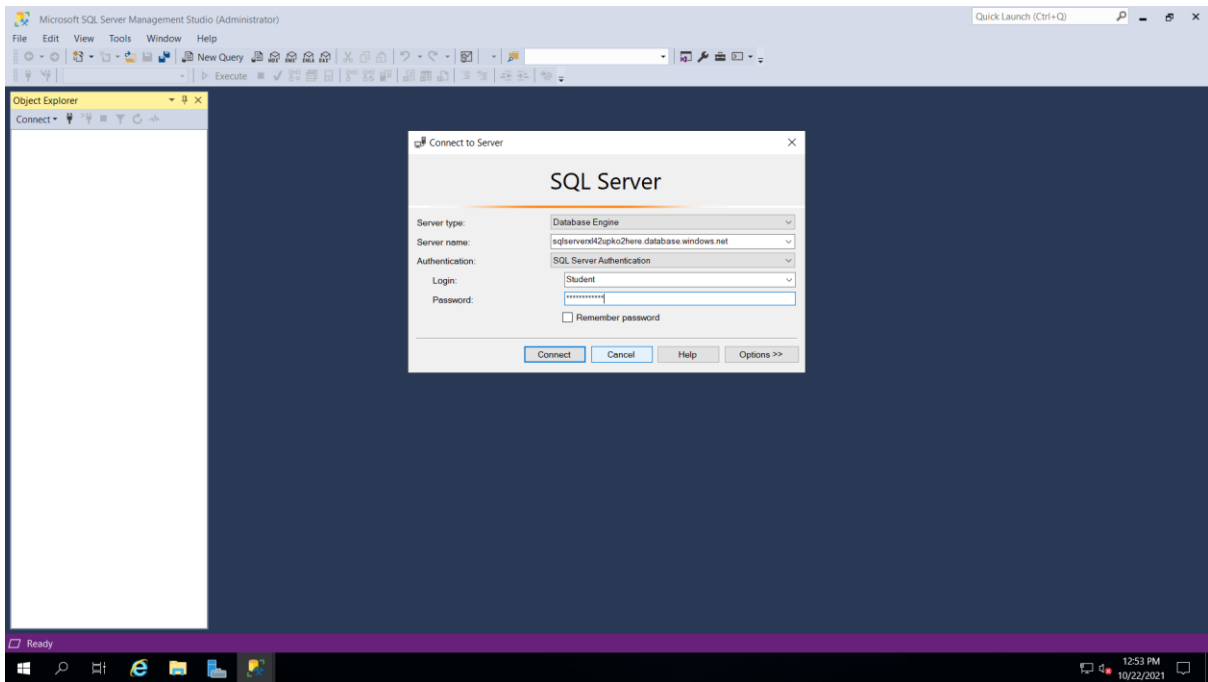
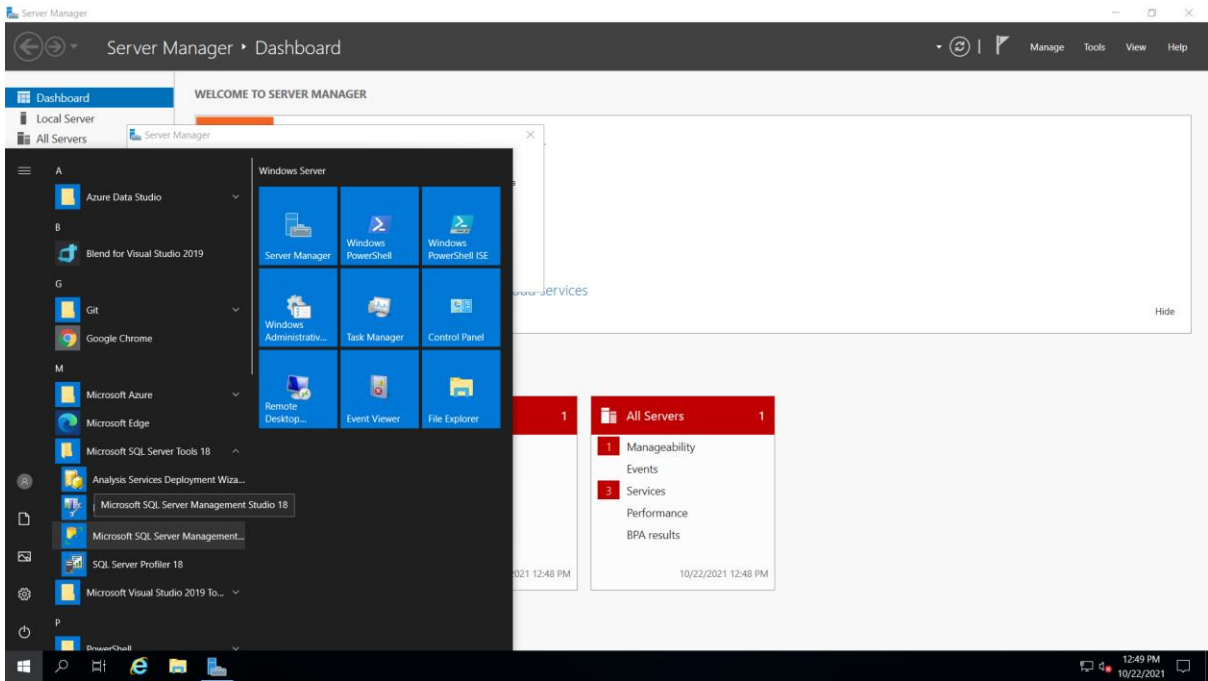
Rule name	Start IP	End IP
<input type="text"/>	<input type="text"/>	<input type="text"/>
Allow Mgmt VM	52.191.112.225	52.191.112.225

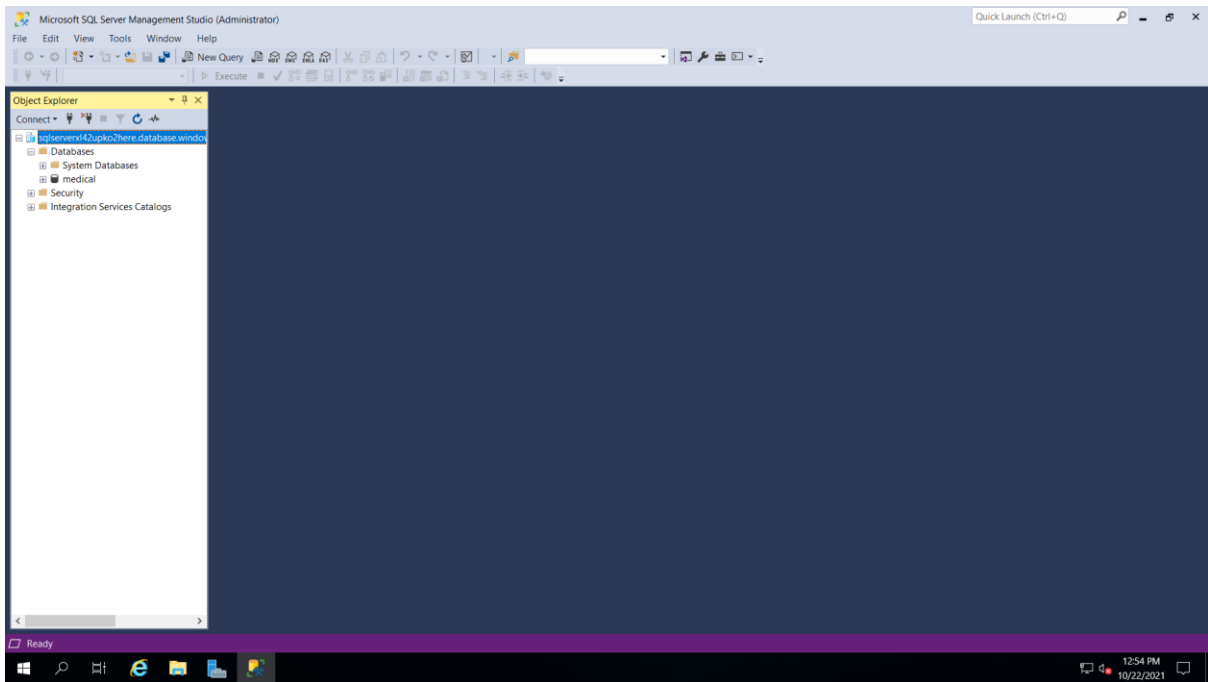
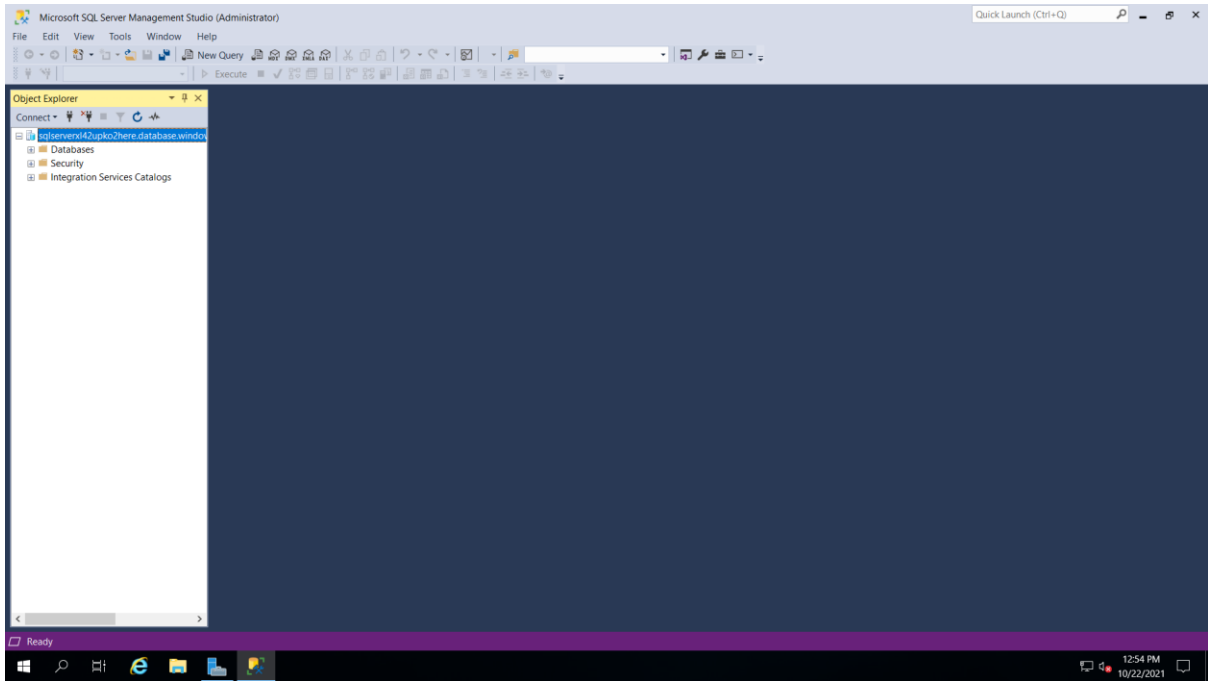
Virtual networks
+ Add existing virtual network + Create new virtual network

