Federator.ai Release v4.4.1
Installation Guide
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Overview

Federator.ai

ProphetStor Federator.ai is an AI-based solution that helps enterprise clients to manage, optimize, auto-scale resources for any applications on Kubernetes/OpenShift. Using advanced machine learning algorithms to predict applications 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, Kubernetes, and other related metrics
- Automatic scaling of application containers through Datadog Watermark Pod Autoscaler (WPA), Federator.ai HPA, Native HPA with Datadog Cluster Agent.

Supported Metrics Data Sources

There are three different types of metrics data sources supported in release 4.4.1: Prometheus, Datadog, and Sysdig.

Prometheus (Kubernetes, Rancher, RedHat OpenShift)

Prometheus is a free and open-source event monitoring tool for containers or microservices. It uses the principle of scraping to collect numerical data based on time series. Metrics are collected in regular timestamps and stored locally. Federator.ai supports using Prometheus gathering Kubernetes cluster metrics, and leverage collected data for workload predictions, recommendations for resource planning, autoscaling containers/pods, and cost analysis for clusters deployed in a multicloud environment.

The following diagram shows how the metrics are collected from Prometheus by Federator.ai in a Kubernetes environment.
Datadog

Federator.ai has integrated with Datadog and utilizes the metrics collected by Datadog Agent for workload predictions. The following diagram shows how application 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 forwards 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

Sysdig

Federator.ai has integrated with Sysdig and utilizes the metrics collected by Sysdig Agent for workload predictions. The following diagram shows how application metrics are used by Federator.ai to predict workload and to automatically scale applications for better performance.
Requirements and Recommended Resource Configuration

Platforms
- OpenShift: 3.11, 4.x
- Kubernetes: 1.11 ~ 1.19.x
- Rancher v2.4.8

Federator.ai Resource Requirements
- Total Resource Requirements
  - 5 CPU cores
  - 4.9 GB Memory
  - StorageClass: 166GB (require ReadWriteOnce access mode)
- Resource requirements for AI Engine
  - There must be at least one worker node with at least 2 CPU cores and 1 GB of memory available
  - The 2 CPU cores and 1 GB memory are included in the total 5 CPU cores and 4.9 GB memory requirements

Federator.ai Version
- Version: Release v4.1-ga

Datadog Agent Version (reference)
- Datadog Agent helm chart version: v2.4.24
- Datadog Agent version: v7.21.1
- Datadog Cluster Agent version: v1.8.0
- Datadog Watermark Pod Autoscaler version: v0.1.0

Prometheus Version
- OpenShift
  - Default installed Prometheus
- Kubernetes
  - prometheus-operator-8.5.11
  - Rancher v2.4.8 kube-prometheus-stack-12.3.0
  - kube-prometheus-release-0.6
  - kube-prometheus-stack-12.5.0

Sysdig Agent Version (reference)
- Sysdig agent: 10.8.0
Persistent Volumes

- The StorageClass that provides the persistent volumes must support RWO (ReadWriteOnce) 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(Reference) : Strimzi/kafka:0.17.0-kafka-2.4.0
Summary of Installation Steps

Step 0: Review pre-installation checklist items, make sure the environment and required information are ready.

Step 1: Preparation
- For Datadog, obtain API Key, Application Key of Datadog Cloud Service account. Instructions are provided below.
- For Prometheus, obtain Prometheus service URL (ex: http://<prometheus_svc_name>.<namespace>:9090).
- For Sysdig, obtain Sysdig API URL and Token.

Step 2:
- For Datadog, install and configure Datadog Agent/Cluster Agent if they have not been installed. Please follow the Datadog documentation on how to install Datadog Agent and Cluster Agent.
- For Sysdig, install and configure Sysdig Agent. Please follow Sysdig documentation on how to install Sysdig Agent.

Step 3: Install Federator.ai.

Step 4: Configure Federator.ai Data Adapter for the external metrics data source via Federator.ai Initial Setup Wizard.

Step 5: Optionally install Datadog WPA and apply WPA autoscaling CR if using Datadog WPA for autoscaling.

Step 6: Review installation result on Datadog/Sysdig Cloud Dashboard.

Pre-installation Check List

Kubernetes:

<table>
<thead>
<tr>
<th>#</th>
<th>Checklist Item</th>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What is the Kubernetes version?</td>
<td>1.11~1.19.x</td>
<td>Use the command below to get the Kubernetes version:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$ kubectl version</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>...</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GitCommit:&quot;596b3c6e503c87169aa6106f57b9f242f64df49&quot;, GitTreeState:&quot;clean&quot;, BuildDate:&quot;2020-01-18T23:22:30Z&quot;, GoVersion:&quot;go1.13.5&quot;, Compiler:&quot;gc&quot;, Platform:&quot;linux/amd64&quot;}</td>
</tr>
<tr>
<td>2</td>
<td>Does installation on this Kubernetes cluster require a private image repository?</td>
<td>If a private image repository is required, the following information is needed during installation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Private image repository URL</td>
<td>Input the URL and credential when the Federator.ai installation script asks for the information.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Credential of the private image repository</td>
<td></td>
</tr>
</tbody>
</table>
### StorageClass and Persistent Volumes requirement

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>StorageClass supports ReadWriteOnce access mode. Available storage size is larger than 16GB.</td>
<td>The minimum storage size for Federator.ai Release v4.4.1 is 166GB, including database, data, and logs.</td>
</tr>
</tbody>
</table>

### Kubernetes cluster CPU/memory requirement

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum CPU/mem/storage: - CPU: 5,000 (mcores) - Memory: 4.9 (GB) - Storage Class Capacity: 166GB At least one worker node with - CPU: 2 Cores - Memory: 1GB</td>
<td>To be able to run the AI Engine pod, there must be at least one worker node that has more than 2 CPU cores and 1 GB of memory available. 2 CPU Cores and 1GB for AI Engine are included in the total 5 CPU Cores and 4.9 GB memory requirements.</td>
</tr>
</tbody>
</table>

### Is this Kubernetes cluster allowed for NodePort configuration?

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
</table>

### Will there be a resource quota imposed for the namespace where Federator.ai is installed?

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU/mem request quota should be more than the minimum resource requirement - CPU: 5 Cores - Memory: 4.9 GB</td>
<td>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 the number of managed clusters/applications increases. Use the command to get namespace resource quota $ kubectl get resourcequota --all-namespaces</td>
</tr>
</tbody>
</table>

