


glu

deployment automation platform

July 2011

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 @yanpujante

* To see a video of this presentation given at Chicago devops, check this link:
<http://devops.com/2011/07/09/glu-deployment-automation-video/>



Video

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<http://devops.com/2011/07/09/glu-deployment-automation-video/>



A little bit about me...

- Software engineer (16 years experience)
- Software is my passion (28 years! TI-99/4A)
- Currently *not* working... for a boss... :)
- glu, kiwidoc (www.kiwidoc.com)
- Worked @ LinkedIn for 8 years (founding team!)
 - Worked on a lot of infrastructure projects and early features (security, payment, graph, etc...)
 - Last (big) project was glu (main author/contributor/maintainer)

Why glu ?

Before glu...

:(

```
Terminal — zsh — 80x24
~2.4.1/
driver-xr-x 9 ypujante admin 544 Jun 22 09:28 org.linkedin.glu.packaging-all
-3.0.0-SNAPSHOT/
driver-xr-x 10 ypujante admin 578 Jun 19 07:49 org.linkedin.glu.packaging-all
-3.0.0-RC2-SNAPSHOT/
driver-xr-x 5 ypujante admin 374 May 5 09:06 org.linkedin.glu.packaging-set
up-2.2.3/
driver-xr-x 5 ypujante admin 374 May 13 09:11 org.linkedin.glu.packaging-set
up-2.3.0/
driver-xr-x 5 ypujante admin 374 May 13 08:15 org.linkedin.glu.packaging-set
up-2.3.0.dev.1-SNAPSHOT/
driver-xr-x 5 ypujante admin 374 May 16 14:59 org.linkedin.glu.packaging-set
up-2.3.1-SNAPSHOT/
driver-xr-x 5 ypujante admin 374 May 18 10:45 org.linkedin.glu.packaging-set
up-2.3.2-SNAPSHOT/
driver-xr-x 5 ypujante admin 374 May 20 08:29 org.linkedin.glu.packaging-set
up-2.4.0/
driver-xr-x 5 ypujante admin 374 May 24 09:15 org.linkedin.glu.packaging-set
up-2.4.1/
driver-xr-x 5 ypujante admin 374 Jun 22 09:29 org.linkedin.glu.packaging-set
up-3.0.0-SNAPSHOT/
driver-xr-x 5 ypujante admin 374 Jun 19 07:38 org.linkedin.glu.packaging-set
up-3.0.0-RC2-SNAPSHOT/
(ypujante@eon:/export/content/glu/ 3)
```

```
Terminal — zsh — 80x24
org.linkedin.glu.console-server-2.3.2-SNAPSHOT/
org.linkedin.glu.console-server-2.4.0/
org.linkedin.glu.console-server-2.4.1/
org.linkedin.glu.console-server-3.0.0-SNAPSHOT/
org.linkedin.glu.console-server-3.0.0-RC2-SNAPSHOT/
org.linkedin.glu.packaging-all-2.2.3/
org.linkedin.glu.packaging-all-2.3.0/
org.linkedin.glu.packaging-all-2.3.0.dev.1-SNAPSHOT/
org.linkedin.glu.packaging-all-2.3.1-SNAPSHOT/
org.linkedin.glu.packaging-all-2.3.2-SNAPSHOT/
org.linkedin.glu.packaging-all-2.4.0/
org.linkedin.glu.packaging-all-2.4.1/
org.linkedin.glu.packaging-all-3.0.0-SNAPSHOT/
org.linkedin.glu.packaging-all-3.0.0-RC2-SNAPSHOT/
org.linkedin.glu.packaging-setup-2.2.3/
org.linkedin.glu.packaging-setup-2.3.0/
org.linkedin.glu.packaging-setup-2.3.0.dev.1-SNAPSHOT/
org.linkedin.glu.packaging-setup-2.3.1-SNAPSHOT/
org.linkedin.glu.packaging-setup-2.3.2-SNAPSHOT/
org.linkedin.glu.packaging-setup-2.4.0/
org.linkedin.glu.packaging-setup-2.4.1/
org.linkedin.glu.packaging-setup-3.0.0-SNAPSHOT/
org.linkedin.glu.packaging-setup-3.0.0-RC2-SNAPSHOT/
(ypujante@eon:/export/content/glu/ 4)
```

```
Terminal — zsh — 80x24
APSHOT
(ypujante@eon:/.../content/glu/org.linkedin.glu.packaging-all-3.0.0-SNAPSHOT/ 4)
alo
zsh: command not found: alo
(ypujante@eon:/.../content/glu/org.linkedin.glu.packaging-all-3.0.0-SNAPSHOT/ 5)
la
total 176
-rw-r--r-- 1 ypujante admin 11358 Nov 7 2010 LICENSE.txt
-rw-r--r-- 1 ypujante admin 26117 Apr 22 10:07 NOTICE.txt
-rw-r--r-- 1 ypujante admin 1447 Apr 25 09:36 README.ad
-rw-r--r-- 1 ypujante admin 487 Apr 22 14:41 README_FIRST.txt
-rw-r--r-- 1 ypujante admin 9208 Jun 20 14:28 RELEASE.rst
-rw-r--r-- 1 ypujante admin 12569 Nov 7 2010 RESTLET-2.0.1-EPL-LICENSE.html
-rw-r--r-- 1 ypujante admin 10950 Nov 7 2010 SIGAR-1.6.4-LICENSE.txt
driver-xr-x 5 ypujante admin 170 Jun 22 09:28 agent-cli/
driver-xr-x 4 ypujante admin 170 Jun 22 09:29 agent-server/
driver-xr-x 2 ypujante admin 374 Jun 22 09:28 bin/
driver-xr-x 4 ypujante admin 136 Jun 22 09:28 console-cli/
driver-xr-x 6 ypujante admin 204 Jun 22 09:28 console-server/
driver-xr-x 7 ypujante admin 374 Jun 22 09:29 org.linkedin.zookeeper-server-
1.3.0/
driver-xr-x 5 ypujante admin 170 Jun 22 09:28 setup/
(ypujante@eon:/.../content/glu/org.linkedin.glu.packaging-all-3.0.0-SNAPSHOT/ 6)

```

```
Terminal — zsh — 80x24
-rw-r--r-- 1 ypujante wheel 2192 Jun 23 08:23 yjs201011091454.jar
(ypujante@eon:/tmp/ 4)ll
total 0
driver-xr-x 7 root wheel 306 Jun 23 09:54 ./
driver-xr-x 7 root wheel 238 Dec 5 2009 ./
driver-xr-x 1 ypujante wheel 8 Jun 23 08:06 icssuite503-
driver----- 2 ypujante wheel 182 Jun 23 08:06 launch-3Naur/
driver----- 2 ypujante wheel 182 Jun 23 08:06 launch-3zh50/
driver----- 2 ypujante wheel 182 Jun 23 08:06 launch-viatv5/
driver----- 2 ypujante wheel 182 Jun 23 08:06 launch-171.WmIP2/
driver----- 2 ypujante wheel 68 Jun 23 08:15 ssh-VFRzHnIMB/
-rw-r--r-- 1 ypujante wheel 2192 Jun 23 08:23 yjs201011091454.jar
(ypujante@eon:/tmp/ 5)ll
total 0
driver-xr-x 7 root wheel 306 Jun 23 09:54 ./
driver-xr-x 7 root wheel 238 Dec 5 2009 ./
driver-xr-x 1 ypujante wheel 8 Jun 23 08:06 icssuite503-
driver----- 2 ypujante wheel 182 Jun 23 08:06 launch-3Naur/
driver----- 2 ypujante wheel 182 Jun 23 08:06 launch-3zh50/
driver----- 2 ypujante wheel 182 Jun 23 08:06 launch-viatv5/
driver----- 2 ypujante wheel 182 Jun 23 08:06 launch-171.WmIP2/
driver----- 2 ypujante wheel 68 Jun 23 08:15 ssh-VFRzHnIMB/
-rw-r--r-- 1 ypujante wheel 2192 Jun 23 08:23 yjs201011091454.jar
(ypujante@eon:/tmp/ 6)
```

```
Terminal — zsh — 80x24
(ypujante@eon:/export/content/repositories/ 3)cd release
(ypujante@eon:/.../content/repositories/release/ 4)ll
total 0
driver-xr-x 3 ypujante admin 182 May 24 09:13 ./
driver-xr-x 4 ypujante admin 170 May 27 14:37 ./
driver-xr-x 3 ypujante admin 182 May 24 09:13 org/
(ypujante@eon:/.../content/repositories/release/ 5)cd org
(ypujante@eon:/.../repositories/release/org/ 6)ll
total 0
driver-xr-x 3 ypujante admin 182 May 24 09:13 ./
driver-xr-x 3 ypujante admin 182 May 24 09:13 ./
driver-xr-x 23 ypujante admin 702 May 24 09:15 linkedin/
(ypujante@eon:/.../repositories/release/org/ 7)cd linkedin/org.linkedin.glu.[]
org.linkedin.glu.agent-api/
org.linkedin.glu.agent-cli/
org.linkedin.glu.agent-cli-lapl/
org.linkedin.glu.agent-lapl/
org.linkedin.glu.agent-rest-client/
org.linkedin.glu.agent-rest-resources/
org.linkedin.glu.agent-server/
org.linkedin.glu.agent-server-lapl/
org.linkedin.glu.agent-server-upgrade/
org.linkedin.glu.agent-tracker/
org.linkedin.glu.console-cli/
org.linkedin.glu.console-server/
org.linkedin.glu.orchestration-engine/
org.linkedin.glu.packaging-all/
org.linkedin.glu.packaging-setup/
org.linkedin.glu.provisioner-agent/
org.linkedin.glu.provisioner-core/
org.linkedin.glu.script-hello-world/
org.linkedin.glu.script-jetty/
org.linkedin.glu.script-noop/
org.linkedin.glu.utils/

