SUSE Linux Enterprise Micro

Hardening SUSE Linux Enterprise Micro with OpenSCAP

To audit and harden SUSE Linux Enterprise Micro (SLE Micro), administrators use the OpenSCAP framework and the `SCAP Security Guide` to automate configuration checks, vulnerability scanning and compliance tracking. This guide details infrastructure preparation, core package installation, policy scanning and automated system remediation using native shell scripts or Ansible playbooks.

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Contents

Important: Disclaimer

SUSE seeks to provide customers with quick and easy guides that can assist them in maintaining security compliance. Implementation of the settings contained within this guide without its prior testing in a non-operational environment is highly discouraged. The developers of these profiles and documentation have made reasonable efforts to ensure overall compliance. They assume no responsibility for its use by other parties, and make no guarantee, expressed or implied, about its quality, reliability or any other characteristic.

1 What are SCAP and OpenSCAP?

SCAP stands for `Security Content Automation Protocol`. It is a framework of specifications that support automated configuration, vulnerability scanning, and policy compliance evaluation of systems deployed in an organization. SCAP is maintained by the National Institute of Standards and Technology (NIST). This framework standardizes how vulnerabilities and security configurations are communicated both to machines and humans.

OpenSCAP is a collection of open source tools that implement the SCAP framework for Linux. The suite received the SCAP 1.2 certification by NIST in 2014.

2 What is the SCAP Security Guide?

The `SCAP Security Guide` (SSG) is an open source project that provides machine-readable security policies for Linux systems. It translates established security benchmarks, such as Security Technical Implementation Guides from the Defense Information Systems Agency (DISA) and Center for Internet Security (CIS) benchmarks, into SCAP content that can be automatically applied and verified. The `SCAP Security Guide` delivers XCCDF checklists, OVAL checks, and ready-to-use remediation scripts in the form of Ansible playbooks and Bash scripts.

3 The benefits of using OpenSCAP and the SCAP Security Guide

Automated auditing

The OpenSCAP tools, together with the `SCAP Security Guide`, can be used for auditing your system in an automated way.

Authoritative guidance

The `SCAP Security Guide` implements security guidelines recommended by respected authorities.

Machine-readable format

These security guidelines are transformed into a machine-readable format, which then can be used by OpenSCAP and other tools.

4 Preparing your infrastructure before hardening SLE Micro

Before installation and hardening, you must prepare your IT infrastructure for the implementation of the SCAP Security Guide. Execute the following sequential steps:

1. Create an inventory of the hosts on which SCAP Security Guide will be installed.
2. Create an inventory of IT and business services that will be in the scope of the installation.
3. Split the inventory into a few groups, considering that the configuration of hosts belonging to a group will be identical.
4. Select the standard or profile you plan to implement. For example, you can use the Defense Information Systems Agency STIG.
5. For each group member, create a list of rules and recommendations you plan to implement. You should consider the following:
    - Preconditions necessary for some of the rules
    - Configuration parameters for each recommendation, if they exist
    - Recommendations to be applied manually

- Recommendations to be applied automatically
- Recommendations to be excluded
- Additional security controls or measures will be implemented to address excluded recommendations

6. Create a test environment that simulates your environment. Use it as a reference before implementing the technology in your real environment. You should consider the following:
   - The remediation has to be executed more than twice, because:
     - The recommendations are executed in alphabetical order.
     - Between some recommendations, there are dependencies.
     - The operating system needs to be restarted after each pass.
   - A 100% hardening is impossible, and you have to specify an acceptable level of risk for members of each group.

   

   Note

   The acceptable level is several rules that will show the result “not pass” in case of an audit. Document these rules and apply additional security controls to compensate for them.

7. Use the test environment to test new patches and new updates of SSG.
8. In case of an error during the remediation, try the following:
   - Apply the rule manually.
   - Exclude the rule using tailoring and use an additional security control instead.
   - Register a bug, providing details about the SSG version, logs from execution and steps performed by you.
9. Create an implementation plan covering your production environment.
10. Create backups.

