Hortonworks Data Platform

Ambari Upgrade Guide

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Hortonworks Data Platform: Ambari Upgrade Guide

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Table of Contents

1. Upgrading Ambari and HDP 1
2. Getting Ready to Upgrade Ambari and HDP 2
3. Upgrading Ambari 4
    3.1. Preparing to Upgrade 4
    3.2. Upgrade Ambari 5
    3.3. Post-Upgrade Tasks 10
        3.3.1. Migrate to Ambari Alerts and Metrics 10
        3.3.2. Adjusting for Kerberos 13
        3.3.3. Upgrade Ambari Metrics 14
4. Upgrading HDP 15
    4.1. Prerequisites 17
        4.1.1. Rolling Upgrade Prerequisites 17
    4.2. Prepare to Upgrade 19
    4.3. Register and Install Target Version 20
        4.3.1. Register Target Version 21
        4.3.2. Install Target Version 22
    4.4. Perform the Upgrade 22
        4.4.1. Perform Rolling Upgrade 23
        4.4.2. Perform Express Upgrade 25

List of Tables

4.1. HDP Upgrade Options 16

1. Upgrading Ambari and HDP

Ambari and the HDP Stack being managed by Ambari can be upgraded independently.

This guide provides information on:

- Getting Ready to Upgrade Ambari and HDP
- Upgrading Ambari
- Upgrading HDP

Important

Ambari 2.2 **does not support managing an HDP 2.0** cluster. If you are running HDP 2.0, in order to use Ambari 2.2 **you must first upgrade to HDP 2.1 or higher** using either Ambari 1.7 or 2.0 **prior to upgrading to Ambari 2.2**. Once completed, upgrade your current Ambari to Ambari 2.2.

2. Getting Ready to Upgrade Ambari and HDP

When preparing to upgrade Ambari and the HDP Cluster, we strongly recommend you review this checklist of items to confirm your cluster operation is healthy. Attempting to upgrade a cluster that is operating in an unhealthy state can produce unexpected results.

Important

If planning to upgrade Ambari and upgrade to a new HDP minor version (for example: moving from HDP 2.2 to HDP 2.3), upgrade Ambari to the lastest version before upgrading the cluster. Refer to the Stack Compatibility Matrix to see which HDP versions each Ambari version supports.

- Ensure all services in the cluster are running.
- Run each Service Check (found under the Service Actions menu) and confirm they execute successfully.
- Clear all alerts, or understand why they are being generated. Remediate as necessary.
- Confirm start and stop for all services are executing successfully.
- Time service start and stops. The time to start and stop services is a big contributor to overall upgrade time so having this information handy is useful.
- Download the software packages prior to the upgrade. Place them in a local repository and/or consider using a storage proxy since multi-gigabyte downloads will be required on all nodes in the cluster. Refer to Using a Local Repository for more information.
- Ensure point-in-time backups are taken of all DBs supporting the clusters. This includes (among others) Ambari, Hive Metastore, Ranger and Oozie.

Note

If you are upgrading to Ambari 2.2, you must make sure that the Ranger db root password is NOT set to blank before performing any Stack upgrade. Ambari 2.1x requires that the Ranger db root password has a value. If you upgrade Ambari to 2.2 and upgrade HDP without setting a value for the Ranger db root password, Ranger Admin will fail to start after the upgrade.

To prepare Ranger for upgrades, set the password for the Ranger DB root user to a non-blank value. Then, set the Ranger db root password field in Ambari Web to match this value. Finally, restart Ranger Admin using Ambari Web.

For Ambari Upgrades

- This (Ambari 2.2) Upgrade Guide will help you upgrade your existing Ambari install to version 2.2. If you are upgrading to another Ambari version, please be sure to use the Ambari Upgrade Guide for that version.

- Be sure to review the Known Issues and Behavioral Changes for this Ambari release in the Ambari 2.2.0 Release Notes.

For HDP Cluster Upgrades

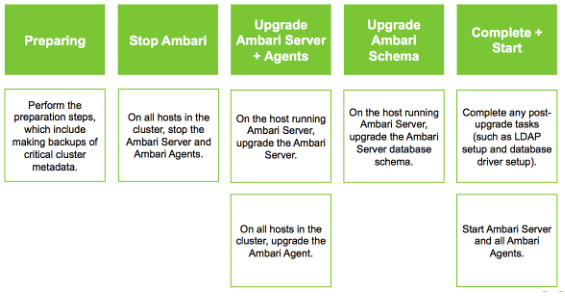
- Ensure sufficient disk space on `/usr/hdp/<version>` (roughly 3GB for each additional HDP release).
- If you plan to add new services available with HDP to your cluster, the new services might include new service accounts. Any operational procedures required to support these new service accounts should be performed prior to the upgrade. The accounts will typically be required on all nodes in the cluster.
- If your cluster includes Storm, document any running Storm topologies.

3. Upgrading Ambari

Ambari and the HDP cluster being managed by Ambari can be upgraded independently. This section describes the process to upgrade Ambari. You are **strongly encouraged** to read completely through this entire document before starting the upgrade process, to that you understand the interdependencies and order of the steps. It is **highly recommended** you validate these steps in a test environment to adjust + account for any special configurations for your cluster.

- Preparing to Upgrade
- Upgrade Ambari
- Post-Upgrade Tasks

The high-level process for upgrading Ambari is as follows:



3.1. Preparing to Upgrade

- Be sure to review the Release Notes for this Ambari release for Known Issues and Behavioral Changes.
- You **must** have root, administrative, or root-equivalent authorization on the Ambari server host and all servers in the cluster.
- You **must** backup the Ambari Server database.
- You **must** make a safe copy of the Ambari Server configuration file found at `/etc/ambari-server/conf/ambari.properties`.
- If you are using Ambari with JDK 1.6, **you must first move to JDK 1.7 before attempting to upgrade to Ambari 2.2**. Refer the the **Ambari Reference Guide** for the Ambari version you are currently running for instructions on Changing the JDK.
- **If you are managing Ganglia and Nagios from Ambari:**
  - Support for managing Ganglia and Nagios from Ambari **has been removed**.
  - Record the location of the Nagios server before you begin the upgrade process.
  - Record the location of the Ganglia server before you begin the upgrade process.

- You **must** stop the Nagios and Ganglia services from **Ambari Web**.
- After upgrading Ambari, you **must remove Nagios and Ganglia from your cluster and replace with Ambari Alerts and Metrics**. For more information, see Migrate to Ambari Alerts and Metrics in Ambari.

