

Cloud Computing Project Report

Title: Creating a VM on Azure and Hosting a Static Website

Submitted by: Nikhil

Assigned by: 1stop.ai

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ABSTRACT

This project explores the end-to-end process of deploying a static website using Microsoft Azure's Infrastructure as a Service (IaaS) platform. Specifically, we provision and configure a Virtual Machine (VM) running Ubuntu 24.04 LTS and install the Nginx web server to serve static content. The aim is to demonstrate how cloud-based virtual infrastructure can be leveraged for simple web hosting tasks, providing flexibility, scalability, and hands-on exposure to real-world deployment environments.

The report outlines the complete workflow—from creating and securing the VM, installing necessary software, uploading website files, and configuring firewalls and network settings, to finally verifying deployment through browser access via a public IP address. This practical implementation reinforces foundational concepts in cloud computing, such as resource provisioning, security group configuration, and virtual networking.

Through this project, students gain hands-on experience with Azure's VM ecosystem and learn how to deploy and manage static websites in a secure and controlled manner. It not only strengthens understanding of hosting fundamentals but also introduces industry-relevant skills necessary for future roles in DevOps, web development, and cloud infrastructure management.

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OBJECTIVE

The primary objectives of this project are to:

- **Understand and apply the fundamentals of cloud computing** by working directly with Microsoft Azure's Infrastructure as a Service (IaaS) offerings.
- **Create, configure, and manage Virtual Machines (VMs)** within the Azure platform to host web services.
- **Gain practical experience working with Linux server environments**, particularly Ubuntu 24.04 LTS.
- **Install and configure the Nginx web server** to host and serve static content over HTTP.
- **Deploy and test a static website** built using HTML and CSS, simulating real-world frontend deployment.
- **Implement basic security configurations** using Azure Network Security Groups (NSG) to manage inbound and outbound traffic.
- **Verify deployment through public IP access** and ensure that the web server is functional and reachable.
- **Monitor VM performance** using Azure's built-in monitoring tools and metrics such as CPU usage and memory availability.
- **Apply secure access techniques** such as SSH key authentication and restricted port access to prevent unauthorized usage.
- **Bridge academic knowledge with real-world infrastructure**, developing familiarity with modern DevOps and cloud hosting techniques.

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INTRODUCTION

Cloud computing provides scalable, on-demand computing resources over the internet, enabling businesses, developers, and students to leverage virtual infrastructure without the need for physical hardware. Among the various service models, **Infrastructure as a Service (IaaS)** offers the greatest flexibility, allowing users to provision virtual machines (VMs), configure network settings, install software, and control the server environment completely.

Microsoft Azure, one of the leading cloud platforms, delivers robust IaaS capabilities through its Virtual Machine service. Azure VMs can run various operating systems, such as Linux or Windows, and are often used to host web servers, databases, applications, and static or dynamic websites.

In this project, we leverage Azure to create a **Linux-based (Ubuntu 24.04 LTS)** virtual machine and host a **static website themed around the Indian Army**. The website is developed using standard frontend technologies like **HTML and CSS**, along with multimedia components such as images and embedded videos. To serve the site, we configure **Nginx**, a lightweight and efficient open-source web server. The deployment process also involves **security configurations** via Azure's **Network Security Groups (NSG)** and **performance monitoring** using Azure's native diagnostic tools.

This hands-on exercise introduces students to real-world cloud deployment scenarios and provides practical insights into hosting, configuring, and securing a server in a cloud environment. It also strengthens foundational skills in Linux administration, web server setup, and cloud-based resource management—essential knowledge areas in today's DevOps and cloud-native development landscape.

A screenshot of the Microsoft Azure portal interface. The top navigation bar is blue with the "Microsoft Azure" logo, a search bar, and user information. The left sidebar shows a navigation menu with options like Overview, Activity log, Access control, Tags, Diagnose and solve problems, Resource visualizer, Connect, Networking, Settings, Availability + scale, Security, Backup + disaster recovery, Operations, Monitoring, Insights, and Alerts. The main content area displays the details of a virtual machine named "hoststaticwebsite". At the top, there's a warning banner about system updates. Below that, a toolbar contains actions like Connect, Start, Restart, Stop, Hibernate, Capture, Delete, Refresh, Open in mobile, Feedback, and CLI/PS. The "Essentials" section lists key properties: Resource group (hoststaticwebsite_group), Status (Running), Location (Central India (Zone 1)), Subscription (Azure for Students), Subscription ID (6b169c15-7b1b-4eb2-a5bf-e978e85283e2), Availability zone (1), Operating system (Linux (ubuntu 24.04)), Size (Standard B1s (1 vcpu, 1 GiB memory)), Public IP address (98.70.58.92), Virtual network/subnet (hoststaticwebsite-vnet/default), DNS name (Not configured), Health state (-), and Time created (6/2/2025, 7:01 PM UTC). Below this, the "Properties" tab is active, showing a table with columns for the property name and value. The "Virtual machine" section lists Computer name (hoststaticwebsite) and Operating system (Linux (ubuntu 24.04)). The "Networking" section lists Public IP address (98.70.58.92) and Public IP address (IPv6) (-).

Property	Value
Resource group	hoststaticwebsite_group
Status	Running
Location	Central India (Zone 1)
Subscription	Azure for Students
Subscription ID	6b169c15-7b1b-4eb2-a5bf-e978e85283e2
Availability zone	1
Operating system	Linux (ubuntu 24.04)
Size	Standard B1s (1 vcpu, 1 GiB memory)
Public IP address	98.70.58.92
Virtual network/subnet	hoststaticwebsite-vnet/default
DNS name	Not configured
Health state	-
Time created	6/2/2025, 7:01 PM UTC

Property	Value
Computer name	hoststaticwebsite
Operating system	Linux (ubuntu 24.04)
Public IP address	98.70.58.92 (Network interface hoststaticwebsite390_x1)
Public IP address (IPv6)	-

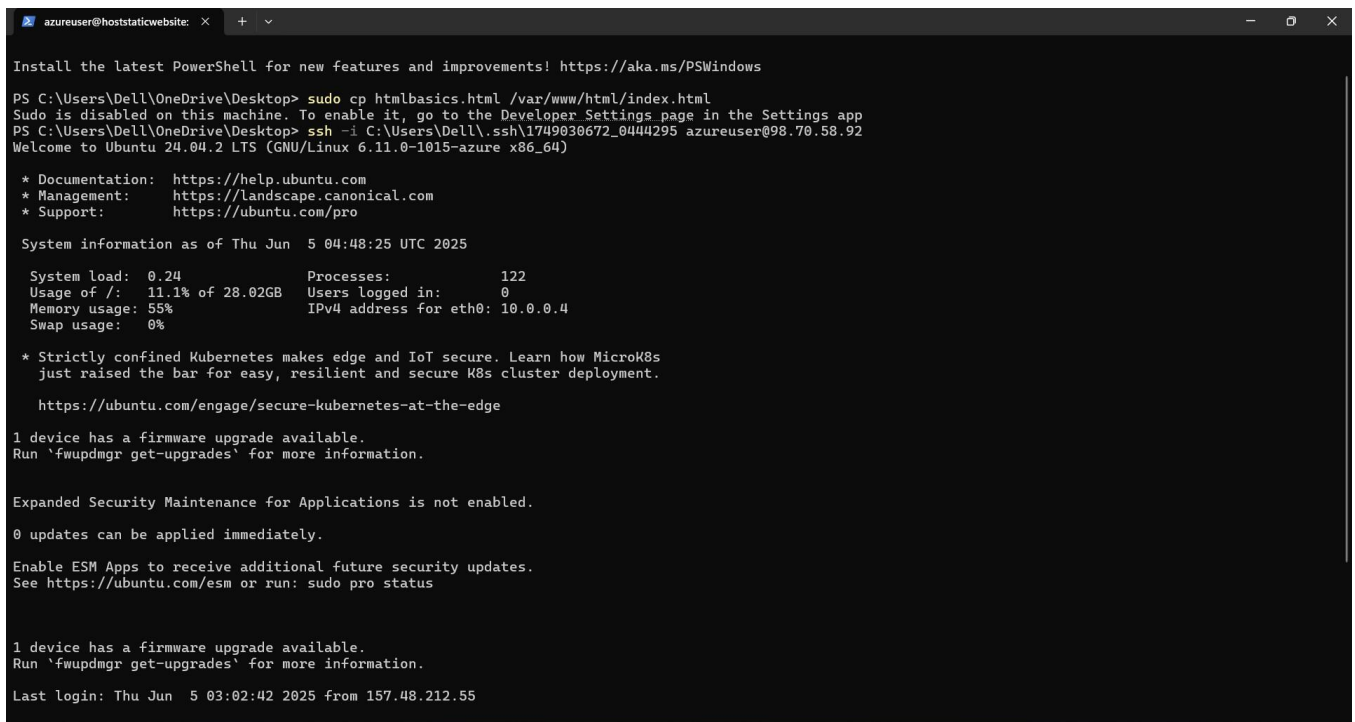
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METHODOLOGY

The project began with logging into Azure and creating a new Virtual Machine under the resource group named 'hoststaticwebsite_group'. The configuration included selecting 'Ubuntu 24.04 LTS' as the OS image and choosing a 'Standard_B1s' instance type for its cost-effectiveness.

