

# Deployment of ToDo App with 3-Tier Architecture

## Introduction

This document outlines the steps to deploy a ToDo application using a 3-tier architecture. The architecture includes:

- A frontend VM running React on Ubuntu 20.04
- A backend VM running Python (Flask) on Ubuntu 20.04
- A SQL database server

## Architecture Overview

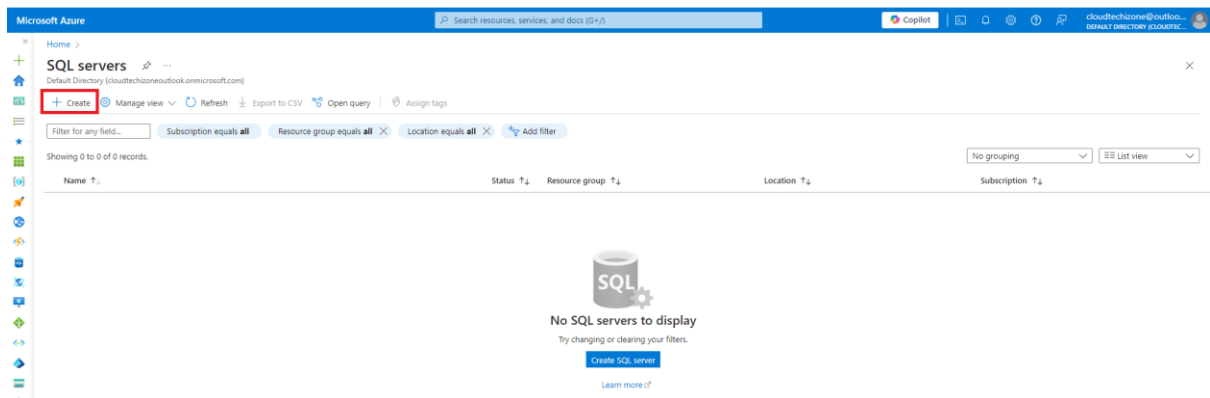
1. **Frontend Tier:** Hosts the React application.
2. **Backend Tier:** Hosts the Python (Flask) application that provides the API endpoints.
3. **Database Tier:** Hosts the SQL database to store ToDo items.

## Prerequisites

- Two Ubuntu 20.04 VMs: frontend-vm, backend-vm, and One database-server with Database
- SSH access to each VM
- Internet connectivity on all VMs

## Step 1: Setup Database Server

### Deploy MySQL Server and SQL Database



Microsoft Azure

Search

Home > SQL servers >

Create SQL Database Server

Microsoft

Subscription \* ⓘ Cloudtechizone-Pay-As-You-Go

Resource group \* ⓘ (New) rg-todo-nonprod-ci-01  
[Create new](#)

Server details

Enter required settings for this server, including providing a name and location.

Server name \* tododevopsinsider .database.windows.net

Location \* (Asia Pacific) Central India

Authentication

Azure Active Directory (Azure AD) is now Microsoft Entra ID. [Learn more](#)

Select your preferred authentication methods for accessing this server. Create a server admin login and password to access your server with SQL authentication, select only Microsoft Entra authentication [Learn more](#) using an existing Microsoft Entra user, group, or application as Microsoft Entra admin [Learn more](#), or select both SQL and Microsoft Entra authentication.

Authentication method

- ☐ Use Microsoft Entra-only authentication
- ☐ Use both SQL and Microsoft Entra authentication
- ☒ Use SQL authentication

Server admin login \* azureadmin

Password \* .....

Confirm password \* .....

Review + create

Next : Networking >

Microsoft Azure

Search resources, services, and docs (Ctrl+V)

Cricket

cloudtechizone@office-365...  
MANAGE DIRECTORY | CLOUDS...

Home >

SQL databases

Default Directory (cloudtechizoneoutlook.onmicrosoft.com)

+ Create

Reservations

Manage view

Refresh

Export to CSV

Open query

Assign tags

Delete

Filter for any field...

Subscription equals all

Resource group equals all

Location equals all

Add filter

Showing 0 to 0 of 0 records.

No grouping

List view

Name	Server	Replica type	Pricing tier	Location	Subscription
<div><div>SQL</div><div>No SQL databases to display</div><div>Try changing or clearing your filters.</div><div>Create SQL database</div><div>Learn more</div></div>					

Microsoft Azure

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

Home > SQL databases >

Create SQL Database

Microsoft

SQL Database Hyperscale: Low price, high scalability, and best feature set. [Learn more](#)

Project details

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

Subscription \* Cloudtechizone-Pay-As-You-Go

Resource group \* rg-todo-nonprod-ci-01

Create new

Database details

Enter required settings for this database, including picking a logical server and configuring the compute and storage resources

Database name \* todoapp

Server \* tododevopsinsider (Central India)

Create new

Compute + storage \* General Purpose - Serverless

Standard-series (Gen5), 2 vCores, 32 GB storage, zone redundant disabled

Configure database

Behavior when free offer limit reached

Behavior when free offer limit reached Auto-pause the database until next month

When free offer limit is reached, the database will not be accessible until

Review + create

Next : Networking >

General Purpose (GP\_S\_Gen5\_2)

Cost per GB (in INR) 0.00

Max storage selected (in GB) x 41.6

First 32 GB storage free

First 100,000 vCore seconds free

Overage billing<sup>1</sup> Disabled

ESTIMATED STORAGE COST / MONTH 0.00 INR

COMPUTE COST / VCORE SECOND<sup>2</sup> 0.000000 INR

<sup>1</sup> There will be no charges for usage within the free limits. The database will be paused automatically when the free limits are reached.