5 Installing OpenSCAP and the SCAP Security Guide on SLE Micro

To use the OpenSCAP tools and the SCAP Security Guide for hardening your target system by scanning and remediating vulnerabilities, install the following core packages:

- openscap-utils
- scap-security-guide

1. To install the packages:

```
> sudo transactional-update pkg install openscap-utils scap-security-guide
```

2. Reboot the system to switch to the new snapshot

```
> sudo reboot
```

6 What are the key components of the SCAP framework?

SCAP consists of the following important components, which interact with each other:

Open Vulnerability and Assessment Language (OVAL)
: An XML format for testing the presence of a specific state.

Extensible Configuration Checklist Description Format (XCCDF)
: An XML format that specifies security checklists, benchmarks and configuration documentation. The XCCDF file includes a benchmark as a set of different profiles related to different groups. Each group is a set of rules that has OVAL definitions. Each profile is related to different good practices such as STIG, HIPAA, PCI-DSS, or ANSSI.

Common Platform Enumeration (CPE)
: A structured naming scheme to identify information technology systems, platforms and software packages. It is maintained by NIST and NDV. The naming scheme consists of the following elements: cpe:/*part*:*vendor*:*product*:*version*:*update*:*edition*:*language*.

DataStreams (DS)

An XML format that packs different SCAP components (CPE, XCCDF, OVAL) into a single file. It can be used to distribute SCAP content over the network. The DataStreams files are useful because they include everything you need when you want to harden and audit your SUSE Linux system.

Common Configuration Enumeration (CCE)

Unique identifiers for security-related system configuration issues.

7 SCAP Security Guide content and directories

SUSE ships the SSG toolset in the `scap-security-guide` package. It contains the latest set of security policies for Linux systems. The `SCAP Security Guide` is maintained upstream in the ComplianceAsCode (https://github.com/ComplianceAsCode/) repository.

After you have installed the package, the SSG security content and the related files are available in your system from the following directories:

7.1 Overview of files and directories

`/usr/share/xml/scap/ssg/content/`

Contains the SSG security content. It consists of several *What are the key components of the SCAP framework?*, which are all based on XML. All XML files in that directory are named according to the SCAP component and to the product they apply to.

You can view all available security policies by getting a list of datastream files:

```
> ls -l /usr/share/xml/scap/ssg/content/ssg-*-ds.xml
```

`/usr/share/doc/scap-security-guide/guides/`

Contains profiles for different hardening policies in a human-readable format. They describe the profiles that are included in the DataStream files. The profiles applicable to SUSE Linux Enterprise Micro are product-specific and differ between each codestream. Each profile is a guide on securing your operating system to ensure compliance with a regulation.

The guides usually have the following structure:

- Short description
- Profile title. For example: *DISA STIG for SLE Micro (SLEM) 5*

- Profile ID. For example: *xccdf_org.ssgproject.content_profile_stig*
- Revision history. Information about the current version and status of the profile. For example: *xccdf_org.ssgproject.content_profile_stig*
- Platforms (in CPE notation). Lists the products or systems to which the profile applies. For example: *cpe:/o:suse:linux_enterprise_micro:5*
- A table of contents
- A checklist that consists of groups (and subgroups) with rules
  Each rule consists of a short description, the rationale behind the rule, a severity (low, medium or high) and a unique identifier in the `Common Configuration Enumeration (CCE)` format. The CCE number for each rule is provided to SUSE by NIST.
  Each rule also lists references to different good practices. For example, the rule known by the unique identifier `CCE-83289-9` in STIG has a reference to a specific good practice `A.12.4.1` in ISO/IEC 27001:2013.
  If remediation options exist for a rule, they are listed in different formats.

`/usr/share/scap-security-guide`

Contains subdirectories with fix scripts that can be used to remediate the target system in case a vulnerability is found during a scan. Fix scripts are available in the following two formats: Shell scripts (`bash/*.sh`) and Ansible snippets (`ansible/*.yml`).

7.2 SCAP Security Guide profiles

The `SCAP Security Guide` contains multiple profiles. The applicable profiles are specific to the individual product and its underlying development stream.

They are maintained and hosted in the following repository: https://github.com/ComplianceAs-Code/content/tree/master/products/slmicro5/profiles

After the installation of the `scap-security-guide` package, human-readable versions of the profiles are available in your file system in `/usr/share/doc/scap-security-guide/guides`.

