FIXING THE FLYING PLANE

Major SAAS Upgrades by a Production DevOps Team
Introduction

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The “Before” Environment

- ~20 custom-developed services accessed by 10,000+ school districts nationwide
- Software not designed for SaaS
- Virtualized environment in Managed Hosting datacenter limited visibility and prevented admin access to infrastructure
The “Before” Environment

Problem Scenario
- Customers reporting networking issues
- Troubleshooting isolates load balancer
- MSP says it can't be

Solution
- Bypass the load balancer

Cost
- Lost customers
- Man-weeks of troubleshooting and workarounds (attempts to work with MSP almost doubled this)
OPERATORS

*can’t*

OPERATE

*if they can’t*

SEE
The Project

- **SOLVE** the Managed Services problem without incurring the business and man-hour costs of colocating
- **DESIGN** a datacenter for the purpose of serving this specific software as SaaS
- **PLAN** up to 5x growth within 2 years, as well as upcoming changes to the software (i.e. clustering)
- **PROOF** the new datacenter in a local virtualized environment so that as much of it as possible can be "ported" directly to the new hardware
The Challenge:

DON’T LAND THE PLANE
The Challenge

- **One week of total downtime** for all operations
- **Six months maximum** limit for datacenter design, code development & implementation
- **Design, Build, Code, Upgrade, and Migrate** all at once!
The

DEVELOPMENT
The Development

Requirements

- What to build?
  - Manage multiple layers
    - Virtual Infrastructure
    - Machine
    - Application
    - Data
- Why should we build it?
The Development

What Did We Build?

- Automated Control engine for existing technologies
  - NFS, Git, Puppet, VSphere, bash, perl
- Unified control front-end
- Extensible framework
- No recovery: destroy and rebuild
- Easy to pick up and create a new complete stack
The Development

The Team

• Methodology
• Mentality
• Motivation
• Personality

• Ownership?
• Who writes the spec?
The Development

The Dev Environment

• Tight schedule
  ▪ Fast iterations
    • Design, Develop, Deploy, Destroy
  ▪ Feature driven design

• Communication
  ▪ Oversight / insight
    • Single point of contact
  ▪ Open access for devs
  ▪ Appeasing stakeholders
    • Legitimate concerns
THEN
and
NOW
Then and Now

Time to Create and Deploy a Site

3–5 DAYS

Vs.

24 HOURS
Then and Now

Time to Bring a Virtual Machine Online

$ Number of words required to get a Virtual Machine online

$ then 23523 words

$ now 5 words
Then and Now

Time to Configure an Application Server

3 DAYS

Vs.

< 5 HOURS, AUTOMATED
Then and Now
Time to Configure a Database Server

1 WEEK vs. <5 HOURS, AUTOMATED
Then and Now

Time to Deploy a Patch (Hours)

4,500 HOURS 18 Months Ago
160 HOURS 12 Months Ago
40 HOURS 6 Months Ago
3 HOURS Today
Then and Now

Time to Re-balance Database Layer

1.5 MONTHS OF OVERTIME
2 People

Vs.

4/4 DECISION-MAKING/4 HOURS REVIEW
Automated
Then and Now

*Time to Recover Our Entire Environment*

5+ WEEKS vs. <24 HOURS
how did it all COME TOGETHER?
How Did it All Come Together?  
Abstracting Enterprise Components

• Abstracting System and Software Components
  □ What are our Software Components?
    • Application Agents
    • Customer Databases
  □ What are our System Components?
    • Application Servers
    • Database Servers
How Did it All Come Together?

Abstracting Harder

- What are the relationships between these components?
- How can they be abstracted?
  - **Cluster**
    - A selection of Customers grouped together and handled by a single Agent
  - **Node**
    - An instance of a cluster running on an Application Server
- What do these abstractions allow us to infer by relation?
How Did it All Come Together?

Agile Development

• Adaptable to
  ▪ Unknown Performance and Needs
  ▪ Changing Requirements
• High Visibility provides
  ▪ Decreased Risk
  ▪ Increased Business Value
• Collaborative Design promotes
  ▪ Diverse Viewpoints
  ▪ Shared Experience