<sup>2</sup> Serverless databases are billed in vCore seconds based on a combination of CPU and memory utilization. [Learn more about serverless billing](#)

Microsoft Azure

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

Home > SQL databases >

Create SQL Database

Microsoft

Basics

Networking

Security

Additional settings

Tags

Review + create

Configure network access and connectivity for your server. The configuration selected below will apply to the selected server 'tododevopsinsider' and all databases it manages. [Learn more](#)

Firewall rules

The settings displayed below are read-only. They can be modified from the "Firewalls and virtual networks" blade for the selected server after database creation. [Learn more](#)

Allow Azure services and resources to access this server No Yes

Add current client IP address \* No Yes

Private endpoints

Private endpoint connections are associated with a private IP address within a Virtual Network. The list below shows all the private endpoint connections for this server. Note that private endpoint connections are defined at the server level and they provide access to all databases in the server. [Learn more](#)

+ Add private endpoint

Name	Subscription	Resource group	Region	Subnet
Click on add to create private endpoint				

Connection policy

The settings displayed below are read-only. They can be modified from the "Firewalls and virtual networks" blade for the selected server after database creation. [Learn more](#)

Connection policy Default - Uses Redirect policy for all client connections originating inside

Review + create

< Previous

Next : Security >

SQL

Cost summary

General Purpose (GP\_S\_Gen5\_2)

Cost per GB (in INR) 0.00

Max storage selected (in GB) x 41.6

First 32 GB storage free

First 100,000 vCore seconds free

Overage billing<sup>1</sup> Disabled

ESTIMATED STORAGE COST / MONTH 0.00 INR

COMPUTE COST / VCORE SECOND<sup>2</sup> 0.000000 INR

<sup>1</sup> There will be no charges for usage within the free limits. The database will be paused automatically when the free limits are reached.

<sup>2</sup> Serverless databases are billed in vCore seconds based on a combination of CPU and memory utilization. [Learn more about serverless billing](#)

Microsoft Azure

Home > Microsoft SQL Database > newDatabaseExistingServer\_c698648dc82a472f | Overview >

**todoapp (tododevopsinsider/todoapp)**

SQL database

Copy Restore Export **Set server firewall** Delete Connect with... Feedback

Overview

Activity log

Tags

Diagnose and solve problems

Query editor (preview)

Settings

Compute + storage

Connection strings

Maintenance

Properties

Locks

Data management

Replicas

Sync to other databases

Integrations

Azure Synapse Link

Stream analytics (preview)

Add Azure AI Search

Power Platform

Power BI

Power Apps

Essentials

Resource group (move)

tp-todo-nonprod-ci-01

Status

Online

Location

Central India

Subscription (move)

CloudTechzone-Pay-As-You-Go

Subscription ID

dcb10fb4-9d27-497e-8dd5-5cae3d81250a

Server name

todoappinsider.database.windows.net

Connection strings

Show database connection strings

Pricing tier

Free - General Purpose - Serverless: Gen5, 2 vCores

Overage billing

Disabled

Free monthly vCore amount

100,000 vCore seconds remaining

Earliest restore point

2024-07-15 05:14 UTC

Tags (edit)

Add tags

Getting started Monitoring Properties Features Notifications (0) Integrations Tutorials

Start working with your database

Connect to your database and start working with data with a few simple steps. [Learn more](#)

Configure access

Configure network access to your SQL server. [Learn more](#)

Configure

Connect to application

Use connection strings to connect to your SQL database from your applications and favorite tools. [See connection strings](#)

Start developing

Work in your database by using tools to add, modify and query data. [Compare tools](#)

Open Azure Data Studio

Open in Visual Studio

Open in Visual Studio Code

Microsoft Azure

Home > Microsoft SQL Database > newDatabaseExistingServer\_c698648dc82a472f | Overview > todoapp (tododevopsinsider/todoapp) > tododevopsinsider

**todoappinsider | Networking**

SQL server

Public endpoints allow access to this resource through the internet using a public IP address. An application or resource that is granted access with the following network rules still requires proper authorization to access this resource. [Learn more](#)

Public network access

☐ Disable

☒ **Selected networks**

Connections from the IP addresses configured in the Firewall rules section below will have access to this database. By default, no public IP addresses are allowed. [Learn more](#)

Please save public network access value before adding new virtual networks.

Virtual networks

Allow virtual networks to connect to your resource using service endpoints. [Learn more](#)

+ Add a virtual network rule

Rule	Virtual network	Subnet	Address range	Endpoint status	Resource group	Subscription	State
+ Add your client (IPv4 address (61.246.214.42)) + Add a firewall rule							
Rule name	Start IPv4 address	End IPv4 address					
ClientIPAddress_2024-7-15_10-49-33	61.246.214.42	61.246.214.42					

Firewall rules

Allow certain public internet IP addresses to access your resource. [Learn more](#)

+ Add your client (IPv4 address (61.246.214.42)) + Add a firewall rule

Exceptions

☒ **Allow Azure services and resources to access this server**

**Save** Discard

## Step 2: Setup Backend Server

Microsoft Azure

Home > Virtual machines > Virtual machines (cloudtechzoneoutlook.azure.microsoft.com)

+ Create

Switch to classic

Reservations

Manage view

Refresh

Export to CSV

Open query

Assign tags

Start

Restart

Stop

Delete

Services

Maintenance

Azure virtual machine

Create a virtual machine hosted by Azure

Azure virtual machine with preset configuration

Create a virtual machine with presets based on your workloads

More VMs and related solutions

Discover and deploy full workloads and Azure products for your business needs

Type equals all

Resource group equals all

Location equals all

Add filter

No grouping

List view

Type	Subscription	Resource group	Location	Status	Operating system	Size	Public IP address	Disks
No virtual machines to display								

Create a virtual machine that runs Linux or Windows. Select an image from the marketplace or use your own customized image.

+ Create

Learn more about Windows virtual machines

Learn more about Linux virtual machines

Microsoft Azure

Search resources, services, and docs (G

Home > Virtual machines >

Create a virtual machine ...

