

EMR Cluster Creation

Presenter, Team

Date



Creation Options



AWS Management Console



AWS CLI

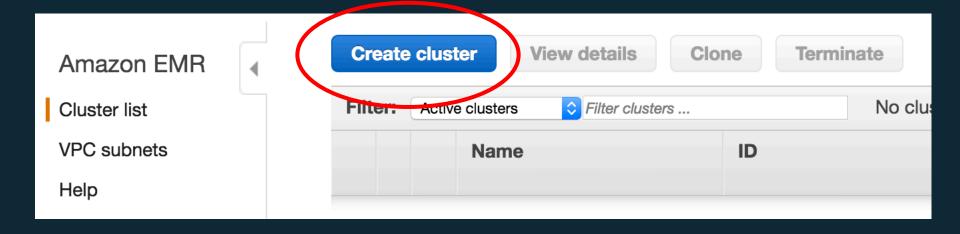


AWS SDKs

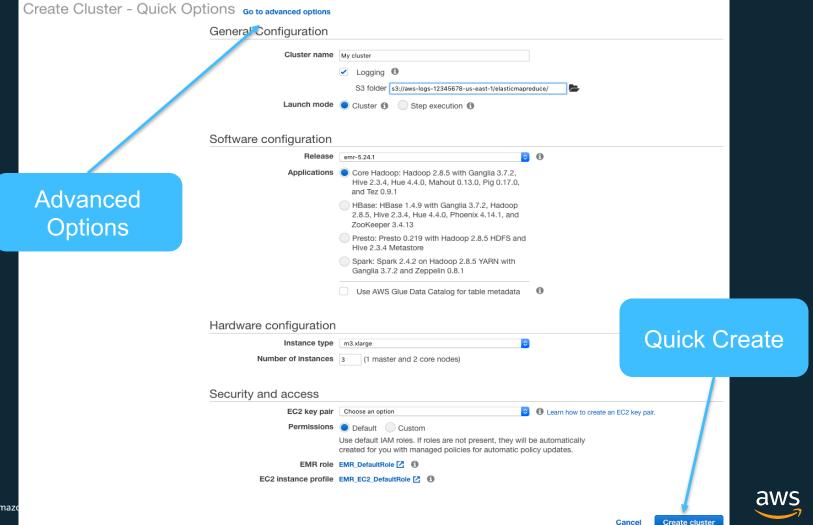


Compute EC2 Lightsail ♂ ECR ECS EKS Lambda Batch Elastic Beanstalk Serverless Application Repository	Robotics AWS RoboMaker Blockchain Amazon Managed Blockchain Satellite Ground Station	Analytics Athena EMR CloudSearch Elasticsearch Service Kinesis QuickSight C Data Pipeline AWS Glue MSK		Business Applications Alexa for Business Amazon Chime WorkMail End User Computing WorkSpaces AppStream 2.0 WorkDocs WorkLink
Storage S3 EFS FSx S3 Glacier Storage Gateway AWS Backup	Management & Governance AWS Organizations CloudWatch AWS Auto Scaling CloudFormation CloudTrail Config OpsWorks Service Catalog Systems Manager	Security, Identity, & Compliance IAM Resource Access Manager Cognito Secrets Manager GuardDuty Inspector Amazon Macie AMS Single Sign-On	�	Internet Of Things IoT Core Amazon FreeRTOS IoT 1-Click IoT Analytics IoT Device Defender IoT Device Management IoT Events
Database RDS DynamoDB	Trusted Advisor Managed Services	Certificate Manager Key Management Service CloudHSM		IoT Greengrass IoT SiteWise IoT Things Graph

