

Python at Netflix

PyCon

March 16th, 2013



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Corey Bertram
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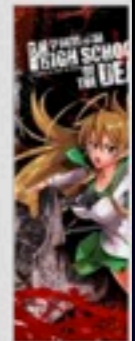
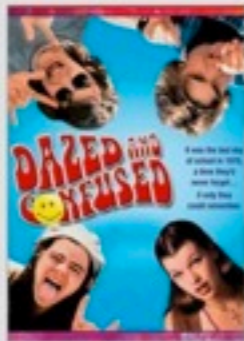
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New movies to watch instantly



Most Popular



New TV to watch instantly



Top Rated



Most Popular



Watch It Again



With more than 33 million streaming members in the United States, Canada, Latin America, the United Kingdom, Ireland and the Nordics, Netflix is the world's leading internet subscription service for enjoying movies and TV programs streamed over the internet to PCs, Macs and TV.

Source: <http://ir.netflix.com>

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Common questions from our blog post

- How did you get Python introduced into a Java environment? I'd like to do that at my company!
- How do you interact with the Netflix platform
- Tell us more about how all this stuff works!



Instance Architecture

Linux Base AMI (CentOS or Ubuntu)

Optional
Apache

Monitoring

Log Rotation
to S3

Appdynamics
Machine
Agent

Java (JDK 6 or 7)

Appdynamics
App Agent
monitoring

GC and
thread
dump
logging

Tomcat

Application war file, base
servlet, platform, interface
jars for dependent
services

Healthcheck, status
servlets, JMX interface,
Servo autoscale

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Instance Architecture

Linux Base AMI (CentOS or Ubuntu)

Optional
Apache

Monitoring

Log Rotation
to S3

Appdynamics
Machine
Agent

Python 2.7

monitoring

Exception
logging

Django, CherryPy, ...

Application file, base
server, platform, interface
libs for dependent
services

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Changing Standards

Security Monkey and Python

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Policies

Raise your hand if you love them

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Policies

(How They Usually Work)



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Policies

(How They Usually Work)

11/27/2006

“Sorry, but the standard monitor...is the HP 17" flat panel. I actually told a director last week that they couldn't have a 19" for a new office so I am not picking on just you.”

6/18/2007

“There is a request for quantity 2 17" flat panels. We have received direction from the CIO that no one will have more than 1 flat panel monitor. I just wanted to let you know that there will only be one monitor ordered ...The 17" is our only standard except for Legal.”

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Policies

(How They Usually Work)

- Prescriptive
- Inflexible
- Determined by others
- Slow to change

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Policies

@nflx



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Policies

@nflx

01/30/2013, 15:22 PST

I'd like to request a 15" MBP w/ Retina Display. I don't know how much you guys care about CPU specs -- it looks like the bump from 2.3GHz to 2.6GHz is reasonably priced at only about \$100, so if it works for you that'd be nice. 16GB RAM and at least 512GB drive.

01/31/2013

12:00 PST: "Forwarded to IT Purchasing to provide a quote to Roy for the requested configuration."

13:33 PST: "Requesting quote from vendor"

15:32 PST: "Attached is the quote, please approve and I'll place order"

15:46 PST: "Thanks for the rapid response. Please order."

15:52 PST: "Ordered. PO #..."

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Policies

@nflx

- Descriptive
- As flexible as we are
- Describe what we choose to do/get
- Evolve quickly

