Logisland

Event mining at scale

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Overview

Logisland

provides a stream analytics solution

that can handle all enterprise-scale

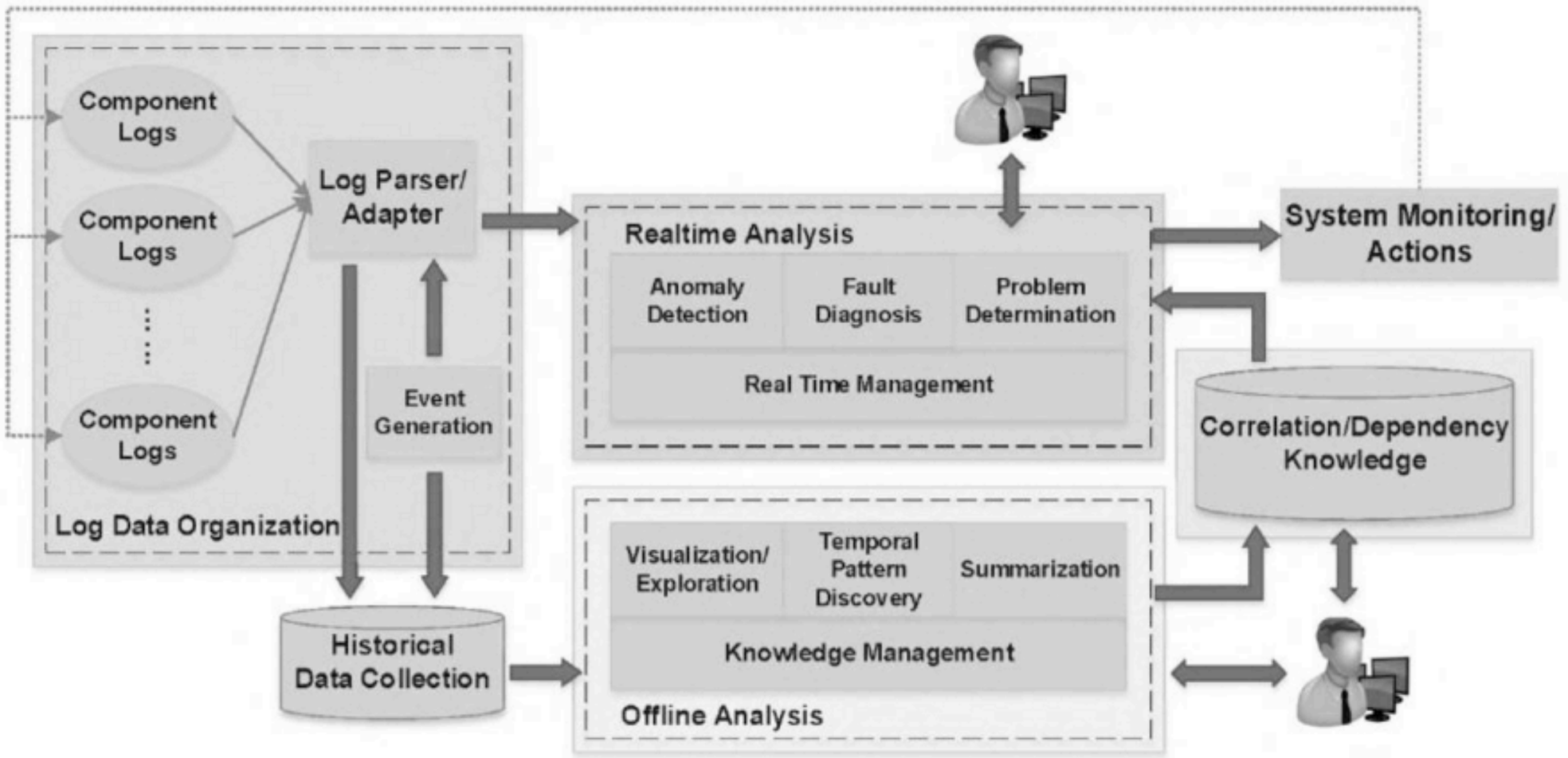
event data and processing

Big picture

- **Open source**, developed by Hurence, implemented at lfdj.fr
- **High scalability** and **Fault-tolerant**.
- **High throughput** (billions messages / day).
- **Easy** to operate on Hadoop or on standalone containers
- **Extensible framework** to build high level apps
- Alternative to Splunk, StreamAnalytix, ...

