Operations

Waterdrop

— 非常易用，高性能的实时、离线数据处理产品

InterestingLab

2018年9月

https://github.com/InterestingLab/waterdrop

个人介绍

Operations

sina新浪

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- 大数据研发工程师
- 新浪运维中心 - 数据分析平台
- 主要负责数据实时处理以及数据平台开发

关于我们

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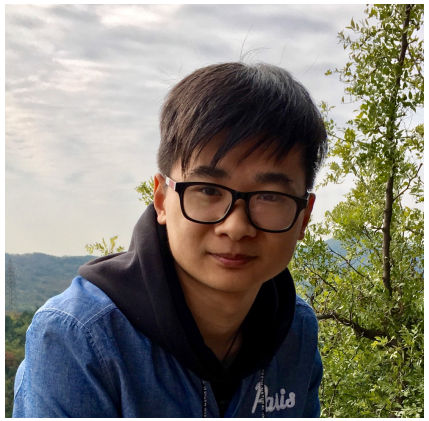
@ Gary Gao	@ Ricky Huo	@ Kevin Xu	@ Kid Xiong
			
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数据平台架构演进

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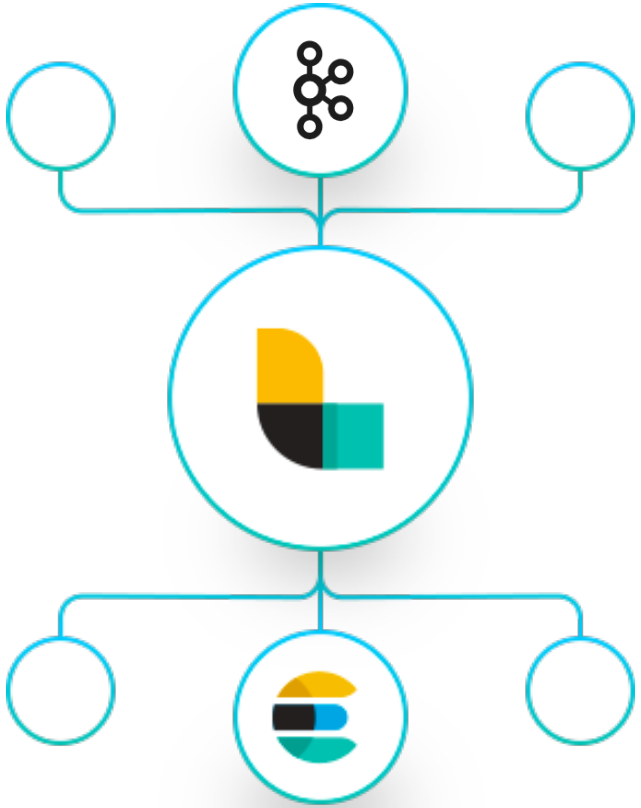
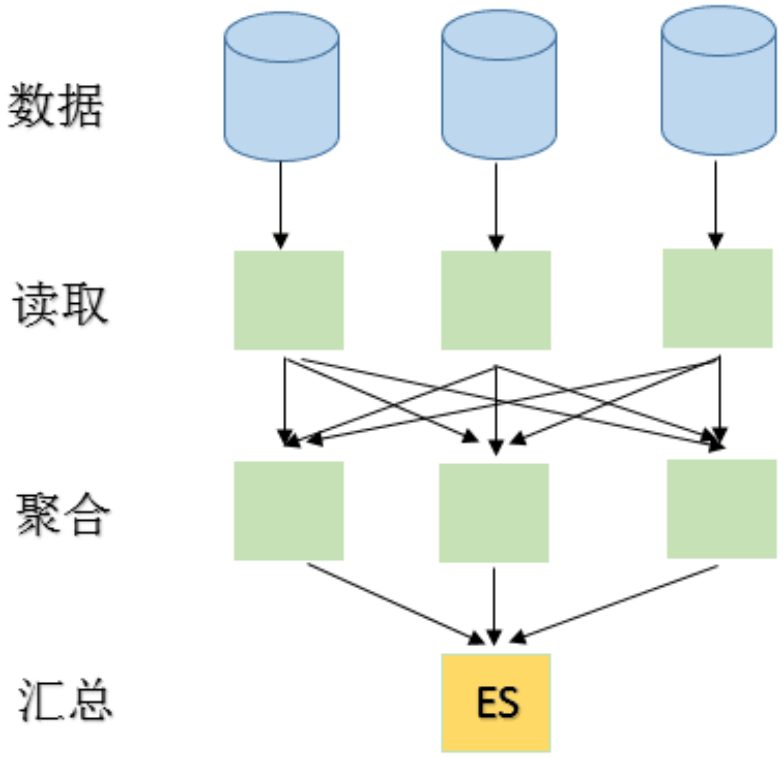
V1（Logstash）



V1遇到的线上挑战

红包飞服务质量监控

- 日志量大
- 多维分析
- 资源有限
- 宏观指标



V2（Logstash+Spark）

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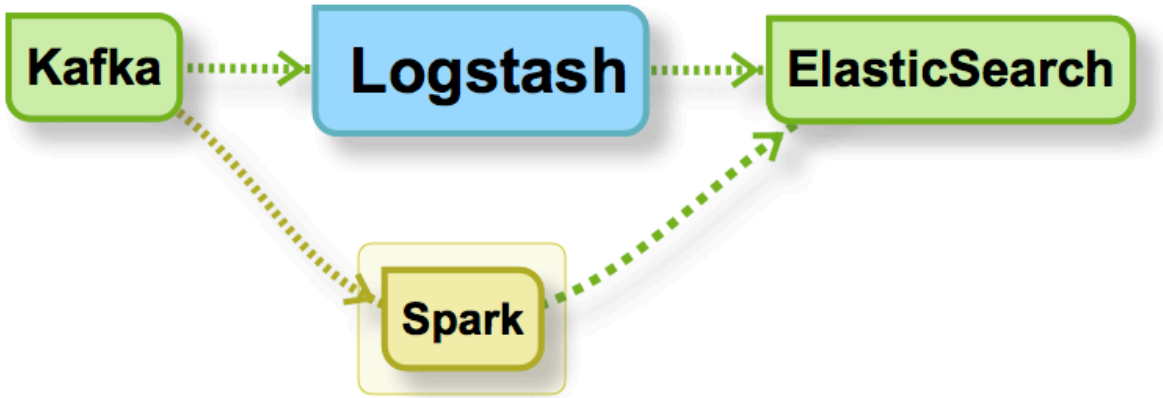