```

```
Terminal — zsh — 80x24
-rw-r--r-- 1 ypujante admin 487 Jun 12 10:24 org.linkedin.util-core-1.7.0-
sources.jar.asc
-rw-r--r-- 1 ypujante admin 32 Jun 12 10:22 org.linkedin.util-core-1.7.0-
sources.jar.ad5
-rw-r--r-- 1 ypujante admin 48 Jun 12 10:22 org.linkedin.util-core-1.7.0-
sources.jar.sha1
-rw-r--r-- 1 ypujante admin 153425 Jun 12 10:22 org.linkedin.util-core-1.7.0-
jar
-rw-r--r-- 1 ypujante admin 487 Jun 12 10:24 org.linkedin.util-core-1.7.0-
jar.asc
-rw-r--r-- 1 ypujante admin 32 Jun 12 10:22 org.linkedin.util-core-1.7.0-
jar.ad5
-rw-r--r-- 1 ypujante admin 48 Jun 12 10:22 org.linkedin.util-core-1.7.0-
jar.sha1
-rw-r--r-- 1 ypujante admin 1839 Jun 12 10:22 org.linkedin.util-core-1.7.0-
pom
-rw-r--r-- 1 ypujante admin 487 Jun 12 10:24 org.linkedin.util-core-1.7.0-
pom.asc
-rw-r--r-- 1 ypujante admin 32 Jun 12 10:22 org.linkedin.util-core-1.7.0-
pom.ad5
-rw-r--r-- 1 ypujante admin 48 Jun 12 10:22 org.linkedin.util-core-1.7.0-
pom.sha1
driver-xr-x 2 ypujante admin 182 Jun 12 10:24 target/
(ypujante@eon:/.../linkedin/org.linkedin.util-core-1.7.0/ 9)
```

```
Terminal — zsh — 80x24
org.linkedin.glu.console-server-2.3.2-SNAPSHOT/
org.linkedin.glu.console-server-2.4.0/
org.linkedin.glu.console-server-2.4.1/
org.linkedin.glu.console-server-3.0.0-SNAPSHOT/
org.linkedin.glu.console-server-3.0.0-RC2-SNAPSHOT/
org.linkedin.glu.packaging-all-2.2.3/
org.linkedin.glu.packaging-all-2.3.0/
org.linkedin.glu.packaging-all-2.3.0.dev.1-SNAPSHOT/
org.linkedin.glu.packaging-all-2.3.1-SNAPSHOT/
org.linkedin.glu.packaging-all-2.3.2-SNAPSHOT/
org.linkedin.glu.packaging-all-2.4.0/
org.linkedin.glu.packaging-all-2.4.1/
org.linkedin.glu.packaging-all-3.0.0-SNAPSHOT/
org.linkedin.glu.packaging-all-3.0.0-RC2-SNAPSHOT/
org.linkedin.glu.packaging-setup-2.2.3/
org.linkedin.glu.packaging-setup-2.3.0/
org.linkedin.glu.packaging-setup-2.3.0.dev.1-SNAPSHOT/
org.linkedin.glu.packaging-setup-2.3.1-SNAPSHOT/
org.linkedin.glu.packaging-setup-2.3.2-SNAPSHOT/
org.linkedin.glu.packaging-setup-2.4.0/
org.linkedin.glu.packaging-setup-2.4.1/
org.linkedin.glu.packaging-setup-3.0.0-SNAPSHOT/
org.linkedin.glu.packaging-setup-3.0.0-RC2-SNAPSHOT/
(ypujante@eon:/export/content/glu/ 4)
```

```
Terminal — zsh — 80x24
-rw-r--r-- 1 ypujante admin 9208 Jun 20 14:28 RELEASE.rst
-rw-r--r-- 1 ypujante admin 12569 Nov 7 2010 RESTLET-2.0.1-EPL-LICENSE.htm
l
-rw-r--r-- 1 ypujante admin 10950 Nov 7 2010 SIGAR-1.6.4-LICENSE.txt
driver-xr-x 2 ypujante admin 170 Jun 22 09:28 bin/
driver-xr-x 2 ypujante admin 68 Jun 22 09:28 data/
-rw-r--r-- 1 ypujante admin 14 Nov 21 2010 version.txt
(ypujante@eon:/.../content/glu/org.linkedin.glu.agent-server-3.0.0-SNAPSHOT/ 5)l
l
total 176
driver-xr-x 5 ypujante admin 488 Jun 22 09:28 ./
driver-xr-x 57 ypujante admin 1938 Jun 22 09:29 ./
driver-xr-x 5 ypujante admin 374 Jun 22 09:28 3.0.0-SNAPSHOT/
-rw-r--r-- 1 ypujante admin 11358 Nov 7 2010 LICENSE.txt
-rw-r--r-- 1 ypujante admin 26117 Apr 22 10:07 NOTICE.txt
-rw-r--r-- 1 ypujante admin 1447 Apr 25 09:36 README.ad
-rw-r--r-- 1 ypujante admin 9208 Jun 20 14:28 RELEASE.rst
-rw-r--r-- 1 ypujante admin 12569 Nov 7 2010 RESTLET-2.0.1-EPL-LICENSE.htm
l
-rw-r--r-- 1 ypujante admin 10950 Nov 7 2010 SIGAR-1.6.4-LICENSE.txt
driver-xr-x 2 ypujante admin 170 Jun 22 09:28 bin/
driver-xr-x 2 ypujante admin 68 Jun 22 09:28 data/
-rw-r--r-- 1 ypujante admin 14 Nov 21 2010 version.txt
(ypujante@eon:/.../content/glu/org.linkedin.glu.agent-server-3.0.0-SNAPSHOT/ 6)
```

```
Terminal — zsh — 80x24
-rw-r--r-- 1 ypujante admin 15967 Nov 7 2010 NOTICE.txt
-rw-r--r-- 1 ypujante admin 3973 Dec 20 2010 README.ad
-rw-r--r-- 1 ypujante admin 659 Apr 30 11:10 RELEASE.ad
driver-xr-x 2 ypujante admin 204 Apr 30 11:11 bin/
driver-xr-x 2 ypujante admin 136 Apr 30 11:13 conf/
driver-xr-x 3 ypujante admin 182 Jun 12 10:47 data/
driver-xr-x 2 ypujante admin 272 Apr 30 11:13 lib/
driver-xr-x 2 ypujante admin 182 Apr 30 11:14 logs/
(ypujante@eon:/.../content/linkedin-zookeeper/org.linkedin.zookeeper-server-1.3.
0/ 5)ll
total 72
driver-xr-x 7 ypujante admin 374 Apr 30 11:13 ./
driver-xr-x 6 ypujante admin 204 Apr 30 11:13 ./
-rw-r--r-- 1 ypujante admin 11358 Nov 7 2010 LICENSE.txt
-rw-r--r-- 1 ypujante admin 15967 Nov 7 2010 NOTICE.txt
-rw-r--r-- 1 ypujante admin 3973 Dec 20 2010 README.ad
-rw-r--r-- 1 ypujante admin 659 Apr 30 11:10 RELEASE.ad
driver-xr-x 2 ypujante admin 204 Apr 30 11:11 bin/
driver-xr-x 2 ypujante admin 136 Apr 30 11:13 conf/
driver-xr-x 3 ypujante admin 182 Jun 12 10:47 data/
driver-xr-x 2 ypujante admin 272 Apr 30 11:13 lib/
driver-xr-x 2 ypujante admin 182 Apr 30 11:14 logs/
(ypujante@eon:/.../content/linkedin-zookeeper/org.linkedin.zookeeper-server-1.3.
0/ 5)ll
```



Before glu...

- Operations performs manual deployment:
 - ssh, rcp, etc...
 - non shared manually edited scripts
- ➔ extremely time-consuming
- ➔ error prone

glu project

- Address operations pain points
- Deploy (and monitor) applications to an arbitrary large set of nodes:
 - efficiently
 - with minimum/no human interaction
 - securely
 - in a reproducible manner
- ensure consistency over time (prevent drifting)
- detect and troubleshoot quickly when problems arise

After...

glu-dev-1 | All [product]

Dashboard | Plans | System | Model | Admin | admin | Help

Quick Select: [Select None](#) | [Select First](#) | [Select All](#) | [25%](#) | [33%](#) | [50%](#) | [66%](#) | [75%](#)

Deploy - Fabric [glu-dev-1] - PARALLEL [12]

- ☒ Deploy - Fabric [glu-dev-1] - PARALLEL
 - ☒ [agent-1](#) - [/sample/i001](#)
 - ☒ 1. Install script for [/sample/i001] on [agent-1]
 - ☒ 2. Run [install] phase for [/sample/i001] on [agent-1]
 - ☒ 3. Run [configure] phase for [/sample/i001] on [agent-1]
 - ☒ 4. Run [start] phase for [/sample/i001] on [agent-1]
 - ☒ [agent-1](#) - [/sample/i002](#)
 - ☒ 1. Install script for [/sample/i002] on [agent-1]
 - ☒ 2. Run [install] phase for [/sample/i002] on [agent-1]
 - ☒ 3. Run [configure] phase for [/sample/i002] on [agent-1]
 - ☒ 4. Run [start] phase for [/sample/i002] on [agent-1]
 - ☒ [agent-1](#) - [/sample/i003](#)
 - ☒ 1. Install script for [/sample/i003] on [agent-1]
 - ☒ 2. Run [install] phase for [/sample/i003] on [agent-1]
 - ☒ 3. Run [configure] phase for [/sample/i003] on [agent-1]
 - ☒ 4. Run [start] phase for [/sample/i003] on [agent-1]



The page at localhost:8080 says:
Are you sure you want to execute this plan ?

Click me!

After...



glu-dev-1 | All [product]

Dashboard

Plans

System

Model

Admin

admin

Help

Recent **Deploy - Fabric [glu-dev-1] - PARALLEL**

Show Errors Only: ☒ Auto Refresh: ☒

Refresh Pause Abort

0/12 - 0%

Deploy - Fabric [glu-dev-1] - PARALLEL

Deploy - Fabric [glu-dev-1] - PARALLEL - running [1s]

agent-1 - /sample/i001 - running [1s]

Install script for [/sample/i001] on [agent-1] - running [1s]- [[Cancel](#)]

Run [install] phase for [/sample/i001] on [agent-1] - not started

Run [configure] phase for [/sample/i001] on [agent-1] - not started

Run [start] phase for [/sample/i001] on [agent-1] - not started

agent-1 - /sample/i002 - running [1s]

Install script for [/sample/i002] on [agent-1] - running [1s]- [[Cancel](#)]

Run [install] phase for [/sample/i002] on [agent-1] - not started

Run [configure] phase for [/sample/i002] on [agent-1] - not started

Run [start] phase for [/sample/i002] on [agent-1] - not started

agent-1 - /sample/i003 - running [1s]

Install script for [/sample/i003] on [agent-1] - running [1s]- [[Cancel](#)]

Run [install] phase for [/sample/i003] on [agent-1] - not started

Run [configure] phase for [/sample/i003] on [agent-1] - not started

Run [start] phase for [/sample/i003] on [agent-1] - not started

Nothing to do here...
Sit back and enjoy!

