Data Lake Scaling (Preview)

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Overview

Data Lake scaling is the process of scaling up a light duty Data Lake to the medium duty form factor, which has greater resiliency than light duty and can service a larger number of clients. You can trigger the scale-up in the CDP UI or through the CDP CLI.

During a typical Data Lake scaling operation, the metadata maintained in the Data Lake services is automatically backed up, a new medium duty Data Lake is created within the environment, and the Data Lake metadata is automatically restored to the new medium duty Data Lake.

Note: RAZ-enabled Data Lakes are not currently eligible for automatic restore during a scaling operation; they will be automatically backed up, but must be manually restored after the scaling is complete. If RAZ is in use, before starting the Data Lake backup make sure that the appropriate Ranger policy exists with access to the backup location in the cloud. See instructions for manually restoring a RAZ-enabled Data Lake here.

Supportability Matrix

	CDW	CDE	CML	ODX	CDF
NON-RAZ	Yes	Yes	Yes	Yes	No
RAZ	No	Yes	Yes	Yes	No

Limitations

1. Scaling is only supported for CDP Runtime versions 7.2.7 and above, because medium duty Data Lakes are not supported for earlier versions.
2. Only resizing from a light duty Data Lake to a medium duty HA Data Lake is supported.
3. Data Lake scaling is not supported for GCP environments.
4. The scaling operation requires an outage and should be performed during a maintenance window. No metadata changes may occur during the scaling, as these changes will no longer be present once the scaling operation completes

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(the previously backed up metadata is being restored). Suspend any operations that may result in any SDX metadata change during the scaling operation.

5. Data Hub clusters should be stopped before the scaling operation begins. For any cluster that cannot be stopped, stop all of the services on the Data Hub through the Cloudera Manager UI.
6. CDW jobs using the warehouses will fail during the scaling operation.
7. CDF flows should be re-created after a scaling operation.
8. Currently, FreeIPA scaling is not supported.

Pre-requisites

Prior to scaling the Data Lake, ensure that the following are in place:

1. The Data Lake must be running to perform the scaling operation.
2. For RAZ-enabled Data Lakes, update the appropriate Ranger policy to give the backup and restore feature permission to access the backup location in the cloud. See instructions for configuring RAZ for backup here.
3. Make sure that Atlas is up to date and has processed all the lineage data in Kafka. To do this, please follow the steps below:
    a. **ssh** into the master node of your light duty Data Lake
    b. Switch to the super user for the node by running **sudo su**
    c. Copy over the following script into a file called **check_atlas_updated.sh**

```
#!/usr/bin/env bash

# Determine Atlas keytab path.
ATLAS_KT=$(find / -wholename "*atlas-ATLAS_SERVER/atlas.keytab"
2>/dev/null | head -n 1)

# Setup required configuration files if needed.
if [[ ! -f jaas.conf ]]; then
        ATLAS_PRINCIPAL=$(klist -kt "${ATLAS_KT}" | grep -o -m 1
"atlas\/\S*")
        printf "KafkaClient {
        \tcom.sun.security.auth.module.Krb5LoginModule required
        \tuseKeyTab=true
        \tkeyTab=\"%s\"
        \tprincipal=\"%s\";\n};\n" "${ATLAS_KT}" "${ATLAS_PRINCIPAL}"
> jaas.conf
fi

if [[ ! -f client.config ]]; then
```

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```
        printf
"security.protocol=SASL_SSL\nsasl.kerberos.service.name=kafka\n" >
client.config
fi

# Determine the Kafka bootstrap server to use.
KAFKA_SERVER=$(grep --line-buffered -oP
"atlas.kafka.bootstrap.servers=\K.*" \
        /etc/atlas/conf/atlas-application.properties | awk -F',' '{print $1}')

# Export Kafka-specific environment variables.
export KAFKA_HEAP_OPTS="-Xms512m -Xmx1g"
export
KAFKA_OPTS="-Djava.security.auth.login.config=${PWD}/jaas.conf"

# Kinit into Atlas keytab as Atlas user.
kinit -kt "$ATLAS_KT" "atlas/$(hostname -f)" 2>/dev/null

# Obtain Atlas lineage information.
LINEAGE_INFO=$(/opt/cloudera/parcels/CDH/lib/kafka/bin/kafka-consu
mer-groups.sh \
        --bootstrap-server "${KAFKA_SERVER}" --describe --group atlas
\
        --command-config="${PWD}/client.config" 2>/dev/null \
        | awk '{print $2, $6}')

if [[ -z "$LINEAGE_INFO" ]]; then
        echo "*ERROR*: Unable to get lineage info for Atlas. Please look
at the created configuration files to make sure they look correct."
        exit 1
fi