### Does this deployment requires resource request/limit specified?

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>By default, Federator.ai deployments do not specify resource requests/limits. It can be done by setting up an environment variable before installation starts.</td>
<td>To turn on resource request/limit settings for all Federator.ai deployments, manually export environment variable before running ‘federatorai-launcher.sh’ $ export ENABLE_RESOURCE_REQUIREMENT=y $ ./federatorai-launcher.sh</td>
</tr>
</tbody>
</table>

### Prometheus:

<table>
<thead>
<tr>
<th>#</th>
<th>Checklist Item</th>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What is the Prometheus version? (for Kubernetes)</td>
<td>Recommended version-Prometheus operator helm chart version: 8.5.11-Prometheus operator version: 0.34.0-Prometheus server version: 2.13.1</td>
<td>Use the command below to get Prometheus version:~# helm ls -A</td>
</tr>
</tbody>
</table>

---
### Datadog Agent:

<table>
<thead>
<tr>
<th>#</th>
<th>Checklist Item</th>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is Datadog Agent installed?</td>
<td>Datadog Agent is mandatory</td>
<td>Kubernetes resources and workload metrics are collected by Datadog Agent.</td>
</tr>
<tr>
<td>2</td>
<td>Is Datadog Cluster Agent installed?</td>
<td>Cluster Agent is mandatory for the HPA autoscaling feature</td>
<td>Cluster Agent provides metrics to HPA Autoscaler for autoscaling.</td>
</tr>
<tr>
<td>3</td>
<td>Is Datadog WPA controller installed?</td>
<td>Datadog WPA is required if autoscaling is done by WPA</td>
<td>Datadog WPA is the HPA Autoscaler developed by Datadog. Users can use Datadog WPA or Kubernetes native HPA to do autoscaling.</td>
</tr>
</tbody>
</table>
| 4  | 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 enabled
$ kubectl exec <datadog-agent-pod> -n <datadog-agent-namespace> -- agent integration show datadog-kafka-consumer
Refer to https://www.datadoghq.com/blog/monitor-kafka-with-datadog/ for Kafka Consumer integration installation |
| 5  | Datadog account API key                             | An API key is mandatory for connecting Datadog Service | Follow the steps described in the "Before You Start" session to obtain the API key. |
| 6  | Datadog account Application key                     | An application key is mandatory for connecting Datadog Service | Follow the steps described in the "Before You Start" session to obtain the Application key. |
| 7  | Is one of cluster name is configured for the Datadog agent/cluster agent? | "kube_cluster","cluster_name","kube_cluster_name" in values.yaml or 1."cluster_name" in values.yaml, or 3."DD_CLUSTER_NAME" in Datadog cluster agent deployment | Case 1.>New Datadog Agent installation:
Install Datadog agent and cluster agent by "helm install -f values.yaml", in values.yaml.
... clusterName: <cluster-name>
... clusterAgent:
  enabled: false true
Case 2.> In Datadog Agent installed environment, with no Cluster Agent and no cluster_name setting Update Datadog Agent to enable Cluster agent by "helm upgrade -f values.yaml ", in values.yaml
  - assign a cluster name
  ...
datadog:
  clusterName: <cluster-name>
  - enable cluster agent
  ...
clusterAgent:
  enabled: false true
  ...
- $helm upgrade ...
- Check "DD_Cluster_Name"
$ kubectl get daemonset <datadog_agent_daemonset_name> -n <datadog_agent_namespace> -o yaml |
Before You Start (Datadog)

- The admin role for installing Federator.ai is "Cluster Admin."
- Datadog agent must be ready if Federator.ai runs in the same Kubernetes 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. [https://www.datadoghq.com/](https://www.datadoghq.com/)
  2. Log in Datadog Cloud Service with your account and get an API key and Application key for using Datadog API
Copy the API Key and Application Key for Federator.ai Data-Adapter configuration

Before You Start (Sysdig)

- Sysdig US east side, the Sysdig API URL is https://app.sysdigcloud.com/
  - For east US, Sysdig API URL is https://app.sysdigcloud.com
  - For west US, Sysdig API URL is https://us2.app.sysdig.com
  - For eu Central, Sysdig API URL is https://eu1.app.sysdig.com
- use Sysdig Monitor API Token as data source API key.
New Installation

(Upgrade from previous Federator.ai, please refer to the next section)

1. Log into Kubernetes cluster

2. Install the Federator.ai for Kubernetes by using the following command

```
$ curl https://raw.githubusercontent.com/containers-ai/prophetstor/master/deploy/federatorai-launcher.sh | bash
```

```
~# curl https://raw.githubusercontent.com/containers-ai/prophetstor/master/deploy/federatorai-launcher.sh | bash

% Total  % Received % Xferd  Average Speed   Time    Time     Time  Current
Download Upload Total Spent  Left  Speed
100 17260  100 17260  0  0  20210  0  --:--:--  --:--:--  --:--:--  20210
Please input Federator.ai version tag (e.g., v4.4.1): v4.4.1-ga

Downloading scripts ...

Downloading Federator.ai CR yamls ...

Downloading Federator.ai operator yamls ...
Done

Do you want to use a private repository URL? [default: n]:
Do you want to launch the Federator.ai installation script? [default: y]:

Executing install.sh ...
Checking environment version...
...Passed
Enter the namespace you want to install Federator.ai [default: federatorai]:
```
tag_number = v4.4.1-ga
install_namespace = federatorai

