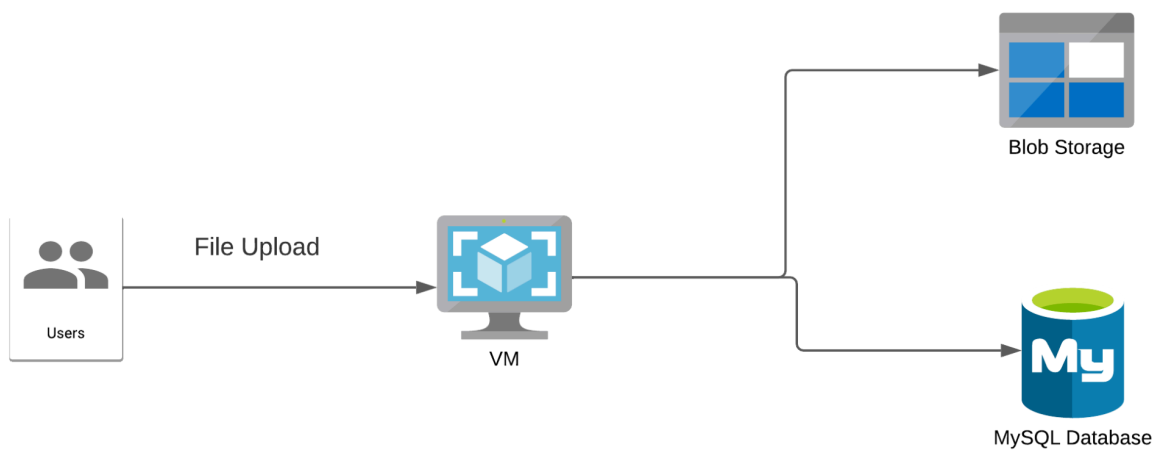


<b>Declaration</b>	
<p>Questions in this exercise are intentionally complex and could be convoluted or confusing. This is by design and to simulate real-life situations where customers seldom give crystal clear requirements and ask unambiguous questions.</p>	
<p>I have read the above statement and agree to these conditions</p>	
I AGREE	Alka Sinha
	<Enter your name above this line to indicate that you are in agreement>

<b>Instructions</b>	
<p>Every screenshot requested in this workbook is compulsory and carries 1 marks</p>	
<p>Your Azure account ID must be clearly visible in every screenshot using the Azure portal; missing id or using someone else's id is not permitted. Such cases will be considered as plagiarism and severe penalty will be imposed.</p>	
<p>All screenshots must be in the order mentioned under "Expected Screenshots" for every step</p>	
<p>DO NOT WAIT UNTIL THE LAST MINUTE. The program office will not extend the project submission deadline under any circumstances.</p>	
<p>The file should be renamed in the format BATCH_FIRSTNAME_LASTNAME_PROJECT1. For example: PGPCCMAY18_VIJAY_DWIVEDI_PROJECT1.pdf</p>	

<b>Resource Clean Up</b>	
<p>Cloud is always pay per use model and all resources/services that we consume are chargeable. Cleaning up when you've completed your lab or project is always necessary. This is true whether you're doing a lab or implementing a project at your workplace.</p>	
<p>After completing the lab, make sure to delete each resource created in reverse chronological order.</p>	

### Architecture diagram



### Architecture Implementation

1	Upload the custom program and provided text file to a VM created using Ubuntu
2	Create a MySQL server using Azure Database service
3	Create a database inside the MySQL server created above
4	Running the custom program will convert the text file into a CSV file, upload it to blob storage and send the data to the MySQL server.



## Step 1: Creation of resources

Step number	a
Step name	Creation of Resource group and blob storage
Instructions	<ol style="list-style-type: none"><li>1) Create a resource group using any region. Use the same resource group for all resources created in this exercise.</li><li>2) Navigate to Storage Accounts and Click on Create.</li><li>3) Enter a name and region for the Storage Account. The rest of the fields can be left to their default values.</li><li>4) Once the storage account has been created, navigate to the resource.</li><li>5) Using the menu on the left, navigate to Access Keys and note down the Connection String value for key 1. You may have to click on the Show keys button at the top of the screen to make the values visible.</li></ol>
Expected screenshots	<ol style="list-style-type: none"><li>1) Screen showing created storage account</li></ol>

