Logging Best Practices

"Logging that makes DevOps happy"

By Reid Morrison

Software Architect

Clarity Services, Inc.

Stock Rails

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  Rendered carts/_cart.html.erb (1.4ms)
Completed 200 OK in 18ms (Views: 15.4ms | ActiveRecord: 0.5ms)


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Many Servers

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Add context

```
2016-02-16 12:19:07.781921 I [26202:70288050797680] Rails -- Started GET "/" for 127.0.0.1 at 2016-02-16 12:19:07 -0500
2016-02-16 12:19:07.783712 I [26202:70288050797680] ActionController::Base -- Processing by StoreController#index as HTML
2016-02-16 12:19:07.784378 D [26202:70288050797680] ActiveRecord::Base --   Cart Load (0.1ms)  SELECT "carts".* FROM "carts" WHERE "carts"."id" = ? LIMIT 1  [["id", 9]]
2016-02-16 12:19:07.789272 D [26202:70288050797680] ActiveRecord::Base --   Product Load (0.2ms)  SELECT "products".* FROM "products" ORDER BY "products".updated_at DESC LIMIT 1
2016-02-16 12:19:07.789643 D [26202:70288050797680] ActiveRecord::Base --   Product Load (0.2ms)  SELECT "products".* FROM "products" ORDER BY "products".title ASC
2016-02-16 12:19:07.792261 I [26202:70288050797680] ActionView::Base --   Rendered store/index.html.haml within layouts/application (4.0ms)
2016-02-16 12:19:07.800406 D [26202:70288050797680] ActiveRecord::Base --   LineItem Exists (0.2ms)  SELECT 1 AS one FROM "line_items" WHERE "line_items"."cart_id" = ? LIMIT 1  [["
cart_id", 9]]
2016-02-16 12:19:07.801725 D [26202:70288050797680] ActiveRecord::Base --   LineItem Load (0.1ms)  SELECT "line_items".* FROM "line_items" WHERE "line_items"."cart_id" = ?  [["cart
_id", 9]]
2016-02-16 12:19:07.801787 I [26202:70288050797680] ActionView::Base --   Rendered collection (0.0ms)
2016-02-16 12:19:07.802581 I [26202:70288050797680] ActionView::Base --   Rendered carts/_cart.html.erb (1.2ms)
2016-02-16 12:19:07.802845 I [26202:70288050797680] ActionController::Base -- Completed 200 OK in 19ms (Views: 17.6ms | ActiveRecord: 0.7ms)
2016-02-16 12:19:07.839937 D [26202:70288050797680] Rails --
2016-02-16 12:19:07.839970 D [26202:70288050797680] Rails --
2016-02-16 12:19:07.840087 I [26202:70288050797680] Rails -- Started GET "/assets/application.css?body=1" for 127.0.0.1 at 2016-02-16 12:19:07 -0500
```

Best Practices – Appropriate Log Levels

```
# Verify correct log levels

logger.info 'Fatal error occurred'

logger.error 'Started processing normally'

logger.debug 'Important log message'
```

```
2016-02-18 03:11:11.333214 I [38464:Main] User -- Fatal error occurred
2016-02-18 03:11:11.334677 E [38464:Main (irb):64] User -- Started processing normally
2016-02-18 03:11:11.335967 D [38464:Main] User -- Important log message
```

Best Practices – Use Blocks

```
# Use blocks to prevent unnecessary evaluation

logger.debug do
  count = results.inject(0) {|sum, i| i+sum }
  "A total of #{count} were processed"
end
```

Best Practices – Measure Everything

```ruby
# Measure the duration of any block of code
count = logger.measure_info('Counting users') do

  User.where('created_at <= ?', date).count

end
```

```
2016-02-18 02:51:12.289139 I [38464:70242051291680] (314.7ms) Google -- Counting users
```

Best Practices – Elastic Logging

```
# Only log when the block takes longer than 50ms
value = logger.measure_warning(
  'Memcache call was slow',
  min_duration: 50
) do
  memcache.get('key')
end
```

