

Lab 2: Configure and test IBM Event Streams on IBM Cloud Private

Duration: 1 hour

In this exercise, you create an instance of IBM Event Streams and test its operation by using a sample application that is generated from Event Streams.

You must complete Lab 1 before proceeding with this exercise.

Step 1. Install the Event Streams Helm chart

You can install a Helm chart by using a command-line interface (CLI), or by using the IBM Cloud Private Console. The instructions here describe how to use the console.

1. On the ICP Master virtual machine image, open Firefox and click the **IBM Cloud Private** bookmark tab, or enter the following address in a browser:
`https://mycluster.icp:8443/`
2. On the IBM Cloud Private login page, log in with the user ID **admin** and password **admin**.
3. Click the "hamburger" icon in the upper left corner to access the menu, and select **Manage > Helm Repositories**.
4. Click **Sync repositories** to make sure that the Helm charts are up to date, and then click **OK** to confirm.

IBM Cloud Private

Create resource Catalog Docs Support

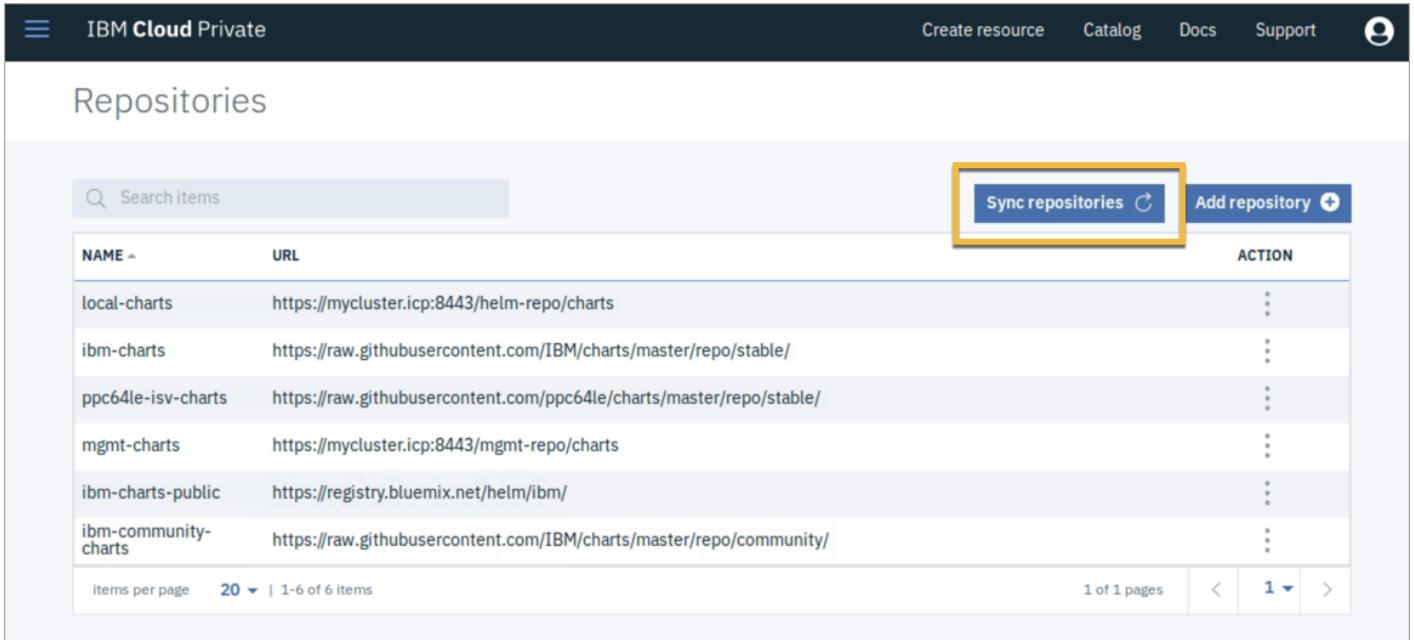
Repositories

Search items

Sync repositories Add repository

NAME	URL	ACTION
local-charts	https://mycluster.icp:8443/helm-repo/charts	⋮
ibm-charts	https://raw.githubusercontent.com/IBM/charts/master/repo/stable/	⋮
ppc64le-isv-charts	https://raw.githubusercontent.com/ppc64le/charts/master/repo/stable/	⋮
mgmt-charts	https://mycluster.icp:8443/mgmt-repo/charts	⋮
ibm-charts-public	https://registry.bluemix.net/helm/ibm/	⋮
ibm-community-charts	https://raw.githubusercontent.com/IBM/charts/master/repo/community/	⋮

items per page 20 | 1-6 of 6 items 1 of 1 pages < 1 >



This process might take several minutes to complete.

- After synchronization is complete, click **Catalog** to display the list of Helm charts.
- Click the **Integration** category, and then click **ibm-evenstreams-prod**.

