

삼성 오픈소스 컨퍼런스

오픈소스와 DevOps

Cloud 환경기반 서비스의 효율적이고 안정적인 운영을 위한 DevOps 사례 소개

무선사업부 | Cloud운영그룹 | 김영욱

18/10/2018

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오픈소스와 DevOps

발표자 소개

DevOps 소개

Infrastructure as Code

Immutable Server

Continuous Delivery

01

02

03

04

05

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DevOps, Bixby

TechOps, SmartThings

Architect, MILK Music



Talk



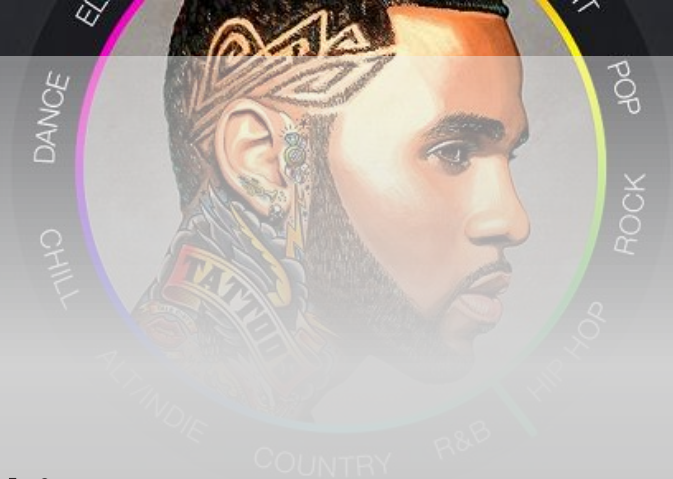
See

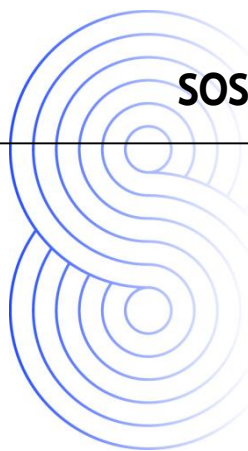


Recommend



Remind





Alerts/Alarm

- Get notification from monitor system

Check

- Check status of application/system

Restart service

- If service is unhealthy, try to restart service
- Create a incident ticket to JIRA

Reboot instance

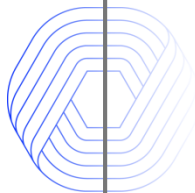
- If service is still going unhealthy after restart, try to make snapshot for inspection
- And reboot instance

Terminate instance

- Finally, terminate instance to bring new one automatically

Communication

- Channel
- Notification
- Alert
- Ticket



어떻게?

Alerts/Alarm

- Get notification from monitor system

Check

- Check status of application/system

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Immutable Server	 HashiCorp Packer  ANSIBLE  CHEF
Infrastructure as Code	 HashiCorp Terraform
Release Pipeline	 Spinnaker
Deployment Strategies • Blue/green deployment • Canary release • Rolling update	
Cluster Management	

Automated Test	  nGrinder  LOCUST
Monitor	 DATADOG  ZIPKIN
Log Stream	 sumologic
Communication	 slack  Jira

Infrastructure (as) Code

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Infrastructure as Code

Blueprint Your Infrastructure

- Compute
- Application
- Storage
- Security
- Network
- Configuration Standards

Build Anything

- Provision compute resources in the cloud
 - Infrastructure
 - Application Stacks
 - HPC
- Linux, Windows, Unix

Manage It Simply

- Automatically reconfigure everything
- Re-provision for disaster recovery

Application



Source Code



Build



Test



Release

Architecture



Source Code



Configuration



Test



Deploy

Infrastructure as Code, Why?

- > Because humans make mistakes
- > Because human brain is terribly bad at repetitive tasks
- > Because human is slow compared to a bash script
- > ... and because we are humans

AUTOMATE



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HashiCorp

Terraform

{ 코딩하자 }



ANSIBLE



HashiCorp

Packer

Infrastructure as Code

- Version control & Code review
- Simulation
- Security as Code
- One click Disaster Recovery

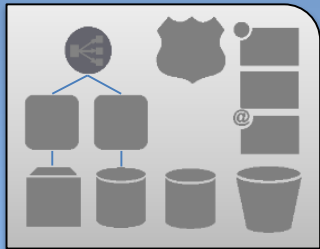


Desired
Architecture

Terraform
Code

Terraform
Plan/Apply

Provisioned
Architecture



```
$ cat example.tf
provider "aws" {
  access_key = "ACCESS_KEY_HERE"
  secret_key = "SECRET_KEY_HERE"
  region     = "us-east-1"
}

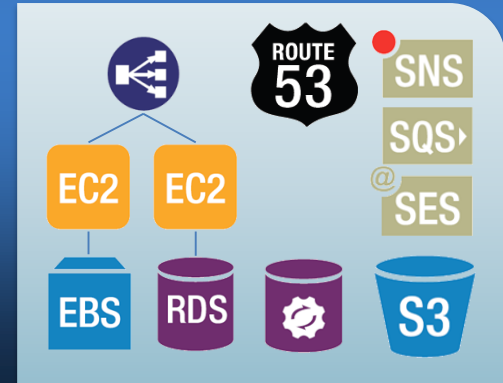
resource "aws_instance" "example" {
  ami           = "ami-0d729a60"
  instance_type = "t2.micro"
}
```

