

# Hands-on MarkLogic in the Cloud Workshop (AWS)

## Unit 1

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### Unit 1 - Create the MarkLogic Cluster

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In unit 1, we will create a three node MarkLogic cluster using CloudFormation templates on Amazon Web Services. For our purposes, a **node** is an Amazon EC2 server instance running MarkLogic. A **cluster** is one or more MarkLogic nodes working together.

It's simple to create a MarkLogic cluster in Amazon Web Services. But before you do, you should become familiar with the process. It's highly recommended to read through the [MarkLogic Server on Amazon EC2 Guide](#).

An overview of the procedures follows with links to MarkLogic documentation.

Procedure	For Details See...
If you don't already have an Amazon EC2 account, create one.	<a href="#">Creating an Amazon EC2 Account</a>
Enable a MarkLogic Server AMI.	<a href="#">Enabling a MarkLogic Server for EC2 AMI</a>
Open the Amazon AWS Management Console.	<a href="#">Accessing the AWS Management Console</a>
Create an IAM role.	<a href="#">Creating an IAM Role</a>
If you don't already have a key pair, create one.	<a href="#">Creating a Key Pair</a>
Create a Simple Notification Service (SNS) Topic.	<a href="#">Creating a Simple Notification Service (SNS) Topic</a>
Create CloudFormation stack from a CloudFormation template.	<a href="#">Deploying MarkLogic on EC2 Using CloudFormation</a>
Open the MarkLogic Server Admin interface.	<a href="#">Accessing a MarkLogic Server Instance</a>

## Process to Create a MarkLogic Cluster using CloudFormation Templates (ALREADY COMPLETED)

Before starting, make sure you have done the following.

- You have created an IAM Role to use for your MarkLogic cluster.
- You have created an EC2 Key-Pair to securely shell into your MarkLogic cluster.

Let's begin.

### Enable a MarkLogic AMI (ALREADY COMPLETED)

1. Go to <https://aws.amazon.com/marketplace> .
2. In the top search bar, leave the dropdown at the default setting of **AMI & SaaS** then enter the search term **marklogic** .
3. Click the Search icon or press the ENTER key to begin the search.
4. In the results, click on **MarkLogic Developer 9**.

AWS Marketplace: Search Results

Guest

Secure | https://aws.amazon.com/marketplace/search/results?x=0&y=0&searchTerms=marklogic&page=1&ref\_=nav\_search\_box

aws marketplace

AMI & SaaS marklogic

Sign in or Create a new account

Sell in AWS Marketplace Amazon Web Services Home Help

**View Categories** Your Saved List

**Categories**

- All Categories
  - Infrastructure Software (4)
  - Business Software (5)

**Filters**

- Operating System**
  - + All Linux/Unix
- Software Pricing Plans**
  - Free (1)
  - Hourly (2)
  - Annual (2)
  - Bring Your Own License (2)
- Delivery Method**
  - Amazon Machine Image (5)
- Average Rating**
  - ★★★★★ & up (1)
- Architecture**
  - 64-bit (5)
- Region**
  - US East (N. Virginia) (5)
  - US East (Ohio) (5)
  - AWS GovCloud (US) (3)
  - US West (Oregon) (5)
  - US West (N. California) (5)
- Show more
- Instance Type**
  - + Micro Instances (Free Tier)

**marklogic (5 results)** showing 1 - 5

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**MarkLogic Developer 9**

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MarkLogic for AWS Marketplace is the only Enterprise NoSQL database. It is a new generation database built with a flexible data model to store, manage, and search JSON, XML,...

Linux/Unix, Amazon Linux 2017.03 - 64-bit Amazon Machine Image (AMI)

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Linux/Unix, Amazon Linux 2017.09 - 64-bit Amazon Machine Image (AMI)

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Linux/Unix, Amazon Linux 2017.09 - 64-bit Amazon Machine Image (AMI)

5. Click the **Continue to Subscribe** button.
6. Click the **Service Catalog** tab.
7. Click the **Accept Software Terms** button.

**Launch on EC2:**  
**MarkLogic Developer 9**

**1-Click Launch**  
Review, modify and launch

**Manual Launch**  
With EC2 Console, API or CLI

**Service Catalog**  
Copy to SC and Launch

**Click Accept Software Terms to copy this software to Service Catalog**

After you accept the terms, you can copy any version of this software to Service Catalog in any region where the service is supported. You can then manage and launch the software from Service Catalog. [Learn more about Service Catalog](#).