Click here to try out the Azure Copilot for additional recommendations while creating a virtual machine →

Basics

Disks

Networking

Management

Monitoring

Advanced

Tags

Review + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. [Learn more](#)

Project details

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

Subscription \*

Cloudtechizone-Pay-As-You-Go

Resource group \*

rg-todo-nonprod-ci-01

Create new

Instance details

Virtual machine name \*

bckvm-todo-nonprod-ci-01

Region \*

(Asia Pacific) Central India

Availability options

No infrastructure redundancy required

Security type

Standard

Image \*

Ubuntu Server 20.04 LTS - x64 Gen2

See all images | Configure VM generation

This image is compatible with additional security features. [Click here to swap to the Trusted launch security type.](#)

< Previous

Next : Disks >

Review + create

Microsoft Azure

Search resources, services, and

Home > Virtual machines >

Create a virtual machine ...

Click here to try out the Azure Copilot for additional recommendations while creating a virtual machine →

VM architecture

x64

Run with Azure Spot discount

Size \*

Standard\_D2as\_v4 - 2 vcpus, 8 GiB memory (₹3,777.54/month)

See all sizes

Enable Hibernation

Hibernate is not supported by the size that you have selected. Choose a size that is compatible with Hiberate to enable this feature. [Learn more](#)

Administrator account

Authentication type

SSH public key

Password

Username \*

azureadmin

Password \*

.....

Confirm password \*

.....

Inbound port rules

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

Public inbound ports \*

None

< Previous

Next : Disks >

Review + create

Microsoft Azure

Search resources, services, or documentation

Home > Virtual machines >

Create a virtual machine

Basics

Disks

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Tags

Review + create

The configuration of this virtual machine and its attached disk(s) does not allow for the disk(s) to utilize their full throughput performance. The current virtual machine size supports 48 MBps. The total for disk(s) attached to virtual machine 'bckvm-todo-nonprod-ci-01' is 100 MBps. You can change the virtual machine size to support additional disk(s) throughput.  
[Learn more](#)

Azure VMs have one operating system disk and a temporary disk for short-term storage. You can attach additional data disks. The size of the VM determines the type of storage you can use and the number of data disks allowed. [Learn more](#)

### VM disk encryption

Azure disk storage encryption automatically encrypts your data stored on Azure managed disks (OS and data disks) at rest by default when persisting it to the cloud.

Encryption at host ☐

Encryption at host is not registered for the selected subscription.  
[Learn more about enabling this feature](#)

**OS disk**

OS disk size

OS disk type \*

The selected VM size supports premium disks. We recommend Premium SSD for high IOPS workloads. Virtual machines with Premium SSD disks qualify for the 99.9% connectivity SLA.

Delete with VM ☒

Key management

Enable Ultra-Disk compatibility ☐

< Previous

Next : Networking >

Review + create

Microsoft Azure

Search resources, services, or documentation

Home > Virtual machines >

Create a virtual machine

Basics

Disks

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Tags

Review + create

Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution. [Learn more](#)

### Network interface

When creating a virtual machine, a network interface will be created for you.

Virtual network \*

[Create new](#)

Subnet \*

Public IP

[Create new](#)

NIC network security group ☐ ☒ ☐

Public inbound ports \* ☐ ☒

Select inbound ports \*

This will allow all IP addresses to access your virtual machine. This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

< Previous

Next : Management >

Review + create

Microsoft Azure

Search resources, services, and docs (0+)

Home > Virtual machines > bckvm-todo-nonprod-ci-01

Virtual machine

Connect > Start > Restart > Stop > Hibernate > Capture > Delete > Refresh > Open in mobile > Feedback > CU / PS

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Connect

Connect

Bastion

Networking

Network settings

Load balancing

Application security groups

Network manager

Settings

Disks

Extensions + applications

Operating system

Configuration

Advisor recommendations

Properties

Locks

Essentials

Resource group [\(move\)](#) : rg-todo-nonprod-ci-01

Status : Running

Location : Central India

Subscription [\(move\)](#) : CloudTechzone-Pay-As-You-Go

Subscription ID : ddb10fb4-9f27-497e-8d05-5cae3d81250a

Operating system : Linux (Ubuntu 20.04)

Size : Standard D2as v4 (2 vcpus, 8 GiB memory)

Public IP address : 74.225.145.164

Virtual network/subnet : bckvm-todo-nonprod-ci-01-vnet/default

DNS name : Not configured

Health state : \*

Time created : 7/15/2024, 5:27 AM UTC

Tags [\(edit\)](#) : [Add tags](#)

Properties Monitoring Capabilities (7) Recommendations Tutorials

Virtual machine

Computer name : bckvm-todo-nonprod-ci-01

Operating system : Linux (ubuntu 20.04)

VM generation : V2

VM architecture : x64

Agent status : Ready

Agent version : 2.11.1.4

Hibernation : Disabled

Host group : -

Host : -

Proximity placement group : -

Colocation status : N/A

Capacity reservation group : -

Networking

Public IP address : 74.225.145.164 ( Network interface bckvm-todo-nonprod-ci-01786 )

Public IP address (IPv6) : -

Private IP address : 10.0.0.4

Private IP address (IPv6) : -

Virtual network/subnet : bckvm-todo-nonprod-ci-01-vnet/default

DNS name : [Configure](#)

Size

Size : Standard D2as v4

vCPUs : 2

RAM : 8 GiB

```

azureadmin@bckvm-todo-nonprod-ci-01: ~
login as: azureadmin
azureadmin@74.225.145.164's password:
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1067-azure x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

System information as of Mon Jul 15 05:35:52 UTC 2024

System load:  0.0          Processes:            125
Usage of /:   5.2% of 28.89GB Users logged in:      0
Memory usage: 4%          IPv4 address for eth0: 10.0.0.4
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

azureadmin@bckvm-todo-nonprod-ci-01:~$

```

Go to GitHub url below for backend VM configuration

<https://github.com/devopsinsiders/PyTodoBackendMonolith>

## Prerequisites

Before getting started, make sure you have the following prerequisites installed on your system:

- source\_image\_reference = { publisher = "Canonical" offer = "0001-com-ubuntu-server-focal" sku = "20\_04-lts" version = "latest" }
- Python
- pip

Check python installed or not on Backend VM

**python3 --version**

```
azureadmin@bckvm-todo-nonprod-ci-01:~$ python3 --version
Python 3.8.10
azureadmin@bckvm-todo-nonprod-ci-01:~$
```