Best Practices - Class specific loggers

```
class Supplier
  include SemanticLogger::Loggable

  def self.some_class_method
    logger.debug 'logger is accessible from class methods'
  end

  def call_supplier
    logger.debug 'logger is accessible from instance methods'
  end
end
```

```
Supplier.some_class_method
Supplier.new.call_supplier
```

```
2016-02-18 04:00:37.036910 D [38464:Main] Supplier -- logger is accessible from class methods
2016-02-18 04:00:37.039196 D [38464:Main] Supplier -- logger is accessible from instance methods
```

Best Practices - Tagging

```ruby
# Add tags to any block of code

logger.tagged('127.0.0.1', 'jbloggs') do
  logger.info 'Started processing normally'
  logger.debug 'Calling supplier'
  logger.trace 'Received Response', response
end
```

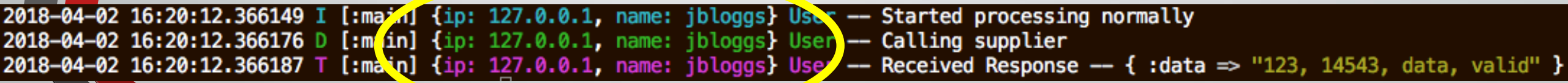
```
2016-02-18 03:08:34.134733 I [38464:Main] [127.0.0.1] [jbloggs] User -- Started processing normally
2016-02-18 03:08:34.134754 D [38464:Main] [127.0.0.1] [jbloggs] User -- Calling supplier
2016-02-18 03:08:34.134763 T [38464:Main] [127.0.0.1] [jbloggs] User -- Received Response -- "123, 14543, data, valid"
```

Best Practices - Tagging

```
# Add the ip-address and a tracking number to every Rails message:
config.log_tags = [
  :remote_ip,
  lambda do |request|
    request.headers["Tracking-Number"] = random_tracking_number
  end
]
```

Best Practices – Named Tagging

```
# Add named tags to any block of code

logger.tagged(ip: '127.0.0.1', name: 'jbloggs') do
  logger.info 'Started processing normally'
  logger.debug 'Calling supplier'
  logger.trace 'Received Response', data: response
end
```



Best Practices – Metric Only

```
# Metric only log event.
# Will not appear in text log file.
logger.error(
  metric:      'Filter/count',
  metric_amount: 15
)
```

Best Practices – Dimensions

```
# Currently only supported by SignalFx Appender.
# Will not appear in text log file.
logger.error(
  metric:      'Filter/count',
  metric_amount: 15,
  dimensions: { user: 'jbloggs' }
)
```

Best Practices – Trace level

```
# Log low level messages as trace
logger.trace('Received', raw_response)
```

Best Practices – Semantic Messages

```
logger.error("Oops external call failed, result: #{result}, reason_code:
#{reason_code}")
```

```
logger.error(
  "Oops external call failed",
  result:      :failed,
  reason_code: -10
)
```

```
2016-02-18 02:45:58.355975 E [38464:70242051291680 (irb):9] Google -- Oops external call failed - { :reason_code => -10, :result => :failed }
```

Best Practices – Name Threads

```
# Name different threads

Thread.current.name = 'Main'
logger = SemanticLogger['Job']
logger.info "Handing work to processing thread"

Thread.new do
  Thread.current.name = 'Pr
  logger = SemanticLogger['
  logger.info "Started proces
end
```

For threading:

Parallel Minion

```
2016-02-18 02:58:51.272253 I [38464:Main] Job -- Handing work to processing thread
2016-02-18 02:58:51.275849 I [38464:Processor] User -- Started processing
```