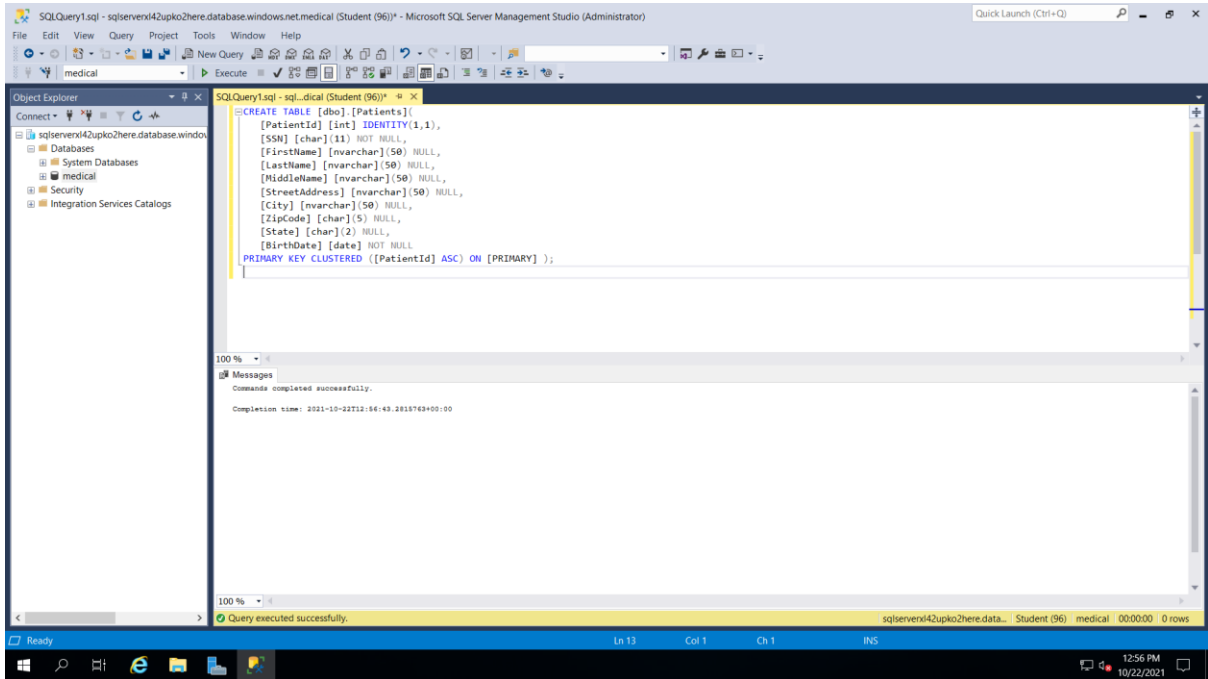
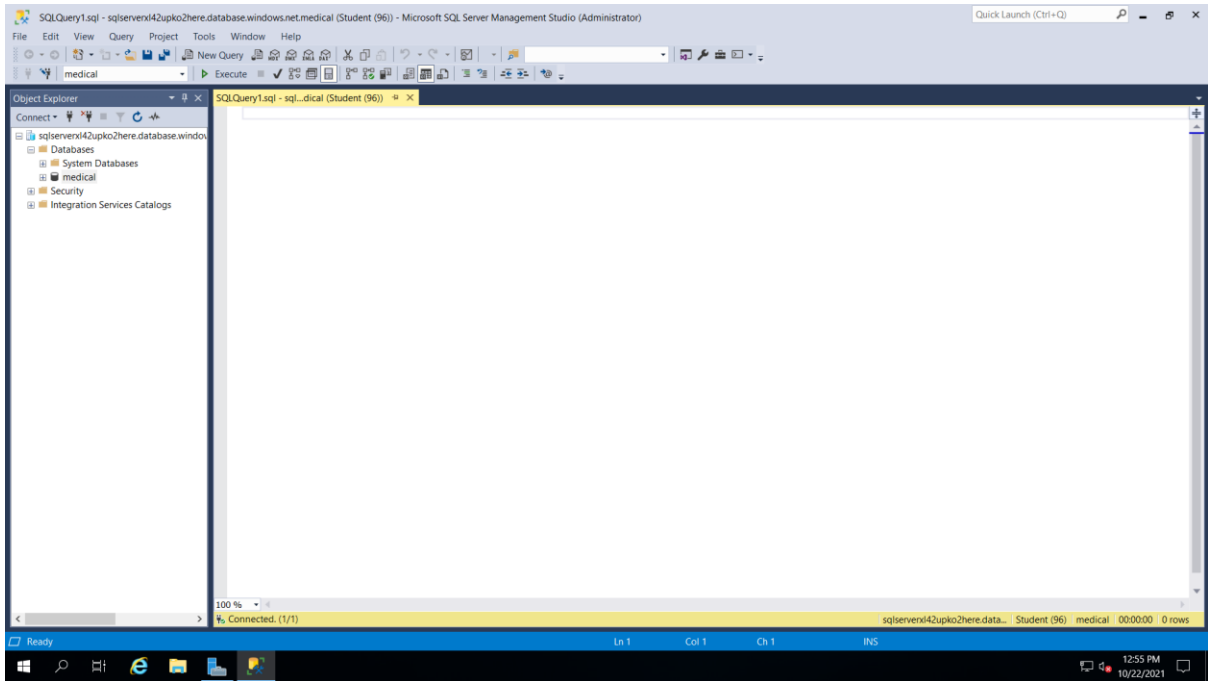
Rule name	Virtual network	Subnet	Address Range	Endpoint status
No vnet rules for this server.				