After...

:D

glu-dev-1 | All [product]

[Dashboard](#) | [Plans](#) | [System](#) | [Model](#) | [Admin](#) | [admin](#) | [Help](#)

Recent **Deploy - Fabric [glu-dev-1] - PARALLEL**

Show Errors Only: ☐ Auto Refresh: ☒

12/12 - 100%

Deploy - Fabric [glu-dev-1] - PARALLEL

Deploy - Fabric [glu-dev-1] - PARALLEL - 16s

[agent-1](#) - [/sample/i001](#) - 16s

Install script for [/sample/i001] on [agent-1] - 1s

Run [install] phase for [/sample/i001] on [agent-1] - 3s

Run [configure] phase for [/sample/i001] on [agent-1] - 2s

Run [start] phase for [/sample/i001] on [agent-1] - 8s

[agent-1](#) - [/sample/i002](#) - 12s

Install script for [/sample/i002] on [agent-1] - 2s

Run [install] phase for [/sample/i002] on [agent-1] - 2s

Run [configure] phase for [/sample/i002] on [agent-1] - 1s

Run [start] phase for [/sample/i002] on [agent-1] - 5s

[agent-1](#) - [/sample/i003](#) - 11s

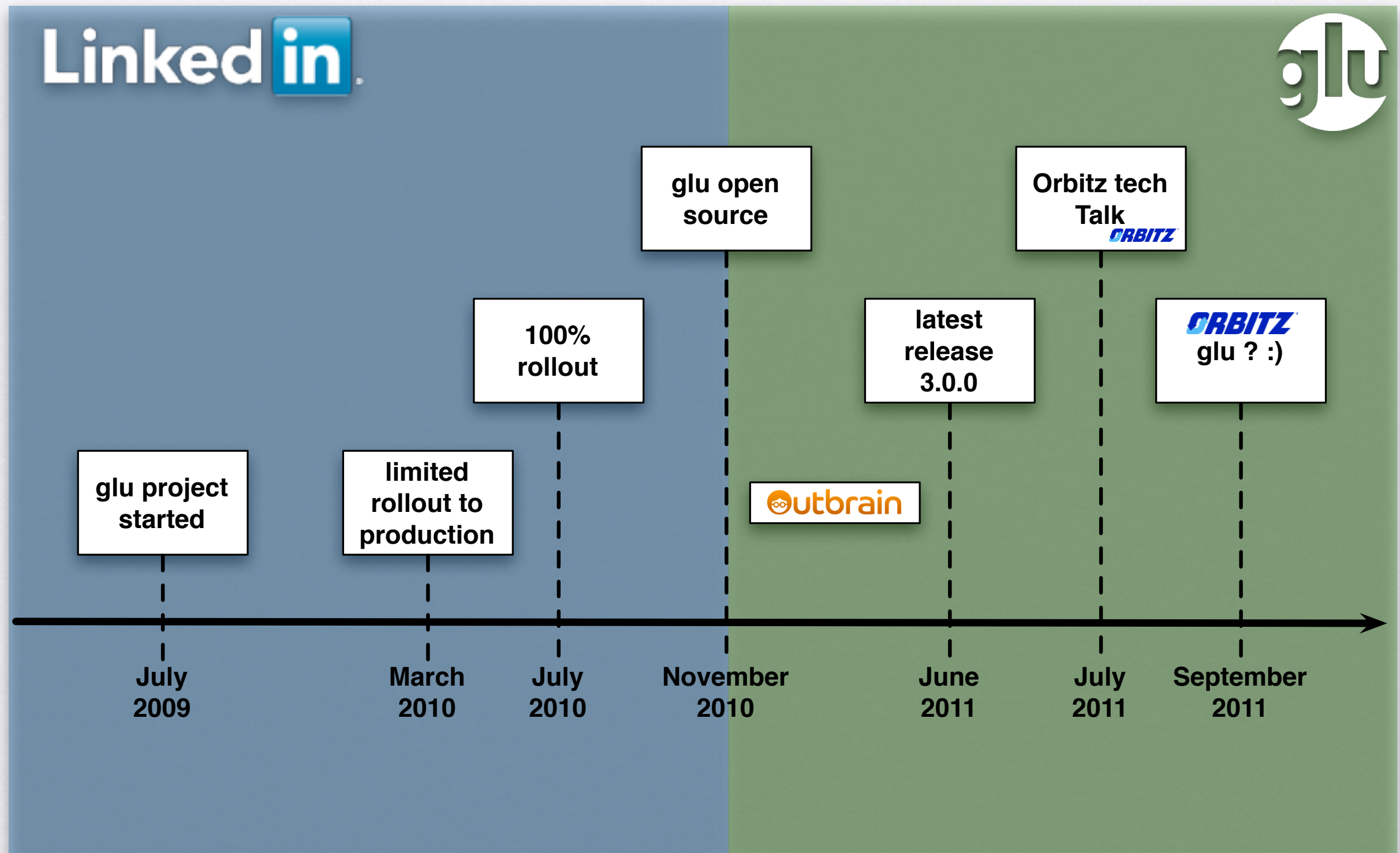
Install script for [/sample/i003] on [agent-1] - 2s

Run [install] phase for [/sample/i003] on [agent-1] - 2s

Run [configure] phase for [/sample/i003] on [agent-1] - 1s

Run [start] phase for [/sample/i003] on [agent-1] - 4s

History of glu



Rollout to production

- glu project started in July 2009
- Initial rollout to LinkedIn production in March 2010
- Gradual until full rollout in July 2010
- As of June 2011 LinkedIn glu numbers:
 - 5 different 'fabrics' (2 prod + 2 stg + 1 int. lab)
 - ~2650 nodes, ~9000 instances, ~300 services
- LinkedIn working on 'glu on the desktop' (dev)

glu open source

- Before I left LinkedIn, open sourced glu (~3 months effort)
 - 1.0.0 released in November 2010
 - 2.0.0 released in February 2011 (tagging)
 - 3.0.0 released in June 2011 (parent/child)
 - (~ 20 releases total... smaller releases)

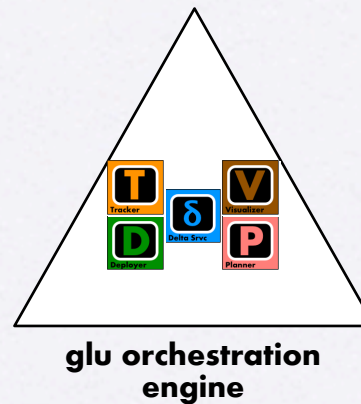
glu interest

- since 11/2010, glu has generated a lot of interest
- oubrain.com is using glu (integrated in CI!)
- companies interested in glu: Orbitz, Netflix, GigaSpaces, Rearden Commerce, etc...
- some academic use (Budapest university)
- a lot of 'followers' on github
- lots of downloads

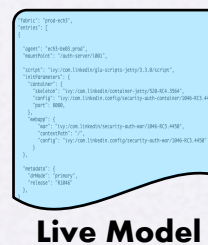
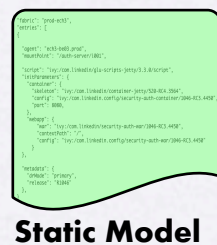
Architecture

Components/Concepts

- 3 physical components



- 3 concepts



ZooKeeper

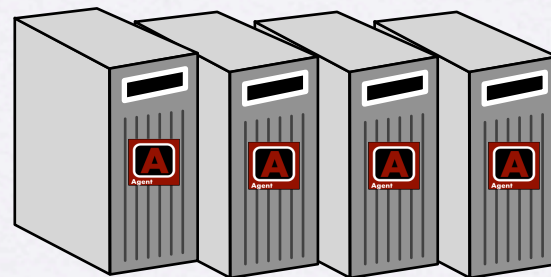


- 1 ZooKeeper cluster (3 or 5 instances enough)
- ZooKeeper is an Apache project
- similar to a (networked) filesystem (think nfs)
 - + 'directories' can also contain data
 - + ephemeral nodes
 - + powerful watcher concept => notifications
- ZooKeeper is used to maintain the state of the system

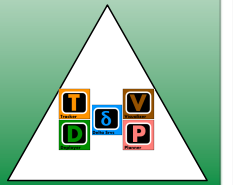
glu Agent



- 1 agent per node => as many agents as there are nodes
- agent is active process (groovy)
- (secure) REST API
- Reports its state to ZooKeeper

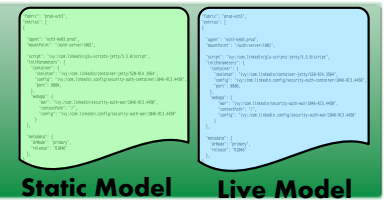


glu orchestration engine



- 1 orchestration engine
- runs inside a webapp
 - offers both browser and REST interface
- Listens to ZooKeeper events (to compute 'live state')
- Talks to the agents

Static/Live Model



- model is a json document which describes
 - where to deploy
 - what and how to deploy
- “Static” is what you want
- “Live” is what is actually deployed/running

Static Model: Where ?

```
{
  "fabric": "prod-chicago",
  "entries": [{
    "agent": "node01.prod",
    "mountPoint": "/search/i001",

    "script": "http://repository.prod/scripts/webapp-deploy-1.0.0.groovy",
    "initParameters": {
      "container": {
        "skeleton": "http://repository.prod/tgz/jetty-7.2.2.v20101205.tgz",
        "port": 8080,
      },
      "webapp": {
        "war": "http://repository.prod/wars/search-2.1.0.war",
        "contextPath": "/"
      }
    }
  ]
}
```

- “agent” => node which runs this agent
- “mountPoint” => unique key
- can deploy more than 1 ‘thing’ per agent