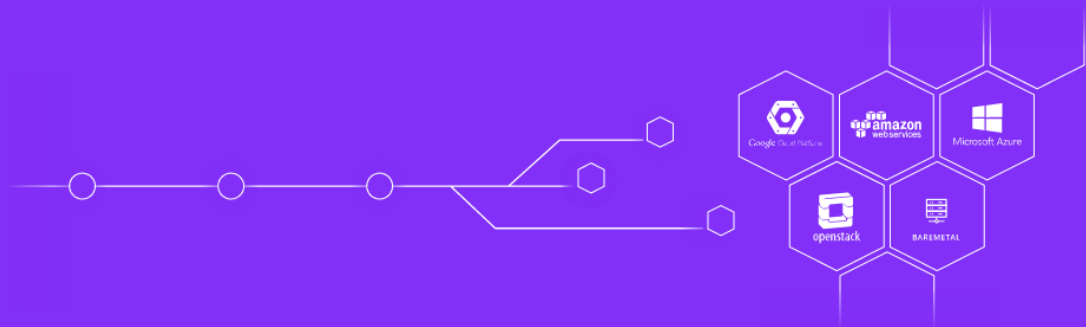
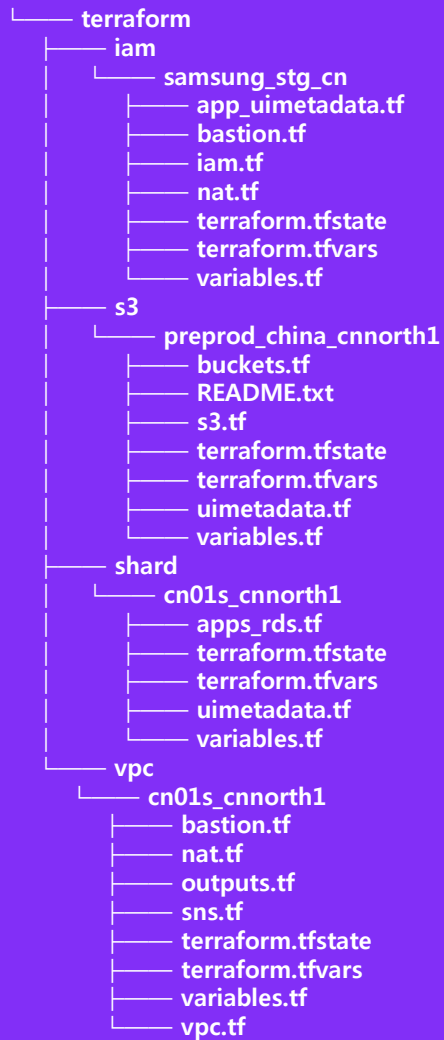
```
$ terraform apply
aws_instance.example: Creating...
  ami:           "" => "ami-0d729a60"
  instance_type: "" => "t2.micro"
[...]

aws_instance.example: Still creating... (10s elapsed)
aws_instance.example: Creation complete

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.

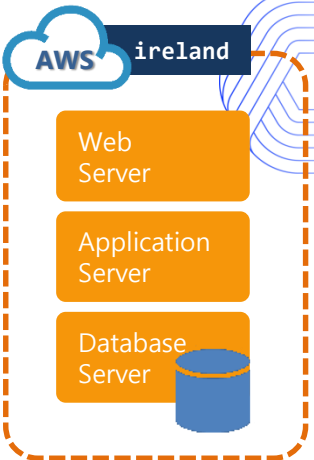
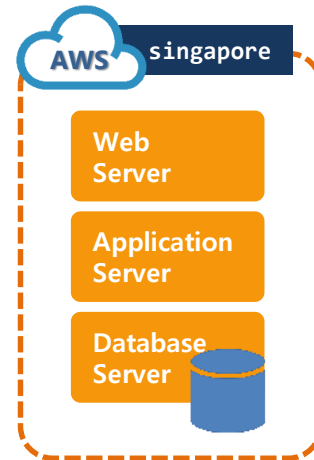
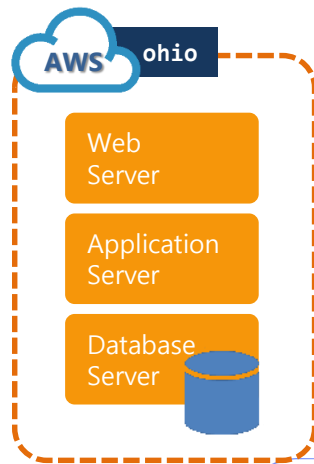
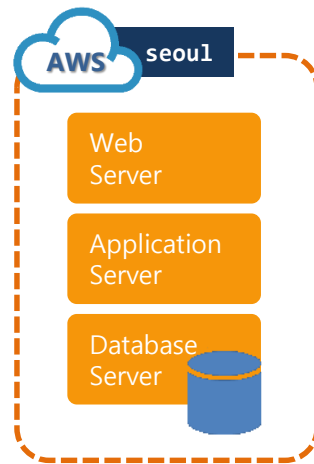
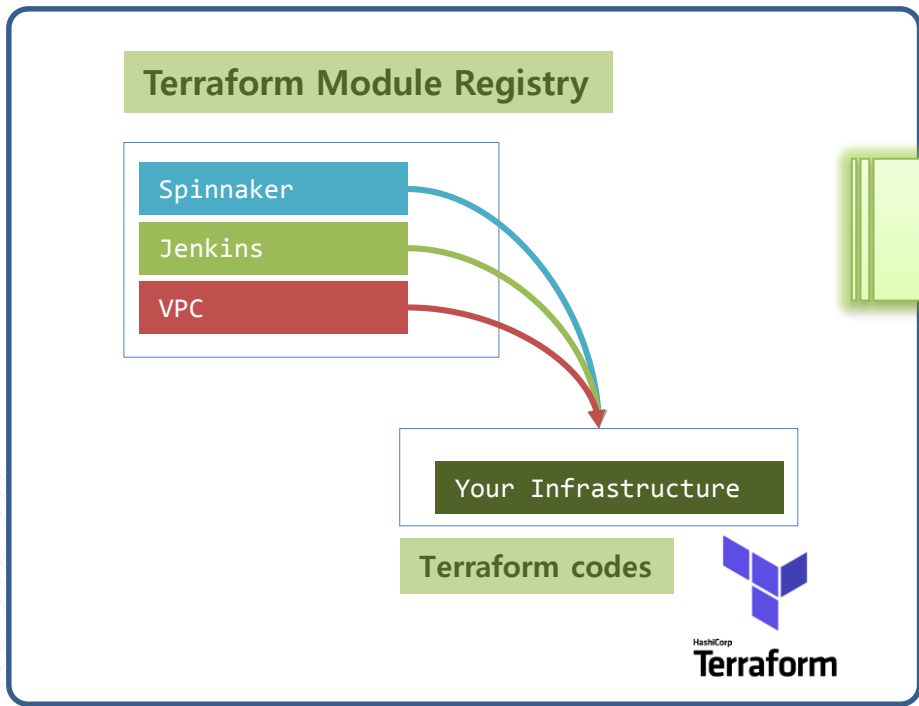
~$ terraform show
aws_instance.example:
  id = i-32cf65a8
  ami = ami-0d729a60
  availability_zone = us-east-1a
  instance_state = running
  instance_type = t2.micro
  private_ip = 172.31.30.244
  public_dns = ec2-52-90-212-55.compute-1.amazonaws.com
  public_ip = 52.90.212.55
  subnet_id = subnet-1497024d
  vpc_security_group_ids.# = 1
  vpc_security_group_ids.3348721628 = sg-67652003
```





Infrastructure Building Blocks

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updated the tag map to support the extra tags
Young committed 4 weeks ago

d37c9b5f



asg.tf 3.96 KB



Edit

Replace

Delete

```
1 # Server group for microservice
2
3 ### Security group for autoscaling group
4 resource "aws_security_group" "this" {
5   name       = "${local.name}"
6   description = "${local.name} ASG SG"
7   vpc_id     = "${var.vpc}"
8
9   tags {
10     Name = "${local.name}"
11   }
12 }
13
14 resource "aws_security_group_rule" "ingress_rules" {
15   count       = "${length(var.ingress_rules)}"
16   type        = "ingress"
17   cidr_blocks = ["${element(var.ingress_rules[count.index], 0)}"]
18   from_port   = "${element(var.ingress_rules[count.index], 1)}"
19   to_port     = "${element(var.ingress_rules[count.index], 2)}"
20   protocol    = "${element(var.ingress_rules[count.index], 3)}"
21   description = "${element(var.ingress_rules[count.index], 4)}"
22   security_group_id = "${aws_security_group.this.id}"
23 }
24
25 resource "aws_security_group_rule" "egress_rules" {
26   count       = "${length(var.egress_rules)}"
27   type        = "egress"
28   cidr_blocks = ["${element(var.egress_rules[count.index], 0)}"]
29   from_port   = "${element(var.egress_rules[count.index], 1)}"
30   to_port     = "${element(var.egress_rules[count.index], 2)}"
31   protocol    = "${element(var.egress_rules[count.index], 3)}"
32   description = "${element(var.egress_rules[count.index], 4)}"
33   security_group_id = "${aws_security_group.this.id}"
34 }
35
36 ### Launch configuration
37 resource "aws_launch_configuration" "this" {
38   count       = "${var.spinnaker_managed == "true" ? 0 : 1}"
39   image_id    = "${var.ami_id}"
40   instance_type = "${var.instance_type}"
41   key_name     = "${var.ssh_key_name}"
42   name_prefix = "${local.deploy_name}-"
```



