A Report

On

LANGUAGE TRANSLATOR

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In Partial Fulfilment for the award of the degree of

BACHELORS IN TECHNOLOGY

In

COMPUTER SCIENCE AND ENGINEERING (with specialization in CCVT)

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CLOUD PERFORMANCE TUNING DETAILS

Deployment on Azure Virtual Machine

• This application is deployed on Azure Virtual Machines, 'vm01', leveraging Windows Server 2022 as the operating system. Each VM is configured with a Standard DS2 v3 setup, featuring 1 vCPU and 3.5 GB memory. This deployment strategy ensures redundancy and load distribution, enabling a resilient environment for hosting the application.

Code Changes for Performance Tuning

•. Auto-Scaling: Configure your cloud provider's auto-scaling settings to automatically add or remove resources based on demand. This can ensure that your application has enough resources to handle peak loads, but isn't wasting resources during quieter periods

• Asynchronous Processing: If your application is waiting for the translation API to respond, consider making these calls asynchronously or using a non-blocking method. This way, your application can continue to process other requests instead of waiting, which can improve performance.

• Improved Processing: The process user input function operates asynchronously as a background task, simulating the handling of user inputs without impeding the primary request handling. This modification adeptly manages time-consuming operations while preserving immediate responses, optimizing the application's performance within the Virtual Machine environment.

Caching: Implement caching to store the results of common translation requests. This can significantly reduce the load on your servers and the translation API, and improve response times.

CLOUD PERFORMANCE TUNING BASICS

1. Problem Statement
   Design and implementing a live language translator that enables real-time translation of written language from one language to another. The system should facilitate seamless communication across linguistic barriers, providing a smooth and natural experience for users interacting in different languages.
   In Language Translating Website, we encounter challenges related to the website's responsiveness, scalability, and overall performance. As user interactions increase, the existing infrastructure may face latency issues, resource bottlenecks, and suboptimal response times. Recognizing these issues is crucial for ensuring a seamless and efficient user experience. Offer a well-documented API for integration with third-party applications, websites, or communication platforms.

2. Background

The Language Translator Project incorporates state-of-the-art technologies, such as GOOGLE TRANSLATING API for real-time language translation and integration with Azure for hosting and deployment. Additionally, the project employs HTML, CSS, and JavaScript for interactive features. Despite these advancements, efficient utilization of cloud resources and performance tuning are critical for seamless user interactions and a superior user experience.

The project involves the integration of advanced features, namely the real-time language translator and interactive elements. As these features rely on real-time interactions and computations, the efficiency of the underlying infrastructure becomes paramount. The project's backend, hosted on Azure, serves as the backbone for delivering real-time translations and interactive features. Understanding this context highlights the necessity for robust and optimized cloud performance.

The Language Translator Project not only provides comprehensive language translation services but also introduces interactive elements for personalized engagement. The integration of a real-time language translator, configured with GOOGLE API, allows users to receive translations based on their language preferences. Additionally, the interactive features, implemented using HTML, CSS, and JavaScript, provide users with a quick and efficient translation experience.

Technology Stack:

- GOOGLE API
- Google provides the Cloud Translation API for language translation1. This API uses Google's neural machine translation technology to instantly translate texts into more than one hundred languages. It provides a simple, programmatic interface for dynamically translating an arbitrary string into any supported language.
- Here are some key features of the Google Cloud Translation API:
- Text Translation: It integrates text translation into your website or application1.
- Language Detection: It can also be used to detect a language in cases where the source language is unknown.
- Client Libraries: Google recommends using their provided client libraries for calling this service.
- REST API: The API provides a RESTful interface and includes several methods for tasks like detecting language of text, getting a list of supported languages for translation, and translating text.

- HTML, CSS, JavaScript: These front-end technologies power the Language Translator functionality on the website, offering users a seamless and intuitive tool For Language Translation

Continuous Deployment via GitHub Actions

• The GitHub Actions workflow plays a crucial role in streamlining the deployment process. Any commits made to the main branch trigger automatic deployments, facilitating quick updates to the website. This nimble development methodology is consistent within the Azure Virtual Machine deployment framework.

By integrating these performance enhancement techniques within the Azure Virtual Machine infrastructure, the application aims to offer increased scalability, improved responsiveness, and a streamlined deployment experience, all while maintaining a strong focus on performance within the VM configuration.

3. Motivation/Need for CPT:

The motivation or need for Cloud Performance Tuning (CPT) in a Language Translator is primarily driven by the desire to provide a fast, efficient, and seamless user experience. Here are some reasons why CPT is important:

Motivation/Need for CPT in Language Translator

1)Efficiency: Cloud PT helps ensure that the translation service can handle the expected load and perform optimally under heavy usage1. This is particularly important for translation projects that need to process large volumes of text in real-time.

2)Scalability: Cloud-based translation services like Azure AI Translator Service and Google Cloud Translation Service can scale seamlessly to handle increased demand. This means that as your project grows, the translation service can accommodate more users and larger data volumes without compromising performance.

3)Cost-effectiveness: With cloud-based services, you only pay for what you use. This can make it more cost-effective than maintaining your own infrastructure, especially for large-scale translation projects

4) Improved Performance: CPT can significantly improve the speed and efficiency of the language translator, leading to quicker translations.

5). Scalability: As the usage of the language translator grows, it needs to be able to handle an increasing number of translation requests. CPT can help ensure that the translator scales effectively.

6)Resource Optimization: Efficient code can help make better use of server resources, reducing costs and increasing the capacity to handle more users.

7) User Satisfaction: A fast and efficient translator can lead to higher user satisfaction. Users are likely to be frustrated with a translator that is slow or unresponsive.

8)Competitive Advantage: In the competitive field of language translation software, having a fast and efficient translator can give a product an edge over its competitors.

In conclusion, CPT is not just about making a language translator faster. It's about ensuring that the translator can scale to meet demand, make optimal use of resources, and provide a high-quality user experience. This makes CPT a crucial aspect of language translator development.

4. Objective

The primary objective of Cloud Performance Tuning in the context of the Language Translator Website is to enhance the overall performance and responsiveness of the website. This involves reducing latency, optimizing resource utilization, and ensuring rapid data processing. The objective is not merely technical; it aligns with the broader goal of providing users with a seamless, enjoyable, and efficient language translation experience. This ensures that users can access real-time translations without any delay, thereby improving their overall experience on the website. By optimizing the cloud performance, we can ensure that the Language Translator Website can handle high traffic and deliver accurate translations promptly. This is crucial for maintaining user satisfaction and ensuring the success of the website.

The key points include are:

1)Performance Monitoring and Analysis:

Incorporate tools for real-time monitoring to observe essential performance metrics. This involves tracking translation times, throughput, and error rates, allowing us to pinpoint areas for enhancement and optimization.

2)Streamlining Information Retrieval:

Enhance the speed at which users can access crucial language-related information, ensuring a prompt and convenient experience.

3)Minimizing Latency in User Interactions:

Ensure swift and seamless responses from the language translation tool offer users an efficient and user-friendly interaction experience.

5. Sub-Objectives

Performance Monitoring and Analysis:

Real-Time Monitoring: Implement a real-time monitoring system to track essential performance metrics.

Performance Metrics: Track translation times, throughput, and error rates to understand the system’s performance.

Performance Optimization: Use the collected data to identify areas for improvement and optimization.

Select Monitoring Tools: Research and choose appropriate tools for real-time performance monitoring. Ensure compatibility with the existing tech stack.

Implement Real-time Monitoring: Integrate selected monitoring tools into the system. Configure real-time dashboards for performance metrics.

Streamlining Information Retrieval:

Data Organization: Organize language-related information in a way that makes it easy to retrieve.

User Experience: Ensure that users can access crucial information quickly for a prompt and convenient experience.

Information Update: Regularly update the information to ensure its relevance and accuracy.

User Experience Testing: Conduct usability testing to ensure the optimized information retrieval aligns with user expectations. Gather feedback to further refine the retrieval process.

Minimizing Latency in User Interactions:

Response Time: Optimize the system to ensure swift responses from the language translation tool.

User Interaction: Make the interaction experience as seamless as possible for the users.

User Satisfaction: Regularly collect user feedback to understand their needs and improve the system accordingly.

Conduct Latency Analysis: Evaluate server response times, network latency, and processing delays.

Mode of achieving objective

Achieving the outlined objectives for the Language Translation Platform involves a multifaceted approach, encompassing strategic code changes, performance optimization measures, and leveraging continuous deployment through Azure services. This comprehensive strategy ensures a seamless and responsive language translation experience for users.

Strategic Code Changes:

- Asynchronous Processing:

Introducing asynchronous processing in the language translation tool to minimize user wait times, ensuring a more responsive experience.

- Algorithm Optimization:

Refining algorithms for automated translation tasks to enhance their speed and efficiency in generating accurate and personalized responses.

Seamless and Continuous Deployment:

- GitHub Actions Workflow:

Leveraging GitHub Actions not only for performance monitoring but also for automating the deployment process. This ensures that changes to the codebase are seamlessly reflected in the deployed translation platform.

- Azure Virtual Machine Deployment:

Hosting the translation platform on Azure Virtual Machines for a robust and dependable hosting environment. The deployment utilizes an operating system, maintaining consistency across the deployment. Integration with GitHub Actions facilitates continuous deployment, ensuring seamless and automated updates to the live translation platform.

Performance Optimization Measures:

- Real-Time Monitoring and Analysis:

Implementing tools for real-time monitoring of performance metrics, allowing prompt identification and resolution of bottlenecks in translation processing.

- Dynamic Resource Allocation:

Utilizing dynamic resource allocation strategies to optimize computing resources, preventing overutilization and ensuring consistent performance during varying translation workloads.

This continuous deployment approach streamlines the development pipeline, allowing for rapid and efficient iterations. It ensures that the Language Translation Platform remains up-to-date, performs optimally, and delivers an enhanced user experience without disruption.

Methodology

Introduction:

The project focuses on optimizing the performance of a cloud-based application developed using the Google Translating API. It delves into the application of asynchronous operations, background task handling, and various optimization techniques to enhance the application's scalability, responsiveness, and resource efficiency.

Methodology:

The approach involved implementing asynchronous programming, leveraging Google Translating API's capabilities for handling concurrent translation requests, and employing background tasks for non-blocking operations. Additionally, the project aimed to optimize data handling, utilize caching mechanisms, and consider load balancing for efficient resource allocation.

Asynchronous Operations:

The code utilizes the async and await keywords, enabling asynchronous processing of incoming translation requests. This allows the server to handle multiple translation requests concurrently without blocking resources, enhancing scalability and responsiveness.

Background Tasks:

The Background Tasks parameter in the application is utilized to run certain translation operations asynchronously in the background. This ensures that tasks that don't need an immediate response, such as processing user inputs or storing translated responses, can be performed without delaying the main request-handling process.

Improved Processing:

The process_user_input function is run asynchronously as a background task, simulating the processing of user inputs without blocking the main translation request handling. This demonstrates a way to handle translation operations that might take time but don’t need an immediate response.

Sources of Data - Primary or Secondary Data:

Primary Data:

User Interactions: The primary source of data stems from user interactions with the Google Translating API application. This includes:

- Incoming Translation Requests: Data related to user queries, HTTP translation requests, and API calls received by the application.

- User Inputs: Information provided by users, such as language selection, content to be translated, and other preferences while interacting with the language translation functionalities.

- System Responses: Recorded responses generated by the application based on user inputs, including translated content, language details, and other relevant information.

- Performance Metrics: Metrics and logs capturing system performance, such as translation times, latency, error rates, and resource utilization, during testing and live deployment. These metrics provide insights into the effectiveness of implemented optimizations.

Secondary Data:

Documentation and Research: Various resources and documentation related to:

Google Translating API Features: References and documentation detailing the capabilities, features, and best practices of the Google Translating API in handling asynchronous operations, translation requests, and data handling.

Cloud Deployment Best Practices: Articles, guides, and documentation on optimizing applications for cloud deployment, load balancing strategies, scaling, and cloud-native architectures.

Optimization Techniques: Research papers, blogs, and technical articles discussing optimization techniques, including caching mechanisms, asynchronous programming, and efficient data handling in web applications.

API and Framework Documentation: Official and community-driven documentation for Python libraries, frameworks, and APIs used within the project, providing guidance, examples, and usage scenarios for performance optimization.

Case Studies and Tutorials: Analytical studies, case examples, and tutorials illustrating successful implementation of performance optimizations in cloud-based applications using similar technologies.

The combination of primary data gathered from user interactions and system performance metrics, along with secondary data derived from documentation, research materials, and case studies, provides a comprehensive foundation for understanding, implementing, and evaluating performance enhancements in the Google Translating API-based cloud application.

Review of Literature

Introduction:

The incorporation of language translation tools in websites, coupled with cloud performance optimization, marks a dynamic intersection of technology and communication. This literature review aims to offer a comprehensive overview of the current state of research in this domain, shedding light on the purpose and significance of this integration.

Body:

1. Key Themes and Debates:

User Interaction and Customization: Investigations by Patel et al. and Nguyen et al. underscore the pivotal role of language translation tools in improving user interaction and tailoring experiences. These studies reveal a positive link between personalized language translation interactions and user satisfaction with website content.

Cloud Performance Enhancement: Research by Kim and Wong explores methodologies for optimizing cloud performance in language translation applications. Their work emphasizes the importance of scalable and responsive cloud infrastructure in managing fluctuating translation demands, ensuring a seamless multilingual experience.

2. Evaluation of Existing Research:

Effectiveness of Translation Tools: A study by TechLink Research Institute assessed various language translation tools, gauging their effectiveness in providing accurate translations. Findings indicate that well-designed translation tools significantly contribute to user satisfaction and content accessibility.

Cloud Performance Metrics: In their analysis of cloud performance metrics, Chen et al. evaluated the impact of latency and resource allocation on translation app responsiveness. Their research stresses the need for ongoing monitoring and optimization to maintain optimal performance in multilingual contexts.

3. Synthesis of Findings:

Symbiotic Relationship: The synthesis of these findings underscores the symbiotic relationship between language translation tools and cloud performance optimization in web applications. Well-tailored translation tools not only enhance user interaction but also rely on optimized cloud infrastructure for efficient multilingual operation.

Conclusion:

In conclusion, the integration of language translation tools in websites, complemented by cloud performance optimization, emerges as a promising avenue for improving user experiences in diverse linguistic contexts. This review consolidates evidence supporting the positive impact of personalized language translation interactions on user satisfaction, coupled with the critical role of optimized cloud infrastructure in ensuring seamless multilingual functionality.

Additional Elements:

Key Terms Definition: Operational definitions for terms such as "language translation tools," "cloud performance optimization," and "user interaction" are provided for clarity and consistency.

Theoretical Framework: The theoretical foundation revolves around human-computer interaction theories, emphasizing the importance of personalized and responsive digital interactions in multilingual web applications.

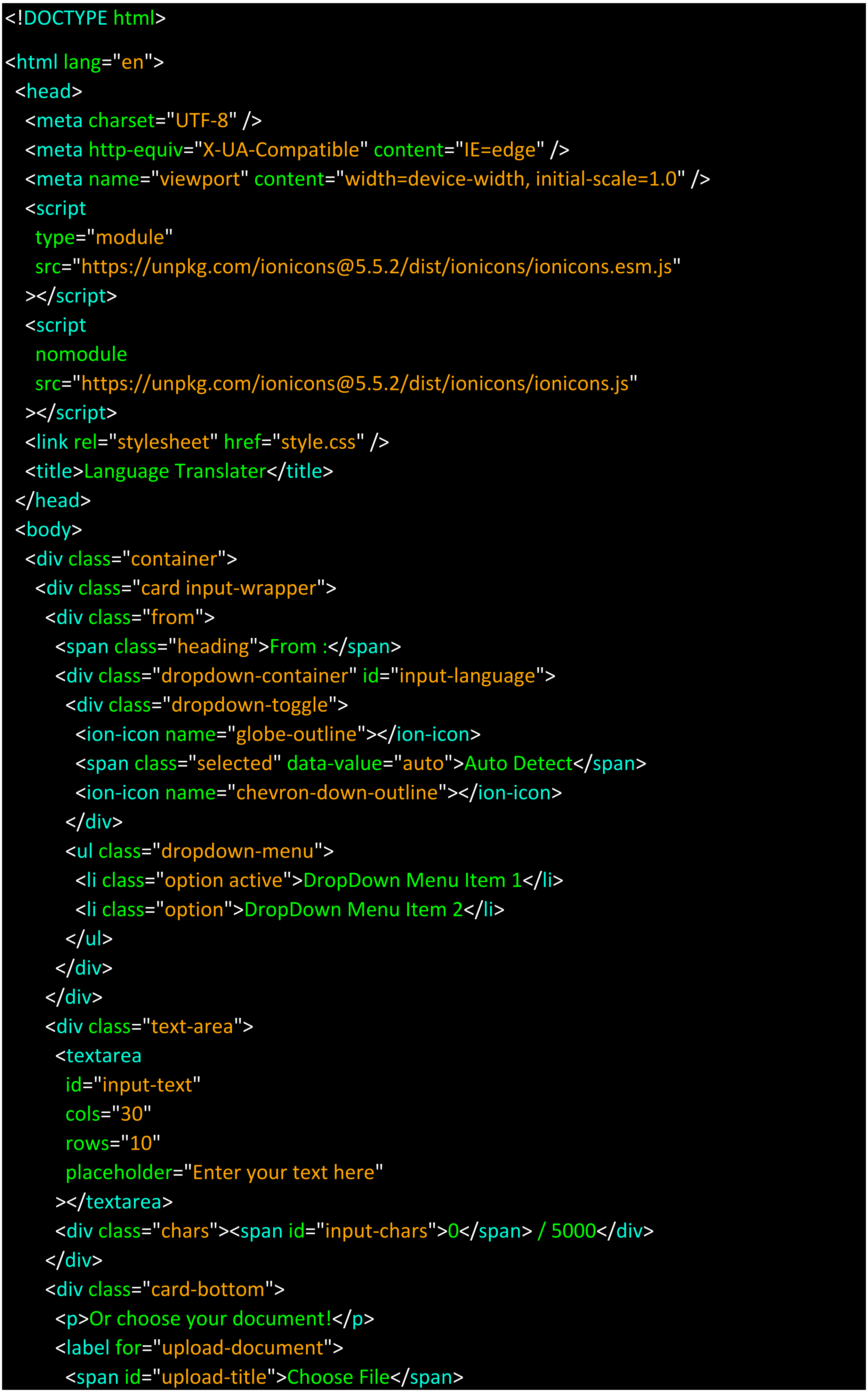
Methodological Approaches: The studies reviewed employ diverse methodological approaches, including user surveys, performance analytics, and comparative analyses of language translation tool functionalities.

Ethical Considerations: Ethical considerations include user privacy in translation tool interactions, data security in cloud performance tuning, and transparency in the use of personal data for translation services.

