

Address Pool Manager Installation Guide

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Address Pool Manager Installation Guide

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About This Guide

Use this guide to install and configure Address Pool Manager (APM) on a Kubernetes orchestration platform.

1

CHAPTER

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APM Installation

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APM Installation Overview

Juniper Address Pool Manager (APM) is an automated, centralized, container-based cloud-native application that network operators and administrators use to manage IP address resources. APM works with managed broadband network gateways (BNGs) to monitor address pools on BNGs. When the number of free addresses drops below a set threshold, the BNG raises an alarm. The alarm triggers APM to allocate unused prefixes from its global list of prefixes and provision a subset of the prefixes to the BNG as new pools.



NOTE: The term *BNG* in this document also applies to the BNG CUPS Controller.

You can deploy APM on any hardware that meets the requirements. The following sections describe:

- APM installation requirements
- How to install APM
- How to adjust APM setup parameters

APM Installation Requirements

IN THIS SECTION

- [APM Requirements | 3](#)
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To install APM, you need the following hardware and software:

APM Requirements

APM installs on a Kubernetes cluster comprised of physical or virtual machines (VMs). For availability, you must have at least three nodes in the cluster. APM requires the following minimal resources from the Kubernetes cluster:

Table 1: Cluster Requirements

Category	Details
Storage	Storage Class or PVs capable of backing 100 mebibytes (MiB) RWX PVC for configuration
Network load balancer addresses	One for APMi
Node port address	One for optional CLI/SSH access
Container/registry storage	Container/registry storage 2.5 gibibytes (GiB)
Worker node resource consumption (specification)	<p>APM resource consumption on each Worker node:</p> <ul style="list-style-type: none"> • CPU: 4 cores • Memory: 2 gibibytes (GiB) • Storage: 2.5 gibibytes (GiB)

Table 1: Cluster Requirements (*Continued*)

Category	Details
Jump host	<ul style="list-style-type: none">• Ubuntu version 22.04 LTS or later• CPU: 1 cores• Memory: 8 gibibytes (GiB)• Storage: 128 gibibytes (GiB)• Installed software<ul style="list-style-type: none">• Python3-venv• The Helm utility• The Docker utility• OpenShift CLI (if you are using a Red Hat OpenShift Container Platform cluster)

Table 1: Cluster Requirements (*Continued*)

Category	Details
Node specification (minimum of 3 nodes)	<ul style="list-style-type: none"> • Operating System: <ul style="list-style-type: none"> • Ubuntu 22.04 LTS (for a BBE Cloudsetup cluster) • Red Hat Enterprise Linux CoreOS (RHCOS) 4.15 or later (for an OpenShift Container Platform cluster) • CPU: at least 8 cores • Memory: 64 GB memory • Storage: 512 GB storage partitioned as 128 GB root (/), 128 GB /var/lib/docker, and 256 GB /mnt/longhorn(application data) <p>This specification establishes a cluster that can run APM as well as its companion applications such as BBE Event Collection and Visualization and BNG Controller simultaneously.</p> <p>NOTE: To create the cluster, you can use either of the following applications:</p> <ul style="list-style-type: none"> • BBE Cloudsetup release 2.1.1 or later • Red Hat OpenShift Container Platform release 4.15 or later. An OpenShift Container Platform cluster also, requires the following: <ul style="list-style-type: none"> • A container registry • A network load balancer with at least one IP Address Pool • A storage class named jnpr-bbe-storage

Additional Requirements

The BNG is a Juniper Networks MX Series router, or a Juniper BNG CUPS Controller (BNG CUPS Controller). We recommend that the BNG is running Junos OS Release 24.2R2 or later.

For APM, confirm that you have a juniper.net user account with permissions to download the APM software package. Download and install the APM software from a machine that will not be part of the Kubernetes cluster.

Install APM

SUMMARY

Use the procedures in this section to install APM for the first time.

Before you begin, confirm that you have met the requirements for the APM installation.

We recommend that you use a secure connection between APM and the BNG.

You have the following two options for installing APM:

- ["Install APM Using the APM installation Utility" on page 8](#)—You can install APM using the APM utility, which streamlines the installation process. To use the APM utility, you must install APM on a Kubernetes cluster that is created by either BBE Cloudsetup (see [BBE Cloudsetup Installation Guide](#)) or by Red Hat OpenShift Container Platform.
- ["Install APM Without Using the APM Utility " on page 18](#)—You can install APM on a preexisting Kubernetes cluster of your choice. This process is a manual process and does not use the APM utility that comes with the APM installation package.

Before starting the APM installation, make sure that you have the following information:

Required Information:

- Container registry details:
 - If you are using a BBE Cloudsetup created cluster:
 - External registry address.
 - External registry port number (usually 5000).
 - If you are using a Red Hat OpenShift Container Platform cluster:
 - External registry (fully qualified domain name)
 - Internal (Docker) registry address

- Internal (Docker) registry port number

Optional Information:

- APM initial configuration file. If a configuration file is not supplied, a basic configuration file is automatically generated.
- Storage class name for permanent virtual channel (PVC) creation (default is jnpr-bbe-storage).
- PVC Size (defaults is 90 MiB).
- Archival configuration details. This is required if you are planning to mirror a copy of the APM configuration to an external server.
 - Either the name of the SSH private key file or the name of the Kubernetes secret that is present in the jnpr-apm namespace containing the SSH private key.
 - The Secure Copy Protocol (SCP) URL of the server where the configuration file will be archived. An SCP URL takes the form of `scp://user-login@server-fqdn:server-port/absolute-file-path` (for example, `scp://user@host1.mydomain.com:30443/home/user/configs/apm`).
- Syslog server details. This is required if you are planning to export APM logs to an external syslog collector.



NOTE: If [BBE Event Collection and Visualization](#) is detected running on the target cluster, the address and port values of the ECAV deployment will be suggested as the default.

- Syslog server address.
- Syslog server port number.
- Network load balancer details. This is required if you are planning to use a specific network load balancer pool and address for APMi.
 - Network load balancer pool name.
 - Network load balancer pool address.
- APMi Details:
 - Port (default is 20557)
 - TLS details. You will need one of the following:
 - None (insecure)
 - Either the key and certificate files or the name of the Kubernetes secret that is present in the jnpr-apm namespace that contains the key and certificate information.

- Number of worker processes for the provman microservice (default is 3).

Install APM Using the APM installation Utility

SUMMARY

You use the procedure in this section if you are installing APM on a cluster that was created by the BBE Cloudsetup utility or by Red Hat OpenShift Container Platform Console.

1. Download the APM software package from the Juniper Networks [software download page](#) to the jump host.
APM is available as a compressed TAR (.tgz) file. The filename includes the release number as part of the name. The release number has the format: <Major>.<Minor>.<Maintenance>
 - *major* is the main release number of the product.
 - *minor* is the minor release number of the product.
 - *maintenance* is the revision number.
2. Unpack the APM TAR (.tgz) file on the jump host by entering:

```
$ tar -zxvf apm-m.m.m.tgz
apm/
apm/apm_loader
apm/images/
apm/images/apm_containerImages.tar.gz
apm/charts/
apm/charts/provman/
apm/charts/provman/templates/
apm/charts/provman/templates/apmProv-man.yaml
apm/charts/provman/templates/apmApmiSvc.yaml
apm/charts/provman/questions.yaml
apm/charts/provman/Chart.yaml
apm/charts/provman/containers.yaml
apm/charts/provman/values.yaml
apm/charts/provman/.helmignore
apm/charts/entman/
```

```

apm/charts/entman/templates/
apm/charts/entman/templates/apmEnt-man.yaml
.
.
.

```

3. Run the loader script after you unpack the TAR file.

```

$ sudo apm/apm_loader
Creating apm group... done.
Loading files... done.
Updating latest link... done
Setting up utility script... done.
Updating wrapper... done
Successfully loaded: 3.3.0

```

4. Use the `sudo -E apm link --context context-name --version apm-version` command to link to the cluster. The `link` command associates the loaded APM software package to the cluster in preparation for the setup.

```

$ sudo -E apm link --context context-name --version 3.3.0
3.3.0
Linking contextName to 3.3.0 ... done.
Linking complete, please run apm setup.

