syslog-ng: from log collection to processing and information extraction

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About me

- Peter Czanik from Hungary
- Community manager at BalaBit: syslog-ng upstream
- Doing syslog-ng packaging, support, advocating
- BalaBit is an IT security company with development HQ in Budapest, Hungary
- Over 170 employees: the majority are engineers

Topics

- What is syslog-ng
- Basic syslog-ng configuration
- The importance of structured log messages
- Message parsing
- Creating patterns for PatternDB
- Language bindings
- Managing syslog-ng with Puppet

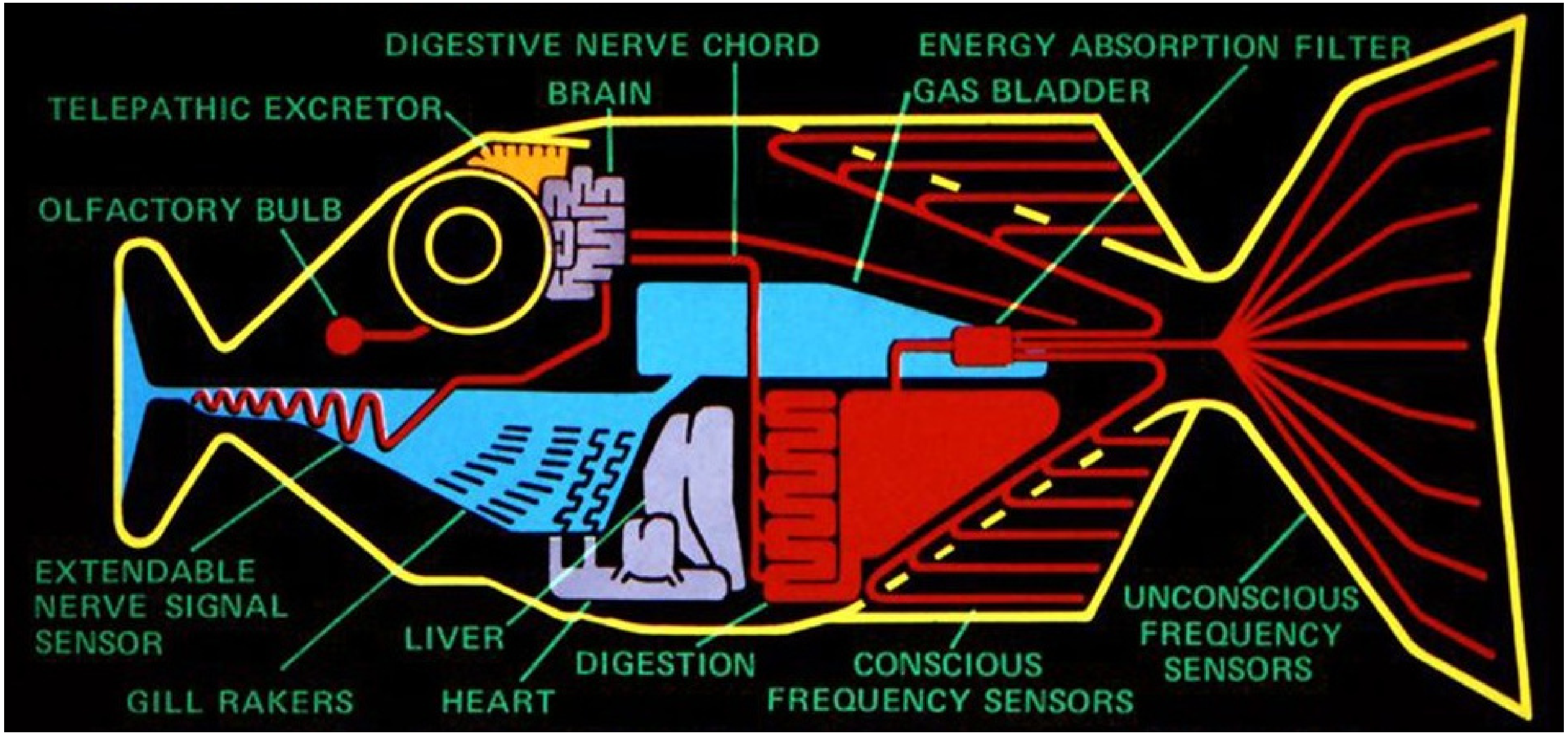
Syslog → syslog-ng

- Logging: recording events

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

- syslog-ng: enhanced log daemon, with a focus on central log collection, supporting a wide range of input and output methods with a flexible configuration language