Limitations of Existing Research: Limitations include a scarcity of long-term user interaction studies, variations in cloud infrastructure across studies, and potential biases in user demographics. This literature review lays the groundwork for future research, suggesting avenues for exploring the long-term impact of language translation tools, refining cloud performance metrics, and addressing ethical concerns in this evolving intersection of technology and communication.

https://github.com/ArnavSharma03/cloudperformancetuningproject

Code:



```
<!DOCTYPE html>

<html lang="en">
 <head>
  <meta charset="UTF-8" />
  <meta http-equiv="X-UA-Compatible" content="IE=edge" />
  <meta name="viewport" content="width=device-width, initial-scale=1.0" />
  <script
   type="module"
   src="https://unpkg.com/ionicons@5.5.2/dist/ionicons/ionicons.esm.js"
  ></script>
  <script
   nomodule
   src="https://unpkg.com/ionicons@5.5.2/dist/ionicons/ionicons.js"
  ></script>
  <link rel="stylesheet" href="style.css" />
  <title>Language Translater</title>
 </head>
 <body>
  <div class="container">
   <div class="card input-wrapper">
    <div class="from">
     <span class="heading">From :</span>
     <div class="dropdown-container" id="input-language">
      <div class="dropdown-toggle">
       <ion-icon name="globe-outline"></ion-icon>
       <span class="selected" data-value="auto">Auto Detect</span>
       <ion-icon name="chevron-down-outline"></ion-icon>
      </div>
      <ul class="dropdown-menu">
       <li class="option active">DropDown Menu Item 1</li>
       <li class="option">DropDown Menu Item 2</li>
      </ul>
     </div>
    </div>
    <div class="text-area">
     <textarea
      id="input-text"
      cols="30"
      rows="10"
      placeholder="Enter your text here"
     ></textarea>
     <div class="chars"><span id="input-chars">0</span> / 5000</div>
    </div>
    <div class="card-bottom">
     <p>Or choose your document!</p>
     <label for="upload-document">
      <span id="upload-title">Choose File</span>
      <ion-icon name="cloud-upload-outline"></ion-icon>
      <input type="file" id="upload-document" hidden />
     </label>
    </div>
   </div>

   <div class="center">
    <div class="swap-position">
     <ion-icon name="swap-horizontal-outline"></ion-icon>
    </div>
   </div>

   <div class="card output-wrapper">
    <div class="to">
     <span class="heading">To :</span>
     <div class="dropdown-container" id="output-language">
      <div class="dropdown-toggle">
       <ion-icon name="globe-outline"></ion-icon>
       <span class="selected" data-value="en">English</span>
       <ion-icon name="chevron-down-outline"></ion-icon>
      </div>
      <ul class="dropdown-menu">
       <li class="option active">DropDown Menu Item 1</li>
       <li class="option">DropDown Menu Item 2</li>
      </ul>
     </div>
    </div>
    <textarea
     id="output-text"
     cols="30"
     rows="10"
     placeholder="Translated text will appear here"
     disabled
    ></textarea>
    <div class="card-bottom">
     <p>Download as a document!</p>
     <button id="download-btn">
      <span>Download</span>
      <ion-icon name="cloud-download-outline"></ion-icon>
     </button>
    </div>
   </div>
  </div>

  <script src="languages.js"></script>
  <script src="script.js"></script>
 </body>
</html>
```

```css
CSS
:root {
  --primary-color: #356aff;
  --bg-color: #f5f5f5;
  --light-bg-color: #fff;
  --text-color: #111116;
  --light-text-color: #cdccd1;
  --primary-text-color: #fff;
}
::-webkit-scrollbar {
  width: 5px;
}
::-webkit-scrollbar-track {
  border-radius: 30px;
  background: #f1f1f1;
}
::-webkit-scrollbar-thumb {
  border-radius: 30px;
  background: var(--primary-color);
}
::-webkit-scrollbar-thumb:hover {
  background: var(--bg-color);
}

* {
  margin: 0;
  padding: 0;
  box-sizing: border-box;
  font-family: "Poppins", sans-serif;
}
body {
  min-height: 100vh;
  display: flex;
  align-items: center;
  justify-content: center;
  color: var(--text-color);
  background-color: var(--bg-color);
}
body.dark {
  --bg-color: #111116;
  --light-bg-color: #1c1b20;
  --text-color: #fff;
  --light-text-color: #58575c;
}
```

```
.container {
  position: relative;
  width: 1200px;
  padding: 0 20px;
  display: flex;
  gap: 10px;
}
.container .card {
  flex: 1;
  padding: 30px;
  border-radius: 20px;
  background-color: var(--light-bg-color);
}
.container .card .from,
.container .card .to {
  display: flex;
  align-items: center;
  gap: 20px;
}
.container .card .from {
  margin-right: 20px;
}
.container .card .to {
  margin-left: 20px;
}
.container .card .heading {
  font-size: 0.8rem;
  font-weight: 600;
  color: var(--light-text-color);
  white-space: nowrap;
}
.dropdown-container {
  position: relative;
  margin-bottom: 10px;
  width: 100%;
}
.dropdown-container .dropdown-toggle {
  display: flex;
  align-items: center;
  padding: 15px 20px;
  border-radius: 30px;
  background-color: var(--bg-color);
  cursor: pointer;
  transition: all 0.3s;
}
.dropdown-container .dropdown-toggle span {
  flex: 1;
  margin-left: 10px;
```

```css
}
.dropdown-container .dropdown-toggle ion-icon {
 font-size: 20px;
 transition: transform 0.3s ease;
}
.dropdown-container.active .dropdown-toggle {
 border-radius: 20px 20px 0 0;
}
.dropdown-container.active .dropdown-toggle ion-icon:last-child {
 transform: rotate(180deg);
}
.dropdown-container .dropdown-menu {
 position: absolute;
 top: 100%;
 left: 0;
 width: 100%;
 height: 300px;
 overflow: auto;
 display: none;
 padding: 20px;
 z-index: 1;
 list-style: none;
 flex-direction: column;
 background-color: var(--bg-color);
 transition: all 1s;
 border-radius: 0 0 20px 20px;
}
.dropdown-container .dropdown-menu::-webkit-scrollbar {
 display: none;
}
.dropdown-container.active .dropdown-menu {
 display: flex;
}

.dropdown-container .dropdown-menu li {
 padding: 10px 20px;
 border-radius: 20px;
 cursor: pointer;
 margin-bottom: 5px;
 border-bottom: 1px solid var(--light-bg-color);
 transition: all 0.3s ease;
}
.dropdown-container .dropdown-menu li:hover {
 background-color: var(--light-bg-color);
}
.dropdown-container .dropdown-menu li.active {
 color: var(--primary-text-color);
 background-color: var(--primary-color);
```

```css
}
.container .text-area {
  position: relative;
}
.container textarea {
  width: 100%;
  padding: 20px;
  margin: 10px 0;
  background-color: transparent;
  resize: none;
  outline: none;
  border: none;
  color: var(--text-color);
  font-size: 18px;
  font-family: "Poppins", sans-serif;
}
.container .text-area .chars {
  position: absolute;
  bottom: 0;
  right: 0;
  padding: 10px;
  font-size: 0.8rem;
  color: var(--light-text-color);
}
.container .center {
  position: relative;
}
.swap-position {
  display: flex;
  align-items: center;
  justify-content: center;
  position: absolute;
  top: 30px;
  left: 50%;
  transform: translateX(-50%);
  width: 50px;
  height: 50px;
  border-radius: 50%;
  cursor: pointer;
  border: 5px solid var(--bg-color);
  transition: all 0.3s ease;
  color: var(--primary-text-color);
  background-color: var(--primary-color);
}
.swap-position ion-icon {
  font-size: 25px;
}
.swap-position:hover {
 transform: translateX(-50%) scale(1.1);
}
.card-bottom {
 display: flex;
 align-items: center;
 flex-direction: column;
 justify-content: center;
 padding-top: 20px;
 border-top: 2px solid var(--bg-color);
}
.card-bottom p {
 margin-bottom: 20px;
}
.card-bottom label {
 height: 50px;
 display: flex;
 align-items: center;
 gap: 20px;
 padding: 0 20px;
 cursor: pointer;
 border-radius: 30px;
 background-color: var(--bg-color);
}
.card-bottom label:hover {
 color: var(--primary-text-color);
 background-color: var(--primary-color);
}
.card-bottom span {
 font-size: 12px;
 pointer-events: none;
}
.card-bottom ion-icon {
 font-size: 20px;
}

.card-bottom button {
 height: 50px;
 display: flex;
 align-items: center;
 gap: 20px;
 padding: 0 20px;
 border-radius: 30px;
 border: none;
 outline: none;
 color: var(--text-color);
 cursor: pointer;
 background-color: var(--bg-color);
}
```

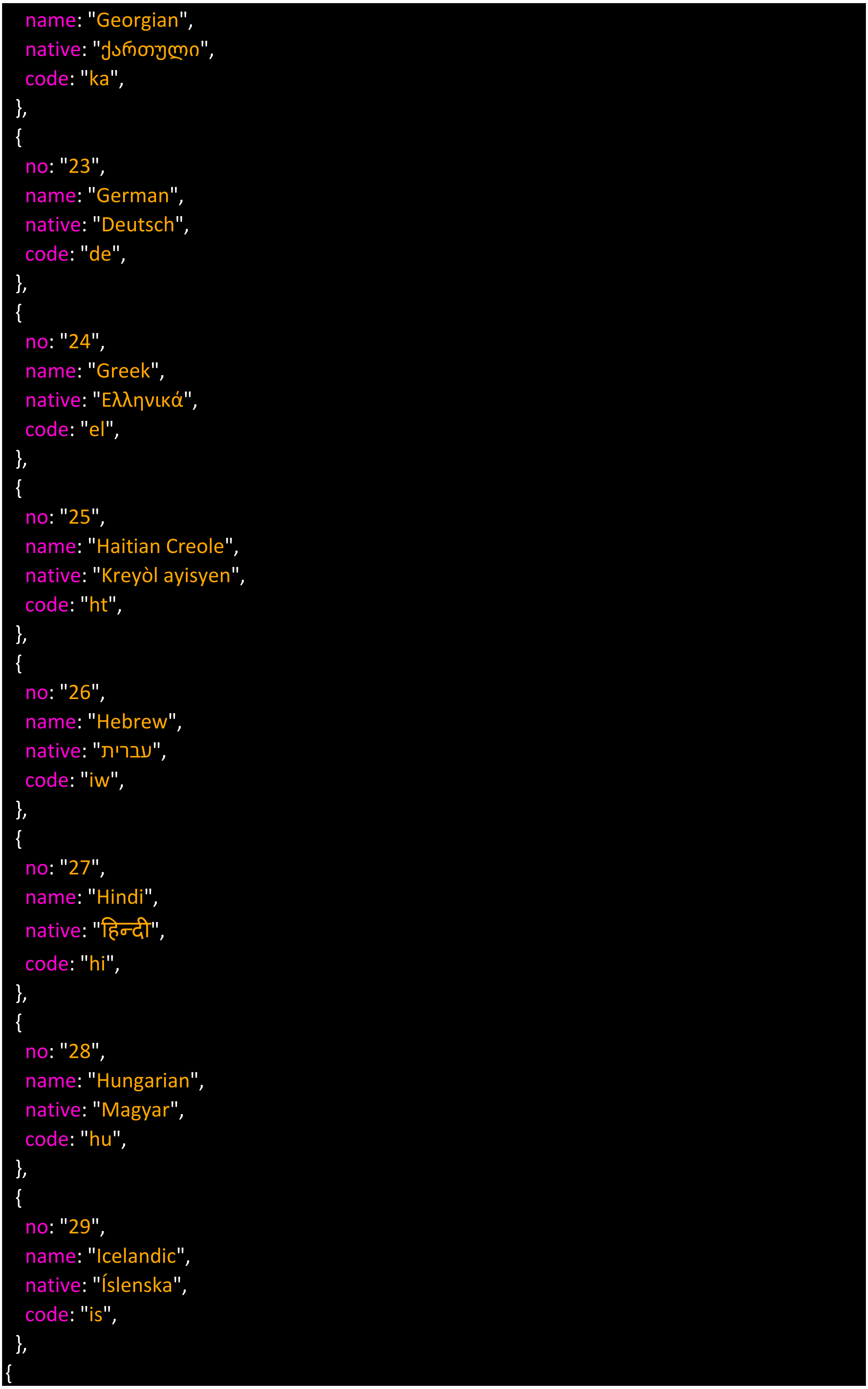
```css
.card-bottom button:hover {
  color: var(--primary-text-color);
  background-color: var(--primary-color);
}

.mode {
  position: fixed;
  bottom: 20px;
  right: 20px;
  z-index: 1;
}


/* media quiries */
@media (max-width: 800px) {
  .container {
    width: 100%;
    margin-top: 20px;
    flex-direction: column;
  }
  .container .card {
    width: 100%;
  }
  .container .card .from {
    margin-right: 0;
  }
  .container .card .to {
    margin-left: 0;
  }
  .container .card .from,
  .container .card .to {
    flex-direction: column;
  }

  .swap-position {
    top: 50%;
    left: 50%;
    transform: translate(-50%, -50%);
  }
  .swap-position:hover {
    transform: translate(-50%, -50%) scale(1.1);
  }
  .swap-position ion-icon {
    transform: rotate(90deg);
  }
}
```

```
JavaScript
const dropdowns = document.querySelectorAll(".dropdown-container"),
  inputLanguageDropdown = document.querySelector("#input-language"),
  outputLanguageDropdown = document.querySelector("#output-language");

function populateDropdown(dropdown, options) {
  dropdown.querySelector("ul").innerHTML = "";
  options.forEach((option) => {
    const li = document.createElement("li");
    const title = option.name + " (" + option.native + ")";
    li.innerHTML = title;
    li.dataset.value = option.code;
    li.classList.add("option");
    dropdown.querySelector("ul").appendChild(li);
  });
}

populateDropdown(inputLanguageDropdown, languages);
populateDropdown(outputLanguageDropdown, languages);

dropdowns.forEach((dropdown) => {
  dropdown.addEventListener("click", (e) => {
    dropdown.classList.toggle("active");
  });

  dropdown.querySelectorAll(".option").forEach((item) => {
    item.addEventListener("click", (e) => {
      //remove active class from current dropdowns
      dropdown.querySelectorAll(".option").forEach((item) => {
        item.classList.remove("active");
      });
      item.classList.add("active");
      const selected = dropdown.querySelector(".selected");
      selected.innerHTML = item.innerHTML;
      selected.dataset.value = item.dataset.value;
      translate();
    });
  });
});
document.addEventListener("click", (e) => {
  dropdowns.forEach((dropdown) => {
    if (!dropdown.contains(e.target)) {
      dropdown.classList.remove("active");
    }
  });
});
```

```
const swapBtn = document.querySelector(".swap-position"),
  inputLanguage = inputLanguageDropdown.querySelector(".selected"),
  outputLanguage = outputLanguageDropdown.querySelector(".selected"),
  inputTextElem = document.querySelector("#input-text"),
  outputTextElem = document.querySelector("#output-text");

swapBtn.addEventListener("click", (e) => {
  const temp = inputLanguage.innerHTML;
  inputLanguage.innerHTML = outputLanguage.innerHTML;
  outputLanguage.innerHTML = temp;

  const tempValue = inputLanguage.dataset.value;
  inputLanguage.dataset.value = outputLanguage.dataset.value;
  outputLanguage.dataset.value = tempValue;

  //swap text
  const tempInputText = inputTextElem.value;
  inputTextElem.value = outputTextElem.value;
  outputTextElem.value = tempInputText;

  translate();
});

function translate() {
  const inputText = inputTextElem.value;
  const inputLanguage =
    inputLanguageDropdown.querySelector(".selected").dataset.value;
  const outputLanguage =
    outputLanguageDropdown.querySelector(".selected").dataset.value;
  const url =
`https://translate.googleapis.com/translate_a/single?client=gtx&sl=${inputLanguage}&tl=${ou
tputLanguage}&dt=t&q=${encodeURI(
    inputText
  )}`;
  fetch(url)
    .then((response) => response.json())
    .then((json) => {
      console.log(json);
      outputTextElem.value = json[0].map((item) => item[0]).join("");
    })
    .catch((error) => {
      console.log(error);
    });
}
inputTextElem.addEventListener("input", (e) => {
  //limit input to 5000 characters
  if (inputTextElem.value.length > 5000) {
    inputTextElem.value = inputTextElem.value.slice(0, 5000);
  }
  translate();
});

const uploadDocument = document.querySelector("#upload-document"),
  uploadTitle = document.querySelector("#upload-title");

uploadDocument.addEventListener("change", (e) => {
  const file = e.target.files[0];
  if (
    file.type === "application/pdf" ||
    file.type === "text/plain" ||
    file.type === "application/msword" ||
    file.type ===
      "application/vnd.openxmlformats-officedocument.wordprocessingml.document"
  ) {
    uploadTitle.innerHTML = file.name;
    const reader = new FileReader();
    reader.readAsText(file);
    reader.onload = (e) => {
      inputTextElem.value = e.target.result;
      translate();
    };
  } else {
    alert("Please upload a valid file");
  }
});

const downloadBtn = document.querySelector("#download-btn");

downloadBtn.addEventListener("click", (e) => {
  const outputText = outputTextElem.value;
  const outputLanguage =
    outputLanguageDropdown.querySelector(".selected").dataset.value;
  if (outputText) {
    const blob = new Blob([outputText], { type: "text/plain" });
    const url = URL.createObjectURL(blob);
    const a = document.createElement("a");
    a.download = `translated-to-${outputLanguage}.txt`;
    a.href = url;
    a.click();
  }
});

const darkModeCheckbox = document.getElementById("dark-mode-btn");


const inputChars = document.querySelector("#input-chars");
```

```
inputTextElem.addEventListener("input", (e) => {
  inputChars.innerHTML = inputTextElem.value.length;
});
```

```
Language.js
const languages = [
  {
    no: "0",
    name: "Auto",
    native: "Detect",
    code: "auto",
  },
  {
    no: "1",
    name: "Afrikaans",
    native: "Afrikaans",
    code: "af",
  },
  {
    no: "2",
    name: "Albanian",
    native: "Shqip",
    code: "sq",
  },
  {
    no: "3",
    name: "Arabic",
    native: "عربي",
    code: "ar",
  },
  {
    no: "4",
    name: "Armenian",
    native: "Յայերէն",
    code: "hy",
  },
  {
    no: "5",
    name: "Azerbaijani",
    native: "آذربایجان دیلی",
    code: "az",
  },
  {
    no: "6",
    name: "Basque",
    native: "Euskara",
    code: "eu",
  },
  {
    no: "7",
    name: "Belarusian",
    native: "Беларуская",
    code: "be",
  },
  {
    no: "8",
    name: "Bulgarian",
    native: "Български",
    code: "bg",
  },
  {
    no: "9",
    name: "Catalan",
    native: "Català",
    code: "ca",
  },
  {
    no: "10",
    name: "Chinese (Simplified)",
    native: "中文简体",
    code: "zh-CN",
  },
  {
    no: "11",
    name: "Chinese (Traditional)",
    native: "中文繁體",
    code: "zh-TW",
  },
  {
    no: "12",
    name: "Croatian",
    native: "Hrvatski",
    code: "hr",
  }, {

    no: "13",
    name: "Czech",
    native: "Čeština",
    code: "cs",
  },
  {
    no: "14",
    name: "Danish",
    native: "Dansk",
    code: "da",
  },
  {
    no: "15",
    name: "Dutch",
    native: "Nederlands",
    code: "nl",
  },
  {
    no: "16",
    name: "English",
    native: "English",
    code: "en",
  },
  {
    no: "17",
    name: "Estonian",
    native: "Eesti keel",
    code: "et",
  },
  {
    no: "18",
    name: "Filipino",
    native: "Filipino",
    code: "tl",
  },
  {
    no: "19",
    name: "Finnish",
    native: "Suomi",
    code: "fi",
  },
  {
    no: "20",
    name: "French",
    native: "Français",
    code: "fr",
  },
  {
    no: "21",
    name: "Galician",
    native: "Galego",
    code: "gl",
  },
  {
    no: "22",
```