```

- *context-name* is the Kubernetes context (cluster name).
 - *apm-version* is the software version.
5. If you are installing APM on a Red Hat OpenShift Container Platform cluster, log in with the OpenShift CLI and then proceed to the next step.
If you are installing APM on a BBE Cloudsetup created cluster, proceed to the next step.
 6. You must authenticate with the container registry in order to be able to push the APM container images. How you authenticate to the registry varies depending on if you are installing APM on a BBE Cloudsetup created cluster or on an Red Hat OpenShift Container Platform cluster (see the respective documentation for details).
 7. Run `setup` to configure your installation. The `setup` command does the following:
 - Collects information about the cluster environment such as; Container registry contact information, keys and certificates needed to secure external interfaces, persistent storage resources, and other information relevant to supporting APM features.
 - Initializes the APM configuration.

If you did not use either the `bbcloudsetup` option or the `template file-name` option with the `setup` command, you need to complete these prompts during the setup:

- If you are using BBE Cloudsetup to create your cluster.
 - External registry address.
 - External registry port number.
- If you are using a Red Hat OpenShift Container Platform cluster:
 - External registry (fully qualified domain name)
 - Internal (Docker) registry address
 - Internal (Docker) registry port number



NOTE: When running `setup`, you can interact with the setup process by entering `^d`.

If you want to change a value after entering it, enter `^d`. After entering `^d`, the value you previously entered is removed and the default value is automatically used for the question. You can use the `^d` operation for any setup questions that are optional or for which a list of values can be provided.

```
$ sudo -E apm setup --context context-name --update [--bbcloudsetup] [--ssh] <host:port> [--secrets]
```

- `context-name` is the Kubernetes context name.
- `update` prompts for only missing values (primarily used after loading a new software release).
- `bbcloudsetup` uses the default values provided with the charts, so that you do not need to answer prompts during setup. The `bbcloudsetup` option is used when installing APM on a BBE Cloudsetup created cluster (see the [BBE Cloudsetup Installation Guide](#) for installation instructions).
- `template file-name` uses the values provided in the YAML file for the Red Hat OpenShift Container Platform cluster, so that you do not need to answer prompts during setup. The `template file-name` option is used when installing APM on a Red Hat OpenShift Container Platform created cluster. [Table 2 on page 12](#) describes the information that you need to enter into the `template` configuration file.
- `ssh host:port` is a hostname or IP address of the cluster (any of the cluster's nodes) and open port for ssh access to the CLI. SSH access to the CLI is provided by the MGMT microservice.



NOTE: Enabling SSH access requires the MGMT microservice to run in *privileged* mode.

- `config config-file-name` name of the initial configuration file used for APM at startup.



NOTE: You can use an initial configuration file to start and roll out APM. You use the configuration file through the `--config config-file-path` switch on the utility script's setup command.

```
sudo -E apm setup -context context-name --config config-file-path
```

When APM is started or rolled out, the configuration file that you supply during setup is used to initialize APM. If you do not supply a configuration file, APM starts with the factory defaults. The factory defaults include the bbe-ecav syslog server configuration, if the BBE Event Collection and Visualization application is detected running on the cluster.

The supplied configuration file is stored on the jumphost's context repository. This allows the configuration to be preserved across APM start and stop events. Commits to the initial configuration are not automatically saved to the persistent location on the jumphost. To update the configuration at the persistent location, use the utility script's `save-config` command.

```
sudo -E apm save-config --context context-name
```

Using the `save-config` command ensures that the latest configuration is used the next time that APM is started and rolled out. In order to restore the initial configuration back to its factory default, enter setup interactively and enter `^d` to the *startup config ...* question.

```
sudo -E apm setup -context context-name
```

```
.  
.
.
```

```
Startup config to mount into mgmt pod on rollout (deployed: true) > ^d
```

The action in the parenthesis changes to *remove*. Press **Enter** to accept the removal of the deployed configuration. APM reverts back to the factory default configuration after a stop and then rollout command sequence.

When you change the initial configuration file using the utility script's setup command, you must perform a stop and then rollout command sequence for the change to take effect.

8. Verify the APM installation `apm version --context context-name [--detail]` .

```
$ apm version --context context-name --detail
NOTE: Address_Pool_Manager not deployed
Address_Pool_Manager versions:
  Microservice  Release          (version)
  apm:          3.3.0
  addrman:     (3.3.0)
  entman:     (3.3.0)
  mgmt:       (3.3.0) (24.2R2)
  provman:    (3.3.0)
  redis:     (3.3.0) (6.2.14-debian-12-r21)
```

- *context-name* is the Kubernetes context
- **detail** detail adds information about available releases in the software repository.

Table 2: Setup File Field Descriptions

Field	Description
External registry address	The external registry address is a fully qualified domain name (FQDN) that the container images are pushed to.
Internal (Docker) registry transport address (fqdn:port)	The internal registry transport address is the address from which the container images are pulled from during rollout. This address is typically different than the external registry address.
(Optional) Initial APM configuration file	The configuration file that is used at APM startup.
(Optional) Cluster storage-class name	The name of the Kubernetes storage class to use for creating Persistent Volume Claims (PVCs). The management microservice uses a PVC to record the configuration state.

Table 2: Setup File Field Descriptions *(Continued)*

Field	Description
(Optional) Cluster storage size	The PVC size in mebibytes (MiB).

Table 2: Setup File Field Descriptions (*Continued*)

Field	Description
(Optional) Configuration archival server	<p>When you configure the Configuration archival server option, APM archives a copy of the updated configuration to an external server after each successful commit.</p> <p>To configure the server information where configuration file changes are archived, you must enter the following information:</p> <ul style="list-style-type: none"> ssh-key information. Provide information for one of the following: <ul style="list-style-type: none"> The name of a Kubernetes Secret in the APM namespace that contains the SSH private key data. The name of the SSH private-key file. <p>NOTE: If a secret name is supplied, you will not be prompted for the SSH private-key file.</p> The Secure Copy Protocol (SCP) URL of the server where the configuration file will be archived. <p>NOTE: The URL must use the following format: <code>scp://user-login@server-fqdn:server-port/absolute-file-path</code> (for example, <code>scp://user@host1.mydomain.com:30443/home/user/configs/apm</code>).</p> <p>Upon successful commit, an SCP transfer of the candidate configuration is transferred to the archival URL as a compressed file with the name:</p> <code>apm-identifier_YYYYMMDD_HHMMSS_juniper.conf.n.gz</code> <ul style="list-style-type: none"> <code>apm-identifier</code> is the external IP address of the APMi interface.

Table 2: Setup File Field Descriptions (*Continued*)

Field	Description
	<ul style="list-style-type: none"> • YYYYMMDD_HHMMSS is the time stamp in Coordinated Universal Time (UTC). • <i>n</i> is the number designation of the compressed configuration rollback file.
(Optional) Syslog Details	<p>If you want to export APM log information to an external syslog collector, enter the following syslog server information:</p> <ul style="list-style-type: none"> • IP address or fully qualified domain name • Port number <p>Syslog information is included in the generated factory default configuration file. If you did not use the generated factory default configuration file, and used your own initial configuration file, you must include the <code>system syslog host</code> stanza containing the connection details for the syslog server.</p>
(Optional) Network Load Balancer Pool	<p>If you want the APMi external address to be allocated from a specific network load balancer address pool, enter the following network load balancer pool information:</p> <ul style="list-style-type: none"> • Network load balancer address annotation • Network load balancer pool annotation
(Optional) APMi port	The APMi port number (default is 20557).

Table 2: Setup File Field Descriptions (*Continued*)

Field	Description
(Optional) APMi secrets	<p>To secure the APMi (recommended), enter one of the following:</p> <ul style="list-style-type: none"> • The name of a Kubernetes secret in the APM namespace that contains the TLS secret data (root Certificate Authority certificate, certificate, private-key) • Key files (root Certificate Authority certificate, certificate, and private key) <p>NOTE: If a secret is provided, you will not be prompted for the Key files during installation.</p>
(Optional) Number of worker processes	<p>The number of provman worker processes determines how simultaneous processes provman deploys to handle the entity workload. We suggest that you plan for 20 entities per process. Each process can consume a CPU core on the node it is running on. Therefore, the nodes in the cluster must have sufficient CPU cores to support the number of provman processes (plus any other workloads that may be running on a node).</p> <p>You can configure 1 to 10 worker process (default is 3).</p>

Start APM

SUMMARY

Use this procedure to configure and to start APM.

