



TOWARDS EFFICIENT VIRTUAL APPLIANCE CREATION AND OPTIMIZATION IN STABLE INFRASTRUCTURE AS A SERVICE IN CLOUD

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ABSTRACT

The concept of virtualization is used because it combines or divides the computing resources. The main issue in the traditional system is that, which leads to the inefficiency of data delivery in the infrastructure as a service (IaaS), and because of inefficiency of the data, the delivery time is also increased, to overcome these problems in the existing system the concept of virtual appliance is introduced whereas, virtual appliance is defined as the software image of the predefined application. The virtual appliance is created to run on the virtualized platform and the created virtual appliance is deployed in the Infrastructure as a service (IaaS) for calculating the delivery time and the concept of optimization is used for reducing the size of the virtual appliance for efficient data delivery.

Keywords: Cloud computing, Virtualization, Virtual Appliance, Infrastructure as a service

1. INTRODUCTION

“Cloud” computing a relatively recent term, defines the paths ahead in computer science world. Being built on decades of research it utilizes all recent achievements in



virtualization, distributed computing, utility computing, and networking. It implies a service oriented architecture through offering software and platforms as services, reduced information technology overhead for the end-user, great flexibility, reduced total cost of ownership, on demand services and many other things.

The Cloud is a metaphor for the Internet, based on how it is depicted in computer network diagrams, and is an abstraction for the complex infrastructure it conceals. Cloud Computing becomes widespread particularly as these systems are “always-on always-available. “The Cloud is a Virtualization of resources that maintains and manages itself, delivering massively scalable enterprise IT as a Service across Internet.

Essential characteristics:

- On-demand self-service,
- Broad network access,
- Resource pooling,
- Rapid elasticity and measured service.

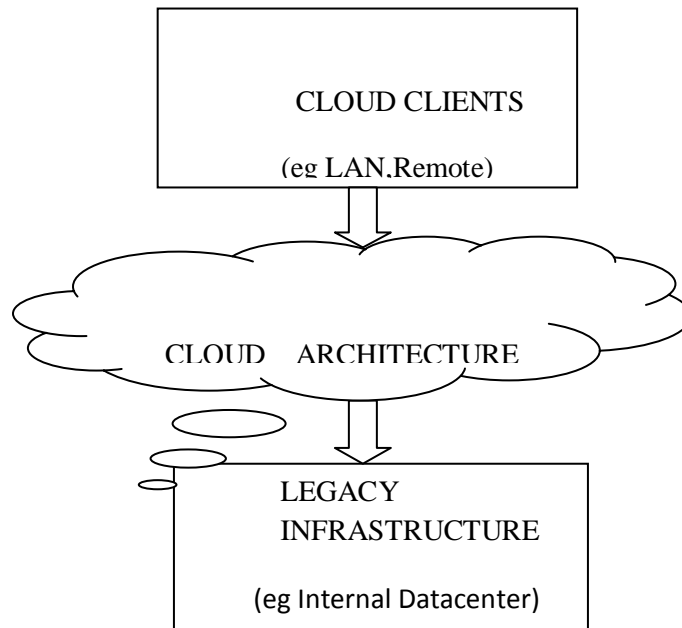


Fig 1.1 Basic cloud Architecture



2. SERVICES IN CLOUD COMPUTING

Three models based on the type of service offered to the user.

- Infrastructure as a Service (IAAS).
- Platform as a Service (PAAS).
- Software as a Service (SAAS).

INFRASTRUCTURE AS A SERVICE

Infrastructure includes Server, Storage, Networking, Operating System and basic Set of Software. The provider outsources an Infrastructure. User remotely accesses the Infrastructure.

PLATFORM AS A SERVICE

Delivery of Computing Platform over the Web. Platform = Place where software's can be developed and tested. Infrastructure (Hardware + OS) is hidden from the User.

SOFTWARE AS A SERVICE

SAAS is an Online application . App running on Cloud Infrastructure. SAAS app's total life cycle is taken care by the Provider.

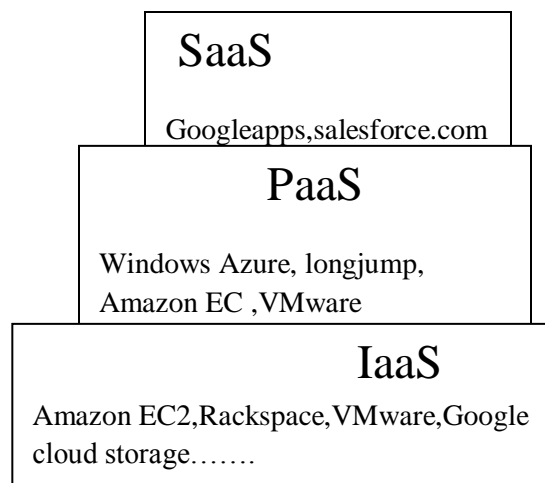


Fig 2 Services in Cloud Computing



3. VIRTUALIZATION

Virtualization is the creation of a virtual (rather than actual) version of something, such as an operating system, a server, a storage device or network resources. Virtualization is a technology that combines or divides computing resources to present one or many operating environments. It uses methodologies like hardware and software partitioning or aggregation, partial or complete machine simulation, emulation, time-sharing etc .Offers a wide variety of tangible benefits to those wanting to consolidate their computing resources and at the same time save money. E.g. VMware, Virtual PC, Virtual Box etc.