----------------------------------------
Is the above information correct? [default: y]: 
Downloading file 00-namespace.yaml ...
Done
Downloading file 01-serviceaccount.yaml ...
Done
Downloading file 02-alamedaservice.crd.yaml ...
Done
Downloading file 03-federatorai-operator.deployment.yaml ...
Done
Downloading file 04-clusterrole.yaml ...
Done
Downloading file 05-clusterrolebinding.yaml ...
Done
Downloading file 06-role.yaml ...
Done
Downloading file 07-rolebinding.yaml ...
Done
Downloading file 08-service.yaml ...
Done
Downloading file 09-secret.yaml ...
Done
Downloading file 10-mutatingwebhook.yaml ...
Done
Downloading file 11-validatingwebhook.yaml ...
Done
Applying Federator.ai operator yaml files...
Applying 00-namespace.yaml...
namespace/federatorai created
Applying 01-serviceaccount.yaml...
serviceaccount/federatorai-operator created
Applying 02-alamedaservice.crd.yaml...
customresourcedefinition.apiextensions.k8s.io/alamedaservices.federatorai.containers.ai created
Applying 03-federatorai-operator.deployment.yaml...
deployment.apps/federatorai-operator created
Applying 04-clusterrole.yaml...
clusterrole.rbac.authorization.k8s.io/federatorai-operator created
clusterrole.rbac.authorization.k8s.io/alameda-gc created
Applying 05-clusterrolebinding.yaml...
clusterrolebinding.rbac.authorization.k8s.io/federatorai-operator created
Applying 06-role.yaml...
role.rbac.authorization.k8s.io/federatorai-operator created
Applying 07-rolebinding.yaml...
rolebinding.rbac.authorization.k8s.io/federatorai-operator created
Applying 08-service.yaml...
service/federatorai-operator created
Applying 09-secret.yaml...
secret/federatorai-operator-admission created
Applying 10-mutatingwebhook.yaml...
mutatingwebhookconfiguration.admissionregistration.k8s.io/federatorai-operator-servicesmutation created
Applying 11-validatingwebhook.yaml...
validatingwebhookconfiguration.admissionregistration.k8s.io/federatorai-operator-servicesvalidation created
Checking pods...
Waiting for pod federatorai-operator-646f8446d8-hmv9p in namespace federatorai to be ready.
phase: [Pending]
Waiting for pods in namespace federatorai to be ready...
Waiting for pod federatorai-operator-646f8446d8-hmv9p in namespace federatorai to be ready.
phase: [Pending]
Waiting for pods in namespace federatorai to be ready...
Waiting for pod federatorai-operator-646f8446d8-hmv9p in namespace federatorai to be ready.
phase: [Running]
Waiting for pods in namespace federatorai to be ready...

All pods under namespace(federatorai) are ready.

Install Federator.ai operator v4.4.1-ga successfully

Downloading Federator.ai CR sample files ... Done

Downloading Federator.ai alamedascaler sample files ... Done

Which storage type you would like to use? ephemeral or persistent? [default: persistent]:
Specify log storage size [e.g., 10 for 10GB, default: 10]: 5
Specify AI engine storage size [e.g., 10 for 10GB, default: 10]: 5
Specify InfluxDB storage size [e.g., 100 for 100GB, default: 100]: 50
Specify storage class name: managed-nfs-storage
Do you want to expose dashboard and REST API services for external access? [default: y]:

```
install_namespace = federatorai
storage_type = persistent
log storage size = 5 GB
AI engine storage size = 5 GB
InfluxDB storage size = 50 GB
storage class name = managed-nfs-storage
expose service = y
```

Is the above information correct [default: y]:
Processing...
Waiting for datahub(v4.4.1-ga) pod to appear ...

datahub pod is present.

Checking pods...
Waiting for pod alameda-ai-5cc75c94b7-gvttm in namespace federatorai to be ready.
phase: [Pending]
Waiting for pods in namespace federatorai to be ready...
Waiting for pod alameda-ai-5cc75c94b7-gvttm in namespace federatorai to be ready.
phase: [Pending]
Waiting for pods in namespace federatorai to be ready...
Waiting for pod alameda-ai-5cc75c94b7-gvttm in namespace federatorai to be ready.
phase: [Running]
Waiting for pods in namespace federatorai to be ready...
Waiting for pod alameda-executor-5f8fffb574-5b417 in namespace federatorai to be ready.
phase: [Running]
Waiting for pods in namespace federatorai to be ready...
Waiting for pod alameda-executor-5f8ffb574-5b4l7 in namespace federatorai to be ready.
phase: [Running]
Waiting for pods in namespace federatorai to be ready...

All pods under namespace(federatorai) are ready.
The default alamedaorganization under namespace federatorai is ready.

=========================================================================
You can now access GUI through https://<YOUR IP>:31012
The default login credential is admin/admin
Also, you can start to apply alamedascaler CR for the target you would like to monitor.
Review the administration guide for further details.
=========================================================================

You can now access Federator.ai REST API through https://<YOUR IP>:31011
The default login credential is admin/admin
The REST API online document can be found in https://<YOUR IP>:31011/apis/v1/swagger/index.html
=========================================================================

Install Federator.ai v4.4.1-ga successfully
Downloaded YAML files are located under /tmp/install-op
Downloaded files are located under /tmp/federatorai-scripts/v4.4.1-ga

3. Verify Federator.ai pods are running properly

<table>
<thead>
<tr>
<th>NAME</th>
<th>READY</th>
<th>STATUS</th>
<th>RESTARTS</th>
<th>AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>alameda-ai-5cc75c94b7-gvttm</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-ai-dispatcher-6cc9cf66b4-2gccv</td>
<td>1/1</td>
<td>Running</td>
<td>1</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-analyzer-67f545df882fik</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-datahub-76cb7c5446-xwx5b</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-executor-5f8ffb574-5b4l7</td>
<td>1/1</td>
<td>Running</td>
<td>5</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-influxdb-0</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-notifier-6b84d9677c-sxfbh9</td>
<td>1/1</td>
<td>Running</td>
<td>4</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-operator-5c5b4b67df-h4rlq</td>
<td>1/1</td>
<td>Running</td>
<td>4</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-rabbitmq-764db78df-q9jmh</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-recommender-b997975f-gwb2z</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>fedemeter-api-c74b9f777-4nv95</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>fedemeter-influxdb-0</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>federatorai-agent-74d5df8689-w5clw</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>federatorai-dashboard-backend-7bb94c8c48-w9r7f</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>federatorai-dashboard-frontend-797b98b5dd-h8ghv</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>federatorai-data-adapter-574fc947c7-wkhlv</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>federatorai-operator-646f8446dh-hmv9p</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>22m</td>
</tr>
<tr>
<td>federatorai-rest-5b95f47f45-fqwvk</td>
<td>1/1</td>
<td>Running</td>
<td>1</td>
<td>19m</td>
</tr>
</tbody>
</table>

4. Log on Federator.ai GUI and finish installation through the Initial Setup Wizard. For more information on Initial Setup Wizard, please see Federator.ai 4.4 User Guide.

https://<master_node_IP>:31012
Login ID: admin
Password: admin
Upgrade from a previous version

Federator.ai v4.4.1 supports upgrade from previous versions. The Federator.ai installation script automatically detects previously installed Federator.ai. When the installation script prompts if a backup of the previous configuration is needed, just enter yes to save a copy of the configuration if a rollback to the previous version is needed.