1. Enter `rollout` to start the APM installation. You need to use the rollout command with `sudo/as root`. The rollout command also validates that all the values needed for the new releases are present and loads the new release container images to the registry. Use `sudo -E apm rollout --context context-name` to start APM services. For example:

```
$ sudo -E apm rollout --context context-name
  RHOC: adding privileged SCC to apm service account
Validating registries... done.
Load container images to registry...
  Loading 3.3.0 redis images to local cache... done.
  Loading 3.3.0 mgmt images to local cache... done.
  Loading 3.3.0 addrman images to local cache... done.
  Loading 3.3.0 entman images to local cache... done.
  Loading 3.3.0 provman images to local cache... done.
  Pushing 3.3.0 redis images to registry... done.
  Pushing 3.3.0 mgmt images to registry... done.
  Pushing 3.3.0 addrman images to registry... done.
  Pushing 3.3.0 entman images to registry... done.
  Pushing 3.3.0 provman images to registry... done.
Loaded container images to registry.
Rollout Address_Pool_Manager... done.
```

- *context-name* is the Kubernetes context (cluster name).



NOTE: By default, APM starts with the values that you provided during setup. Unless the configuration was saved, the initial configuration is what was provided during setup. All other persistent states (logs, database keys, and so on) are cleared.

2. Enter `apm status --context context-name [-o|--output json] [--detail]` to verify that the APM services are up and running. For example:

```
$ apm status --context context-name --detail
MICROSERVICE  POD                                STATE  RESTARTS  UPTIME
NODE
addrman        jnpr-apm-addrman-7cff87b557-gp8s7  Running  0          0:01:52.755513  test-
node-1.juniper.net
entman        jnpr-apm-entman-67d9bf9498-bx8jj  Running  0          0:01:49.755557  test-
node-2.juniper.net
mgmt          jnpr-apm-mgmt-6c76cc8dd7-pmlpv    Running  0          0:01:56.755587  test-
node-3.juniper.net
provman       jnpr-apm-provman-75bc8d465d-czcfm  Running  0          0:01:36.755613  test-
```

```

node-3.juniper.net
redis      jnpr-apm-redis-0           Running 0      0:02:28.755636 test-
node-1.juniper.net
redis      jnpr-apm-redis-1           Running 0      0:02:15.755658 test-
node-3.juniper.net
redis      jnpr-apm-redis-sentinels-0 Running 0      0:02:14.755679 test-
node-3.juniper.net
redis      jnpr-apm-redis-sentinels-1 Running 0      0:02:13.755700 test-
node-2.juniper.net
redis      jnpr-apm-redis-sentinels-2 Running 0      0:02:13.755722 test-
node-1.juniper.net

Storage: Healthy

```



NOTE: Collect the logs for a service and contact the Juniper Networks Technical Assistance Center (JTAC) when either of the following occurs:

- The service is not running.
- The service's uptime compared with other services indicates that it has restarted.

Install APM Without Using the APM Utility

The instructions in this section describes the installation steps for installing APM on a preexisting Kubernetes cluster of your choice. This process is a manual process and does not use the APM utility that comes with the APM installation package.

1. Download the APM software package from the Juniper Networks [software download page](#) to the jump host.

APM is available as a compressed TAR (.tgz) file. The filename includes the release number as part of the name. The release number has the format: <Major>.<Minor>.<Maintenance>

- *major* is the main release number of the product.
- *minor* is the minor release number of the product.
- *maintenance* is the revision number.

2. Unpack the APM TAR (.tgz) file on the jump host by entering:

```
$ tar -zxvf apm-m.m.m.tgz
apm/
apm/apm_loader
apm/images/
apm/images/apm_containerImages.tar.gz
apm/charts/
apm/charts/provman/
apm/charts/provman/templates/
apm/charts/provman/templates/apmProv-man.yaml
apm/charts/provman/templates/apmApmiSvc.yaml
apm/charts/provman/questions.yaml
apm/charts/provman/Chart.yaml
apm/charts/provman/containers.yaml
apm/charts/provman/values.yaml
apm/charts/provman/.helmignore
apm/charts/entman/
apm/charts/entman/templates/
apm/charts/entman/templates/apmEnt-man.yaml
.
.
.
```

3. The container images needed by APM are stores in the **images** subdirectory. You must push the images to the registry where the scheduled application images will be pulled from. Depending on the type of container registry being used the commands may be different. The following commands illustrate one method of pushing container images to the registry:

```
% docker image load -i ./images/apm_addr-man_containerImages.tar.gz
Loaded image: apm_addr-man:3.3.0
```



```
docker image load -i ./images/apm_init_containerImages.tar.gz
Loaded image: apm_init:3.3.0
```

```
% docker tag apm_addr-man:3.3.0 <regHost>:<regPort>/apm_addr-man:3.3.0
docker tag apm_init:3.3.0 [regHost]:[regPort]/apm_init:3.3.0
```

```
% docker push <regHost>:<regPort>/apm_addr-man:3.3.0
docker push [regHost]:[regPort]/apm_init:3.3.0
```

4. To prepare APM for deployment, you must create a YAML configuration file for each microservice. Each microservice's configuration file contains the specific configuration settings for the microservice. The YAML configuration file is called **values.yaml** and the file is located under the **charts** subdirectory, with each microservice. You should create a separate **values.yaml** (for example, **new-values.yaml**) specific to your configuration for each microservice. [Table 3 on page 21](#) describes the fields in the microservice's configuration files (**values.yaml**).



NOTE: If you do not want to create multiple **values.yaml** files, you can create a single **values.yaml** that contains information for all the microservices. The single **values.yaml** is located under the umbrella chart in the **apm/apm/charts/address_pool_manager** folder. The procedures in this section describe how to configure an individual YAML configuration file for each microservice.

Create a new **values.yaml** file for each of the microservices, by making a copy of the file and then saving the new file. Update each file according to your Kubernetes cluster's information.

Following are the microservices and their **values.yaml** file location:

- **redis** microservice—Located at **apm/apm/charts/redis**
- **mgmt** microservice—Located at **apm/apm/charts/mgmt**
- **addrman** microservice—Located at **apm/apm/charts/addrman**
- **entman** microservice—Located at **apm/apm/charts/entman**.
- **provman** microservice—Located at **apm/apm/charts/provman**

Table 3: Microservices Configuration File Field Descriptions

Field	Description	Microservice
APMi port	The APMi exposed port number.	provman
APMi secrets	<ul style="list-style-type: none"> • name—Name space secret to mount • certificate—Certificate file name • key—Private key file name • rootca—CA certificate file name 	provman
apmInitVersion	APM init software version.	<ul style="list-style-type: none"> • mgmt • redis
archivalUrl	The Secure Channel Protocol (SCP) URL of the server where the configuration file is archived.	mgmt
db master updateStrategy	Only RollingUpdate is supported.	redis
evictionToleration	The node's unreachable tolerance (in seconds).	<ul style="list-style-type: none"> • addrman • entman • mgmt • provman • redis
init_wait_for_sync	Indicates whether or not to wait for all entities to synchronize during startup.	provman

Table 3: Microservices Configuration File Field Descriptions (*Continued*)

Field	Description	Microservice
log_level	The default logging level.	<ul style="list-style-type: none"> • addrman • entman • mgmt • provman • redis
nlbPoolAnnotation	The network load balancer pool name.	provman
nlbPoolIpAnnotation	The network load balancer IP address	provman
pvc config	<ul style="list-style-type: none"> • meta—Permanent virtual channel (PVC) for configuration file storage. • size—PVC size (MiB). 	mgmt
registry	Registry information: <ul style="list-style-type: none"> • host—The registry contact for the cluster pulls. • port—The registry port number for cluster pulls. 	<ul style="list-style-type: none"> • addrman • entman • mgmt • provman • redis

Table 3: Microservices Configuration File Field Descriptions (*Continued*)

Field	Description	Microservice
resourceRequestsEnabled	Whether or not to accept the resource request.	<ul style="list-style-type: none"> • addrman • entman • mgmt • provman • redis
resourceRanges	Required resource ranges: <ul style="list-style-type: none"> • cpuRequest—The minimum millicores that are required to operate the system. • memRequest—The minimum mebibytes (MiB) that are required to operate the system. 	<ul style="list-style-type: none"> • addrman • entman • mgmt • provman • redis • redis
sentinelCount	The number of sentinels to start.	redis
startup config	The configuration to use for system startup.	mgmt
storage_class	Name of the storage class for PVC.	mgmt
tlsEnabled	Indicates if TLS is enabled.	provman
workerProcs	The number of worker processes that you want started.	provman

5. After you have made all the desired changes to your new **values.yaml** files for each microservice, the microservices must be deployed with the new **values.yaml** files.