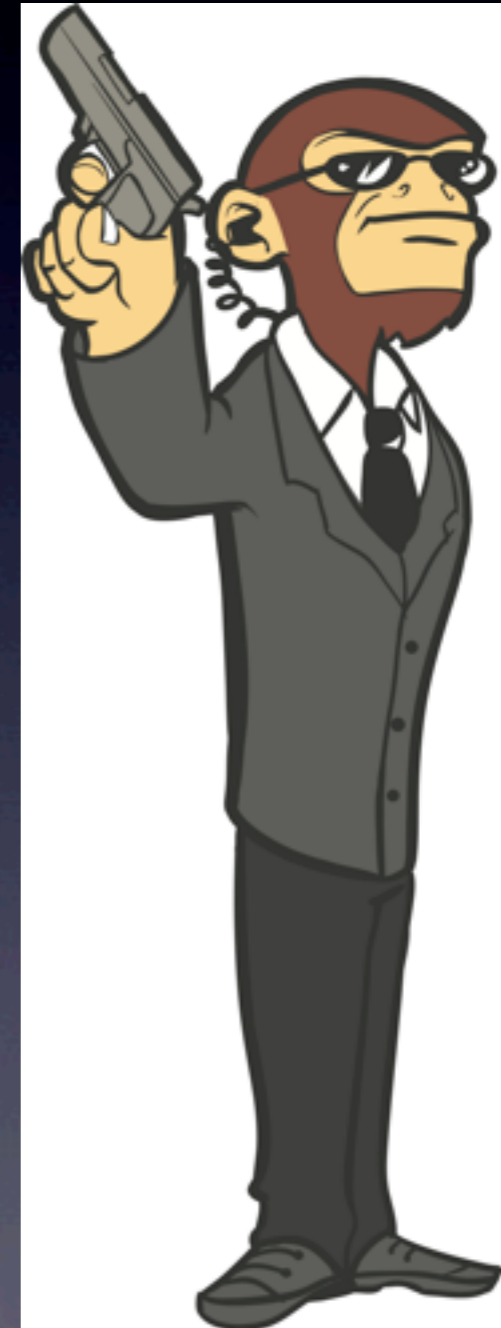
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Security Monkey

- Dozens of SSL Certificates
 - All over the place
 - Owned by various teams
 - Kept Expiring
 - Hilarity would ensue



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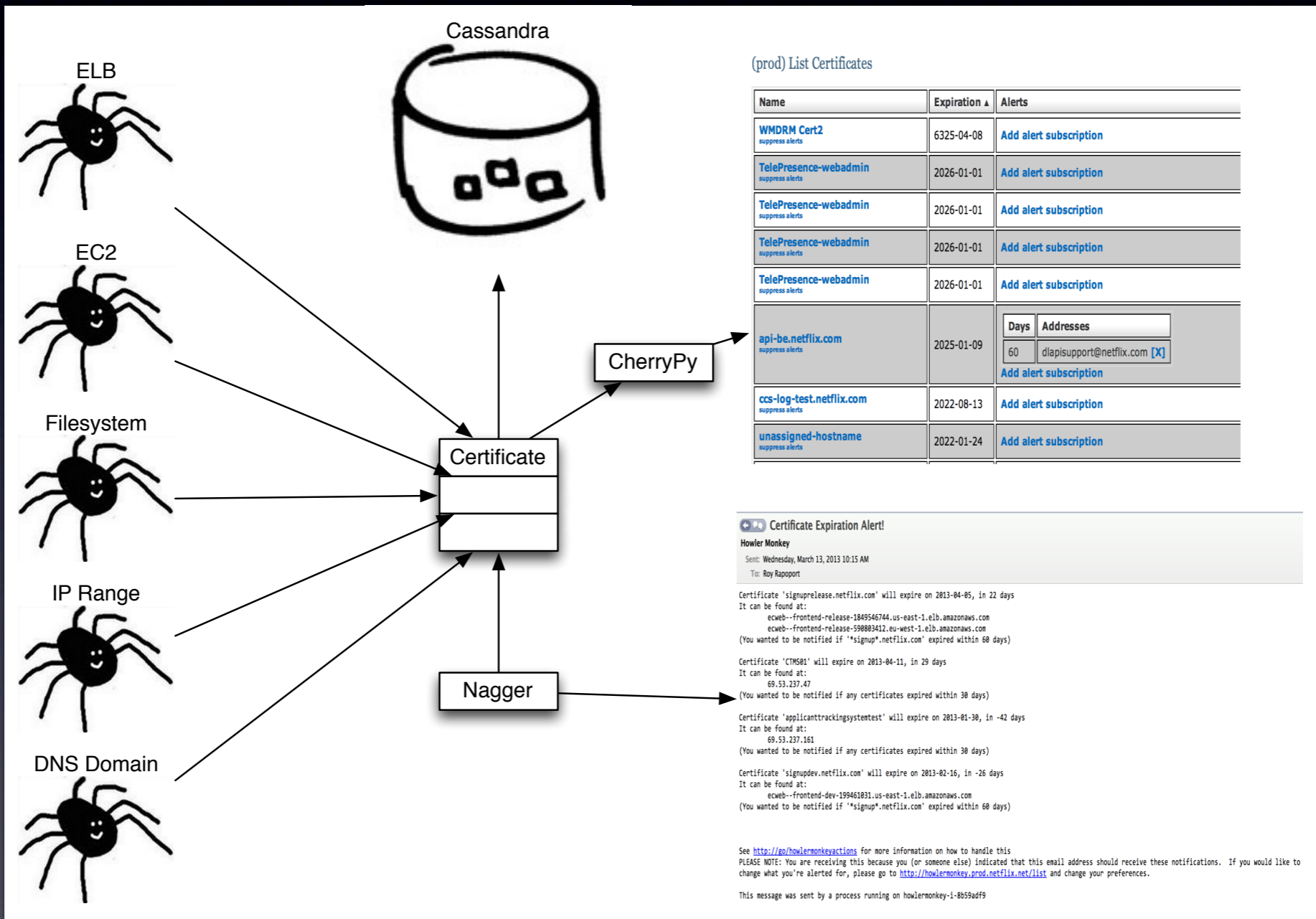
So me ...