Prerequisite

1. Federator.ai version is 4.2 or later.
2. Federator.ai installed and running with Persistent Volume.

Upgrade

1. Log into Kubernetes cluster
2. Install the Federator.ai for Kubernetes by using the following command

```bash
$ curl https://raw.githubusercontent.com/containers-ai/prophetstor/master/deploy/federatorai-launcher.sh | bash
```

```
~# curl https://raw.githubusercontent.com/containers-ai/prophetstor/master/deploy/federatorai-launcher.sh | bash
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
   100 16783  100 16783    0     0  25155      0 --:--:-- --:--:-- --:--:-- 25161
100 16783  100 16783  0 0  25155  0:00:03  0:00:03  0:00:03
Downloaded scripts ...
Downloaded Federator.ai CR yamls ...
Downloaded Federator.ai operator yamls ...
Done
Do you want to use a private repository URL? [default: n]:
Do you want to launch the Federator.ai installation script? [default: y]:

Executing install.sh ...
Checking environment version...
...Passed
Enter the namespace you want to install Federator.ai [default: federatorai]:

tag_number = v4.4.1-ga
install_namespace = federatorai

Is the above information correct? [default: y]:
Do you want to backup your configuration before upgrading Federator.ai? [default: y]: y
Please input path for storing backup configuration: [default: /tmp/configuration_backup]
Backup configuration ...
backup yamls saved to folder /tmp/configuration_backup/federatorai-backup-1610932387
Done.
Downloading file 00-namespace.yaml ...
Done
```

```
Downloading file 01-serviceaccount.yaml ...
```
Done
Downloading file 02-alamedaservice.crd.yaml ...
Done
Downloading file 03-federatorai-operator.deployment.yaml ...
Done
Downloading file 04-clusterrole.yaml ...
Done
Downloading file 05-clusterrolebinding.yaml ...
Done
Downloading file 06-role.yaml ...
Done
Downloading file 07-rolebinding.yaml ...
Done
Downloading file 08-service.yaml ...
Done
Downloading file 09-secret.yaml ...
Done
Downloading file 10-mutatingwebhook.yaml ...
Done
Downloading file 11-validatingwebhook.yaml ...
Done
Applying Federator.ai operator yaml files...
Applying 00-namespace.yaml
namespace/federatorai created
Applying 01-serviceaccount.yaml
serviceaccount/federatorai-operator created
Applying 02-alamedaservice.crd.yaml
customresourcedefinition.apiextensions.k8s.io/alamedaservices.federatorai.containers.ai created
Applying 03-federatorai-operator.deployment.yaml
deployment.apps/federatorai-operator created
Applying 04-clusterrole.yaml
clusterrole.rbac.authorization.k8s.io/federatorai-operator created
Applying 05-clusterrolebinding.yaml
clusterrolebinding.rbac.authorization.k8s.io/federatorai-operator created
Applying 06-role.yaml
role.rbac.authorization.k8s.io/federatorai-operator created
Applying 07-rolebinding.yaml
rolebinding.rbac.authorization.k8s.io/federatorai-operator created
Applying 08-service.yaml
service/federatorai-operator created
Applying 09-secret.yaml
secret/federatorai-operator-admission created
Applying 10-mutatingwebhook.yaml
mutatingwebhookconfiguration.admissionregistration.k8s.io/federatorai-operator-servicesmutation created
Applying 11-validatingwebhook.yaml
validatingwebhookconfiguration.admissionregistration.k8s.io/federatorai-operator-servicesvalidation created
Checking pods...
Waiting for pod federatorai-operator-c689896fb-lpwc8 in namespace federatorai to be ready.
  phase: [Pending]
Waiting for pods in namespace federatorai to be ready...
Waiting for pod federatorai-operator-c689896fb-lpwc8 in namespace federatorai to be ready.
  phase: [Pending]
Waiting for pods in namespace federatorai to be ready...
Waiting for pod federatorai-operator-c689896fb-lpwc8 in namespace federatorai to be ready.
  phase: [Pending]
Waiting for pods in namespace federatorai to be ready...

All pods under namespace(federatorai) are ready.

Install Federator.ai operator v4.4.1-ga successfully

Downloading Federator.ai CR sample files ...
Done

Downloading Federator.ai alamedascaler sample files ...
Done

Which storage type you would like to use? ephemeral or persistent?
[default: persistent]:

Specify log storage size [e.g., 10 for 10GB, default: 10]:

Specify AI engine storage size [e.g., 10 for 10GB, default: 10]:

Specify InfluxDB storage size [e.g., 100 for 100GB, default: 100]:

Specify storage class name: managed-nfs-storage

Do you want to expose dashboard and REST API services for external access? [default: y]:

install_namespace = federatorai
storage_type = persistent
log storage size = 10 GB
AI engine storage size = 10 GB
InfluxDB storage size = 100 GB
storage class name = managed-nfs-storage
expose service = y

Is the above information correct [default: y]:
Processing...
Waiting for datahub (v4.4.1-ga) pod to appear ...
datahub pod is present.

Checking pods...
Waiting for pod alameda-ai-568d8b44f4-96gxj in namespace federatorai to be ready. phase: [Running]
Waiting for pods in namespace federatorai to be ready...
Waiting for pod alameda-ai-568d8b44f4-96gxj in namespace federatorai to be ready. phase: [Running]
Waiting for pods in namespace federatorai to be ready...

All pods under namespace(federatorai) are ready.

The default alamedaorganization under namespace federatorai is ready.

You can now access GUI through https://<YOUR IP>:31012
The default login credential is admin/admin

Also, you can start to apply alamedascaler CR for the target you would like to monitor.
Review the administration guide for further details.

You can now access Federator.ai REST API through https://<YOUR IP>:31011
The default login credential is admin/admin
The REST API online document can be found in https://<YOUR IP>:31011/apis/v1/swagger/index.html

Install Federator.ai v4.4.1-ga successfully
Downloaded YAML files are located under /tmp/install-op
Downloaded files are located under /tmp/federatorai-scripts/v4.4.1-ga

3. Verify Federator.ai pods are running properly

<table>
<thead>
<tr>
<th>NAME</th>
<th>READY</th>
<th>STATUS</th>
<th>RESTARTS</th>
<th>AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>alameda-ai-5cc75c94b7-gvttm</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-ai-dispatcher-6cc9cf66b4-2gccv</td>
<td>1/1</td>
<td>Running</td>
<td>1</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-analyzer-67f545dfdb-82fik</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-datahub-76cb7c5446-xwx5b</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-executor-5f8ffbf574-5bd4l7</td>
<td>1/1</td>
<td>Running</td>
<td>5</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-influxdb-0</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-notifier-6b84d9677-c-sxfh9</td>
<td>1/1</td>
<td>Running</td>
<td>4</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-operator-5c5b4b67df-h4rlq</td>
<td>1/1</td>
<td>Running</td>
<td>4</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-rabbitmq-764db78df-q9jmh</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>alameda-recommender-b997975f-gwb2z</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>fedemeter-api-c74b9f777-4nv95</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>fedemeter-influxdb-0</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>federatorai-agent-74d5df8689-w5clw</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>federatorai-dashboard-backend-7bb94c8c48-w9r7f</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>federatorai-dashboard-frontend-797b98b5dd-h8ghv</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>federatorai-data-adapter-574fc947c7-wklhv</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>19m</td>
</tr>
<tr>
<td>federatorai-operator-646f8446d8-hmv9p</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>22m</td>
</tr>
<tr>
<td>federatorai-rest-5b95f47f45-fqvwk</td>
<td>1/1</td>
<td>Running</td>
<td>1</td>
<td>19m</td>
</tr>
</tbody>
</table>

Installing Datadog Watermark Pod Autoscaler (WPA)

If you wish to enable HPA autoscaling via Datadog WPA for your application, please follow the instructions below to install Datadog WPA.