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All Categories Search items Filter

- Blockchain
- Business Automation
- Data
- Data Science & Analytics
- DevOps
- Integration**
- IoT
- Network
- Operations
- Runtimes & Frameworks

ibm-ace-dashboard-dev App Connect Enterprise Dashboard ibm-charts

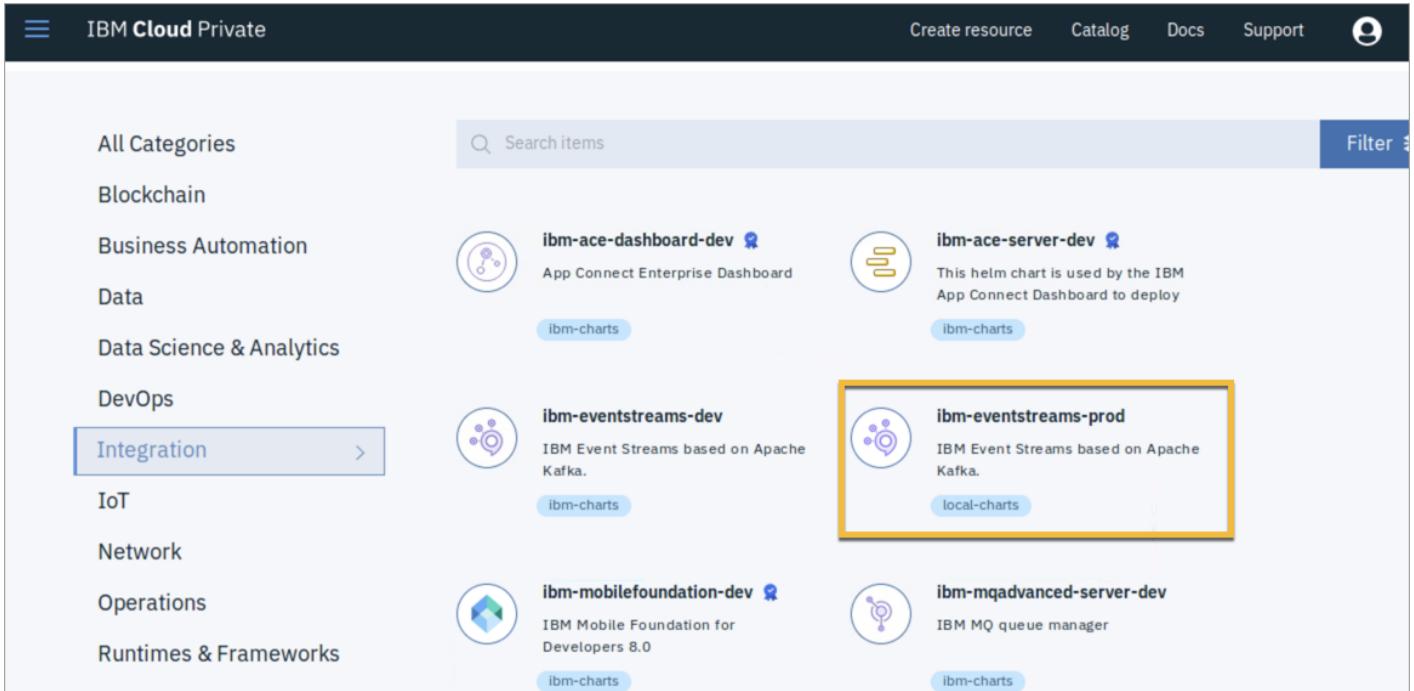
ibm-ace-server-dev This helm chart is used by the IBM App Connect Dashboard to deploy ibm-charts

ibm-eventstreams-dev IBM Event Streams based on Apache Kafka. ibm-charts

ibm-eventstreams-prod IBM Event Streams based on Apache Kafka. local-charts

ibm-mobilefoundation-dev IBM Mobile Foundation for Developers 8.0 ibm-charts

ibm-mqadvanced-server-dev IBM MQ queue manager ibm-charts



- Review all of the configurable options that are available for Event Streams, and then click **Configure**.

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View All

ibm-eventstreams-prod V 1.1.0

Overview Configuration

IBM Event Streams based on Apache Kafka.

local-charts

Licenses Release Notes

CHART VERSION

1.1.0

DETAILS & LINKS

Type Helm Chart

IBM Event Streams

IBM Event Streams is a high-throughput, fault-tolerant, pub-sub technology for building event-driven applications. It's built on top of Apache Kafka® version 2.0.1.

Introduction

This chart deploys Apache Kafka® and supporting infrastructure such as Apache ZooKeeper™. Further information about IBM Event Streams can be found [here](#).

Chart Details

Configure

8. Enter **eslab** for the Helm release name and then select **es** from the Target namespace drop-down menu. Also, select the license agreement checkbox.

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Create resource Catalog Docs Support

Pod Security Warning Your ICP cluster is running all namespaces Unrestricted (ibm-anyuid-hostpath-psp) by default. This could pose a security risk.

Configuration
IBM Event Streams based on Apache Kafka. Edit these parameters for configuration.