Spark的引入带来的问题

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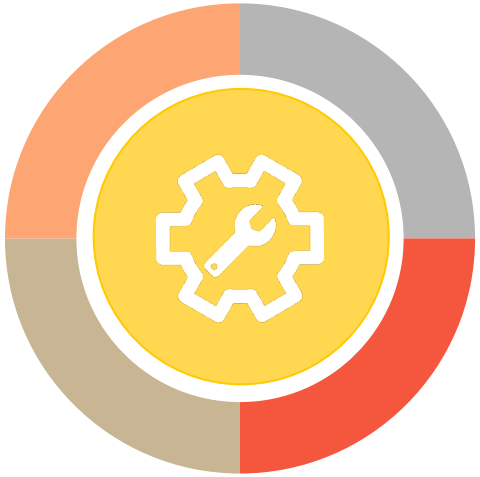
学习成本

启动一个Spark应用需要熟悉Spark提供的方法，了解常用的优化手段，才能完成一个高效的应用。

任务繁重，如何快速上线

随着业务和需求的增长，如何在有限的人力成本下快速地提供稳定且高效的数据处理服务



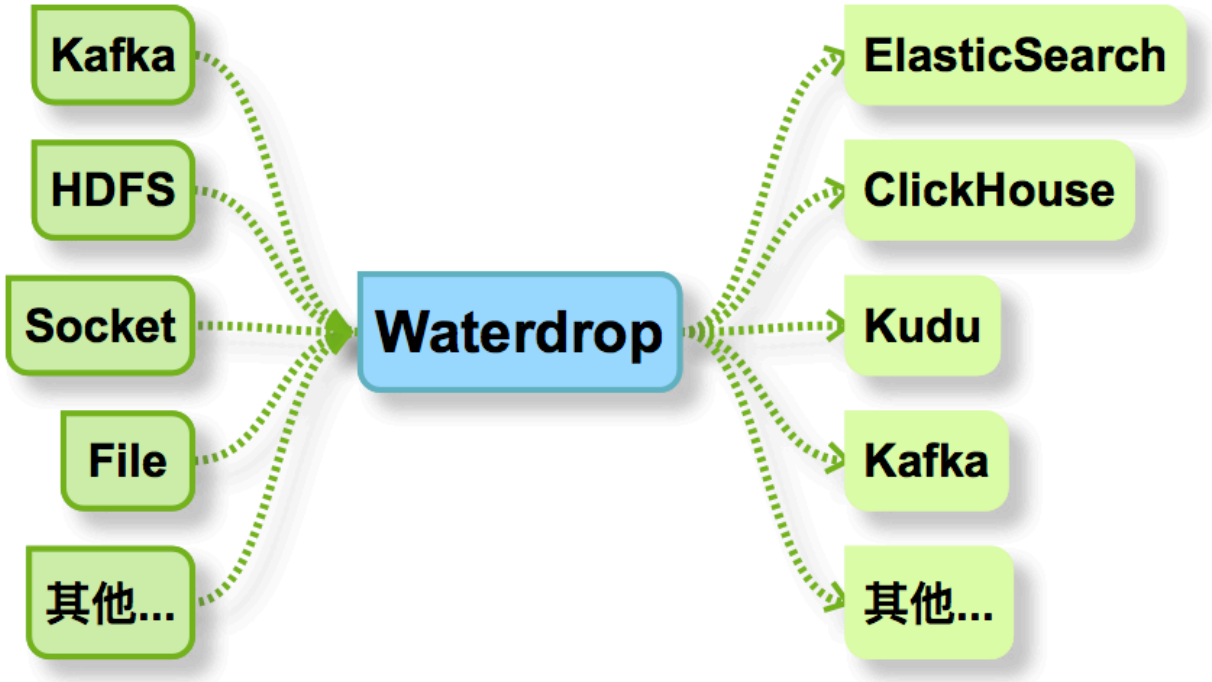
太多重复代码

每个人都有自己的编码习惯，每个人对接的业务需求不同。导致项目代码难以管理且难以复用。

线上应用的管理

应用的管理和监控给运维人员造成了不小的困扰。

V3（Waterdrop）



什么是Waterdrop

02

什么是Waterdrop

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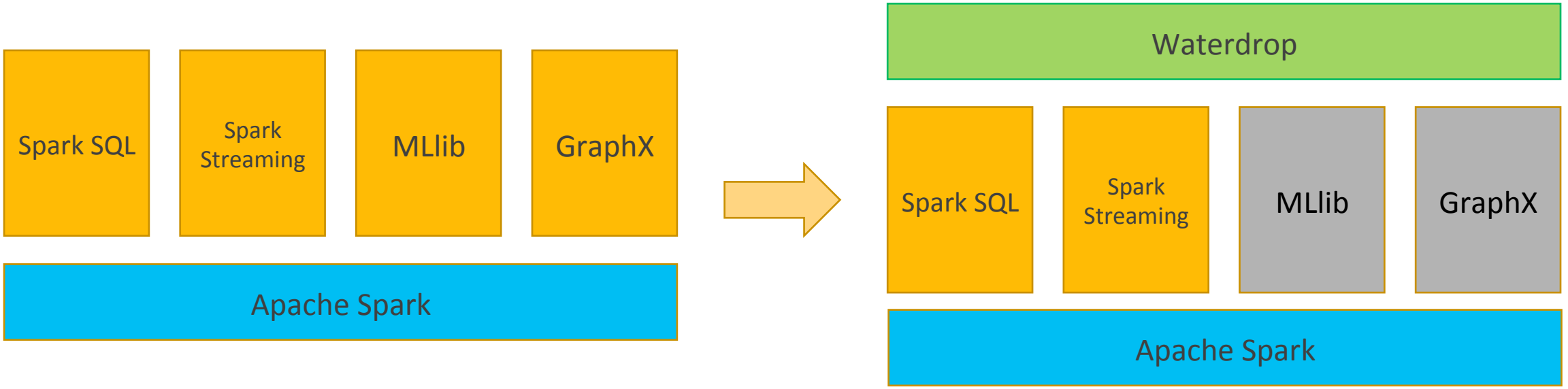
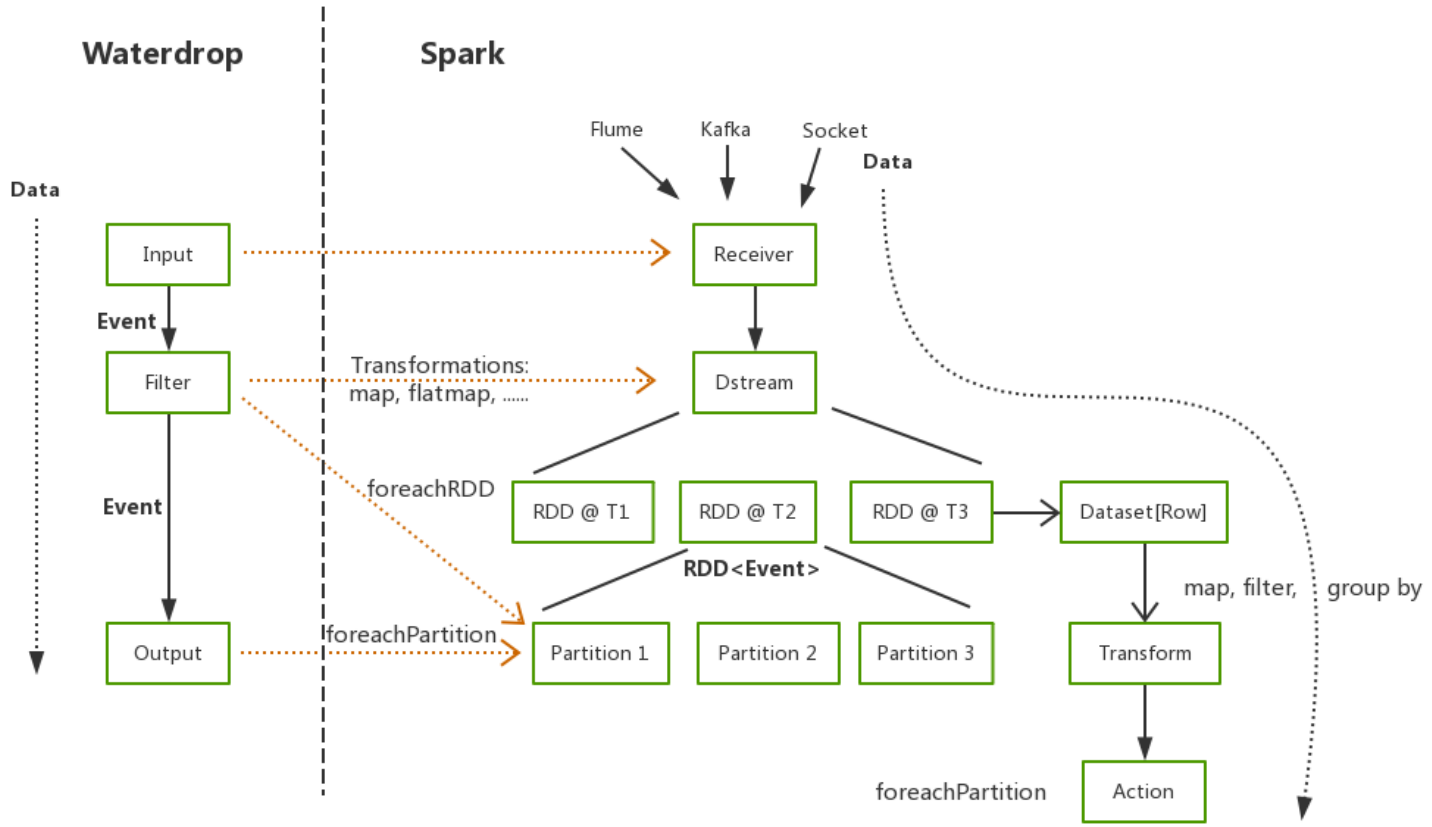
Waterdrop是一个非常易用、高性能，能够应对海量数据的数据处理产品，构建于Apache Spark之上



Waterdrop 架构



整个架构主要由三部分组成：

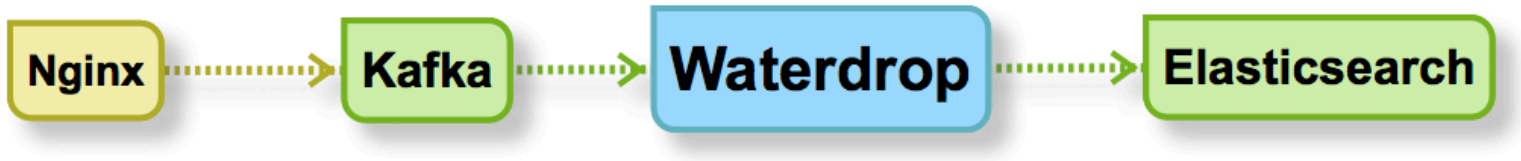
1. Input
2. Filter
3. Output

多个Filter构建了数据处理的Pipeline，满足各种各样的数据处理需求。

Waterdrop 使用场景

03

场景1：Nginx日志入Elasticsearch



Logstash实现

Operations 新浪

```
input {
    kafka {
        topics => ["waterdrop_nginx_demo"]
        bootstrap_servers => ["localhost:9092"]
        group_id => "logstash_nginx_demo"
        auto_offset_reset => "latest"
    }
}
filter {
    grok {
        match => {
            message => "%{IP:ha_ip}\\s%{NOTSPACE:domain}\\s%{IP:remote_addr}\\s%{NUMBER:request_time}s\\s\"%
{DATA:upstream_ip}\"\\s\\[%{HTTPDATE:datetime}\\]\\s\"%{NOTSPACE:method}\\s%{DATA:url}\\s%
{NOTSPACE:http_ver}\"\\s%{NUMBER:status}\\s%{NUMBER:body_bytes_send}\\s%{DATA:referer}\\s%
{NOTSPACE:cookie_info}\\s\"%{DATA:user_agent}\"\\s%{DATA:uid}\\s%{DATA:session_id}\\s\"%{DATA:pool}\"\\s%
{DATA:city_code}\\s%{DATA:tag3}\\s\"%{DATA:tag4}\""
        }
    }
    date {
        match => ["datetime", "dd/MMM/yyyy:HH:mm:ss Z"]
    }
}
output {
    elasticsearch {
        hosts => ["localhost:9200"]
    }
}
```