- Download Datadog WPA package

```bash
~# 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.

  ```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

~# pwd
/root/datadog_wpa/watermarkpodautoscaler
~# DD_NAMESPACE="default"
~# DD_NAMEWPA="wpacontroller"
~# helm install $DD_NAMEWPA -n $DD_NAMESPACE ./chart/watermarkpodautoscaler
~# kubectl get pods -n default

<table>
<thead>
<tr>
<th>NAME</th>
<th>READY</th>
<th>STATUS</th>
<th>RESTARTS</th>
<th>AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>datadog-monitoring-6lckr</td>
<td>2/2</td>
<td>Running</td>
<td>0</td>
<td>2d19h</td>
</tr>
<tr>
<td>datadog-monitoring-cluster-agent-7d79559979-cnjhj</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>2d19h</td>
</tr>
<tr>
<td>datadog-monitoring-dwq7f</td>
<td>2/2</td>
<td>Running</td>
<td>0</td>
<td>2d19h</td>
</tr>
<tr>
<td>datadog-monitoring-hlm8x</td>
<td>2/2</td>
<td>Running</td>
<td>0</td>
<td>2d19h</td>
</tr>
<tr>
<td>datadog-monitoring-kube-state-metrics-765978777d-b5dnq</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>6d3h</td>
</tr>
<tr>
<td>nfs-client-provisioner-7cd5f68cf7-cfqqb</td>
<td>1/1</td>
<td>Running</td>
<td>0</td>
<td>6d3h</td>
</tr>
<tr>
<td>wpacontroller-watermarkpodautoscaler-68484f8dd4-zxm22</td>
<td>1/1</td>
<td>Running</td>
<td>18</td>
<td>6d3h</td>
</tr>
</tbody>
</table>

• Download WPA pod autoscaler CR yaml file

~# wget https://github.com/DataDog/watermarkpodautoscaler/blob/master/deploy/crds/datadoghq.com_watermarkpodautoscalers_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 highWatermark, 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: 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 highWatermark, 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: 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

```bash
~# kubectl apply -f wpa.yaml
```
Appendix

Datadog Dashboards Overview

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

ProphetStor Federator.ai Cluster Overview

ProphetStor Federator.ai Application Overview
ProphetStor Federator.ai Kafka Overview

With integration of ProphetStor Federator.ai, users can easily track the Kafka message production/consumption rates, as well as the prediction of message production rates from Federator.ai dashboard. Based on the prediction or message production rate, Federator.ai automatically scales Kafka consumer replica to handle the workload. This can be visualized from Federator.ai dashboard where the recommended consumer replicas and the current number of consumer replicas are shown. Additionally, overall consumer lag as well as the average latency in the queue before a message is received by a consumer are also shown on the dashboard for better performance monitoring.

ProphetStor Federator.ai Cost Analysis Overview

Current Cluster Cost: 2078.52

Recommended Cluster - AWS

Recommended Cluster Configuration - AWS

Recommended Cluster - Azure

Recommended Cluster Configuration - Azure

Recommended Cluster - GCP

Recommended Cluster Configuration - GCP
Sysdig Dashboard Overview

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

Federator.ai Cluster Overview

Federator.ai Application Overview
Federator.ai Application Overview

Federator.ai installation/uninstallation using Ansible

Only support Federator.ai since v4.4.0 or later

Prerequisite

Ansible Control Node

<table>
<thead>
<tr>
<th>Software:</th>
<th>Version:</th>
<th>Query Command:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ansible</td>
<td>2.10.2 or later</td>
<td>ansible --version</td>
</tr>
<tr>
<td>Ansible Collection - community.kubernetes</td>
<td>1.1.1 or later</td>
<td>ansible-galaxy collection list or ansible-galaxy collection install community.kubernetes -vvv</td>
</tr>
<tr>
<td>Python</td>
<td>3.7 or later</td>
<td>python3 --version</td>
</tr>
<tr>
<td>OpenShift python client</td>
<td>0.11.2 or later</td>
<td>pip3 list</td>
</tr>
<tr>
<td>kubeconfig file (Need to copy target cluster's kubeconfig file to the Ansible Control Node)</td>
<td></td>
<td>e.g. file is put on /root/.kube/config.135</td>
</tr>
</tbody>
</table>
Preparation (Ansible Control Node):

1. Install Ansible
   
   https://docs.ansible.com/ansible/latest/installation_guide/intro_installation.html

2. Install collection “community.kubernetes”
   
   root@node1740:~# ansible-galaxy collection install community.kubernetes

3. Install python & pip
   
   https://www.python.org/downloads/

4. Install OpenShift python client if you are using OpenShift clusters
   
   root@node1740:~# pip3 install openshift

5. Download Ansible playbook for Federator.ai

6. Modify user_variable.yaml file for customizing needed info.

Installing Federator.ai

<table>
<thead>
<tr>
<th>Variables for in user_variable.yml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>Federator.ai env</td>
</tr>
<tr>
<td>Storage for Federator.ai pods</td>
</tr>
<tr>
<td>Storage info (Only be used when storage_type is persistent)</td>
</tr>
<tr>
<td>Private repo</td>
</tr>
<tr>
<td>Pod resource</td>
</tr>
<tr>
<td>Expose services (Only be used when openshift_env is “n”)</td>
</tr>
<tr>
<td>Cluster type</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Steps:

1. Go to Ansible playbook folder
   root@node1740:~# cd ansible_for_federatorai

2. Modify user_variable.yaml (under uninstaller folder) file for customizing needed info.

3. Export K8S_AUTH_KUBECONFIG to specify kubeconfig file path for Ansible collection (community.kubernetes).
   root@node1740:~/.ansible_for_federatorai# export K8S_AUTH_KUBECONFIG=/root/.kube/config.135

4. Run Ansible playbook
   root@node1740:~/.ansible_for_federatorai# ansible-playbook federtorai_installation.yaml

Uninstalling Federator.ai

For Uninstallation, please use the file under ansible_for_federatorai/uninstaller directory.

