

Zaeem Assignment 2 - Mike (FINAL)

by Zaeem Gulammamodo

Submission date: 21-Jan-2022 03:57PM (UTC+0000)

Submission ID: 169934821

File name: 17602_Zaeem_Gulammamodo_Zaeem_Assignment_2_-_Mike_FINAL_382342_1151445531.docx
(2.19M)

Word count: 4852

Character count: 27992

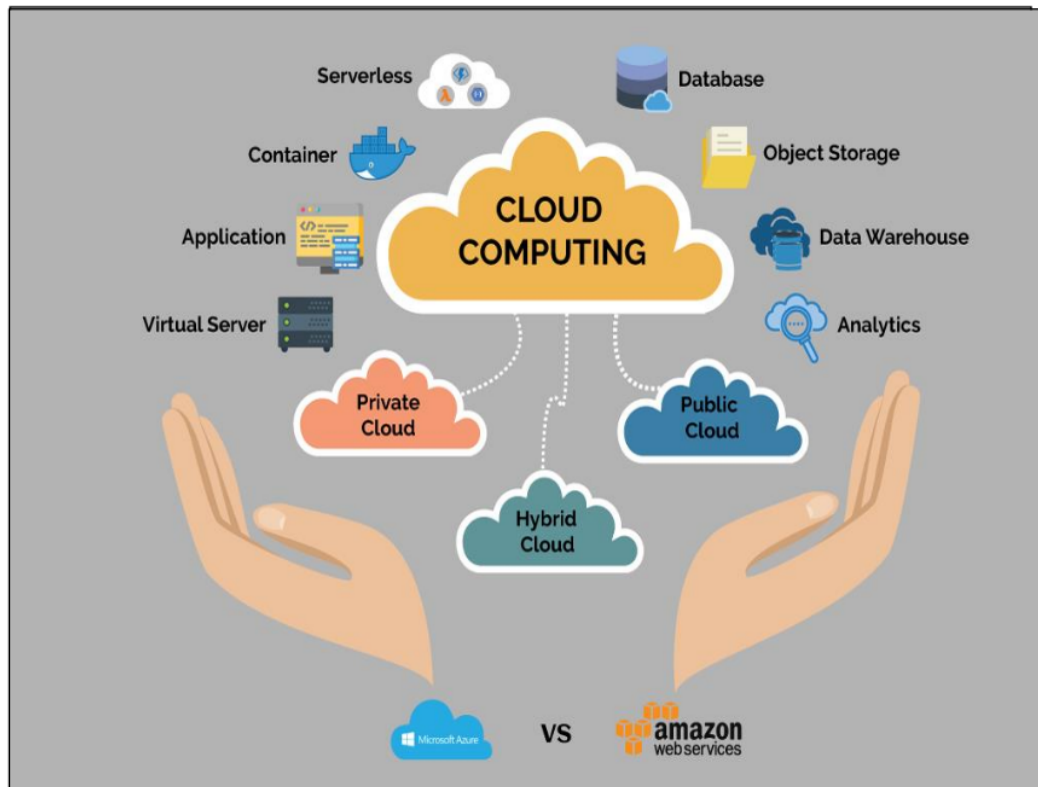


Image [7]

Assignment 2

Name: Zaeem

Student No.: 1902036

Course: Applied Computing (Web Development)

Module: Cloud-Based Web Services

Date: 11/12/2021

Table Of Contents

<u>Content</u>	<u>Page Number</u>
1. Introduction	3
2. What is Cloud Computing?	3
2.1. Cloud Computing – How Does It Work?	3
2.2. Cloud Computing – Advantages	4
2.3. Cloud Computing – Disadvantages	5
2.4. Cloud Computing – Costs	6
2.5. Cloud Computing – Examples	7
2.6. Cloud Computing – Reliability	9
2.7. Cloud Computing – Scalability	10
3. What is Docker?	11
4. Fundamental Differences – Virtual Machines & Containers	12
5. Node.js & Docker Development	14
6. Website	21
7. References	22
8. Bibliography	24

1. Introduction

In this documentation, a report has been created explaining the meaning behind Cloud Computing, its advantages and disadvantages, what the cost will be, different examples of cloud computing and the reliability of Cloud Computing. Also, the user will need to discuss the differences and the driving forces from the adoption of Docker. The user will need to evaluate the development process of creating Node.js programs operated in Docker as well.

2. What is Cloud Computing?

Everything which includes offering hosted services via the internet is referred to as cloud computing. Infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS) are indeed the three primary kinds of these services. It is possible to have a private or public cloud. Users using the internet can pay for services from a public cloud. A private cloud would be a closed network or data centre which provides hosted services to a small group of users with specific access and rights. The purpose of cloud computing, whether private or public, would be to give quick, flexible access to network resources and computer activities. The hardware and software elements needed to establish a cloud computing model is referred to as cloud infrastructure. [1]

2.1. Cloud Computing – How Does It Work?

Cloud computing allows user devices to retrieve information from remote services, networks, and PCs via the internet. The front end, that contains the accessing user devices, internet, networking, and cloud software products, is connected to the back end, that contains records, servers, and PCs, via an online connection. The back-end acts as a library, keeping data which the front end can view. A centralised server controls interaction between the front and back ends. Protocols are used by the centralised server to simplify data sharing. To maintain connections across multiple user devices and cloud services, the centralised server utilises both programs and hardware. In most cases, every program will have its own specialised server. [1]

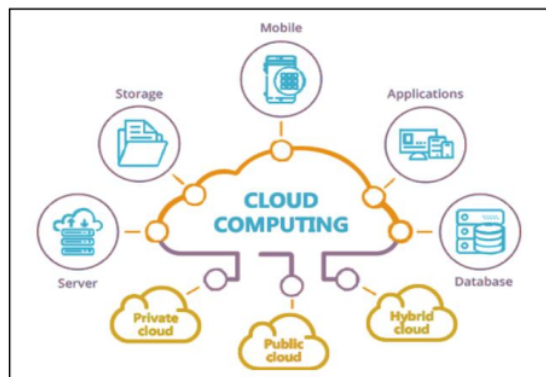


Image [8]

