CFEngine

LinkedIn

KEY FACTS

• Needed to accommodate rapid growth in business by automating 40k+ servers.

• Team Size = 6 Members

• Making 5-10 production changes per day.

WHY CFENGINE

• Enabled a low touch, programmable approach to infrastructure automation and IT operations.

• Increased efficiency with minimal risk as well as enhanced visibility into infrastructure operations.

"Our operations team will make around 5-10 production changes per day. CFEngine provides the automation framework & gives us the ability to continue to scale operationally. "

Mike Svoboda

Systems & Automation Engineer, LinkedIn

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Company Biography

LinkedIn, one of the world's leading online professional networks, has enjoyed explosive growth, scaling from 300 machines in 2010 to over 40,000 servers growing very rapidly every month. As a result, the company turned to CFEngine to scale and automate its infrastructure throughout its entire lifecycle - from build and deploy to continuous operations

Challenge

LinkedIn operates one of the world's premier online professional networks, allowing members to manage and share their professional identity online, find jobs, connect with other professionals, and locate business opportunities. LinkedIn has grown significantly since its inception and currently serves over 250 million users in over 200 countries. In March 2014, Quantcast reported that LinkedIn gets 237 million monthly unique U.S. visitors. Supporting this exponential business growth presented the IT infrastructure operations team at LinkedIn with a unique set of challenges and requirements:

Accommodating rapid growth: With a group of 40,000 servers growing over 5% per month, LinkedIn adds thousands of new machines every year. To keep pace, these machines needed to be configured and set up for production in 15 minutes or less, with minimal headcount addition.

Increasing developer efficiency: It took several weeks for new resources to be setup on the infrastructure using traditional methods, a

process that was repeated many times every week. LinkedIn needed to automate this process so users could be removed or added to thousands of machines within minutes, freeing up IT operations to focus on higher value work.

Avoiding fear of change and increasing agility: With the site and traffic growing at a very fast clip, LinkedIn needed an automation solution that could introduce changes in a controlled fashion to minimize the risk of breaking the production environment.

Establishing a culture of trust: LinkedIn needed to offer elevated access to production machines to engineers while at the same time introducing self-healing capabilities to ensure that the systems could recover to their earlier state if an engineer were to cause production disruption.

The Solution

In the face of these mounting challenges, LinkedIn chose CFEngine to automate their infrastructure configuration and lifecycle management by enforcing intended system state for compliance. Unlike other platforms based on Ruby, Python or Perl, CFEngine has provided LinkedIn with a lightweight solution based on 'C' with minimal dependencies that can easily scale to thousands of machines. CFEngine controls virtually everything in production except for the application deployment, including setting up new servers from bare metal, all OS configurations, software updates, and Java-based lifecycle management.

The Results

Rapid and Dynamic Server Management

CFEngine provides LinkedIn with a fully-automated provisioning process that can put a new machine into production within minutes, so they can easily add hundreds of new machines a month into production. This includes bare-metal provisioning, operating system configuration, account administration (assigning ssh access and sudo account elevation to machines), auditing against desired state, hardware failure detection, and system monitoring. CFEngine automation means that LinkedIn operations staff no longer needs to log into individual machines to maintain them – they instead make changes into CFEngine as a policy and the changes are propagated to all the relevant servers.

Increased Engineer Efficiency

Prior to CFEngine, LinkedIn needed to ssh to every machine to add accounts and it would 2-3 weeks to get new hires set up in all of the infrastructure. Now, using CFEngine, they have the ability to install and remove hundreds of users from thousands of machines in minutes. They have also taken advantage of this capability to minimize other repetitive tasks, so when the operations team solves an issue once and commits it to CFEngine, it is automatically replicated on other machines. As a result, wasted time is minimized and freed up to pursue higher value work.

Minimized risk with insightful phased deployment rollouts

LinkedIn can now make large-scale changes across thousands of machines in a controlled manner that minimizes the risk of breaking the production environment. To implement this, they use CFEngine to assign each policy to a range class of specific machines affected by the policy. When the operations staff commits a change to production (such as sudo rules, account access, or software installs), they assign it to its related range classes at 0%, - no systems initially affected. Next they increase the range class to contain 10% of machines and CFEngine's monitoring capabilities immediately notify them if anything breaks as a result of the change, in which case they can immediately roll it back to its previous state. If not, they gradually increase to 100% while continually monitoring for issues. Phased rollout is one of the most important features CFEngine has enabled LinkedIn to implement because it gives them the confidence to automate operations change management aggressively with the knowledge that it will not break the production environment. As a result, it is now common for LinkedIn to push up to 15 CFEngine-related changes per day.

A culture of trust that leads to agility

CFEngine enables LinkedIn to minimize the possibility of engineers inadvertently causing "configuration drift" and disrupting the production environment. Rather than adding significant delay by carefully evaluating every elevated access request from engineers before granting it, LinkedIn now grants root access to engineers by leveraging the powerful flexibility of CFEngine classes to determine who gets elevated access and where. By doing this, an engineer can't disrupt a machine because in the case of any issues, CFEngine will immediately restore the system to its desired system state using its policy engine. Thanks to CFEngine, LinkedIn believes that their account privilege escalation infrastructure is probably one of the most advanced and flexible solutions in the industry.

Granular insight of actual states in seconds regardless of scale

LinkedIn uses CFEngine to publish data about the status of any machine to a custom- built monitoring solution which can answer environment questions almost immediately. CFEngine is used as a closed-loop system enabling LinkedIn to make configuration changes while visualizing the impact of those changes immediately to ensure they have taken place as intended.

THE BOTTOM LINE

✔️ **Fully Automated Infrastructure**

Provision and bring online in minutes. Reliably & consistently.

✔️ **Automated User Management**

Add/remove users and accounts from thousands of machines in minutes.

✔️ **Phased Rollout With Reporting**

Make dozens of changes across thousands of machines reliably.

✔️ **Make Changes Only Once**

Set it and forget it. Operations commits changes to CFEngine to infrastructure only one time.

✔️ **Safely Grant Access to Team**

Elevated access grants reporting ability to remediate and restore to operational configuration.

✔️ **Scalable In-Memory Reporting**

Publish data about any machine to reporting system and provide answers in seconds.

✔️ **Failure Detection & Repair**

Automatically detect and replace failed hardware.

✔️ **Programmable Infrastructure**

Leverage programmable infrastructure to migrate to self-owned facility in 5 months.

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