**Version**  
9.0-4, released 02/22/2019

**Copy to Service Catalog**

Select a region into which to copy the software. Repeat this process for each region you choose.

**Service Catalog Region**  
Asia Pacific (Mumbai)

To view pricing information use the region selector to the right

**Product:** MarkLogic Developer 9

**Choose the versions to copy to the selected region. Each time you complete a copy operation, a new entry will be created in Service Catalog, even if an identical entry already exists.**

**Price for your Selections:**  
Price will be dependent on usage

**Accept Software Terms**

You will be subscribed to this software and agree that your use of this software is subject to the pricing terms and the seller's [End User License Agreement \(EULA\)](#) and your use of AWS services is subject to the [AWS Customer Agreement](#).

**Pricing Information**  
Use the Region dropdown selector to see software and infrastructure pricing information for the chosen AWS region.

**For Region**  
US East (N. Virginia)

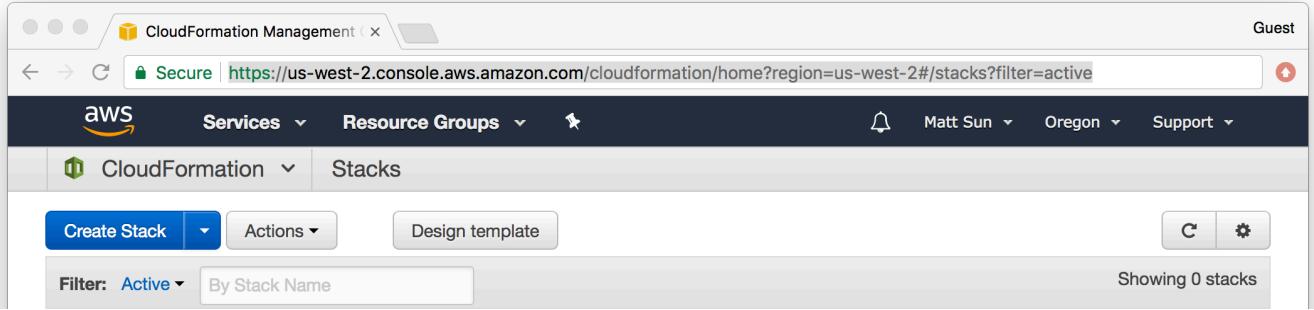
**Free Tier Eligible** EC2 charges for Micro instances are free for up to **750 hours** a month if you qualify for the [AWS Free Tier](#).

**Bring Your Own License (BYOL)** Available for customers with current licenses purchased via other channels.

8. You've now subscribed to the MarkLogic AMI and can proceed to use a CloudFormation template to create your running instance.

## Launch your cluster using a CloudFormation template

1. Log in via the link provided and with the your credentials.
2. Go to [CloudFormation page](#) of AWS Web Console. Change your region at the top right corner to **Oregon**. For the purpose of this excercise, we are using this region (US West 2).



3. Click the **Create stack** button.
4. In the **Select Template** section, select the radio button "Specify an Amazon S3 template URL". Copy and paste the URL to the `mlcluster-vpc.template` provided.

The screenshot shows the 'Create A New Stack' wizard. On the left, there's a sidebar with tabs: 'Select Template' (which is active), 'Specify Details', 'Options', and 'Review'. The main area is titled 'Select Template' with the sub-instruction: 'Select the template that describes the stack that you want to create. A stack is a group of related resources that you manage as a single unit.' Below this, there are two sections: 'Design a template' (with a 'Design template' button) and 'Choose a template' (with three options: 'Select a sample template', 'Upload a template to Amazon S3' (with a 'Choose File' button), and 'Specify an Amazon S3 template URL' which is selected). The URL 'https://s3-us-west-2.amazonaws.com/cf-templates-g11hbnbsw4v0-us-' is pasted into the input field for the selected option. At the bottom right, there are 'Cancel' and 'Next' buttons.

5. Click the **Next** button.

Screenshot of the AWS CloudFormation 'Create Stack' wizard - Step 2: Specify Details.

