

Federator.ai 4.3 for OpenShift Installation Guide

(for Red Hat Marketplace)

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Overview

Federator.ai

ProphetStor Federator.ai is an AI-based solution that helps enterprise manage, optimize, auto-scale resources for any applications on OpenShift. Using advanced machine learning algorithms to predict application workload, Federator.ai scales the right amount of resources at the right time for optimized application performance.

- AI-based workload prediction for Kafka or other applications
- Resource recommendation based on workload prediction, application, OpenShift and other related metrics
- Automatic scaling of application containers through Datadog Watermark Pod Autoscaler (WPA)

Datadog Integration Workflows

The following diagram shows how applications metrics are used by Federator.ai to predict workload and to automatically scale applications for better performance. Specifically,

- Datadog Agent sends cluster/applications metrics to Datadog Services
- Federator.ai's Data-adapter queries cluster/applications metrics from Datadog Services and fowards them to Federator.ai AI engine
- Data-adapter posts the prediction/recommendation/plan created by Federator.ai to Datadog Services
- Datadog Cluster Agent gets prediction/recommendation/plan from Datadog Services
- WPA applies plans and auto-scales applications
- Datadog Dashboard displays cluster/applications metrics and prediction/recommendation/plan by Federator.ai



Requirements and Recommended Resource Configuration

Platform

• OpenShift 4.4 and above

Federator.ai Resource Requirements

- Total Resource Requirments
 - 4 CPU cores
 - 4 GB Memory
 - StorageClass: 420GB (require ReadWriteMany access mode)
- Resource requirements for AI Engine
 - There must be at least one worker node with at least 2 CPU cores and 1 GB memory available
 - The 2 CPU cores and 1 GB memory are included in the total 4 CPU cores and 4 GB memory requirements

Federator.ai Version

- Version: Release 4.3
- 30 days trial license

Datadog Agent Version(reference)

- Datadog Agent version : v7.21.1
- Datadog Cluster Agent version : v1.7.0
- Datadog Watermark Pod Autoscaler version : v0.1.0
- kube-state-metrics : v1.5.0 (for OpenShift 3.11, Kubernetes 1.11 ~ 1.12)
 - v1.9.6 (for OpenShift 4.3/4.4/4.5, Kubernetes 1.13 ~ 1.18.x)

Persistent Volumes

- The StorageClass that provides the persistent volumes must support RWX (read-write many) access mode.
- It is recommended to use persistent volumes instead of using ephemeral storage to store the data in the production environment.

Kafka

• For Federator.ai's application-aware Kafka consumer resource/performance optimization feature, the following version of Kafka is supported :

Kafka operator version : Strimzi/kafka:0.17.0-kafka-2.4.0

Federator.ai Installation and Configuration

Summary of Installation Steps

- Step 0: Review pre-installation checklist items, make sure the environment and required information are ready.
- Step 1: Collect information on Datadog Cloud Service account, API Key, Application Key. Instructions are provided below.
- Step 2: Install and configure Datadog Agent/Cluster Agent if they have not been installed. Please follow Datadog docummentation on how to install Datadog Agent and Cluster Agent.
- Step 3: Install Federator.ai.
- Step 4: Configure Federator.ai Data Adapter for Datadog.
- Step 5: Optionally install Datadog WPA and apply WPA autsocaling CR if using Datadog WPA for autoscaling.
- Step 6: Review installation result on Datadog Cloud Dashboard.

Pre-installation Check List

OpenShift:

#	Check list Item	Requirement	Details
1	What is the OpenShift version?	4.4 and above	Use the command below to get OpenShift version: ~# oc version Client Version: 4.4.5 Server Version: 4.4.5 Kubernetes Version: v1.17.1
2	StorageClass and Persistent Volumes requirement	StorageClass supports ReadWriteMany access mode. Available storage size is larger than 430GB.	Minimum storage size for Federator.ai Release 4.3 is 430GB, including database, data, and logs.
3	OpenShift cluster CPU/memory requirement	Minimum CPU/mem/storage: - CPU: 4 Cores - Memory: 4 GB - Storage Class Capacity: 430GB At least one worker node with - CPU: 2 Cores - Memory: 1GB	To be able to run Al Engine pod, there must be at least one worker node that has more than 2 CPU cores and 1 GB memory available. 2 CPU Cores and 1GB for Al Engine are included in the total 4 CPU Cores and 4GB memory requirements.
4	Will there be a resource quota imposed for the namespace where Federator.ai is installed?	CPU/mem request quota should be more than minimum resource requirement - CPU: 4 Cores - Memory: 4 GB	The CPU/memory required for Federator.ai depends on the number of clusters and applications being monitored/managed. Suggestion for initial namespace quota is - CPU 8 cores - Memory 12G The quota could be adjusted if number of managed clusters/applications increases. Use the command to get namespace resource quota ~# oc get resourcequotaall-namespaces

Datadog Agent:

#	Check list Item	Requirement	Details
5	Is Datadog Agent installed?	Datadog Agent is mandatory	OpenShift resources and workload metrics are collected by Datadog Agent.
6	Is Datadog Cluster Agent installed?	Cluster Agent is mandatory for HPA autoscaling feature	Cluster Agent provides metrics to HPA Autoscaler for autoscaling.
7	Is Datadog WPA controller installed?	Datadog WPA is required if auto- scaling is done by WPA	Datadog WPA is the HPA Autoscaler developed by Datadog. Users can use Datadog WPA or Kubernetes native HPA to do autoscaling.
8	Datadog Kafka Consumer integration is enabled?	Datadog Kafka Consumer integration is mandatory if user wants to use Kafka optimization feature	Use the command to confirm Kafka integration is enables ~# oc exec <datadog-agent-pod> -n <datadog-agent- namespace> agent integration show datadog-kafka- consumer Refer to <u>https://www.datadoghq.com/blog/monitor- kafka-with-datadog/</u> for Kafka Consumer integration installation</datadog-agent- </datadog-agent-pod>
9	Datadog account API key	API key is mandatory for connecting Datadog Service	Follow the steps described in the "Before You Start" session to obtain the API key.
10	Datadog account Application key	Application key is mandatory for connecting Datadog Service	Follow the steps described in the "Before You Start" session to obtain the Application key.
11	DD_TAGS with value="kube_cluster:< <i>cluster</i> _ <i>name></i> " is configured for Datadog Agent?	DD_TAGS with value="kube_cluster:< <i>cluster_name</i> > " is required for Federator.ai to identify OpenShift cluster	Use the command below to confirm DD_TAGS with value="kube_cluster:< <i>cluster_name></i> " is configured ~# oc get daemonset < <i>datadog_agent_daemonset_name></i> -n < <i>datadog_agnet_namespace></i> -o yaml - name: DD_TAGS value: kube_cluster:my-cluster

Before You Start

- The admin role for installing Fedeator.ai is "Cluster Admin."
- Datadog agent must be ready if Federator.ai runs in the same OpenShift cluster that is being monitored.
- Obtain Datadog account APIKey, APPKey.
 - 1. A Datadog account is required for connecting and using Datadog Cloud Service. If you don't have an account, visit Datadog website and sign up for a free trial account. <u>https://www.datadoghq.com/</u>
 - 2. Log in Datadog Cloud Service with your account and get an API key and Application key for using Datadog API

https://docs.datadoghq.com/account management/api-app-keys/



Copy the API Key and Application Key for Federator.ai Data-Adapter configuration



- To install Federator.ai from Red Hat Marketplace, you need to have a Red Hat account and log in Red Hat Marketplace at <u>https://marketplace.redhat.com/api-security/en-us/login/landing</u>
 If you don't have a Red Hat account, register an account at <u>https://marketplace.redhat.com/en-us/registration/redhat-marketplace</u>
- Red Hat Marketplace integration with OpenShift provides easy install of purchases and trials on Red Hat Marketplace. This requires registering your OpenShift clusters to your Red Hat account. The procedure of adding clusters is at <u>https://marketplace.redhat.com/enus/workspace/clusters/add/register</u>. OpenShift 4.2 and above clusters are supported.

Installation

- E Cred Hat OpenShift Container Platform o ⊞ o 0 kube:admin 👻 ou are logged in as a ten tate the cluster OAuth conf 🗱 Administrator Dashboards B Dashboards Overview Details Cluster Health Events View all Î Cluster ID dc1cfcea-2fd4-4a32-85b4-6cff37491c60 Cluster is healthy Provider AWS Cluster Capacity Workloads OpenShift Version 4.2.8 CPU Memory Storage Network 76.8% available out 87.73 Gi available out 11.51 Ti available out of 100% of 91.25 Gi of 11.75 Ti 7.5 GBps available out of 7.5 GBps Cluster Inventory 06 6 Nodes 23% 4% 2% 0% Ø 189 €)1 190 Pods 0 PVCs Top Consumers Cluster Utilization
- 1. Log in OpenShift administration console as cluster admin

2. Go to "Projects" page and create a new project. For example, "federatorai" for Federator.ai

■ CRed Hat OpenShift Col		Create Project			
📽 Administrator		Name * federatorai	guration	to allow others to log in.	
Home	Projects Create Project	Display Name federatorai		Filter by name	
Projects Search		Description			
Explore Events	Name T			Labels 1	1
Operators	🔭 kube-node-lease		Cancel Create		1
Workloads	wube-system	Active	No requester		1
Networking	(PP) openshift	Active			I

3. Go to Red Hat Marketplace and use keyword "federator" to search for products. Federator.ai Operator will be listed for installation.

Red Hat Marketp	blace Learn more V	Sell with us	Blog	Docs	Support	
Q federatorai			×			
← Return to store home	Viewing 1 products					Most relevant
Categories						
Al/machine learning	Federator.ai®	\mathbf{N}				
Application runtime	Federator.ai					
Big data	By ProphetStor Data Services, Inc					
Database	Federator.ai helps enterprises					
Developer tools	optimize cloud resources, maximize application					
Integration & delivery	***** (0)					
Logging & tracing	\					
Monitoring	\smile					

4. Click "Purchase" or "Free Trial" to initiate the installation.

Federator.ai®	Federato	or.ai				Purchase		
٠	By ProphetStor	By ProphetStor Data Services, Inc						
Certified enterprise ready About certification	Federator.ai helps save significant co meeting the servi	enterprises optimize ost without excessive ce-level requirements	cloud resources over-provisionir of their applica	maximize application pe g or under-provisioning tions.	erformance, and of resources,	*Requires OpenShift to install		
	Software version	Туре		Rating				
	4.2	Operator		**** No reviews				
Operator version v4.2.601	Overview	Documentation	Pricing	Help				
Certification standards	Enterprises often	lack understanding of	the resources r	eeded to support their a	applications. This	leads to either excessive		
 Runs on OpenShift 	determines the o	of under-provisioning stimal cloud resources	needed to supr	ort any workload on Op	enShift and helps	s users find the best-		
 Certified operators 	cost instances fro	m cloud providers for	their application	з.				
 Fully containerized 								
 T1-T3 support 	Resource planning	g and optimization		Federator.ai	i - Resource & C	ost Optimization on OpenShift		
⊘ Vulnerability scans	By installing Federator.ai as an operator on OpenShift, you can predict what resources (e.g. CPU, Memory) are needed to support				Al solution that automatically provisions services by analyzing historical and ongoing			

5. Click the "Install Operator" and select the namespace "federatorai" to start install the software. It's recommended to keep all the default options.

