

Module 9 Guided Lab - Creating a Highly Available Environment

Name: Pham Do Tien Phong
Student Id: 104189767

Task 1: Inspecting your VPC

The screenshot shows the AWS VPC console interface. On the left, there is a navigation menu with options like 'VPC dashboard', 'EC2 Global View', and 'Filter by VPC'. The main area displays a table of VPCs. The first VPC, 'Lab VPC' with ID 'vpc-0e7811017a67ca2a3', is selected. Below the table, the 'Details' tab is active, showing various configuration parameters for the VPC.

Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP option set	Main route table	Main network ACL	Tenancy
Lab VPC	vpc-0e7811017a67ca2a3	Available	10.0.0.0/16	-	dopt-0e6693f012535c7ce	rtb-02bd0ca7b4af91d8d	acl-02cd0ca7b4af91d8d	Default

Details

VPC ID vpc-0e7811017a67ca2a3	State Available	DNS hostnames Enabled	DNS resolution Enabled
Tenancy Default	DHCP option set dopt-0e6693f012535c7ce	Main route table rtb-02bd0ca7b4af91d8d	Main network ACL acl-02cd0ca7b4af91d8d
Default VPC No	IPv4 CIDR 10.0.0.0/16	IPv6 pool -	IPv6 CIDR (Network border group) -

I filter the Lab VPC

The screenshot shows the AWS VPC console interface, specifically the 'Subnets' page. The 'Public Subnet 1' is selected, and its details are displayed. The details include the Subnet ID, Subnet ARN, State, Availability Zone, Route table, and various reservation settings.

subnet-05ec9552396ac7718 / Public Subnet 1

Details

Subnet ID subnet-05ec9552396ac7718	Subnet ARN arn:aws:ec2:us-east-1:797105526760:subnet/subnet-05ec9552396ac7718	State Available	IPv4 CIDR 10.0.0.0/24
Available IPv4 addresses 249	IPv6 CIDR -	Availability Zone us-east-1a	Availability Zone ID use1-az2
Network border group us-east-1	VPC vpc-0e7811017a67ca2a3 Lab VPC	Route table rtb-05348d18cc07968c8 Public Route Table	Network ACL acl-02cd0ca7b4af91d8d
Default subnet No	Auto-assign public IPv4 address Yes	Auto-assign IPv6 address No	Auto-assign customer-owned IPv4 address No
Customer-owned IPv4 pool -	Output ID -	IPv4 CIDR reservations -	IPv6 CIDR reservations -
IPv6-only No	Hostname type IP name	Resource name DNS A record Disabled	Resource name DNS AAAA record Disabled
DNS64 Disabled	Owner 797105526760		

The details of Public Subnet 1

subnet-05ec9552396ac7718 / Public Subnet 1

Details

Subnet ID subnet-05ec9552396ac7718 Available IPv4 addresses 249 Network border group us-east-1 Default subnet No Customer-owned IPv4 pool No IPv6-only No DNS64 Disabled	Subnet ARN arn:aws:ec2:us-east-1:797105526760:subnet/subnet-05ec9552396ac7718 IPv6 CIDR -- VPC vpc-0e7811017a67ca2a3 Lab VPC Auto-assign public IPv4 address Yes Outpost ID -- Hostname type IP name Owner 797105526760	State Available Availability Zone us-east-1a Route table rtb-05348d18cc0796d8 Public Route Table Auto-assign IPv6 address No IPv4 CIDR reservations -- Resource name DNS A record Disabled	IPv4 CIDR 10.0.0.0/24 Availability Zone ID use1-az2 Network ACL acl-02cd0ca7b4af91d8d Auto-assign customer-owned IPv4 address No IPv6 CIDR reservations -- Resource name DNS AAAA record Disabled
--	---	---	--

Route table: rtb-05348d18cc0796d8 / Public Route Table

Routes (2)