Best Practices – Log Rescued Exceptions

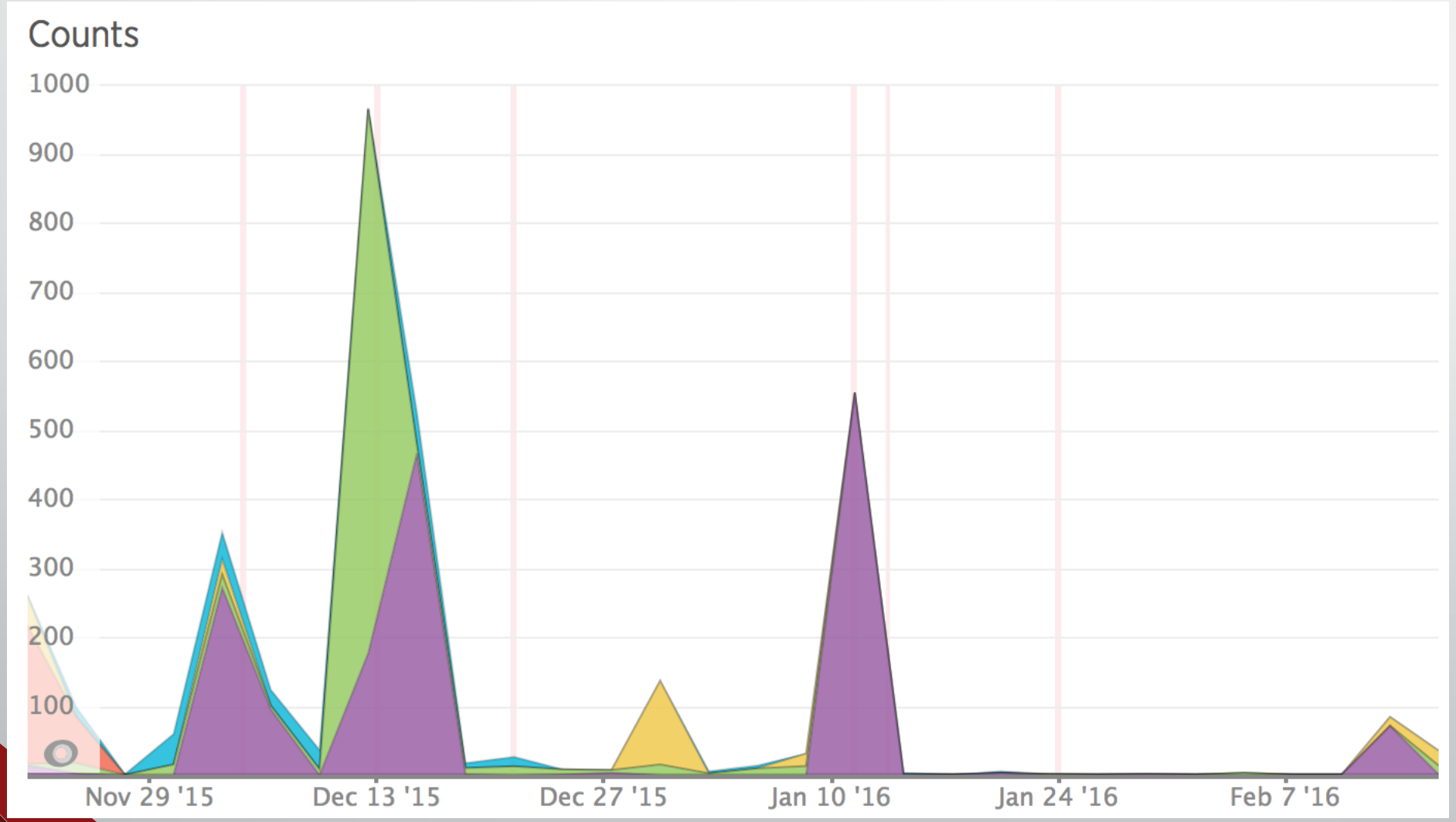
```ruby
# Log rescued exceptions
begin
  google.search('semantic logger')
rescue StandardError => exc
  logger.error 'Failed calling supplier', exc
  'No data available'
end
```

```
2016-02-18 04:16:24.377592 E [38464:Main (irb):122] User -- Failed calling supplier -- Exception: Timeout::Error: Timeout::Error
(irb):120:in `irb_binding'
/Users/rmorrison/.rvm/rubies/ruby-2.3.0/lib/ruby/2.3.0/irb/workspace.rb:87:in `eval'
/Users/rmorrison/.rvm/rubies/ruby-2.3.0/lib/ruby/2.3.0/irb/workspace.rb:87:in `evaluate'
/Users/rmorrison/.rvm/rubies/ruby-2.3.0/lib/ruby/2.3.0/irb/context.rb:380:in `evaluate'
/Users/rmorrison/.rvm/rubies/ruby-2.3.0/lib/ruby/2.3.0/irb.rb:489:in `block (2 levels) in eval_input'
```