The page shows the 'Specify Details' step selected in the left sidebar. The main area displays configuration options:

- Stack name:** development-env
- Resource Configuration:**
  - IAM Role:** myRole
  - Volume Size:** 10 (The EBS Data volume size (GB) for all nodes)
  - Volume Type:** gp2 (The EBS Data volume Type)
  - Instance Type:** c3.large (Type of EC2 instance to launch)
  - Spot Price:** 0 (Spot price for instances in USD/Hour – Optional/advanced)

6. Fill in the following information.

- Stack Name - a **unique** stack name across the account (example: your full name). Take a note of this stack name. You will need it later for tags.
- IAM Role - a previously created Identity and Access Management role name. **Use the value provided.**
- Volume Size - leave at the default of 10 GB.
- Volume Type - leave at the default.
- Instance Type - Use **m3.medium** for this exercise.
- Spot Price - leave at the default.
- SSH Key Name - a previously created EC2 Key-Pair name. **Use the value provided.**
- Number of Zones - leave at the default of 3.
- Nodes Per Zone - total number of nodes per Zone. Leave this at 1 to create a simple 3-node cluster.
- Availability Zone - select **us-west-2a, us-west-2b** and **us-west-2c** from dropdown menu.
- Instance Public IP - leave at the default of disable.

- Logging SNS ARN - optional. Leave at the default value.
- VPC CIDR - leave at the default value.
- Subnet 1 CIDR - leave at the default value.
- Subnet 2 CIDR - leave at the default value.
- Subnet 3 CIDR - leave at the default value.
- Admin User - the MarkLogic administrator user name. The user and password will be created when the cluster is created. We will use `mlwadmin` for the administrator name.
- Admin Password - the MarkLogic administrator user password. The user and password will be created when the cluster is created. We will use `MarkLogicWorld_2018` as the password.
- Licensee - leave at the default value "none" to use the included Developer's License.
- LicenseKey - leave at the default value "none"

7. Click the **Next** button.
8. On the **Options** page, create a tag with key as `Name` and value as your stack name specified in the previous page. Leave all other settings to the defaults, scroll to the bottom and click the **Next** button.

**Create stack**

**Options**

**Tags**

You can specify tags (key-value pairs) for resources in your stack. You can add up to 50 unique key-value pairs for each stack. [Learn more.](#)

Key	(127 characters maximum)	Value	(255 characters maximum)
1	Name	development-env	<a href="#">+</a>

**Permissions**

You can choose an IAM role that CloudFormation uses to create, modify, or delete resources in the stack. If you don't choose a role, CloudFormation uses the permissions defined in your account. [Learn more.](#)

**IAM Role** Choose a role (optional)

Enter role arn

**Rollback Triggers**

Rollback triggers enable you to have AWS CloudFormation monitor the state of your application during stack creation and updating, and to rollback that operation if the application breaches the threshold of any of the alarms you've specified. [Learn more.](#)

9. On the **Review** page, scroll to the bottom and check the box "I acknowledge that AWS CloudFormation might create IAM resources with custom names". This is to authorize CloudFormation to create IAM role based on the permissions specified in the template. Then click the **Create** button.

The screenshot shows the 'Create A New Stack' review page. At the top, there are three circular progress indicators followed by the title 'Create A New Stack'. To the right is a 'Guest' link. Below the title is a URL bar showing 'Secure | https://us-west-2.console.aws.amazon.com/cloudformation/home?region=us-west-2#/stacks/new?templateURL=https%3A%2F%2F...'. The main content area includes sections for monitoring, rollback triggers, and advanced settings. Under 'Advanced', there are three rows: 'Termination Protection' set to 'Disabled', 'Timeout' set to 'none', and 'Rollback on failure' set to 'Yes'. A 'Capabilities' section follows, containing a message about required IAM resources and a checkbox for acknowledging the creation of custom IAM resources. At the bottom, there is a 'Quick Create Stack' link, a note about auto-populated details, and a footer with links for Feedback, English (US), copyright information, Privacy Policy, and Terms of Use. The 'Create' button is highlighted in blue.

No monitoring time provided

No rollback triggers provided

Advanced

Notification	
Termination Protection	Disabled
Timeout	none
Rollback on failure	Yes

Capabilities

**i** The following resource(s) require capabilities: [AWS::CloudFormation::Stack]

This template contains Identity and Access Management (IAM) resources. Check that you want to create each of these resources and that they have the minimum required permissions. In addition, they have custom names. Check that the custom names are unique within your AWS account. [Learn more.](#)

I acknowledge that AWS CloudFormation might create IAM resources with custom names.

