Data Ingestion & Distribution with Apache NiFi

by Aol.
PUBLISHERS

Agenda

Introduction to NiFi

Our use case for NiFi

Demo

Q&A

Introduction to NiFi

History & Facts

Created by : NSA

Incubating : 2014

Available : 2015

Main contributors: Hortonworks

Current Stable Version : 1.1.1

Delivery Guarantees : at least once

Out of Order Processing : no

Windowing : no

Back-pressure : yes

Latency : configurable

Resource Management : native

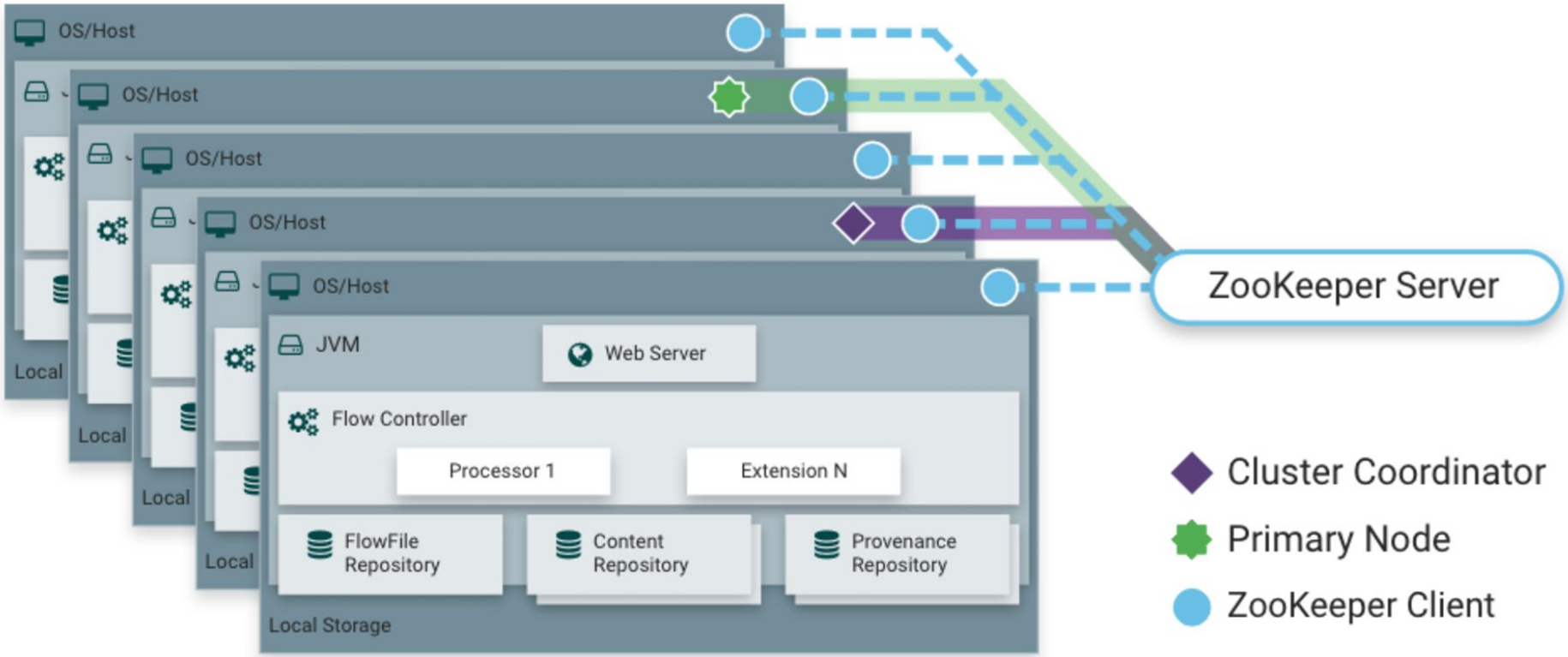
API : REST (GUI)

Ecosystem

Data Moving

Stream Processing

Architecture



Flow Files

Basic Abstraction

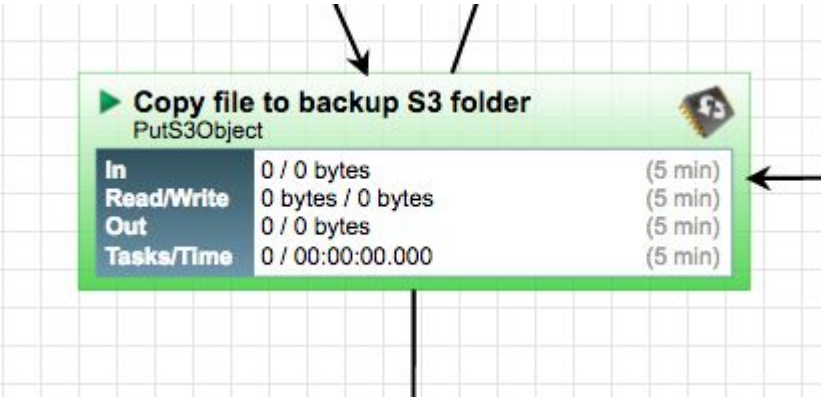
- Pointer to content
- Content Attributes (key/value)
- Connection to provenance events