## Created storage account screenshot

The screenshot displays the Microsoft Azure portal interface. At the top, the header shows 'Microsoft Azure' with a search bar and user information. The main content area is titled 'srforproj2\_1710957799201 | Overview' and shows a deployment status of 'Your deployment is complete'. The deployment details include the name 'srforproj2\_1710957799201', subscription 'Azure subscription 1', and resource group 'rgforproj2'. The start time is '3/20/2024, 11:03:22 AM' and the correlation ID is '83b0944d-954c-4018-8ce4-10f5567c6f12'. On the left, a sidebar lists 'Overview', 'Inputs', 'Outputs', and 'Template'. On the right, there are recommendations for 'Cost Management', 'Microsoft Defender for Cloud', 'Free Microsoft tutorials', and 'Work with an expert'.

Step number	b
Step name	Creation of VM

Instructions	<ol style="list-style-type: none"> <li>1) Navigate to Virtual Machines</li> <li>2) Create a VM using the Ubuntu 20.04 image.</li> <li>3) Make sure that port 22 is enabled in inbound ports for the VM during creation.</li> <li>4) Authentication type needs to be SSH public key. Make sure you note down the value you enter in the Username field.</li> <li>5) The rest of the fields can be left to their default values. Click on Create.</li> </ol>
Expected screenshots	1) Created VM

## VM screenshot

The screenshot displays the Microsoft Azure portal interface. At the top, the navigation bar shows 'Microsoft Azure' and a search bar. Below the navigation bar, the breadcrumb trail indicates 'Home > CreateVm-canonical.0001-com-ubuntu-server-focal-2-20240320112553 | Overview'. The main content area features a green checkmark icon and the text 'Your deployment is complete'. Below this, deployment details are listed: 'Deployment name: CreateVm-canonical.0001-com-ubuntu-server-...', 'Subscription: Azure subscription 1', and 'Resource group: rgforproj2'. The start time is '3/20/2024, 11:26:53 AM' and the correlation ID is '645eeeb-7615-4662-99f7-37e7'. A section titled 'Next steps' provides recommendations: 'Setup auto-shutdown', 'Monitor VM health, performance and network dependencies', and 'Run a script inside the virtual machine'. At the bottom of this section are buttons for 'Go to resource' and 'Create another VM'. On the right side, there are three promotional cards: 'Cost Management', 'Microsoft Defender for Cloud', and 'Free Microsoft tutorials'.

Microsoft Azure

Search resources, services, and docs (G+/I)

alkasinha2011@gmail.c...  
DEFAULT DIRECTORY (ALKASINH...)

Home > CreateVm-canonical.0001-com-ubuntu-server-focal-2-20240320112553 | Overview

Deployment

Search

Delete Cancel Redeploy Download Refresh

Overview

Inputs

Outputs

Template

**Your deployment is complete**

Deployment name: CreateVm-canonical.0001-com-ubuntu-server-... Start time: 3/20/2024, 11:26:53 AM  
Subscription: Azure subscription 1 Correlation ID: 645eeeb-7615-4662-99f7-37e7  
Resource group: rgforproj2

Deployment details

Next steps

Setup auto-shutdown Recommended

Monitor VM health, performance and network dependencies Recommended

Run a script inside the virtual machine Recommended

Go to resource Create another VM

Give feedback

Tell us about your experience with deployment

**Cost Management**  
Get notified to stay within your budget and prevent unexpected charges on your bill.  
Set up cost alerts >

**Microsoft Defender for Cloud**  
Secure your apps and infrastructure  
Go to Microsoft Defender for Cloud >

**Free Microsoft tutorials**  
Start learning today >

**Work with an expert**  
Azure experts are service provider partners

Step number	c
Step name	Creation of MySQL server
Instructions	<ol style="list-style-type: none"><li>1) Navigate to Azure Database for MySQL servers using the search bar at the top of the Azure portal and click on Create</li><li>2) Select the Flexible Server option</li><li>3) Enter the server name of choice and the username and password. Make sure to note down the username and password you have entered.</li><li>4) Under networking, ensure public access is allowed and check the box "Allow public access from any Azure service within Azure to this server"</li><li>5) The rest of the fields can be left to their default values. Click on Create.</li><li>6) Once the server has been created, navigate to the resource and note down the Server Name field present in the Overview section.</li></ol>
Expected screenshots	<ol style="list-style-type: none"><li>1) Overview screen of the created database server.</li></ol>

## Database server

Microsoft Azure

Search resources, services, and docs (G+)

alkasinha2011@gmail.c...  
DEFAULT DIRECTORY (ALKASINH...