SSH key authentication was set up to ensure secure login. Inbound port rules were configured to allow traffic on ports 22 (SSH), 80 (HTTP), and 443 (HTTPS). Nginx was installed using the command `sudo apt update && sudo apt install nginx``.

The static website files were then securely uploaded to the VM's Nginx web root directory at ``/var/www/html`` using SCP from the local machine. After uploading, the Nginx server was restarted and tested to verify it served the uploaded HTML page.



```
azureuser@hoststaticwebsite: X + v
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows
PS C:\Users\Dell\OneDrive\Desktop> sudo cp htmlbasics.html /var/www/html/index.html
Sudo is disabled on this machine. To enable it, go to the Developer Settings page in the Settings app
PS C:\Users\Dell\OneDrive\Desktop> ssh -i C:\Users\Dell\.ssh\1749030672_0444295 azureuser@98.70.58.92
Welcome to Ubuntu 24.04.2 LTS (GNU/Linux 6.11.0-1015-azure x86_64)

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

System information as of Thu Jun  5 04:48:25 UTC 2025

System load:  0.24               Processes:    122
Usage of /:   11.1% of 28.02GB   Users logged in: 0
Memory usage: 55%               IPv4 address for eth0: 10.0.0.4
Swap usage:   0%

 * Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
   just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

1 device has a firmware upgrade available.
Run 'fwupdmgmr get-upgrades' for more information.

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

1 device has a firmware upgrade available.
Run 'fwupdmgmr get-upgrades' for more information.

Last login: Thu Jun  5 03:02:42 2025 from 157.48.212.55
```

Azure VM Basic Configuration

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```
azureuser@hoststaticwebsite: x + v
Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

1 device has a firmware upgrade available.
Run 'fwupdmgm get-upgrades' for more information.

Last login: Thu Jun  5 04:58:18 2025 from 157.48.212.55
azureuser@hoststaticwebsite:~$ sudo apt update && sudo apt install nginx
Hit:1 http://azure.archive.ubuntu.com/ubuntu noble InRelease
Get:2 http://azure.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Hit:3 http://azure.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://azure.archive.ubuntu.com/ubuntu noble-security InRelease
Hit:5 https://packages.microsoft.com/repos/azure-cli noble InRelease
Get:6 http://azure.archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [1112 kB]
Get:7 http://azure.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Packages [1070 kB]
Get:8 http://azure.archive.ubuntu.com/ubuntu noble-updates/universe Translation-en [273 kB]
Fetched 2582 kB in 1s (2520 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
nginx is already the newest version (1.24.0-2ubuntu7.3).
0 upgraded, 0 newly installed, 0 to remove and 2 not upgraded.
azureuser@hoststaticwebsite:~$
```

Nginx successfully installed

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

shrijesh.choubey_cs.aim...
DEFAULT DIRECTORY (SHRUESHC...)

Home > Create a resource >

Create a virtual machine

Changing Basic options may reset selections you have made. Review all options prior to creating the virtual machine.

Help me create a low cost VM | Help me create a VM optimized for high availability | Help me choose the right VM size for my workload

Azure now automatically generates an SSH key pair for you and allows you to store it for future use. It is a fast, simple, and secure way to connect to your virtual machine.

Username *

SSH public key source

SSH Key Type ☒ RSA SSH Format ☐ Ed25519 SSH Format

Ed25519 provides a fixed security level of no more than 128 bits for 256-bit key, while RSA could offer better security with keys longer than 3072 bits.

Key pair name *

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

Give feedback

VM Deployment Confirmation

important codes that were used is –

ssh -i C:\Users\Dell\.ssh\1749030672_0444295 azureuser@98.70.58.92 – this is the code used to Connect to the remote server using ssh with using a specific private key.

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```
Windows PowerShell
azureuser@hoststaticwebsite:~$ ssh azureuser@98.70.58.92
ssh: connect to host 98.70.58.92 port 22: Connection timed out
azureuser@hoststaticwebsite:~$ telnet 98.70.58.92 22
Trying 98.70.58.92...
telnet: Unable to connect to remote host: Connection timed out
azureuser@hoststaticwebsite:~$
Broadcast message from root@hoststaticwebsite (Thu 2025-06-05 14:41:06 UTC):

The system will power off now!

Connection to 98.70.58.92 closed by remote host.
Connection to 98.70.58.92 closed.
PS C:\Users\Dell\OneDrive\Desktop> sudo systemctl restart sshd
Sudo is disabled on this machine. To enable it, go to the Developer Settings page in the Settings app
PS C:\Users\Dell\OneDrive\Desktop> az login
Select the account you want to log in with. For more information on login with Azure CLI, see https://go.microsoft.com/fwlink/?linkid=2271136

Retrieving tenants and subscriptions for the selection...

[Tenant and subscription selection]

No      Subscription name      Subscription ID      Tenant
-----
[1] *   Azure for Students   6b169c15-7b1b-4eb2-a5bf-e978e85283e2   Default Directory

The default is marked with an *; the default tenant is 'Default Directory' and subscription is 'Azure for Students' (6b169c15-7b1b-4eb2-a5bf-e978e85283e2).

Select a subscription and tenant (Type a number or Enter for no changes): 1

Tenant: Default Directory
Subscription: Azure for Students (6b169c15-7b1b-4eb2-a5bf-e978e85283e2)

[Announcements]
With the new Azure CLI login experience, you can select the subscription you want to use more easily. Learn more about it and its configuration at https://go.microsoft.com/fwlink/?linkid=2271236

If you encounter any problem, please open an issue at https://aka.ms/azclibug

[Warning] The login output has been updated. Please be aware that it no longer displays the full list of available subscriptions by default.

PS C:\Users\Dell\OneDrive\Desktop>
```

Code- az login- successful login

```
https://ubuntu.com/engage/secure-kubernetes-at-the-edge

1 device has a firmware upgrade available.
Run `fwupdmgmt get-upgrades` for more information.

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

1 device has a firmware upgrade available.
Run `fwupdmgmt get-upgrades` for more information.

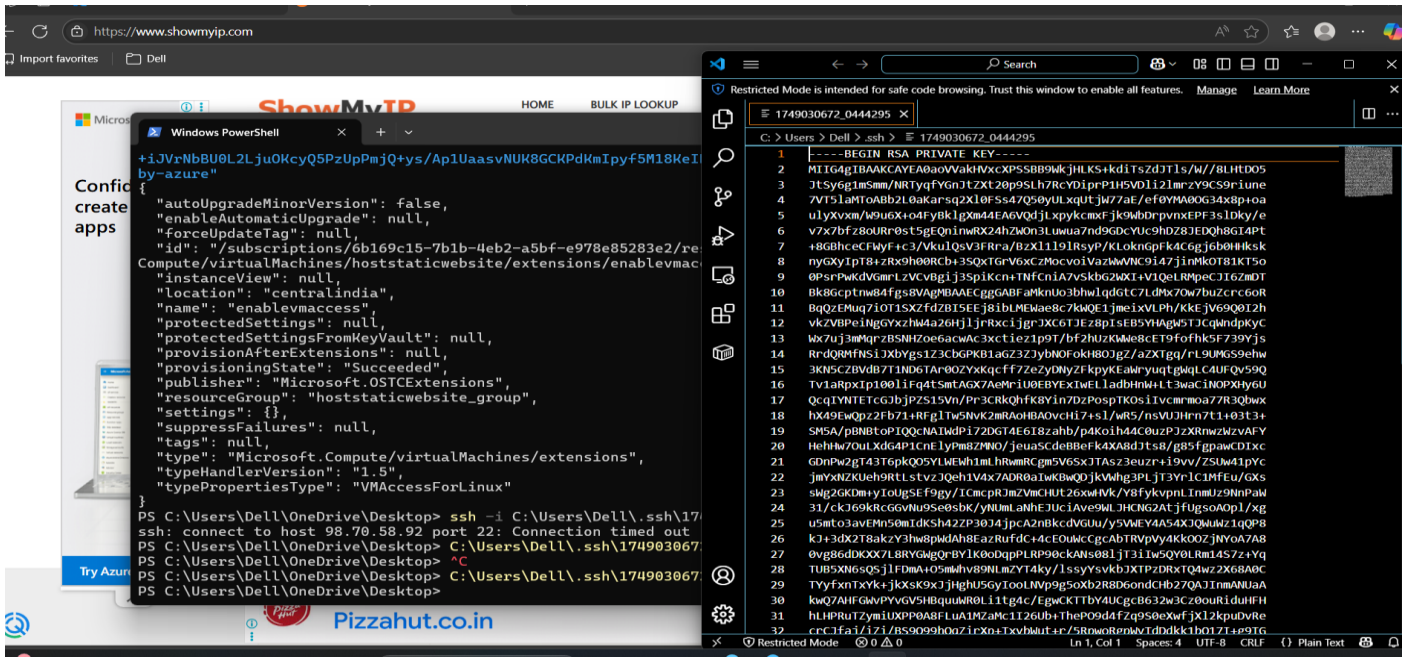
Last login: Thu Jun  5 14:26:16 2025 from 157.48.213.169
azureuser@hoststaticwebsite:~$ sudo systemctl status nginx
● nginx.service - A high performance web server and a reverse proxy server
   Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; preset: enabled)
   Active: active (running) since Thu 2025-06-05 14:41:26 UTC; 22min ago
     Docs: man:nginx(8)
   Main PID: 792 (nginx)
    Tasks: 2 (limit: 1056)
   Memory: 3.1M (peak: 3.4M)
      CPU: 21ms
   CGroup: /system.slice/nginx.service
           └─792 "nginx: master process /usr/sbin/nginx -g daemon on; master_process on;"
             └─794 "nginx: worker process"

Jun 05 14:41:26 hoststaticwebsite systemd[1]: Starting nginx.service - A high performance web server and a reverse proxy server...
Jun 05 14:41:26 hoststaticwebsite systemd[1]: Started nginx.service - A high performance web server and a reverse proxy server.
azureuser@hoststaticwebsite:~$
```