Federator.ai®	r.ai										
	Free 30-day Trial Version 4.2										
Overview	Operators	Documentation	Support								
You haven	't installed any	Operators									
Install Oper	ator	Operator' to get starte	2d.								

Update channel

Operators are organized into packages and streams of updates called "channels". If an operator is available through multiple channels, you can choose which one you want to subscribe to. Learn more

💿 stable

Approval strategy

Automatic updates keep the operator and any instances on the cluster up to date. Manual updates require approval and are done via OpenShift console or CLI. Learn more

Automatic

🔿 Manual

Target clusters

Choose clusters where you want to install and manage this operator. Then select the Namespace scope for each cluster you are installing into. Learn more



6. It will take a few minutes to pull the software images and install Federator.ai in the "federatorai" project. Once the installation completes, Federator.ai will show up on "Installed Operators" page

E CRed Hat OpenShift Container Pla	tform	ø		o	0	kube:admin 👻
🕫 Administrator 👻	You are logged in as a temporary administrative user, Update the <u>cluster DAuth configuration</u> to allow others t Project: federatoral 🗢	o log in.				
Home v Dashboards Projects Search Explore	Installed Operators > Operator Details Federator.al 4.2.301 provided by ProphetStor Data Services. Inc. Overview YAML Subscription Events AlamedaService					Actions 👻
Events Operators V	Provided APIs	Provi Propl	i der hetStor D	lata Serv	vices, Inc.	
OperatorHub Installed Operators	AlamedaService An instance of Alameda.	Great Gat	ted At few secor	nds ago		
Workloads	© <u>create starge</u>	Webs	ite ://www.p	rophets	tor.com/fe	derator-ai/fed
Networking	Description	Quick	start gui	de	V LS	
Storage	Enderster al DrochetStorie Artificial Intelligence for IT Amerikans (AIAnet alstform monicles intelligence to archectrate container carources on too of ULE	https	://github	.com/co /master	/docs/oui	kstart md r2

7. Click "Federator.ai" to see the details of Federator.ai Operator. After Federator.ai Operator is installed, configure Federator.ai Operator to install the rest of Federator.ai components by creating an "AlamedaService" resource. You can configure with your persistent volumes (it is recommended) or leave the default ephemeral storage.

E Gred Hat OpenShift Container Pla	tform				Q	≡ 0	0	kube:admin 👻
Administrator –		You are logged in as a tempor	ary administrative user. Update the <u>cl</u>	luster OAuth configuration to	allow others to log in.			
	Project: federatorai 👻							
Home 🗸	Installed Operators							
Dashboards								
Projects	Installed Operators are represented by Clus	ter Service Versions within this nam	espace. For more information, see the	e Operator Lifecycle Manager	r documentation 🖪 Or	Filter by na	me	1
Search	create an Operator and Cluster Service Vers	ion using the Operator SDK 🗗						
Explore								
Events	Name †	Namespace	Deployment	Status	Provided APIs			
Operators 🗸 🗸	Federator.ai	(NS) federatorai	federatorai-operator	Copied Up to date	AlamedaServi	ce		I
OperatorHub	Data Services, Inc.							
Installed Operators								
Workloads								



8. Click "my-alamedaservice" resource to see the details. "Resources" view shows the status of the rest of Federator.ai components. When the status of all components are "Running," Federator.ai installation is complete successfully.

Red Hat OpenShift Container Pla	form				G		• •	kube:admin 👻
🕫 Administrator 🗸 🗸		You are logged	in as a temporary administrative	user. Update the <u>cluster OAuth c</u>	onfiguration to allow others to log in.			
	Project: federatorai 👻							
Home 🗸	Installed Operators > Operator Details							
Dashboards	Federator.ai							
Projects	4.2.301 provided by ProphetStor D	ata Services, Inc.						Actions -
Search								
Explore	Overview YAML Subscrip	tion Events	AlamedaService					
Events	Manuala Canalana							
Operators 🗸	Alameda Services							
OperatorHub	Create Alameda Service					Filter	by name	/
Installed Operators								
	Name † Labels	Ť	Kind 1	Status 1	Version	Last	Indated 1	
Workloads	Name Labers	•		Status 🖟	Version 1	Last	obasted *	
Networking	AS <u>my-alamedaservice</u> No lab	els	AlamedaService	Unknown	v4.2.301	3 a	few seconds ago	:

E Sed Hat OpenShift Container Pla	tform					o	Ø	kube:admin 👻
** Administrator	You are logged in	as a temporary administrativ	ve user. Update the <u>cluster OAuth confi</u> g	uration to allow others to log in.				
	Project: federatorai 👻							
	Installed Operators > federatorai.v4.2.301 > AlamedaService Det	ails						
	MS my-alamedaservice							Actions 👻
Projects								
Search	Overview YAML Resources							
Explore								
					Filter F	Resource	es by nam	ie
Operators 🗸 🗸					-			
OperatorHub	15 Deployment 15 ReplicaSet 15 Pod Select All Fil	ters						15 of 45 Items
Installed Operators			~					10 01 10 10 10
	25							
Workloads	Name T	Kind I	Status	Created				
	admission-controller-6f5f5b8dcb-nv59r	Pod	Pending	a few seconds ago				
Networking	alameda-ai-7bb84bcc47-qpjhv	Pod	Pending	a few seconds ago				
Storage	alameda-ai-dispatcher-796b9f998c-52fkl	Pod	Pending	a few seconds ago				
Builds	Palameda-analyzer-8684fdc449-cw6bw	Pod	Pending	a few seconds ago				
	🕐 alameda-datahub-6fdfc558ff-sfmjz	Pod	Pending	a few seconds ago				
Monitoring	alameda-evictioner-6d56c5bd9c-m2kvh	Pod	Running	a few seconds ago				
Compute	B alameda-executor-5556cd8b78-lkzv6	Pod	Pending	a few seconds ago				