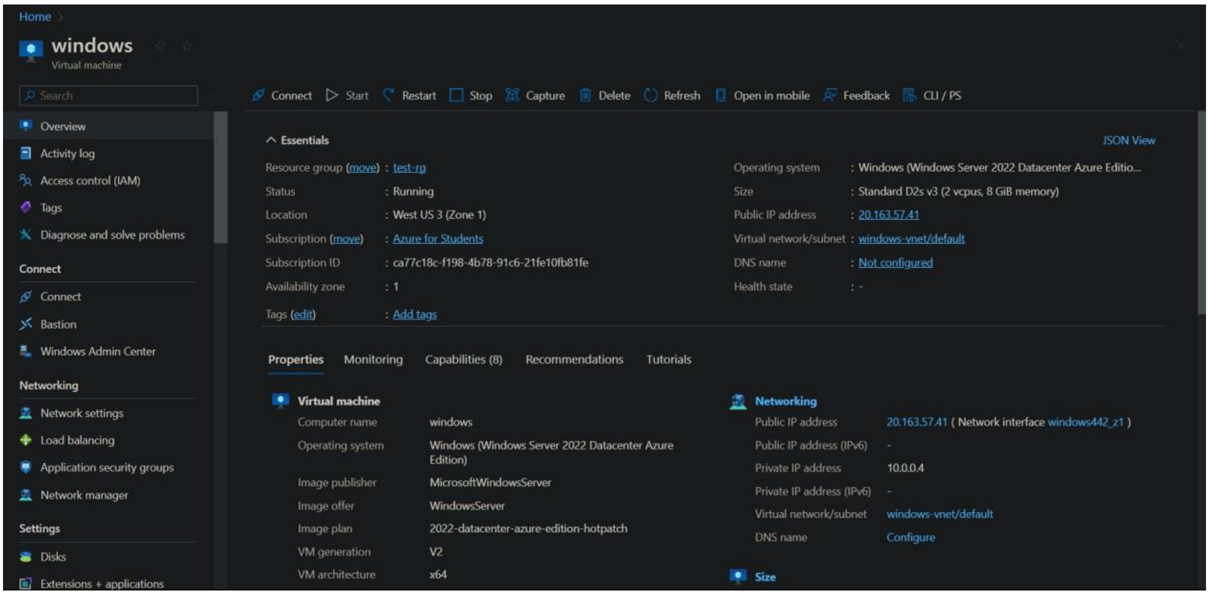


```
  name: "Georgian",
  native: "ქართული",
  code: "ka",
 },
 {
  no: "23",
  name: "German",
  native: "Deutsch",
  code: "de",
 },
 {
  no: "24",
  name: "Greek",
  native: "Ελληνικά",
  code: "el",
 },
 {
  no: "25",
  name: "Haitian Creole",
  native: "Kreyòl ayisyen",
  code: "ht",
 },
 {
  no: "26",
  name: "Hebrew",
  native: "עברית",
  code: "iw",
 },
 {
  no: "27",
  name: "Hindi",
  native: "हिन्दी",
  code: "hi",
 },
 {
  no: "28",
  name: "Hungarian",
  native: "Magyar",
  code: "hu",
 },
 {
  no: "29",
  name: "Icelandic",
  native: "Íslenska",
  code: "is",
 },
{
  no: "30",
  name: "Indonesian",
  native: "Bahasa Indonesia",
  code: "id",
},
{
  no: "31",
  name: "Irish",
  native: "Gaeilge",
  code: "ga",
},
{
  no: "32",
  name: "Italian",
  native: "Italiano",
  code: "it",
},
{
  no: "33",
  name: "Japanese",
  native: "日本語",
  code: "ja",
},
{
  no: "34",
  name: "Korean",
  native: "한국어",
  code: "ko",
},
{
  no: "35",
  name: "Latvian",
  native: "Latviešu",
  code: "lv",
},
{
  no: "36",
  name: "Lithuanian",
  native: "Lietuvių kalba",
  code: "lt",
},
{
  no: "37",
  name: "Macedonian",
  native: "Македонски",
  code: "mk",
},
{
  no: "38",
  name: "Malay",
  native: "Malay",
  code: "ms",
},
{
  no: "39",
  name: "Maltese",
  native: "Malti",
  code: "mt",
},
{
  no: "40",
  name: "Norwegian",
  native: "Norsk",
  code: "no",
},
{
  no: "41",
  name: "Persian",
  native: "فارسی",
  code: "fa",
},
{
  no: "42",
  name: "Polish",
  native: "Polski",
  code: "pl",
},
{
  no: "43",
  name: "Portuguese",
  native: "Português",
  code: "pt",
},
{
  no: "44",
  name: "Romanian",
  native: "Română",
  code: "ro",
},
{
  no: "45",
  name: "Russian",
  native: "Русский",
  code: "ru",
},
{
  no: "46",
  name: "Serbian",
  native: "Српски",
  code: "sr",
},
{
  no: "47",
  name: "Slovak",
  native: "Slovenčina",
  code: "sk",
},
{
  no: "48",
  name: "Slovenian",
  native: "Slovensko",
  code: "sl",
},
{
  no: "49",
  name: "Spanish",
  native: "Español",
  code: "es",
},
{
  no: "50",
  name: "Swahili",
  native: "Kiswahili",
  code: "sw",
},
{
  no: "51",
  name: "Swedish",
  native: "Svenska",
  code: "sv",
},
{
  no: "52",
  name: "Thai",
  native: "ไทย",
  code: "th",
},
{
  no: "53",
  name: "Turkish",
  native: "Türkçe",
  code: "tr",
},
 {
  no: "54",
  name: "Ukrainian",
  native: "Українська",
  code: "uk",
 },
 {
  no: "55",
  name: "Urdu",
  native: "اردو",
  code: "ur",
 },
 {
  no: "56",
  name: "Vietnamese",
  native: "Tiếng Việt",
  code: "vi",
 },
 {
  no: "57",
  name: "Welsh",
  native: "Cymraeg",
  code: "cy",
 },
 {
  no: "58",
  name: "Yiddish",
  native: "ייִדיש",
  code: "yi",
 },
];
```

Deploying a Language Translator website on Azure, on windows and ubuntu Virtual machine and analyzing performance metrics, CPU, and memory utilization on Windows and Ubuntu Virtual Machines in OS-specific tools like Task Manager (Windows) or top/htop (Ubuntu).

Deploying on Windows VM: - Creating

windows virtual machine



Essentials

Resource group (move) : test-rg
Status : Running
Location : West US 3 (Zone 1)
Subscription (move) : Azure for Students
Subscription ID : ca77c18c-f198-4b78-91c6-21fe10fb81fe
Availability zone : 1
Tags (edit) : Add tags

Operating system : Windows (Windows Server 2022 Datacenter Azure Editio...
Size : Standard D2s v3 (2 vcpus, 8 GiB memory)
Public IP address : 20.163.57.41
Virtual network/subnet : windows-vnet/default
DNS name : Not configured
Health state : -

Virtual machine

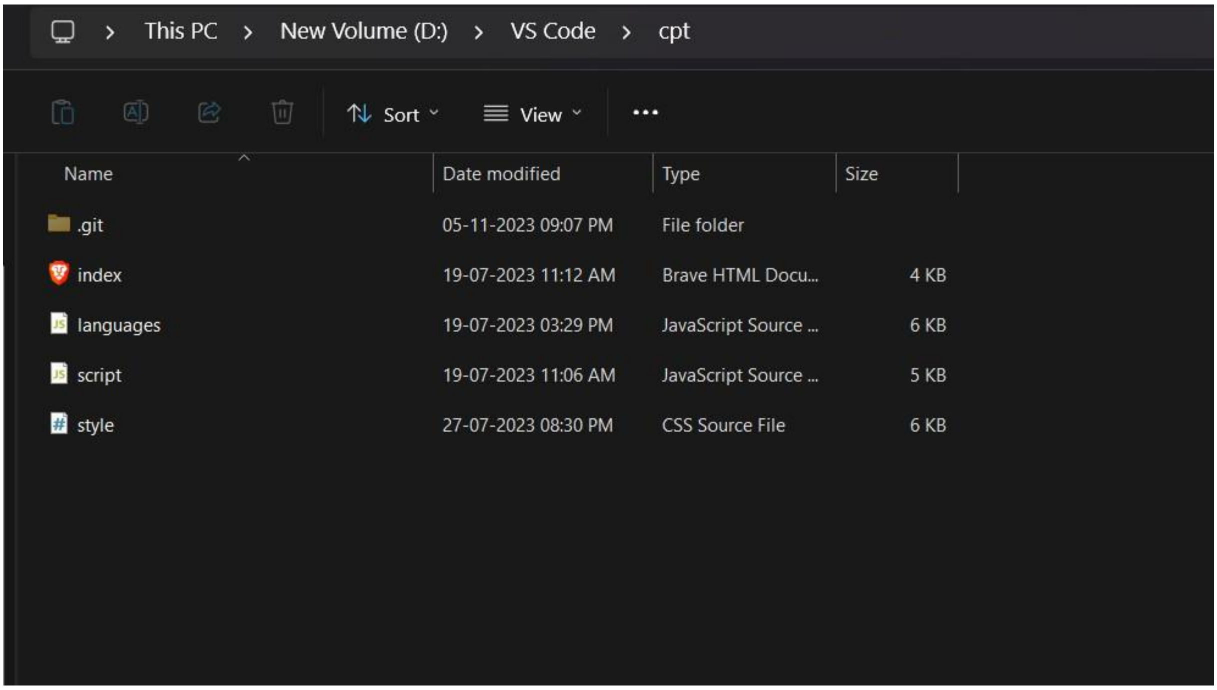
Computer name windows
Operating system Windows (Windows Server 2022 Datacenter Azure Edition)
Image publisher MicrosoftWindowsServer
Image offer WindowsServer
Image plan 2022-datacenter-azure-edition-hotpatch
VM generation V2
VM architecture x64

Networking

Public IP address 20.163.57.41 (Network interface windows442_z1)
Public IP address (IPv6) -
Private IP address 10.0.0.4
Private IP address (IPv6) -
Virtual network/subnet windows-vnet/default
DNS name Configure

Size

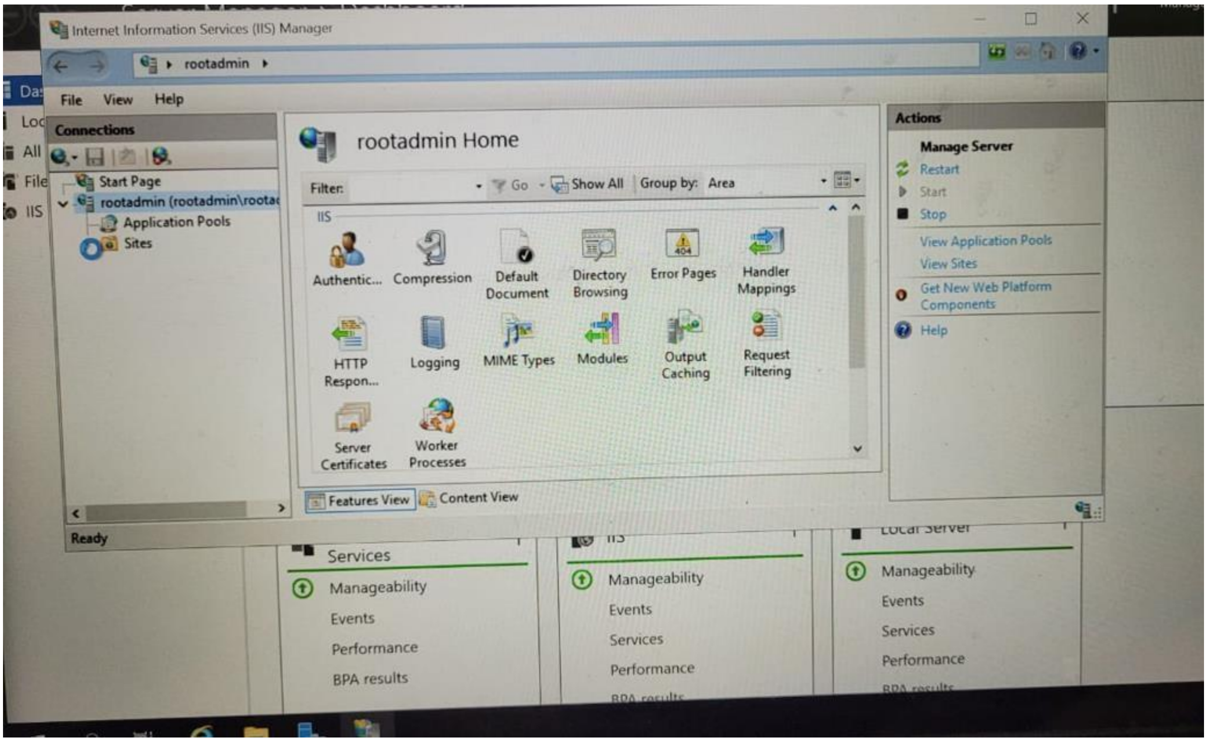
Copied files from host OS to Windows VM in C Drive

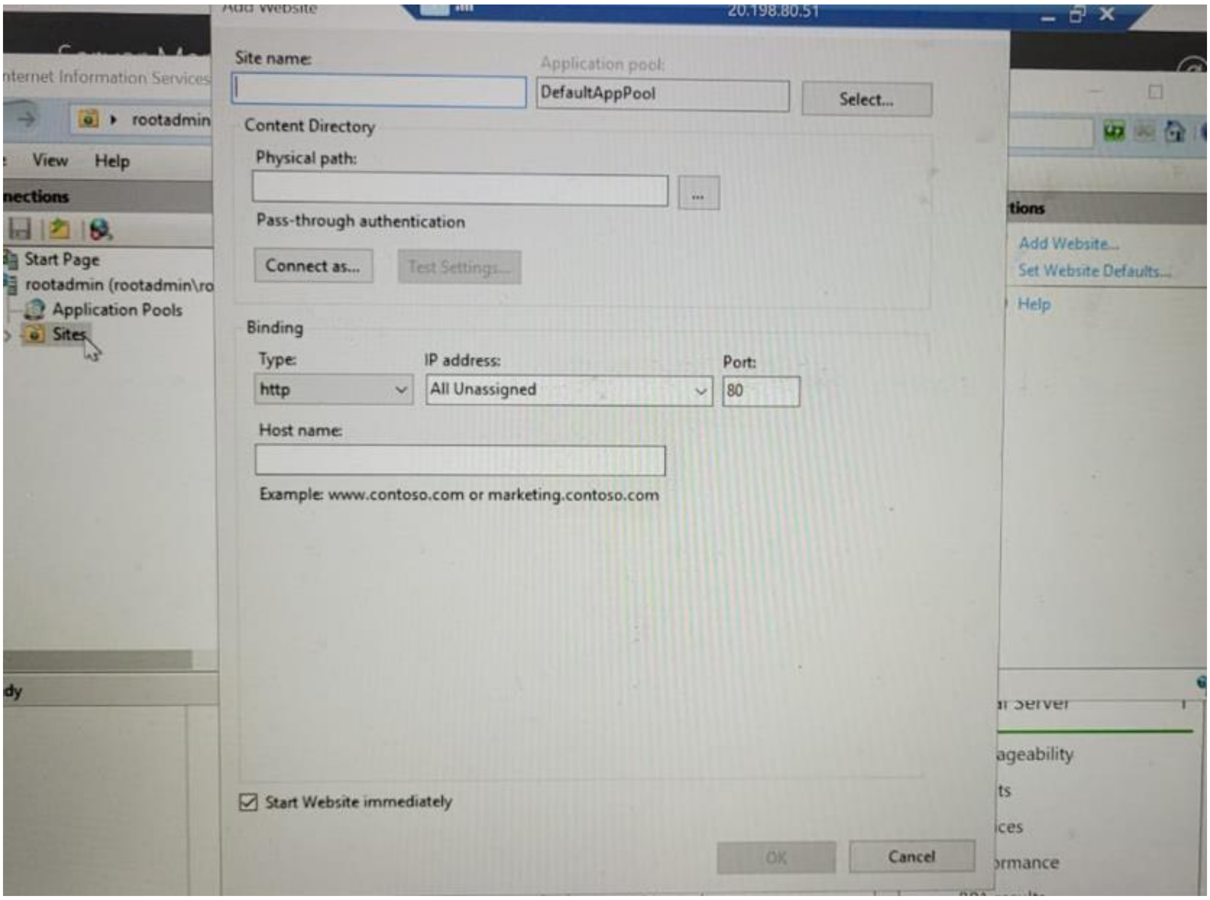


This PC > New Volume (D:) > VS Code > cpt

Name	Date modified	Type	Size
.git	05-11-2023 09:07 PM	File folder	
index	19-07-2023 11:12 AM	Brave HTML Docu...	4 KB
languages	19-07-2023 03:29 PM	JavaScript Source ...	6 KB
script	19-07-2023 11:06 AM	JavaScript Source ...	5 KB
style	27-07-2023 08:30 PM	CSS Source File	6 KB

In IIS manager we are adding the website





Site name:

Application pool: DefaultAppPool

Content Directory

Physical path:

Pass-through authentication

Binding

Type: http

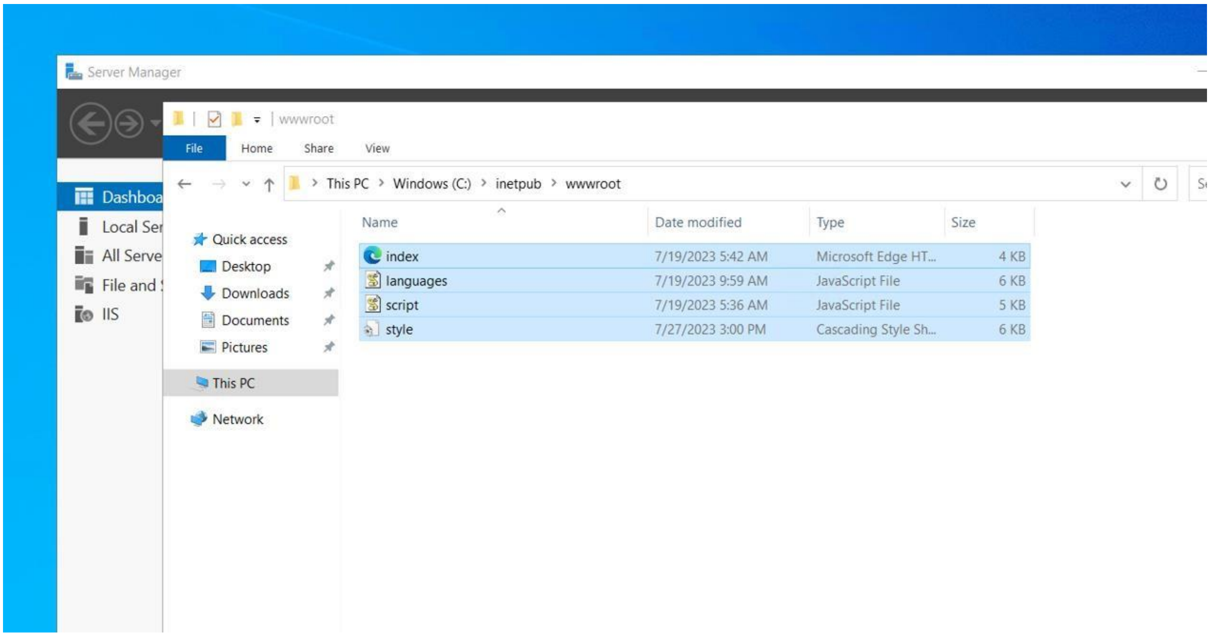
IP address: All Unassigned

Port: 80

Host name:

Example: www.contoso.com or marketing.contoso.com

☑ Start Website immediately

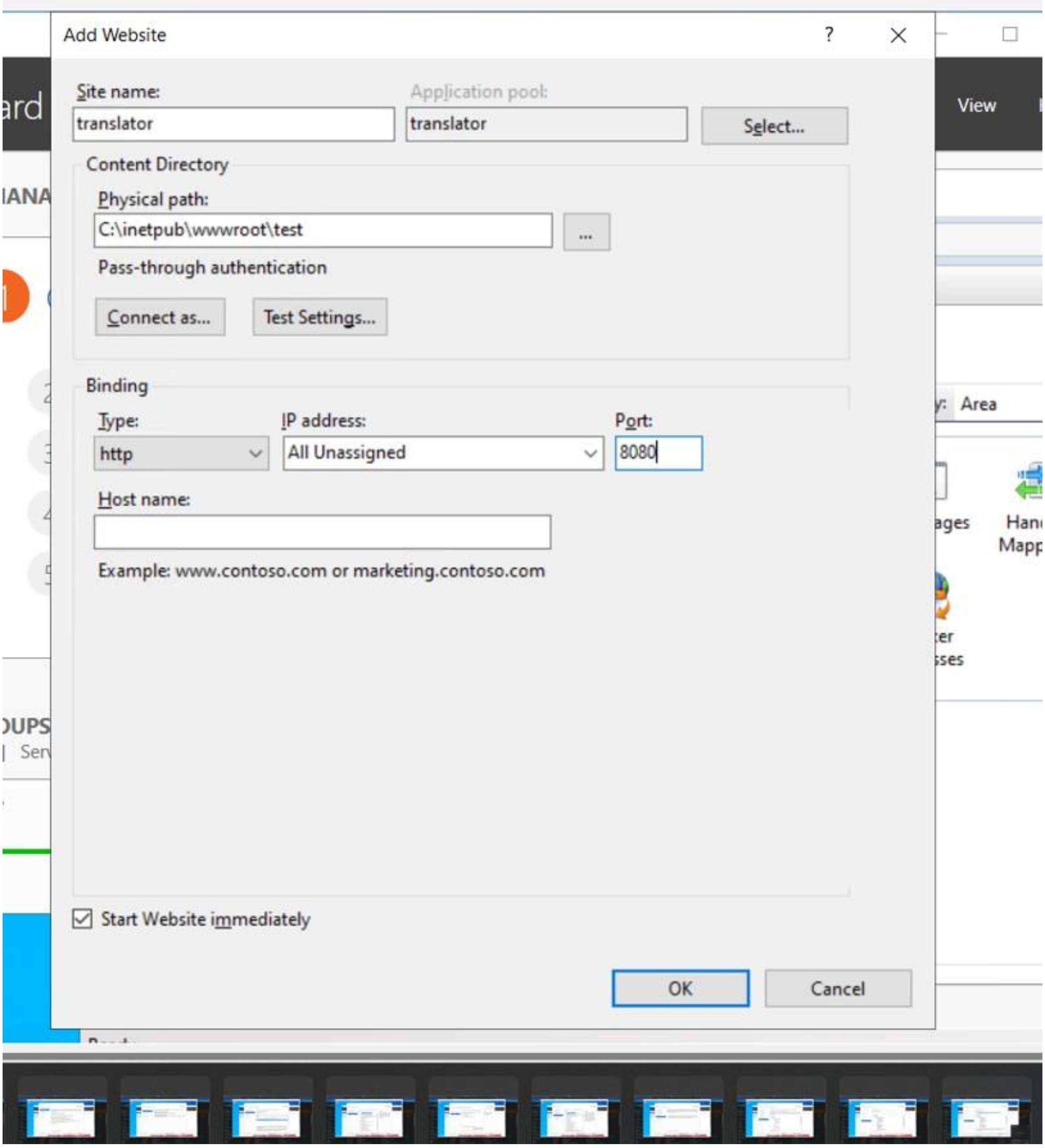


This PC > Windows (C:) > inetpub > wwwroot

Name	Date modified	Type	Size
index	7/19/2023 5:42 AM	Microsoft Edge HT...	4 KB
languages	7/19/2023 9:59 AM	JavaScript File	6 KB
script	7/19/2023 5:36 AM	JavaScript File	5 KB
style	7/27/2023 3:00 PM	Cascading Style Sh...	6 KB