Babel Fish (The hitchhiker's guide to the galaxy)



syslog-ng: sources

- Receive and send RFC3164 (legacy, BSD) and RFC5424 (“new”, IETF) style syslog messages over the network
  - <34>Oct 11 22:14:15 mymachine su: 'su root' failed for lonvick on /dev/pts/8
  - <165>1 2003-10-11T22:14:15.003Z mymachine.example.com evntslog - ID47 [exampleSDID@32473 iut="3" eventSource= "Application" eventID="1011"] BOMAn application event log entry...
- A wide variety of platform specific sources:
  - /dev/log & Co
  - Journal
  - Sun streams
- Files, sockets, pipes, etc.

syslog-ng: processing

- Filter
- rewrite (anonymize)
- classify, normalize and structure logs with built-in parsers:
  - CSV-parser
  - DB-parser (PatternDB)
  - JSON parser

syslog-ng: destinations

- Traditional file and UDP/TCP/TLS destinations
- SQL and NoSQL destinations (mysql, mongodb)
- Visualization (graphite)
- Alerting (riemann)
- Message queuing (RabbitMQ, ZeroMQ)
- Redis, Kafka and many more

Configuration

- “Don't Panic”
- Simple and logical, even if looks difficult
- Pipeline model:
    - Many different building blocks (sources, destinations, filters, parsers, etc.)
    - Connected using “log” statements into a pipeline

- Sample config from Fedora

syslog-ng.conf: global options

```
@version:3.6
@include "scl.conf"

# this is a comment :)

options {
    flush_lines (0);
# [...]
    keep_hostname (yes);
};
```

syslog-ng.conf: sources

```
source s_sys {
    system();
    internal();
};

source  s_net {
    udp(ip(0.0.0.0) port(514));
};
```

syslog-ng.conf: destinations

```
destination d_cons { file("/dev/console"); };
destination d_mesg { file("/var/log/messages"); };
destination d_auth { file("/var/log/secure"); };
destination d_mail { file("/var/log/maillog" flush_lines(10)); };
destination d_spol { file("/var/log/spooler"); };
destination d_boot { file("/var/log/boot.log"); };
destination d_cron { file("/var/log/cron"); };
destination d_kern { file("/var/log/kern"); };
destination d_mlal { usertty("*"); };
```

syslog-ng.conf: filters

```
filter f_kernel     { facility(kern); };
filter f_default    { level(info..emerg) and
                    not (facility(mail)
                    or facility(authpriv)
                    or facility(cron)); };
filter f_auth       { facility(authpriv); };
filter f_mail       { facility(mail); };
filter f_emergency  { level(emerg); };
# [...]
```

syslog-ng.conf: logpath

```
log { source(s_sys); filter(f_kernel); destination(d_kern); };
log { source(s_sys); filter(f_default); destination(d_mesg); };
log { source(s_sys); filter(f_auth); destination(d_auth); };
log { source(s_sys); filter(f_mail); destination(d_mail); };
log { source(s_sys); filter(f_emergency); destination(d_mlal); };
log { source(s_sys); filter(f_news); destination(d_spol); };
log { source(s_sys); filter(f_boot); destination(d_boot); };
log { source(s_sys); filter(f_cron); destination(d_cron); };
```

Free-form 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

Why it does not scale

- Information is presented differently by each application
- Few logs (workstation) → easy to find information
- Many logs (server) → difficult to find information
- Difficult to process them with scripts

