Evidian

SafeKit Release Notes

High Availability Software for Critical Applications

Overview

Subject	This document provides information about SafeKit releases: major changes, restrictions and known problems, migration instructions.
Content	
Version	SafeKit 8.2
Operating Systems	Windows and Linux; for a detailed list of supported OS refer to 1.1 page 5.
Web Site	Evidian marketing site: https://www.evidian.com/safekit Evidian support site: https://support.evidian.com
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1. Before Starting

This document describes the latest releases of SafeKit. We encourage users of all previous releases to upgrade to the latest release when it is possible.

1.1 Supported Operating Systems

At the time this document was written, SafeKit **8.2** is available for:

Operating system	Information

- Red Hat Entreprise Linux 9 (Intel x86 64-bit kernel)
- Red Hat Entreprise Linux 8 (Intel x86 64-bit kernel)
	In Red Hat, the following packages are required:
	✓ for SafeKit core
	`bind-utils, binutils >= 2.30, coreutils >= 8.30, cronie, curl >= 7.60, gawk, httpd, iproute, libcap, libcurl >= 7.60, libcrypto.so.1.1, libssl.so.1.1, libxml2 >= 2.9, lua >= 5.3, mod_auth_openidc, mod_ldap, mod_session, mod_ssl, sed, unzip, zip`
	`mod_lua` for Red Hat 8
	✓ for SafeKit file replication
	`nfs-utils`
	✓ for SafeKit load balancing:
	`gcc, elfutils-libelf-devel,glibc >= 2.28, kernel >= 4.18, kernel-devel, make`
	During SafeKit install, missing packages for the SafeKit core will be automatically installed via `yum` command.

- Windows Server 2022 (Intel x86 64-bit kernel) - Windows Server 2019 (Intel x86 64-bit kernel)	Two packages are downloadable: ✓ a Windows Installer package (safekit_windows_x86_64_8_x_y_z.msi) It depends on the VS2022 C runtime which must be previously installed. ✓ a standalone executable bundle (safekit_windows_x86_64_8_x_y_z.exe) It includes the SafeKit package and the VS2022 C runtime.

The up-to-date list of supported operating systems can be found in the *Software Release Bulletin* and at https://support.evidian.com/supported_versions/#SK. Old SafeKit packages and documentations can be found at https://support.evidian.com/safekit_old.

1.2 SafeKit cluster upgrade

You may upgrade SafeKit to fix resolved issues or take advantages of new features.

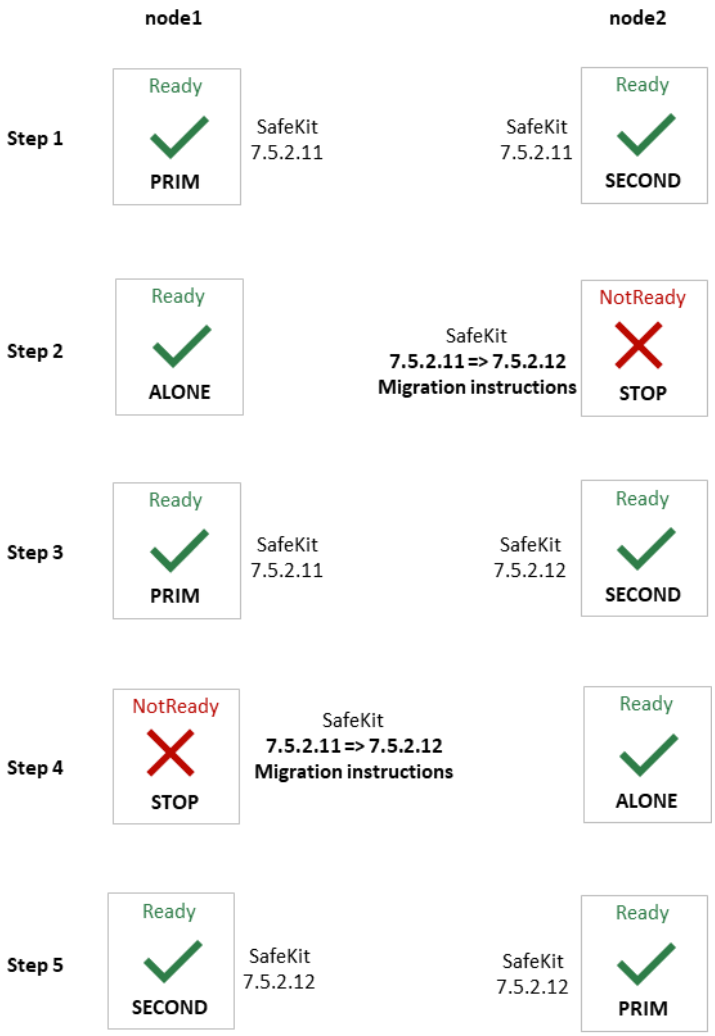
Before upgrading:

- ✓ check the list of fixes into the *Software Release Bulletin*
- ✓ read this Release Notes to learn about the new features and migration instructions
- ✓ if possible, select the latest SafeKit package released

As SafeKit is installed on at least two nodes, you must take certain precautions when upgrading them to limit service unavaibility while respecting version compatibility constraints. These differ according to whether the upgrade is a minor or a major one. *Migration Instructions* section page 35 details the procedure to upgrade SafeKit from a version to the next one and specifies whether it is a minor or major upgrade.

1.2.1 Minor upgrade

An upgrade is minor when the installed SafeKit package and the new one are compatibles in term of communications and internal components. Usually, only the last version number changes. For instance, upgrading from 7.5.2.11 to 7.5.2.12 is a minor upgrade. In this case, the order in which nodes are upgraded can be as described below (example of upgrade from 7.4.0.69 to 7.4.0.70).



At step 3 (and 4), check that the module (and the application) are operationals on `node2` before upgrading `node1`. If not, do not migrate `node1` and on `node2`, rollback to the previous version:

1. Stop the module on `node2`
2. Force `node1` to start as primary
3. Reinstall the previous SafeKit release on `node2`

The upgrade procedure on the node itself is usually the standard one described in the *SafeKit upgrade* section of the *SafeKit User's* Guide. Anyway, always check for *Migration Instructions* section page 35 for details depending on your SafeKit release.

1.2.2 Major upgrade

An upgrade is major when the installed SafeKit package and the new one are not compatibles in term of communications or internal components. For instance, upgrading from 7.5.2.12 to 8.2.0.3 is a major upgrade. In this case, the upgrade may require applying specific migration instructions before being operational. The order in which nodes are upgraded must be as described below.

At step 3, check that the module and the application are operationals on `node1` before upgrading `node2`. If not, do not migrate `node2` and on `node1`, rollback to the previous version:

4. Stop the module on `node1`
5. Force `node2`, that is not updated, to start as primary
6. Reinstall the previous SafeKit release on `node1`

The upgrade procedure on the node itself may not be the standard one. Refer *Migration Instructions* section page 35 for details depending on your SafeKit release.

Note that it is safe to apply this upgrade order also for minor upgrades.

1.3 Documentation

The latest version of the SafeKit 8.2 documentation can be found at https://support.evidian.com/safekit under Version 8.2/Documentation.

Name	Description
SafeKit Solution	SafeKit solution is fully detailed at https://www.evidian.com/safekit
SafeKit Release Notes	It describes new features of major SafeKit releases and provides migration instructions.
Software Release Bulletin	Technical release bulletin for all SafeKit 8.2 packages with the description of changes and problems that are fixed.
SafeKit Knowledge Base	List of known problems and restrictions on SafeKit
SafeKit User's Guide (english version) *Guide de l'utilisateur SafeKit (french version)*	It covers all phases of SafeKit implementation: architecture, initial use, installation, configuration, administration, troubleshooting, testing and support.  Important The links refer the latest version of the SafeKit User's Guide. For previous versions, refer to the one delivered into the SafeKit package.
SafeKit Training (english version) *Formation SafeKit*	Refer to this online training for a quick start in using SafeKit.

2. Major changes

This section gives the list of new features introduced in SafeKit since release 7.4. Go to section 3 page 31 and carefully read known problems about SafeKit releases and to section 4 page 35 for migration instructions.

