



# NetWitness Shell User Guide

for RSA NetWitness® Platform 11.5



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## Usage

The primary goal of `nw-shell` is to help a human operator explore the runtime state of a NetWitness Platform service. It is, essentially, an interactive program that invokes APIs on running NetWitness Platform services. Each NetWitness Platform service includes a system API that exposes its runtime state as a *logical* tree. The shell leverages the Tree API structure to present a hierarchical view of a service that is similar to a file system view. Users can navigate the tree by using the `cd` command to access directories, and can view or modify the corresponding configuration at the location, or invoke API methods and view the current state of components in the node.

The set of commands available to users at a given time depend on the current shell *context*, for example, their placement inside the *logical* tree. Certain commands, however, are always available, and we begin with a description of those commands.

## System Commands

Shell *system* commands operate on the shell itself, instead of the nodes of a connected service. These commands are always available.

Command	Function	Example
<code>help [&lt;command&gt;]</code>	Provides help on available commands or a particular command.	<code>help</code> or <code>help connect</code>
<code>clear</code>	Clears the screen (shortcut <code>Ctrl-L</code> ).	<code>clear</code>
<code>exit</code> or <code>quit</code>	Exits the shell.	<code>quit</code>
<code>history</code>	Displays the history of previously-run commands.	<code>history</code>

- Use the `help <command>` to explore the available commands. It is always available.
- `nw-shell` supports tab completion of a command, and the applicable parameter names wherever possible. For example, pressing the **Tab** key after typing `e` completes the command to `exit`.
- `nw-shell` also supports a non-interactive mode where it executes scripts from a provided file, used by specifying the absolute filepath prefixed by the `@` argument. See [Shell](#) for details.

## Available Commands

### Built-In Commands

`clear`: Clear the shell screen.

`exit`, `quit`: Exit the shell.

`help`: Display help about available commands.

`history`: Display or save the history of previously run commands

script: Read and execute commands from a file.  
stacktrace: Display the full stacktrace of the last error.

#### Context Commands

- \* cd: Change the current node. Usage: cd <path>
- connect: Connect to a service. One of --service or --port must be specified. Usage: connect [--service <service>[.<id>]] [--broker amqp://localhost/rsa/system] [--host localhost] [--port] [--insecure false]
- \* where: Which service shell is connected to?

#### Token Commands

- login: Authenticate to a service. Usage: login [connect-parameters]
- login-insecure: Authenticate to a service providing user and password on the command prompt. The password is recorded in the shell history so this command must be used with care. Usage: login-insecure --user <user> --password <password> [connect-parameters]
- \* logout: Clear the authentication context: logout
- \* whoami: Who am I?

#### Tree Node Commands

- \* json: Print the current node as a JSON string
- \* show: Pretty print the current node

#### Tree Node List Commands

- \* config: Summarize configuration of the current subtree
- \* health: Summarize health of the current subtree
- \* ls: List the children of the current node. Usage: ls [<filter>] [--values] [--types]
- \* lsv: Shorthand for ls --values. Usage: lsv [<filter>] [--types]
- \* method: Summarize methods of the current subtree
- \* metrics: Summarize metrics of the current subtree
- \* snapshot: Snapshot the current subtree

#### Tree Node Method Commands

- \* invoke: Invokes the method that exists on the current method type

node. Usage: invoke [argument] [--file jsonfile]

#### Tree Node Value Commands

- \* get: Get the value of the current node
- \* set: Set the value of the current node. Usage: set <new-value>

Commands marked with (\*) are currently unavailable.

Type ``help <command>`` to learn more.

## Help, History Command Usage

```
offline » help connect
```

```
    connect - Connect to a service. One of --service or --port must be
specified. Usage: connect [--service <service>[.<id>]] [--broker
amqp://localhost/rsa/system] [--host localhost] [--port] [--insecure false]
    ...
    ...
```

```
offline » history
```

```
help
help connect
history
offline »
```

You can navigate previously-typed commands in `nw-shell` by using the Up and Down arrow keys, which can help minimize typing by recalling previously-executed commands.