Waterdrop实现

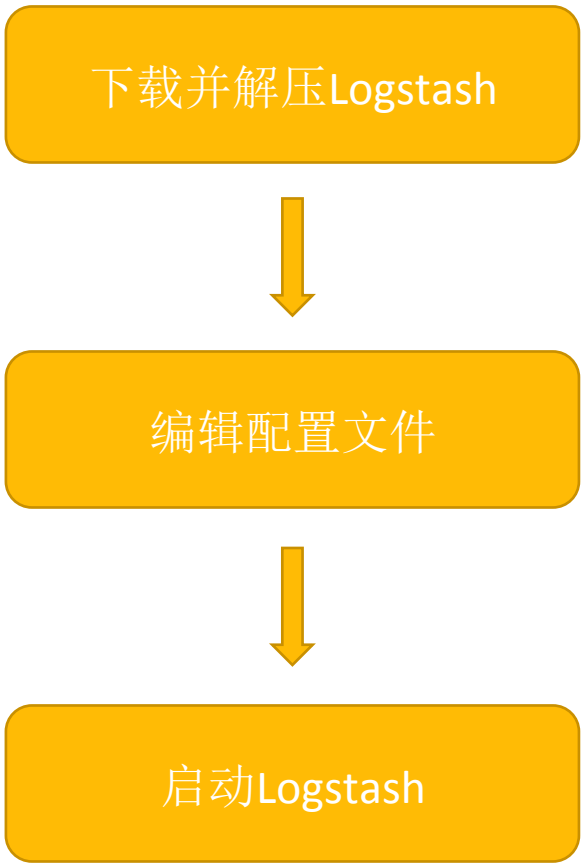
Operations 新浪

```
input {
    kafkaStream {
        topics = "waterdrop_nginx_demo"
        consumer.bootstrap_servers = "localhost:9092"
        consumer.zookeeper.connect = "localhost:2181"
        consumer.group.id = "logstash_nginx_demo"
    }
}
filter {
    grok {
        source_field = "raw_message"
        pattern = "%{IP:ha_ip}\\s%{NOTSPACE:domain}\\s%{IP:remote_addr}\\s%{NUMBER:request_time}s\\s\"%
{DATA:upstream_ip}\"\\s\\[%{HTTPDATE:datetime}\\]\\s\"%{NOTSPACE:method}\\s%{DATA:url}\\s%
{NOTSPACE:http_ver}\"\\s%{NUMBER:status}\\s%{NUMBER:body_bytes_send}\\s%{DATA:referer}\\s%
{NOTSPACE:cookie_info}\\s\"%{DATA:user_agent}\"\\s%{DATA:uid}\\s%{DATA:session_id}\\s\"%{DATA:pool}\"\\s%
{DATA:city_code}\\s%{DATA:tag3}\\s\"%{DATA:tag4}\""
        }
    }
    date {
        "source_field" = "datetime"
        "target_field" = "timestamp"
        "source_field_format" = "dd/MMM/yyyy:HH:mm:ss Z"
        "target_field_format" = "yyyy/MM/dd HH:mm:ss"
    }
}
output {
    elasticsearch {
        hosts = ["localhost:9200"]
        index = ["waterdrop"]
    }
}
```

Waterdrop 部署方式

Operations

Logstash



Waterdrop

https://interestinglab.github.io/waterdrop/#/zh-cn/quick-start

场景2：聚合指标入ElasticSearch

数据聚合需求

1. 统计每个域名在每个机房的各状态码访问情况（使用Waterdrop的SQL插件）

```
sql {
    table = “nginx_info”
    sql = “select count(1)  as count, status, idc, domain, datetime from nginx_info group by domain, status, datetime, idc”
}
```

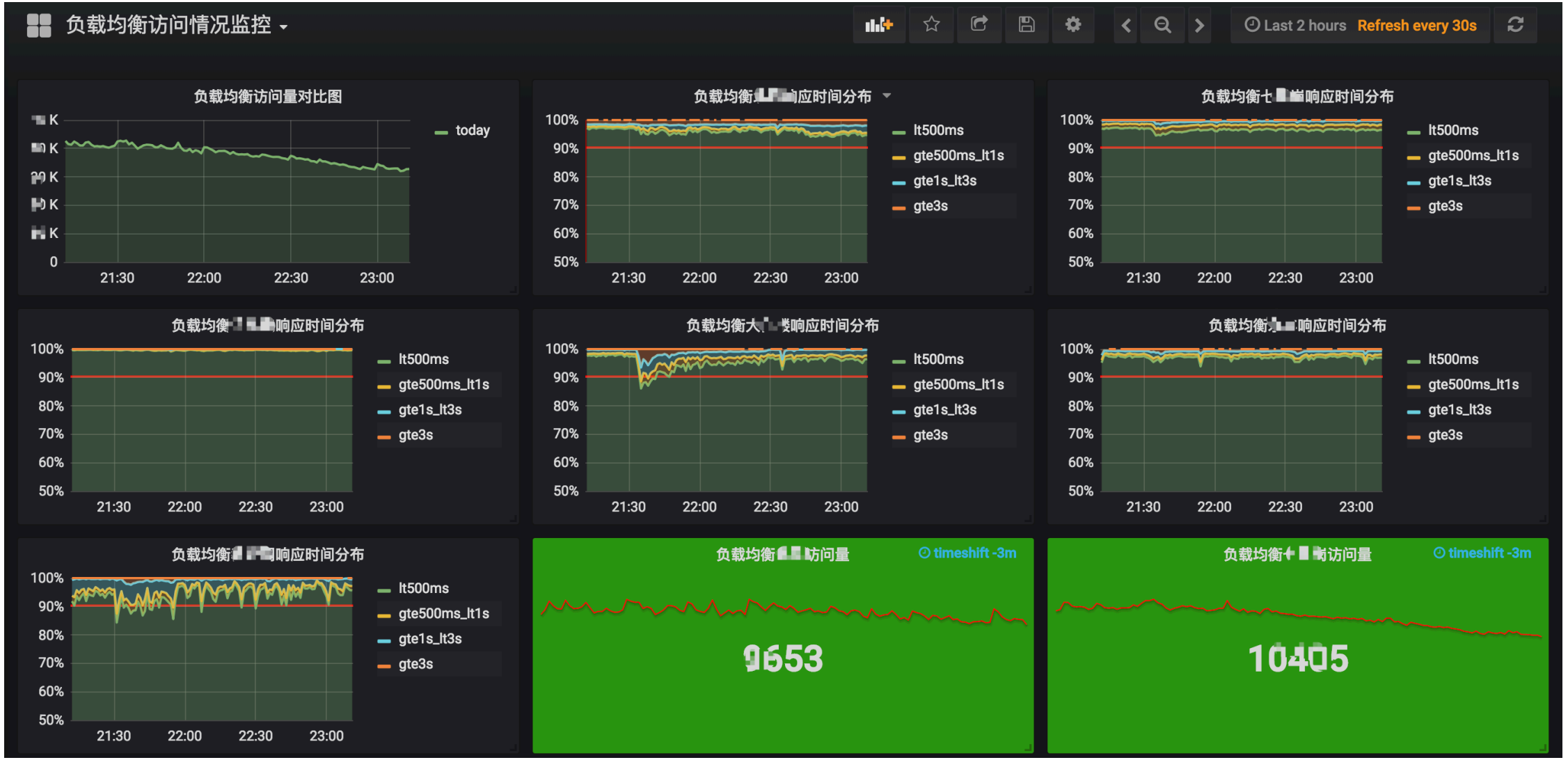
2. 统计每个域名在每个机房的各响应时间段的次数（使用Waterdrop的SQL插件）

```
sql {
    table = “nginx_info”
    sql = “select sum(int(request_time < 0.03)) as lt30, sum(int((request_time >= 0.03) AND (request_time < 0.1)))  as lt100, sum(int(request_time >= 0.1)) as gt100, domain, idc, datetime from nginx_info group by domain, idc, datetime”
}
```

