

Paragon Active Assurance Lifecycle Management Guide

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Introduction

The Lifecycle Management Guide covers various aspects of operating and maintaining an on-premise installation of Paragon Active Assurance. Among the topics in this guide are the following:

- Data backup and restore
- Updating user passwords
- Managing authentication
- Monitoring the system
- Tuning the system

Please note that troubleshooting is covered in the *Installation API Guide*.

Backing Up Product Data

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To make a consistent backup of your Paragon Active Assurance data, you need to stop all services accessing the database before starting the backup procedure. It is possible to make backups of a live system, but data consistency cannot then be guaranteed.

Proceed as follows:

- **Stop** Paragon Active Assurance services:

```
sudo systemctl stop "netrounds-*" apache2 kafka openvpn@netrounds
```

- **Make backups** according to the subsections below.
- **Start** Paragon Active Assurance services:

```
sudo systemctl start --all "netrounds-*" apache2 kafka openvpn@netrounds
```

Backing Up the Main PostgreSQL Database and Plugin Database

The plugin database is created along with the main PostgreSQL database, but it needs to be backed up separately.

Run these commands:

```
pg_dump -h localhost -U netrounds netrounds > cc_postgres.sql
pg_dump -h localhost -U netrounds paa-plugins > paa_plugins.sql
```

NOTE: The `pg_dump` command will ask for a password which can be found in `/etc/netrounds/netrounds.conf` under "postgres database". The default password is "netrounds".

To learn about advanced options of `pg_dump`, such as compression, type

```
pg_dump --help
```

NOTE: Alternatively, you may want to back up the database in binary format. If so, use this command:

```
pg_dump -h localhost -U netrounds -Fc netrounds > cc_postgres.binary
pg_dump -h localhost -U netrounds -Fc paa-plugins > paa_plugins.binary
```

Backing Up the RRD Files

The RRD (round-robin database) files contain the Paragon Active Assurance measurement data.

- For a small-scale setup (< 50 GB), use this backup command:

```
sudo tar -czf cc_rrd.tar.gz /var/lib/netrounds/rrd
```

- For a large-scale setup (> 50 GB), making a tarball of the RRD files might take too long, and taking a snapshot of the volume can be a better idea. Possible solutions for doing this include: using a file system that supports snapshots, or taking a snapshot of the virtual volume if the server is running in a virtual environment.

Backing Up Plugin Files

Back up plugin files with the commands

```
sudo tar -czf paa_plugins.tar.gz /var/lib/netrounds/plugins  
sudo tar -czf paa_plugin_keys.tar.gz /etc/netrounds/plugin_keys
```

Backing Up the TimescaleDB Database

TimescaleDB uses the tool PGBackRest (pgbackrest.org) to manage backup and restore. This tool is used by the script `backup-restore-timescaledb.sh` which is what you run as a Paragon Active Assurance user.

PGBackRest uses the concept of *stanzas*. A stanza is the configuration for a PostgreSQL database cluster that defines where it is located, how it will be backed up, what the archiving options are, etc. In Paragon Active Assurance, only one stanza is defined by default, named `paa-metrics`. As only one stanza exists, it does not need to be specified in the backup command, and it has been omitted below.

To back up the TimescaleDB database, you must first start it.

Backup of the TimescaleDB database also requires the `netrounds-timescaledb` service related to the Streaming API to be enabled and running:

```
sudo systemctl enable netrounds-timescaledb
sudo systemctl start netrounds-timescaledb
```

For more information on this API, see the document *Streaming API Guide*.

To back up the TimescaleDB database manually, run:

```
sudo /etc/netrounds/backup-restore-timescaledb.sh --backup
```

The backup operation creates either an incremental backup or a full backup. The latter occurs if no previous backups are present in the stanza.

Backups of TimescaleDB data are stored in `/var/lib/netrounds/rrd/timescaledb/pgbackrest/repo/backup`.