Destination	Target
10.0.0.0/16	local
0.0.0.0/0	igw-007a42448272a20d7

subnet-05ec9552396ac7718 / Public Subnet 1

Details

Subnet ID subnet-05ec9552396ac7718 Available IPv4 addresses 249 Network border group us-east-1 Default subnet No Customer-owned IPv4 pool No IPv6-only No DNS64 Disabled	Subnet ARN arn:aws:ec2:us-east-1:797105526760:subnet/subnet-05ec9552396ac7718 IPv6 CIDR -- VPC vpc-0e7811017a67ca2a3 Lab VPC Auto-assign public IPv4 address Yes Outpost ID -- Hostname type IP name Owner 797105526760	State Available Availability Zone us-east-1a Route table rtb-05348d18cc0796d8 Public Route Table Auto-assign IPv6 address No IPv4 CIDR reservations -- Resource name DNS A record Disabled	IPv4 CIDR 10.0.0.0/24 Availability Zone ID use1-az2 Network ACL acl-02cd0ca7b4af91d8d Auto-assign customer-owned IPv4 address No IPv6 CIDR reservations -- Resource name DNS AAAA record Disabled
--	---	---	--

Network ACL: acl-02cd0ca7b4af91d8d

Inbound rules (2)

Rule number	Type	Protocol	Port range	Source	Allow/Deny
100	All traffic	All	All	0.0.0.0/0	Allow
*	All traffic	All	All	0.0.0.0/0	Deny

The Route table as well as Network ACL of Public Subnet 1

Internet gateways (1/1)

Name	Internet gateway ID	State	VPC ID	Owner
Lab IG	igw-007a42448272a20d7	Attached	vpc-0e7811017a67ca2a3 Lab VPC	797105526760

igw-007a42448272a20d7 / Lab IG

Details

Internet gateway ID igw-007a42448272a20d7 State Attached VPC ID vpc-0e7811017a67ca2a3 Lab VPC Owner 797105526760

The Internet gateway(Lab IG) is in Lab VPC

Security Groups (1/3) info

Filter security groups

search: vpc-0e7811017a67ca2a3 Clear filters

Name	Security group ID	Security group name	VPC ID	Description	Owner	Inbound rules count	Outbound rules count
Inventory-App	sg-04389f20c702aa26e	Inventory-App	vpc-0e7811017a67ca2a3	Enable access to App	797105526760	0 Permission entries	1 Permission entry
-	sg-0345a69a7bc4335c7	default	vpc-0e7811017a67ca2a3	default VPC security gr...	797105526760	1 Permission entry	1 Permission entry
Inventory-DB	sg-062c4d40a1e860d90	Inventory-DB	vpc-0e7811017a67ca2a3	Enable access to MySQL	797105526760	1 Permission entry	1 Permission entry

sg-062c4d40a1e860d90 - Inventory-DB

Details Inbound rules Outbound rules Tags

Inbound rules (1/1)

Filter security group rules

Name	Security group rule...	IP version	Type	Protocol	Port range	Source	Description
-	sg-0442b7a0d0c9111...	IPv4	MySQL/aurora	TCP	3306	10.0.0.0/16	-

Security Groups (1/3) info

Filter security groups

search: vpc-0e7811017a67ca2a3 Clear filters

Name	Security group ID	Security group name	VPC ID	Description	Owner	Inbound rules count	Outbound rules count
Inventory-App	sg-04389f20c702aa26e	Inventory-App	vpc-0e7811017a67ca2a3	Enable access to App	797105526760	0 Permission entries	1 Permission entry
-	sg-0345a69a7bc4335c7	default	vpc-0e7811017a67ca2a3	default VPC security gr...	797105526760	1 Permission entry	1 Permission entry
Inventory-DB	sg-062c4d40a1e860d90	Inventory-DB	vpc-0e7811017a67ca2a3	Enable access to MySQL	797105526760	1 Permission entry	1 Permission entry

sg-062c4d40a1e860d90 - Inventory-DB

Details Inbound rules Outbound rules Tags

Outbound rules (1/1)

Filter security group rules

Name	Security group rule...	IP version	Type	Protocol	Port range	Destination	Description
-	sg-06c1f21cd9f80d6ec	IPv4	All traffic	All	All	0.0.0.0/0	-

Inbound rules and Outbound rules of Inventory-DB security group.

Task 2: Creating an Application Load Balancer

Basic details

Security group name info

Inventory-LB

Name cannot be edited after creation.

Description info

Enable web access to load balancer

VPC info

vpc-0e7811017a67ca2a3 (Lab VPC)

Inbound rules info

Type	Protocol	Port range	Source	Description - optional
HTTP	TCP	80	Anywhere-IPv4	0.0.0.0/0
HTTPS	TCP	443	Anywhere-IPv4	0.0.0.0/0

Add rule

I create Inventory-LB security group for Load Balancer.

