



KubeCon



CloudNativeCon

North America 2017

Kubernetes in the Public Cloud

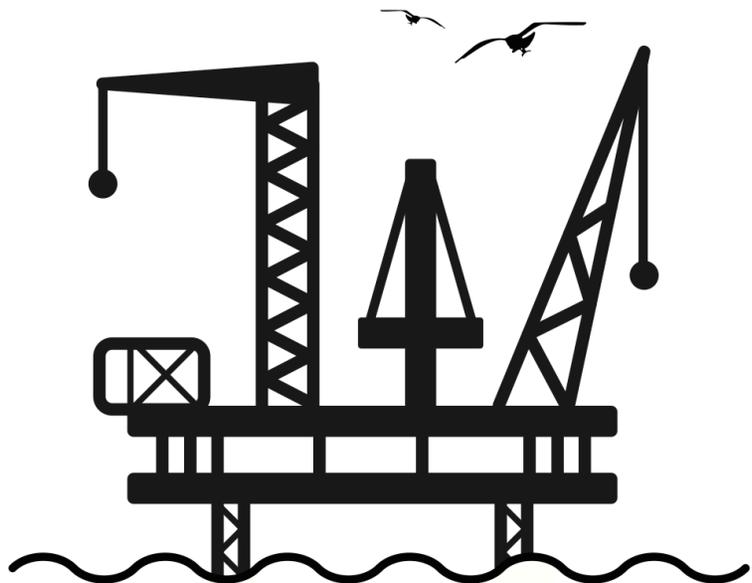
Ron Lipke, Senior Engineer – PaaS

Gannett

GANNETT?

- National News and Media Company
- National brand is **USA TODAY**
- **USA TODAY Network** comprised of 131 media companies in 33 states
- 125 MILLION unique visitors per month





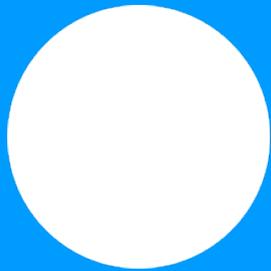
PLATFORM AS A SERVICE

Powering the  **USATODAY NETWORK**

Teams:

- Integration
- API
- Success
- Optimization
- Test Automation

OUR CONTAINER JOURNEY



**USA
TODAY
NETWORK™**

ELECTIONS 2016

**The Largest Night of Traffic in
USA Today History...**

**...Why not Make that Our First
Container App!?**

REQUIREMENTS

- Integration with legacy resources in existing networks
- Bootstrapping and orchestration compatible with our existing platform tooling and APIs
- Autoscaling (nodes and containers)
- Self service provisioning
- Maintain cost boundaries and charge back insight
- Quickly iterate with new features

CONTAINER ORCHESTRATION OPTIONS

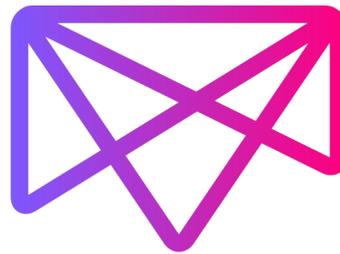


AWS ECS

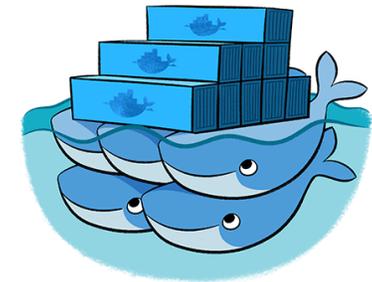


HashiCorp

Nomad



MESOSPHERE



docker



kubernetes

AND THE WINNER IS...