Giving name and adding website Assigning

port number



Add Website

Site name: translator

Application pool: translator

Content Directory

Physical path: C:\inetpub\wwwroot\test

Pass-through authentication

Binding

Type: http

IP address: All Unassigned

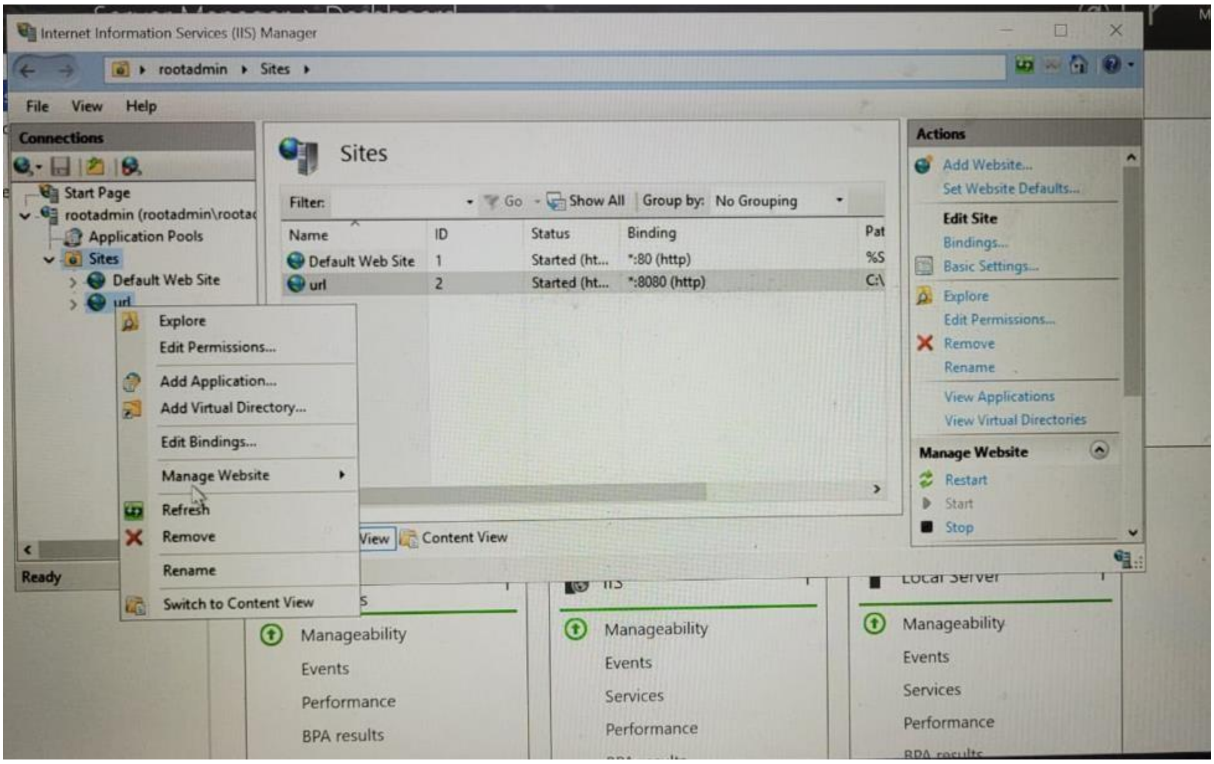
Port: 8080

Host name:

Example: www.contoso.com or marketing.contoso.com

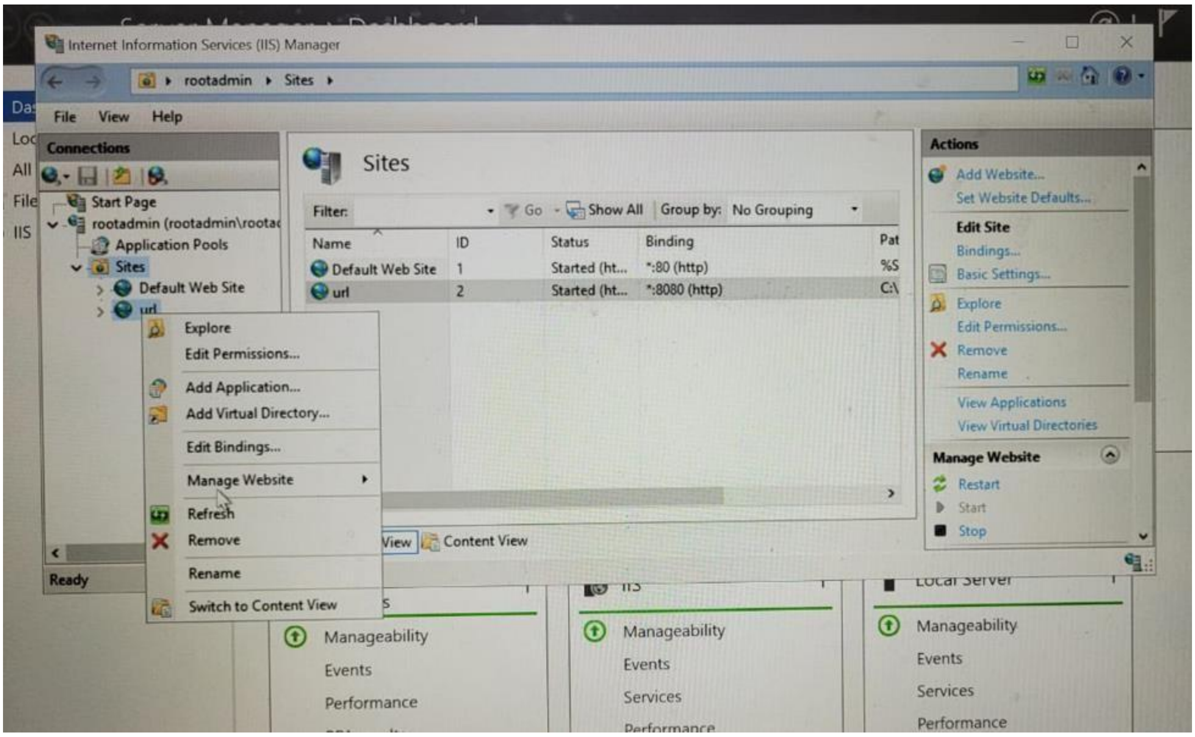
☑ Start Website immediately

Going to manage website

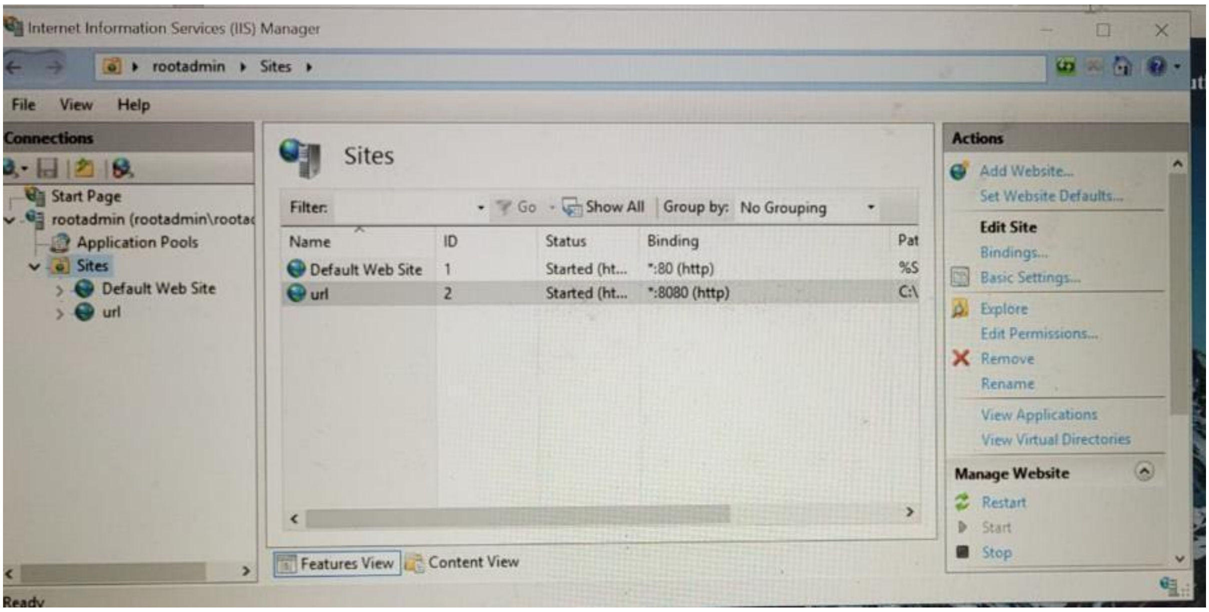


Name	ID	Status	Binding	Pat
Default Web Site	1	Started (ht...	*:80 (http)	%S
url	2	Started (ht...	*:8080 (http)	C:\

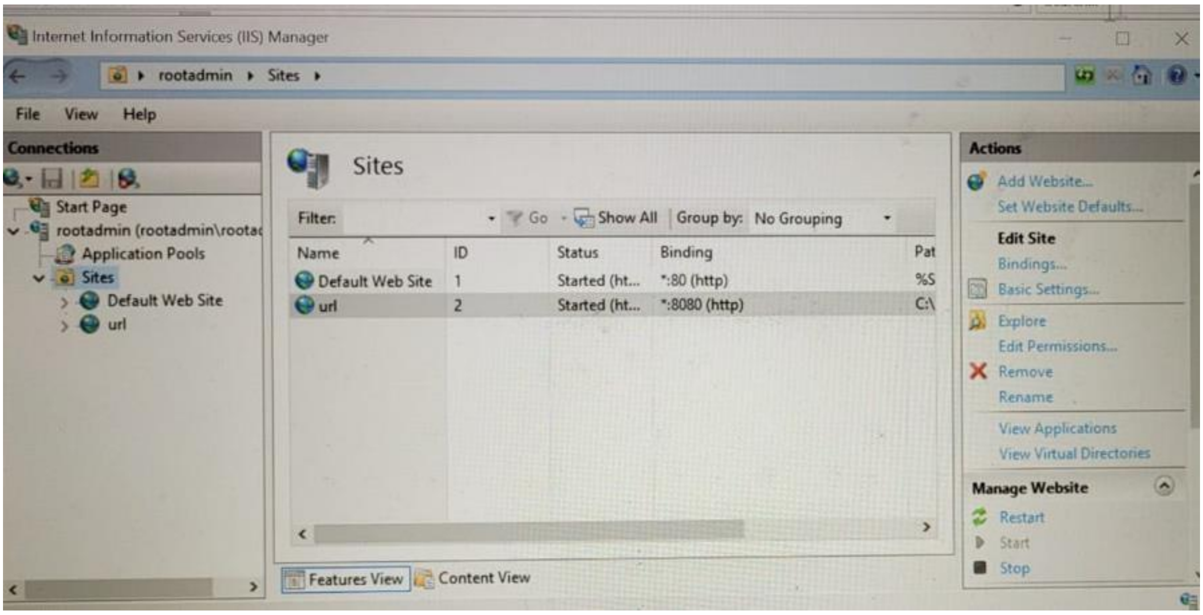
Selecting browse to open the website



Name	ID	Status	Binding	Pat
Default Web Site	1	Started (ht...	*:80 (http)	%S
url	2	Started (ht...	*:8080 (http)	C:\

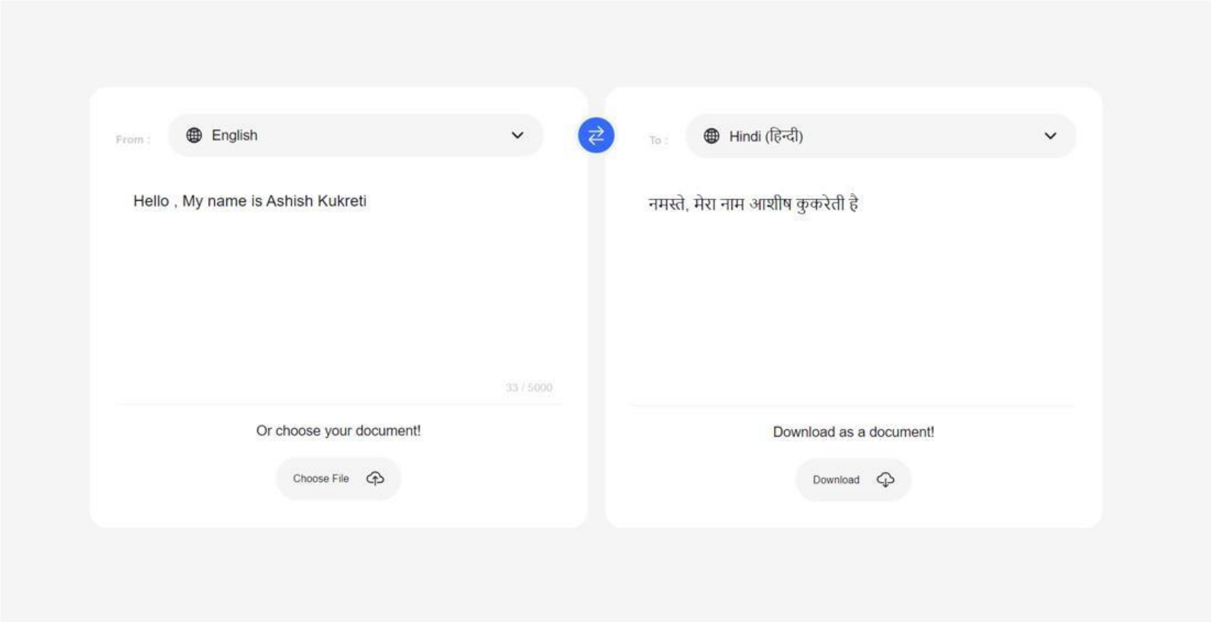


Name	ID	Status	Binding	Pat
Default Web Site	1	Started (ht...	*:80 (http)	%S
url	2	Started (ht...	*:8080 (http)	C:\



Name	ID	Status	Binding	Pat
Default Web Site	1	Started (ht...	*:80 (http)	%S
url	2	Started (ht...	*:8080 (http)	C:\