Create Cluster – Console







Create Cluster - Advanced Options Go to quick options

Step 1: Software and Steps

Step 2: Hardware

Step 3: General Cluster Settings

Step 4: Security

Software Configuration				
Release emr-5.24.1	○ ①			
✓ Hadoop 2.8.5	Zeppelin 0.8.1		Livy 0.6.0	
JupyterHub 0.9.6	Tez 0.9.1		Flink 1.8.0	
Ganglia 3.7.2	HBase 1.4.9	✓	Pig 0.17.0	
✓ Hive 2.3.4	Presto 0.219		ZooKeeper 3.4.13	
MXNet 1.4.0	Sqoop 1.4.7		Mahout 0.13.0	
✓ Hue 4.4.0	Phoenix 4.14.1		Oozie 5.1.0	
Spark 2.4.2	HCatalog 2.3.4		TensorFlow 1.12.0	
Multi-master support				
Enable multi-master support 1				
AWS Glue Data Catalog settings (op	tional)			
Use for Hive table metadata ①				
Edit software settings (1)				
Enter configuration	from S3			
classification=config-file-name,p	roperties=[myKey1=myValue1	,myKey2=myValue2]		
Add steps (optional) 0				
Step type Select a step	Configure			
Auto-terminate cluster after the last	step is completed			
			Cancel	Nevt

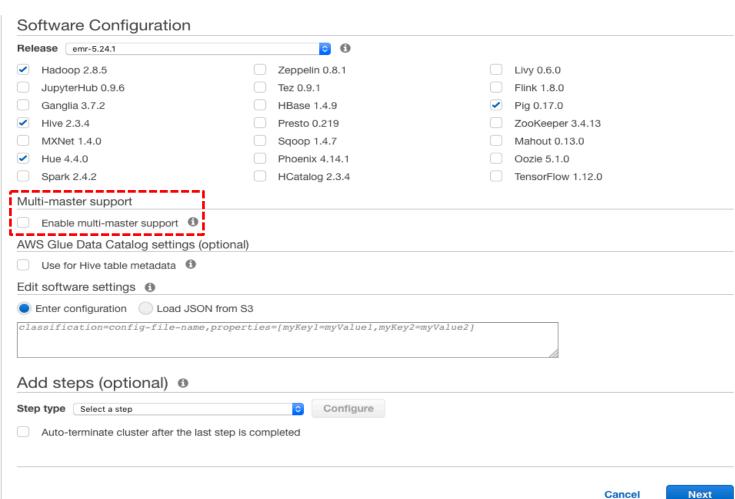
Create Cluster - Advanced Options Go to quick options

Step 1: Software and Steps

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EMR Multi-Master

- When selected EMR multi-master will create a cluster with three master nodes
- Multi-master grants support for high availability for Hbase, YARN Resource Manager, HDFS Name Node, Spark, Hive, and Ganglia
- With multi-master Amazon EMR automatically fails over to a standby master node if the primary master node fails



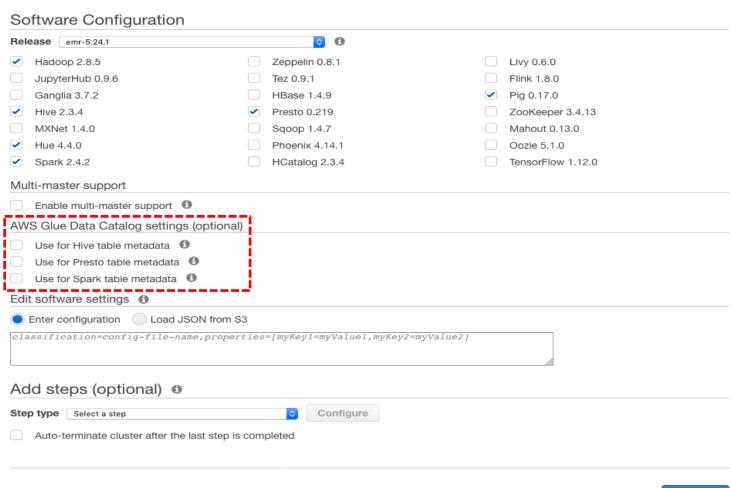
Create Cluster - Advanced Options Go to quick options

Step 1: Software and Steps

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Step 4: Security



Glue Data Catalog Settings

- Specify the Glue data catalog as your external metastore supported in Hive, Spark, and Presto
- This configuration option is useful when you require a persistent metastore or a metastore shared by different clusters, services, applications, or AWS accounts