2.1 Major changes between SafeKit 8.2 and SafeKit 7.5

2.1.1 New ergonomic web console

SafeKit web console has evolved to offer a more ergonomic and pleasant user experience. It is loaded by connecting a web browser to http://host:9010 (where `host` is the name or IP address of one of the SafeKit servers) and offers a navigation side bar with 2 selections:

- Configuration to configure the cluster and the modules. Configuration is only authorized to users that have Admin role. By default, the `admin` user has the Admin role.

  Switching to advanced configuration is now easier in the configuration wizard.

- Monitoring to monitor and control the configured modules. Monitoring is authorized to users that have Admin, Control and Monitor roles. With Monitor role, actions on modules (start, stop…) are prohibited.

  The module log is now displayed in real time, and its analysis has been improved.

For details, see section "The SafeKit web console" in the *SafeKit User's Guide*.

2.1.2 SafeKit web service enhancement

Since the new console relies on a new SafeKit API, the console delivered with SafeKit 8 can only administer SafeKit 8 servers, which cannot be administered with an older console.

The Apache configuration of the SafeKit web server has been modified and enhanced to:

- ✓ implement the new API and remove the legacy one
- ✓ simplify user cutomization into `SAFE/web/conf/httpd.conf` ; for details, see section "Configuration of the SafeKit web service" in the *SafeKit User's Guide*
- ✓ offer OpenID authentication ; for details see section "OpenID authentication setup" in the *SafeKit User's Guide*

Note that client certificate authentication is no more documented while still supported.

2.1.3 SafeKit logs enhancement

2.1.3.1 System log

Since SafeKit 8.2, main module log messages are also logged into the system log. To display SafeKit messages:

- in Windows, in a Powershell console, run

  ```
  Get-EventLog -Logname Application -Source Evidian.SafeKit
  ```

- in Linux, in a terminal, run

  ```
  journalctl -r -t safekit
  ```

2.1.3.2 Module log

Module log messages have been requalified and now include levels:

- U(ser) for action executed by the user (start/stop of the module…)
- E(vent) for major events on the module (state changes…)
- C(ritical) for critical events that require attention
- S(cript) for user script execution (start_prim/stop_prim…)

Other levels are for support and debug purpose.

In previous SafeKit releases, some users used to search for the keyword *atleast* to look for process/service monitoring error detection. For instance, errd used to log:

```
| 2023-10-12 10:15:42:447000|errd | E | event atleast on proc idsyncsrv.exe
```

Since SafeKit 8.2, errd logs:

```
| 2023-10-12 10:15:42:447000 | errd | E | Process idsyncsrv.exe not running
```

2.1.3.3 Module scripts log

Before SafeKit 8.2, output messages of user scripts were stored into **`SAFEVAR/modules/AM/userlog.ulog`** (where AM is the module name).

Since SafeKit 8.2, a log is created on each user script execution and is stored into **`SAFEVAR/modules/AM/userlog_AAAA_MM_DDThhmmss_<script name>.ulog`.** This makes it easier to find the output of a script execution.

For instance, the file **`C:\safekit\var\modules\database\userlog_2023-12-12T083203_stop_prim.ulog`** is the output of the execution of `stop_prim` for the module `database` on the 2023/12/12 at 08h32mn03sec.

2.1.4 Replication enhancement

2.1.4.1 Replicate only

The `regexpath` attribute of `<notreplicated>` tag has evolved to express the need to replicate only certain files into a `<replicated>` directory.

`<notreplicated regexpath="regular expression" />`	Regular expression on the name of entries under the replicated directory :
	⇨ **Replicate all except** entries matching the regular expression
	For example, to avoid replicating entries with the extension `.tmp` or `.bak` in the `/safedir` directory or its sub-directories :
	`<replicated dir="/safedir">`
	` <notreplicated regexpath=".*\.tmp$" />`
	` <notreplicated regexpath=".*\.bak$" />`
	`</replicated>`
	Note that `/safedir/conf/config.tmp.swap` is replicated.
	⇨ Since SafeKit 8.2
	Replicate only those entries in the directory that match the regular expression after the **!**
	For example, to replicate only entries with the extension `.mdf` or `.ldf` in the `/safedir` directory or its sub-directories :
	`<replicated dir="/safedir">`
	` <notreplicated regexpath="!.*\.mdf$" />`
	` <notreplicated regexpath="!.*\.ldf$" />`
	`</replicated>`
	 
	Important
	Rename between not replicated and replicated is not supported.
	The regex engine is POSIX Extended regex (see POSIX documentation):
	✓ in Windows, case insensitive mode
	✓ in Linux, case sensitive mode
	 
	Important
	As regular expressions are defined inside the XML file `userconfig.xml`, special characters interpreted by XML like '`<`' or '`>`' cannot be used in regular expressions.

2.1.4.2 Replication of anti-ransomware folders in Windows

In Windows, protected folders can be enabled as follow:

1. open Windows Security

2. select *Virus & heart protection* and *Manage ransomware protection*
3. set *Controlled access* to *on* and select *Protected folders* to add folders

Once done, you must allow SafeKit to access such directories to replicate them. For this:

4. select *Allow an app through Controlled access folder*
5. *Add an allowed app*
6. *Browse all apps*
7. Add the following apps:

   `C:\safekit\private\bin\nfsbox.exe`

   `C:\safekit\private\bin\reintegre.exe`

   `C:\safekit\private\bin\sync.exe`

   `C:\safekit\private\plugin\heart\heartplug.exe`

Replace `c:\safekit` by the installation path of SafeKit if you changed the default one.

2.1.5 Custom checker simplification

Since SafeKit 8.2, the custom checker action can be defined with the `action` attribute of the `<custom>` tag instead of a failover rule configuration.

⇨ Configuration example before SafeKit 8.2

```
…
  <check>
    <custom ident="checkfile" exec="checker.ps1"
            arg="c:\safekit\checkfile" when="prim"/>
  </check>
  <user></user>
  <failover>
      <![CDATA[
         c_checkfile:
         if( custom.checkfile == down ) then restart();
         ]]>
  </failover>
…
```

⇨ Configuration example since SafeKit 8.2

```
…
  <check>
    <custom ident="checkfile" exec="checker.ps1"
            arg="c:\safekit\checkfile" when="prim" action="restart"/>
  </check>
  <user></user>
…
```

The corresponding failover rule is automatically generated according to `action` attribute value and is named `c_checkfile` (checkfile is the ident value of the custom checker).

2.1.6 Module templates

2.1.6.1 Solution for Podman

SafeKit brings high availability to Podman between two redundant servers. For details, see Podman: the simplest high availability cluster between two redundant servers

2.1.6.2 hyperv.safe enhancement with software error detection

A custom checker is included in the hyperv.safe module to run in the host and to detect VM malfunction using Hyper-V heartbeat feature: VM locked up, crashed, or ceased to function. In addition, you can integrate the automatic restart of your service if it fails inside the VM. Both solutions are described here (step 12 and 13 of Step by step configuration).

2.1.7 Permanent disabling of application checkers

To avoid false error detection and automatic failover on application maintenance, you can use the commands: `safekit errd suspend|resume –m module` and `safekit checker on|off –m module`.

With SafeKit < 8.2, these operations could only be run while the module is started, and the module configuration options were restored on the next stop-start of the module.

Since SafeKit 8.2, these operations can be run while the module is stopped and are not resetted when the module stops-starts.

Moreover, you can now use `safekit errd off|on` instead of `suspend|resume`.

2.1.8 License check

Before SafeKit 8.2, SafeKit used to check the product license only from the file `SAFE/conf/license.txt`. Since SafeKit 8.2, this control is less strict and accept any filename. If many license files are present into `SAFE/conf`, the most favorable license is selected (permanent over temporary, latest expiration date…). If only expired license is found, the product will stop every 3 days.