Website opened

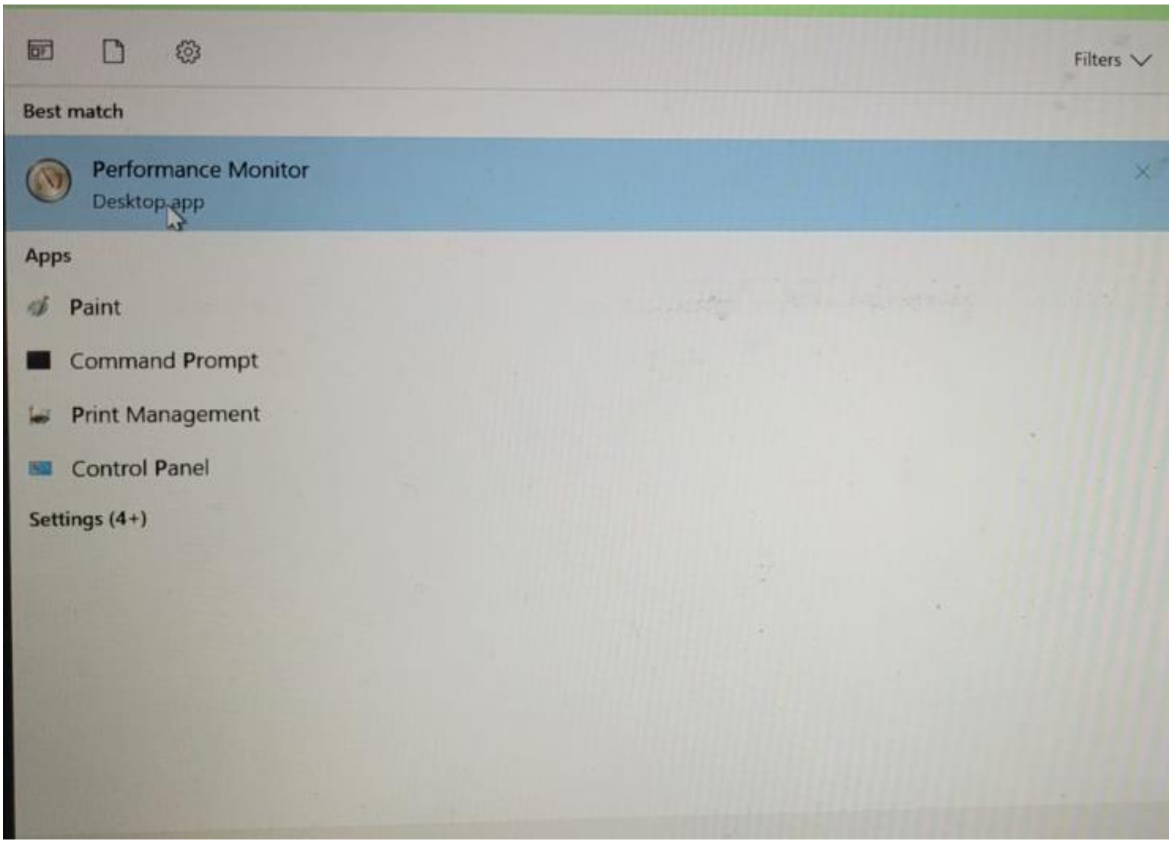


Hello , My name is Ashish Kukreti

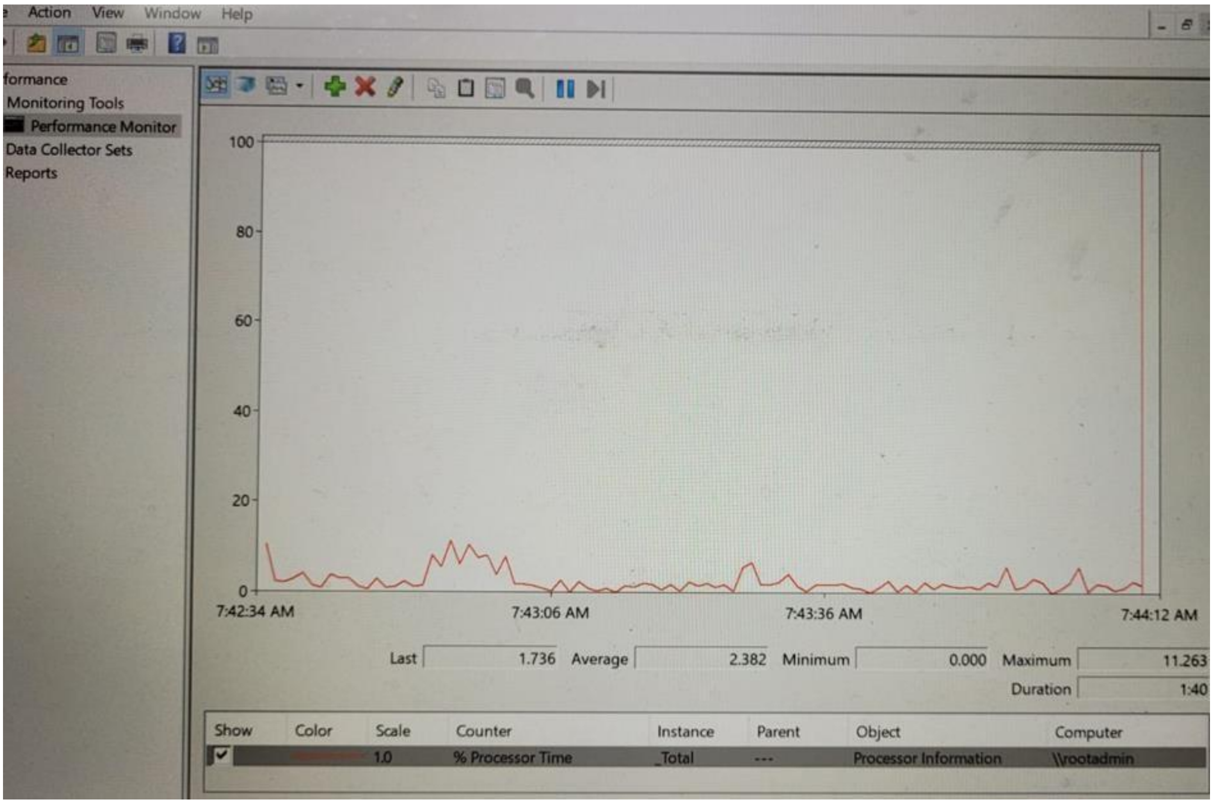
नमस्ते, मेरा नाम आशीष कुकरेती है

List Of Figures

Checking Performance



Performance

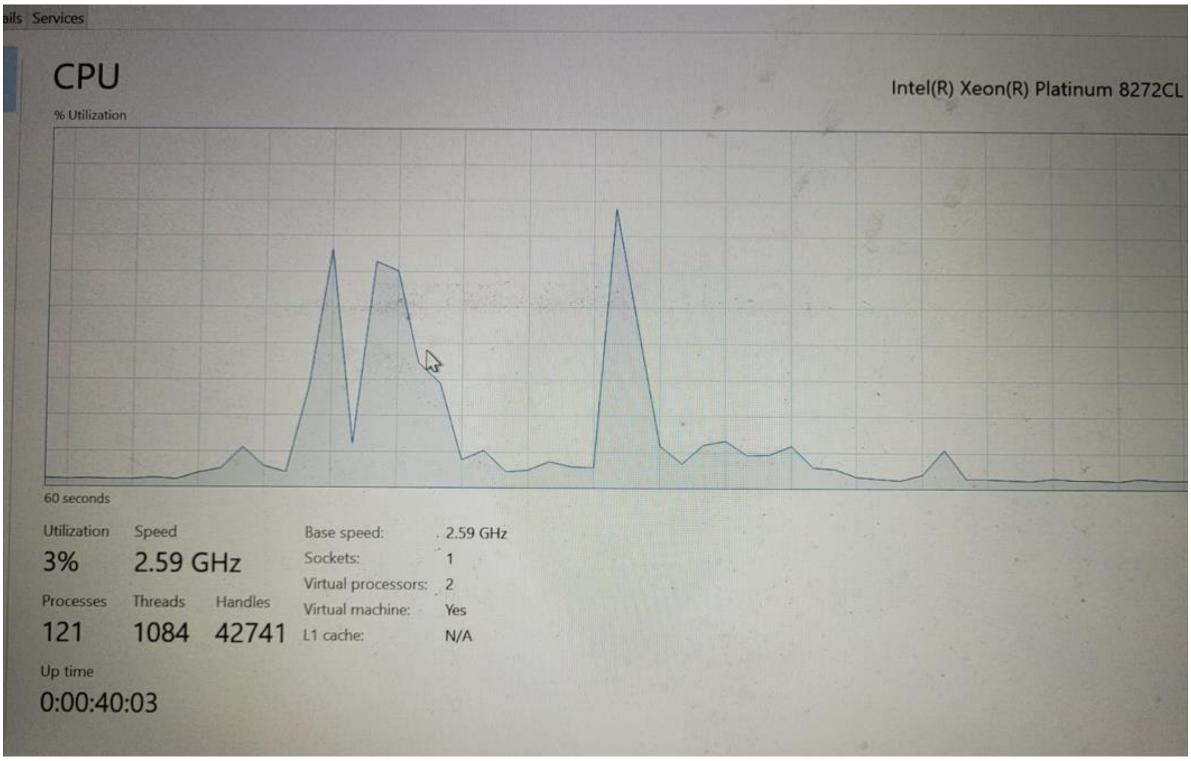


Last 1.736 Average 2.382 Minimum 0.000 Maximum 11.263

Duration 1:40

Show	Color	Scale	Counter	Instance	Parent	Object	Computer
☑	🟥	1.0	% Processor Time	_Total	---	Processor Information	\\rootadmin

CPU Utilization



Utilization 3%

Speed 2.59 GHz

Processes 121

Threads 1084

Handles 42741

Up time 0:00:40:03

Base speed: 2.59 GHz

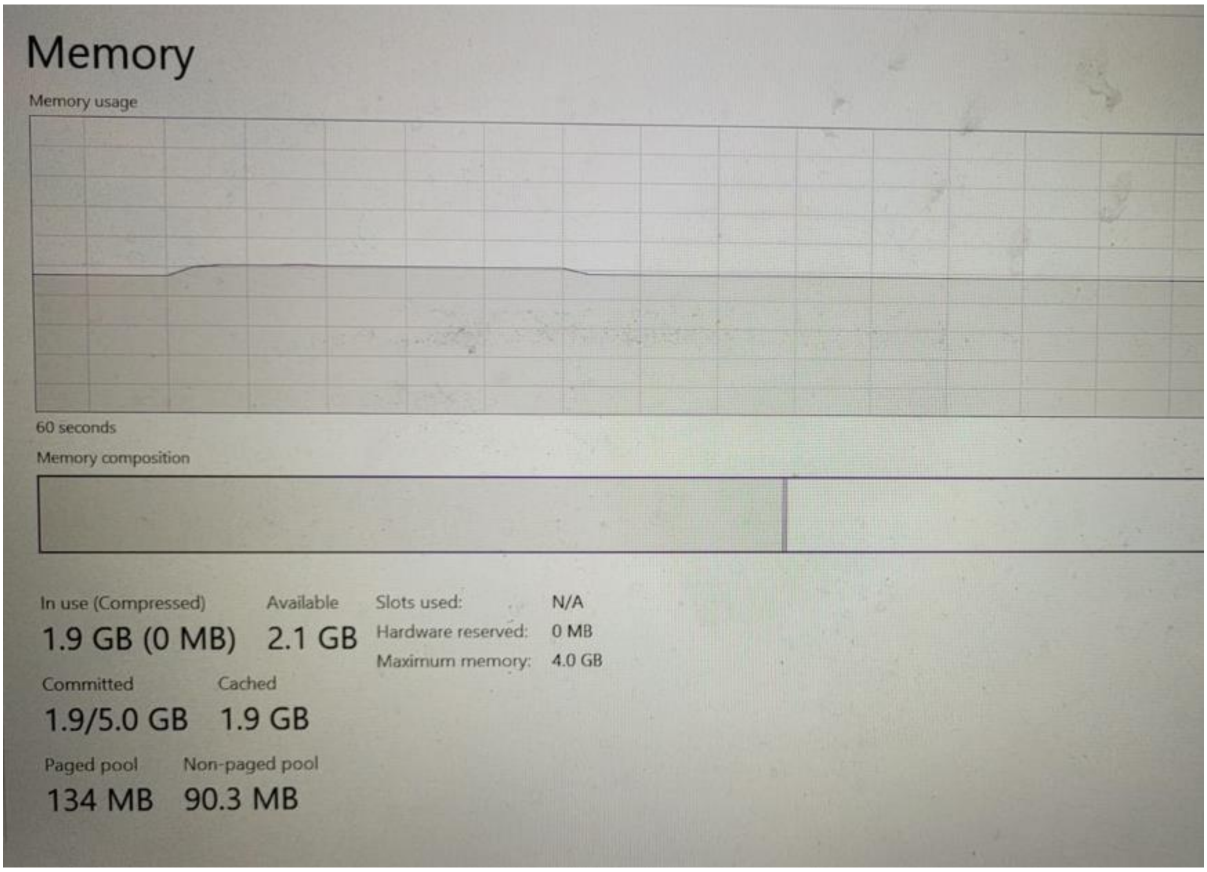
Sockets: 1

Virtual processors: 2

Virtual machine: Yes

L1 cache: N/A

Memory Utilization



In use (Compressed) 1.9 GB (0 MB)

Available 2.1 GB

Slots used: N/A

Hardware reserved: 0 MB

Maximum memory: 4.0 GB

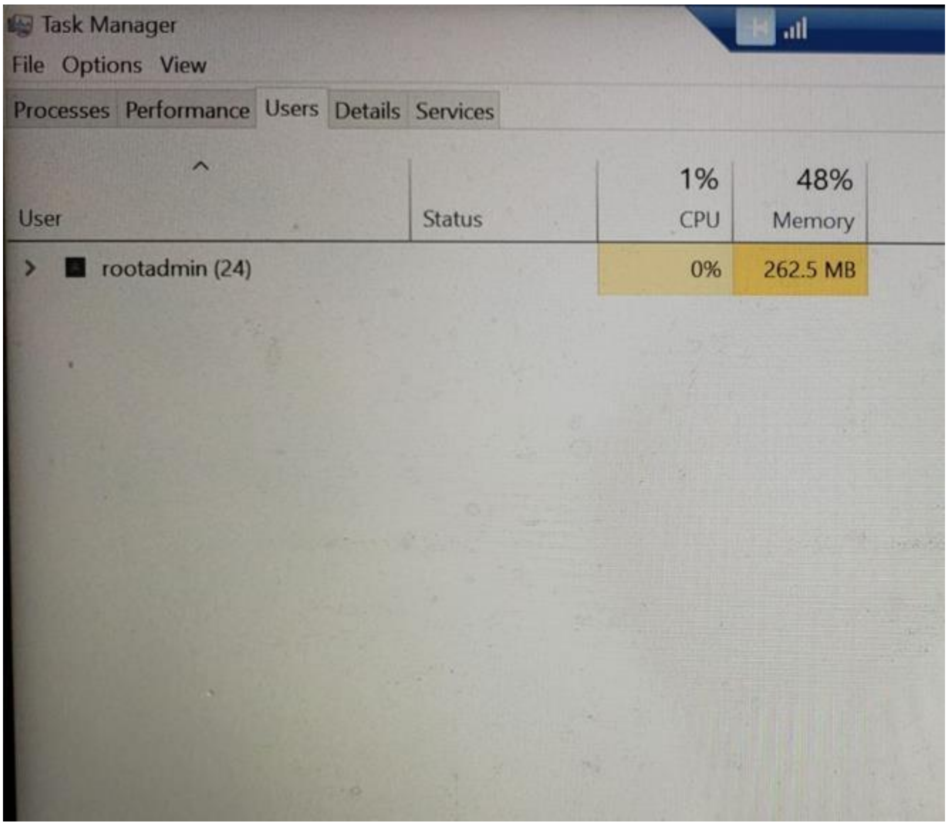
Committed 1.9/5.0 GB

Cached 1.9 GB

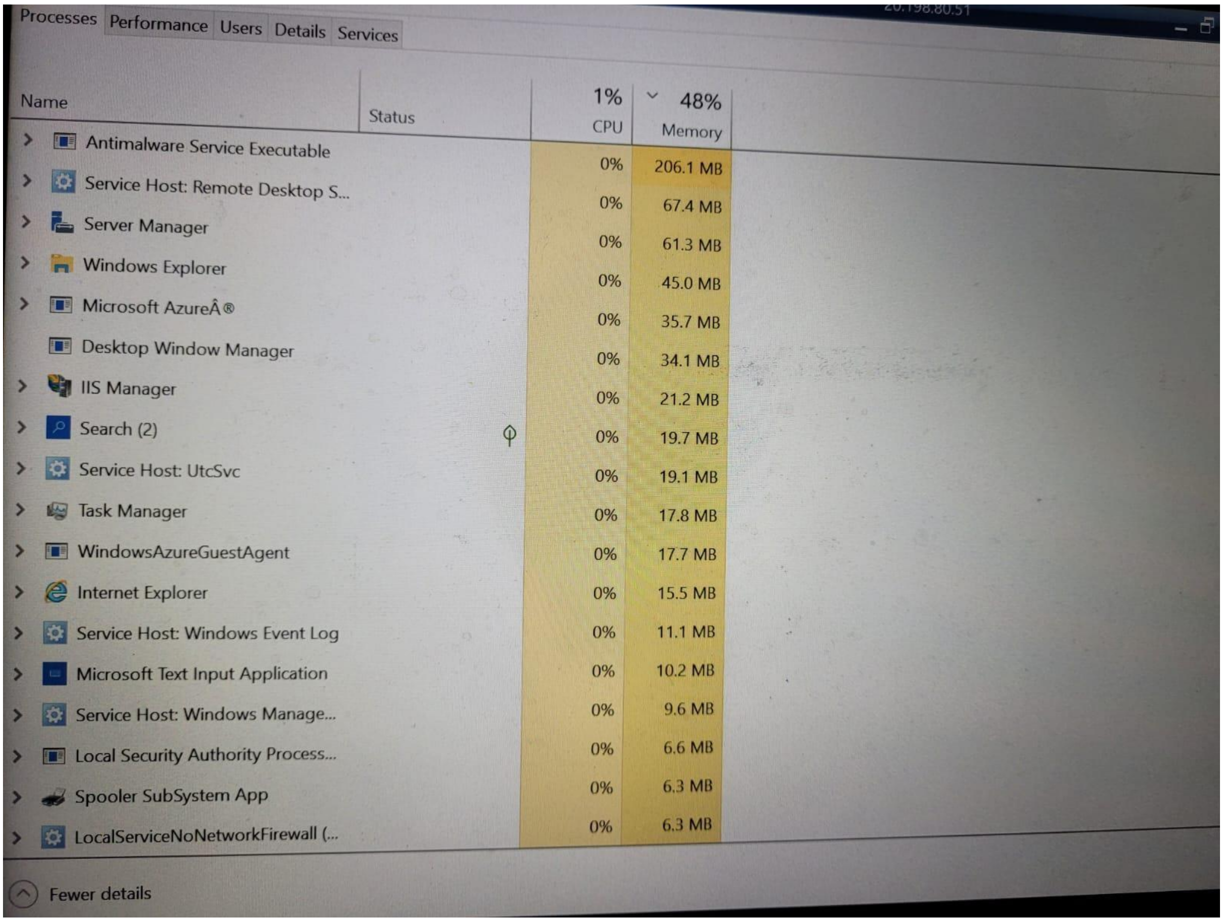
Paged pool 134 MB

Non-paged pool 90.3 MB

Other metrics:



User	Status	1% CPU	48% Memory
rootadmin (24)		0%	262.5 MB

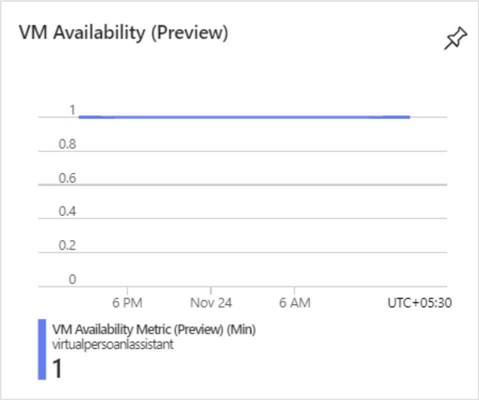


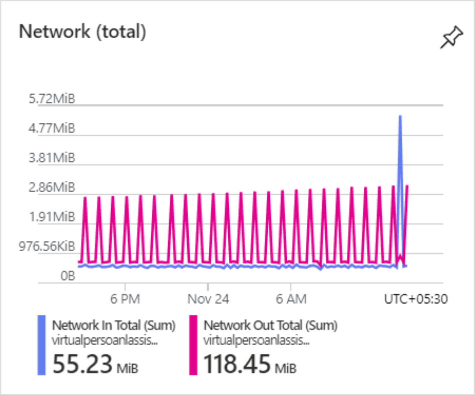
Name	Status	1% CPU	48% Memory
Antimalware Service Executable		0%	206.1 MB
Service Host: Remote Desktop S...		0%	67.4 MB
Server Manager		0%	61.3 MB
Windows Explorer		0%	45.0 MB
Microsoft AzureÂ®		0%	35.7 MB
Desktop Window Manager		0%	34.1 MB
IIS Manager		0%	21.2 MB
Search (2)		0%	19.7 MB
Service Host: UtcSvc		0%	19.1 MB
Task Manager		0%	17.8 MB
WindowsAzureGuestAgent		0%	17.7 MB
Internet Explorer		0%	15.5 MB
Service Host: Windows Event Log		0%	11.1 MB
Microsoft Text Input Application		0%	10.2 MB
Service Host: Windows Manage...		0%	9.6 MB
Local Security Authority Process...		0%	6.6 MB
Spooler SubSystem App		0%	6.3 MB
LocalServiceNoNetworkFirewall (...		0%	6.3 MB

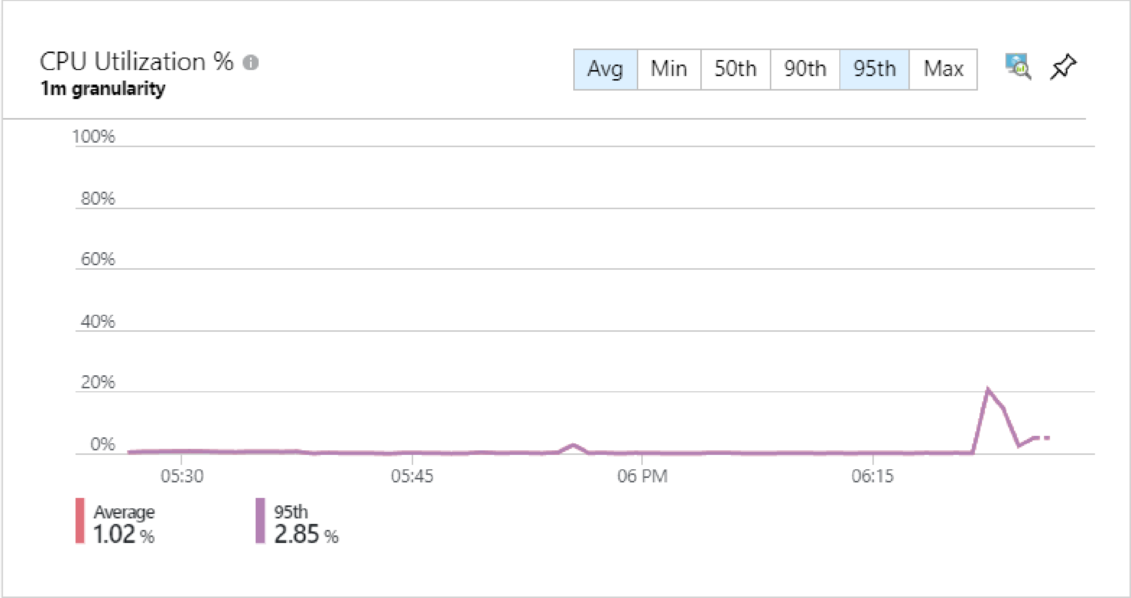
Response Time: 13 minutes and 30 seconds.

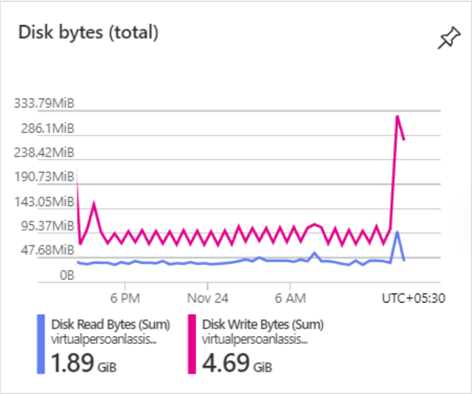
Before Changes

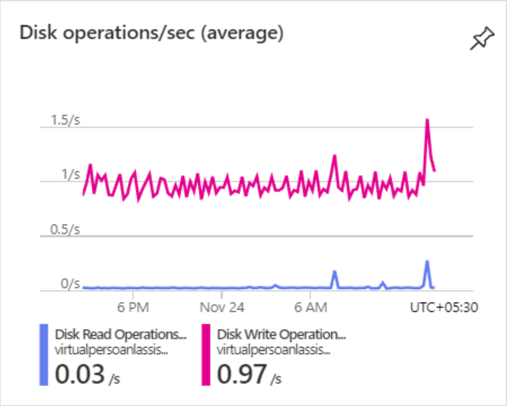
Before the cloud performance tuning changes were implemented, the application operated within a Virtual Machine (VM) environment using synchronous operations for handling user requests. This synchronous approach led to potential bottlenecks, especially during resource-intensive tasks, causing delays in response times. The absence of asynchronous operations and background task handling resulted in a less scalable and less responsive application within the VM setup.