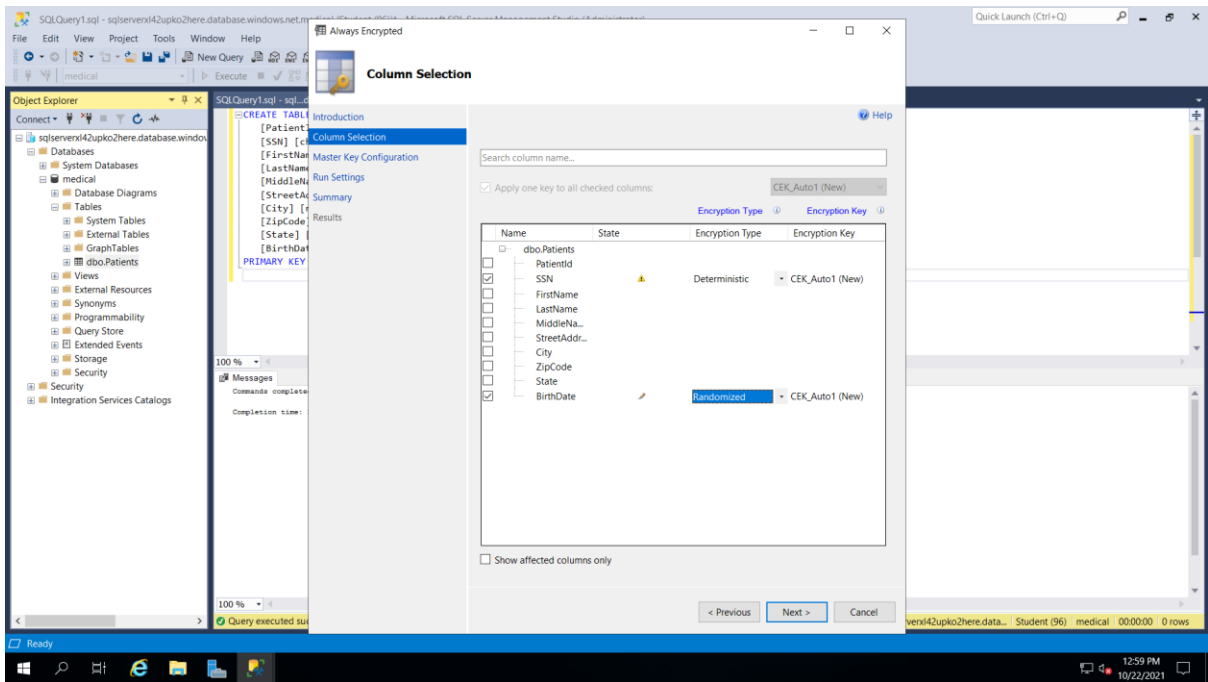
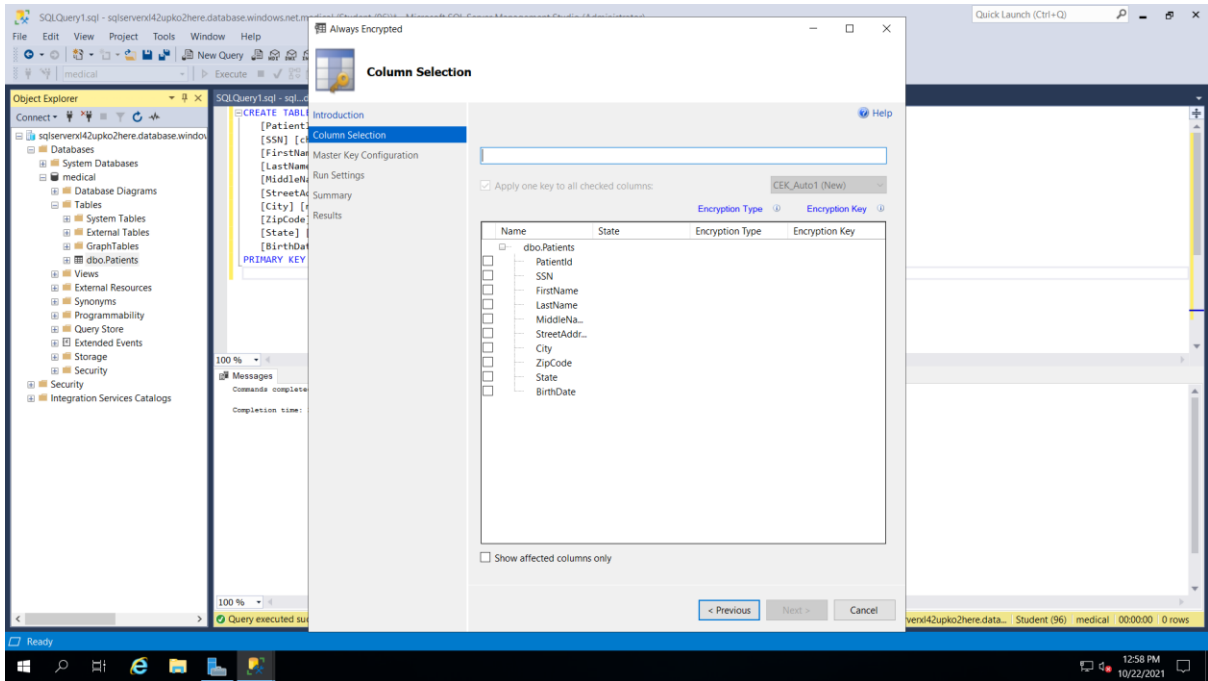
24°C Partly sunny 14:44 2021/10/22



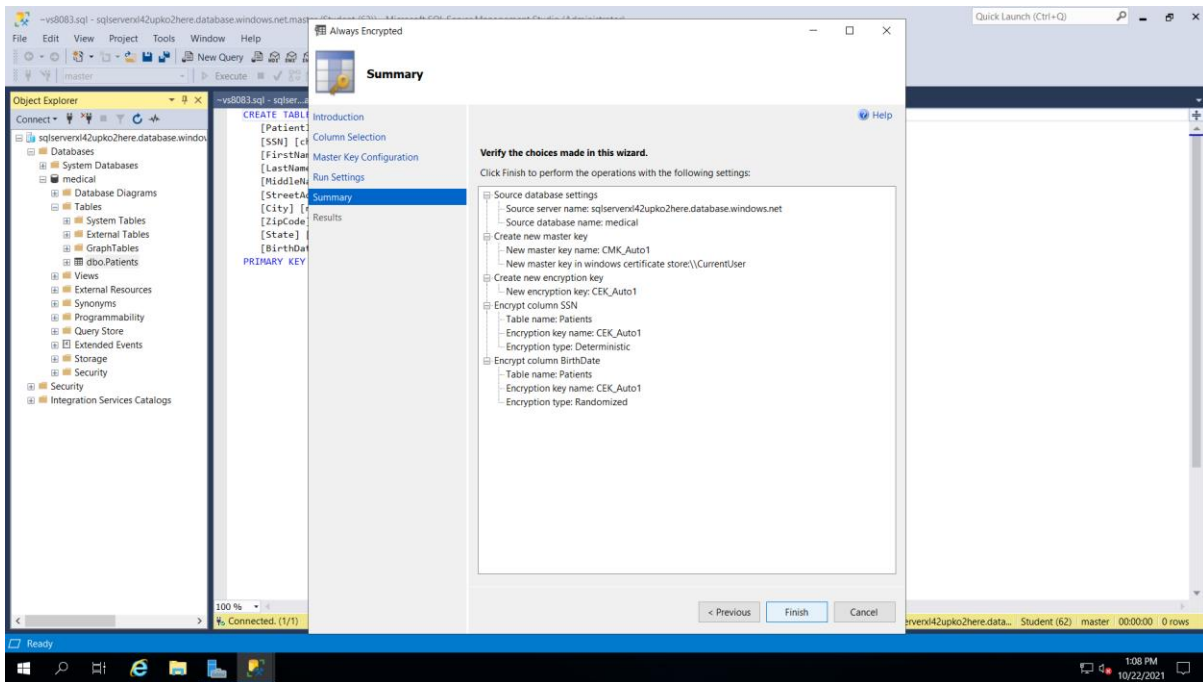
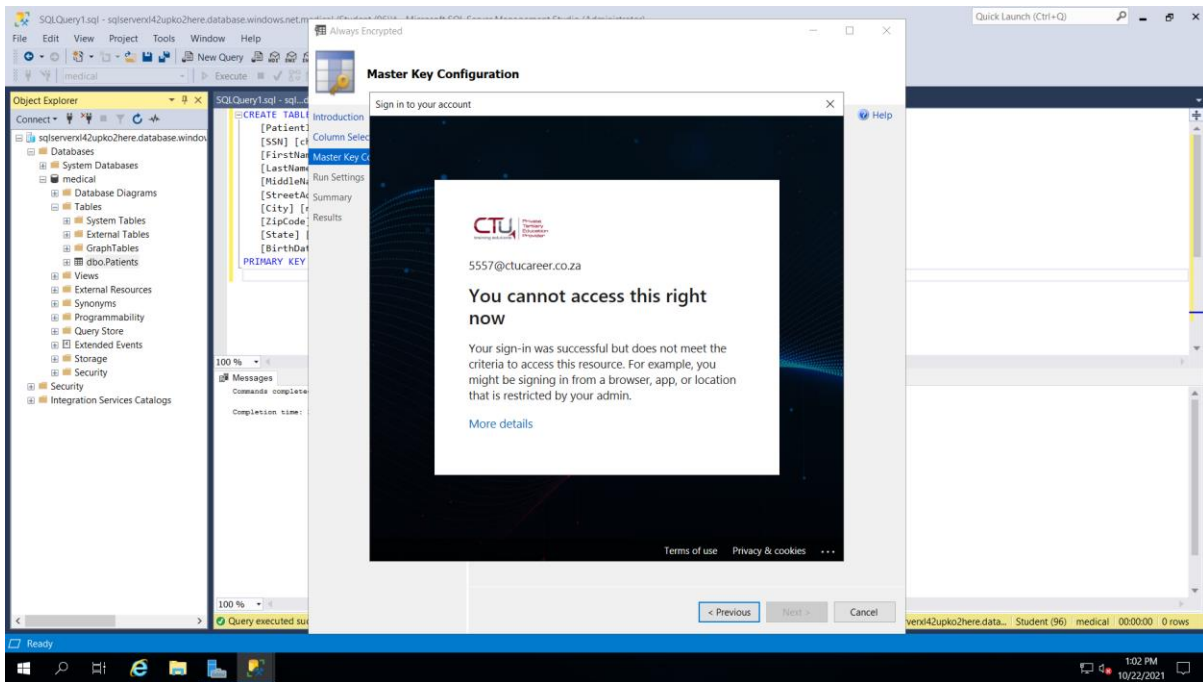