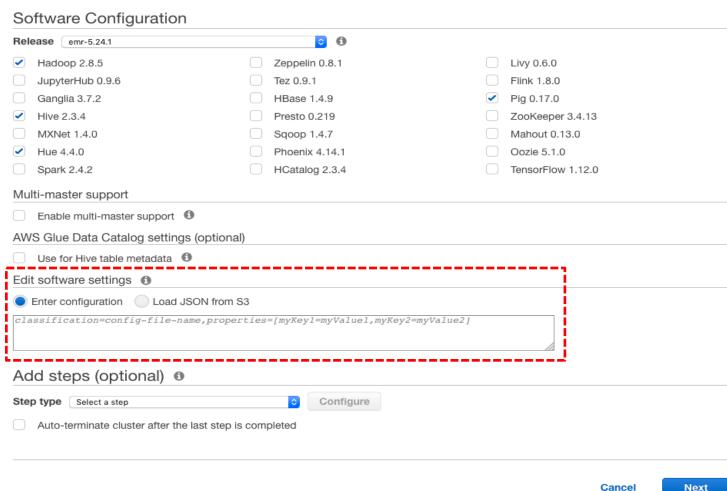
Create Cluster - Advanced Options Go to quick options

Step 1: Software and Steps

Step 2: Hardware

Step 3: General Cluster Settings

Step 4: Security



Create Cluster - Advanced Options Go to quick options

Step 1: Software and Steps

Step 2: Hardware

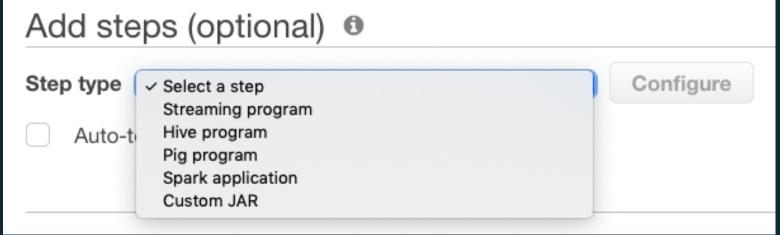
Step 3: General Cluster Settings

Step 4: Security

Release emr-5.24.1	© •	
✓ Hadoop 2.8.5	Zeppelin 0.8.1	Livy 0.6.0
JupyterHub 0.9.6	Tez 0.9.1	Flink 1.8.0
Ganglia 3.7.2	HBase 1.4.9	✓ Pig 0.17.0
✓ Hive 2.3.4	✓ Presto 0.219	ZooKeeper 3.4.13
MXNet 1.4.0	Sqoop 1.4.7	Mahout 0.13.0
✓ Hue 4.4.0	Phoenix 4.14.1	Oozie 5.1.0
Spark 2.4.2	HCatalog 2.3.4	TensorFlow 1.12.0
Multi-master support		
Enable multi-master support		
AWS Glue Data Catalog settings (optional)	
Use for Hive table metadata ①		
Use for Presto table metadata	•	
Use for Spark table metadata 1	1	
Edit software settings 🕦		
Enter configuration	ON from S3	
classification=config-file-name	e,properties=[myKeyl=myValuel,myKey	r2=myValue2]
Add steps (optional) 0		
Step type Select a step	○ Configure	

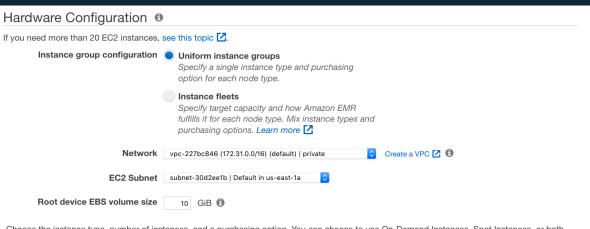
Add Steps

- A step is a unit of work you submit to the cluster
- Can choose to auto-terminate cluster upon completion
- Preconfigured options for streaming, Hive, Pig, Spark, and customer JARs





Hardware Configuration



Choose the instance type, number of instances, and a purchasing option. You can choose to use On-Demand Instances, Spot Instances, or both. The instance type and purchasing option apply to all EC2 instances in each instance group, and you can only specify these options for an instance group when you create it. Learn more about instance purchasing options

