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TOPIC:

**STUDY ABOUT DOCKER CLOUD CONTAINER AND PROPOSTAL THE
IMPLEMENTATION FOR THE FICA COUD PLATAFORM**

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STUDY ABOUT DOCKER CLOUD CONTAINER AND PROPOSTAL THE IMPLEMENTATION FOR THE FICA COUD PLATAFORM

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Keywords. - **Container Cloud, Cloud Computing, Private Servers, Virtualization with Docker, Docker, Bitnami.**

Summary. - Docker is an open source project that allows you to create containers that are called lightweight virtual machines that will be less demanding in terms of hardware and software resources, one of the characteristics of these containers is to provide portability, Lightness and self-sufficiency to applications that deployed on the containers cloud.

The principal characteristic of Docker is to offer the option to create virtual infrastructures, this depends that application that is go away deployed. Bitnami is a tool that provides Docker with manageable software installations, Configurable by offering docker support, So docker and Bitnami work together to establish better development environments.

I. INTRODUCTION

This technological tool tends to be extended because the organizations have problems of isolation of applications in the servers, this causes that the server only contains installations of software not administrable and therefore does not allow the optimization and fluency in a server.

In addition to creating a virtual infrastructure on a real server is likely that if you want to add a different infrastructure to the one that is installed cause problems of communication between facilities and do not work well.

This problem is notorious in many organizations that are dedicated to building normal virtual infrastructures, But the problem is that they use different servers increasing their costs on computers. (RedesZone, 2016)

The solution to this problem that organizations

tend to have is the use of the docker tool because it gives the user the ability to manage a diversity of virtual infrastructures and also to optimize the flow of hosted applications.



Figure 1. virtual infrastructures with Docker.

Docker does not contain a complete system, but only those libraries, files and configurations required to display the features it contains. Likewise, Docker handles the container and the applications it contains. (L. T. Semmens, 2016)

Features and functionality of Docker.

- Self-management of containers.
- Reliability.
- Free applications of the dependencies installed in the host system.
- Ability to deploy multiple containers.

- Very light containers that facilitate storage, transport and deployment.
- Ability to deploy a wide range of applications.
- Multi-System Compatibility means we can deploy our containers on multiple platforms.
- Ability to share containers through the Docker Hub repository. (Docker, 2016)

Requirements for Docker installation.

Docker is a multiplatform tool that adapts to various operating systems as Linux, Windows and MAC Can also be installed under any Cloud platform as OpenStack, Open Nebula, Eucalyptus among others. (Docker, 2016)

Table 1 *Minimum installation requirements.*

Windows	Linux	Mac OS
<ul style="list-style-type: none"> • To install Docker, you need to have Windows 7 x64 on. • Also go to the official Docker website and download the necessary components for your installation. 	<ul style="list-style-type: none"> • To install Docker on Linux has taken three commonly used S.O such as Centos, Ubuntu, Fedora. • In Centos you must have version 7x64 onwards. • In Ubuntu you must have the version 14.04 x64 on. • In Fedora you must have version 22 x64 on. 	<ul style="list-style-type: none"> • To install Docker, you must have OS X 10.8 "Mountain Lion". • Also go to the official Docker website and download necessary components for installation.
Minimum hardware requirements		
<ul style="list-style-type: none"> • RAM Memory de 1GB. • Disk space of 20 GB. 		

Docker also presents custom instructions for the

tool in such a way that its structure is understandable and adapts quickly to requirements that have the developer or the administrator who are building virtual infrastructures.

This is why the commands most commonly used by the tool administrators are shown, allowing the tool to be manipulated according to the necessary requirements. (Docker, 2016)

Table 2 *Docker Basic Instructions.*

Basic Docker Command	
<code>docker version</code>	Displays the installed docker version.
<code>docker info</code>	Displays docker features.
<code>docker images</code>	Displays installed docker images..
<code>docker ps</code>	Shows running containers.
<code>docker pull [image]:[Version]</code>	Make a request to download images.
<code>docker run [image]:[Version]</code>	Executes a specific installed image.

Advantages and disadvantages of the Docker tool

Advantages:

- Ability to isolate virtual infrastructures with their respective hosted applications.
- Shows a great advantage in the installation sizes and the tool itself presenting lightness and self-sufficiency in a server.

- Bitnami deploys a variety of docker compatible installations.
- Easy to execute and remember instructions.
- Quick updates and easy access.

disadvantages :

This tool presents dependence of connections to the network of either Internet or Intranet in case of being a private server being a disadvantage of the Docker tool.

II. MATERIALS AND METHODS



Figure 2. *Running the Docker tool.*

After mentioning the characteristics of the tool a practical case was also made to demonstrate that the tool works and that it also provides the advantages mentioned above.

