

How we learned to stop worrying and start deploying
The Netflix API service



NETFLIX

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Netflix started out as a DVD rental by mail service in the US.



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NETFLIX

Watch TV shows & movies
anytime, anywhere.
Plans from \$7.99 a month.

[Start Your Free Month](#)

Sign In

Watch on your PS3, Wii, Xbox, PC, Mac, Mobile, Tablet and more.

TV shows & movies streamed instantly over the internet

No commitments, cancel online anytime

Introduced on-demand video streaming over the internet in 2007



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Global Streaming for Movies and TV Shows



Started expanding the streaming service into international markets a few years after launching in the US



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High Quality Original Content



Late 2011/2012 marked a major new strategic focus with foray into the world of original programming



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Shows like HoC & Orange have been received with high acclaim; as evidenced by recent Emmy wins. Strategy is to expand internationally and pursue high quality content to drive engagement and acquisition.



Over 50 Million Subscribers



Over 40 Countries

Global expansion, high quality originals and personalized content have fueled rapid subscriber growth.



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> 34% of Peak Downstream Traffic in North America

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	BitTorrent	24.53%	Netflix	34.21%	Netflix	31.09%
2	HTTP	14.27%	YouTube	13.19%	YouTube	12.28%
3	SSL	6.54%	HTTP	11.65%	HTTP	11.84%
4	Netflix	6.44%	iTunes	3.64%	BitTorrent	5.96%
5	YouTube	5.52%	SSL	3.42%	SSL	3.80%
6	Skype	2.23%	BitTorrent	3.40%	iTunes	3.33%
7	Facebook	2.17%	MPEG	2.85%	MPEG	2.62%
8	FaceTime	1.50%	Facebook	1.99%	Facebook	1.83%
9	Dropbox	1.20%	Amazon Video	1.90%	Amazon Video	1.82%
10	iTunes	1.15%	Hulu	1.74%	Hulu	1.58%
		64.40%		76.24%		74.58%

sandvine

Over 2 billion streaming hours a month

Netflix now accounts for over 1/3rd of downstream internet traffic in NA at peak. This number has been in the news a lot lately!



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Our members can choose to enjoy our service on over 1000 device types.



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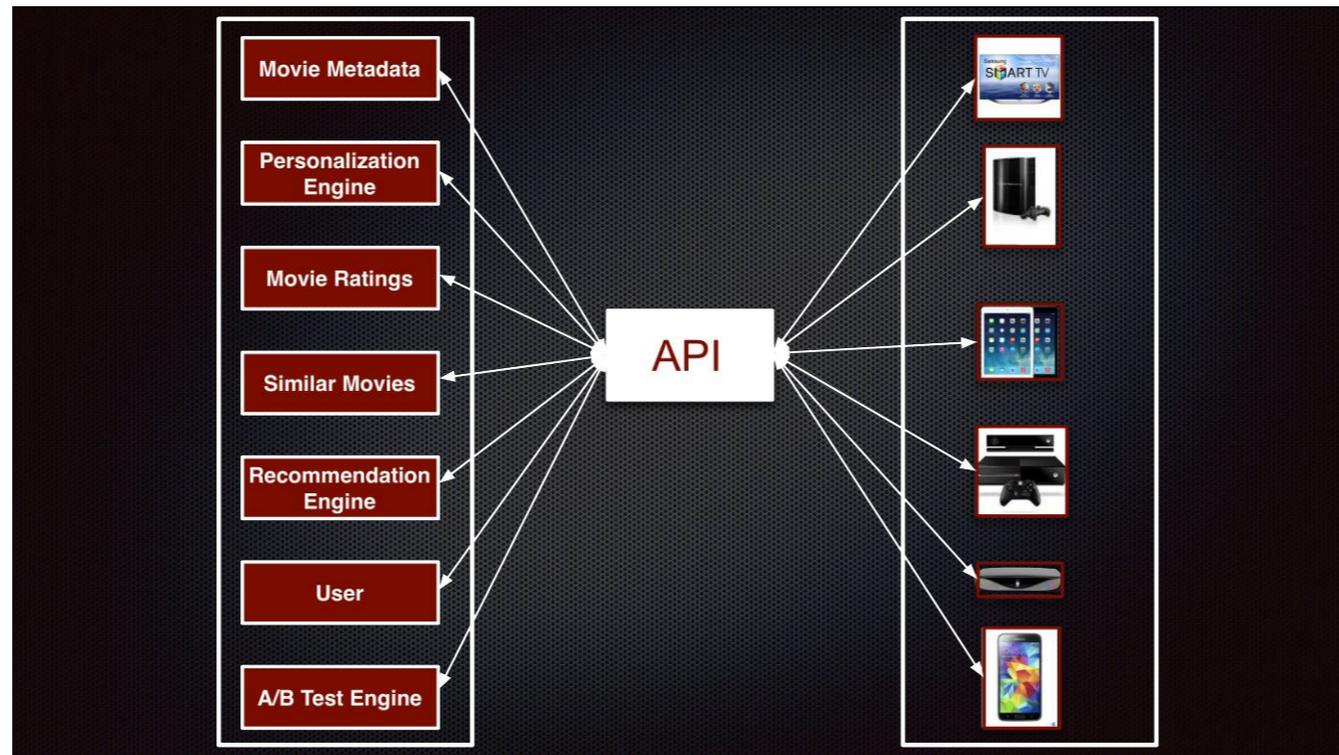
Personalized User Experience



Edge Engineering operates the services that are the entry point to the personalized discovery and streaming experience for our members.



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This is an extremely high level view of how the Netflix Discovery experience is rendered. API is the internet facing service that all devices connect to to provide the user experience. The API in turn consumes data from several middle-tier services, applies business logic on top of it as needed and provides an abstraction layer for devices to interact with. The API in effect, acts as a broker of metadata between services and devices. Put another way, almost all product functionality flows through the API.



Role of API

- Enable rapid innovation
 - Conduit for metadata between Devices and Services
 - Implements business logic
- Scale with business growth
- Maintain resiliency

<http://goo.gl/VhokZV>





Looking at the motivations behind our move towards CD



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PM: When can I get my feature?



PM: When can I get my feature?

Us: 2 -4 weeks



PM: When can I get my feature?

Us: 2 -4 weeks - ish...



PM: When can I get my feature?

Us: 2 -4 weeks - ish...

IF all goes well...

We were lacking confidence in our delivery process





API Server Push Calendar - 2011

Created and last modified by Sangeeta Narayanan on Nov 02, 2011

This is the API Push Calendar for 2011.

2 week release cycle

PROD Push	Code Freeze	JIRA Query	Status	Push Lead	CI Lead	Notes
2011-01-11	2011-12-28	API 01.11 Push				PUSHED Push delayed to 01/17 because of issues around partner notification
2011-01-25	2011-01-11	API 01.25 Push	API 01.25 Push Status			PUSHED
2011-02-08	2011-01-25	API 02.08 Push	API 02.08 Push Status			PUSHED
2011-02-22	2011-02-08	API 02.22 Push	API 02.22 Push Status			PUSHED
2011-03-08	2011-02-22	API 03.08 Push	API 03.08 Push Status			PUSHED
2011-03-22	2011-03-08		Delayed/Combined with 3.28 Push			
2011-03.28		API 03.22 Push	API 03.22 Push Status			PUSHED Full API push (Was: Off cycle push for Sony Field Test of BIVL 1.5 (BIVL only changes))
2011-04-07	2011-03-22	API 04.07 Push	PUSHED			PUSHED Moving to 04.07 to accommodate BIVL US launch 4/4 - 4/6
2011.04.13		API 04.13 Push	PUSHED			PUSHED Off cycle push for BIVL CA launch (if needed)
2011-04-21	2011-04-05	API 04.21 Push	PUSHED			DELAYED To 4/27 because of AWS outage and lingering issues. Moved to 04.21 to accommodate BIVL CA launch on 4/19



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API Server Push Calendar - 2011

Created and last modified by Sangeeta Narayanan on Nov 02, 2011

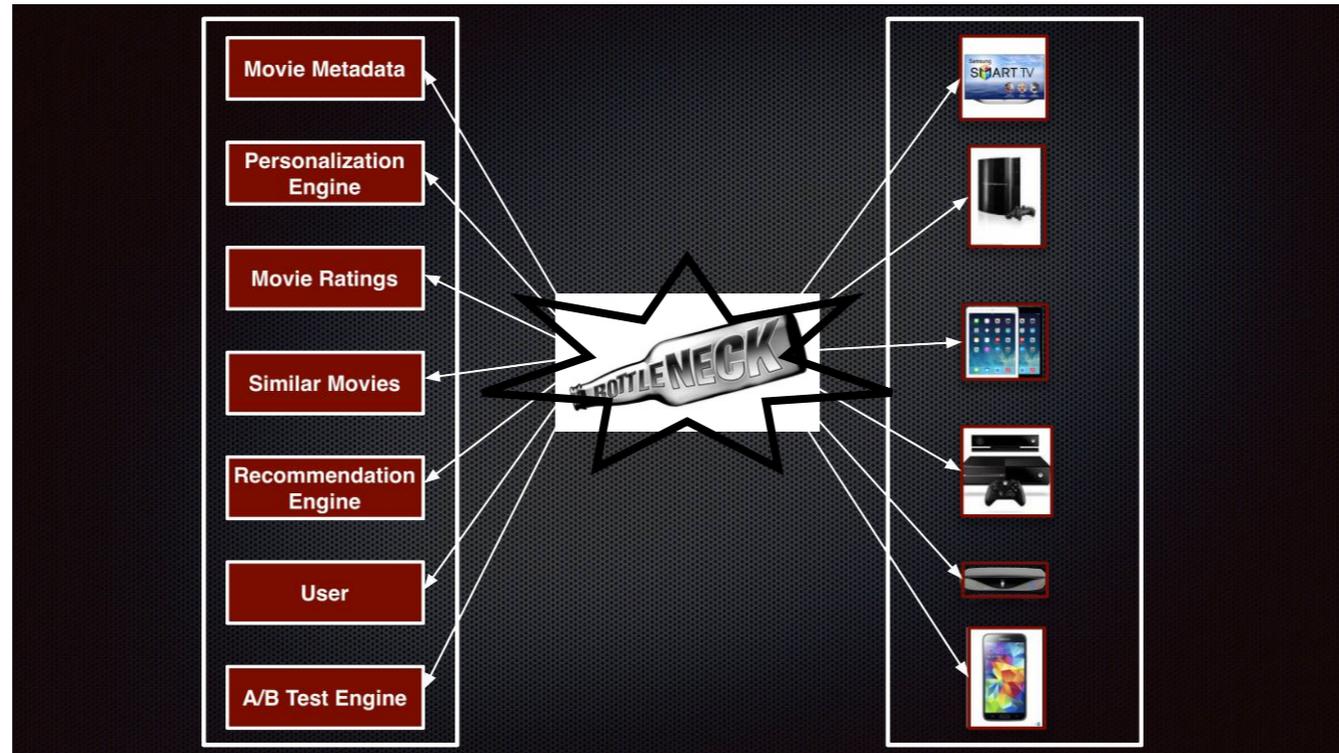
Not Quite!

This is the API Push Calendar for 2011.

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API was becoming a bottleneck where functionality would get delayed.



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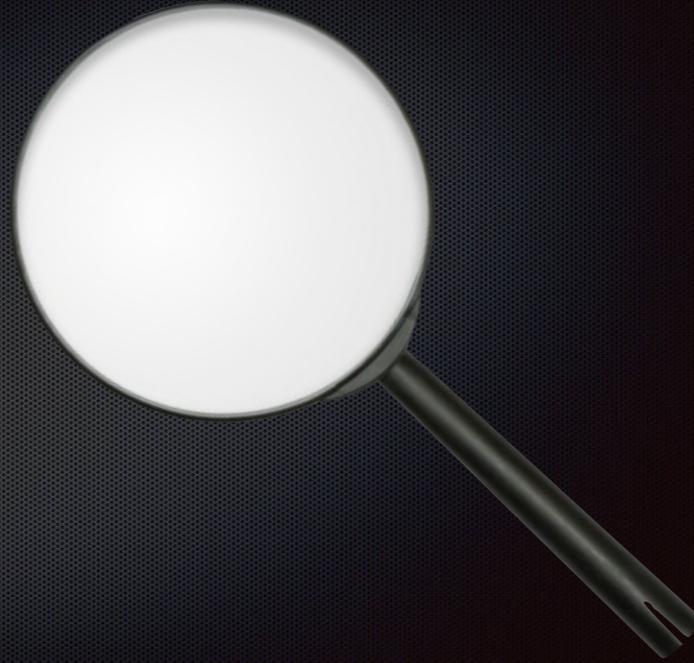


We had a simple goal.