Nginx server status checked –successful

SCP command used - `scp -i "C:/Users/Dell/.ssh/1749030672_0444295" "C:/Users/Dell/OneDrive/Desktop/coding folder/HTML-CSS-code/htmlbasics.html" azureuser@98.70.58.92:/var/www/html/`

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```
PS C:\Users\Dell\OneDrive\Desktop> ssh -i C:\Users\Dell\.ssh\1749030672_0444295 1749030672_0444295@1749030672_0444295
ssh: connect to host 98.70.58.92 port 22: Connection timed out
PS C:\Users\Dell\OneDrive\Desktop> C:\Users\Dell\.ssh\1749030672_0444295
PS C:\Users\Dell\OneDrive\Desktop> C:\Users\Dell\.ssh\1749030672_0444295
PS C:\Users\Dell\OneDrive\Desktop>
```

```
{
  "autoUpgradeMinorVersion": false,
  "enableAutomaticUpgrade": null,
  "forceUpdateTag": null,
  "id": "/subscriptions/6b169c15-7b1b-4eb2-a5bf-e978e85283e2/resourceGroups/hoststaticwebsite/extensions/enablvmaaccess",
  "instanceView": null,
  "location": "centralindia",
  "name": "enablvmaaccess",
  "protectedSettings": null,
  "protectedSettingsFromKeyVault": null,
  "provisionAfterExtensions": null,
  "provisioningState": "Succeeded",
  "publisher": "Microsoft.OSTCExtensions",
  "resourceGroup": "hoststaticwebsite_group",
  "settings": {},
  "suppressFailures": null,
  "tags": null,
  "type": "Microsoft.Compute/virtualMachines/extensions",
  "typeHandlerVersion": "1.5",
  "typePropertiesType": "VMAccessForLinux"
}
```