2.2. Cloud Computing – Advantages

- **Cost-cutting** - One of the most significant advantages of Cloud Computing is cost reduction. It allows users to save a lot of money because it doesn't require any actual equipment. In addition, users would not require qualified staff to keep the equipment up to date. The cloud service provider is in charge of purchasing and maintaining hardware. [2]
- **Data backup and restoration** - Once data is saved on the Cloud, it is much simpler to back it up and restore it, which would be a time-consuming task on-premises. [2]
- **Integration of software that is done automatically** - Software integration would be anything that happens immediately on the cloud. As a result, users would not need to invest extra effort in modifying and connecting their programs to meet their specific needs. [2]
- **Storage space is limitless** - The cloud provides nearly infinite storage space. With relatively low monthly rates, the user can simply increase their storage space anywhere at any time. [2]
- **Flexibility** - Users having to work on-site or in remote areas can quickly use all of the available services. What they require is access to the internet. [2]
- **Cooperation** - The cloud computing system allows users in various parts of the world to cooperate in a very simple and safe way. [2]

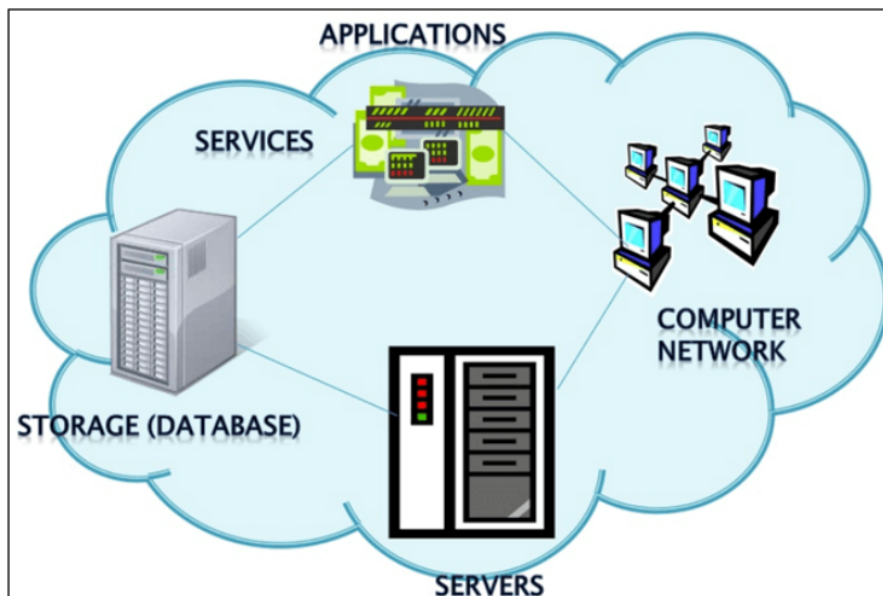


Image [2]

2.3. Cloud Computing – Disadvantages

- Performance is subject to change - Whenever users operate in a cloud platform, their program runs on a server that is also providing resources to other organisations. Any selfish activity or DDOS strike on the user might have an impact on the associated resource's functionality. [2]
- Technical Difficulties - Cloud computing is vulnerable to interruptions as well as other technical problems. Then again, the greatest cloud service provider organisations, while keeping good servicing criteria, may run into problems. [2]
- Cloud security is an issue - Another disadvantage of using cloud computing technology is the safety hazard. When implementing cloud computing, users should be informed that they would be transferring over all their organisation's private data to a third-party cloud computing service provider. This data could be accessed by cybercriminals. [2]
- Breakdowns - When dealing with cloud computing, failures should really be taken into account. This is since the user cloud service might experience issues such as power failures, poor internet access, and maintenance costs, along with many other things. [2]
- Access to the Internet - In cloud computing, reliable Internet access is crucial. Without a connection to the internet, the user is unable to use the cloud. Furthermore, the user has no other means of accessing data from the cloud. [2]
- A shortage of assistance - Users are not properly supported by cloud computing organisations. They also encourage their users to rely on FAQs or online support, which can be a time-consuming task for non-technical users. [2]



Image [2]

2.4. Cloud Computing – Costs

Standard IT services have higher advance expenses, whereas cloud computing has reduced advance expenses. Cloud computing works on the principle of "pay for what you use." The user would spend for as much or as less as their usage of the system demands. The user is more bound into greater advance charges and management IT costs using standard IT solutions. Users would save money over the long period because cloud computing allows them to only pay for what they use. This enables them to expand generally in response to changing organisational requirements and user demands. The user will save money on total operational costs by using cloud computing rather than managing and purchasing for their own server, independent of user or organisation requirements. [3]

Rather than operating the user own data centre, cloud computing allows their IT staff to concentrate on other elements of the organisation. After switching to the cloud, there is usually little hardware to manage. The IT team won't have to waste effort and time updating servers, troubleshooting network difficulties, or monitoring storage. They would rather be able to concentrate on maintaining and developing current facilities. [3]

If the user is uploading their data to the cloud as a backup, the cost of their own backup machines which synchronise from their workplace to the cloud can range from £0.15 per month to a few thousand pounds. Prices varies between £400 per month for one server to £15,000 per month for the user's whole back-office system when it comes to hosting. [4]

A fully hosted network would cost the user between £100 and £200 per PC per month, includes the amount of installation, data integration, and continuous storage. This would not involve the cost of keeping the user's in-office network up and running. [4]



Image [9]

2.5. Cloud Computing – Examples

Cloud services are divided into three categories: [5]

- SaaS (Software as a Service) - This will be a cloud-based software program which the user may utilise without needing to install it on their machine. [5]