Immutable Server

Artifact

Machine

Infrastructure

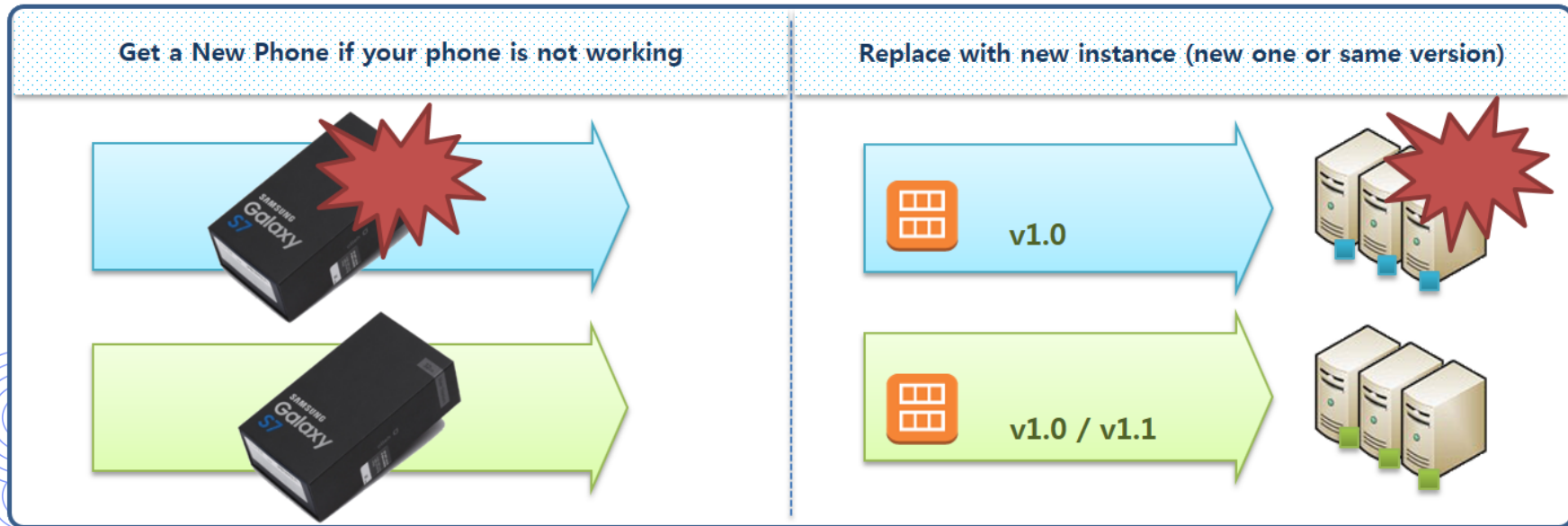
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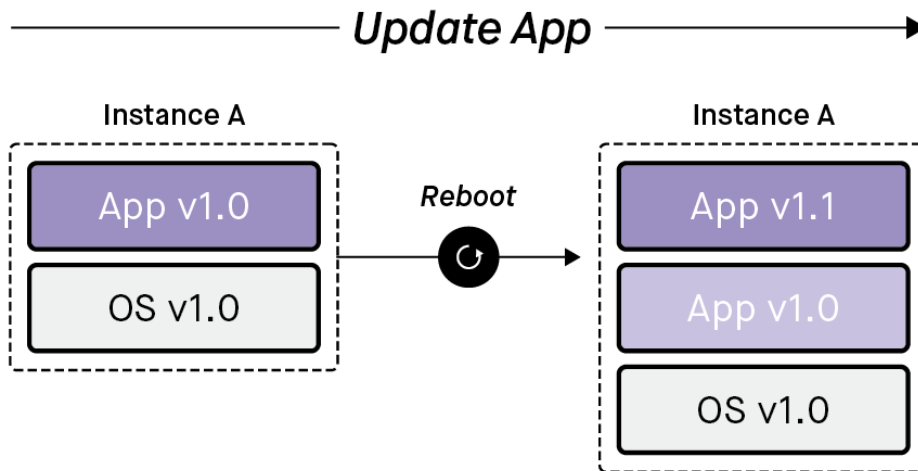
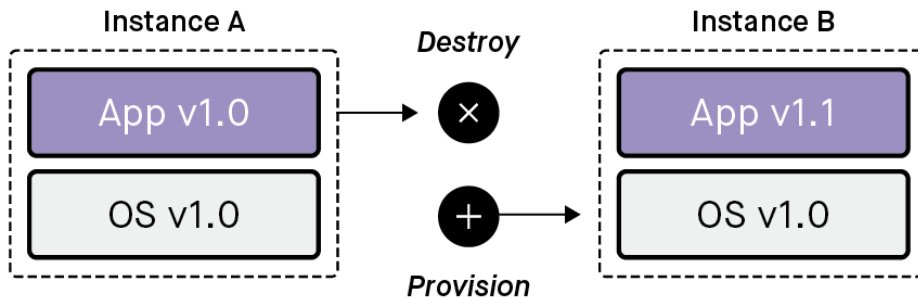
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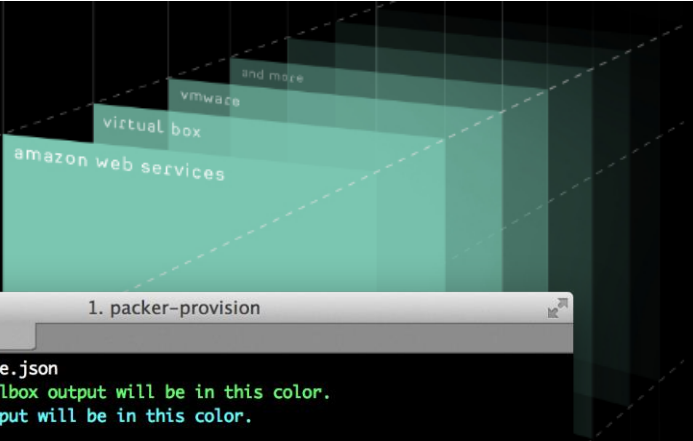


We can replace them with new image in an incident.
We don't need to touch the running server to fix problem.



Mutable
InfrastructureImmutable
Infrastructure

Packer is a tool for creating machine and container images for multiple platforms from a single source configuration.