2.1.9 SNMP monitoring

Since SafeKit 8.2, SNMP monitoring implementation differs in Windows and Linux:

- in Windows, it uses its own snmp agent service
- in Linux, it is based on the operating system's SNMP agent. Therefore, the safekit commands for installing and controlling the SNMP agent used in previous SafeKit releases are deprecated

Refer to the section "SNMP monitoring" of the *SafeKit User's Guide* for the new procedures to manage the SNMP agent in SafeKit 8.2.

Moreover, SNMP traps are no more generated.

2.1.10 Miscellaneous

- Linux package

  Since SafeKit 8.2, all third-party librairies and bins that can be delivered with the Linux operating system are no more included into the SafeKit package. During SafeKit install, these packages will be automatically installed, if necessary, with the `yum` command (except the packages for the file replication or load-balancing that must be manually installed according to your needs).

- Windows package

  Two SafeKit packages are available:

  - ✓ a Windows Installer package (safekit_windows_x86_64_8_x_y_z.msi)

    It depends on the VS2022 C runtime which must be previously installed.

  - ✓ a standalone executable bundle (safekit_windows_x86_64_8_x_y_z.exe)

    It includes the SafeKit package and the VS2022 C runtime.

- Module snapshot

  The structure and content of the snapshot has slightly changed in SafeKit 8.2. For a full description, see section "Analysis from snapshots of the module" in the *SafeKit User's Guide*. See also the new SafeKit training resources "Support tools".

- Module status

  Since SafeKit 8.2, the internal module status previously represented by the colors `red`, `magenta`, `green` has been replaced by `Ready`, `Transient` and `NotReady`. These values are displayed into the module log, module state and some module resources.

- User scripts dynamic reconfiguration

  Since SafeKit 8.2, dynamic re-configuration of scripts is supported except for running scripts in Windows (such as custom checkers).

- SafeKit web server port change

  Before SafeKit 8.2, when changing the default value of the SafeKit web server, it was also necessary to change its value into the internal file `safeini.xml`. This is no more required.

- Catalog files for internationalizing backend and frontend messages have changed format

2.2 Major changes between SafeKit 7.5.2 and SafeKit 7.5.1

Version 7.5.2 is a consolidation of version 7.5.1 and includes the following changes.

2.2.1 Virtual IP

In Linux, load-balancing for farm module is now based on two kernel modules, instead of one in preceding releases (`vip` and `tcpseq`). The two kernels' modules must be signed when used with SecureBoot (see Q009176).

Re-introduction of the possibility to designate the interface, on which to configure the virtual IP, by its `name` (necessary in some use cases). The interface name must be identical on all nodes. Supported in Linux **and** Windows.

Add the netmask definition for the virtual IP in Windows, in addition to Linux.

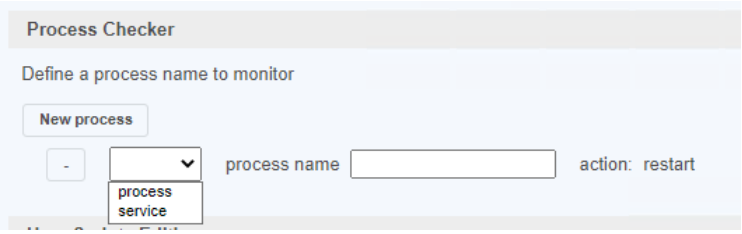
```
<vip [tcpreset="off"|"on"]>
 <interface_list>
  <interface
    [name="interface name"]
  >
  …
  <virtual_addr
      addr="virtual_IP_name"|"virtual_IP_address"

       [netmask="netmask for the virtual address"]
  …
```

`<vip`	
`<interface_list>`	
`<interface`	
`[name="interface name"]`	You can specify the name of the network interface on which the virtual IP addresses will be set. Ex.: `name="bond0"` on Linux. Default: no value, SafeKit detects the network interface with virtual IP addresses set on it.
…	
`<virtual_interface`	Definition of virtual IP addresses configured on an Ethernet interface.
`netmask="defaultnetmask"`	IPV4 only. By default, the netmask of the network interface on which the virtual IP address is set. Set a netmask if there are several netmasks on the interface.

2.2.2 SafeKit web console

The module configuration wizard with the SafeKit console now allows you to select the type of monitoring to be performed (process or service) when configuring the process checker.



2.2.3 Japanese language support

The Japanese translation has been updated.

2.2.4 Miscellaneous

In Windows, add `printcert` utility to display the module certificate subject and expiration date. Usage: `safekit.exe -r printcert -m AM`, where `AM` is the name of a configured module.

2.3 Major changes between SafeKit 7.5.1 and SafeKit 7.4.0

SafeKit 7.5 comes with major changes for storing internal data and for authenticating users of the web console and `safekit` distributed command (`safekit -H …`). For migrating to SafeKit 7.5, you must follow the procedure described in 4.3 page 40.

2.3.1 SafeKit install procedure

Since SafeKit 7.5, by default, the web service requires user authentication to access the service to improve security when using the SafeKit web console and `safekit` distributed command (`safekit -H …`). To make the web console and the distributed command operational quickly and easily, now the install procedure requires a new step for initializing the web service with an `admin` user.

For details, see "SafeKit install" in in the *SafeKit User's Guide*. Below is the quick install and setup procedure:

Windows	Linux
a. Log as administrator b. Double click on the package `safekitwindows_7_5_y_z.msi` c. Open a PowerShell console d. To setup the Windows firewall, run: `cd SAFE\private\bin\`	a. Log as root b. Open a system console c. Run `chmod +x safekitlinux_7_x_y_z.bin` d. Run `./safekitlinux_7_x_y_z.bin` It extracts the package and the `safekitinstall` script

.\firewallcfg add

e. To initialize the web service with the `admin` user and its password, for instance, `pwd`, run

cd SAFE\private\bin\

.\webservercfg.ps1 -passwd pwd

e. Run `./safekitinstall`

⇨ Reply `yes` for firewall automatic configuration (with `firewalld` or `iptables`)

⇨ Reply with the password, for instance, `pwd` to initialize the web service with the `admin` user

The password assigned during initialization must be identical on all nodes that belong to the same SafeKit cluster. Otherwise, web console and distributed commands will fail with authentication errors.

Once this initialization is done:

⇨ you can authenticate in the web console with the name `admin` and the password you provided. The role is Admin by default.

⇨ you can run distributed command `safekit -H …`

This default configuration can be extended:

✓ to add users and assign them a role

✓ to switch to HTTPS

The default configuration can still be replaced by another predefined setup with HTTP/HTTPS; no authentication; authentication based on LDAP/AD server or client certificates.

For details on the default setup and all predefined setups, see section "Securing the SafeKit web service" in the *SafeKit User's Guide*.

2.3.2 Module resources and web console enhancement

Since SafeKit 7.5, text files storage for internal data has been replaced by SQLite database. This evolution offers increased resiliency, protections against corruption while providing scalability and performance. It has also permitted to add new module resources for:

- making visible the internal state of the module (such as failover rules...)
- provide performance/usage indicators (such as synchronization indicators...)

And finally, it allowed to keep a history of the state of the resources to be able to make an analysis of the evolution of the states over time.

The web console has been revised to provide a lighter and more ergonomic layout. Resource display has been improved to better represent new resources and their history. For details, see section "The SafeKit web console" in the *SafeKit User's Guide*.

2.3.2.1 Mirror module resources

- In Control tab
- Click on the node to display the detailed status of the module on this node
- Select the Resources tab to view the status of resources

Since SafeKit 7.5, the date displayed is the last date the resource was assigned. Before SafeKit 7.5, this is the first time the resource has been assigned to the current value.

- Module state

  Local and remote state; replication state ; boot and encryption configured or not ; checkers, errd, failover active/inactive (result of commands in the Admin submenu of a node)

- Checkers

  heartbeats, errd, intf, ip, ping, tcp, custom, …

- File replication (since SafeKit 7.5)

  - ✓ Incoming and outgoing bandwidth

    There are 2 new resources that reflect the network bandwidth (in KBytes/sec) used between nfsbox processes:

    - `rfs.netout_bandwidth` is the network output bandwidth
    - `rfs.netin_bandwidth` is the network input bandwidth

    You can observe the value of `rfs.netout_bandwidth` on the primary or `rfs.netin_bandwidth` on the secondary to know the modification rate at the time of observation (write, create, delete, …). The history of the resource values gives an overview of its evolution over time.

