Virgin America and Open Source Software
Presented at LinuxCon 2010
Virgin America – Who We Are

• Newest hybrid/low-cost airline serving the US domestic market


• San Francisco’s Home Town airline

• Serve 10 markets including San Francisco, Los Angeles, New York, and Washington, D.C.

• Fleet of Airbus A319 and A320 aircraft, 28 planes

• Three classes of service – First, Main Cabin Select, Main Cabin

• Winner of major industry awards
  – Best Domestic Airline - Conde Nast Traveler
  – Best Domestic Airline - Travel + Leisure World’s Best Awards
  – Number 1 in First Class 07/08 - Zagat

• Well known for product and technology innovation
Virgin America – Our Product

• Brand new Airbus A319 and A320 aircraft which are up to 25% more fuel efficient

• Mood lighting and ambiance – known as the “iPod in the Sky”

• Wi-Fi Broadband available on all aircraft

• “RED” in-flight entertainment system based on Linux
  – 9” video touch-screen
  – Movies and Music
  – Food ordering
  – Games and Chat
  – Carbon footprint offsetting
  – Live TV

• Recaro all leather seats

• 110v power, USB and RJ45 jacks available to all seats
Virgin America Information Technology Overview

• 28 FTEs
  – Strategy and Innovation
  – Program management
  – Software engineering
  – Business systems partners
  – Operations

• Responsibilities
  – Core infrastructure – data/voice networks, email, information security
  – VirginAmerica.com web site development
  – Airport Kiosk development
  – Remote infrastructure - Airport
  – Reservations system
  – Business continuity
  – Constant innovation
  – Over 85 commercial and custom applications are supported
Core Systems

• Where did we start?
  – Email – SaaS based MSExchange
  – Internal/External DNS – MSWindows
  – Sharepoint for document management
  – Not much in application delivery – waiting for DOT approval
  – HP SAN with 4.5TB of available storage, Brocade fabric
  – HP DL Series 1 and 4u servers with ILO
  – Cisco switching backbone

• Where are we now?
  – Email – MS Exchange hosted in house with Trend AV
  – External MTAs based on a Postfix cluster
  – Border AV/Spam filtering based on clamav, spamassassin
  – External DNS on UltraDNS
  – Application delivery via Citrix
  – NetApp FAS3040 heads, with about 40TB of storage in multiple sites
  – iSCSI/CIFS/NFS instead of Fibre Channel
  – Cisco VoIP with Unity – MSExchange integration
Open Source – Compelling Reasons

• Our philosophy is that software built on a foundation of quality, pride, and love of the subject is superior, if not equivalent, to software built on a foundation of profit.

• Mature open source software is stable, performs extremely well, and has solid support in the form of community forums, user groups, and some commercial entities.

• Stable, well adopted Open Source Software can (and in our case, DOES) significantly reduce costs.

• Source Code availability offers a level of transparency that cannot be matched, and allows for custom code injections where required.

• Open Source Software requires IT teams to be innovators, early-adopters and thinkers, unlike big brand software that mostly requires monetary and not intellectual investment from the customer.

• For cash-poor startups, Open Source Software is a real “black-box” panacea to expensive IT implementations – a number of inexpensive all-in-one hardware and VM based appliances are available.

• The 100% (yes, this is true) uptime of Virgin America’s Open Source Software systems is compelling enough that the business does not question our selection of technologies – they are interested in successful and sustained outcomes.
Open Source Adoption Requires *Special Skills* within IT Teams

- Ability to conduct unbiased R&D.
- Keeping an open mind.
- Ability to integrate a broad base of technologies to produce a single service offering.
- An incessant drive to keep costs low without compromising core needs.
- The strength to not get drawn into CYA relationships with large, commercially successful vendors i.e. don’t just buy software from a vendor because you can point a finger at them when things go south. Taking responsibility for one’s computing environment is very satisfying – Open Source enables this.
- Ability to recognize and eliminate BBBS (big-brand BS). Big-brand software does play a critical role in IT ecosystems, however, the role is not (and should never be) all-encompassing.
- Of course, all of the above require that IT teams spend a good deal of time conducting research, and candidly, have to be smart and agile. Hiring ninnies to maintain headcount is self-destructive. On the other hand, rocket scientists tend to fire their engines in orthogonal directions.
Factors that convinced Virgin America Executives on the benefits of Open Source

- Quality, stability and reliability were/are paramount. Open Source Software offered these attributes.

- Low maintenance and overhead in terms of work effort and headcount.

- Fire and forget solutions – Simply put, the software **JUST WORKS**, and in many cases, can be configured to self-adjust/heal. Nothing gets the attention of executives more than broken software that mucks up their day, and thereafter destroys their confidence in the IT team and their solutions.

- Reduced need for exotic and expensive hardware platforms (compute/storage etc.) to host critical infrastructural components like e-Mail and VPN - most Open Source Software packages operate very nicely on low-spec platforms.

- Cost was/is definitely a critical selection criterion, but **NOT** at the expense of quality, stability and reliability. In a nutshell, we would never adopt Open Source Software for cost containment alone.

- Not having to deal with “entrenched” vendors with complex, and mostly useless contracts was highly desirable, especially for a fledgling capital intensive startup – a plane can cost upwards of $35 Million.
Open Source in Virgin America

- Commercial web site http://www.virginamerica.com - 100% uptime
  - Apache Web Server: http://httpd.apache.org
  - Tomcat Application Server: http://tomcat.apache.org
  - MySQL Database Engine with replication: http://www.mysql.com
  - RHEL 5.4
  - Memcached for certain cacheable data services: http://www.memcached.org
  - Pentaho Kettle: ETL services

- Email Infrastructure – 100% uptime
  - Postfix MTA clusters at our borders
    - http://www.postfix.org
    - Mailbox sync with active directory users
  - Virus scanning of email using ClamAV
  - SPAM checks using spamassassin, SARE rulesets, MAIA Quarantine management
    - http://spamassassin.apache.org
    - http://www.maiamailguard.com/maia/wiki

- VPN: OpenVPN Community Software - 100% uptime
  - http://www.openvpn.net
Open Source in Virgin America - Continued

• Document Management System: **KnowledgeTree** DMS Community Edition - 100% uptime
  –  [http://www.knowledgetree.com](http://www.knowledgetree.com)

• Issues/Artifact management: **Scarab** – 100% uptime

• Internal/External Proxy Servers: **Apache** - 100% uptime

• Content filtering and QOS: **DansGuardian and Squid** – in proof of concept stage
  –  [http://dansguardian.org](http://dansguardian.org)

• Load balancing and fail-over - **HAProxy**
  –  [http://haproxy.1wt.eu](http://haproxy.1wt.eu)

• Software release management – **Capistrano**

• **MySql** High Availability – **DRBD**
  –  [http://www.drbd.org](http://www.drbd.org)
Future State of Virgin America and Open Source Software

- Edge and security network appliances and applications (routers, firewalls, filters, IDS)
- HA and scalable databases
- Business Intelligence and analytics
- OpenFiler and JBOD implementations to simplify storage solutions
- Exploring LAMP for the next major release of our In-Flight Entertainment software
- Improve and change application architecture to leverage new technology
VirginAmerica.Com Infrastructure
Our Product in Pictures – In Flight
Our Product in Pictures - Mood Lighting
Our Product in Pictures - First Class
Our Product in Pictures - Airport Kiosk
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