

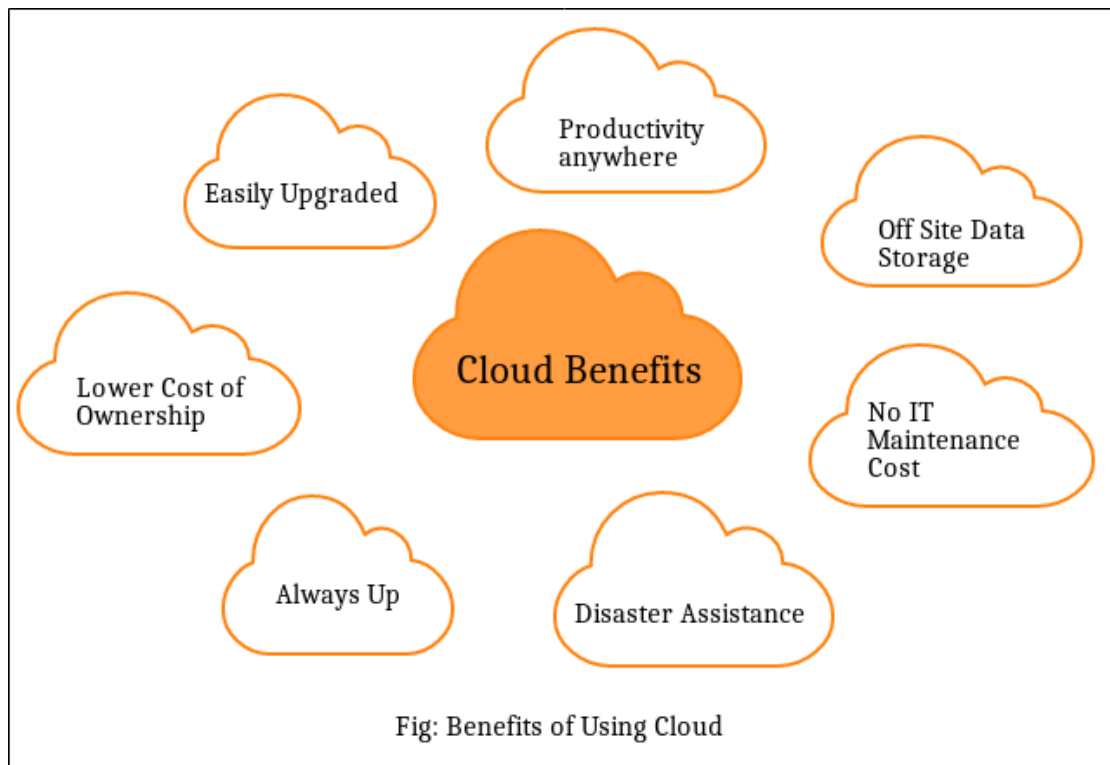
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Chapter 1 Introduction

Cloud computing is the delivery of computing services-servers, storage, databases, networking, software, analytics and moreover the Internet (the cloud). Companies offering these computing services are called cloud providers and typically charge for cloud computing services based on usage, similar to how you are billed for water or electricity at home.

You are probably using cloud computing right now, even if you dont realise it. If you use an online service to send email, edit documents, watch movies or TV, listen to music, play games or store pictures and other files, it is likely that cloud computing is making it all possible behind the scenes. The first cloud computing services are barely a decade old, but already a variety of organisationsfrom tiny startups to global corporations, government agencies to non-profitsare embracing the technology for all sorts of reasons. Here are a few of the things you can do with the cloud:



- Create new apps and services
- Store, back up and recover data
- Host websites and blogs
- Stream audio and video
- Deliver software on demand

- Analyse data for patterns and make predictions

Types of cloud services: IaaS, PaaS, SaaS Most cloud computing services fall into three broad categories: infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS). These are sometimes called the cloud computing stack, because they build on top of one another. Knowing what they are and how they are different makes it easier to accomplish your business goals.

Infrastructure-as-a-service (IaaS)

The most basic category of cloud computing services. With IaaS, you rent IT infrastructure servers and virtual machines (VMs), storage, networks, operating systems from a cloud provider on a pay-as-you-go basis.