Check pip install or not if not installed install pip

**sudo apt update**

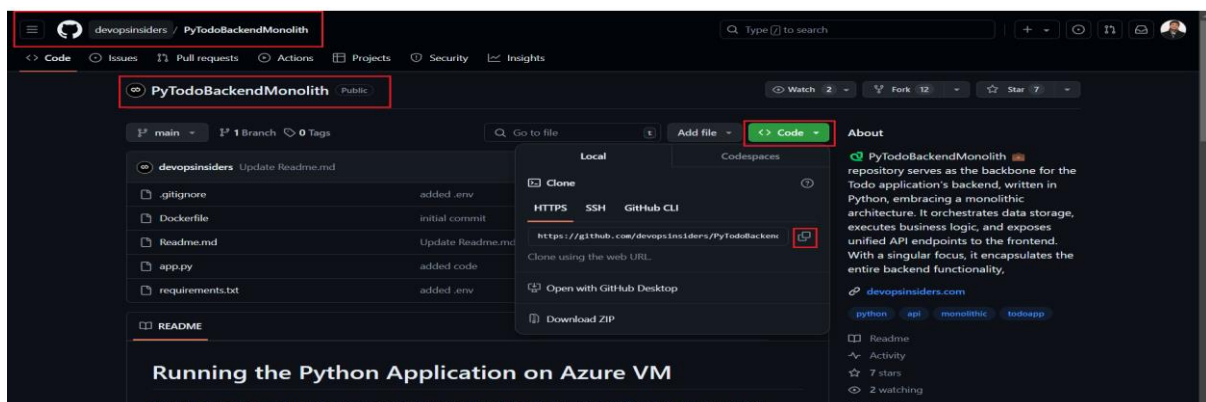
**sudo apt install python3-pip**

**pip3 --version**

```
azureadmin@bckvm-todo-nonprod-ci-01:~$ pip3 --version
pip 20.0.2 from /usr/lib/python3/dist-packages/pip (python 3.8)
azureadmin@bckvm-todo-nonprod-ci-01:~$
```

## Step 1: Clone the Repository

Clone the application's source code from your version control system or download it as a zip archive and extract it to your local machine.





```

azureadmin@bckvm-todo-nonprod-ci-01:~$ git clone https://github.com/devopsinsiders/PyTodoBackendMonolith.git
Cloning into 'PyTodoBackendMonolith'...
remote: Enumerating objects: 59, done.
remote: Counting objects: 100% (59/59), done.
remote: Compressing objects: 100% (52/52), done.
remote: Total 59 (delta 30), reused 21 (delta 5), pack-reused 0
Unpacking objects: 100% (59/59), 14.67 KiB | 1.22 MiB/s, done.
azureadmin@bckvm-todo-nonprod-ci-01:~$

```

## Step 2: Update Connection String

Edit the `app.py` file to update the `connection_string` variable with the appropriate connection details for your SQL Server database. Update ODBC Version to 17

Now got to **SQL Database deployed and copy the ODBC value from connection string**

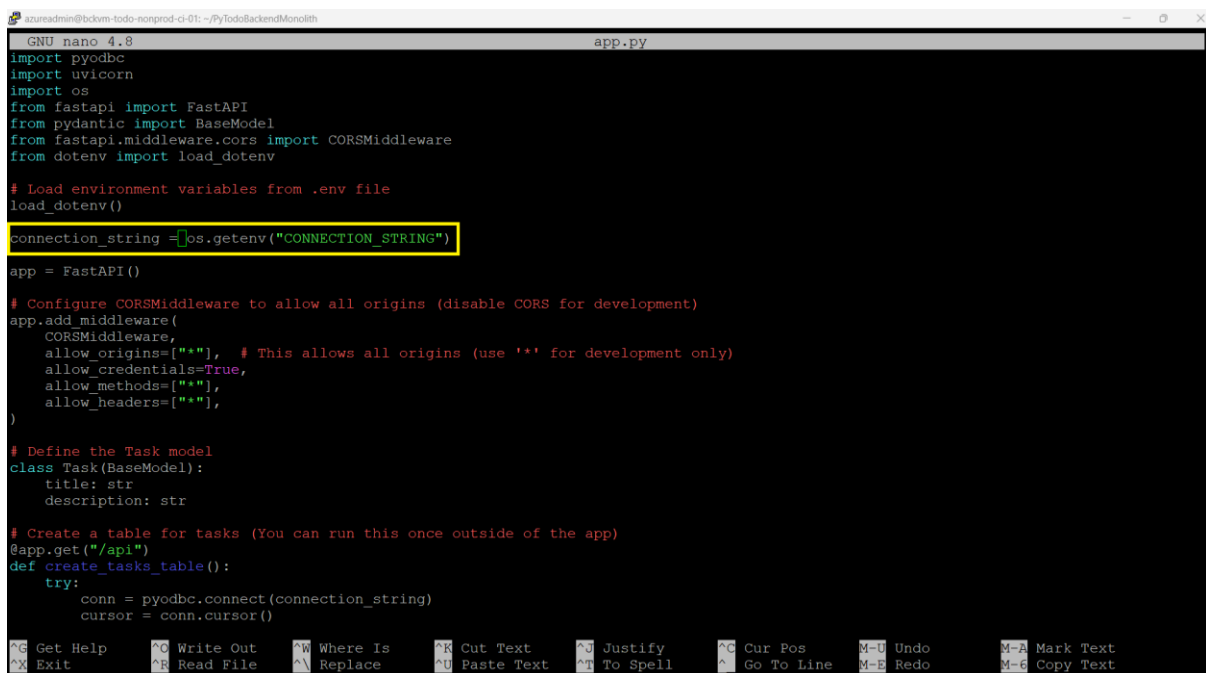
```

azureadmin@bckvm-todo-nonprod-ci-01:~$ ls
PyTodoBackendMonolith
azureadmin@bckvm-todo-nonprod-ci-01:~$ cd PyTodoBackendMonolith/
azureadmin@bckvm-todo-nonprod-ci-01:~/PyTodoBackendMonolith$