Static Model: What / How ?

```
{
  "fabric": "prod-chicago",
  "entries": [{
    "agent": "node01.prod",
    "mountPoint": "/search/i001",

    "script": "http://repository.prod/scripts/webapp-deploy-1.0.0.groovy",
    "initParameters": {
      "container": {
        "skeleton": "http://repository.prod/tgz/jetty-7.2.2.v20101205.tgz",
        "port": 8080,
      },
      "webapp": {
        "war": "http://repository.prod/wars/search-2.1.0.war",
        "contextPath": "/"
      }
    }
  ]
}
```

- “script” => instructions about what ‘deploy’ means
- “initParameters” => parameters provided to the script

glu Script

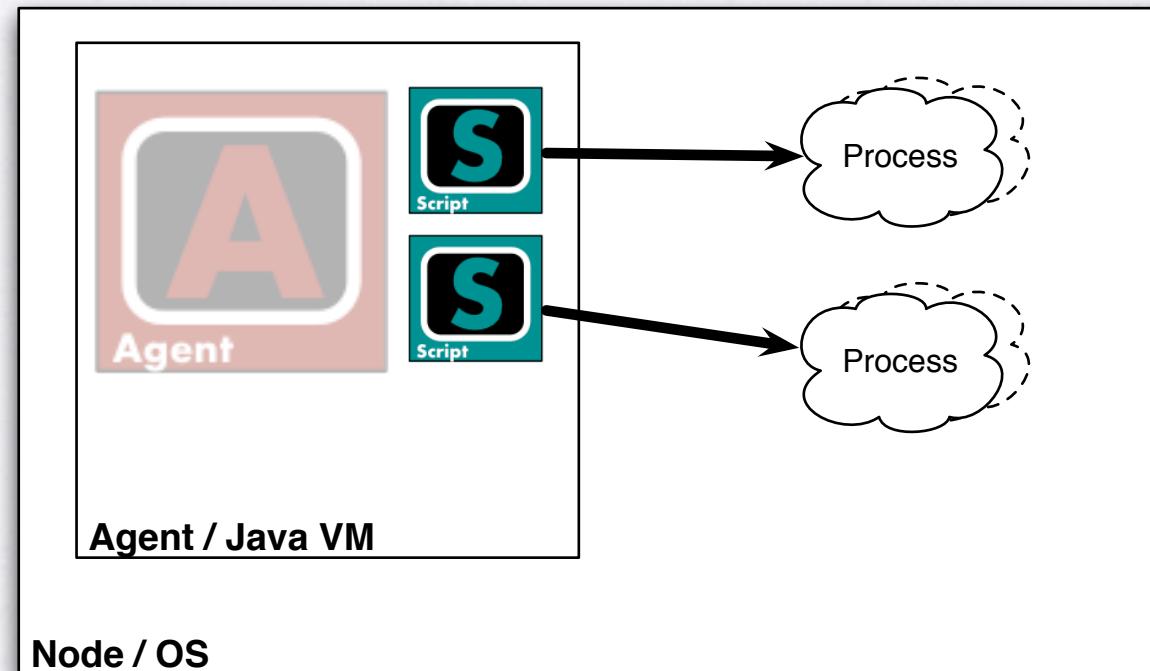


```
class MyGluScript
{
    def port
    def pid

    def install      = { /* install code */ }
    def configure    = { /* configure code */ }
    def start        = { /* start code */ }
    def stop         = { /* stop code */ }
    def unconfigure  = { /* unconfigure code */ }
    def uninstall    = { /* uninstall code */ }
}
```

- groovy class which defines
 - a set of 'phases' (install, start, etc...) backed by a state machine
 - properties (exported to ZooKeeper)
- glu does not dictate what goes in each 'phase'

glu Script runtime



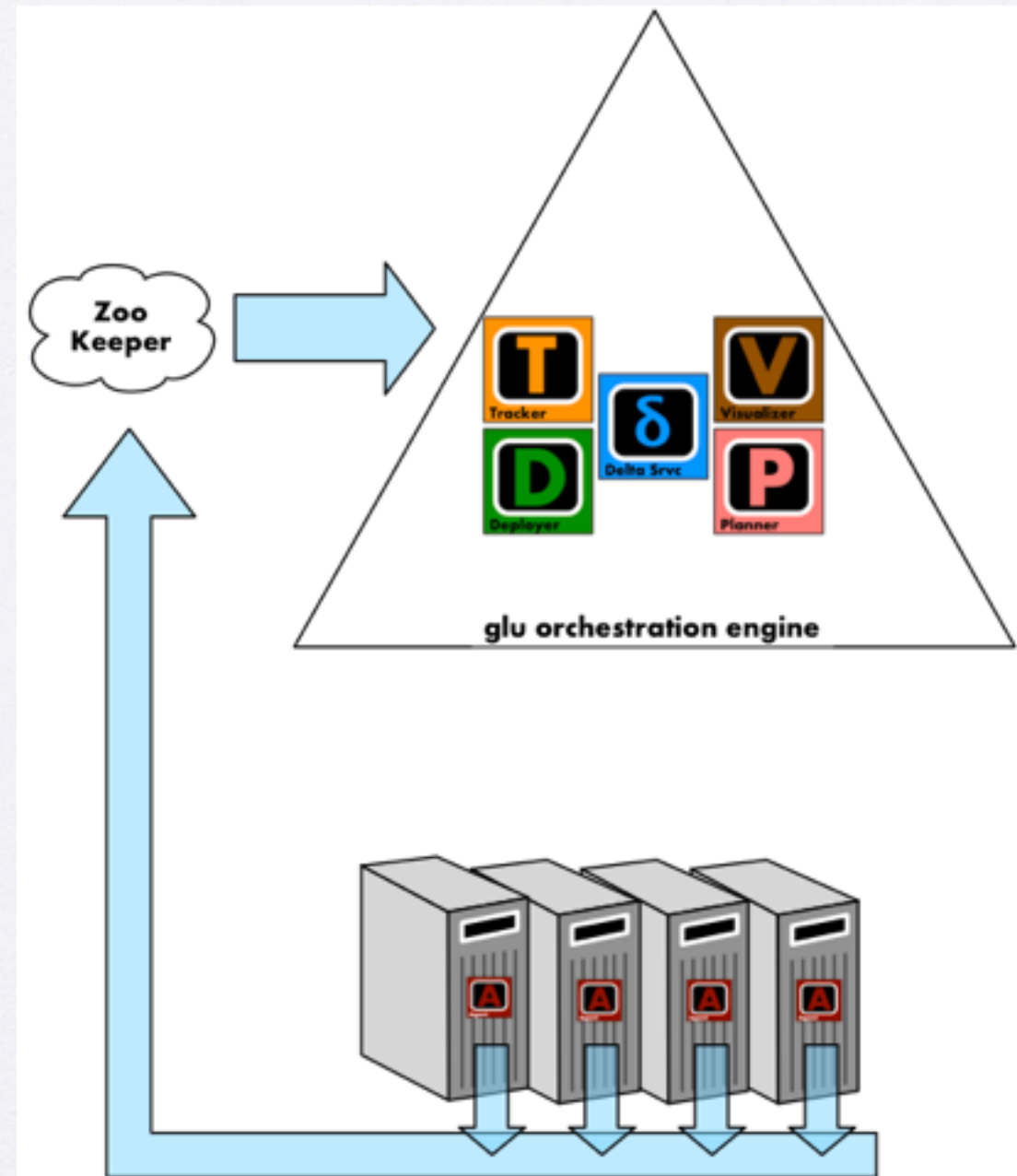
- glu Script code runs inside the (java) VM of the agent
- in general, a glu Script will spawn external processes (ex: webapp container, memcached, etc...) but it is not a requirement!

How does it all work ?

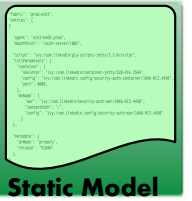
Live Model

Live Model

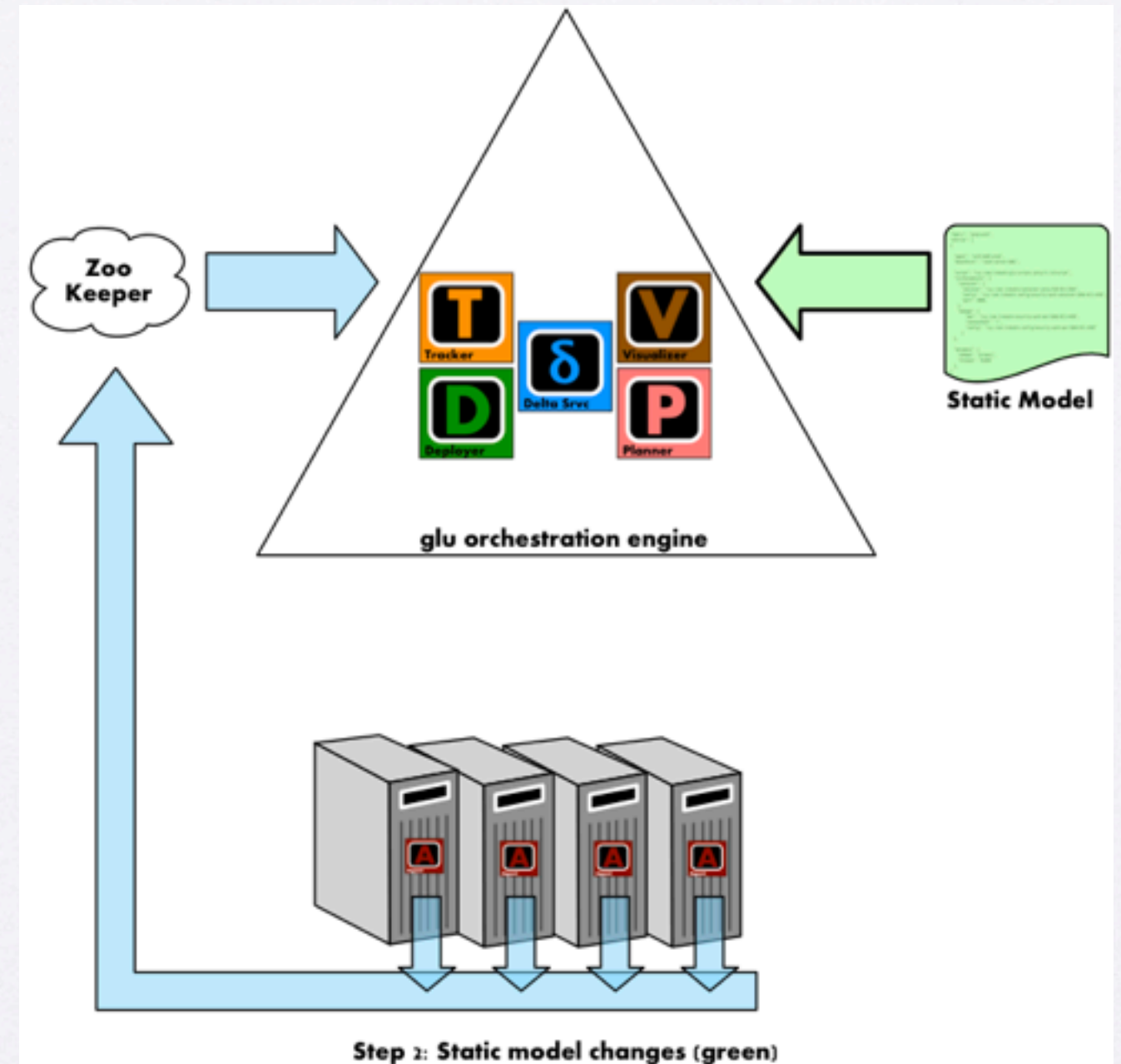
- each agent reports its state to ZooKeeper
- the orchestration engine listens to ZooKeeper and builds the 'live' model