To list the guides for each profile in an HTML format, run the following command:

```
> ls -l /usr/share/doc/scap-security-guide/guides/ssg*.html
```

You can then see the guide related to a specific profile in your Web browser by running the following command.

```
> firefox
/usr/share/doc/scap-security-guide/guides/ssg-slmicro5-guide-stig.html
```

7.2.1 Viewing information on SSG profiles

Each security policy can have multiple profiles, which provide policies implemented according to specific security baselines. Every profile can select different rules and use different values. You can list these profiles using the following command format:

```
> oscap info --fetch-remote-resources
/usr/share/xml/scap/ssg/content/ssg-OPERATING-SYSTEM-TYPE-OF-FILE.xml (1)
```

(1) In the above command:

- Replace *OPERATING-SYSTEM* with `slmicro5`
- Replace *TYPE-OF-FILE* with either `ds` or `xccdf`

For example, you can view information about the `ds` files of SLE Micro using the following command:

```
> oscap info
/usr/share/xml/scap/ssg/content/ssg-slmicro5-ds.xml
```

The following technical terms appear in the **`oscap info`** output for `ds` and `xccdf` files:

- **Document type.** Describes the file format. Common types include XCCDF, OVAL, Source Data Stream and Result Data Stream.
- **Checklist version.** The XCCDF version only shown for XCCDF files. Common values are `1.1` and `1.2`.
- **Imported.** The date the file was imported for use with OpenSCAP. As OpenSCAP uses the local file system and has no proprietary database format, the imported date is the same as the file modification date.
- **Status.** The XCCDF Benchmark status. Common values include `accepted`, `draft`, `deprecated`, and `incomplete`. Please refer to the XCCDF specification for details. This is only shown for XCCDF files.
- **Generated.** The date the file was created. This date is shown for XCCDF files and Checklists, and is sourced from the XCCDF Status element.

- **Profiles.** Available profile IDs that you can use for the `--profile` command-line attribute with the **`oscap xccdf eval`** command.
- **Checklists.** Lists available checklists incorporated in the Data Stream that you can use for the `--benchmark-id` command-line attribute with the **`oscap xccdf eval`** command. Also, each checklist has detailed information displayed.

For example, for Security Technical Implementation Guide profiles, the following is relevant: `xccdf_org.ssgproject.content_profile_stig`.

7.2.2 SLE Micro 5 profiles

For SLE Micro 5, the following profiles are supported by SUSE:

- DISA STIG for SLE Micro (SLEM) 5
- Public Cloud Hardening for SLE Micro (SLEM) 5

8 Scanning for security vulnerabilities using OpenSCAP

8.1 Targets to scan

The content provided by the `SCAP Security Guide` can be used to scan the following targets for vulnerabilities:

- bare-metal machines
- virtual machines
- virtual machine images
- containers
- container images

Automated checks help to identify the target and to select only the rules that make sense for this specific target. For example, checks for separate partitions make sense for bare-metal machines but not for containers.

8.2 Tools for scanning

Note

Before using the tools described in this section, ensure that you have installed them as described in *Section 5, "Installing OpenSCAP and the* `SCAP Security Guide` *on SLE Micro"*, as they are interdependent.

Depending on your setup and the target to scan (remote or local), you can use either of the following tools:

oscap

A command-line interface that can be used to scan local machines. Both the `openscap-utils` and `scap-security-guide` packages need to be installed on the local machine.

To understand the basic usage of **`oscap`**, run it with the **`-h`** option:

```
> oscap -h

  oscap

  OpenSCAP command-line tool

  Usage: oscap [options] module operation [operation-options-and-arguments]

  Common options:
    --verbose <verbosity_level>   - Turn on verbose mode at specified verbosity
level.
                                    Verbosity level must be one of: DEVEL, INFO,
WARNING, ERROR.
    --verbose-log-file <file>     - Write verbose information into file.

  oscap options:
    -h --help                     - show this help
    -q --quiet                    - quiet mode
    -V --version                  - print info about supported SCAP versions

  Commands:
      ds - Data stream utilities
      oval - Open Vulnerability and Assessment Language
      xccdf - eXtensible Configuration Checklist Description Format
      cvss - Common Vulnerability Scoring System
      cpe - Common Platform Enumeration
```

```
      cve - Common Vulnerabilities and Exposures
      cvrf - Common Vulnerability Reporting Framework
      info - Print information about a SCAP file.
```

To understand `oscap` in greater detail, read its man pages by running **`man oscap`**.

oscap-ssh

A command-line interface that can be used to scan a remote machine via SSH with an interface resembling the **`oscap`** tool. On the local machine, the package `openscap-utils` needs to be installed. On the remote machine, the `openscap-utils` package needs to be installed.