Purpose

- log mining
- complex event processing
- patterns finding
- reframing
- normalizing
- contextualizing


Component Logs
Component Logs
Component Logs
Log Parser/ Adapter
Event Generation
Log Data Organization
Historical Data Collection
Realtime Analysis
Anomaly Detection
Fault Diagnosis
Problem Determination
Real Time Management
System Monitoring/ Actions
Correlation/Dependency Knowledge
Visualization/ Exploration
Temporal Pattern Discovery
Summarization
Knowledge Management
Offline Analysis

Why ?

- lot of historical code with elasticsearch, **Pig**, **Mahout** before **Spark** & **Kafka**
- **ELK** is great to start, but hard to centralize processing and lacks of offline ML
- **Splunk** is fantastic but clients are not rich enough to afford it ;)
- **NIFI** is a great tool but doesn't play well with distributed processing
- **Metron**, **Eagle** are too security centric

Features

- out-of-the-box processors (no code required)
- raw data to structured records conversion
- store to HDFS for offline analysis
- records indexation for realtime search
- alert percolation or query matching

Features 2

- high level extensible framework
- stream governance with Avro schema management
- SQL aggregations
- Time series sampling
- Outliers detection
- Network footprint clustering

Paradigm

Logisland continously transforms

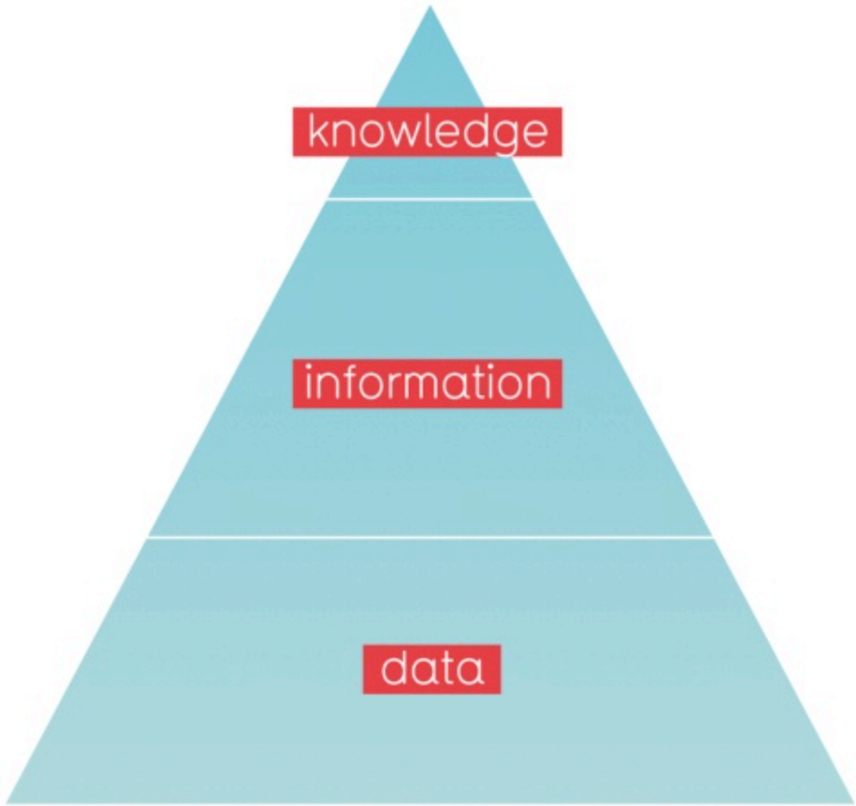
data into information &

information into knowledge

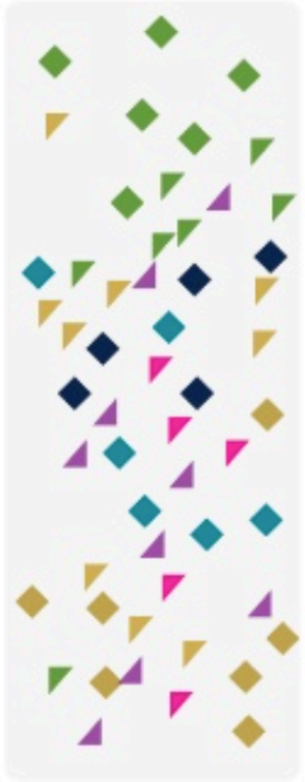
by using asynchronous processing on

increasingly abstract

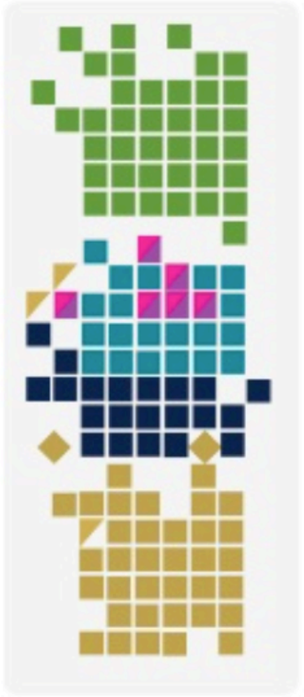
and meaningfull records.



