

The Theoretics of Cloud-Based Web Development

by Finley Shaun Clarke

Submission date: 14-Jan-2022 07:22PM (UTC+0000)

Submission ID: 169053068

File name: 32984_Finley_Shaun_Clarke_The_Theoretics_of_Cloud-Based_Web_Development_382342_1404037082.docx (37.48K)

Word count: 1195

Character count: 6282

Cloud-Based Web Services

The Theoretics of Cloud-Based Web Development

A document on the terms of Cloud Computing, the benefits and drawbacks of applications being deployed to it, cost-related implications, etc. Also detailed is the use of the tool Docker and the development process of producing node.js applications.

Finley Shaun Michael Clarke (1910794)
Applied Computing YR3 | 2022

Table of Contents

<i>What is "Cloud Computing" and what does it provide?</i>	<i>2</i>
<i>The Fundamentals of Docker</i>	<i>3</i>
<i>The Development Process of node.js Applications Using Docker</i>	<i>4</i>
<i>Referential Information</i>	<i>5</i>

What is “Cloud Computing”, what does it provide, and what are its drawbacks and benefits?

In the most basic of descriptions, Cloud Computing is a generalised term that involves hosting services over the internet. These types of services include Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Online Clouds can be either private or public. Obviously, public clouds are available to anyone with an active internet connection whereas private clouds are open to only a select few, normally those apart of a company network or data centre. Despite this, Cloud Computing’s main objective is mainly always to provide easy to access computing resources and IT services over the web as opposed to using them locally on one’s machine directly.ⁱ

Cloud computing comes with it several drawbacks and benefits that users of it would be wise to consider before fully committing to such an infrastructure. One such benefit would be the cost savings. This is due to the fact that cloud computing does not require any major physical hardware to be purchased and there is not a need for any trained staff to help maintain the hardware as a result too. Cloud computing is also known for its high speed, requiring fewer clicks to deploy services. This increase in speed allows resources to be sent to one’s system far quicker than would be normally possible. Cloud computing can also include storage options for keeping personal files and folders stored virtually which is fantastic for the process of backing up files and documents. Another benefit is its mobility and reliability. Most users can expect to be updated on any changes to their services on a frequent basis and services based on the cloud are accessible through various means, from desktops and laptops, down to people’s smartphones and tablets.ⁱⁱ

Despite its various upsides, cloud computing does possess some drawbacks that should be discussed. Chief among them: possible downtime. If a user’s internet access is compromised somehow this will render all cloud-based services completely useless as it requires the use of the internet to access data and information that user requires from the server in which it is stored. Another disadvantage is the potential security risks and it’s mostly the user’s fault in this case. Not taking the proper precautions like maintaining strong passwords, changing them on a fairly frequent basis, and maybe encrypting data too in more extreme cases can leave one’s data at risk and if malicious parties are able to access a user’s cloud services that can cause untold amounts of costly damage. Another disadvantage is the longevity of any given cloud-based service. Nothing lasts forever and no cloud-based solution is safe from being shut down. This could be for several reasons: lack of use or interest from consumers, the service not being financially viable or even worse the company supplying the service folds and has to close its doors for good. Anyone still using the cloud service when this happens is going to be left in quite the bind as they scramble to find another suitable service that they can transfer to.ⁱⁱⁱ

The Fundamentals of Docker

Docker is a set of **PaaS** (Product as a Service) services that first released in early 2013. Its main purpose is to allow developers to build, test, and then deploy applications at a speedy rate. Docker includes everything a piece of software needs to run into objects called containers, this includes libraries, system tools, code, and also runtime. While using Docker, it is possible to quickly deploy and scale applications and be safe in the knowledge that the code is going to run without any issues.^{iv}