```

We have to edit connection string in the `app.py` file inside the directory

**sudo nano app.py**



```

GNU nano 4.8 app.py
import pyodbc
import uvicorn
import os
from fastapi import FastAPI
from pydantic import BaseModel
from fastapi.middleware.cors import CORSMiddleware
from dotenv import load_dotenv

# Load environment variables from .env file
load_dotenv()

connection_string = os.getenv("CONNECTION_STRING")

app = FastAPI()

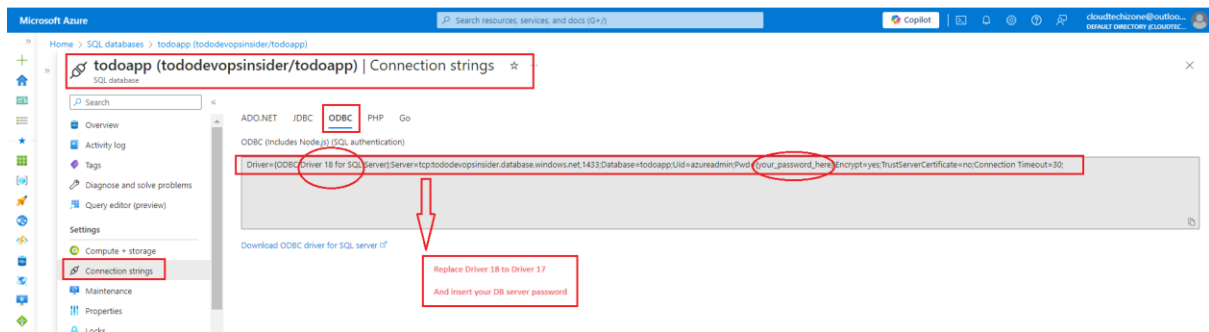
# Configure CORSMiddleware to allow all origins (disable CORS for development)
app.add_middleware(
    CORSMiddleware,
    allow_origins=["*"], # This allows all origins (use '*' for development only)
    allow_credentials=True,
    allow_methods=["*"],
    allow_headers=["*"],
)

# Define the Task model
class Task(BaseModel):
    title: str
    description: str

# Create a table for tasks (You can run this once outside of the app)
@app.get("/api")
def create_tasks_table():
    try:
        conn = pyodbc.connect(connection_string)
        cursor = conn.cursor()

```

Replace the connection string value with ODBC value in database connection string also need to change version of **ODBC driver from 18 – 17** and insert **your password** that you integrated during deployment of database server



```

GNU nano 4.8 app.py
import pyodbc
import uvicorn
import os
from fastapi import FastAPI
from pydantic import BaseModel
from fastapi.middleware.cors import CORSMiddleware
from dotenv import load_dotenv

# Load environment variables from .env file
load_dotenv()

connection_string = "Driver={ODBC Driver 17 for SQL Server};Server=tcp:todoappdevinsider.database.windows.net,1433;Database=todoapp;Uid=azureadmin;Pwd=admin@1234567;encrypt=yes;TrustServerCertificate=yes;Connection Timeout=30;"

app = FastAPI()

# Configure CORSMiddleware to allow all origins (disable CORS for development)
app.add_middleware(
    CORSMiddleware,
    allow_origins=["*"], # This allows all origins (use '*' for development only)
    allow_credentials=True,
    allow_methods=["*"],
    allow_headers=["*"],
)

