



OpenStack at NSA

Infrastructure as a Service

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National Security Agency

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Thank You



National Security Agency

IT Challenges

Private, IaaS Cloud - OpenStack



[[REDACTED]]



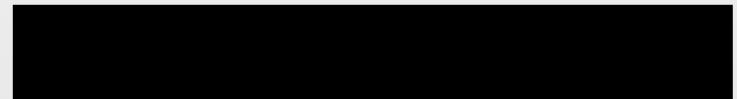
Number of users:



Number of systems:



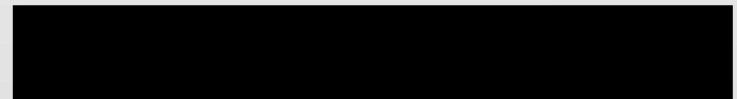
Number of servers:



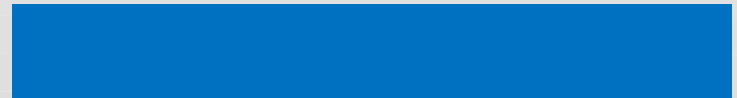
Storage capacity:



Applications used:



Favorite color:





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NSA: Intelligence Community





Signals Intelligence

Information Assurance



Computer Science

Mathematics

Cryptanalysis

Foreign language analysis



-All the Technologies!

Commercial

Open Source

In-House



“Cloud”?

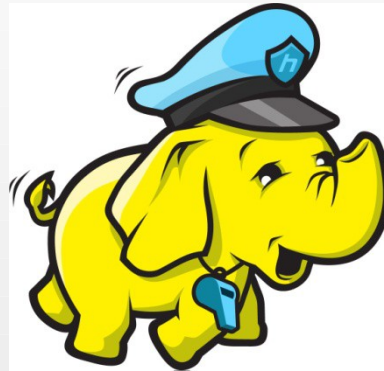




Big Data



Hadoop



Accumulo



- **Developed by NSA**
- **Inspired by Google BigTable Paper**
- **Open Source, Apache Software Foundation**



Manually Intensive



Stovepipes of Excellence!

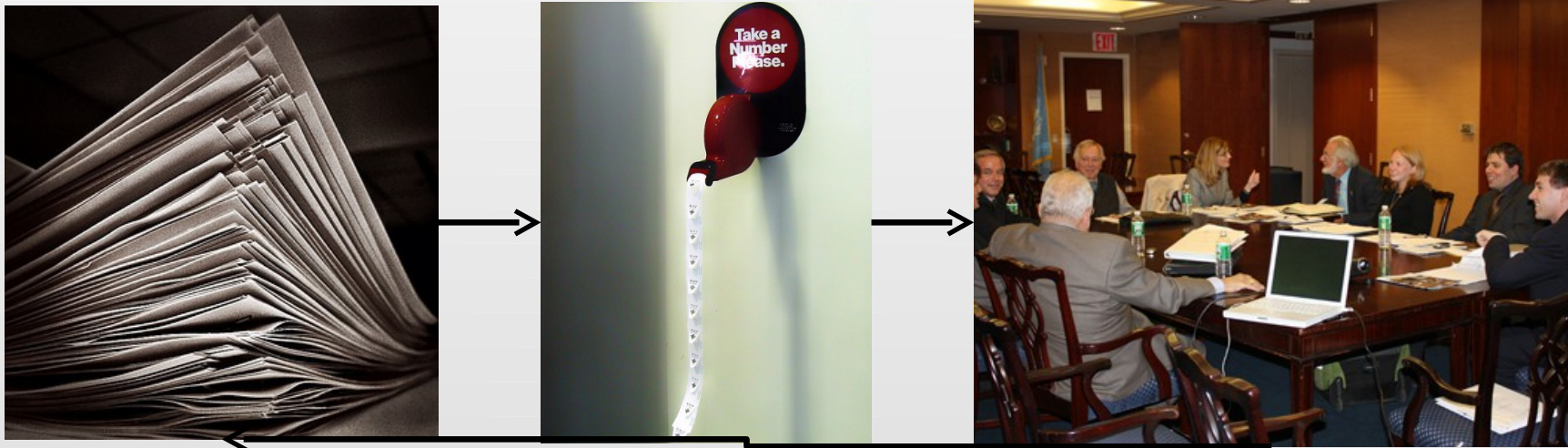


I have an idea!





