



Your Own Cloud for \$500?

Who is Darren?

Husband

Dad

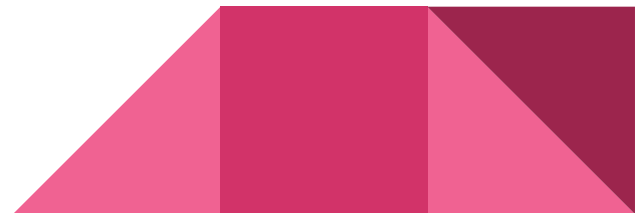
Computer Programmer

Home SysAdmin

Linux User for Over 20 Years

Actually worked on Trusted OS

Will provide any links at end of Slides



Why?

- See if I could build a cloud for <\$500
- Learn cloud tech better by running one
- Had some uses for my own cloud
- Seemed like fun
- Turned out to quite useful

Why Apache CloudStack?

- Open Source
- Simpler setup than other options
- Matched up with work proposal
- Wanted to work with a new cloud
- Already worked with Eucalyptus and AWS



Requirements

- Cheap
- 64-bit CPU w/ VM support
- Minimum of two nodes
- NFS Storage
- Single network
- 3-5 instances
- 16GBs for compute node



What Did I Skip?

- Network switch.
 - Enough Ports Available (two total)
 - Had recently upgrade network gear
- Cases
 - Can look ugly
 - Can just build something with scrap wood
 - Inspired by minimalistic crypto mining rigs



Process

1. Pick Cheapest 64-bit CPU w/ VM support
2. Find cheapest motherboard to support CPU
3. Pick cheapest mem w/o too many DOAs in reviews
4. Find Cheapest power supply
5. Reasonable?
 - a. No, start again with next cheapest CPU
 - b. Yes, pick HDs to stay within budget

The Hardware Ordered

Newegg.com - Fall 2017

2 AMD A6-6400K + \$100.79

2 PSUs, 2 ASRock A68M-ITX Motherboards, 3
8GB DDR3 Memoy + \$346.23

2 250GB HD + \$40.50

Total Shipped: \$487.52

-\$30 in rebates.....

Upgraded/Repaired Instead

2 250GB SSDs + \$75.98 (cheap HDs died) PC

Replacement Management server

1 Raspberry Pi 4 with 4GB + \$55

1 Raspberry Pi case + \$9.47

1 power supply + \$7.95

Shipping + \$21.7

Total with Shipping = \$170.10


Where to Save Money

- Use All Raspberry Pies
- Most of us have spare HD or SSDs laying around unused
- Pick a refurbished CPU
 - may required purchasing CPU cooler
 - CPU Socket requires figuring out
 - Motherboard for Socket not available
- Pick refurbished motherboard
- Repurpose old Motherboard
- Use Old CPU from last server upgrade
- Spare memory? Pick CPU and motherboard for what you have
- Pick memory first, and then CPU and Motherboard to fit
- Used rackmount can be really cheap
 - Often includes storage, Memory, and CPU
 - Can be loud
 - Requires rack (real cost money, but can be made from lumber or Ikea Lack table)



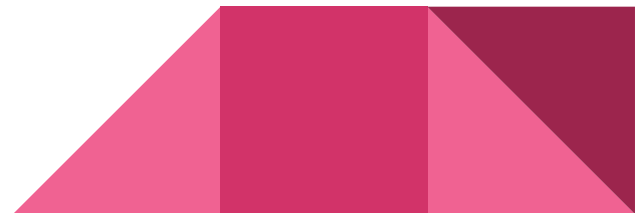
CloudStack

Installation

- Started with Ubuntu on two nodes: 1x compute & 1x management/storage
 - Transitioned to: 2x compute & 1x management/storage on raspberry pi
 - Manual setup of compute node networking
 - Custom ansible roles (<https://gitlab.com/coledarr/cloudstack-roles>)
 - Pulled all the rolls together with a playbook and static inventory
 - Automated purging of nfs setup, compute, and management
 - Big time saver
 - Quicker for testing
 - Easier to reset to known good state
 - Automated source installation and building
 - Manual setup of management server webinterface
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Gotchas

- Systemvm loading No longer needed
- Networking issues
- Custom template creation



Networking Issues

- Did not set vlan tagging for bridges
- All networking on 10.0.0.0/8
- Final put everything in their own network
 - 10.0.0.1/16 - pod
 - 10.0.1.1/24 - management network
 - 10.0.2.1/24 - Guest “public ip”

Custom Template Creation

- Use newest cloud-init in my distro
- Partition for “/” Did Not Grow
 - cloudstack doesn't grow filesystem
 - Cloud-init grows filesystem
 - Cloud-init only grows last partition if it is a filesystem, don't put swap there
- Rocky needs cloud-init-utils

Uses of my Cloud

Uses

- Ansible test and development to destroy and recreate as needed
- Testing different distros, or even full setups like TruNAS Core
- Testing new services like Plex, Wireguard, QMK building, etc.
- Devnode that can be reinstalled as needed


Learn from what I did

- CPU mattered more than memory
- Memory not as critical as expected
- Save templates outside the cloud to speed up re-installs
- Keep templates size minimal
- Storage is at a premium, but most people probably have bigger HD lying around.
- More networking knowledge would definitely help

Probably Less than AWS

- \$50-\$70 per month for similar instance, storage, and AMIs in AWS
 - 10 month return on investment (@\$50)
 - No need to worry about shutdown or termination
 - No extra costs for custom templates (AMIs)
 - Some testing would be a non-starter (Plex server)

Final Thoughts

- Implement linux package caching
 - Keep templates, ISOs, and anything else saved outside the cloud
 - Add extra switch for storage network
 - Setup up vlan tagging and trunking
 - Try some of the SDN options
 - SSL certs for Cloudstack
 - New managed Kubernetes cluster
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Promised links Links

- dcole@aseq.com or darren.cole@gmail.com

- This Presentation:

<https://docs.google.com/presentation/d/18IldHMCXiX0FXq6o7VD-0f7RyLGX23haYarRfI2S9Jw/edit?usp=sharing>

- Cloudstack roles and example plays:

<https://gitlab.com/coledarr/cloudstack-roles>

- Ikea Lack rack page:

<https://wiki.eth0.nl/index.php/LackRack>