kubernetes

NETWORKING



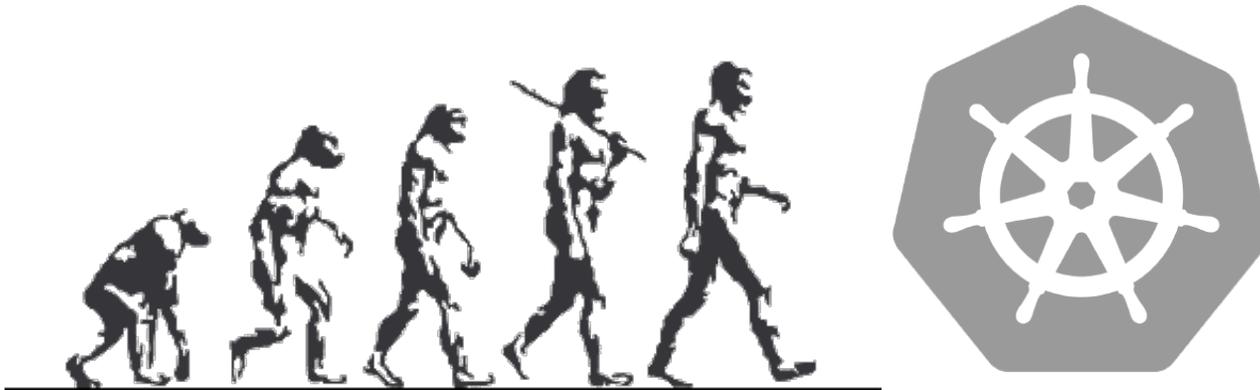
- Project Calico
- Policy driven
- Lightweight IP to IP encapsulation
- Usable in existing VPC or Shared VPN

CLOUD MANAGEMENT PORTAL (CMP)

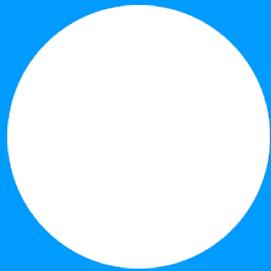
The screenshot displays the Cloud Management Portal (CMP) interface. The top navigation bar includes tabs for DASHBOARD, FARMS, ROLES, IMAGES, SERVERS, SCRIPTS, SYSTEM LOG, and ORCHESTRATION LOG. The left sidebar shows a list of farm roles: kube-gce-test, gce-k8s-...aproxy-7, gci-etcd3, kubernetes-master, and kubern...rker-173. The main content area is for the 'kubernetes-master' role, showing configuration details such as ALIAS (kubernetes-master), ROLE NAME (gci-kubernetes-manager-173), OS (CentOS 7.X Final (64bit)), and INSTANCE TYPE (n1-standard-1). The configuration section includes SCALING, NETWORK, ORCHESTRATION, GCE SETTINGS, STORAGE, GLOBAL VARIABLES, and ADVANCED. The SCALING section shows HOSTNAME SOURCE (TEMPLATE), NETWORK (gannett-east-xpn-network), and SUBNET (gannett-paas-tools-us-east1). The NETWORK TAGS section lists scalr, office-ssh, gannett-tools-kubernetes-master, gannett-east-tools-calico, and gannett-tools-internal-consul-agent-access. The COST METERING section shows MIN INSTANCES (1) and MAX INSTANCES (2), both at \$0.00 per day. The SCALR logo is visible in the bottom right corner of the interface.

ORGANIZATIONAL CHALLENGES

- Cluster ownership – single tenancy, self-service
- Cost boundaries/charge back
- First time ops-ing