NODE	NOMINATED NODE	READINESS	GATES		
jnpr-apm-addrman-7cff87b557-gp8s7	1/1	Running	0	124m	10.42.2.15
jib.englab.juniper.net	<none>	<none>			
jnpr-apm-entman-67d9bf9498-bx8jj	1/1	Running	0	124m	10.42.1.141
keel.englab.juniper.net	<none>	<none>			
jnpr-apm-mgmt-6c76cc8dd7-pmlpv	1/1	Running	0	124m	10.42.0.20
binnacle.englab.juniper.net	<none>	<none>			
jnpr-apm-provman-75bc8d465d-czcfm	1/1	Running	0	123m	10.42.0.22
binnacle.englab.juniper.net	<none>	<none>			
jnpr-apm-redis-0	1/1	Running	0	124m	10.42.2.16
jib.englab.juniper.net	<none>	<none>			
jnpr-apm-redis-1	1/1	Running	0	123m	10.42.0.21
binnacle.englab.juniper.net	<none>	<none>			
jnpr-apm-redis-sentinels-0	1/1	Running	0	124m	10.42.0.19
binnacle.englab.juniper.net	<none>	<none>			
jnpr-apm-redis-sentinels-1	1/1	Running	0	124m	10.42.1.142
keel.englab.juniper.net	<none>	<none>			
jnpr-apm-redis-sentinels-2	1/1	Running	0	124m	10.42.2.17
jib.englab.juniper.net	<none>	<none>			

8. Verify that the services are present. Run the Kubernetes Command Line Tool command `kubectl get services`.

```
$ kubectl get services -n jnpr-apm
```

NAME	AGE	TYPE	CLUSTER-IP	EXTERNAL-IP
jnpr-apm-mgmt-svc	125m	ClusterIP	10.43.131.131	<none> 8066/
jnpr-apm-redis-sentinels-0-svc	125m	ClusterIP	10.43.142.53	<none> 7381/
jnpr-apm-redis-sentinels-1-svc	125m	ClusterIP	10.43.109.206	<none> 7381/
jnpr-apm-redis-sentinels-2-svc	125m	ClusterIP	10.43.104.100	<none> 7381/
jnpr-apm-redis-svc	125m	ClusterIP	10.43.6.207	<none> 7380/
provman-apmi	125m	LoadBalancer	10.43.221.12	198.19.224.212 20557:32553/

How to Use Command Line Tools to Administer APM

SUMMARY

After you've installed the Address Pool Manager (APM) application, you can perform the following administration functions.

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- [Uninstall and Remove APM Without Using the APM Utility | 53](#)
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Address Pool Manager gives you two command line options for perform administrator tasks. You can either use the APM utility script (`apm`) or the Kubernetes Command Line tool to administer APM.

Access APM Utility Commands

SUMMARY

Use the APM utility commands to perform administration functions.

You can use the APM utility script (`apm`) to administer the application and to access the CLI that you use to configure the address management functions. The Juniper APM installation places the utility script in `/var/local/apm` and creates a symbolic link to the script in `/usr/local/bin/apm`.

You can use the `apm` utility script (which uses the Kubernetes command line tool and Helm commands) to do the following:

- Create and delete objects.
- Provide log access.
- Conduct interactive sessions with pod containers.
- Display the status of the APM objects.

Using the `apm` utility script simplifies many of your administrative duties. The script performs the tasks you need to manage APM, while masking the complexity of the `kubect1` command.

Table 4 on page 28 lists the commands that you can invoke with the `apm` utility script and describes the action that occurs. Many of the individual commands have options that you can specify.

Table 4: APM Utility Script Commands

Name	Action
clean	Clean up unneeded releases and/or docker cache. To run this command, you need sudo privileges. NOTE: Introduced in Release 3.2.
cli	Access the CLI that you can use to configure APM features and to monitor the current status for managed BNGs.
contexts	Display the available cluster contexts for control with APM NOTE: Introduced in Release 3.2.
db-info	Displays current state of APM's database microservice including the current version, stateful set pods, and their roles. NOTE: Introduced in Release 3.2.
db-switchover	Forces the persistent state database (DB) primary pod to switchover to an eligible backup pod. To run this command, you need sudo privileges. Introduced in Release 3.2. NOTE: DB switchover is a service disrupting event and you only use it with the upgrade procedure.
ip	Displays the IP addresses of Address Pool Manager. NOTE: Introduced in Release 3.2.
link	Links a cluster to a specific software version. NOTE: Introduced in Release 3.2.
logs	Display APM logs.

Table 4: APM Utility Script Commands (*Continued*)

Name	Action
rename-context	<p>Rename a context. Does not effect the running Address Pool Manager on the cluster. To run this command, you need sudo privileges.</p> <p>NOTE: Introduced in Release 3.2.</p>
restart	<p>Restart one or more specified services. To run this command, you need sudo privileges.</p> <p>NOTE: Introduced in Release 3.1.</p>
rollout	<p>Upgrade or start an APM service. To run this command, you need sudo privileges.</p> <p>NOTE: Introduced in Release 3.2.</p>
save-config	<p>Saves the current configuration of the Address Pool Manager to a file outside the pod. To run this command, you need sudo privileges.</p> <p>NOTE: Introduced in Release 3.2.</p>
shell	<p>Connect to a running APM microservice. To run this command, you need sudo privileges.</p>
setup	<p>Set up the APM application as part of the installation process. To run this command, you need sudo privileges.</p>
start	<p>Start all APM services. To run this command, you need sudo privileges.</p>
status	<p>Display the current status of the APM services. To run this command, you need sudo root privileges.</p>
storage	<p>Provides the status of the storage drivers for APM.</p> <p>NOTE: Introduced in Release 3.2.</p>
stop	<p>Stop all APM services. To run this command, you need sudo privileges.</p>

Table 4: APM Utility Script Commands (*Continued*)

Name	Action
unlink	Unlink components associated with the context. To run this command, you need sudo privileges. NOTE: Introduced in Release 3.2.
version	Displays the version of every running microservice in the APM instance as well as the APM utility. It also lists all available APM software releases on the system.

Use the following general syntax to issue a command:

- For a short option:

```
$ apm command-name -option
```

- For a long option:

```
$ apm command-name --option
```

To target a command at a particular cluster context, use the **context** option.

```
$ apm command-name --context context-name
```

To display a list of available commands with a brief description, use either the **h** or **help** option:

```
$ apm -h
```

```
$ apm --help
```

To display the options for a specific command:

```
$ apm command-name -h
```

To specify the `--no-color` option to disable colored-text output (used to distinguish logs from different microservices):

```
$ apm command-name --nocolor
```

Upgrade APM to a New Version Using the APM installation Utility

Use this procedure to upgrade to a new version of APM which is installed on a cluster that was created by the BBE Cloudsetup utility or by Red Hat OpenShift Container Platform Console. This procedure assumes APM is running on your system.

1. Download the APM software package from the Juniper Networks [software download page](#) to the jump host.

APM is available as a compressed tarball image (`.tgz`). The filename includes the release number as part of the name. The release number has the format: `<Major>.<Minor>.<Maintenance>`

- *major* is the main release number of the product.
- *minor* is the minor release number of the product.
- *maintenance* is the revision number.