data

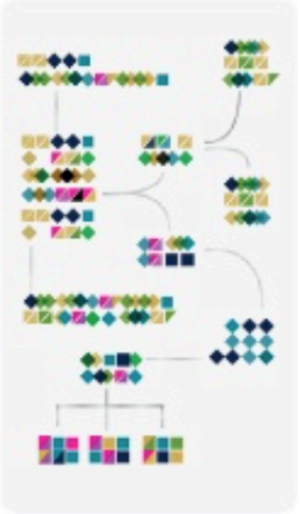


structured
data



information

linked
information



knowledge

inter-connected
knowledge

La française des jeux sample

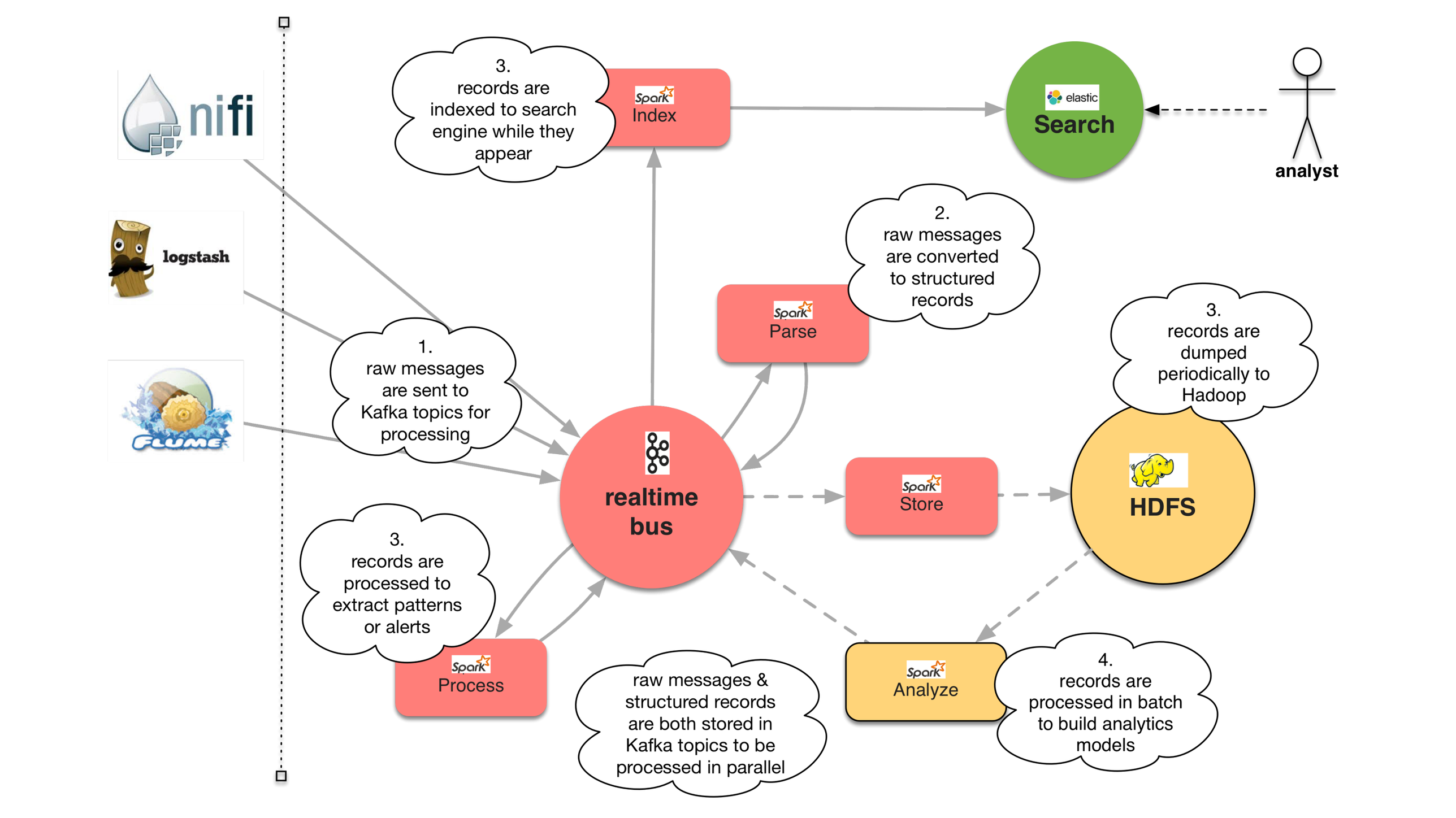
Example of one production cluster

- 5 brokers
- 2000 partitions (replication factor 3)
- 100 000 msg/s

Use cases

- **Log aggregation** : low latency processing over mutliple log datasources
- **Stream processing** : multiple stages of processing (enriching, ...)
- **Complex Event processing** : write custom business Rules to generate alerts, for fraud detection
- **click stream tracking** : capture user click stream data
- **SIEM** : security manager for intrusion detection
- **IoT** : generate alerts based on outliers and forcasting.

Design


nifi
logstash
FLUME
1.
raw messages
are sent to
Kafka topics for
processing
3.
records are
indexed to search
engine while they
appear
Spark
Index
elastic
Search
analyst
2.
raw messages
are converted
to structured
records
Spark
Parse
realtime
bus
Spark
Store
3.
records are
dumped
periodically to
Hadoop
HDFS
3.
records are
processed to
extract patterns
or alerts
Spark
Process
raw messages &
structured records
are both stored in
Kafka topics to be
processed in parallel
Spark
Analyze
4.
records are
processed in batch
to build analytics
models

Record

The basic unit of processing is the Record.
A `Record` is a collection of `Field`, while a `Field` has a `name`, a `type` and a `value`.

```
String id = "firewall_record1";
String type = "cisco";
Record record = new Record(type).setId(id);

assertTrue(record.isEmpty());
assertEquals(record.size(), 0);
```

A record is defined by its type and a collection of fields.