Helm release name * eslab

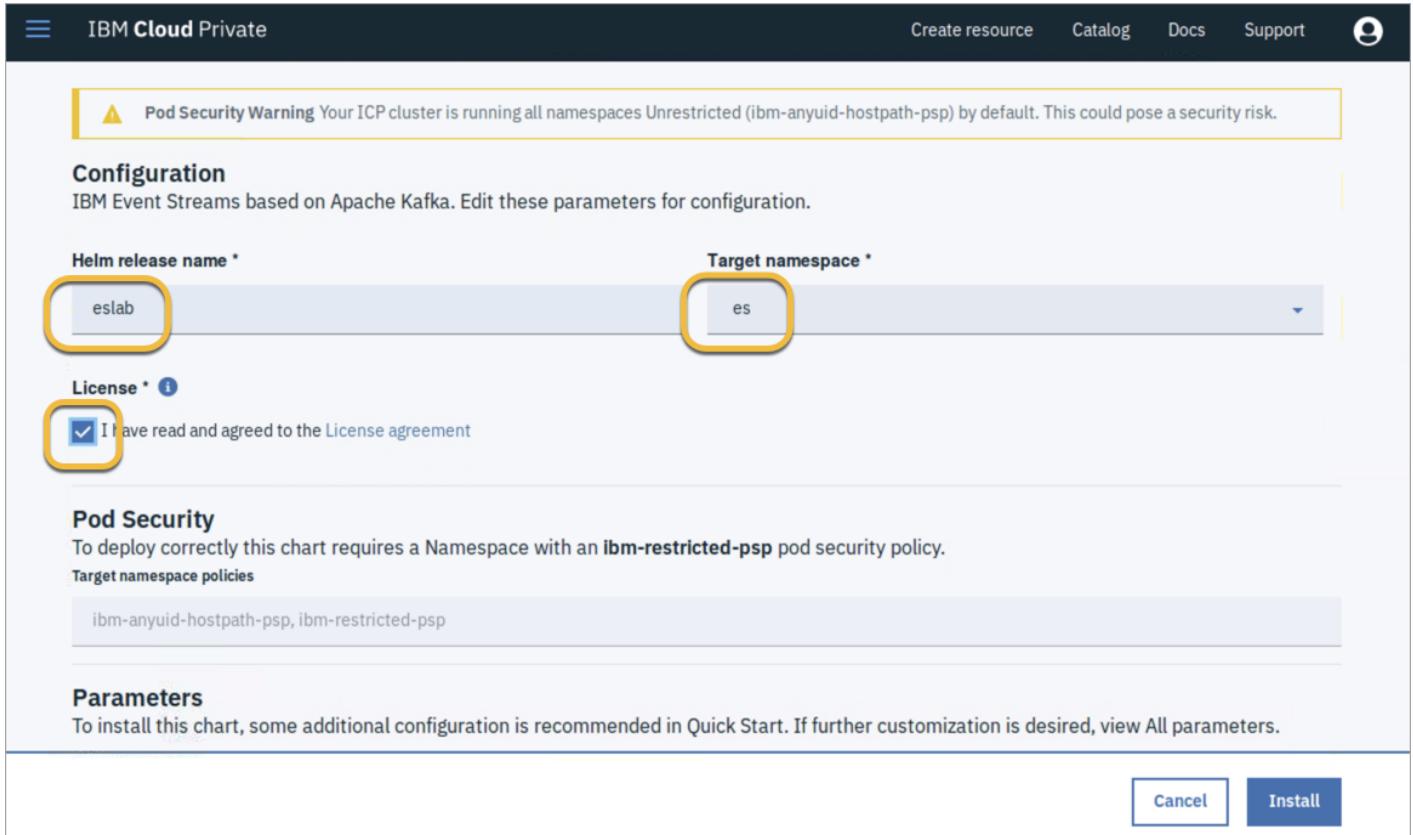
Target namespace * es

License * I have read and agreed to the License agreement

Pod Security
To deploy correctly this chart requires a Namespace with an **ibm-restricted-psp** pod security policy.
Target namespace policies
ibm-anyuid-hostpath-psp, ibm-restricted-psp

Parameters
To install this chart, some additional configuration is recommended in Quick Start. If further customization is desired, view All parameters.

Cancel Install



If you see a **Pod Security Warning**, you can ignore it for this lab exercise.

9. Scroll down and expand the **Quick start** section. Enter **regcred** for the Image pull secret.

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Create resource Catalog Docs

ibm-anyuid-hostpath-psp, ibm-restricted-psp

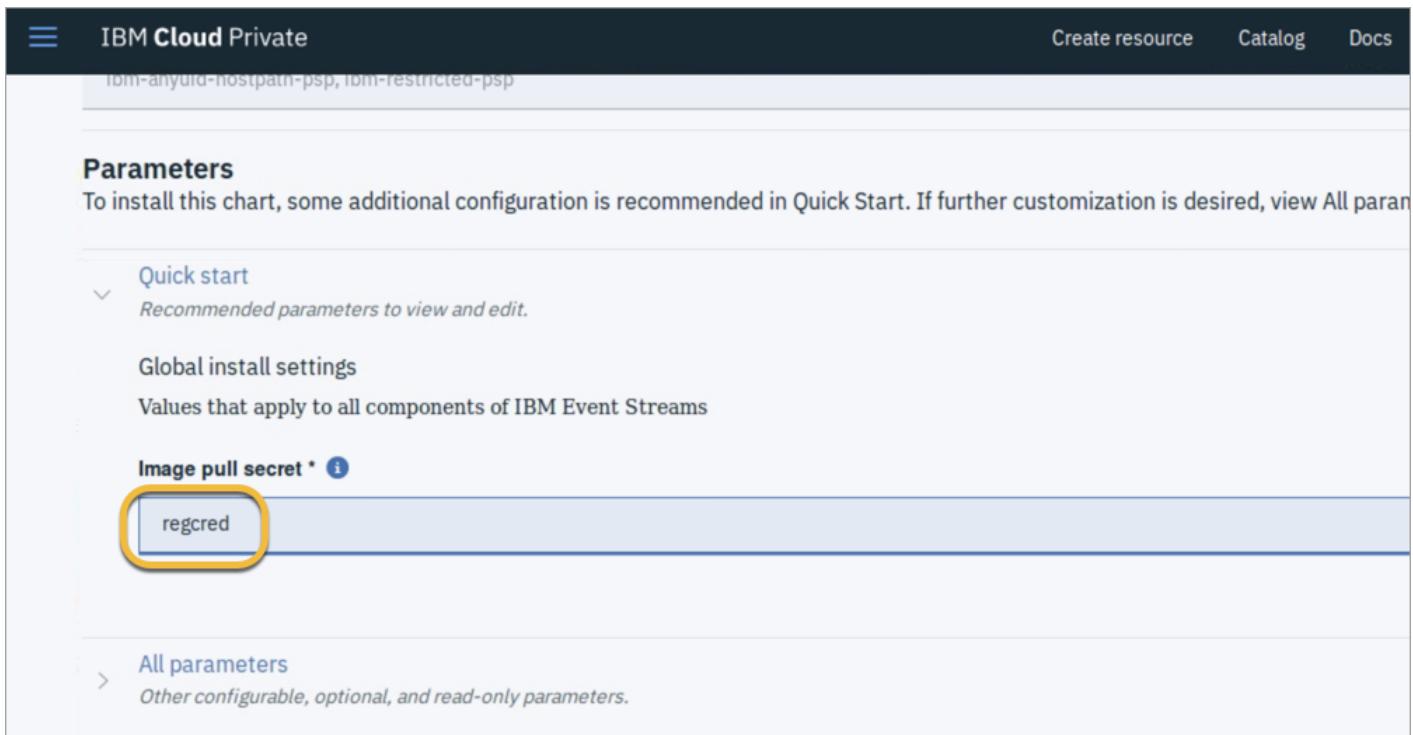
Parameters
To install this chart, some additional configuration is recommended in Quick Start. If further customization is desired, view All parameters.