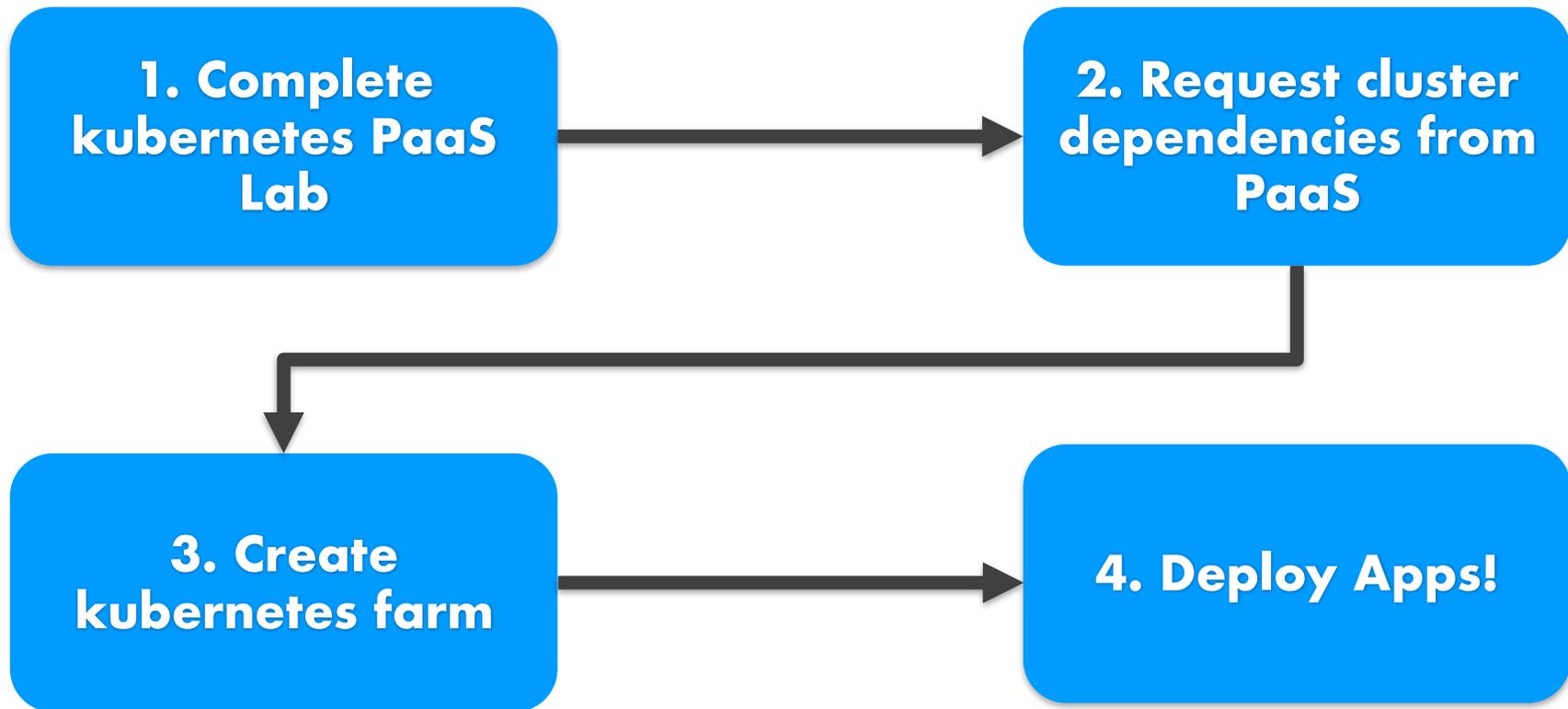


CURRENT KUBERNETES