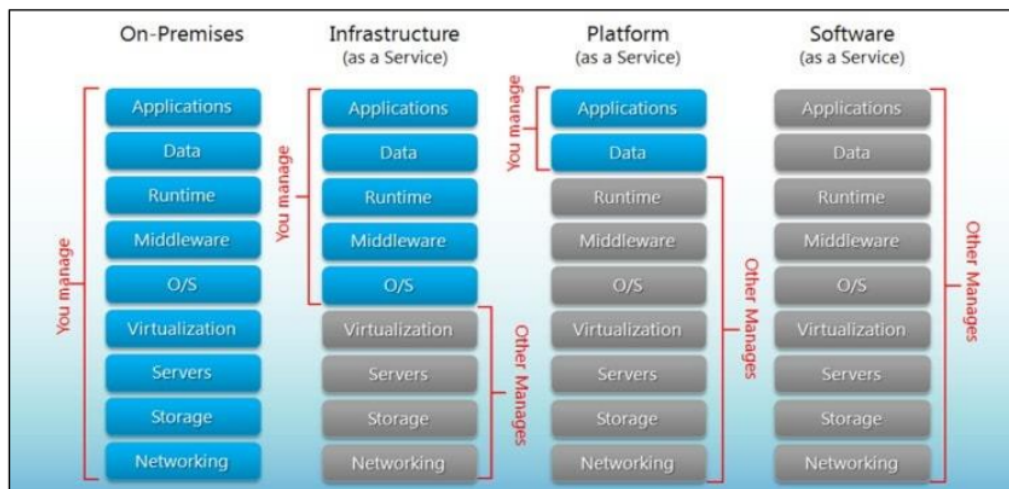
SaaS includes storage space, recovery, web-based email, and task managing applications, among other things. Users could browse, exchange, save, and protect data on the cloud with one of these programs. Dropbox, Slack, and Microsoft 365 are examples of SaaS cloud services. [5]

- PaaS (Platform as a Service) - A service carrier provides the user with a system that allows them to design, operate, and maintain commercial programs in the cloud. [5]

PaaS would be a cloud platform where users may create and publish programs. PaaS offers the database and the OS required for cloud-based program development. Users could concentrate on the work instead of building and maintaining the technology that certain program development methods often demand. PaaS seems to be a cloud platform that includes AWS Elastic Beanstalk and Windows Azure. [5]

- IaaS (Infrastructure as a Service) - Rather than managing servers and physical server farms, the users are able to access all their data through the cloud. [5]

IaaS offers users with the technology they need to handle SaaS solutions, such as servers, memory, and networking. The cloud service will be responsible for managing the memory systems and networking equipment, as well as providing extra features such as task scheduling and firewalls. [5]



Zaeem

Many organizations utilize a mix of SaaS and IaaS models of cloud computing, and many employ users to develop PaaS-based apps. [6]

Many examples of cloud computing programs will include:

- BigCommerce (SaaS) [6] (Free & Paid Versions Available)
- Google Apps (SaaS) [6] (Free & Paid Versions Available)
- Dropbox (SaaS) [6] (Free & Paid Versions Available)
- MailChimp (SaaS) [6] (Free & Paid Versions Available)
- ZenDesk (SaaS) [6] (Paid Versions Available)
- DocuSign (SaaS) [6] (Free & Paid Versions Available)
- AWS Elastic Beanstalk (PaaS) [6] (Free & Paid Versions Available)
- Heroku (PaaS) [6] (Free & Paid Versions Available)
- Windows / Microsoft Azure (PaaS) [6] (Free & Paid Versions Available)
- OpenShift (PaaS) [6] (Paid Versions Available)
- Apache Stratos (PaaS) [6] (Free Versions Available)
- Magento Commerce Cloud (PaaS) [6] (Free & Paid Versions Available)
- AWS EC2 (IaaS) [6] (Free & Paid Versions Available)
- Rackspace (IaaS) [6] (Paid Versions Available)
- Google Compute Engine (GCE) (IaaS) [6] (Free & Paid Versions Available)
- Digital Ocean (IaaS) [6] (Free & Paid Versions Available)
- Magento 1 Enterprise Edition (IaaS) [6] (Free & Paid Versions Available)



Image [10]

2.6. Cloud Computing – Reliability

It's reasonable to suggest that cloud computing's functionality, accessibility, and reliability can all be problematic. A few of the problems are due to cloud computing in general, while others are due to cloud service clients. There seems to be a method which leads in trustworthy cloud computing, regardless of where the issue exists. All that is required of the user is to recognise that there is an issue, discover its reason, and discover a fix. [7]

Various users' programs and content could be maintained on a single platform in the public cloud as it is a multi-tenanted system. Whenever one VM or program on a single platform consumes the rest of shared assets, network speed for all other VMs and programs on the platform suffers. When a user notices a performance difficulty, they could move the resource to the next Availability Zone or even to a physical hardware platform, where the resource is located physically on hardware instead of inside the user OS, to check if it's related to a disruptive neighbour. If this doesn't fix the problem, the problem is most likely due to the asset being under-provisioned. [7]

Cloud computing has several advantages, however if a user is unavailable to access to the cloud service provider's server farm, they will be unlikely to take full benefit of any one of them. Many cloud service operators provide Service Level Agreements whereas they promise to provide 99.9% availability using "commercially reasonable endeavours." The user receives a "service credit" whenever they fail to reach their promise. Gaining a service credit for a service that the user has not obtained is typical corporate procedure, but, whenever the service that the user does not receive puts their organisation offline, the impact might be significantly greater than the credit worth. Because of the security measures used by cloud service providers, service failures are rare, therefore connectivity is largely reliable, but again not guaranteed. Sharing resources across various cloud service providers and the user's on-premises IT systems would be the nearest a user can come to assured 100% availability. As a result, even if a single cloud service provider breaks down, the user is not affected. This technique makes managing user resources a little more difficult, but this is the most trustworthy way of ensuring cloud computing access. [7]

Somewhere at user tier, efficiency, trustworthiness, accessibility, and protection in the cloud might very well be upgraded. Organisations could improve unproductive resources or transfer them to a more peaceful location, distribute resources over many cloud service providers to reduce the danger of a connection issues, and apply regulations and best standards to improve protection. [7]

2.7. Cloud Computing – Scalability

Cloud scalability refers to the potential to expand or remove IT assets in response to changing requirements. It refers to a system's potential to handle higher or smaller loads. Organisations could grow or shrink, increase or decrease. Increasing, for instance, makes hardware more powerful, whereas decreasing introduces more nodes. Whether the user's organisation demands additional storage space or computing power, they would like a platform which could expand back and forth fast. Cloud computing services can help with this, which is why the industry has expanded in latest years. Third-party cloud services may expand with limited impact by utilising current cloud platform. [8]