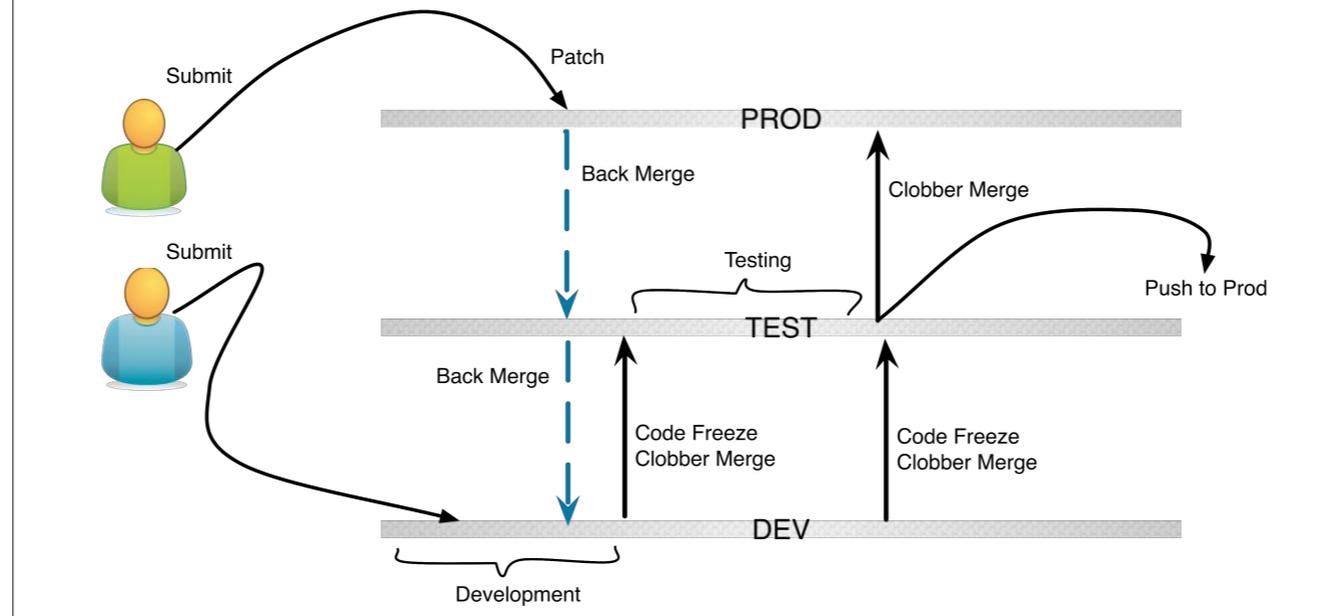


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**What's not
working?**

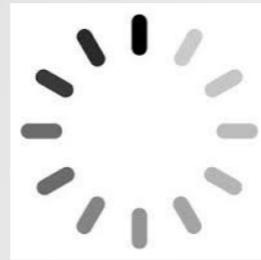


Heavy weight Code Management



3 long lived branches with code in varying states of release readiness. Lots of manual tracking, merging and co-ordination.





Slow, non-repeatable builds



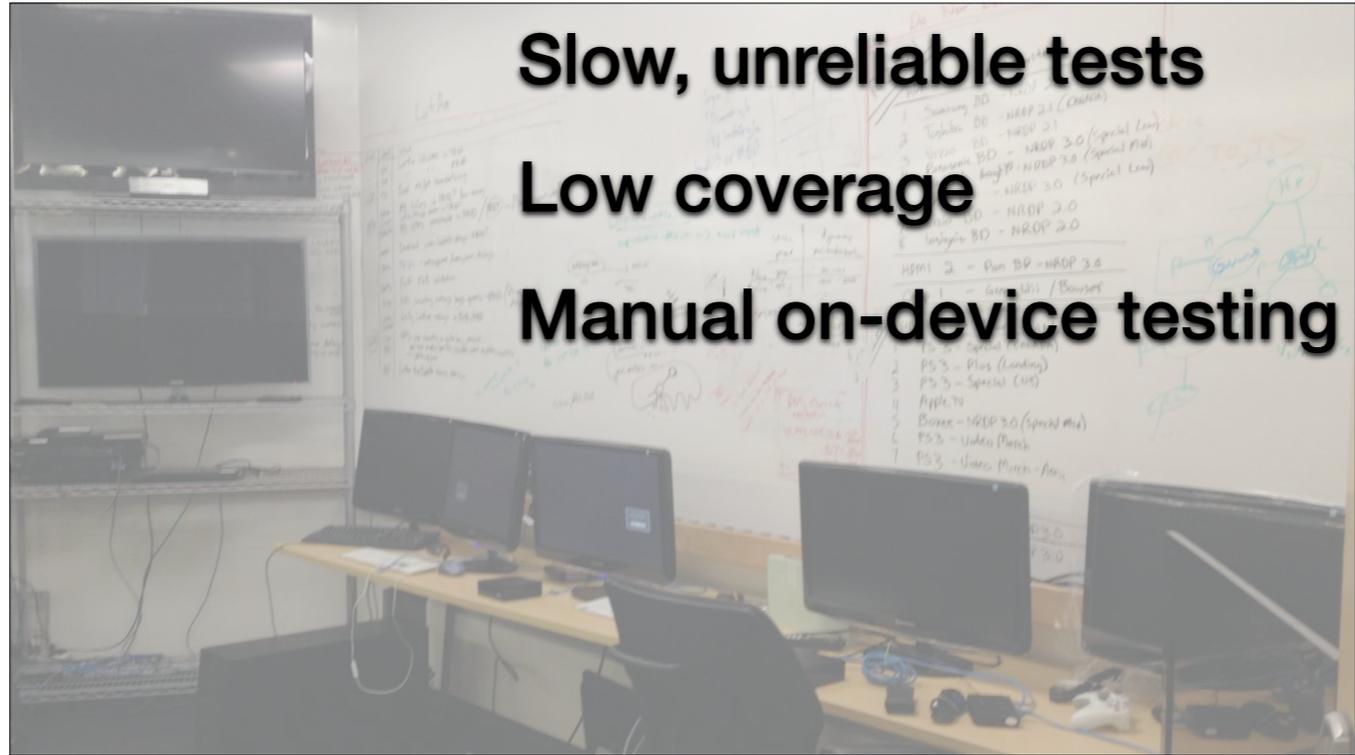
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Constantly Changing Dependencies



Dependency management was hard and contributed to slow, unpredictable builds.





Lots of manual testing - on device tool!



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ASGARD test us-east-1 | 3 Logged in as snarayanan | [Out]

Home App AMI Cluster ELB EC2 SDB SNS SQS RDS Task

Manage Cluster of Sequential Auto Scaling Groups

Prepare Automated Deployment

Recommended next step:
Create a new group and switch traffic to it

api-

Resize to 3

Delete Disable Enable

3 instances grouped by state

Count	State	Build	ELB	Eureka
3	InService	2038	[Icons]	UP

Create Next Group: [Advanced Options](#)

api-

Instance Bounds: Min: 3 Max: 3

Desired Capacity: 3 instances

AMI Image ID: 179727101194/hfix-api.1410152255... [Show more AMIs](#)

After launch: Wait for Eureka health check pass

[Create Next Group api-test-v443](#)

Manual deployments



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Push Lead!



Life of push on-call was not fun.