    The value of the bandwidth depends on the application, system, and network activity. Its measurement is available for information purposes only.

  - ✓ Data synchronization metrics

    New resources have been added to have metrics on the synchronization (number of files, copied size and time, …). These measurements are for information purposes only and may be inaccurate in some cases. In addition, some are not updated in real time.

- Others

  Failover rules (including the active one) ; internal resources

Resources named `rfs_bandwidth.replication` and `rfs_bandwidth.reintegration` have been renamed `rfs.rep_bandwidth` and `rfs.rei_bandwidth`

2.3.2.2 Farm module resources

- In Control tab
- Click on the node to display the detailed status of the module on this node
- Select the Resources tab to view the status of resources

Since SafeKit 7.5, the date displayed is the last date the resource was assigned. Before SafeKit 7.5, this is the first time the resource has been assigned to the current value.

- Module state

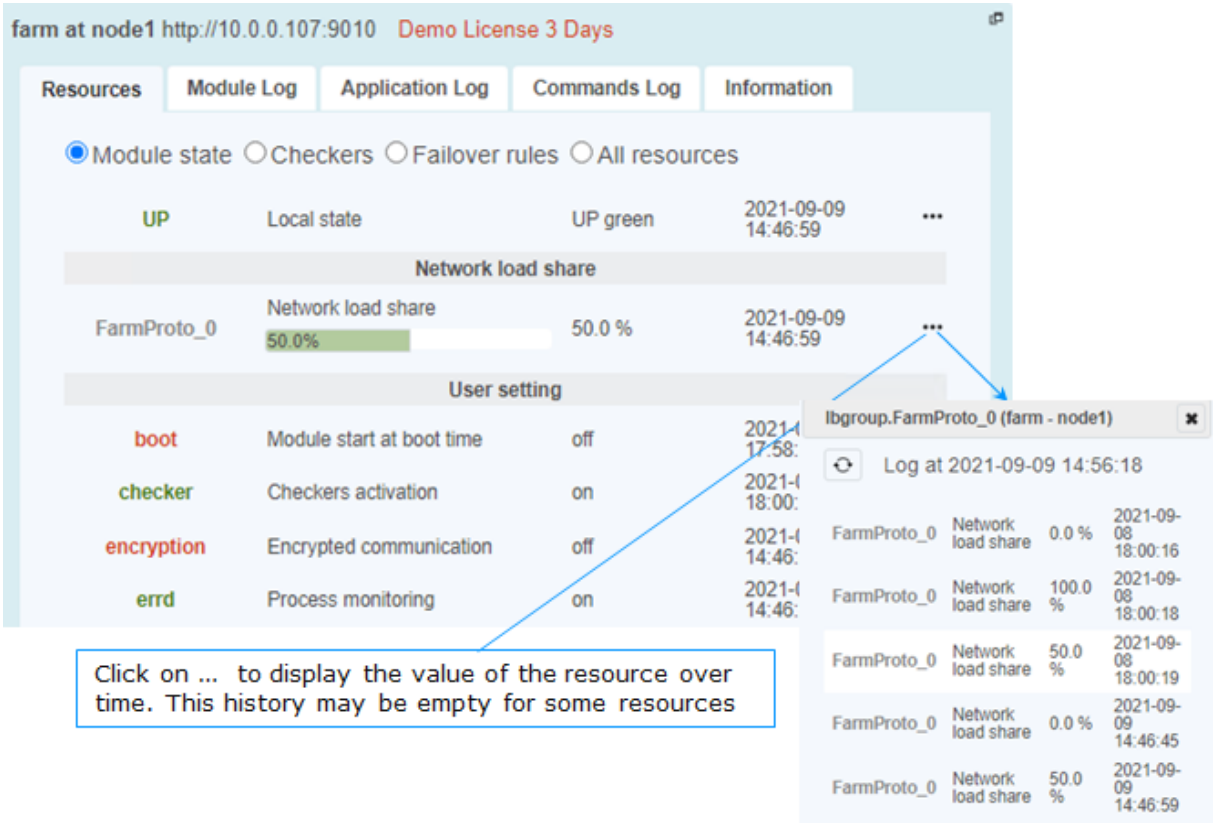
  Local state; network load share for the node; boot and encryption configured or not; checkers, errd (result of commands in the Admin submenu of a node)

- Checkers

  heartbeats, errd, intf, ip, ping, tcp, custom, …

- Others

  Failover rules (including the active one), internal resources



2.3.3 Module templates

2.3.3.1 Lightweight Kubernetes

Evidian SafeKit brings high availability to Kubernetes between two redundant servers. For details see Kubernetes: The Simplest High Availability Cluster with Synchronous Replication and Failover between Two Redundant Servers – Evidian

2.3.3.2 Custom checker module template

SafeKit 7.5 delivers a new module template, `customchecker.safe`, that is a basic example of a custom checker in a mirror module. Install it with the web console (in Advanced modules) or with the `safekit` command. For details, see section "Custom checker example with customchecker.safe" in the *SafeKit User's Guide*.

2.3.4 New attributes for the module configuration

2.3.4.1 Module boot configuration

A new attribute permits to integrate the boot configuration of the module into its configuration. It can be set with the web console into the configuration wizard or in the XML configuration file of the module:

```
<service mode=”mirror”|”farm”|”light”
         [boot="off"|"on"|"auto"|"ignore"]
         [boot_delay="0"]
```

`<service`	Top level section of `userconfig.xml`
`[boot= "on"| "off"| "auto"| "ignore"]`	If set to `on`, the module is automatically started at boot time. If set to `off`, the module is not started at boot time. If set to `auto`, the module is automatically started at boot time, if it was started before the reboot. Before SafeKit 7.5, the configuration to start the module at boot was done with the command `safekit boot -m AM on | off` (which had to be executed on each node). If you prefer to continue using this command, remove the `boot` attribute or set it to `ignore` (the default). The module will not be started at boot time unless the `safekit boot -m AM on` command is executed. The state of the boot configuration is visible in the `usersetting.boot` resource. The status of resources is visible in web console/ Control/Select the node/Resources tab/; with the command `safekit state -m AM -v` Default value: `ignore`
`[boot_delay="0"]`	The delay, in seconds, before starting the module at boot. Default value: `0` (no delay)

2.3.4.2 Counter of active connections on the virtual IP

The `connections` attribute enable metric on the virtual IP. It must be set in the XML configuration file of the module:

```
<virtual_addr addr=”virtual_IP_name”|”virtual_IP_address”
[connections=”off”|”on”]
```

`<virtual_addr`	Definition of one Virtual IP address
`[connections="off"|"on"]`	Enables counting of the number of active connections on the virtual address. This count is stored in the resource named `connections.<virtual addr value>` (for example: `connections.192.168.1.99`) which is assigned every 10 seconds. This value is provided as a guideline only. Default value: off

2.3.5 Scripts for the test, debug, or support

Since SafeKit 7.5, when configuring the module, 2 scripts are generated under `SAFE/private/modules/AM/bin` (where `AM` is the name of the module):

- `AM_start_wrapper` (`.ps1` in Windows, `.sh` in Linux)

  It configures the virtual IP address if one is defined into the module's configuration and runs the script `start_prim` or `start_both` with all required environment variables

- `AM_stop_wrapper` (`.ps1` in Windows, `.sh` in Linux)

  It runs the script `stop_prim` or `stop_both`, with all required environment variables, and deconfigures the virtual IP address if one is defined into the module's configuration

These scripts can be executed, as administrator/root, when the module is stopped:

- ✓ to test or debug the application start/stop scripts in the module (`start_prim/stop_prim`, `start_both/stop_both`)
- ✓ to run the application for support or maintenance purpose

If the start/stop scripts execute a SafeKit command, it may have a different behavior when executed while the module is stopped.

Be aware that starting the application outside of the module may cause application files on that node to change. If these files are replicated by a mirror module, the next time you start the module, please start as primary, the node that has the most up-to-date data from your point of view.