Static Model

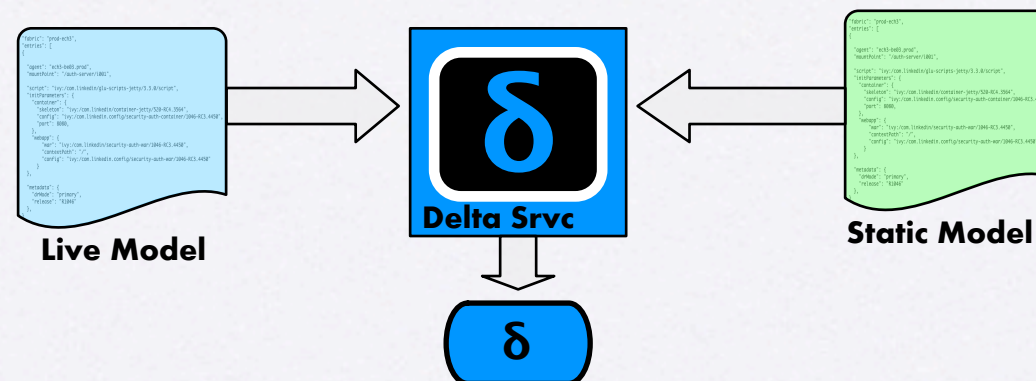


- the 'static' model is loaded in the orchestration engine



Delta Computation

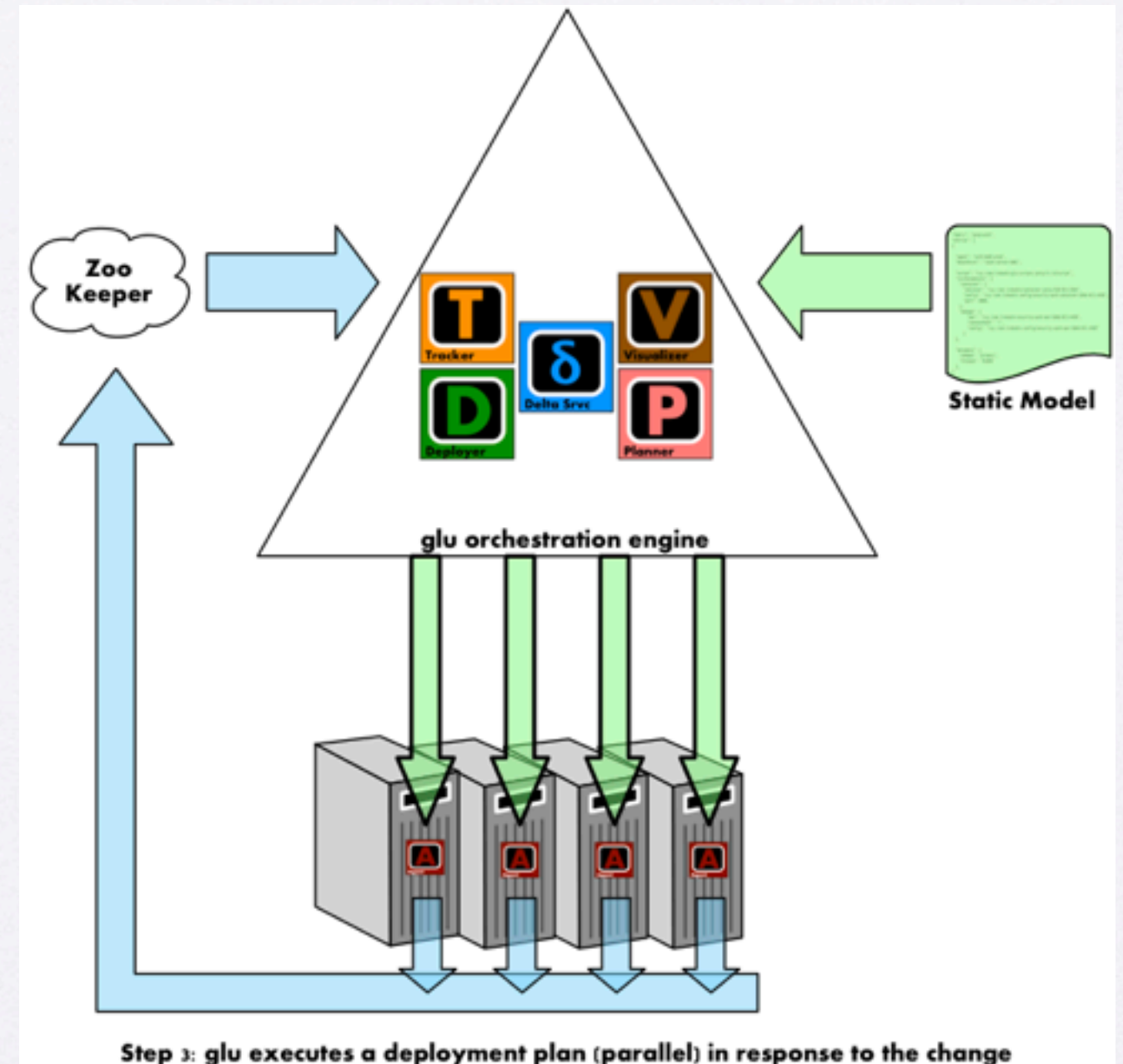
δ



- orchestration engine computes a delta by comparing the static model and the live model
- “desired” state vs “current” state

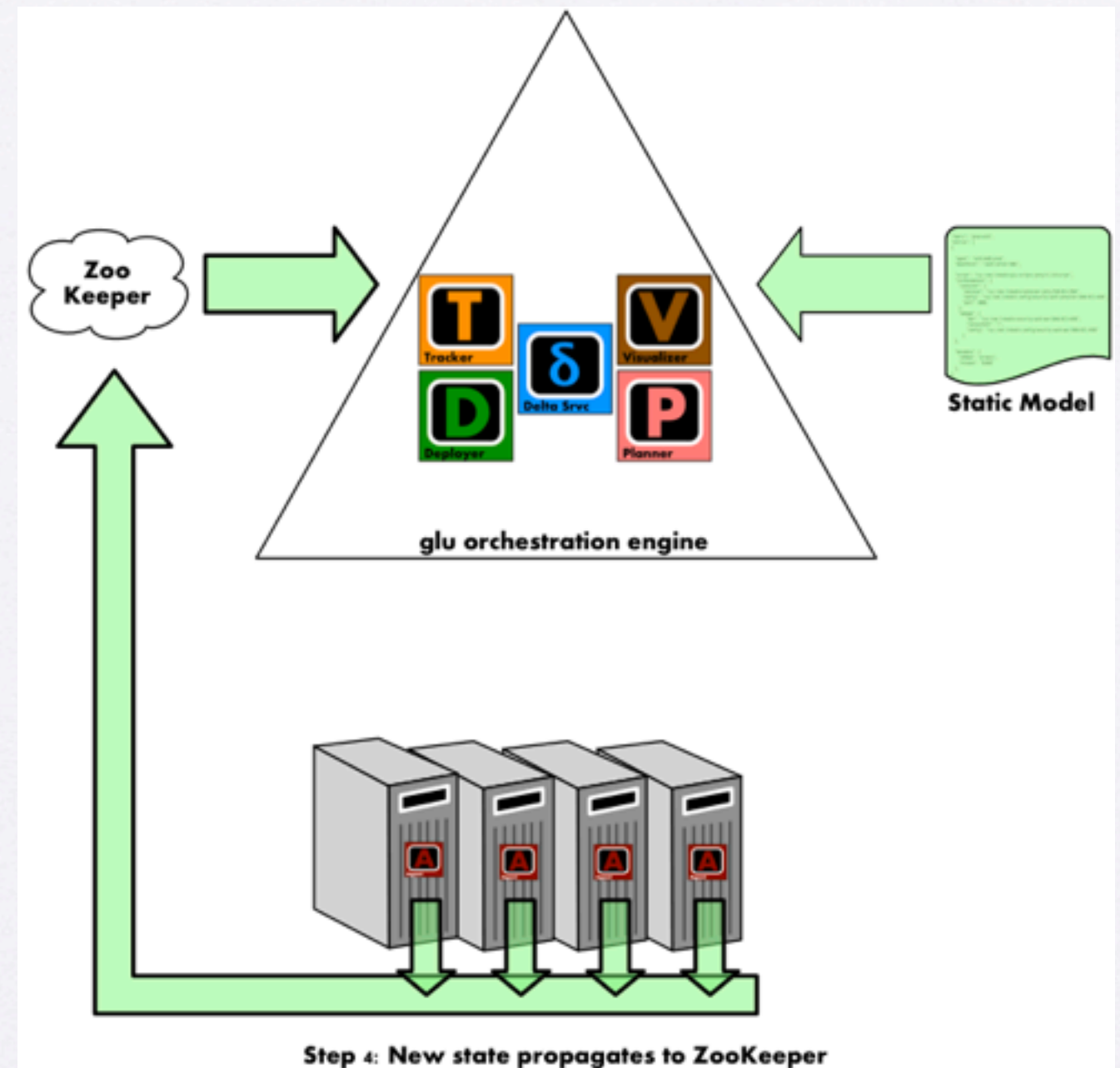
deployment plan

- delta is used to compute a deployment plan
- orchestration engine sends commands (REST) to the appropriate agents