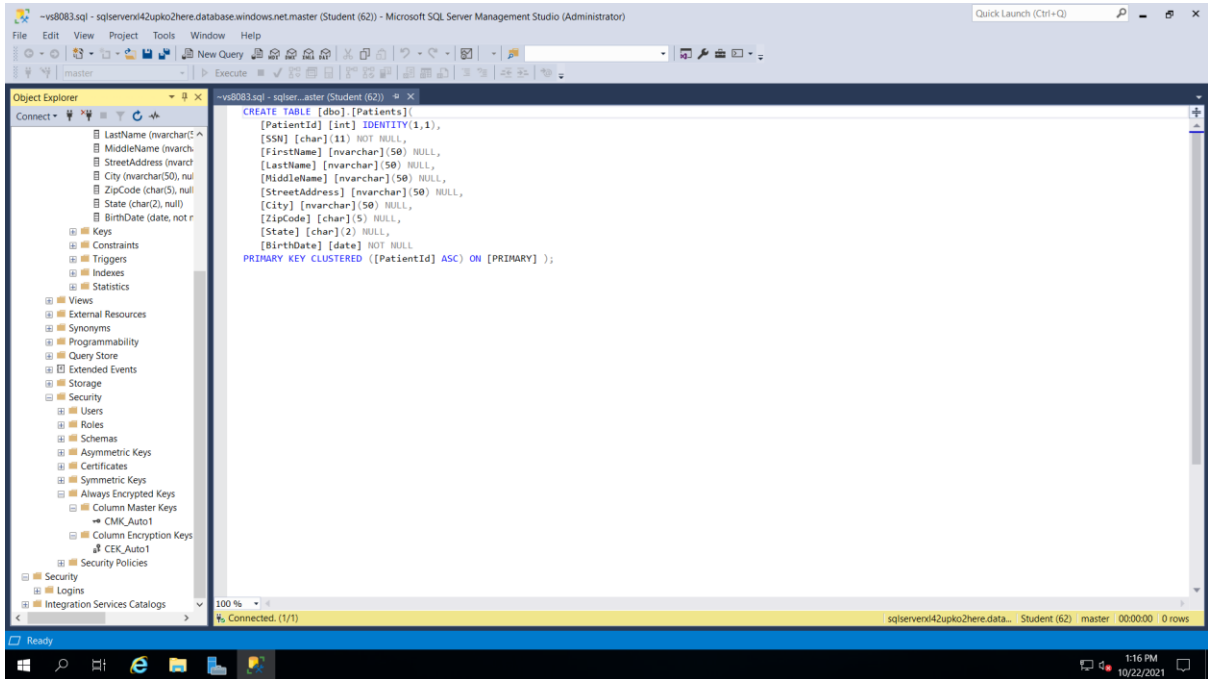
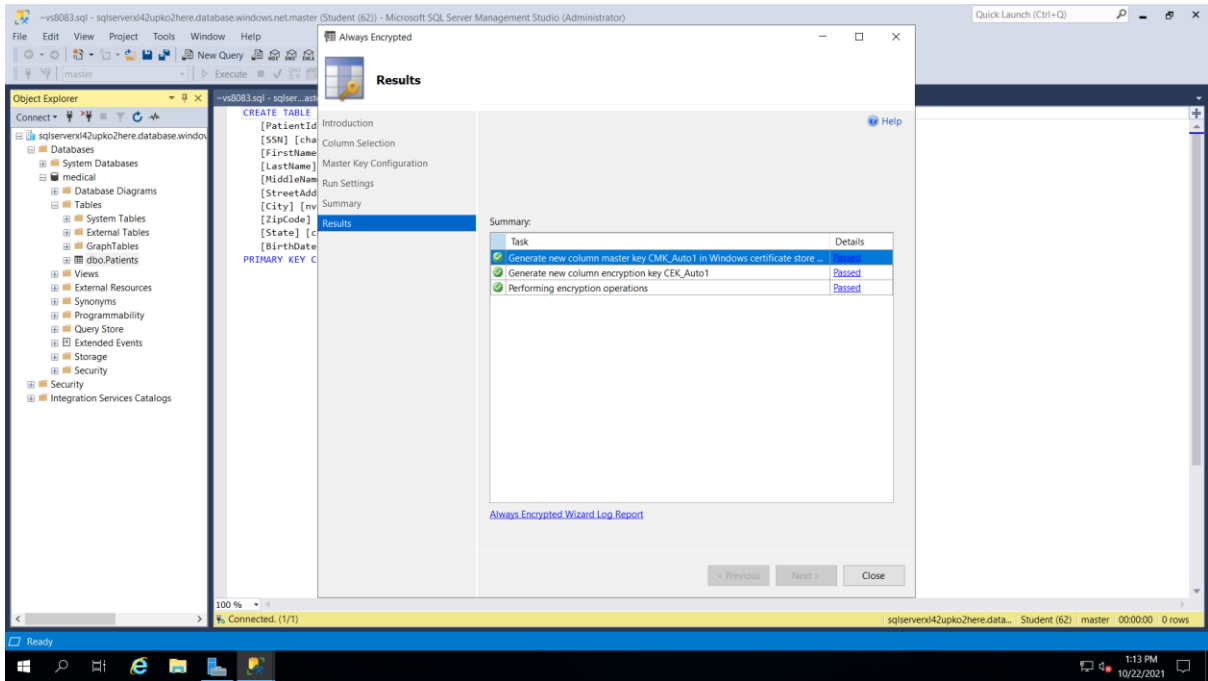






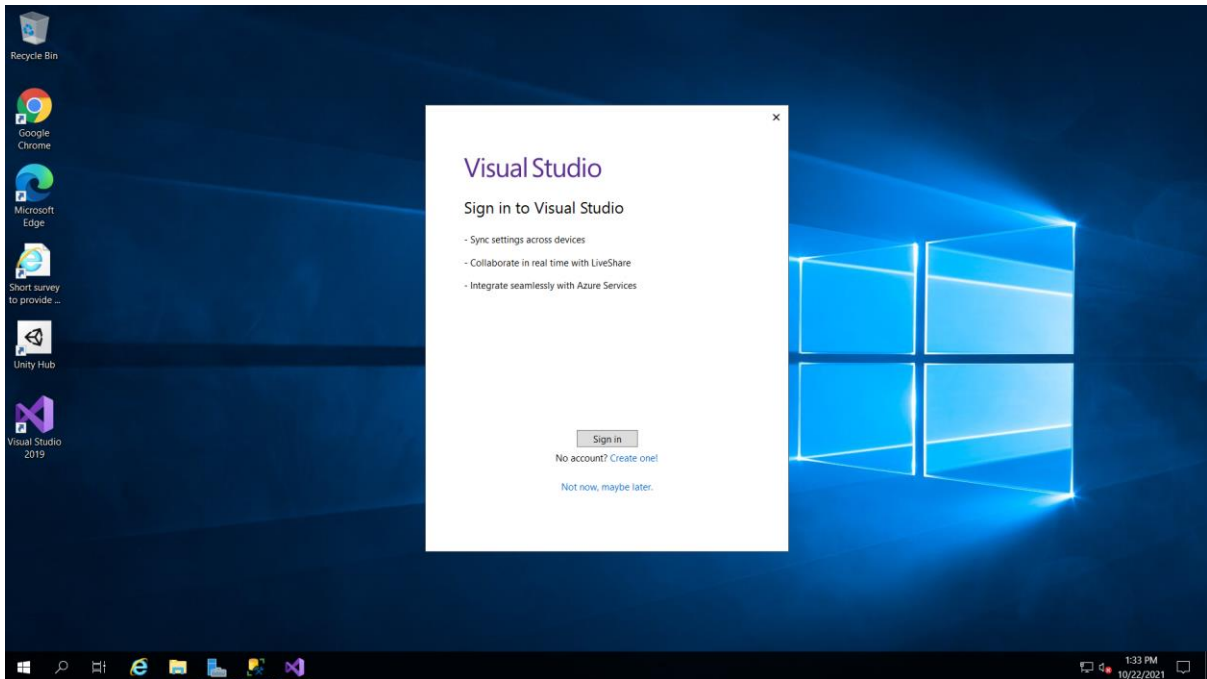
Shows that I can sign in while I am already signed in