```

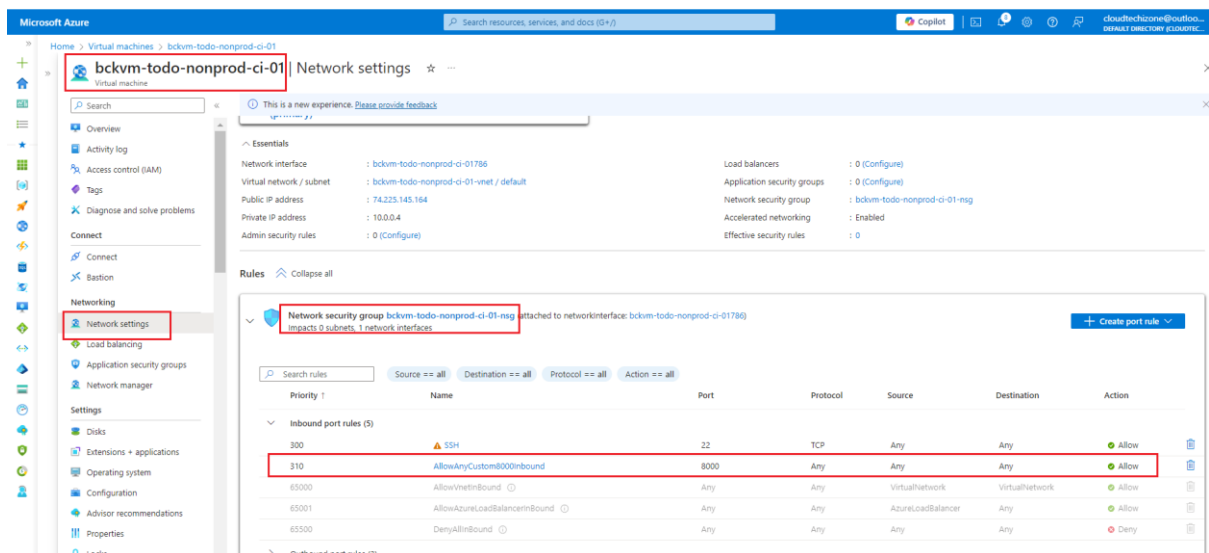
Save the file and exit

## Step 3: Run Below Commands to make the application running

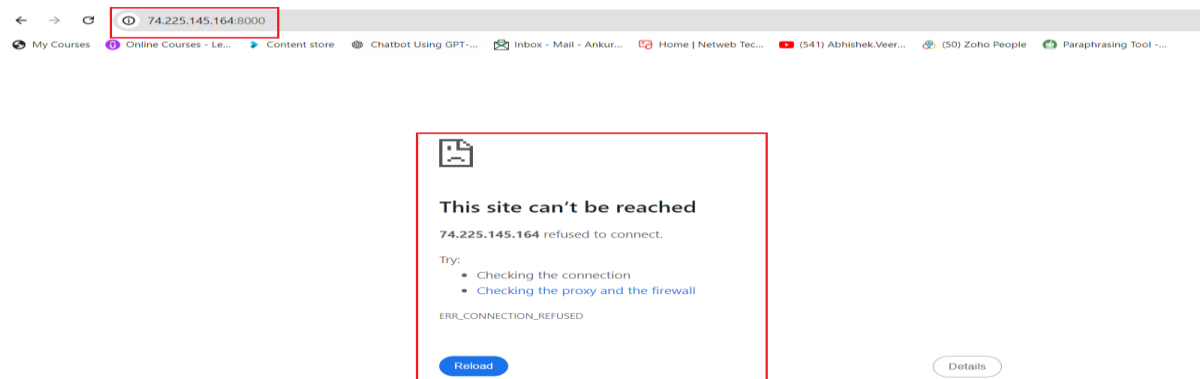
To Run the Application, open a terminal, navigate to the project directory, and run the following command:

While remaining in the PyTodoBackendMonolith directory RUN below command to run the application.

Before that please allow port 8000 on NSG of backend VM



Now check the app services working or not it will not work as we have not started the services of app deployed



To start the app service RUN below commands

```
sudo su
```

```
apt-get update && apt-get install -y unixodbc unixodbc-dev
```

```
curl https://packages.microsoft.com/keys/microsoft.asc | apt-key add -
```

```
curl https://packages.microsoft.com/config/debian/10/prod.list > /etc/apt/sources.list.d/mssql-release.list
```

```
apt-get update
```

```
ACCEPT_EULA=Y apt-get install -y msodbcsql17
```

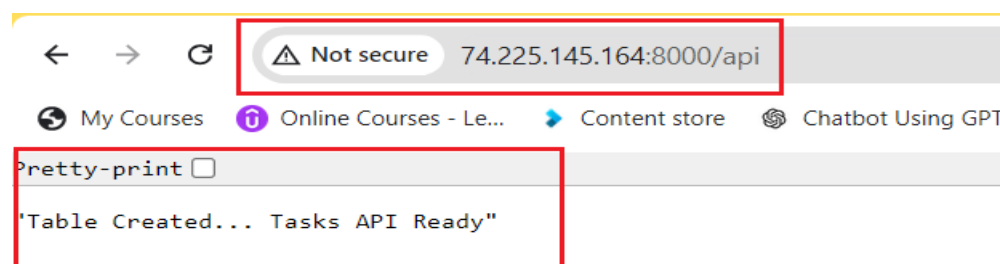
```
pip install -r requirements.txt
```

```
uvicorn app:app --host 0.0.0.0 --port 8000
```

```
root@bckvm-todo-nonprod-ci-01:/home/azureadmin/PyToDoBackendMonolith# uvicorn app:app --host 0.0.0.0 --port 8000
INFO: Started server process [22825]
INFO: Waiting for application startup.
INFO: Application startup complete.
INFO: Uvicorn running on http://0.0.0.0:8000 (Press CTRL+C to quit)
```

Last command will run the app now again in a browser hit the below url

<http://backend-pip:8000/api>



## Step 3: Setup Frontend Server

Microsoft Azure

Search resources, services

Home > Virtual machines >

### Create a virtual machine

Click here to try out the Azure Copilot for additional recommendations while creating a virtual machine →

BasicsDisksNetworkingManagementMonitoringAdvancedTagsReview + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. [Learn more](#)

**Project details**

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

Subscription \*

Resource group \*  [Create new](#)

**Instance details**

Virtual machine name \*

Region \*

Availability options

Security type

Image \*  [See all images](#) | [Configure VM generation](#)

☒ This image is compatible with additional security features. [Click here to swap to the Trusted launch security type.](#)

[< Previous](#) [Next : Disks >](#) [Review + create](#)

Microsoft Azure

Search resources, services

Home &gt; Virtual machines &gt;

Click here to try out the Azure Copilot for additional recommendations while creating a virtual machine →

[< Previous](#) [Next : Disks >](#) [Review + create](#)

Microsoft Azure

Search resources, services, or documentation

Home > Virtual machines >

Create a virtual machine

Basics

Disks

Networking

Management

Monitoring

Advanced

Tags

Review + create

Azure VMs have one operating system disk and a temporary disk for short-term storage. You can attach additional data disks. The size of the VM determines the type of storage you can use and the number of data disks allowed. [Learn more](#)

### VM disk encryption

Azure disk storage encryption automatically encrypts your data stored on Azure managed disks (OS and data disks) at rest by default when persisting it to the cloud.

Encryption at host ☐

Encryption at host is not registered for the selected subscription. [Learn more about enabling this feature](#)

### OS disk

OS disk size

OS disk type \*

The selected VM size supports premium disks. We recommend Premium SSD for high IOPS workloads. Virtual machines with Premium SSD disks qualify for the 99.9% connectivity SLA.

Delete with VM ☒

Key management

Enable Ultra Disk compatibility ☐

### Data disks for frntvm-todo-nonprod-ci-01

You can add and configure additional data disks for your virtual machine or attach existing disks. This VM also comes with a temporary disk.

LUN	Name	Size (GiB)	Disk type	Host caching	Delete with VM
-----	------	------------	-----------	--------------	----------------

< Previous

Next : Networking >

Review + create

Microsoft Azure

Search resources, services, or documentation

Home > Virtual machines >

Create a virtual machine

Basics

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Tags

Review + create

Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution. [Learn more](#)

### Network interface

When creating a virtual machine, a network interface will be created for you.