4. VIRTUAL APPLIANCE

A **virtual appliance** is a virtual machine image designed to run on a virtualization platform (e.g., VirtualBox, Xen, VMware Workstation, Parallels Workstation). Virtual appliances are a subset of the broader class of software appliances. Installation of a software appliance on a virtual machine creates a virtual appliance. Like software appliances, virtual appliances are intended to eliminate the installation, configuration and maintenance costs associated with running complex stacks of software.

Because virtual appliances are preconfigured, they help organizations reduce the time and expense associated with application deployment including the patching and ongoing management of the software.

BENEFITS OF BUILDING VIRTUAL APPLIANCES

Delivering software as a virtual appliance has numerous business and technical benefits that can result in higher conversion rates, shorter sales cycles and increased renewals.



Simplifying Development

In the virtual-appliance model, you can enable greater usability out of the box by optimizing the application for one of several VMware supported OSs. Can make the OS thinner and more secure by removing unnecessary components.

HYPERVERSOR USED IN CLOUD ENVIRONMENT

KERNEL –BASED VIRTUAL MACHINE

KVM is a full virtualization solution for x86 processors supporting hardware virtualization (Intel VT or AMD-V). It consists of two main components VM Guests (virtual machines), virtual storage and networks can be managed with libvirt-based and QEMU tools. libvirt is a library that provides an API to manage VM Guests based on different virtualization solutions, among them KVM and Xen. It offers a graphical user interface as well as a command line program. The QEMU tools are KVM/QEMU specific and are only available for the command line.

5. PROJECT DESCRIPTION

5.1 EXISTING SYSTEM

In existing system the concept of virtual machine, and virtualization integrator (VSI) technique forms the cluster of virtual machine based on the size of the bytes and the clustered virtual machine is deployed virtual machine is deployed in the cloud and the deployment will modify the data in the cloud center, so that the drawback of this technique is that virtual machine reduces the efficiency of the cloud data center. And therefore it will underlay some changes in the data center.

5.2 PROPOSED SYSTEM

In the proposed system had explained the process of how the appliance is created and the conversion of the application into an appliance. And deployment time is calculated for verifying the efficiency of the data received. The proposed virtual appliance were measured with



several services offered by the various online appliance repositories such as SUSE.NOVELL, online appliance repository. And also the concept of optimization is introduced for still reducing the size of the virtual appliance results reveal that the introduced techniques significantly decrease the deployment time of virtual appliance based deployment systems.

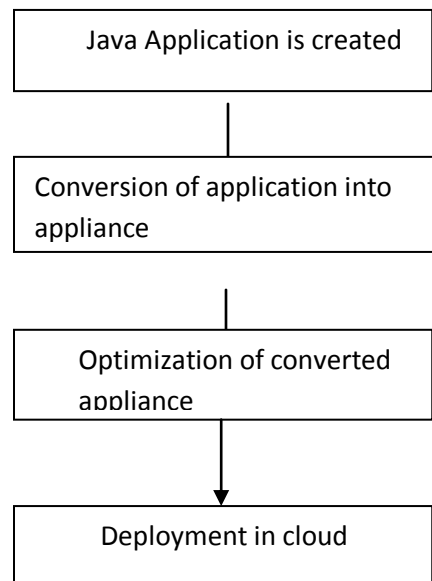


Fig 5.2 System flow Diagram

5.3 MODULES

5.3.1 CREATION OF JAVA APPLICATION

The java application is created for firewall, whereas firewall is defined as the process that it allows only the authorized person for accessing the data. The main concept used in this firewall is when the user access the particular application their entries will be stored in the database and the that list is called as batch list .And when the entry of the user reaches the particular count that IP address will be blocked and removed from the database.



The user is said to unauthorized when the same user accessing the resource frequently. The user will be blocked when the entries of the user is increased which will be showed in the batch list and not allowed for accessing the web application. And some of the process involved in the firewall application is tracking the IP ,creation of hit list, blocked IP list.

i)Tracking Of IP(Internet Protocol)

When the user enters the details in the web application using the user's name, password When the user enters their data the IP(internet protocol) will be tracked. The tracked IP will be stored in the list called batch list.(list of entries of the user).This batch list will verify the IP address when the user is entering into to the application .

ii)Blocked IP And Removal

The IP address and the details of the user are stored in the batch list. If the user is repeatedly accessing then the user access will be denied after some entries. And the IP will be blocked according to the batch list has been created by the database. And the blocked IP will be stored in the hit list.