```
-----BEGIN RSA PRIVATE KEY-----
MIIGAgIBAAKCAQEAA0aVakHVxcXPS5BB9WkjHLKS+kdTsdT1sW/8LHTD05
3JtSy6g1mSmm/NRTYqfVgnJtZT20p9SLh7RcYDlprP1H5V01i21mrZ9C59riune
47Vt51aMT0aBB2L0akarsq2X10F5s47Q50yULxqUTjw77ae/ef0YMA00G34X8p+oa
5uLyXvsm/wou6x+o4FyBklgxm44EA6VQdjLxpykcmxjFjkWbDrpvnxEpF3s1Dky/e
6v7x7bfz80URr0st5gEnlnwRX24hZW0n3Luwua7nd9GdcYUC9HDZ8JEDQh8G14PT
7+8GBhceFwyF+c3/Vku1QsV3FRra/BzX11191RsyP/KLoknppfK4C6gJ6b0Hkksk
8nyGxyIPt8+zR9h00Rcb+35QXTGrV6xczMocvoIVazwVNC9i47jinMkOT81KT5o
90PsrPwKdVgmRLZVCVbgi35piKcn+TNfCniA7v5kbG2wXCI+V1QeLRMPeCJ16ZmDT
10Bk86cptnw84fsg8VAgMBAAEggGABFamknUo3bhw1qdGtC7Ldpx70w7buZcrrc60R
11BqQzEMuq710T1SXZfdZB15EEj81bLMEWae8C7kQOE1jmeixVPh/KkEjV69Q0I2h
12vkZV8PeINggYxzHw4a26Hj1jRxcijgrJXC6T3Ez8PIS8B5YHAgw5T3CqWnndpKyc
13Wx7uj3mMqrZBSNHZoeacwAC3xtieZ1p9T/bf2huzKwM8cET9fofhk5F739Yjs
14RrdQRMfNS1JXBygs123CbGPKB1agZ3ZJybnOfokH80Jg/azXTGg/rL9UMGS9ehw
153KNSCZBVdb7T1ND6TA80ZYxkqcFF7ZezyDNY2fKpykEawryuqgtGwLCAUfQv59Q
16Tv1a8pxiP0011Fq4T5mtAGX7AeHr1U0EBYEX1WE1adbinh+L3wac1NOPXHy6U
17QcQIYNTETCG0jP2515Vn/Pr3CRKQhfkBYIn7D2PospTK0S11Vcmrmoa77R3Qbwx
18hX49E9Qp22Fb71rFg1Tw5NwK2m0a0HBA0vch17+sl/ams/nsVUthn7L1+03E3+
19SH5A/gBMBt0PQ0E0M1MdpP72DGT4E6182ahh/p4koiH4C0uzp3Z8RwzqZVAFY
20HehW70uLXdc4P1CnE1yPw8Z7M0/J3euaScd0B6RfK4X8dJtS8/g85fgnawCDIXc
21GdnPw2gT4T6pkQ05YUkEwh1mLhRwMRcm5V6S3TAsz3euzr+19vv/Z5Uw41pYc
22jmyXNZKueh9RLstVz3Qeh1V4x7AD80aIwKbwQJkVhlg3PLjT3Vr1C1MFEU/GXS
23shg2GK0myyIouGSEf9gy/1CmcpR1mZVmhCHUT26xwMVK/Y8fykvpnlImuZ5NnpaW
2431/cK369KRC6GVWU9S90sbk/ybUml.aNHEJUC1Ave9MLJHCNG62ATjflgsoAdPl/xg
25u5mto3aveFm50m1dKSh42ZP3034jpcA2nB8CdVGuU/y5VwE4AS4XQWkMz1qQP8
26k7+3dX2T8akzY3hw8pkdAh8EazRufd44cEOUwCgcAbTRVPVY4K00ZjNyoAQPB
270vg86dK0XX7L8RYGagQrBY1K0oDqpPLRP90cKANS081jT31tw5QY0Lrm1457z+Yq
28TUB5XN6s05j1FDm4+05mMhV89NLwZYT4ky/1ssyysvkbJXTPZDRX7Q4wz2X68A0C
29TYFxnTxYk+jkXsK9x3jghU5GyToULNVp9g50xb2R8D6ondCHb27QAjImMANUAa
30kwQ7AHFGwPVYGV5HBQuumR0L11tg4c/EgvCKTTbY4UCgB632w3Cz0ouR1duHFH
31hLHPRuTymiuXPP0A8FLuA1MzaMc1T26ub+TheP09d4Fz950eXwfjX12kpudVRe
32cc1fa1/iZi/BS9099h0aZirXn+Txvbwut+e/5RwoRenwvTdddkk1k01Z1+e9TG
-----
```

Got private key through command and connected to remote server with ssh command with private key

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CODE EXPLANATION

The HTML structure of the static website is designed with multiple semantic tags like ``, ``, `

`, and ``. These provide clear divisions for user interface layout.

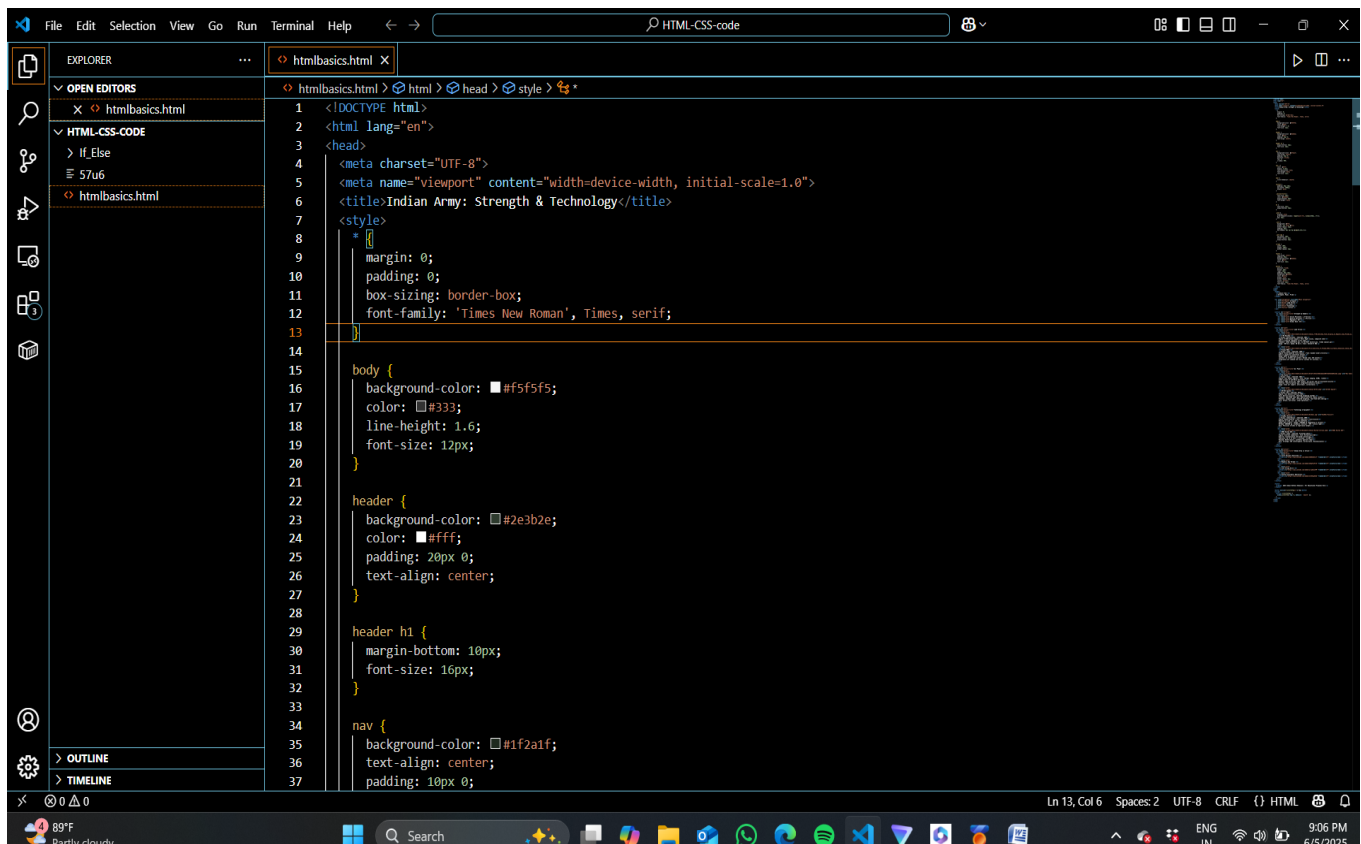
Styling was handled using embedded CSS, with a military green color scheme to reflect the Indian Army theme. Fonts were set explicitly to 'Times New Roman' to align with academic formatting requirements.

The website featured a responsive grid using:

display: grid;

grid-template-columns: repeat(auto-fit, minmax(250px, 1fr));

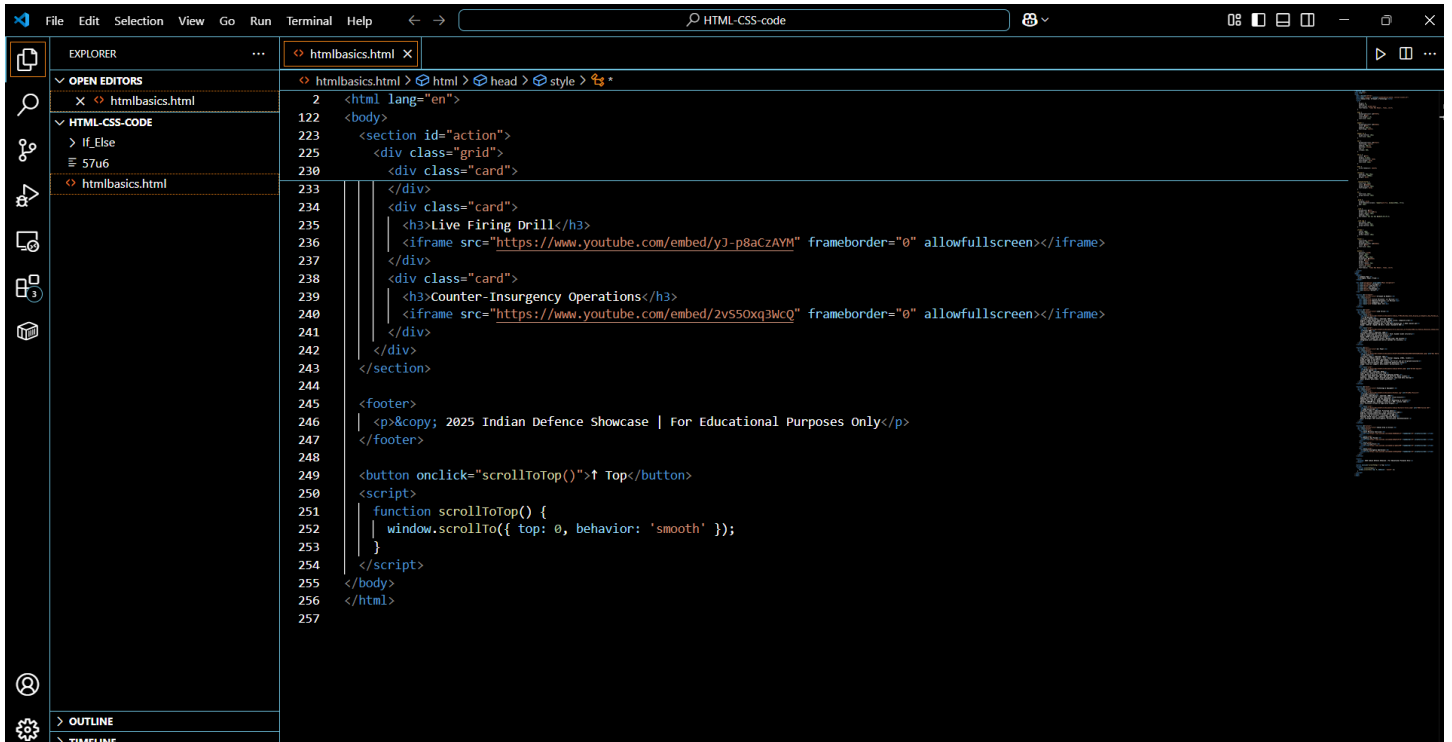
This layout adapts to screen size, making the site mobile-friendly. Additional features included image cards, YouTube video embeds for military showcases, and a 'Back to Top' button using JavaScript scroll behavior.

A screenshot of a code editor window titled 'HTML-CSS-code'. The editor shows the source code for a web page. The Explorer panel on the left shows 'htmlbasics.html' and 'HTML-CSS-CODE'. The main editor area displays the following code:

```
1 <!DOCTYPE html>
2 <html lang="en">
3 <head>
4   <meta charset="UTF-8">
5   <meta name="viewport" content="width=device-width, initial-scale=1.0">
6   <title>Indian Army: Strength & Technology</title>
7   <style>
8     * {
9       margin: 0;
10      padding: 0;
11      box-sizing: border-box;
12      font-family: 'Times New Roman', Times, serif;
13    }
14
15    body {
16      background-color: #f5f5f5;
17      color: #333;
18      line-height: 1.6;
19      font-size: 12px;
20    }
21
22    header {
23      background-color: #2e3b2e;
24      color: #fff;
25      padding: 20px 0;
26      text-align: center;
27    }
28
29    header h1 {
30      margin-bottom: 10px;
31      font-size: 16px;
32    }
33
34    nav {
35      background-color: #1f2a1f;
36      text-align: center;
37      padding: 10px 0;
```

CSS Styling

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The screenshot displays the Visual Studio Code (VS Code) editor interface. The Explorer panel on the left shows the file structure with 'htmlbasics.html' selected. The main editor area displays the HTML code for 'htmlbasics.html', which includes a header, a main content area with two video embeds, a footer, and a scroll-to-top button. The code is as follows:

```
2 <html lang="en">
122 <body>
223 <section id="action">
225 <div class="grid">
230 <div class="card">
233 </div>
234 <div class="card">
235 | <h3>Live Firing Drill</h3>
236 | <iframe src="https://www.youtube.com/embed/yJ-p8aCzAYM" frameborder="0" allowfullscreen></iframe>
237 </div>
238 <div class="card">
239 | <h3>Counter-Insurgency Operations</h3>
240 | <iframe src="https://www.youtube.com/embed/2v550xq3WcQ" frameborder="0" allowfullscreen></iframe>
241 </div>
242 </div>
243 </section>
244
245 <footer>
246 | <p>&copy; 2025 Indian Defence Showcase | For Educational Purposes Only</p>
247 </footer>
248
249 <button onclick="scrollToTop()">↑ Top</button>
250 <script>
251 | function scrollToTop() {
252 | | window.scrollTo({ top: 0, behavior: 'smooth' });
253 | }
254 </script>
255 </body>
256 </html>
257
```

HTML code – structure

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NETWORK SECURITY CONFIGURATION

The VM's security posture was managed using Azure's Network Security Groups (NSG). Inbound rules were added to allow only HTTP (80), HTTPS (443), and SSH (22) traffic. SSH was restricted to the creator's IP to enhance access control.

These rules ensure minimum surface exposure to external threats. No unnecessary ports were left open. Azure also allows tracking of security metrics through its built-in security center, which helps identify misconfigurations.

Microsoft Azure

Home > Create a resource >

Create a virtual machine

Validation passed

Help me create a low cost VM | Help me create a VM optimized for high availability | Help me choose the right VM size for my workload

Basics | Disks | Networking | Management | Monitoring | Advanced | Tags | **Review + create**

Price

1 X Standard B1s
by Microsoft
[Terms of use](#) | [Privacy policy](#)

Subscription credits apply ⓘ
0.9318 INR/hr
[Pricing for other VM sizes](#)

TERMS

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. See the [Azure Marketplace Terms](#) for additional details.

Name:

Preferred e-mail address:

[< Previous](#) [Next >](#) [Create](#)

[Download a template for automation](#) [Give feedback](#)

VM DEPLOYMENT SUCCESSFUL

Microsoft Azure

Home >

hoststaticwebsite-nsg

Network security group

Search

Move | Delete | Refresh | Give feedback

Location: Central India | Associated with: 0 subnets, 1 network interfaces

Subscription (move): Azure for Students | Subscription ID: 6b169c15-7b1b-4eb2-a5bf-e978e85283e2 | Tags (edit): Add tags

Filter by name | Port == all | Protocol == all | Source == all | Destination == all | Action == all

Priority	Name	Port	Protocol	Source	Destination	Action
Inbound Security Rules						
300	HTTP	80	TCP	Any	Any	Allow
310	Allow-SSH	22	TCP	157.48.213.169	Any	Allow
320	HTTPS	443	TCP	Any	Any	Allow
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny
Outbound Security Rules						
65000	AllowVnetOutBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowInternetOutBound	Any	Any	Any	Internet	Allow
65500	DenyAllOutBound	Any	Any	Any	Any	Deny

Add or remove favorites by pressing Ctrl+Shift+F

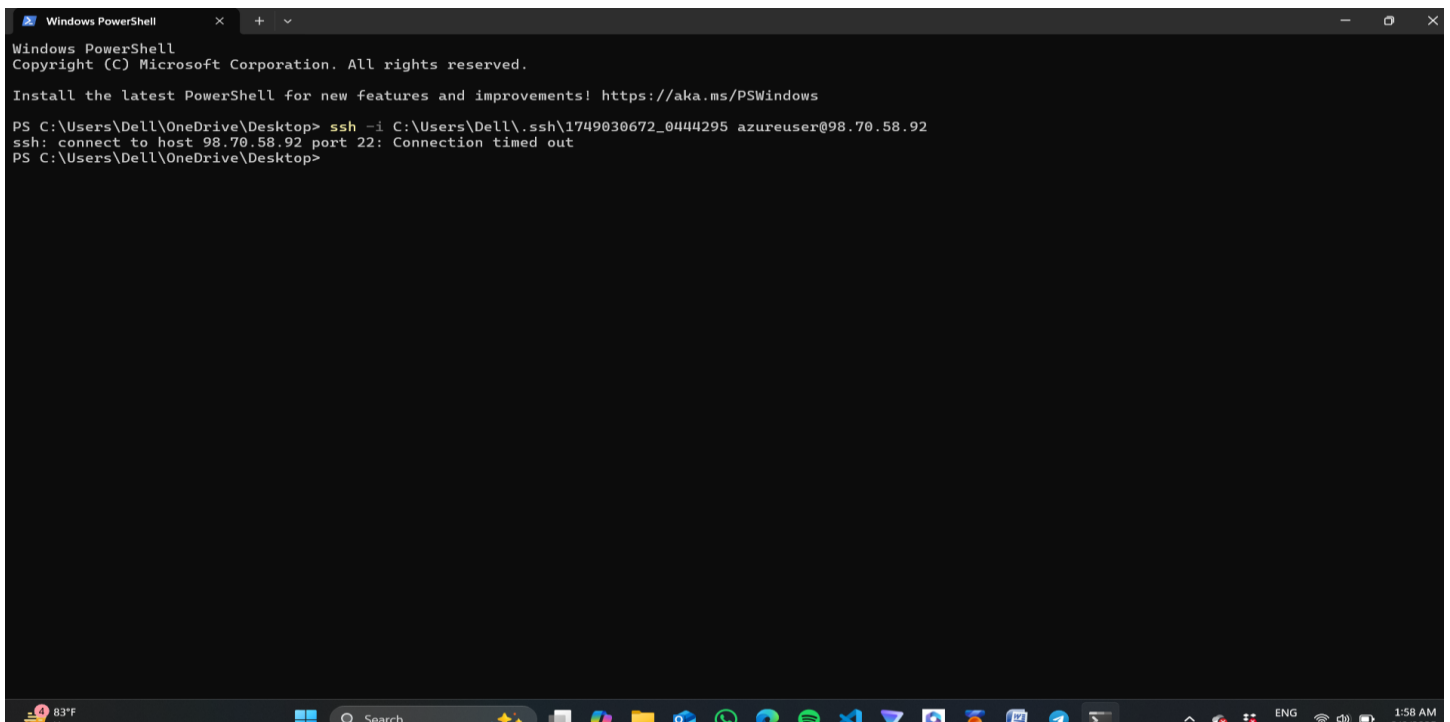
NSG Rules for HTTP, HTTPS, SSH

Cloud Computing Project Report

DEPLOYMENT CHALLENGES

During deployment, the initial issue faced was SSH and HTTP port inaccessibility due to NSG misconfiguration. A `telnet` test revealed port blocks.

The solution was to manually edit NSG rules to ensure ports 22 and 80 were open to inbound connections. Image path issues due to local paths were fixed by correctly copying assets into the `/var/www/html/` folder and referencing them using relative links.

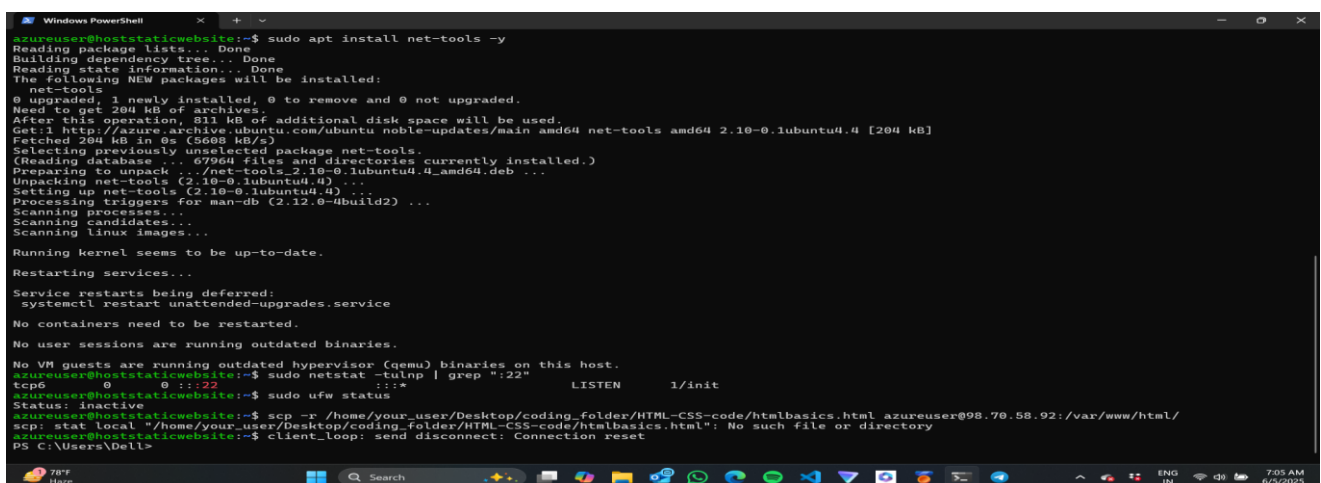


```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\Dell\OneDrive\Desktop> ssh -i C:\Users\Dell\.ssh\1749030672_0444295 azureuser@98.70.58.92
ssh: connect to host 98.70.58.92 port 22: Connection timed out
PS C:\Users\Dell\OneDrive\Desktop>
```

ssh connection timed out – due to port - 22



```
azureuser@hoststaticwebsite:~$ sudo apt install net-tools -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
 net-tools
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 204 kB of archives.
After this operation, 811 kB of additional disk space will be used.
Get:1 http://azure.archive.ubuntu.com/ubuntu noble-updates/main amd64 net-tools amd64 2.10-0.1ubuntu4.4 [204 kB]
Fetched 204 kB in 0s (5608 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 67964 files and directories currently installed.)
Preparing to unpack .../net-tools_2.10-0.1ubuntu4.4_amd64.deb ...
Unpacking net-tools (2.10-0.1ubuntu4.4) ...
Setting up net-tools (2.10-0.1ubuntu4.4) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning candidates...
Scanning linux images...