2.3.6 Miscellaneous

- Commands log of the SafeKit node

  Since SafeKit 7.5, this log is stored in SQLite3 format. For viewing the commands log, run the command `safekit cmdlog` or click on the commands log tab into the web console.

  For more details, refer to section "Commands log of the SafeKit server" in the *SafeKit User's Guide*.

- Module snapshot

  The structure and content of the snapshot has changed in SafeKit 7.5. For a full description, see section "Analysis from snapshots of the module" in the *SafeKit User's Guide*. See also the new SafeKit training resources "Support tools".

- Proxy mode for the web console

  In previous versions of the SafeKit web console, it connected to each cluster node to retrieve their state and run commands. In this new version, the console connects only to the node specified in the URL, which acts as a proxy for the other nodes. This

implementation is called `proxy` mode (set the query ?`proxy=false` on the URL, to revert to the previous implementation).

The proxy mode means that the console becomes inaccessible if the connecting node is unreachable. It is then necessary to change the URL to get the cluster state from another cluster node.

⇨ Command to clean the HTTPS setup

If necessary, you can use the new command `rmcerts` under `SAFEBIN` to clean your HTTPS setup. It removes all certificates and switch to HTTP mode for the web service

⇨ SafeMonitor

SafeMonitor, the legacy java console for SafeKit, is no more delivered with the SafeKit package and no more supported.

2.4 Major changes between SafeKit 7.4.0 and SafeKit 7.3.0

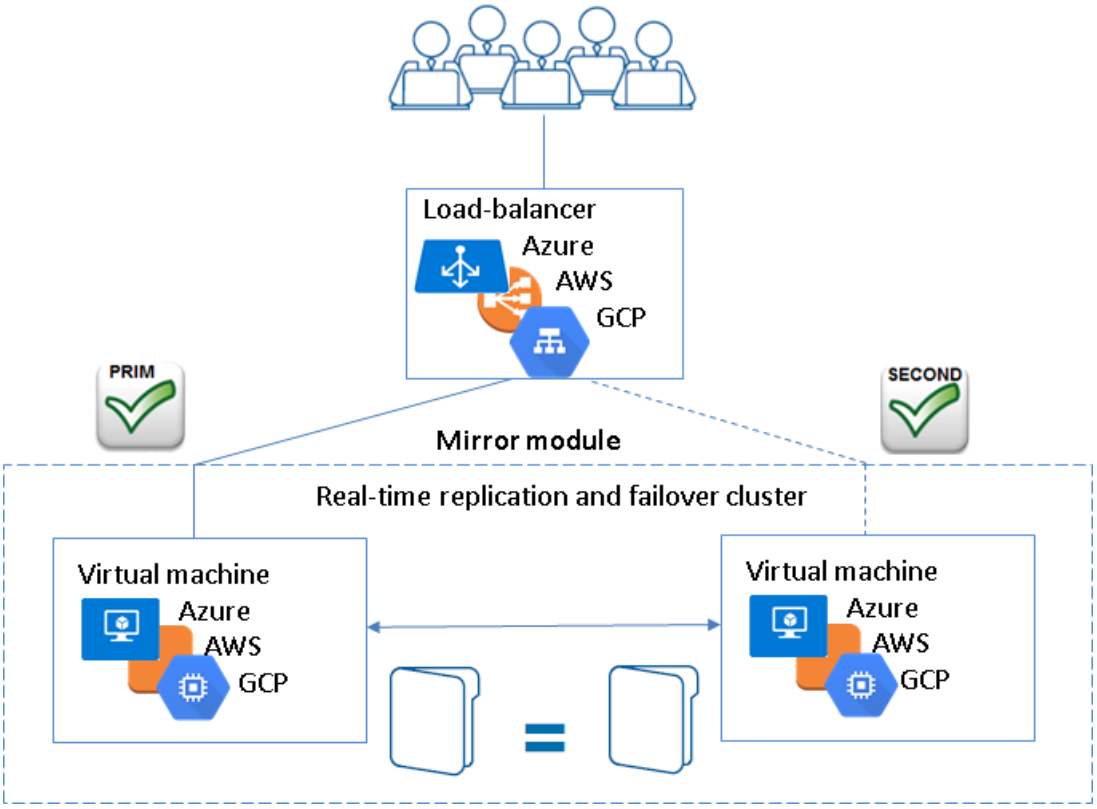
2.4.1 SafeKit cluster in Microsoft Azure, Amazon Aws, and Google GCP clouds

SafeKit 7.4 core and console have been improved for providing the simplest solution for a high availability cluster in the Microsoft Azure, Amazon AWS and Google GCP clouds. It can be implemented on existing virtual machines or on a new virtual infrastructure.

For a full description, see in section 17 "SafeKit Cluster in the Cloud" in the *SafeKit User's Guide*.

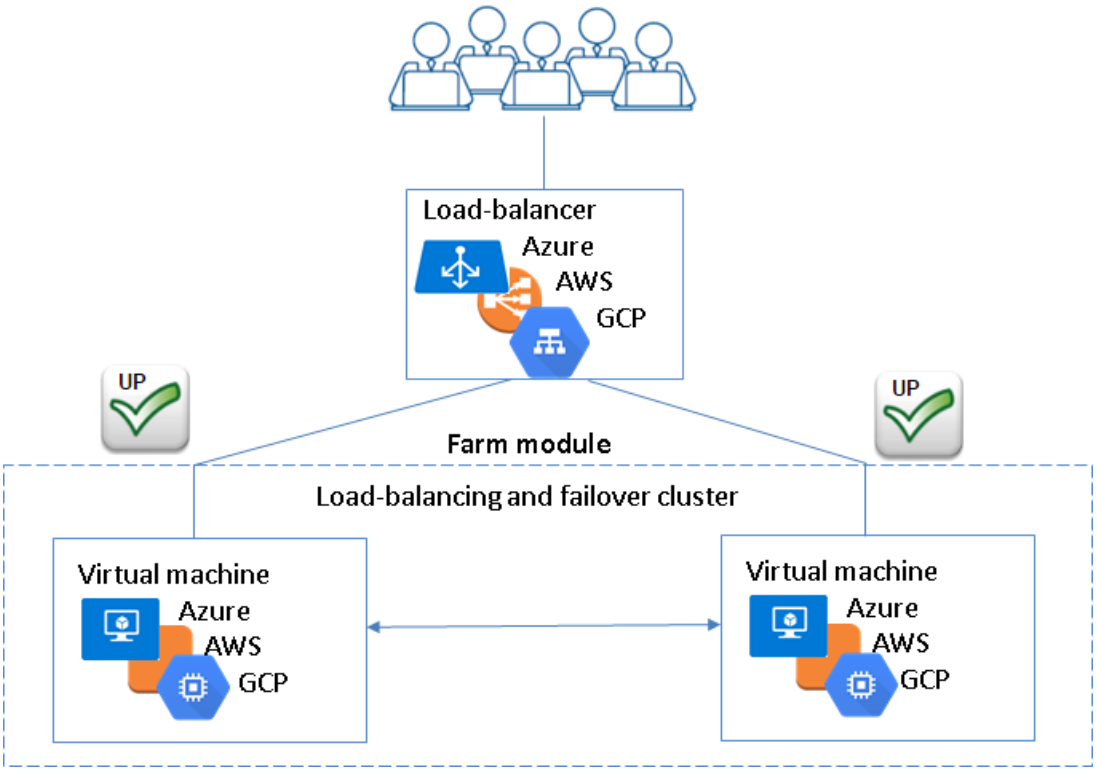
⇨ high availability cluster with real-time replication and failover (mirror cluster)

For a quick start, refer to mirror cluster in Azure, mirror cluster in AWS or mirror cluster in GCP.



- high availability cluster with load balancing and failover (farm cluster)

  For a quick start, refer to farm cluster in Azure, farm cluster in AWS or farm cluster in GCP.



2.4.2 File replication

File replication offers 3 new configuration attributes.