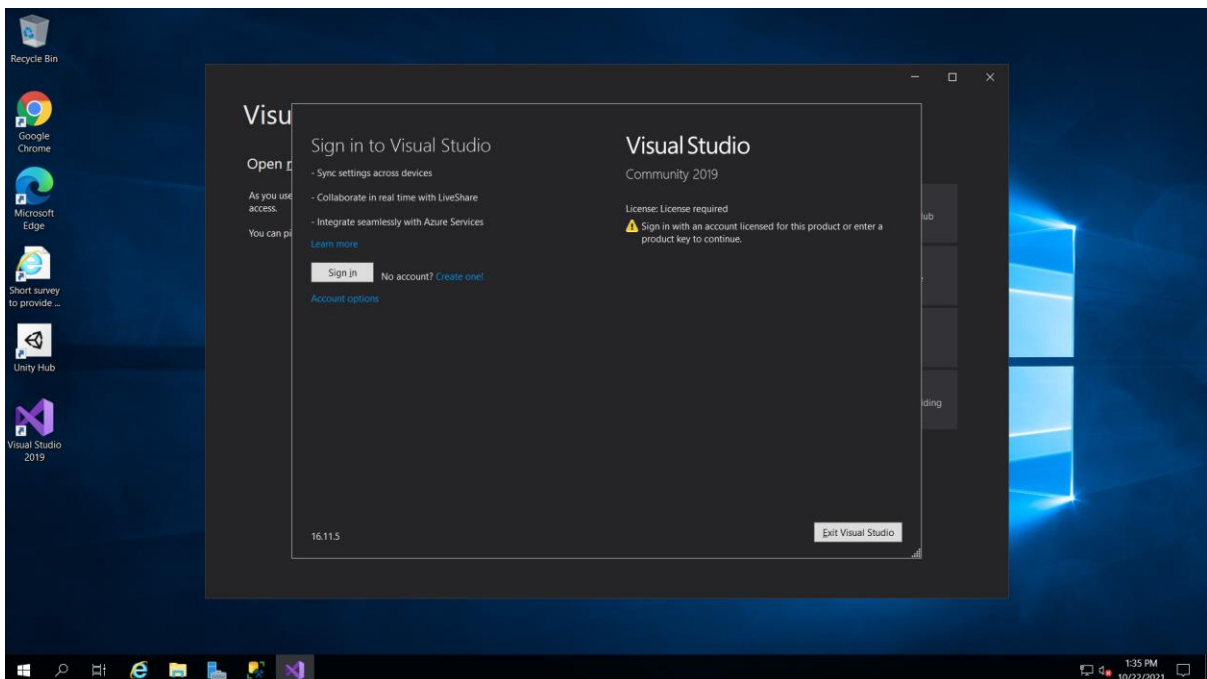


- Demonstrate the use of Azure Key Vault in encrypting the Azure SQL database- [20]

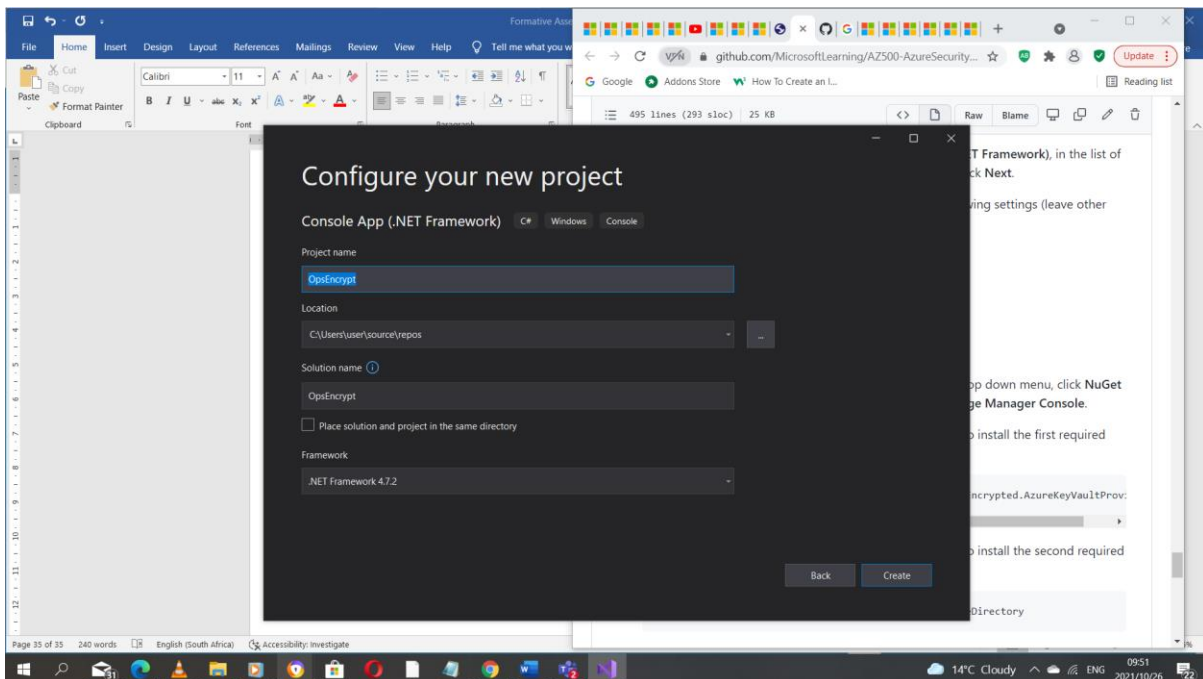
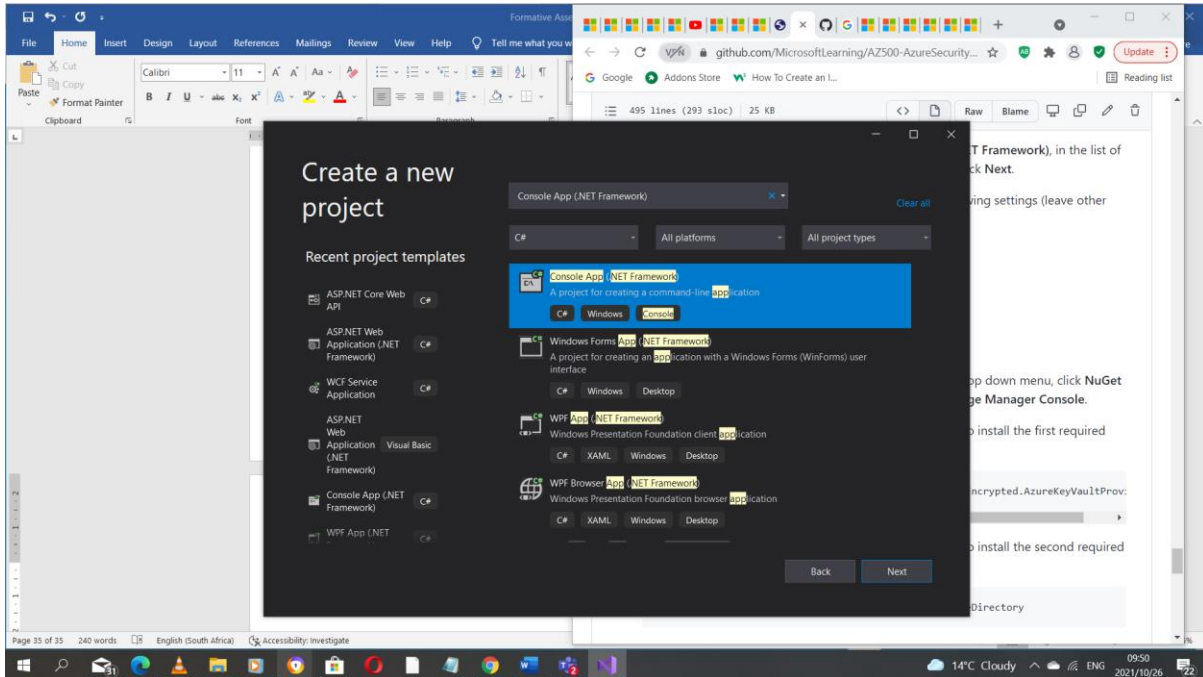
Task 1: Run a data-driven application to demonstrate the use of Azure Key Vault in encrypting the Azure SQL database