The benefits of IaaS

- No need to invest in your own hardware
- Infrastructure scales on demand to support dynamic workloads
- Flexible, innovative services available on demand

Platform as a service (PaaS)

Platform-as-a-service (PaaS) refers to cloud computing services that supply an on-demand environment for developing, testing, delivering and managing software applications. PaaS is designed to make it easier for developers to quickly create web or mobile apps, without worrying about setting up or managing the underlying infrastructure of servers, storage, network and databases needed for development

. The benefits of PaaS

- Develop applications and get to market faster
- Deploy new web applications to the cloud in minutes
- Reduce complexity with middleware as a service

Software as a service (SaaS)

Software-as-a-service (SaaS) is a method for delivering software applications over the Internet, on demand and typically on a subscription basis. With SaaS, cloud providers host and manage the software application and underlying infrastructure and handle any maintenance, like software upgrades and security patching. Users connect to the application over the Internet, usually with a web browser on their phone, tablet or PC.

The benefits of SaaS

- You can sign up and rapidly start using innovative business apps
- Apps and data are accessible from any connected computer
- No data is lost if your computer breaks, as data is in the cloud
- The service is able to dynamically scale to usage needs

Red Hat Satellite

Provisioning

Provision on bare metal, virtualized infrastructure, public or private clouds all from 1 centralized console and with 1 standardized process.

Configuration

Configure your Red Hat systems in a more agile and efficient way. Analyze and automatically remediate configuration drift and control, and enforce the desired host end state, all from 1 convenient console.

Software management

Use a systematic process to apply content including patches to deployed systems in all stages, from development to production. The result is better consistency and availability of systems, letting IT more quickly respond to business needs and vulnerabilities.

Subscription management

Report and map your Red Hat-purchased products to registered systems for end-to-end visibility into subscription usage details.

Chapter 2 Problem Statement

”MiniSat - A web based portal to provision Vm. Minisat offers a powerful set of system management tools, from process automation to security compliance and more. Here’s how to get started.”

As your organization grows, so does your workload and the IT resources required to manage it. There is no ”one-size-fits-all” system management solution, but a centralized, open source tool such as miniSat can help you manage your company’s IT assets by provisioning, maintaining, and updating hosts throughout the complete lifecycle.

MiniSat becomes even more powerful when integrated with other open source projects and plugins, and I will discuss these in more detail below. To get started, however, let’s consider key functions of an effective system management tool.

MiniSat and essential system management areas An effective systems management tool should address all of these key areas. Host provisioning is for deploying instances or virtual machines on bare-metal, on-premises, or a cloud provider’s data center.

Content management refers to publishing, promoting, and managing various versions of repositories and packages in the CDN and systems across the life cycle (i.e., development, testing, QA, and production). Patch/errata management includes bug fixes and advisory or enhancement packages. An effective systems management tool should identify applicable errata regularly and patch registered systems promptly.

Health monitoring and reporting enables real-time system checkups. This should include updates, errata, compliance, workload, and system performance metrics for registered hosts and running services. Remote execution is for running arbitrary commands on hosts or groups of hosts to perform similar activities remotely. These commands can be customized; for example, to provision templates or partition tables.

Identity and policy lets you create different users and roles and manage various permission policies. This function should also support Kerberos and LDAP integration and authentication. Alerts and notification audits administrator and user activities. This tool should instantly detect what changes are made in each node, when they are made, and where potential risk may exist. Automation applies to repetitive tasks. A top systems management tool should help identify and automate these processes.

Chapter 3 Literature Survey

Linux is a name which broadly denotes a family of free and open-source software operating system distributions built around the Linux kernel. The defining component of a Linux distribution is the Linux kernel, an operating system kernel first released on September 17, 1991 by Linus Torvalds.