Variables in user_variable.yml.

<table>
<thead>
<tr>
<th>Group</th>
<th>Variable Name</th>
<th>Sample value</th>
<th>Description</th>
<th>Mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage for Federator.ai pods</td>
<td>storage_type</td>
<td>ephemeral or persistent</td>
<td>Specify current Federator.ai storage type (ephemeral or persistent)</td>
<td>Y</td>
</tr>
<tr>
<td>Preserve current persistent volume (Only be used when storage_type is persistent)</td>
<td>preserve_pv</td>
<td>Y</td>
<td>Specify whether to preserve Federator.ai PVs</td>
<td></td>
</tr>
</tbody>
</table>

Steps:
1. Get to Ansible playbook uninstallation folder

```
~# cd ansible_for_federatorai/uninstaller
```

2. Modify user_variable.yaml (under uninstaller folder) file for customizing needed info.

3. Export `K8S_AUTH_KUBECONFIG` to specify kubeconfig file path for Ansible collection (community.kubernetes)

```
~# export K8S_AUTH_KUBECONFIG=/root/.kube/config.135
```

4. Run Ansible playbook

```
~# ansible-playbook federatorai_uninstaller.yaml
```

**Troubleshooting**

**Downgrade from v4.4.1**

- **V4.4.1 -> v4.3.1**
  
  Following v4.3.1 installation step to rollback to previous version v4.3.1 directly. Installation script keeps configuration, metrics, and prediction data, which is stored on Persistent volume, user does not need to perform a complicated process.

- **V4.4.1 -> v4.2**

  If Federator.ai is upgraded from v4.2, rollback could be done from the 4.2 configuration backup saved during the upgrade process. Here is the general workflow for downgrading to the 4.2 version:
  
  1. Run v4.4.1/Uninstall.sh script.
  2. Re-install v4.2.
  3. Restore 4.2 backup configuration.

**Step 1**: Run uninstall.sh. The uninstall script is placed under /tmp/federatorai-scripts/v4.4.1-ga/scripts directory.

```
~cd /tmp/federatorai-scripts/v4.4.1-ga/scripts/
~bash uninstall.sh
```

Do you want to preserve your Federator.ai persistent volumes? [default: y]:

Patching pv pvc-{09324a63-01cc-44d1-9d67-313d2172b41e ...}
persistentvolume/pvc-{09324a63-01cc-44d1-9d67-313d2172b41e} patched (no change) Done.

Patching pv pvc-{0a0b1fb2-b96b-4c74-abdf-5aa1ef930f4f ...}
persistentvolume/pvc-{0a0b1fb2-b96b-4c74-abdf-5aa1ef930f4f} patched (no change) Done.

Patching pv pvc-{0da9f9c8-9ee0-4ac1-b5dc-50e6311d5920 ...}
persistentvolume/pvc-{0da9f9c8-9ee0-4ac1-b5dc-50e6311d5920} patched (no change) Done.

Patching pv pvc-{0f6554ab-d0d6-46f1-a295-b3cf133ceef6 ...}
persistentvolume/pvc-{0f6554ab-d0d6-46f1-a295-b3cf133ceef6} patched (no change) Done.

Done.
Patching pv
persistentvolume/pvc-pvc

Patching pv
Done.

Patching pv
persistentvolume/pvc-pvc

Patching pv
Done.

Patching pv
persistentvolume/pvc-pvc

Patching pv
Done.

Patching pv
persistentvolume/pvc-pvc

Patching pv
Done.

Patching pv
persistentvolume/pvc-pvc

Patching pv
Done.

Patching pv
persistentvolume/pvc-pvc

Patching pv
Done.

Patching pv
persistentvolume/pvc-pvc

Patching pv
Done.

Patching pv
persistentvolume/pvc-pvc

Patching pv
Done.

Patching pv
persistentvolume/pvc-pvc

Patching pv
Done.

Patching pv
persistentvolume/pvc-pvc

Patching pv
Done.

Patching pv
persistentvolume/pvc-pvc

Patching pv
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Patching pv cdd0c3d-c299-44b4-bc59-b5a9eb856521 ...
persistentvolume/pvc-cdd0c3d-c299-44b4-bc59-b5a9eb856521 patched (no change) Done.
Patching pv 9b7c2a77-0bde-4748-9eda-ca067cd6c710 ...
persistentvolume/pvc-9b7c2a77-0bde-4748-9eda-ca067cd6c710 patched (no change) Done.
Patching pv 9e7429c9-30df-4790-b706-61a1b86cbe35 ...
persistentvolume/pvc-9e7429c9-30df-4790-b706-61a1b86cbe35 patched (no change) Done.
Patching pv b10c40d3-6485-4ddb-828e-dec8693ca31e ...
persistentvolume/pvc-b10c40d3-6485-4ddb-828e-dec8693ca31e patched (no change) Done.
Patching pv c3b35cad-1a5b-4f6b-93de-2026e4502112 ...
persistentvolume/pvc-c3b35cad-1a5b-4f6b-93de-2026e4502112 patched (no change) Done.
Patching pv b517207b-54b6-4a42-81da-936acfff0d30 ...
persistentvolume/pvc-b517207b-54b6-4a42-81da-936acfff0d30 patched (no change) Done.
Patching pv bc70b3d2-9e14-442a-930b-3f817f312b79 ...
persistentvolume/pvc-bc70b3d2-9e14-442a-930b-3f817f312b79 patched (no change) Done.
Patching pv bd3cf813-ec79-4649-a685-1a8fac8f375c ...
persistentvolume/pvc-bd3cf813-ec79-4649-a685-1a8fac8f375c patched (no change) Done.
Patching pv c4e1717a-bff7-4997-ab94-d3c6e13c05a3 ...
persistentvolume/pvc-c4e1717a-bff7-4997-ab94-d3c6e13c05a3 patched (no change) Done.
Patching pv ced6151e-962a-4bd9-854c-82083ca292e8 ...
persistentvolume/pvc-ced6151e-962a-4bd9-854c-82083ca292e8 patched (no change) Done.
Patching pv d09ee21-f5f4-4c01-8c28-c02a9f951b7d ...
persistentvolume/pvc-d09ee21-f5f4-4c01-8c28-c02a9f951b7d patched (no change) Done.
Patching pv d88f0a6e-e645-4980-a477-b354f1182a8e ...
persistentvolume/pvc-d88f0a6e-e645-4980-a477-b354f1182a8e patched (no change) Done.
Patching pv dccdbcf7-6f7f-46a9-9388-8a5b97e7126d ...
persistentvolume/pvc-dccdbcf7-6f7f-46a9-9388-8a5b97e7126d patched (no change) Done.
Patching pv e7667f8f-8e7d-4a7b-9fae-4d5f9726a59d ...
persistentvolume/pvc-e7667f8f-8e7d-4a7b-9fae-4d5f9726a59d patched (no change) Done.
Patching pv f4f884c6-066e-4e6f-90e4-426a132417cf ...
persistentvolume/pvc-f4f884c6-066e-4e6f-90e4-426a132417cf patched (no change) Done.
Patching pv f8257bf4-abf9-4de2-b3da-1f2daa1451ad ...
persistentvolume/pvc-f8257bf4-abf9-4de2-b3da-1f2daa1451ad patched (no change) Done.
Patching pv fb35cb57-436a-4561-80f3-2a3e0b763c8f ...
persistentvolume/pvc-fb35cb57-436a-4561-80f3-2a3e0b763c8f patched (no change) Done.
Patching pv fe27c9cf-80d4-4acc-b50b-94bd09d575a4 ...
persistentvolume/pvc-fe27c9cf-80d4-4acc-b50b-94bd09d575a4 patched (no change)
Done.

