Building Clouds on Apache CloudStack: An Introduction

Linux CloudOpen 23 Oct 2013
Giles Sirett
CEO ShapeBlue
Giles.sirett@shapeblue.com
Twitter: @ShapeBlue
So, what is CloudStack then?

Apache CloudStack is a scalable, multi-tenant, open source, purpose-built, cloud orchestration platform for delivering turnkey Infrastructure-as-a-Service clouds
How to build an IaaS cloud

PaaS

Developer tooling

Multi-cloud management

Billing

Ecommerce platform

Management

CloudStack API

Apache CloudStack

Choice of Hypervisor (KVM, VMware, Xen, hyper-V)

Networking compute Storage
The World of IaaS Choices

Vendor centric:
- vCloud Director
- Microsoft System Center

End to end:
- Abiquo
- OnApp
- Flexiant
- Haexagrid

Open communities:
- CloudStack
- OpenStack
- Opennebula
- Euacalyptus

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CloudStack Background

• Open source Infrastructure-as-a-Service platform, under ASL 2.0 license

• A vibrant and growing community in ASF
  – Developed since 2008 by Cloud.com
  – Acquired by Citrix in 2011
  – Donated to Apache April 2012
  – Became top level AF project March 2013

• A proven cloud platform
CloudStack Users

www.shapeblue.com
CloudStack Users 2.0

[Image of various company logos related to CloudStack users]
CloudStack Deployment Models

Private Cloud

Hybrid Cloud

Public Cloud

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CloudStack Use-Case’s

• Service Provider / public cloud
• Devops automation
• AWS insourcing
• Traditional enterprise workloads
Feature Highlights

- Broad Hypervisor support
  - XenServer, KVM, VMware, OracleVM
- Scalable architecture
  - Support thousands of hosts and virtual machine guests
  - AWS API fidelity
- High availability
  - Configurations that provide automatic failover for virtual machines
- Virtual Networking Ability to define service level definitions with specific resource footprints
- Choice of interfaces
  - Web UI, command line, REST-based API
Management Server Deployment Architectures

- Load Balancer
- Management Server
- Management Server
- Management Server
- MySQL DB
- MySQL DB
- Zones

GUI
API
Two Networking Models

**Basic Zone**
- Massive scale
- Simple, AWS like
- Security Groups
- Elastic IPs and Elastic Load Balancing

**Advanced Zone**
- VLAN / SDN isolation
- Virtual Router or physical devices for:
  - DNS & DHCP
  - Firewall, VPN
  - Load Balancing
  - Source / Static NAT
  - Port Forwarding
- Virtual Private Clouds
Demo

- Provisioning virtual resources
- Controlling virtual resources
- Networking as a Service

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Any Questions?
VPC Components

Virtual Router – Connects all the VPC Components

Network Tiers – Isolated Networks, each with unique VLAN and linked to Public Gateway

Tier 1 VLAN 101
Tier 2 VLAN 102
Tier 3 VLAN 103

Public Gateway

Virtual Gateway Created by Root Admins
Configured by Users (Static Routes)

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Select a zone
A zone typically corresponds to a single datacenter. Multiple zones help make the cloud more reliable by providing physical isolation and redundancy.

Select ISO or template
- **Template**: OS image that can be used to boot VMs
- **ISO**: Disc image containing data or bootable media for OS
Please select a template for your new virtual instance.

- Ubuntu 12.04 64-bit (VMware)
- RHEL 6.4 (64-bit) (XenServer)
- CentOS 5.6 (64-bit) (XenServer)
- Windows 2012 Enterprise (VMware)
Please select networks for your virtual machine.

VPC: All

Networks:
- BM-DB-Tier: isolated
- BM-App-Tier: isolated
- BM-Web-Tier: isolated
- batman: isolated

Add Network:
- New
Add Instance

Please review the following information and confirm that your virtual instance is correct before launch.

- Name (Optional): Demo
- Zone: Linux
- Hypervisor: XenServer
- Template: CentOS 6.8 (64-bit) (XenServer)
- Compute offering: Micro, Shared Storage
- Data Disk Offering: (None)
- Affinity Groups: (None)
- Network: batman

Cancel  
Launch VM
<table>
<thead>
<tr>
<th><strong>Display name</strong></th>
<th>Demo</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td>Demo</td>
</tr>
<tr>
<td><strong>State</strong></td>
<td>Running</td>
</tr>
<tr>
<td><strong>Template</strong></td>
<td>CentOS 5.6 (64-bit) (XenServer)</td>
</tr>
<tr>
<td><strong>Dynamically Scalable</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>OS Type</strong></td>
<td>CentOS 5.3 (64-bit)</td>
</tr>
</tbody>
</table>
You can setup recurring snapshot schedules by selecting from the available options below and applying your policy preference.