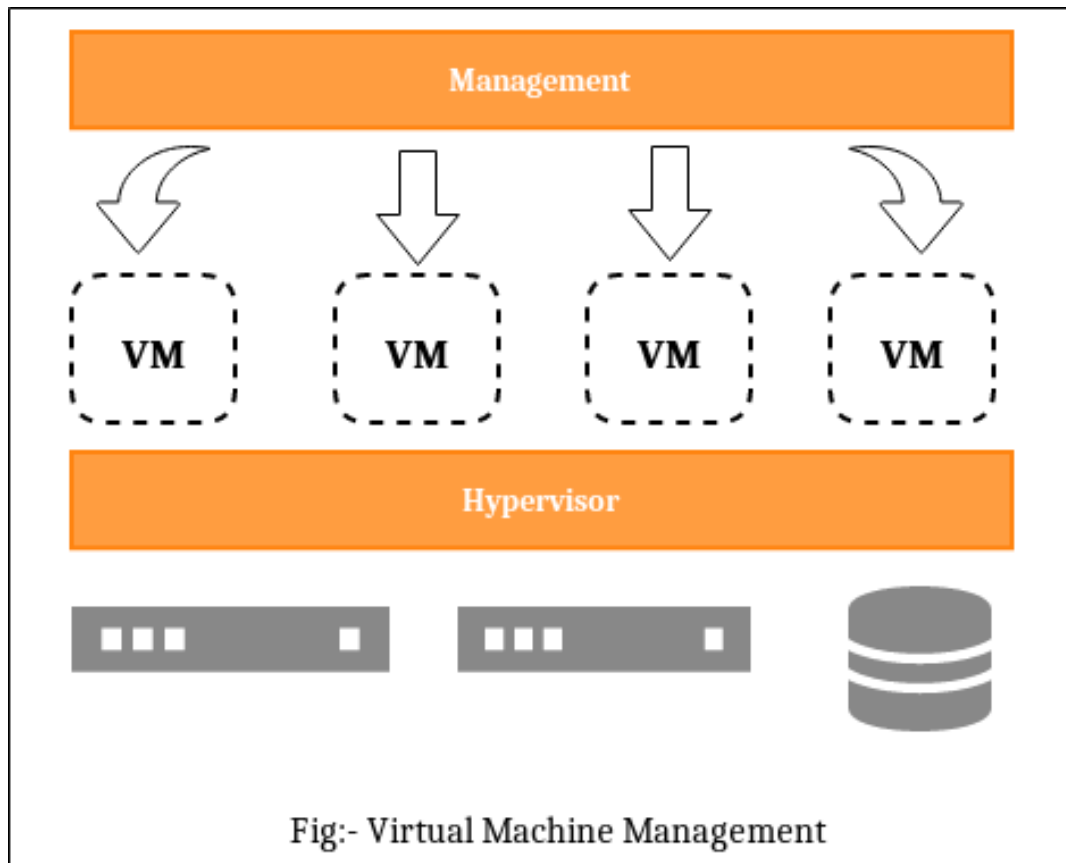
Typically, Linux is packaged in a form known as a Linux distribution for both desktop and server use. Some of the most popular and mainstream Linux distributions are Arch Linux, CentOS, Debian, Fedora, Gentoo Linux, Linux Mint, Mageia, openSUSE and Ubuntu, together with commercial distributions such as Red Hat Enterprise Linux and SUSE Linux Enterprise Server.

In many ways, Linux is similar to other operating systems you may have used before, such as Windows, OS X, or iOS. But Linux also is different from other operating systems in many important ways. First, and perhaps most importantly, Linux is open source software. The code used to create Linux is free and available to the public to view, edit, and for users with the appropriate skills to contribute to.

Linux is also different in that, although the core pieces of the Linux operating system are generally common, there are many distributions of Linux, which include different software options. This means that Linux is incredibly customizable, because not just applications, such as word processors and web browsers, can be swapped out.

Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency. Git was created by Linus Torvalds in 2005 for development of the Linux kernel, with other kernel developers contributing to its initial development. 2.15 is the latest git version released on 2017-10-30.

Virtualization is technology that allows you to create multiple simulated environments or dedicated resources from a single, physical hardware system. Software called a hypervisor connects directly to that hardware and allows you to split 1 system into separate, distinct, and secure environments known as virtual machines (VMs). These VMs rely on the hypervisors ability to separate the machines resources from the hardware and distribute them appropriately.