Quick Create Stack (Create stacks similar to this one, with most details auto-populated)

Cancel Previous **Create**

[Feedback](#) [English \(US\)](#) © 2008 - 2018, Amazon Web Services, Inc. or its affiliates. All rights reserved. [Privacy Policy](#) [Terms of Use](#)

10. You are returned to the **Create Stack** page while your CloudFormation stack is being created.
11. After the stack is created, the page will refresh with the name of your completed stack. You should expect to see "CREATE COMPLETE" of your stack. This process may take up to 10 minutes.

The screenshot shows the AWS CloudFormation Management console. The top navigation bar includes tabs for 'CloudFormation Management' and 'AWS SNS'. The main header shows 'Guest', the URL 'Secure | https://us-west-2.console.aws.amazon.com/cloudformation/home?region=us-west-2#/stacks?tab=overview&filter=active&st...', and user information 'matt.sun @ marklogic' with dropdown menus for 'Oregon' and 'Support'.

The main content area is titled 'Stacks' under 'CloudFormation'. It features a search bar with 'Filter: Active' and a search term 'development'. Below the search is a table with the following columns: Stack Name, Created Time, Status, and Description. The table lists five stacks:

Stack Name	Created Time	Status	Description
development-env-NodeMgrL...	2018-04-08 17:27:09 UTC-0700	CREATE_COMPLETE	Launch Lambda functio...
development-env-ManagedE...	2018-04-08 17:26:32 UTC-0700	CREATE_COMPLETE	Launch Managed ENI f...
development-env-VpcStack-...	2018-04-08 17:25:31 UTC-0700	CREATE_COMPLETE	Create interface endpoi...
development-env-VpcStack-...	2018-04-08 17:24:48 UTC-0700	CREATE_COMPLETE	Create a VPC for MarkL...
development-env	2018-04-08 17:24:42 UTC-0700	CREATE_COMPLETE	Deploy a MarkLogic Cl...

Below the table, there is a section titled 'Overview' with the following details:

- Stack name: development-env
- Stack ID: arn:aws:cloudformation:us-west-2:027394069461:stack/development-env/66042cd0-3b8c-11e8-94a1-50a68a2012f2
- Status: CREATE\_COMPLETE
- Status reason:
- Termination protection: Disabled
- IAM role:

At the bottom of the page are links for 'Feedback', 'English (US)', '© 2008 - 2018, Amazon Web Services, Inc. or its affiliates. All rights reserved.', 'Privacy Policy', and 'Terms of Use'.

12. Scroll down to find the **Outputs** tab, click it.
13. The URL to access MarkLogic's Administrative Interface page on port 8001 is in the **Value** column.  
Note this URL to use later.

The screenshot shows the AWS CloudFormation Management console. At the top, there are tabs for 'CloudFormation Management' and 'AWS SNS'. The main navigation bar includes 'Services', 'Resource Groups', and 'CloudFormation'. The 'CloudFormation' dropdown is open, showing 'Stacks'. On the left, a sidebar menu lists options: Overview, **Outputs**, Resources, Events, Template, Parameters, Tags, Stack Policy, Change Sets, and Rollback Triggers. The 'Outputs' option is selected. The main content area displays a table of stacks. A filter bar at the top of the table says 'Filter: Active' and has a dropdown set to 'development'. To the right, it says 'Showing 5 stacks'. The table columns are 'Stack Name', 'Created Time', 'Status', and 'Description'. The first four rows are collapsed, indicated by a small triangle icon. The fifth row, 'development-env', is expanded, showing its details. The 'Value' column contains the URL 'http://developeme-ElasticL-1S8S9T.TCQC4CT-1028959607.us-west-2.elb.amazonaws.com:8001'. The 'Description' column states 'The URL of the MarkLogic Cluster'. The 'Status' column for all five rows is 'CREATE\_COMPLETE'. The 'Actions' button in the top right of the table header has a dropdown arrow pointing down.