All services >

MySQLFlexibleServer\_c1b0309281354659976f56695c857796 | Overview

Deployment

Search

DeleteCancelRedeployDownloadRefresh

Overview

Inputs

Outputs

Template

✔ Your deployment is complete

Deployment name: MySQLFlexibleServer\_c1b030928135465997...

Subscription: [Azure subscription 1](#)

Resource group: [rgforproj2](#)

Start time: 3/20/2024, 11:48:53 AM

Correlation ID: 7a36825f-fc34-41ea-8bb5-e0f0f7c3

Deployment details

Next steps

[Learn how to manage your server](#) Recommended

[For public access connectivity, setup a firewall rule to connect to the server](#) Recommended

[Learn about private access connectivity method](#) Recommended

[Setup monitoring alerts](#) Recommended

Go to resource

Give feedback

[Tell us about your experience with deployment](#)

Cost Management

Get notified to stay within your budget and prevent unexpected charges on your bill.  
[Set up cost alerts >](#)

MySQL

Get started with MySQL Flexible Server

Free Microsoft tutorials

Create PHP + MySQL App

Work with an expert

Azure experts are service provider partners who can help manage your assets on Azure and be your first line of support.

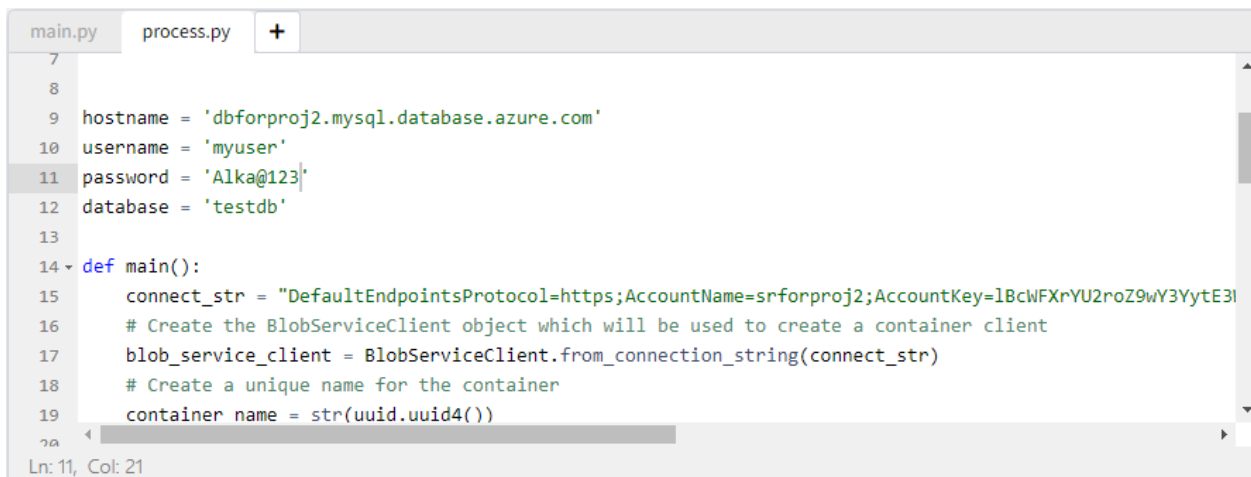
Step 2: Run the custom program in the VM

Step number    a

Step name      Environment setup

Instructions	<ol style="list-style-type: none"> <li>1) Download the invoice file and python script provided with this workbook.</li> <li>2) Open the Python script using your text editor or code editor of choice</li> <li>3) Replace the values in lines 9,10,11, and 15 with the database server name, username, password, and storage account connection string(received in step 1(a)(5)) respectively. Save the file.</li> <li>4) Copy both the files to the VM using the scp command.  <pre>scp -i &lt;pem file&gt; &lt;file to be copied&gt; &lt;VM username&gt;@&lt;public IP of VM&gt;:/home/ubuntu</pre> You will need to run the scp command twice, once for each file.</li> <li>5) SSH into the VM using your SSH client of choice and run the below commands to set up the environment   <pre>sudo apt install python3 sudo apt install python3-pip sudo pip3 install pandas sudo pip3 install azure-storage-blob sudo pip3 install mysql-connector-python sudo apt install mysql-client-core-8.0</pre> </li> </ol>
Expected screenshots	<ol style="list-style-type: none"> <li>1) Screenshot of the process.py file after completing Step3 above</li> <li>2) Copying the files using scp</li> <li>3) Screenshot after completing Step 5 above.</li> </ol>