Types of virtualization:

- Server Virtualization
- OS Virtualization
- Network Virtualization
- Hardware Virtualization
- Application Virtualization
- Storage Virtualization

Django is a free and open source web application framework, written in Python. A web framework is a set of components that helps you to develop websites faster and easier. When you're building a website, you always need a similar set of components: a way to handle user authentication (signing up, signing in, signing out), a management panel for your website, forms, a way to upload files, etc.

Other people long ago noticed that web developers face similar problems when building a new site, so they teamed up and created frameworks (Django being one of them) that give you ready-made components to use. Frameworks exist to save you from having to reinvent the wheel and to help alleviate some of the overhead when you're building a new site.

To understand what Django is actually for, we need to take a closer look at the servers. The first thing is that the server needs to know that you want it to serve you a web page.

Imagine a mailbox (port) which is monitored for incoming letters (requests). This is done by a web server. The web server reads the letter and then sends a response with a webpage. But when you want to send something, you need to have some content. And Django is something that helps you create the content.

Chapter 4 National/International Status

Since 2000, cloud computing has come into existence. In early 2008, NASA's OpenNebula, enhanced in the RESERVOIR European Commission-funded project, became the first open-source software for deploying private and hybrid clouds, and for the federation of clouds. In the same year, efforts were focused on providing quality of service guarantees (as required by real-time interactive applications) to cloud-based infrastructures, in the framework of IRMOS European Commission-funded project, resulting in a real-time cloud environment.

In August 2006 Amazon introduced its Elastic Compute Cloud. Microsoft Azure was announced as "Azure" in October 2008 and was released on 1 February 2010 as Windows Azure, before being renamed to Microsoft Azure on 25 March 2014.

In July 2010, Rackspace Hosting and NASA jointly launched an open-source cloud-software initiative known as OpenStack. The OpenStack project intended to help organisations offering cloud-computing services running on standard hardware. The early code came from NASA's Nebula platform as well as from Rackspace's Cloud Files platform. As an open source offering and along with other open-source solutions such as CloudStack, Ganeti and OpenNebula, it has attracted attention by several key communities. Several studies aim at comparing these open sources offerings based on a set of criteria. In computing, Red Hat Satellite[2] is a systems-management product by the company Red Hat which allows system administrators to deploy and manage Red Hat Enterprise Linux (RHEL) hosts.

A Satellite server registers with Red Hat Subscription Management, mirrors all relevant software like security errata and bug fixes, and provides this together with locally added software and configuration to the attached servers.

The managed hosts register against the local Satellite server and access the provided resources like software packages, patches, configuration, etc. while they also provide information about the current health state of the server to the Satellite.

Component on Red Hat Satellite

- The Foreman
- Katello
- Candlepin
- Pulp
- Hammer
- REST API
- Apache Tomcat
- Puppet
- Hier

Chapter 5 Applications

Virtualization isn't just for geeks or those who run enormously powerful servers. It offers something for everybody, and if you haven't yet dipped your toe into the virtualization ocean, then you're at serious risk of being left behind.

In its strictest sense, virtualization refers to running two or more operating systems on one physical PC. Either the multiple operating systems run side-by-side, with a separate piece of software called a hypervisor used to manage them, or one operating system runs the other operating systems within program windows. The former is usually limited to servers, with the latter finding common use on desktop computers. Here are various things you can do with virtualization that might convince you that it's worth giving it a try, if you haven't already.

Run Old Apps

Got an application that won't play nice in Windows 7 or Vista, but works fine in XP or an even earlier version of Windows, like Me? Just grab an old Windows CD and install it within a virtual machine (VM). Then install your app.

VMware Player features Unity mode, which allows applications running in the virtual machine to appear as if they're running natively on the host computer. They have their own taskbar buttons and their own program windows, making for a seamless experience. For this to work, however, you'll need to install the VMware Tools program on the virtualized operating system. You're usually prompted to do this after installation of the OS has finished.