- Was coming up on 2 years @nflx
- Just moved from IT/Ops to Cloud Engineering
- Asked to finally solve SSL cert expiration problem as my big Q3/2011 goal
- Didn't know Java.



Next Steps

7/10/2011 Ready for beta



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Next Steps

```
2262 lgml-rrapoport1> p4 filelog setup.py#1
//depot/[...]nflx-cloudsol-python-libs/setup.py
... #1 change 973662 add on 2011/08/10 by
rrapoport@rrapoorttest100 (text) 'initial'
```

- import AKMS
- import Cassandra
- import Eureka
- import Metrics
- import Evcache
- import Archaius
- import AsgardRegistry
- import PagerDutyAdmin
- import RedBlackAdmin
- import Service



Summary

- Go fast, demonstrate value
- Solve **your** problems
- After that, think of other use cases
- Minimum Viable Product
- Figure out what a standard thing looks like



Service Class

- Decrease the barrier to entry.
- Easy access to our many services.
- Speed and flexibility.
- Power without complexity.
- Pick and choose components.



Service Class

- Standard Configuration Options
- Logging / Metrics
- Eureka Registration / Lookups
- Cassandra
- Evcache
- AKMS
- Boto / AWS
- Route53
- SNS / SQS / AMQP

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Code!

hello.py

```
from netflix.service import BotoService, Route53Service
from netflix.service.bottle import BottleService, get
```

```
class HelloNflx(BottleService, Route53Service):
    @get('/')
    def index(self):
        return "Hello from Netflix!"
```

```
if __name__ == "__main__":
    HelloNflx.main()
```



