

# E91 Cloud Devops: Fall 2018

## Assignment 4

Stephen Akaeze

[https://code.harvard.edu/sta283/cscie-91\\_sta283](https://code.harvard.edu/sta283/cscie-91_sta283)

### Instruction Manual:

<https://canvas.harvard.edu/courses/53026/files/6766783/download?verifier=xUKCvQlgJZRiNwn3UPVakGUKxXvVSFnBP1eWMDZR&wrap=1>

### Problem 1

- 1) As instructed by the manual, Template 1 (questtemp1.yaml) creates one VPC, subnets and 1 security group permitting ports 80, 443 and 22.

Stack Name	Created Time	Status	Description
Setup	2018-11-09 15:06:52 UTC-0800	CREATE_COMPLETE	AWS CloudFormation Template to create a VPC...

Logical ID	Physical ID	Type	Status	Status Reason
GatewayToInternet	Setup-Gatew-HRP97L1J21T8	AWS::EC2::VPCGatewayAtt...	CREATE_COMPLETE	
InternetGateway	igw-0a3aad1dfc99cf85a	AWS::EC2::InternetGateway	CREATE_COMPLETE	
PublicRoute1	Setup-Publi-1GRYNT2OO7WHA	AWS::EC2::Route	CREATE_COMPLETE	
PublicRoute2	Setup-Publi-1F2IVGEE6NEY0	AWS::EC2::Route	CREATE_COMPLETE	
PublicRouteTable1	rtb-07e6f8a788ae6a301	AWS::EC2::RouteTable	CREATE_COMPLETE	
PublicRouteTable2	rtb-0bf3c17674848e12a	AWS::EC2::RouteTable	CREATE_COMPLETE	
PublicSubnet1	subnet-081e368e65b28bc20	AWS::EC2::Subnet	CREATE_COMPLETE	
PublicSubnet2	subnet-050dc389714a59680	AWS::EC2::Subnet	CREATE_COMPLETE	
PublicSubnetRouteT...	rtbassoc-0c08627def65de920	AWS::EC2::SubnetRouteTa...	CREATE_COMPLETE	
PublicSubnetRouteT...	rtbassoc-0fc6b803760eb6d09	AWS::EC2::SubnetRouteTa...	CREATE_COMPLETE	
SSHANDWEB	sg-0823711824ffe77bc	AWS::EC2::SecurityGroup	CREATE_COMPLETE	
VPC	vpc-00fcfd6c425aa5bc9	AWS::EC2::VPC	CREATE_COMPLETE	

- 2) Template 2 (questtemp1.yaml) creates 3 instances where the first is located in the first public subnet created from Template 1 while the second and third instances are created in the second public subnet.

Stack Name	Created Time	Status	Description
Instances	2018-11-09 15:10:53 UTC-0800	CREATE_COMPLETE	Create three EC2s with multiple input parameter...
Setup	2018-11-09 15:06:52 UTC-0800	CREATE_COMPLETE	AWS CloudFormation Template to create a VPC...