Specify group details

Step 1: Specify group details
Step 2: Register targets

Your load balancer routes requests to the targets in a target group and performs health checks on the targets.

Basic configuration
Settings in this section can be changed after the target group is created.

Choose a target type

- ☒ **Instances**
 - Supports load balancing to instances within a specific VPC.
 - Facilitates the use of [Amazon EC2 Auto Scaling](#) to manage and scale your EC2 capacity.
- ☐ **IP addresses**
 - Supports load balancing as VPC and on-premise resources.
 - Facilitates routing to multiple IP addresses and network interfaces on the same instances.
 - Offers flexibility with instance-level permissions, simplifying inter-application communication.
 - Supports IPv4 targets, enabling end-to-end IPv4 communications, and IPv4 to IPv6 NAT.
- ☐ **Lambda function**
 - Facilitates routing to a single Lambda function.
 - Accessible to Application Load Balancers only.
- ☐ **Application Load Balancer**
 - Offers the flexibility for a Network Load Balancer to accept and route TCP requests within a specific VPC.
 - Facilitates using static IP addresses and PrivateLink with an Application Load Balancer.

Target group name
Inventory-LB
A maximum of 32 alphanumeric characters (including hyphens) are allowed, but the name must not begin or end with a hyphen.

Protocol: Port
HTTP 80
1-65535

IP address type
Get targets with the indicated IP address type can be registered to this target group.
☒ **IPv4**
Each instance has a default network interface (eni) that is assigned the primary private IP address. The instance's primary private IP address is the one that will be applied to the target.
☐ **IPv6**
Each instance you register must have an assigned primary IPv6 address. This is configured on the instance's default network interface (eni). [Learn more](#)

VPC
Select the VPC with the instances that you want to include in the target group. Only VPCs that support the IP address type selected above are available to select.
Lab VPC
vpc-0e7811017a67ca...
IPv4: 10.0.0.0/16

Health checks
The Amazon load balancer periodically sends requests, per the settings below, to the registered targets to test their status.

Health check protocol
HTTP

Health check path
Use the default path of "/" to ping the root, or specify a custom path if preferred.
/

Up to 1024 characters allowed.

Advanced health check settings
[Restore defaults](#)

Health check port
The port the load balancer uses when performing health checks on targets. By default, the health check port is the same as the target group's health port. However, you can specify a different port as an override.
☒ **Traffic port**
☐ **Override**

Healthy threshold
The number of consecutive health checks successes required before considering an unhealthy target healthy.
2

Unhealthy threshold
The number of consecutive health check failures required before considering a target unhealthy.
2

Timeout
The amount of time, in seconds, during which no response means a failed health check.
10 seconds

Interval
The approximate amount of time between health checks of an individual target.
30 seconds

2 photos above is the step I create target group for Load Balancer.

Load balancers (1/1)

Elastic Load Balancing scales your load balancer capacity automatically in response to changes in incoming traffic.

Filter load balancers: 1 match

Name	DNS name	State	VPC ID	Availability Zones	Type	Date created
Inventory-LB	Inventory-LB-1430625237...	Provisioning	vpc-0e7811017a67ca...	2 Availability Zones	application	October 28, 2023, 17:22 (UTC+08:00)

Load balancer: Inventory-LB

Details | **Listeners and rules** | Network mapping | Security | Monitoring | Integrations | Attributes | Tags

Listeners and rules (1)

A listener checks for connection requests on its configured protocol and port. Traffic received by the listener is routed according to the default action and any additional rules.

Manage rules | Manage listener | Add listener

Filter listeners

Protocol/Port	Default action	Rules	ARN	Security policy	Default SSL/TLS certificate	Tags
HTTP/80	Forward to target group <ul style="list-style-type: none">Inventory-LB-1 (100%)Group-level stickiness: Off	1 rule	ARN	Not applicable	Not applicable	0 tags

The first screenshot shows the 'Load balancers' page in the AWS Management Console. It displays a table with one load balancer, 'Inventory-LB', which is in a 'Provisioning' state. Below the table, the 'Network mapping' section is expanded, showing the VPC 'vpc-0e7811017a67ca...' and the IP address type 'IPv4'. The 'Mappings' section shows two subnets: 'subnet-05ec9552396ac77318' and 'subnet-02b33a06f2b9a3e0d0', both assigned by AWS.