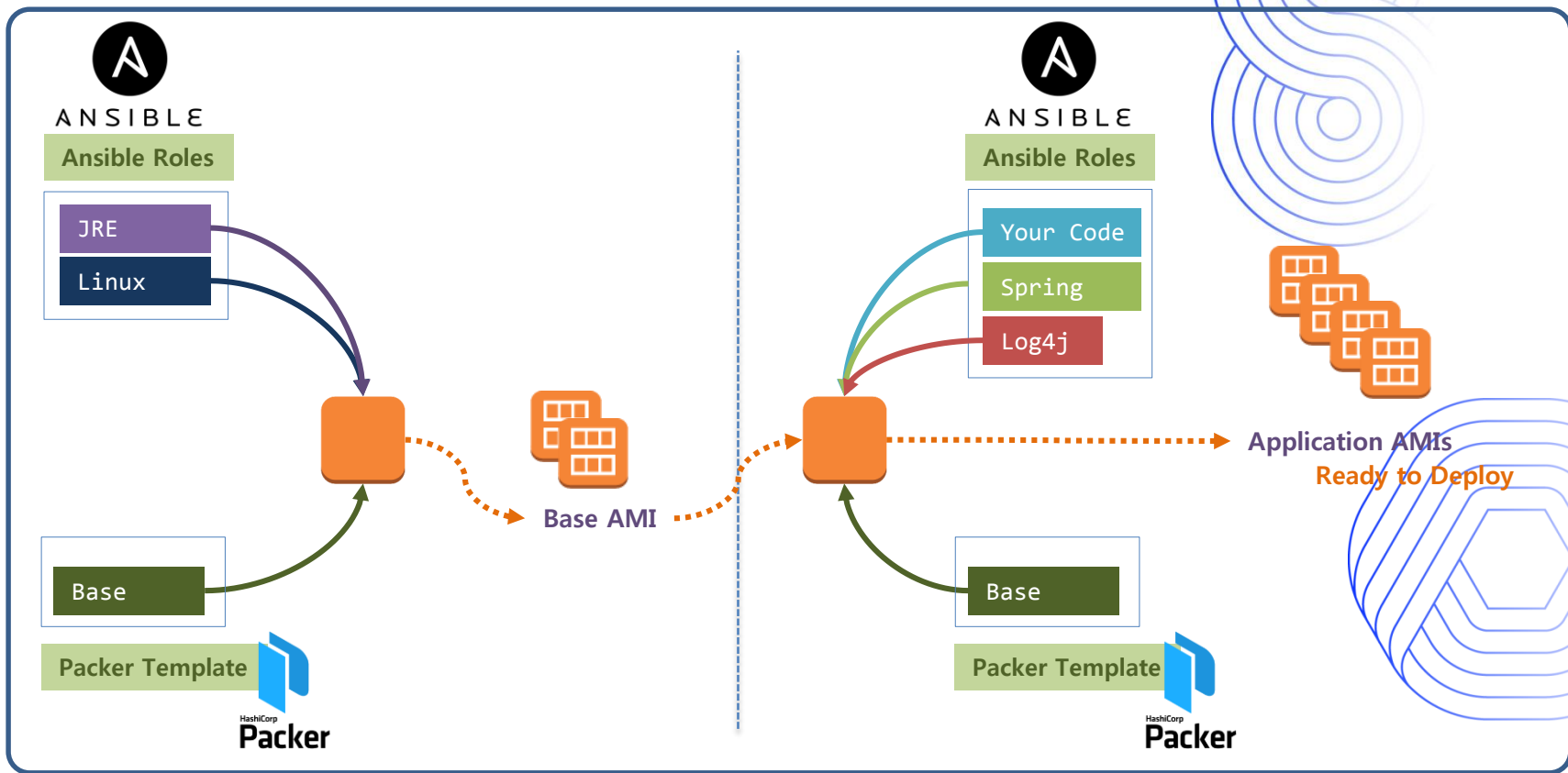


```
1. packer-provision
packer-provision
→ packer build template.json
⇒ virtualbox: virtualbox output will be in this color.
⇒ vmware: vmware output will be in this color.

⇒ vmware: Copying or downloading ISO. Progress will be reported periodically.
⇒ vmware: Creating virtual machine disk
⇒ vmware: Building and writing VMX file
⇒ vmware: Starting HTTP server on port 8964
⇒ vmware: Starting virtual machine...
⇒ virtualbox: Downloading VirtualBox guest additions. Progress will be shown periodically.
⇒ virtualbox: Copying or downloading ISO. Progress will be reported periodically.
⇒ virtualbox: Starting HTTP server on port 8081
⇒ virtualbox: Creating virtual machine...
⇒ virtualbox: Creating hard drive...
⇒ virtualbox: Creating forwarded port mapping for SSH (host port 3213)
⇒ virtualbox: Executing custom VBoxManage commands...
    virtualbox: Executing: modifyvm packer --memory 480
    virtualbox: Executing: modifyvm packer --cpus 1
⇒ virtualbox: Starting the virtual machine...
⇒ vmware: Waiting 10s for boot...
⇒ virtualbox: Waiting 10s for boot...
```

How to Build/Bake Immutable Images

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new handlers, tasks, and templates

Young committed 8 months ago

dccb132d

install.yml 1.2 KB



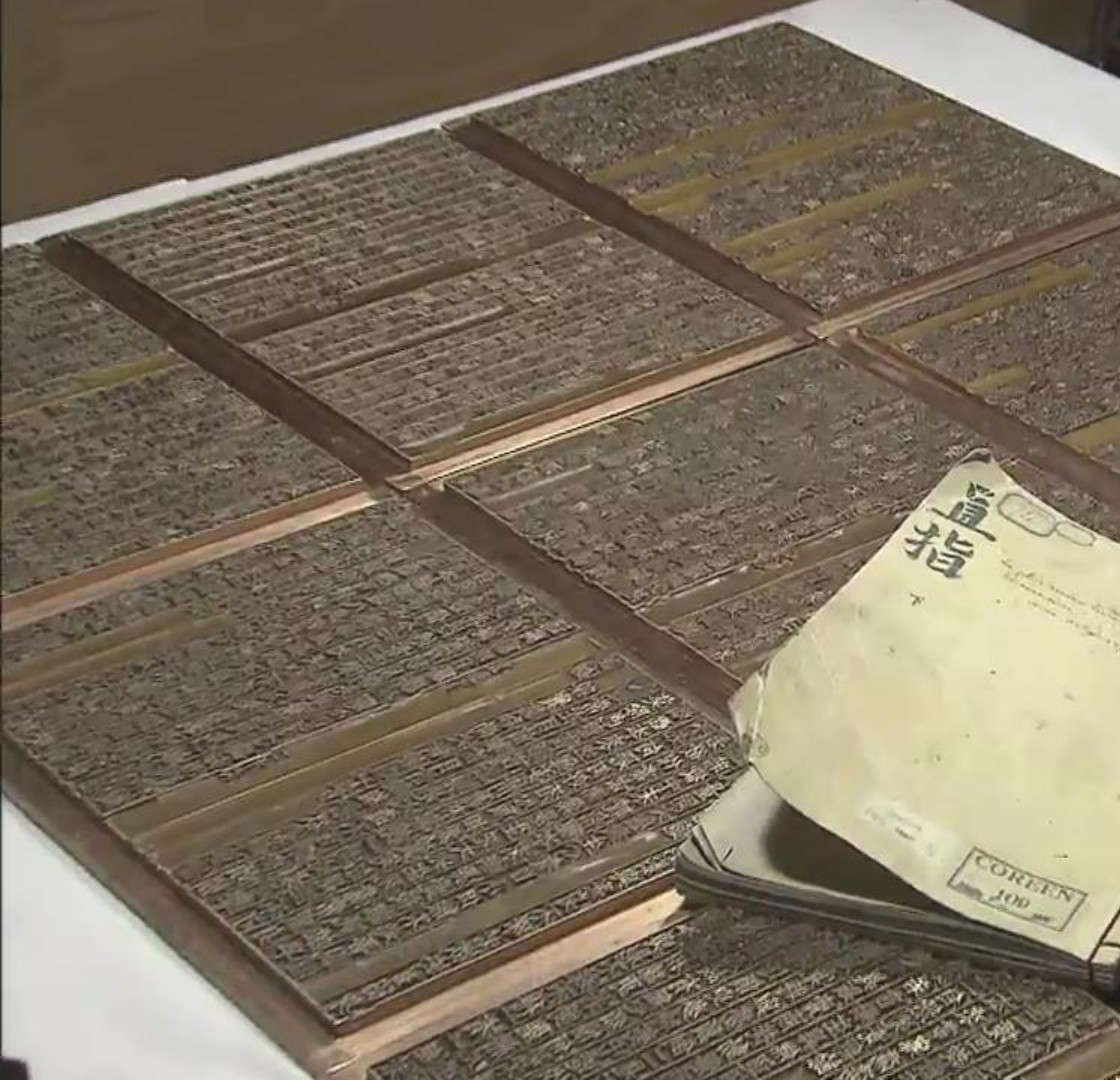
Edit

Replace

Delete

```
1 ---
2 # add repository of spinnaker releases
3 - name: Add a repository of stable releases
4   apt_key: url="https://bintray.com/user/downloadSubjectPublicKey?username=spinnaker-releases"
5   when:
6     - spinnaker_release is defined
7     - spinnaker_release == "stable"
8
9 - apt_repository:
10   repo: deb https://dl.bintray.com/spinnaker-releases/debians trusty spinnaker
11   state: present
12   update_cache: yes
13   when:
14     - spinnaker_release is defined
15     - spinnaker_release == "stable"
16
17 - name: Add a repository of development builds
18   apt_key: url="https://bintray.com/user/downloadSubjectPublicKey?username=spinnaker"
19   when: (spinnaker_release is undefined or spinnaker_release != "stable")
20
21 - apt_repository:
22   repo: deb [arch=amd64] https://dl.bintray.com/spinnaker/debians trusty spinnaker
23   state: present
24   update_cache: yes
25   when: (spinnaker_release is undefined or spinnaker_release != "stable")
26
27 # install package
28 - apt: name=spinnaker-clouddriver={{ clouddriver_version }} state=present force=yes
29   when:
30     - clouddriver_version is defined
31     - clouddriver_version != "latest"
32
33 - apt: name=spinnaker-clouddriver state=present force=yes
34   when: (clouddriver_version is undefined or clouddriver_version == "latest")
```





LIFE 선정

인류 역사를 바꾼 100대 사건 중 1위!