聚合结果展示

Operations 新浪

聚合结果展示


负载均衡访问情况监控
Last 2 hours
Refresh every 30s
负载均衡访问量对比图
today
21:30
22:00
22:30
23:00
lt500ms
gte500ms_lt1s
gte1s_lt3s
gte3s
timeshift -3m
9653
10405

Why SQL

Operations

1. SQL简单易用

2. 提供基于SQL的ETL

- select int(status) from nginx_info …
- select to_date(datetime, 'yyyy-MM-dd’) from nginx_info …
- select * from nginx_info where domain = ‘sina.com.cn’ …

3. 提供基于SQL数据聚合

- select count(1) as c, status, idc, domain, datetime from nginx_info group by domain, status, datetime, idc

场景3：高度定制化场景

Waterdrop部分插件列表

Operations

新浪

Input

- File
- HDFS
- Kafka
- Socket
- S3
- ...

01

Filter

- SQL
- JSON
- Grok
- Sample
- Replace
- ...

02

Output

- Elasticsearch
- Kafka
- HDFS
- ClickHouse
- MySQL
- ...

03

https://interestinglab.github.io/waterdrop/#/zh-cn/

反抓站

针对实时数据，定期聚合数据，提取特征判断抓站行为

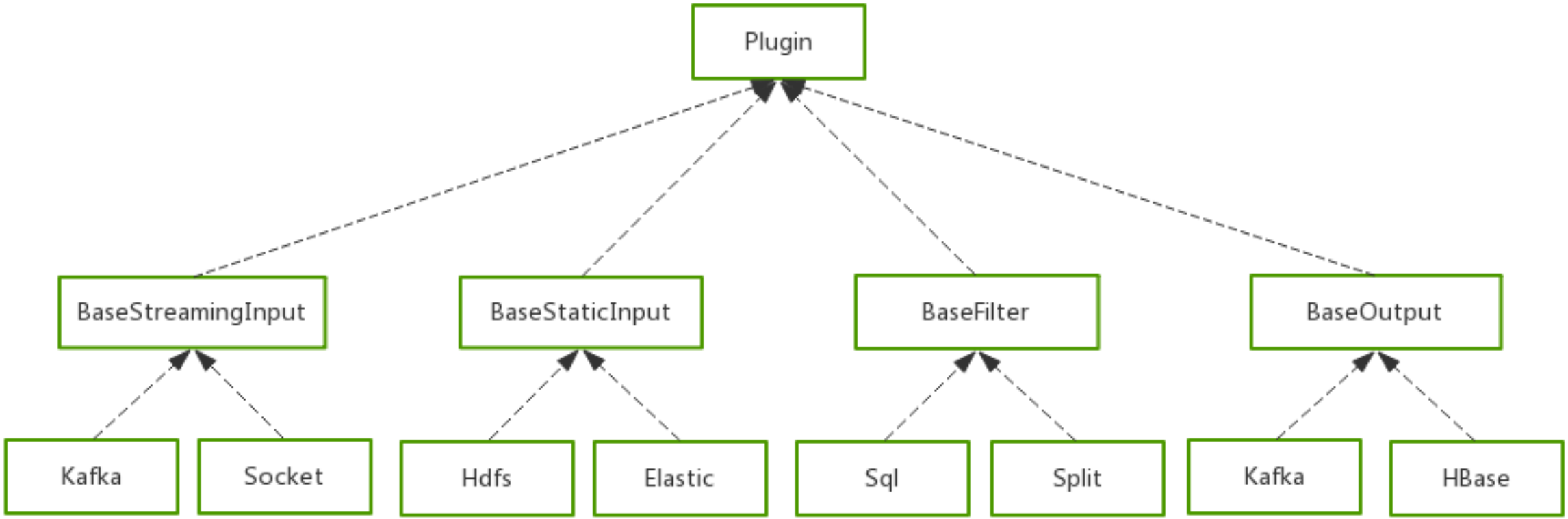
安全部门

- 不了解大规模数据实时处理方案
- 学习Spark并投入使用具有一定成本

数据平台

- 不了解抓站特征提取机制
- 应用从测试到上线需要不断调试

Waterdrop 插件体系



BaseFilter

Operations sina新浪

```scala
abstract class BaseFilter extends Plugin {

  def process(spark: SparkSession, df: Dataset[Row]): Dataset[Row]

  /**
   * Allow to register user defined UDFs
   * @return empty list if there is no UDFs to be registered
   * */
  def getUdfList(): List[(String, UserDefinedFunction)] = List.empty

  /**
   * Allow to register user defined UDAFs
   * @return empty list if there is no UDAFs to be registered
   * */
  def getUdafList(): List[(String, UserDefinedAggregateFunction)] = List.empty
}
```