9. The URL of Federator.ai GUI can be found at "Projects -> federatorai -> Route -> federatorai-dashboard-frontend"

Red Hat OpenShift Container Platform				O	Ⅲ ♣ O Ø	admín 👻
Stateful Sets	Project: federatorai 👻					
Secrets	Routes					
Config Maps 	Create Route				Filter by name	[7]
Cron Jobs Jobs						
Daemon Sets	2 Accepted 0 Rejected	0 Pending Select all filters				2 Items
Replica Sets	Name 1	Namespace 1	Status	Location 1	Service 1	
Replication Controllers			omito	Edulion	Garrier 🔹	
Horizontal Pod Autoscalers	RI <u>federatorai-dashboard-</u> <u>frontend</u>	NS federatorai	Accepted	https://federatorai- dashboard-frontend-	S federatorai-dashboard- frontend	:
Networking Y			(federatorai.apps.ocp4.172- 31-2-90.nip.io 🕑		
Services	RT federatorai-rest	NS federatorai	Accepted	https://federatorai-rest-	S federatorai-rest	:
Routes				federatoral.apps.ocp4.172- 31-2-90.nip.io 🗹		
Ingresses						

10. Log in Federator.ai GUI with the default account id/password, "admin/admin". The portal page of Federator.ai GUI shows the summary of Federator.ai and OpenShift cluster information.



Configuration

Federator.ai supports two types of applications, Kafka consumers and generic applications. The configuration procedure illustrated below uses one Kafka and one generic application (NGINX) as examples.

- 1. Prepare your Kafka configuration information if you will configure Federator.ai to manage Kafka consumers. This step is optional.
 - Get Kafka connection string (e.g., "my-cluster-kafka-brokers.myproject:9092")

```
~# oc get svc -n myproject
my-cluster-kafka-bootstrap
                             ClusterIP
                                         10.107.237.39
                                                         <none>
9091/TCP,9092/TCP,9093/TCP,9404/TCP 15d
my-cluster-kafka-brokers
9091/TCP,9092/TCP,9093/TCP
                            ClusterIP None
                                                         <none>
                              15d
my-cluster-kafka-exporter
                             ClusterIP 10.98.96.53
                                                         <none>
                                                                       9404/TCP
15d
my-cluster-zookeeper-client ClusterIP
                                         10.110.115.16
                                                         <none>
9404/TCP,2181/TCP
                                    15d
my-cluster-zookeeper-nodes
                             ClusterIP
                                        None
                                                         <none>
2181/TCP,2888/TCP,3888/TCP
                                     15d
```

• Find topic ID of interest (e.g., "topic001")

~# oc get pod -n myproject				
my-cluster-entity-operator-995df8959-vkwrn	3/3	Running	0	6d
my-cluster-kafka-0	2/2	Running	0	3d5h
my-cluster-kafka-1	2/2	Running	0	12h
my-cluster-kafka-2	2/2	Running	0	4d3h
my-cluster-kafka-exporter-6b84688dbd-4dgv2	1/1	Running	57	15d
my-cluster-zookeeper-0	2/2	Running	0	6d
my-cluster-zookeeper-1	2/2	Running	0	15d
my-cluster-zookeeper-2	2/2	Running	0	15d
producer-topic0001-8c8c4f5-xfdz7	1/1	Running	0	43h
strimzi-cluster-operator-77555d4b69-j4975	1/1	Running	1	6d
<pre>~# oc -n myproject exec my-cluster-kafka-0 - server my-cluster-kafka-bootstrap:9092lis OpenJDK 64-Bit Server VM warning: If the num from one, then you should configure the numb using -XX:ParallelGCThreads=Nconsumer_offsets topic0001 topic0002</pre>	c kafka it iber of p per of pa	bin/kaf rocessors rallel GC	ka-topics.s is expected threads app	<pre>hbootstrap- to increase ropriately</pre>

Find Consumer Group ID (e.g., "group0001")

<pre>~# oc get pod -n myproject my-cluster-entity-operator-995df8959-vkwrn my-cluster-kafka-0 my-cluster-kafka-1 my-cluster-kafka-2 </pre>	3/3 2/2 2/2 2/2	Running Running Running Running	0 0 0	6d 3d5h 12h 4d3h
<pre>~# oc -n myproject exec my-cluster-kafka-0 - bootstrap-server my-cluster-kafka-bootstrap; OpenJDK 64-Bit Server VM warning: If the num from one, then you should configure the numb using -XX:ParallelGCThreads=N group0001 group0002</pre>	- c kafka : 9092 nber of per of p	<pre> bin/kaf list processors parallel GC</pre>	<pre>Fka-consum is expect threads a</pre>	er-groups.sh ed to increase ppropriately

- 2. Configure Federator.ai Data Adapter to connect to Datadog Service
 - Use the command to download configuration helper scripts from Github

~# curl https://raw.githubusercontent.com/containers-ai/federatoraioperator/master/deploy/federatorai-launcher.sh |bash % Total % Received % Xferd Average Speed Time Time Time Current Dload Upload Total Spent Left Speed 100 13270 100 13270 0 0 21667 0 --:--:- --:--:-- 21683 Please input Federator.ai version tag (e.g., v4.2.755): v4.3.datadog Downloading scripts ... Downloading Federator.ai CR yamls ... Downloading Federator.ai operator yamls ... Done Do you want to use a private repository URL? [default: n]: n Do you want to launch the Federator.ai installation script? [default: y]: n Downloaded files are located under /tmp/federatorai-scripts/v4.3.datadog