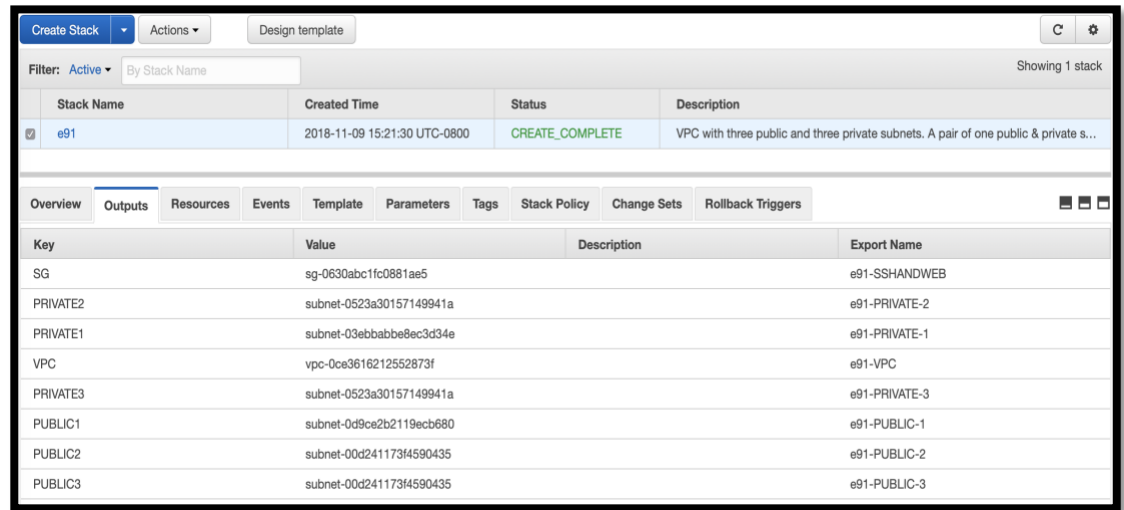
Logical ID	Physical ID	Type	Status	Status Reason
EC2Instance1	i-0c7dcb03874a71765	AWS::EC2::Instance	CREATE_COMPLETE	
EC2Instance2	i-02e7d19c10f02a9b8	AWS::EC2::Instance	CREATE_COMPLETE	
EC2Instance3	i-093f02840201d044d	AWS::EC2::Instance	CREATE_COMPLETE	
NetworkInterface1	eni-07209d50fd8325f2e	AWS::EC2::NetworkInterface	CREATE_COMPLETE	
NetworkInterface2	eni-0c893b6e2c643df29	AWS::EC2::NetworkInterface	CREATE_COMPLETE	
NetworkInterface3	eni-0dab7145bec02feb3	AWS::EC2::NetworkInterface	CREATE_COMPLETE	

The GitHub link to both templates is as follows: [https://code.harvard.edu/sta283/cscie-91\\_sta283/tree/master/assignment-04/question-01-templates](https://code.harvard.edu/sta283/cscie-91_sta283/tree/master/assignment-04/question-01-templates)

## Problem 2

- 1) As instructed by the instruction manual, the VPC, public subnets, private subnets, Load balancer, auto scaling, target groups and launch configuration were created using three different availability zones on us-east-1a, us-east-1b and us-east-1c.

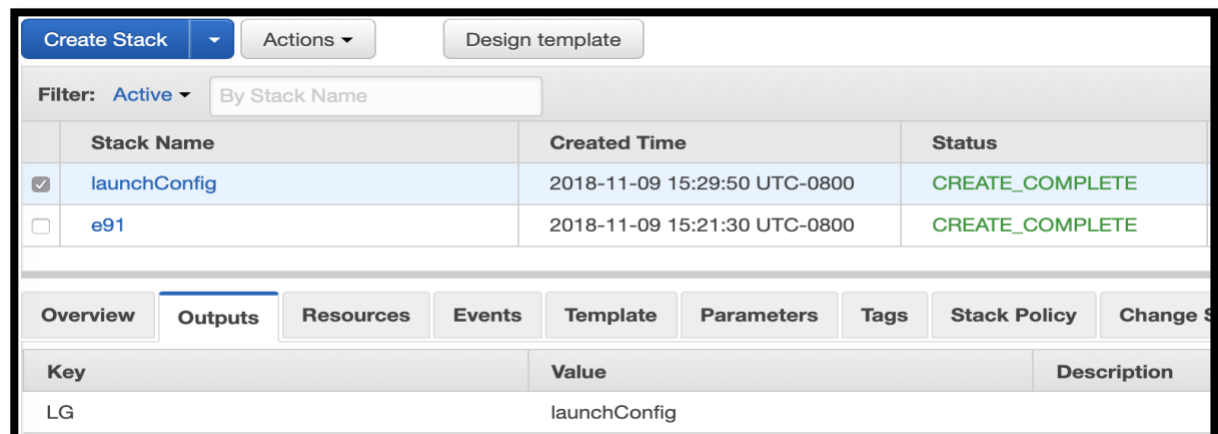
### a. Network Setup (Template: ques2SubnetSetup.yaml)



The screenshot shows the AWS CloudFormation console for a stack named 'e91'. The stack is in the 'CREATE\_COMPLETE' state. The 'Outputs' tab is selected, displaying a table of stack outputs.