## Authentication Commands

As an administration and monitoring tool, it is important that `nw-shell` authenticates users before handing them control over a running service. The following commands manage the shell authentication context:

Command	Function
login	Authenticates and retains tokens for future interactions.
logout	Clears the security context and token.
whoami	Prints a summary of the current identity.

The `login` command can be used to authenticate the user and establish an identity. Service operators can log in once (against the NetWitness Security Server) and then use the token to connect to multiple services and perform administration based on the roles assigned. This single-sign-on workflow is simplified by separating the `login` and `connect` commands to allow the operator to authenticate once (using `login`) and then switch services seamlessly using `connect`.

In general, the `login` command takes the same parameters as `connect` (described below) to specify the service that performs the credential validation. For example:

```
offline » login
user: admin
password: *****
admin@offline » connect --service respond-server
INFO: Connected to respond-server (23e1dab7-0658-41a5-bb1e-d716a37d5ea5)
admin@respond-server:Folder:/rsa »
admin@respond-server:Folder:/rsa » connect --service investigate-server
INFO: Connected to investigate-server 2f21db20-4b50-48cf-8f7f-c0be0d1d1d12)
admin@investigate-server:Folder:/rsa »
```

The current logged-in identity can be confirmed at any point using the `whoami` command. For example:

```
admin@offline » whoami
```

<b>Subject</b>	<b>admin</b>
Issued By	security-server-eb90da-761b-4f14-b9ec-30410499d2b8
Issued At	2018-10-04T17:22:52.041Z
Expires After	2018-10-05T05:22:52.041Z
Roles	[eb90da-761b-4f14-b9ec-30410499d2b8]

The shell security context can be cleared by using the `logout` command.

```
security-server:Folder:/rsa » logout
security-server:Folder:/rsa » whoami
You are not logged in.
```

Some operations, such as setting certain configuration properties or invoking a method, require a certain RBAC. To perform such privileged operations, you need to authenticate with an identity that has the necessary permissions. For example:

```
security-server:Configuration » /rsa/logging/operations/max-file-count » get
10
security-server:Configuration:/rsa/logging/operations/max-file-count » set 15
ERROR: Failed to set the node value: Access is denied
security-server:Configuration:/rsa/logging/operations/max-file-count » login
user: admin
```



```
password: *****
admin@security-server:Configuration:/rsa/logging/operations/max-file-count »
set 15
security-server:Configuration:/rsa/logging/operations/max-file-count » get
15
```

## Context-Changing Commands

The following commands change the current shell context.

Command	Function	Options	Examples
connect	Connect to a service	servicehost, port, http, broker	connect --service security- server.d6a55b48...
cd	Change context to a node		cd /rsa/security, cd ../sys, cd .., cd

## Connecting to a Service

The shell can connect to services over AMQP or HTTP(S), however, AMQP is the preferred and default option.

To connect to a specific instance of a service, name and serviceId needs to be supplied in the format:

```
connect --service {service-name}.{serviceId}
```

For example, `foo-server.d6a55b48-6103-46bd-9ead-3b4d589b302b`.

If the service identifier is skipped, it is assumed to be any, for example, `connect --service foo-server` will connect with any service named `foo-server` that is connected to the AMQP broker.

## Change Node

The `cd` command can be used to change the current node. Just like `cd` on a file system shell, it takes relative or absolute paths as input and changes the current context to the node at that path.

```
offline » cd
```

```
Command 'cd' was found but is not currently available because you are not
connected to any service.
```

```
offline » connect
```

```
security-server:Folder:/rsa » cd log
security-server:Folder:/rsa/logging » cd ../security
security-server:Component:/rsa/security » cd /rsa/security/fips-mode
security-server:Configuration:/rsa/security/fips-mode » cd
security-server:Folder:/rsa »
```

The shell prompt summarizes and presents the user’s current context. It starts off with `offline`, and once the shell is connected to a service, it displays the service name it is connected to, and the type and the path of the current node. Once the user is authenticated, the `userId` is included in the prompt.

Invoking `cd` before connecting to a service reminds the user that some commands work only in certain contexts.

