# Rsyslog Missing Manual Documentation

## *Release 7.4.4*

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Rsyslog is an excellent syslog server used by default in many Linux distributions. Written in C, it's faster, more efficient, and generally more reliable than the larger, more featureful log forwarders. Unfortunately its documentation is both sparse and often wrong, especially for the older 7.x release series preferred by distributions.

This is an attempt by a third party to address that flaw by providing a complete and accurate manual. The information presented in this manual comes primarily from reading the Rsyslog source code. This documentation project is not affiliated with Rainer Gerhards or the Rsyslog project.

# Contents

## 1.1 Configuration

Since version 6, Rsyslog is configured in a simple procedural language called RainerScript whose syntax should seem familiar to users of any language in the C extended family. The elements of the classic `syslogd` configuration format are carried forward as statements in RainerScript, so configuration files for `syslogd` or `sysklogd` should work in Rsyslog without modification.

### 1.1.1 Syntax

#### Whitespace and Comments

RainerScript is whitespace-insensitive except for a few places in legacy directives, which are identified when they're discussed. Whitespace is any number of tab, space, or newline characters, and is allowed anywhere between tokens. It's required only where two adjacent tokens would otherwise be ambiguous.

Both C-style block comments (`/* comment */`) and shell-style line comments (`# comment`) are allowed in most places. Unlike many languages, comments are not fully interchangeable with whitespace. They're allowed in any context where a statement would be allowed, and also within some compound statements. Look for the `cws` production in the syntax descriptions for exact information on where comments are permitted.

```
character      ::=   ?  any ASCII character between 0x20 and 0x7E inclusive ?
char_htab      ::=   ?  ASCII 0x09 Horizontal Tab ?
char_newline   ::=   ?  ASCII 0x0A Line Feed ?
char_space     ::=   ?  ASCII 0x20 Space ?
whitespace     ::=   ( char_htab | char_newline | char_space )*
comment_block  ::=   "/*" ( character - "*/" )* "*/"
comment_line   ::=   "#" ( character - char_newline )* char_newline
comment        ::=   comment_block | comment_line
cws            ::=   ( whitespace | comment )*
```

#### Literals

A *literal* is a representation of a fixed value included directly in the configuration file. It will be converted to an in-memory representation and used directly in the operation where it appears.

### Number Literals

Literal numbers can be specified in decimal (base 10), octal (base 8), or hexadecimal (base 16). Decimal is the default; start the literal with `0` for octal or `0x` for hexadecimal. Only positive integers and zero are supported. Negative numbers and fractional parts cannot be used.

**Tip:** Since a leading zero is used to indicate octal literals, zero-padding decimal literals will cause issues. If you want to right-align number literals you should use space-padding instead.

**Warning:** As can be seen in the formal syntax definition below, there's a parser bug in the handling of hexadecimal numbers: only one digit is supported, and the values `8` and `9` are missing. It is therefore recommended that decimal numbers be used instead.

```
digit_oct    ::=    "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7"
digit_dec    ::=    "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7" | "8" | "9"
digit_hex    ::=    "0" | "1" | "2" | "3" | "4" | "5" | "6" | "7"
                    "a" | "b" | "c" | "d" | "e" | "f"
number_oct   ::=    "0" digit_oct+
number_hex   ::=    "0x" digit_hex
number_dec   ::=    "0" | ( (digit_dec - "0") digit_dec* )
number       ::=    number_dec | number_hex | number_octal
```

### String Literals

RainerScript supports string literals wrapped in either single (`'`) or double (`"`) quote characters. Both styles of string are identical except for their quote character.

**Warning:** For reasons that aren't clear dollar signs (`$`) must be escaped in double-quoted strings in expressions. This does not apply to single-quoted strings or strings used in objects.

```
str_escape_octal   ::=   "\" digit_oct{3}
str_escape_hex     ::=   "\x" digit_hex{2}
str_escape_char    ::=   "\" character
str_escape         ::=   str_escape_octal | str_escape_hex | str_escape_char
string_single      ::=   "'" ( character - ( "'" | "\" ) | str_escape )* "'"
string_double      ::=   '"' ( character - ( '"' | "\" | "$" ) | str_escape )* '"'
string             ::=   string_single | string_double
```

Escape sequences are supported in order to represent characters that aren't otherwise permissible. A backslash (`\`) followed by three octal digits will be interpreted as an octal number and replaced by the ASCII character encoded by that number. Likewise, `\x` followed by two hexadecimal digits will be interpreted as a hexadecimal number and replaced by the corresponding ASCII character. A backslash followed by any other character is a character escape. The list of supported character escapes can be found in the following table. Any character escape not currently supported is reserved for future use and has undefined behavior.