<rfs	
[allocthreshold="0"]	Windows only. Size in Gb to apply the allocation policy before reintegration. When allocthreshold> 0, enable fast allocation of disk space for files to be synchronized on the secondary node. This feature avoids a timeout when the primary writes at the end of the file, when the file is very large (> 200 Gb) and not yet completely copied. The allocation is applied only: - for new files (files that do not exist on the secondary when reintegration starts) - for a full synchronization (for example, during the first reintegration or when the secondary is started with `safekit second fullsync`) - when the file size on the primary is >= allocthreshold (size in Gb) Default value: 0 (that disables the feature)

[nbremconn="1"]	Number of TCP connections between the primary and the secondary nodes. This value may be increased to improve the replication and synchronization throughput when the network has high latency (in cloud for instance). Default value: 1
[sendtimeout="30"]	For SafeKit > 7.4.0.13 Timeout, in seconds, for sending packets to the remote node. This value may be increased when replication or reintegration fails on low latency networks. Default value: 30

Moreover, the file replication component:

- now uses only one port for communication between mirror nodes
- data synchronization has been improved for low latency networks:
  - ✓ automatic reconnection on communication failure
  - ✓ optimisation for the first synchronization retries (with `namespacepolicy="4"` that is the default value since SafeKit 7.4.0.13)
- has been improved and fixed for hard links managements. But some operations are still not supported
- checks on the secondary node that files are not opened before starting the synchronization
- since SafeKit 7.4.0.31, in Windows, it now supports a new value for `roflags=0x10000` attribute; when set, the secondary is stopped if a process other than system tries to modify a replicated file

2.4.3 Process death detection

Process death detection now offers a new monitoring class, `class="pre"` for monitoring processes started/stopped into user scripts `prestart`/`poststop`.

Since SafeKit > 7.4.0.19, in Linux, process death detection can monitor a Linux system service in addition to processes.

2.4.4 SafeKit web console and web server

Since SafeKit 7.4.0.13:

- The web server configuration provides built-in configuration files for login to the web console with roles based on basic authentication (ldap or file)
- On the first start of the web console, automatic insertion of the connected server as the cluster named `cluster1`, into the cluster inventory

2.4.5 DNS name resolution

Some fixes and changes have been made for a better management of the DNS resolution of names contained into the cluster configuration.

These changes also impact the way to force a DNS resolution when a DNS entry is modified. Since SafeKit 7.4.0.58, to consider the new IP address (by SafeKit services and modules), you must re-apply the cluster configuration on all nodes with the web console or the commands:

```
safekit cluster config ; safekit -H "*" -G
```

The new name resolution is not automatically considered by the running modules. To do this, you must either:

- Stop and start the module
- Run the command `safekit update -m AM`

  This is allowed only if the module is in the states UP (farm module) or ALONE (mirror module)

2.4.6 Miscellaneous

- Since SafeKit 7.4.0.19, the extension for the application log file has changed. The file name is now `userlog.ulog` and it was `userlog.AM` (where AM is the module name)
- Since 7.4.0.20, module log display (`safekit logview -m AM`) and save (`safekit logsave -m AM`) has been changed to display/save only E(vent) messages. Use `-I` option for displaying/save also I(nformation) messages, or `-A` for displaying all messages (including debug ones)
- Since SafeKit 7.4.0.27 in Linux, modification of firewall rules management
- Since SafeKit 7.4.0.27, improvement of the section "Securing the SafeKit web console" into the SafeKit User's Guide

3. Restrictions and Known Problems

This section lists the main restrictions and known problems with SafeKit release at the time the present document was written. This list is not exhaustive and must be completed with:

- *SafeKit Knowledge Base*

  An up-to-date list of all known problems and restrictions.

- *SafeKit User's Guide*

  It gives some information about each SafeKit component (file replication, fail-over and network load balancing).

- Evidian Knowledge Base

  It contains a set of technical articles created and validated by Evidian Support. For this, log on to https://support.evidian.com.

Most of the problems listed here are also included in *SafeKit Knowledge Base* (with the associated ID: SK-<num>). When problems are fixed, it will be reported into *Software Release Bulletin*.

3.1 Restrictions and known problems from 7.4.0 to 8.2

See the SafeKit knowledge base for an uptodate list.

3.1.1 Restrictions

3.1.1.1 File replication

- Hard links are not supported into replicated directories
- NFS mounts of replicated directories are not supported
- In Windows, file system transactions, file encryption and file compression are not supported on replicated files
- In Linux, replicated directory cannot be a file system root. See SK-0030 for a workaround

3.1.1.2 Virtual IP

- For farm module, when configuring the relative weight load balancing you must use the same node names as those defined into the SafeKit cluster configuration

3.1.1.3 Web console

- If you have configured two SafeKit clusters and installed modules, you must be careful when merging these two clusters into the same one. It is recommended to uninstall first the modules on one of the SafeKit cluster before merging. Once the merge is done, you can reinstall the modules
- The action "Estimate the data sync" may timeout when the replicated tree contains too many entries (>= 1 million). For getting the estimation, directly run the command on the server: `safekit rfsdiff -m AM`

3.1.1.4 Dynamic configuration of modules

Dynamic configuration of modules (in ALONE/WAIT states) may not work properly in some cases, such as errd re-configuration.

The `<errd>` tag and full subtree can be changed with a dynamic configuration. But, when the `class` set for the `<proc>` is defined by the user (i.e., different from `prim`, `both`, `second`, `sec`), the process monitoring of these processes does not apply anymore after the dynamic configuration.

It is recommended to limit the use of dynamic configuration of modules.

3.1.2 Known problems

3.1.2.1 DNS names into the cluster configuration

If the cluster configuration contains DNS names, bugs with DNS name resolution leads to module start or internal communication failures. See SK-0079 for details.

3.1.2.2 Templates modules

- When using MySQL module on a Linux configured with SELinux, MySQL may not properly work. See SK-0071 and SK-0072 for workarounds
- Hyper-V module failover may fail when prerequisites are not met. See SK-0088

3.1.2.3 Web console and server

- The SafeKit web console may not properly work with some proxy configuration
- The browser may hang when running the SafeKit web console. In that case, kill the browser and launch a new web console. The SafeKit web console also hangs when using invalid client certificates
- The web console does not work properly when mixing HTTP and HTTPS connections

3.2 Restrictions and known problems with SafeKit 8.2

- Since the new ergonomic web console is still under development, some features may be incomplete, malfunction and may be subject to changes
- Do not use at the same time the legacy web console and the new one

3.3 Restrictions and known problems with SafeKit 7.5.2

Restrictions and know problems with SafeKit 7.5.1 are still valid for SafeKit 7.5.2.

3.4 Restrictions and known problems with SafeKit 7.5.1

Restrictions and know problems with SafeKit 7.4.0 are still valid for SafeKit 7.5.1.

- Administer all the clusters of the inventory with the web console

  Since SafeKit 7.5, this global administration of modules from all clusters is incompatible with the configuration of user authentication based on file or LDAP/AD server. This means that it is incompatible with the default configuration of the SafeKit web service. If you need this feature, change the default configuration to the unsecure one or the secured one based on HTTPS and client certificates. Refer to section "Securing the SafeKit web service" in the *SafeKit User's Guide*.

3.5 Restrictions and known problems with SafeKit 7.4.0

- Since SafeKit 7.4.0.16, you can set DNS names into the cluster configuration. It remains some problems in Windows in some cases described in SK-0079.
- In Windows 10 Pro, the execution policy of PowerShell scripts must be changed as described in SK-0083.
- When the Linux NetworkManager is used to manage network interfaces, if the network cable is unplugged, the network interface is automatically unconfigured by the Network Manager. When the cable is plugged, SafeKit may not properly detects it and sometimes requires the module stop and start (`safekit stop -m AM ; safekit start -m AM`) or dynamic update (`safekit update -m AM`) to use this network again.
- In Linux, the SafeKit web server start fails when using port 80 or LDAP/AD basic authentication. See SK-0093 and SK-0092
- SafeKit relies on a certificate for securing module internal communications. With SafeKit <= 7.4.0.31, the validity period for this certificate is 1 year. When this certificate expires in a mirror module with file replication, the data synchronization fails. See SK-0084 for a solution.