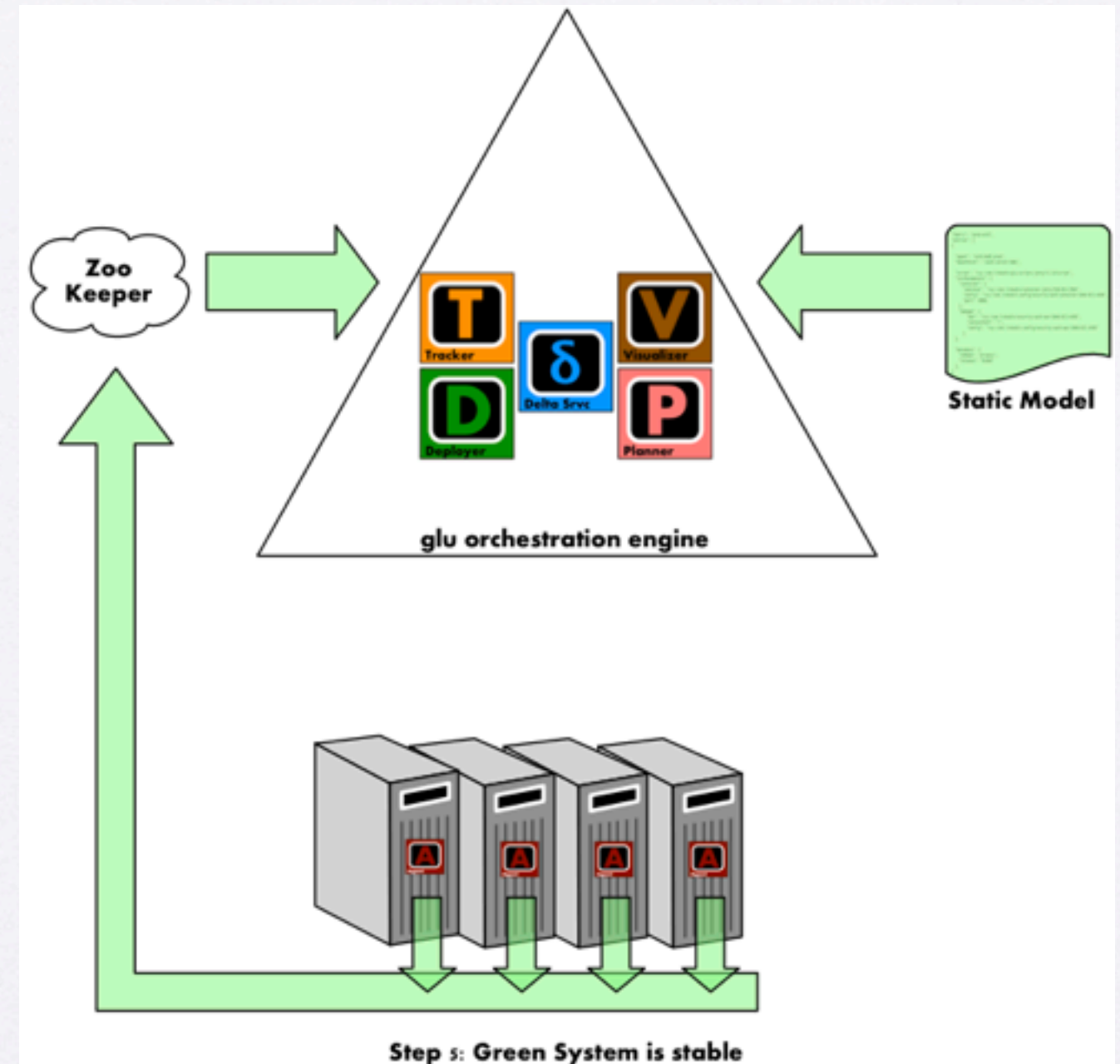
Live Model updated

- as the agents run the commands they update their state in ZooKeeper



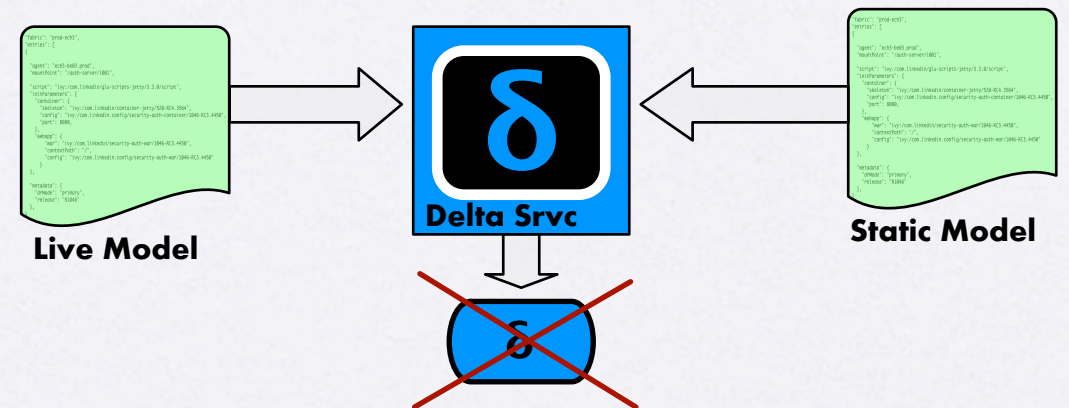
System Stable

- The live model and the static model match
- => no more delta

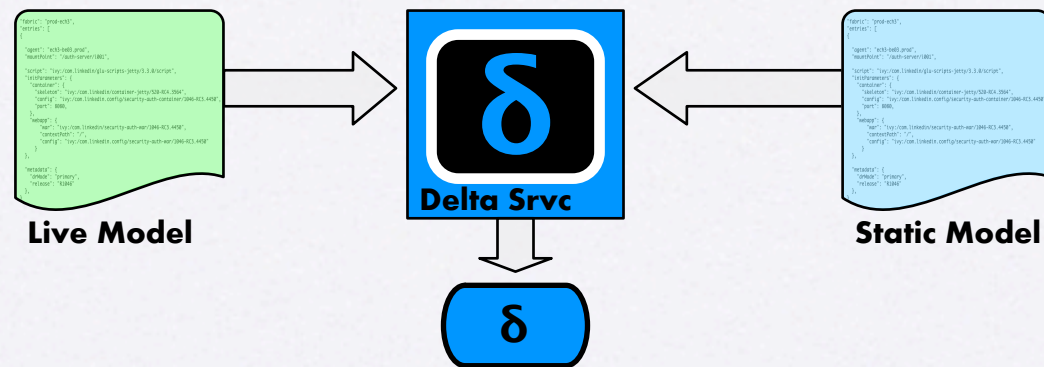


System Stable (no delta)

- remains stable until:
 - static model changes (ex: new version of software)
 - live model changes (ex: hardware crash)