2. Unpack the APM tarball (`.tgz`) file on the jump host by entering:

```
$ tar -zxvf apm-m.m.m.tgz
apm/
apm/apm_loader
apm/images/
apm/images/apm_containerImages.tar.gz
apm/charts/
apm/charts/provman/
apm/charts/provman/templates/
apm/charts/provman/templates/apmProv-man.yaml
apm/charts/provman/templates/apmApmiSvc.yaml
apm/charts/provman/questions.yaml
apm/charts/provman/Chart.yaml
apm/charts/provman/containers.yaml
apm/charts/provman/values.yaml
apm/charts/provman/.helmignore
apm/charts/entman/
apm/charts/entman/templates/
```

```
apm/charts/entman/templates/apmEnt-man.yaml
.
.
.
```

3. Run the loader script after you unpack the tarball.

```
$ sudo apm/apm_loader
Creating apm group... done.
Loading files... done.
Updating latest link... done
Setting up utility script... done.
Updating wrapper... done
Successfully loaded: 3.3.0
```

4. Link to the cluster by using the `link` command. The `link` command associates the loaded APM software package to the cluster in preparation for the setup.

```
$ sudo -E apm link --context context-name --version apm-version
Linking contextName to 3.3.0 ... done.
Linking complete, please run apm setup.
```

- *context-name* is the Kubernetes context (cluster name).
 - *apm-version* is the software version.
5. If you are upgrading APM on a Red Hat OpenShift Container Platform cluster, log in with the OpenShift CLI and then proceed to the next step.
If you are installing APM on a BBE Cloudsetup created cluster, proceed to the next step.
 6. You must authenticate with the container registry in order to be able to push the APM container images. How you authenticate to the registry varies depending on if you are installing APM on a BBE Cloudsetup created cluster or on an Red Hat OpenShift Container Platform cluster (see the respective documentation for details).
 7. Run `setup` to complete any additional environment values.

```
$ sudo -E apm setup --context context-name --update
```

- *context-name* is the Kubernetes context (cluster names).
- **update** are the prompts for only missing values (primarily used after loading a new software release).

8. Display the running DB to see which pod is the primary pod and to determine whether to upgrade the persistent state database (DB):

```
apm db-info -context myCluster
Version: 6.2.13
Primary: jnpr-apm-redis-1
Backup(s): jnpr-apm-redis-0
```

9. Display the DB version in the new package:

```
apm version --compare 3.3.0 --context myCluster
components:
apm: 3.2.2-2 -> 3.3.0
addrman: 3.2.2-2 -> 3.3.0
entman: 3.2.2-2 -> 3.3.0
mgmt: 3.2.2-2 -> 3.3.0
provman: 3.2.2-2 -> 3.3.0
redis: 6.2.13 -> 6.2.14-debian-12-r21
```



NOTE: For example, the DB version 6.2.14-debian-12-r21 is later than what is running (6.2.13), so you need to upgrade the DB.

10. Initiate a DB switchover if the `jnpr-apm-redis-0` is not the primary DB.

```
sudo -E apm db-switchover --context context-name
```

11. Rollout the new DB version.

```
sudo -E apm rollout --context context-name --service redis --version 3.3.0
```

- Upgrade the microservices with the `sudo -E apm rollout --context context-name --service service-name --version software-version` command. Enter the commands in the following order:

```
sudo -E apm rollout --context context-name --service mgmt --version 3.3.0
```

```
sudo -E apm rollout --context context-name --service addrman --version 3.3.0
```

```
sudo -E apm rollout --context context-name --service entman --version 3.3.0
```

```
sudo -E apm rollout --context context-name --service provman --version 3.3.0
```

- Verify that all microservices are running the new version of software:

```
$ apm version --context context-name --detail
Address_Pool_Manager versions:
  Microservice  Release          (version)
  apm:          3.3.0
  addrman:     3.3.0
  entman:      3.3.0
  mgmt:        3.3.0 (24.2R2)
  provman:     3.3.0
  redis:       3.3.0 (6.2.14-debian-12-r21)
```

Upgrade APM to a New Version Without Using the APM Utility

The instructions in this section describes the upgrade steps for installing APM on a preexisting Kubernetes cluster of your choice. This process is a manual process and does not use the APM utility that comes with the APM installation package.

- Download the APM software package from the Juniper Networks [software download page](#) to the jump host.

APM is available as a compressed tarball image (`.tgz`). The filename includes the release number as part of the name. The release number has the format: `<Major>.<Minor>.<Maintenance>`

- major* is the main release number of the product.

- *minor* is the minor release number of the product.
- *maintenance* is the revision number.

2. Unpack the APM tarball (.tgz) file on the jump host by entering:

```
$ tar -zxvf apm-m.m.m.tgz
apm/
apm/apm_loader
apm/images/
apm/images/apm_containerImages.tar.gz
apm/charts/
apm/charts/provman/
apm/charts/provman/templates/
apm/charts/provman/templates/apmProv-man.yaml
apm/charts/provman/templates/apmApmiSvc.yaml
apm/charts/provman/questions.yaml
apm/charts/provman/Chart.yaml
apm/charts/provman/containers.yaml
apm/charts/provman/values.yaml
apm/charts/provman/.helmignore
apm/charts/entman/
apm/charts/entman/templates/
apm/charts/entman/templates/apmEnt-man.yaml
.
.
.
```

3. The container images needed by APM are stores in the **images** subdirectory. You must push the images to the registry where the scheduled application images will be pulled from. Depending on the type of container registry being used the commands may be different. The following commands illustrate one method of pushing container images to the registry:

```
% docker image load -i ./images/apm_addr-man_containerImages.tar.gz
Loaded image: apm_addr-man:3.3.0
```

```
% docker tag apm_addr-man:3.3.0 <regHost>:<regPort>/apm_addr-man:3.3.0
```

```
% docker push <regHost>:<regPort>/apm_addr-man:3.3.0
```


4. To prepare APM for upgrade, create a new YAML configuration file for each microservice. (Table 3 on page 21 describes the fields in the microservice's configuration files.)



NOTE: You may have create a single **values.yaml**, during your intial installation,that contains information for all the microservices. The single **values.yaml** is located under the umbrella chart in the **apm/apm/charts/address_pool_manager** folder. The procedures in this section only describe how to upgrade if created individual YAML configuration files for each microservice.

Create a new **values.yaml** file for each of the microservices, by making a copy of the file and then saving the new file. Update each file according to your Kubernetes cluster's information.

Following are the microservices and their **values.yaml** file location:

- **redis** microservice—Located at **apm/apm/charts/redis**
- **mgmt** microservice—Located at **apm/apm/charts/mgmt**
- **addrman** microservice—Located at **apm/apm/charts/addrman**
- **entman** microservice—Located at **apm/apm/charts/entman**.
- **provman** microservice—Located at **apm/apm/charts/provman**

5. Run the dependency update command:

```
helm dependency update --kube-context context-name --namespace jnpr-apm ./charts/redis/
```

6. After you have made all the desired changes to your new **values.yaml** files for each microservice, the microservices must be deployed with the new **values.yaml** files.

Run the following commands:

```
helm upgrade --dependency-update --kube-context context-name --namespace jnpr-apm --create-namespace --atomic --install -f ./charts/redis/new-values.yaml redis ./charts/redis
```

```
helm upgrade --dependency-update --kube-context context-name --namespace jnpr-apm --create-namespace --atomic --install -f ./charts/mgmt/new-values.yaml mgmt ./charts/mgmt
```

```
helm upgrade --dependency-update --kube-context context-name --namespace jnpr-apm --create-namespace --atomic --install -f ./charts/addrman/new-values.yaml addrman ./charts/addrman
```

```
helm upgrade --dependency-update --kube-context context-name --namespace jnpr-apm --create-namespace --atomic --install -f ./charts/entman/new-values.yaml entman ./charts/entman
```

```
helm upgrade --dependency-update --kube-context context-name --namespace jnpr-apm --create-namespace --atomic --install -f ./charts/provman/new-values.yaml provman ./charts/provman
```

7. Verify the APM installation by running the Kubernetes Command Line Tool command `kubectl get pods` and verify the APM pods are running.

```
$ kubectl get pods -n jnpr-apm -o wide
```

NAME	READY	STATUS	RESTARTS	AGE	IP
NODE	NOMINATED	NODE	READINESS	GATES	
jnpr-apm-addrman-7cff87b557-gp8s7	1/1	Running	0	124m	10.42.2.15
jib.englab.juniper.net	<none>	<none>			
jnpr-apm-entman-67d9bf9498-bx8jj	1/1	Running	0	124m	10.42.1.141
keel.englab.juniper.net	<none>	<none>			
jnpr-apm-mgmt-6c76cc8dd7-pmlpv	1/1	Running	0	124m	10.42.0.20
binnacle.englab.juniper.net	<none>	<none>			
jnpr-apm-provman-75bc8d465d-czcfm	1/1	Running	0	123m	10.42.0.22
binnacle.englab.juniper.net	<none>	<none>			
jnpr-apm-redis-0	1/1	Running	0	124m	10.42.2.16
jib.englab.juniper.net	<none>	<none>			
jnpr-apm-redis-1	1/1	Running	0	123m	10.42.0.21
binnacle.englab.juniper.net	<none>	<none>			
jnpr-apm-redis-sentinels-0	1/1	Running	0	124m	10.42.0.19

```

binnacle.englab.juniper.net <none> <none>
jnpr-apm-redis-sentinels-1 1/1 Running 0 124m 10.42.1.142
keel.englab.juniper.net <none> <none>
jnpr-apm-redis-sentinels-2 1/1 Running 0 124m 10.42.2.17
jib.englab.juniper.net <none> <none>