**Note:** Some commands are available only in certain contexts. For example, `cd` works only when the shell is *online*. The `Help` command lists all the commands, but commands marked with (\*) are unavailable in the given context.

Certain node-specific commands are enabled only when the current node is of a certain type. For example, method nodes support a command `invoke`, which is not enabled for any other node type.

## Node Display Commands

The following commands are available with all node types. They do not take any arguments, and display the node details for the user to review.

Command	Function
<code>show</code>	Pretty-print the current node.
<code>json</code>	Print the current node as a JSON string.

For example:

```
security-server:Configuration:/rsa/security/authentication/token-lifetime » show
```

Configuration	/rsa/security/authentication/token-lifetime
value	10 hours
valueType	com.rsa.asoc.launch.api.helpers.Seconds
defaultValue	10
description	The time-to-live on a token.

```
security-server:Configuration » /rsa/security/authentication/token-lifetime »
json
{
  "path" : "/rsa/security/authentication/token-lifetime",
  "type" : "Configuration",
```

```

"value" : "10 HOURS",
"parent" : {
  "path" : "/rsa/security/authentication",
  "type" : "Component"
},
"attributes" : {
  "defaultValue" : 10,
  "valueType" : "com.rsa.asoc.launch.api.helpers.Seconds",
  "description" : "The time-to-live on a token."
}
}

```

The output of `json` dumps the API payload and may contain more details than those shown by `show`.

## Node Value Commands

Configuration, Metric and Health nodes have values. Their current values can be obtained using the `get` command.

Command	Function	Examples
<code>get</code>	Get the current value of the node.	
<code>set</code>	Update the value of the node.	<code>set false, set '{"enabled": false}'</code>

For example:

```

security-server:Gauge:/rsa/process/hostname » get
"hostxyz.corp.emc.com"
security-server:Gauge:/rsa/process/hostname » cd /rsa/transport/http/secure
security-server:Configuration:/rsa/transport/http/secure » get
true

```

The value of a Configuration node can be changed by invoking the `set` command. For example:

```

admin@security-server:Configuration:/rsa/security/pki/tls-protocols » show

```

Configuration	/rsa/security/pki/tls-protocols
value	[TLSv1.2]
valueType	java.lang.String[]
description	This property controls the TLS protocol versions supported by the applications.

```
admin@security-server:Configuration:/rsa/security/pki/tls-protocols » set '
["SSLv3"]'
admin@security-server:Configuration:/rsa/security/pki/tls-protocols » value
[
  "SSLv3"
]
```

## Node List Commands

Folder, Component and Method nodes can contain other nodes as their children. You can use the `ls` command to list the children nodes, their types, and where available, their current values.

Command	Function	Options	Examples
<code>ls &lt;filter&gt;</code>	List the child nodes of the current node.	types, values	<code>ls, ls cfg, ls --values</code>
<code>lsv &lt;filter&gt;</code>	Shorthand for <code>ls &lt;filter&gt; --values</code>	types	<code>lsv metrics ls name:fips</code>

For example:

```
security-server:Component:/rsa/process » ls
jvm                Component
modules            Component
current-time-utc   Gauge
current-time-utc-pretty Gauge
fips140-mode       Gauge
hostname           Gauge
mode               Gauge
service-id         Gauge
service-name       Gauge
status             Gauge
uptime            Gauge
uptime-pretty      Gauge
version            Gauge
version-full       Gauge
version-raw        Gauge
```

ready Method

shutdown Method

```
security-server:Component:/rsa/process » ls comp
```

jvm Component

modules Component

```
security-server:Component:/rsa/process » ls name:uptime
```

uptime Gauge

uptime-pretty Gauge

```
security-server:Component:/rsa/process » ls name:uptime --values
```

uptime Gauge 3713854

uptime-pretty Gauge 1 hour 1 minute 53 seconds

```
security-server:Component:/rsa/process » lsv
```

jvm

modules

current-time-utc 1483978142782

current-time-utc-pretty 2017-01-09T16:09:02.782Z

fips140-mode true

hostname hostxyz.corp.emc.com

mode Normal

service-id 1fb7572a-4d87-497e-a4da-802819c10a72

service-name no-op-server

status Running

uptime 512064

uptime-pretty 8 minutes 32 seconds

version 0.0

version-full 0.0.0.0

version-raw 0.0.0.0

ready

shutdown

Listing commands are not available on nodes that do not have children (for example, configuration or metric nodes):

```
security-server:Component:/rsa/process » cd hostname
security-server:Gauge:/rsa/process/hostname » ls
Command 'ls' exists but is not currently available because you are not logged
in.
```