Running kernel seems to be up-to-date.
Restarting services...
Service restarts being deferred:
 systemctl restart unattended-upgrades.service
No containers need to be restarted.
No user sessions are running outdated binaries.
No VM guests are running outdated hypervisor (qemu) binaries on this host.
azureuser@hoststaticwebsite:~$ sudo netstat -tulnp | grep ":22"
tcp6      0      0  ::::22                :::*                    LISTEN     1/init
Status: inactive
azureuser@hoststaticwebsite:~$ scp -r /home/your_user/Desktop/coding_folder/HTML-CSS-code/htmlbasics.html azureuser@98.70.58.92:/var/www/html/
scp: stat local "/home/your_user/Desktop/coding_folder/HTML-CSS-code/htmlbasics.html": No such file or directory
azureuser@hoststaticwebsite:~$ client_loop: send disconnect: Connection reset
PS C:\Users\Dell>
```

other major problems faced due to sudo command not operating properly

Cloud Computing Project Report

```
azureuser@hoststaticwebsite: x + v
just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

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

Last login: Thu Jun  5 15:29:41 2025 from 157.48.213.169
azureuser@hoststaticwebsite:~$ scp -i C:\Users\Dell\.ssh\1749030672_0444295 your-website-folder/* azureuser@98.70.58.92:/var/www/html/
scp: stat local "your-website-folder/*": No such file or directory
azureuser@hoststaticwebsite:~$ sudo apt update && sudo apt install nginx -y
Hit:1 http://azure.archive.ubuntu.com/ubuntu noble InRelease
Get:2 http://azure.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Hit:3 http://azure.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://azure.archive.ubuntu.com/ubuntu noble-security InRelease
Get:5 http://azure.archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [1112 kB]
Hit:6 https://packages.microsoft.com/repos/azure-cli noble InRelease
Get:7 http://azure.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Packages [1070 kB]
Fetched 2309 kB in 1s (2281 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
nginx is already the newest version (1.24.0-2ubuntu7.3).
0 upgraded, 0 newly installed, 0 to remove and 2 not upgraded.
azureuser@hoststaticwebsite:~$ scp -i C:\Users\Dell\.ssh\1749030672_0444295 your-website-folder/* azureuser@98.70.58.92:/var/www/html/
scp: stat local "your-website-folder/*": No such file or directory
azureuser@hoststaticwebsite:~$ ls ~/your-website-folder
ls: cannot access '/home/azureuser/your-website-folder': No such file or directory
azureuser@hoststaticwebsite:~$ scp -i C:\Users\Dell\.ssh\1749030672_0444295 "C:\Users\Dell\OneDrive\Desktop\coding folder\HTML-CSS-code\htmlbasics.html" azu
reuser@98.70.58.92:/var/www/html/
Warning: Identity file C:\Users\Dell\.ssh\1749030672_0444295 not accessible: No such file or directory.
^[]
```

Errors occurred with secured copy protocol

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TESTING & VALIDATION

After deployment, the site was tested by visiting the public IP in a browser (`http://98.70.58.92/htmlbasics.html``). The site loaded successfully on both desktop and mobile browsers.

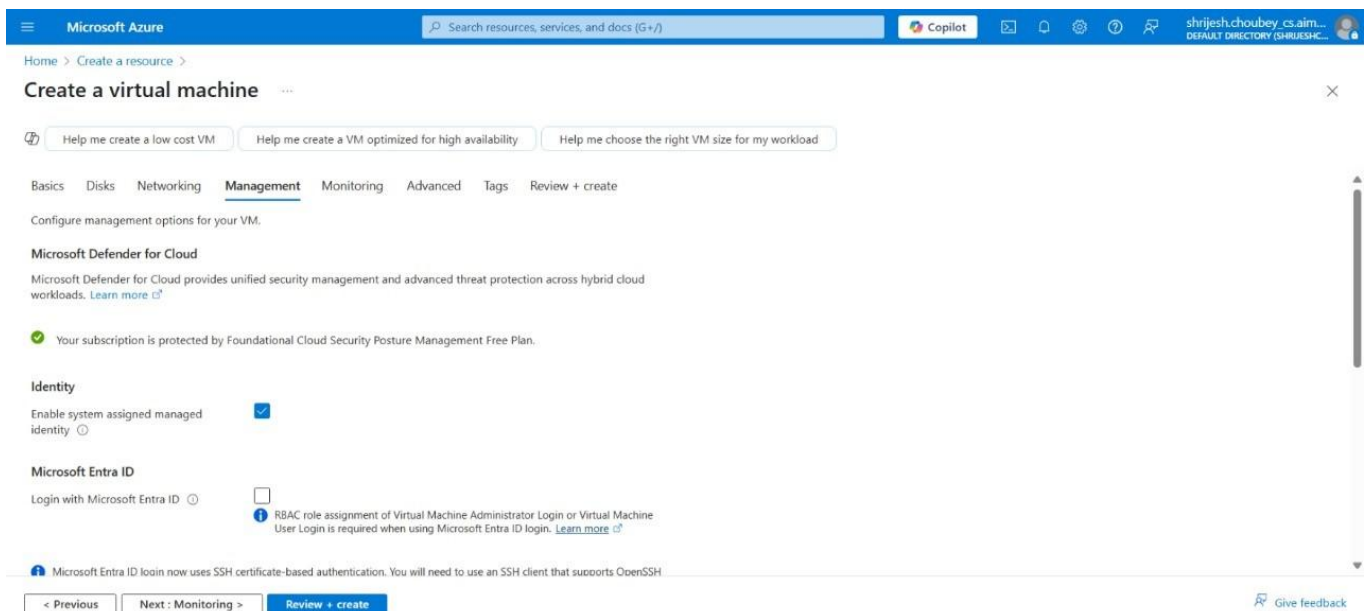
Additionally, Nginx service status was confirmed with:

```
---
```

```
systemctl status nginx
```

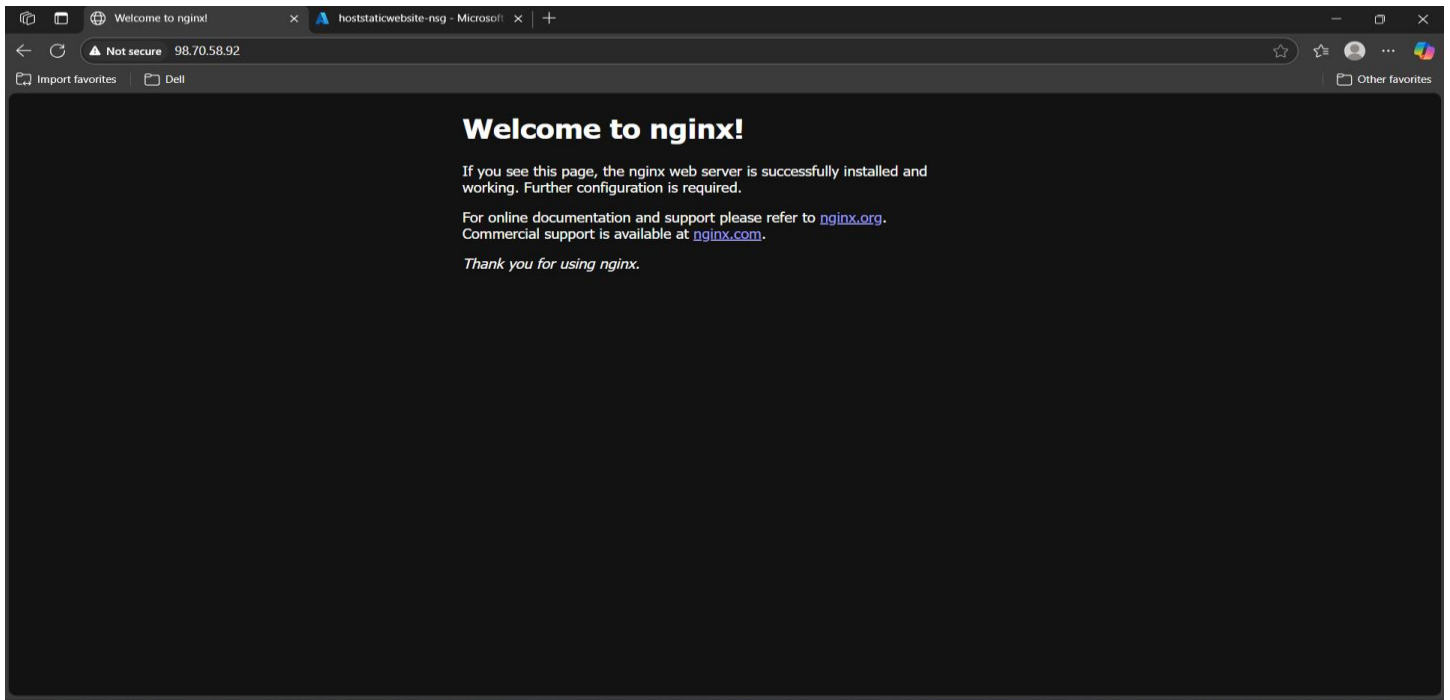
```
---
```

The Azure dashboard was checked to confirm that the VM status was 'Running' and inbound port traffic was being handled correctly.



Deployed Website Preview

Cloud Computing Project Report



Nginx service status confirmed