- **If you are on Ambari 1.7 or earlier:**
  - If your cluster has Kerberos enabled, you **must** disable Kerberos prior to performing the upgrade. Be sure to review Adjusting for Kerberos for more information on the additional steps required pre- and post-upgrade.
- **If you are on Ambari 2.0 or later:**
  - Record the location of the **Metrics Collector** component before you begin the upgrade process.
  - You **must** stop the Ambari Metrics service from **Ambari Web**.
  - After upgrading Ambari, you must also Upgrade Ambari Metrics service.
- Proceed to Upgrade to Ambari 2.2.

Note

If your current Ambari version is 1.6.1 or below, you must upgrade the Ambari Server version to 1.7 before upgrading to version 2.2.

Note

During Ambari upgrade, the existing `/var/lib/ambari-server/ambari-env.sh` file is overwritten and a backup copy of `ambari-env.sh` (with extension `.rpmsave`) is created. If you have manually modified `ambari-env.sh` (for example, to change Ambari Server heap), you will need to re-apply your changes to the new file.

3.2. Upgrade Ambari

1. If you are running Ambari Metrics service in your cluster, stop the service. From **Ambari Web**, browse to **Services > Ambari Metrics** and select **Stop** from the **Service Actions** menu.
2. Stop the Ambari Server. On **the host** running Ambari Server:

   ```
   ambari-server stop
   ```

3. Stop all Ambari Agents. On **each host** in your cluster running an Ambari Agent:

   ```
   ambari-agent stop
   ```

4. Fetch the new Ambari repo and replace the old repository file with the new repository file **on all hosts** in your cluster.

Important

Check your current directory before you download the new repository file to make sure that there are no previous versions of the `ambari.repo` file. If you do not, and a previous version exists, the new download will be saved with a numeric extension, such as `ambari.repo.1`. Make sure that the version you copy is the new version.

Select the repository appropriate for your environment from the following list:

- **For RHEL/CentOS/Oracle Linux 6:**

```
wget -nv http://public-repo-1.hortonworks.com/ambari/centos6/2.x/updates/
2.2.0.0/ambari.repo -O /etc/yum.repos.d/ambari.repo
```

- **For RHEL/CentOS/Oracle Linux 7:**

```
wget -nv http://public-repo-1.hortonworks.com/ambari/centos7/2.x/updates/
2.2.0.0/ambari.repo -O /etc/yum.repos.d/ambari.repo
```

- **For SLES 11:**

```
wget -nv http://public-repo-1.hortonworks.com/ambari/suse11/2.x/updates/2.
2.0.0/ambari.repo -O /etc/zypp/repos.d/ambari.repo
```

- **For Ubuntu 12:**

```
wget -nv http://public-repo-1.hortonworks.com/ambari/ubuntu12/2.x/updates/
2.2.0.0/ambari.list -O /etc/apt/sources.list.d/ambari.list
```

- **For Ubuntu 14:**

```
wget -nv http://public-repo-1.hortonworks.com/ambari/ubuntu14/2.x/updates/
2.2.0.0/ambari.list -O /etc/apt/sources.list.d/ambari.list
```

- **For Debian 7:**

```
wget -nv http://public-repo-1.hortonworks.com/ambari/debian7/2.x/updates/
2.2.0.0/ambari.list -O /etc/apt/sources.list.d/ambari.list
```

Note

If your cluster does not have access to the Internet, set up a local repository with this data before you continue. See Using a Local Repository for more information.

Note

Ambari Server does not automatically turn off `iptables`. Check that your installation setup does not depend on `iptables` being disabled. After upgrading the server, you must either disable `iptables` manually or make sure that you have appropriate ports available on all cluster hosts. For more information about ports, see Configuring Network Port Numbers.

5. Upgrade Ambari Server. On **the host** running Ambari Server:

- **For RHEL/CentOS/Oracle Linux:**

```
yum clean all
yum info ambari-server
```

In the info output, visually validate that there is an available version containing "2.2.0"

```
yum upgrade ambari-server
```

- **For SLES:**

```
zypper clean
zypper info ambari-server
```

In the info output, visually validate that there is an available version containing "2.2.0"

```
zypper up ambari-server
```

- **For Ubuntu/Debian:**

```
apt-get clean all
apt-get update
apt-cache show ambari-server | grep Version
```

In the info output, visually validate that there is an available version containing "2.2.0"

```
apt-get install ambari-server
```

Important

When performing upgrade on SLES, you will see a message "There is an update candidate for 'ambari-server', but it is from different vendor. Use 'zypper install ambari-server-2.2.0-101.noarch' to install this candidate". You will need to to use yast to update the package, as follows:

a. From the command line run: > yast.

```
> yast
```

You will see command line UI for YaST program.

b. Choose `Software > Software Management`, then click the `Enter` button.

c. In the `Search Phrase` field, enter `ambari-server`, then click the `Enter` button.

d. On the right side you will see the search result `ambari-server 2.2.0`. Click `Actions`, choose `Update`, then click the `Enter` button.

e. Go to `Accept`, and click `enter`.

6. Check for upgrade success by noting progress during the Ambari Server installation process you started in Step 5.

- As the process runs, the console displays output similar, although not identical, to the following:

```
Setting up Upgrade Process
Resolving Dependencies
--> Running transaction check
```

- If the upgrade fails, the console displays output similar to the following:

```
Setting up Upgrade Process
No Packages marked for Update
```

- A successful upgrade displays output similar to the following:

```
Updated:
   ambari-server.noarch 0:2.2.0-111
Complete!
```

Note

Confirm there is only one ambari-server*.jar file in `/usr/lib/ambari-server`. If there is more than one JAR file with name ambari-server*.jar, move all JARs except ambari-server-2.2.0.*.jar to /tmp before proceeding with upgrade.

7. Upgrade all Ambari Agents. On **each host** in your cluster running an Ambari Agent:

- **For RHEL/CentOS/Oracle Linux:**

```
yum upgrade ambari-agent
```

- **For SLES:**

```
zypper up ambari-agent
```

Note

Ignore the warning that begins with "There are some running programs that use files deleted by recent upgrade".

Important

When performing upgrade on SLES, you will see a message "There is an update candidate for 'ambari-agent', but it is from different vendor. Use 'zypper install ambari-agent-2.2.0-101.noarch' to install this candidate". You will need to to use yast to update the package, as follows:

a. From the command line run: > yast

```
> yast
```

You will see command line UI for YaST program.

b. Choose `Software > Software Management`, then click the `Enter` button.

c. In the `Search Phrase` field, enter `ambari-agent`, then click the `Enter` button.

d. On the right side you will see the search result `ambari-agent 2.2.0`. Click `Actions`, choose `Update`, then click the `Enter` button.

e. Go to `Accept`, and click `enter`.