Best Practices – Count Metrics

```
# Increment google search count metric

logger.info(
  message: 'Called Google',
  metric: ‘Google/search'
)
```

Best Practices - Dashboard for count based metrics

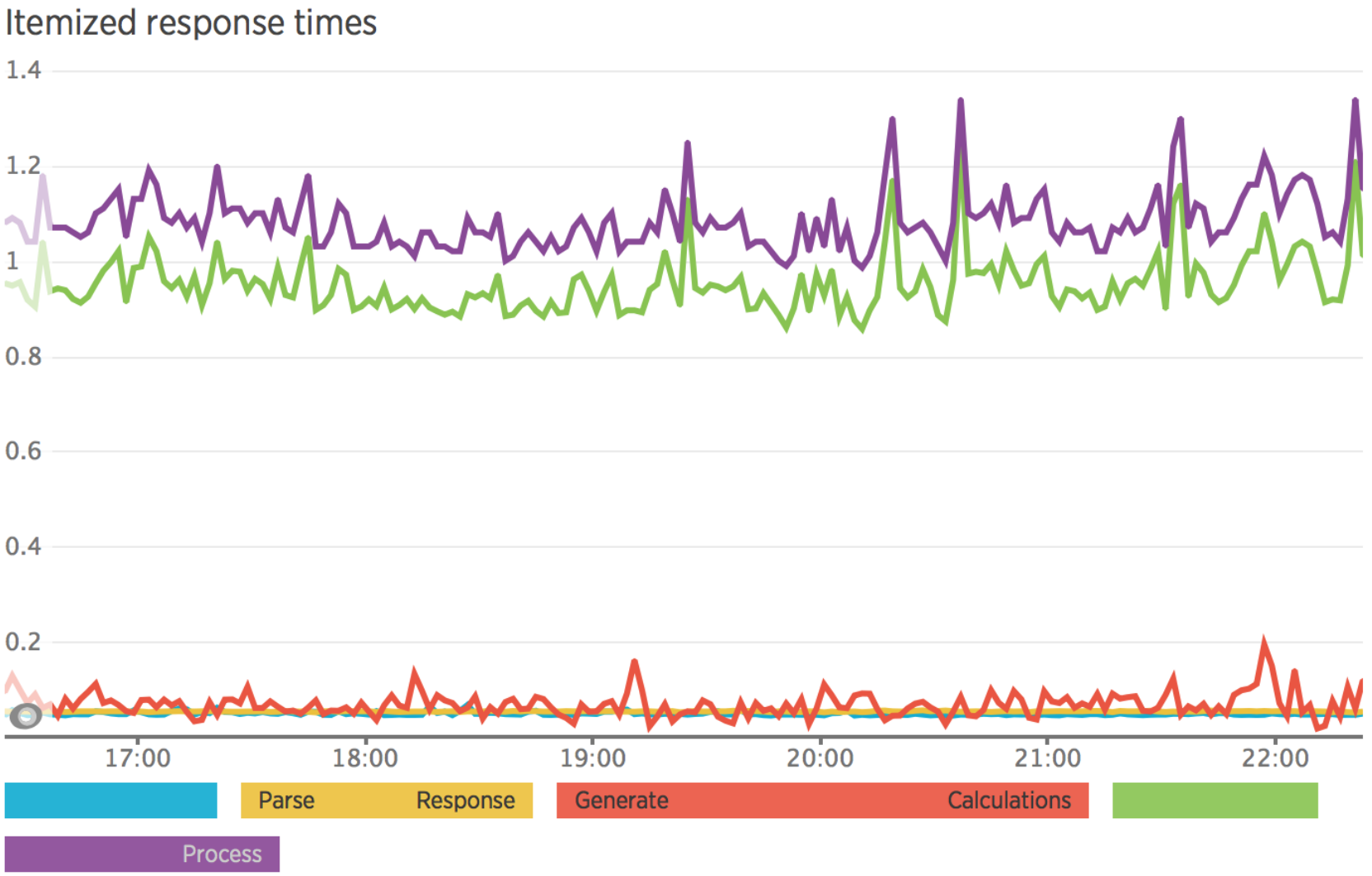


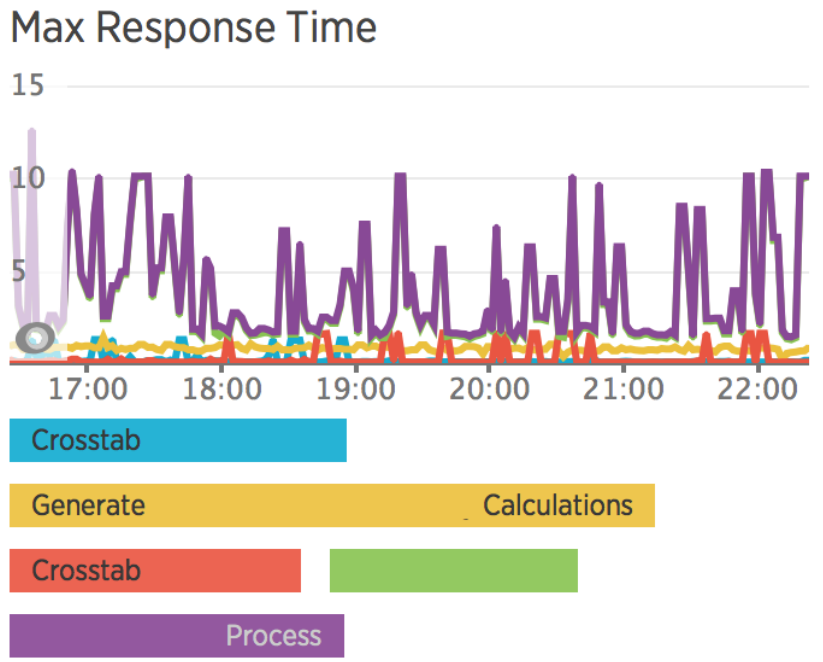
Best Practices – Duration Metrics