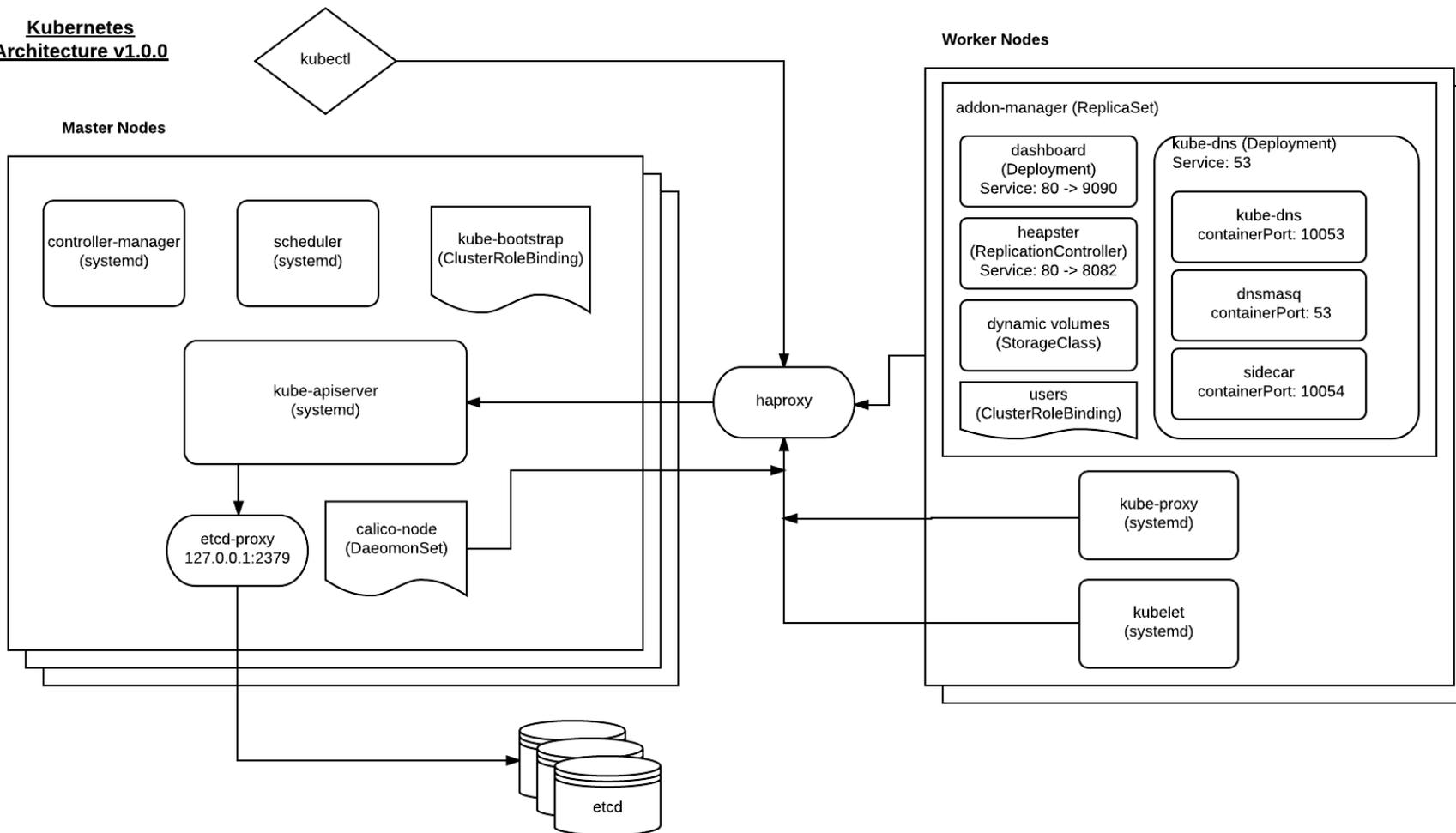


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