- **For Ubuntu/Debian:**

```
apt-get update
apt-get install ambari-agent
```

8. After the upgrade process completes, check each host to make sure the new files have been installed:

```
rpm -qa | grep ambari-agent
```

9. Upgrade Ambari Server database schema. On **the host** running Ambari Server:

```
ambari-server upgrade
```

10. Start the Ambari Server. On **the host** running Ambari Server:

```
ambari-server start
```

11. Start all Ambari Agents. On **each host** in your cluster running an Ambari Agent:

```
ambari-agent start
```

12. Open Ambari Web.

    Point your browser to http://<your.ambari.server>:8080

    where <your.ambari.server> is the name of your ambari server host. For example, c6401.ambari.apache.org.

Important

Refresh your browser so that it loads the new version of the Ambari Web code. If you have problems, clear your browser cache manually, then restart Ambari Server.

13. Log in, using the Ambari administrator credentials that you have set up.

    For example, the default name/password is `admin/admin`.

14. You will see a Restart indicator next to each service after upgrading. Ambari upgrade has added to/adjusted the configuration properties of your cluster based on new configuration types and properties being made available for each service with this release of Ambari. Review these changes by comparing the previous configuration with the latest version created by "ambari-upgrade".

15. If you have configured Ambari to authenticate against an external LDAP or Active Directory, you **must** re-run "ambari-server setup-ldap". For more information, see Set Up LDAP or Active Directory Authentication.

16. If you have configured your cluster for Hive or Oozie with an external database (Oracle, MySQL or PostgreSQL), you **must** re-run "ambari-server setup –jdbc-db and –jdbc-driver" to get the JDBC driver JAR file in place. For more information, see Using Non-Default Databases - Hive and Using Non-Default Databases - Oozie.

17. **If your cluster includes Ganglia and Nagios**:

    You **must** remove Nagios and Ganglia from your cluster and replace with Ambari Alerts and Metrics. For more information, see Migrate to Ambari Alerts and Metrics.

18. **If you have upgraded from Ambari 1.7 or earlier:**

    - If your cluster was configured for Kerberos, you **must** adjust your cluster for Kerberos. For more information, see Adjusting for Kerberos.
    - If your cluster is running HDP 2.2 Stack, you **must** get the cluster hosts to advertise the "current version". This is done by restarting a master or slave component (such as a DataNode) on each host to have the host. For example, in **Ambari Web**, navigate to the **Hosts** page, select any Host that has the DataNode component and restart that DataNode component on that single host.

19. If you are running **Ambari Metrics** service in your cluster, Upgrade Ambari Metrics service.

3.3. Post-Upgrade Tasks

Depending on the configuration of your cluster and the Ambari version you are starting with, review the following post-upgrade tasks.

Task	Description
Migrate to Ambari Alerts and Metrics	If your cluster includes legacy Nagios and Ganglia services, they must be removed and replaced with Ambari Alerts and Metrics.
Adjusting for Kerberos	If you have upgraded from Ambari 1.7 or earlier and your cluster was configured for Kerberos, you must adjust Ambari.
Upgrading Ambari Metrics Service	If your cluster includes the Ambari Metrics System ("AMS") service, you must upgrade the system along with Ambari.
Upgrading SmartSense	If your cluster includes the SmartSense service, you must upgrade it along with Ambari.

3.3.1. Migrate to Ambari Alerts and Metrics

Starting with Ambari 2.0, Ambari includes built-in systems for alerting and metrics collection. Therefore, when upgrading to Ambari 2.2, the legacy Nagios and Ganglia services must be removed and replaced with the new systems. **You only need to perform these steps and migrate to Ambari Alerts and Metrics if you are running Nagios and Ganglia**.

Important

We highly recommended that you perform and validate this procedure in a test environment prior to attempting the Ambari upgrade on production systems.

3.3.1.1. Moving from Nagios to Ambari Alerts

After upgrading to Ambari 2.2, the Nagios service will be removed from the cluster. The Nagios server and packages will remain on the existing installed host but Nagios itself is removed from Ambari management.

Important

Nagios used the operating system sendmail utility to dispatch email alerts on changes. With Ambari Alerts, the email dispatch is handled from the Ambari Server via Javamail. Therefore, you must provide SMTP information to Ambari for sending email alerts. Have this information ready. You will use it after the Ambari 2.2 upgrade to get Ambari Alert email notifications configured in the new Ambari Alerts system.

The Ambari Alerts system is configured automatically to replace Nagios but you must:

1. Configure email notifications in Ambari to handle dispatch of alerts. Browse to `Ambari Web > Alerts`.
2. In the Actions menu, select `Manage Notifications`.
3. Click to `Create a new Notification`. Enter information about the SMTP host, port to and from email addresses and select the Alerts to receive notifications.
4. Click `Save`.

Note

(Optional) Remove the Nagios packages (nagios, nagios-www) from the Nagios host.

For more information Ambari Alerts, see Managing Alerts in the Ambari User's Guide.

3.3.1.2. Moving from Ganglia to Ambari Metrics

After upgrading to Ambari 2.2, the Ganglia service stays intact in the cluster. You must perform the following steps to remove Ganglia from the cluster and to move to the new Ambari Metrics system.

Important

- If you are using HDP 2.2 Stack, Storm metrics will not work with Ambari Metrics until you are upgraded to HDP 2.2.4 or later.
- It is recommended that, after moving to Ambari Metrics restart Storm to pick up the new metrics sink classes.
- Do not add the Ambari Metrics service to your cluster until you have removed Ganglia using the steps below.

1. Stop Ganglia service via Ambari Web.

2. Using the Ambari REST API, remove the Ganglia service by executing the following:

```
curl -u admin.user:admin.password -H 'X-Requested-By:ambari' -X DELETE
 'http://ambari.server:8080/api/v1/clusters/cluster.name/services/GANGLIA'
```

   where **admin.user** and **admin.password** are credentials for an Ambari Administrator, **ambari.server** is the Ambari Server host and **cluster.name** is the name of your cluster.

3. Refresh Ambari Web and make sure that Ganglia service is no longer visible.

4. In the Actions menu on the left beneath the list of Services, use the "Add Service" wizard to add `Ambari Metrics` to the cluster.