```

- Verify that the services are present. Run the Kubernetes Command Line Tool command `kubectl get services`.

```

$ kubectl get services -n jnpr-apm
NAME                                TYPE                CLUSTER-IP      EXTERNAL-IP
PORT(S)          AGE
jnpr-apm-mgmt-svc      ClusterIP           10.43.131.131   <none>        8066/
TCP               125m
jnpr-apm-redis-sentinels-0-svc    ClusterIP           10.43.142.53   <none>        7381/
TCP               125m
jnpr-apm-redis-sentinels-1-svc    ClusterIP           10.43.109.206   <none>        7381/
TCP               125m
jnpr-apm-redis-sentinels-2-svc    ClusterIP           10.43.104.100   <none>        7381/
TCP               125m
jnpr-apm-redis-svc      ClusterIP           10.43.6.207     <none>        7380/
TCP               125m
provman-apmi           LoadBalancer        10.43.221.12    198.19.224.212 20557:32553/
TCP               125m

```

Start or Stop APM Services Using the APM Utility

Use the `apm` utility script to start or stop all APM services. The services start in order of dependency. Essential services (`db` and `mgmt`) start first, followed by the other services. The services stop in reverse order of dependency.

- To start all APM services:

```
$ sudo -E apm start --context context-name
```



NOTE: We recommend that you use the `sudo -E apm start --services` option to start individual services or a set of services only for troubleshooting. Use under the guidance of a Juniper Networks support representative. Use with caution as this command is like rebooting to factory-default.



NOTE: APM starts from its initial settings when you execute the `apm setup` command. Any persistent state is lost when the `apm stop` command is executed. The current configuration can be saved using the `apm save-config` command. The saved configuration is the configuration that is used the next time APM is started.

- To stop all APM services:

```
$ sudo -E apm stop --context context-name
WARNING Shutting down your Address Pool Manager will reset it to factory defaults and you
will lose all state on the system.

Shutdown will begin in 2 minutes. Please use CTRL+C to cancel.
```

Restart APM Services Using the Kubernetes Command Line Tool

Use the `kubectl delete pods` Kubernetes command to restart APM services. For example:

```
$ kubectl delete pod -n jnpr-apm jnpr-apm-addrman-758cc8885
pod "jnpr-apm-addrman-7585cc8885" deleted
```



NOTE: To determine the pod name, you can use the `kubectl get pods -n jnpr-apm` Kubernetes command (see ["Check the Status of APM Services Using the Kubernetes Command Line Tool" on page 45](#)).

Setup Secrets Using the APM Utility

You can setup secrets during setup or run the `sudo -E apm setup --context context-name --secrets` to setup secrets or update them.

```
$ sudo -E apm setup --context context-name --secrets
APMi Secret Name (deployed: ) >
APMi certificate (default: ) > ./apm.crt
Copied /home/user/apm.crt to /var/local/apm/e476597324/secrets/apmi with 600 permissions
APMi private key (default: ) > ./apm.key
Copied /home/user/apm.key to /var/local/apm/e476597324/secrets/apmi with 600 permissions
APMi root certificate (default: ) > ./rootCA.crt
Copied /home/user/rootCA.crt to /var/local/apm/e476597324/secrets/apmi with 600 permissions
```



NOTE: If you enter a value for the secret name, you will not be asked for the key or certification files.

Display Database Information Using the APM Utility

The `apm db-info` command displays current state of APM's database microservice including the current version, stateful set pods, and their roles.

```
apm db-info [--context context-name] [-o|--output json]
```

```
$ apm db-info [--context context-name] [-o|--output json]
Version: 6.2.13
Primary: jnpr-apm-redis-0
Backup(s): jnpr-apm-redis-1
```

Display the Running Database Using the Kubernetes Command Line Tool

Use the `kubectl exec` Kubernetes command to display the running database (DB) to see which pod is the primary pod and to determine whether to upgrade the persistent state database. You should run the `kubectl exec` on both the primary and secondary redis server instances. For example:

```
$ kubectl exec -i -n jnpr-apm jnpr-apm-redis-0 -- redis-cli -p 7380 role
master
174738135
10.42.1.152
7380
174738135$
```

```
$ kubectl exec -i -n jnpr-apm jnpr-apm-redis-1 -- redis-cli -p 7380 role
slave
10.42.2.22
7380
connected
174740637
```

Perform a Database Switchover Using the Kubernetes Command Line Tool

To force the persistent state database (DB) primary pod to switchover to an eligible backup pod, perform the following:

1. Run the `kubectl get pods` Kubernetes command to determine the name of the sentinel pods.

```
$ kubectl get pods -n jnpr-
apm
```

NAME	READY	STATUS	RESTARTS
AGE			
jnpr-apm-addrman-7585cc8885-5xr24	1/1	Running	0

```
5m28s
```

jnpr-apm-entman-5dcf659676-4mq6g	1/1	Running	0	
5d22h				
jnpr-apm-mgmt-6d7c4f47dc-2v8ss	1/1	Running	0	
5d22h				
jnpr-apm-provman-65c66bc689-bvhb6	1/1	Running	0	
5d22h				
jnpr-apm-redis-0	1/1	Running	0	
5d22h				
jnpr-apm-redis-1	1/1	Running	0	
5d22h				
jnpr-apm-redis-sentinels-0	1/1	Running	0	
5d22h				
jnpr-apm-redis-sentinels-1	1/1	Running	0	
5d22h				
jnpr-apm-redis-sentinels-2	1/1	Running	0	5d22h

2. Pick any of the three sentinel pods to use with the `kubectl exec` command. The following example uses the `jnpr-apm-redis-sentinels-0` sentinel pod. After running following commands, the roles of the redis instances are reversed (`redis-0` is the secondary and `redis-1` is the primary).

```
$ kubectl exec -i -n jnpr-apm jnpr-apm-redis-sentinels-0 -c redis-sentinel -- redis-cli -p 7381 sentinel failover jnpr-apm-redis-
```

```
masters
```

```
OK
```

```
$ kubectl exec -i -n jnpr-apm jnpr-apm-redis-0 -- redis-cli -p 7380
```

```
role
```

```
slave
```

Check the Status of APM Services Using the APM Utility

Use the `apm status` utility script to check the status of each APM service (functional component) listed in [Table 5 on page 43](#). The status shows whether a service is running, has exited, or has not started. It also displays the service name on the Kubernetes pod. You can compare uptime for the services to quickly see whether any service has been restarted.

Table 5: Services Displayed with the status Command

Microservice	Pod Prefix
addrman—Address manager	jnpr-apm-addrman
mgmt—CLI management	jnpr-apm-mgmt
redis (Remote Dictionary Server)—consists of a set of pods which provide the persistent database.	jnpr-apm-redis
entman—Entity manager	jnpr-apm-entman
provman—Provisioning manager	jnpr-apm-provman

To check the status:

1. Display the service status.

```
$ apm status --context contextName [-o|--output json] [--detail]
```

2. (Optional) Render the version information in JavaScript Object Notation (JSON) format, which is useful for scripting interfaces.

```
$ apm status [-o|--output json]
```

For example:

```
$ apm status --context context-name --detail
MICROSERVICE  POD                               STATE  RESTARTS  UPTIME
NODE
addrman        jnpr-apm-addrman-7b778979b6-5vk44  Running  0          11 days, 23:25:14.629150
test-node-1
mgmt           jnpr-apm-mgmt-6b4cf98d4d-hmjd9     Running  0          11 days, 23:25:33.629206
test-node-1
entman        jnpr-apm-entman-7d66d89d6b-5295d   Running  0          11 days, 23:25:14.629224
test-node-1
provman       jnpr-apm-provman-849fb9cc4-vswm6    Running  0          11 days, 22:50:05.629258
test-node-1
redis         jnpr-apm-redis-0                   Running  0          11 days, 23:25:36.629275
test-node-1
redis         jnpr-apm-redis-1                   Running  0          11 days, 23:25:23.629290
test-node-1
redis         jnpr-apm-redis-sentinels-0         Running  0          11 days, 23:25:26.629306
test-node-1
redis         jnpr-apm-redis-sentinels-1         Running  0          11 days, 23:25:26.629322
test-node-1
redis         jnpr-apm-redis-sentinels-2         Running  0          11 days, 23:25:26.629337
test-node-1

Storage: Healthy
```

```
$ apm status --context context-name
MICROSERVICE PODS RESTARTS
addrman 1/1 0
mgmt 2/2 0/0
```

```
entman 1/1 0
provman 1/1 0
redis 5/5 0/0/0/0/0
```

Storage: Healthy

Check the Status of APM Services Using the Kubernetes Command Line Tool

Use the Kubernetes Command Line tool to check the status of each APM service (functional component) listed in [Table 5 on page 43](#). The status shows whether a service is running, has exited, or has not started. It also displays the service name on the Kubernetes pod. You can compare uptime for the services to quickly see whether any service has been restarted.