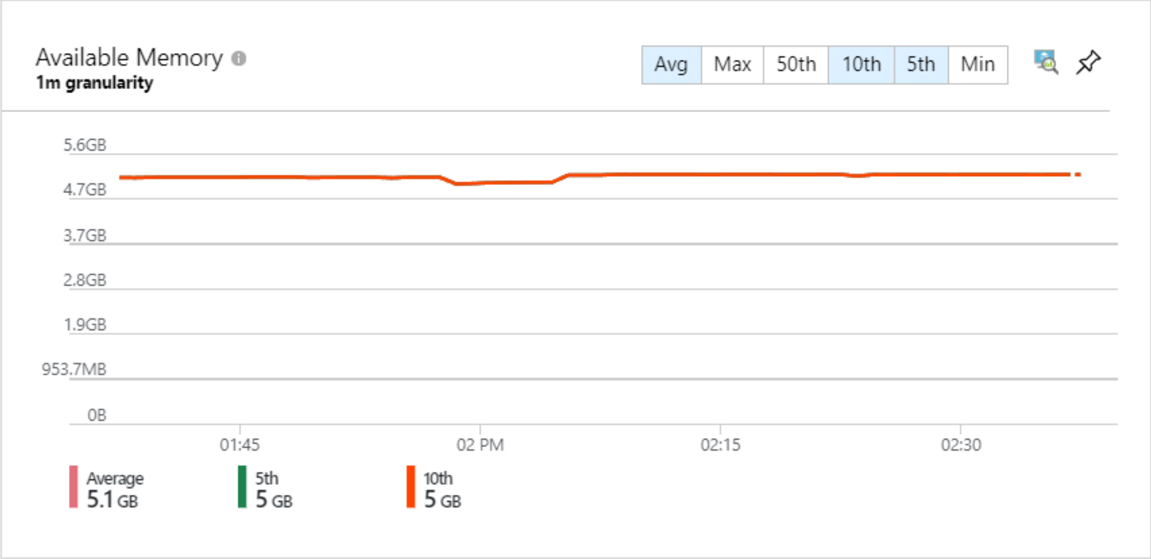


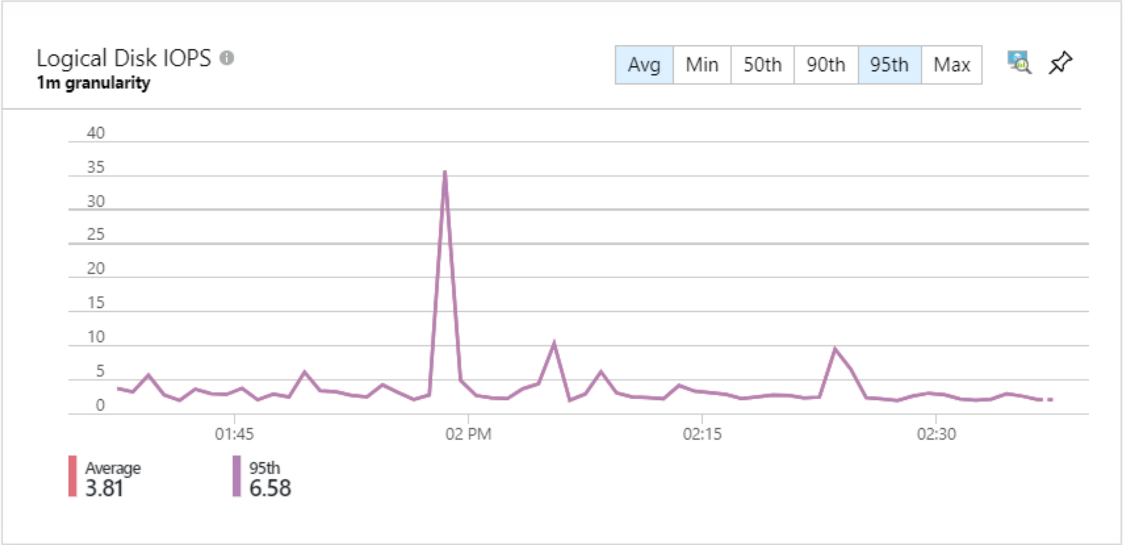


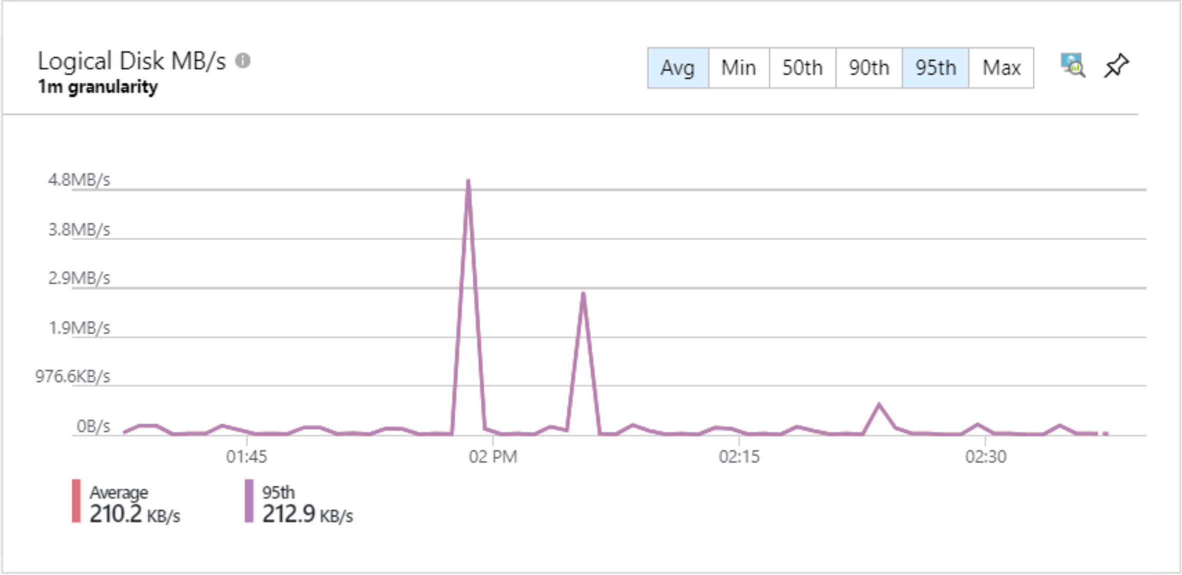

CPU Utilization %
1m granularity
Avg
Min
50th
90th
95th
Max
100%
80%
60%
40%
20%
0%
05:30
05:45
06 PM
06:15
Average
1.02 %
95th
2.85 %

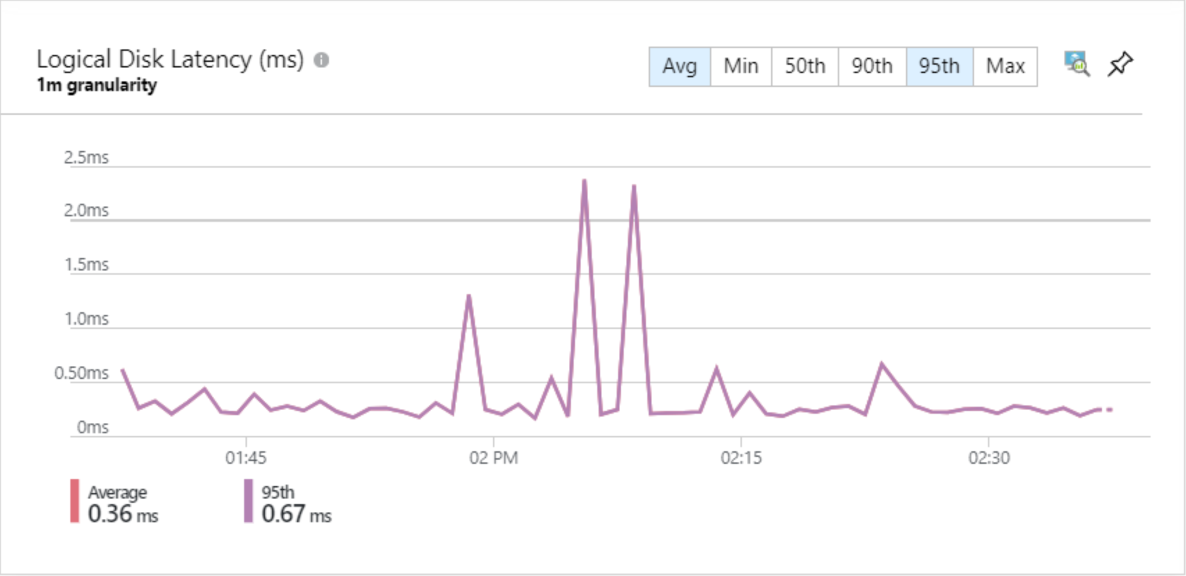

Disk bytes (total)
333.79MiB
286.1MiB
238.42MiB
190.73MiB
143.05MiB
95.37MiB
47.68MiB
0B
6 PM
Nov 24
6 AM
UTC+05:30
Disk Read Bytes (Sum)
virtualpersoanlassis...
1.89 GiB
Disk Write Bytes (Sum)
virtualpersoanlassis...
4.69 GiB

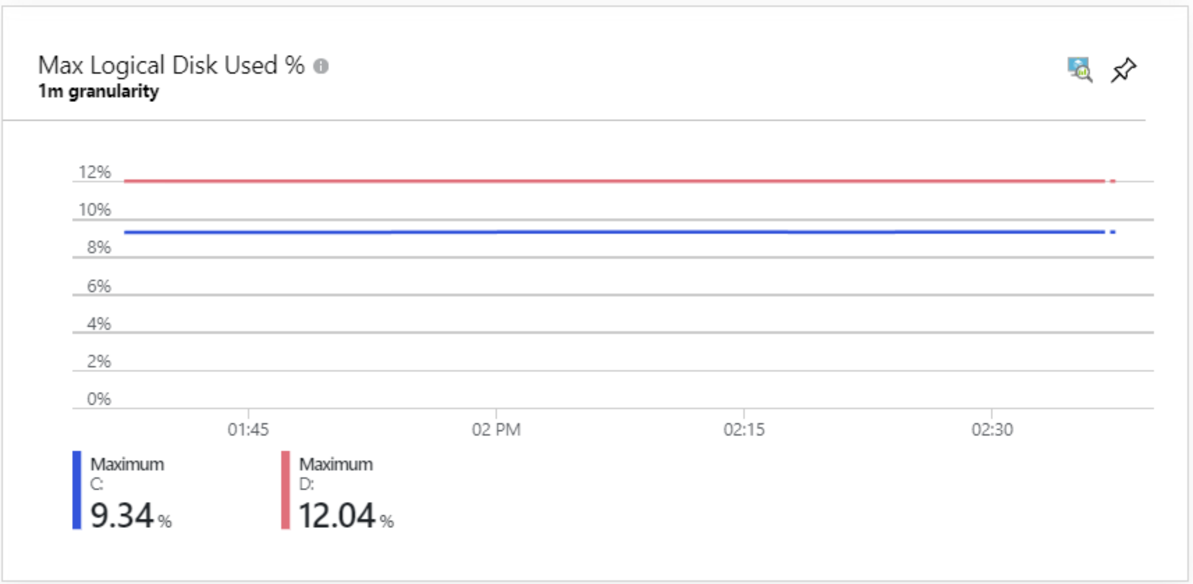

Disk operations/sec (average)
1.5/s
1/s
0.5/s
0/s
6 PM
Nov 24
6 AM
UTC+05:30
Disk Read Operations...
virtualpersoanlassis...
0.03 /s
Disk Write Operation...
virtualpersoanlassis...
0.97 /s

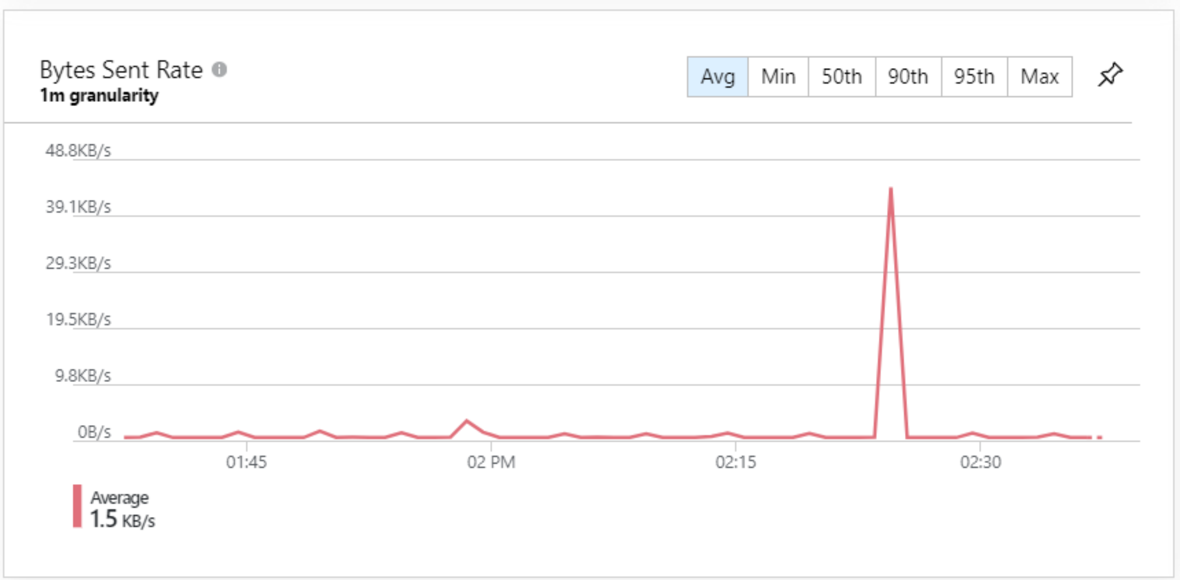

Available Memory
1m granularity
Avg
Max
50th
10th
5th
Min
5.6GB
4.7GB
3.7GB
2.8GB
1.9GB
953.7MB
0B
01:45
02 PM
02:15
02:30
Average
5.1 GB
5th
5 GB
10th
5 GB

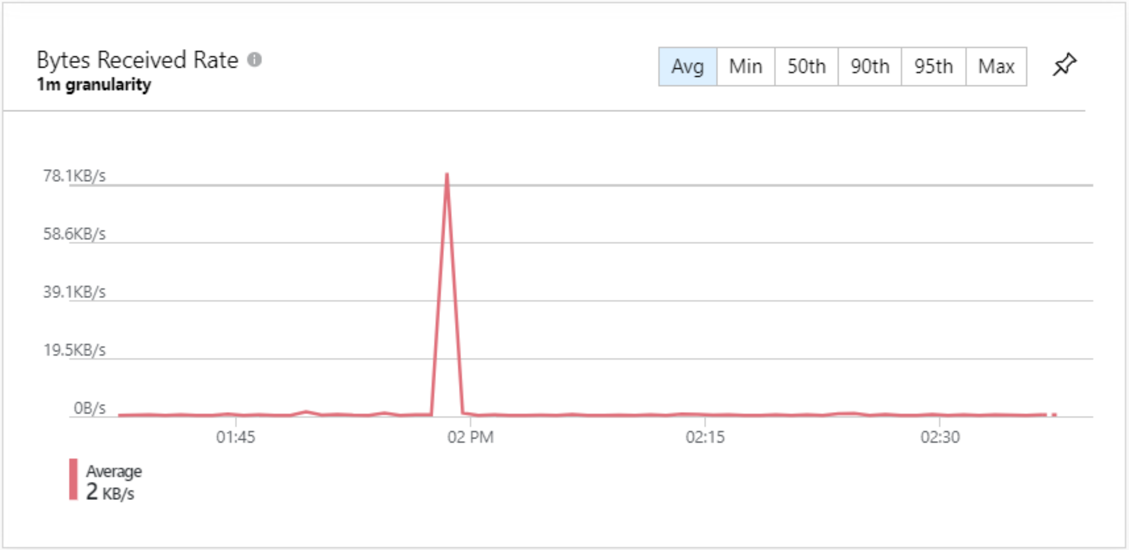

Logical Disk IOPS
1m granularity
Avg
Min
50th
90th
95th
Max
40
35
30
25
20
15
10
5
0
01:45
02 PM
02:15
02:30
Average
3.81
95th
6.58


Logical Disk MB/s
1m granularity
Avg
Min
50th
90th
95th
Max
4.8MB/s
3.8MB/s
2.9MB/s
1.9MB/s
976.6KB/s
0B/s
01:45
02 PM
02:15
02:30
Average
210.2 KB/s
95th
212.9 KB/s


Logical Disk Latency (ms)
1m granularity
Avg
Min
50th
90th
95th
Max
2.5ms
2.0ms
1.5ms
1.0ms
0.50ms
0ms
01:45
02 PM
02:15
02:30
Average
0.36 ms
95th
0.67 ms



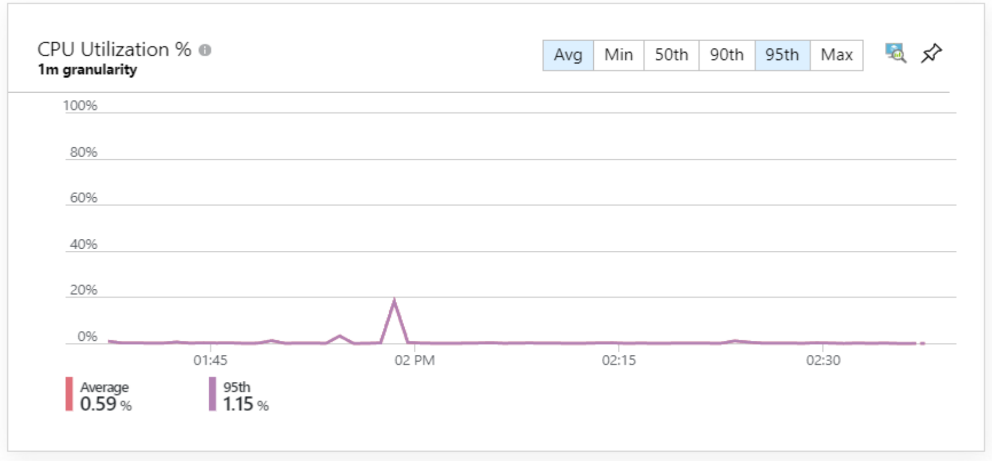


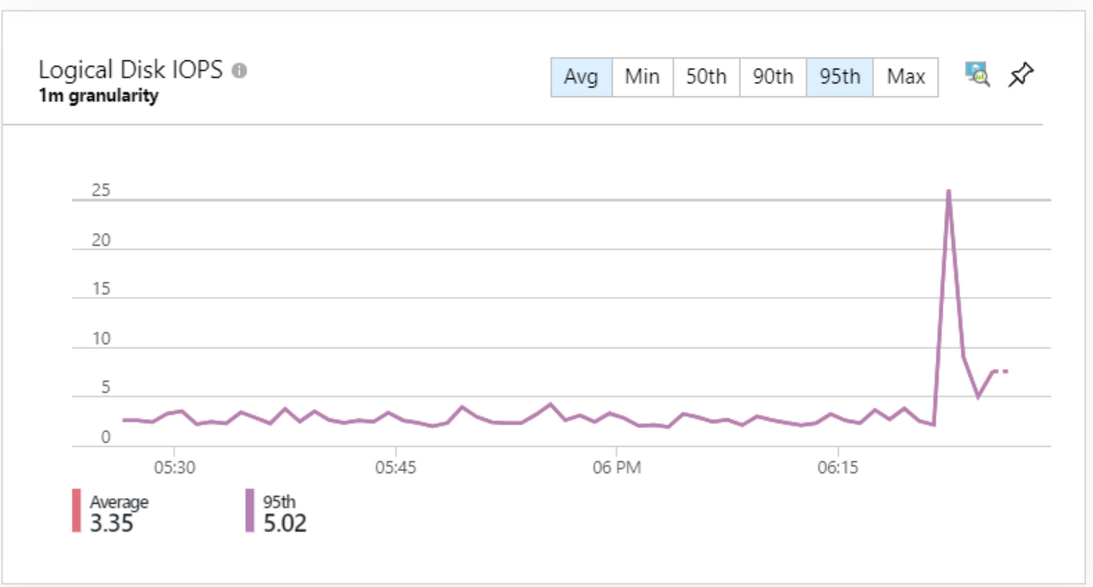


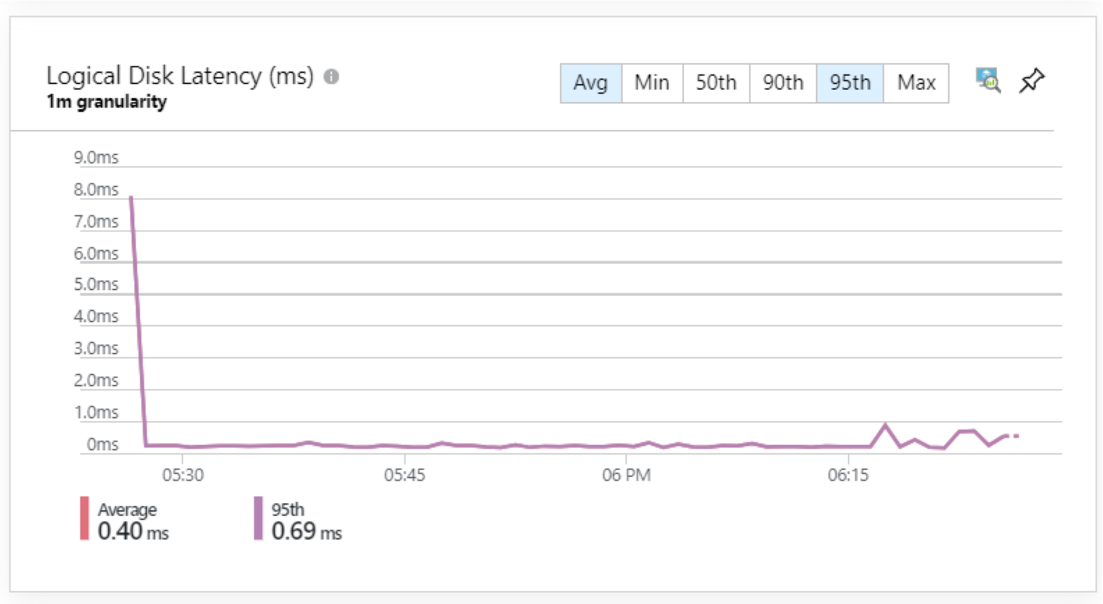
After Changes

Following the cloud performance tuning changes, significant enhancements were observed in the application's performance within the VM environment. The integration of asynchronous operations, background task handling, and optimized processing .