Key	Value	Description	Export Name
SG	sg-0630abc1fc0881ae5		e91-SSHANDWEB
PRIVATE2	subnet-0523a30157149941a		e91-PRIVATE-2
PRIVATE1	subnet-03ebbabb8ec3d34e		e91-PRIVATE-1
VPC	vpc-0ce3616212552873f		e91-VPC
PRIVATE3	subnet-0523a30157149941a		e91-PRIVATE-3
PUBLIC1	subnet-0d9ce2b2119ecb680		e91-PUBLIC-1
PUBLIC2	subnet-00d241173f4590435		e91-PUBLIC-2
PUBLIC3	subnet-00d241173f4590435		e91-PUBLIC-3

### b. Launch Configuration (Template: ques2LaunchConfig.yaml)



The screenshot shows the AWS CloudFormation console for a stack named 'launchConfig'. The stack is in the 'CREATE\_COMPLETE' state. The 'Outputs' tab is selected, displaying a table of stack outputs.

Key	Value	Description
LG	launchConfig	

c. Target Group (Template: ques2TargetGroup.yaml)

Create Stack	Actions	Design template
--------------	---------	-----------------

Filter:	Active	By Stack Name
---------	--------	---------------

	Stack Name	Created Time	Status
<input checked="" type="checkbox"/>	targetGroup	2018-11-09 15:34:33 UTC-0800	CREATE_COMPLETE
<input type="checkbox"/>	launchConfig	2018-11-09 15:29:50 UTC-0800	CREATE_COMPLETE
<input type="checkbox"/>	e91	2018-11-09 15:21:30 UTC-0800	CREATE_COMPLETE

Overview	Outputs	Resources	Events	Template	Parameters	Tags	Stack Policy	Change S
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Key	Value	Description
TG	arn:aws:elasticloadbalancing:us-east-1:293836347668:targetgroup/targetGroup/456a487fb75af60c	

d. Load balancer (Template: ques2LoadBalancer.yaml)

Create Stack

Actions

Design template

Filter: Active

By Stack Name

	Stack Name	Created Time	Status	Description
<input checked="" type="checkbox"/>	LoadBalancer	2018-11-09 15:40:42 UTC-0800	CREATE_COMPLETE	Deploys an Application Load Balancer
<input type="checkbox"/>	targetGroup	2018-11-09 15:34:33 UTC-0800	CREATE_COMPLETE	Deploys an a Target group
<input type="checkbox"/>	launchConfig	2018-11-09 15:29:50 UTC-0800	CREATE_COMPLETE	Deploys Launch Configuration
<input type="checkbox"/>	e91	2018-11-09 15:21:30 UTC-0800	CREATE_COMPLETE	VPC with three public and

Overview

Outputs

Resources

Events

Template

Parameters

Tags

Stack Policy

Change Sets

Rollback Triggers

Key	Value	Description
Listener	arn:aws:elasticloadbalancing:us-east-1:293836347668:listener/app/LoadBalancer/fb608b331d575f6a/9af0306b516c28ed	A reference to a port 80 listener
LoadBalancerUrl	LoadBalancer-686044706.us-east-1.elb.amazonaws.com	The URL of the ALB
LoadBalancer	arn:aws:elasticloadbalancing:us-east-1:293836347668:loadbalancer/app/LoadBalancer/fb608b331d575f6a	A reference to the Application Load Balancer

e. Auto Scaling (Template: ques2AutoScaling)

