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## Sieve Email Filtering: Include Extension

### Abstract

The Sieve Email Filtering "include" extension permits users to include one Sieve script inside another. This can make managing large scripts or multiple sets of scripts much easier, and allows a site and its users to build up libraries of scripts. Users are able to include their own personal scripts or site-wide scripts.

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## 1. Introduction and Overview

It's convenient to be able to break Sieve [RFC5228] scripts down into smaller components that can be reused in a variety of different circumstances. For example, users may want to have a default script and a special 'vacation' script, the latter being activated when the user goes on vacation. In that case, the default actions should continue to be run, but a vacation command should be executed first. One option is to edit the default script to add or remove the vacation command as needed. Another is to have a vacation script that simply has a vacation command and then includes the default script.

This document defines the Sieve Email Filtering "include" extension, which permits users to include one Sieve script inside another.

## 2. Conventions Used in This Document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

Conventions for notations are as in Sieve [RFC5228], Section 1.1.

The following key phrases are used to describe scripts and script execution:

**script**

a valid Sieve script.

**script execution**

an instance of a Sieve interpreter invoked for a given message delivery, starting with the user's active script and continuing through any included scripts until the final disposition of the message (e.g., delivered, forwarded, discarded, rejected, etc.).

**immediate script**

the individual Sieve script file being executed.

**including script**

the individual Sieve script file that had an include statement that included the immediate script.

### 3. Include Extension

#### 3.1. General Considerations

Sieve implementations that implement the "include", "return", and "global" commands described below have an identifier of "include" for use with the capability mechanism. If any of the "include", "return", or "global" commands are used in a script, the "include" capability **MUST** be listed in the "require" statement in that script.

Sieve implementations need to track the use of actions in included scripts so that implicit "keep" behavior can be properly determined based on whether any actions have executed in any script.

Sieve implementations are allowed to limit the total number of nested included scripts, but **MUST** provide for a total of at least three levels of nested scripts including the top-level script. An error **MUST** be generated either when the script is uploaded to the Sieve repository, or when the script is executed, if any nesting limit is exceeded. If such an error is detected whilst processing a Sieve script, an implicit "keep" action **MUST** be executed to prevent loss of any messages.

Sieve implementations **MUST NOT** allow recursive script inclusion. Both direct recursion, where script A includes script A (itself), and indirect recursion, where script A includes script B which includes script A once again, are prohibited.

Sieve implementations **MUST** generate an error at execution time if an included script is a recursive inclusion. Implementations **MUST NOT** generate errors for recursive includes at upload time, as this would force an upload ordering requirement upon script authors and generators.

Sieve implementations **MUST** generate an error at execution time if an included script does not exist, except when the `":optional"` parameter is specified. Implementations **MUST NOT** generate errors for scripts missing at upload time, as this would force an upload ordering requirement upon script authors and generators.

If the Sieve `"variables"` extension [RFC5229] is present, an issue arises with the `"scope"` of variables defined in scripts that may include each other. For example, if a script defines the variable `"${status}"` with one particular meaning or usage, and another defines `"${status}"` with a different meaning, then if one script includes the other there is an issue as to which `"${status}"` is being referenced. To solve this problem, Sieve implementations **MUST** follow the scoping rules defined in Section 3.4 and support the `"global"` command defined there.

### 3.2. Control Structure `"include"`

Usage: `include [LOCATION] [":once"] [":optional"] <value: string>`

LOCATION = `":personal" / ":global"`

The `"include"` command takes an optional `"location"` parameter, an optional `":once"` parameter, an optional `":optional"` parameter, and a single string argument representing the name of the script to include for processing at that point. Implementations **MUST** restrict script names according to ManageSieve [RFC5804], Section 1.6. The script name argument **MUST** be a constant string as defined in [RFC5229], Section 3; implementations **MUST NOT** expand variables in the script name argument.

The `"location"` parameter **MUST** default to `":personal"` if not specified. The `"location"` parameter **MUST NOT** be specified more than once. The `"location"` has the following meanings:

**:personal**

Indicates that the named script is stored in the user's own personal (private) Sieve repository.

**:global**

Indicates that the named script is stored in a site-wide Sieve repository, accessible to all users of the Sieve system.

The `:once` parameter tells the interpreter only to include the named script if it has not already been included at any other point during script execution. If the script has already been included, processing continues immediately following the `include` command. Implementations **MUST NOT** generate an error if an `include :once` command names a script whose inclusion would be recursive; in this case, the script **MUST** be considered previously included, and therefore `include :once` will not include it again.

Note: It is **RECOMMENDED** that script authors and generators use the `:once` parameter only when including a script that performs general duties such as declaring global variables and making sanity checks of the environment.

The `:optional` parameter indicates that the script may be missing. Ordinarily, an implementation **MUST** generate an error during execution if an `include` command specifies a script that does not exist. When `:optional` is specified, implementations **MUST NOT** generate an error for a missing script, and **MUST** continue as if the `include` command had not been present.