5. This will install an `Ambari Metrics Collector` into the cluster, and an `Ambari Metrics Monitor` on each host.

6. Pay careful attention to following service configuration for Ambari Metrics.

   By default, Ambari Metrics uses the local filesystem as the default storage backend. This is **embedded mode** and the rootdir for HBase is set to a local filesystem path by default when using Ambari Metrics in **embedded mode**. If you want to run Ambari Metrics in **distributed mode** (i.e. use HDFS instead of local filesystem for storage), set this rootdir value to an HDFS dir. For example: hdfs://namenode.example.org:8020/apps/ams/metrics. See Tuning Ambari Metrics for more information.

Section	Property	Default Value
Advanced ams-hbase-site	hbase.rootdir	file:///var/lib/ambari-metrics-collector/hbase

7. For the cluster services to start sending metrics to Ambari Metrics, restart all services. For example, restart HDFS, YARN, HBase, Flume, Storm and Kafka.

Note

(Optional) Remove the Ganglia packages (ganglia-gmetad and ganglia-gmond) from the hosts.

Important

If you are managing a HDP 2.2 cluster that includes Kafka, you must adjust the Kafka configuration to send metrics to the Ambari Metrics system.

From Ambari Web, browse to `Services > Kafka > Configs` and edit the `kafka-env template` found under `Advanced kafka-env` to include the following:

```
# Add kafka sink to classpath and related dependencies

if [ -e "/usr/lib/ambari-metrics-kafka-sink/ambari-
metrics-kafka-sink.jar" ];

then

export CLASSPATH=$CLASSPATH:/usr/lib/ambari-metrics-kafka-
sink/ambari-metrics-kafka-sink.jar
```

```
export CLASSPATH=$CLASSPATH:/usr/lib/ambari-metrics-kafka-
sink/lib/*

fi
```

3.3.2. Adjusting for Kerberos

Important

You **only** need to perform these Kerberos steps **if you are running Ambari 1.7 or earlier and your cluster is Kerberos enabled**. You **do not need** need to perform these steps if you are running **Ambari 2.0 or later**.

If you are upgrading to Ambari 2.2 from an Ambari-managed cluster that is already Kerberos-enabled, because of new Kerberos features introduced in Ambari, you need perform the following steps:

1. Review the procedure for Configuring Ambari and Hadoop for Kerberos in the Ambari Security Guide.

2. Have your Kerberos environment information readily available, including your KDC Admin account credentials.

3. Take note of current Kerberos security settings for your cluster.

   a. Browse to `Services > HDFS > Configs`.

   b. Record the core-site auth-to-local property value.

4. Disable Kerberos **before** performing the Ambari upgrade. In Ambari Web, browse to `Admin > Kerberos`, and click **Disable Kerberos**. You can re-enable Kerberos after performing the Ambari upgrade.

5. Upgrade Ambari according to the steps in Upgrading to Ambari 2.2.

6. Ensure your cluster and the Services are healthy.

7. Browse to `Admin > Kerberos` and you'll notice Ambari thinks that Kerberos is not enabled. Run the `Enable Kerberos Wizard`, following the instructions in the Ambari Security Guide. Be sure to pay close attention to the principal names in the **Configure Identities step in the wizard to confirm principals names match what you expect** for your environment.

8. Ensure your cluster and the Services are healthy.

9. Verify the Kerberos security settings for your cluster are correct.

   - Browse to `Services > HDFS > Configs`.
   - Check the core-site auth-to-local property value.
   - Adjust as necessary, based on the pre-upgrade value recorded in Step 3.

3.3.3. Upgrade Ambari Metrics

1. Upgrade to Ambari 2.2 and perform needed post-upgrade checks. Make sure all services are up and healthy.

2. Make sure Ambari Metrics service is stopped. From **Ambari Web**, browse to **Services > Ambari Metrics** and select **Stop** from the **Service Actions** menu.

3. On **every host** in your cluster running a **Metrics Monitor**, run the following commands:

   For RHEL/CentOS/Oracle Linux:

   ```
   yum clean all
   ```

   ```
   yum upgrade ambari-metrics-monitor ambari-metrics-hadoop-sink
   ```

   For SLES:

   ```
   zypper clean
   ```

   ```
   zypper up ambari-metrics-monitor ambari-metrics-hadoop-sink
   ```

   For Ubuntu/Debian:

   ```
   apt-get clean all
   ```

   ```
   apt-get update
   ```

   ```
   apt-get install ambari-metrics-assembly
   ```

4. Execute the following command on all hosts running the **Metrics Collector**:

   For RHEL/CentOS/Oracle Linux:

   ```
   yum upgrade ambari-metrics-collector
   ```

   For SLES:

   ```
   zypper up ambari-metrics-collector
   ```

   For Ubuntu/Debian:

   ```
   apt-get install ambari-metrics-assembly
   ```

5. Start Ambari Metrics Service. From `Ambari Web`, browse to `Services > Ambari Metrics` and select `Start` from the `Service Actions` menu.

6. Updated Ambari Metrics Sink jars will be installed on all hosts. You must restart each service to pick up the latest sink implementations.

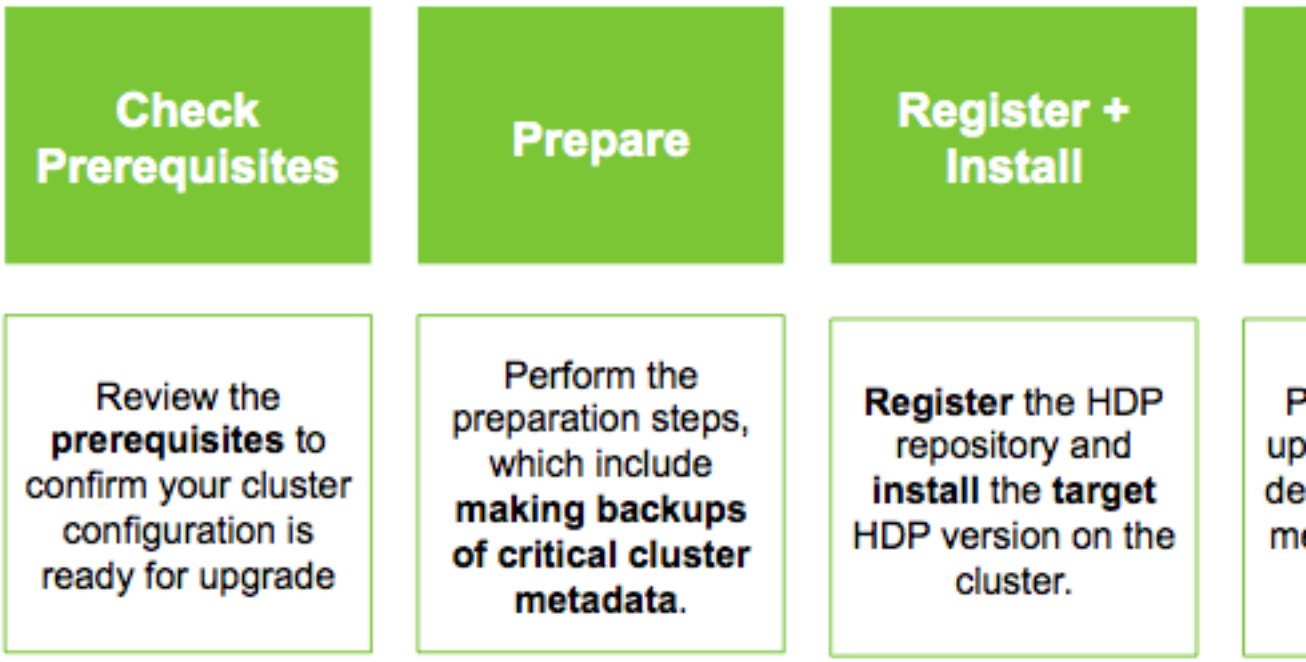
   (For example: HDFS, YARN, Kafka, HBase, Flume, Storm)