Create Stack <span>Actions</span> <span>Design template</span>				
Filter: <span>Active</span> <span>By Stack Name</span>				
	Stack Name	Created Time	Status	Description
<input checked="" type="checkbox"/>	autoScale	2018-11-09 15:50:00 UTC-0800	CREATE_COMPLETE	Deploys Auto Scaling
<input type="checkbox"/>	LoadBalancer	2018-11-09 15:40:42 UTC-0800	CREATE_COMPLETE	Deploys an Application
<input type="checkbox"/>	targetGroup	2018-11-09 15:34:33 UTC-0800	CREATE_COMPLETE	Deploys an a Target g
<input type="checkbox"/>	launchConfig	2018-11-09 15:29:50 UTC-0800	CREATE_COMPLETE	Deploys Launch Conf
<input type="checkbox"/>	e91	2018-11-09 15:21:30 UTC-0800	CREATE_COMPLETE	VPC with three public

Overview	Outputs	Resources	Events	Template	Parameters	Tags	Stack Policy	Change Sets	Rollback Triggers
Filter by: <span>Status</span> <span>Search events</span>									
2018-11-09	Status	Type	Logical ID						
15:51:01 UTC-0800	CREATE_COMPLETE	AWS::CloudFormation::Stack	autoScale						
15:50:59 UTC-0800	CREATE_COMPLETE	AWS::AutoScaling::AutoScalingGroup	ec2testas						
15:50:06 UTC-0800	CREATE_IN_PROGRESS	AWS::AutoScaling::AutoScalingGroup	ec2testas						
15:50:04 UTC-0800	CREATE_IN_PROGRESS	AWS::AutoScaling::AutoScalingGroup	ec2testas						
15:50:00 UTC-0800	CREATE_IN_PROGRESS	AWS::CloudFormation::Stack	autoScale						

The GitHub link to the above implemented templates and READ.me file is as follows:  
[https://code.harvard.edu/sta283/cscie-91\\_sta283/tree/master/assignment-04/question-02-templates-and-README-response](https://code.harvard.edu/sta283/cscie-91_sta283/tree/master/assignment-04/question-02-templates-and-README-response)

### Problem 3

- 1) The Ansible server and client were configured as instructed and shown below

Launch Instance <span>Connect</span> <span>Actions</span>							
Instance State : Running <span>Add filter</span>							
	Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status
<input type="checkbox"/>	ansibleClient	i-06b5ba6893c1aaef0	t2.micro	us-east-1e	running	2/2 checks ...	None
<input checked="" type="checkbox"/>	ansibleServer	i-08ac4d2bcd8b8e741	t2.micro	us-east-1e	running	2/2 checks ...	None