**Note:** Values displayed in `ls` and `lsv` may be truncated for presentation purposes. Use `get` on the value node to get the complete (unaltered) value of a node.

## Method Node Commands

The `method` command shows all the available methods and all the sub-folders under the current node.

```
security-server:Component:/rsa/process » method
/rsa/process/ready
/rsa/process/shutdown
```

On a node that is of `Method` type, the `invoke` command will invoke the method. For example:

```
security-server:Method:/rsa/process/ready » invoke
{
  "ready" : true,
  "serviceId" : "84f36740-5ae7-409f-b14f-b17e98703983",
  "marketingVersion" : "0.0"
}
```

If the method signature takes input, then `invoke <input>` will invoke the method with given parameters.

```
security-server:Method:/rsa/health/get » show
```

Method	/rsa/health/get
output	java.util.List<com.rsa.asoc.launch.api.health.api.HealthStatus>
input	java.lang.String
description	Get the details of a single composite health check @param id The health check id @return The composite health check

Metric	Value
failed	0
invoked	0
timer	0.0

```
Method:/rsa/health/get » invoke 'rsa.health.checks.security-pki'  
[  
  {  
    "name" : "rsa.security.pki.pki-health",  
    "status" : "Unhealthy",  
    "details" : {  
      "Reason" : "Using a self-signed certificate"    }  
    }  
  ]
```

For inline method execution with input payload, in cases where the input contains any special characters such as `\`, `\n`, `\r`, `\t`, `,`, `"`, the input needs to be properly escaped with a backslash (`\`).

In cases where method takes a complex payload, payload can be supplied with a file reference. In this case, payload does not need any special escaping.

```
Method:/rsa/configuration/collections/register » invoke --file  
/tmp/jsonfile.txt
```

## Run State of a Service

Once `nw-shell` is connected to a service, commands like `health`, `metrics`, `config` or `snapshot` can be used to retrieve the current state of the service at the current node, and all the sub-folders under the current node.

## Health

The `health` command lists the health of the components, and the all the sub-folders, under the current node.

```
admin@security-server:Component:/rsa/process » health  
/rsa/process/jvm/memory-health      Healthy  
/rsa/process/modules/module-health  Healthy
```

## Metrics

The `metrics` command lists all of the available metrics, and all the sub-folders, under the current node.

```
admin@respond-server:Component:/rsa/tree/node » metrics  
/rsa/tree/node/get/invoked    14
```

```

/rsa/tree/node/get/timer      5666541.077918259
/rsa/tree/node/list/invoked  12
/rsa/tree/node/list/timer    6652400.379371729

```

In the above example, `/rsa/tree/node/get/invoked 14` shows that the method `get` is invoked 14 times, and `timer` shows that it took on average `5666541.077918259` nano seconds to process the `get` request.

Using `cd` into the `timer` node shows more details, such as rate of requests, for the current node for per-minute and five minutes. For example:

```
admin@respond-server:Timer:/rsa/tree/node/get/timer » show
```

Timer	/rsa/tree/node/get/timer
value	3267513.7521543643
valueType	java.lang.Double
stdDeviation	4381863.808014679
fiveMinuteRate	0.018725581010540414
max	181326026
count	27
sampleSize	27
oneMinuteRate	0.038516144812437314
min	810240
fifteenMinuteRate	0.009425563630894371
median	2146170.0
meanRate	5.189274295248098E-4
mean	3267513.7521543643