The IT element of the user's organisation is affected by cloud scalability. The company maintains its competitiveness by taking use of cloud scalability. Relocation towards the cloud is motivated by scalability. Whenever a company expands and requires more assets, cloud scalability allows for a quick solution. This is also a budget-friendly option. [8]

Cloud scalability would be achievable because of virtualisation. Physical systems have limitations in terms of assets and efficiency. VMs, on the other hand, are adaptable and scalable. VMs can be moved to a new server or hosted on numerous servers. [8]



Image [13]

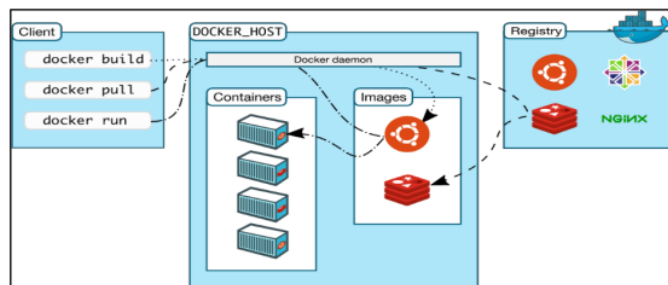
3. What is Docker?

Docker would be a free and accessible software for creating, delivering, and operating programs. Docker allows users to isolate their programs from their technology, allowing them to instantly release programs. Users may control their technology in the very same manner they control their programs using Docker. The user can greatly cut down on the time from developing the code and executing it in operation by applying Docker's methods for delivering, debugging, and releasing code efficiently. [9]

Docker allows users to store and execute a program inside a container, which would be a weakly separated platform. Because of the separation and protection, the user can run multiple containers on the very same server at the same time. Containers are small and include everything required to operate a program, eliminating the need for the user to depend on what is already installed on the server. While working, the user could simply exchange containers with others and ensure that everybody receives the same container which operates the very same manner. [9]

The container-based Docker system enables extremely flexible activities. Docker containers could execute on a user's PC, in a server farm on real or virtual machines, in cloud service providers, or in a hybrid cloud environment. Because of Docker's mobility and compact design, it's also simple to constantly control tasks, moving up or down software and services in real time based as company requires dictate. Docker would be a compact and quick program. It offers a realistic, cost-effective solution to hypervisor-based virtual machines, allowing users to make better use of their computational resources. Docker is ideal for strong situations as well as small and medium installations where the user needs to accomplish more with less. [9]

Docker is built on a client-server model. The Docker client communicates with the Docker daemon, which would be responsible for creating, executing, and delivering user Docker containers. The Docker client and daemon can both operate on the same machine, or the user could connect a Docker client to a Docker daemon that is located elsewhere. A REST API, UNIX sockets, or a network interface will be used by the Docker client and daemon to interact. Docker Compose would be another Docker client which allows users to deal with programs made up of many containers. [9]



4. Fundamental Differences - Virtual Machines & Containers

Virtualisation would be the method for generating a computer-generated simulated computing platform which is isolated from the physical PC hardware. Virtualisation enables users to make many virtual technology situations from a specific computer's hardware and software resources. A PC as in classic way, as well as a memory resource, program, server, or network settings, are examples of such entities. [10]

Virtual Machines has become and remain to be extremely famous and valuable, but they now carry the label "monolithic" around them anywhere they go. Containers, wrapped in the sparkling mantle of "microservices," moved the previous technology away. Each give the user whatever they need to stay in the virtualisation environment. Although both are compact, containers would get the user beyond and quicker if that is their aim. Containers, on the other hand, leave the elements behind to save space, whereas VMs carry everything and the kitchen sink as well. [10] Below will be an image showing the comparison between the both:

VMS	CONTAINERS
Heavyweight.	Lightweight.
Limited performance.	Native performance.
Each VM runs in its own OS.	All containers share the host OS.
Hardware-level virtualization.	OS virtualization.
Startup time in minutes.	Startup time in milliseconds.
Allocates required memory.	Requires less memory space.
Fully isolated and hence more secure.	Process-level isolation, possibly less secure.

Image [10]

Whenever a user needs to run many programs on servers or handle a broad range of OS's, VMs would be a better solution for executing programs which demand all of the OS's assets and functionalities. If the user already has a monolithic program which they don't intend to or need to convert into microservices, VMs would remain to meet their needs. [10]

Containers seem to be a preferable solution when the user's primary goal is to execute as many programs or services as possible on a small number of servers while maintaining highest possible adaptability. Containers are indeed the method to approach if the user is building a new program and want to use a microservices structure for scalability and mobility. Whenever it comes to creating cloud-native programs built on a microservices structure, containers excel. [10]

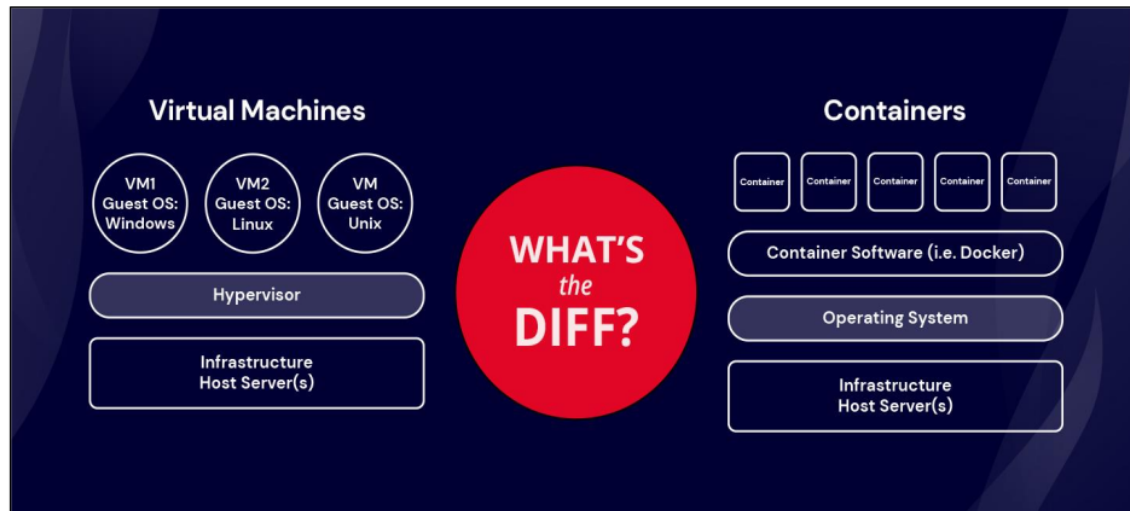


Image [10]