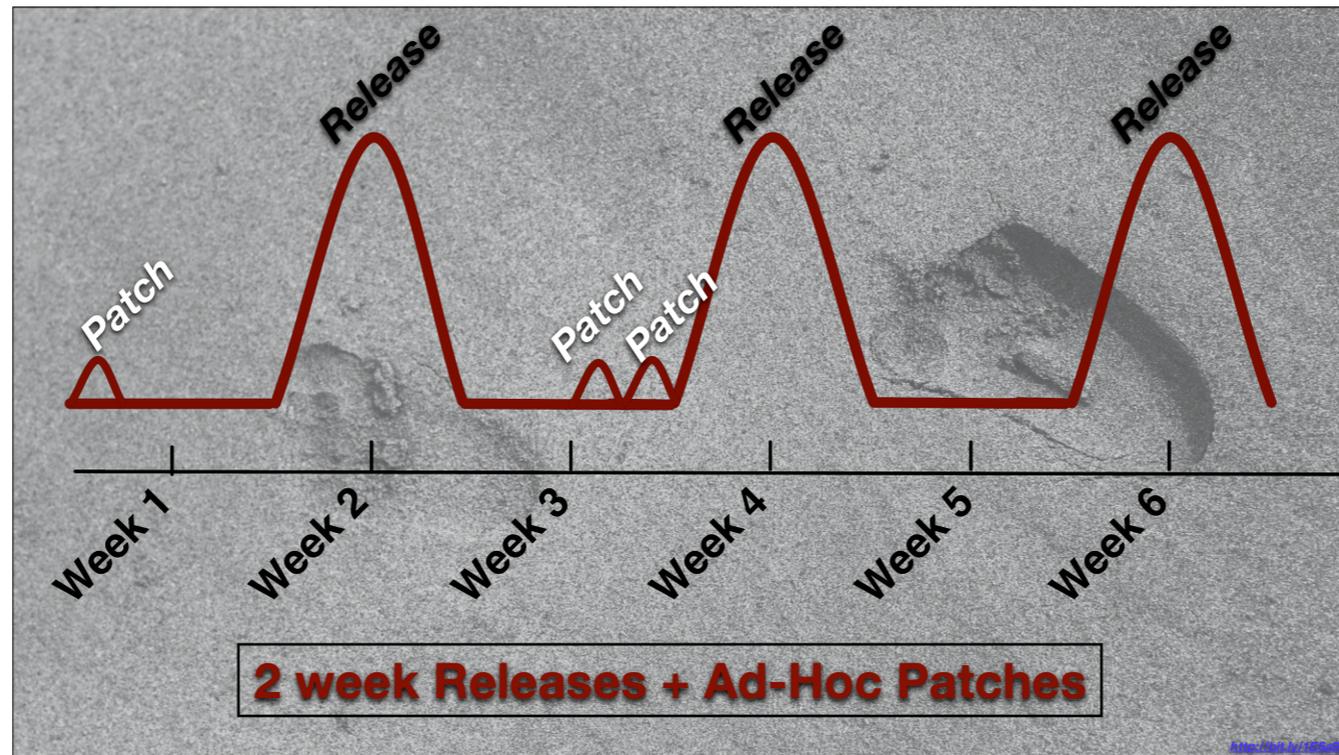


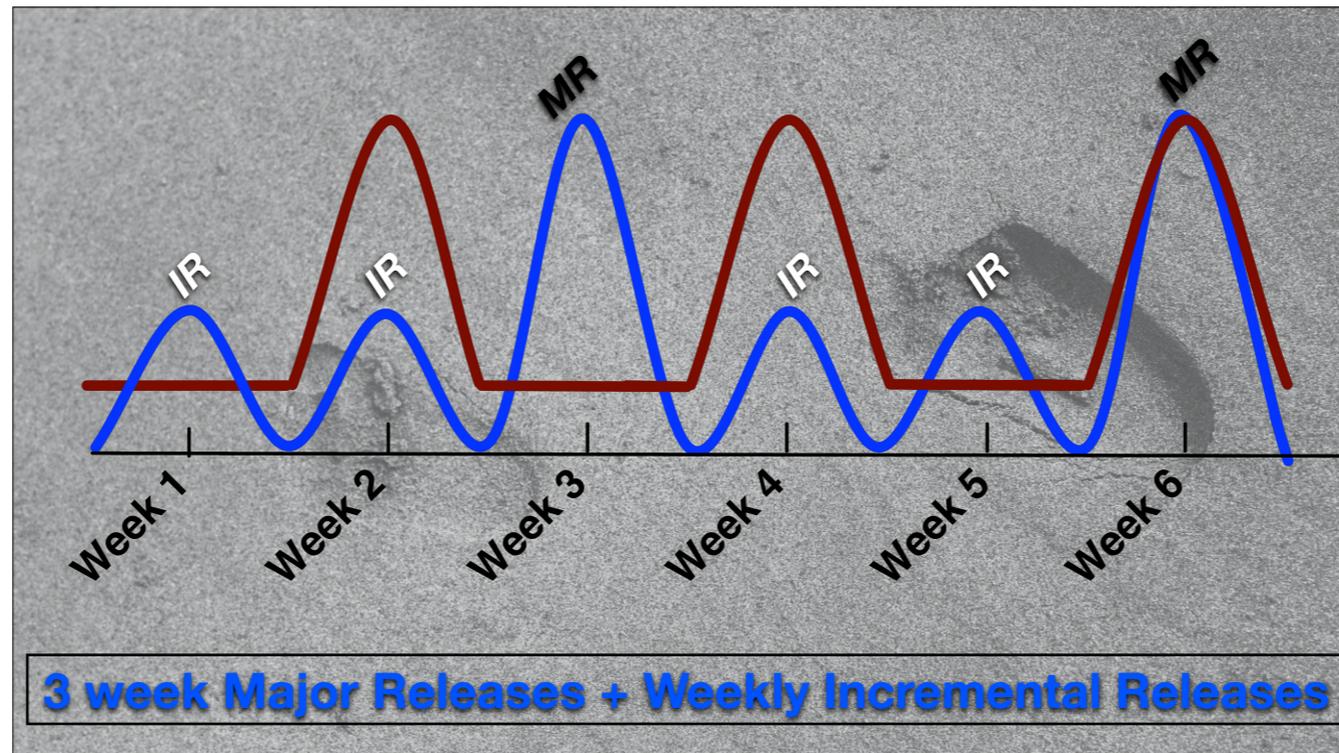
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Requirements for new system

- On-Demand, Rapid Feature Delivery
- Intuitive and painless
- Easy recovery from errors
- Insight and Communication
- Balance between Agility & Stability





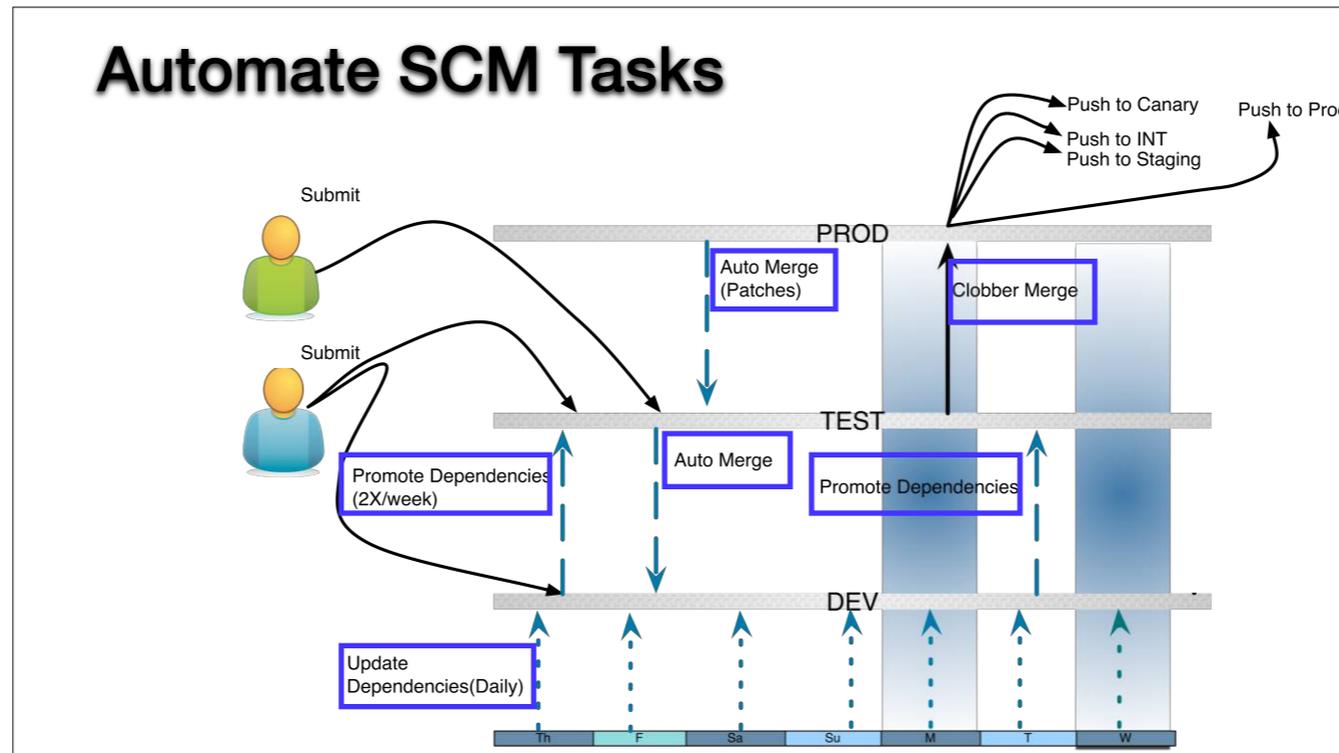


Major releases (MR) every three weeks - dates shared outside the team

Weekly Incremental releases (IR) in between; two IRs per MR cycle



Automate SCM Tasks

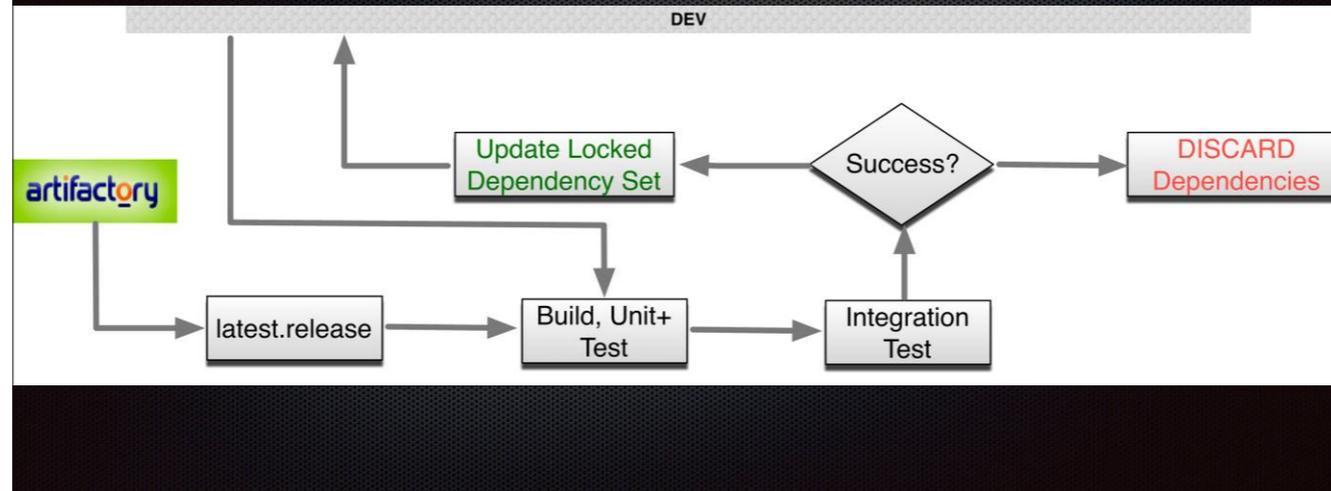


Eliminated Code Freeze. Engineers were responsible for managing their commits.

Automated code merge tasks



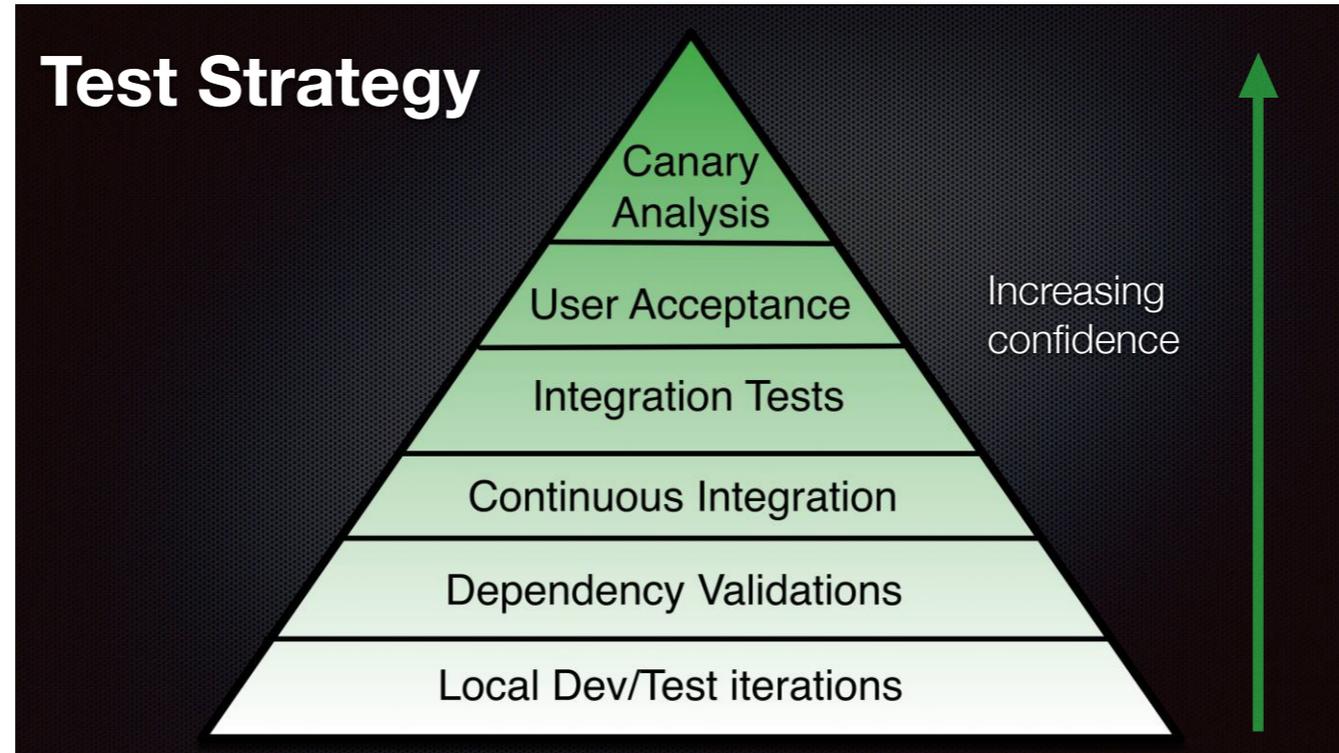
Automated Dependency Validation



Dependency Management was creating a lot of churn in our cycle. We built a separate pipeline that resolved the dependency tree, validated it by running a series of tests and then committed the resolved graph to source. All development is based off that known good set of dependencies until the next run of that pipeline.



Test Strategy



Worked out a test strategy so effort could be applied at the appropriate level of testing. The idea was to build a series of tests that acted as gates and as code made its way up the pyramid, our confidence in it would increase.



Test Runtimes ↓ **60%**
No False Positives

ENABLE AUTO REFRESH

Tests Cc

Workspace

Last Successful Artifacts

- api_4.1320-h1928.95287af_all.txt
- null.txt
- pull-request.properties
- test-results.json

Recent Changes

Latest Test Result (no failures)

Upstream Projects

- EDGE-Master-Install-RPM

Eliminating non-determinism and shortening runtime is a fundamental requirement. The point to note is that this is an ongoing process; you need to stay on top of this!