Node type	Instance type	Instance count	Purchasing option	Auto Scaling	
Master Master - 1	m3.xlarge 8 vCore, 15 GiB memory, 80 SSD GB storage EBS Storage: none Add configuration settings	1 Instances	On-demand Spot Use on-demand as max price	Not available for Master	0
Core Core - 2	m3.xlarge 8 vCore, 15 GiB memory, 80 SSD GB storage EBS Storage: none Add configuration settings	2 Instances	On-demand Spot Use on-demand as max price	Not enabled 🧬	0
Task Task - 3	m3.xlarge 8 vCore, 15 GiB memory, 80 SSD GB storage EBS Storage: none Add configuration settings	0 Instances	● On-demand ⑤ Spot ⑤ Use on-demand as max price	Not enabled 🧬	0

Instance Group Configuration – Instance fleets

- Provision from a list of instance types with Spot and On-Demand
- Launch in the most optimal Availability Zone based on capacity/price
- Spot block support

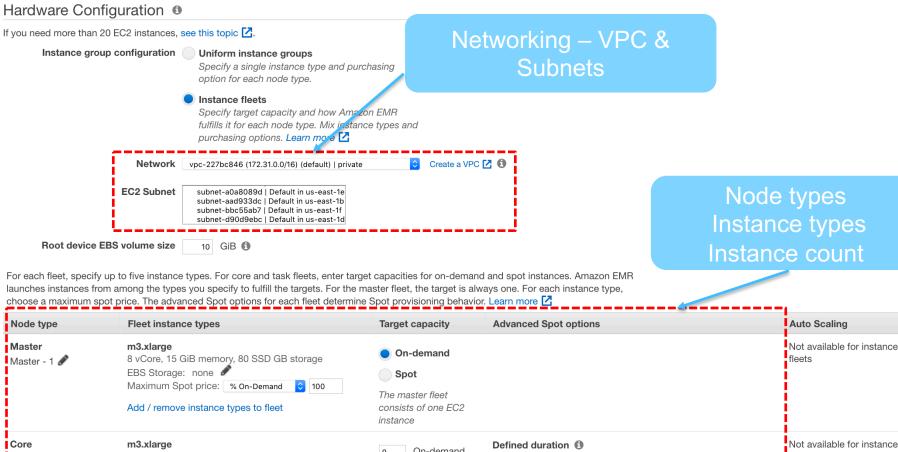
Instance group configuration

Uniform instance groups

Specify a single instance type and purchasing option for each node type.

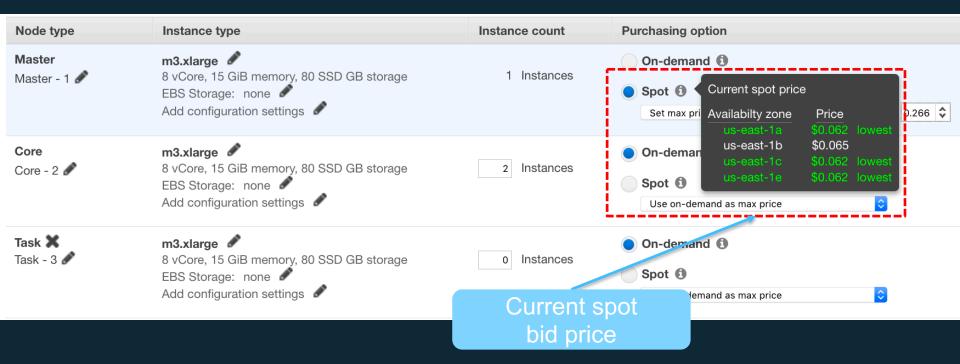
Instance fleets

Specify target capacity and how Amazon EMR fulfills it for each node type. Mix instance types and purchasing options. Learn more