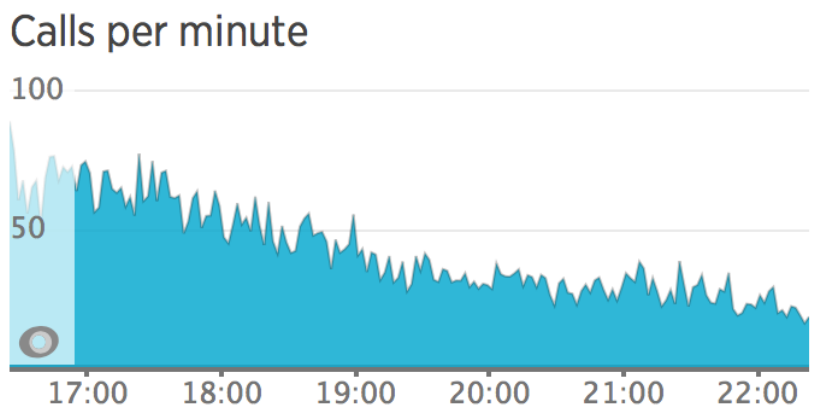
```
# Measure the duration of any block of code
count = logger.measure_info('Counting users',
    metric: 'User/count') do

  User.where('created_at <= ?', date).count

end
```

```
2016-02-18 02:51:12.289139 I [38464:70242051291680] (314.7ms) Google -- Counting users
```