----------------------------------------
Starting to remove the Federator.ai product
----------------------------------------

Please input your Federator.ai Operator tag: v4.4.1-ga

----------------------------------------
Your tag number = v4.4.1-ga
----------------------------------------
Is the above information correct? [default: y]:

Downloading file 00-namespace.yaml ...
Downloading file 01-serviceaccount.yaml ...
Downloading file 02-alamedaservice.crd.yaml ...
Downloading file 03-federatorai-operator.deployment.yaml ...
Downloading file 04-clusterrole.yaml ...
Downloading file 05-clusterrolebinding.yaml ...
Downloading file 06-role.yaml ...
Downloading file 07-rolebinding.yaml ...
Downloading file 08-service.yaml ...
Downloading file 09-secret.yaml ...
Downloading file 10-mutatingwebhook.yaml ...
Downloading file 11-validatingwebhook.yaml ...

Deleting my-alamedaservice in federatorai namespace...
clusterrole.rbac.authorization.k8s.io "alameda-gc" deleted

Deleting 11-validatingwebhook.yaml ...
validatingwebhookconfiguration.admissionregistration.k8s.io "federatorai-operator-servicesvalidation" deleted

Deleting 10-mutatingwebhook.yaml ...
mutatingwebhookconfiguration.admissionregistration.k8s.io "federatorai-operator-servicesmutation" deleted

Deleting 09-secret.yaml ...
secret "federatorai-operator-admission" deleted

Deleting 08-service.yaml ...
service "federatorai-operator" deleted

Deleting 07-rolebinding.yaml ...
rolebinding.rbac.authorization.k8s.io "federatorai-operator" deleted

Deleting 06-role.yaml ...
role.rbac.authorization.k8s.io "federatorai-operator" deleted

Deleting 05-clusterrolebinding.yaml ...
clusterrolebinding.rbac.authorization.k8s.io "federatorai-operator" deleted

Deleting 04-clusterrole.yaml ...
clusterrole.rbac.authorization.k8s.io "federatorai-operator" deleted
Error from server (NotFound): error when deleting "04-clusterrole.yaml":
clusterroles.rbac.authorization.k8s.io "alameda-gc" not found
Error in removing 04-clusterrole.yaml

Deleting 03-federatorai-operator.deployment.yaml ...
deployment.apps "federatorai-operator" deleted

Deleting 02-alamedaservice.crd.yaml ...
customresourcedefinition.apiextensions.k8s.io "alamedaservices.federatorai.containers.ai" deleted

Deleting 01-serviceaccount.yaml ...
serviceaccount "federatorai-operator" deleted

Deleting 00-namespace.yaml ...
namespace "federatorai" deleted

Namespace federatorai is removed successfully.

**Step 2:** Reinstall Federator.ai 4.2.

**Step 3:** Restore 4.2 backup configuration.

Follow the steps below:

- a. Go to /tmp/configuration_backup, which is the default federator.ai configuration backup directory.
- b. Change to the directory where the 4.2 configuration backup is stored.
- c. Run backup-restore.sh script.

```bash
~# cd /tmp/configuration_backup
~# cd federatorai-backup-1611212333
~# bash backup-restore.sh -r
Download origin operator upstream files and apply v4.3.1046
Downloading file 00-namespace.yaml ...
Downloading file 01-serviceaccount.yaml ...
Downloading file 02-alamedaservice.crd.yaml ...
Downloading file 03-federatorai-operator.deployment.yaml ...
Downloading file 04-clusterrole.yaml ...
Downloading file 05-clusterrolebinding.yaml ...
Downloading file 06-role.yaml ...
Downloading file 07-rolebinding.yaml ...
/tmp/configuration_backup/federatorai-backup-1611212333
namespace/federatorai created
serviceaccount/federatorai-operator created
customresourcedefinition.apiextensions.k8s.io/alamedaservices.federatorai.containers.ai created
deployment.apps/federatorai-operator created
clusterrole.rbac.authorization.k8s.io/federatorai-operator created
clusterrole.rbac.authorization.k8s.io/alameda-gc created
```
clusterrolebinding.rbac.authorization.k8s.io/federatorai-operator created role.rbac.authorization.k8s.io/federatorai-operator created rolebinding.rbac.authorization.k8s.io/federatorai-operator created