The included script **MUST** be a valid Sieve script. Implementations **MUST** validate that each script has its own `require` statements for all optional capabilities used by that script. The scope of a `require` statement is the script in which it immediately appears, and neither inherits nor passes on capabilities to other scripts during the course of execution.

A `stop` command in an included script **MUST** stop all script processing, including the processing of the scripts that include the immediate one. The `return` command (described below) stops processing of the immediate script only, and allows the scripts that include it to continue.

The `include` command **MAY** appear anywhere in a script where a control structure is legal, and **MAY** be used within another control structure, e.g., an `if` block.

**Examples:**

The user has four scripts stored in their personal repository:

**"default"**

This is the default active script that includes several others.

```
require ["include"];

include :personal "always_allow";
include :global "spam_tests";
include :personal "spam_tests";
include :personal "mailing_lists";
```

**Personal script "always\_allow"**

This script special-cases some correspondent email addresses and makes sure any message containing those addresses is always kept.

```
if address :is "from" "boss@example.com"
{
    keep;
}
elsif address :is "from" "ceo@example.com"
{
    keep;
}
```

**Personal script "spam\_tests" (uses "reject" [RFC5429])**

This script does some user-specific spam tests to catch spam messages not caught by the site-wide spam tests.

```
require ["reject"];

if header :contains "Subject" "XXXX"
{
    reject "Subject XXXX is unacceptable.";
}
elsif address :is "from" "money@example.com"
{
    reject "Mail from this sender is unwelcome.";
}
```

### Personal script "mailing\_lists"

This script looks for messages from different mailing lists and files each into a mailbox specific to the mailing list.

```
require ["fileinto"];

if header :is "List-ID" "sieve.ietf.org"
{
    fileinto "lists.sieve";
}
elsif header :is "List-ID" "ietf-imapext.imc.org"
{
    fileinto "lists.imapext";
}
```

There is one script stored in the global repository:

### Site script "spam\_tests" (uses "reject" [RFC5429])

This script does some site-wide spam tests that any user at the site can include in their own scripts at a suitable point. The script content is kept up to date by the site administrator.

```
require ["reject"];

if anyof (header :contains "Subject" "$$",
          header :contains "Subject" "Make money")
{
    reject "No thank you.";
}
```

### 3.3. Control Structure "return"

Usage: return

The "return" command stops processing of the immediately included script only and returns processing control to the script that includes it. If used in the main script (i.e., not in an included script), it has the same effect as the "stop" command, including the appropriate "keep" action if no other actions have been executed up to that point.

### 3.4. Interaction with the "variables" Extension

In order to avoid problems of variables in an included script "overwriting" those from the script that includes it, this specification requires that all variables defined in a script **MUST** be kept "private" to the immediate script by default -- that is, they are not "visible" to other scripts. This ensures that two script authors cannot inadvertently cause problems by choosing the same name for a variable.

However, sometimes there is a need to make a variable defined in one script available to others. This specification defines the new command "global" to declare that a variable is shared among scripts. Effectively, two namespaces are defined: one local to the immediate script, and another shared among all scripts. Implementations **MUST** allow a non-global variable to have the same name as a global variable but have no interaction between them.

#### 3.4.1. Control Structure "global"

Usage: `global <value: string-list>`

The "global" command accepts a string list argument that defines one or more names of variables to be stored in the global variable space. Each name **MUST** be a constant string and conform to the syntax of variable-name as defined in the "variables" extension document [RFC5229], Section 3. Match variables cannot be specified, and namespace prefixes are not allowed. An invalid name **MUST** be detected as a syntax error.

The "global" command is only available when the script has both "include" and "variables" in its require line. If the "global" command appears when only "include" or only "variables" has been required, an error **MUST** be generated when the script is uploaded.

If a "global" command is given the name of a variable that has previously been defined in the immediate script with "set", an error **MUST** be generated either when the script is uploaded or at execution time.

If a "global" command lists a variable that has not been defined in the "global" namespace, the name of the variable is now marked as global, and any subsequent "set" command will set the value of the variable in global scope.



A variable has global scope in all scripts that have declared it with the "global" command. If a script uses that variable name without declaring it global, the name specifies a separate, non-global variable within that script.

Interpretation of a string containing a variable marked as global, but without any value set, SHALL behave as any other access to an unknown variable, as specified in the "variables" extension document [RFC5229], Section 3 (i.e., evaluates to an empty string).

Example:

The active script

The included script may contain repetitive code that is effectively a subroutine that can be factored out. In this script, the test that matches last will leave its value in the test\_mailbox variable, and the top-level script will file the message into that mailbox. If no tests matched, the message will be implicitly kept in the INBOX.

```
require ["fileinto", "include", "variables", "relational"];
global "test";
global "test_mailbox";
```

```
set "test" "$$";
include "subject_tests";
```

```
set "test" "Make money";
include "subject_tests";
```

```
if string :count "eq" "${test_mailbox}" "1"
{
    fileinto "${test_mailbox}";
    stop;
}
```

### Personal script "subject\_tests"

This script performs a number of tests against the message, sets the `global test_mailbox` variable with a folder to file the message into, and then falls back to the top-level script.

```
require ["include", "variables"];
global ["test", "test_mailbox"];

if header :contains "Subject" "${test}"
{
    set "test_mailbox" "spam-${test}";
}
```

### 3.4.2. Variables Namespace global

In addition to the "global" command, this document defines the variables namespace "global", in accordance with the "variables" extension document [RFC5229], Section 3. The "global" namespace has no sub-namespaces (e.g., 'set "global.data.from" "me@example.com";' is not allowed). The variable-name part **MUST** be a valid identifier (e.g., 'set "global.12" "value";' is not valid because "12" is not a valid identifier).