Quick start
Recommended parameters to view and edit.

Global install settings
Values that apply to all components of IBM Event Streams

Image pull secret * regcred

All parameters
Other configurable, optional, and read-only parameters.



10. Expand the **All parameters** section, and make sure that the value for Docker image registry is **mycluster.icp:8500/es**. The address must not contain a trailing forward slash. If it does, delete the slash (there is a typo in the Helm chart, which will be corrected in a future release).
11. You can accept the remaining default values. Click **Install** to start the installation.

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Parameters

To install this chart, some additional configuration is recommended in Quick Start. If further customization is desired, view All parameters.

- > Quick start
Recommended parameters to view and edit.
- ▽ All parameters
Other configurable, optional, and read-only parameters.

Global install settings
Values that apply to all components of IBM Event Streams

Docker image registry * <small>i</small>	Image pull secret *
mycluster.icp:8500/es	regcred
Image pull policy *	File system group ID
IfNotPresent	Enter value

Cancel **Install**

This process might take several minutes to complete.

IBM Cloud Private

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[View All](#)

ibm-eventstreams-prod V 1.1.0

Overview Configuration

Pod Security Warning Your ICP cluster is running all namespaces Unrestricted (ibm-anyuid-hostpath-psp) by default. This could pose a security risk.

Chart deployment is in progress and may take a few minutes. Go to the Helm Releases page to check on the status of your deployment. [X](#)

Configuration

IBM Event Streams based on Apache Kafka. Edit these parameters for configuration.

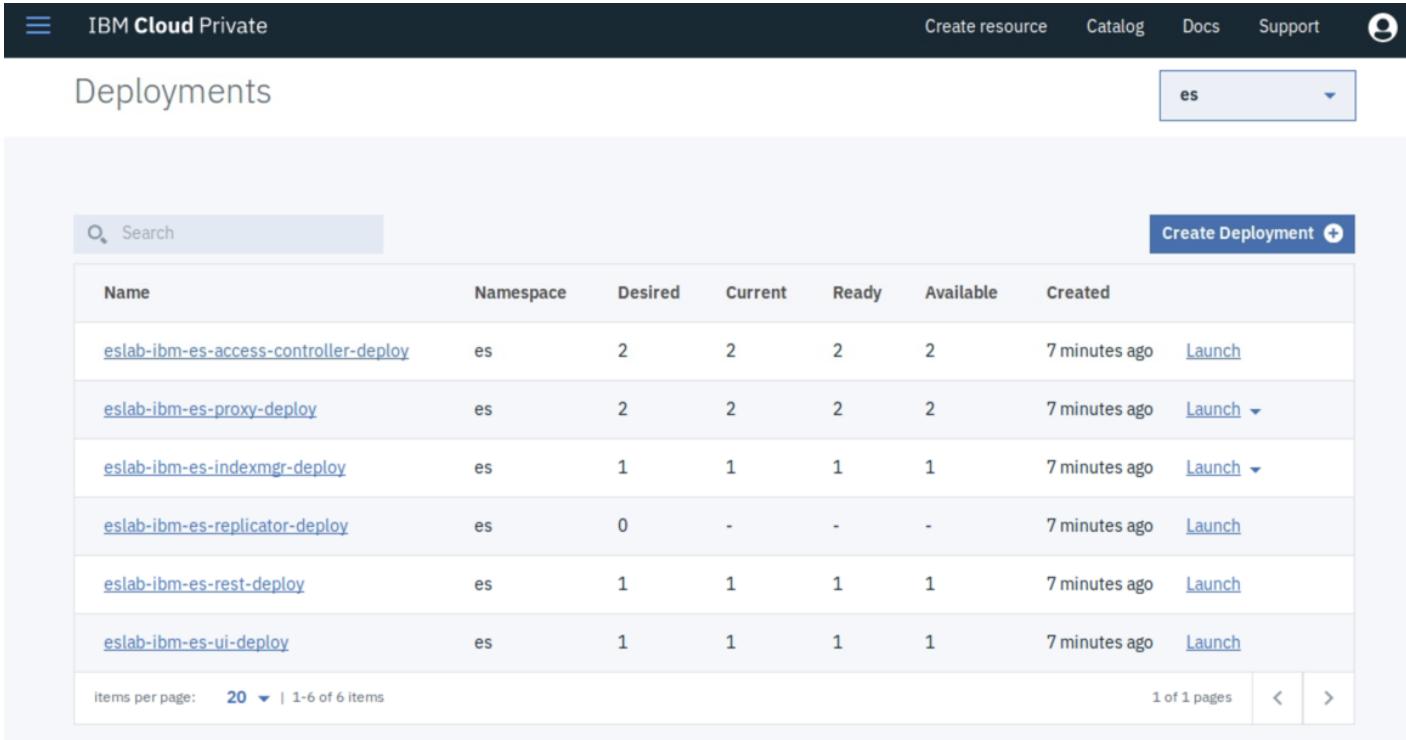
Helm release name *	Target namespace *
eslab	es