 Use Data Adapter configuration helper script in "/tmp/federatoraiscripts/v4.3.datadog/scripts"

```
~# ls -1 /tmp/federatorai-scripts/v4.3.datadog
-rw-r--r-- 1 root root 11968 Aug 19 17:49 email-notifier-setup.sh
-rw-r--r-- 1 root root 31708 Aug 19 17:49 federatorai-setup-for-datadog.sh
-rw-r--r-- 1 root root 42722 Aug 19 17:49 install.sh
-rw-r--r-- 1 root root 4949 Aug 19 17:49 node-label-assignor.sh
-rw-r--r-- 1 root root 34819 Aug 19 17:49 planning-util.sh
-rw-r--r-- 1 root root 49215 Aug 19 17:49 preloader-util.sh
-rw-r--r-- 1 root root 1721 Aug 19 17:49 prepare-private-repository.sh
-rw-r--r-- 1 root root 4433 Aug 19 17:49 uninstall.sh
```

Change file permission to be executable

~# chomd +x federatorai-setup-for-datadog.sh

 Run the configuration helper script and follow the instructions to input configuration parameters

~# ./federatorai-setup-for-datadog.sh

```
~# cd /tmp/federatorai-scripts/v4.3.datadog/scripts
~#./federatorai-setup-for-datadog.sh
Checking environment version...
...Passed
You are connecting to cluster: https://172.31.3.34:8443
Do you want to reconfigure Datadog API & Application keys? [default: n]: n
Do you want to configure alamedascaler for generic application? [default: y]: y
Getting generic application info... No.1
Input alamedascaler name []: nginx-sample
Input cluster name []: k8s-4-205
Getting controller info for nginx-sample alamedascaler... No.1
Input target app kind (Deployment/DeploymentConfig/StatefulSet)[]: Deployment
Input target app namespace []: nginx-sample
Input Deployment name []: nginx-sample
Do you want to enable HPA recommendation? [default: y]:
Input minimum replicas number []: 1
```

```
Input maximum replicas number []: 5
Do you want to add another controller in nginx-sample alamedascaler? [default: n]: y
Getting controller info for nginx-sample alamedascaler... No.2
Input target app kind (Deployment/DeploymentConfig/StatefulSet)[]: Deployment
Input target app namespace []: nginx-sample
Input Deployment name []: nginx-sample-1
Do you want to enable HPA recommendation? [default: y]:
Input minimum replicas number []: 1
Input maximum replicas number []: 3
Do you want to add another controller in nginx-sample alamedascaler? [default: n]:
Do you want to add another generic application? [default: n]:
Do you want to configure alamedascaler for kafka? [default: y]: : y
Getting Kafka info... No.1
Input alamedascaler name []: kafka-consumer
Input cluster name []: k8s-4-205
Getting controller info for kafka-consumer alamedascaler... No.1
Input Kafka exporter namespace []: myproject
Input Kafka consumer group kind (Deployment/DeploymentConfig/StatefulSet) []: Deployment
Input Kafka consumer group kind name []: consumer1-topic0001-group-0001
Input Kafka consumer group namespace []: myproject
Input Kafka consumer topic name []: topic0001
You can use Kafka command-line tool 'kafka-consumer-group.sh' (download separately or
enter into a broker pod, in /bin directory) to list consumer groups.
e.g.: "/bin/kafka-consumer-groups.sh --bootstrap-server <kafka-bootstrap-service>:9092 --
describe --all-groups --members"
The first column of output is the 'kafkaConsumerGroupId'.
Input Kafka consumer group id []: group0001
Input Kafka consumer minimum replica number []: 1
Input Kafka consumer maximum replica number []: 3
Do you want to add another controller in kafka-consumer alamedascaler? [default: n]: y
Getting controller info for kafka-consumer alamedascaler... No.2
Input Kafka exporter namespace []: myproject
Input Kafka consumer group kind (Deployment/DeploymentConfig/StatefulSet) []: Deployment
Input Kafka consumer group kind name []: consumer2-topic0002-group-0002
Input Kafka consumer group namespace []: myproject
Input Kafka consumer topic name []: topic0002
You can use Kafka command-line tool 'kafka-consumer-group.sh' (download separately or
enter into a broker pod, in /bin directory) to list consumer groups.
e.g.: "/bin/kafka-consumer-groups.sh --bootstrap-server <kafka-bootstrap-service>:9092 --
describe --all-groups --members"
The first column of output is the 'kafkaConsumerGroupId'.
Input Kafka consumer group id []: group0002
Input Kafka consumer minimum replica number []: 1
Input Kafka consumer maximum replica number []: 5
Do you want to add another controller in kafka-consumer alamedascaler? [default: n]:
Do you want to add another Kafka set? [default: n]:
Updating Federator.ai data adapter configmap...
Warning: oc apply should be used on resource created by either oc create --save-config or
oc applv
configmap/federatorai-data-adapter-config configured
...Done.
Adding alamedascaler for generic applications...
```

alamedascaler.autoscaling.containers.ai/nginx-sample created
...Done.
Adding alamedascaler for Kafka...
alamedascaler.autoscaling.containers.ai/nginx-sample unchanged
alamedascaler.autoscaling.containers.ai/kafka-consumer created
...Done.
Restarting Federator.ai data adapter...
pod "federatorai-data-adapter-b7d9db494-s9g6v" deleted
Checking pods...
All federatorai pods are ready.
...Done.