To understand the basic usage of **`oscap-ssh`**, run it with the **`-h`** option:

```
> oscap -h

  oscap-ssh -- Tool for running oscap over SSH and collecting results.

  Usage:

  $ oscap-ssh user@host 22 info INPUT_CONTENT
  $ oscap-ssh user@host 22 xccdf eval [options] INPUT_CONTENT

  Only source data streams are supported as INPUT_CONTENT!

  supported oscap xccdf eval options are:
    --profile
    --tailoring-file
    --tailoring-id
    --cpe (external OVAL dependencies are not supported yet!)
    --oval-results
    --results
    --results-arf
    --report
    --skip-valid
    --skip-validation
    --fetch-remote-resources
    --local-files
    --progress
    --datastream-id
    --xccdf-id
    --benchmark-id
    --remediate

  $ oscap-ssh user@host 22 oval eval [options] INPUT_CONTENT

  supported oscap oval eval options are:
```

```
    --id
    --variables
    --directives
    --results
    --report
    --skip-valid
    --skip-validation
    --datastream-id
    --oval-id

  $ oscap-ssh user@host 22 oval collect [options] INPUT_CONTENT

  supported oscap oval collect options are:
    --id
    --syschar
    --variables
    --skip-valid
    --skip-validation

  specific option for oscap-ssh (must be first argument):
    --sudo

  To supply additional options to ssh/scp, define the SSH_ADDITIONAL_OPTIONS
variable
  For instance, to ignore known hosts records, define SSH_ADDITIONAL_OPTIONS='-o
StrictHostKeyChecking=no -o UserKnownHostsFile=/dev/null'

  specific option for oscap-ssh (must be first argument):

  See `man oscap` to learn more about semantics of these options.
```

To understand `oscap-ssh` in greater detail, read its man pages by running **`man oscap-ssh`**.

8.3 Scanning a SUSE Linux Enterprise Micro system

You can scan your system locally with **`oscap`** for vulnerability issues according to a certain profile. You can save the results in XML format and generate an HTML report.

EXAMPLE 1: SCANNING SLE MICRO WITH OSCAP

```
> oscap xccdf eval❶ \
    --profile stig❷ \
    --results /tmp/results.xml❸ \
    --report /tmp/report.html❹ \
    /usr/share/xml/scap/ssg/content/ssg-slmicro5-ds.xml❺
```

1. Calls the **`oscap xccdf`** module and tells it to perform an evaluation (vulnerability scan).
2. Specifies the profile to use, in this case, `stig`.
3. Saves the results of the evaluation to */tmp/results.xml*.
4. Generates an HTML report called */tmp/report.html* in addition to the results in XML.
5. Specifies the `SCAP Security Guide` policy file to use. In this example, we use a policy file in the `DataStream` format. To list all available policies, run: **`ls -1 /usr/share/xml/scap/ssg/content/ssg-*-ds.xml`**. For more information about a particular policy, run **`oscap info`** on the file.

The evaluation process usually takes a few minutes, depending on the number of selected rules.