5. Node.js & Docker Development

Below will show what type of applications & add-ons the user will be using when evaluating this task:

Node.js – Node.js would be a JavaScript runtime environment which contains the contents that the user requires to run an application that is coded in JavaScript. [11]

Docker - Docker would be a free and accessible software for creating, delivering, and operating programs. Docker allows users to isolate their programs from their technology, allowing them to instantly release programs. [9]

Express - Express would be a Node.js web application framework which offers a comprehensive range of functionality for both web and mobile apps. [12]

Chocolatey - Chocolatey would be an application management solution beyond any other Windows user has ever encountered. Chocolatey implements full package management techniques, allowing users to version items, manage requirements and installation order, improve inventory control, and more. [13]

The first step for the user is to use Linux Ubuntu or Windows PowerShell or Command Prompt to install Chocolatey, Node.js, Docker and Express on the PC.

To install Chocolatey, the user will need to enter the command

```
"Set-ExecutionPolicy Bypass -Scope Process -Force;  
[System.Net.ServicePointManager]::SecurityProtocol =  
[System.Net.ServicePointManager]::SecurityProtocol -bor 3072; iex ((New-  
Object  
System.Net.WebClient).DownloadString('https://community.chocolatey.org/inst  
all.ps1'))"
```

This will install Chocolatey and all its components onto the user PC. This method is not too hard as this is a developer method to install a add on by using a specific command instead of visually clicking the safe Download button from the official source but this method could confuse some users that do not understand technology in the computer world very well.

After Chocolatey is installed onto the user PC, the user can install different application packages with the help of the Chocolatey add on and its components.

Zaeem

To install Node.js, the user will need to enter the command

```
'choco install -y nodejs'
```

```
npm install -g npx
```

```
npm install --global windows-build-tools'
```

This will install Node.js and all its components onto the user PC. This method is not too hard as this is a developer method to install an application by using a specific command instead of visually clicking the safe Download button from the official source but this method could confuse some users that do not understand technology in the computer world very well.

Or, the other method to install Node.js will be

Go to '<https://nodejs.org/en/download/>' on the web browser > click 'Windows Installer' > complete the setup wizard

This will install Node.js and its components onto the user PC as well. This method is very easy as this is the visual method to install an application by clicking the safe Download button from the official source and completing the setup wizard.

To install Docker, the user will need to enter the command

```
'choco install docker-desktop -y'
```

This will install Docker Desktop and all its components onto the user PC. This method is not too hard as this is a developer method to install an application by using a specific command instead of visually clicking the safe Download button from the official source but this method could confuse some users that do not understand technology in the computer world very well.

To enter in an interactive JavaScript mode, the user will need to enter the command

```
'node'
```

```
>'console.log("hello")'
```

This will allow the PC to show what the user commanded node to say within the brackets.

Zaeem

To have Node run a JS file, the user will need to enter the command

'node hello5times.js'

This would say hello 5 times on the PC.

The JS File Code

```
for(i = 0; i < 5; i++)  
{  
  console.log("[+i+] hello");  
}
```

To create a package.json file, the user will need to enter the command

'npm init'

This would create a JSON file which will store a list of modules that is being used on the PC after entering all of the details.

```
npm init  
description: A simple node.js webserver  
entry point: (hello5times.js) server.js  
test command:  
git repository:  
keywords:  
author: Zaeem  
license: (ISC)  
about to write to c:\Users\soac-azure\Documents\package.json:  
{  
  "name": "nodewebserver",  
  "version": "1.0.0",  
  "description": "A simple node.js webserver",  
  "main": "server.js",  
  "scripts": {  
    "test": "echo \"Error: no test specified\" && exit 1"  
  },  
  "author": "Zaeem",  
  "license": "ISC"  
}  
Is this OK? (yes) _
```

To create a network service, the user will need to enter the command

'node server.js'

This would make the network service running the specific IP Address and it will show the text that the user has coded on that IP Address.

The server.js File Code

```
const http = require('http');  
server = http.createServer((req, res) => {  
  res.writeHead(200, {'Content-Type': 'text/plain'});  
  res.end('Hello, World!\n');  
});  
server.listen(8124, '127.0.0.1', () => {  
  console.log('Server running http://127.0.0.1:8124');  
});
```

To install Express, the user will need to enter the command

'npm install express express-validator cors pg pg-format'

This will install Express Framework and all its components onto the user PC. This method is not too hard as this is a developer method to install an add on by using a specific command.

Zaeem

When using the JS code file from Node in Express, it will be shortened and simplified which is helpful to the user (see below)

The Code in Node.js

```
const http = require('http');
server = http.createServer(function (req, res) {
  res.writeHead(200, {'Content-Type': 'text/plain'});
  res.end('Hello, World!\n');
});

server.listen(3000, '127.0.0.1', () => {
  console.log('Server running');
});
```

The Code in Express

```
const express = require('express');
const app = express();

app.get('/', (req, res) => { //get method
  res.send('Hello World'); //send response
})
app.listen(3000);
```

The user will need install Postman as this will add data and response to it towards the JSON file on the webserver.

To install Postman, the user would need to

Go to '<https://www.postman.com/downloads/>' on the web browser > click 'Windows' > complete the setup wizard

This will install Postman and its components onto the user PC as well. This method is very easy as this is the visual method to install an application by clicking the safe Download button from the official source and completing the setup wizard.

