Syslog-ng for DevOps: Customized Logging with Python

Peter Czanik / syslog-ng, a One Identity business

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About me

Peter Czanik from Hungary

Evangelist at One Identity: syslog-ng upstream

syslog-ng packaging, support, advocacy

syslog-ng originally developed by Balabit, now part of One Identity

Overview

- What is syslog-ng
- The four roles of syslog-ng
- Configuring syslog-ng for Python
- Python source, parser, destination

syslog-ng

Logging

Recording events, such as:

Jan 14 11:38:48 linux-0jbu sshd[7716]: Accepted publickey for root from 127.0.0.1 port 48806 ssh2

syslog-ng

Enhanced logging daemon with a focus on portability and high-performance central log collection. Originally developed in C.

Python

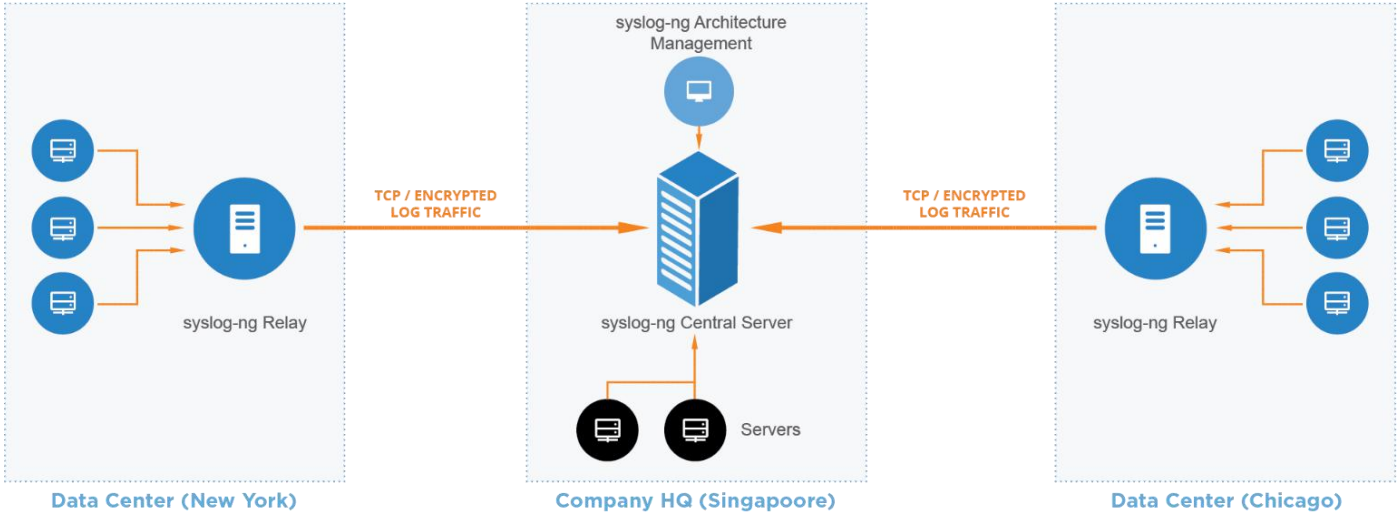
Makes syslog-ng slower but gives easy development and flexibility.

Why central logging?

Ease of use
One place to check instead of many

Availability
Even if the sender machine is down

Security
Logs are available even if sender machine is compromised



Main syslog-ng roles

Collector

Processor

Filter

Storage
(or forwarder)

Role: data collector

Collect system and application logs together: contextual data for either side

A wide variety of platform-specific sources:

- /dev/log & co
- Journal, Sun streams

Receive syslog messages over the network:

- Legacy or RFC5424, UDP/TCP/TLS

Logs or any kind of text data from applications:

- Through files, sockets, pipes, application output, etc.

Python source: Jolly Joker

HTTP server, Amazon CloudWatch fetcher, Kafka source, etc.

Role: processing

Classify, normalize, and structure logs with built-in parsers:
- CSV-parser, PatternDB, JSON parser, key=value parser

Rewrite messages:
- For example: anonymization

Reformatting messages using templates:
- Destination might need a specific format (ISO date, JSON, etc.)