There are three special fields:

```
// shortcut for id
assertEquals(record.getId(), id);
assertEquals(record.getField(FieldDictionary.RECORD_ID).asString(), id);

// shortcut for time
assertEquals(record.getTime().getTime(),
    record.getField(FieldDictionary.RECORD_TIME).asLong().longValue());

// shortcut for type
assertEquals(record.getType(), type);
```

And the *standard* fields have generic setters, getters and removers

```
record.setStringField("url_host", "origin-www.20minutes.fr")
      .setField("method", FieldType.STRING, "GET")
      .setField("response_size", FieldType.INT, 452)
      .setField("is_outside_office_hours", FieldType.BOOLEAN, false)
      .setField("tags",
                FieldType.ARRAY,
                Arrays.asList("spam", "filter", "mail"));

assertEquals(record.getField("method").asString(), "GET");
assertTrue(record.getField("response_size").asInteger() - 452 == 0);
record.removeField("is_outside_office_hours");
assertFalse(record.hasField("is_outside_office_hours"));
```

Fields are strongly typed, you can validate them

```
Record record = new StandardRecord();
record.setField("request_size", FieldType.INT, 1399);
assertTrue(record.isValid());

record.setField("request_size", FieldType.INT, "zer");
assertFalse(record.isValid());

record.setField("request_size", FieldType.DOUBLE, 45.5d);
assertTrue(record.isValid());

record.setField("request_size", FieldType.STRING, 45L);
assertFalse(record.isValid());
```

Processor

Logisland is a component centric framework,

It's built over an abstraction layer to build configurable components.

A component can be `Configurable` and `Configured`.