NOTE: If you see an error like the following:

Internal service error : rpc error: code = Unknown desc = Internal error occurred: admission webhook "trust.hooks.securityenforcement.admission.cloud.ibm.com" denied the request: Deny "mycluster.icp:8500/es/eventstreams-kubectl-icp-linux-amd64:2018-11-15-16.27.22-6a75737", no matching repositories in the ImagePolicies

The issue might be the `imgpol.yaml` file that you created in the previous exercise. Make sure there are no typos, and the spacing is correct in the file. Run the command to apply the changes, and then try clicking **Install** again.

12. You can check the status of the deployment by selecting **Workloads > Deployments** from the console menu. Select **es** from the drop-down menu in the upper right corner.



The screenshot shows the 'Deployments' page in the IBM Cloud Private interface. The top navigation bar includes 'IBM Cloud Private', 'Create resource', 'Catalog', 'Docs', 'Support', and a user icon. A search bar at the top right contains the text 'es'. The main table lists six deployed assets:

Name	Namespace	Desired	Current	Ready	Available	Created	Actions
eslab-ibm-es-access-controller-deploy	es	2	2	2	2	7 minutes ago	Launch
eslab-ibm-es-proxy-deploy	es	2	2	2	2	7 minutes ago	Launch ▾
eslab-ibm-es-indexmgr-deploy	es	1	1	1	1	7 minutes ago	Launch ▾
eslab-ibm-es-replicator-deploy	es	0	-	-	-	7 minutes ago	Launch
eslab-ibm-es-rest-deploy	es	1	1	1	1	7 minutes ago	Launch
eslab-ibm-es-ui-deploy	es	1	1	1	1	7 minutes ago	Launch

items per page: [20](#) ▾ | 1-6 of 6 items 1 of 1 pages < >

Six items are listed. When the **Desired**, **Current**, **Ready** and **Available** columns all display the same value in each row (except for **eslab-ibm-es-replicator-deploy**, which has a Desired value of **0**), Event Streams is ready.

Step 2. Explore the Event Streams console

1. From the hamburger menu, select **Workload > Helm Releases**.
2. Click the **eslab** release to view all of the assets that are deployed. Note that there are several IBM Cloud Private assets included in the release.

Helm Releases

NAME	NAMESPACE	STATUS	CHART NAME	CURRENT VERSION	AVAILABLE VERSION	UPDATED	ACTION
audit-logging	kube-system	● Deployed	audit-logging	3.1.1	Up To Date	December 18, 2018 03:56pm	⋮
auth-apikeys	kube-system	● Deployed	auth-apikeys	3.1.1	Up To Date	December 18, 2018 03:51pm	Launch ⋮
auth-idp	kube-system	● Deployed	auth-idp	3.1.1	Up To Date	December 18, 2018 03:51pm	Launch ⋮
auth-pap	kube-system	● Deployed	auth-pap	3.1.1	Up To Date	December 18, 2018 03:51pm	Launch ⋮
auth-pdp	kube-system	● Deployed	auth-pdp	3.1.1	Up To Date	December 18, 2018 03:51pm	Launch ⋮
calico	kube-system	● Deployed	calico	3.1.1	Up To Date	December 18, 2018 03:47pm	⋮
catalog-ui	kube-system	● Deployed	icp-catalog-chart	3.1.1	Up To Date	December 18, 2018 03:55pm	⋮
cert-manager	cert-manager	● Deployed	ibm-cert-manager	3.1.1	Up To Date	December 18, 2018 03:49pm	⋮
custom-metrics-adapter	kube-system	● Deployed	ibm-custom-metrics-adapter	3.1.1	Up To Date	December 18, 2018 03:55pm	Launch ⋮
eslab	es	● Deployed	ibm-eventstreams-prod	1.1.0	Up To Date	May 8, 2019 10:47am	Launch ⋮
heapster	kube-system	● Deployed	heapster	3.1.1	Up To Date	December 18, 2018 03:55pm	⋮

3. To access the Event Streams admin console, click **Launch** in the upper right corner, and then select **admin-ui-https**.

IBM Cloud Private Create resource Catalog Docs Support

View All

eslab ● Deployed

UPDATED: May 8, 2019 at 10:47 AM

Launch ↗

Details and Upgrades

CHART NAME	CURRENT VERSION	AVAILABLE VERSION
eslab	1.1.0	1.1.0
NAMESPACE	Installed: May 8, 2019 → Release Notes	Released: May 7, 2019 → Release Notes
es		

admin-ui-https

Upgrade

Rollback

ConfigMap

NAME	DATA	AGE
eslab-ibm-es-replicator-cm	1	30m
eslab-license-accept	1	30m
eslab-ibm-es-metrics-cm	1	30m

↗

NOTE: If you see a warning about using an insecure connection, click **Advanced > Accept the risk and continue**.

If you see a login screen, enter **admin** and **admin**.

If you see an OAuth error, you must launch the admin console by using the **eslab-ibm-es-ui-svc** Service to continue. In the Service section, click **eslab-ibm-es-ui-svc**, and then click the link next to **Node port**. The console opens in a new browser tab.

- Review the contents of the Welcome page. Note the System health indicator in the lower right corner of the page. Click it to expand a list of components that are running in the Event Streams Deployment. Click the **X** to close it.