Best Practices - Dashboard from duration Metrics





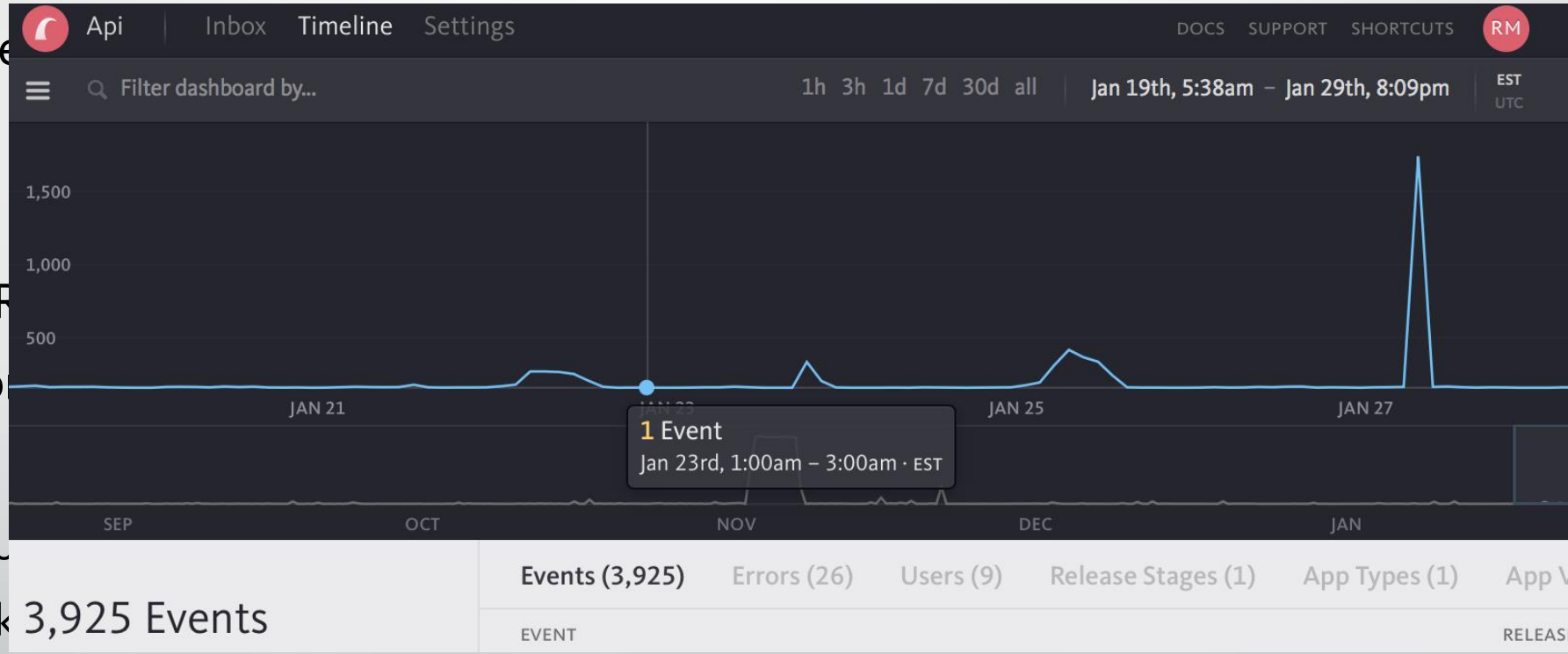


Best Practices - Log Filtering

```
# Configure sensitive parameters which will be filtered
# from the log file.

Rails.application.config.filter_parameters += [:password,
:social_security_number]
```