Solution: structured logging

- Events represented as name-value pairs
- Example: an ssh login:
  - source_ip=192.168.123.45
  - app=sshd
  - user=root
- Parsers in syslog-ng can turn unstructured and some structured data (csv, JSON) into name value pairs
- syslog-ng: name-value pairs inside
  - Date, facility, priority, program name, pid, etc.
- Templates: use name-value pairs for custom file names or messages

JSON parser

- Turns JSON based log messages into name-value pairs
- {"PROGRAM":"prg00000","PRIORITY":"info","PID":"1234","MESSAGE":"seq: 0000000000, thread: 0000, runid: 1374490607, stamp: 2013-07-22T12:56:47 MESSAGE... ","HOST":"localhost","FACILITY":"auth","DATE":"Jul 22 12:56:47"}

csv parser

- csv-parser: parses columnar data into fields

```
parser p_apache {
    csv-parser(columns("APACHE.CLIENT_IP", "APACHE.IDENT_NAME", "APACHE.USER_NAME",
        "APACHE.TIMESTAMP", "APACHE.REQUEST_URL", "APACHE.REQUEST_STATUS",
        "APACHE.CONTENT_LENGTH", "APACHE.REFERER", "APACHE.USER_AGENT",
        "APACHE.PROCESS_TIME", "APACHE.SERVER_NAME")
         flags(escape-double-char,strip-whitespace) delimiters(" ") quote-pairs("""[]')
         );
};
destination d_file { file("/var/log/messages-${APACHE.USER_NAME:-nouser}"); };
log { source(s_local); parser(p_apache); destination(d_file);};
```

PatternDB parser

- PatternDB message parser:
    - Can extract useful information from unstructured messages into name-value pairs
    - Add status fields based on message text
    - Message classification (like LogCheck)
- Needs XML describing log messages
- Example: an ssh login failure:
    - user=root, source_ip=192.168.123.45, action=login, status=failure
    - classified as “violation”

Sample XML

```xml
<?xml version='1.0' encoding='UTF-8'?>
<patterndb version='3' pub_date='2010-07-13'>
  <ruleset name='opensshd' id='2448293e-6d1c-412c-a418-a80025639511'>
    <pattern>sshd</pattern>
    <rules>
      <rule provider="patterndb" id="4dd5a329-da83-4876-a431-ddcb59c2858c" class="system">
        <patterns>
          <pattern>Accepted @ESTRING:usracct.authmethod: @for @ESTRING:usracct.username: @from @ESTRING:usracct.device: @port @ESTRING::
@@ANYSTRING:usracct.service@</pattern>
        </patterns>
        <examples>
          <example>
           <test_message program="sshd">Accepted password for bazsi from 127.0.0.1 port 48650 ssh2</test_message>
           <test_values>
            <test_value name="usracct.username">bazsi</test_value>
            <test_value name="usracct.authmethod">password</test_value>
            <test_value name="usracct.device">127.0.0.1</test_value>
            <test_value name="usracct.service">ssh2</test_value>
           </test_values>
          </example>
        </examples>
        <values>
          <value name="usracct.type">login</value>
          <value name="usracct.sessionid">$PID</value>
          <value name="usracct.application">$PROGRAM</value>
          <value name="secevt.verdict">ACCEPT</value>
        </values>
      </rule>
```

Creating patterns for syslog-ng: editor

- Some sample patterns available:
  - https://github.com/balabit/syslog-ng-patterndb
- Use an XML editor or text editor with syntax highlighting
- Use “pdbtool” to
  - test, debug
  - merge
  - convert

  patterns

Creating patterns for syslog-ng: Puppet

- More friendly format (especially if you use Puppet :-))
- https://github.com/ccin2p3/puppet-patterndb
- Use “pdbtool” as usual

```
patterndb::simple::ruleset { 'myruleset':
id => '9586b525-826e-4c2d-b74f-381039cf470c',
patterns => [ 'sshd' ],
pubdate => '2014-03-24',
rules => [
{
id => 'd69bd1ed-17ff-4667-8ea4-087170cbceeb',
patterns => ['Successful login for user @QSTRING:user:"@ using method @QSTRING:method:"@']
}
]
```