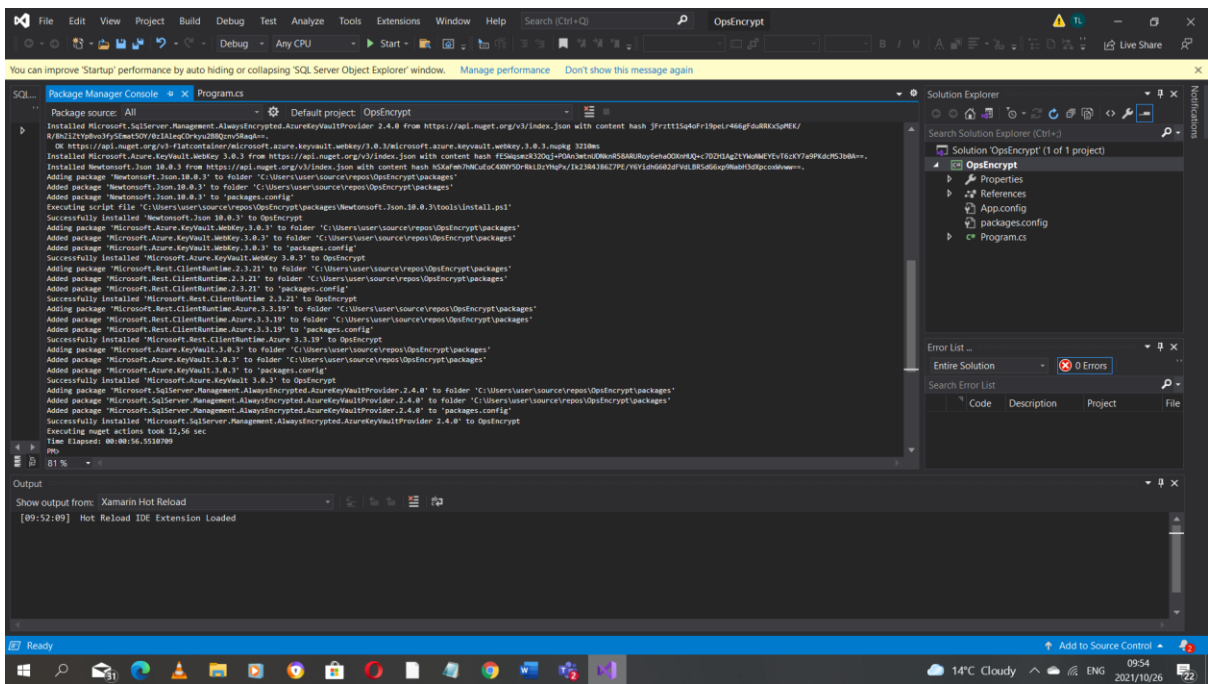
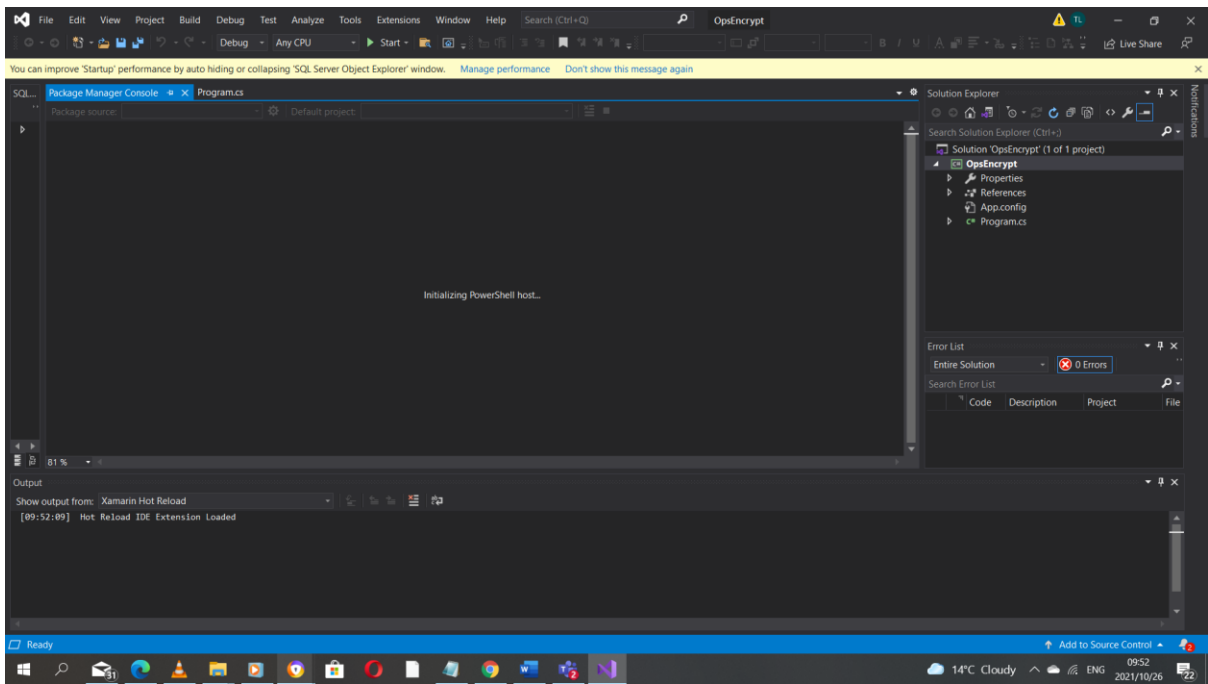


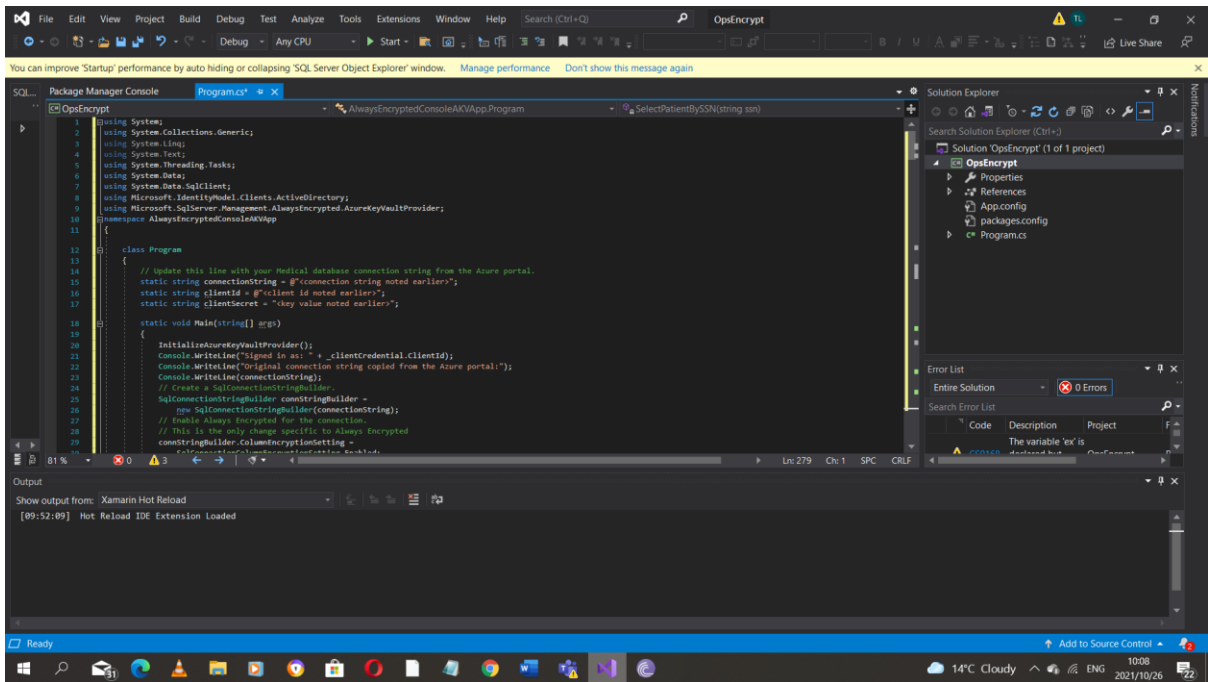
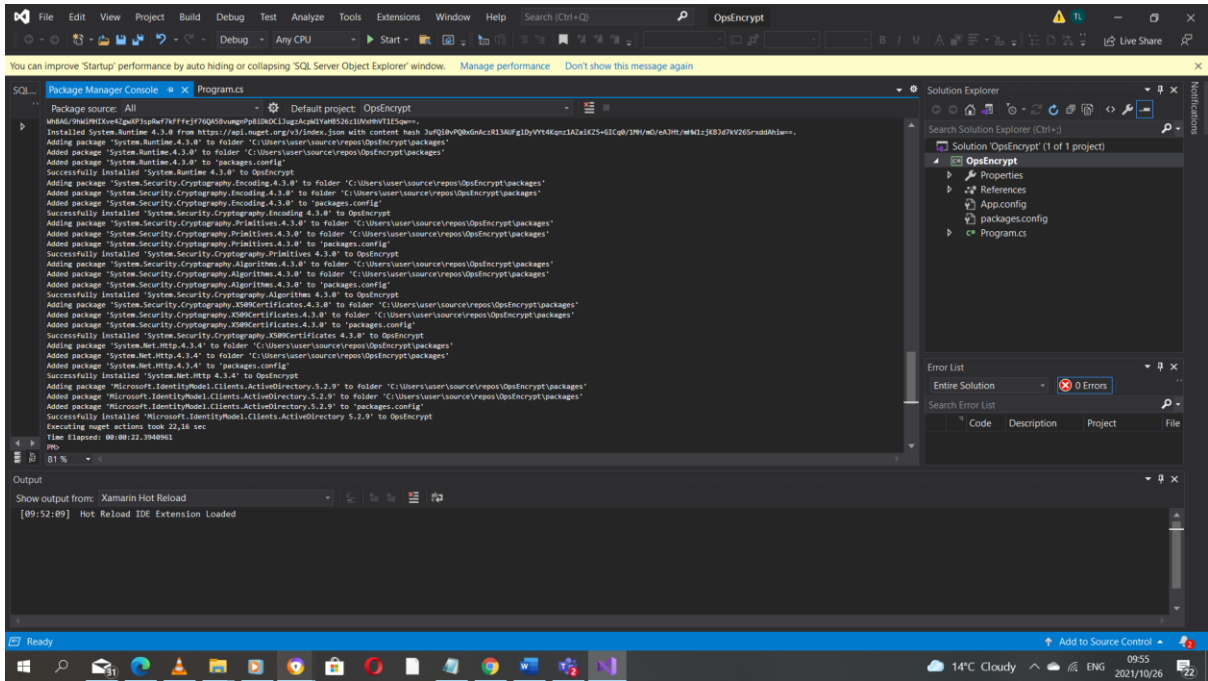
Can't sign in to the visual studio due to I am already logged in using that account