Setup Federator.ai for Datadog successfully Yaml files generated are under ./config_result

#notes-1: input cluster name must match with the **<cluster_name>** configured in Datadog Agent DD_TAGS (value="kube_cluster:**<cluster_name>**")

Verify configuration result

```
~# ls -l config-result/
-rw-r--r-- 1 root root 35666 9月 16 12:06 adapter-configmap.yaml
-rw-r--r-- 1 root root 912 9月 16 12:06 kafka-consumer.yaml
-rw-r--r-- 1 root root 690 9月 16 12:06 nginx-sample.yaml
```

kafka-consumer.yaml

```
~# cat config-result/kafka-consumer.yaml
apiVersion: autoscaling.containers.ai/v1alpha2
kind: AlamedaScaler
metadata:
  name: kafka-consumer
  namespace: federatorai
spec:
  clusterName: k8s-4-205
  controllers:
    - type: kafka
      enableExecution: false
      scaling: hpa
      kafka:
        exporterNamespace: myproject
        consumerGroup:
         namespace: myproject
          name: consumer1-topic0001-group-0001
          kind: Deployment
          topic: topic0001
          groupId: group0001
        hpaParameters:
          maxReplicas: 3
          minReplicas: 1
    - type: kafka
      enableExecution: false
      scaling: hpa
      kafka:
        exporterNamespace: myproject
        consumerGroup:
          namespace: myproject
          name: consumer2-topic0002-group-0002
```

```
kind: Deployment
topic: topic0002
groupId: group0002
hpaParameters:
maxReplicas: 5
minReplicas: 1
```

nginx-sample.yaml

```
~# cat config-result/nginx-sample.yaml
apiVersion: autoscaling.containers.ai/v1alpha2
kind: AlamedaScaler
metadata:
  name: nginx-sample
  namespace: federatorai
spec:
  clusterName: k8s-4-205
  controllers:
    - type: generic
      enableExecution: false
      scaling: hpa
      generic:
        target:
         namespace: nginx-sample
          name: nginx-sample
          kind: Deployment
        hpaParameters:
         maxReplicas: 5
          minReplicas: 1
     type: generic
      enableExecution: false
      scaling: hpa
      generic:
        target:
          namespace: nginx-sample
          name: nginx-sample-1
          kind: Deployment
        hpaParameters:
          maxReplicas: 3
          minReplicas: 1
```

- 3. (Optional) Install Datadog Watermark Pod Autoscaler Controller if you enable HPA autoscaling and would like to use WPA to do autoscaling
 - Download Datadog WPA package

```
~# wget https://github.com/DataDog/watermarkpodautoscaler/archive/master.zip
~# unzip master.zip
```

 Install Watermark Pod Autoscaler controller WPA Helm Chart package requires using 'helm' to install. If you don't have 'helm' installed, use the following command to install.

~# curl -L https://raw.githubusercontent.com/helm/helm/master/scripts/get-helm-3| bash

Set up environment variables and then use 'helm' command to install WPA

```
~# DD_NAMESPACE="default"
~# DD_NAMEWPA="wpacontroller"
~# helm install $DD_NAMEWPA -n $DD_NAMESPACE ./chart/watermarkpodautoscaler
```

<pre>~# pwd /root/datadog_wpa/watermarkpodautoscaler ~# DD_NAMESPACE="default" ~# DD_NAMEWPA="wpacontroller" ~# helm install \$DD_NAMEWPA -n \$DD_NAMESPACE ./chart/v ~# oc get pods -n default</pre>	watermai	rkpodautoscal	ler	
NAME	READY	STATUS RES	STARTS	AGE
datadog-monitoring-6lckr	2/2	Running	0	2d19h
datadog-monitoring-cluster-agent-7d79559979-cnjhj	1/1	Running	0	2d19h
datadog-monitoring-dwq7f	2/2	Running	0	2d19h
datadog-monitoring-hlm8x	2/2	Running	0	2d19h
datadog-monitoring-kube-state-metrics-765978777d-b5dn	q 1/1	Running	0	6d3h
nfs-client-provisioner-7cd5f68cf7-cfqqb	1/1	Running	0	6d3h
wpacontroller-watermarkpodautoscaler-68484f8dd4-zxm22	1/1	Running	18	6d3h

Download WPA pod autoscaler CR yaml file

~# wget

https://github.com/DataDog/watermarkpodautoscaler/blob/master/deploy/crds/datadoghq.com_wa termarkpodautoscalers_cr.yaml