Substring实现

```
org.interestinglab.waterdrop.filter.ScalaSubstring {
    source_field = "message"
    target_field = "sub"
    pos = 1
    len = 3
}
```

获取配置中的变量

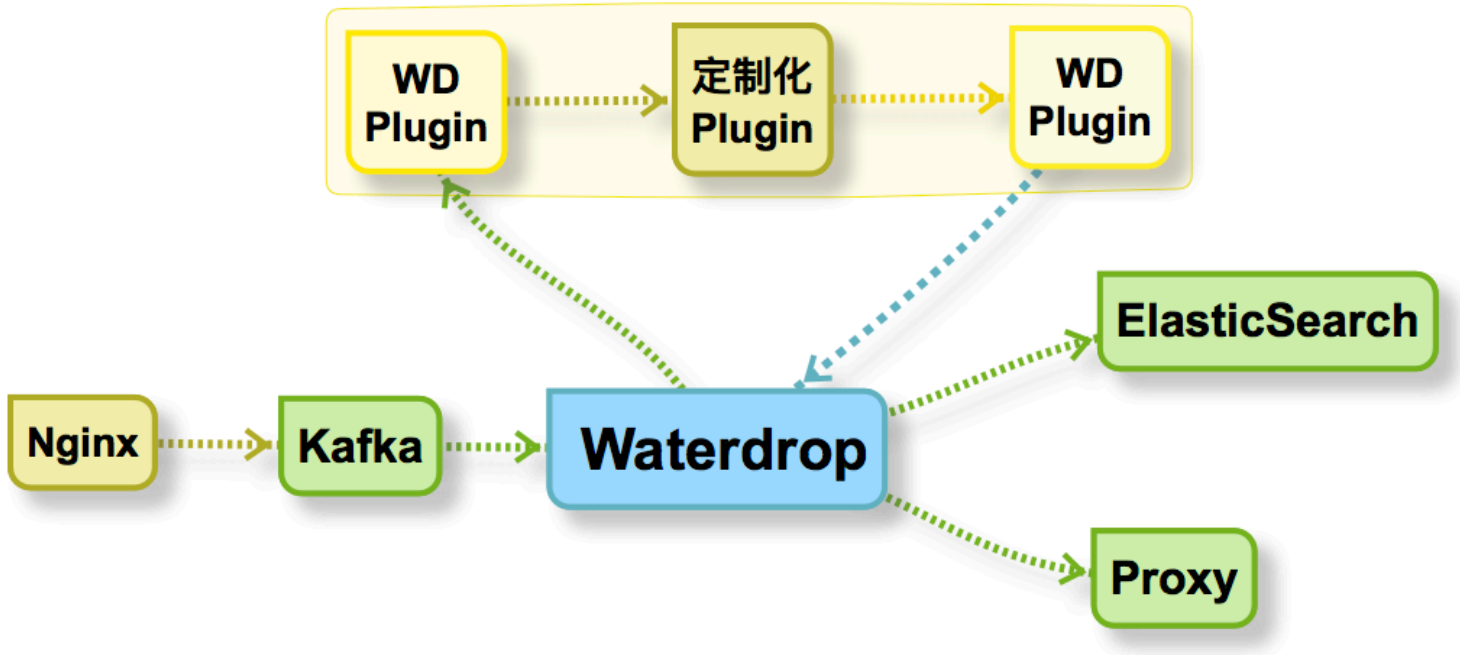
自定义方法（UDF）

应用到每一条数据

```
override def process(spark: SparkSession, df: Dataset[Row]): Dataset[Row] = {

  val srcField = config.getString("source_field")
  val targetField = config.getString("target_field")
  val pos = config.getInt("pos")
  val len = config.getInt("len")

  val func = udf((s: String) => s.substring(pos, pos+len))

  df.withColumn(targetField, func(col(srcField)))
}
```

更多插件使用方法参照：https://github.com/InterestingLab/waterdrop-example

反抓站与插件体系


WD Plugin
定制化 Plugin
WD Plugin
ElasticSearch
Nginx
Kafka
Waterdrop
Proxy

场景4：离线处理场景

实时离线统一融合

Operations 新浪

Streaming Input

```
input {
  kafkaStream {
    topics = "waterdrop"
    consumer.bootstrap.servers = "localhost:9092"
    consumer.zookeeper.connect = "localhost:2181"
    consumer.group.id = "waterdrop_group"
  }
}
```

Static Input

```
input {
  hdfs {
    path = "hdfs://m2.8022/waterdrop-logs/access.log"
    format = "json"
  }
}
```