With this feature set, Docker and its container-based setup understandably and rightfully gets compared to virtual machines and virtualisation in general. Despite this, Docker containers do possess some notable differences that are worth discussing and weighing up to see if it's worthy of adoption over standard virtual machines. The first notable difference between Docker and virtual machines is the operating system support and how that support differs between them. Virtual machines run its guest operating systems over the host's main OS. This is known to eat up more resources but Docker in comparison is different as it runs all of its containers under the host OS which can make it less resource hungry as a result. This can result in things like faster boot times for the applications or systems being run under Docker through its containers and also leaves plenty of overheard resource-wise compared to using virtual machines which need higher capacities of memory and processing power. Despite this, security is a concern with Docker. Since all of the containers run under Docker are run directly from the host OS, they share the host kernel which makes them more vulnerable to security flaws and malicious attacks. Virtual machines in comparison are completely isolated from the host kernel and thus do not have these same vulnerabilities that Docker containers do.^v What Docker does have over traditional virtual machines is substantial performance improvement. As containers are stored locally and not isolated, users can expect native performance as a result. The same cannot be said for virtual machines as they take up more resources (as stated above) and are completely isolated from the host OS. The start-up times of VMs are also affected by this too.^{vi}

The Development Process of node.js Applications Using Docker

Despite their differences and use-cases, the process of using Docker isn't too far removed from the process of interacting with virtual machines and their feature sets. A lot of the knowhow and other relevant knowledge of using VMs and their quirks can be transferred over while using Docker to design applications and cloud-based services. Most Docker applications start with the image of the application itself which a developer can run in one of Docker's containers. This image contains code, configuration files, runtime, libraries, and environmental variables. The image is a template of sorts that makes sure that the environment that the application is built in contains only what the application needs and requires. This also lends into Docker's portable nature as applications developed using it don't require any prerequisites to function correctly. Thanks to Docker, all a developer really needs is Docker installed on their device wherever they decide to develop and not much else.

The development of applications and services has been made a much easier going experience thanks to this design principle introduced by Docker. The time-consuming nature of application development has been mostly streamlined by the on-the-go nature of Docker which can allow for simultaneous development, amendment and deployment of applications and services.

Referential Information

ⁱ Chai, W. and Bigelow, S., n.d. *Cloud Computing*. [online] techtarget.com. Available at: <https://searchcloudcomputing.techtarget.com/definition/cloud-computing> [Accessed 13 January 2022].

ⁱⁱ Peterson, R., 2021. *Advantages and Disadvantages of Cloud Computing*. [online] guru99.com. Available at: <https://www.guru99.com/advantages-disadvantages-cloud-computing.html> [Accessed 13 January 2022].

ⁱⁱⁱ theamegroup.com. n.d. *Cloud Computing Advantages and Disadvantages*. [online] Available at: <https://www.theamegroup.com/cloud-computing-advantages-disadvantages> [Accessed 14 January 2022].

^{iv} <https://aws.amazon.com/docker>. n.d. *What is Docker? | AWS*. [online] Available at: <https://aws.amazon.com/docker> [Accessed 14 January 2022].

^v Geekflare. 2019. *Docker vs Virtual Machine - Understanding the Differences*. [online] Available at: <https://geekflare.com/docker-vs-virtual-machine> [Accessed 14 January 2022].

^{vi} Clancy, M., 2021. *Docker Containers vs. VMs*. [online] Backblaze Available at: <https://www.backblaze.com/blog/vm-vs-containers> [Accessed 14 January 2022].

The Theoretics of Cloud-Based Web Development

GRADEMARK REPORT

FINAL GRADE

43 / 100

GENERAL COMMENTS

Instructor

Cloud Computing (40): 21

Virtual & Container (15): 12

Eval Dev (25): 10

eComm (20): 0

Feedback:

=====

More consideration was required for factors such as reliability, costing and scaling.

I wanted a little more technical discussion of VMs and containers to bring out the fundamental differences.

I wanted more discussion of the node.js development process with examples.

No code.

PAGE 1

PAGE 2

PAGE 3

PAGE 4