The screenshot shows the IBM Event Streams admin console for a cluster named "eslab". The top navigation bar includes "IBM Event Streams", a user dropdown, and a cluster dropdown. Below the header, there's a "Getting started" button and tabs for "Topics", "Consumer groups", "Monitor", and "Toolbox". A "Connect to this cluster" button is also present. The main content area features a "Welcome to IBM Event Streams, let's get you up and running..." message. It includes two cards: "Use a simulated topic" (with an icon of a gear and wrench) and "Generate a starter application" (with an icon of a laptop). To the right, a "Learn more..." section has a "Kafka basics" card with a "Learn the heart" link. A prominent "System is healthy" panel lists six components: UI server (green checkmark), Kafka brokers (green checkmark, 3/3), ZooKeeper servers (green checkmark, 3/3), Administration server (green checkmark), External access server (green checkmark, 2/2), and Geo-replication workers (0). The "System is healthy" status is highlighted with a green bar and a green checkmark icon.

Step 3. View Event Streams Topics

Event Streams applications write to or read from Topics. A *Topic* is a group of related data that applications either produce or consume. The Event Streams administrator creates and configures Topics. Applications connect to Topics.

The Event Streams Deployment includes a sample Topic that you can use to explore and learn about Event Streams operations.

1. In the Event Streams console, click **Use a simulated topic**.

The screenshot shows the 'Getting started' page of the IBM Event Streams interface. At the top, there are navigation tabs: 'Getting started' (which is selected and highlighted in blue), 'Topics', 'Consumer groups', 'Monitor', and 'Toolbox'. On the right side, there are links for 'Connect to this cluster' (with a gear icon), 'FAQs', 'GitHub', and 'Documentation'. Below the tabs, a large blue banner says 'Welcome to IBM Event Streams, let's get you up and running...'. Inside this banner, there are two main call-to-action boxes. The first box, which is highlighted with a yellow border, contains an icon of a wrench and gear, and the text 'Use a simulated topic'. Below it, it says 'Start exploring what IBM Event Streams has to offer with our simulated topic. You can do this even if your brokers aren't ready.' The second box contains an icon of a laptop and the text 'Generate a starter application', followed by the sub-instruction 'Download and install our starter Kafka'. To the right of the banner, there is a 'Learn more...' section with an icon of a person at a computer, titled 'Kafka basics' with the subtext 'Learn the basics of Apache Kafka, the heart of Event Streams.'

2. On the Topics page, click **IBM_simulation_Topic**.

The screenshot shows the 'Topics' page of the IBM Event Streams interface. At the top, there are navigation tabs: 'Getting started' (selected), 'Topics' (highlighted in blue), 'Consumer groups', 'Monitor', and 'Toolbox'. On the right, there is a link for 'Connect to this cluster' (with a gear icon). Below the tabs, the word 'Topics' is displayed. There is a search bar with the placeholder 'Type to search topics' and buttons for 'Geo-replication' and 'Create topic +'. A table lists topics with columns: 'Name', 'Replicas', and 'Partitions'. One row in the table is highlighted with a yellow border, corresponding to the topic 'IBM_Simulated_Topic'. This row shows values: 3 for Replicas and 2 for Partitions. To the right of the table is a 'More' button (three vertical dots). At the bottom of the page, there is a 'Topic management illustration' section with the text 'You have a simulated topic.' and the subtext 'The simulated topic will allow you to explore the IBM'.

3. The view opens at the **Messages** tab for the selected Topic. Note that a calendar widget and a table that contains a list of sample messages, their associated partition, and offset, is displayed. Take a moment to explore each of the tabs along the top of this page.

This is a simulated topic with generated data [i](#)

Topics

IBM_Simulated_Topic

Messages Consumer groups

Connect to this topic [o](#)

All partitions Showing 17 message(s) across all partitions Find message

This is a simulated topic

Show messages from date: [5/8/2019](#)

Kafka timestamp i	Partition	Offset
5/8/2019, 2:11:09 PM	0	0
5/8/2019, 2:11:09 PM	1	0
5/8/2019, 2:11:11 PM	0	1
5/8/2019, 2:11:13 PM	0	

