Moving Large Workloads from a Public Cloud to an OpenStack Private Cloud: Is It Really Worth It?

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Who are we?

An enterprise software company for digital branding

- Filtered over 12.6 Trillion Ad Auctions in 2015
- Served over 3 Billion Ad Impressions on linear TV via our PTV solution
- Process bids in less than 50 ms
- Serve bids in less than 80 ms (includes network round-trip)
- Serve 5 PB of monthly video traffic
Who are we?

A team of **Operations Engineers**

- Comprised of **SREs**, **SEs** and **DBAs**
- Ensure the **smooth day-to-day** operation of the platform infrastructure
- Provide a **cost-effective** and **cutting edge** infrastructure
- Manage over **2,500 servers** (virtual and physical)
Technology Hoarders

- Java (a lot!)
- MySQL (Percona, MariaDB)
- Memcached, Couchbase
- Aerospike, Vertica, Druid
- Kafka
- Storm
- Zookeeper, Exhibitor
- Hadoop, HBase, Hive
- Terracotta
- ElasticSearch, Logstash, Kibana
- Varnish
- PHP, Python, Ruby, Go...
- Apache httpd
- Nagios, Sensu
- Ganglia, Graphite, Grafana

- Puppet
- HAproxy
- OpenStack
- Git and Gerrit
- Gor
- ActiveMQ, RabbitMQ
- OpenLDAP
- Redis
- Blackbox
- Jenkins, Sonar
- RunDeck
- Tomcat, Jetty, Netty
- Qubole
- Snowflake
- AWS DynamoDB, EC2, S3, SWF...
Mixed Infrastructure
High Level Technical Overview

- High Volumes
- Low Latency
- Small Packets

- Large Data Sets
- Low Latency

Low Latency User Database for User Targeting and Frequency Capping

Bidding Layer

- Fast Processing
- Large Caches

Console / Website

Real-Time "Loop" for Campaign Management, RT Spendings, etc.

Stats Aggregation

User Cookie and Segment Collection

Machine Learning, Optimization, Targeting, Segment Building

Browser Based

SSP

Third Party VAST

Browser Based

DMP
Public Cloud: Technical Challenges

- Our **high volume** and **low latency** traffic makes our proximity to some partners matter.

- **Huge datasets** used for decisioning require high performance infrastructure, which **costs a lot**. Even with reserved capacity.

- Instances’ **packet per second limitations** lead us to large public footprint and poor backend performances, especially for load balancers.

- **Network disruptions** with no root causes.
Our Strategy

Go in-house in 4 locations and 3 continents, in less than 6 months, using a ready-to-go cloud solution and two part-time engineers. Then, go celebrate in Vegas.

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EASY!

YEAH!
TCO analysis: what to consider?

- Which infrastructure is being moved?
- How do you compare apples to apples?
- Do you plan to overcommit?
- Do you cost properly for engineering resources, software maintenances, and various support?
- Does your design make trade-offs on High Availability?
- Do you plan for a test environment and R&D?
- Are you using your public cloud at its best?
- Are you building a public cloud or optimizing your environment?
- Do you plan for growth and how does it impact your cost models?
- Which locations are you deploying to? What is the impact on bandwidth and data center costs?
Three simple TCO rules

- **Be Fair**: Challenge your Public Cloud partners and share your TCO with them.

- **Keep It Simple**: Limit the scope of your TCO to a clear and well known subset.

- **Make Clear Assumptions**: Have a defined list of feature sets on what you are building.
How did we start?

We built a test environment with **Eucalyptus** to move our integration environment on it.
How did we start (again)?

We built a test lab environment with a vendor using CloudStack to move our integration environment on it.
We built a test lab environment and first data center location *ourselves using OpenStack on Gentoo* and shared the lab for our software engineers’ integration environment.
First Failures and Lessons Learned

- **Do not share your lab**: Your lab is meant to fail and be destroyed. Don’t assume people will be OK to work with something unreliable.

- Don’t mess up your block storage strategy. **No last minute changes**.

- Starting a first data center location may require a lot of paperwork time, executive approval, and hardware mistakes. **Plan ahead**.

- **OpenStack is complex**. Don’t make it more complex.
How did we reboot?

We (re)built our lab and prod environment with a vendor using OpenStack on Ubuntu to move our QA environment into one region.
How did we reboot (again)?

We (re)built our lab and prod environment ourselves by using OpenStack on Ubuntu to move our production environment into one region.
In Production...

- First traffic switch went smoothly and allowed us to **decrease our footprint** by 40% and our load balancer footprint by 95%.

- Progressive **traffic migration is not easy**. Consider the impact of multiple environments to maintain and all application dependencies.

- Load Balancers, and core data services run on **bare metal** and leverage **VLANs**.

- **Fully automated** bare metal and OpenStack provisioning.

- We are deploying **three new on-premise locations** in Q2/Q3 2016.

- **Limit scope** to our high volume and low latency infrastructure.
Lessons Learned

- OpenStack requires a **long learning curve and design phase**. Account for it, in terms of cost, skill-set, and time.

- We are not building a Public Cloud. **Be very clear on your feature set and business case.**

- You don’t know your application as well as you think. Be ready to **adapt quickly** and don’t overlook the impact of network traffic that switches from private to public.

- Really, you don’t know your application as well as you think. Be ready to deal with **ip conntrack table full**.
So, is it worth it?

- Moving in-house led to an estimated **30% cost savings** and reduced our server footprint.

- The **improved visibility** on our network traffic and our full application stack greatly helped for **troubleshooting and performance improvements**.

- Have a **strong technical need** for it. Cost shouldn’t be the only driving factor.
THANK YOU

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