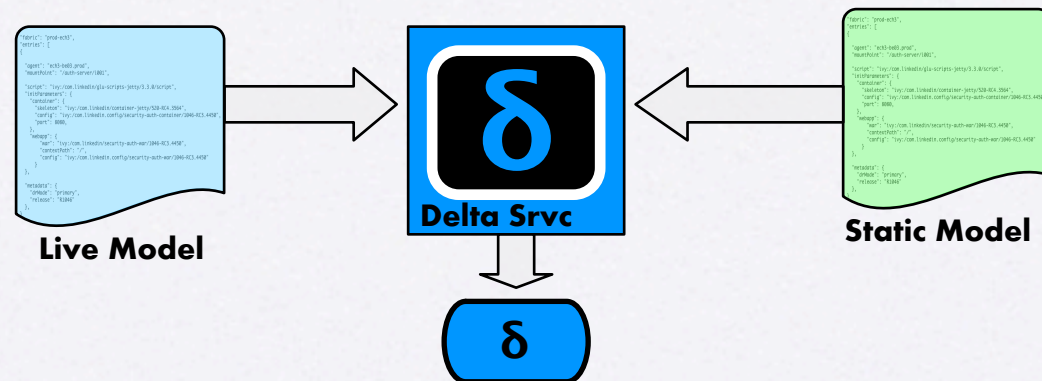


Static Model Changes



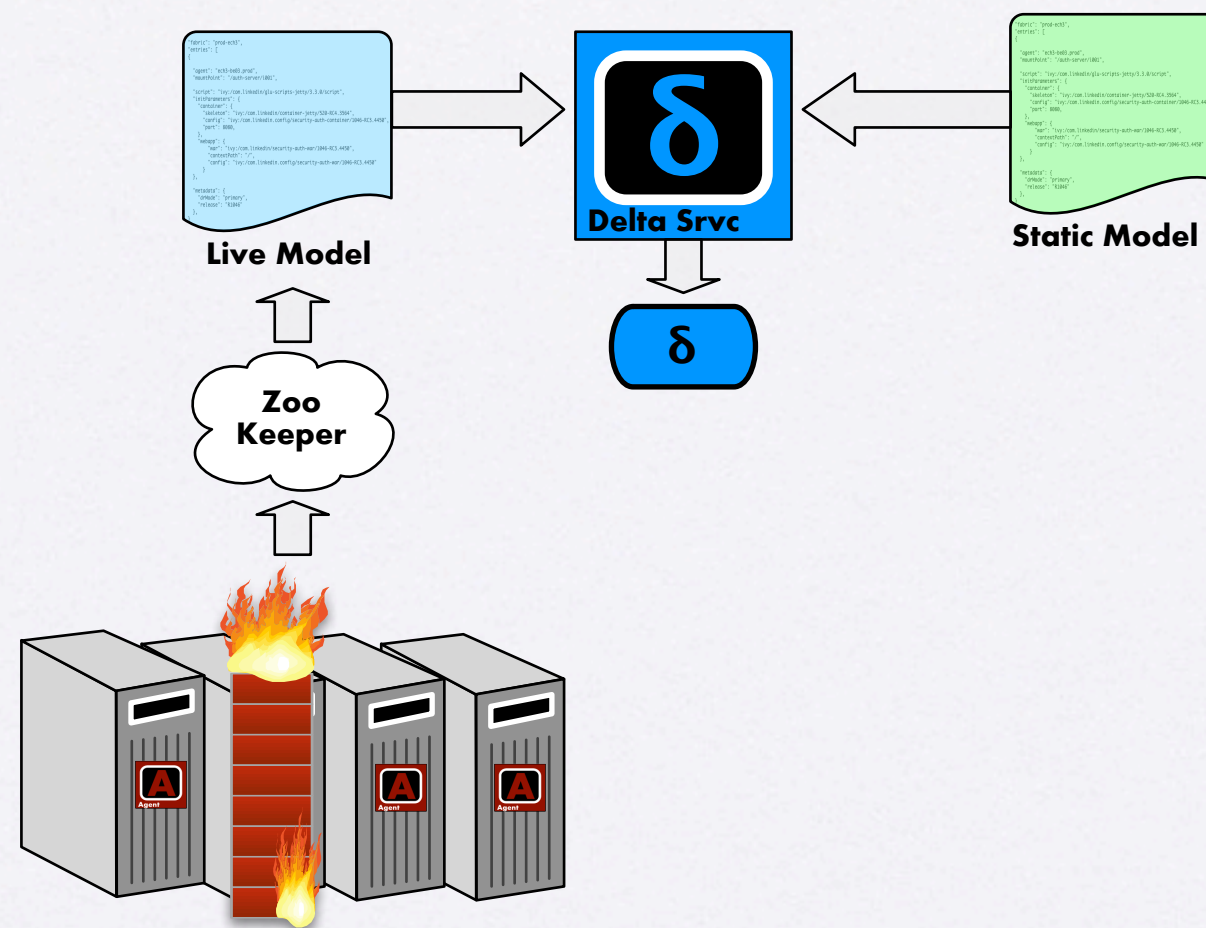
- Static model changes
 - ex: new version of software, new node, etc...
 - => delta => deploy/upgrade software, provision new nodes

Live Model Changes



- Live Model changes
 - ex: hardware crash, bad behavior, high load, etc...
 - => delta => monitoring!

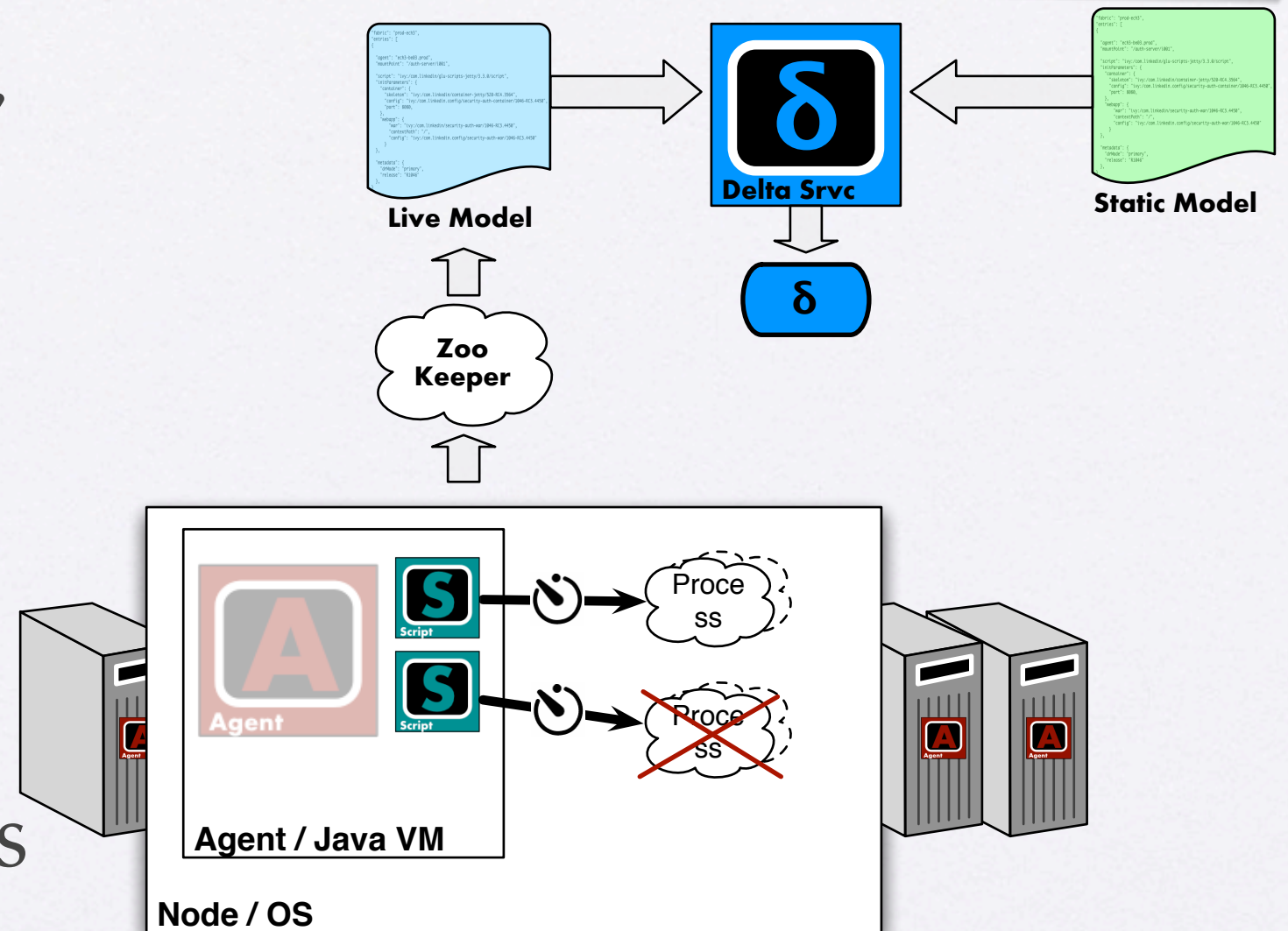
Monitoring: built-in



- agent registers a ZooKeeper ephemeral node
- => when agent disappears, state changes!

Monitoring: add-on

- script runs in “active” agent
- agent has “timer” capability
- =>script can also monitor what it starts and change state when failure detected



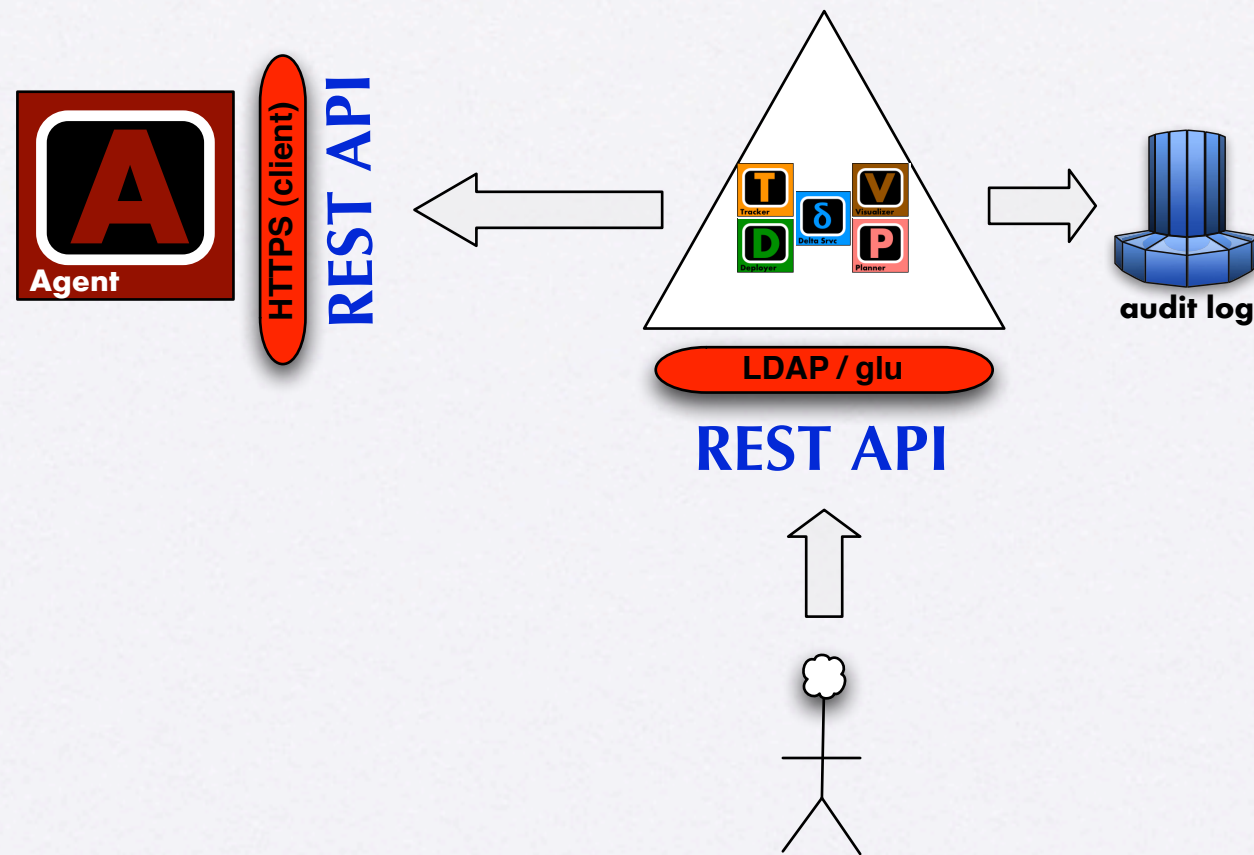
Monitoring: advanced

- You can even build a full monitoring solution on top of glu
- Not enough time/space here :)
- Check out my blog (source examples included!) @ <http://www.pongasoft.com/blog/yan/categories/glu/>

mountPoint:4	I:4	E:1	agent:1	status:2
/monitor	1	1	agent-1	ERROR High load detected...
/sample/i001	1	0	agent-1	running
/sample/i002	1	0	agent-1	running
/sample/i003	1	0	agent-1	running

What about security ?

Security



- User must authenticate (LDAP and/or glu)
- Agent REST API is 'protected' behind HTTP**S** with client auth
- Every 'change' is audited in the audit log

Live Demo...