Browse in Complete Safety

Why not install Windows on VMware Player, then install Firefox, and run it in Unity mode so it appears to run natively on the host computer? Essentially Firefox will be running in what's known as a sandbox, meaning that should it (or one of its plugins) get hacked while you're online, there'll be no absolutely no risk to your actual operating system. You could create a snapshot once everything's been configured in the virtual machine in order to get things back up and running quickly, should anything go wrong.

Back Up an Entire Operating System

Because the virtual OS is entirely contained within a series of files, backing it up is as simple as backing up any other files. It's the same with virtualized server installations too. If you're running a virtual machine on a server to host your mail server, and it's brought down by a hack attack, then bringing things back to working order is as simple as restoring the backup files (assuming the vulnerability that allowed the hack is quickly addressed once things are up and running, of course). Bear in mind that creating a copy of a VM creates legal issues. Backing up should be fine, but if you create a copy of a VM installation to give to a friend, for example, then you'll be contravening copyright laws (assuming they apply, as with Microsoft, but not always with Linux).

Create a Personal Cloud Computer

If you're out of the office, there's no need to take your laptop with you. Just leave it running (with power saving turned off!), take your mobile phone or tablet computer instead, and access the laptop via a Remote Desktop Protocol (RDP) connection over the Internet. This will let you access the same desktop environment you're used to, although there'll be no fancy graphics.

You'll need to take a note of the public IP address of your router in order to connect remotely, and configure the router to port forward incoming RDP connections to your notebook PC. How this is done varies from computer to computer, but often you can select predefined rules. Then download an RDP client for your mobile device and connect. For the Apple iPad and iPhone, you can try iTap but there are RDP clients for most platforms.

Reuse Old Hardware

By installing Citrix XenDesktop on your Windows server, you can turn old, less powerful computers into thin clients, wiping out the need for a workstation IT upgrade budget.

The clients access their personal desktop spaces on the server and there's little noticeable difference compared with running the operating system and applications locally. XenDesktop includes clever technology to avoid common thin-client pitfalls, such as the fact videos and animations don't play well, by shifting some of the processing work to the client computer. XenDesktop also allows your workers to access their desktops from home, provided the server is configured to be publicly accessible and they have the right client software installed. You can even use mobile phones to connect to the desktop environments.

Chapter 6 Objectives of Project

1. User should be able to login application with ldap authentication on application.
2. User should be able to provision host with different provider such as libvirt, docker container etc.
3. User should be able to configure network and storage, select type of provider, type of operating system and contents.
4. User should be able to register already provisioned host within network to application.(Existing machine having already installed operating system can fetch packages from server application)
5. User should be able to register already provisioned host within network to application.(Existing machine having already installed operating system can fetch packages from server application)
6. User should be able to sync content from application to host.
7. User should be able to get system health

Chapter 7 Future Scope

Adoption of cloud computing technology has significantly increased over the last few years, promising a great opportunity for innovation amongst businesses. However some businesses are still sceptical of how Cloud Computing can enhance or replace all or part of their IT environment.

Cloud is typically marketed to promote benefits such as improved efficiency, flexibility and even opportunity for expansion. However many of these benefits lack tangibility, often making it difficult to validate a move to the cloud.

Organisations considering the change typically look at implementing a solution that incorporates a mix of on premise, and public or private cloud, referred to as a hybrid cloud model.

Business continuity has been identified as one of the most important elements of business operations. A business continuity solution is not just simply backing up and/or replicating content to the cloud, nor is it simply a Disaster Recovery plan. Business continuity is to continue to do business during a failure or disaster. In basic terms, it means that when a failure or disaster happens, that data is still accessible with little to no downtime.

A business continuity solution therefore needs to be planned to consider key elements such as resilience, recovery and contingency. Hybrid cloud solutions are often considered by organisations as a key component of a business continuity solution where critical data is replicated to a cloud solution in a different location to the primary systems. This provides data insurance in the event of a disaster (natural or technological), minimising downtime and the costs associated with such an event. Understanding this benefit, service providers have streamlined their offerings to easily integrate a business continuity solution into hybrid cloud systems.