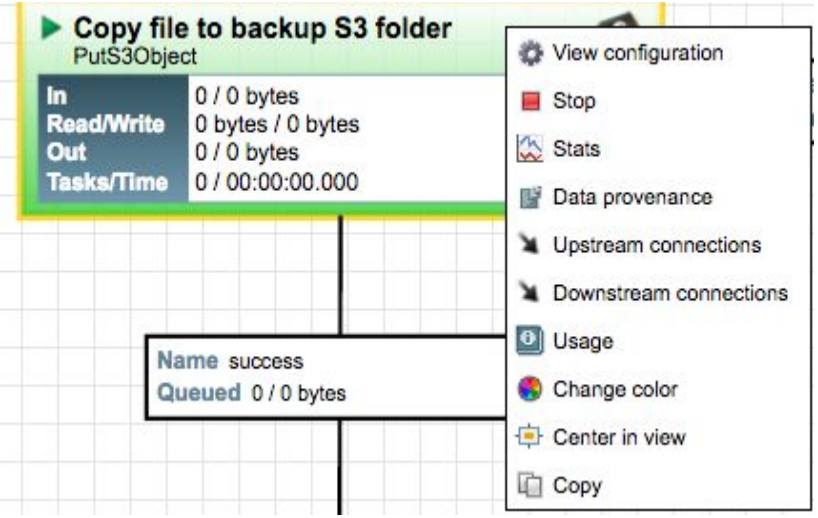
Repositories

- FlowFile
- Content
- Provenance
- Immutable
- Copy-on-write

Processor

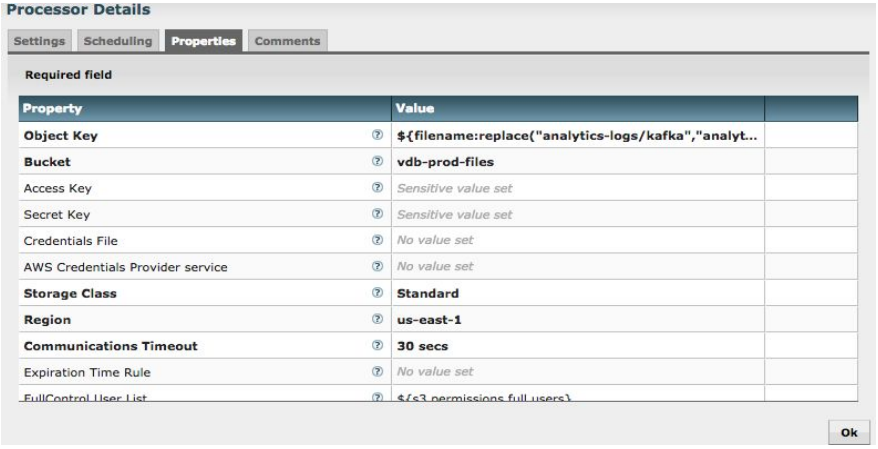
Processors actually perform the work of data routing, transformation, or mediation between systems. Processors have access to attributes of a given FlowFile and its content stream. Processors can operate on zero or more Flow Files in a given unit of work and either commit that work or rollback





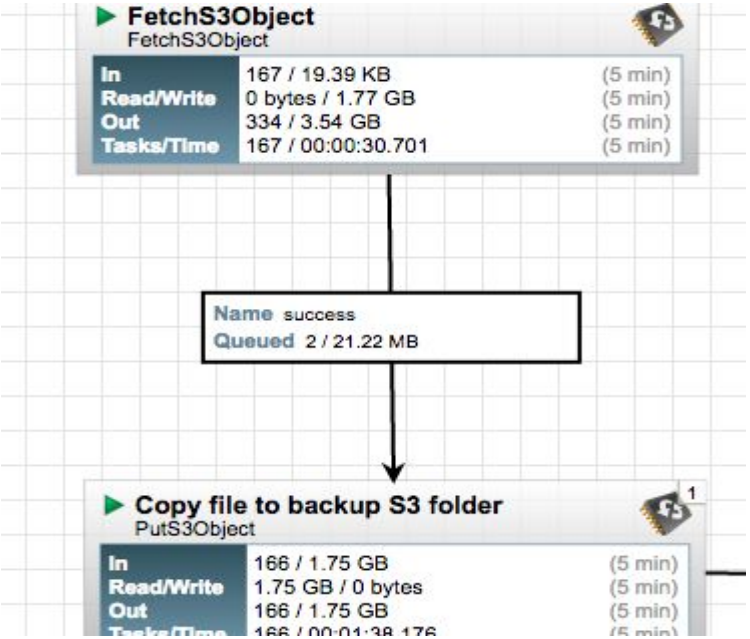
Processor

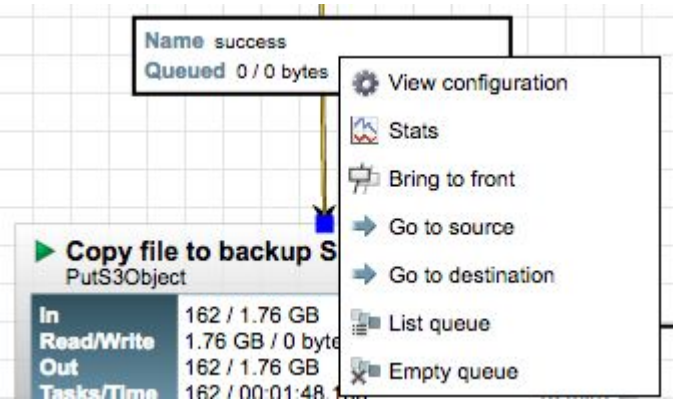
- Basic Work Unit
- State
- Statistics
- Settings
- Input/Output
- Provenance
- Scheduling
- Logging (bulletins)



Connection

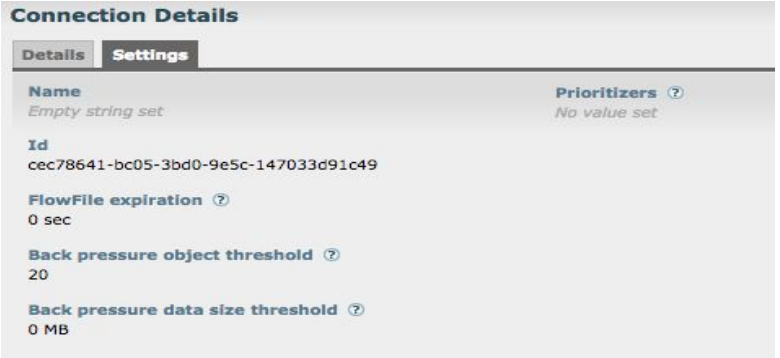
Connections provide the actual linkage between processors. These act as queues and allow various processes to interact at differing rates. These queues can be prioritized dynamically and can have upper bounds on load, which enable back pressure





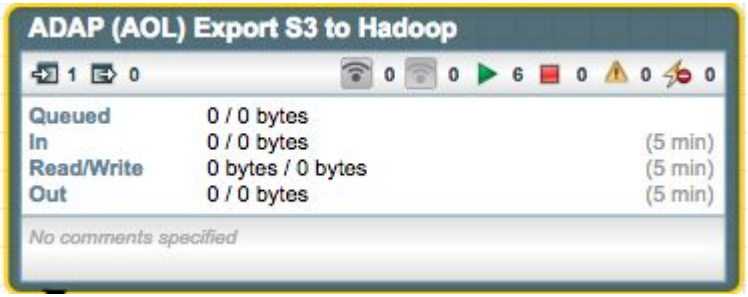
Connection

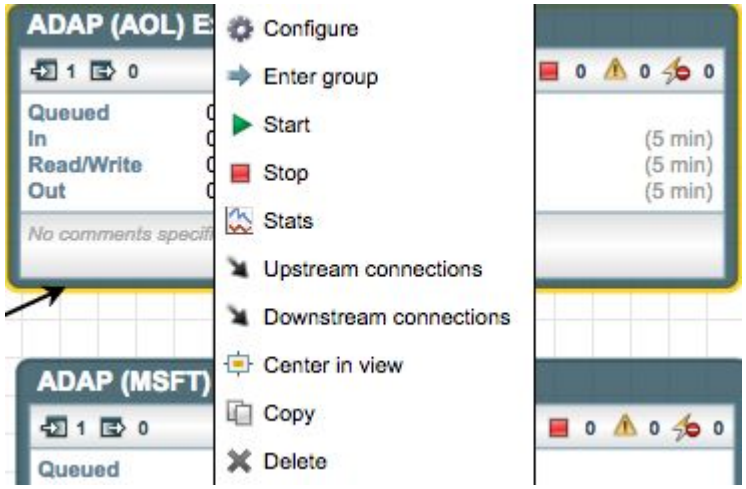
- Queue
- Statistics
- Settings
- Prioritization
- Details