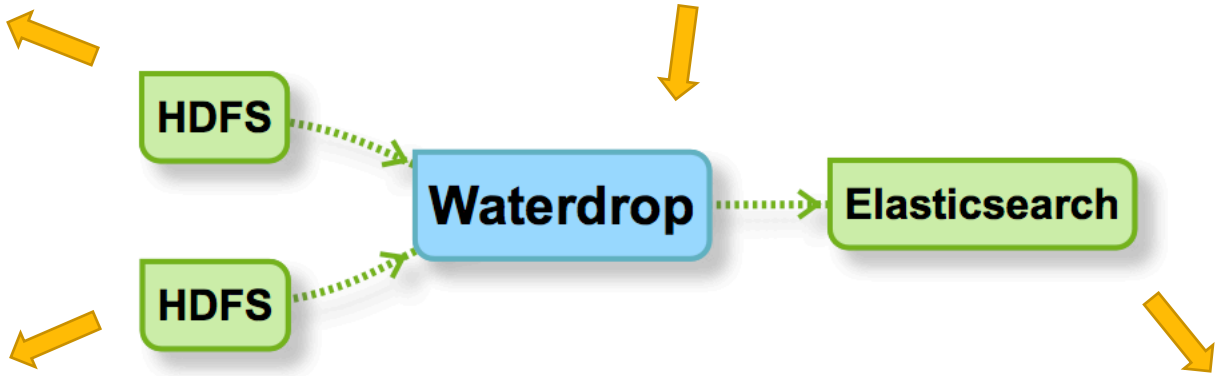
流式处理与离线处理入口统一，改变**input**即可自动切换到离线处理

离线多数据源Join

Operations 新浪

consumer_id	first_name	last_name	address
1	George	Jefferson	3200 Mt Vemon Hwy
2	John	Adams	1250 Hancock St
3	Thomas	Madison	931 Tomas Pkwy
4	James	Monroe	11350 Constitution Hwy

```
select first_name, last_name, order_date, order_amount
from customers c
inner join orders o
on c.customer_id = o.customer_id
```



order_id	order_date	amount	costomer_id
1	07/04/1776	$234.56	1
2	03/14/1760	$78.50	3
3	05/23/1784	$124.00	2
4	09/03/1790	$65.50	3
5	11/27/1787	$14.40	10

first_name	last_name	order_date	order_amount
George	Washington	07/04/1776	$234.56
John	Adams	05/23/1784	$124.00
Thomas	Madison	03/14/1760	$78.50
Thomas	Madison	09/03/1790	$65.50

More Complex ?

https://github.com/InterestingLab/waterdrop/issues

数据平台遇到的问题

Operations

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不支持海量计算（数据转换或聚合）

数据处理学习成本较高

业务、工程代码复用率低

如何快速ETL、快速上线

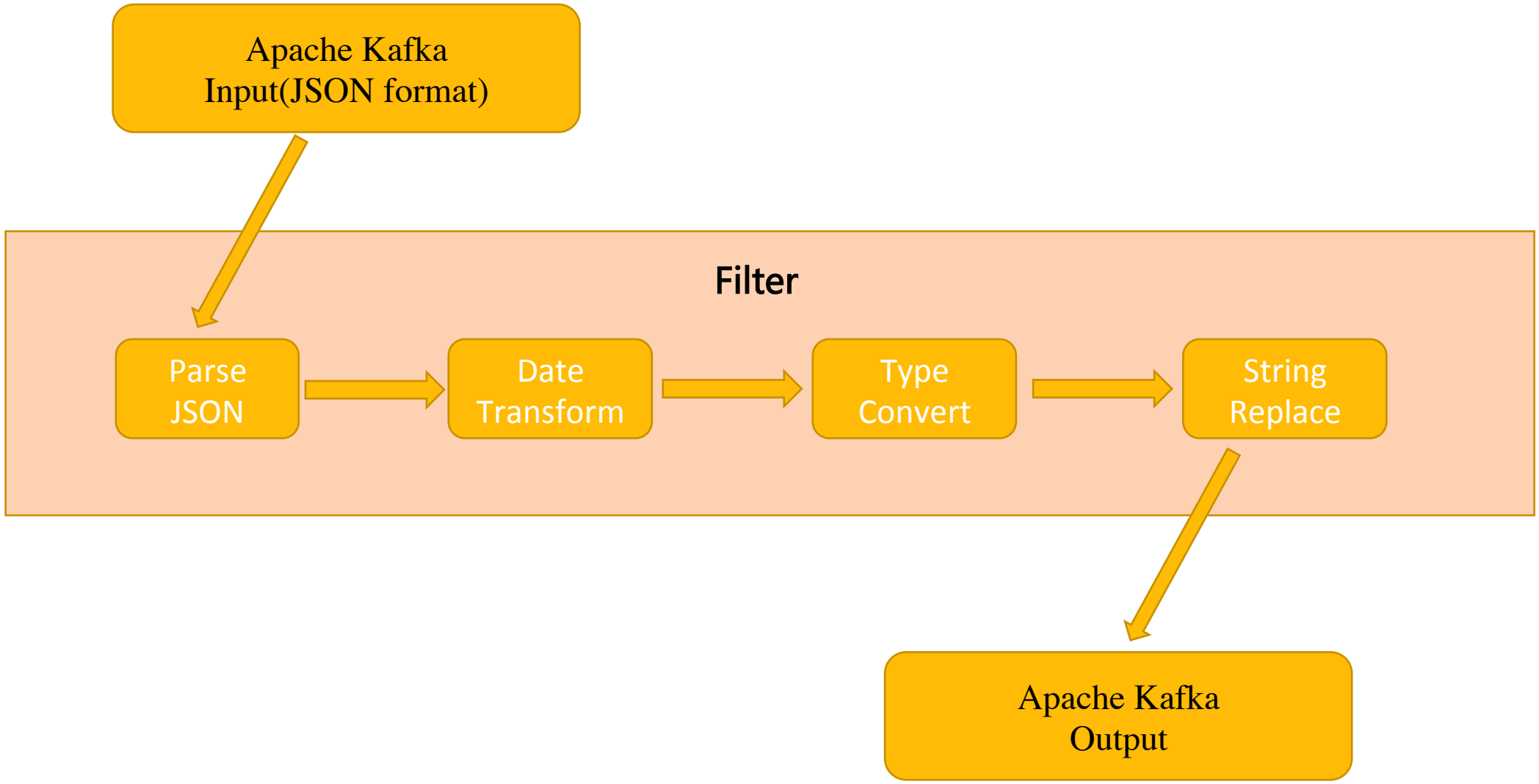
服务难以监控和保障

- Waterdrop底层使用Spark这个分布式计算框架作为计算引擎，并使用SQL支持聚合功能。
- Waterdrop高度配置化，并且本身提供了丰富的插件，无需了解Spark就可轻松上手。
- Waterdrop中离线实时统一融合。
- Waterdrop插件化体系，保证用户多为业务逻辑操心，少为流程和容错困扰。
- 子产品 Guardian，自动拉起异常退出spark程序，自动监控报警streaming处理延迟