Restore service
alamedaservice.federatorai.containers.ai/my-alamedaservice created
Patch pv if necessary

persistentvolume/pvc-09324a63-01cc-44d1-9d67-313d2172b41e patched
persistentvolume/pvc-0a0b1fbd-9b6b-4c74-abdf-5aa1ef930f4f patched
persistentvolume/pvc-0da9f9c8-9e00-4ac1-b5dc-50e6311d920 patched
persistentvolume/pvc-0f6554ab-d0d6-46f1-a295-b3cf1333ceef6 patched
persistentvolume/pvc-15ee7f93-2012-44a7-9b6b-067fba999e0 patched
persistentvolume/pvc-29e8d506-b659-4f78-b22e-b74a0baea80e patched
persistentvolume/pvc-33cae9a9-8b6d-4786-806d-34ac3ca2ad5 patched
persistentvolume/pvc-4531b2ae-6678-4342-b83f-03e757013523 patched
persistentvolume/pvc-4ad88729-6c1b-4fb7-95b9-fbc30748c2b6 patched
persistentvolume/pvc-5452d9fd-e471-42a5-a03c-2435c7539972 patched
persistentvolume/pvc-570ad717-a306-4800-b6a0-cbe20a1805e3 patched
persistentvolume/pvc-65bb40fe-0c98-4f5c-8af0-42558f0510f1 patched
persistentvolume/pvc-6a1257b4-7582-4ab9-be66-5f7d8e85badc patched
persistentvolume/pvc-6fe2b2a5-7b53-421a-85e4-25491688057a patched
persistentvolume/pvc-7412750a-fe39-4a79-a78b-b47fd6f18f68 patched
persistentvolume/pvc-79dfbb73-cdc7-4acc8-a73e-94b1b973f60b patched
persistentvolume/pvc-7fdb8acb-461a-4633-815a-2eeab88d1148 patched
persistentvolume/pvc-83f7f104-9516-44fa-a083-84732e9240ed patched
persistentvolume/pvc-8ed66d59-d003-4243-91c3-ca7526f33c2d patched
persistentvolume/pvc-8fe930f1-24cd-4a9e-b7e1-4e7b50766f65 patched
persistentvolume/pvc-99b0d47b-5730-4300-86c6-1ec65ca9b9b8 patched
persistentvolume/pvc-9a4e4ccf7e-4639-45d8-92cd-655aa49853f9 patched
persistentvolume/pvc-9acd0c3d-c299-44b4-bc59-b5a9eb885621 patched
persistentvolume/pvc-9b7c2a77-0bde-4748-9eda-ca0b67c6c710 patched
persistentvolume/pvc-9e7429c9-30df-4790-b706-61a1b86cbe35 patched
persistentvolume/pvc-b10c40d3-6485-4dbb-828e-dec8693a31e patched
persistentvolume/pvc-b3b35cad-1a5b-4f6b-93de-2026e4502112 patched
persistentvolume/pvc-b517207b-54b6-4a42-81da-936ac0ff03d0 patched
persistentvolume/pvc-bc70b3d2-9e14-442a-930b-3f817f312f79 patched
persistentvolume/pvc-bd3c8f13-ec79-4649-6a85-1aaf8ac8f375c patched
persistentvolume/pvc-c4e1717a-bbff-4997-ab94-d3c6e113c95a3 patched
persistentvolume/pvc-ced6151e-962a-4bd9-854c-82083ca292e8 patched
persistentvolume/pvc-d09ee21-f5f4-4c01-8c28-c02a9f9517b7d patched
persistentvolume/pvc-d88f0ae6-e645-4980-a477-b354f1182a8e patched
persistentvolume/pvc-dccdcbbf-76f7f-46a9-9388-8a5b97e7126d patched
persistentvolume/pvc-e766f7f8-8e7d-4a7b-9fae-4d5f9726a59d patched
persistentvolume/pvc-f4f884c6-066e-4eef-90e4-426a132417cf patched
persistentvolume/pvc-f8257fb4-abf9-4de2-b3da-1f2daa1451ad patched
persistentvolume/pvc-fb35cb57-436a-4561-80f3-2a3e0b763c8f patched
persistentvolume/pvc-fe27c9cf-80d4-4acc-b50b-94bd09d575a4 patched

Restore CRs
alamedanotificationchannel.notifying.containers.ai/default created
alamedanotificationtopic.notifying.containers.ai/default created
alamedaorganization.tenant.containers.ai/default created

Restore complete
Datadog Integration

1. Datadog WPA dumps errors during autoscaling
   - Error message in WPA Controller

```
~# kubectl get pod -n default
NAME                   READY STATUS  RESTARTS AGE
datadog-agent-2m6kk    1/1    Running  2       2d
datadog-agent-8kd54    1/1    Running  0       2d
datadog-agent-94rl6    1/1    Running  0       2d
datadog-agent-mq4mv    1/1    Running  0       2d
datadog-cluster-agent-74f44fdd4d-82tjp 1/1    Running  0       1d
docker-registry-1-vw59s 1/1    Running  4       324d
prometheus-adapter-799bd7fc4f-rs7zj 1/1    Running  1       6d
registry-console-2-jxfdl 1/1    Running  2       6d
router-1-sw78l         1/1    Running  4       324d
wpacontroller-watermarkpodautoscaler-7ffbb97f9d-hcbsg 1/1    Running  0       1d

~# kubectl logs wpacontroller-watermarkpodautoscaler-7ffbb97f9d-hcbsg -n default
```

- Reason
  - WPA is incompatible with Kubernetes 1.11
  - Install WPA on Kubernetes 1.11 dumps errors
must only have "properties", "required" or "description" at the root if the status subresource is enabled

• Workaround
  - Comment out 'subresources' key in WatermarkPodAutoscaler CRD

```bash
# cd datadog_wpa/watermarkpodautoscaler_for_k8s_1.11/chart/watermarkpodautoscaler/templates
# vi datadoghq.com_watermarkpodautoscalers_crd.yaml
...
...
shortNames:
  - wpa
    singular: watermarkpodautoscaler
scope: Namespaced
#subresources: ← comment out
# status: {} ← comment out
validation:
  openAPIV3Schema:
    description: WatermarkPodAutoscaler is the Schema for the watermarkpodautoscalers API
    properties:
      apiVersion:
        description: 'APIVersion defines the versioned schema of this representation ...
...

Note: It can auto-scale monitored application, but dump some errors during update status

• Related Datadog WPA ticket
  https://github.com/DataDog/watermarkpodautoscaler/issues/50

2. Data Adapter reports errors
  • Error messages in Data Adapter logs

```bash
# oc exec -it $(oc get pods|grep federatorai-data-adapter|grep Running|awk '{print $1}') -- cat /var/log/telegraf.log > telegraf.log
# cat telegraf.log | grep "E!"
2020-05-15T09:59:33Z E! [datadog][application_aware] Failed to get kafka consumer spec replicas
```
• Reason

Datadog Agent does not work with 'kube-state-metrics' comes with OpenShift

• Solution

Install another compatible 'kube-state-metrics'

If there is another kube-state-metrics running on openshift, rename all the clusterrole and clusterrolebinding name of kube-state-metrics to prevent kube-state-metrics clusterrole name collision

restart datadog agent and make sure agent integrate with kube-state-metrics properly.
check all the node agent status by following command
~# oc exec <datadog-agent-pod-name> agent status