Instance: i-08ac4d2bcd8b8e741 (ansibleServer)				Public DNS: ec2-100-25-104-200.compute-1.amazonaws.com			
Description	Status Checks	Monitoring	Tags				
Instance ID	i-08ac4d2bcd8b8e741	Public DNS (IPv4)	ec2-100-25-104-200.compute-1.amazonaws.com				
Instance state	running	IPv4 Public IP	100.25.104.200				
Instance type	t2.micro	IPv6 IPs	-				
Elastic IPs		Private DNS	ip-172-31-54-61.ec2.internal				
Availability zone	us-east-1e	Private IPs	172.31.54.61				
Security groups	<a href="#">Internet_ssh_open</a> . <a href="#">view inbound rules</a> . <a href="#">view outbound rules</a>	Secondary private IPs					
Scheduled events	No scheduled events	VPC ID	vpc-b70443d1				
AMI ID	CentOS_7.5 (ami-058f0b6d904c90419)	Subnet ID	subnet-05b32839				
Platform	-	Network interfaces	eth0				
IAM role	-	Source/dest. check	True				
Key pair name	-	T2/T3 Unlimited	Disabled				
Owner	293836347668	EBS-optimized	False				
Launch time	November 9, 2018 at 1:49:00 PM UTC-8 (less than one hour)	Root device type	ebs				

```

[root@ansibleServer ~]#
[root@ansibleServer ~]# sudo ansible all -m ping
172.31.48.39 | SUCCESS => {
  "changed": false,
  "ping": "pong"
}
[root@ansibleServer ~]# ansible-playbook jenkins.yml
ERROR! the playbook: jenkins.yml could not be found
[root@ansibleServer ~]# ls
cscie91
[root@ansibleServer ~]# cd cscie91/
[root@ansibleServer cscie91]# ls
ansible  cloudFormation  puppet  README.md  userData
[root@ansibleServer cscie91]# cd ansible/
[root@ansibleServer ansible]# ls
ansible.cfg  cloudwatch.yaml  defaults  hosts  jenkins.yml  main.yml  playbooks  README.md  roles
[root@ansibleServer ansible]# ansible-playbook jenkins.yml

PLAY [jenkins] *****

TASK [Gathering Facts] *****
ok: [172.31.48.39]

TASK [jenkins : add jenkins repo] *****
changed: [172.31.48.39]

TASK [jenkins : yum update] *****
ok: [172.31.48.39]

TASK [jenkins : include_tasks] *****

```



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# Customize Jenkins

Plugins extend Jenkins with additional features to support many different needs.

## Install suggested plugins

Install plugins the Jenkins community finds most useful.

## Select plugins to install

Select and install plugins most suitable for your needs.

The GitHub link to the above implemented templates and READ.me file is as follows:  
[https://code.harvard.edu/sta283/cscie-91\\_sta283/tree/master/assignment-04/question-03-templates-and-README-response](https://code.harvard.edu/sta283/cscie-91_sta283/tree/master/assignment-04/question-03-templates-and-README-response)