/status

Status		App Version: 40802d6a.h27 / us-east-1 / prod	
Configs			
Key	Value	Source	Last Update
akms.enable	True	default	2013-03-14 21:43:34
server.type	cherrypy	default	2013-03-14 21:43:34
app.instance		default	2013-03-14 21:43:34
dns.type	CNAME	default	2013-03-14 21:43:34
server.host	0.0.0.0	default	2013-03-14 21:43:34
discovery.port	7001	default	2013-03-14 21:43:34
app.name		default	2013-03-14 21:43:34
app.cluster	core_tools	default	2013-03-14 21:43:34
discovery.health.url	/healthcheck	default	2013-03-14 21:43:34
server.template.path	./templates	default	2013-03-14 21:43:34
dns.regions	None	default	2013-03-14 21:43:34
akms.id		default	2013-03-14 21:43:34
log.level	DEBUG	default	2013-03-14 21:43:34
dns.ttl	60	default	2013-03-14 21:43:34
log.rotate.backups	3	default	2013-03-14 21:43:34
discovery.status.url	/status	default	2013-03-14 21:43:34
app.property.period	30.0	default	2013-03-14 21:43:34
app.stack		default	2013-03-14 21:43:34
log.file	/logs/core_tools/sidecar.log	default	2013-03-14 21:43:34

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SIMIYAN ARMY

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The simian army

- Chaos -- Kills random instances
- Chaos Gorilla -- Kills zones
- Chaos Kong -- Kills regions
- Latency -- Degrades network and injects faults
- Conformity -- Looks for outliers
- Circus -- Kills and launches instances to maintain zone balance
- Doctor -- Fixes unhealthy resources
- Janitor -- Cleans up unused resources
- Howler -- Yells about bad things like Amazon limit violations
- Security -- Finds security issues and expiring certificates

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Chaos Gorilla



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Chaos Gorilla

- 100% Python.
- Reliability is goal; Python helps us get there.
- Destroys an an entire availability zone.
- Leverages and builds on the findings of our other OSS projects.
- Future: Chaos Kong?

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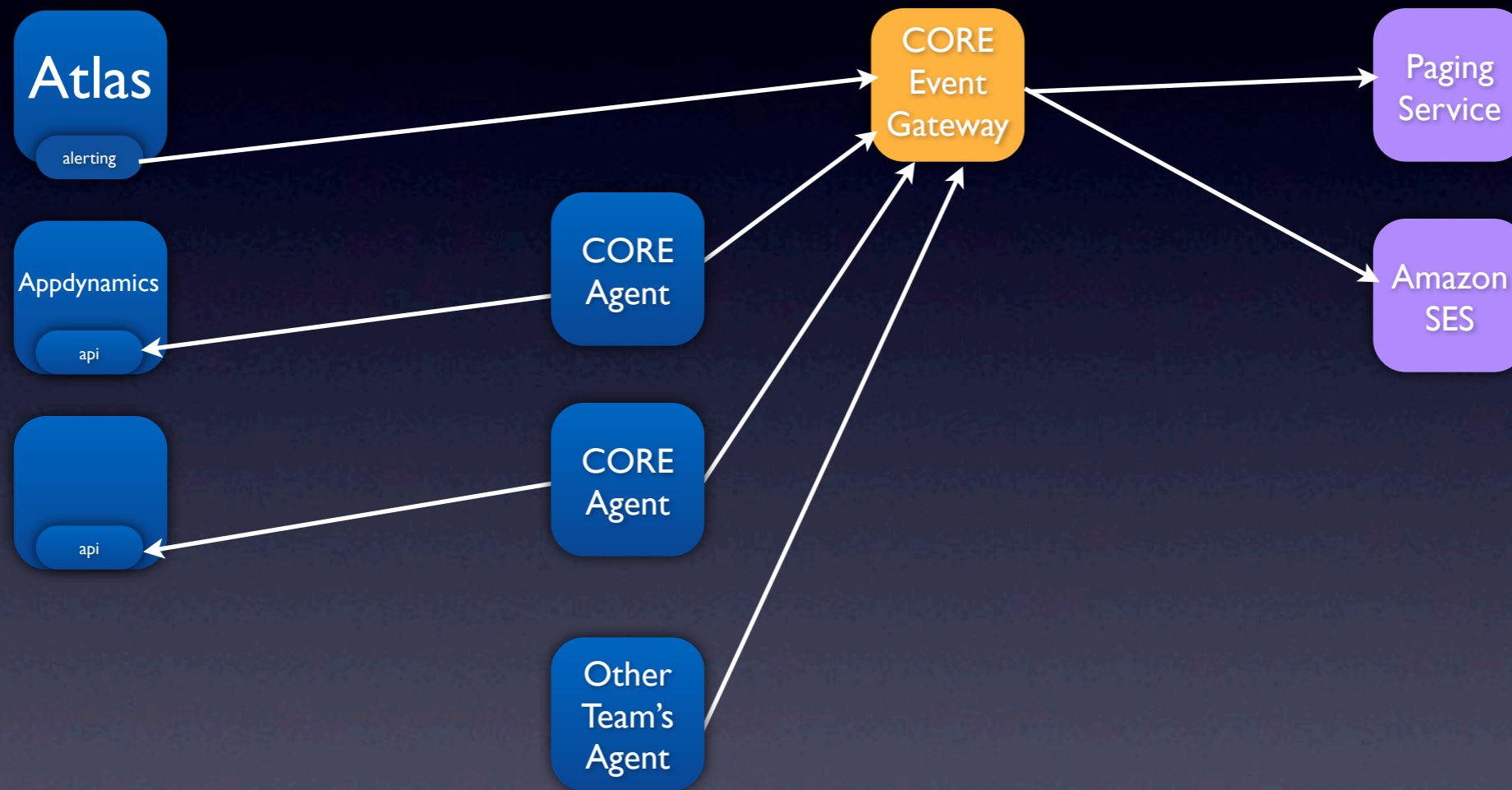
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Keeping track of what's going on