Waterdrop 性能对比

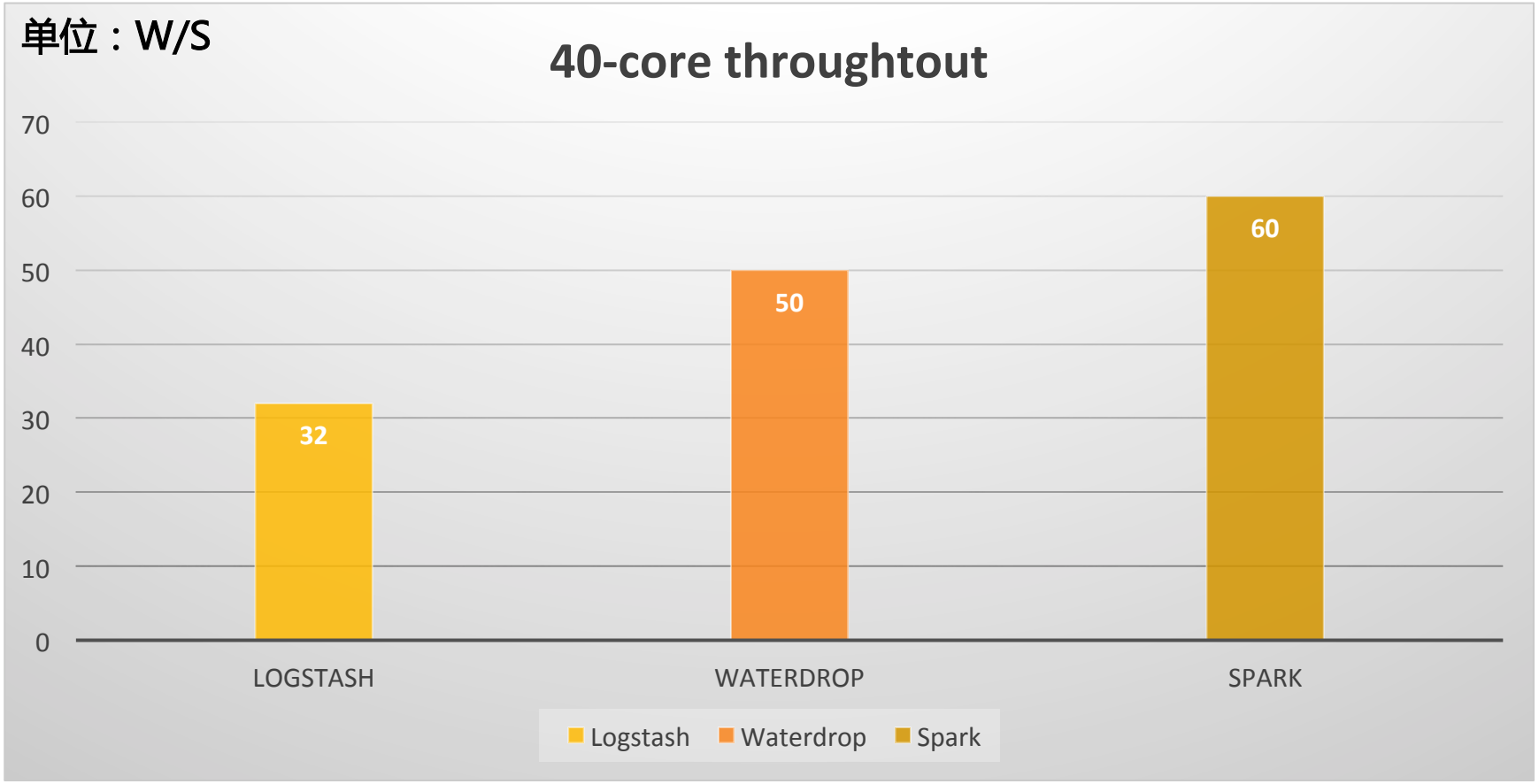
04

Waterdrop Benchmark



Waterdrop Benchmark

- Logstash 6.3.1
- Waterdrop 1.1.0
- Spark 2.2.0



Waterdrop Roadmap

05

Roadmap

Operations

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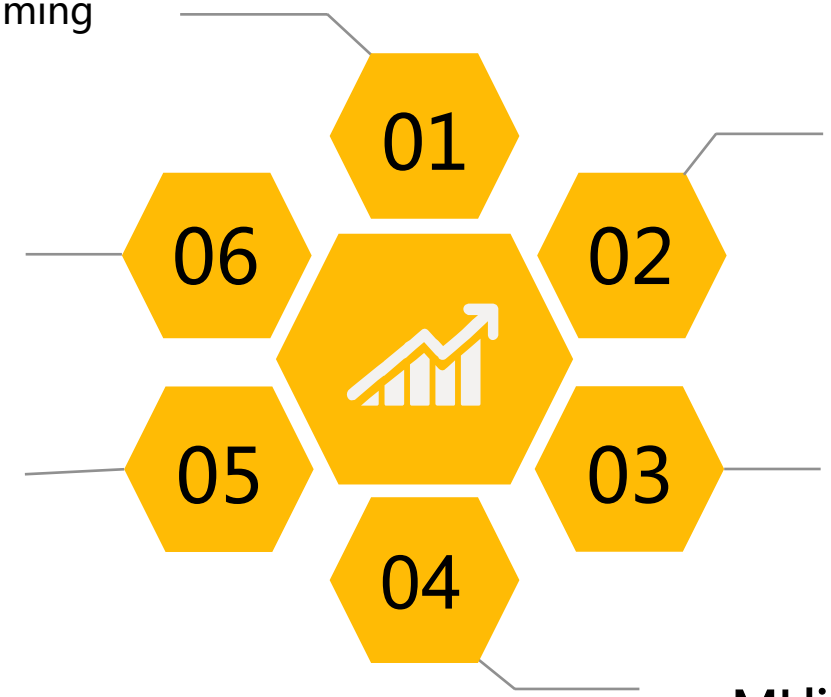
Structured Streaming

Spark Structured Streaming



更多的插件和处理逻辑

多pipleline 动态处理逻辑

数据处理平台化

可视化UI，血缘管理

插件性能统计和优化

Waterdrop性能和各插件耗时统计

Flink

支持Flink框架作为计算引擎

MLlib

流式机器学习

感谢Elastic，祝Elastic社区越来越好

本次分享由Interesting Lab出品

https://github.com/InterestingLab/waterdrop

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