## Config

The `config` command shows all the configuration properties in the current node and all the sub-folders under the current node.

```

admin@respond-server:Component:/rsa/logging » config
/rsa/logging/audit/max-file-count      10
/rsa/logging/audit/max-file-size      10 MB
/rsa/logging/forward/categories        [Audit]
/rsa/logging/forward/destination      SYSLOG_UDP
/rsa/logging/forward/enabled          true
/rsa/logging/forward/host              localhost
/rsa/logging/forward/port              50514
/rsa/logging/forward/secure           false
/rsa/logging/levels
/rsa/logging/operations/max-file-count 10

```



```
/rsa/logging/operations/max-file-size 10 MB
```

## Snapshot

The `snapshot` command combines metrics, configuration, and health of the current state of the service node and all the sub-folders under the current node. This command is very useful for troubleshooting purposes. When opening a support case, take a snapshot dump at the root node `\rsa` of a service that might be having issues, and attach it to the case.

```
admin@security-server:Component:/rsa/security » snapshot
/rsa/security/account/external/get-all/invoked      16
/rsa/security/account/external/get-all/timer       NaN
/rsa/security/account/external/get/failed          6
/rsa/security/account/external/get/invoked         6
/rsa/security/account/external/get/timer           NaN
/rsa/security/account/force-password-change/invoke  1
/rsa/security/account/force-password-change/timer  NaN
/rsa/security/account/get/invoked                 123
/rsa/security/account/get/timer                   902163.0
/rsa/security/account/password-policy/cannot-inclu false
/rsa/security/account/password-policy/min-chars     8
/rsa/security/account/password-policy/min-lower-ch  0
/rsa/security/account/password-policy/min-non-lati  0
/rsa/security/account/password-policy/min-numeric-  0
/rsa/security/account/password-policy/min-special-  0
```

----

## Scripting

`nw-shell` supports non-interactive executions that can take commands from files. For example:

```
> cat /tmp/foo.script
connect --service security-server
cd /rsa/security/pki/ciphers
get
> time nw-shell @/tmp/foo.script
```

```
INFO: Connected to security-server (52c7b92c-23d5-4b3e-9973-31d8b1b27ec4)
[
  "TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256",
  "TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA",
  "TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256",
  "TLS_DHE_RSA_WITH_AES_128_CBC_SHA"
]
nw-shell    5.89s user 0.33s system 305% cpu 2.032 total
```

`nw-shell` also has a built-in script which can be used to execute scripts in the shell once the shell is launched.

```
offline » script --file /tmp/foo.script
INFO: Connected to security-server (52c7b92c-23d5-4b3e-9973-31d8b1b27ec4)
[
  "TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256",
  "TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256",
  "TLS_DHE_RSA_WITH_AES_128_GCM_SHA256",
  "TLS_RSA_WITH_AES_128_CBC_SHA256"
]
```

**Note:** `nw-shell` is primarily meant to help a human to explore the runtime state of a NetWitness Platform service. For most other purposes, it is usually best to use the service published APIs.

## Troubleshooting Commands

The `nw-shell` utility provides troubleshooting commands to help recover from misconfigurations that may cause the service to work improperly.

### fix-keystore

When a service's keystore is corrupt or its SSL trust is broken with the rest of NetWitness Platform, you can use the `fix-keystore` command to fix this issue. This command reads the keystore file of the services running on the host and attempts to reestablish trust with the NetWitness Platform CA. For example, the following is the command to repair the `respond-server`'s keystore:

```
>> fix-keystore --service respond-server
```

This command repairs the keystore `keystore.p12` that is located at `/etc/netwitness/respond-server`. It does not modify the service's original keystore. The repaired keystore can be found with the suffix

`.good`, for example, `keystore.p12.good`. If no fixes can be made to the keystore, this command does not write the new `keystore.p12.good` file.

Once the keystore repair is successful, the system admin can restore the service's communication by renaming `keystore.p12.good` to `keystore.p12` and restart the service.