#### Problem 4

As instructed by the manual, the templates and Readme file were pushed to dev origin and merged with the master branch.

```
stakes@CSCI91:~/cscie-91_sta283$ git branch
* dev
  master
stakes@CSCI91:~/cscie-91_sta283$ git status
On branch dev
Your branch is up to date with 'origin/dev'.

Untracked files:
  (use "git add <file>..." to include in what will be committed)
  assignment-04/

nothing added to commit but untracked files present (use "git add" to track)
stakes@CSCI91:~/cscie-91_sta283$ git add .
stakes@CSCI91:~/cscie-91_sta283$ git status
On branch dev
Your branch is up to date with 'origin/dev'.

Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

        new file:   assignment-04/cscie91-master/README.md
        new file:   assignment-04/cscie91-master/ansible/README.md
        new file:   assignment-04/cscie91-master/ansible/ansible.cfg
        new file:   assignment-04/cscie91-master/ansible/cloudwatch.yaml
        new file:   assignment-04/cscie91-master/ansible/defaults/main.yaml

stakes@CSCI91:~/cscie-91_sta283$ git commit -m "committing assignment-04 to dev branch"
[dev fa324ec] committing assignment-04 to dev branch
105 files changed, 5777 insertions(+)
create mode 100644 assignment-04/cscie91-master/README.md
create mode 100644 assignment-04/cscie91-master/ansible/README.md
create mode 100644 assignment-04/cscie91-master/ansible/ansible.cfg
create mode 100644 assignment-04/cscie91-master/ansible/cloudwatch.yaml
create mode 100755 assignment-04/cscie91-master/ansible/defaults/main.yaml
create mode 100644 assignment-04/cscie91-master/ansible/hosts
create mode 100644 assignment-04/cscie91-master/ansible/jenkins.yml
create mode 100644 assignment-04/cscie91-master/ansible/main.yml
create mode 100644 assignment-04/cscie91-master/ansible/playbooks/0-apache.yml
create mode 100644 assignment-04/cscie91-master/ansible/playbooks/0-hosts
create mode 100644 assignment-04/cscie91-master/ansible/playbooks/1-apache.yml
create mode 100644 assignment-04/cscie91-master/ansible/playbooks/1-hosts
```



```
stakes@CSCI91:~/cscie-91_sta283$ git push origin dev
Enumerating objects: 140, done.
Counting objects: 100% (140/140), done.
Compressing objects: 100% (118/118), done.
Writing objects: 100% (139/139), 235.08 KiB | 3.05 MiB/s, done.
Total 139 (delta 42), reused 0 (delta 0)
remote: Resolving deltas: 100% (42/42), completed with 1 local object.
To code.harvard.edu:sta283/cscie-91_sta283.git
 1b96cd2..fa324ec dev -> dev
```

```
stakes@CSCI91:~/cscie-91_sta283$ git branch
* dev
  master
stakes@CSCI91:~/cscie-91_sta283$ git pull
Already up to date.
stakes@CSCI91:~/cscie-91_sta283$ git checkout master
Switched to branch 'master'
Your branch is up to date with 'origin/master'.
stakes@CSCI91:~/cscie-91_sta283$ ll
total 24
drwxr-xr-x  5 stakes stakes 4096 Nov  9 16:39 ./
drwxr-xr-x 17 stakes stakes 4096 Nov  9 08:49 ../
drwxr-xr-x  2 stakes stakes 4096 Nov  3 13:07 assignment-01/
drwxr-xr-x  2 stakes stakes 4096 Nov  9 16:39 assignment-02/
drwxr-xr-x  8 stakes stakes 4096 Nov  9 16:39 .git/
-rw-r--r--  1 stakes stakes   63 Nov  3 13:07 README.md
stakes@CSCI91:~/cscie-91_sta283$ git pull
Already up to date.
stakes@CSCI91:~/cscie-91_sta283$ git branch
  dev
* master
stakes@CSCI91:~/cscie-91_sta283$ git merge --no-ff --no-commit dev
Automatic merge went well; stopped before committing as requested
stakes@CSCI91:~/cscie-91_sta283$ git status
On branch master
Your branch is up to date with 'origin/master'.

All conflicts fixed but you are still merging.
  (use "git commit" to conclude merge)

Changes to be committed:
  new file:   assignment-02/problem-03
  new file:   assignment-02/vpc-2subs-1ec2.sh
  new file:   assignment-03/assig3_quest3_doc.txt
  new file:   assignment-04/cscie91-master/README.md
  new file:   assignment-04/cscie91-master/ansible/README.md
```

```
stakes@CSCI91:~/cscie-91_sta283$ git commit -m "Merging Dev into Master branch"
[master bea3525] Merging Dev into Master branch
stakes@CSCI91:~/cscie-91_sta283$ git status
On branch master
Your branch is ahead of 'origin/master' by 12 commits.
  (use "git push" to publish your local commits)

nothing to commit, working tree clean
stakes@CSCI91:~/cscie-91_sta283$ git push
Enumerating objects: 1, done.
Counting objects: 100% (1/1), done.
Writing objects: 100% (1/1), 232 bytes | 232.00 KiB/s, done.
Total 1 (delta 0), reused 0 (delta 0)
To code.harvard.edu:sta283/cscie-91_sta283.git
ef93caa..bea3525  master -> master
```

17 commits

2 branches

0 releases

1 contributor

Branch: master

New pull request

Create new file

Upload files

Find file

Clone or download

sta283 Merging Dev into Master branch

Latest commit bea3525 2 minutes ago

assignment-01	Renaming assignment 1 folder	6 days ago
assignment-02	committing assignment-02 final completion 1.0 to dev branch	21 days ago
assignment-03	assignment 3 documentation file	6 days ago
assignment-04	committing assignment-04 to dev branch	11 minutes ago
README.md	Initial Line/description added	a month ago