Enrich data:
- GeoIP
- Additional fields based on message content

Python parser: all of above, enrich logs from databases and also filtering

Role: data filtering

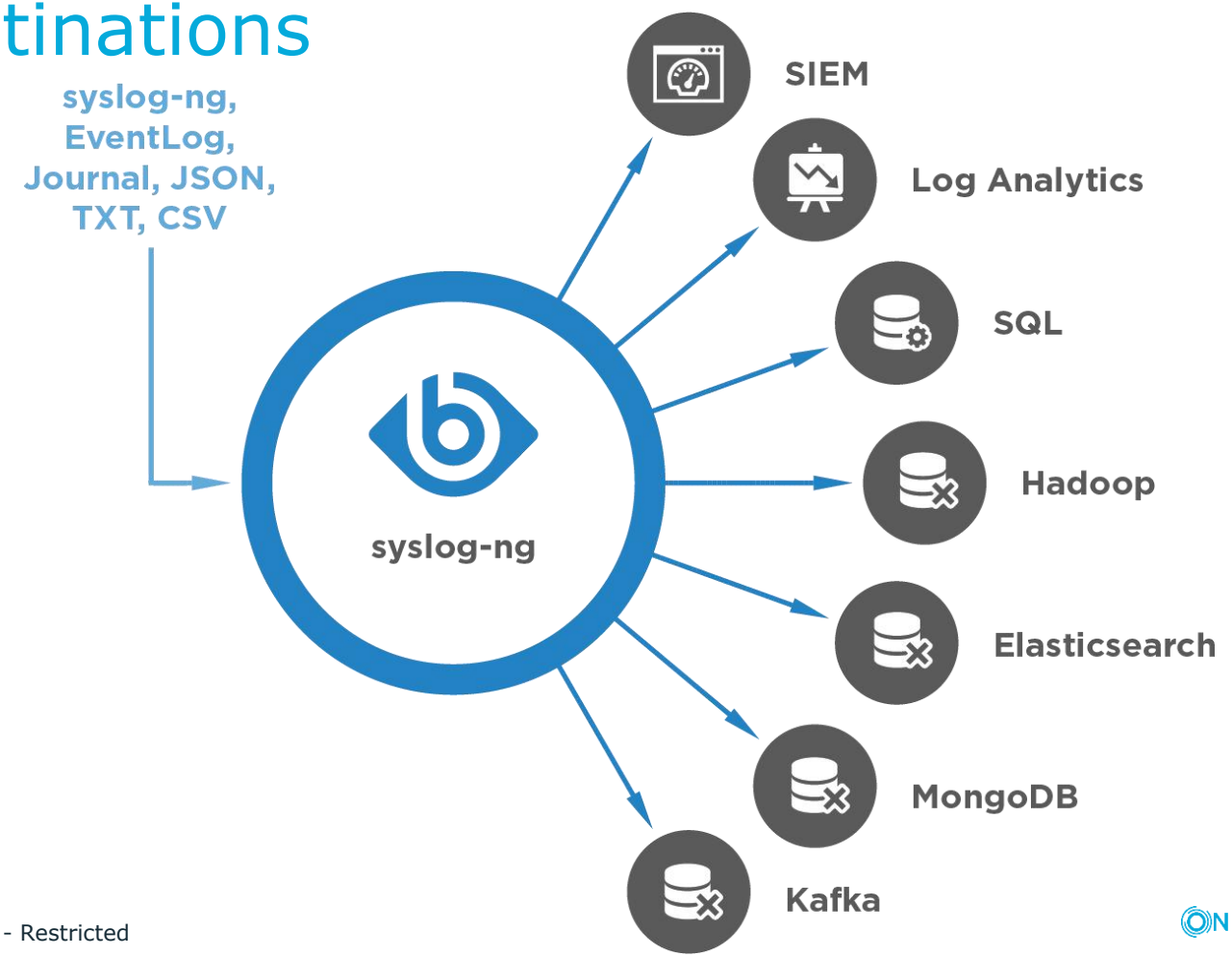
Main uses:

- Discarding surplus logs (not storing debug-level messages)
- Message routing (login events to SIEM)

Many possibilities:

- Based on message content, parameters, or macros
- Using comparisons, wildcards, regular expressions, and functions
- Combining all of these with Boolean operators

Role: destinations

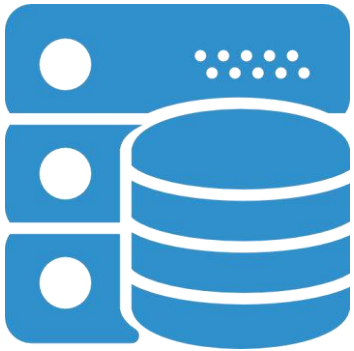


Freeform log messages

Most log messages are: date + hostname + text

Mar 11 13:37:56 linux-6965 sshd[4547]: Accepted keyboard-interactive/pam for root from 127.0.0.1 port 46048 ssh2

- Text = English sentence with some variable parts
- Easy to read by a human
- Difficult to create alerts or reports