# Parse lineage information and determine if Atlas is out of date.
LINEAGE_LAG_VALS=($LINEAGE_INFO)
NUM_LAG_VALS=${#LINEAGE_LAG_VALS[@]}
OUT_OF_DATE_TOPICS=""
for (( i = 2; i < ${NUM_LAG_VALS}; i += 2 )); do
        if [[ ${LINEAGE_LAG_VALS[${i} + 1]} != '-' &&
${LINEAGE_LAG_VALS[${i} + 1]} != '0' ]]; then

OUT_OF_DATE_TOPICS="${OUT_OF_DATE_TOPICS}${LINEAGE_LA
G_VALS[$i]}, "
        fi
done

if [[ -z "$OUT_OF_DATE_TOPICS" ]]; then
```

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```
        echo "Atlas is up to date! Feel free to continue with the
migration."
else
        echo "The following Atlas topics are not up to date:
${OUT_OF_DATE_TOPICS%??}!"
        echo "Please wait until Atlas is entirely up to date before
continuing with the migration."
fi
```

   d. Allow the new script to be run by running **chmod +x check_atlas_updated.sh**
   e. Run the script with **./check_atlas_updated.sh**. The script will tell you if Atlas is up to date or not. If it isn't, wait a while and check again. You should only begin the scaling process if the script tells you that Atlas is up to date.
4. If you are using CDW, stop the virtual warehouses and data catalogs associated with the environment.
5. If you are using CDE, do one of the following:
   a. Upgrade to CDE 1.15.
   b. Create new service.
      i. Take a backup of your jobs following Backing up Cloudera Data Engineering jobs.
      ii. Create a new DE service and virtual cluster.
      iii. Restore the jobs following the instructions in Restoring Cloudera Data Engineering jobs from backup.

Scaling the Data Lake through the CDP UI

Required role: *EnvironmentAdmin* or *Owner* of the environment

1. Stop all of the attached Data Hub clusters that can be stopped, to make sure that there are no changes to HMS metadata during the scaling operation. For any cluster that cannot be stopped, stop all of the services on the Data Hub through the Cloudera Manager UI.
2. Verify that the DATALAKE_ADMIN_ROLE, RANGER_AUDIT_ROLE, and LOG_ROLE have read/write permissions to the backup location. See the Data Lake backup and restore documentation for more information on these permissions. LOG_ROLE is specific to Data Lake restore.
3. In the CDP UI, click **Data Lakes** and select the Data Lake that you want to scale.
4. Click **Resize**.

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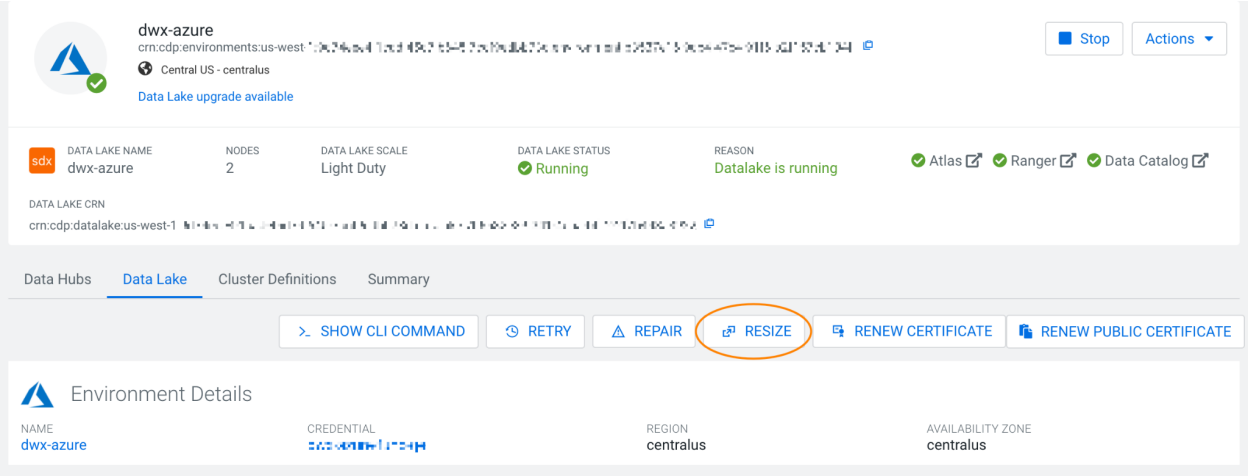

You will be asked to confirm that you want to resize the Data Lake, after which the scaling process will begin. The scaling operation is finished when the Data Hub clusters have been automatically refreshed, which happens after the original light duty Data Lake has been deleted. Check the Event History to verify that the Data Hubs have been refreshed.