Stack Name	Created Time	Status	Description
development-env-NodeMgrL...	2018-04-08 17:27:09 UTC-0700	CREATE_COMPLETE	Launch Lambda functio...
development-env-ManagedE...	2018-04-08 17:26:32 UTC-0700	CREATE_COMPLETE	Launch Managed ENI f...
development-env-VpcStack-...	2018-04-08 17:25:31 UTC-0700	CREATE_COMPLETE	Create interface endpoint...
development-env-VpcStack-...	2018-04-08 17:24:48 UTC-0700	CREATE_COMPLETE	Create a VPC for MarkL...
development-env	2018-04-08 17:24:42 UTC-0700	CREATE_COMPLETE	Deploy a MarkLogic Cl...

## Check the Status of the New Instance

1. Open another tab in your browser.
2. Go to the AWS Console page at <https://console.aws.amazon.com>.
3. In the **Compute** section, click on **EC2**.
4. On the left side, click on **Instances** in the **Instances** group.

The screenshot shows the AWS EC2 Management Console interface. On the left, there's a navigation sidebar with links like EC2 Dashboard, Events, Tags, Reports, Limits, Instances, Launch Templates, Spot Requests, Reserved Instances, Dedicated Hosts, Scheduled Instances, Images, AMIs, Bundle Tasks, Elastic Block Store, Volumes, Snapshots, Network & Security, Security Groups, Elastic IPs, Placement Groups, and Key Pairs. The main area has tabs for Launch Instance, Connect, and Actions. A search bar at the top says "Name : development-env". Below it is a table of instances with columns for Name, Instance ID, Instance Type, Availability Zone, Instance State, and Status Checks. The table shows three rows of data. At the bottom, there's a detailed view for the first instance, showing fields like Instance ID, Instance state, Instance type, Elastic IPs, Availability zone, Security groups, Scheduled events, Public DNS (IPv4), IPv4 Public IP, IPv6 IPs, Private DNS, Private IPs, Secondary private IPs, and VPC ID.

5. In the list of EC2 instances, make sure the state is `started` in the **Instance State** column and the **Status Checks** column is `2/2 checks passed` with a green checkmark icon.
6. If the status passes both checks, the instance has started successfully.

## Check the Status of the New Cluster

Note: it takes approximately 10 to 15 minutes for the created MarkLogic server instances to pass their validation checks and initialize MarkLogic clusters.

1. Go to CloudFormation page at <https://us-west-2.console.aws.amazon.com/cloudformation/home>
2. Select the stack you just created. Note that you should select the parent stack, not those substacks with a "NESTED" label.
3. Click on the **Resource** tab at the bottom.
4. From the list of resources, find the ElasticLoadBalancer. Most likely, it's on top.
5. Click on the **Physical ID** of ElasticLoadBalancer. You will be redirected to ElasticLoadBalancer page.

The screenshot shows the AWS CloudFormation Management console. At the top, there's a navigation bar with 'Services' dropdown, 'Resource Groups', and icons for EC2, S3, VPC, CloudWatch, DynamoDB, and other services. The user is logged in as 'Matt Sun'. Below the navigation is a search bar with 'CloudFormation' and 'Stacks' selected. A 'Create Stack' button and an 'Actions' dropdown are also present. A filter dropdown set to 'Active' shows results for 'development-env'. The main table lists 5 stacks, each with a checkbox, Stack Name, Stack ID, Created Time, Status (all 'CREATE\_COMPLETE'), and Status Reason. Below the table are tabs for 'Overview', 'Outputs', 'Resources' (which is selected), 'Events', 'Template', 'Parameters', 'Tags', 'Stack Policy', 'Change Sets', and 'Rollback Triggers'. Under the 'Resources' tab, another table lists logical and physical IDs, types, and status for resources like an Elastic Load Balancer, security groups, and CloudWatch alarms.

6. Click on the **Instances** tab at the bottom of Load Balancer page.
7. You should see three instances of status "In Service" when the MarkLogic cluster is up. If not yet, wait for a few minutes and refresh.

The screenshot shows the AWS EC2 Management Console. The left sidebar has links for EC2 Dashboard, Events, Tags, Reports, Limits, Instances (selected), Launch Templates, Spot Requests, Reserved Instances, Dedicated Hosts, Scheduled Instances, Images, AMIs, Bundle Tasks, Elastic Block Store, Volumes, Snapshots, Network & Security, Security Groups, Elastic IPs, Placement Groups, and Key Pairs. The main area shows a 'Create Load Balancer' button and an 'Actions' dropdown. A search bar is at the top. Below it is a table for a load balancer named 'developme-ElasticL-9HIEUVJKFUL4'. The 'Instances' tab is selected, showing three instances: 'i-005451df5749651c1', 'i-01e2b1d56d1698da', and 'i-021179cdf072acd15', all in 'InService' status. Below the instances is an 'Edit Instances' table and an 'Edit Availability Zones' table.