Virtual network \*

[Create new](#)

Subnet \*

Public IP

[Create new](#)

NIC network security group ☐ ☒ ☐

Public inbound ports \* ☐ ☒

Select inbound ports \*

**This will allow all IP addresses to access your virtual machine.** This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

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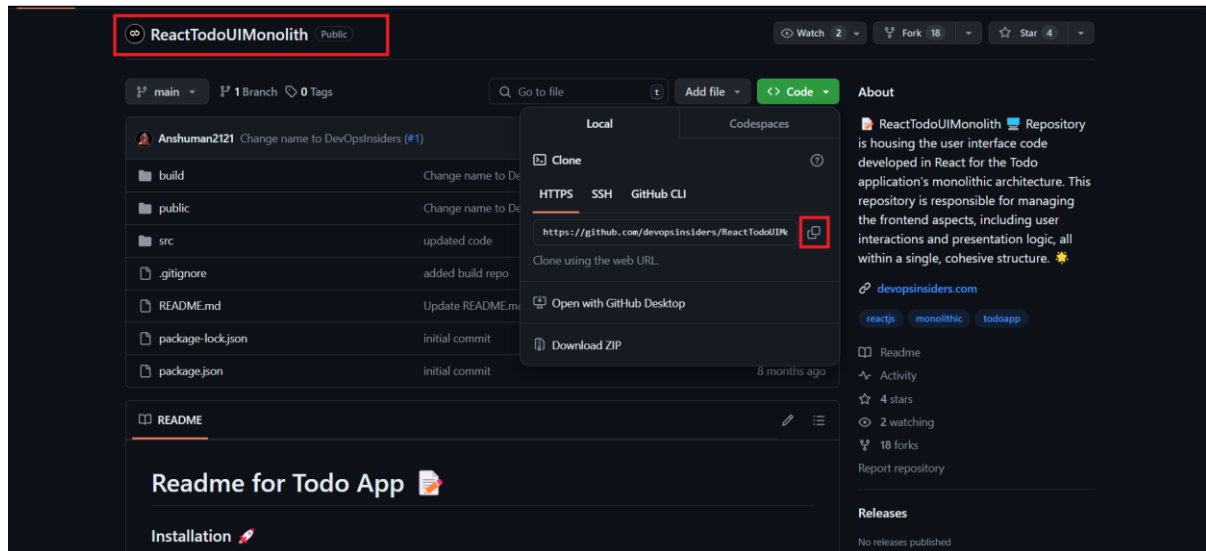
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Take the access of frontend VM from its public IP

Now login the GitHub link and follow the steps to configure Frontend VM

<https://github.com/devopsinsiders/ReactTodoUIMonolith>

first clone the repo in front VM



```
azureadmin@frntvm-todo-nonprod-ci-01:~$ git clone https://github.com/devopsinsiders/ReactTodoUIMonolith.git
Cloning into 'ReactTodoUIMonolith'...
remote: Enumerating objects: 107, done.
remote: Counting objects: 100% (14/14), done.
remote: Compressing objects: 100% (6/6), done.
remote: Total 107 (delta 13), reused 8 (delta 8), pack-reused 93
Receiving objects: 100% (107/107), 1.25 MiB | 30.38 MiB/s, done.
Resolving deltas: 100% (49/49), done.
azureadmin@frntvm-todo-nonprod-ci-01:~$
```

## Installation 🚀

### 1. Install Node.js and NPM on Ubuntu:

- Make sure you have Node.js 16.x and NPM installed on your machine. If not, you can install them using the following commands:

```
curl -s https://deb.nodesource.com/setup_16.x | sudo bash
```

```
sudo apt install nodejs -y
```

## Configuration ⚙️

### 2. Update Backend URL:

- Open the `src/ToDoApp.js` file.

As we have clone the repo go inside the directory cloned and modify `ToDoApp.js` file as below

```

azureadmin@frntvm-todo-nonprod-ci-01:~$ ls
ReactTodoUIMonolith
azureadmin@frntvm-todo-nonprod-ci-01:~$ cd ReactTodoUIMonolith/
azureadmin@frntvm-todo-nonprod-ci-01:~/ReactTodoUIMonolith$ ls
README.md build package-lock.json package.json public src
azureadmin@frntvm-todo-nonprod-ci-01:~/ReactTodoUIMonolith$ sudo nano src/ToDoApp.js

```

```
const API_BASE_URL = http://backendpip:8000/api
```

```

GNU nano 4.8 src/ToDoApp.js
import React, { useState, useEffect } from 'react';
import axios from 'axios';
import { Button, TextField, Container, Typography, Grid, Card, CardContent, IconButton } from '@mui/material';
import { Delete } from '@mui/icons-material';
import { Box } from '@mui/material';

const API_BASE_URL = 'http://74.225.145.164:8000/api';

const backgroundImage = process.env.PUBLIC_URL + '/background.jpg';

function ToDoApp() {
  const [tasks, setTasks] = useState([]);
  const [newTask, setNewTask] = useState({ title: '', description: '' });

  const fetchTasks = async () => {
    try {
      const response = await axios.get(`${API_BASE_URL}/tasks`);
      setTasks(response.data);
    } catch (error) {
      console.error('Error fetching tasks', error);
    }
  };

  const createTask = async () => {
    try {
      await axios.post(`${API_BASE_URL}/tasks`, newTask);
      fetchTasks();
      setNewTask({ title: '', description: '' });
    } catch (error) {
      console.error('Error creating task', error);
    }
  };
}

```

Save and exit

## Building and Running 🛠️

### 3. Install Dependencies:

- Run the following command to install project dependencies:

```
npm install
```

### 4. Build the Project:

- Execute the following command to build the project:

```
npm run build
```

RUN these two commands

```
sudo npm install
```

```
sudo npm run build
```

## Deployment

### 5. Deploy to Nginx Server:

- Copy the generated artifacts from the build process.
- Deploy the artifacts to your Nginx server. Ensure that the server is properly configured to serve the application.

```
sudo apt install nginx -y
```