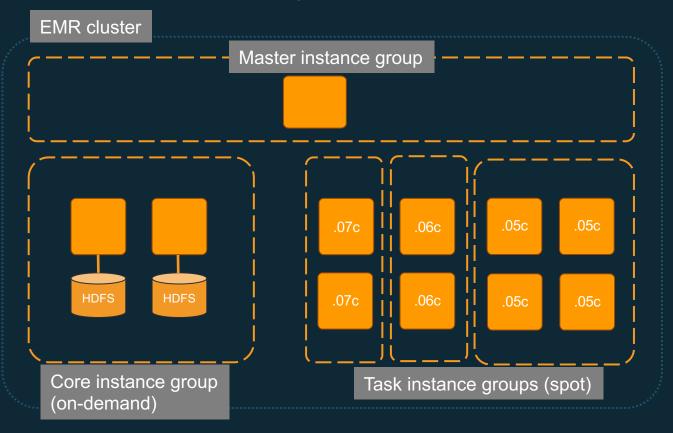
Not available for instance On-demand 8 vCore, 15 GiB memory, 80 SSD GB storage Core - 2 🖋 fleets units Not set EBS Storage: none Maximum Spot price: % On-Demand Spot units Provisioning timeout 1 Each instance counts as 8 units 1 0 Total units Terminate cluster Add / remove instance types to fleet after 60 min, of Spot unavailability

Hardware Configuration – Spot Integration



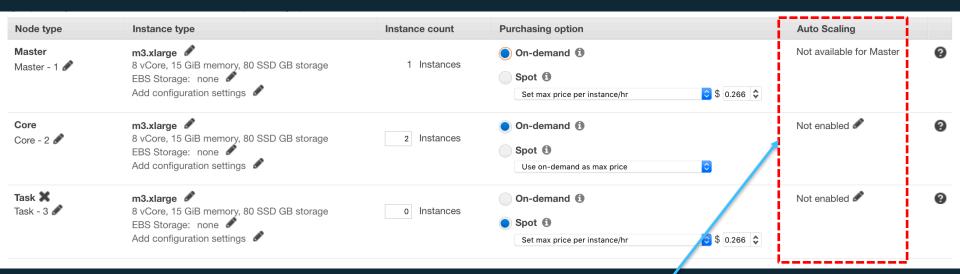


Hardware Configuration – Multiple Task Groups





Hardware Configuration – Auto Scaling



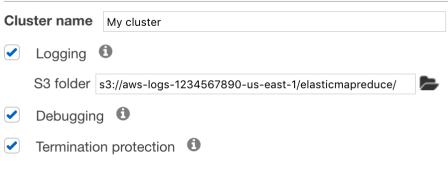
Auto scaling option



o Scaling rules	
Maximum instances: Minimum instances:	
Scale out	
Default-scale-out-1: Add 1 instance if YARNMemoryAvailablePercentage is less than 15 for five-minute period with a cooldown of 300 seconds	<i>P</i> >
Default-scale-out-2: Add 1 instance if ContainerPendingRatio is greater than 0.75 for 1 ve-minute period with a cooldown of 300 seconds	Ø 3
+ Add rule	
Scale in	
Scale in Default-scale-in: Terminate 1 instance if YARNMemoryAvailablePercentage is greater than 75 or 1 five-minute period with a cooldown of 300 seconds	/ 3

General Options and Tags

General Options



Tags 0





General Options – Logging

- By default, logs written to master node /mnt/var/log
 - Step logs
 - Hadoop and YARN component logs
 - Bootstrap Action logs
 - Instance State logs

- If Logging box is checked, logs are also written to S3
 - 5 minute intervals
 - On by default for console
 - Off by default for CLI



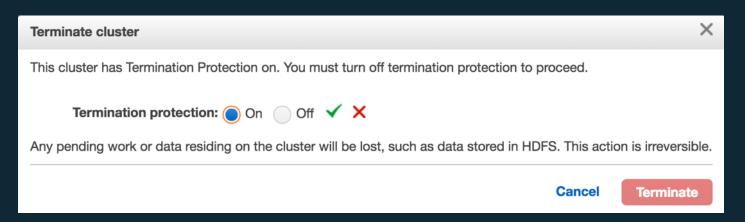
General Options – Debugging

- When you enable debugging on a cluster, Amazon EMR archives the log files to Amazon S3 and then indexes those files
- You can then use the console to browse the step, job, task, and task-attempt logs for the cluster
- Logs for debugging are also pushed to S3 at 5 minutes intervals