8.4 Evaluating with rules

For each rule, we have the following fields:

- **Rule.** For example, `Install AIDE`
- **Rule ID.** For example, *xccdf_org.ssgproject.content_rule_package_aide_installed*

After determining the security policy and profile, use **`oscap xccdf eval`** to perform an evaluation against them. For example, to evaluate the profile `xccdf_org.ssgproject.content_profile_stig` and generate an HTML report, you can use the following command format:

```
> sudo oscap xccdf eval \
--profile xccdf_org.ssgproject.content_profile_stig \
--report report_slmicro5_stig.html \
/usr/share/xml/scap/ssg/content/ssg-slmicro5-ds.xml
```

To evaluate with a specific rule, you can specify the *Rule ID* using the `--rule` command option. For example, you can evaluate only with the rule `xccdf_org.ssgproject.content_rule_package_aide_installed`.

```
> sudo oscap xccdf eval \
--profile xccdf_org.ssgproject.content_profile_stig \
--report report_slmicro5_stig.html \
--rule xccdf_org.ssgproject.content_rule_package_aide_installed
/usr/share/xml/scap/ssg/content/ssg-slmicro5-ds.xml
```

To evaluate *without* a specific rule, you can specify to skip the *Rule ID* using the `--skip-rule` command option. For example, you can evaluate without the rule `xccdf_org.ssgproject.content_rule_package_aide_installed`.

```
> sudo oscap xccdf eval \
--profile xccdf_org.ssgproject.content_profile_stig \
--report report_slmicro5_stig.html \
--skip-rule xccdf_org.ssgproject.content_rule_package_aide_installed
/usr/share/xml/scap/ssg/content/ssg-slmicro5-ds.xml
```

9 How to automatically remediate non-compliant configurations?

Beyond scanning and reporting, the `SCAP Security Guide` security profiles can automatically remediate the target system by applying necessary fixes.

Important: Automatic remediation not always available

Automatic remediation is *not* offered in case the automatic application of a fix is too dangerous to be enforced in a running target system.

9.1 OpenSCAP remediation process

OpenSCAP allows to automatically remediate target systems that have been found in a non-compliant state. This requires an XCCDF file with instructions. The overall process is as follows:

1. The **`oscap`** command-line tool performs a system scan.
2. Each rule that fails is marked as a candidate for remediation.
3. Within the XCCDF file, **`oscap`** then searches for an appropriate <xccdf:fix> element, resolves it, prepares the environment, and executes the fix script. The fix scripts can be either Bash `*.sh` files or Ansible playbook `*.yml` files.
4. After the execution of the script, the respective rule is evaluated again to check if the fix was successful.

All results of the remediation are stored in an output XCCDF file.

9.2 OpenSCAP remediation options

For remediating a target system with **oscap**, you have the following options:

Remediation on the fly

You can remediate a target system on the fly, while you are scanning it. In this case, evaluation and remediation are performed as a part of a single command. For details, see *Section 9.4.1, "Remediating SUSE Linux Enterprise Micro (on the fly)"*.

Remediation after scanning

You can remediate a target system after you have scanned it. In the first step, the system is only evaluated, and the results are stored in the XCCDF results file. In the second step, **oscap** executes the fix scripts and verifies the result. For details, see *Section 9.4.2, "Remediating SUSE Linux Enterprise Micro (after scanning)"*.

Review mode

The review mode allows to save remediation instructions to a file for further review. The remediation content is not executed during this operation. For details, see *Section 9.4.4, "Storing SLE Micro remediation instructions for review"*.

9.3 Remediating for a specific profile using shell scripts

For simple remediation of a profile without any condition, you can use the shell scripts that are shipped with the SCAP Security Guide.

1. Find the shell scripts that perform remediation without any condition:

```
> ls -l /usr/share/scap-security-guide/bash/
```

The names of the scripts follow the format: *NAME-OF-PRODUCT*`-script-`*NAME-OF-PROFILE*`.sh`.
NAME-OF-PRODUCT can be `slmicro5`.
The supported profiles are as follows: `stig` and `pcs-hardening`.

Note

The standard profile is officially *not supported*.

2. Understand the format of the shell scripts and the rules within. In the scripts, each rule or recommendation maintains the following format:

    - Starts with `# BEGIN fix (CURRENT-NUMBER/TOTAL-NUMBER-OF-RULES) for RULE-ID`
    - Ends with `# END fix for RULE-ID`.

    

    ### Note: Exceptions to the rule format

    Certain rules contain a line ending with `IS MISSING!` in between the `BEGIN` and `END` lines for a rule block. These rules do not have a remediation part. You need to do remediation manually to apply them.