Asynchronous operations enabled concurrent request handling without blocking resources, enhancing scalability and responsiveness. Additionally, background tasks facilitated the non-blocking execution of essential operations, mitigating delays during resource-intensive tasks. Overall, these changes markedly optimized the application's performance within the VM infrastructure, ensuring smoother and more responsive user experiences.

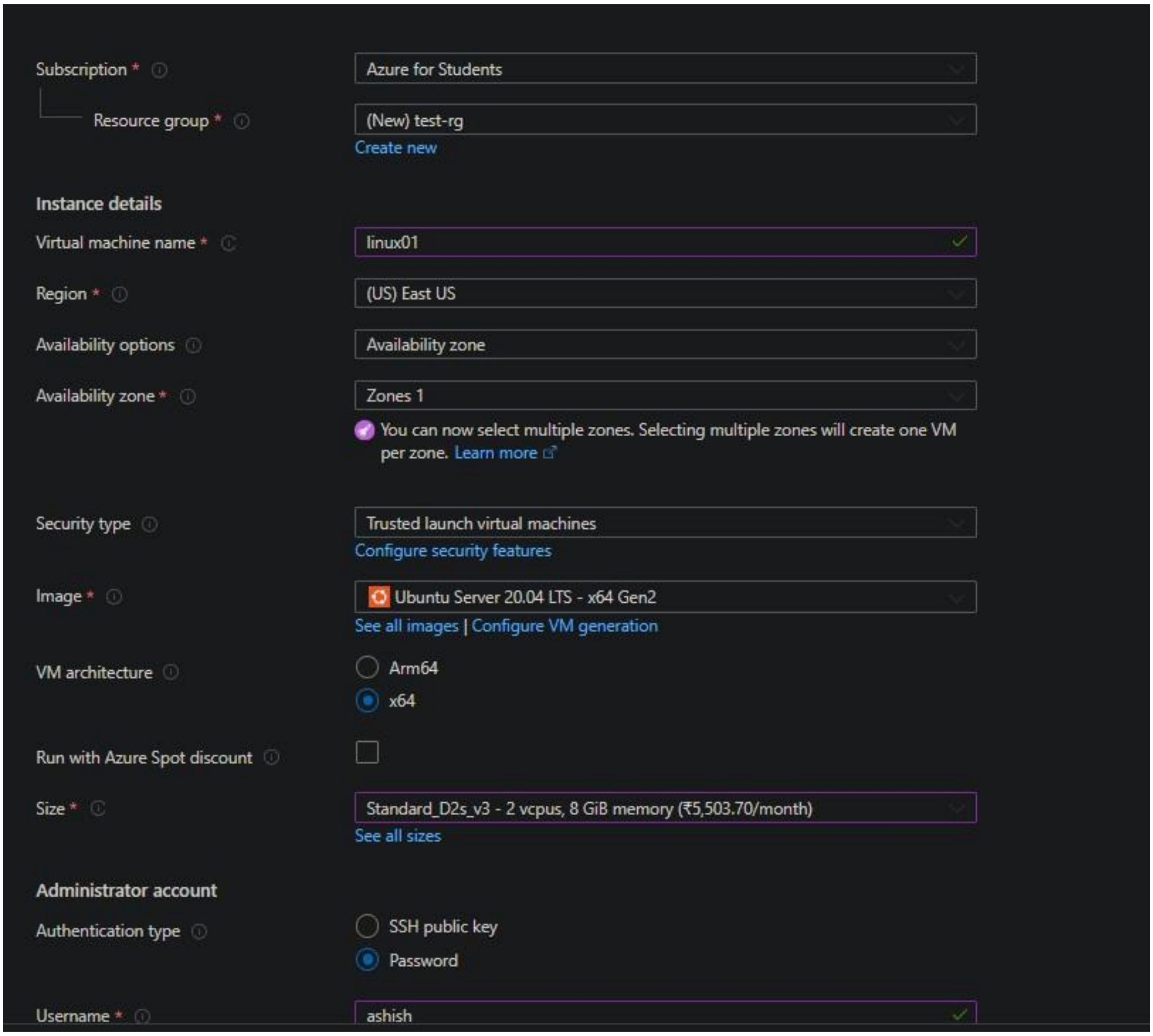





Logical Disk Latency (ms)
1m granularity
Avg
Min
50th
90th
95th
Max
9.0ms
8.0ms
7.0ms
6.0ms
5.0ms
4.0ms
3.0ms
2.0ms
1.0ms
0ms
05:30
05:45
06 PM
06:15
Average
0.40 ms
95th
0.69 ms

Deploying on ubuntu VM Creating

Ubuntu virtual machine



Subscription * ⓘ Azure for Students

Resource group * ⓘ (New) test-rg

Create new

Instance details

Virtual machine name * ⓘ linux01 ✓

Region * ⓘ (US) East US

Availability options ⓘ Availability zone

Availability zone * ⓘ Zones 1

You can now select multiple zones. Selecting multiple zones will create one VM per zone. Learn more

Security type ⓘ Trusted launch virtual machines

Configure security features

Image * ⓘ Ubuntu Server 20.04 LTS - x64 Gen2

See all images | Configure VM generation

VM architecture ⓘ ○ Arm64 ● x64

Run with Azure Spot discount ⓘ □

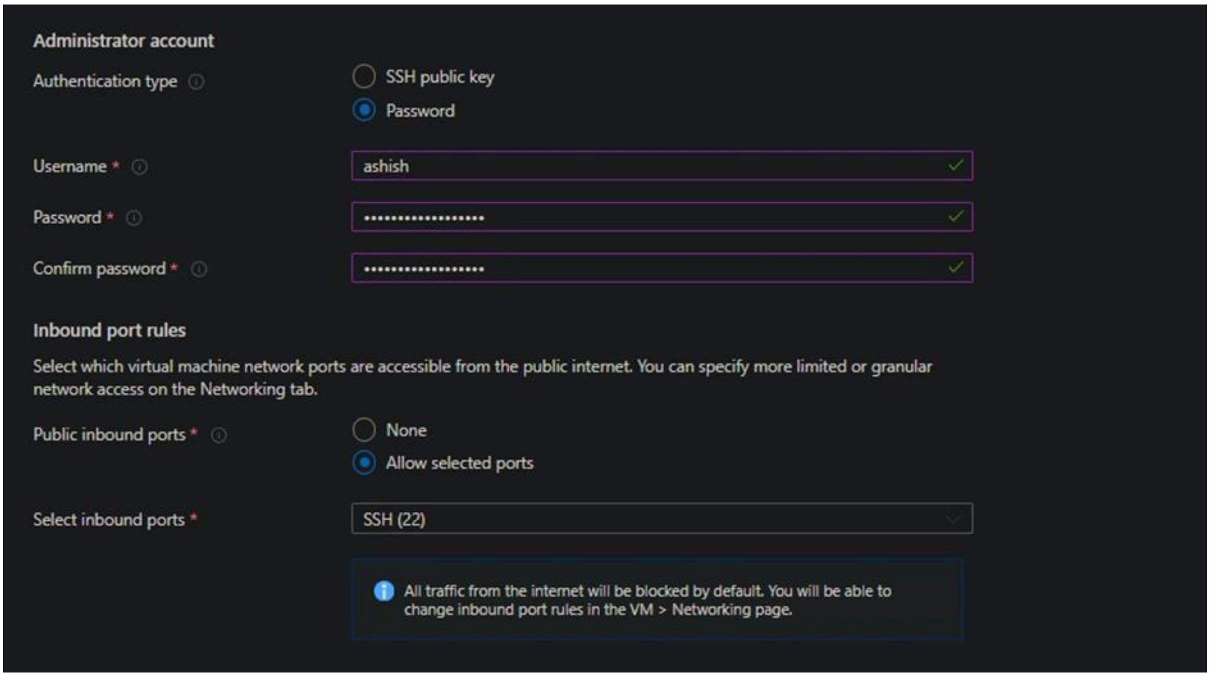
Size * ⓘ Standard_D2s_v3 - 2 vcpus, 8 GiB memory (₹5,503.70/month)

See all sizes

Administrator account

Authentication type ⓘ ○ SSH public key ● Password

Username * ⓘ ashish ✓



Administrator account

Authentication type ⓘ
○ SSH public key
● Password

Username * ⓘ: ashish ✓

Password * ⓘ: •••••••••••••••••• ✓

Confirm password * ⓘ: •••••••••••••••••• ✓

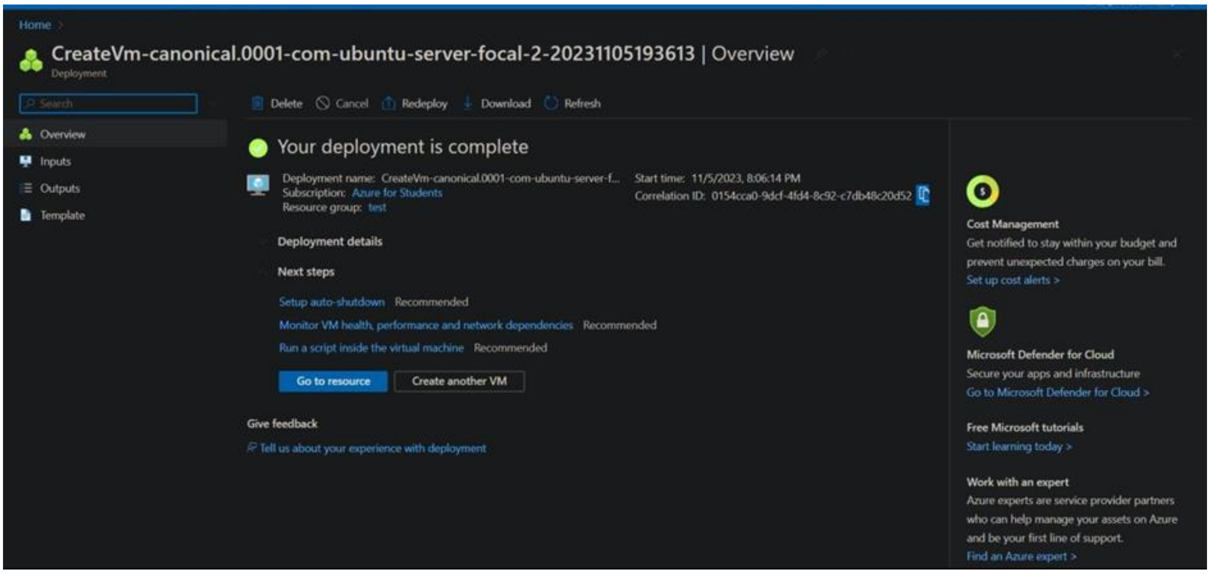
Inbound port rules

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
● Allow selected ports

Select inbound ports *: SSH (22)

ⓘ All traffic from the internet will be blocked by default. You will be able to change inbound port rules in the VM > Networking page.



CreateVm-canonical.0001-com-ubuntu-server-focal-2-20231105193613 | Overview

Deployment

Your deployment is complete

Deployment name: CreateVm-canonical.0001-com-ubuntu-server-f...
Subscription: Azure for Students
Resource group: test

Start time: 11/5/2023, 8:06:14 PM
Correlation ID: 0154cca0-9dcf-4fd4-8c92-c7db48c20d52

Deployment details

Next steps

Setup auto-shutdown Recommended
Monitor VM health, performance and network dependencies Recommended
Run a script inside the virtual machine Recommended

Give feedback

Tell us about your experience with deployment

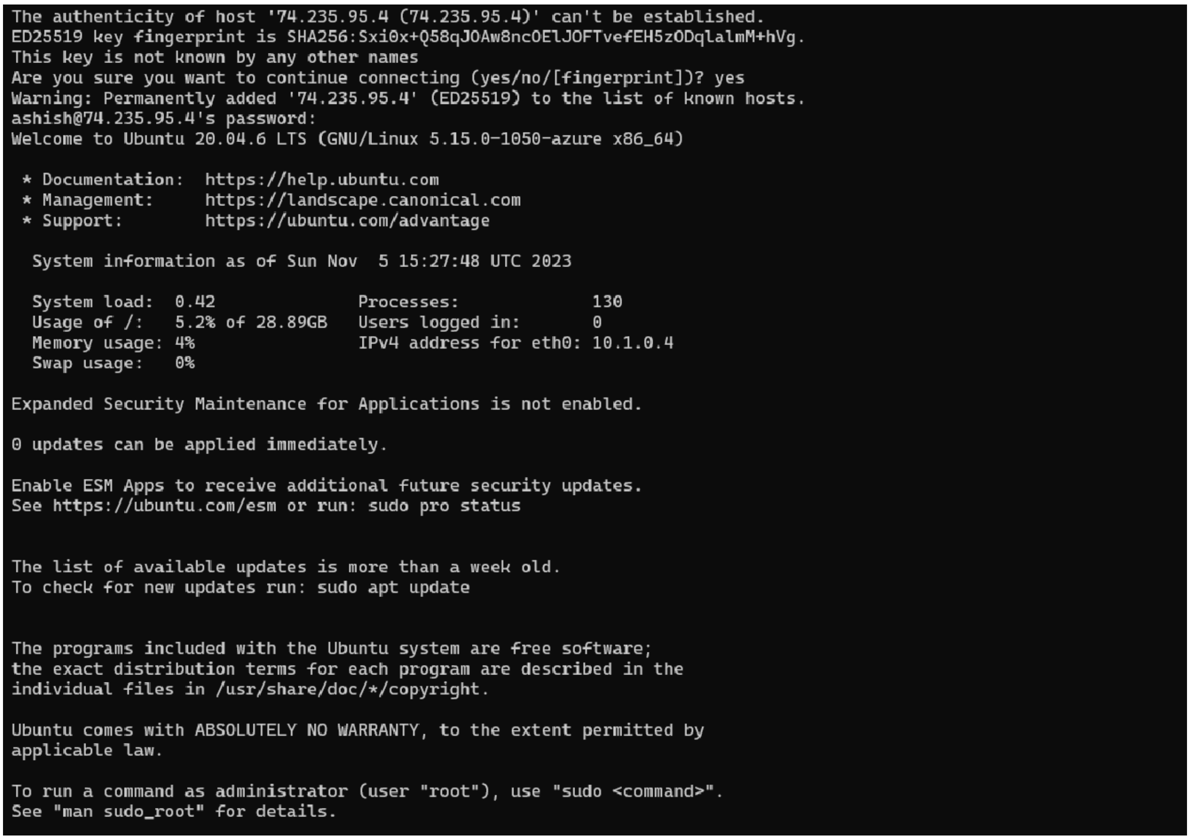
Cost Management
Get notified to stay within your budget and prevent unexpected charges on your bill.
Set up cost alerts >

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

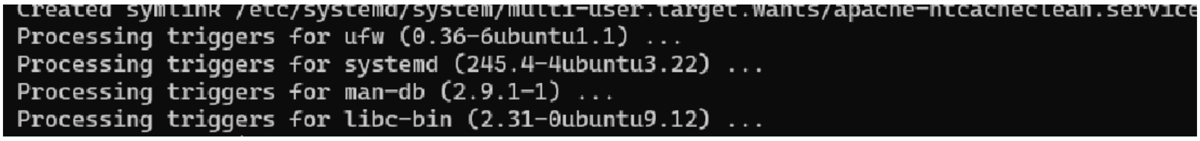
Free Microsoft tutorials
Start learning today >

Work with an expert
Azure experts are service provider partners who can help manage your assets on Azure and be your first line of support.
Find an Azure expert >

Opened SSH terminal and running commands.

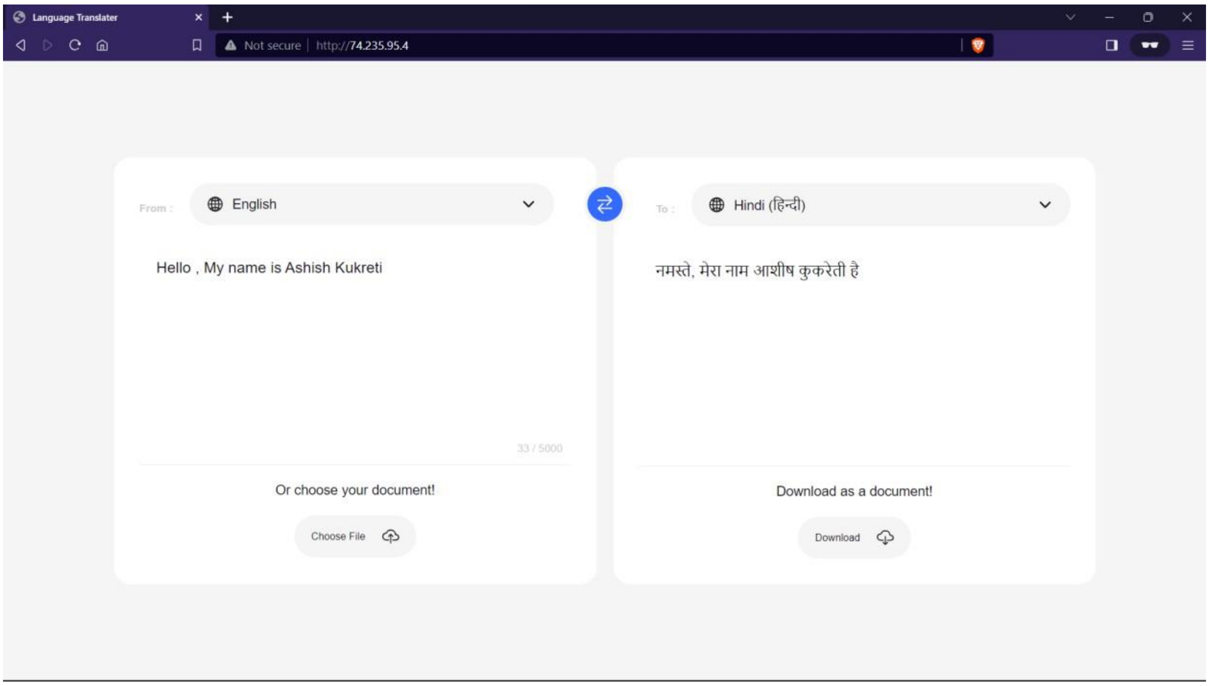


```
The authenticity of host '74.235.95.4 (74.235.95.4)' can't be established.
ED25519 key fingerprint is SHA256:Sxi0x+Q58qJOAw8ncOElJOFTvefEH5zODqlalmM+hVg.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '74.235.95.4' (ED25519) to the list of known hosts.
ashish@74.235.95.4's password:
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1050-azure x86_64)

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

  System information as of Sun Nov  5 15:27:48 UTC 2023

  System load:  0.42              Processes:             130
  Usage of /:   5.2% of 28.89GB   Users logged in:       0
  Memory usage: 4%                IPv4 address for eth0: 10.1.0.4
  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.
```



```
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service
Processing triggers for ufw (0.36-6ubuntu1.1) ...
Processing triggers for systemd (245.4-4ubuntu3.22) ...
Processing triggers for man-db (2.9.1-1) ...
Processing triggers for libc-bin (2.31-0ubuntu9.12) ...
```