Backing Up the OpenVPN Keys

Use this command:

```
sudo tar -czf cc_openvpn.tar.gz /var/lib/netrounds/openvpn
```

Backing Up the Licenses

Use this command:

```
sudo tar -czf cc_license.tar.gz /var/lib/netrounds/license
```

Backing Up the Configuration Files

Make copies of the following files:

- /etc/apache2/sites-available/netrounds-ssl.conf
- /etc/apache2/sites-available/netrounds.conf
- /etc/netrounds/consolidated.conf
- /etc/netrounds/metrics.yaml
- /etc/netrounds/netrounds.conf
- /etc/netrounds/plugin.yaml
- /etc/netrounds/probe-connect.conf
- /etc/netrounds/restol.conf
- /etc/netrounds/test-agent-gateway.yaml
- /etc/netrounds/timescaledb.conf
- /etc/openvpn/netrounds.conf

For example:

```
cp /etc/apache2/sites-available/netrounds-ssl.conf /etc/apache2/sites-available/netrounds-ssl.conf.old
```

Restoring Product Data from Backup

Here is how to restore Paragon Active Assurance data from backup files. In this chapter, the backup files are assumed to be named in the same way as in the chapter ["Backing Up Product Data" on page 1](#).

NOTE: The procedure that follows requires that Control Center has been installed (so that the netrounds database exists) and that the backup files are from the same version of Control Center as the installed version.

1. **Stop** all Paragon Active Assurance **services** that are accessing the database:

```
sudo systemctl stop "netrounds-*" apache2 kafka openvpn@netrounds
```

2. Drop the main PostgreSQL database and plugin database:

```
sudo -u postgres psql -c "DROP DATABASE netrounds;"
sudo -u postgres psql -c 'DROP DATABASE "paa-plugins";'
```

3. Recreate the main PostgreSQL database and plugin database:

```
sudo -u postgres psql -c "CREATE DATABASE netrounds OWNER netrounds ENCODING 'UTF8'
TEMPLATE 'template0';"
sudo -u postgres psql -c 'CREATE DATABASE "paa-plugins" OWNER netrounds ENCODING "UTF8"
TEMPLATE "template0";'
```

4. Restore the main PostgreSQL database and plugin database:

```
sudo -u postgres psql --set ON_ERROR_STOP=on netrounds < cc_postgres.sql
sudo -u postgres psql --set ON_ERROR_STOP=on paa-plugins < paa_plugins.sql
```

Setting `ON_ERROR_STOP` to `on` will cause `psql` to exit if an error occurs. For further details, see the PostgreSQL documentation: <https://www.postgresql.org/docs/9.4/backup-dump.html#BACKUP-DUMP-RESTORE>.

There are several options for the backup format. Please refer to the `psql` documentation (<https://www.postgresql.org/docs/>) if you are using anything other than plain `.sql`.

If you backed up the databases in binary format, use these commands to restore them (you will be prompted for a password which is by default "netrounds"):

```
pg_restore -Fc -h localhost -d netrounds -c --verbose --disable-triggers cc_postgres.binary
-U netrounds --password
pg_restore -Fc -h localhost -d paa-plugins -c --verbose --disable-triggers
paa_plugins.binary -U netrounds --password
```

5. Restore the plugin tarballs and signing keys:

```
sudo tar -xzf paa_plugins.tar.gz -C /
sudo tar -xzf paa_plugin_keys.tar.gz -C /
```


6. Restore the OpenVPN keys:

```
# Remove any existing OpenVPN keys
sudo rm -rf /var/lib/netrounds/openvpn

# Unpack the backed-up keys
sudo tar -xzf cc_openvpn.tar.gz -C /
```

7. Restore RRD files, either from a tarball or from a snapshot. Compare the chapter ["Backing Up Product Data" on page 1](#). In the tarball case, the procedure is as follows:

```
# Remove any existing RRDs
sudo rm -rf /var/lib/netrounds/rrd

# Unpack the backed-up RRDs
sudo tar -xzf cc_rrd.tar.gz -C /
```

8. Restore the TimescaleDB database:

Before doing the restore, copy the `.conf` files in the data directory `/var/lib/netrounds/rrd/timescaledb/data/` to a different location. This allows you to restore any configuration changes performed after the last full backup.