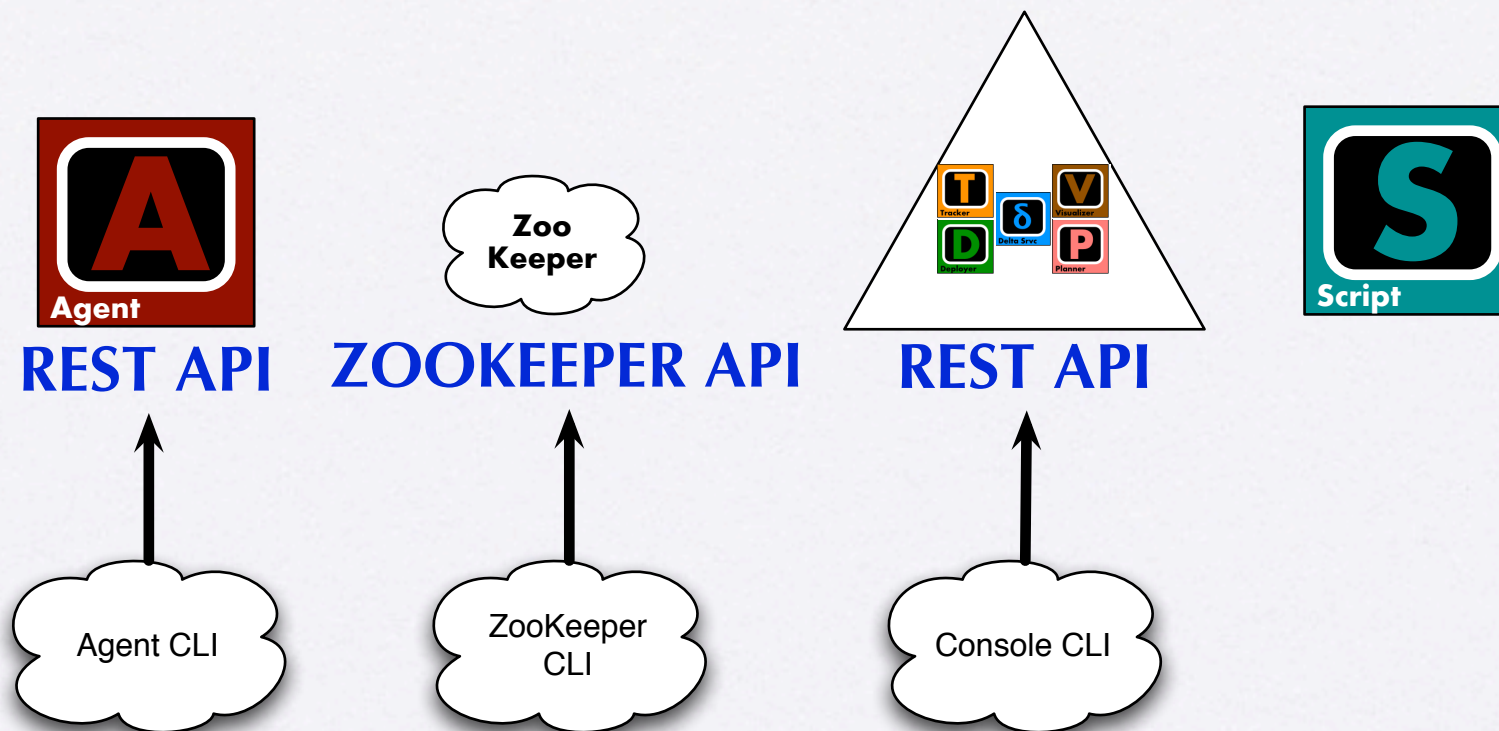
* You can see the live demo in the presentation given at Chicago devops (starts around 27:00):
<http://devops.com/2011/07/09/glu-deployment-automation-video/>

glu as a platform

glu is more than a tool

- glu is a tool with a lot of customization points
- it is also a **platform** on top of which you can build your **own** deployment (and optionally monitoring) solution

APIs



- Agent CLI and Console CLI are mostly wrappers/ examples around the REST API
- => you can use the REST API directly or use the CLI

glu Script



- A glu script is any code you want (groovy/java) made easier by agent capabilities (but you don't have to use them!)
- **shell.exec** capability allow you to write your script in any language you want (will be 'promoted' native soon...)

```
class RubyGluScript {  
  def install = {  
    shell.exec("./ruby/install.rb")  
  }  
  def start = {  
    shell.exec("./ruby/start.rb")  
  }  
}
```


Agent



- One way to look at the agent: script engine remotely accessible through a (secure) REST API
- => can also be used on its own (no ZooKeeper or orchestration engine)

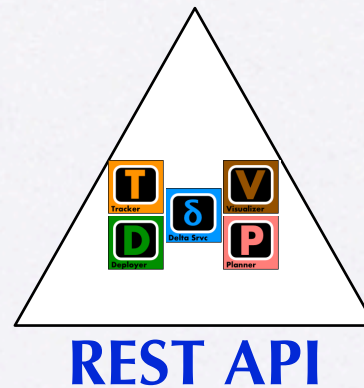
ZooKeeper



ZOOKEEPER API

- ZooKeeper is independently accessible
 - => can build your own listeners/watchers directly
 - => use AgentsTracker library which comes with glu (check the blog for more details)
- Ex: build a monitoring solution

Orchestration Engine



- For example, you can integrate your CI directly with glu by using the orchestration engine REST api (ex: outbrain.com)
- Although very customizable, you can also build your own UI if you do not like the one that comes with glu

Much more...

- Powerful tagging/filtering feature allow to create concepts that glu does not know about (ex: webapp, frontend, cluster, etc...)
- Query language allows you to slice & dice the models
 - => build higher level constructs (like dynamic node assignment)

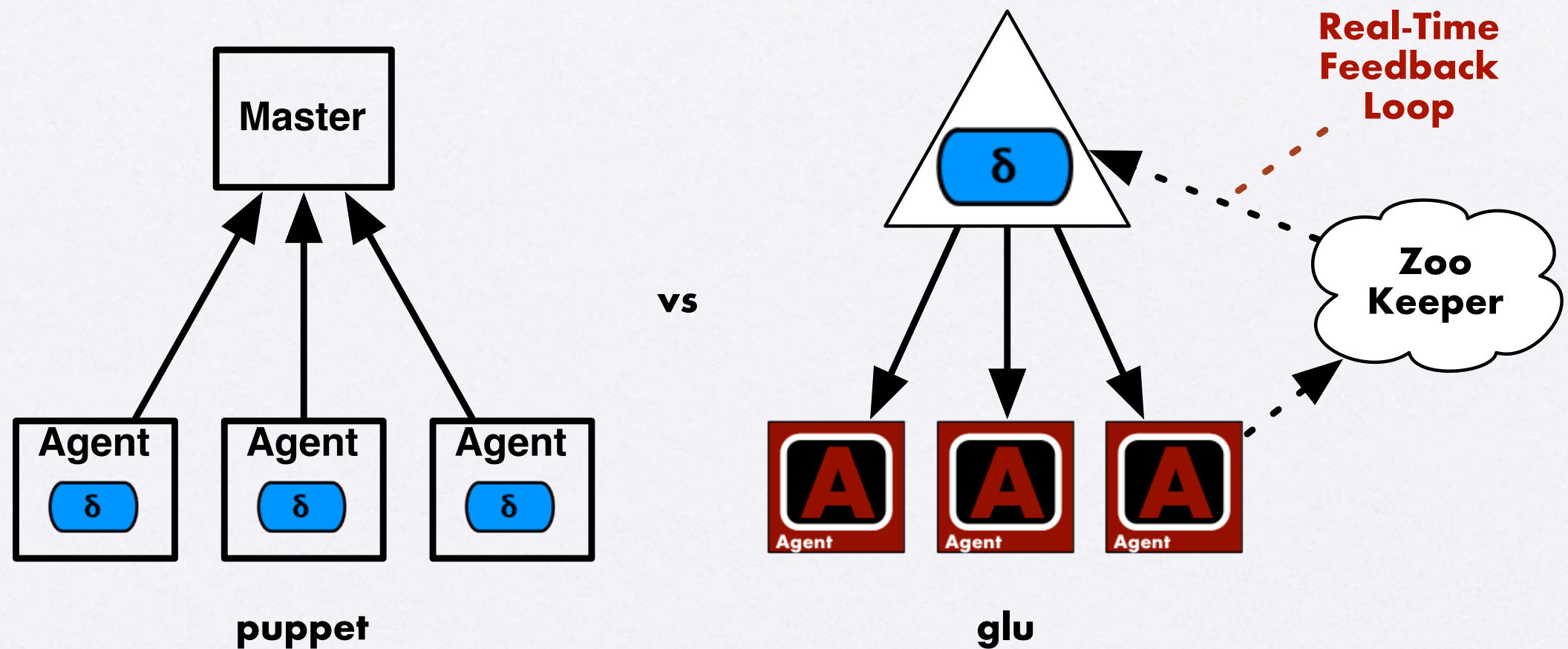
glu vs puppet

* Disclaimer: I have spent 2 years with glu (I wrote it :-)) and 1 day with puppet...

glu vs puppet

- Great news: intrinsically similar concepts
 - 'desired' vs 'current'!
 - declarative approach
- Minor difference:
 - puppet is ruby vs glu is groovy/java

glu vs puppet: orchestration



- delta computation / orchestration takes place at a different level
- => glu can orchestrate across nodes
- => glu delta is system wide (and real-time)

glu vs puppet: conclusion

- puppet is very good at **configuring** the infrastructure of a machine (users, groups, packages, etc...)
 - => static/stable does not change often
- glu is very good at **provisioning** dynamic applications on an ensemble of machines (the system)
 - => changes often, real-time failure detection (monitoring), “bounce”, etc...

glu can use puppet :)

```
class PuppetGluScript {  
  def puppetManifest  
  
  def install = {  
    // download manifest  
    puppetManifest = shell.fetch(params.puppetManifestURI)  
  }  
  
  def start = {  
    // execute manifest  
    shell.exec("puppet apply ${puppetManifest}")  
  }  
}
```


References

References

- glu source: github.com/linkedin/glu (links to all you need)
- blog: www.pongasoft.com/blog/yan
- twitter: @glutweets