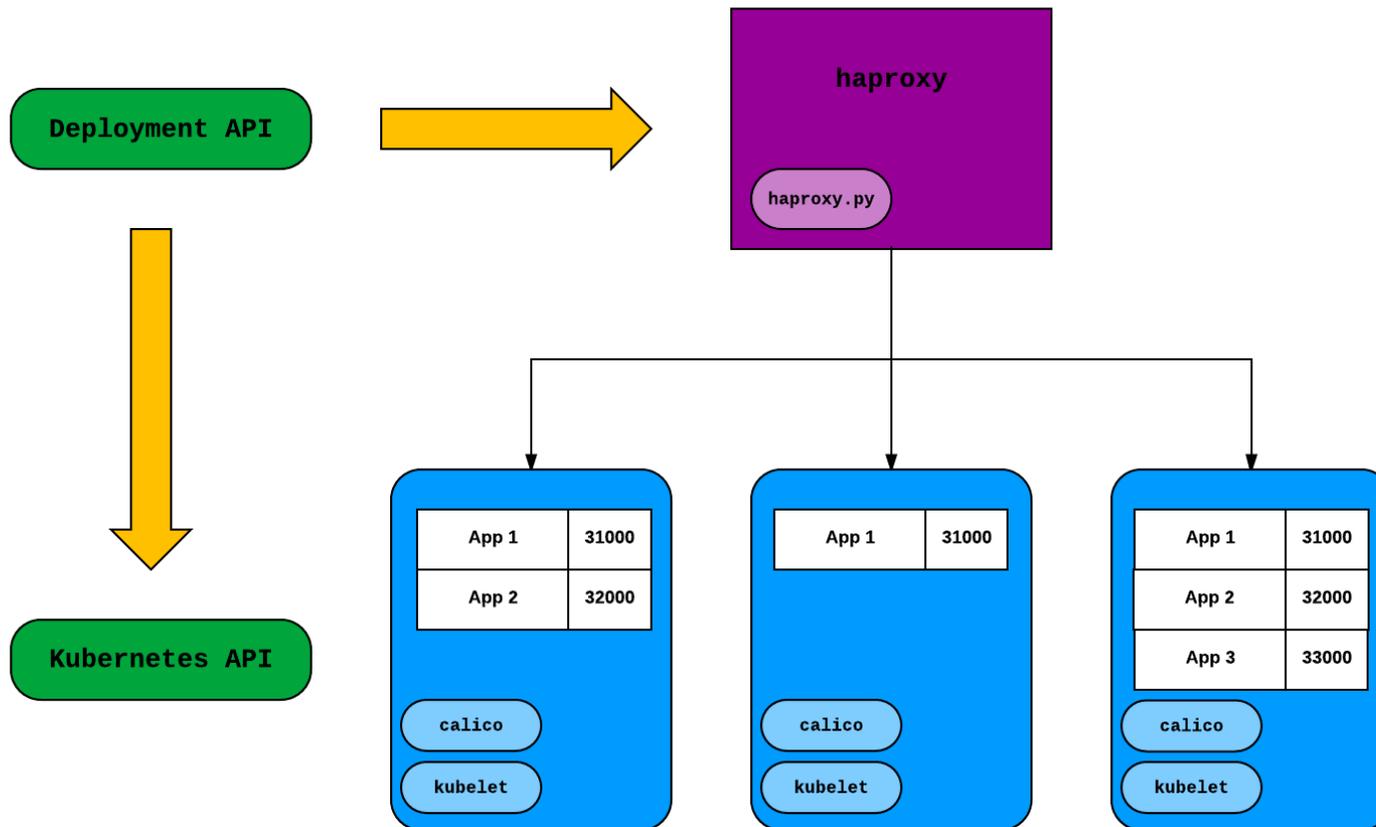
PROVISIONING AND BOOTSTRAPPING