- To perform an *in-place* database restore, proceed as follows:
 - Create a directory `/tmp/timescaledb_conf`.
 - Stop the `netrounds-timescaledb` service:

```
sudo systemctl stop netrounds-timescaledb
```

- Copy the `*.conf` files in `/var/lib/netrounds/rrd/timescaledb/data` to `/tmp/timescaledb_conf`.
- Run the command

```
sudo /etc/netrounds/backup-restore-timescaledb.sh --restore
```

- Copy the `*.conf` files from `/tmp/timescaledb_conf` to `/var/lib/netrounds/rrd/timescaledb/data`.

- Start the `netrounds-timescaledb` service:

```
sudo systemctl start netrounds-timescaledb
```

- To restore a database from host A on a *different host* B, proceed as follows:
 - On host B, install and configure Control Center according to the *Installation Guide*, and enable the metrics service.
 - On host B, stop the `netrounds-timescaledb` service:

```
sudo systemctl stop netrounds-timescaledb
```

- From host A, copy the contents of `/var/lib/netrounds/rrd/timescaledb/pgbackrest` to the same directory on host B.
- On host B, run the command

```
sudo /etc/netrounds/backup-restore-timescaledb.sh --restore
```

- From host A, copy the `*.conf` files from `/var/lib/netrounds/rrd/timescaledb/data` to the same directory on host B.
- On host B, start the `netrounds-timescaledb` service:

```
sudo systemctl start netrounds-timescaledb
```

9. **Copy the license files** into their original location. (Alternatively, you may download the license files once more from the Juniper EMS Portal and apply them using the `ncc license activate` command, as explained in the [Installation Guide](#).)

10. **Start** Paragon Active Assurance services:

```
sudo systemctl start --all "netrounds-*" apache2 kafka openvpn@netrounds
```

Updating Databases with New User Passwords

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- [Main PostgreSQL Database | 9](#)
- [TimescaleDB Database | 10](#)
- [Streaming API | 11](#)

Main PostgreSQL Database

The chapter "[PostgreSQL Configuration](#)" on [page 11](#) tells how to change the password for the "netrounds" user in a configuration file.

You also need to update the password in the following files:

- /etc/netrounds/netrounds.conf
- /etc/netrounds/plugin.yaml
- /etc/netrounds/probe-connect.conf

Furthermore, you must update that user's role in the database. How to do that is explained below.

- Log in to the database using:

```
sudo -u postgres psql
```

- Inside the database, execute this command (substituting the correct new password):

```
ALTER ROLE netrounds WITH PASSWORD 'securePassword';
```

The relevant PostgreSQL documentation is found here: www.postgresql.org/docs/9.0/sql-alterrole.html

Another option is to run the following after logging in to the database:

```
\password netrounds
```

and then provide the password twice.

After changing the password in the database as well as in the configuration files, reboot the system:

```
sudo reboot
```

Using Special Characters in the Password

In the `ALTER ROLE` query, if the character used to surround the password string occurs in the password itself, that character must be escaped. The escape character is a single quote (`'`).

Suppose you want to set the password `#secure`. To this end, run the query

```
ALTER ROLE netrounds WITH PASSWORD '#secure';
```

However, if you run

```
\password netrounds
```

you can enter any password characters without escaping them.

TimescaleDB Database

To change the password for the `paa` user, do the following:

- Connect to the database as the `paa` user (password `paa`). Full details on how to do this are found in the document *Querying Metrics in TimescaleDB*, chapter *Preparations*.

Then run:

```
ALTER USER paa PASSWORD 'new_password';
```

- In the file `/etc/netrounds/metrics.yaml`, enter the new password in the field `db-password`. Then restart the `netrounds-metrics` service:

```
sudo systemctl start netrounds-metrics
```

To change the password for the `paaread` user, do the following:

- Connect to the database as the `paaread` user (password `paaread`) and run

```
ALTER USER paaread PASSWORD 'new_password';
```

Streaming API

Regarding authentication for accessing Kafka via the Streaming API, see the document [Streaming API Guide](#), chapter *Configuring the Streaming API*.