**Warning:** Parser support for character escape sequences is variable. This does not appear to be intentional. Check the notes in the following table to make sure the escape you want to use is available in the appropriate context.

| Sequence | ASCII | Value |
|----------|-------|-------|
| \\ | 0x5C | Backslash |
| \" | 0x22 | Double Quote |
| \' | 0x27 | Single Quote |
| \$ [2] | 0x24 | Dollar Sign |
| \? | 0x3F | Question Mark |
| \a [1] | 0x07 | Terminal Bell |
| \b | 0x08 | Backspace |
| \f [1] | 0x0C | Form Feed |
| \n | 0x0A | Line Feed |
| \r | 0x0D | Carriage Return |
| \t | 0x09 | Horizontal Tab |

## 1.1.2 Conditionals

Rsyslog supports three kinds of conditional logic: the `if` statement, classic BSD facility/priority selectors, and property filters. All three are statements that control the execution of a block, so they can be used at any point in the configuration — including within another conditional — and are interchangeable. For example:

```
if $fromhost == 'host1' then {
    mail.* action(type="omfile" file="/var/log/host1/mail.log")
    *.err /var/log/host1/errlog
} else {
    mail.* action(type="omfile" file="/var/log/mail.log")
    *.err /var/log/errlog
}
```

> stmt_conditional  ::=  *stmt_if* | *stmt_selector* | *stmt_propfilter*

### Conditional Expressions

Rsyslog supports a fairly standard system of conditional expressions which are documented in the section on expressions. They can be used with the `if` statement for conditional execution.

> stmt_if  ::=  "if" expression "then" block ( "else" block )?

---

**Tip:** Conditional expressions are powerful, but evaluating them can be costly. Since the BSD-style selectors discussed below operate using bitmasks instead of string comparison they're *much* faster and should be used when possible, i.e. when operating only on the facility or priority.

---

A conditional statement takes either of these forms:

```
if <expression> then <block>
if <expression> then <block> else <block>
```

Where `<expression>` is a conditional expression as documented in the expressions section and `<block>` is either a single statement or a collection of statements wrapped in curly braces (`{}`). For example:

---

[2]not supported within objects
[1]not supported within expressions

```
if $programname == 'prog1' then {
    action(type="omfile" file="/var/log/prog1.log")
    if $msg contains 'test' then
        action(type="omfile" file="/var/log/prog1test.log")
    else
        action(type="omfile" file="/var/log/prog1notest.log")
}
```

### BSD Selectors

Rsyslog, of course, supports traditional BSD-style selectors, which filter on the facility and priority (together, the PRI field). It's worth noting these are not second-class citizens in the world of filters; they are, in fact, the most efficient way to filter on facility or priority or both. A selector consists of two fields separated by a period (`.`), facility on the left and priority on the right.

```
facility       ::=    "auth" | "authpriv" | "cron" | "daemon" | "kern"
                      "lpr" | "mail" | "mark" | "news" | "security"
                      "syslog" | "user" | "uucp" | "ftp" | "audit"
                      "local" digit_octal
                      digit? digit
priority       ::=    "alert" | "crit" | "debug" | "emerg" | "err" | "error"
                      "info" | "none" | "notice" | "panic" | "warn"
                      "warning" | "*"
selector       ::=    facility ( "," facility )* "."  "!"?  "="?  priority
                      selector ";" selector
stmt_selector  ::=    selector block
```

### Facility

In BSD syslog, the facility field must be either a facility name or its underlying number. Unfortunately different *NIX implementations have never agreed on exactly how the numbers are assigned, so their use is discouraged. If you must use the numeric values, the correct ones for your system can be found in `/usr/include/syslog.h`.

Rsyslog provides a few helpful extensions to the BSD behavior. If an asterisk (`*`) is used in the facility field the selector will match any facility. Also, if the same priority filter should apply to multiple facilities (but not all of them), a list of facility names separated with commas (`,`) may be provided in place of a single facility specification.

---

**Note:** When handling the special `*` facility, the parser only checks that the first character of the given facility is `*`. Any characters after that are ignored. That means these selectors are equivalent and all perfectly valid:

```
*.emerg
*foo.emerg
****.emerg
```

After handling a facility value the parser skips any number of commas that are present. That means these selectors are equivalent and all perfectly valid:

```
auth,authpriv.emerg
auth,,,,authpriv.emerg
auth,authpriv,.emerg
```

---

The valid facility names are:

| Keyword | Purpose |
|---|---|
| `kern` | messages |
| `user` | user-level messages |
| `mail` | mail system |
| `daemon` | system daemons |
| `auth` | authorization messages |
| `security` | deprecated alias for `auth` |
| `syslog` | messages generated internally by syslogd |
| `lpr` | printing subsystem |
| `news` | network news subsystem |
| `uucp` | UUCP subsystem |
| `cron` | scheduled task subsystem |
| `authpriv` | authorization messages (private) |
| `ftp` | FTP daemon |
| `audit` | ??? |
| `local0` | local use |
| `local1` | local use |
| `local2` | local use |
| `local3` | local use |
| `local4` | local use |
| `local5` | local use |
| `local6` | local use |
| `local7` | local use |

### Priority

Like the facility, in BSD syslog the priority field must be either a priority name or number. While the priority numbers are consistent across platforms it's still better to use the names. The selector will match messages at any priority equal to or higher than that specified.