Edit datadoghq.com_watermarkpodautoscalers_cr.yaml
 Configure WPA to auto-scale Kafka consumer group and generic application (NGINX)

```
~# mv datadoghq.com_watermarkpodautoscalers_cr.yaml wpa.yaml
~# vi wpa.yaml
apiVersion: datadoghq.com/v1alpha1
kind: WatermarkPodAutoscaler
metadata:
  name: consumer
  namespace: myproject
spec:
  # Add fields here
  # algorithm must be average
  algorithm: average
  maxReplicas: 10
  minReplicas: 1
  tolerance: 0.01
  downscaleForbiddenWindowSeconds: 300
  upscaleForbiddenWindowSeconds: 15
  scaleUpLimitFactor: 90
  scaleDownLimitFactor: 90
  scaleTargetRef:
    kind: Deployment
    apiVersion: apps/v1
   name: consumer
  readinessDelay: 10
  metrics:
  # Resource or External type supported
  # Example usage of External type
   type: External
    external:
      # do not edit highWatermakr, and lowWatermark
      # highWatermark and lowWatermark must be 1
      highWatermark: "1"
      lowWatermark: "1"
      metricName: federatorai.recommendation
      metricSelector:
        matchLabels:
          resource: replicas
          kube_cluster: k8s-4-205 ← see below #notes-1 for more details
          kube_deployment: consumer
          kube_namespace: myproject
```

```
# Example usage of Resource type
  # - type: Resource
 # resource:
 #
      highWatermark: "50"
 #
       lowWatermark: "10"
 #
      name: cpu
 #
      metricSelector:
 #
       matchLabels:
 #
          foo: bar
apiVersion: datadoghq.com/v1alpha1
kind: WatermarkPodAutoscaler
metadata:
  name: nginx-sample
  namespace: nginx-sample
spec:
 # Add fields here
  # algorithm must be average
  algorithm: average
 maxReplicas: 5
 minReplicas: 1
 tolerance: 0.01
 downscaleForbiddenWindowSeconds: 300
 upscaleForbiddenWindowSeconds: 15
 scaleUpLimitFactor: 90
 scaleDownLimitFactor: 90
 scaleTargetRef:
   kind: Deployment
   apiVersion: apps/v1
   name: nginx-sample
  readinessDelay: 10
 metrics:
  # Resource or External type supported
  # Example usage of External type
  - type: External
   external:
     # do not edit highWatermakr, and lowWatermark
     # highWatermark and lowWatermark must be 1
     highWatermark: "1"
     lowWatermark: "1"
     metricName: federatorai.recommendation
     metricSelector:
       matchLabels:
         resource: replicas
         kube_deployment: nginx-sample
         kube_namespace: nginx-sample
```

#notes-1: "kube_cluster" value must match with DD_TAGS (value="kube_cluster:<**cluster_name>**") configured in Datadog Agent (datadog-values.yaml)

Deploy WPA and confirm the status

~# oc apply -f wpa.yaml

Managing Federator.ai License Keycode

Federator.ai uses a keycode for license control. A 30-day trial keycode is installed by default. It is required to replace it with a valid keycode from ProphetStor in order to continue using Federator.ai after the 30-day trial.

The keycode operations are done by editing the "AlamedaService" CR which is created during Federator.ai installation.

Applying A New Keycode

1. Get the "AlamedaService" CR name

```
~# oc get alamedaservice --all-namespaces
NAMESPACE NAME EXECUTION VERSION PROMETHEUS
AGE
federatorai my-alamedaservice false v4.3.958 https://prometheus-
k8s.openshift-monitoring:9091 45d
```

2. Edit the "AlamedaService" CR

~# oc edit alamedaservice my-alamedaservice -n <namespace>

3. Go to "keycode:" section, replace the value of "codeNumber" with the new keycode and then save the change

Deleting An Existing Keycode

1. Get the "AlamedaService" CR name

```
~# oc get alamedaservice --all-namespaces
NAMESPACE NAME EXECUTION VERSION PROMETHEUS
AGE
federatorai my-alamedaservice false v4.3.958 https://prometheus-
k8s.openshift-monitoring:9091 45d
```

2. Edit the "AlamedaService" CR

~# oc edit alamedaservice my-alamedaservice

 Go to "keycode:" section, delete the keycode from "codeNumber" and then save the change

```
apiVersion: federatorai.containers.ai/v1alpha1
kind: AlamedaService
metadata:
   name: my-alamedaservice
.....
spec:
   .....
   keycode:
        codeNumber:
```

Activating A Keycode

1. Get the "AlamedaService" CR name

```
~# oc get alamedaservice --all-namespaces
NAMESPACE NAME EXECUTION VERSION PROMETHEUS
AGE
federatorai my-alamedaservice false v4.3.958 https://prometheus-
k8s.openshift-monitoring:9091 45d
```

2. Edit the "AlamedaService" CR

~# oc edit alamedaservice my-alamedaservice

3. Go to "status.keycodeStatus:" section, copy the value of "registrationData" and email it to register@prophetstor.com.

```
apiVersion: federatorai.containers.ai/v1alpha1
kind: AlamedaService
metadata:
 name: my-alamedaservice
. . . . . .
status:
  . . . . . .
  keycodeStatus:
   codeNumber: K4AMOC4TSDXXXXXXXXXXXXXXXXXXXXXXXX
   lastErrorMessage: ""
   registrationData: H4sICAavJ18C/2Z1ZGFpLXJ1Z2RhdGEudGd6A03ad1DTZxjA8R9IoMoe
KkMhZSiKSAYgG0IwjBBkb4kRAgZJwwa3oAiKUPYoSB0E0YooKquADCGmgkiQCigqVoYgURCFiEJtr3
wegjWPwWLNYAt0UfY4hgsAYYrCGCxiBfQExUNC0SjUZoYTQmPYj2r+ciWazo/1vy76W+yNM/B2c3R3
uiEIKEsagUrZnnh3s61yZ/YfrFk5cVpi86XqYU4E4XqnoFLDYPs0p1xeTw5iR365holofk8dRD7VOP
2prLF+uEPGkmGsIS7AxNoeT1cR2W6u7GekO3Lp/TEBGxrKoUXEP5TmlvF3RNqd6N2UoyPbrr+8Z8Zi
e9613bfzzvvHs+/zz3vXvfu/f5/6UxdKPokbGMQDo1kh6yOYgWjXx2mE8M9fX/mNgtBtg/+50/Jg6P
JJhu2gMPKh7XE116h40jfv5pHraf0CXvxB0zbTXkyjk1VgoLsdVXGd1HDARd6sVWbcrBqLP3M2bDP9
*****
```