직지코드

DANCING WITH JIKJI

세계 최초 금속활자 탄생의 미스터리

6월, 역사는 새로 쓰여야 한다



출연 데이빗 레드먼 명사팀 이세스 김만중 | 감독 유광호 (90)넷 레드먼 | 제작 <부러진 화살> <남영동 1985> 정지영
제작 (주) 코어엔터테인먼트

Continuous Delivery

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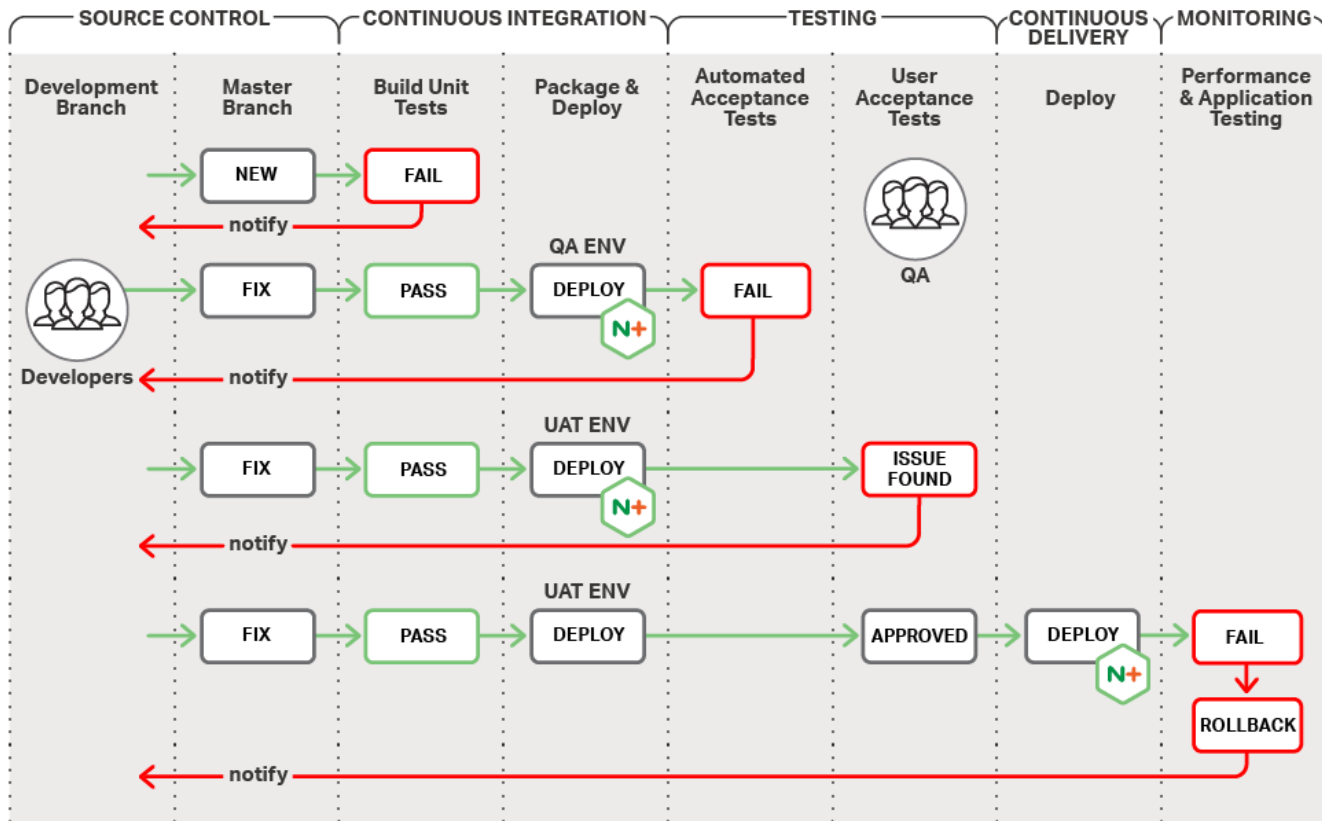


Production-ready software

Fast, automated feedback on the **production readiness** of your applications **every** time there is a **change** – to code, infrastructure, or configuration



Continuous Delivery Pipeline





Continuous Delivery Pipeline

Pipeline instance	Commit stage	Acceptance test stage	Release stage	UAT stage
0.0.133.12	Completed	Failed		
0.0.133.13	Completed	Completed	Completed	Completed
0.0.133.14	Completed	Completed	Pending <u>Trigger now</u>	Pending <u>Trigger now</u>
0.0.133.15	Failed			
0.0.133.16	Running			



The screenshot shows the Jenkins web interface for a build pipeline named 'apps-backend'. The top navigation bar includes the Jenkins logo, the name of the workspace 'apps-backend [Jenkins]', a search bar, and a 'log out' button. The main content area displays the pipeline graph, which consists of several stages and steps. The stages are color-coded: green for successful builds, red for failed builds, and blue for pending or in-progress builds. The steps are labeled with their names and build numbers. The interface also includes a sidebar on the left with navigation links like 'Run', 'History', 'Configure', 'Add Step', 'Delete', and 'Manage'.

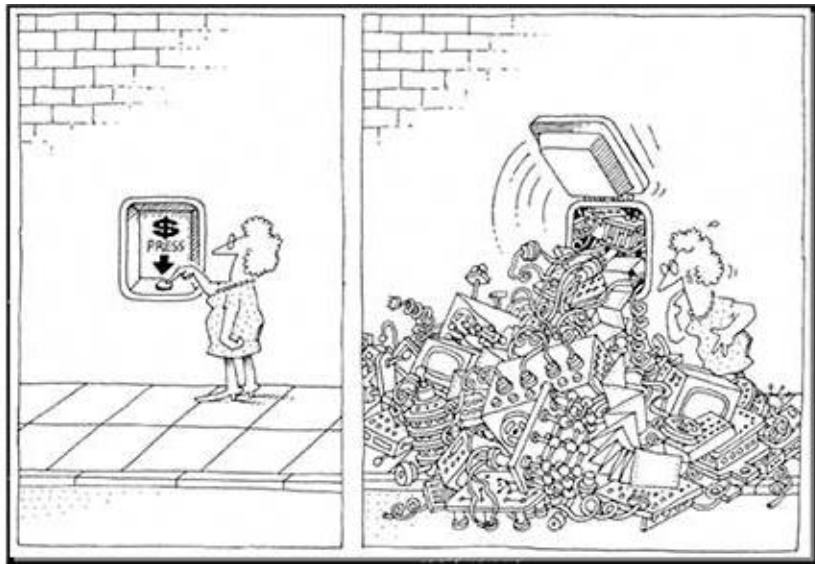
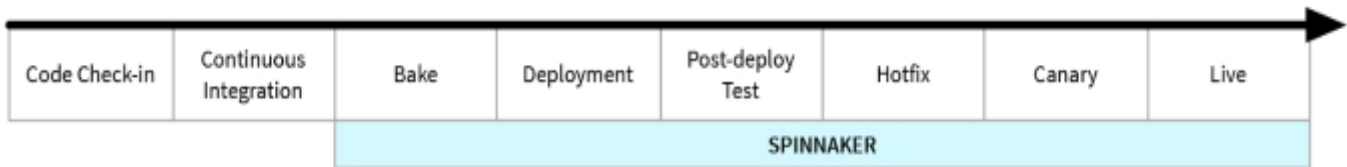
Stage	Step Name	Build Number	Status	Timestamp	Duration
apps-backend-library-build	#11 apps-backend-library-build	1	Success	Sep 1, 2015 2:34:13 PM	0 min 18 sec
	#10 apps-backend-library-build	10	Success	Sep 1, 2015 2:22:07 PM	0 min 17 sec
	#9 apps-backend-library-build	9	Success	Sep 1, 2015 2:14:31 PM	0 min 16 sec
apps-backend-library-test	#14 apps-backend-library-test		Success	Sep 1, 2015 2:35:40 PM	0.84 sec
	#13 apps-backend-library-test		Success	Sep 1, 2015 2:22:33 PM	0.41 sec
apps-backend-admin-build	#2 apps-backend-admin-build		Success	Sep 1, 2015 2:36:40 PM	0 min 49 sec
	apps-backend-admin-build		Pending		
apps-backend-seller-build	#1 apps-backend-seller-build		Success	Sep 1, 2015 2:35:35 PM	0 min 1.2 sec and counting
	apps-backend-seller-build		Pending		