3. Although the recommended approach for excluding rules from remediation is to use tailoring, you can also do it manually if there are bugs, or for tests. In that case, open the intended script with a text editor and comment out the necessary lines between `BEGIN` and `END` for a rule block.

4. Make the script executable:

```
> sudo chmod +x slmicro5-script-NAME-OF-PROFILE.sh
```

5. Run the script:

```
> sudo transactional-update run
./slmicro5-script-NAME-OF-PROFILE.sh
```

6. Reboot the system:

```
> sudo reboot
```

9.4 Remediating a SLE Micro system with **oscap**

The following examples show how to scan and remediate SUSE Linux Enterprise Micro locally with **oscap** to comply with a certain profile.

9.4.1 Remediating SUSE Linux Enterprise Micro (on the fly)

To remediate a system (on the fly), you can use a combination of `--eval` and `--remediate` options of the **`oscap`** command. In this case, the system is first scanned (audited), and then the command attempts to fix the system. During the execution of the audit, you will see the status after each rule as `pass`, `fail`, or `not applicable`. During the execution of the remediation, you will see the status as `fixed` or `error` after some of the rules.

EXAMPLE 2: REMEDIATING SLE MICRO SYSTEMS (ON THE FLY)

```
> sudo transactional-update run oscap xccdf eval --remediate \
--profile stig \
--results /tmp/results_1.xml \
--report /tmp/report_1.html \
--skip-rule xccdf_org.ssgproject.content_rule_accounts_authorized_local_users \
/usr/share/xml/scap/ssg/content/ssg-slmicro5-ds.xml
```

Restart the system to switch to the new snapshot:

```
> sudo reboot
```

Perform scanning and remediation again:

```
> sudo oscap xccdf eval --remediate \
--profile stig \
--results /tmp/results_2.xml \
--report /tmp/report_2.html \
--skip-rule xccdf_org.ssgproject.content_rule_accounts_authorized_local_users \
/usr/share/xml/scap/ssg/content/ssg-slmicro5-ds.xml
```

Restart the system to apply the changes:

```
> sudo reboot
```

Warning: Usage of the `--skip-rule` option

In the above examples, the `--skip-rule` option is optional. However, it is necessary to use it if you did not change the variable `var_accounts_authorized_local_users_regex`. Otherwise, you will not be able to do a **`sudo`** after reboot.

9.4.2 Remediating SUSE Linux Enterprise Micro (after scanning)

In this example, we first execute a scan and then run the remediation as the next step.

EXAMPLE 3: REMEDIATING SLE MICRO (AFTER SCANNING)

1.
```
> oscap xccdf eval❶ \
      --profile stig❷ \
      --results /tmp/results.xml❸ \
      /usr/share/xml/scap/ssg/content/ssg-slmicro5-ds.xml❹
```

   ❶ Calls the **`oscap xccdf`** module and tells it to perform an evaluation.

   ❷ Specifies the profile to use, in this case, `stig`.

   ❸ Saves the results of the evaluation as an XCCDF file to */tmp/results.xml*.

   ❹ Specifies the `SCAP Security Guide` policy file to use. In this example, we use a policy file in the `DataStream` format that applies to SUSE Linux Enterprise Micro. To list all available policies, run: **`ls -1 /usr/share/xml/scap/ssg/content/ssg-*-ds.xml`**. For more information about a particular policy, run **`oscap info`** on the file.

   During this step, the system is only evaluated, and the results are stored in a `TestResult` element in */tmp/results.xml*.

2.
```
> sudo transactional-update run oscap xccdf remediate❶ \
     --results /tmp/results.xml❷ \
     /tmp/results.xml❸
```

   ❶ Calls the **`oscap xccdf`** module and tells it to perform a remediation.

   ❷ Saves the results of the remediation to */tmp/results.xml*.

   ❸ Uses the */tmp/results.xml* XCCDF file from the first step (evaluation) as input file.

   Restart the system to switch to the new snapshot:

```
> sudo reboot
```

   Perform remediation again:

```
> sudo oscap xccdf remediate \
     --results /tmp/results.xml \
     /tmp/results.xml
```

   Restart the system to apply the changes:

```
> sudo reboot
```

9.4.3 Remediating systems using `oscap` and scripts

To remediate a system, you have to generate a script that will fix the system. You have to decide in advance the profile and type of the script—bash or Ansible.