Website opened



From : English

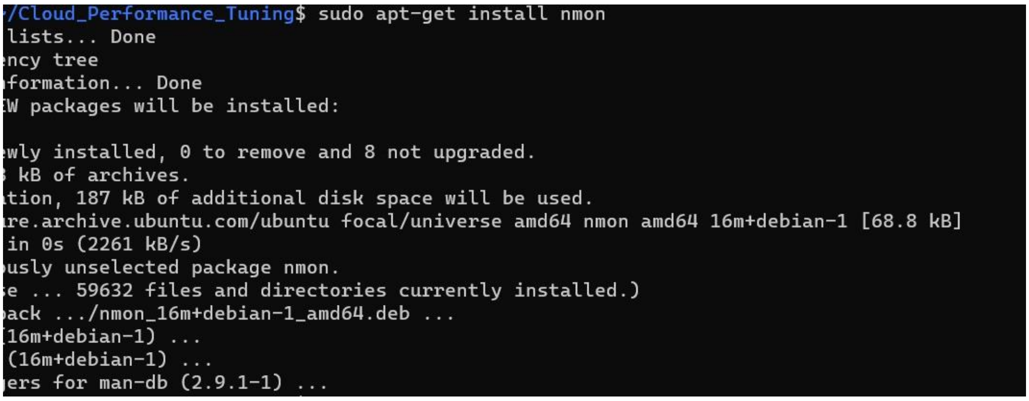
Hello , My name is Ashish Kukreti

33 / 5000

To : Hindi (हिन्दी)

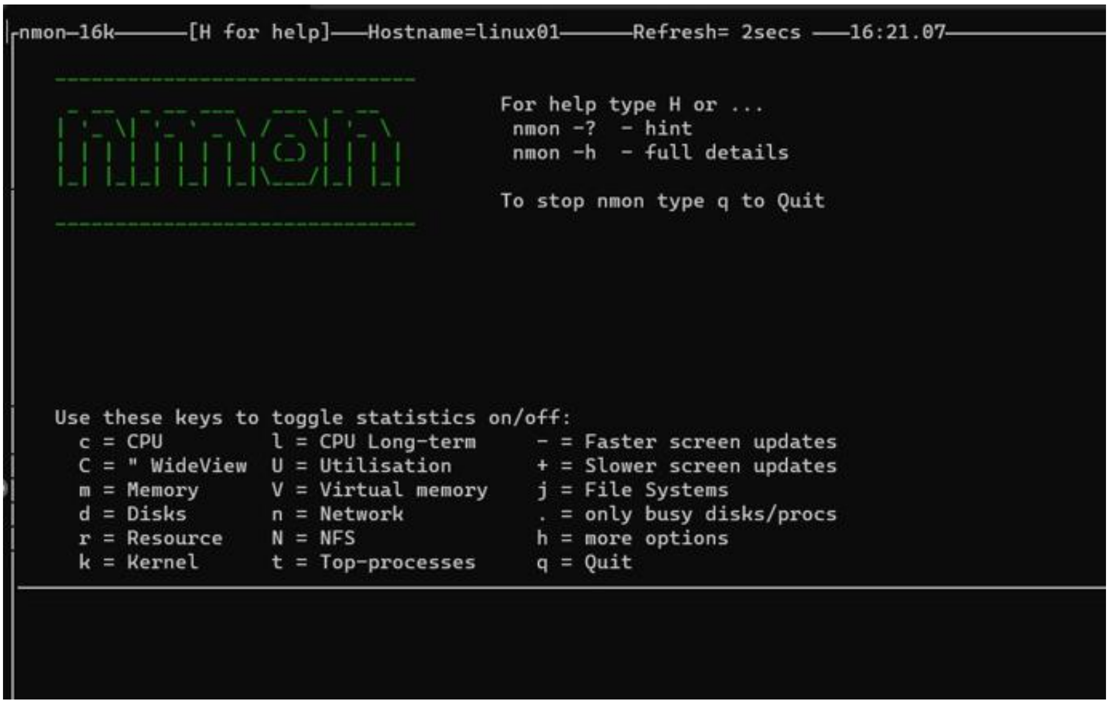
नमस्ते, मेरा नाम आशीष कुकरेती है

Using NMON and HTOP commands to check performance, CPU utilization, memory utilization.

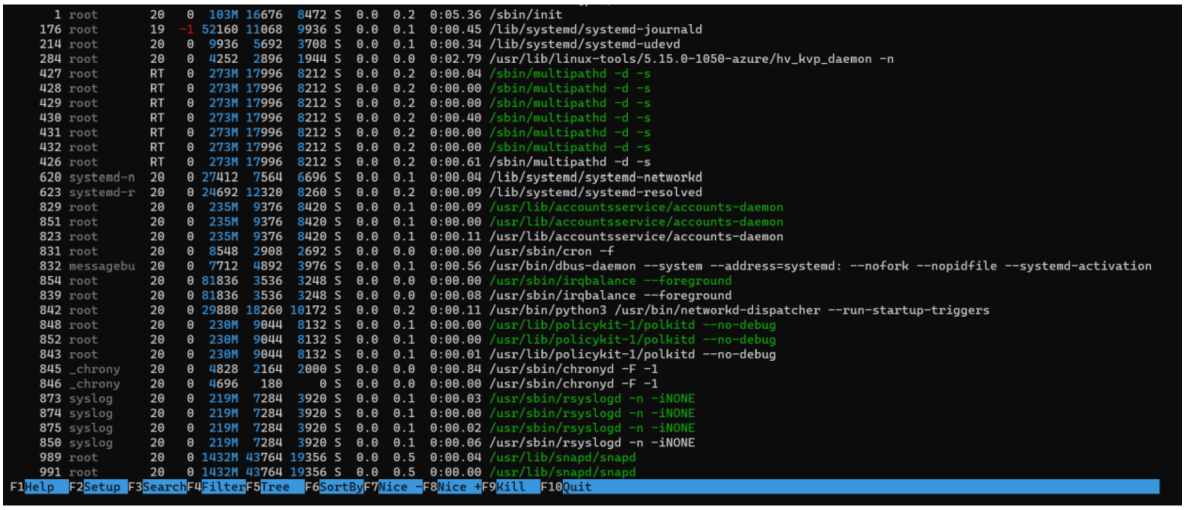


```
~/Cloud_Performance_Tuning$ sudo apt-get install nmon
 lists... Done
ncy tree
formation... Done
W packages will be installed:

wly installed, 0 to remove and 8 not upgraded.
 kB of archives.
tion, 187 kB of additional disk space will be used.
re.archive.ubuntu.com/ubuntu focal/universe amd64 nmon amd64 16m+debian-1 [68.8 kB]
 in 0s (2261 kB/s)
usly unselected package nmon.
e ... 59632 files and directories currently installed.)
ack .../nmon_16m+debian-1_amd64.deb ...
(16m+debian-1) ...
 (16m+debian-1) ...
ers for man-db (2.9.1-1) ...
```

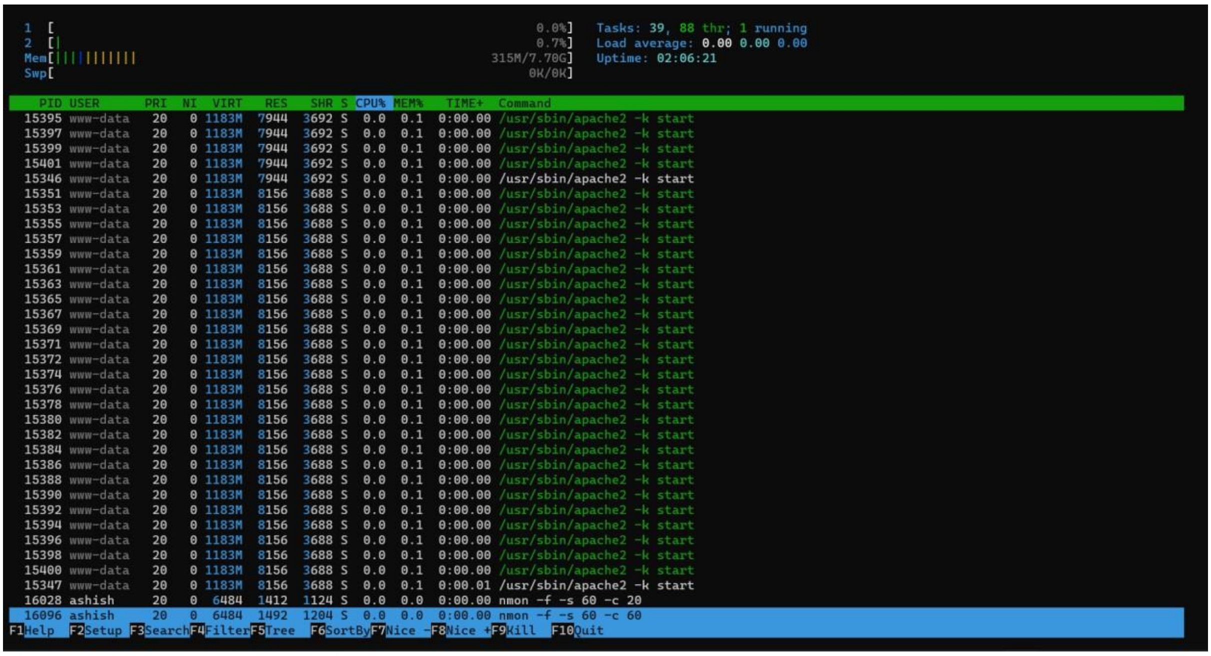
Memory utilization



```
nmon-16k——[H for help]——Hostname=linux01———Refresh= 2secs ——16:21.07—

                                          For help type H or ...
                                           nmon -?  - hint
                                           nmon -h  - full details

                                          To stop nmon type q to Quit

  Use these keys to toggle statistics on/off:
    c = CPU         l = CPU Long-term     - = Faster screen updates
    C = " WideView  U = Utilisation       + = Slower screen updates
    m = Memory      V = Virtual memory    j = File Systems
    d = Disks       n = Network           . = only busy disks/procs
    r = Resource    N = NFS               h = more options
    k = Kernel      t = Top-processes     q = Quit
```

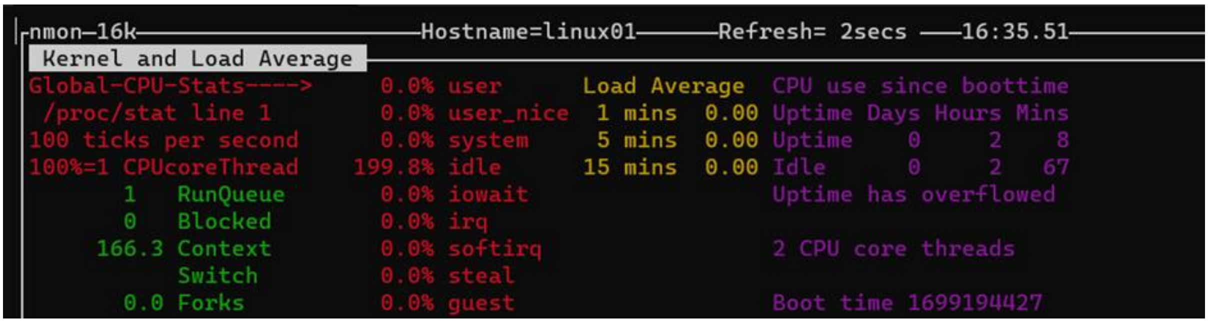


```
      1 root       20   0  103M 16676  8472 S  0.0  0.2  0:05.36 /sbin/init
    176 root       19  -1 52160 11068  9936 S  0.0  0.1  0:00.45 /lib/systemd/systemd-journald
    214 root       20   0  9936  5692  3708 S  0.0  0.1  0:00.34 /lib/systemd/systemd-udevd
    284 root       20   0  4252  2896  1944 S  0.0  0.0  0:02.79 /usr/lib/linux-tools/5.15.0-1050-azure/hv_kvp_daemon -n
    427 root       RT   0  273M 17996  8212 S  0.0  0.2  0:00.04 /sbin/multipathd -d -s
    428 root       RT   0  273M 17996  8212 S  0.0  0.2  0:00.00 /sbin/multipathd -d -s
    429 root       RT   0  273M 17996  8212 S  0.0  0.2  0:00.00 /sbin/multipathd -d -s
    430 root       RT   0  273M 17996  8212 S  0.0  0.2  0:00.40 /sbin/multipathd -d -s
    431 root       RT   0  273M 17996  8212 S  0.0  0.2  0:00.00 /sbin/multipathd -d -s
    432 root       RT   0  273M 17996  8212 S  0.0  0.2  0:00.00 /sbin/multipathd -d -s
    426 root       RT   0  273M 17996  8212 S  0.0  0.2  0:00.61 /sbin/multipathd -d -s
    620 systemd-n  20   0 27412  7564  6696 S  0.0  0.1  0:00.04 /lib/systemd/systemd-networkd
    623 systemd-r  20   0 24692 12320  8260 S  0.0  0.2  0:00.09 /lib/systemd/systemd-resolved
    829 root       20   0  235M  9376  8420 S  0.0  0.1  0:00.09 /usr/lib/accountsservice/accounts-daemon
    851 root       20   0  235M  9376  8420 S  0.0  0.1  0:00.00 /usr/lib/accountsservice/accounts-daemon
    823 root       20   0  235M  9376  8420 S  0.0  0.1  0:00.11 /usr/lib/accountsservice/accounts-daemon
    831 root       20   0  8548  2908  2692 S  0.0  0.0  0:00.00 /usr/sbin/cron -f
    832 messagebu  20   0  7712  4892  3976 S  0.0  0.1  0:00.56 /usr/bin/dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation
    854 root       20   0 81836  3536  3248 S  0.0  0.0  0:00.00 /usr/sbin/irqbalance --foreground
    839 root       20   0 81836  3536  3248 S  0.0  0.0  0:00.08 /usr/sbin/irqbalance --foreground
    842 root       20   0 29880 18260 10172 S  0.0  0.2  0:00.11 /usr/bin/python3 /usr/bin/networkd-dispatcher --run-startup-triggers
    848 root       20   0  230M  9044  8132 S  0.0  0.1  0:00.00 /usr/lib/policykit-1/polkitd --no-debug
    852 root       20   0  230M  9044  8132 S  0.0  0.1  0:00.00 /usr/lib/policykit-1/polkitd --no-debug
    843 root       20   0  230M  9044  8132 S  0.0  0.1  0:00.01 /usr/lib/policykit-1/polkitd --no-debug
    845 _chrony    20   0  4828  2164  2000 S  0.0  0.0  0:00.84 /usr/sbin/chronyd -F -1
    846 _chrony    20   0  4696   180     0 S  0.0  0.0  0:00.00 /usr/sbin/chronyd -F -1
    873 syslog     20   0  219M  7284  3920 S  0.0  0.1  0:00.03 /usr/sbin/rsyslogd -n -iNONE
    874 syslog     20   0  219M  7284  3920 S  0.0  0.1  0:00.00 /usr/sbin/rsyslogd -n -iNONE
    875 syslog     20   0  219M  7284  3920 S  0.0  0.1  0:00.02 /usr/sbin/rsyslogd -n -iNONE
    850 syslog     20   0  219M  7284  3920 S  0.0  0.1  0:00.06 /usr/sbin/rsyslogd -n -iNONE
    989 root       20   0 1432M 43764 19356 S  0.0  0.5  0:00.04 /usr/lib/snapd/snapd
    991 root       20   0 1432M 43764 19356 S  0.0  0.5  0:00.00 /usr/lib/snapd/snapd
F1Help  F2Setup F3SearchF4FilterF5Tree  F6SortByF7Nice -F8Nice +F9Kill  F10Quit
```

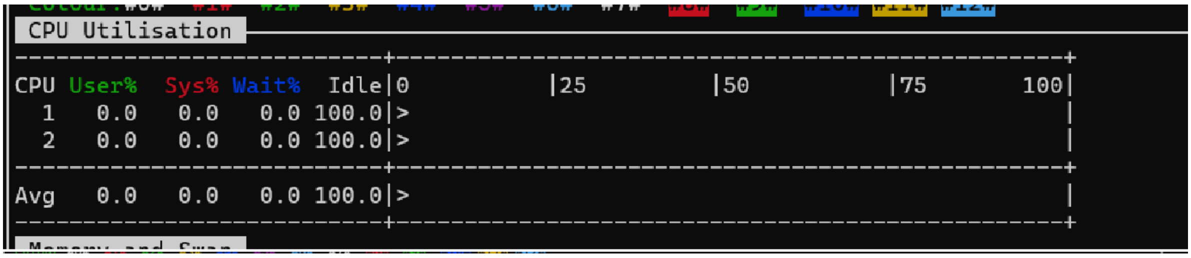


```
  1  [                                                  0.0%]   Tasks: 39, 88 thr; 1 running
  2  [|                                                 0.7%]   Load average: 0.00 0.00 0.00
  Mem[||||||||||                                  315M/7.70G]   Uptime: 02:06:21
  Swp[                                                0K/0K]

    PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+  Command
  15395 www-data   20   0 1183M  7944  3692 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15397 www-data   20   0 1183M  7944  3692 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15399 www-data   20   0 1183M  7944  3692 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15401 www-data   20   0 1183M  7944  3692 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15346 www-data   20   0 1183M  7944  3692 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15351 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15353 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15355 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15357 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15359 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15361 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15363 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15365 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15367 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15369 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15371 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15372 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15374 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15376 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15378 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15380 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15382 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15384 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15386 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15388 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15390 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15392 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15394 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15396 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15398 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15400 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.00 /usr/sbin/apache2 -k start
  15347 www-data   20   0 1183M  8156  3688 S  0.0  0.1  0:00.01 /usr/sbin/apache2 -k start
  16028 ashish     20   0  6484  1412  1124 S  0.0  0.0  0:00.00 nmon -f -s 60 -c 20
  16096 ashish     20   0  6484  1492  1204 S  0.0  0.0  0:00.00 nmon -f -s 60 -c 60
F1Help  F2Setup F3SearchF4FilterF5Tree  F6SortByF7Nice -F8Nice +F9Kill  F10Quit
```

CPU Utilization



```
┌nmon─16k───────────────────Hostname=linux01────────Refresh= 2secs ───16:35.51──
│ Kernel and Load Average
│Global-CPU-Stats---->      0.0% user        Load Average  CPU use since boottime
│ /proc/stat line 1         0.0% user_nice    1 mins  0.00 Uptime Days Hours Mins
│100 ticks per second       0.0% system       5 mins  0.00 Uptime     0     2    8
│100%=1 CPUcoreThread     199.8% idle        15 mins  0.00 Idle       0     2   67
│       1   RunQueue        0.0% iowait                    Uptime has overflowed
│       0   Blocked         0.0% irq
│     166.3 Context         0.0% softirq                   2 CPU core threads
│           Switch          0.0% steal
│       0.0 Forks           0.0% guest                     Boot time 1699194427
```



```
 CPU Utilisation
---------------------------+-------------------------------------------------+
CPU User%  Sys% Wait%  Idle|0          |25         |50          |75       100|
  1   0.0   0.0   0.0 100.0|>                                                |
  2   0.0   0.0   0.0 100.0|>                                                |
---------------------------+-------------------------------------------------+
Avg   0.0   0.0   0.0 100.0|>                                                |
---------------------------+-------------------------------------------------+
```

Response Time: 10 minutes and 18 seconds.

Conclusion: -

Response Time:

Both Linux and Windows can provide good response times. but Linux, due to its efficiency and minimal resource usage, we have seen in this case Linux have less response time compared to windows.

Response Time: 10 minutes and 18 seconds.

Response Time: 13 minutes and 30 seconds.

Fast OS Performance:

Linux ubuntu are often known for their fast performance due to their lightweight nature and efficient resource handling. They generally have lower overhead and tend to be very responsive, making them favorable in terms of quick performance.

CPU Utilization:

As we have seen in both the cases, the CPU utilization is less in ubuntu in comparison to windows.

Windows might tend to use more CPU resources for its background services and GUI, potentially leading to slightly higher CPU utilization in some cases.

Memory Utilization:

Ubuntu generally has a reputation for efficient memory management. It tends to use less memory for the operating system itself, leaving more available for applications and services.

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