5.3.2 CONVERSION OF APPLICATION INTO APPLIANCE

The application is converted in to an appliance ,whereas appliance is defined as the predefined software which can be modified according to the end user while it is deployed in the cloud. The main scope of converting the application into appliance is to reduce the delivery time and increasing the efficiency. The application is converted into appliance using various techniques and methods which is given below.

OPEN VIRTUALIZATION FORMAT

The appliance can be converted into appliance using various method. The Open Virtualization Format (OVF) is a packaging standard from Distributed Management Task Force, Inc., designed to facilitate portability and deployment of virtual appliances. In Virtual Machine Manager (VMM), you can use an OVF package to create a virtual machine. In



System Center 2012 – Virtual Machine Manager (VMM), you can use the *OVF* Import/Export tool to perform these tasks.

When you work with OVF packages, the name of the virtual hard disk that is specified in the .ovf file must match the actual path and name of the virtual hard disk. If you convert a file from, for example, .vmdk to .vhd, or if you rename the virtual hard disk file, you must also edit the .ovf file to update the name.

Note the following:

1. If you plan to convert a virtual hard disk from one format to another, such as from .vhd to .vmdk or from .vmdk to .vhd, we recommend that you use the fixed size disk format. A fixed size disk is also known as a "thick disk."
2. The virtual hard disk name appears more than once in the .ovf file. Ensure that you update all instances of the name.
3. The current version of the OVF tool supports a single virtual machine. The import and export of VMM service templates containing more than one virtual machine or with deployment customizations are not currently supported.

Creating Virtual Machines(appliance from OVF Packages)

As of Virtual Machine Manager in System Center 2012 Service Pack 1 (SP1), the OVF tool is not supported. Instead, to import an OVF package to a Hyper-V host, you can use the Microsoft Virtual Machine Converter (MVMC), which converts the .vmdk file to a .vhd file. By using MVMC, the metadata in the OVF package is lost, so you must capture information, such as the virtual machine hardware configuration, before you create a new virtual machine from the converted virtual hard disk.

To convert an OVF package into a virtual machine

1. Open the descriptor in the OVF package and note the virtual machine metadata, such as the virtual machine hardware configuration.
2. Use Microsoft Virtual Machine Converter (MVMC) to convert the .vmdk file to a .vhd file.



3. Use VMM to create a virtual machine from the virtual hard disk; use the original metadata that you noted from the OVF package, as applicable.

Using the OVF Tool to Import and Export Virtual Machines

The OVF Import/Export tool consists of Windows Power Shell cmdlets that enable users of System Center 2012 – Virtual Machine Manager (VMM) to import and export virtual machines that are packaged in the OVF format. You can use the OVF tool to import a virtual machine from other virtualization platforms (currently, these are VMware vCenter and Citrix XenServer) or to export a virtual machine for use on another platform.

The OVF format uses an XML file with the extension .ovf together with one or more virtual disks. The OVF Import/Export tool does not convert virtual hard disk file formats. You might require third-party tools to convert a virtual hard disk format.

Importing a virtual machine

Use the Import-SCVirtualMachine to create a new virtual machine for VMM by using the .ovf file and virtual hard disks in a specified location. The cmdlet creates a new virtual machine with the referenced virtual hard disk and stores it in a VMM library share. Self-service users must specify a writable share for the virtual machine. Note the following:

1. Before you import an OVF package to VMM with the OVF Import/Export tool, verify that the virtual hard disk format is .vhd or .vhdx, or convert it to be .vhd or .vhdx. Ensure that you use the fixed size disk format.
2. If the original virtual machine is joined to a logical network, the import process tries to join the imported virtual machine to a logical network with the same name, if such a network exists. Otherwise, the virtual machine is not joined to a network.
3. The java application is imported in ovf (open virtualization tool) for supporting the .ovf file in virtualized environment.
4. And the created appliance will be deployed in the cloud environment for calculating the delivery time.



These are the explanation about how the application is converted into an appliance/virtual machine which supports the virtualized environment.

At final the web application of java file is converted into an image file which is considered to be a virtual appliance. And the converted appliance is deployed in the cloud system to calculate the deployment time for checking its efficiency of the data is increased in the infrastructure as a service system (IaaS).