At the bottom of the page, there is a footer that reads 'Page generated: 2015. 9. 1 2:39:36 REST API Jenkins ver. 1.609.2'.

```
apps-backend-admin-build > #2
AU APP-INF\lib\jackson-core-2.1.1.jar
AU APP-INF\lib\contextsvcl-client.jar
AU APP-INF\lib\jackson-annotations-2.3.0.jar
AU APP-INF\lib\location-client.jar
AU APP-INF\lib\INICrypto_v3.1.7_signed.jar
AU APP-INF\lib\social-client.jar
AU APP-INF\lib\spring-oxm-3.2.6.RELEASE.jar
AU APP-INF\lib\eezep153.jar
AU APP-INF\lib\libatis-2.3.4.726.jar
AU APP-INF\lib\libappstore_v2_0_1.jar
AU APP-INF\lib\INIPayJAVA.jar
AU APP-INF\lib\commons-lang-2.4.jar
AU APP-INF\lib\xmlsec-1.4.3.jar
AU APP-INF\lib\xbean.jar
AU APP-INF\lib\spring-web-3.2.6.RELEASE.jar
AU APP-INF\lib\rest-api-sdk-0.7.1.jar
AU APP-INF\lib\spring-webmvc-3.2.6.RELEASE.jar
AU APP-INF\lib\wsdl4j.jar
AU APP-INF\lib\serializer.jar
AU APP-INF\lib\transformation-api-1.0.jar
AU APP-INF\lib\stax-1.2.0.jar
AU APP-INF\lib\spring-beans-3.2.6.RELEASE.jar
AU APP-INF\lib\commons-discovery-0.2.jar
AU APP-INF\lib\ZirconiaLicenseGeneratorV01.jar
AU APP-INF\lib\ezmorph-1.0.jar
At revision 601
no revision recorded for http://svn/amazon/trunk/AStore-gar-Amaزون/AStore-Admin in the previous build
no revision recorded for http://svn/amazon/trunk/AStore-gar-Amaزون/facContent in the previous build
Copied 1 artifact from "apps-backend-library-build" build number 11
[workspace] $ cmd.exe /C "D:\tools\ant\ant-1.9.4\bin\ant.bat clean
compile war && exit %ERRORLEVEL%"
Buildfile: C:\Users\admin\jenkins\jobs\apps-backend-admin-build\workspace\build.xml
clean:

compile:
[mkdir] Created dir: C:\Users\admin\jenkins\jobs\apps-backend-admin-build\workspace\build\classes
[echo] source dir: C:\Users\admin\jenkins\jobs\apps-backend-admin-build\workspace\src
[echo] binary dir: C:\Users\admin\jenkins\jobs\apps-backend-admin-build\workspace\build\classes
[javac] Compiling 89 source files to
C:\Users\admin\jenkins\jobs\apps-backend-admin-build\workspace\build\classes
[javac] Note: Some input files use unchecked or unsafe operations.
[javac] Note: Recompile with -Xlint:unchecked for details.

war:
[copy] Copying 94 files to C:\Users\admin\jenkins\jobs\apps-backend-admin-build\workspace\WebContent\WEB-INF\classes
[war] Building war: C:\Users\admin\jenkins\jobs\apps-backend-admin-build\workspace\build\galaxy-apps-backend-admin.war
BUILD SUCCESSFUL
Total time: 19 seconds
Warning: you have no plugins providing access control for builds, so
falling back to legacy behavior of permitting any downstream builds to be
triggered
Triggering a new build of apps-backend-admin-test
Finished: SUCCESS
```



→ Let's don't manage the whole mess.

Just use the **push button**





SPINNAKER Projects Applications Infrastructure youngook.kim@samsung.com Search

hello

PIPELINES CLUSTERS LOAD BALANCERS SECURITY GROUPS TASKS CONFIG

Filters Clear All Unpin

SEARCH

PIPELINES

- test, build, bake, deploy

Reorder Pipelines

STATUS

- Running
- Terminal
- Succeeded
- Not Started
- Canceled
- Stopped

Group by Pipeline Show 2 executions per pipeline stage durations

New Configure Start Manual Execution

test, build, bake, deploy Configure Start Manual Execution

MANUAL START
youngook.kim@samsung.com
a day ago
Details

Status: SUCCEEDED Duration: 13:14

test Build #15 Package Build #27 Bake Build #33 Manual Judgment Deploy

DEPLOY DETAILS
Duration: 06:36

Step	Started	Duration	Status
Deploy in us-east-1	2017-03-14 22:24:29 KST	04:12	SUCCEEDED
Disable Cluster	2017-03-14 22:28:42 KST	02:01	SUCCEEDED
Shrink Cluster	2017-03-14 22:30:44 KST	00:21	SUCCEEDED

DEPLOYMENT CONFIG Task Status

Account DEV
Region us-east-1
(us-east-1a, us-east-1b, us-east-1c, us-east-1d, us-east-1e)
Cluster hello-global-d-app-greetings

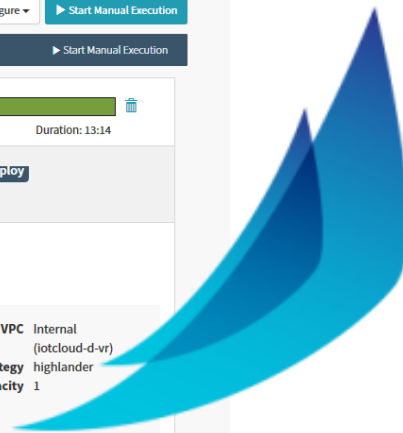
VPC Internal (iotcloud-d-vr)
Strategy highlander
Capacity 1