Process Group

Specific set of processes and their connections, which can receive data via input ports and send data out via output ports. In this manner, process groups allow creation of entirely new components simply by composition of other components





Templates

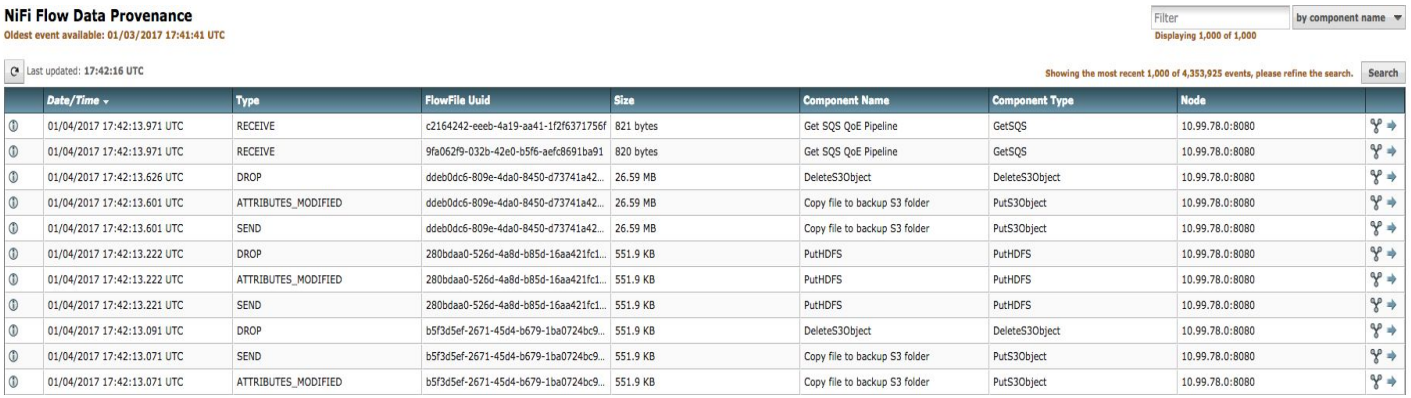
Templates tend to be highly pattern oriented and while there are often many different ways to solve a problem, it helps greatly to be able to share those best practices. Templates allow subject matter experts to build and publish their flow designs and for others to benefit and collaborate on them

- **XML Based**
- **Reusable unit**
- **Versioning** **(versioning with Git)**

Date/Time	Name	Description	
12/01/2016 21:31:20 UTC	ProdictionPipeline-20161201	Empty string set	
11/17/2016 23:59:10 UTC	ProductionPipeline_20161117	Empty string set	
09/09/2016 04:29:26 UTC	General S3 - Kafka Proccessing	Empty string set	
09/09/2016 04:29:05 UTC	General S3 - Hadoop Proccessing	Empty string set	
09/09/2016 04:28:39 UTC	ADAP Processing	Empty string set	
09/09/2016 04:28:15 UTC	sFTP Processing	Empty string set	

Data Provenance

NiFi automatically records, indexes, and makes available provenance data as objects flow through the system even across fan-in, fan-out, transformations, and more. This information becomes extremely critical in supporting compliance, troubleshooting, optimization, and other scenarios



NiFi Flow Data Provenance

Oldest event available: 01/03/2017 17:41:41 UTC

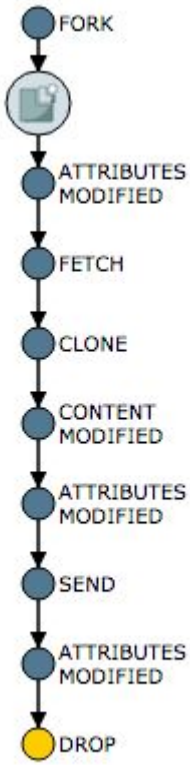
Filter | by component name

Displaying 1,000 of 1,000

Last updated: 17:42:16 UTC

Showing the most recent 1,000 of 4,353,925 events, please refine the search. Search

Date/Time	Type	FlowFile Uuid	Size	Component Name	Component Type	Node
01/04/2017 17:42:13.971 UTC	RECEIVE	c2164242-eeeb-4a19-aa41-1f2f6371756f	821 bytes	Get SQS QoE Pipeline	GetSQS	10.99.78.0:8080
01/04/2017 17:42:13.971 UTC	RECEIVE	9fa062f9-032b-42e0-b5f6-aefc8691ba91	820 bytes	Get SQS QoE Pipeline	GetSQS	10.99.78.0:8080
01/04/2017 17:42:13.626 UTC	DROP	ddeb0dc6-809e-4da0-8450-d73741a42...	26.59 MB	DeleteS3Object	DeleteS3Object	10.99.78.0:8080
01/04/2017 17:42:13.601 UTC	ATTRIBUTES_MODIFIED	ddeb0dc6-809e-4da0-8450-d73741a42...	26.59 MB	Copy file to backup S3 folder	PutS3Object	10.99.78.0:8080
01/04/2017 17:42:13.601 UTC	SEND	ddeb0dc6-809e-4da0-8450-d73741a42...	26.59 MB	Copy file to backup S3 folder	PutS3Object	10.99.78.0:8080
01/04/2017 17:42:13.222 UTC	DROP	280bdaa0-526d-4a8d-b85d-16aa421fc1...	551.9 KB	PutHDFS	PutHDFS	10.99.78.0:8080
01/04/2017 17:42:13.222 UTC	ATTRIBUTES_MODIFIED	280bdaa0-526d-4a8d-b85d-16aa421fc1...	551.9 KB	PutHDFS	PutHDFS	10.99.78.0:8080
01/04/2017 17:42:13.221 UTC	SEND	280bdaa0-526d-4a8d-b85d-16aa421fc1...	551.9 KB	PutHDFS	PutHDFS	10.99.78.0:8080
01/04/2017 17:42:13.091 UTC	DROP	b5f3d5ef-2671-45d4-b679-1ba0724bc9...	551.9 KB	DeleteS3Object	DeleteS3Object	10.99.78.0:8080
01/04/2017 17:42:13.071 UTC	SEND	b5f3d5ef-2671-45d4-b679-1ba0724bc9...	551.9 KB	Copy file to backup S3 folder	PutS3Object	10.99.78.0:8080
01/04/2017 17:42:13.071 UTC	ATTRIBUTES_MODIFIED	b5f3d5ef-2671-45d4-b679-1ba0724bc9...	551.9 KB	Copy file to backup S3 folder	PutS3Object	10.99.78.0:8080