```
azureuser@hoststaticwebsite: ~$ apt update
Hit:4 http://azure.archive.ubuntu.com/ubuntu noble-security InRelease
Get:5 http://azure.archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [1112 kB]
Hit:6 https://packages.microsoft.com/repos/azure-cli noble InRelease
Get:7 http://azure.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Packages [1070 kB]
Fetched 2309 kB in 1s (2281 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
nginx is already the newest version (1.24.0-2ubuntu7.3).
0 upgraded, 0 newly installed, 0 to remove and 2 not upgraded.
azureuser@hoststaticwebsite:~$ scp -i C:\Users\Dell\.ssh\1749030672_0444295 your-website-folder/* azureuser@98.70.58.92:/var/www/html/
scp: stat local "your-website-folder/*": No such file or directory
azureuser@hoststaticwebsite:~$ ls ~/your-website-folder
ls: cannot access '/home/azureuser/your-website-folder': No such file or directory
azureuser@hoststaticwebsite:~$ scp -i C:\Users\Dell\.ssh\1749030672_0444295 "C:\Users\Dell\OneDrive\Desktop\coding folder\HTML-CSS-code\htmlbasics.html" azu
reuser@98.70.58.92:/var/www/html/
Warning: Identity file C:\Users\Dell\.ssh\1749030672_0444295 not accessible: No such file or directory.
^[ssh: connect to host 98.70.58.92 port 22: Connection timed out
scp: Connection closed
azureuser@hoststaticwebsite:~$ [200~systemctl status nginx~
[200~systemctl: command not found
azureuser@hoststaticwebsite:~$ systemctl status nginx
● nginx.service - A high performance web server and a reverse proxy server
   Loaded: loaded (/usr/lib/systemd/system/nginx.service; enabled; preset: enabled)
   Active: active (running) since Thu 2025-06-05 20:42:17 UTC; 11min ago
     Docs: man:nginx(8)
   Main PID: 821 (nginx)
    Tasks: 2 (limit: 1056)
   Memory: 2.7M (peak: 3.3M)
      CPU: 18ms
   CGroup: /system.slice/nginx.service
           └─821 "nginx: master process /usr/sbin/nginx -g daemon on; master_process on;"
             └─822 "nginx: worker process"