System is healthy

4. Click Topics in the upper left corner to return to the Topics view.

Step 4. Create and test a Topic

1. On the Topics page, click **Create Topic**.
2. Enter **eslab** for the Topic name.

IBM Event Streams

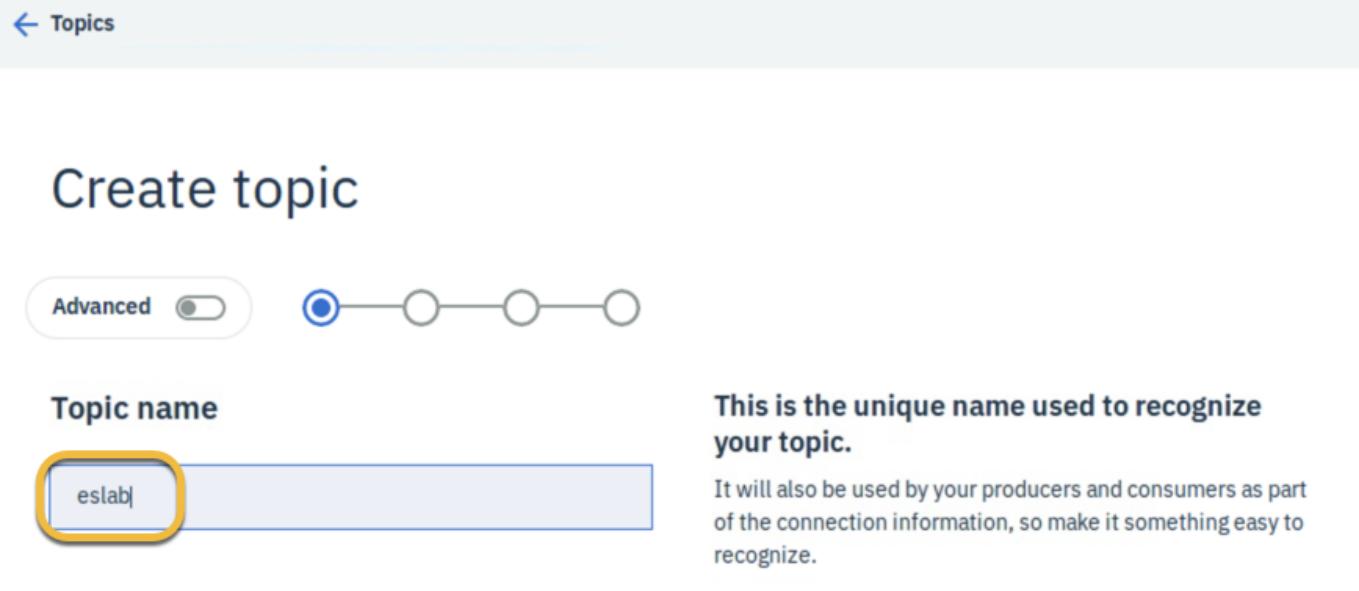
← Topics

Create topic

Advanced

Topic name **eslab**

This is the unique name used to recognize your topic.
It will also be used by your producers and consumers as part of the connection information, so make it something easy to recognize.



3. Click **Advanced** to expand and review the configuration parameters that are available. Click **Advanced** again to close that section, and then click **Next** to proceed through the remaining options. Accept the default settings on each page, and then click **Create Topic**.

IBM Event Streams

← Topics

Create topic

Advanced

Replicas

This is how many copies of a topic will be made for high availability.

The partitions of each topic can be replicated across a configurable number of brokers.

Replication factor: 1
Minimum in-sync replicas: 1

Replication factor: 3
Minimum in-sync replicas: 2

Replication factor

3

Minimum in-sync replicas

2

Back Create topic

This is a screenshot of the 'Create topic' page in the IBM Event Streams interface. At the top left is the 'Topics' navigation link. The main title is 'Create topic'. Below it is an 'Advanced' toggle switch which is turned on. A horizontal progress bar with four circular steps is shown, where the first three steps are checked and the fourth is empty. The next section is titled 'Replicas' with the sub-instruction: 'This is how many copies of a topic will be made for high availability.' and 'The partitions of each topic can be replicated across a configurable number of brokers.'. There are two radio button options for 'Replication factor': one for '1' and one for '3'. The '3' option is selected and highlighted with a blue border. Below these are dropdown menus for 'Minimum in-sync replicas' set to '2'. At the bottom right are two buttons: 'Back' and a purple 'Create topic' button which is also highlighted with a blue border and has a yellow arrow pointing to it.

4. In the Topics view, click **eslab**.
5. Click **Connect to this Topic**.

IBM Event Streams

admin ▾

Topics

eslab

Messages Consumer groups

All partitions No messages to display for the selected partition Find message

May 1, 2019, 2:37:05 PM

5/3/2019 12:00:00 AM 5/5/2019 12:00:00 AM 5/7/2019 12:00:00 AM

View live data ▶

Select timeframe of data to display
Hours

Indexed timestamp ⓘ Partition Offset

Connect to this topic ⚙

6. Review the options on this page, and note the bootstrap server address and port. You use this information in a later exercise. Then, click the X to close it, and click the arrow to go back to Topics.

Topic connection

Connect a client Sample code Geo-replication

To connect an application or tool to this cluster, you will need the address of a bootstrap server, a certificate and an API key.

Bootstrap server
Your application or tool will make its initial connection to the cluster using the bootstrap server.
10.0.0.5:32643

API key
To connect securely to Event Streams, your application or tool needs an API key with permission to access the cluster and resources such as topics.

Certificates
A certificate is required by your Kafka clients to connect securely to this cluster.

Name your application
Provide a name for your application

7. Event Streams has several tools that can be used for development and testing of Event Streams applications. Click the **Toolbox** tab to access these tools.

8. Click **Generate application**.

The screenshot shows the 'Toolbox' tab selected in the eslab interface. Under the 'Applications' section, there are two cards: 'Starter application' and 'Workload generation application'. The 'Starter application' card contains a description and a purple 'Generate application' button, which is highlighted with a yellow box. A tooltip 'Just looking for the instructions?' is visible next to the button.

9. Enter **eslabtester** for the Application name, and select the **eslab** Topic. Accept the default settings to produce and consume messages, and then click **Generate**.

The screenshot shows the 'Toolbox' configuration page. The 'Application name' field is set to 'eslabtester' and is highlighted with a yellow box. Under 'What do you want this application to be able to do?', both 'Produce messages' and 'Consume messages' checkboxes are checked. In the 'Which topic shall we connect with?' section, the 'Choose existing topic' radio button is selected, and the 'eslab' topic is chosen from the dropdown, which is also highlighted with a yellow box. A large yellow arrow points to the 'Generate' button at the bottom right of the form, which is also highlighted with a yellow box. A status message 'System is healthy' is visible at the bottom right.

10. After the starter application is generated, click **Download** and save the archive file to the Downloads

directory.

← Toolbox

Starter application

The starter application has been generated

1. Download the starter application

Download the compressed file and extract the contents to your preferred location.