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Alert Systems



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CAG

```
import CORE.Gateway

gateway = CORE.Gateway.Gateway(debug = True)

gateway.send(cluster='pycon', \
             severity='normal', \
             desc='Pycon rocks!', \
             incident_key='PyconAlert', \
             details='PyCon is the awesomest!')
```

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The screenshot shows an email client interface. At the top, there are several action buttons: a plus sign, an exclamation mark, a trash can, a folder icon, a tag icon, and a 'More' dropdown. Below these is the email subject 'minor alert for Pycon' with a yellow arrow icon. To the right of the subject are tabs for 'Inbox' and 'Alert', and a printer icon. The email header shows the sender as 'netflix.com' with a redacted profile picture, the time '8:36 AM (3 minutes ago)', a star icon, and a reply dropdown. The body of the email contains the text 'Pycon rocks!' followed by a 'Details:' section with a JSON object:

```
{  "uuid": "76ba5628-c888-4c96-848e-82433e089b26",  "original details": "PyCon is the awesomest!"}
```

 Below the JSON is the text 'Mailed to: jedberg@netflix.com', 'Incident key: PyconAlert', and 'It was generated on [redacted] / us-east-1 / prod'.

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The screenshot displays the AWS Management Console interface. At the top, there is a navigation bar with the 'ASGARD test' logo, a region selector set to 'us-east-1', and a user profile for 'jedberg'. Below the navigation bar is a horizontal menu with icons for various AWS services: Home, App, AMI, Cluster, ELB, EC2, SDB, SNS, SQS, RDS, and Task. The main content area is titled 'Application Details in us-east-1 (Virginia)'. It features three action buttons: 'Edit Application', 'Delete Application', and 'Create Security Group'. Below these buttons is a list of application details:

Name:	pycon
Type:	Web Service
Description:	Pycon test app
Owner:	Jeremy Edberg
Email:	jedberg@netflix.com
Monitor Bucket Type:	Aggregate monitoring data by application
Chaos Monkey:	Edit in Cloudready
Create Time:	2013-03-16 08:39:13 PDT
Update Time:	2013-03-16 08:39:13 PDT