4. Upgrading HDP

- Prerequisites
- Prepare to Upgrade
- Register and Install Target Version
- Perform the Upgrade

There are different HDP upgrade options based on your current HDP and the target HDP. This section describes the different upgrade options, their prerequisites, and the overall process. You are **strongly encouraged** to read completely through this entire document before starting the upgrade process, to that you understand the interdependencies and order of the steps. It is **highly recommended** you validate these steps in a test environment to adjust and account for any special configurations for your cluster.

The high-level process for perfoming an HDP upgrade is as follows:



Ambari will guide you through the steps required to upgrade HDP. Make sure Ambari and the cluster are healthy, operating normally and all service checks are passing. See Preparing to Upgrade Ambari and HDP for more information on performing the Ambari upgrade.

Note

Be sure to review the available HDP upgrade scenarios below. It is **strongly recommended** that you **first upgrade to Ambari 2.2** before upgrading HDP unless otherwise noted. After upgrading Ambari, be sure the cluster is operating normally and service checks are passing prior to attempting an HDP upgrade.

There are two methods for upgrading HDP with Ambari: **Rolling Upgrade** and **Express Upgrade**.

- A **Rolling Upgrade** orchestrates the HDP upgrade in an order that is meant to preserve cluster operation and minimize service impact during upgrade. This process has more stringent prerequisites (particularly regarding cluster high availability configuration) and can take longer to complete than an Express Upgrade.
- An **Express Upgrade** orchestrates the HDP upgrade in an order that will incur cluster downtime but with less stringent prerequisites.

The following table describes which upgrade option is available based on the current and target HDP version combinations. It is important to note that the HDP Stack version is based on the following format: **major.minor.maintenance.patch-build#**. A "minor" release is a release that increments the second-digit. A "maintenance" release is one that increments the third-digit. This terminology is used in the following table to describe the different upgrade paths. For example: if you want to upgrade from HDP 2.2 to HDP 2.3, that is a "Minor Upgrade". If you want to upgrade from HDP 2.2.x to HDP 2.2.y, that is a "Maintenance" Upgrade.

Table 4.1. HDP Upgrade Options

Upgrade Path	Current HDP*	Target HDP*	Rolling Upgrade	Express Upgrade
Maintenance	HDP 2.2.x.y	HDP 2.3.x.y	✅	✅
Maintenance	HDP 2.2.x.y	HDP 2.2.x.y	✅	✅
Minor **	HDP 2.2	HDP 2.3	✅	✅
Minor **	HDP 2.1	HDP 2.3	*not available*	✅***
Minor	HDP 2.1	HDP 2.2	Contact Hortonworks Support for information on perform a HDP 2.1 to HDP 2.2 upgrade.	
Minor	HDP 2.0	HDP 2.2	Ambari 2.2 does **not** support HDP 2.0 and **you must upgra to HDP 2.2 using either Ambari 1.7 or 2.0** before going to Ambari 2.2.	

* The instructions in this document sometimes refer to an HDP “version” using the HDP #.#.x.y convention. For example, you will see the HDP 2.3.x.y convention to refer to any HDP 2.3 “maintenance” release. Therefore, to use a specific HDP 2.3 maintenance release, be sure to replace 2.3.x.y in the following instructions with the appropriate maintenance version, such as 2.3.0.0 for the HDP 2.3 GA release, or 2.3.2.0 for an HDP 2.3 maintenance release.

** A Minor upgrade can be performed from any current maintenance release to any target maintenance release in that minor release. For example, you can go from HDP 2.2.x.y to HDP 2.3.x.y as part of a Minor upgrade.

*** An Express Upgrade from HDP 2.1 -> 2.3 has **no option to "Downgrade"** since the bits for HDP 2.1 will have to be removed midway through the process.

4.1. Prerequisites

To perform an HDP upgrade using Ambari, your cluster must meet the following prerequisites. These prerequisites are required regardless of Rolling or Express upgrade because these checks are important for Ambari to know the cluster is in a healthy operating mode and can be successfully managed from Ambari. However, there are additional prerequisites for a Rolling Upgrade that require your cluster to be configured a certain way to support the rolling upgrade orchestration process.

Check	Description
HDP Version	All hosts must have the target HDP version installed. See the Register and Install Target Version section for more information.
Disk Space	Be sure to have adequate space on `/usr/hdp` for the target HDP version. Each complete install of an HDP version will occupy about 2.5 GB of disk space.
Ambari Agent Heartbeats	All Ambari Agents must be communicating and heartbeating to Ambari Server. Any hosts that are not heartbeating must be in Maintenance Mode.
Host Maintenance Mode	The following two scenarios are checked: • Any hosts in Maintenance Mode must not be hosting any Service Master Components. • Any host in Maintenance Mode that is not hosting Master Components is allowed but you will receive a warning. You can proceed with your upgrade but these hosts will not be upgraded and **before** you can finalize the upgrade, you must delete the hosts from the cluster.
Service Maintenance Mode	No Services can be in Maintenance Mode.
Services Started	All Services must be started.
Service Checks	All Service Checks must pass. Be sure to run **Service Actions > Run Service Check** on all services (and remediate if necessary) prior to attempting an HDP upgrade.

4.1.1. Rolling Upgrade Prerequisites

To perform a **Rolling Upgrade**, your cluster must meet the following prerequisites. If you do not meet these upgrade prerequisites, you can consider an **Express Upgrade**.