### Screenshot of the process.py file after completing Step3 above



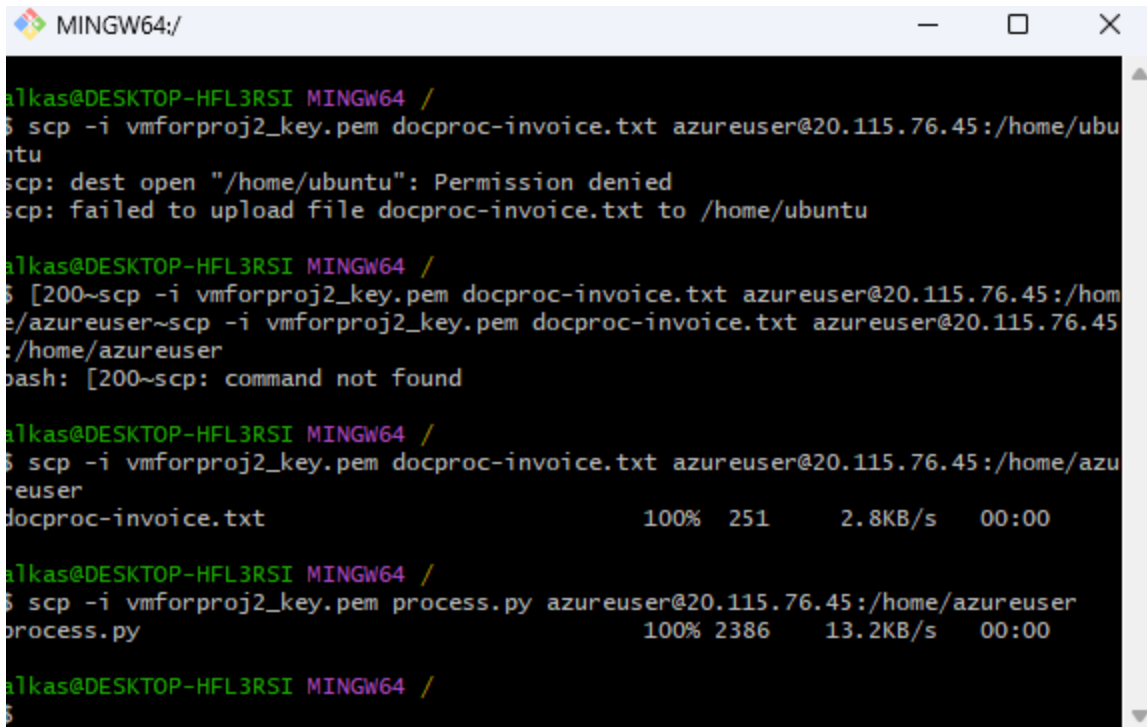
```

main.py  process.py  +
7
8
9 hostname = 'dbforproj2.mysql.database.azure.com'
10 username = 'myuser'
11 password = 'Alka@123'
12 database = 'testdb'
13
14 def main():
15     connect_str = "DefaultEndpointsProtocol=https;AccountName=srforproj2;AccountKey=1BcWFXrYU2roZ9wY3YytE3I
16     # Create the BlobServiceClient object which will be used to create a container client
17     blob_service_client = BlobServiceClient.from_connection_string(connect_str)
18     # Create a unique name for the container
19     container_name = str(uuid.uuid4())
20
Ln: 11, Col: 21