Rsyslog substantially extends this behavior. An asterisk (`*`) may be used in place of a priority value, which means the same thing as `debug` (messages at any priority are selected) but more clearly expresses that meaning. A priority value may be preceded by an equals sign (`=`), in which case the selector will match only messages with exactly that priority. If the priority is preceded by an exclamation point (`!`) the meaning of the priority filter will be inverted, so any priorities it would normally match will be excluded instead. If both modifiers are used, the exclamation point must be before the equals sign (`!=`). The keyword `none` means the same thing as `!*` (messages at all priorities are excluded) but more clearly expresses that meaning.

The valid priority names, in descending order, are:

| Keyword | Number | Severity |
|---|---|---|
| `emerg` | 0 | Emergency: system is unusable |
| `panic` | | deprecated alias for `emerg` |
| `alert` | 1 | Alert: action must be taken immediately |
| `crit` | 2 | Critical: critical conditions |
| `err` | 3 | Error: error conditions |
| `error` | | deprecated alias for `err` |
| `warning` | 4 | Warning: warning conditions |
| `warn` | | deprecated alias for `warning` |
| `notice` | 5 | Notice: normal but significant condition |
| `info` | 6 | Informational: informational messages |
| `debug` | 7 | Debug: debug-level messages |

**Compound Selectors**

Compound selectors can be created by joining together selectors with semicolons (`;`). The sub-selectors are applied from left to right and only the last action applied for each combination of facility and priority takes effect. For any given message, if any sub-selector matched the message will be considered to have matched the compound selector, unless the last selector to match was an exclusion (priority `none` or starting with `!`, but not `!none`).

---

**Note:** After encountering the semicolon which ends a sub-selector the parser will skip any number of commas or semicolons that are present. That means all these compound selectors are equivalent and perfectly valid:

```
auth.emerg;authpriv.emerg
auth.emerg;;authpriv.emerg
auth.emerg;,,authpriv.emerg
auth.emerg;,,,;,,,;authpriv.emerg
auth.emerg;authpriv.emerg;
```

---

**Property Filters**

Rsyslog adds another type of simple filter which can match on any message property, not just the facility and priority. They compare a provided static value with the value of a selected message property using any of several comparison operations.

```
propfilter_op      ::=   "isempty" | "isequal" | "contains" | "startswith"
                         "regex" | "ereregex"
propfilter_string  ::=   '"' ( character - ( '"' | '\' ) | '\' ( '"' | '\' ) )* '"'
propfilter         ::=   ":"  property ","  space* "!"?  propfilter_op ","  space* propfilter
stmt_propfilter    ::=   propfilter block
```

---

**Warning:** Property filters were added to Rsyslog before support for full conditional expressions was introduced. While they're not quite deprecated they're less flexible and no more efficient than conditional expressions, which should therefore generally be used instead when writing new configurations.

---

A property filter consists of a colon followed by a property name, then a comma, optional space, a comparison operation, another comma and space, and finally a quoted string. Property names are case-sensitive, so `msg` works while `MSG` will cause an error. A full list of built-in properties can be found in the section on properties.

The supported comparison operations are listed below. In addition, an exclamation point (`!`) can be added to the beginning of any operation name to negate its meaning.

| Keyword | Operation |
|---|---|
| `isempty` | Checks if the property is empty, which means either it hasn't been set or has been set to the empty string. |
| `isequal` | Checks whether the given value exactly matches the property's value. |
| `contains` | Checks whether the given value exactly matches a substring of the property's value at any location. |
| `startswith` | Checks whether the given value exactly matches a substring of the property's value starting at the first character. |
| `regex` | Interprets the given value as a POSIX Basic Regular Expression and checks whether it matches the property. |
| `ereregex` | Interprets the given value as a POSIX Extended Regular Expression and checks whether it matches the property. |

The value is a quoted string, but it follows different rules than strings in most other parts of the configuration file. It supports only very limited escapes: `\\` will produce a backslash (\) and `\"` will produce a double quote (`"`). All other escape sequences (backslash followed by any character) are reserved for future use and behave in an undefined manner. Any backslash not intended as part of an escape sequence must therefore be escaped.

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