**Kubernetes
Architecture v1.0.0**



DEPLOYMENT API



TESTING AND TROUBLESHOOTING

- Serverspec
- Canary clusters
- Runbooks
- Log Aggregation
- Monitoring/tracing

MONITORING KUBERNETES CLUSTERS



MONITORING KUBERNETES CLUSTERS

Container Count on Workers

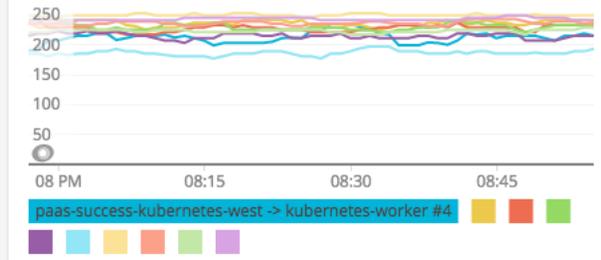
Since 60 minutes ago

Count

937	paas-docker-artifactory.gannettdigital.com/pause-amd64:3.0
867	paas-success-docker-artifactory.gannettdigital.com/moxi@sha256:d4cf0f5551fc95972031c9ea251c439e740e3ba5d365da6e58af7b5209468522
865	paas-success-docker-artifactory.gannettdigital.com/nginx@sha256:b1cb253acf15587bf3cdebba70746144dead6ca9a896f671568ad40666b66f65
840	paas-success-docker-artifactory.gannettdigital.com/uwsgi@sha256:9c85445bad23cb59cbde49a92da5369b9205b6873d5a4a697d73be7dfa5691e
44	paas-success-docker-artifactory.gannettdigital.com/uwsgi@sha256:32741626138024835d3f8543c99e4a0c0cec61a3fd35684b837813a6b75c0cf5
17	paas-docker-artifactory.gannettdigital.com/calico-node:v1.3.0
17	paas-success-docker-artifactory.gannettdigital.com/uwsgi@sha256:3c18293f9cd0354ec7afe49fa479d2fafdb977f0fa75772e1144b8344415d3a9
16	paas-docker-artifactory.gannettdigital.com/k8s-dns-kube-dns-amd64@sha256:40790881bbe9ef4ae4ff7fe8b892498eeb7fe6dcc22661402f271e0
16	paas-docker-artifactory.gannettdigital.com/k8s-dns-sidecar-amd64@sha256:97074c951046e37d3cbb98b82ae85ed15704a290cce66a8314e7f84e
16	paas-docker-artifactory.gannettdigital.com/k8s-dns-dnsmasq-nannv-amd64@sha256:aeeb994acbc505eabc7415187cd9edh38cbb5364dc1c2fc74