```

### Copying files using SCP





```
alkas@DESKTOP-HFL3RSI MINGW64 /
$ scp -i vmforproj2_key.pem docproc-invoice.txt azureuser@20.115.76.45:/home/ubuntu
scp: dest open "/home/ubuntu": Permission denied
scp: failed to upload file docproc-invoice.txt to /home/ubuntu

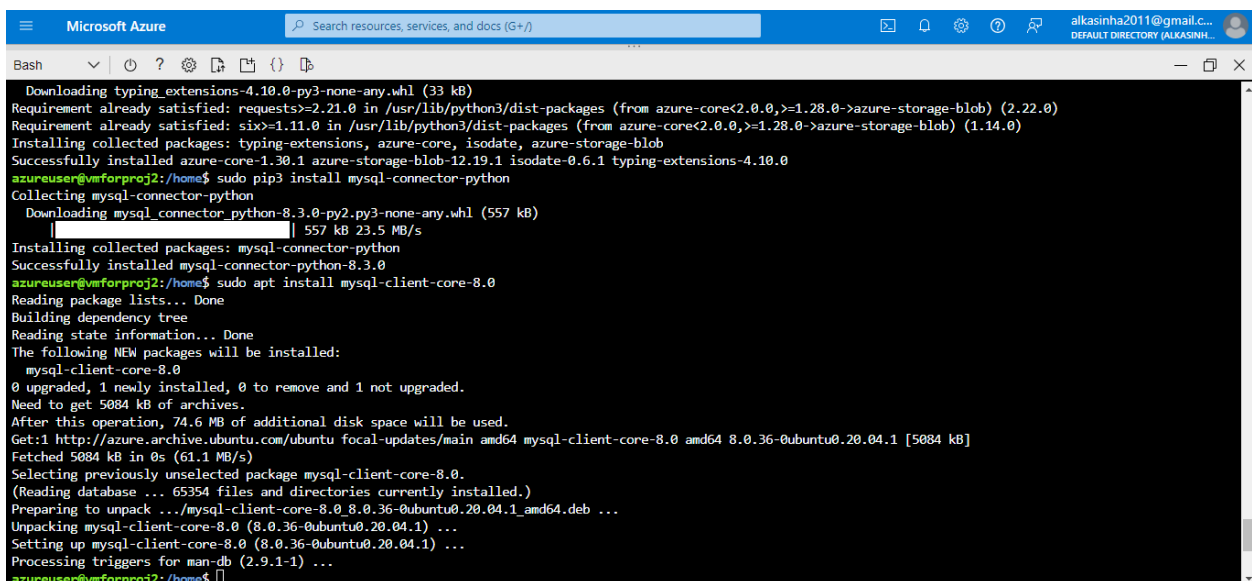
alkas@DESKTOP-HFL3RSI MINGW64 /
$ [200~scp -i vmforproj2_key.pem docproc-invoice.txt azureuser@20.115.76.45:/home/azureuser~scp -i vmforproj2_key.pem docproc-invoice.txt azureuser@20.115.76.45:/home/azureuser
bash: [200~scp: command not found

alkas@DESKTOP-HFL3RSI MINGW64 /
$ scp -i vmforproj2_key.pem docproc-invoice.txt azureuser@20.115.76.45:/home/azureuser
docproc-invoice.txt                                100% 251      2.8KB/s   00:00

alkas@DESKTOP-HFL3RSI MINGW64 /
$ scp -i vmforproj2_key.pem process.py azureuser@20.115.76.45:/home/azureuser
process.py                                          100% 2386     13.2KB/s   00:00

alkas@DESKTOP-HFL3RSI MINGW64 /
$
```

Screenshot of 5th step



```
Microsoft Azure
Search resources, services, and docs (G+/)
alkasinha2011@gmail.c...
DEFAULT DIRECTORY (ALKASINH...)

Bash
Downloading typing_extensions-4.10.0-py3-none-any.whl (33 kB)
Requirement already satisfied: requests>=2.21.0 in /usr/lib/python3/dist-packages (from azure-core<2.0.0,>=1.28.0->azure-storage-blob) (2.22.0)
Requirement already satisfied: six>=1.11.0 in /usr/lib/python3/dist-packages (from azure-core<2.0.0,>=1.28.0->azure-storage-blob) (1.14.0)
Installing collected packages: typing_extensions, azure-core, isodate, azure-storage-blob
Successfully installed azure-core-1.30.1 azure-storage-blob-12.19.1 isodate-0.6.1 typing_extensions-4.10.0
azureuser@vmforproj2:/home$ sudo pip3 install mysql-connector-python
Collecting mysql-connector-python
  Downloading mysql_connector_python-8.3.0-py2.py3-none-any.whl (557 kB)
    | 557 kB 23.5 MB/s
Installing collected packages: mysql-connector-python
Successfully installed mysql-connector-python-8.3.0
azureuser@vmforproj2:/home$ sudo apt install mysql-client-core-8.0
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  mysql-client-core-8.0
0 upgraded, 1 newly installed, 0 to remove and 1 not upgraded.
Need to get 5084 kB of archives.
After this operation, 74.6 MB of additional disk space will be used.
Get:1 http://azure.archive.ubuntu.com/ubuntu focal-updates/main amd64 mysql-client-core-8.0 amd64 8.0.36-0ubuntu0.20.04.1 [5084 kB]
Fetched 5084 kB in 0s (61.1 MB/s)
Selecting previously unselected package mysql-client-core-8.0.
(Reading database ... 65354 files and directories currently installed.)
Preparing to unpack .../mysql-client-core-8.0_8.0.36-0ubuntu0.20.04.1_amd64.deb ...
Unpacking mysql-client-core-8.0 (8.0.36-0ubuntu0.20.04.1) ...
Setting up mysql-client-core-8.0 (8.0.36-0ubuntu0.20.04.1) ...
Processing triggers for man-db (2.9.1-1) ...
azureuser@vmforproj2:/home$
```