Carbon-based IaaS: An Example





**Weeks or months
later...**



**What was my idea
again?**



The Problem



**Too much time from
idea to capability**

Needed scale, agility



Lower barriers to entry
Self-service, on-demand

Elastic

API access

Private OpenStack IaaS Cloud



Diablo Summit

Two mad scientists

~~Repurposed~~ Stole a rack

Lab



Try out OpenStack

Offer flexible hosting

Automate lab infrastructure



Working Pilot in two weeks:

- **Cactus**
- **API / CLI**
- **10's of users**
- **Improved service delivery time**

Limited capabilities:

- **Lab**
- **Firewall / network isolation**



Patient Zero





What Next?



Let's go bigger!



More hardware

More users

More use cases

More data





Co-located with Big Data system

Started with half rack

Access to mission data

Use cases:

- **RDBMs**
- **Web applications**
- **Non-Hadoop processing**



100's of users

“Fail fast” model

Generous with capacity

Huge potential



MORE unicorns!





Production



Puppet / Kickstart

- **Installation**
- **Configuration**
- **Enforcement**
- **Management**

Bare metal to OpenStack in 20 minutes!



Harden the system:

- **Operating System**
- **OpenStack APIs**
- **Database**
- **Message Queue**
- **Guest OS**

SSI Everywhere!^{B1}



Accounts? \$\$\$?



-Amazon, Dreamhost, Rackspace ...

· NSA





Have PKI? You're in!

Auto-account creation



Outbreak



- <http://www.flickr.com/photos/goopymart/6917974213/>
- http://commons.wikimedia.org/wiki/File:Unicorn_llama.jpg
- http://commons.wikimedia.org/wiki/File:Zebra_%28PSF%29.png
- <http://www.flickr.com/photos/bulius/4839345269>



An Epidemic



Opened for general availability:

- **Silent launch, viral growth:**
 - **100's of users in first weeks**
- **Production workloads**
- **Migrated from Diablo to Folsom**

Still managed by a small team!



Development patterns:

- **“In a box” recipes**
- **System lifecycle**
- **Common environment**
- **Better collaboration**
- **Better development**



We broke things

Change or eliminate process

Rethink problems

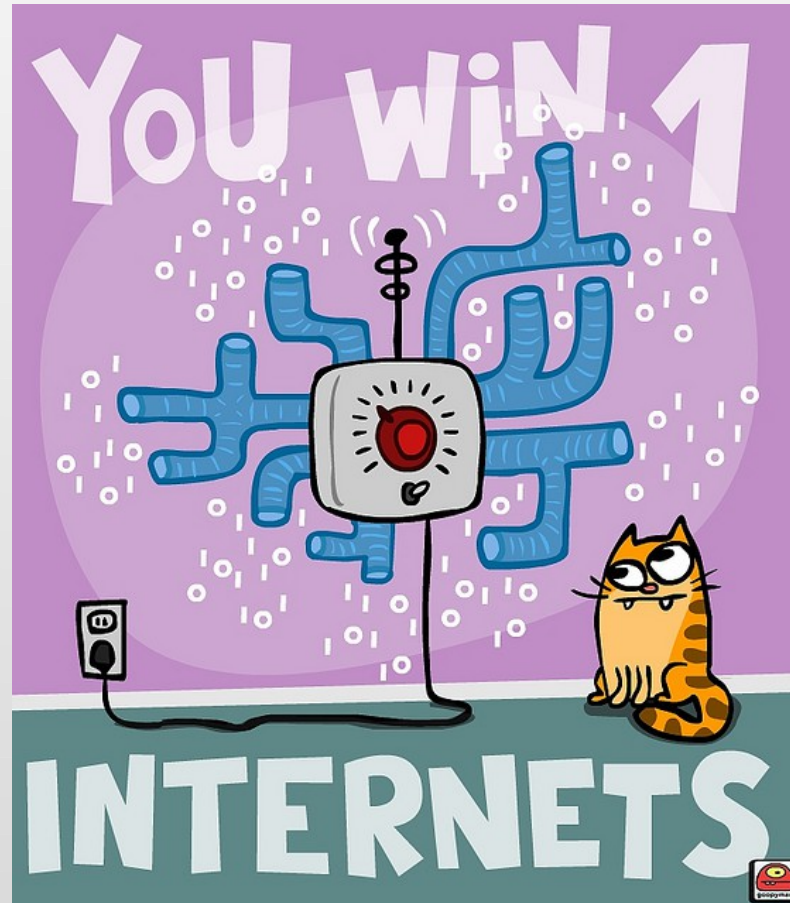


Agility
Flexibility
Scalability

Better mission systems!



Win Win!





Lowering risk, while increasing flexibility

- **Trust but verify**
- **Security**
- **Accountability**
- **Central reporting**
- **Logging**
- **Metrics**



IT Efficiency = Time = \$\$\$





Continued growth, scaling

Folsom to Grizzly ++

Open source contributions

More community participation

We're Hiring!



Thank You

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