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Improved Result Reporting

Test :	com.netflix.atf.api.video.json.CatalogTitlesTests.testEpisodeDetails.1		
Parameters :	id=http://api.netflix.com. v=2.0 esn= HFXZ1CKEX9FFMAR params={v=2.0, esn= HFXZ1CKEX9FFMAR, debug=true, output=json, country=US} output=json country=US		
Duration :	11:53:07 - 11:53:07		
Assertions			
Num	Test	Result	Message
1	assertEquals	PASSED	Expected: 'Episode 2' Actual: 'Episode 2'
2	assertEquals	PASSED	Expected: 'Example Show: Ssn 1: Ep 2' Actual: 'Example Show: Ssn 1: Ep 2'
3	assertEquals	PASSED	Expected: '' Actual: ''
4	assertEquals	PASSED	Expected: '' Actual: ''
5	assertEquals	PASSED	Expected: 'Title[titleShort=Example Show: Ssn 1: Ep 2,regular=Episode 2,episodeShort=,episodeSho
6	assertEquals	PASSED	Expected: 'Episode 2' Actual: 'Episode 2'
7	assertNotNull	FAILED	Assertion Error: sequence is not as expected Expected: Object to be 'NOT NULL' Actual: 'null'

In keeping with the goal of making the system simple and intuitive, we added detailed insights into test results so anyone could quickly root cause failures and act on them.



Automated Deployments

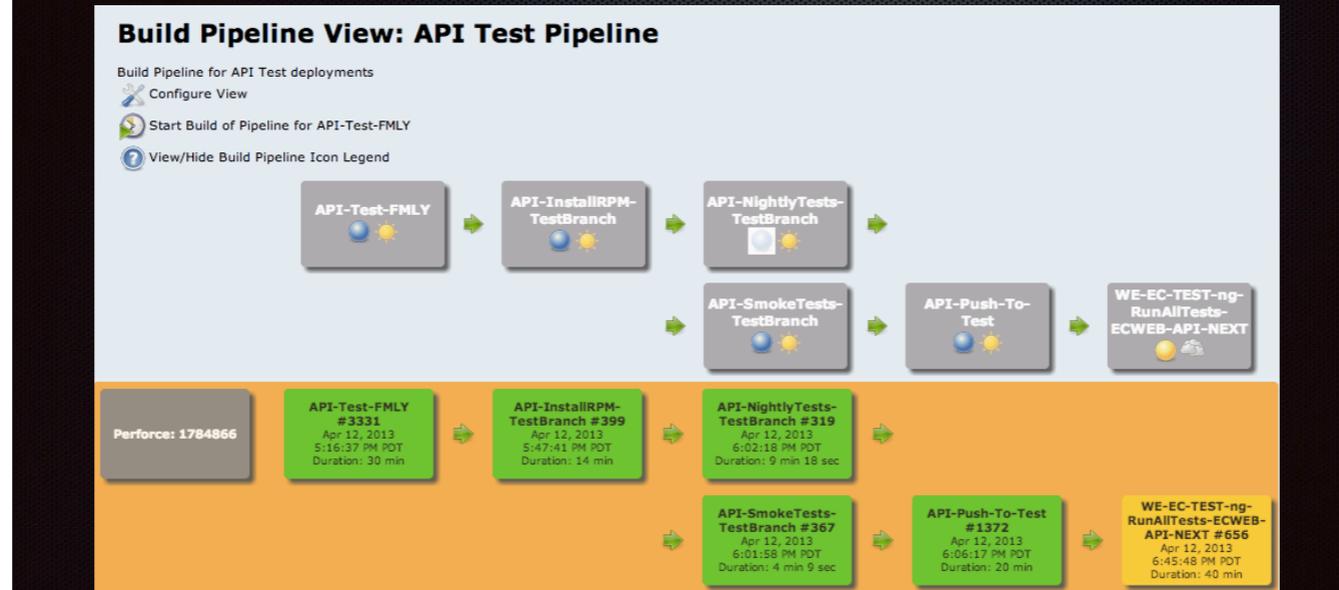
- Internal Environments
- Using Asgard API
- Connected to builds
- Driven from CI Server



By now, we were operating multiple internal environments and the company was getting ready to bring a new AWS region online. We automated deployments to all those environments.



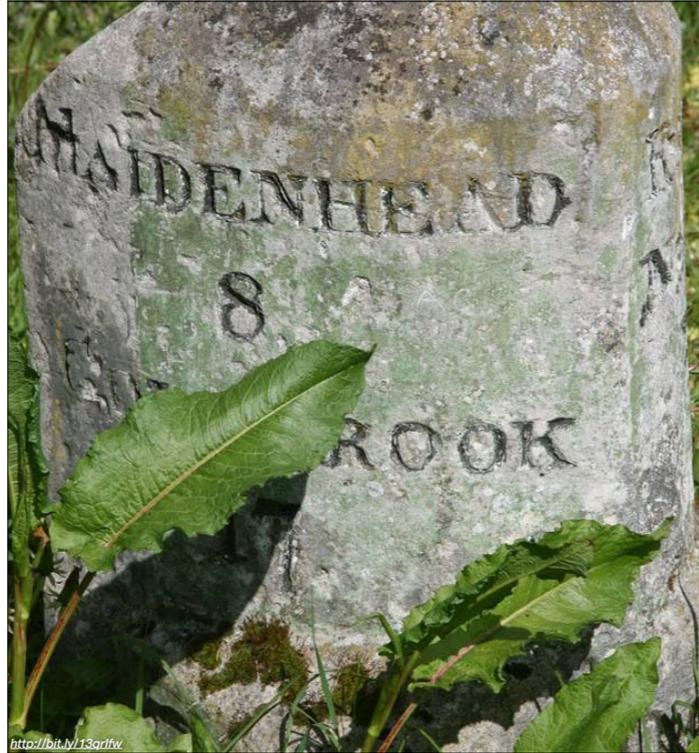
Pipelines



And now, we had ourselves a pipeline! In fact, we had 3 - one for each long lived branch.



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- Multiple **deployments/day**
- Multiple internal **environments**
- Multiple AWS **regions**

A big milestone for the team.



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Team Cohesion

- Shared ownership - no silos
- Increased partner satisfaction
- Greater productivity

Equally, if not more important was the change in the team dynamic. There was increased cohesion as people got comfortable with the self-service model and the idea of sharing ownership.

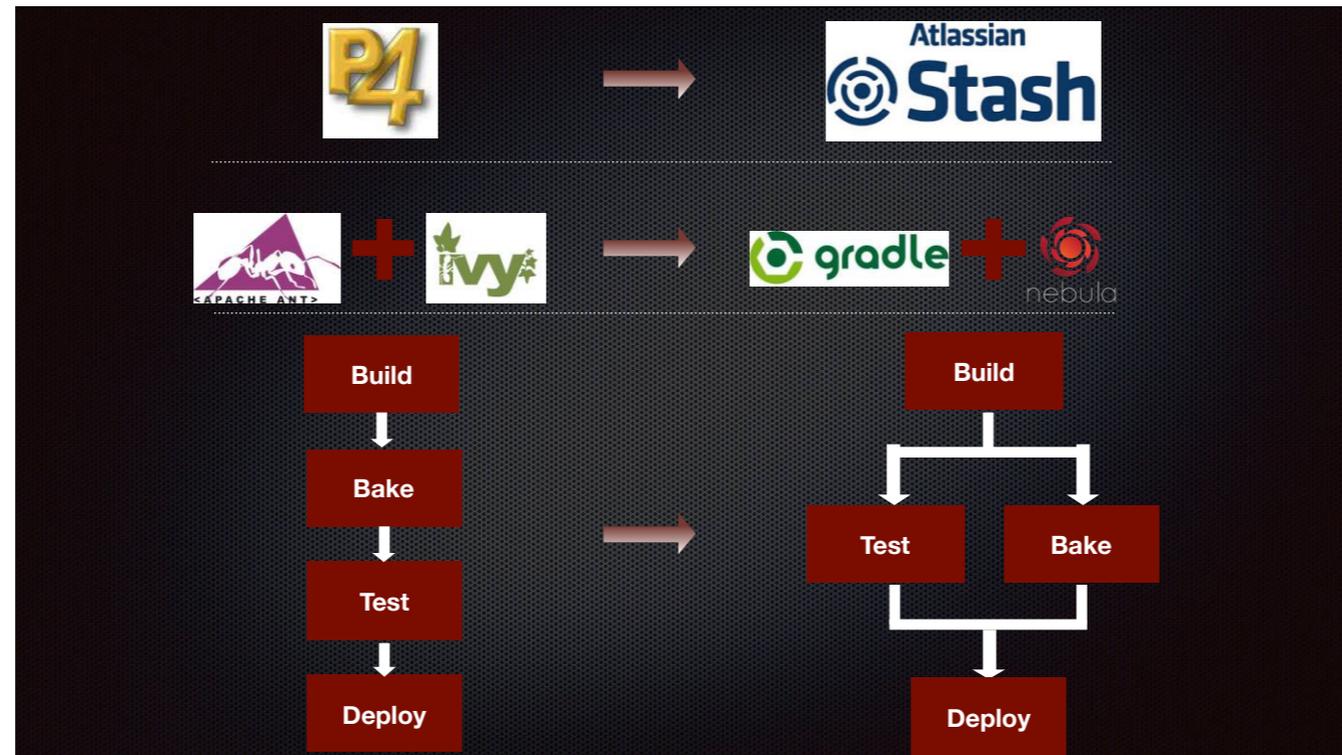




Faster, Better, All the way!

- ❑ **Shorter Feedback Loop**
- ❑ Increased Confidence
- ❑ Richer Insight & Communication





Increase velocity: Developer workflow

NETflix BUild LAnguage plugin for Gradle that provides specific functionality for the Netflix environment



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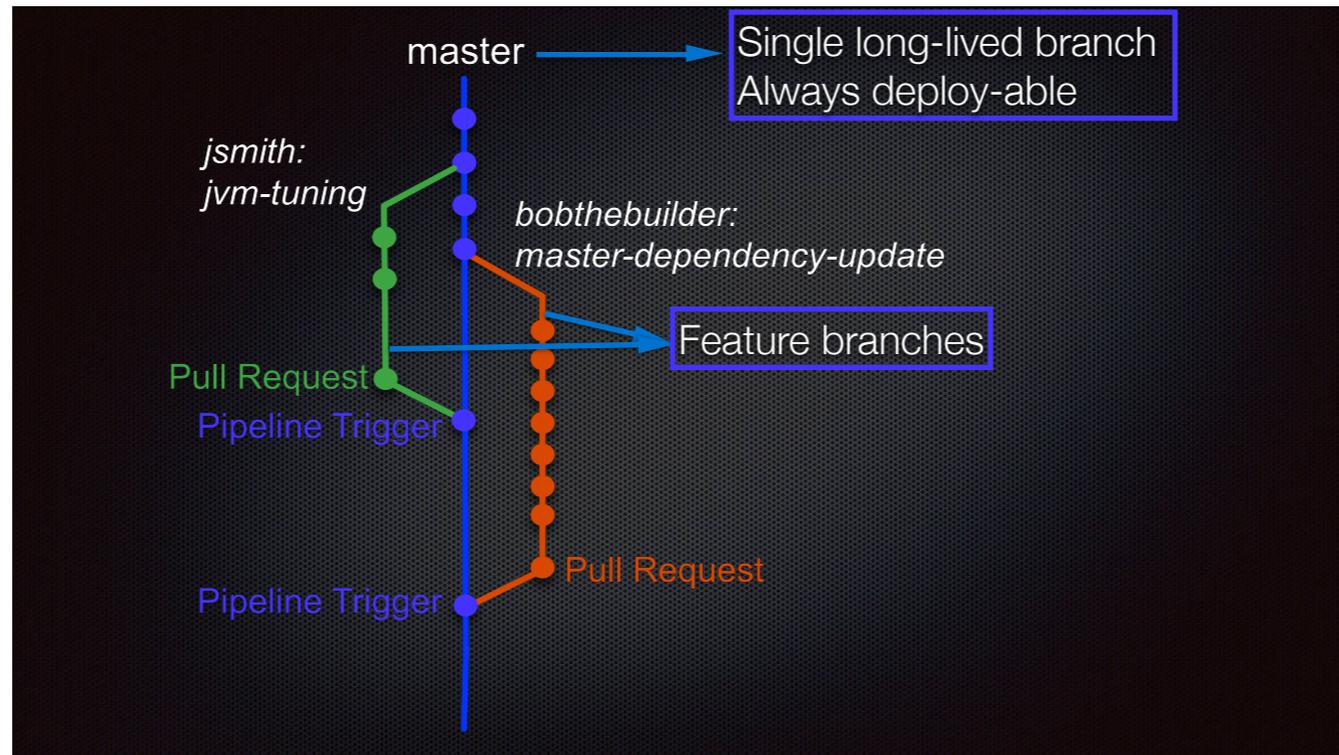
Branching Strategy