Step number	b
Step name	Configure the database
Instructions	<p>1) Run the following command in the SSH terminal after substituting the database server name and username.</p> <pre>mysql -h &lt;database server name&gt; -u &lt;database_username&gt; -p</pre> <p><i>Note : In case of a database server connection error , ensure that the firewall is configured correctly using the below link</i>  <a href="https://learn.microsoft.com/en-us/azure/mysql/single-server/how-to-manage-firewall-using-portal">https://learn.microsoft.com/en-us/azure/mysql/single-server/how-to-manage-firewall-using-portal</a></p> <p>2) Enter the password when prompted.</p> <p>3) Enter the following command  <pre>create database testdb;</pre></p> <p>4) Enter <i>exit</i> to exit out of the MySQL environment.</p>
Expected screenshots	1) Screenshot after completing Step 3 above

### Step 3 screen shot

```
Microsoft Azure Search resources, services, and docs (G+/) alkasinha2011@gmail.c...  
Bash ? ? ? ? ? alkasinha2011@gmail.c...  
See https://ubuntu.com/esm or run: sudo pro status  
  
New release '22.04.3 LTS' available.  
Run 'do-release-upgrade' to upgrade to it.  
  
Last login: Thu Mar 21 18:23:25 2024 from 13.93.230.31  
alkasinha2011@gmail.com@vmforproj2:~$ sudo su azureuser  
azureuser@vmforproj2:/home/alkasinha2011$ mysql -h dbforproj2.mysql.database.azure.com -u myuser -p Alka@123  
Enter password:  
ERROR 1049 (42000): Unknown database 'alka@123'  
azureuser@vmforproj2:/home/alkasinha2011$ mysql -h dbforproj2.mysql.database.azure.com -u myuser -p  
Enter password:  
Welcome to the MySQL monitor.  Commands end with ; or \g.  
Your MySQL connection id is 14  
Server version: 8.0.36 Source distribution  
  
Copyright (c) 2000, 2024, Oracle and/or its affiliates.  
  
Oracle is a registered trademark of Oracle Corporation and/or its  
affiliates. Other names may be trademarks of their respective  
owners.  
  
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.  
  
mysql> create database testdb;  
Query OK, 1 row affected (0.03 sec)  
  
mysql> 
```

Step number	c	
Step name	Running the custom program	
Instructions	<ol style="list-style-type: none"> <li>1) Run the program using the command <i>python3 process.py</i></li> <li>2) Navigate to the storage account using the Azure portal. Select the Containers option from the menu on the left and select the created container. Verify that it contains a generated CSV file</li> <li>3) Run the following command in the SSH terminal after substituting the database server name and username. <i>mysql -h &lt;database server name&gt; -u &lt;database_username&gt; -p</i></li> <li>4) Enter the password when prompted.</li> <li>5) Run the following commands to verify that the data has been entered into the database <i>use testdb;</i> <i>select * from invoice;</i></li> <li>6) Enter <i>exit</i> to exit out of the MySQL environment.</li> </ol>	
Expected screenshots	1) Running the custom Python program	2)Created CSV file in Blob Storage 3) Screenshot after running step 5 above