# Access the Cluster

Use the URL in the CloudFormation stack's **Outputs** tab to navigate to MarkLogic's Admin Interface.

The screenshot shows the MarkLogic Admin Interface with the following details:

- Header:** CloudFormation Management, EC2 Management Console, Cluster Summary - MarkLogic, Guest.
- Address Bar:** developme-elasti1-1s8s9tcqc4ct-1028959607.us-west-2.elb.amazonaws.com:8001
- Page Title:** Cluster Summary - MarkLogic
- Page Content:**
  - Left Sidebar (Configure):** Groups, Databases, Hosts, Forests, Mimetypes, Clusters, Security.
  - Summary Tab:** Shows system status: ip-10-0-32-134.us-west-2.compute.internal, April 9, 2018, 12:35 AM, No license key has been entered, Software pre-release expires in 89 days.
  - Cluster Summary Section:** Contains links for App-Services, Documents, Extensions, Fab, Last-Login, Meters, Modules, Schemas, Security, Triggers; App Servers (4) - Enable connections from client software (Default :: Admin : 8001 [HTTP], Default :: App-Services : 8000 [HTTP], Default :: HealthCheck : 7997 [HTTP], Default :: Manage : 8002 [HTTP]); Groups (1) - Allow hosts to share a common configuration (Default); Forests (10) - Manage physical content storage for databases; Security - Resources describing the role-based security model; Hosts (3) - Computers belonging to this cluster (Default :: ip-10-0-0-124.us-west-2.compute.internal, Default :: ip-10-0-32-134.us-west-2.compute.internal, Default :: ip-10-0-64-247.us-west-2.compute.internal); Clusters (1) - Cluster configuration (ip-10-0-0-124.us-west-2.compute.internal-cluster (Local Cluster)).
- Footer:** Copyright © 2011-2018 MarkLogic Corporation. All rights reserved.

If you need to copy the URL again:

- Navigate to the **CloudFormation** service by clicking on the **Services** link at the top of the AWS Console page.
- Select your CloudFormation stack by clicking the checkbox.
- Click the **Outputs** tab below the list of CloudFormation stacks for the URL.

## Optional Exercise

Once you go through the basic flow of deploying a cluster, you can also customize the cluster by using different

deployment type.

- Use the CloudFormation template that deploys cluster into **existing VPC**. Copy and paste the URL to the `mlcluster.template` provided. ([Step 3 of Launching](#))
- Fill in the following parameters. ([Step 5 of Launching](#))
  - Stack Name - a **unique** stack name across the account (example: your full name). Take a note of this stack name. You will need it later for tags.
  - IAM Role - a previously created Identity and Access Management role name. **Use the value provided**.
  - Volume Size - leave at the default of 10 GB.
  - Volume Type - leave at the default.
  - Instance Type - Use **m3.medium** for this exercise.
  - Spot Price - leave at the default.
  - SSH Key Name - a previously created EC2 Key-Pair name. **Use the value provided**.
  - **Number of Zones - Set to 1. Deploy to only 1 availability zone.**
  - Nodes Per Zone - total number of nodes per Zone. Leave this at 1 to create a simple 3-node cluster.
  - **Availability Zone - select "us-west-2a" from dropdown menu.**
  - Instance Public IP - leave at the default of disable.
  - Logging SNS ARN - optional. Leave at the default value.
  - **VPC - Select the VPC you created in this exercise unit.**
  - **Subnets - Select one subnet you created in this excercise unit.**
  - Admin User - the MarkLogic administrator user name. The user and password will be created when the cluster is created. We will use `mlwadmin` for the administrator name.
  - Admin Password - the MarkLogic administrator user password. The user and password will be created when the cluster is created. We will use `MarkLogicWorld_2018` as the password.
  - Licensee - leave at the default value "none" to use the included Developer's License.
  - LicenseKey - leave at the default value "none"

Now you should see a new one node cluster is coming up!