Modeled after github-flow

Automated Pull Request Processing

Automated Patch Branching





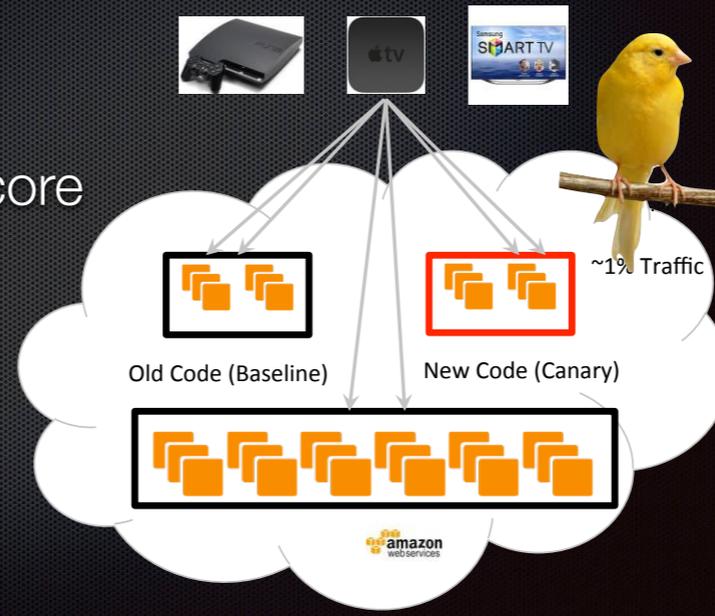
More, Better, Faster & to Prod

- ✦ Shorter Feedback Loop
- ✦ **Increased Confidence**
- ✦ Richer Insight & Communication



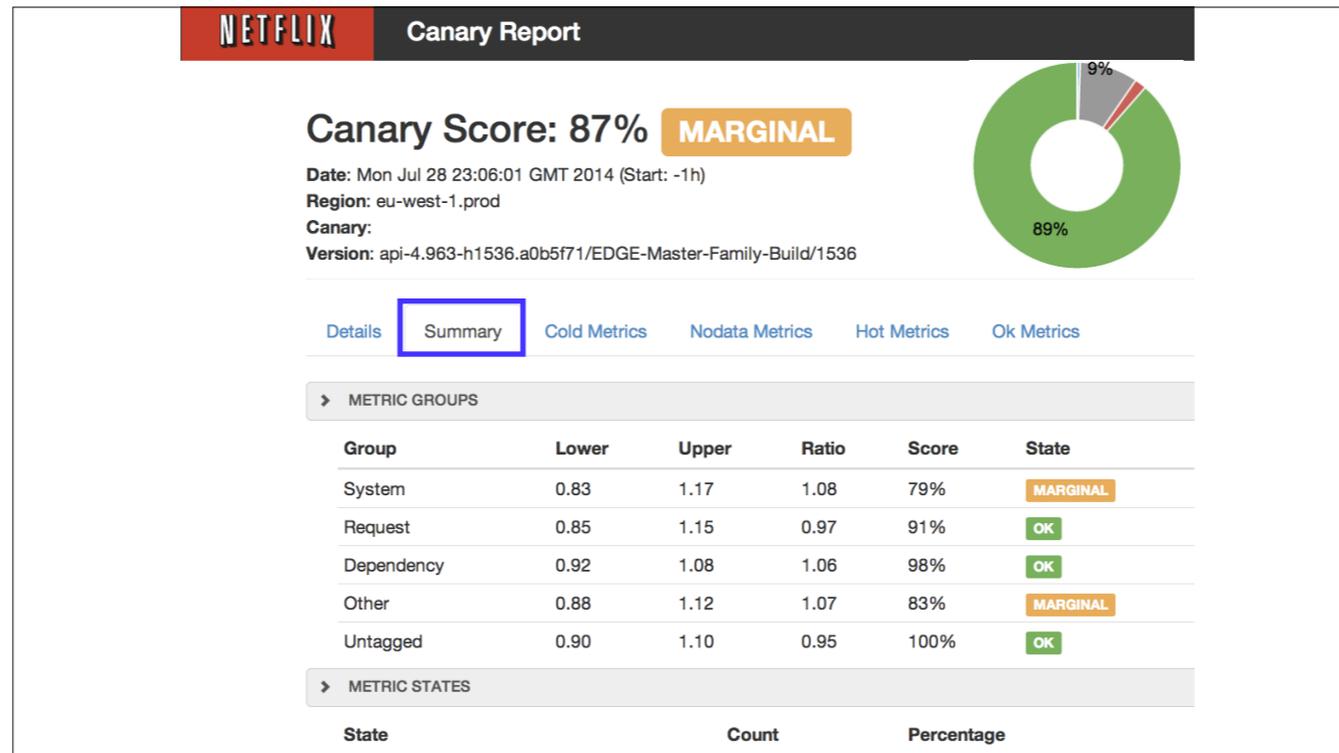
Automated Canary Analysis

- Aggregate Health Score
- >1500 metrics
- Configurable
- Multiple regions



Automated Canary Analysis is the arguably the most important tool in our toolkit. We started out small, comparing simple metrics. Then expanded it to make it a system that generates a health score based on comparisons across 1000s of metrics.





Canary reports are generated at periodic intervals and emailed to the team. They are also available off the dashboard. The report shows an overall confidence score of the readiness of that build. This one didn't do very well.



NETFLIX Canary Report

Canary Score: 87% **MARGINAL**

Date: Mon Jul 28 23:06:01 GMT 2014 (Start: -1h)
Region: eu-west-1.prod
Canary:
Version: api-4.963-h1536.a0b5f71/EDGE-Master-Family-Build/1536

[Details](#) [Summary](#) [Cold Metrics](#) [Nodata Metrics](#) **Hot Metrics** [Ok Metrics](#)

➤ system metrics

Name	State	Ratio	Lower	Upper	Average
_OpenFileDescriptorCount	HOT	1.2005	0.8	1.2	10227.2213
ParNew_CollectionCount	HOT	1.2024	0.8	1.2	0.4605
AtlasPlugin_MetricCount	HOT	1.0409	0.98	1.02	23779.3123

➤ dependency metrics

Details of the problematic metrics that contributed to the poor canary score.



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EdgeCenter ENDPOINTS SERVICE LAYER DELIVERY ENVIRONMENTS DEPLOYMENTS CANARIES TRIGGERS APPLICATION EDGE Server

Developer Canaries (dynamically provisioned)

developer EDGE-De

#	🔗	Date	Build	Source	Committer(s)	Bake	Patch Server	Smoke Tests	Canary Push
1093		Oct 27 14:56	✓	api		✓	✓	✗ 2	
1092		Oct 23 15:15	✓	grc		✓	✓	✓	
1091		Oct 16 23:43	✓	prc ack		✓	✓	✓	✓ 99%
1090		Oct 16 23:20	✓	prc		✓	✓	✓	
1089		Oct 16 10:38	✓	prc		✓	✓	✗ 5	✓ 99%
1088		Oct 15 12:21	✗	Pin					
1087		Oct 6 16:14	✓	prc		✓	✓	✓	✓ 99%
1086		Oct 5 21:10	✓	s STI		✓	✓	✓	✓ 94%
1085		Oct 5 19:10	✓	s STI		✓	✓	✗ 5	



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EdgeCenter ENDPOINTS SERVICE LAYER DELIVERY ENVIRONMENTS DEPLOYMENTS CANARIES TRIGGERS APPLICATION EDGE Server

dependency [EDGE-Dependency-Update-Family-Build](#)

#	Date	Build	Source	Committer(s)	Bake	Patch Server	Smoke Tests	Canary Push
718	Oct 27 17:00	✓	master-dependency-update		✓	✓	✓	94%
717	Oct 27 12:00	✓	master-dependency-update		✓	✓	✓	97%
716	Oct 26 23:07	✓	master-dependency-update		✓	✗		
715	Oct 26 17:00	✗	master-dependency-update					
714	Oct 25 17:00	✗	master-dependency-update					
713	Oct 24 17:00	✗	master-dependency-update					
712	Oct 24 13:01	✓	master-dependency-update		✓	✓	✓	87%
711	Oct 23 17:00	✓	master-dependency-update		✓	✓	✓	96%
710	Oct 23 14:11	✓	master-dependency-update		✓	✓	✓	

Dependency Validation Canary



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DELIVERY PIPELINE (Builds View)

DELIVERY
Branches View
Builds View
Commits View

FUNCTIONAL TESTING
Known Test Issues

Table View Workflow View

Search: [] Today Last Week Last Month

master source: master-dependency-update	Build 2071 EDGE-Master-Family-Build Oct 27 21:31	Patch Server Oct 27 21:38	Bake Oct 27 21:38	Smoke Tests Oct 27 15:03	Int Push Oct 27 22:09
master source: fix-oauth-login	Build 2070 EDGE-Master-Family-Build	Bake Oct 27 20:58	Smoke Tests	Int Push Oct 27 21:21	
dependency source:	Build 718 EDGE-Dependency-Update-Family-Build	Patch Server Oct 27 17:09	Smoke Tests Oct 27 16:38		
developer source: apuser_observable	Build 1093 EDGE-Developer-Branch-Build	Bake Oct 27 15:02	Smoke Tests Oct 27 08:19		
dependency	Build 717 EDGE-Dependency-Update-Family-Build	Patch Server Oct 27 12:08	Smoke Tests		