Best Practices – Centralized Exception & Error Management

- Services
  - Bugsnag
  - NewRelic
  - HoneyBadge
  - Etc…
- Features
  - Unhandled R
  - Log file erro
  - Alerting
    - First occu
    - Error spik



Best Practices – Centralized Logging

- Solutions
  - Elasticsearch & Kebana
  - Splunk
  - Graylog
  - Loggly
  - Logstash
  - MongoDB
  - Etc…
- Features
  - Search by any text keyword
    - Example: tracking number
  - Search by specific field
    - login = 'jbloggs'
  - Dashboards
  - Alerting

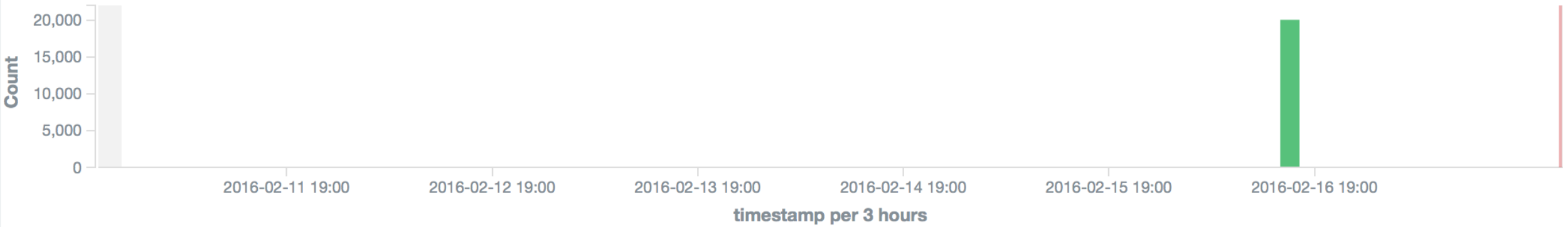
kibana

Discover | Visualize | Dashboard | Settings | Last 7 days

duration_ms:[0 TO 10000]

20,138 hits

February 10th 2016, 23:42:53.090 - February 17th 2016, 23:42:53.090 — by 3 hours



Time	duration	level	name	message
February 17th 2016, 11:50:10.628	0.644ms	info	RocketJob::Jobs::DirmonJob	Completed #perform
February 17th 2016, 11:45:10.362	1.153ms	info	RocketJob::Jobs::DirmonJob	Completed #perform
February 17th 2016, 11:40:10.067	1.078ms	info	RocketJob::Jobs::DirmonJob	Completed #perform
February 17th 2016, 11:35:09.502	1.491ms	info	RocketJob::Jobs::DirmonJob	Completed #perform
February 17th 2016, 11:30:08.848	0.912ms	info	RocketJob::Jobs::DirmonJob	Completed #perform
February 17th 2016, 11:25:08.155	0.855ms	info	RocketJob::Jobs::DirmonJob	Completed #perform

Logging Framework Should Support:

- Multiple processes.
- Multiple threads.
- Measure everything.
- Metrics.
- Centralized Logging.
- Concurrent destinations.
- Many log destinations.
- Appender Neutral.
- Class specific log levels.
- Runtime log level change.
- Capture Ruby thread dumps.
- Performance.
- Battle tested.
- Standalone: semantic_logger.
- Rails: rails_semantic_logger.
- Common API across other loggers.

Questions?

- Semantic Logger
  - http://rocketjob.github.io/semantic_logger/
- Feedback?
  - @reidmorrison
  - http://linkedin.com/in/reidmorrison
  - reid@rocketjob.io
- Support
  - https://gitter.im/rocketjob/support
  - github.com/rocketjob/semantic_logger
    - Star project on github
- Projects using Semantic Logger:
  - Rocket Job
  - Parallel Minion
  - Data Cleansing
  - JRuby JMS