Download 

2. Navigate to the extracted file and run this command to build and deploy the application

Java version 8 and Maven are prerequisites to building and running the starter application

[Maven download repository](#)

```
mvn install liberty:run-server
```

← Toolbox

The starter application has been generated

1. Download the starter application

Download the compressed file and extract

Download

2. Navigate to the extracted file and run this command to build and deploy the application

Java version 8 and Maven are prerequisites to building and running the starter application

[Maven download repository](#)

```
mvn install liberty:run-server
```

Opening IBMEventStreams_eslabtester.zip

You have chosen to open:
IBMEventStreams_eslabtester.zip
which is: Zip archive (907 KB)
from: https://10.0.0.5:30987

What should Firefox do with this file?
 Open with Archive Manager (default)
 Save File
 Do this automatically for files like this from now on.

Cancel **OK**

Note: Detailed instructions on how to build and run the starter application can be found in the README.md file in the top level project directory.

11. In a command terminal, run the following commands to extract the starter application:

```
cd Downloads  
unzip IBMEventStreams_eslabtester.zip
```

When prompted, enter **A** to replace files.

NOTE: Java and Maven, a build tool that is used to create Java applications, are installed in the lab environment. The starter application contains a `pom.xml` file, which provides the instructions for Maven to generate the starter application.

12. Run the following commands to build and start the application:

```
export _JAVA_OPTIONS=-Djdk.net.URLClassPath.disableClassPathURLCheck=true  
mvn install liberty:run-server
```

It might take a few minutes for the process to complete. Wait until you see the message, "The server defaultServer is ready to run a smarter planet" before you proceed to the next step.

13. In a new browser tab, enter the following URL:

```
http://localhost:9080/elabtester
```

The Starter Application screen is split, with a producer on the left and a consumer on the right. Note that the consumer already started to listen for messages.

The screenshot shows a split-screen application titled "Starter Application".

Left Side (Producer):

- Header: "IBM Event Streams" with a gear icon.
- Title: "Starter Application".
- Section: "How does this work?"
Text: "We've created this starter application in order to give you a starting point to produce and consume messages to IBM Event Streams. Start the producer and see the consumed messages appear."
- Count: "00" messages have been produced.
- Text: "messages have been produced topic: eslab".
- Input field: "Custom payload string (optional)" with placeholder "Add custom payload (Hello World)".
- Control: A blue play button icon.
- Section: "Most recent messages".
- Text: "No messages produced yet.."

Right Side (Consumer):

- Count: "00" messages have been consumed.
- Text: "messages have been consumed topic: eslab".
- Control: A blue square button labeled "Stop listening for messages". This button is highlighted with a yellow border.
- Section: "Most recent messages".
- Text: "No messages consumed yet.."
- Table headers: "Most recent messages", "Partition", and "Offset".

14. Enter a message, for example, "Hello World," in the Custom payload field and click **Run**.

The screenshot shows the 'Starter Application' page of the IBM Event Streams interface. At the top, there's a section titled 'How does this work?' with a brief description: 'We've created this starter application in order to give you a starting point to produce and consume messages to IBM Event Streams. Start the producer and see the consumed messages appear.' Below this, a large counter displays '00' messages produced. A yellow arrow points from this counter down to the 'Custom payload string (optional)' input field, which contains the text 'Hello World!'. To the right of this field is a blue play button icon, also highlighted with a yellow box and arrow. Below the payload field, a section titled 'Most recent messages' shows the message 'No messages produced yet..'. The overall theme is dark with light-colored text and UI elements.

The producer begins producing messages, which are sent to the Topic. On the consumer side, the number of messages increments, while the message list becomes populated.

The screenshot shows two panels of the IBM Event Streams Starter Application. The left panel is for producing messages, and the right panel is for consuming messages.

Left Panel (Producing):

- Header: "IBM Event Streams" with a gear icon.
- Title: "Starter Application".
- Section: "How does this work?"

We've created this starter application in order to give you a starting point to produce and consume messages to IBM Event Streams. Start the producer and see the consumed messages appear.
- Large number: "10".
- Text: "messages have been produced" and "topic: eslab".
- Form:
 - Custom payload string (optional): "Hello World!"
 - File input field: "Choose file..."
 - Save button: "Save" (with a blue arrow icon).
- Text: "Show 5 most recent message(s)" with a dropdown arrow.

Right Panel (Consuming):

- Large number: "10".
- Text: "messages have been consumed" and "topic: eslab".
- Text: "Stop listening for messages" with a blue square icon.
- Table:

Showing 10 most recent message(s)		
	Partition	Offset
Message 10	0	9 Consumed at 4:50:25 PM
Message 9	0	8 Consumed at 4:50:23 PM
Message 8	0	7 Consumed at 4:50:21 PM

15. Click a message in the list to see more details about it. Click the X in the upper right corner to hide the details.

A screenshot of a Kafka message viewer interface. At the top, there's a table with two columns: 'Partition' (value 0) and 'Offset' (value 253). Below the table, detailed message information is shown: 'Message size' (12 B), 'Kafka timestamp' (5/8/2019, 4:58:36 PM), and 'Key' (empty). A large number '254' is prominently displayed in the center. Below it, text indicates '254 messages have been consumed' from the 'topic: eslab'. A yellow arrow points to the text 'Showing 250 most recent message(s)'. To the right of the message details, there are buttons for 'Raw payload' (which shows 'Hello World!') and a copy icon. Below the main message area, three messages are listed: 'Message 254', 'Message 253', and 'Message 252'.

16. To stop producing messages, click **Run** again.
17. You can leave the application running in the terminal window because you use it again in a later lab exercise, but if you need to stop it, press Ctrl-C in the window. You can start it again later by running the `export` and `mvn` commands from a previous step in this section.

End of exercise

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Notices

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