The second screenshot shows the 'Security' tab for the 'Inventory-LB' load balancer. It displays a table with one security group, 'sg-0968b30c08179106', which is associated with the load balancer. The description of the security group is 'Enable web access to load balancer'.

The review of load balancer

Task 3: Creating an Auto Scaling group

Create an AMI for Auto Scaling

The screenshot shows the 'Create image' page in the AWS Management Console. The 'Instance ID' field is populated with 'i-059952ef001a3b0ff' (Web Server 1). The 'Image name' field is 'Web Server AMI'. The 'Image description - optional' field is 'Lab AMI for Web Server'. The 'Maximum 127 characters. Can't be modified after creation.' and 'Maximum 255 characters.' labels are visible below the respective fields.

I create image for Auto Scaling

Create a Launch Template and an Auto Scaling Group

The image displays three sequential screenshots of the AWS Management Console, illustrating the process of creating a Launch Template and an Auto Scaling Group.

Top Screenshot: Create launch template

This screen shows the initial setup for a Launch Template. The "Launch template name and description" section includes a text input for the name (set to "Inventory-LT") and a description ("A prod webserver for MyApp"). The "Template version description" section has a text input (set to "A prod webserver for MyApp") and a checkbox for "Provide guidance to help me set up a template that I can use with EC2 Auto Scaling". The "Summary" section on the right lists the configuration: Software Image (AMI) as "Lab AMI for Web Server", Virtual server type (Instance type) as "t2.micro", Firewall (security group) as "Inventory-App", and Storage (volumes) as "1 volume(s) - 8 GiB". A "Free tier" notification is visible, stating that 750 hours of t2.micro (or t3.micro) are available for free in the first year.

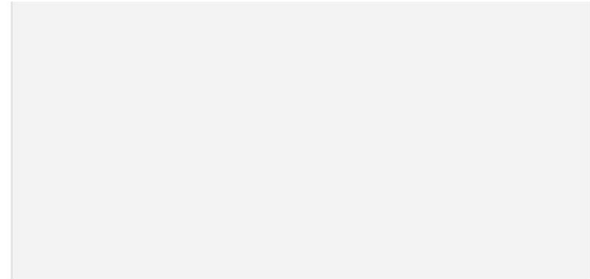
Middle Screenshot: Instance type

This screen shows the "Instance type" selection. The "Instance type" dropdown is set to "t2.micro". The "Key pair (login)" section shows a key pair named "mykey". The "Summary" section on the right is identical to the top screenshot. A "Free tier" notification is also present.

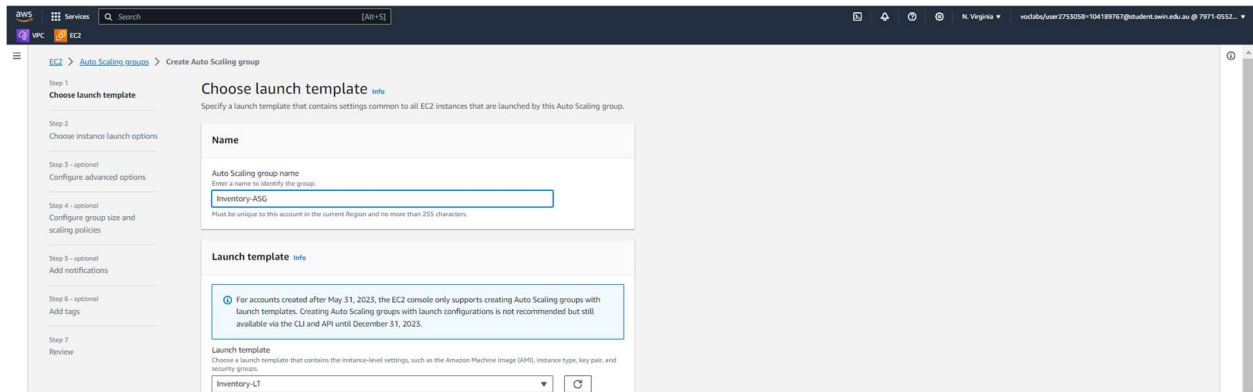
Bottom Screenshot: Network settings

This screen shows the "Network settings" section. The "Subnet" dropdown is set to "vpc-0a3b3f3b-7f2a2b2c". The "Firewall (security group)" dropdown is set to "sg-0a3b3f3b-7f2a2b2c". The "Summary" section on the right is identical to the previous screenshots. A "Free tier" notification is also present.