4. Migration Instructions

This section gives instructions and recommendations for SafeKit server migration.

4.1 Migrating from SafeKit 7.5 to SafeKit 8.2

SafeKit 8.2 is not compatible with 7.5. Therefore, it is a major upgrade that requires to stop and upgrade nodes at the same time when migrating to release 8.2. This is detailed in 1.2.2 Major upgrade page 8.

Moreover, SafeKit 8.2 comes with a major change in internal data storage, web service and web console. You can not apply the standard procedure but only the one described below.

4.1.1 Upgrade procedure

SafeKit is installed in:

	Windows if %SYSTEMDRIVE%=C:	Linux
SAFE	C:\safekit	/opt/safekit
SAFEVAR	C:\safekit\var	/var/safekit

4.1.1.1 Pre-upgrade operations

On each node to migrate:

1. For a mirror module

   Note the server in the ALONE or PRIM status to know which server holds the up-to-date replicated files

2. Run the command safekit module listid to know the installed modules and note their ids

   This is necessary if you have more than one module installed and if the value of the communication ports used by the module is important in your environment.

3. Optionally, take snapshots of modules

   Uninstalling/reinstalling will reset SafeKit logs and dumps of each module. If you want to keep this information (logs and last 3 dumps and configurations), run the command safekit snapshot -m AM /path/snapshot_xx.zip (replace AM by the module name)

4.1.1.2 Old SafeKit package uninstall

On each node to migrate:

1. Log as administrator/root
2. Open a PowerShell/shell console
3. Stop all modules using the command `safekit shutdown`

   For a mirror in the `PRIM-SECOND` status, stop first the `SECOND` server to avoid an unnecessary failover
4. Close all editors, file explorers, shells, or terminal under `SAFE` and `SAFEVAR` (to avoid package uninstallation error)
5. Uninstall the SafeKit package
   - ⇨ in Windows, using the Control Panel-Add/Remove Programs applet
   - ⇨ in Linux, using the command s`afekit uninstall`
6. undo all configurations that you have done manually for the firewall setup

Uninstalling SafeKit includes creating a backup of the installed modules in `SAFE/Application_Modules/backup`, then unconfiguring them.

4.1.1.3 Post-uninstall operations

On each node, save the cluster configuration and clean some directories:

1. Create a folder for saving SafeKit configuration files
2. Copy the file `SAFEVAR/cluster.xml` into your backup folder
3. Delete the directory `SAFE/modules/`
4. Delete the directory `SAFEVAR`
5. Copy the directories `SAFE/web` and `SAFE/snmp` into your backup folder

   This copy is necessary only if you have changed the default settings
6. Delete the directories `SAFE/web` and `SAFE/snmp`

   Warning: your previous password to log in the web console will be lost

4.1.1.4 New SafeKit 8.2 package install

This is the quick install and setup procedure. For details, see “SafeKit install” in in the *SafeKit User’s Guide*.

On each node:

1. Install the package

Windows	Linux
a. Log as administrator b. Double click on the package	a. Log as root b. Open a system console

safekitwindows_8_2_y_z.msi

c. Open a PowerShell console

d. To setup the Windows firewall, run:

```
cd SAFE\private\bin\
.\firewallcfg add
```

e. To initialize the web service with the `admin` user and its password, for instance, `pwd`, run

```
cd SAFE\private\bin\
.\webservercfg.ps1 -passwd pwd
```

c. Run `chmod +x safekitlinux_8_2_y_z.bin`

d. Run `./safekitlinux_8_2_y_z.bin`

It extracts the package and the `safekitinstall` script

e. Run `./safekitinstall`

⇨ Reply `yes` for firewall automatic configuration (with `firewalld` or `iptables`)

⇨ Reply with the password, for instance, `pwd` to initialize the web service with the `admin` user

The password must be identical on all nodes that belong to the same SafeKit cluster. Otherwise, web console and distributed commands will fail with authentication errors.

The last step is for initializing the web service that relies by default, since SafeKit 7.5, on user authentication. Once this initialization is done on all the cluster nodes:

⇨ you can authenticate in the web console with the name `admin` and the password you provided. The role is Admin by default.

⇨ you can run distributed command `safekit -H …`

Skip this initialization if you want to setup another configuration for the web service. For other setups, see section "Securing the SafeKit web service" in the *SafeKit User's Guide*.

2. For using the web console, clear the browser cache with CTRL and SHIFT while tapping the DELETE key
3. Check with the command `safekit level` the installed SafeKit version and the validity of the license (which has not been uninstalled)

4.1.1.5 Migration operations for the web service

In the previous release of SafeKit, you may have modified the default configuration of the web service to customize it to your needs. In that special case, you should have saved the directory `SAFE/web` in step 4.1.1.3.

In SafeKit 8.2, the configuration of the web service has evolved. Carrying over your old configuration to the new version of SafeKit may require some adaptations. For details on the default setup and all predefined setups, see section "Securing the SafeKit web service" in the *SafeKit User's Guide*. For HTTPS and login/password configurations, certificates and `user.conf/group.conf` generated for the previous release are still supported.

On Linux, for all files added under `SAFE/web/conf`, change their rights with:

```
chown safekit:safekit SAFE/web/conf/<filename>
chown safekit:safekit
SAFE/web/conf/ssl/httpd.webconsolessl.conf (when configured for HTTPS)
```

4.1.1.6 Migration operations for the SNMP agent

In the previous release of SafeKit, you may have modified the default configuration of the SNMP agent to customize it to your needs. In that special case, you should have saved the directory `SAFE/snmp` in step 4.1.1.3.

In SafeKit 8.2, the configuration of the SNMP agent has evolved. Carrying over your old configuration to the new version of SafeKit may require some adaptations. For details see section "SNMP monitoring" in the *SafeKit User's Guide*. It also details to manage the SNMP agent in SafeKit 8.2.

4.1.1.7 Migration operations for the cluster configuration

From one node:

1. Log as administrator/root
2. Open a PowerShell/shell console
3. Configure the cluster
   - ⇨ Edit the saved `cluster.xml` and remove:
     - ✓ `console="on"` or `console="off"`
     - ✓ `framework="on"` or `framework="off"`
     - ✓ `connect="on"` or `connect ="off"`

     These attributes are obsolete from SafeKit 8.2 web console.
   - ⇨ Copy the saved `cluster.xml` file into `SAFE/var/cluster/`
   - ⇨ Apply the cluster configuration on all nodes with

     ```
     safekit cluster config
     safekit -H "*" -G
     ```
   - ⇨ Check the cluster configuration is consistent (same signature for all nodes)

     ```
     safekit -H "*" cluster confinfo
     ```

4.1.1.8 Migration operations for the modules

From one node:

1. Log as administrator/root
2. Open a PowerShell/shell console
3. Install the modules

   Old installed modules must be re-installed with:

- their configuration saved into `SAFE/Application_Modules/Backup`

  Select the last saved configuration for the module (`.safe` file with the module name as prefix)

- their module id that you have noted in step 4.3.1.1. The module id is necessary only if you have more thant one module and if the value of the communication ports used by the module is important in your environment.

For instance, to re-intall the `AM` module with the saved configuration `SAFE/Application_Modules/Backup/AM.safe` and the id 2, run:

```
safekit module install -M 2 -m AM SAFE/Application_Modules/Backup/AM.safe
```

4. Configure the modules

   If the module was configured to automatically start at boot, change the module configuration to insert the attribute `boot="on"` (see 2.3.4.1 "Module boot configuration" page 23). Since SafeKit 7.5, this option replaces the command `safekit boot –m AM`.