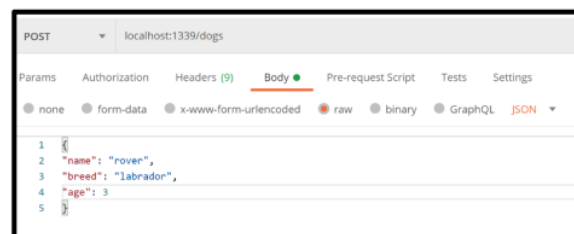
Below will show how Postman adds the data to the JSON file

The service.js code

```
// for parsing application/x-www-form-urlencoded
service.use( express.urlencoded( { extended: true } ) );

service.post('/dogs', (req, res) => {
  let result = {
    id: 101,
    name: req.body.name,
    breed: req.body.breed,
    age: req.body.age
  };
  res.send( result );
});
```

The JSON file in Postman



The Response in Postman



The Response in the Webservice

```
{"id":101,"name":"rover","breed":"labrador","age":3}
```

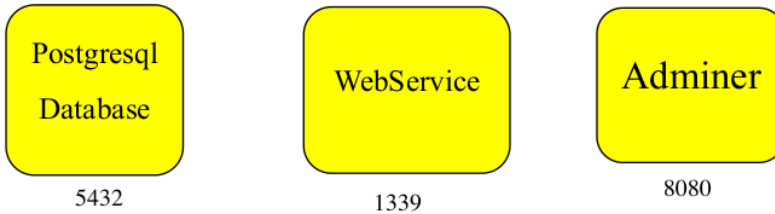
Zaeem

To run the Web Service & Database together, the user will need to enter the command

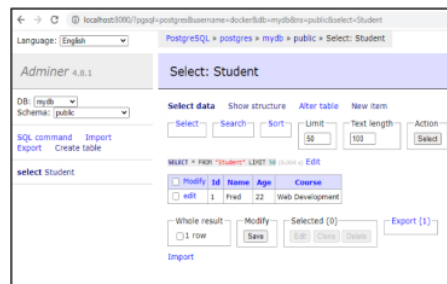
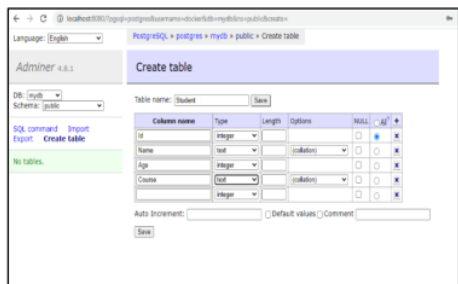
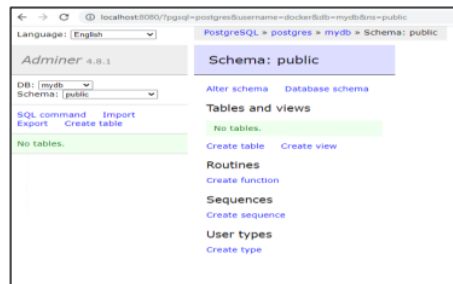
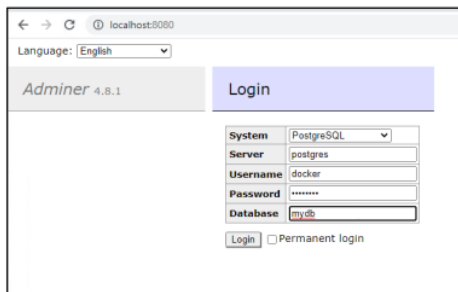
'docker-compose up'

This will run the Web Service & Database at the same time and the user will be access this on <http://localhost:1339>.

At the same time, multiple containers with their port number will be running:



From this the user can use Adminer to create their database using the URL <http://localhost:8080>.



Zaeem

To run the Web Server, Web Service & Database together, the user will need to enter the command after creating the file server.js

'docker-compose up'

The server.js code

```
const express = require('express');
const path = require('path');
const axios = require('axios');

const port = 80;
const server = express();
let dirName = './dirname';

// for parsing application/json
server.use(express.json());
// for parsing application/x-www-form-urlencoded
server.use(express.urlencoded({ extended: true }));

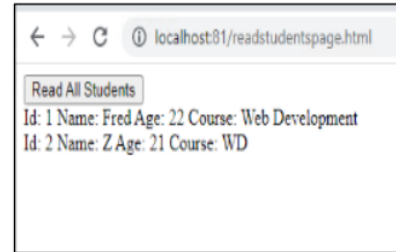
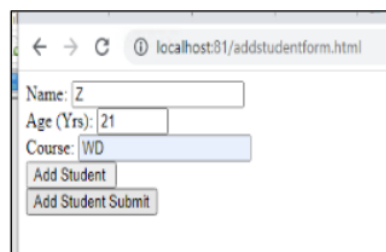
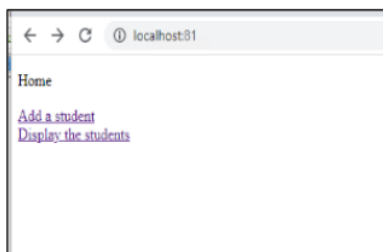
server.use(express.static(path.join(dirName, '/public')));

server.post('/addstudent', async (req, res) => {
  try {
    let containerName = "webservice";
    let serviceResponse = await axios.post("http://${containerName}:1339/students", {
      name: req.body["name-textbox"],
      age: req.body["age-numberbox"],
      course: req.body["course-textbox"]
    });
    console.log('Service response = ' + serviceResponse.status);
    res.redirect('thanks.html');
  } catch (error) {
    // handle error
  }
});
```

```
Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them
[+] Running 0/4
- Container documents-webserver-1 Created
- Container documents-adminer-1 Created
- Container documents-postgres-1 Created
- Container documents-webservice-1 Created
Attaching to documents-adminer-1, documents-postgres-1, documents-webserver-1, documents-webservice-1
documents-adminer-1 | [Thu Jan 20 11:18:52 2022] PHP 7.4.27 Development Server (http://[::]:8080) started
documents-webservice-1 | > nodewebservice@1.0.0 start-mount
documents-webservice-1 | > ./node_modules/.bin/nodemon -L service.js
documents-webservice-1 |
documents-webserver-1 | > nodewebserver@1.0.0 start-mount
documents-webserver-1 | > ./node_modules/.bin/nodemon -L server.js
documents-webserver-1 |
documents-postgres-1 |
```

This would run all of the containers at the same time when using this command.

This will run the Web Server, Web Service & Database at the same time and the user will be access this on <http://localhost:1339> & <http://localhost:81>. It will also update the JS files and restarts the web server as well. The user will be able to add data to the database and the database will be updated at the same time.