Solution: structured logging

Events represented as name-value pairs. For example, an ssh login:

app=sshd user=root source_ip=192.168.123.45

syslog-ng: name-value pairs inside

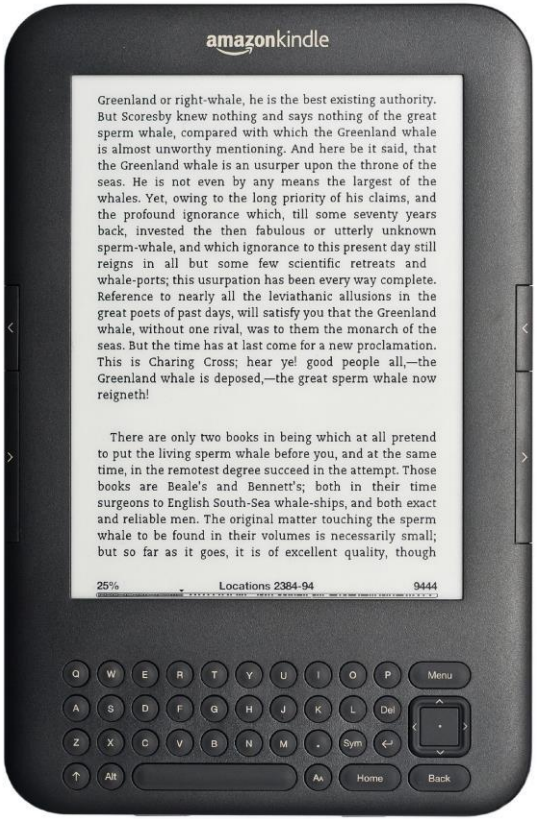
Date, facility, priority, program name, pid, etc.

Parsers in syslog-ng can turn unstructured and some structured data (CSV, JSON) into name-value pairs

Python bindings fully support name-value pairs

Which is the most used version?

- Project started in 1998
- RHEL EPEL has version 3.5
- Latest stable version is 3.20, released a month ago



Kindle e-book reader

Version 1.6

Configuration

- “Don't Panic”
- Simple and logical, even if it looks difficult at first

- Pipeline model:
  - Many different building blocks (sources, destinations, filters, parsers, etc.)
  - Connected into a pipeline using “log” statements

syslog-ng.conf: getting started

```
@version:3.19
@include "scl.conf"

# this is a comment :)

options {flush_lines (0); keep_hostname (yes);};

source s_sys { system(); internal();};
destination d_mesg { file("/var/log/messages"); };
filter f_default { level(info..emerg) and not (facility(mail)); };

log { source(s_sys); filter(f_default); destination(d_mesg); };
```

Python in syslog-ng

- Python bindings: configuration + code
- Can pass parameters to Python code
- Only the class name is mandatory in config
- Python code can be in-line in a python {} block, or stored in external file(s)

Python destination: mandatory

- Only the class name is mandatory in config
- Only send() method is mandatory
- Name-value pairs as
  - object – all
  - dict – only those configured

Python destination: optional

- Many non-mandatory options, like disk-buffer, etc.

- init() and deinit()
  - When syslog-ng started or reloaded
- open() and close()
  - start/reload or when sending fails

A simple file destination

```
destination d_python_to_file {
    python(
        class("TextDestination")
    );
};

log {
    source(src);
    destination(d_python_to_file);
};

python {
class TextDestination(object):
    def send(self, msg):
        self.outfile = open("/tmp/example.txt", "a")
        self.outfile.write("MESSAGE = %s\n" % msg["MESSAGE"])
        self.outfile.flush()
        self.outfile.close();
        return True
};
```

Python parser

- Only parse() method is mandatory
- Name-value pairs only as object
    - Can create new: log_message['hostname.dest'] = 'myname'

- <38>2018-10-03T18:00:17 localhost prg00000[1234]: seq: 0000001451, thread: 0000, runid: 1538582416, stamp: 2018-10-03T18:00:17 PADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADDPADD

Python parser: config

```
parser my_python_parser{
    python(
        class("SngRegexParser")
        options("regex", "seq: (?P<seq>\\d+), thread: (?P<thread>\\d+),
runid: (?P<runid>\\d+), stamp: (?P<stamp>[^ ]+) (?P<padding>.*$)")
    );
};

log {
    source { tcp(port(5555)); };
    parser(my_python_parser);
    destination {file("/tmp/regexparser.log.txt" template("seq: $seq thread:
$thread runid: $runid stamp: $stamp my_counter: $MY_COUNTER\n"));
    };
};
```

Python parser: code

```
python {

import re

class SngRegexParser(object):
def init(self, options):
        """
        Initializes the parser
        """
        pattern = options["regex"]
        self.regex = re.compile(pattern)
        self.counter = 0
        return True
```