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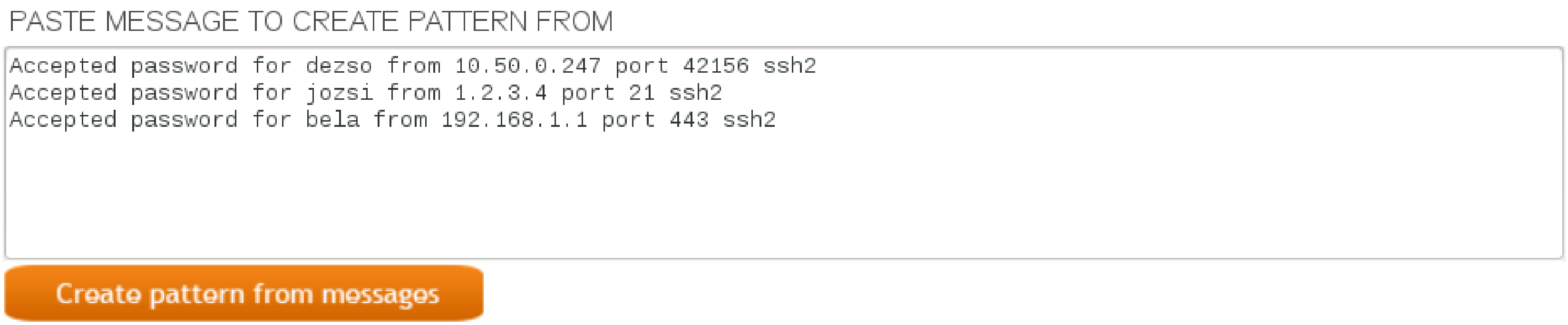
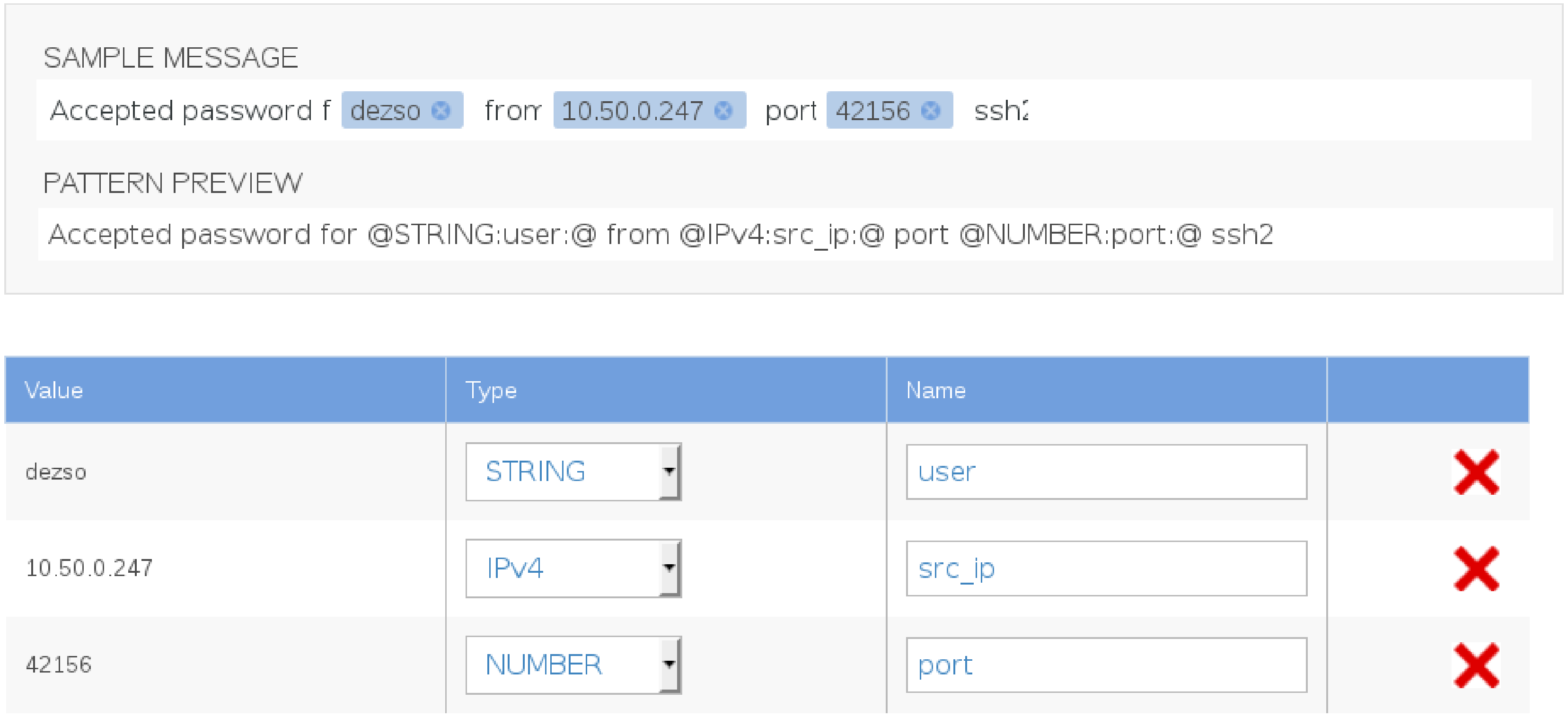
Creating patterns for syslog-ng: GUI