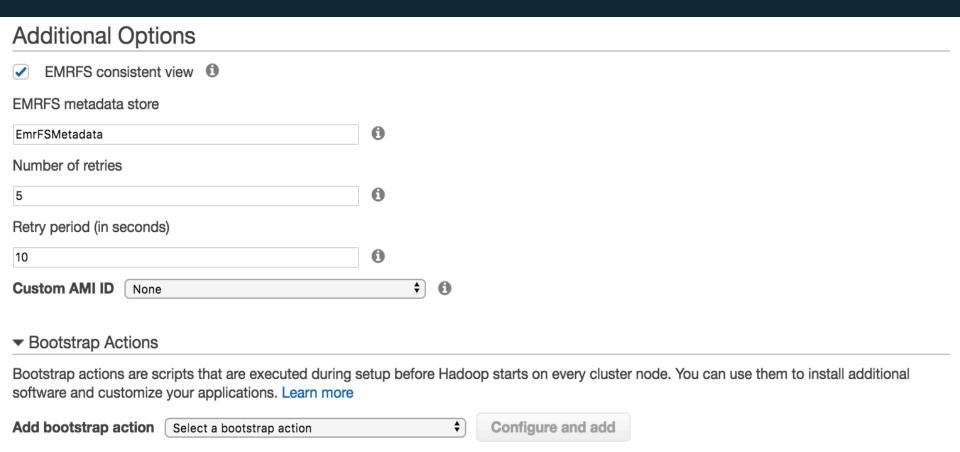
General Options – Termination Protection

- Prevents accidental termination of the cluster
 - On by default in Console
 - Off by default for CLI





General Options – Additional Options



Additional Options – EMRFS Consistent View

- S3 is eventually consistent
- EMRFS consistent view:
 - Uses DynamoDB as a file registry
 - Allows EMR clusters to check for list and read-after-write consistency for Amazon S3 objects written by or synced with EMRFS
- You can configure:
 - Number of times EMFRS calls S3 after finding inconsistency
 - Amount of time until the first retry. Subsequent retries use an exponential back-off



Additional Options – Custom AMI

Benefits

- Can reduce cluster start time by pre-installing applications and perform other customizations instead of using bootstrap actions
- Prevent unexpected bootstrap action failures
- Support for Amazon EBS root volume encryption

Requirements

- Must be an *Amazon Linux* AMI. Amazon Linux 2 AMIs are not supported
- Must be an HVM and an EBS-backed AMI
- Must be a 64-bit AMI
- Must not have users with the same name as applications (example: hadoop, hdfs, yarn, or spark)

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Additional Options – Bootstrap Actions (BA)

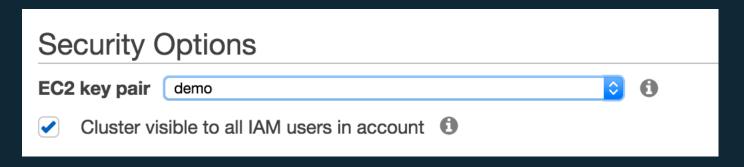
- Scripts executed before Hadoop starts on each node
- Typically used for installing additional software
- Can run up to 16 BAs

- Run If
 - Conditional on an instance-specific value found in the instance.json or job-flow.json i.e. IsMaster=true

- Custom
 - Run custom script. i.e. Copy a file from S3 to each node



Security Options – EC2 Key Pair & Visibility

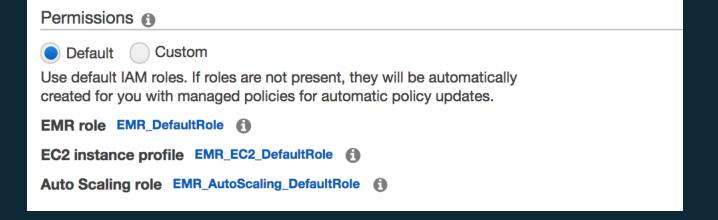


- EC2 key pair
 - Need to attach key pair to be able to SSH into Master node.