Zaeem

Overall, the technology to use Node.js & Docker at the same time will be to add, exchange and remove specific set of data towards a website. The main downfall would be that the user may not be comfortable to understand these methods from the commands they enter in the Command Prompt or Ubuntu as this is working from a developer point of view instead of a visual point of view.

The main focus will be to have the Node.js web application included within the containers provided by Docker as Docker will allow users to have many environments to be included as well. Docker will make the containers lightweight and quicker compared to Virtual Machines.

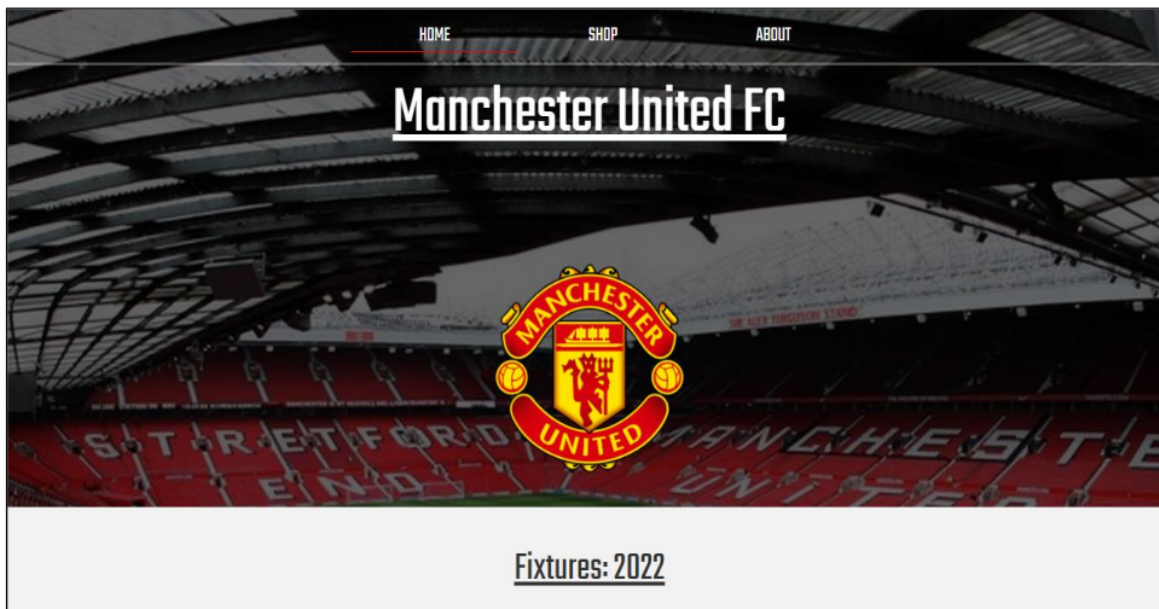
6. Website

The website will contain multiple pages showing the usage of HTML, CSS, jQuery and Node. A video will be created demonstrating the usage of the created website.

To view the video, please visit this link:

<https://vimeo.com/668467292>

Image of Home Page:



7. References

References

- [1] W. Chai, "cloud computing," N/A December 2020. [Online]. Available: <https://searchcloudcomputing.techtarget.com/definition/cloud-computing>. [Accessed 12 December 2021].
- [2] R. Peterson, "Advantages and Disadvantages Of Cloud Computing," 7 October 2021. [Online]. Available: <https://www.guru99.com/advantages-disadvantages-cloud-computing.html>. [Accessed 13 December 2021].
- [3] E. CLAY, "The Game Changing Cost Benefits of Cloud Computing," N/A N/A N/A. [Online]. Available: <https://www.thortech-solutions.com/cloud-computing-cost-benefits/>. [Accessed 14 December 2021].
- [4] I. Optimal Networks, "How Much Does Cloud Computing Cost?," 10 October 2013. [Online]. Available: <https://resource.optimalnetworks.com/blog/2013/10/10/how-much-does-cloud-computing-cost>. [Accessed 14 December 2021].
- [5] D. Data, "What are some examples of Cloud Services," N/A N/A 2020. [Online]. Available: <https://www.dimensiondata.com/en-gb/insights/blogs/what-are-some-examples-of-cloud-services>. [Accessed 14 December 2021].
- [6] T. Hou, "IaaS vs PaaS vs SaaS Enter the Ecommerce Vernacular: What You Need to Know, Examples & More," N/A N/A N/A. [Online]. Available: <https://www.bigcommerce.com/blog/saas-vs-paas-vs-iaas/#examples-of-saas-paas-and-iaas>. [Accessed 14 December 2021].
- [7] C. T. Staff, "How Reliable Is Cloud Computing?," 16 October 2018. [Online]. Available: <https://www.cloudhealthtech.com/blog/how-reliable-is-cloud-computing>. [Accessed 15 December 2021].
- [8] W. Cichy, "Cloud Computing Scalability: What Is It and Why It's Important?," 16 June 2021. [Online]. Available: <https://www.netguru.com/blog/cloud-computing-scalability>. [Accessed 16 December 2021].
- [9] D. Inc., "Docker overview," N/A N/A 2021. [Online]. Available: <https://docs.docker.com/get-started/overview/>. [Accessed 19 December 2021].
- [10] M. Clancy, "What's the Diff: VMs vs. Containers," 15 October 2021. [Online]. Available: <https://www.backblaze.com/blog/vm-vs-containers/>. [Accessed 19 December 2021].
- [11] P. Patel, "What exactly is Node.js?," 18 April 2018. [Online]. Available: <https://www.freecodecamp.org/news/what-exactly-is-node-js-ae36e97449f5/>. [Accessed 17 January 2022].