Jun 05 20:42:16 hoststaticwebsite systemd[1]: Starting nginx.service - A high performance web server and a reverse proxy server...
Jun 05 20:42:17 hoststaticwebsite systemd[1]: Started nginx.service - A high performance web server and a reverse proxy server.
azureuser@hoststaticwebsite:~$ |
```

System status - Active

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SECURITY BEST PRACTICES

Key practices followed include:

- SSH key authentication (disabling password login)
- IP whitelisting for SSH in NSG
- Only opening essential ports
- Installing only necessary software packages
- Keeping the system up to date with `apt upgrade`
- Avoiding root user login by using 'azureuser' with limited privileges.

Cloud Computing Project Report

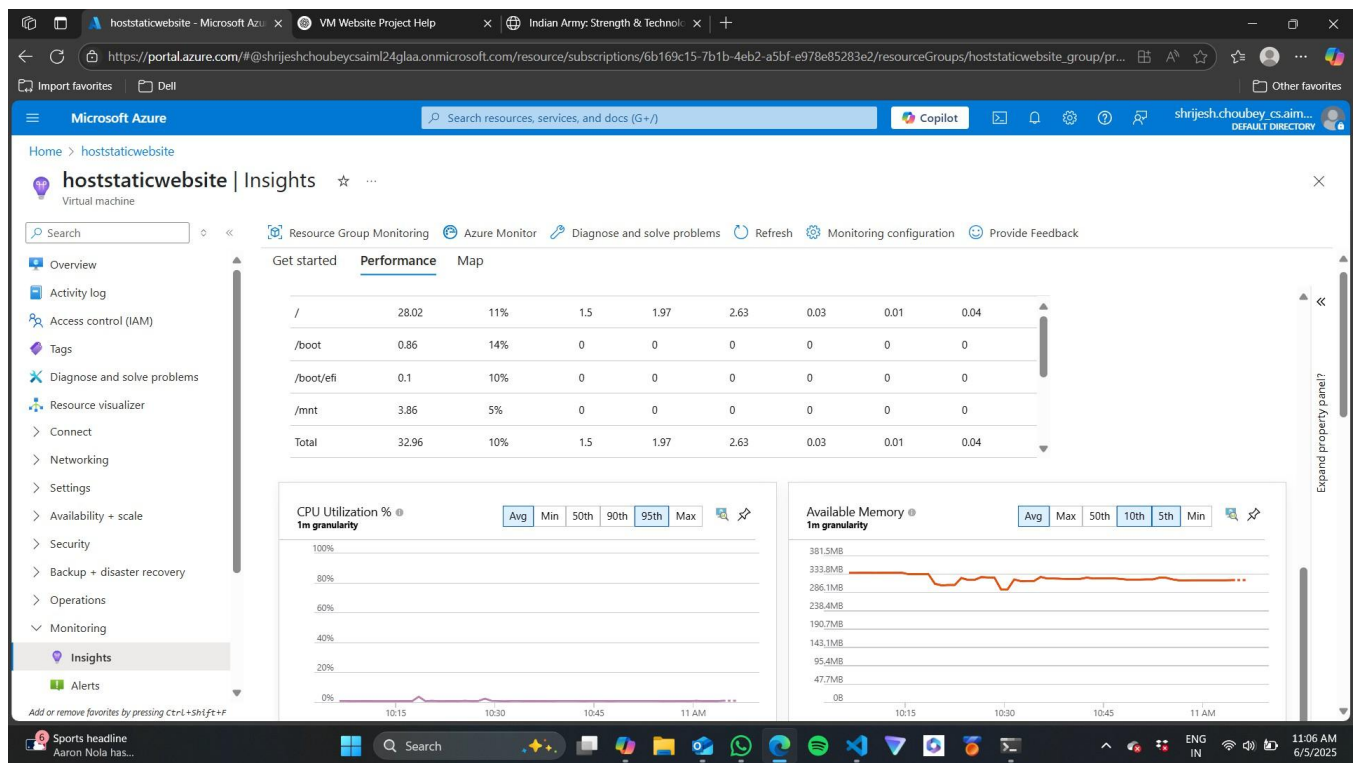
PERFORMANCE MONITORING

Azure Monitor and built-in diagnostics tools were used to track resource usage. CPU and RAM metrics showed the VM was operating well below capacity. This confirms that a Standard_B1s instance is sufficient for small static websites.

Installed Azure extensions include:

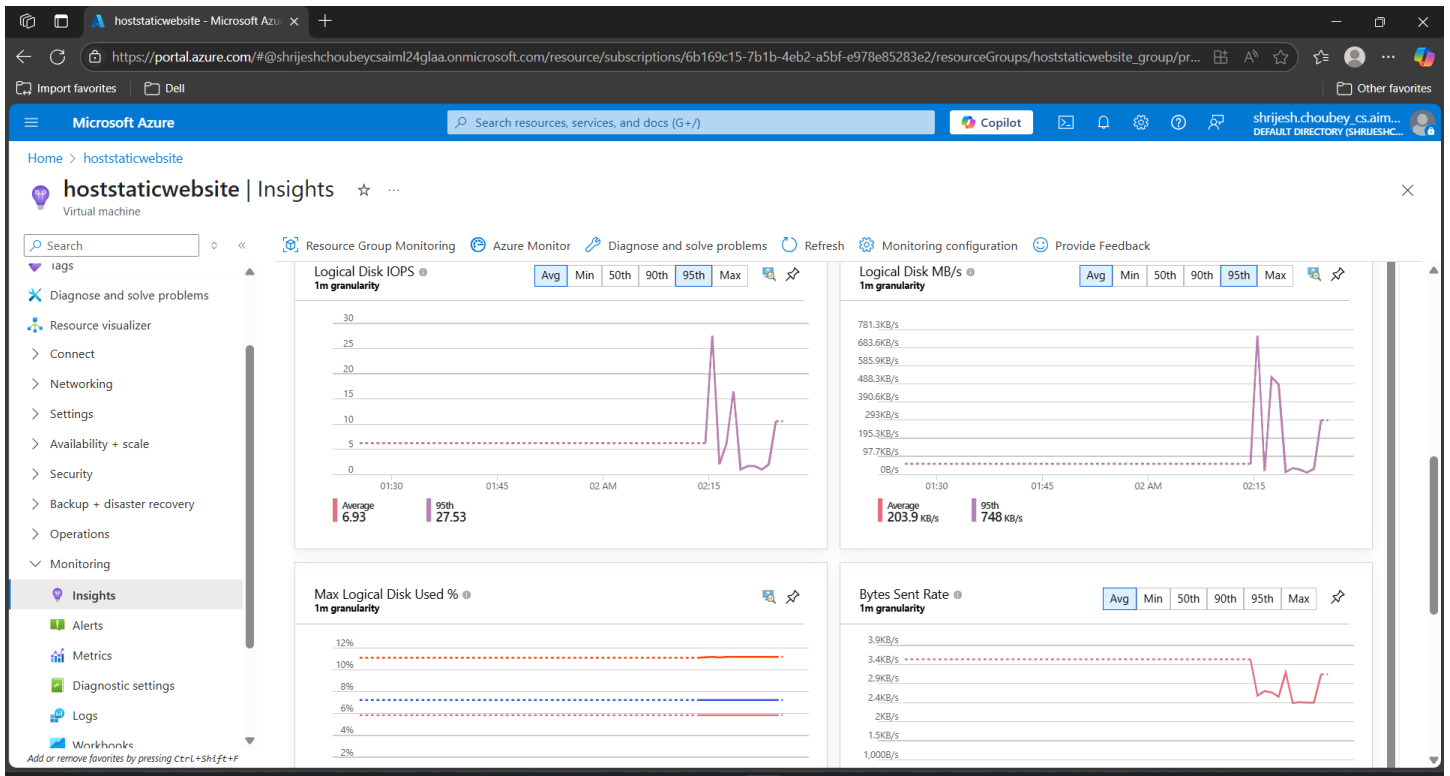
- Azure Monitor Linux Agent
- Azure Performance Diagnostics

These provide real-time metrics and enable performance tracing if needed.

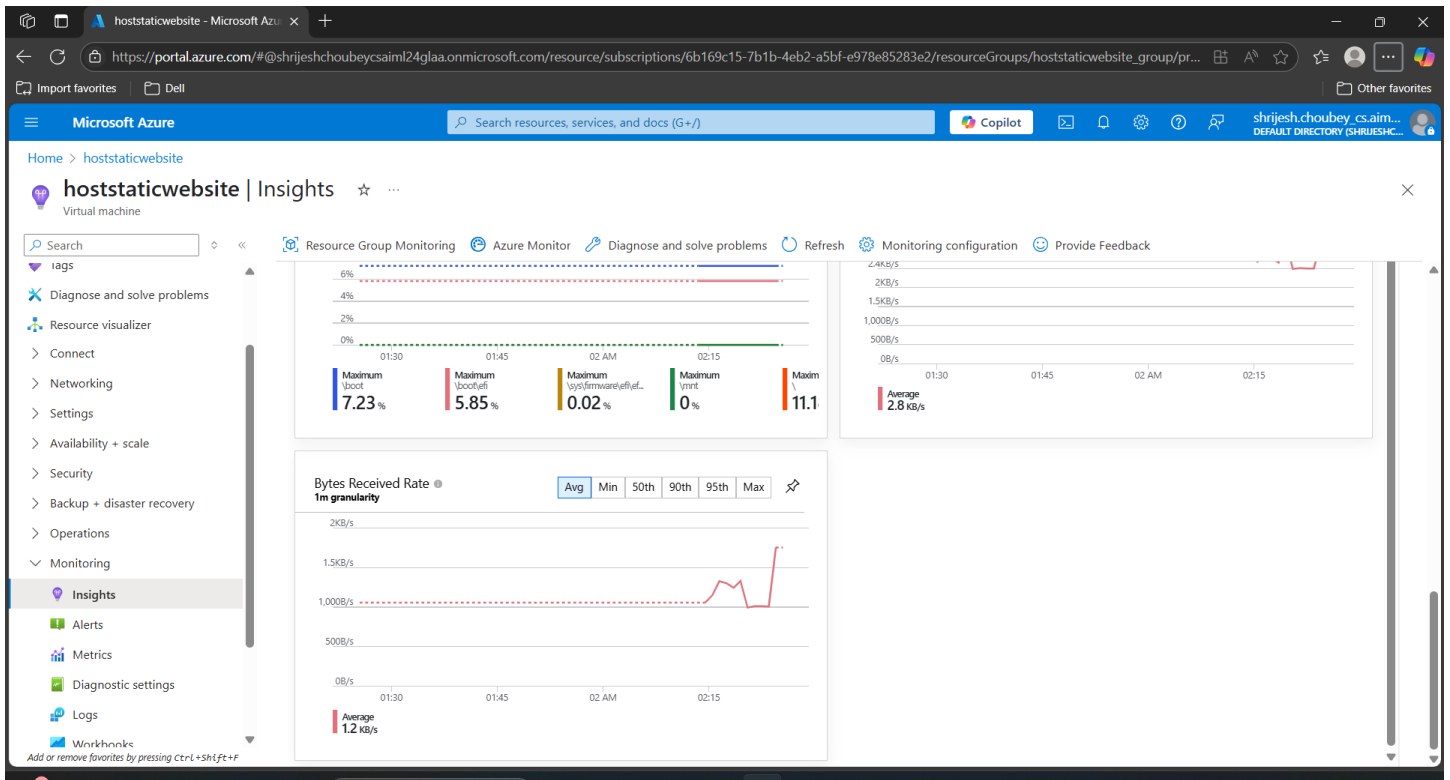


Azure Monitor - CPU and RAM Insights

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Disk running performance



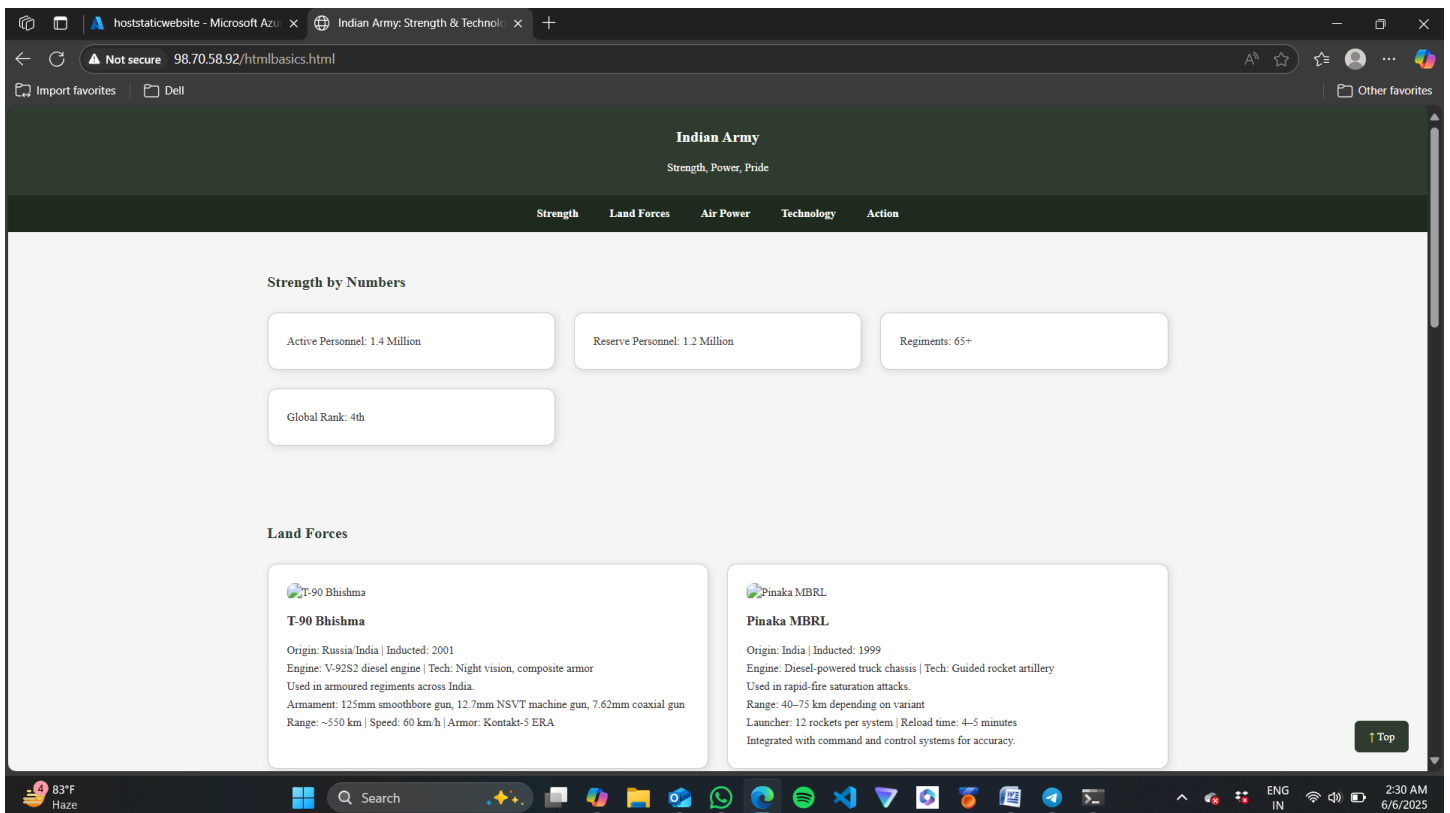
Other monitoring insights – bytes received rate

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CONCLUSION

This project demonstrated a real-world example of provisioning a VM on Azure, configuring it securely, deploying a static website, and validating performance.

Students gain insights into cloud networking, web servers, file transfer security, and performance metrics. Future extensions could include deploying a React or Flask app, adding an SSL certificate via Let's Encrypt, or setting up a CI/CD deployment pipeline.



Website successfully working

Cloud Computing Project Report

REFERENCES

- Microsoft Azure Documentation: <https://learn.microsoft.com/en-us/azure/>
- Ubuntu Documentation: <https://ubuntu.com/>
- Nginx Documentation: <https://nginx.org/en/docs/>
- Mozilla Developer Network (HTML/CSS): <https://developer.mozilla.org/>
- ChatGPT by OpenAI (for technical explanations)