Now go inside the cloned directory and go to build directory and copy all files & folders to nginx server path

```
/var/www/html
```

```
azureadmin@frntvm-todo-nonprod-ci-01:~/ReactTodoUIMonolith$ history
 1  git clone https://github.com/devopsinsiders/ReactTodoUIMonolith.git
 2  curl -s https://deb.nodesource.com/setup_16.x | sudo bash
 3  sudo apt install nodejs -y
 4  ls
 5  cd ReactTodoUIMonolith/
 6  ls
 7  sudo nano src/ToDoApp.js
 8  sudo npm install
 9  sudo npm run build
10  sudo apt install nginx -y
```

```
azureadmin@frntvm-todo-nonprod-ci-01:~/ReactTodoUIMonolith$ cd build/
azureadmin@frntvm-todo-nonprod-ci-01:~/ReactTodoUIMonolith/build$ ls
asset-manifest.json  background.jpg  devopsinsiderslogo.png  favicon.ico  index.html  logo192.png  logo512.png  manifest.json  robots.txt  static
azureadmin@frntvm-todo-nonprod-ci-01:~/ReactTodoUIMonolith/build$ sudo -r * /var/www/html
sudo: background.jpg: command not found
azureadmin@frntvm-todo-nonprod-ci-01:~/ReactTodoUIMonolith/build$ sudo cp -r * /var/www/html
azureadmin@frntvm-todo-nonprod-ci-01:~/ReactTodoUIMonolith/build$
```

## Important Note

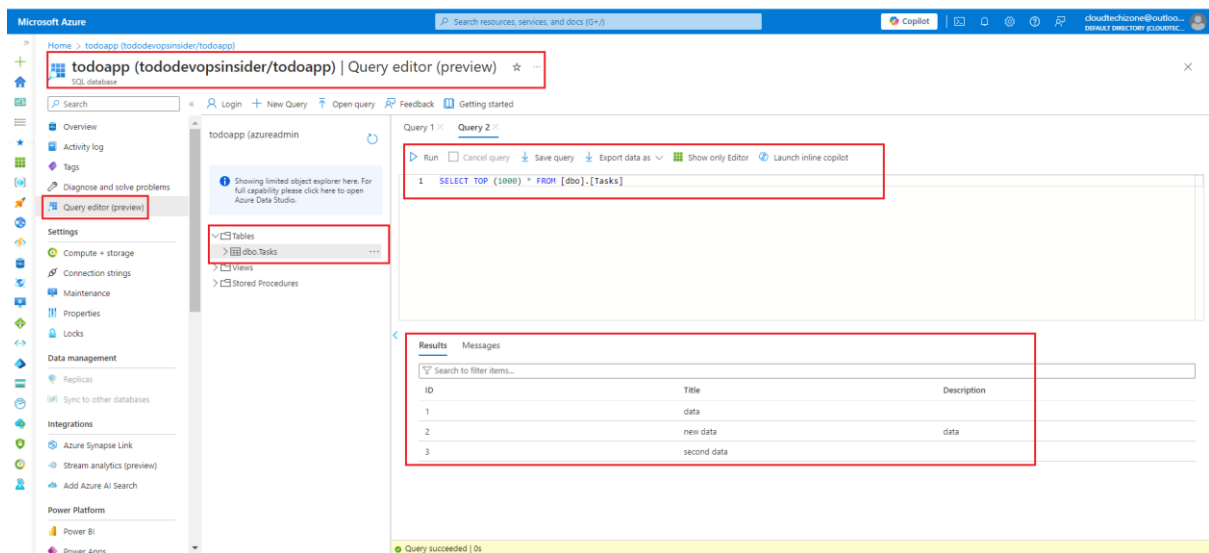
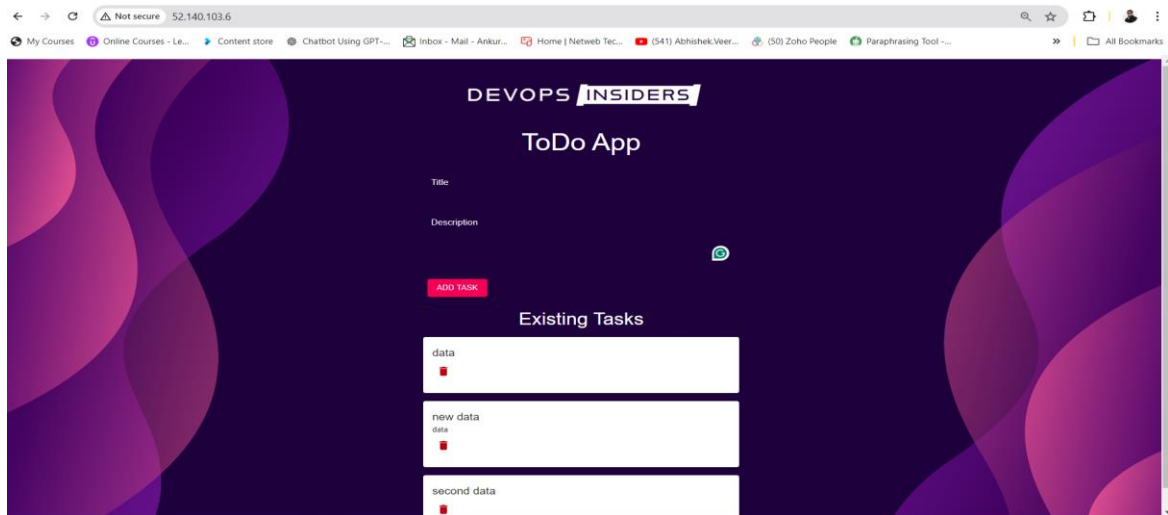
Make sure to restart NGINX on the VM after making the changes:

```
sudo service nginx restart
```

Now open a browser and hit the public IP of frontend VM

Fill the title and description and click the task button you will find a task added below same you can check in your database





## Conclusion

This document outlines the steps to set up a 3-tier architecture for a ToDo app with a React frontend, Python backend, and MySQL database. Ensure each component can communicate over the network by updating security group settings or firewall rules as needed.