Table 6: Services Displayed with the status Command

Microservice	Pod Prefix
addrman—Address manager	jnpr-apm-addrman
mgmt—CLI management	jnpr-apm-mgmt
redis (Remote Dictionary Server)—consists of a set of pods which provide the persistent database.	jnpr-apm-redis
entman—Entity manager	jnpr-apm-entman
provman—Provisioning manager	jnpr-apm-provman

To check the status, run the following command:

```
$ kubectl get pods -n jnpr-apm -o wide
```

For example:

```
$ kubectl get pods -n jnpr-apm -o wide
NAME                                READY   STATUS    RESTARTS   AGE   IP
NODE                                NOMINATED NODE   READINESS GATES
jnpr-apm-addrman-7585cc8885-5xr24  1/1     Running   0           11m   10.42.0.31
binnacle.englab.juniper.net        <none>         <none>
jnpr-apm-entman-5dcf659676-4mq6g  1/1     Running   0           5d22h 10.42.2.24
jib.englab.juniper.net              <none>         <none>
jnpr-apm-mgmt-6d7c4f47dc-2v8ss    1/1     Running   0           5d22h 10.42.0.30
binnacle.englab.juniper.net        <none>         <none>
jnpr-apm-provman-65c66bc689-bvhb6 1/1     Running   0           5d22h 10.42.1.153
keel.englab.juniper.net            <none>         <none>
jnpr-apm-redis-0                   1/1     Running   0           5d22h 10.42.2.22
jib.englab.juniper.net              <none>         <none>
jnpr-apm-redis-1                   1/1     Running   0           5d22h 10.42.1.152
keel.englab.juniper.net            <none>         <none>
jnpr-apm-redis-sentinels-0        1/1     Running   0           5d22h 10.42.1.151
keel.englab.juniper.net            <none>         <none>
jnpr-apm-redis-sentinels-1        1/1     Running   0           5d22h 10.42.0.28
binnacle.englab.juniper.net        <none>         <none>
jnpr-apm-redis-sentinels-2        1/1     Running   0           5d22h 10.42.2.23
jib.englab.juniper.net              <none>         <none>
```

Display APM IP Addresses Using the APM Utility

Use the `apm ip` utility script to display the Kubernetes objects that are necessary for the orchestration of the APM pods. For example:

```
$ apm ip --context context-name --detail
SERVICE                MICROSERVICE  EXTERNAL IP   INTERNAL IP   PORT(S)
apm-ssh                 mgmt           198.19.224.215 10.43.35.110  22
jnpr-apm-mgmt-svc      mgmt           10.43.131.131  8066
jnpr-apm-redis-sentinels-0-svc redis          10.43.142.53   7381
jnpr-apm-redis-sentinels-1-svc redis          10.43.109.206  7381
jnpr-apm-redis-sentinels-2-svc redis          10.43.104.100  7381
jnpr-apm-redis-svc     redis          10.43.6.207    7380
provman-apmi           provman        198.19.224.212 10.43.221.12  20557
```

Display the APM IP Addresses Using the Kubernetes Command Line Tool

Use the `kubectl get services` Kubernetes command to display the Kubernetes objects that are necessary for the orchestration of the APM pods. For example:

```
$ kubectl get services -n jnpr-apm | egrep "TYPE|LoadBalancer"
NAME                                TYPE                CLUSTER-IP          EXTERNAL-IP
PORT(S)          AGE
apm-apmi          LoadBalancer        10.43.99.79         198.19.224.212    20557:32136/
TCP              5d22h
apm-ssh           LoadBalancer        10.43.35.110       198.19.224.215    22:30261/
TCP              146d
```

Display Logging Using the APM Utility

SUMMARY

Use the `apm logs` utility script to display the logs of events that occur while APM is running. You can also use the BBE Event Collection and Visualization utility to display file-based logs collected and stored since the time APM is started. BBE Event Collection and Visualization is a cloud-based centralized utility that provides a way to capture APM logs that span the life-cycle of APM micro-services. You link to the BBE Event Collection and Visualization logging utility when you set up APM. See the [Broadband Edge Event Collection and Visualization Installation Guide](#).

IN THIS SECTION

- [Display APM Logging | 47](#)
- [Display Logs Using the Kubernetes Command Line Tool | 51](#)

Display APM Logging

BBE Event Collection and Visualization is a cloud-based centralized utility that provides a way to capture APM logs that span the life-cycle of APM micro-services. If you have BBE Event Collection and Visualization setup, during the APM setup, you can point BBE Event Collection and Visualization to perform the logging. BBE Event Collection and Visualization has a web-based interface to OpenSearch's capabilities for advanced searching, aggregation, viewing, and data analysis of collected syslog events.

Use the `apm logs` utility script to display the logs of events that occur while APM is running. The event logs include events such as those shown in the following non-exhaustive list:

- Pool-domain registration events
- Address allocation failures
- Network entity connection failures
- Startup messages
- Network entity resynchronization events
- Pool and partition utilization threshold and depletion warnings

By default, APM sends logs to the standard output (stdout) of the service. The output displays the circular buffer of all services or of a specified service. You can also enable logging to follow the log output of the running services. Following the log output creates an open session that continuously streams the logs to stdout.

The APM logging functions mask the underlying complexities of the `kubect1 log` command that is collecting the log information. You can still use the `kubect1 log` command, but that is outside the scope of this documentation.



NOTE: You can use third-party applications to capture and redirect the stdout stream for the container. Refer to your third-party documentation for assistance. You can also configure Docker with different logging drivers to redirect stdout. Refer to your Docker documentation for assistance.

To display APM logs for all services:

```
$ apm logs [--context contextName] [-f] [--previous] [--services SERVICES [SERVICES ...]] [--logset LOGSET] [--nocolor]
```



BEST PRACTICE: Use the `apm logs --services` option only when you are troubleshooting under the guidance of a Juniper Networks support representative.

To follow the logs for all services, specify the follow option (-f):

```
$ apm logs -f
```

To view logs from previous instances of the containers in a Kubernetes pod, specify the previous container option (-p):

```
$ apm logs -p
```

You can use standard Ubuntu conventions to redirect the logs to a file or to the terminal and to a file. Refer to the Ubuntu documentation for more information, but you can use the following examples as a starting point:

- Redirect all logs to only a file.

```
$ apm logs > file-path
```

- Redirect all logs to both the screen and to a file.

```
$ apm logs | tee file-path
```



BEST PRACTICE: Use the `--services` option only for troubleshooting under the guidance of a Juniper Networks support representative.

You can specify any of the following severity levels, in order of increasing severity:

Table 7: Severity Level

Severity Level	Description
debug	Detailed information that is typically of interest only when you are trying to diagnose a problem. These logs are often very frequent.
info	Events or non-error conditions of interest. Logs at this level provide confirmation that everything is working as expected. These logs are generally not very frequent.

Table 7: Severity Level (*Continued*)

Severity Level	Description
warning	Indicates that something unexpected happened or that some problem might occur in the near future. A simple example of the latter is the <i>disk space low</i> warning that indicates that you might run out of disk space soon. In either case, the software is still working as expected, but you might want to monitor it more closely. These logs are generally not very frequent.
error	Indicates that a more serious problem has prevented the software from performing some function, but the software has handled the problem as gracefully as possible to continue functioning.
critical	A serious error that indicates that the program itself might be unable to continue running.

You can use the `--logset` option to display logs either for only APM services or for only prebuilt services. If you do not use this option, then only the APM services logs are displayed.