Barriers to innovation are reduced in a cloud environment, as large capital expenditure is not required for modelling a new service. Previously, cost associated with such a task would include capital expenditure for infrastructure, labour and time for research then more resources to install and maintain. This places a lot of pressure on capacity management practices and perfect forecasting despite many uncertain variables. In hybrid cloud, concepts can be tested without capital expenditure, prototyped in a cloud environment then rapidly deployed and measured for success. The added benefit of hybrid cloud is the availability of resources combining both internal and external environments including data, network, and infrastructure, all available on iseeks cloud environment.

Scaling on IT infrastructure can be extremely expensive, inefficient and places much more pressure on accurate forecasting in growing companies. However, a hybrid cloud environment can provide the opportunity for businesses to scale out to a cloud environment for specific workloads. Implementing automation rules on the cloud provides the ability to scale resources up and down as business demands change. This allows the hybrid cloud

system to take advantage of unlimited resources based on demand driven usage, optimising the environment for performance and efficiency.

In many organisations, speed to market is a key differentiator. In a digital age, the ability to quickly spin up environments to test, prototype and launch new products is highly desirable. For organisations with an IT infrastructure that is working near or close to capacity, spinning up a new environments can become a challenge and potentially hinder the business

Hybrid cloud allows resources to be deployed and commissioned in an automated process that can yield results at hugely improved speeds, so companies are no longer limited by their IT footprint.

Companies can leverage hybrid cloud as the first step in moving to a predominately cloud environment. A hybrid solution provides the perfect opportunity for companies to test the capability of certain workloads and providers in a cloud based environment and assist them in planning their cloud strategy. However planning is key, as hybrid cloud can require complex design to coherently combine an organisations platform with a cloud environment.

Chapter 8 Methodology

Began with learning the term "Virtualization". Virtualization is technology that allows you to create multiple simulated environments or dedicated resources from a single, physical hardware system. Software called a hypervisor connects directly to that hardware and allows you to split 1 system into separate, distinct, and secure environments known as virtual machines (VMs). These VMs rely on the hypervisors ability to separate the machines resources from the hardware and distribute them appropriately.

To create VM on linux operating system we have tools like virt-manager which uses Libvirt APIs. Started with creating VM on same machine and then moved further and tried creating VM on another machine in same network. Developed a script to automatically deploy VM on the target machine by taking input from client. Designed a GUI using Django to provide easy to user in generating VM of its own desire.

Setup project environment

Two machine with 16GB RAM and four CPUs. The system is installed using Fedora 26 operating system. Fedora 26 is a linux flavour with linux kernel. The should have libvirt and lxc installed in there system.

Creating a local repository To provision a virtual machine we need a operating system. We cant download operating system every time we provision a virtual machine So we create a mirror of different operating system. We use rsync a cli tool to mirror a repository.

Creating a python package

We are planning on creating a python package which will work as API. We will use the API function to provision virtual machine and run docker container.

Developing a WebUI

Using django we will create a centrilize a WebUI which will be used to provision virtual machine and run docker container. We will import the python package.

Create documentation

Doing a task is must, but its documentation is more valuable as that of project. The details of the projects are to be documented with all the installation procedure and the actual flow of project implementation to help other people understand the project brightly.

Chapter 9 Conclusion

With MiniSat we will be able to simplify day to day task for system administrator. The task will include:

Provision Satellite offers numerous methods for deploying hosts, including simple kickstart, bare metal install and re-imaging. Current versions of Satellite support kickstart using Cobbler as an underlying framework. PXE Boot, and Koan are methods that can be used to implement bare metal installs and re-imaging of hosts.

Manage Satellite assists in remotely managing hosts in several areas: software, operational management, and configuration. The main mechanisms for managing hosts are:

- Software Channels
- Configuration Channels
- Activation Keys

Monitor Satellite can provide monitoring of software and systems via probes. These probes periodically explore the target host and send alerts if the probes do not get the correct replies, or if the replies fall outside of upto specified range.

For a system administrator this task are very important and if there are hundreds on different machine which require monitoring, for system monitor it is like a nightmare. So I hope MiniSat will help administrator and simplify there task.

Chapter 10 References

1. Project Link

<https://github.com/miniSat>

2. Documentation

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