HDFS

Requirement	Description
NameNode HA	NameNode HA must be enabled and working properly. See the Ambari User's Guide for more information, Configuring NameNode High Availability.
NameNode Truncate	In HDP 2.2, truncate **must** be disabled and this prerequisite is **REQUIRED**. There is an hdfs-site configuration `dfs.allow.truncate`, This configuration property is set to true if truncate is enabled. If the property is not set or is false, truncate is disabled. In 2.3 onwards, truncate is always enabled, which is acceptable. Therefore, this check is not applicable and will not be performed with HDP 2.3 maintenance upgrades.

YARN

Requirement	Description
Timeline Service State Recovery	YARN state recovery should be enabled. Check the Services > YARN > Configs > Advanced property yarn.timeline-service.recovery.enabled is set to true .
ResourceManager Work Preserving Recovery	YARN work preserving recovery should be enabled. Check the **Services > YARN > Configs > Advanced** property `yarn.resourcemanager.work-preserving-recovery.enabled` is set to `true`.
ResourceManager HA	ResourceManager HA should be enabled to prevent a disruption in service during the upgrade. See the Ambari User's Guide for more information on Configuring ResourceManager High Availability. This prerequisite is **OPTIONAL**.

MapReduce2

Requirement	Description
MapReduce Distributed Cache	MapReduce should reference Hadoop libraries from the distributed cache in HDFS. Refer to the YARN Resource Management guide for more information.
JobHistory State Recovery	JobHistory state recovery should be enabled. Check the following: **Services > MapReduce > Configs > Advanced** property `mapreduce.jobhistory.recovery.enable` is set to true . Once enabled, dependent properties for `mapreduce.jobhistory.recovery.store.class` and `mapreduce.jobhistory.recovery.store.leveldb.path` should also be set.
Encrypted Shuffle	If encrypted shuffle has been enabled, the `ssl-client.xml` file must be copied to `/etc/hadoop/conf/secure` directory on each node in the cluster.

Tez

Requirement	Description
Tez Distributed Cache	Tez should reference Hadoop libraries from the distributed cache in HDFS. Check the **Services > Tez > Configs** configuration and confirm `tez.lib.uris` is set with the path in HDFS for the `tez.tar.gz` file.

Hive

Requirement	Description
Hive Dynamic Service Discovery	HiveServer2 dynamic service discovery should be configured for Rolling Upgrade.
HiveServer2 Port	During the upgrade, Ambari will switch the HiveServer2 port from 10000 to 10010 (or 10011 if using HTTP transport mode).
Hive Client Retry	Hive client retry properties must be configured. Review the **Services > Hive > Configs** configuration and confirm `hive.metastore.failure.retries` and `hive.metastore.client.connect.retry.delay` are specified.
Multiple Hive Metastore	Multiple Hive Metastore instances are recommended for Rolling Upgrade. This ensures that there is at least one Hive Metastore running during the upgrade process. Additional Hive Metastore instances can be added through Ambari. This prerequisite is **OPTIONAL**.

Oozie

Requirement	Description
Oozie Client Retry	Oozie client retry properties must be configured. Review the **Services > Oozie > Configs > oozie-env** configuration and confirm

Requirement	Description
	"export OOZIE_CLIENT_OPTS="${OOZIE_CLIENT_OPTS} -Doozie.connection.retry.count=<number of retries>" is specified.

4.2. Prepare to Upgrade

Review Preparing to Upgrade Ambari and HDP. It is also **strongly** recommended that you perform backups of your databases before beginning upgrade.

- Ambari database
- Hive Metastore database
- Oozie Server database
- Ranger Admin database
- Ranger Audit database

Checkpoint HDFS

1. Perform the following steps on the NameNode host. If you are configured for NameNode HA, perform the following steps on the Active NameNode. You can locate the Active NameNode from **Ambari Web > Services > HDFS** in the **Summary** area.
2. Check the NameNode directory to ensure that there is no snapshot of any prior HDFS upgrade. Specifically, using Ambari Web, browse to **Services > HDFS > Configs**, and examine the `dfs.namenode.name.dir` in the `NameNode Directories` property. Make sure that only a `"/current"` directory and no `"/previous"` directory exists on the NameNode host.
3. Create the following log and other files. Creating these logs allows you to check the integrity of the file system after the Stack upgrade.

   As the HDFS user, `"su -l <HDFS_USER>"` run the following (where <HDFS_USER> is the HDFS Service user, for example, hdfs):

   - Run fsck with the following flags and send the results to a log. The resulting file contains a complete block map of the file system. You use this log later to confirm the upgrade.

     ```
     hdfs fsck / -files -blocks -locations > dfs-old-fsck-1.log
     ```

   - Create a list of all the DataNodes in the cluster.

     ```
     hdfs dfsadmin -report > dfs-old-report-1.log
     ```

   - **Optional**: Capture the complete namespace of the file system. The following command does a recursive listing of the root file system:

     ```
     hdfs dfs -ls -R / > dfs-old-lsr-1.log
     ```

   - **Optional**: Copy all unrecoverable data stored in HDFS to a local file system or to a backup instance of HDFS.

4. Save the namespace. As the HDFS user, "su -l <HDFS_USER>", you must put the cluster in Safe Mode.

   ```
   hdfs dfsadmin -safemode enter
   ```

   ```
   hdfs dfsadmin -saveNamespace
   ```

   Note

   In a highly-available NameNode configuration, the command `hdfs dfsadmin -saveNamespace` sets a checkpoint in the first NameNode specified in the configuration, in `dfs.ha.namenodes.[nameserviceID]`.

   You can also use the `dfsadmin -f`option to specify which NameNode to connect. For example, to force a checkpoint in NameNode2:

   ```
   hdfs dfsadmin -fs hdfs://namenode2-hostname:namenode2-port -saveNamespace
   ```

5. Copy the checkpoint files located in `${dfs.namenode.name.dir}/current` into a backup directory.

   Note

   In a highly-available NameNode configuration, the location of the checkpoint depends on where the `saveNamespace` command is sent, as defined in the preceding step.

6. Store the layoutVersion for the NameNode located at

   `${dfs.namenode.name.dir}/current/VERSION`, into a backup directory where

   `${dfs.namenode.name.dir}` is the value of the config parameter NameNode directories.

   This file will be used later to verify that the layout version is upgraded.

7. As the HDFS user, "su -l <HDFS_USER>", take the NameNode out of Safe Mode.

   ```
   hdfs dfsadmin -safemode leave
   ```

8. Finalize any prior HDFS upgrade, if you have not done so already. As the HDFS user, " su -l <HDFS_USER> ", run the following:

   ```
   hdfs dfsadmin -finalizeUpgrade
   ```

Proceed to Register and Install Target Version.