Deployed: hello-global-d-app-greetings-v001

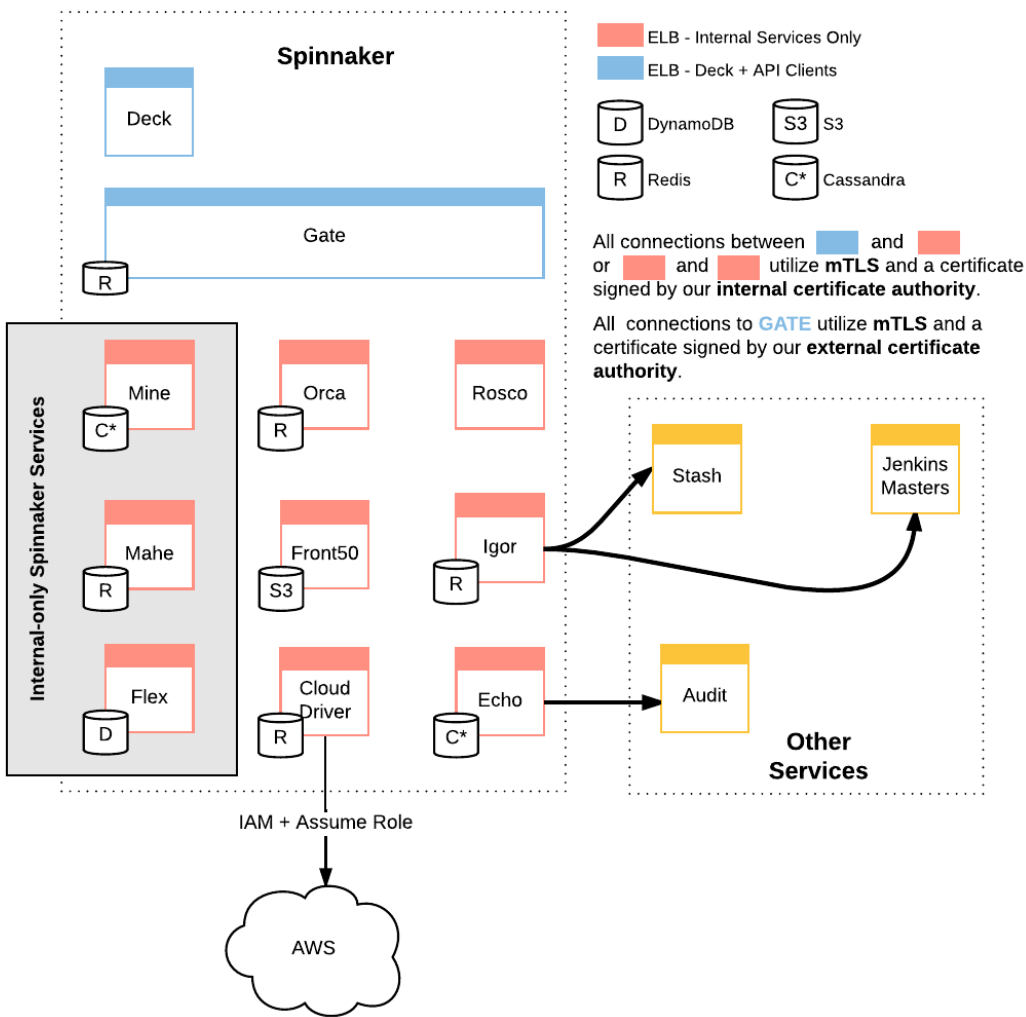
Source | Permalink

MANUAL START
uks.lee@samsung.com
a day ago
Details

Status: CANCELED by uks.lee@samsung.com — 2017-03-14 21:56:12 KST Duration: 06:37



Spinnaker



Application Status

Filter by region / namespace ▾

▼ PROD

.

22 Applications 1157 Instances

1026 ▲ / 111 ▼ / 20 ◻ : 88%

		Last Push	ap-northeast-2	eu-west-1	us-east-2
ET JI	#0	2 months ago	2 ▲ : 100%	6 ▲ : 100%	2 ▲ : 100%
MTI	#0	a month ago	4 ▲ : 100%	4 ▲ : 100%	4 ▲ : 100%
DI	#0	20 hours ago	4 ▲ : 100%	4 ▲ : 100%	4 ▲ : 100%
CUV	#0	19 hours ago	17 ▲ : 100%	45 ▲ : 100%	70 ▲ : 100%
TIPI API	#0	a year ago	2 ▲ : 100%	-	-
NIEC	#0	19 hours ago	40 ▲ : 100%	240 ▲ : 100%	260 ▲ : 100%
TWA	#0	a month ago	4 ▲ : 100%	4 ▲ : 100%	4 ▲ : 100%
GEZ	#0	a year ago	3 ▲ : 100%	-	-
IN	#0	2 months ago	1 ▲ : 100%	1 ▲ : 100%	1 ▲ : 100%
GO	#0	a year ago	1 ▲ : 100%	1 ▲ : 100%	1 ▲ : 100%
	#0	a day ago	8 ▲ : 100%	23 ▲ : 100%	23 ▲ : 100%
UTE	#0	18 hours ago	24 ▲ : 100%	90 ▲ : 100%	2 ▲ / 98 ▼ : 2%
ALICV	#0	3 months ago	8 ▲ : 100%	34 ▲ / 13 ▼ : 72%	20 ◻
PIDATOR	#0	a day ago	5 ▲ : 100%	6 ▲ : 100%	4 ▲ : 100%
BVEIT	#0	a month ago	3 ▲ : 100%	2 ▲ : 100%	2 ▲ : 100%
IRY	#0	14 days ago	2 ▲ : 100%	2 ▲ : 100%	2 ▲ : 100%
NILII	#0	25 days ago	4 ▲ : 100%	4 ▲ : 100%	4 ▲ : 100%
VEN	#0	25 days ago	4 ▲ : 100%	4 ▲ : 100%	4 ▲ : 100%
KIC	#0	a month ago	2 ▲ : 100%	2 ▲ : 100%	2 ▲ : 100%
CIELER	#0	2 months ago	2 ▲ : 100%	2 ▲ : 100%	2 ▲ : 100%
MDIN	#0	a month ago	2 ▲ : 100%	2 ▲ : 100%	4 ▲ : 100%
MAA	#0	5 months ago	5 ▲ : 100%	4 ▲ : 100%	4 ▲ : 100%

Pipeline Status

DATA: Deploy on Multi regions (get readyBuild #19, started 2018-03-15 16:15:52 KST)

COUNT: PROD deploy on multi regions (get readyBuild #198, started 2018-03-15 13:51:11 KST)

RD: Deploy on AP03 (started 2018-03-15 11:05:03 KST)

UTE: PROD deploy on multi regions (get readyBuild #110, started 2018-03-15 10:50:30 KST)

DAPTOR: Deploy on NA03 (PROD deploy on multi regionsBuild #45, started 2018-03-15 10:45:20 KST)

DAPTOR: Deploy on AP03 (PROD deploy on multi regionsBuild #45, started 2018-03-15 10:45:20 KST)

D: Deploy on NA03 (PROD deploy on multi regionsBuild #39, started 2018-03-15 10:40:00 KST)

DAPTOR: Deploy on EU02 (PROD deploy on multi regionsBuild #45, started 2018-03-15 09:41:22 KST)

D: Deploy on EU02 (PROD deploy on multi regionsBuild #39, started 2018-03-15 09:35:21 KST)

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event

PIPELINES 1 CLUSTERS TASKS

LOAD BALANCERS SECURITY GROUPS CONFIG

SEARCH

ACCOUNT

REGION

STACK

STATUS

AVAILABILITY ZONES

Clusters

PROD event-ap03_apnortneast2 1 ▲ / 9 ▼ : 10%

AP-NORTHEAST-2

V005 1 ▲ / 9 ▼ : 10%

V004

PROD event-eu02_euwest1 2 ▲ : 100%

EU-WEST-1

V005 2 ▲ : 100%

V004

PROD event-na03_useast2

US-EAST-2

V004

V003

event-ap03_apnortneast2-v005

Server Group Actions

Max 10
Current 10

Resize Server Group
View Scaling Activities

HEALTH

Instances 1 ▲ / 9 ▼ : 10%

LAUNCH CONFIGURATION

SECURITY GROUPS

SCALING PROCESSES

SCALING POLICIES

STEP SCALING

Whenever Average of CPUUtilization is > 50
for at least 2 consecutive periods of 300 seconds
then increase capacity by 1 instance
wait 60 seconds to warm up after each step.

webevent-ap03_apnortneast2-v005-policy-96a92609-6db7-4870-89ad-d611e6606870

CPUUtilization (average) alarm threshold (50)

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PIPELINES

CLUSTERS

TASKS

LOAD BALANCERS

SECURITY GROUPS

CONFIG

deploy

Permalink

Create

Configure

Pipeline Actions

Configuration

Find Image from Tags

Deploy in eu02

Modular Test 1 for EU02

Modular Test 2 for EU02

Deploy Continue Judgment

Deploy in ap03

Modular Test 1 for AP03

Modular Test 2 for AP03

Deploy in na03

Modular Test 1 for NA03

Modular Test 2 for NA03

Add stage

Copy an existing stage

CONCURRENT EXECUTIONS

Automated Triggers

PARAMETERS (2)

NOTIFICATIONS (1)

DESCRIPTION

Concurrent Executions

☒ Disable concurrent pipeline executions (only run one at a time).