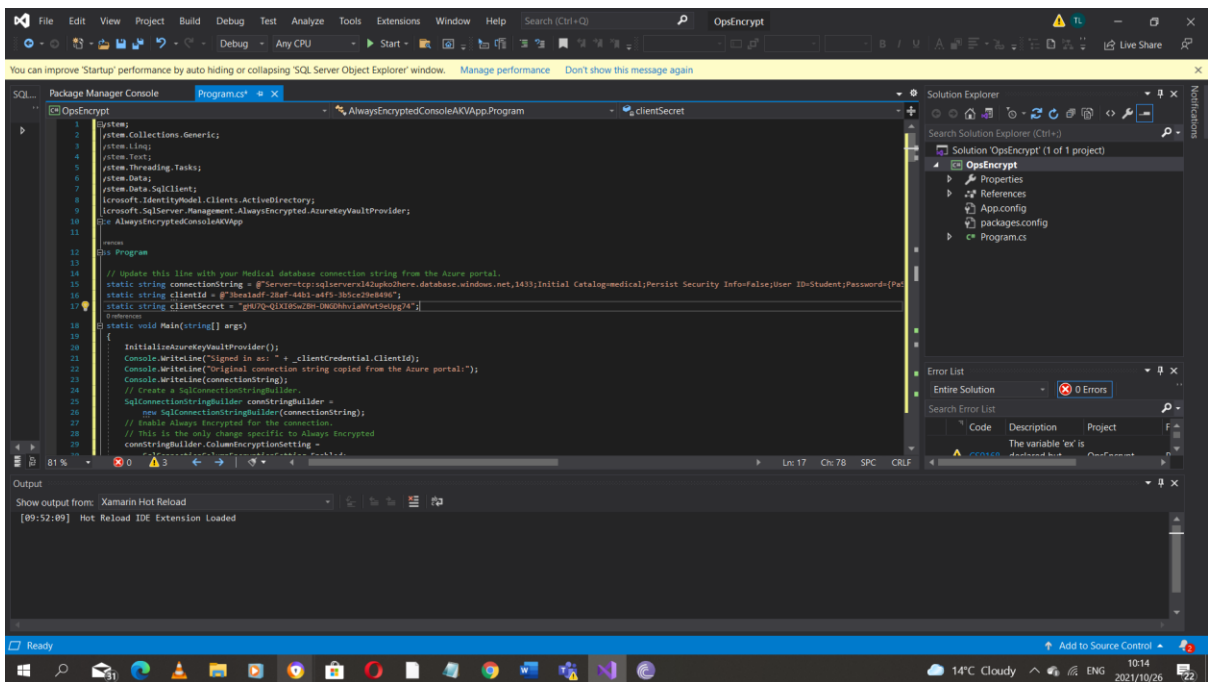
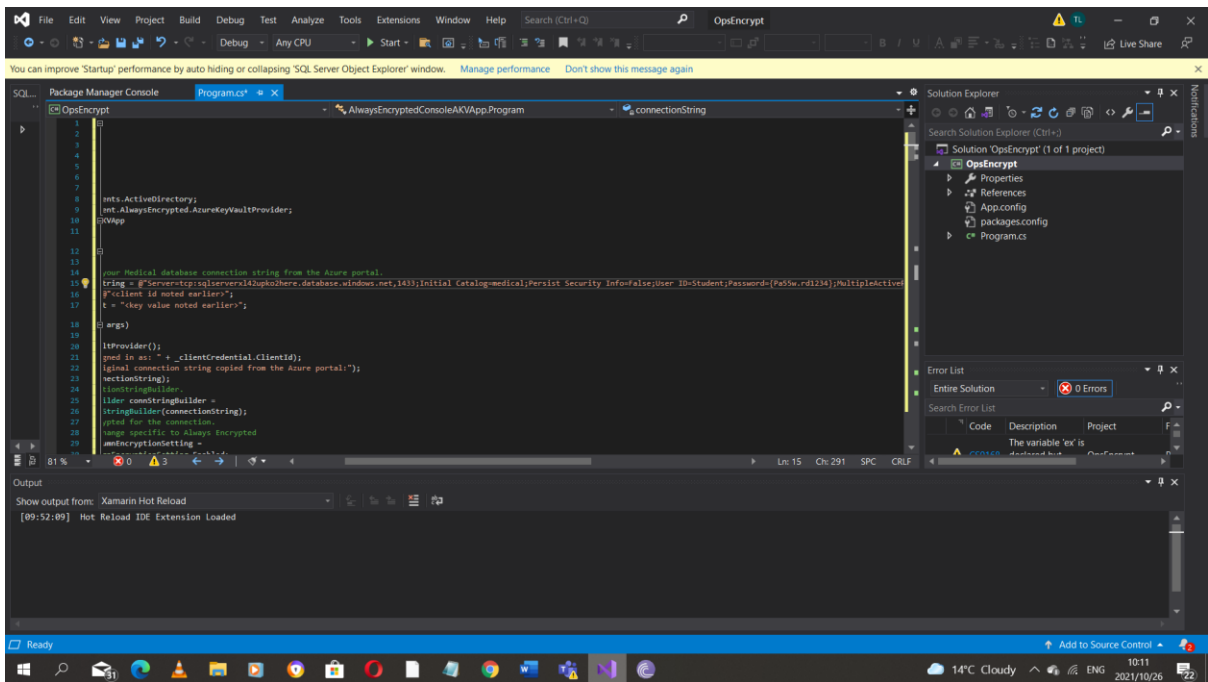


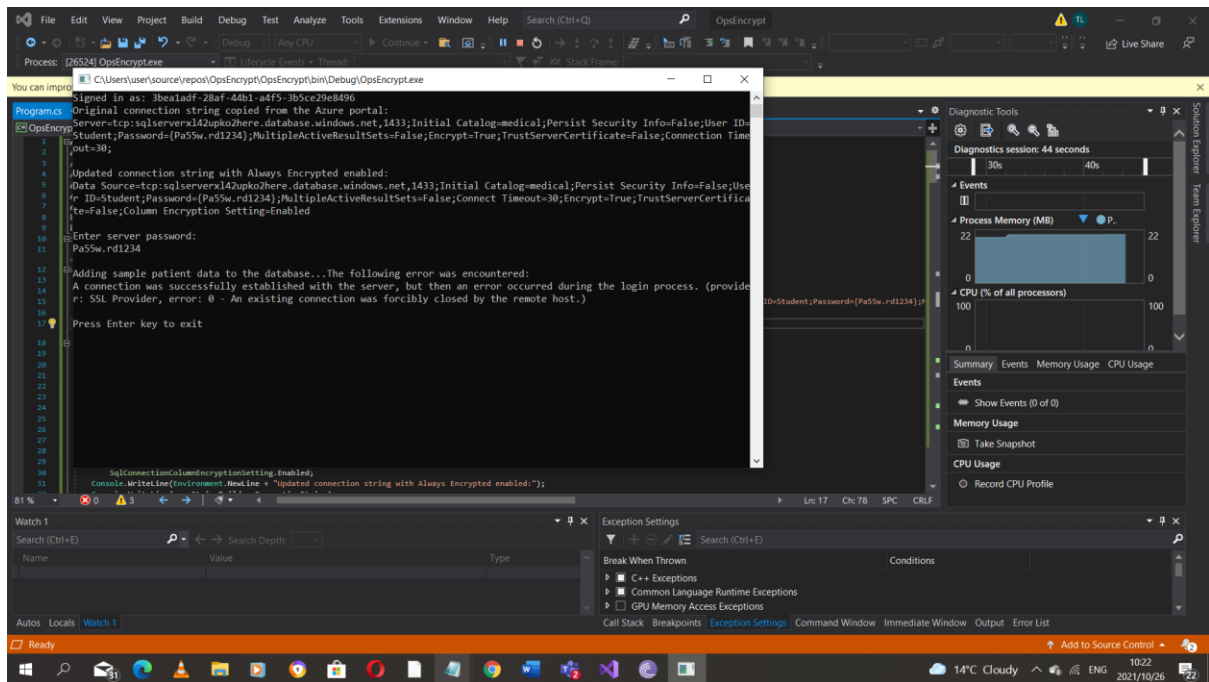
Will just use the visual studio I have just to show more practical way of doing this assignment