   At this step, module can be re-configured either with the web console or commands:

   - create cryptographic for the module if necessary

     ```
     safekit module genkey –m AM
     ```

   - configure and export the module on node1 and node2 (node name in `cluster.xml`)

     ```
     safekit -H "node1,node2" -E AM
     ```

     note: if the module must be configured on all nodes of the `cluster.xml` you can run `safekit -H "*" -E AM`

5. Start the modules

   To restart modules after the upgrade:

   - farm module

     `safekit start –m AM` (replace `AM` by the module name)

   - mirror module

     - ✓ On the server that has the up-to-date replicated files (former `PRIM` or `ALONE`):

       `safekit prim –m AM` (replace `AM` by the module name)

     - ✓ On the other server (former `SECOND`):

       `safekit second –m AM` (replace `AM` by the module name)

4.2 Migrating from SafeKit 7.5.1 to SafeKit 7.5.2

SafeKit 7.5.2 is compatible with SafeKit 7.5.1. Therefore, it is a minor upgrade and the nodes upgrade order can the one described in 1.2.1 Minor upgrade page 6. The upgrade

procedure for one node is the standard one described in the *SafeKit upgrade* section of the *SafeKit User's* Guide.

4.3 Migrating from SafeKit 7.4.0 to SafeKit 7.5.1

Since SafeKit 7.5, some changes into protocol imply that this release is not compatible with older releases. Therefore, it is a major upgrade that requires to stop and upgrade nodes at the same time when migrating to release 7.5. This is detailed in 1.2.2 Major upgrade page 8.

Moreover, SafeKit 7.5 comes with a major change in internal data storage and web service. You can not apply the standard procedure but only the one described below.

4.3.1 Upgrade procedure

SafeKit is installed in:

	Windows if %SYSTEMDRIVE%=C:	Linux
SAFE	C:\safekit	/opt/safekit
SAFEVAR	C:\safekit\var	/var/safekit

4.3.1.1 Pre-upgrade operations

On each node to migrate:

4. Note the state "on" or "off" of services and modules started automatically at boot `safekit boot webstatus; safekit boot snmpstatus; safekit boot status -m AM` (where AM is the name of the module)
5. For a mirror module

   Note the server in the `ALONE` or `PRIM` status to know which server holds the up-to-date replicated files
6. Run the command `safekit module listid` to know the installed modules and note their ids
7. Optionally, take snapshots of modules

   Uninstalling/reinstalling will reset SafeKit logs and dumps of each module. If you want to keep this information (logs and last 3 dumps and configurations), run the command `safekit snapshot -m AM /path/snapshot_xx.zip` (replace AM by the module name)

4.3.1.2 Old SafeKit package uninstall

On each node to migrate:

7. Log as administrator/root
8. Open a PowerShell/shell console
9. Stop all modules using the command `safekit shutdown`

   For a mirror in the `PRIM-SECOND` status, stop first the `SECOND` server to avoid an unnecessary failover
10. Close all editors, file explorers, shells, or terminal under `SAFE` and `SAFEVAR` (to avoid package uninstallation error)
11. Uninstall the SafeKit package
    - ⇨ in Windows, using the Control Panel-Add/Remove Programs applet
    - ⇨ in Linux, using the command s`afekit uninstall`
12. undo all configurations that you have done manually for the firewall setup

Uninstalling SafeKit includes creating a backup of the installed modules in `SAFE/Application_Modules/backup`, then unconfiguring them.

4.3.1.3 Post-uninstall operations

On each node, save the cluster configuration and clean some directories:

7. Copy the file `SAFEVAR/cluster.xml` in another directory
8. Delete the directory `SAFE/modules/`
9. Delete the directory `SAFEVAR`

4.3.1.4 New SafeKit 7.5 package install

This is the quick install and setup procedure. For details, see "SafeKit install" in in the *SafeKit User's Guide*.

On each node:

4. Install the package

Windows	Linux

f. Log as administrator
g. Double click on the package `safekitwindows_7_5_y_z.msi`
h. Open a PowerShell console
i. To setup the Windows firewall, run:
`cd SAFE\private\bin\`
`.\firewallcfg add`
j. To initialize the web service with the `admin` user and its password, for instance, `pwd`, run
	f. Log as root
	g. Open a system console
	h. Run `chmod +x safekitlinux_7_x_y_z.bin`
	i. Run `./safekitlinux_7_x_y_z.bin`
	It extracts the package and the `safekitinstall` script
	j. Run `./safekitinstall`
	⇨ Reply `yes` for firewall automatic configuration (with `firewalld` or

cd SAFE\private\bin\ .\webservercfg.ps1 -passwd pwd	iptables) ⇨ Reply with the password, for instance, pwd to initialize the web service with the admin user

The password must be identical on all nodes that belong to the same SafeKit cluster. Otherwise, web console and distributed commands will fail with authentication errors.

The last step is for initializing the web service that relies by default, since SafeKit 7.5, on user authentication. Once this initialization is done on all the cluster nodes:

⇨ you can authenticate in the web console with the name admin and the password you provided. The role is Admin by default.

⇨ you can run distributed command safekit -H …

Skip this initialization if you want to setup another configuration for the web service. For other setups, see section "Securing the SafeKit web service" in the *SafeKit User's Guide*.

5. If you use the web console, clear the browser cache with CTRL and SHIFT while tapping the DELETE key
6. Check with the command safekit level the installed SafeKit version and the validity of the license (which has not been uninstalled)

4.3.1.5 Migration operations for the web service

In the previous version of SafeKit, you may have modified the default configuration of the web service to customize it to your needs. In that special case, the customized files in SAFE/web/conf/ have been saved in SAFE/web/conf/<file name>.conf.<date>.

Since SafeKit 7.5, the configuration of the web service has evolved. Carrying over your old configuration to the new version of SafeKit may require some adaptations. For details on the default setup and all predefined setups, see section "Securing the SafeKit web service" in the *SafeKit User's Guide*.

4.3.1.6 Migration operations for the cluster configuration

From one node:

4. Log as administrator/root
5. Open a PowerShell/shell console
6. Configure the cluster

⇨ Copy the saved cluster.xml file into SAFE/var/cluster/

⇨ Apply the cluster configuration on all nodes with

safekit cluster config

```
safekit -H "*" -G
```

⇨ Check the cluster configuration is consistent (same signature for all nodes)

```
safekit -H "*" cluster confinfo
```

4.3.1.7 Migration operations for the modules

From one node:

6. Log as administrator/root
7. Open a PowerShell/shell console
8. Install the modules

   Old installed modules must be re-installed with:

   ⇨ their configuration saved into `SAFE/Application_Modules/Backup`

   Select the last saved configuration for the module (`.safe` file with the module name as prefix)

   ⇨ their module id that you have noted in step 4.3.1.1. The module id is necessary if the value of the communication ports used by the module is important in your environment.

   For instance, to re-intall the mirror module with the saved configuration `SAFE/Application_Modules/Backup/mirror.safe` and the id 2, run:

```
safekit module install -M 2 -m mirror SAFE/Application_Modules/Backup/mirror.safe
```

9. Configure the modules

   If the module was configured to automatically start at boot, change the module configuration to insert the attribute `boot="on"` (see 2.3.4.1 "Module boot configuration" page 23). This option replaces the command `safekit boot -m AM`.

   At this step, module can be re-configured either with the web console or commands:

   ⇨ create cryptographic for the module if necessary

   ```
   safekit module genkey -m AM
   ```

   ⇨ configure and export the module on node1 and node2 (node name in `cluster.xml`)

   ```
   safekit -H "node1,node2" -E AM
   ```

10. Start the modules

    To restart modules after the upgrade:

    ⇨ farm module

    web console/ Control/ on the module/ Start/ or command line `safekit start -m AM` (replace AM by the module name)

    ⇨ mirror module

On the server that has the up-to-date replicated files (former PRIM or ALONE): web console/ Control/ on the node/Expert/Force start/as prim/ or command line `safekit prim -m AM` (replace AM by the module name)

On the other server (former SECOND): web console/ Control/ on the node/Expert/Force start/as second/ or command line `safekit second -m AM` (replace AM by the module name)

4.3.2 Configuration of the module boot start

Before SafeKit 7.5, the configuration to start the module at boot was done with the command `safekit boot -m AM on | off` (which had to be executed on each node).

Since SafeKit 7.5, this configuration is included into the module configuration. This simplifies the configuration on both nodes and preserves the configuration on SafeKit upgrade. For details, see 2.3.4.1 "Module boot configuration" page 23.

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