Data Provenance

- Details
- Attributes
- Content

Provenance Event

Details | Attributes | Content

Time	01/03/2017 19:41:18.576 UTC
Event Duration	*No value set*
Lineage Duration	00:00:00.296
Type	DROP
FlowFile Uuid	27fa0855-87a8-4876-a677-128bf59bf17f
File Size	1.13 MB
Component Id	0af51e00-2d36-3acd-b618-a4b626882836
Component Name	PutHDFS
Component Type	PutHDFS
Node Address	10.99.84.132:8080
Details	Auto-Terminated by success Relationship

Parent FlowFiles (0)

No parents

Child FlowFiles (0)

No children

Provenance Event

Details | Attributes | Content

Attribute Values — Only show modified

absolute.hdfs.path	/raw_data/vidible
previous	*No value set*
filename	analytics-logs-hadoop-Nginx-2017-01-03-19-2017-01-03-194101_Nginx-lua-prod-ap-southeas...
filename.0	analytics-logs/hadoop/Nginx/2017-01/03/19/2017-01-03-194101_Nginx-lua-prod-ap-southeas...
filename.1	analytics-logs/hadoop/Nginx/2017-01/03/19/2017-01-03-194101_Nginx-lua-prod-ap-southeas...
hash.algorithm	md5
hash.value	0f061bbe5a936cb1f1d8573b97462d24
mime.type	application/octet-stream
path	./
s3.bucket	vdb-prod-files
s3.etag	2707d41a0f6c58b54abab23f1fd93506
s3.sseAlgorithm	AES256
s3.version	null
sqs.ApproximateFirstReceiveTimesta...	1483472478285
sqs.ApproximateReceiveCount	1
sqs.message.id	659bc816-7727-4dc1-8bfe-57f6b0e68a16
sqs.receipt.handle	AQEBL/R2xlnsgsYDmzcsqRKxW6CuwBND/3XckkBTKqM5Ol7k26kbGitUlTBX4YKV7UpahplTPViNp...
sqs.SenderId	AIDAJVEO32BJMF27H2JKW

Details | Attributes | Content

Input Claim		Output Claim	
Container	default	Container	default
Section	102	Section	102
Identifier	1483472478280-1698918	Identifier	1483472478280-1698918
Offset	936	Offset	936
Size	1.13 MB	Size	1.13 MB

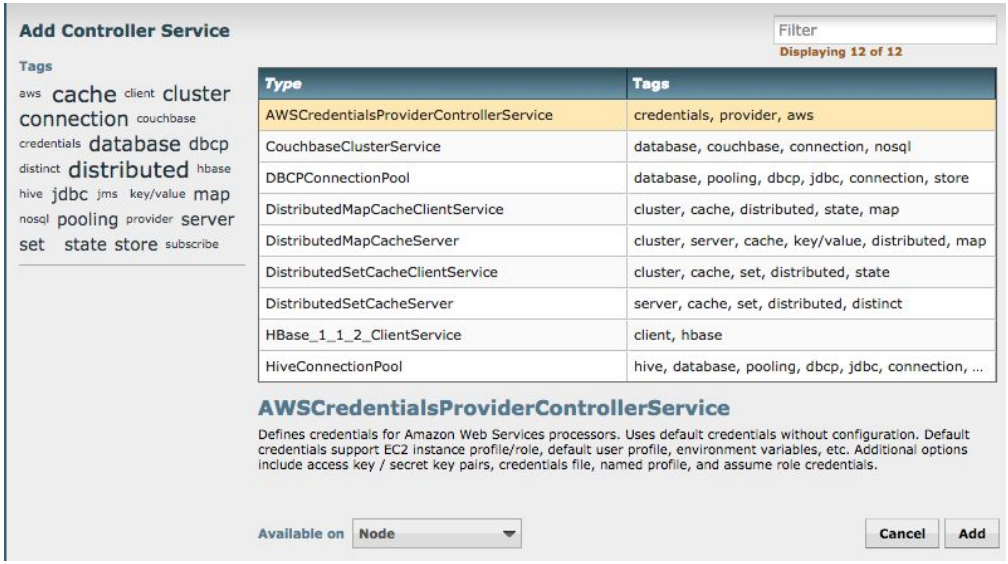
Replay

Content is no longer available in Content Repository

Controller Service

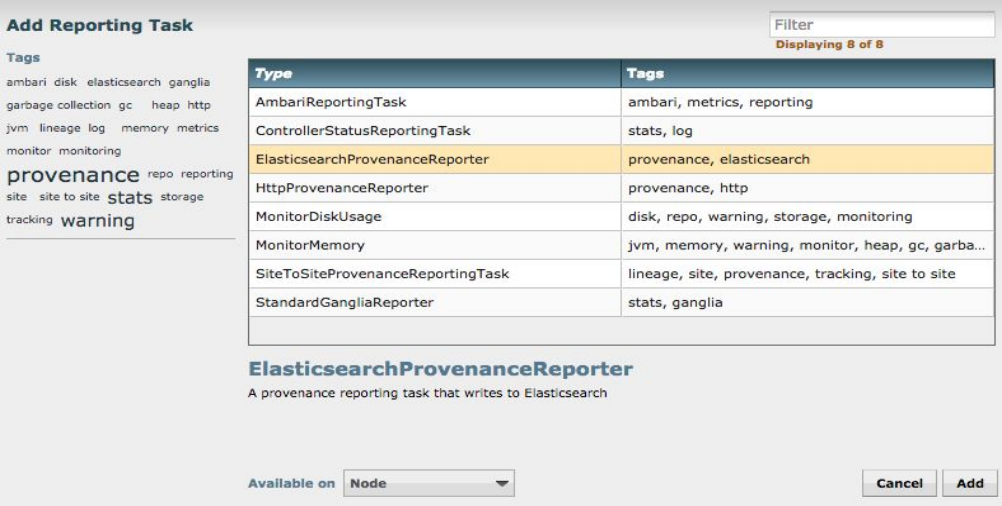
Controller Service allows developers to share functionality and state across the JVM in a clean and consistent manner