Note: Evaluate the system before remediation

Before running the examples in this section, ensure that you have evaluated the system using the **`oscap xccdf eval`** commands.

EXAMPLE 4: REMEDIATING SLE MICRO SYSTEMS USING `oscap` AND BASH

```
> sudo oscap xccdf generate fix --profile stig --fetch-remote-resources \
--fix-type bash --output GENERATED-BASH-REMEDIATION-SCRIPT-NAME.sh \
/usr/share/xml/scap/ssg/content/ssg-slmicro5-ds.xml
```

After running the above command, you can run the generated script to remediate the system.

Note

To execute remediation on SLE Micro systems, you may need to make it executable and to run the remediation scripts *more than once* using the following commands:

```
> sudo chmod u+x GENERATED-BASH-REMEDIATION-SCRIPT-NAME.sh
```

```
> sudo transactional-update run GENERATED-BASH-REMEDIATION-SCRIPT-NAME.sh
```

```
> sudo reboot
```

```
> sudo GENERATED-BASH-REMEDIATION-SCRIPT-NAME.sh
```

```
> sudo reboot
```

9.4.4 Storing SLE Micro remediation instructions for review

You can also run **oscap** in review mode to store remediation instructions to a file for further review. During this operation, the remediation content is *not* executed. The following shows how to generate remediation instructions in the form of a shell script:

EXAMPLE 5: STORING SLE MICRO REMEDIATION INSTRUCTIONS FOR REVIEW

```
> oscap xccdf generate fix❶ \
    --template urn:xccdf:fix:script:sh❷ \
    --profile stig❸ \
    --output my-remediation-script.sh❹ \
    /usr/share/xml/scap/ssg/content/ssg-slmicro5-ds.xml❺
```

❶ Calls the **oscap xccdf** module and tells it to generate a file with remediation instructions.

❷ Specifies the template to use, in this case, a shell script.

❸ Specifies the profile to use, in this case, `stig`.

❹ Specifies the file to which the remediation instructions are written.

❺ Specifies the `SCAP Security Guide` policy file to use. In this example, we use a policy file in the `DataStream` format that applies to SLE Micro 5. To list all available policies, run: **ls -1 /usr/share/xml/scap/ssg/content/ssg-*-ds.xml**. For more information about a particular policy, run **oscap info** on the file.

9.5 Remediating for a specific profile using Ansible

For simple remediation of a profile without any condition, you can use the Ansible playbooks that are shipped with the SCAP Security Guide.

1. List the Ansible playbooks that are shipped with the SCAP Security Guide.

   ```
   > ls -l /usr/share/scap-security-guide/ansible/
   ```

   The file names are in the following format: *NAME-OF-PRODUCT*`-playbook-`*NAME-OF-PROFILE*`.yml`.

2. Create a file `ansible_inventory.yml` and include the following configuration snippet:

   ```
   all:
     hosts:
   ```

```
    localhost:
  vars:
    ansible_connection: local
```

3. Then run the following commands:

```
> sudo transactional-update run ansible-playbook -i
/root/ansible_inventory.yml slmicro5-playbook-NAME-OF-PROFILE.yml
```

4. Reboot the system:

```
> sudo reboot
```

5. To skip some of the rules during the execution, use the `--tag` option. You can find the tag of a specific rule by searching for the rule's tag in the playbook file. For example, to skip some rules for SLE Micro, run the following command:

```
> sudo transactional-update run ansible-playbook -i ansible_inventory.yml
slmicro5-playbook-NAME-OF-PROFILE.yml --tags
"package_aide_installed,aide_build_database"
```

6. Reboot the system again to switch to the new snapshot:

```
> sudo reboot
```

Note

You might need to repeat the steps above more than twice, because of the following reasons:

- Some of the rules require a restart of the system to take effect.
- The rules are executed in alphabetical order.

10 Related topics

- Check out the `SCAP Security Guide` pages online at https://www.open-scap.org/security-policies/scap-security-guide/.
- For general instructions on how to use the `SCAP Security Guide`, see the README in https://github.com/ComplianceAsCode/content/.
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