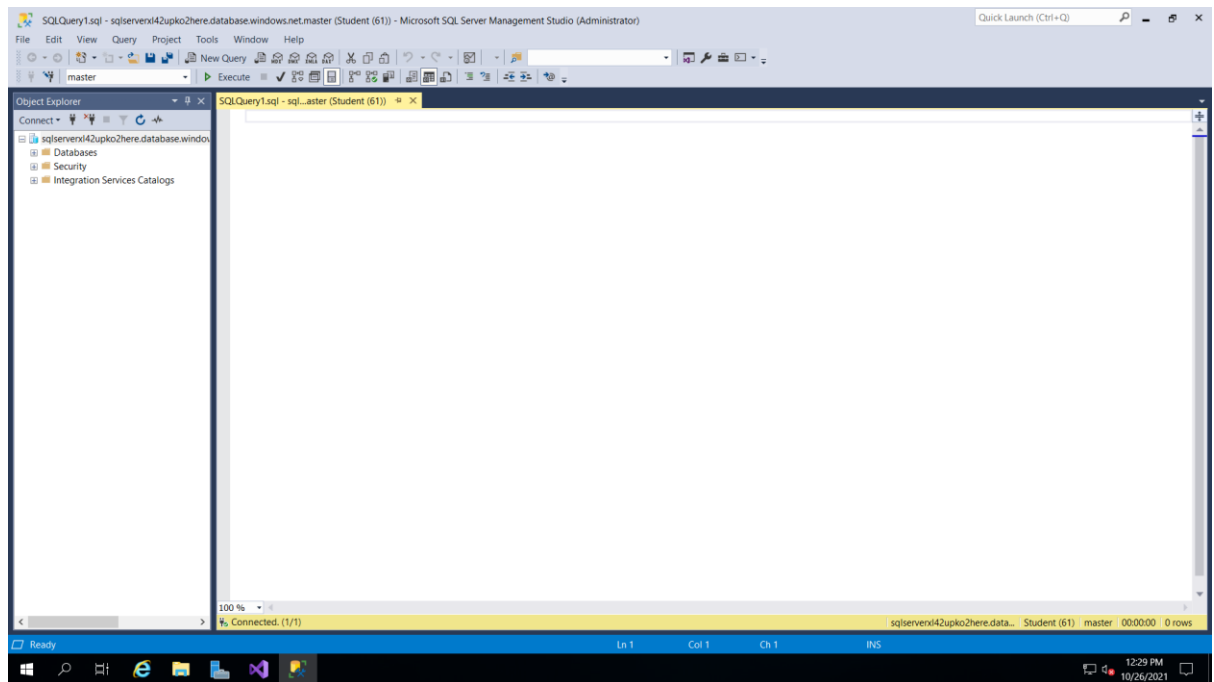






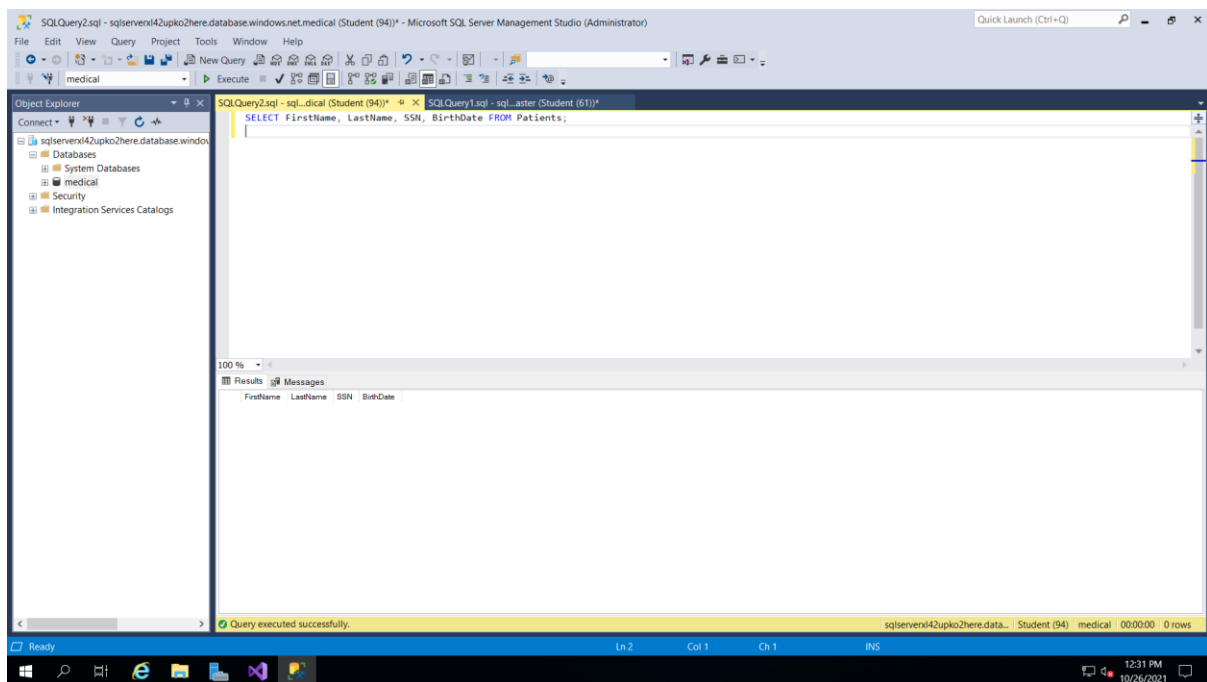
As I did Visual studio code in my own windows didn't use the remote that I had to use it won't be linked with the **SQL Management Studio** that is supposed to be used but let us try and see practically

1. In the **Object Explorer** pane, right-click the medical database and, in the right-click menu, click **New Query**.



2. From the query window, run the following query to verify that the data that loaded into the database from the console app is encrypted.

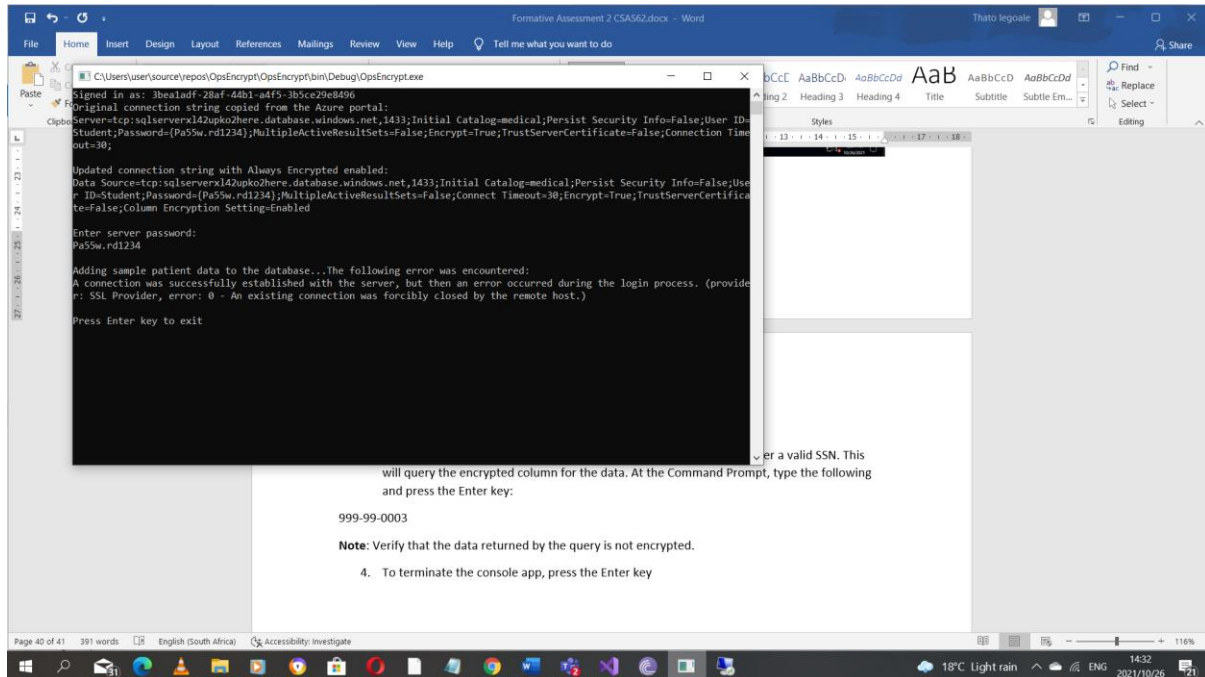
```
SELECT FirstName, LastName, SSN, BirthDate FROM Patients;
```



3. Switch back to the console application where you are prompted to enter a valid SSN. This will query the encrypted column for the data. At the Command Prompt, type the following and press the Enter key:

999-99-0003

It didn't appear that I have to enter SSN



Note: Verify that the data returned by the query is not encrypted.

4. To terminate the console app, press the Enter key

Clean up resources

The screenshot displays the Microsoft Azure portal interface. The top navigation bar shows the user is logged in as 'Thatol55@ctucareer.co.za'. The main content area is titled 'az500-10-vm1 | Connect' and includes a search bar and a navigation menu with options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Settings, and Networking. A warning banner at the top states: 'To improve security, enable just-in-time access on this VM.' Below this, there are tabs for 'RDP', 'SSH', and 'BASTION'. The 'Connect with RDP' section provides instructions and includes input fields for 'IP address' (set to 'Public IP address (52.191.112.225)') and 'Port number' (set to '3389').

Below the portal is a PowerShell terminal window. The terminal output shows the following commands and results:

```
MOTD: Modules installed with 'Install-Module' are persisted across sessions
VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/thato> Remove-AzResourceGroup -Name "AZ500LAB10" -Force -AsJob
```

Id	Name	PSJobTypeName	State	HasMoreData	Location	Command
2	Long Running O...	AzureLongRunni...	Running	True	localhost	Remove-AzResourceGroup

The terminal prompt is 'PS /home/thato>'.

Conclusion

The assignment was done by following the instructions given in some I did what I can in my own way.