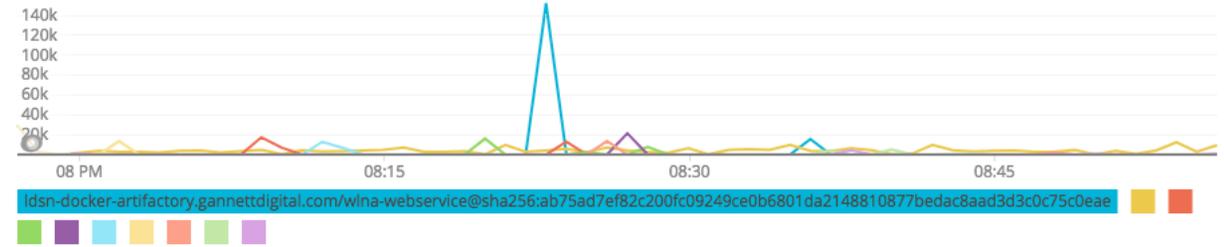
Containers by Host

Since 60 minutes ago until 1 minute ago



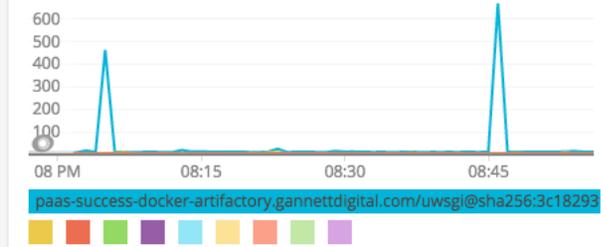
I/O Read Bytes Per Second Per Container

Since 60 minutes ago



I/O Writes/sec per Container

Since 60 minutes ago



CHALLENGES

- Terminating nodes

KUBE WORKER REMOVAL

```
#!/bin/bash
# coding:utf-8

# This script requires kube-apiserver to utilize TLS, and expects calicoctl >= 1.0.0

PATH=$PATH:/usr/local/bin

if hash kubectl 2>/dev/null; then
    NODENAME=`curl -Gs http://localhost:10255/stats/summary | grep -o '"nodeName": "[^"]*' | head -n 1 | cut -c 13- |
sed -e 's/^\///' -e 's/"$//'\`

    echo "==> Draining worker"
    kubectl drain -s https://$KUBE_MASTER:443 $NODENAME --grace-period=120 --force --delete-local-data --kubeconfig
/etc/kubernetes/kubeconfig-bootstrap

    echo "==> Deleting worker"
    kubectl delete node -s https://$KUBE_MASTER:443 $NODENAME --kubeconfig /etc/kubernetes/kubeconfig-bootstrap

else
    echo "kubectl not found on this worker"
fi

systemctl stop calico-node

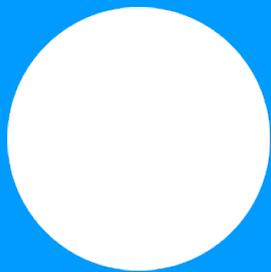
sleep 5

# Remove node from Calico
calicoctl delete node $HOSTNAME
```

CHALLENGES

- Terminating nodes
- Autoscaling worker nodes
- Contrack limits
- Cloud Parity
- Keeping pace with releases

SO...HOW DID WE DO?



**USA
TODAY
NETWORK™**

ELECTIONS 2016

USAT Web Traffic

▲ Since 7 days ago

83.4 M ↑1,042.86%

Page Views



'Elections 2016' Page Traffic

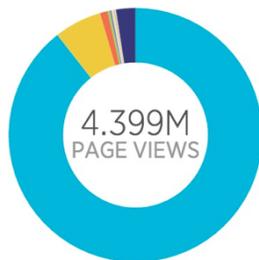
Since 7 days ago

3.93 M ↓0.01%

Sessions

Gannett's Most Popular Elections 2016 Pages

Since 7 days ago



- <http://www.usatoday.com/section/global/elections-2016/> (89.4%)
- <http://www.usatoday.com/elections-2016/> (6.05%)
- <http://www.freep.com/elections-2016/> (0.980%)
- <http://www.desmoinesregister.com/elections-2016/> (0.284%)
- <http://www.cincinnati.com/elections-2016/> (0.181%)
- <http://www.delawareonline.com/section/elections-2016/> (0.143%)
- <http://www.courier-journal.com/elections-2016/> (0.140%)
- <http://www.indystar.com/elections-2016/> (0.137%)
- <http://www.azcentral.com/elections-2016/> (0.131%)
- <http://www.democratandchronicle.com/news/elections-2016/> (0.0554%)

PAAS SUCCESS KUBERNETES MIGRATION

Cost Reduction

Daily operating costs cut by **several hundred dollars.**

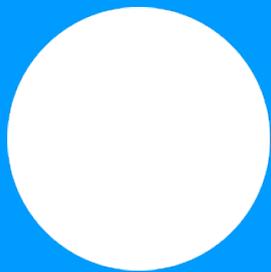
Deployment Times

A full deployment of all 140 sites took over 2 hours, now down to **25 minutes.**

Deployment Frequency

During Hurricanes Harvey and Irma, over **1500 successful deployments** with no pay wall.

WHAT'S NEXT?



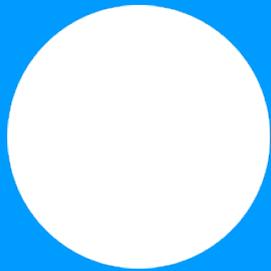
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CLUSTER IMPROVEMENTS

- ETCD v3
- Kubernetes 1.9
- kubectl
- Vault Integration
- Service Mesh
- Ingress Overhaul

THANK YOU

Ron Lipke – Senior Engineer, PAAS



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