Deployed

Not intended for deployment

Not deployable; failed tests



Hands Free Production Deployments

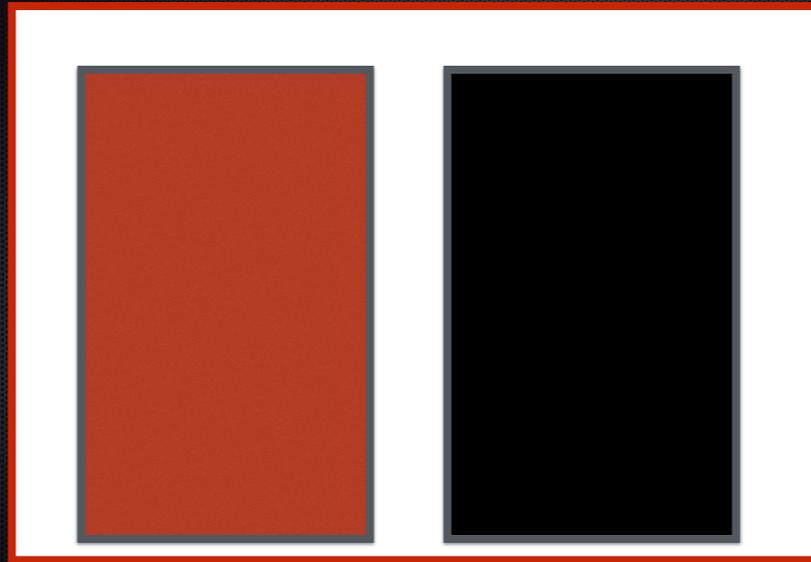


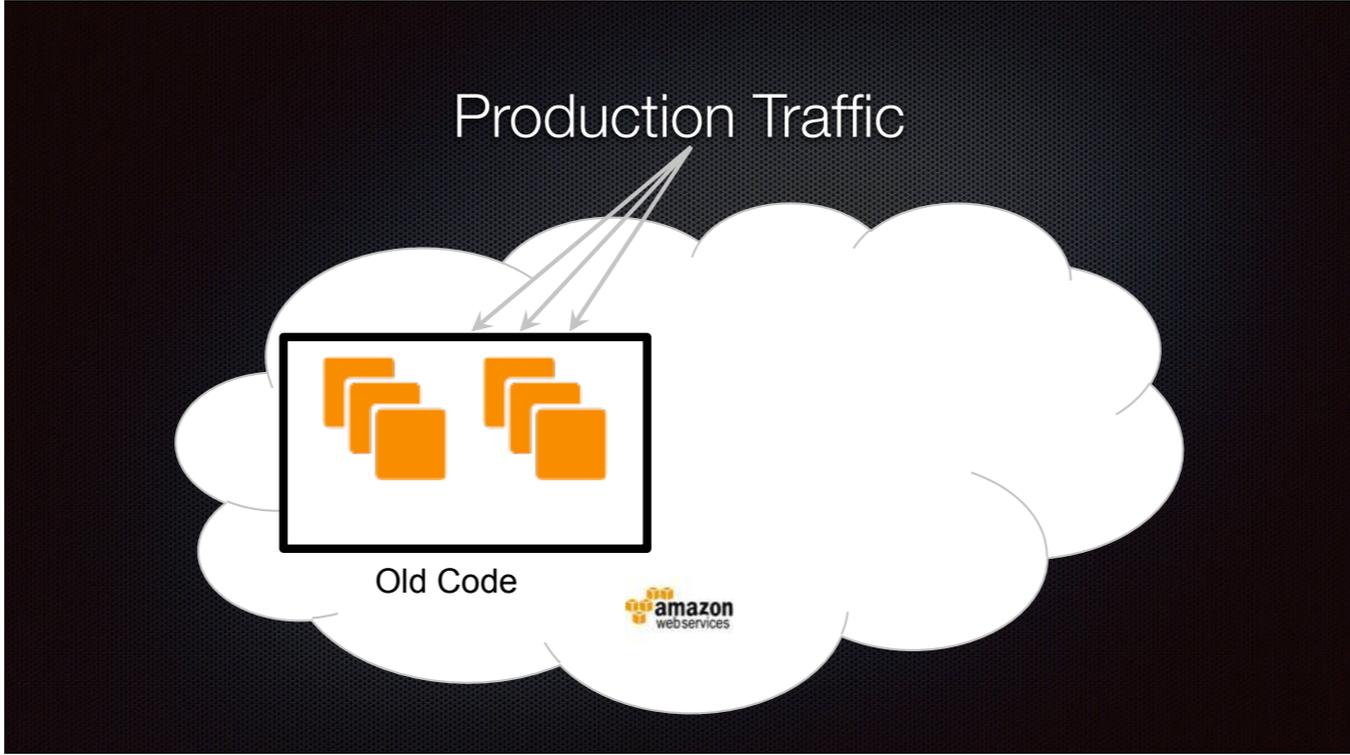
<http://bit.ly/1wQ8fEQ>

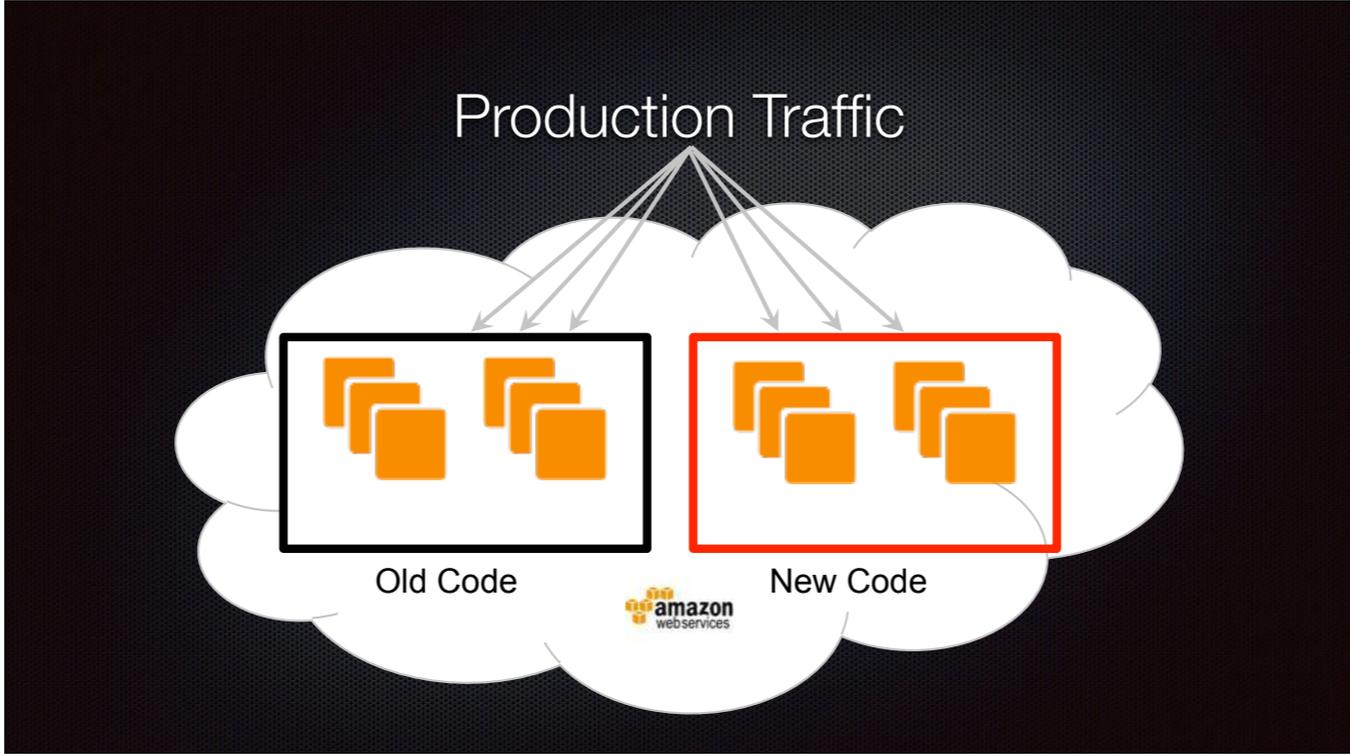


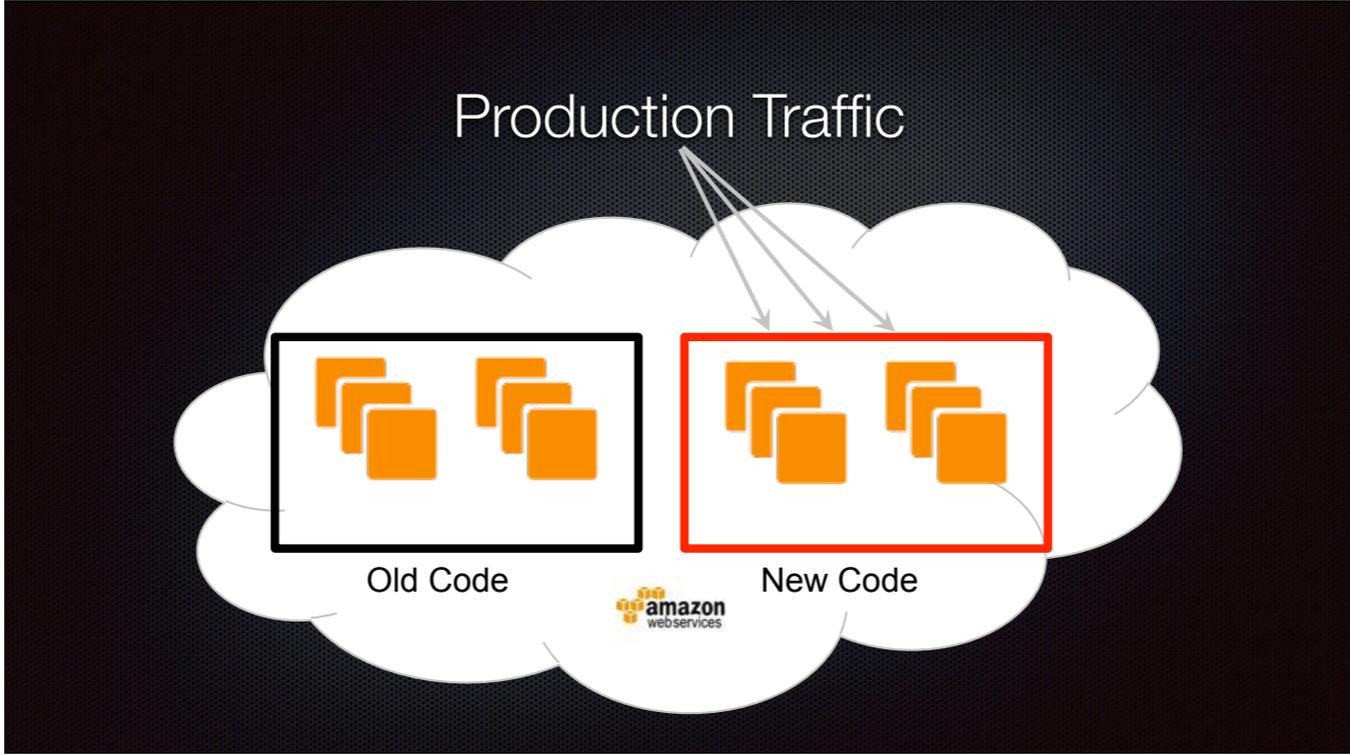
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Red/Black Deployments









★ Prod us-east-1 [redacted] FailuresInProd

Summary: prod.us-east-1 - **failing**
in production fleet

Check time: 2014-10- Environment: prod
Time of alert: 2014-10 Region: us-east-1

Match set:
Incident Key: email, :

Description / Instructions

Helpful Dashboards

Related Links





We can see an outage in real time - the no. of 5XX errors & latency spiked during the incident. This data is being streamed by hundreds of servers, aggregated using Turbine and streamed to the dashboard.



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Feature Rollback

Fast Properties for api

Refresh Create New Fast Property Show 50 entries Search: EDGE-

Property	Value	Env	Region	Stack	Additional Scope	Expiration
com.netflix.api.feature.EDGE-103.enabled	ON	test				
com.netflix.api.feature.EDGE-1060.enabled	true	test				
com.netflix.api.feature.EDGE-1135.enabled	true	test				
com.netflix.api.feature.EDGE-1135.enabled	true	test		test		
com.netflix.api.feature.EDGE-1200.enabled	false	test				
com.netflix.api.feature.EDGE-1214.enabled						
com.netflix.api.feature.EDGE-1493.enabled						
com.netflix.api.feature.EDGE-1494.enabled	true	test		mdrm		

Edge Services / EDGE-1493
Default Kids Profile

Dynamic configuration using Archaius allows features to be toggled dynamically. If newly introduced feature proves to be problematic, turning it off is an easy way to restore system health. Archaius is a set of config mgmt APIs based on Apache Common Config lib. This allows configuration changes to be propagated in a matter of minutes; at runtime without requiring app downtime. Configuration properties are multi-dimensional and context aware so their scope can be applied to a specific context e.g. env = Test/Staging/Production or region=us-east/us-west/eu-west etc.