It should also be mentioned that along with Docker Bitnami was used as a complement to the necessary installations, With the objective of creating a virtual infrastructure, this allowed the use of Docker to be more compact and avoided the development of a dockerfile that contains the instructions to install the tools required by the infrastructure to be developed.

The virtual infrastructure to be developed is structured in a way that supports the hosting of a JSF application with a database PostgreSQL.

For this it is necessary to create or to look for the facilities that allow the lodging mentioned, in this case was established as a web server to Tomcat in its version 8.0.36 and PostgreSQL its version 9.6.

Bitnami tool

Bitnami contains a diverse library of installations and libraries collapsible with Docker so it was carried out the instruction of Git pull to obtain these images Docker from Bitnami.

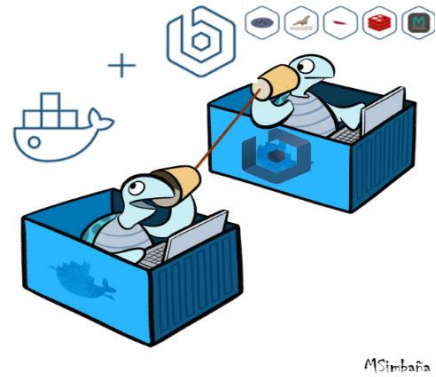


Figure 3.Link Docker and Bitnami.

Table 3 Size of the Docker tool and components to be used.

Name of the image Virtual Docker	File size	Version
Tomcat	426.8 MB	8.0.36
Postgres	259.8 MB	9.6
Docker	2.849 MB	1.11.0

It is worth mentioning that this virtual testing infrastructure was installed using the Linux version of Ubuntu 14.04(x64).



Figure 4.Docker Installations on Ubuntu.

After you have structured all the server building materials and virtual infrastructure you can get the images on a local docker server using Git instructions to get them.

```
docker pull bitnami/tomcat:latest
docker pull bitnami/postgresql:latest
```

Figure 5. Obtaining Bitnami images for Docker.

After obtaining the images we proceed to execute them with certain parameters of credentials and ports for which the executed service will be provided.

```
docker run -d -p 9090:5432 --name db1 -e POSTGRESQL_USERNAME=masimbaniaa
-e POSTGRESQL_PASSWORD=1003862792 -e POSTGRESQL_DATABASE=juegos_db
bitnami/postgresql:latest
```

Figure 6. Instruction to execute the PostgreSQL image.

```
docker run -d -p 8090:8080 --name app1 -e TOMCAT_USERNAME=admin
-e TOMCAT_PASSWORD=admin --link db1 bitnami/tomcat:latest
```

Figure 7. Instruction to run Tomcat image.

At the end of the instructions, you will find Tomcat and postgres running in such a way that they communicate with each other, allowing you to host applications.

III. ANALYSIS OF RESULTS

This tool is very light and easy to install since only three instructions are enough to achieve this, there are also docker images inside that contain separate installations with which the Docker containers can be generated.

Bitnami is a tool that provided the docker images in an easy and safe way, in addition this tool provides total support to all the docker images that were obtained through Git Hub, that is why the tool Bitnami in a fundamental element for the development of virtual infrastructures.

Not only was the installation of the Docker tool but also its functionality verified with the objective of proposing the use of this tool in the FICA platform, additionally after developing the test application to stay in a virtual infrastructure, it was determined that this tool is compatible with several Frameworks and databases which makes it possible to build a data center using this technology.

The development of the application allowed to prove that this technology works correctly and that can be used in large entities helping to manage diverse applications improving its performance.

In order to determine the above, an execution test was performed using the JMeter tool Which made it possible to compare the execution times between the docker facilities and the traditional installations and it was determined, That the best option to use is Docker according to the results obtained.

Table 4 *Tool execution comparison.*

Tool	Docker runtime	Traditional Runtime
Tomcat + application	1 minute :40 seconds	4 minute :30 seconds
PostgresSQL + BDD	1 minute:10 seconds	2 minute:50 seconds

IV. CONCLUSIONS

- Docker is a technological trend that many entities could adopt in order to improve performance in their applications and decrease hardware and software constants.
- For this study the implementation of docker did not present limitations in its free software in terms of its functionality, in this way allowed to fully comply with the stated objectives.
- Due to the features that docker presents, it was possible to create a virtual infrastructure

that later allowed the hosting of web applications.

- Using this technology is simple and allows applications to be published quickly because docker uses lightweight virtual machines on Linux, and uses libraries and configuration files only if they are strictly necessary.
- The test application was able to be done without major problem since Bitnami was indeed key to the development of the virtual infrastructure that required the test application developed in JSF.
- This tool is extremely light to install and its operation is really optimal as it allows to perform instances of the images docker to create containers so we can host several applications with its own virtual infrastructure.

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Research Interests. Software Engineering, applications development, Cloud platforms, Cloud Containers, ISO standards, CRM Tools.