4.3. Register and Install Target Version

This section describes the steps to register the software repositories with Ambari for the new target version (i.e. the version you will be upgrading to) and how to install the software on all host prior to performing the upgrade.

- Register Target Version
- Install Target Version

4.3.1. Register Target Version

1. Log in to Ambari.
2. Browse to **Admin > Stack and Versions**.
3. Click on the **Versions** tab. You will see the version currently running, marked as "Current".

   Note

   The full version is dependent on the HDP version you are actually running. For example, if you are currently running the HDP 2.2.0.0 release, you would see something like **HDP-2.2.0.0-2557** as the full version number.
4. Click **Manage Versions**.
5. Proceed to register a new version by clicking **+ Register Version**.
6. Enter the "name" for the version you are registering. The name is made up of two parts; the "HDP-major.minor" version, and the "VersionNumber".

   a. Select the "HDP-major.minor" version from the dropdown.

   b. Enter a "two-digit Version Number" in the input field.
   For example, if you are registering version "HDP-2.3.0", select **HDP** and enter **2.0**.

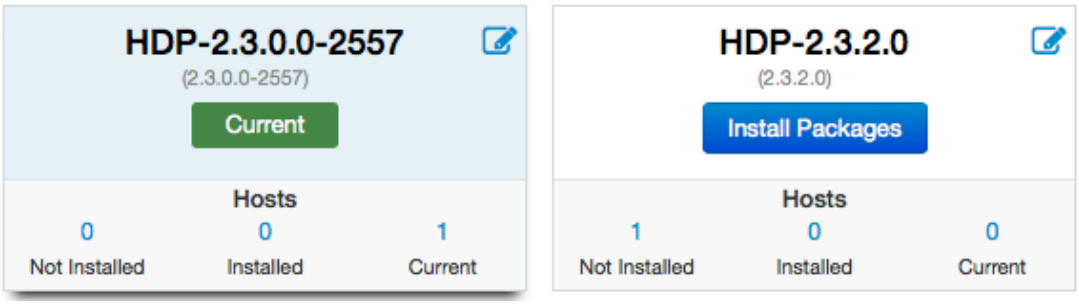
7. Select one or more OS families and enter the respective Base URLs for each repository.

   To use the public software repositories, see the list of available HDP Repositories for each OS. Or, if you are using a local repository, enter the Base URLs for the local repository you have created. Refer to Using a Local Repository for more information in setting-up a local repository in your environment.
8. Click **Save**.
9. Ambari will attempt to validate the Base URLs by checking that the Base URLs entered are valid, reachable and resolve as software repositories.
10. Click Go To Dashboard, and browse back to **Admin > Stack and Versions > Versions**.

    You will see the version currently running, marked "Current", and the version you just registered **HDP-2.3.2.0** which is showing an **Install Packages** button.
11. Proceed to Install Target Version.

4.3.2. Install Target Version

1. Log in to Ambari.
2. Browse to **Admin > Stack and Versions**.
3. Click on the **Versions** tab.



4. Click **Install Packages** and click **OK** to confirm.
5. The Install version operation will start. This will install the target version on all hosts in the cluster. You can monitor the progress of the install by clicking the "Installing" link.
6. Once the install is complete, the **Install Packages** button will be replaced with the option to **Perform Upgrade**.
7. Proceed to Perform the Upgrade.

4.4. Perform the Upgrade

1. Log in to Ambari.
2. Browse to **Admin > Stack and Versions**.
3. Click on the **Versions** tab. The registered and installed target HDP version should be visible.
4. Click **Perform Upgrade** on the target version.
5. Based on your current HDP version and the target HDP version, Ambari will perform a set of prerequisite checks to determine if you can perform a **Rolling Upgrade** or an **Express Upgrade**. A dialog will be presented with the options available.
6. Select your upgrade method: **Rolling Upgrade** or **Express Upgrade**. There are also advanced options available.

Option	Description
Skip all Service Check failures	Ambari will automatically skip any Service Check failures and complete the task without requiring user intervention to continue. After all the Service Checks have run in a task, you will be presented with summary of the failures and an option to continue the upgrade or pause.
Skip all Slave Component failures	Ambari will automatically skip any Slave Component failures and complete the task of upgrading Slave components without requiring user intervention to continue. After all Slave Components have been

Option	Description
	upgraded, you will be presented with a summary of the failures and an option to continue the upgrade or pause.

7. Click **Proceed**. Based on your option choice, proceed with the upgrade:

   - If you selected Rolling Upgrade , proceed to Perform Rolling Upgrade.
   - If you selected Express Upgrade , proceed to Perform Express Upgrade.

4.4.1. Perform Rolling Upgrade

1. Ambari will check that your cluster meets the Rolling Upgrade Prerequisites. A dialog will be presented with the results:

   a. If any prerequisites are not met but are required, the result will be shown with an error. You will not be allowed to proceed with the upgrade. Make the appropriate corrections and return to Perform Upgrade again.

   b. If any prerequisites are not met but are optional, the result will be shown with a warning. You will be allowed to Proceed with the upgrade.

   c. A list of configuration changes (if any) will be displayed.

2. Once the prerequisite checks are complete, the upgrade will start. The time it takes to perform the upgrade dependents on many factors. As part of the upgrade process, each component in the cluster is restarted in a serial fashion as such, the stop/start time is a big contributor to the overall time.

3. The upgrade process involves a set of stages. This table lists the high-level stages and if the process requires any action by you during normal operation.

Note

If any stage fails, the upgrade will halt and prompt for action.