**Schedule:**
- Hourly
- Daily
- Weekly
- Monthly

**Time:**
- 01:00 AM

**Timezone:** [UTC-12:00] GMT-12:00

**Keep:** 8 snapshot(s)

**Add**

**Scheduled Snapshots**

**Done**
<table>
<thead>
<tr>
<th>Source CIDR</th>
<th>Protocol</th>
<th>Start Port</th>
<th>End Port</th>
<th>Add</th>
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<tbody>
<tr>
<td>10.1.1.0/24</td>
<td>ICMP</td>
<td>-1</td>
<td>-1</td>
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<td>10.1.1.0/24</td>
<td>TCP</td>
<td>443</td>
<td>443</td>
<td>✗</td>
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<tr>
<td>10.1.1.0/24</td>
<td>TCP</td>
<td>80</td>
<td>80</td>
<td>✗</td>
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<tr>
<td>10.1.1.0/24</td>
<td>TCP</td>
<td>123</td>
<td>123</td>
<td>✗</td>
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<tr>
<td>10.1.1.0/24</td>
<td>TCP</td>
<td>53</td>
<td>53</td>
<td>✗</td>
</tr>
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</table>
Your VPN access is currently enabled and can be accessed via the IP 10.10.0.103

Your IPSec pre-shared key is YH4VE5pmqTCyWGJDesNFHb4C

Username  Password  Add User  Actions

iames
<table>
<thead>
<tr>
<th>Source CIDR</th>
<th>Protocol</th>
<th>Start Port</th>
<th>End Port</th>
<th>ICMP Type</th>
<th>ICMP Code</th>
<th>Add rule</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0.0.0/0</td>
<td>TCP</td>
<td>2221</td>
<td>2223</td>
<td></td>
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<tr>
<td>0.0.0.0/0</td>
<td>UDP</td>
<td>4500</td>
<td>4500</td>
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<td></td>
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<tr>
<td>0.0.0.0/0</td>
<td>UDP</td>
<td>1701</td>
<td>1701</td>
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<td></td>
</tr>
<tr>
<td>0.0.0.0/0</td>
<td>UDP</td>
<td>500</td>
<td>500</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>0.0.0.0/0</td>
<td>TCP</td>
<td>80</td>
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</tr>
<tr>
<td>Private Port</td>
<td>Public Port</td>
<td>Protocol</td>
<td>Add VM</td>
<td>Actions</td>
<td></td>
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<tr>
<td>22 - 22</td>
<td>2223 - 2223</td>
<td>TCP</td>
<td>VM: VM-003</td>
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<td></td>
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<td>IP: 10.1.1.117</td>
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<tr>
<td>22 - 22</td>
<td>2222 - 2222</td>
<td>TCP</td>
<td>VM: VM-002</td>
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<td></td>
<td>IP: 10.1.1.213</td>
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<tr>
<td>22 - 22</td>
<td>2221 - 2221</td>
<td>TCP</td>
<td>VM: VM-001</td>
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<td></td>
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<td>IP: 10.1.1.220</td>
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<tr>
<td>Name</td>
<td>Public Port</td>
<td>Private Port</td>
<td>Algorithm</td>
<td>Stickiness</td>
<td>Health Check</td>
<td>AutoScale</td>
<td>Add VMs</td>
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<td>Round-robin</td>
<td>Configure</td>
<td>Configure</td>
<td>Configure</td>
<td>Add</td>
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<tr>
<td>http</td>
<td>80</td>
<td>80</td>
<td>Round-robin</td>
<td>Configure</td>
<td>Configure</td>
<td>Configure</td>
<td>Add</td>
</tr>
<tr>
<td>VM-003</td>
<td>State - Stopped</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>VM-002</td>
<td>State - Stopped</td>
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<td></td>
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</tr>
<tr>
<td>Description</td>
<td>Level</td>
<td>Type</td>
<td>Domain</td>
<td>Account</td>
<td>Date</td>
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</tr>
<tr>
<td>Successfully completed starting Vm. Vm Id: 52</td>
<td>INFO</td>
<td>VM.CREATE</td>
<td>Wayne</td>
<td>batman</td>
<td>Tue, 22 Oct 2013 16:00:13 GMT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Successfully created entity for deploying Vm. Vm Id: 52</td>
<td>INFO</td>
<td>VM.CREATE</td>
<td>Wayne</td>
<td>batman</td>
<td>Tue, 22 Oct 2013 16:00:05 GMT</td>
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<td></td>
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<tr>
<td>Starting Vm. Vm Id: 52</td>
<td>INFO</td>
<td>VM.CREATE</td>
<td>Wayne</td>
<td>batman</td>
<td>Tue, 22 Oct 2013 16:00:05 GMT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User has logged in from IP Address 10.0.0.32</td>
<td>INFO</td>
<td>USER.LOGIN</td>
<td>Wayne</td>
<td>batman</td>
<td>Tue, 22 Oct 2013 15:54:07 GMT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User has logged in from IP Address 10.0.0.32</td>
<td>INFO</td>
<td>USER.LOGIN</td>
<td>Wayne</td>
<td>batman</td>
<td>Tue, 22 Oct 2013 15:04:47 GMT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Successfully completed destroying Vm. Vm Id: 50</td>
<td>INFO</td>
<td>VM.DESTROY</td>
<td>Wayne</td>
<td>batman</td>
<td>Tue, 22 Oct 2013 13:45:00 GMT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Destroying Vm. Vm Id: 50</td>
<td>INFO</td>
<td>VM.DESTROY</td>
<td>Wayne</td>
<td>batman</td>
<td>Tue, 22 Oct 2013 13:44:35 GMT</td>
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<tr>
<td>Successfully completed starting Vm. Vm Id: 50</td>
<td>INFO</td>
<td>VM.CREATE</td>
<td>Wayne</td>
<td>batman</td>
<td>Tue, 22 Oct 2013 13:36:31 GMT</td>
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</tr>
</tbody>
</table>