Note that the "variables" extension document [RFC5229], Section 3 suggests that extensions should define a namespace that is the same as its capability string (in this case, "include" rather than "global"). Nevertheless, references to the "global" namespace without a prior require statement for the "include" extension **MUST** cause an error.

Example:

```
require ["variables", "include"];

set "global.i_am_on_vacation" "1";
```

Variables declared global and variables accessed via the "global" namespace **MUST** each be one and the same. In the following example script, we see the variable "i\_am\_on\_vacation" used in a "global" command, and again with the "global" namespace. Consider these as two syntaxes with identical meaning.

**Example:**

```
require ["variables", "include", "vacation"];
global "i_am_on_vacation";

set "global.i_am_on_vacation" "1";

if string :is "${i_am_on_vacation}" "1"
{
    vacation "It's true, I am on vacation.";
}
```

**3.5. Interaction with Other Extensions**

When "include" is used with the "editheader" extension [RFC5293], any changes made to headers in a script **MUST** be propagated both to and from included scripts. By way of example, if a script deletes one header and adds another, then includes a second script, the included script **MUST NOT** see the removed header, and **MUST** see the added header. Likewise, if the included script adds or removes a header, upon returning to the including script, subsequent actions **MUST** see the added headers and **MUST NOT** see the removed headers.

When "include" is used with the MIME extension [RFC5703] "foreverypart" control structure, the included script **MUST** be presented with the current MIME part as though it were the entire message. A script **SHALL NOT** have any special control over the control structure it was included from. The "break" command in an included script is not valid on its own and may not terminate a "foreverypart" iteration in another script. The included script can use "return" to transfer control back to the including script. A global variable can be used to convey results to the including script. A "stop" in an included script, even within a "foreverypart" loop, still halts all script execution, per Section 3.2.

When "include" is used with the "reject" extension [RFC5429], calling "reject" or "ereject" at any time sets the reject action on the message, and continues script execution. Apropos of the MIME extension, if an included script sees only a portion of the message and calls a reject, it is the entire message and not the single MIME part that carries the rejection.

#### 4. Security Considerations

Sieve implementations **MUST** ensure adequate security for the global script repository to prevent unauthorized changes to global scripts. For example, a site policy might enable only certain users with administrative privileges to modify the global scripts. Sites are advised against allowing all users to have write access to the sites' global scripts.

Sieve implementations **MUST** ensure that script names are checked for validity and proper permissions prior to inclusion, in order to prevent a malicious user from gaining access to files accessible to the mail server software that should not be accessible to the user.

Sieve implementations **MUST** ensure that script names are safe for use with their storage system. An error **MUST** be generated either when the script is uploaded or at execution time for a script including a name that could be used as a vector to attack the storage system. By way of example, the following include commands should be considered hostile: 'include "../...//etc/passwd"', 'include "foo\$(`rm star`)'".

Beyond these, the "include" extension does not raise any security considerations that are not discussed in the base Sieve [RFC5228] document and the "variables" extension document [RFC5229].

#### 5. IANA Considerations

The following template specifies the IANA registration of the Sieve extension specified in this document:

To: [iana@iana.org](mailto:iana@iana.org)

Subject: Registration of new Sieve extension

Capability name: include

Description: adds the "include" command to execute other Sieve scripts, the "return" action from an included script, and the "global" command and "global" variables namespace to access variables shared among included scripts.

RFC number: this RFC

Contact address: the Sieve discussion list <[sieve@ietf.org](mailto:sieve@ietf.org)>

This information has been added to IANA's "Sieve Extensions" registry (<http://www.iana.org>).

## 6. References

### 6.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC5228] Guenther, P., Ed., and T. Showalter, Ed., "Sieve: An Email Filtering Language", RFC 5228, January 2008.
- [RFC5229] Homme, K., "Sieve Email Filtering: Variables Extension", RFC 5229, January 2008.
- [RFC5804] Melnikov, A., Ed., and T. Martin, "A Protocol for Remotely Managing Sieve Scripts", RFC 5804, July 2010.

### 6.2. Informative References

- [RFC5293] Degener, J. and P. Guenther, "Sieve Email Filtering: Editheader Extension", RFC 5293, August 2008.
- [RFC5429] Stone, A., Ed., "Sieve Email Filtering: Reject and Extended Reject Extensions", RFC 5429, March 2009.
- [RFC5703] Hansen, T. and C. Daboo, "Sieve Email Filtering: MIME Part Tests, Iteration, Extraction, Replacement, and Enclosure", RFC 5703, October 2009.

## Appendix A. Acknowledgments

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