Stage	Description	Action Required
Prepare Upgrade	You should stop all YARN queues, all long-running applications on Slider, and deactivate & kill all running Storm topologies.	Perform the actions to prepare for the upgrade.
Prepare Backups	This is a confirmation step used to confirm that you have taken proper backups before proceeding.	You must acknowledge the prompt for database backups.
ZooKeeper	All ZooKeeper servers are upgraded and restarted.	None
Ranger	Ranger Admin and UserSync servers are upgraded and restarted.	None. If Ranger Admin does not function after the upgrade completes, run the upgrade scripts manually, then Retry Upgrading Ranger, as described here.
Core Masters	This stage upgrades the master components of core services. This includes JournalNodes & NameNodes (HDFS), HistoryServer (MapReduce2), ResourceManager & ATS (YARN) and HBase Masters (HBase).	None

Stage	Description	Action Required
All Service Checks	All Service Checks are performed against the cluster.	If any service check fails, you will be prompted to Ignore and Continue, Downgrade or Retry. If you selected the "Skip all Service Check failures" option, you will only be prompted at the completion of all of the Service Checks.
Core Slaves	This stage upgrades the slave components of core services. This includes DataNodes (HDFS), RegionServers (HBase) and NodeManagers (YARN). This is down in two batches: 20% of the slaves first, then the remaining slaves.	After the first 20% batch is complete, you will be prompted to Verify the cluster is operating correctly.
All Service Checks	All Service Checks are performed against the cluster.	If any service check fails, you will be prompted to Ignore and Continue, Downgrade or Retry. If you selected the “Skip all Service Check failures” option, you will only be prompted at the completion of all of the Service Checks.
Hive	This stage upgrades the Hive Metastore, HiveServer2 and WebHCat components and the Hive clients.	Ambari will switch the HiveServer2 port from 10000 to 10010 (or, 10011 if using HTTP transport mode). You will be prompted to confirm prior to the switch.
Spark	The Spark Job History Server and clients are upgraded.	None
Oozie	The Oozie Server and clients are upgraded.	None
Falcon	The Falcon Server and clients are upgraded.	None
Client Components	All remaining clients are upgraded.	None
All Service Checks	All Service Checks are performed against the cluster.	If any service check fails, you will be prompted to Ignore and Continue, Downgrade or Retry. If you selected the “Skip all Service Check failures” option, you will only be prompted at the completion of all of the Service Checks.
Kafka	The Kafka Brokers are upgraded.	None
Knox	The Knox Gateways are upgraded.	None
Storm	The Nimbus, REST API, DRPC Server and UI Server components are upgraded, along with the Supervisors.	None
Slider	The Slider clients are upgraded.	None
Flume	The Flume agents are upgrade.	None
Finalize Upgrade Pre-Check	Checks if any hosts were not upgraded, either because the host was in Maintenance Mode, or one or more components on the host failed to upgrade (and were skipped).	Click on the list that displays "# hosts" for details on the hosts (and their components) that are not upgraded. You can **Pause Upgrade**, delete the hosts and return to finalize.
Finalize	The component upgrades are complete. You are presented the option to Finalize, which when selected, completes the upgrade process + saves the cluster state.	Prompted to Finalize, Finalize Later or Downgrade.

4. Once the upgrade is complete, you have an option to **Finalize** the upgrade, to **Finalize Later** or to **Downgrade**. Finalizing later gives you a chance to perform more validation on the cluster. Downgrade moves the cluster version back to the previous version (basically: the reverse of the upgrade process stages). **Once finalized, you cannot downgrade back to the previous version**.

Note

If you choose to finalize later, both versions will be listed on the Stack and Versions tab with the starting version displaying as Current. It is not until you finalize that Ambari makes the target version the current version. Also, until you finalize, you will not be able to perform operational changes to the cluster (such as move components, change configurations, etc).

5. Click **Finalize** and the upgrade process is complete.

4.4.2. Perform Express Upgrade

1. Ambari will check that your cluster meets the Prerequisites. A dialog will be presented with the results:

   a. If any prerequisites are not met but are required, the result will be shown with an error. You will not be allowed to proceed with the upgrade. Make the appropriate corrections and return to Perform Upgrade again.

   b. If any prerequisites are not met but are optional, the result will be shown with a warning. You will be allowed to Proceed with the upgrade.

   c. A list of configuration changes (if any) will be displayed.

2. Once the prerequisite checks are complete, the upgrade will start. The time it takes to perform the upgrade dependents on many factors. As part of the Express upgrade process, each component in the cluster is restarted in parallel across all hosts, usually requiring less time than the serial approach used in the Rolling Upgrade.

3. The upgrade process involves a set of stages. This table lists the high-level stages and if the process requires any action by you during normal operation.

Note

If any stage fails, the upgrade will halt and prompt for action.

Stage	Description	Action Required
Prepare Upgrade	You should stop all YARN queues, all long-running applications on Slider, and deactivate & kill all running Storm topologies.	Perform the actions to prepare for the upgrade.
Stop Components for High-Level Services	This will stop all components for High-Level Services. This includes all master components **except** those of HDFS, HBase, ZooKeeper and Ranger.	None
Perform Backups	This is a confirmation step used to confirm that you have taken proper backups before proceeding.	You must acknowledge the prompt for database backups.
Stop Components for Core Service	Stops all components with HDFS, HBase, ZooKeeper and Ranger.	None
Update Target Stack	Updates the stack version in Ambari to the target version.	None

Stage	Description	Action Required
Update Service Configs	Updates (i.e. transfers or replaces) any configurations that are necessary for the upgrade.	None
Restart Components	Restarts all core components such as ZooKeeper, Ranger, HDFS, YARN, MapReduce2 and various Clients (Tez, Pig, Sqoop).	None
All Service Checks	All Service Checks are performed against the cluster.	If any service check fails, you will be prompted to Ignore and Continue, Downgrade or Retry. If you selected the "Skip all Service Check failures" option, you will only be prompted at the completion of all of the Service Checks.
Restart Components	Restarts the remaining components such as Oozie, Falcon, Hive, Spark and others.	None
Set Version on All Hosts	Sets the HDP version on all hosts to the target HDP version.	None
Finalize Upgrade Pre-Check	Checks if any hosts were not upgraded, either because the host was in Maintenance Mode, or one or more components on the host failed to upgrade (and were skipped).	Click on the list that displays "# hosts" for details on the hosts (and their components) that are not upgraded. You can **Pause Upgrade**, delete the hosts and return to finalize.
Finalize Upgrade	The component upgrades are complete. You are presented the option to Finalize, which when selected, completes the upgrade process + saves the cluster state.	Prompted to Finalize or Finalize Later or Downgrade.

4. Once the upgrade is complete, you have an option to **Finalize** the upgrade, to **Finalize Later** or to **Downgrade**. Finalizing later gives you a chance to perform more validation on the cluster. Downgrade moves the cluster version back to the previous version (basically: the reverse of the upgrade process stages). **Once finalized, you cannot downgrade back to the previous version**.

Note

If you choose to finalize later, both versions will be listed on the Stack and Versions tab with the starting version displaying as Current. It is not until you finalize that Ambari makes the target version the current version. Also, until you finalize, you will not be able to perform operational changes to the cluster (such as move components, change configurations, etc).

5. Click **Finalize** and the upgrade process is complete.

Important

An Express Upgrade from HDP 2.1 -> 2.3 has **no option to "Downgrade"** since the bits for HDP 2.1 will have to be removed midway through the process.