Full Rollback

EdgeCenter ENDPOINTS SERVICE LAYER DELIVERY ENVIRONMENTS DEPLOYMENTS CANARIES TRIGGERS APPLICATION EDGE Server

DEPLOYMENTS Schedule

TRIGGER / SCHEDULE PUSH

PUSH ROLLBACK

Environment : prod
 prod (us east)
 prod (us west 2)
 prod (eu)

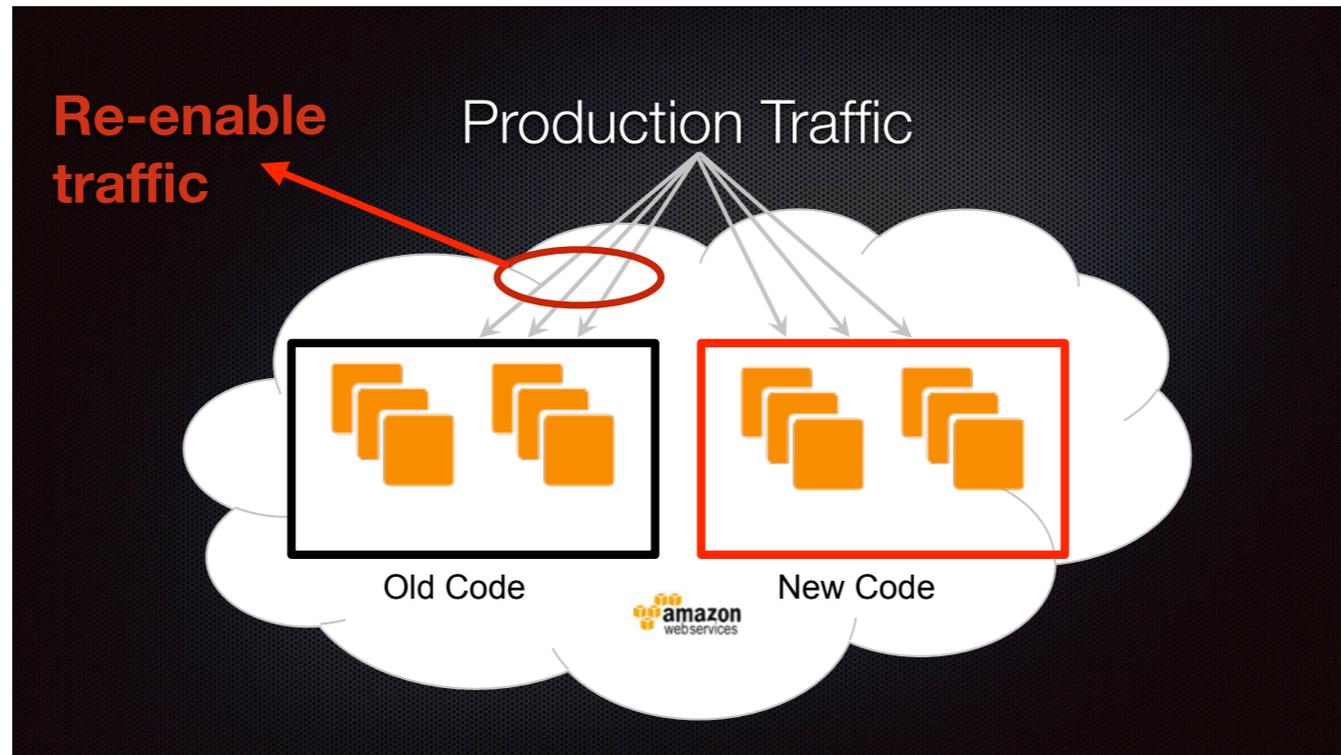
User : @netflix.com

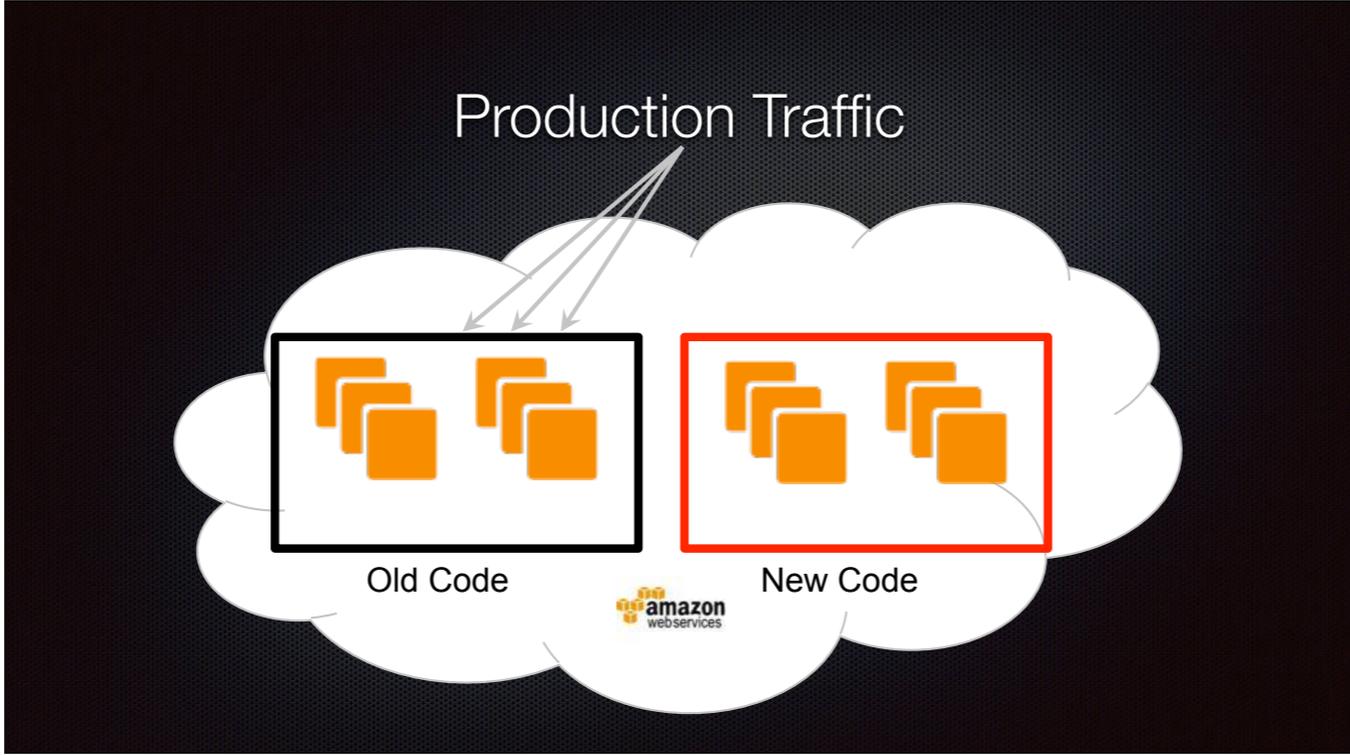
Rollback

Group	Environment	Status	Date	Build	Requestor	Details
PROD	prod (us east)	DEPLOYED	Fri, Oct 24, 10:00 PDT	EDGE-Master-Family-Build-2066		Details
	prod (us west 2)	DEPLOYED	Fri, Oct 24, 10:00 PDT	EDGE-Master-Family-Build-2066		Details
	prod (eu)	DEPLOYED	Fri, Oct 24, 16:15 PDT	EDGE-Master-Family-Build-2066		Details

In the event that a newly deployed version of the software proves to be problematic, the system can be rolled back to the previous version. The old cluster is kept alive for a few hours so the automation knows what to roll back to. Because of our extensive use of autoscaling, provisioning the clusters accurately is tricky; and having to do it manually across three regions would make rollbacks slow and leave them to prone to error. Even though rollbacks are rare, the cost of getting it wrong is too high.







More, Better, Faster & to Prod

- ▣ Shorter Feedback Loop
- ▣ Increased Confidence
- ▣ **Richer Insight & Communication**



The screenshot displays the EdgeCenter dashboard with the following components:

- Navigation Bar:** ENDPOINTS, SERVICE LAYER, DELIVERY, ENVIRONMENTS, DEPLOYMENTS, CANARIES, TRIGGERS. Application: EDGE Server.
- Auto Canary And Prod Push Events:**
 - Next Auto Canary And Prod Push: Oct 28 17:00 PDT
 - Show All Events, Show Trigger
- Event Details (Oct 27 17:00 PDT):**
 - Status: **IN PROGRESS** (with Cancel button)
 - Committer(s): [Redacted]
 - Build: **EDGE-Master-Family-Build-2069** | 8 commit(s) | Libraries: Upgraded: 71 | **Source & Library Diff**
 - Canary: [Progress indicator] | Hour(s): 5 | Details
 - Prod Deployments Schedule: us-west-2: **Oct 28 10:00 PDT** | eu-west-1: **Oct 28 15:00 PDT** | us-east-1: **Oct 28 10:00 PDT**
 - Build Promotions: Build [Progress indicator] | Baker [Progress indicator] | Patch Server [Progress indicator] | Smoke Tests [Progress indicator] | Int Push [Progress indicator] | Autoprodpush Canary [Progress indicator] 96%
 - Build: **EDGE-Master-Family-Build-2069** Libraries
 - Date: Oct 24 15:01:14
 - Artifact: api_4.1439-h2069.a72afa1_all.deb
 - AMI(s): [ami-0434b26c (us-east-1), ami-a89039df (eu-west-1), ami-d3a8e6e3 (us-west-2)]
 - Duration: 6 minutes
 - Pull Request Id: 2572
 - Source Branch: [Redacted]
 - Changes:
 - 1 a72afa12ce96fa386d75d066650195e76c18acc EDGE-2345 -
 - 2 1977affc13c15ac1705a23e66ed2e666dc9745ab EDGE-2345 -
- Production Deployments Table:**

Group	Environment	Status	Date	Build	Details
PROD	prod (us east)	DEPLOYED	Fri, Oct 24, 10:00 PDT	EDGE-Master-Family-Build-2066	Details
	prod (us west 2)	DEPLOYED	Fri, Oct 24, 10:00 PDT	EDGE-Master-Family-Build-2066	Details
	prod (eu)	DEPLOYED	Fri, Oct 24, 16:15 PDT	EDGE-Master-Family-Build-2066	Details
- Footer:** edgecenter.netflix.com/#

Dashboard shows the status of current and upcoming deployments, builds and associated artifacts. Diff reports for source and libraries help identify contents of the build.



EdgeCenter ENDPOINTS SERVICE LAYER DELIVERY ENVIRONMENTS DEPLOYMENTS CANARIES TRIGGERS SELECT APPLICATION EDGE Server

Known Test Issues

#	Date	#	Build	Source	Committer(s)	Bake	Patch Server	Smoke Tests	Int Push	Canary Push	Prod Push (us-east-1)	Prod Push (eu)	Prod Push (us-west-2)
1	Aug	1639	✓	dynamic-new-episode-ba		✓	✓	✓	✓				
2	Aug	1638	✓	bugfix/STR-12072-serializ		✓	✓	✓	✓				
3	Aug	1637	✓	automerger-prod-to-maste		✓	✓	✓	✓				
4	Aug	1636	✓	bugfix/APIMediaAttrib		✓	✓	✓	✓				
5	Aug	1635	✓	mediaroom-profile-manag		✓	✓	✓	✓				
6	Aug	1634	✗	mediaroom-profile-manag									
7	Aug	1633	✓	nicobar-primer-bootstrap		✓	✓						
8	Aug	1632	✗	nicobar-primer-bootstrap									
9	Aug	1631	✓	feature/STR-12065-add-te		✓	✓	✓	✓				
10	Aug	1630	✓	mediaroom-profile-manag		✓	✓	✓	✓				
11	Aug	1629	✓	-edit-ee3e986d74		✓	✓	✓	✓				
12	Aug	1628	✓	automerger-prod-to-maste		✓	✓	✓	✓				
13	Aug	1627	✓	mediaroom-profile-manag		✓	✓	✓	✓				
14	Aug	1626	✓	config-svc-mod-fix		✓	✓	✓	✓				
15	Aug	1625	✓	mediaroom-profile-manag		✓	✓	✓	✓	93%	✓	✓	✓
16	Aug	1624	✓	rebuild		✓	✓	✓	✗				
17	Aug	1623	✗	cargo-console-logging									
18	Aug	1622	✓	composite_hook_init_fix		✓	✓	✓	✗				
19	Aug	1621	✓	composite_hook_init_fix		✓	✗						
20	Aug	1620	✓	runScript-post-string		✓	✓	✓	✓				
21	Aug	1619	✓	update-email-consent		✓	✓	✓	✓	✗			
22	Aug	1618	✓	-edit-95b257cc74		✓	✓	✓	✓				

Different views of the data are available. This is a build that passed through all the stages successfully; including the canary.