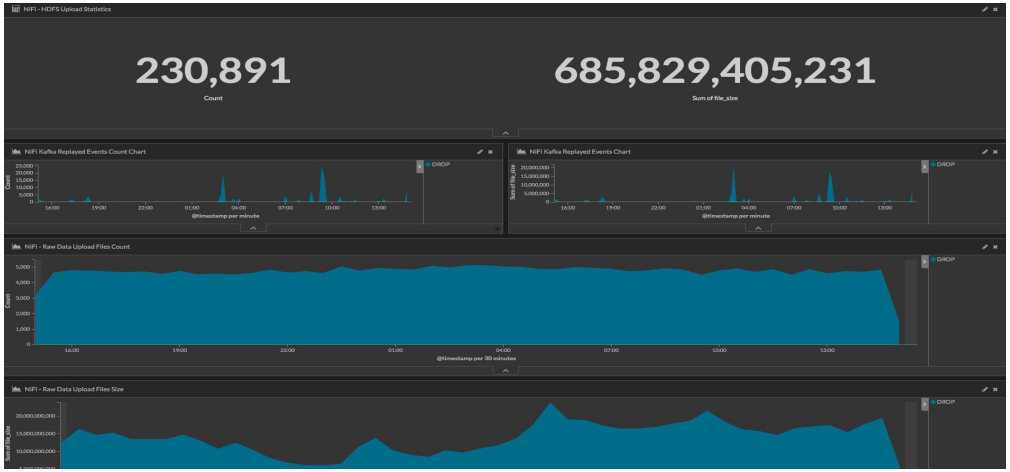
- **No scheduling**
- **No connections**
- **Used by Processors, Reporting Tasks, and other Controller Services**



Reporting Tasks

Provides a capability for reporting status, statistics, metrics, and monitoring information to external services





- ElastichSearchProvenanceReporter and DataDogReportingTask

Extensibility

- Ready to use maven template
- Well defined interface for each component
- Classloader Isolation (.nar files)
- Great documentation for developers

Statistics

- 200+ built in Processors
- 10+ built Control Services
- 10+ built in Reporting Tasks

Introduction Summary

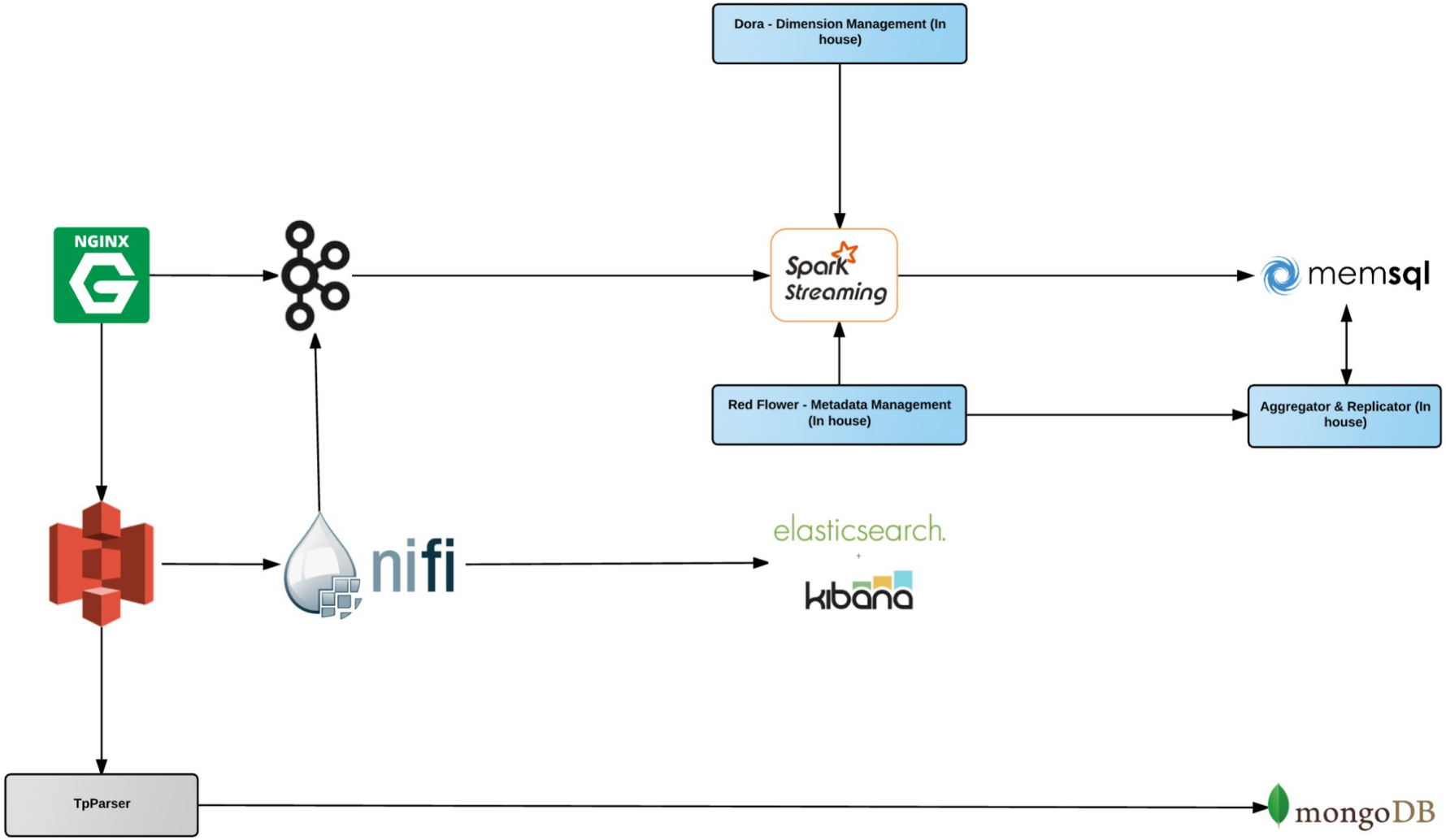
- Processor
- Connection
- Processing Group
- Template
- Controller Service
- Reporting Task