PostgreSQL Configuration

PostgreSQL settings are found in the following configuration file:

- `/etc/netrounds/probe-connect.conf`

Below is an example of file contents specifying username "user" and password "password".

```
DATABASES['default']['USER'] = 'user'
DATABASES['default']['PASSWORD'] = 'password'
```

When updating the password in `probe-connect.conf`, you need to escape any characters that are identical to the character surrounding strings (above, this is the single quote, `'`). It is also best to escape any other non-alphanumeric characters. The escape character used is the backslash.

You can verify that you have set the intended password as follows:

```
source /etc/netrounds/probe-connect.conf
echo $PASSWORD
```

NOTE: After making changes to these settings, you must also update the PostgreSQL database itself with the new password. How to do that is explained in the chapter ["Updating the Database with a New User Password"](#) on page 9.

Managing Control Center and NETCONF Users

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Managing Control Center Users

- You can **list** all currently existing users with

```
ncc user-list
```

For each user is indicated:

- the user's permission for the account (read/write/admin)
 - whether the user is owner
- You can **update a user's password** with

```
ncc user-update <user email> --password <new password>
```

For available options please use --help.

- You can **activate a user** that was previously deleted or disabled with

```
ncc user-activate <user email>
```

- There is also the following command:

```
ncc user-delete <user email>
```

By default, this command **deactivates the user** so that it can no longer log in. However, the user's permissions remain, as does all data created by the user. The user can be reactivated with the `ncc user-activate` command.

The user can be completely **removed** by adding the `--force` flag. This removes the user from the database *along with all related database objects, including measurement results*. You are prompted to confirm this action.

A user that owns an account cannot be removed. The account owner must first be changed using the `account-update` command (see below).

- To **create a superuser**, use this command:

```
ncc user-create <email> --password --is-superuser
```

A superuser has access to all accounts in the system and is the only type of user authorized to perform certain tasks.

- To **change the owner of an account**, run this command:

```
ncc account-update <account short name> --owner <user email>
```

Managing NETCONF Users

These commands (as given here) are all executed from the directory `/opt/netrounds-confd/`.

- To create a user "user1" with password "pwd1" in ConfD, run:

```
./ncc-netconf user create --username=user1 --password=pwd1
```

- To list all available users in ConfD:

```
./ncc-netconf user list
```

- To update the password to "pwd2" for user "user1" in ConfD:

```
./ncc-netconf user update --username=user1 --password=pwd2
```

- To delete the user "user1" from ConfD:

```
./ncc-netconf user delete --username=user1
```

Importing and Exporting Test and Monitor Templates

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- [Listing Templates | 15](#)
- [Exporting Templates | 15](#)
- [Importing Templates | 15](#)
- [Usage Examples | 16](#)

Templates for tests and monitors can be exported from one installation of Control Center and imported into another (or into a different account on the same Control Center). The following commands are used for this purpose:

- `ncc template` for tests
- `ncc monitor-template` for monitors

The syntax is identical for these two commands and is detailed below for `ncc template`.

Listing Templates

To list all templates with account name, template name and ID, give this command:

```
ncc template list [--account NAME]
```

Use the `--account` flag to list templates from a specific account only.

Exporting Templates

Use this command to export template configurations in JSON format:

```
ncc template export [--account NAME] [--file NAME] [id ...]
```

Here, `[id ...]` is a list of IDs of the templates you want to export. If no template IDs are specified, all templates are exported.

The `--file` flag specifies the name of the output file. If you omit this, the output will be written to stdout.

Use the `--account` flag to filter templates by account.

Importing Templates

On exporting templates, you can import them to a specified account as follows:

```
ncc template import --account NAME [--force_overwrite] [export file name]
```

Here, `export file name` is an output file obtained from `ncc template export`. (If no file is specified, the import command reads from stdin.)

If the `force_overwrite` flag is set, then any templates with the same name that already exist in the account will be overwritten. Using this option is **not recommended** in general. It is preferable to rename the existing template(s) before importing.