5.3.2 VIRTUAL APPLIANCE OPTIMIZATION

The appliance size should be optimized for efficient delivery the time calculation and for increasing the efficiency of data in infrastructure as a service system. Various methods and techniques are used for optimizing the virtual appliance. The appliance can be optimized under various method. This method will identify the parts of the packages that has to be eliminated. The steps that is in methods are,

- Identify the unused packages to be eliminated
- Removal of the identified parts
- Validation and verification

Identifying the unused packages to be eliminated :

The main task of this method is to identify the parts to be removed. Items are the smallest size handled by the identify and removal algorithms. The second subtask of the identify method is weighting the packages in the virtual appliance (image file).

Removal of the identified parts :

The removal action sorts the items according to their weight and it removes the item with the highest weight from the virtual appliance. For the removal operation, the optimization facility has to understand the contents of the appliance to be able to remove the identified item. This is achieved with the removal technique that operates on the contents of the virtual appliance (image fie).



Validation and Verification :

After removal, validation instantiates the reduced appliance in a virtual machine (vm).The removed content of the appliance, is tested for validation(it is loaded in the virtual machine)if the image is not loaded the removal process continues. And the process of validation is continued until the image file to be loaded.

And this method is validated and verified until the virtual appliance is deployed in the cloud and the delivery time is calculated. The delivery time of the optimized virtual appliance is compared with virtual appliance which is not optimized. If the delivery time is decreased then the virtual appliance is validated, if not again the optimization process is continued. Hence the efficiency of the data is increased.

6. RESULTS

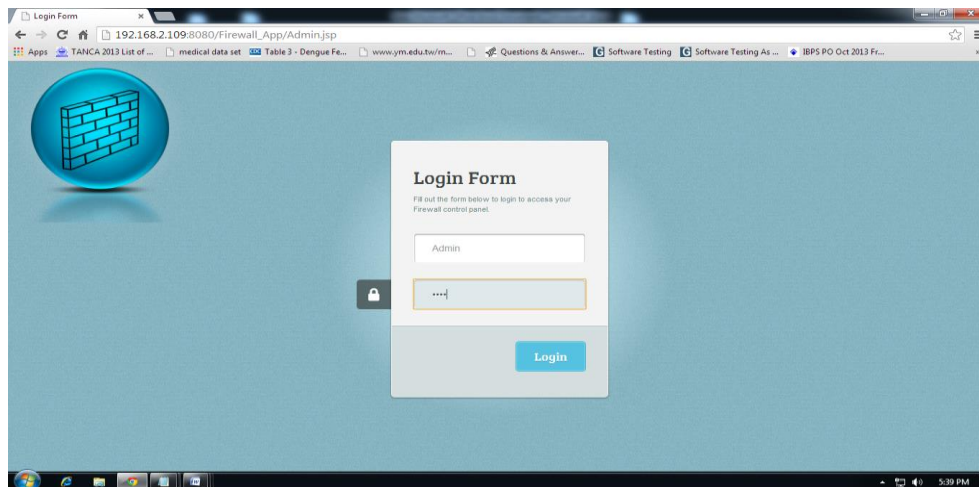


Fig 6.1 Admin login page



The screenshot shows a web browser window titled "IP Hits" with the URL "192.168.2.109:8080/Firewall_App/ShowIPHits.jsp". The page displays a table with the following data:

S.No	IP Number	Hit Count	Hit Date&Time
1	127.0.0.1	5	03-12-2013 17:19:04
2	192.168.2.104	5	03-12-2013 17:34:18

Fig 6.2 The IP address are stored in the hit list

The screenshot shows a web browser window titled "IP Hits" with the URL "192.168.2.109:8080/Firewall_App/ShowBlockedIP.jsp". The page displays a table with the following data:

S.No	IP Number	Hit Date&Time
1	127.0.0.1	03-12-2013 17:20:08
2	192.168.2.104	03-12-2013 17:37:39

Fig 6.3 IP addresses are blocked

A screenshot of a Windows command prompt window. The title bar reads "C:\Windows\system32\cmd.exe". The window content shows the following text:

```
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\acer>java -jar jrocketve-imagetool.jar -a config.xml output_dir [hyperv
isor] new machine is created
```

Fig 6.4 Application is converted into appliance

7. CONCLUSION

Therefore, in highly dynamic service environments appliance based service deployment systems are only usable if the deployment time of the various appliances can be reduced. The virtual appliance(image file) this contribution not only reduces the deployment time by optimizing the size of the virtual appliances but it also provides efficient delivery of the data content in cloud for reducing the delivery time and increasing the efficiency of the data in infrastructure as a service(IaaS) system.

8. FUTURE ENHANCEMENT

The future enhancement is to combine the virtual appliance package with online repositories. And deploying it in the cloud and calculating the delivery time in cloud and using various algorithms the optimization is of appliance is done. And by combining the manually created virtual appliance with automatic virtual appliance created by online repositories.



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