Our use case for NiFi

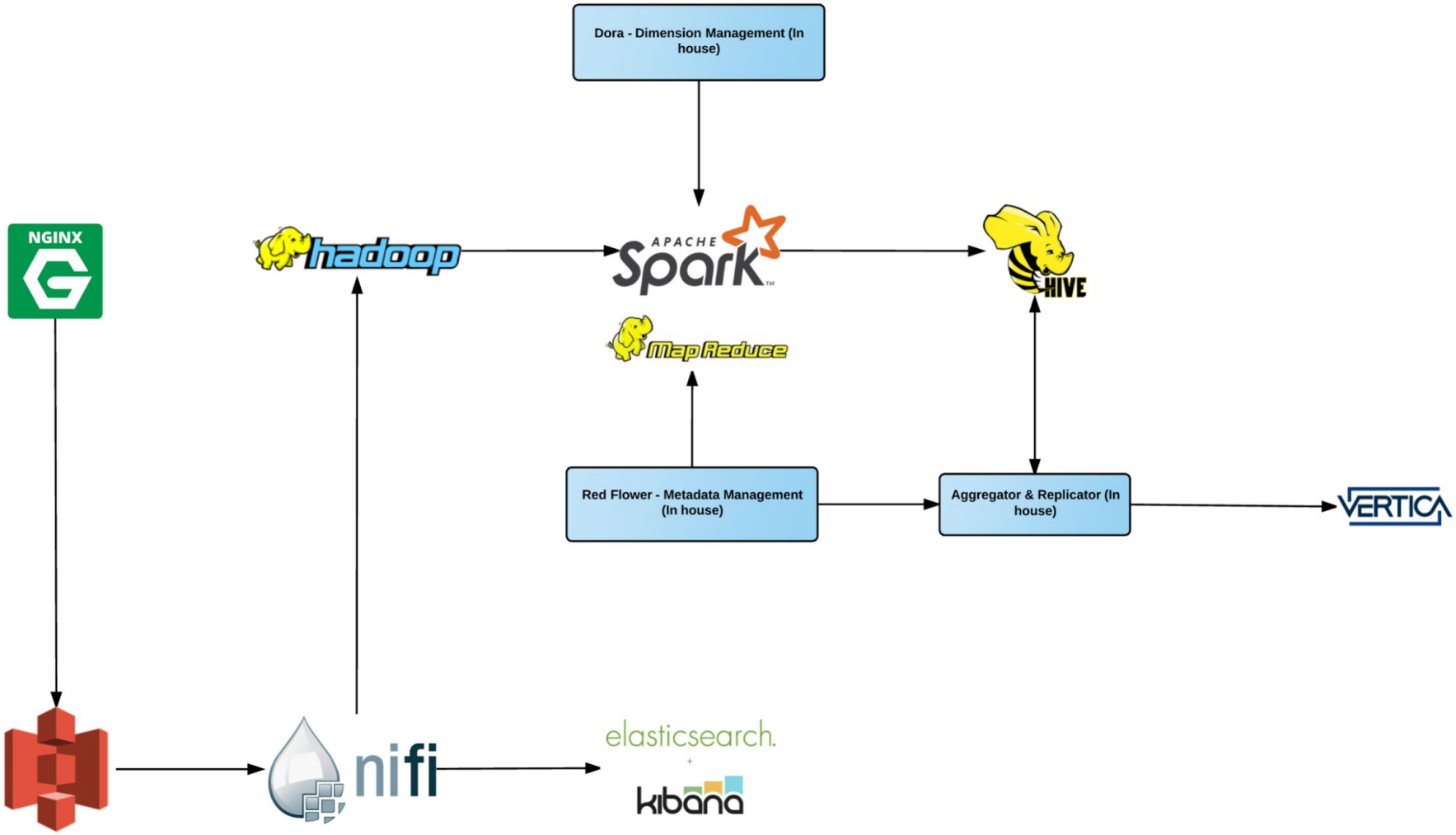
What was before

- Inhouse built file collector
- Footprint of 10 server
- Hard to manage, scale, extend