Usage Examples

- Export a single template named "template1":

```
ncc template export template1 --file my_template.json
```

- Export all templates from account "demo":

```
ncc template export --account demo --file all_demo_templates.json
```

- Export all templates on the server:

```
ncc template export --file all_templates.json
```

- Import templates from export file to account "demo":

```
ncc template import --account demo all_demo_templates.json
```

Monitoring the System

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- [System Parameters | 17](#)
- [Application Parameters | 17](#)
- [Licenses | 17](#)
- [Processes | 18](#)
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This section points to parameters that are useful for monitoring the health of the Paragon Active Assurance system.

System Parameters

Standard system parameters:

- CPU utilization
 - Should stay below 80%
- Memory utilization, excluding cache and buffers
 - Should stay below 80%
- Disk utilization
 - Should stay below 80%

Application Parameters

For Control Center, run the command

```
ncc status
```

The following parameters are of particular interest:

- `test_agent_appliance_online`: This indicates how many Test Agent Appliances are currently logged in to the server. The desirable numbers here are of course dependent on how you deploy the Test Agents.
- `scheduled_call_latency`: This indicates how far behind schedule the background job processing is. Among other things, this processing collects results from Test Agents and generates periodic reports. The latency should stay below 10 s.

Licenses

The expiry date for the license activated on the server can be inspected with the command

```
ncc license show
```

In the output from this command, look for `end_date`.

Processes

The following ncc processes should normally be running:

- netrounds-callexecuter
- netrounds-confd
- netrounds-plugin
- netrounds-probe-login
- apache2
- kafka
- openvpn@netrounds
- zookeeper
- netrounds-metrics (if Streaming API or TimescaleDB is enabled)
- netrounds-timescaledb (if Streaming API or TimescaleDB is enabled)

Logs

Webapp Logs

The file `/var/log/apache/netrounds_access.log` contains all HTTP requests made to the Control Center web GUI.

The file `/var/log/apache/netrounds_error.log` contains all errors reported by Apache for HTTP requests towards the Control Center web GUI. Console output from the Control Center back-end is also in this file; by default, all logging is done by the console.

The configuration of the logging is done using the Python logging module configuration schema (docs.python.org/2/library/logging.config.html#configuration-dictionary-schema).

Call Executer Logs

`callexecuter` is a service that executes background tasks such as configuring Test Agents or fetching metrics.

To see the logs for this service, you can use `journalctl`, for example to look at the logs from the last hour and then follow all incoming logs:

```
sudo journalctl -u netrounds-callexecuter.service --since "1 hour ago" --follow
```

Plugin Service Logs

For the plugin system you can look at the logs using:

```
sudo journalctl -u netrounds-plugin.service
```

Metrics Service Logs

NOTE: These logs are only relevant if you have this feature enabled, which is the case if you are using the Streaming API or TimescaleDB.

The metrics service is responsible for ingesting metrics data into TimescaleDB and to push such data to the Streaming API, insofar as these are enabled.

```
sudo journalctl -u netrounds-metrics.service
```

TimescaleDB

To view TimescaleDB logs, run:

```
sudo journalctl -u netrounds-timescaledb.service
```

Kafka

To view Kafka logs, run:

```
sudo journalctl -u kafka
```

Zookeeper

Zookeeper is relied on by Kafka.

To view Zookeeper logs, run:

```
sudo journalctl -u zookeeper
```

Custom Formatters

Paragon Active Assurance provides two custom formatters that yield additional information about log entries and thus should be favored over Python's default formatters:

- The formatter `netrounds.utils.loggers.ContextFormatter` provides `record_tags` and `context_tags` that provide additional information about the context of the log entry, for example what Test Agent the log entry is about. Colors are also supported.
- The formatter `netrounds.thirdparty.logstash_formatter.ContextLogstashFormatterV1` outputs a JSON format compatible with Logstash.

The custom formatters are added by default in:

- `LOGGING['formatters']['context']`
- `LOGGING['formatters']['context_color']`
- `LOGGING['formatters']['logstash']`

Tuning the System

A number of Control Center parameters can be tuned according to the available resources and the system load. These include:

- `/etc/netrounds/netrounds.conf`
 - `CALL_EXECUTER_MAX_CHILDREN`: This configures how many background jobs can run in parallel. The default is 20. Each test and monitor (not each task) will periodically run as a background job. If you have many tests or monitors, you might want to set this value to match the number of running tests and monitors to prevent those jobs from queuing up and delaying the collecting of data. The current queue length can be seen as the `scheduled_call_latency` parameter returned by the `ncc status` command.