4. Once ProphetStor received the activation request email and validated the "registrationData", you will receive the license activation code, "signatureData", via an email. Copy the "signatureData" from the email to the "keycode.signatureData" field and save the change. You license keycode is now activated.

```
apiVersion: federatorai.containers.ai/v1alpha1
kind: AlamedaService
metadata:
 name: my-alamedaservice
. . . . . .
spec:
  . . . . . .
 keycode:
   signatureData: F5nmus478ertgnldd430gvsef90gNYAt0UfY4hgsAYYrCGCxiBfQExUNC0S
KkMhZSiKSAYgG pi86XqYU4E4a3oAiKUPYoSB0E0YooKquADCGmgkiQCigYrCGCxergHwernREBo4E
wegjWPwWLNYAt0UfY4hgsAYYrCGCx6UxdKPokG0SjUZoYTQmPYj2r+ciWazo/1vy76W+yNM/B2c3R3
OYgWjXx2mE8M9fh3s61yZ/YfrFk5cVpixdKPokbGMQDo1khRTNB0p1xeTw5iR365holofk8dRD7VQP
2prLF+uEPGkmGsIS7AxNoeT1cR2W6u7GekO3Lp/TEBGxrKoUXEP5TmlvF3RNqd6N2UoyPbrr+8Z8Zi
e9613bfzzvvHs+/2Z1ZGFpLXJ1ZAO3ad1DTZxjA8R9IoxdKPokbGMQDo1kh6yOYg8M9fX/RwtBVerh
YBoerBTR445h4536g456UJdfsheryhryu6JwerJwerYjJKER5zQ6kZrFFhkr6sVWbcrBqLPregUh9
*****
```

Appendix

Datadog Dashboards

The following Custom Datadog Dashboards are available after Federator.ai is installed.

ProphetStor Federator.ai Cluster Overview

	* ProphetSt	• Skube_clust	ator.ai Clus	ster Overvie Shost * * Spred	W 🗸 Edi	Widgets +					11	Past 1 Hour		Q Q
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10 Loor	jean3-61	jek8s-362	24_hours		496.32	326.25	673.79	1.01	ĸ	8.45G	3.93G	13.49G	14.81G	
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						Nodes R	esource Utilizat	ion History						
 Help It Team root@prophet, Propheter Data 	Node Current, 8K 6K 4K 2K 4K 4K 4K 4K 4K 4K 4K 4K 4K 4K 4K 4K 4K	Predicted CI	PU Usage (Dail	y) mi 20 12 ⁱ Taga i nost-jek8s-361,kub- in host-jek8s-361,kub-	2d Nod 15k 10k 5k 0 0k	e Current/Pred sar15 Value Min Avg 358K 704.92 4.4 2.71K 2.86K 39	Mon 17 Max Metric 8K 11.39K Kebernera 4K 5.24K federator	e (Weekly) Wed 19 Tags I scpu usa hostjekt	1W	Node Cu 15K kuberni kube_du 5K 0K Valu 1.01	rrent/Predictec tei: cpu usage.total stergean3-61, hostj jul 26 Ac Min Avg Ma 4 536.86 3.444 12. 6 41.25 882,98 5.	CPU Usage (Mon Illicore) 33K 92 92 92 94tric 75X hubernetes.cpu.us. 255 16deratoral.predict.	thly) Imo Aug 16 Fag 1 hostjekis-361,kub hostjekis-361,kub	

ProphetStor Federator.ai Application Overview

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т≕ АРМ	•	Workload Predi	ction for Next 7 D	ays												
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	ity ,	myproject	consumer1-topic000	N/A		59.57	59.5	7	59.57	51	1.70		1.43G	1.97G	1.84G	
	onitoring															
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		KUBE NAMESPACE	KUBE DEPLOYMENT	KUBE STATE	FUL S	AVG CPU (MCORES)	MIN CPU (MCORE) MAX CPU (M	CORES) REC	CPU (MCORES)	AVG MEM (BYTES	MIN MEM (B	YTES) MAX M	EM (BYTES)	REC MEM (BYTES)	
		nginx-preloader-san	nginx-prepared	N/A		429.82	391.5	8	471.59	451	7.96N	1	7.7M	8.26M	9.09M	
		myproject	consumer2-topic000	N/A		79.01	75.0	6	87.15	84	1.860	5	1.57G	2.15G	2.36G	
		myproject	consumer1-topic000	N/A		78.89	78.8	9	78.89	79	1.440	858	8.94M	2.02G	2.23G	
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• ProphetStor Federator.ai Kafka Overview

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	\$kube_cluster jean3-61 v \$kube_namespace myproject v \$kube_deployment consum	ner1-topic0001-group-0001 v \$topic topic0001 v	\$consumer_group group0001 v	÷
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Infrastructure >	Recommended Replicas vs Current/Desired Replicas	Production vs Consumption vs Prod	uction Prediction	
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Integrations	2	ок		
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ت Logs	Kaika Consumer Lag	20K		
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	0K	ок 13:45 14:00	14:15 14:33:20	
	Deployment Memory Usage	Deployment CPU Usage		
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• ProphetStor Federator.ai Cost Analysis Overview

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	- E	1 1 1 1			HOST	KUBE_	NODE_ROLE	AVAILABILITY-ZONE	INSTANCE-TYPE	SIZE	CPU CAPACITY	MEMORY CAPACITY
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bards +	PROPH					N/A		N/A	N/A	N/A	4 cpus	
ucture			2078	52	jek8s-362	N/A		N/A	N/A	N/A	4 cpus	15.51 GiB
rs 🕴			2070	• • • • \$/mo	jek8s-364	N/A		N/A	N/A	N/A	4 cpus	15.51 GiB
uons -	Recommended C	luster - AWS 1d	Recommender	d Cluster Configura	ion - AWS							
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ies +	839	.22 s/mo	aws	m5.4xlarge_16.0_co	res_us_west	oregon	m5.4xlarge	1	0	0	0	usa
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