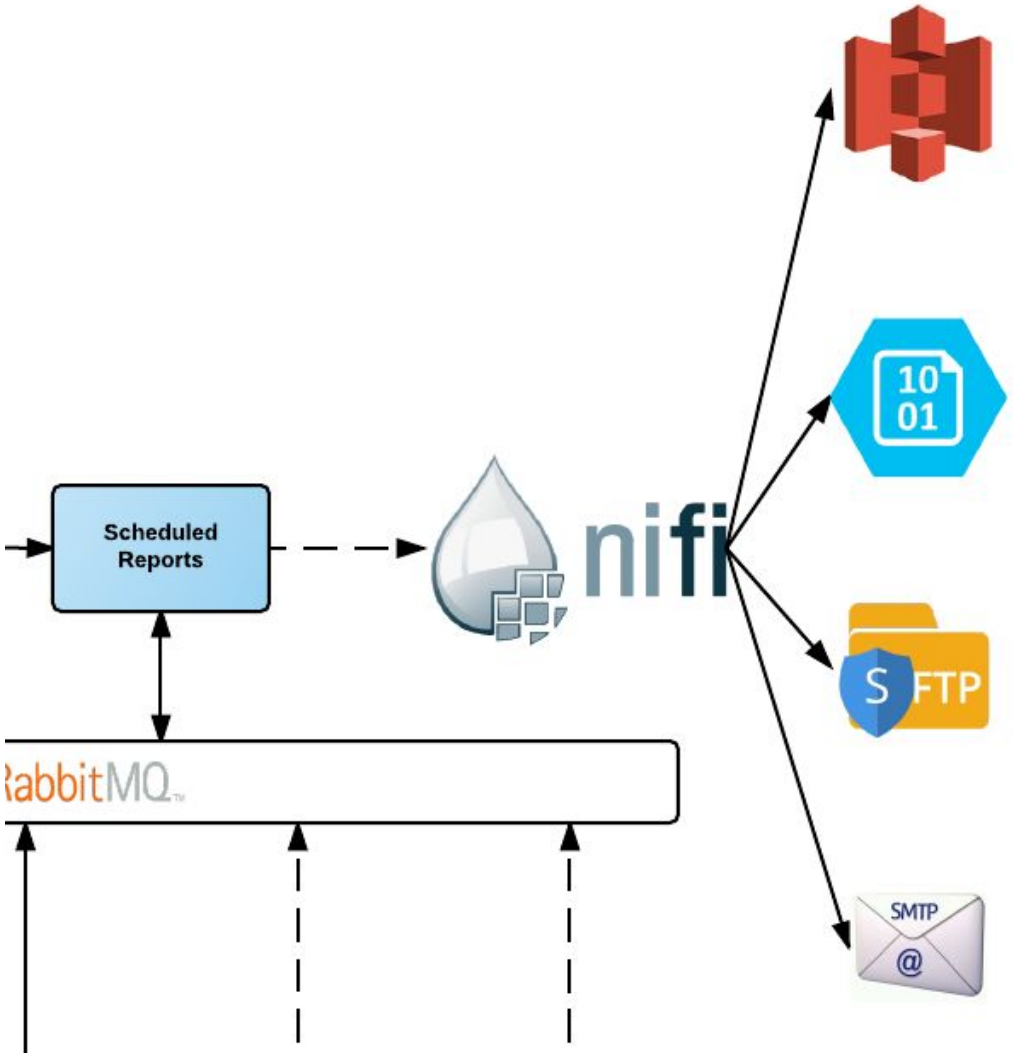
DWH Real Time



DWH Batch


Dora - Dimension Management (In house)
NGINX
hadoop
APACHE Spark
HIVE
Map Reduce
Red Flower - Metadata Management (In house)
Aggregator & Replicator (In house)
VERTICA
nifi
elasticsearch.
kibana