PASTE MESSAGE TO CREATE PATTERN FROM
Create pattern from messages

```
Accepted password for dezso from 10.50.0.247 port 42156 ssh2
Accepted password for jozsi from 1.2.3.4 port 21 ssh2
Accepted password for bela from 192.168.1.1 port 443 ssh2
```

- This is a work in progress
- Finds patterns automagically from similar lines
- Fields can be edited and named
- Results can be verified

Creating patterns for syslog-ng: GUI



SAMPLE MESSAGE

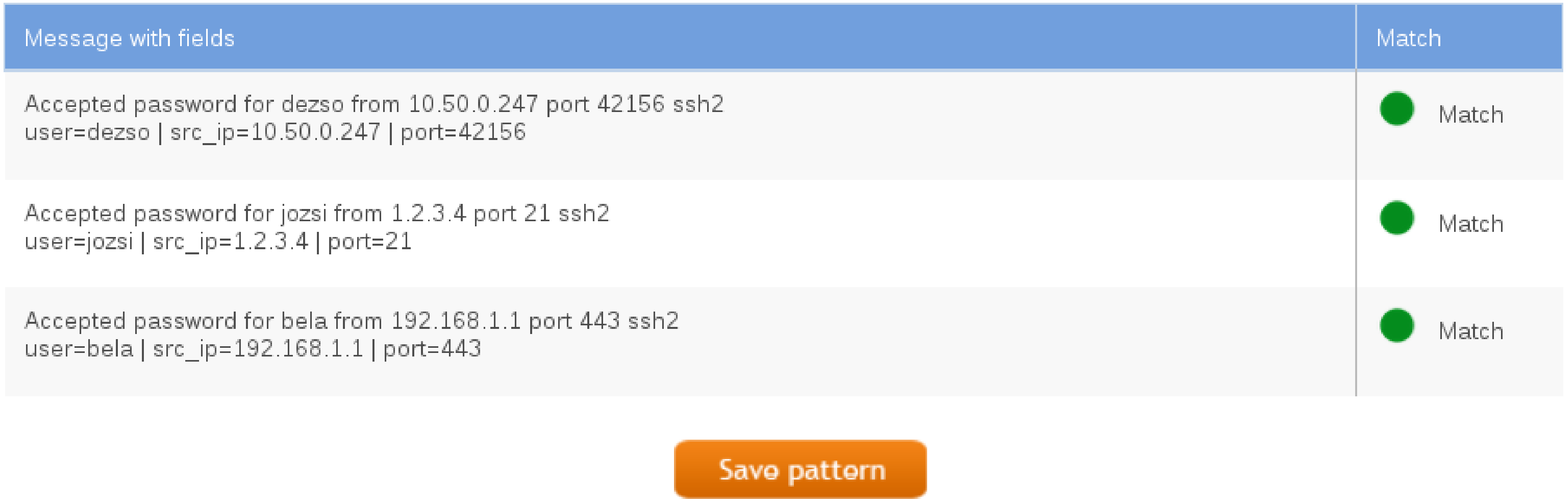
Accepted password f dezso from 10.50.0.247 port 42156 ssh2