## Running the custom python program

```
Microsoft Azure Search resources, services, and docs (G+/) alka...
Bash
rm-r--r-- 1 azureuser azureuser 2386 Mar 21 18:28 process.py
azureuser@vmforproj2:~$ delete rm process.py
delete: command not found
azureuser@vmforproj2:~$ rm process.py
azureuser@vmforproj2:~$ ll
total 40
lrwxr-xr-x 4 azureuser azureuser 4096 Mar 21 19:41 ./
lrwxr-xr-x 4 root root 4096 Mar 21 18:23 ../
-rw-r--r-- 1 azureuser azureuser 224 Mar 21 19:02 .bash_history
-rw-r--r-- 1 azureuser azureuser 220 Feb 25 2020 .bash_logout
-rw-r--r-- 1 azureuser azureuser 3771 Feb 25 2020 .bashrc
-rwx----- 2 azureuser azureuser 4096 Mar 21 18:13 .cache/
-rw-r--r-- 1 azureuser azureuser 48 Mar 21 18:49 .mysql_history
-rw-r--r-- 1 azureuser azureuser 807 Feb 25 2020 .profile
-rwx----- 2 azureuser azureuser 4096 Mar 20 18:27 .ssh/
-rw-r--r-- 1 azureuser azureuser 0 Mar 21 18:32 .sudo_as_admin_successful
-rw-r--r-- 1 azureuser azureuser 251 Mar 21 18:26 docproc-invoice.txt
azureuser@vmforproj2:~$ python3 process.py
***** Processing File *****
file has been processed

uploading to Azure Storage as blob: docproc.csv
inv-00001
Mar 31 2018

*****
creating table invoice
inserting data into database
azureuser@vmforproj2:~$
```

## Created CSV file

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

Home > srforproj2 | Containers >

6a6f6fd2-8bd1-462c-8fff-208d8421deb4 ...

Container

Search « Upload Change access level Refresh Delete Change tier Acquire lease Break lease View snapshots Create snapshot ...

Overview

Diagnose and solve problems

Access Control (IAM)

Settings

Shared access tokens

Access policy

Properties

Metadata

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

Location: 6a6f6fd2-8bd1-462c-8fff-208d8421deb4

Search blobs by prefix (case-sensitive) Show deleted blobs

Add filter

	Name	Modified	Access tier	Archive status	Blob type	Size	Lease state	
<input type="checkbox"/>	docproc.csv	3/21/2024, 12:43:32 ...	Hot (Inferred)		Block blob	251 B	Available	...

## 5th step screenshot

```
Microsoft Azure Search resources, services, and docs (G+/)
Bash
Bye
alka [ ~ ]$ mysql -h dbforproj2.mysql.database.azure.com -u myuser -p "--ssl-ca=DigiCertGlobalRootCA.crt.pem"
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 17
Server version: 8.0.36 Source distribution

Copyright (c) 2000, 2023, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use testdb;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> SELECT * FROM invoice;
+-----+-----+
| cust_id | inv_id |
+-----+-----+
| inv-00001 | Mar 31 2018 |
+-----+-----+
1 row in set (0.07 sec)

mysql>
```

### Answer the following questions

Q1 At which level are lifecycle management rules for Blob storage applied?

- a) File Level
- b) Blob Level
- c) Storage account level
- d) Subscription level

Enter your answer here

c

C storage account level

Q2 Which of the following is not true about the Premium performance storage tier in Azure?

- a) Only Hot and Cool storage tiers are available
- b) Supports only LRS and ZRS
- c) Data is stored on SSDs
- d) Geo-redundancy is not possible.

Enter your answer here

A

A Only Hot and Cool storage tiers are available

Q3 Which of the following Azure SQL deployment options should you use when the number of databases to be created is variable.

- a) On-premises deployment of Azure SQL

- b) Azure SQL Database
- c) Managed DB instance
- d) None of these

Enter your answer here

b

- b) Azure SQL Database

Q4 Which of the following Azure SQL purchasing models would be more beneficial for BYOL (Bring-Your-Own-License) use-cases?

- a) Depends on the license type
- b) Does not matter
- c) vCore based
- d) DTU based

Enter your answer here

A

- a) Depends on the license type

Q5 Why was port 3306 not enabled for incoming connections in the VM in this exercise?

- a) The port is only required to be enabled on the database server
- b) Azure MySQL uses a different port
- c) Port 3306 has no bearing on this exercise.
- d) None of these

Enter your answer here

A

- a) The port is only required to be enabled on the database server
-

<b>Grades distribution</b>	
MCQs	10 (2 mark each)
Implementation screenshots	10 marks (1 marks each)
Total	20 marks