## print-keystore

The `print-keystore` command prints the requested NetWitness Platform Service's keystore certificates to the given output file in JSON format. Unless verbose is enabled, only a few key attributes of the certificates are printed to the file. For example, the following command prints the respond-server's keystore certificates.

```
>> print-keystore respond-server outputFile /tmp/crts
```

With verbose enabled:

```
>> print-keystore respond-server outputFile /tmp/crts verbose
```

## reconstruct-keystore

The `reconstruct-keystore` command can be used when a service's keystore needs to be restored to its original clean state.

The following command reconstructs the respond-server's keystore to the new file `/etc/netwitness/respond-server/keystore.p12.new` (it does not modify the original keystore).

```
>> reconstruct-keystore --service respond-server
```

To restore the service back to its healthy state, restore `keystore.p12.new` to `keystore.p12`, and restart the service.

## Advanced Customization

The following JVM system properties can be used to customize certain aspects of the `nw-shell` presentation:

System Property	Controls	Default Value
<code>console.width</code>	The width of text.	100
<code>console.colors</code>	The use of colors.	true
<code>console.prompt</code>	The prompt.	<code>%s%s%s &gt;&gt;</code>
<code>timeout</code>	The API timeout.	30s

These can be specified using the `JAVA_OPTS` environment variable. For example:

```
> export JAVA_OPTS="-Dtimeout=100s -Dconsole.width=40 -
```

```
Dconsole.prompt=%s%s%s>"
```

```
> export JAVA_OPTS="-Dconsole.colors=false"
```

> nw-shell

The API timeout is a time unit which can use typical time unit values such as 30 MINUTES, 30 mins, 30 m, 5 seconds, 5 sec, 5s, 5, 8000 milliseconds, or 8000 ms (ms = milliseconds).

The value of `console.prompt` must contain placeholders (for example, `%s`) for three strings which are replaced, in order, by:

1. The node type
2. A separator ( : )
3. The node path

Setting `console.colors` to `false` will not turn off *all* use of colors, it only disables colors used by `nw-shell` in its output. The underlying libraries that the program uses may still output some text in color.

## Tree View

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A NetWitness Platform service, such as `security-server` or `investigate-server`, is a collection of components working together to implement the goals of the service. This topic describes the support for exposing these components and their associated elements (for example, configuration parameters, metrics, API methods, health checks, and so on) in a `tree-view`. The `tree-view` is a hierarchically-nested arrangement of `tree-nodes`, each of which corresponds to a distinct functional area of the service. The arrangement enables the end-user to navigate the nodes at run-time and to explore the current state of the service. See [Shell](#) for an interactive tool that uses the `tree-view`.

## Features

The `tree-view` implements the following features:

- Supports encapsulation of functionally related elements under the same `tree-node`.
- Supports hierarchical linkage of `tree-nodes` to enable navigation from one node to another.

## Implementation

The current implementation of the `tree-view` is described in the following sections.

## Node Types

The `tree-view` is comprised of `tree-node` instances taken from the following types.

Type	Represents
Component	A service component with associated configurations, metrics, health, APIs, etc.
Configuration	A configuration parameter that controls some aspect of the service behavior (for example, <code>rsa.filesystem.prefix</code> ).
Metric	A <i>quantitative</i> measure of some aspect of the component operations (for example, Requests Processed).
Health	A <i>qualitative</i> assessment of some aspect of the component (for example, "Using too much memory").
Method	An API that can be invoked remotely to interact with the component (for example, <code>/rsa/security/pki/setCertificate</code> )
Parameter	A payload parameter that is an input or an output from an API.
Folder	A logical grouping of nodes that are related to one another but are not a component (for example, the root <code>/rsa</code> ).

## Node Structure

All `tree-nodes` have the same structure. In particular, they include the following elements:

Item	Information
<code>path</code>	The node path is a backslash (/) separated path, for example, <code>/rsa/security/pki/api-secure</code> .
<code>type</code>	The type of the node, taken from the previous table.
<code>attributes</code>	A map of string keys to attribute values. The available keys depend on the type of the node.
<code>value</code>	The value of this node. This can be null if the node has no associated value (or if it has a null value).
<code>children</code>	A list of child nodes, if the node has any.
<code>parent</code>	The parent node. This is only null for the root node.