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Chronos

Search

Tag: Values:

Time Period:

Results
Total Events: 92
[Permalink](#)

Timestamp (PDT)	Application	Event Type	Region	CMC	CMC Details	Description
2012-06- T11:35:38	cass_xxx	SecurityGroup	us-east-1		No CMC Details	changed SG cass_xxx
2012-06- T11:35:16	AWS	EnableInstance	us-east-1		No CMC Details	Enable _____ in Discovery
2012-06- T11:33:01	nccp	TerminateInstance	us-east-1		No CMC Details	Terminate instance _____ and shrink auto scaling group 'nccp-debug'
2012-06- T11:32:59	nccp	UpdateASG	us-east-1		No CMC Details	Update Autoscaling Group 'nccp-debug'
2012-06- T11:32:29	apidaemon	DeleteASG	us-east-1		CMC Details	Deleting apidaemon
2012-06- T11:30:37	cass_xxx	SecurityGroup	us-east-1		No CMC Details	changed SG cass_xxx
2012-06- T11:28:47	AWS	DisableInstance	us-east-1		No CMC Details	Disable _____ in Discovery
2012-06- T11:28:09	AWS	EnableInstance	us-east-1		No CMC Details	Enable _____ in Discovery
2012-06- T11:26:18	AWS	DisableInstance	us-east-1		No CMC Details	Disable _____ in Discovery
2012-06- T11:25:45	beaconserver	UpdateASG	eu-west-1		CMC Details	Update Autoscaling Group 'beaconserver-pt-v002'
2012-06- T11:25:39	AWS	EnableInstance	us-east-1		No CMC Details	Enable _____ in Discovery
2012-06- T11:25:35	cass_xxx	SecurityGroup	us-east-1		No CMC Details	changed SG cass_xxx
2012-06- T11:25:20	beaconserver	UpdateASG	eu-west-1		CMC Details	Update Autoscaling Group 'beaconserver-ce-v001'
2012-06- T11:25:02	beaconserver	UpdateASG	eu-west-1		CMC Details	Update Autoscaling Group 'beaconserver-v021'
2012-06- T11:23:07	MerchWeb	CreateFastProperty	us-east-1		CMC Details	Create Fast Property



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Chronos

POST /api/v1/event

```
{  
  "type": "SampleEvent",  
  "app": "pycon",  
  "desc": "Presentation started",  
  "data_field": "Going well so far",  
  "another_field": "another_value"  
}
```

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Chronos

```
GET /api/v1/event?timelines=all:all
```

```
{  
  "id": "all:all",  
  "count": 200,  
  "start": 201303010500000,  
  "end": 201303160500000,  
  "events": [ ... ]  
}
```