- Cluster visible
 - If unchecked, only creator can see Cluster in CLI and Console



Security Options – Permissions



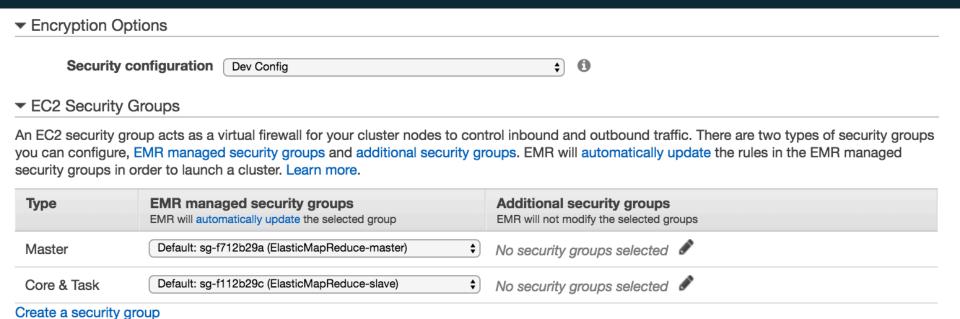


Security Options – Permissions

- EMR uses Roles to access AWS resources
 - EMR Role
 - Allows EMR to access resources such as EC2
 - EC2 Instance Profile
 - Allows EC2 instances in cluster to access resources such as S3
 - Auto Scaling Role
 - Allows Auto Scaling to add and terminate instances
- Can use default or choose your own



Security Options – Encryption & Security Groups





Create security configuration

Name Dev Config

Needs to be created before you start cluster creation

At-rest encryption

Enable and choose options for at-rest data encryption features in Amazon EMR, including Amazon S3 with EMRFS, local volumes attached to cluster instances, and block-transfer encryption for HDFS. Learn more

S3 encryption •			
Encryption mode			•
AWS KMS Key	SSE-RedshiftCOPY \$		0
Local disk encryption	0		
Key provider type	AWS KMS \$		
AWS KMS Key	Enter a Key ARN \$		0
		1	

✓ In-transit encryption

Enable and choose options for open-source encryption features that apply to in-transit data for specific applications. Available encryption options may vary by Amazon EMR release. Learn more

TLS certificate provider



EMR Notebooks

- Based on Jupyter to analyze data interactively
- Create and attach notebooks to Amazon EMR clusters running Hadoop, Spark, and Livy. Notebooks are saved in Amazon S3 independently of clusters

Notebooks

Showing 0 of 1 notebooks



Name and configure your notebook

Name your notebook, choose a cluster or create one, and customize configuration options if desired. Learn more 🛂

Notebook name*	Specify your notebook name.					
	Names may only contain letters (a-z), numbers (0-9), hyphens (-), or underscores (_).					
Description						
	256 characters max.					
Cluster*	Choose an existing cluster					
	Create a cluster 1					
Security groups	Use default security groups 1					
	Choose security groups					
AWS service role*	EMR_Notebooks_DefaultRole					
Notebook location*	Choose an S3 location where files for this notebook are saved.					
	Use a location that EMR creates 1					
	Choose an existing S3 location in us-east-1					
	s3://test/notebooks/					
Tags A						

Cluster: My cluster Waiting Cluster ready after last step completed.

Connections: Enable Web Connection – Hue, Spark History Server, Resource Manager ... (View All)

Hardware

Master public DNS: ec2-54-89-173-61.compute-1.amazonaws.com SSH

Monitoring

Tags: Name = My Cluster View All / Edit

ID: i-3OQFQVKDBEL82

Creation date: 2018-06-26 10:14 (UTC-5)

Application history

Elapsed time: 10 minutes

Auto-terminate: No

Termination On Change

protection:

Configuration details

Events

Release label: emr-5.14.0

Hadoop distribution: Amazon 2.8.3

op distribution: Amazon 2.6.3

Steps

Applications: Hive 2.3.2, Pig 0.17.0, Hue 4.1.0, Spark 2.3.0, Livy 0.4.0, Oozie 4.3.0,

Sqoop 1.4.7

Configurations

Log URI: s3://tm-app-logs/emr/

EMRFS consistent Disabled

view:

Custom AMI ID: --

Security and access

Summary

Summary

Key name: dev-virginia

EC2 instance profile: EMR_EC2_DefaultRole

EMR role: EMR DefaultRole

Auto Scaling role: EMR_AutoScaling_DefaultRole

Visible to all users: All Change

Security groups for sg-8ebea5fb (emr-master)

Master:

Security groups for sg-d3b8a3a6 (emr-slave)

Core & Task:

Network and hardware

Bootstrap actions

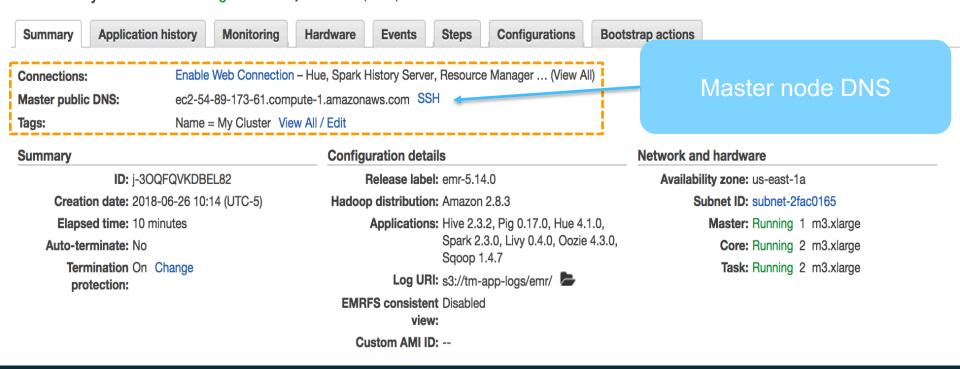
Subnet ID: subnet-2fac0165

Availability zone: us-east-1a

Master: Running 1 m3.xlarge

Core: Running 2 m3.xlarge

Task: Running 2 m3.xlarge





Application history

Monitoring

Hardware

Events Steps

Configurations

Bootstr

Information about the software you are running, logs, and features

Connections:

Summary

Enable Web Connection - Hue, Spark History Server, Resource Manager ... (View All)

Master public DNS:

ec2-54-89-173-61.compute-1.amazonaws.com SSH

Tags:

Name = My Cluster View All / Edit

Summary

ID: j-30QFQVKDBEL82

Creation date: 2018-06-26 10:14 (UTC-5)

Elapsed time: 10 minutes

Auto-terminate: No

Termination On Change

protection:

Configuration details

Release label: emr-5.14.0

Hadoop distribution: Amazon 2.8.3

Applications: Hive 2.3.2, Pig 0.17.0, Hue 4.1.0,

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EMRFS consistent Disabled

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Network and hardware

Availability zone: us-east-1a

Subnet ID: subnet-2fac0165

Master: Running 1 m3.xlarge

Core: Running 2 m3.xlarge

Task: Running 2 m3.xlarge



Application history Monitoring Configurations Bootstrap actions Summary Hardware **Events** Steps Information on the Enable Web Connection - Hue, S Connections: infrastructure for this Master public DNS: ec2-54-89-173-61.compute-1.an cluster Name = My Cluster View All / Ed Tags: **Network and hardware** Summary **Configuration details ID:** i-30QFQVKDBEL82 Release label: emr-5.14.0 Availability zone: us-east-1a **Creation date:** 2018-06-26 10:14 (UTC-5) Subnet ID: subnet-2fac0165 **Hadoop distribution:** Amazon 2.8.3 Elapsed time: 10 minutes **Applications:** Hive 2.3.2, Pig 0.17.0, Hue 4.1.0, Master: Running 1 m3.xlarge Spark 2.3.0, Livy 0.4.0, Oozie 4.3.0, Auto-terminate: No. Core: Running 2 m3.xlarge Sgoop 1.4.7 **Termination** On Change Task: Running 2 m3.xlarge Log URI: s3://tm-app-logs/emr/ protection: **EMRFS consistent** Disabled view: Custom AMI ID: --



Summary

ID: i-30QFQVKDBEL82

Creation date: 2018-06-26 10:14 (UTC-5)

Elapsed time: 10 minutes

Auto-terminate: No

Termination On Change

protection:

Security and access

Kev name: dev-virginia

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EMR role: EMR DefaultRole

Auto Scaling role: EMR_AutoScaling_DefaultRole

Visible to all users: All Change

Security groups for sg-8ebea5fb (emr-master)

Master:

Security groups for sq-d3b8a3a6 (emr-slave)

Core & Task:

Configuration details

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Sqoop 1.4.7

Log URI: s3://tm-app-logs/emr/



EMRFS consistent Disabled

view:

Custom AMI ID: --

Information on security groups and IAM roles