PATTERN PREVIEW

```
Accepted password for @STRING:user:@ from @IPv4:src_ip:@ port @NUMBER:port:@ ssh2
```

Value	Type	Name	
dezso	STRING	user	✗
10.50.0.247	IPv4	src_ip	✗
42156	NUMBER	port	✗

Creating patterns for syslog-ng: GUI

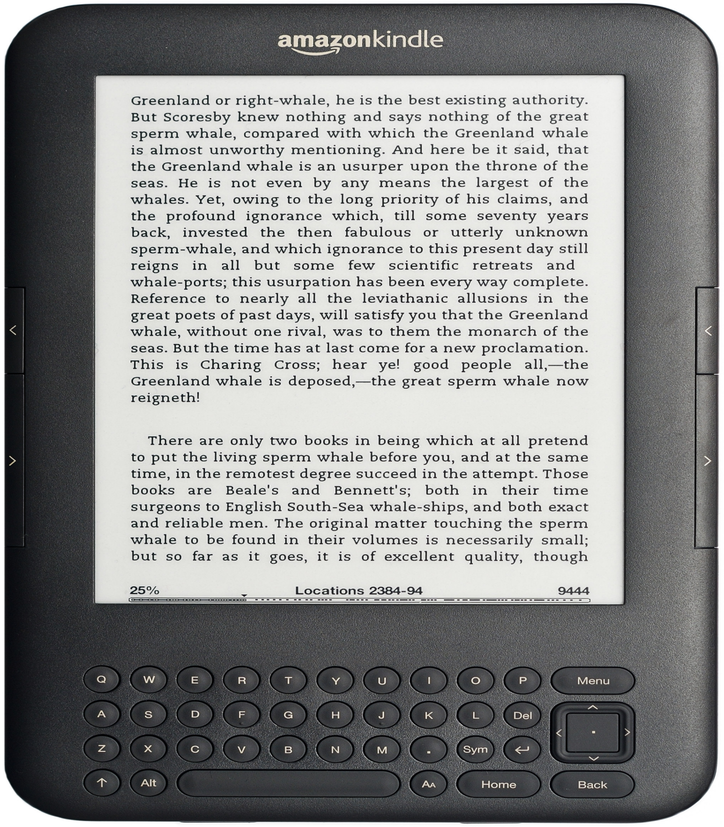


Message with fields	Match
Accepted password for dezso from 10.50.0.247 port 42156 ssh2 user=dezso | src_ip=10.50.0.247 | port=42156	● Match
Accepted password for jozsi from 1.2.3.4 port 21 ssh2 user=jozsi | src_ip=1.2.3.4 | port=21	● Match
Accepted password for bela from 192.168.1.1 port 443 ssh2 user=bela | src_ip=192.168.1.1 | port=443	● Match

Which syslog-ng version is the most popular?