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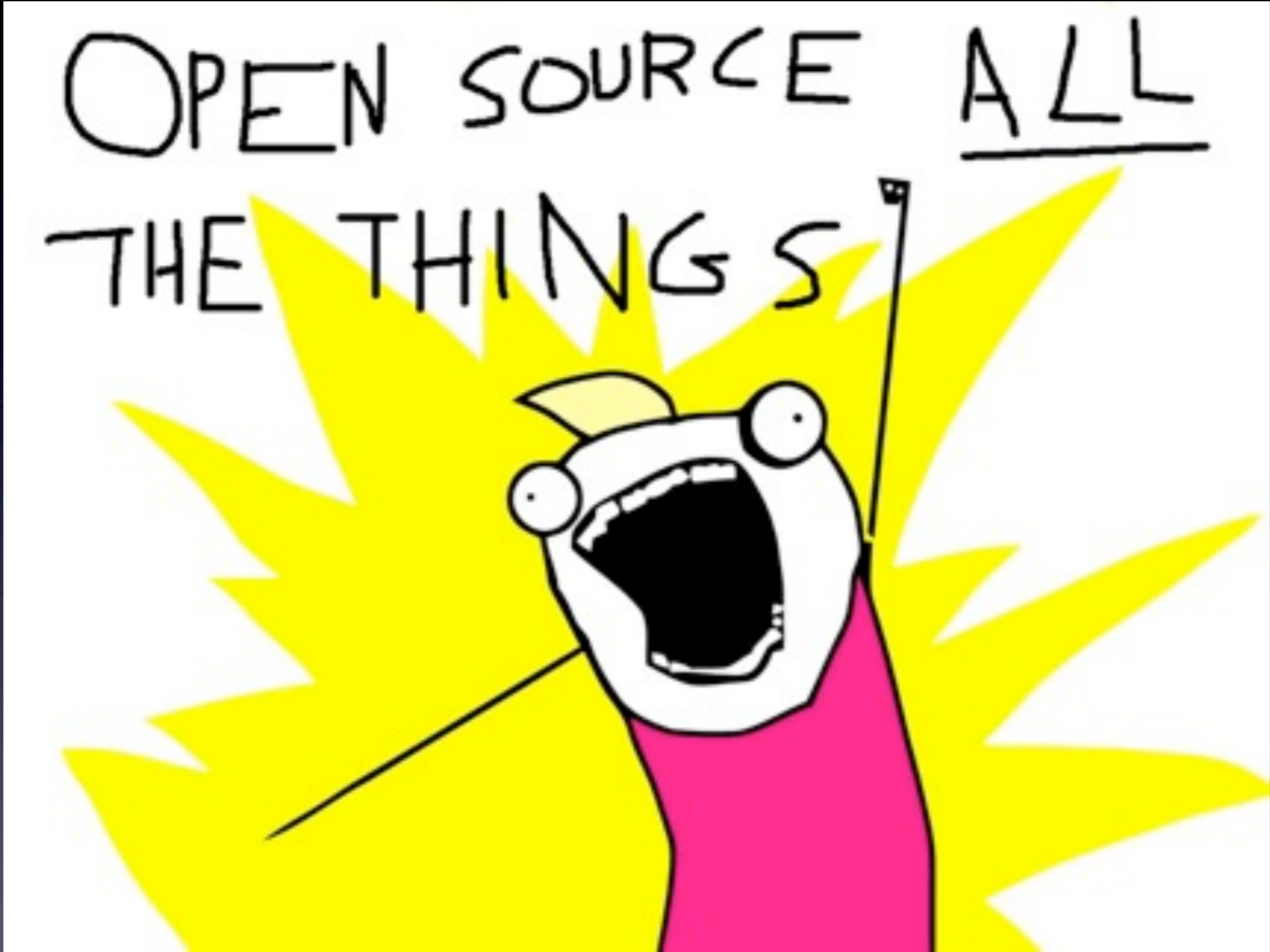