- `/etc/apache2/sites-available/netrounds-ssl.conf`
 - `WSGIDaemonProcess netrounds ... processes`: This configures how many HTTP requests to the Control Center GUI can be handled at the same time. The default is 10. If you have many or slow requests, you might need to increase this number. If no worker is available to start processing a request, a 504 Gateway Timeout response will be returned.
- `/etc/postgresql/10/main/postgresql.conf`
 - `max_connections`: As a rule of thumb, this value should be roughly equal to `CALL_EXECUTER_MAX_CHILDREN + WSGIDaemonProcess processes + 50`.
 - `shared_buffers`: For advice on setting this parameter, see this page: <https://www.postgresql.org/docs/current/runtime-config-resource.html#GUC-SHARED-BUFFERS>.

Troubleshooting

More tips on troubleshooting generally are found in the *Troubleshooting* chapter of the Installation Guide.

To contact Juniper technical support, file a ticket at support.juniper.net/support/requesting-support. In your ticket, please include the output from the command

```
ncc generate-troubleshooting-report
```

Deleting Licenses from the System

If for some reason you need to wipe all existing licenses from your Paragon Active Assurance system and start over, you can do so as follows:

```
sudo rm /var/lib/netrounds/license/*.lic
sudo systemctl restart netrounds-license-daemon
```

To activate new licenses, follow the procedure in the Installation Guide, chapter *Getting Started with Paragon Active Assurance*.

Deleting Paragon Active Assurance Accounts

How to create accounts in Paragon Active Assurance is dealt with in the Installation Guide, chapter *Getting Started with Paragon Active Assurance*.

To delete a Paragon Active Assurance account, use the following command.

NOTE: This command will permanently delete the specified account. You should back up your database and be sure what you are doing before using this command.

```
ncc account-delete --help # Read help first!  
ncc account-delete <short name of product account>
```

In order to delete anything, you must add the `--force` option to the command. Even with this option added, you will be asked to confirm your action. The confirmation step can be suppressed by adding the `--noinput` option.

Uninstalling Paragon Active Assurance

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- [Optional Steps | 23](#)

Installation of Paragon Active Assurance is covered in the *Installation Guide*.

To uninstall the Control Center software, run the following command:

```
sudo apt-get remove "netrounds-*
```


Alternatively, in order to delete the Control Center packages from the instance, you can add the `--purge` flag:

```
sudo apt-get remove --purge "netrounds-*
```

This will not remove the data or the configuration, however. To remove all data, do the following:

```
sudo rm -rf /var/lib/netrounds
sudo -u postgres dropdb netrounds
sudo -u postgres dropdb paa-plugins
sudo -u postgres dropdb -h localhost -p 7432 paa-metrics
```

where the password for the last command (for TimescaleDB) is postgres.

Optional Steps

If you are not using PostgreSQL for anything else, you may want to uninstall the PostgreSQL database:

```
sudo apt-get remove --purge postgresql
```

Further optional cleanup tasks are as follows:

- Remove the Test Agent applications remaining in the static folder:

```
sudo rm -rf /usr/lib/python3.6/dist-packages/netrounds
```

- Remove logs from apache2:

```
sudo rm -rf /var/log/apache2/netrounds*
```

- Remove the Paragon Active Assurance site from apache2:

```
sudo rm -rf /var/lib/apache2/site/disabled_by_admin/netrounds*
```

- Remove available sites for Paragon Active Assurance:

```
sudo rm -rf /etc/apache2/sites-available/netrounds*
```

- Remove the OpenVPN environment:

```
sudo rm -rf /var/lib/openvpn/netrounds.env
```

- Remove Kafka logs:

```
sudo rm -rf /var/log/kafka/netrounds*
```

- Finally, remove these directories if they are present:

```
sudo rm -rf /usr/share/netrounds  
sudo rm -rf /usr/share/mibs/netrounds  
sudo rm -rf /usr/lib/netrounds
```