- [12] O. Foundation, "Express," N/A N/A 2017. [Online]. Available: <https://expressjs.com/>. [Accessed 17 January 2022].
- [13] I. Chocolatey Software, "Overview," N/A N/A 2022. [Online]. Available: <https://chocolatey.org/how-chocolatey-works>. [Accessed 17 January 2022].
- [14] B. Technologies, "Cloud Computing : A Comparative study between Amazon Web Services (AWS) and Microsoft Azure," 12 July 2019. [Online]. Available: <https://medium.com/@BangBitTech/cloud-computing-a-comparative-analysis-between-amazon-web-services-aws-and-microsoft-azure-ac3fba05d8b7>. [Accessed 1 November 2021].
- [15] C. Baird, "A Primer on Cloud Computing," 25 August 2019. [Online]. Available: https://medium.com/@colinbaird_51123/a-primer-on-cloud-computing-9a34e90303c8. [Accessed 12 December 2021].
- [16] J. Schwartz, "Does Cloud Computing Reduce IT Costs?," 27 February 2013. [Online]. Available: <http://xcluesiv.com/does-cloud-computing-reduce-it-costs/>. [Accessed 14 December 2021].
- [17] K. Zabor, "How to choose the best offshore cloud services provider," 27 July 2020. [Online]. Available: <https://www.n-ix.com/offshore-software-development-company-cloud-computing/>. [Accessed 14 December 2021].
- [18] E. (Cloud), "Cloud Scalability and Flexibility Advantages for Business," 30 March 2018. [Online]. Available: <https://solutiondots.com/blog/erp-cloud/cloud-scalability-flexibility-advantages-business/>. [Accessed 16 December 2021].

8. Bibliography

Bibliography

- [1] W. Chai, "cloud computing," N/A December 2020. [Online]. Available: <https://searchcloudcomputing.techtarget.com/definition/cloud-computing>. [Accessed 12 December 2021].
- [2] R. Peterson, "Advantages and Disadvantages Of Cloud Computing," 7 October 2021. [Online]. Available: <https://www.guru99.com/advantages-disadvantages-cloud-computing.html>. [Accessed 13 December 2021].
- [3] E. CLAY, "The Game Changing Cost Benefits of Cloud Computing," N/A N/A N/A. [Online]. Available: <https://www.thortech-solutions.com/cloud-computing-cost-benefits/>. [Accessed 14 December 2021].
- [4] I. Optimal Networks, "How Much Does Cloud Computing Cost?," 10 October 2013. [Online]. Available: <https://resource.optimalnetworks.com/blog/2013/10/10/how-much-does-cloud-computing-cost>. [Accessed 14 December 2021].
- [5] D. Data, "What are some examples of Cloud Services," N/A N/A 2020. [Online]. Available: <https://www.dimensiondata.com/en-gb/insights/blogs/what-are-some-examples-of-cloud-services>. [Accessed 14 December 2021].
- [6] T. Hou, "IaaS vs PaaS vs SaaS Enter the Ecommerce Vernacular: What You Need to Know, Examples & More," N/A N/A N/A. [Online]. Available: <https://www.bigcommerce.com/blog/saas-vs-paas-vs-iaas/#examples-of-saas-paas-and-iaas>. [Accessed 14 December 2021].
- [7] C. T. Staff, "How Reliable Is Cloud Computing?," 16 October 2018. [Online]. Available: <https://www.cloudhealthtech.com/blog/how-reliable-is-cloud-computing>. [Accessed 15 December 2021].
- [8] W. Cichy, "Cloud Computing Scalability: What Is It and Why It's Important?," 16 June 2021. [Online]. Available: <https://www.netguru.com/blog/cloud-computing-scalability>. [Accessed 16 December 2021].
- [9] D. Inc., "Docker overview," N/A N/A 2021. [Online]. Available: <https://docs.docker.com/get-started/overview/>. [Accessed 19 December 2021].
- [10] M. Clancy, "What's the Diff: VMs vs. Containers," 15 October 2021. [Online]. Available: <https://www.backblaze.com/blog/vm-vs-containers/>. [Accessed 19 December 2021].
- [11] P. Patel, "What exactly is Node.js?," 18 April 2018. [Online]. Available: <https://www.freecodecamp.org/news/what-exactly-is-node-js-ae36e97449f5/>. [Accessed 17 January 2022].

- [12] O. Foundation, "Express," N/A N/A 2017. [Online]. Available: <https://expressjs.com/>. [Accessed 17 January 2022].
- [13] I. Chocolatey Software, "Overview," N/A N/A 2022. [Online]. Available: <https://chocolatey.org/how-chocolatey-works>. [Accessed 17 January 2022].
- [14] B. Technologies, "Cloud Computing : A Comparative study between Amazon Web Services (AWS) and Microsoft Azure," 12 July 2019. [Online]. Available: <https://medium.com/@BangBitTech/cloud-computing-a-comparative-analysis-between-amazon-web-services-aws-and-microsoft-azure-ac3fba05d8b7>. [Accessed 1 November 2021].
- [15] C. Baird, "A Primer on Cloud Computing," 25 August 2019. [Online]. Available: https://medium.com/@colinbaird_51123/a-primer-on-cloud-computing-9a34e90303c8. [Accessed 12 December 2021].
- [16] J. Schwartz, "Does Cloud Computing Reduce IT Costs?," 27 February 2013. [Online]. Available: <http://xcluesiv.com/does-cloud-computing-reduce-it-costs/>. [Accessed 14 December 2021].
- [17] K. Zabor, "How to choose the best offshore cloud services provider," 27 July 2020. [Online]. Available: <https://www.n-ix.com/offshore-software-development-company-cloud-computing/>. [Accessed 14 December 2021].
- [18] E. (Cloud), "Cloud Scalability and Flexibility Advantages for Business," 30 March 2018. [Online]. Available: <https://solutiondots.com/blog/erp-cloud/cloud-scalability-flexibility-advantages-business/>. [Accessed 16 December 2021].

Zaeem Assignment 2 - Mike (FINAL)

GRADEMARK REPORT

FINAL GRADE

77 / 100

GENERAL COMMENTS

Instructor

Cloud Computing (40): 36

Virtual & Container (15): 11

Eval Dev (25): 20

eComm (20): 10

Feedback:

=====

Generally a nice discussion of cloud computing, a little more evaluation with a more concrete example could have been provided.

Interesting discussion of VMs and containers without really stating what the benefit is. There is a table but you don't discuss it.

Good discussion of the process but I wanted more evaluation.

eCommerce application but written entirely in client side javascript.

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15

PAGE 16

PAGE 17

PAGE 18

PAGE 19

PAGE 20

PAGE 21

PAGE 22

PAGE 23

PAGE 24

PAGE 25