- Help:
  - Current version is v3.6 (3 months old)
  - Debian: v3.3
  - Gentoo: v3.4
  - OpenSUSE: v3.5
  - Fedora: v3.5
  - FreeBSD: v3.6

Version 1.6 :)



Greenland or right-whale, he is the best existing authority. But Scoresby knew nothing and says nothing of the great sperm whale, compared with which the Greenland whale is almost unworthy mentioning. And here be it said, that the Greenland whale is an usurper upon the throne of the seas. He is not even by any means the largest of the whales. Yet, owing to the long priority of his claims, and the profound ignorance which, till some seventy years back, invested the then fabulous or utterly unknown sperm-whale, and which ignorance to this present day still reigns in all but some few scientific retreats and whale-ports; this usurpation has been every way complete. Reference to nearly all the leviathanic allusions in the great poets of past days, will satisfy you that the Greenland whale, without one rival, was to them the monarch of the seas. But the time has at last come for a new proclamation. This is Charing Cross; hear ye! good people all,—the Greenland whale is deposed,—the great sperm whale now reigneth!

There are only two books in being which at all pretend to put the living sperm whale before you, and at the same time, in the remotest degree succeed in the attempt. Those books are Beale's and Bennett's; both in their time surgeons to English South-Sea whale-ships, and both exact and reliable men. The original matter touching the sperm whale to be found in their volumes is necessarily small; but so far as it goes, it is of excellent quality, though