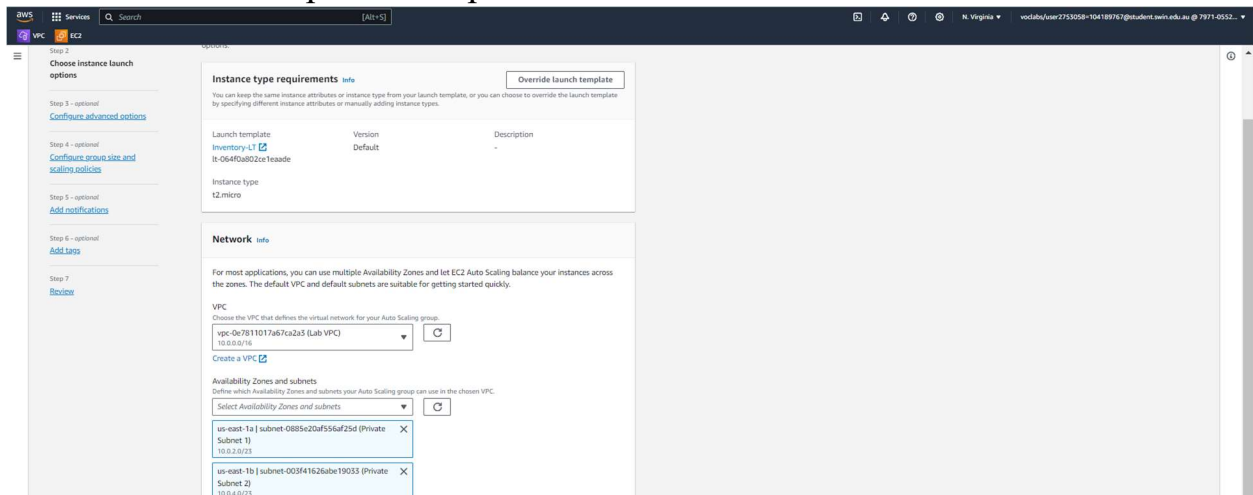
```
#!/bin/bash
# Install Apache Web Server and PHP
yum install -y httpd mysql
amazon-linux-extras install -y php7.2
# Download Lab files
wget https://aws-ec2-largeobjects.s3-us-west-2.amazonaws.com/LT-TT-200-ACACAD-20-EN/mod9-guided/scripts/inventory-app.zip
unzip inventory-app.zip -d /var/www/html/
# Download and install the AWS SDK for PHP
wget https://github.com/aws/aws-sdk-php/releases/download/3.62.3/aws.zip
unzip aws -d /var/www/html
# Turn on web server
chkconfig httpd on
service httpd start
```



These images below are the steps to create launch template.



I choose launch template in step 1



I choose instance launch options in step 2

Gateway Load Balancing

Existing load balancer target groups
Only Amazon target groups that belong to the same VPC as your Auto Scaling group are available for selection.

Select target groups

Inventory-LB | HTTP
Application Load Balancer: Inventory-LB

VPC Lattice integration options
To improve resiliency, availability, and scalability, integrate your Auto Scaling group with VPC Lattice. VPC Lattice facilitates communications between AWS services and helps you connect and manage your applications across compute services in AWS.

Select VPC Lattice service to attach

☒ No VPC Lattice service
VPC Lattice will not manage your Auto Scaling group's network access and connectivity with other services.

☐ Attach to VPC Lattice service
Existing resources associated with your VPC Lattice target group will be moved to your Auto Scaling group.

Create new VPC Lattice service

Health checks
Health checks increase availability by replacing unhealthy instances. When you use multiple health checks, all are evaluated, and if at least one fails, instance replacement occurs.

EC2 health checks
Always enabled

Additional health check types - optional
☐ Turn on Elastic Load Balancing health checks
Elastic Load Balancing monitors whether instances are available to handle requests. When it reports an unhealthy instance, EC2 Auto Scaling can replace it at the next periodic check.