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[EDGE Server] Build EDGE-Master-Family-Build-2052 scheduled for production push - netflix.com

to @netflix.com

Deployment of build [EDGE-Master-Family-Build-2052](#) is scheduled for following environments:

Environment : prod (us east)
Scheduled Time : Oct 22 11:46 PDT

Environment : prod (us west 2)
Scheduled Time : Oct 22 11:46 PDT

Environment : prod (eu)
Scheduled Time : Oct 22 15:00 PDT

Check status in [EdgeCenter](#)

Build : [EDGE-Master-Family-Build-2052](#)
Build Promotions : Autoprodpush Canary (HEALTHY, 99) (HEALTHY), Bake (HEALTHY), Patch Server (HEALTHY)
Committers :

Changes : 40 commit(s)

HipChat

EDGE Services

ami-d8db56b0, API us-east-1 push complete, 2014-11-01 09:09:29.841125 UTC

API Bot changed the topic to: west-2 push in progress, 2014-1	netflix.com, ami-1b1a542b, API us-34899 UTC	1:46 AM
API Bot changed the topic to: east-1 push in progress, 2014-1	netflix.com, ami-fe73f796, API us-3796 UTC	1:47 AM
API Bot changed the topic to: west-2 push complete, 2014-1	netflix.com, ami-1b1a542b, API us-286 UTC	2:16 PM
API Bot changed the topic to: east-1 push complete, 2014-1	netflix.com, ami-fe73f796, API us-35067 UTC	2:41 PM
API Bot changed the topic to: west-1 push in progress, 2014-1	netflix.com, ami-807ad4f7, API eu-38552 UTC	3:00 PM
API Bot changed the topic to: west-1 push complete, 2014-1	netflix.com, ami-807ad4f7, API eu-67270 UTC	3:26 PM

Committers and On-Calls are notified when a build is scheduled for deployment so they can be available if needed.



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EdgeCenter ENDPOINTS SERVICE LAYER DELIVERY ENVIRONMENTS DEPLOYMENTS CANARIES TRIGGERS APPLICATION EDGE Server

ENVIRONMENTS View

ENVIRONMENTS CANARY PROD PROD_MISC INT TEST CI List View Cards View

int (us east) 3 Instances

api-int
test, us-east-1

api-int-v157 (3)
EDGE-Master-Family-Build-2102 (ami-64ae210c)
Instances : UP (3)
Created : Nov 3 10:42:39

int (us west) 3 Instances

api-int
test, us-west-2

api-int-v962 (3)
EDGE-Master-Family-Build-2102 (ami-0d59113d)
Instances : UP (3)
Created : Nov 3 10:42:45

int (eu) 3 Instances

api-int
test, eu-west-1

api-int-v927 (3)
EDGE-Master-Family-Build-2102 (ami-44ab0133)
Instances : UP (3)
Created : Nov 3 10:42:40

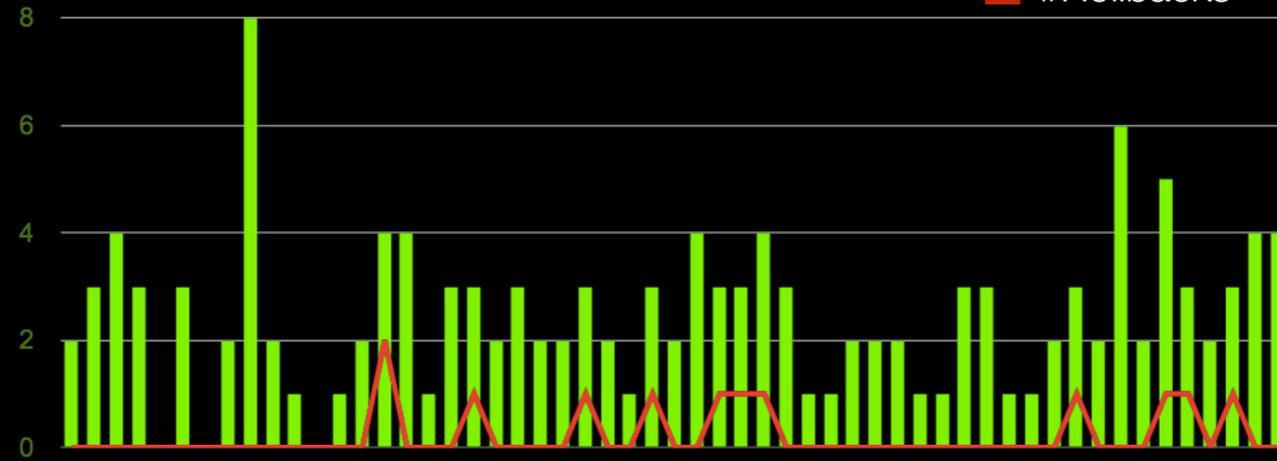


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API Server Deployment Velocity

*Deployments & Rollbacks/week
since Oct 2012*

■ #Deployments
■ #Rollbacks



The current state is that we deploy ~3 times/week on average. Additionally, deployments can be triggered on demand.



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Take-aways

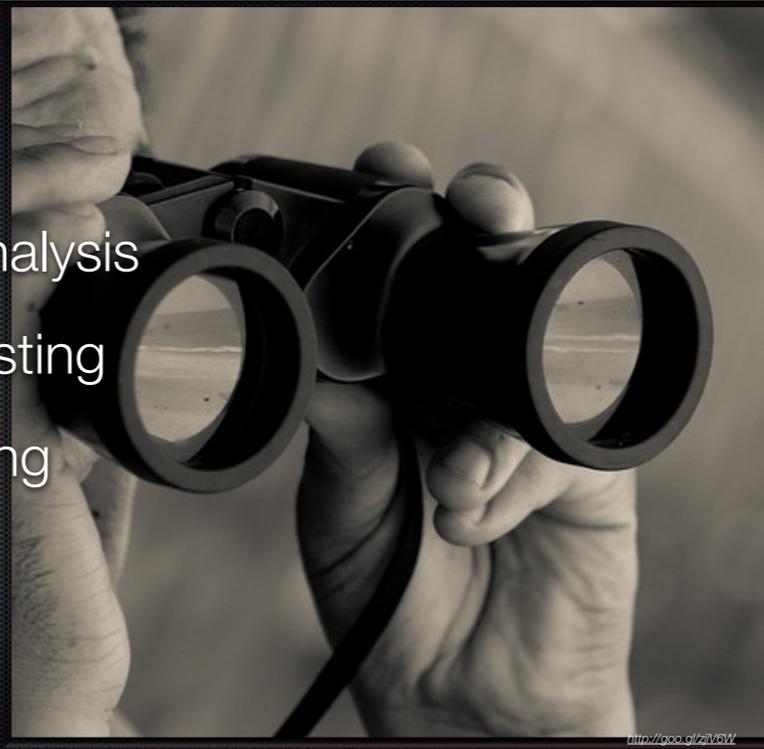
- Build Agility into Architecture
- Embrace Change; Don't Fight it!
- Failure is inevitable
- Insight is key

- Examples of building agility - cloud-native, loosely coupled microservices, distributed data stores, dynamic configuration using Archaius provides ability to effect changes in the behavior of our deployed services dynamically
- Embrace change - dependencies will change; everyone is evolving and moving fast. Best to get ahead of it rather than try and fight it
- Failure is inevitable; re-assess balance of investment between preventing failure and rapid recovery + impact mitigation
- Insight - not just operational(that's a given!), but engineering too. It becomes key when responsibility is shared.



What's Next

- “Tiered” Canary Analysis
- Failure Injection Testing
- Throughput Trending



<http://goo.gl/2i16W>



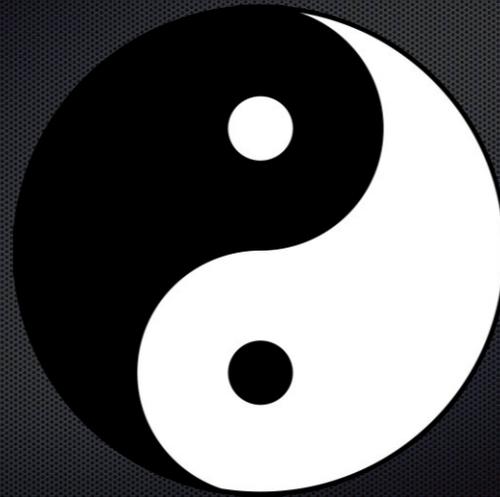


Good architectural practices, automation & tooling and deep insight into our systems allow us to operate resilient systems and go fast at scale. But the key piece that brings it all together and completes the picture is our culture.



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Freedom and Responsibility



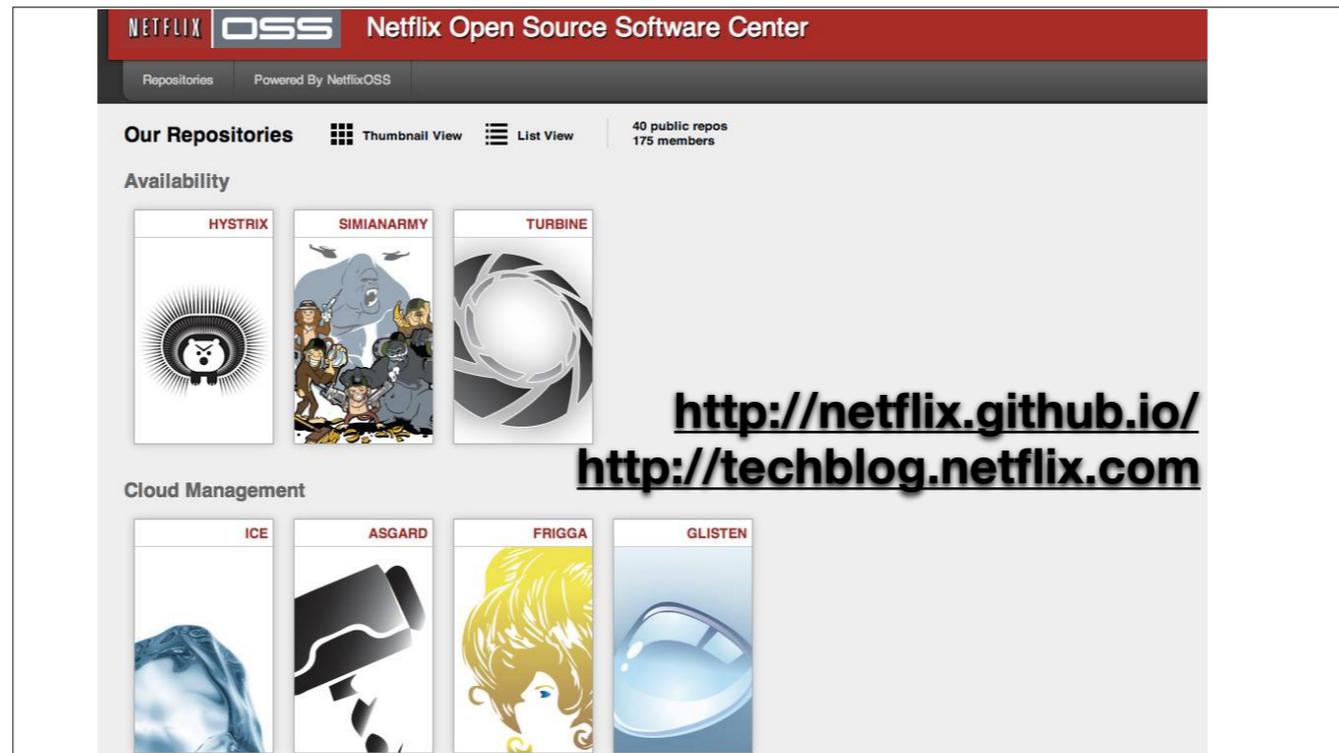
Culture is based on the principles of Freedom and Responsibility.





Employees have the freedom to make decisions and act on them as it pertains to their daily activities. The counterbalance is the responsibility they assume for the implications of their actions. Management's job is to set the appropriate context so employees have all the information they need to make the right decisions and judgement calls. This fosters a blameless culture where people feel empowered to take risks.





Visit our github site and techblog for information and details about interesting topics related to distributed systems,



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How we learned to stop worrying and start deploying
The Netflix API service



Thank You!

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