5. When the scaling operation is finished, if you are upscaling a RAZ-enabled Data Lake, manually restore the Data Lake from the backup taken by the scaling process. To restore, you will need to add the restore_to_raz policy in Ranger and then run the `cdp datalake restore-datalake` command in the CDP CLI.

Post-requisites

After the scaling process is complete, complete the following tasks:

1. If RAZ is not being used, resync the ID broker mappings to the Data Lake.
2. Start the data catalogs and virtual warehouses.
3. Restart or re-deploy any existing CML workloads:

CML Entity	Action Needed
Model	Re-deploy
Applications	Re-deploy
Experiments	Re-deploy
Sessions	Restart New
Jobs	Restart
Notebook	Re-deploy

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4. Re-create any CDF flows.
5. Start the Data Hub cluster services, if you stopped them before the scaling operation.

Data Hubs that were stopped before the scaling operation should continue to work when the scaling completes, by communicating with the new Data Lake automatically when they are re-started.

Scaling the Data Lake through the CDP CLI

***R*equired role:** *EnvironmentAdmin* or *Owner* of the environment

1. Stop all of the attached Data Hub clusters that can be stopped, to make sure that there are no changes to HMS metadata during the scaling operation. For any cluster that cannot be stopped, stop all of the services on the Data Hub through the Cloudera Manager UI.
2. Verify that the DATALAKE_ADMIN_ROLE, RANGER_AUDIT_ROLE, and LOG_ROLE have read/write permissions to the backup location. See the Data Lake backup and restore documentation for more information on these permissions. LOG_ROLE is specific to Data Lake restore.
3. To trigger scaling from the CDP CLI, run the `cdp datalake resize-datalake` command. For example:

```
cdp datalake resize-datalake --datalake-name <mydatalake>
--target-size MEDIUM_DUTY_HA
```

Option	Description
–datalake-name	Name or CRN of the Data Lake that you want to upscale.
–target-size	Currently only MEDIUM_DUTY_HA is supported.

4. Monitor the Event History. The scaling operation is finished when the Data Hub clusters have been automatically refreshed, which happens after the original light duty Data Lake has been deleted. Check the Event History to verify that the Data Hubs have been refreshed.
5. When the scaling operation is finished, if you are upscaling to a RAZ-enabled Data Lake, manually restore the Data Lake from the backup taken by the scaling

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process. To restore, you will need to add the `restore_to_raz` policy in Ranger and then run the `cdp datalake restore-datalake` command in the CDP CLI.

Post-requisites

After the scaling process is complete, complete the following tasks:

1. If RAZ is not being used, resync the ID broker mappings to the Data Lake.
2. Start the data catalogs and virtual warehouses.
3. Restart or re-deploy any existing CML workloads (Sessions, Jobs, Applications, Experiments, notebooks, and Models).
4. Re-create any CDF flows.
5. Start the Data Hub cluster services, if you stopped them before the scaling operation.

Data Hubs that were stopped before the scaling operation should continue to work when the scaling completes, by communicating with the new Data Lake automatically when they are re-started.

Recovering after a failed scaling operation

You can recover from a failed scaling operation by returning a Data Lake to its original state before the resize operation was started. Be sure that this is what you want to do before proceeding.

Data Lake recovery simply reattaches and starts the original light duty Data Lake in the environment. All of the instances, disks, and databases are unchanged from their original state.

Currently the recovery logic uses logs that are cleaned up every 24 hours, so recovery may not be possible after this time period. Try to recover as soon as an error is noticed.

If recovery cannot be started, or fails for any reason, reach out to the Cloudera support team, who can manually recover your Data Lake.

1. Trigger the recovery command through the CDP CLI:

```
cdp datalake recover-datalake --datalake-name <mydatalake>
```

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