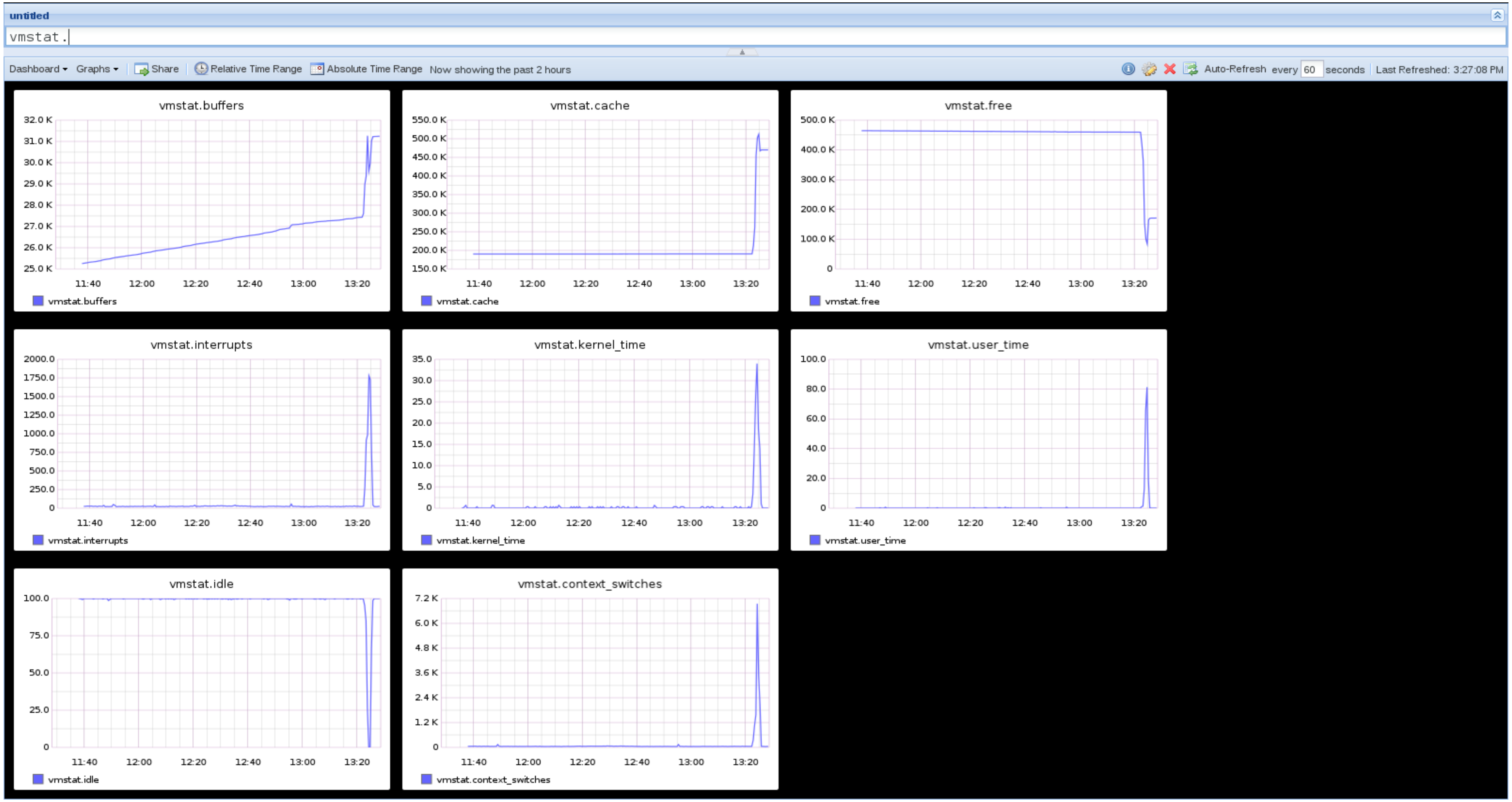
25% Locations 2384-94 9444

Language bindings in syslog-ng

- The primary language of syslog-ng is C:
  - High performance: processes a lot more EPS than interpreted languages
- Not everything is implemented in C
- Rapid prototyping is easier in interpreted languages
- Lua / Perl / Python / Java destinations, Lua monitoring source
  - Embedded interpreter
  - Message or full range of name value pairs can be passed

Monitoring source → Graphite

```
source s_monitor {
monitor(monitor-freq(5) monitor-func("vmstat")
monitor-script("/etc/syslog-ng/vmstat.lua") );
};
destination d_graphite {
tcp( "172.16.177.139" port(2003)
template("$(graphite-output --key vmstat.* )") );
};
log {source(s_monitor); destination(d_graphite); };
```



vmstat.

Now showing the past 2 hours

Auto-Refresh every 60 seconds

Last Refreshed: 3:27:08 PM

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Contextual Security Intelligence™

ElasticSearch through Java destination

- https://github.com/balabit/syslog-ng-incubator/tree/master/modules/java

```
destination d_local {
  java(
    class_path("/usr/lib/syslog-ng/3.6/elasticsearch.jar:/usr/share/elasticsearch/lib/elasticsearch-1.4.0.jar:/usr/share/elasticsearch/lib/lucene-core-4.10.2.jar")
    class_name("org.syslog_ng.destinations.ElasticSearch")
    template("$(format-json --scope rfc5424 --exclude DATE --key ISODATE)")
    option("cluster" "cl1")
    option("index" "syslog")
    option("type" "test")
    option("server" "192.168.1.104")
    option("port" "9300")
  );
};
```

Managing syslog-ng with Puppet

- modules for Puppet, Salt and Ansible
- Puppet is the most tested with thousands of machines
- https://github.com/ihrwein/puppet-syslog_ng
- Features:
  - Installs syslog-ng and sub-modules
  - Can configure syslog-ng with minimal limitations

Interactive syslog-ng

- See which path a log message takes inside syslog-ng
- Stop at break points
- Show current state of macros
- Built-in help and tab completion

- Initial commit in syslog-ng 3.7 (alpha)
- Feedback is very welcome!

Google Summer of Code

- Previous summers brought many new features to syslog-ng
- We hope to participate again this summer
- Babel Fish still needs some additional modules :)
- Many topics from beginner to advanced

- Check for details at: https://github.com/balabit/syslog-ng/wiki/GSoC2015

Questions? (and some answers)

- Questions?

- Some useful syslog-ng resources:
  - syslog-ng: http://syslog-ng.org/
  - ELSA (log analysis based on syslog-ng's patterndb): http://code.google.com/p/enterprise-log-search-and-archive/
  - Alerting: http://devops.com/features/guide-modern-monitoring-alerting/
  - Mailing list: https://lists.balabit.hu/pipermail/syslog-ng/
  - My blog: http://czanik.blogs.balabit.com/
  - My e-mail: czanik@balabit.hu

End

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