The most common component you'll use is the `Processor` which takes a collection of `Record` and publish another collection of records

```
public interface Processor extends ConfigurableComponent {

    /**
     * Setup stateful parameters
     */
    void init(final ProcessContext context);

    /**
     * Process the incoming collection of records to
     * generate a new collection of records
     */
    Collection<Record> process(ProcessContext context,
                               Collection<Record> records);
}
```

Sample Processor config

```
- processor: apache_parser
  component: com.hurence.logisland.processor.SplitText
  type: parser
  documentation: a parser for apache log REGEX
  configuration:
    record.type: apache_log
    value.regex: (\S+)\s+(\S+)\s+(\S+)\s+\[([\w:\/] ...
    value.fields: src_ip,identd,user,record_time,http_method, ...
```

Stream

a record `Stream` basically :

- reads a distributed collection of `Record` from Kafka input topics
- transmits them to a chain of `Processor`
- write the output collection of `Record` to some Kafka output topics

```
public interface RecordStream extends ConfigurableComponent {

    /**
     * start the stream processing
     */
    void start();

    /**
     * stop the stream processing
     */
    void stop();
}
```

Streaming paradigm

You can handle partionned data in 2 ways :

- **fully in parrallel**, eg. a thread by partition, like with `KafkaRecordStreamParallelProcessing`, when records have no link with each other
- by **joining partitions** like with `KafkaRecordStreamSQLAggregator` or `KafkaRecordStreamHDFSBurner` when you need to join related records (costly join and shuffling operations)

Sample Stream configuration

```
- stream: parsing_stream
  component: com.hurence.logisland.stream.spark.KafkaRecordStreamParallelProcessing
  type: stream
  documentation: a processor that links
  configuration:
    kafka.input.topics: logisland_raw
    kafka.output.topics: logisland_events
    kafka.error.topics: logisland_errors
    kafka.input.topics.serializer: none
    kafka.output.topics.serializer: com.hurence.logisland.serializer.KryoSerializer
    kafka.error.topics.serializer: com.hurence.logisland.serializer.JsonSerializer
    ...
  processorConfigurations:
```

Engine

The `Engine` manage a collection of `Stream`

this is the abstraction of the execution model, mainly in Spark actually but plans are to integrate Beam to move on Storm and Kafka Streams

you configure here your Spark job parameters

```
/**
 * Carry the whole workload of processing
 */
public interface ProcessingEngine extends ConfigurableComponent {

    /**
     * start the engine with a context
     *
     * @param engineContext
     */
    void start(EngineContext engineContext);

    /**
     * shutdown the engine with a context
     * @param engineContext
     */
    void shutdown(EngineContext engineContext);

}
```

Sample engine configuration

```
engine:
  component: com.hurence.logisland.engine.spark.KafkaStreamProcessingEngine
  type: engine
  documentation: Index some apache logs with logisland
  configuration:
    spark.app.name: IndexApacheLogsDemo
    spark.master: yarn-cluster
    spark.driver.memory: 1G
    spark.driver.cores: 1
    spark.executor.memory: 2G
    spark.executor.instances: 4
    spark.executor.cores: 2
    spark.yarn.queue: default
    ...
  streamConfigurations:
```

quick start

Getting started (Hadoop cluster)

Download the latest release from github

```
tar -xzf logisland-0.9.7-bin.tar.gz
```

Create a job configuration

```
vim conf/index-apache-logs.yml
```

Run the job

```
export SPARK_HOME=/usr/hdp/current/spark-client
bin/logisland.sh --conf conf/index-apache-logs.yml
```

Getting started (lightweight container)

Pull & run the image from Docker Repository

```
docker pull hurence/logisland
docker run  -it --name logisland \
    -p 8080:8080 -p 5601:5601 -p 9200:9200 \
    -h sandbox  hurence/logisland bash
```

Run the job

```
bin/logisland.sh --conf conf/index-apache-logs.yml
```

Step 4 : Play with your data

Next ?

Roadmap

- Ambari Agent for job dynamic interaction (REST Api)
- visual Stream configuration / dashboards through Ambari views
- Auto-scaling to optimize cluster resources
- Density based automatic Usage profiling
- Pattern discovery through Deep Learning
- App store, per use-case knowledge bundles (cybersecurity, fraud, ...)

Resources

- **source** : https://github.com/Hurence/logisland/releases
- **Docker** : https://hub.docker.com/r/hurence/logisland/tags/
- **Maven** : https://search.maven.org/#search%7Cga%7C1%7Clogisland
- **Documentation** : http://logisland.readthedocs.io/en/latest/concepts.html
- **support** : https://gitter.im/logisland/logisland
- **contact** : thomas.bailet@hurence.com

Questions ?

hurence