☐ Turn on VPC Lattice health checks
VPC Lattice can monitor whether instances are available to handle requests. If it considers a target as failed a health check, EC2 Auto Scaling replaces it at the next periodic check.

Health check grace period
This time period delays the first health check until your instances finish initializing. It doesn't prevent an instance from terminating when grace period ends, even during late.

90 seconds

Additional settings

Monitoring
☒ Enable group metrics collection within CloudWatch

Default instance warmup
The amount of time your CloudWatch metrics for new instances do not contribute to the group's aggregated instance metrics, as this usage will be modest yet.

☐ Enable default instance warmup

Create configure advanced options

Configure group size and scaling policies - optional
Set the desired, minimum, and maximum capacity of your Auto Scaling group. You can optionally add a scaling policy to dynamically scale the number of instances in the group.

Group size - optional
Specify the size of the Auto Scaling group by changing the desired capacity. You can also specify minimum and maximum capacity limits. Your desired capacity must be within the limit range.

Desired capacity
2

Minimum capacity
2

Maximum capacity
4 5

Scaling policies - optional
Choose whether to use a scaling policy to dynamically resize your Auto Scaling group to meet changes in demand.

☐ Target tracking scaling policy
Choose a desired outcome and leave it to the scaling policy to add and remove capacity as needed to achieve that outcome.

☒ None

Configure group size and scaling policies.

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP	IPv6 IPs	Monitoring	Security group
Web Server 1	i-059952ef001a3509f	Running	t2.micro	2/2 checks passed	No alarms	us-east-1a	ec2-3-85-192-18.com...	3.85.182.18	-	-	disabled	Inventory-App
Inventory-App	i-0306ed67a1943f176	Running	t2.micro	Initializing	No alarms	us-east-1b	-	-	-	-	enabled	Inventory-App
Web Server 1	i-0aa08b59ad1a0f18	Terminated	t2.micro	-	No alarms	us-east-1a	-	-	-	-	disabled	-
Inventory-App	i-012f0bd424e2064b	Running	t2.micro	Initializing	No alarms	us-east-1a	-	-	-	-	enabled	Inventory-App

There are 2 instances created.

Task 4: Updating security groups

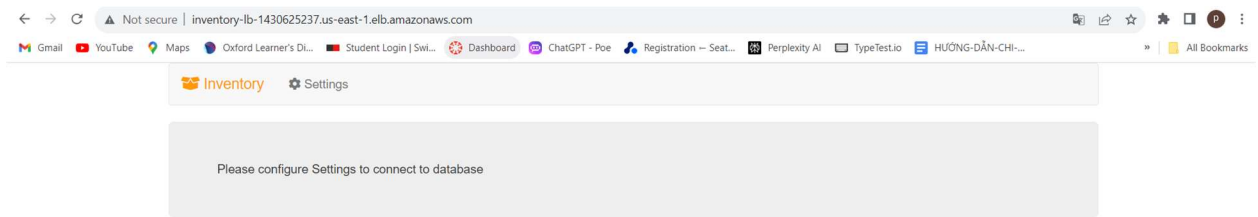
Application security group



Edit inbound rules for database security group

I test the application

Events												
<input type="text" value="Find instance by attribute or tag (case-sensitive)"/>												
Name	ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP	IPv6 IPs	Monitoring	Security group
Inventories												
<input checked="" type="checkbox"/> Inventory App	i-0306ed7e19d3f176	Terminated	t2.micro	No alarms	-	us-east-1b	--	--	--	--	enabled	--
Instances Types												
<input type="checkbox"/> Web Server 1	i-059952ef01a350ff	Running	t2.micro	2/2 checks passed	+ No alarms	us-east-1a	ec2-5-85-182-18.com...	5.85.182.18	--	--	disabled	Inventory-App
Launch Templates												
<input type="checkbox"/> Inventory App	i-070e094366ebcfaf6	Pending	t2.micro	No alarms	+ No alarms	us-east-1b	--	--	--	--	enabled	Inventory-App
Spot Requests												
Savings Plans												
<input type="checkbox"/> Inventory App	i-012f0dbd424e2084b	Running	t2.micro	2/2 checks passed	+ No alarms	us-east-1a	--	--	--	--	enabled	Inventory-App



This page was generated by instance **I-0fc6a62f1f494ea14** in Availability Zone **us-east-1b**.

I test high availability