Python parser: code continued

```
    def deinit(self):
        pass
    def parse(self, log_message):
        decoded_msg = log_message['MESSAGE'].decode('utf-8')
        match = self.regex.match(decoded_msg)
        if match:
            for key, value in match.groupdict().items():
                log_message[key] = value
            log_message['MY_COUNTER'] = str(self.counter)
            self.counter += 1
            return True
        return False
};
```

Python source

- Options, like time zone handling
- Name-value pairs as object
- Two modes
  - server
  - fetcher (syslog-ng handles the eventloop)

- Server: the run() and request_exit() methods are mandatory
- Fetcher: only the fetch() method is mandatory

Simple “server” source

```
source s_python {
    python(
        class("MySource")
        options(
            "option1" "value1",
            "option2" "value2"
        )
    );
};

destination d_file { file("/var/log/python.txt"); };

log { source(s_python); destination(d_file); };
```

Simple “server” source continued

```
python {
from syslogng import LogSource
from syslogng import LogMessage

class MySource(LogSource):
    def init(self, options): # optional
        print("init")
        print(options)
        self.exit = False
        return True

    def run(self): # mandatory
        print("run")
        while not self.exit:
            msg = LogMessage("this is a log message")
            self.post_message(msg)

    def request_exit(self): # mandatory
        print("exit")
        self.exit = True
};
```

Simple “fetcher” source: config

```
source s_loadavg {
    python-fetcher(
      class("loadavg.Loadavg")
      options("interval" "1")
    );
};

destination d_file {
    file("/var/log/loadavg"
      template("$(format-json --scope rfc5424 --scope nv-pairs)\n")
    );
};

log {
  source(s_loadavg);
  destination(d_file);
};
```

Simple “fetcher” source: code

```
import time
from syslogng import LogFetcher
from syslogng import LogMessage

class Loadavg(LogFetcher):
    def __init__(self): # optional
        print("constructor")
        self.fname = '/proc/loadavg'
        self.interval = 0

    def init(self, options): # optional
        print(options)
        try:
            self.interval = int(options["interval"])
            return True
        except:
            print("configure 'interval' in syslog-ng.conf as a positive number")
            return False
```

Simple “fetcher” source: code continued

```
def open(self): # optional
        """
        opens the file
        """
        print("open")
        self.fhandle = open(self.fname)
        return True

    def close(self): # optional
        """
        closes the file
        """
        print("close")
        self.fhandle.close()
```

Simple “fetcher” source: code continued

```
def fetch(self): # mandatory
    time.sleep(self.interval)

    self.fhandle.seek(0, 0)
    line = self.fhandle.readline()
    loadavgtmp = line.split()
    runtmp = loadavgtmp[3].split("/")

    msg = LogMessage()
    msg["loadavg.load1"] = loadavgtmp[0]
    msg["loadavg.load5"] = loadavgtmp[1]
    msg["loadavg.load15"] = loadavgtmp[2]
    msg["loadavg.runcurr"] = runtmp[0]
    msg["loadavg.runproc"] = runtmp[1]
    msg["loadavg.lastpid"] = loadavgtmp[4]
    return LogFetcher.FETCH_SUCCESS, msg
```

Debugging

- Logging to internal() from Python code
- From syslog-ng 3.20

```
import syslogng
logger = syslogng.Logger()
logger.error("plain text message: ERROR")
logger.warning("plain text message: WARNING")
logger.info("plain text message: INFO")
logger.debug("plain text message: DEBUG")
```

Further examples

- MQTT destination: https://www.syslog-ng.com/community/b/blog/posts/writing-python-destination-in-syslog-ng-how-to-send-log-messages-to-mqtt

- Parsers: https://www.syslog-ng.com/community/b/blog/posts/parsing-log-messages-with-the-syslog-ng-python-parser

- HTTP source: https://www.syslog-ng.com/community/b/blog/posts/creating-an-http-source-for-syslog-ng-in-python

What’s new in syslog-ng

- Disk-based buffering
- Grouping-by(): generic correlation
- Python bindings
- HTTP(s) destination:
  - Splunk, Elasticsearch
  - Telegram, Slack, etc.
- Wildcard file source
- Performance and memory usage improvements
- Many more :-)

syslog-ng benefits

High-performance reliable log collection

Simplified architecture

Single application for both syslog and application data

Easier-to-use data

Parsed and presented in a ready-to-use format

Lower load on destinations

Efficient message filtering and routing

Join the community!

- syslog-ng: http://syslog-ng.org/
- Source on GitHub: https://github.com/balabit/syslog-ng
- Mailing list: https://lists.balabit.hu/pipermail/syslog-ng/
- Gitter: https://gitter.im/balabit/syslog-ng

Questions?

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