☐ Do not automatically cancel pipelines waiting in queue.

Automated Triggers

You don't have any triggers configured for deploy.

Add Trigger

Parameters

↑

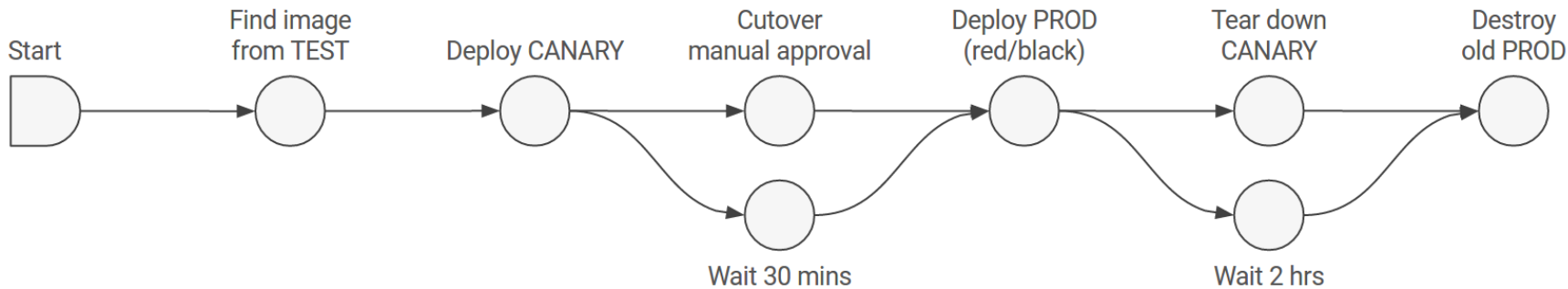
Name

version



Spinnaker Pipeline

SOSCON 2018



Pipelines are the key deployment management construct in Spinnaker. They consist of a sequence of actions, known as stages.





SOSCON 2018

Multi-Cloud Continuous Delivery platform for releasing software changes with high velocity and confidence.

Key features

- Delivery Pipelines
- Deployment Strategies
- Cluster Management
- Jenkins Integration
- Supports Multi Cloud
(**AWS**, **GCP**, Azure, Kubernetes, ECS, DC/OS, Cloud Foundry)



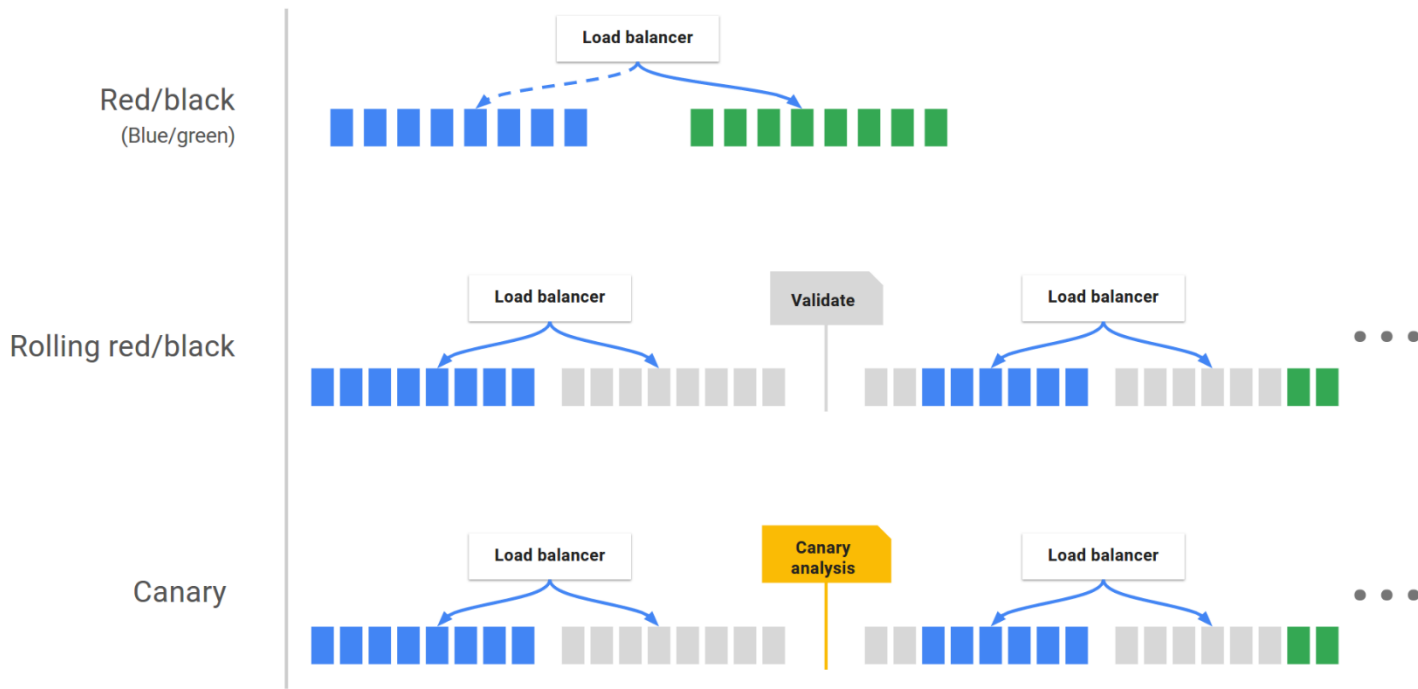
We have experience in utilizing and hosting Spinnaker
about 2 years.



Deployment Strategies

(Immutable Infrastructure)

SOSCON 2018





Cloud

SOSCON 2018

Multi Cloud

VMs

Containers

Serverless



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hello

PIPELINES CLUSTERS LOAD BALANCERS SECURITY GROUPS TASKS CONFIG

Filters Clear All Login

SEARCH @

PIPELINES

- test, build, bake, deploy
- Reorder Pipelines

STATUS

- Running
- Terminal
- Succeeded
- Not Started
- Canceled
- Stopped

MANUAL START

youngrok.kim@samsung.com

1 day ago

Status: SUCCEEDED

Duration: 13:14

test Build #15 Package Build #27 Bake Build #33 Manual Judgment Deploy

DEPLOY DETAILS

Duration: 06:36

✓ DEPLOY IN US-EAST-1

Step	Started	Duration	Status
Deploy in us-east-1	2017-03-14 22:24:20 KST	04:12	SUCCEEDED
Disable Cluster	2017-03-14 22:28:42 KST	02:01	SUCCEEDED
Shrink Cluster	2017-03-14 22:30:44 KST	00:21	SUCCEEDED

Deployment Config Task Status

Account NEW

Region us-east-1

(us-east-1a, us-east-1b, us-east-1c, us-east-1d, us-east-1e)

Cluster hello-global-app-greetings

VPC Internal (iotcloud-0-vr)

Strategy highlander

Capacity 1

Deployed: hello-global-app-greetings-v001

MANUAL START

uks.kim@samsung.com

1 day ago

Status: CANCELED by uks.kim@samsung.com -- 2017-03-14 21:56:12 KST

Duration: 06:37

Spinnaker

THANK YOU

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