To display logs for only APM services:

```
$ apm logs --logset apm
$ apm logs
```

To display logs for prebuilt services:

```
$ apm logs --logset apm-infra
```

Prebuilt services are services borrowed from other sources to provide infrastructure functions for APM. These sources include MGMT, redis, and redis-sentinel. For example, redis provides database and messaging services, MGMT provides a configuration/CLI service, and so on.

Display Logs Using the Kubernetes Command Line Tool

To display all the logs of events that occur while APM is running, run the following command:

```
$ kubectl logs -n jnpr-apm -l jnpr/logset=jnpr-apm --tail=-1
```

To display logs for a specific microservice, replace the label selector (`-l jnpr/logset=jnpr-apm`) with the pod name. For example:

```
$ kubectl logs -n jnpr-apm microservice-pod-name --tail=-1
```



NOTE: To determine the pod name, you can use the `kubectl get pods -n jnpr-apm` Kubernetes command (see ["Check the Status of APM Services Using the Kubernetes Command Line Tool" on page 45](#)).

Determine the APM Version Using the APM Utility

Use the `apm version [--context <context name>] [-o|--output json] [--detail] --compare <software-version>` utility script to determine the version number of the installed APM release.

To display the release version:

```
$ apm version --context contextName --detail
Address_Pool_Manager versions:
  Microservice  Release          (version)
  apm:           3.3.0
  addrman:       3.3.0
  entman:        3.3.0
  mgmt:          3.3.0 (24.2R2)
  provman:       3.3.0
  redis:         3.3.0 (6.2.14-debian-12-r21)
```


To compare the specified software release versions against the current deployed release for the specified context:

```
apm version --compare 3.2.1 --context myCluster
components:
apm: 3.2.2-2 -> 3.3.0
addrman: 3.2.2-2 -> 3.3.0
entman: 3.2.2-2 -> 3.3.0
mgmt: 3.2.2-2 -> 3.3.0
provman: 3.2.2-2 -> 3.3.0
redis: 6.2.13 -> 6.2.14-debian-12-r21
```

Use the `-j` option to render the version information in JavaScript Object Notation (JSON) format.

Archive the APM Configuration Using the Kubernetes Command Line Tool

To archive a copy of the currently running APM configuration, enter the following command:

```
$ kubectl cp jnpr-apm/$( kubectl get pods -n jnpr-apm -l jnpr/cli=cli --no-headers=true | awk
'{print $1}'):config/juniper.conf.gz ./juniper.conf.gz
```

Uninstall and Remove APM Using the APM Utility

Use the `apm` utility script to uninstall the APM configuration. The `uninstall` command reverts the actions you performed when setting up APM. Use this command to return APM to the state it was in immediately after you installed the application but before you did any setup configuration.

To uninstall APM:

```
$ sudo -E apm stop --context context-name
sudo -E apm unlink --context context-name
```

After you uninstall APM, we recommend that you use the Debian uninstall procedure to remove the entire package.

```
$ sudo sudo -E apm clean [-h] [--log {error | warn | info | debug}] [--no-color] [--docker] [--release release-number] [--dry-run] [--uninstall] [--cluster-repos] ]
```

For the `apm clean` command options, see the following:

- `-h` or `--help`—Show the help message and exit.
- `--log` or `-l {error | warn | info | debug}`—Adjust the log level of the utility scrip.
- `--no-color`—Print messages without colors.
- `--docker`—Clean the local docker cache.
- `--release release-number`—The release to clean (defaults to unused releases).
- `--dry-run`—List releases or containers that will be removed.
- `--uninstall`—Uninstall all software releases and remove APM from the system.
- `--cluster-repos`—Clean the cluster repos for the clusters that have been removed.

Uninstall and Remove APM Without Using the APM Utility

This is the uninstall procedure that you use if you installed APM without using the APM utility. You use the `helm uninstall` command to uninstall your APM configuration. To completely remove APM, you must run the `helm uninstall` command for each microservice.

To uninstall APM, run the following:

```
helm uninstall --kube-context <cluster-context> -n jnpr-apm provman
```

```
helm uninstall --kube-context <cluster-context> -n jnpr-apm entman
```

```
helm uninstall --kube-context <cluster-context> -n jnpr-apm addrman
```

```
helm uninstall --kube-context <cluster-context> -n jnpr-apm mgmt
```

```
helm uninstall --kube-context <cluster-context> -n jnpr-apm redis
```

How to Access APM Configuration and Operational Commands Using the APM Utility

IN THIS SECTION

- [Access the APM CLI Using the APM Utility | 55](#)
- [Access and Use CLI Configuration Statements Using the APM Utility | 55](#)
- [Access and Use CLI Operational Commands Using the APM Utility | 56](#)

Access the APM CLI Using the APM Utility

To access the CLI prompt, enter the following `apm` utility script command:

```
$ apm cli --context contextName [-p|--pipe]
```

```
root@jnpr-apm-mgmt
```

Enter a question mark to see the available top-level CLI commands. This list of commands is a subset of the Junos OS top-level commands.

```
root@jnpr-apm-mgmt> ?  
Possible completions:  
clear          Clear information in the system  
configure      Manipulate software configuration information  
file           Perform file operations  
help           Provide help information  
monitor        Show real-time debugging information  
op             Invoke an operation script  
quit           Exit the management session  
request        Make system-level requests  
restart        Restart software process  
set            Set CLI properties, date/time, craft interface message  
show           Show system information  
ssh            Start secure shell on another host  
start          Start shell  
telnet         Telnet to another host  
test           Perform diagnostic debugging  
traceroute     Trace route to remote host
```

For an overview of Junos OS CLI basics, see [Day One: Exploring the Junos CLI](#). For more detailed information, see the [CLI User Guide](#).

Access and Use CLI Configuration Statements Using the APM Utility

1. Use the APM utility command `apm cli` to access the top-level CLI prompt.

```
$ apm cli --context contextName  
root@jnpr-apm-mgmt>
```

2. Access configuration mode to configure APM and the information that APM uses to configure a managed router.

```
root@jnpr-apm-mgmt> configure
root@jnpr-apm-mgmt#
```

3. Enter CLI statements to configure the APM-managed BNGs, pool domains, pools, and system attributes.
4. Save and activate the configuration. This command succeeds only when there are no configuration syntax errors.

```
root@jnpr-apm-mgmt# commit
commit complete
```

5. (Optional) Exit configuration mode and return to the top-level CLI prompt.

```
root@jnpr-apm-mgmt# exit
root@jnpr-apm-mgmt>
```

Access and Use CLI Operational Commands Using the APM Utility

To monitor APM, view APM configuration and statistics, or run certain operations manually:

1. Use the APM utility command `apm cli` to access the top-level CLI prompt.

```
$ $ apm cli --context contextName
root@jnpr-apm-mgmt>
```

2. Enter specific commands.
 - Use `show` commands to display statistics and the relationships between partitions, BNGs, pool domains, and pools.
 - Use `request` commands to manually initiate certain APM operations.

How to Use the APM Command Line Tool Without Using the APM Utility

SUMMARY

This section describes how you use the Kubernetes Command Line tool commands to perform administration functions.

IN THIS SECTION

- [Access the APM Command Line Tool Without Using the APM Utility | 57](#)

You can use the Kubernetes Command Line tool to administer the application and to access the CLI that you use to configure the address management functions.

You can use the Kubernetes Command Line tool to do the following:

- Create and delete objects.
- Provide log access.
- Conduct interactive sessions with pod containers.
- Display the status of the APM objects.

Access the APM Command Line Tool Without Using the APM Utility

To access the APM Command Line tool using the Kubernetes commands, enter the following:

```
$ kubectl exec -it -n jnpr-apm $(kubectl get pods -n jnpr-apm -l jnpr/cli=cli --no-headers=true | awk '{print $1}') -- cli
```

Enter a question mark to see the available top-level CLI commands.

```
?
```

```
Possible completions:
```

```
clear          Clear information in the system
configure      Manipulate software configuration information
file          Perform file operations
help          Provide help information
monitor       Show real-time debugging information
op            Invoke an operation script
quit          Exit the management session
request       Make system-level requests
restart       Restart software process
```

set	Set CLI properties, date/time, craft interface message
show	Show system information
ssh	Start secure shell on another host
start	Start shell
telnet	Telnet to another host
test	Perform diagnostic debugging
traceroute	Trace route to remote host