Image licensed from <http://hyperboleandahalf.blogspot.com/>

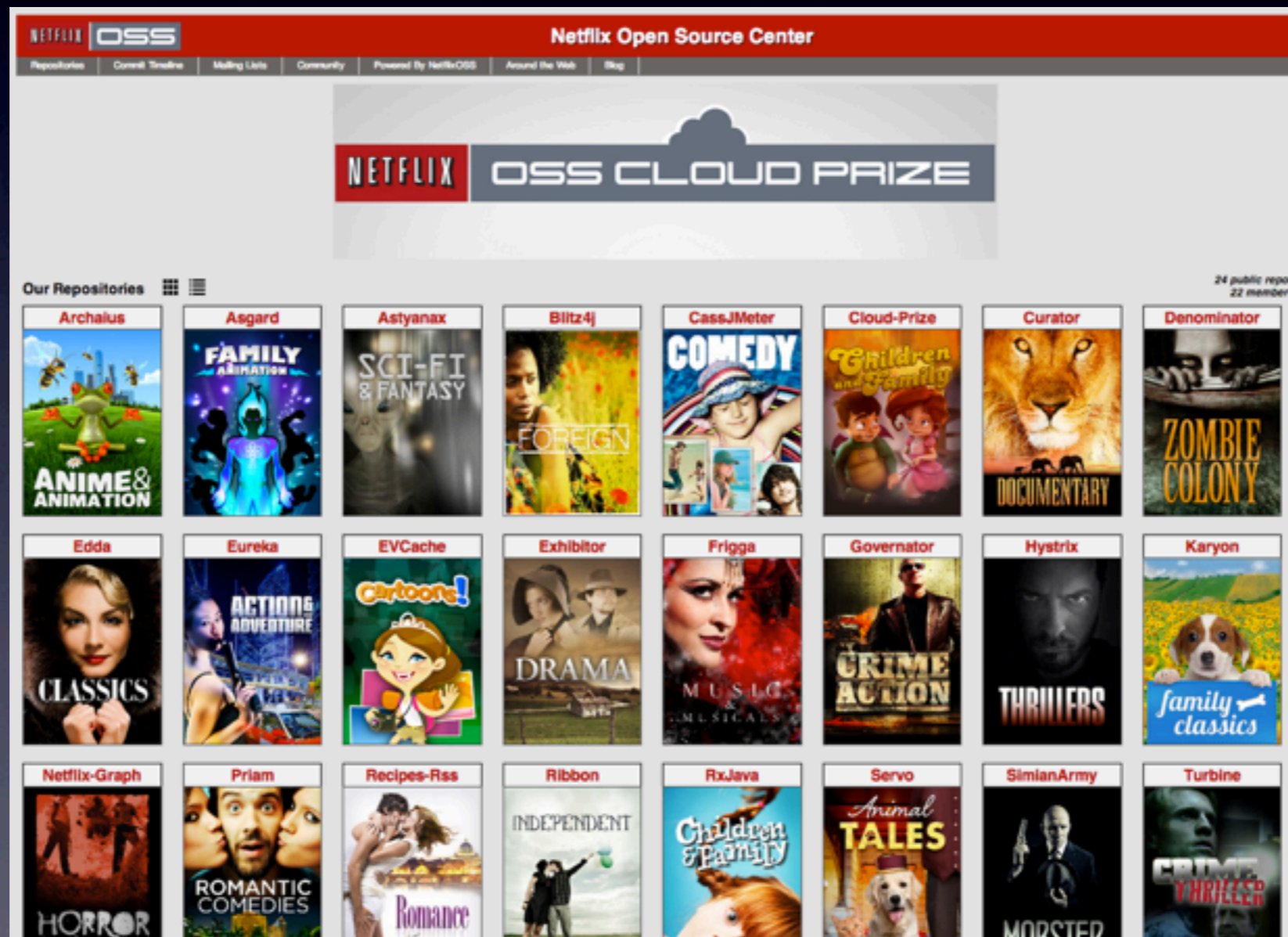


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Just a quick reminder...

(Some of) Netflix is open source:

<https://netflix.github.com/>



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The logo features the Netflix logo in a red box on the left, followed by the text 'OSS CLOUD PRIZE' in a grey box on the right. A stylized cloud icon is positioned above the text in the grey box.

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OSS CLOUD PRIZE

- We're giving people money to make the world better through open source
- We would love to see some Python!
- Next week we'll open source our first Python project, Aminator, our AMI bakery

The logo consists of the word 'NETFLIX' in white on a red background, and the word 'OSS' in white on a grey background below it.

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Netflix is hiring

<http://jobs.netflix.com/jobs.html>

- or -

email talent@netflix.com and
tell them you saw us at Pycon

- or -

Stop by our booth in the
Expo hall or at the job fair

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We use Python for:

- Site-Reliability
- Cassandra Ops
- DevOps
- Data Sciences



BOF

Today in room 212, 6:30pm

We'll be there along with Mitch Garnaat, creator of boto

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Questions?



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