Reports Distribution



Statistics

250K
Files Ingested Daily

30K
Files Exported Daily

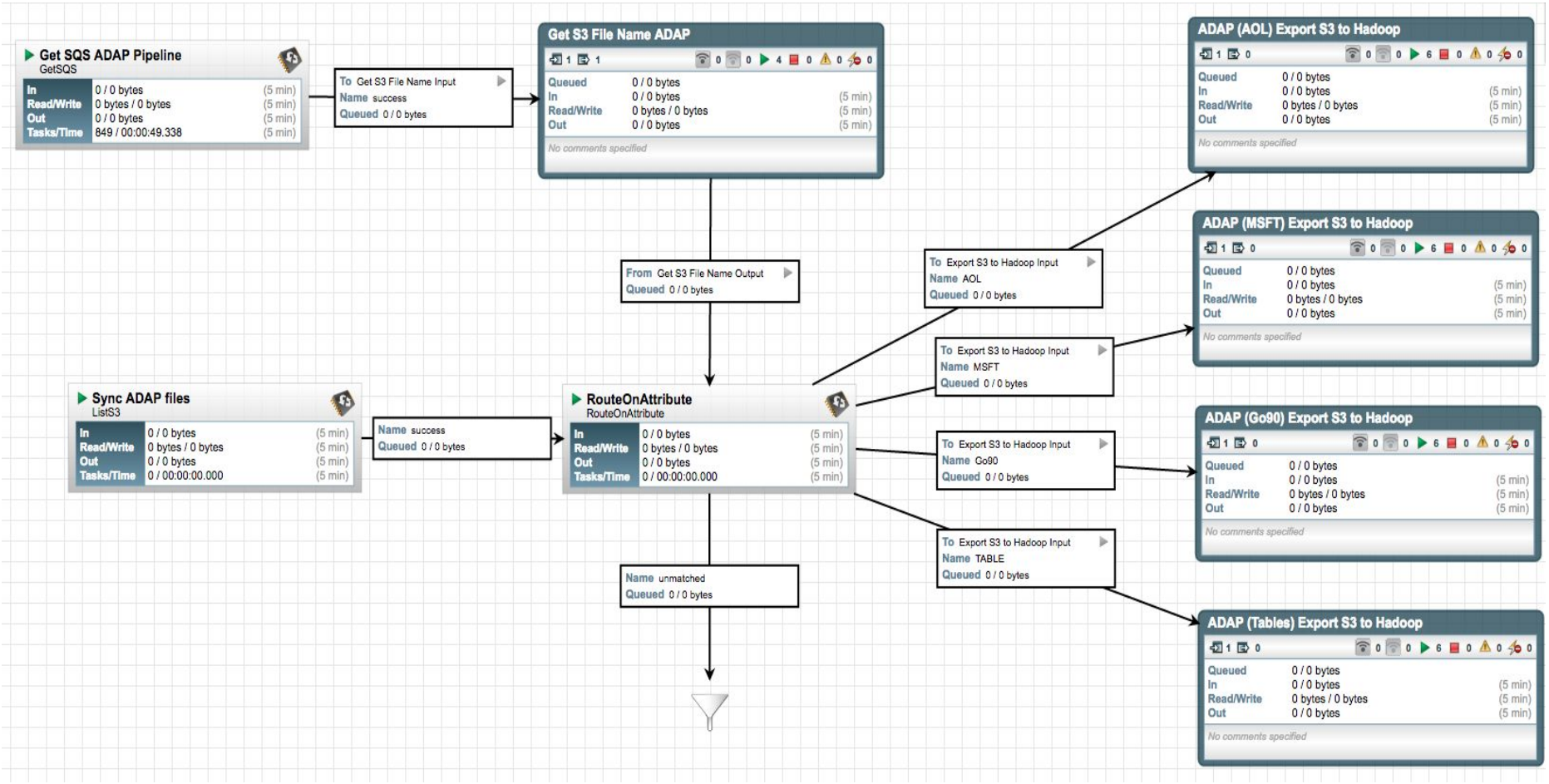
20TB
Data Ingested Daily

1 TB
Data Distributed Reports

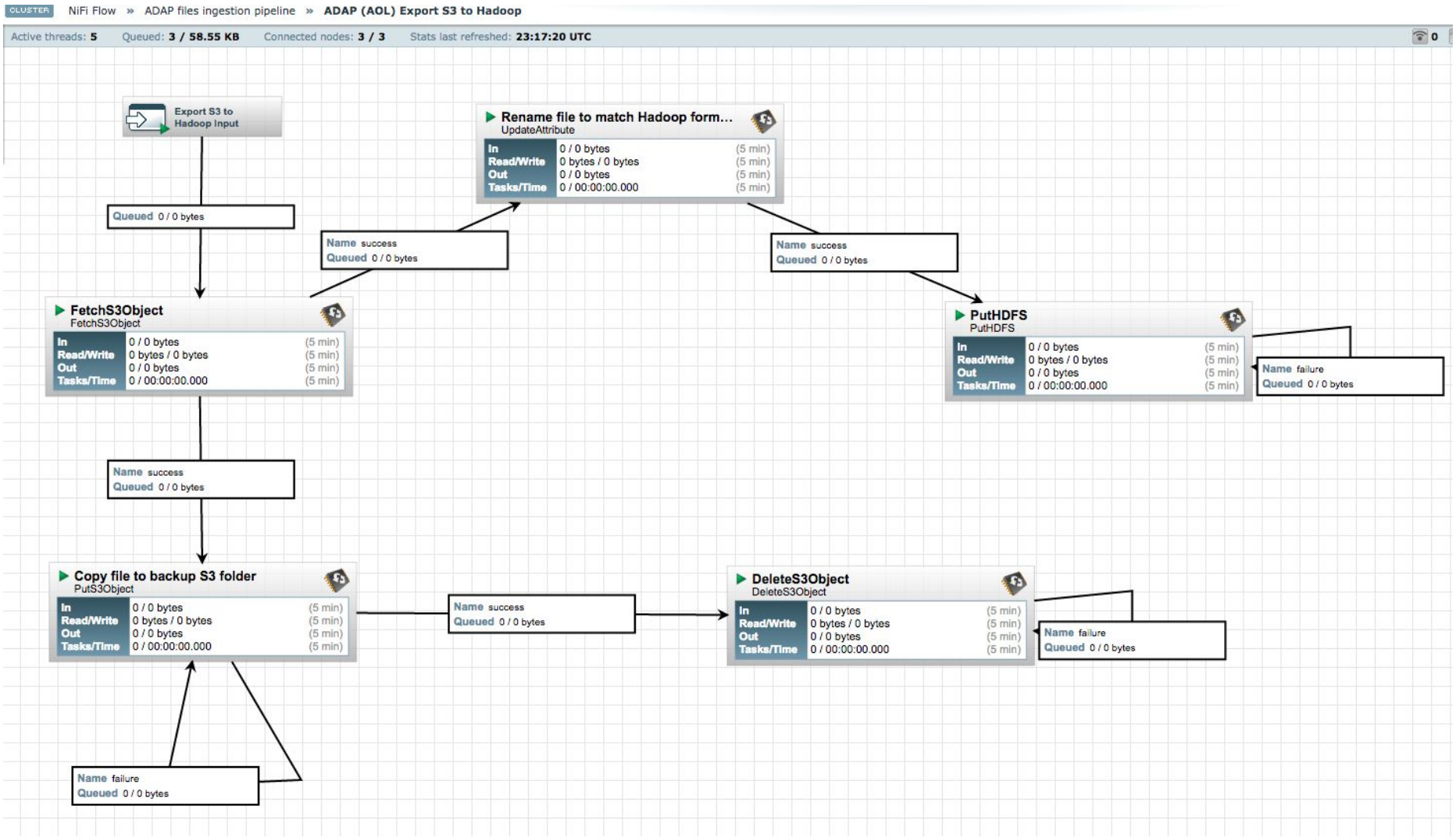
Near Real Time Data Availability

Minimum Interval :1 min

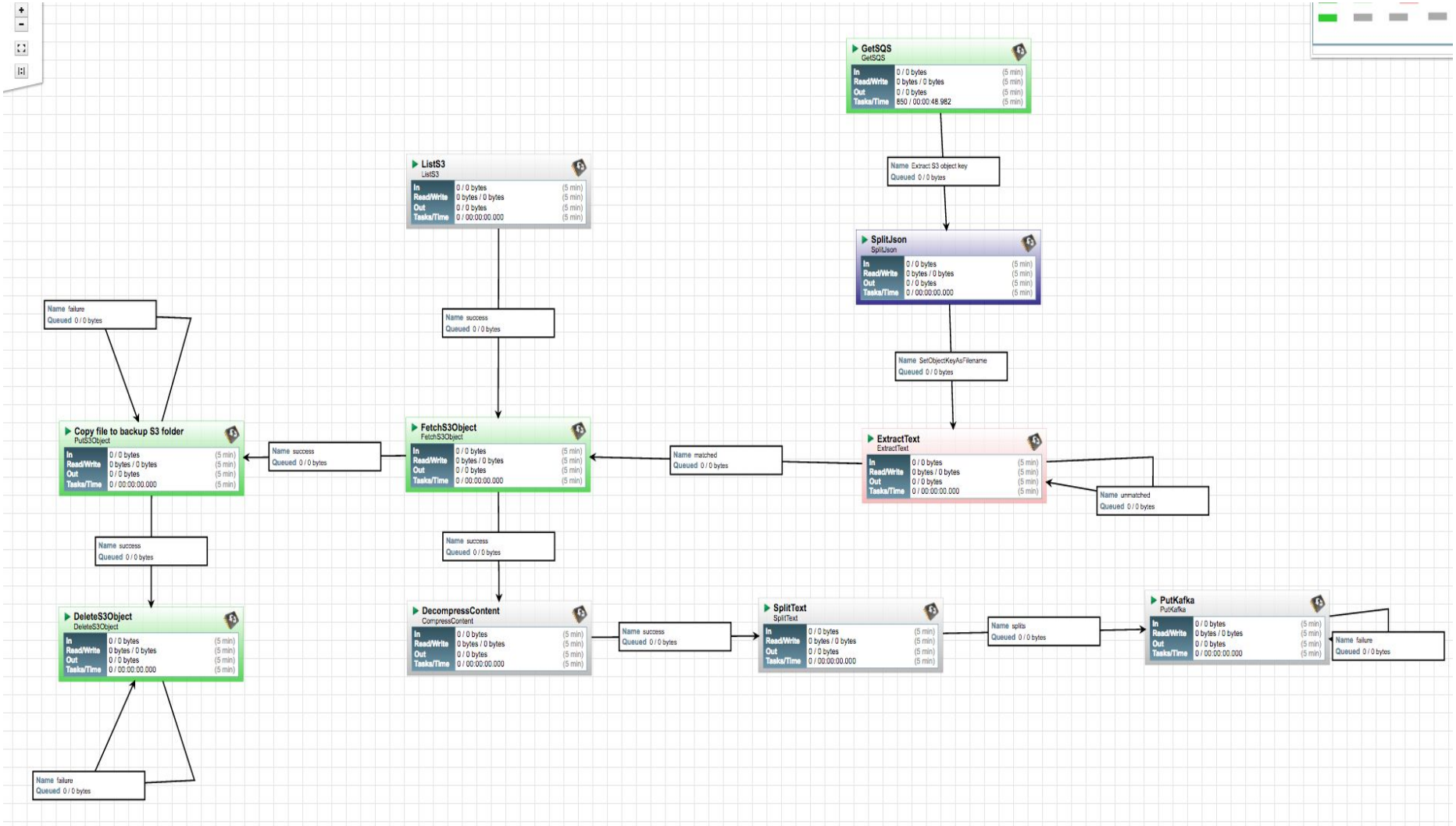
AWS - Hadoop Ingestion



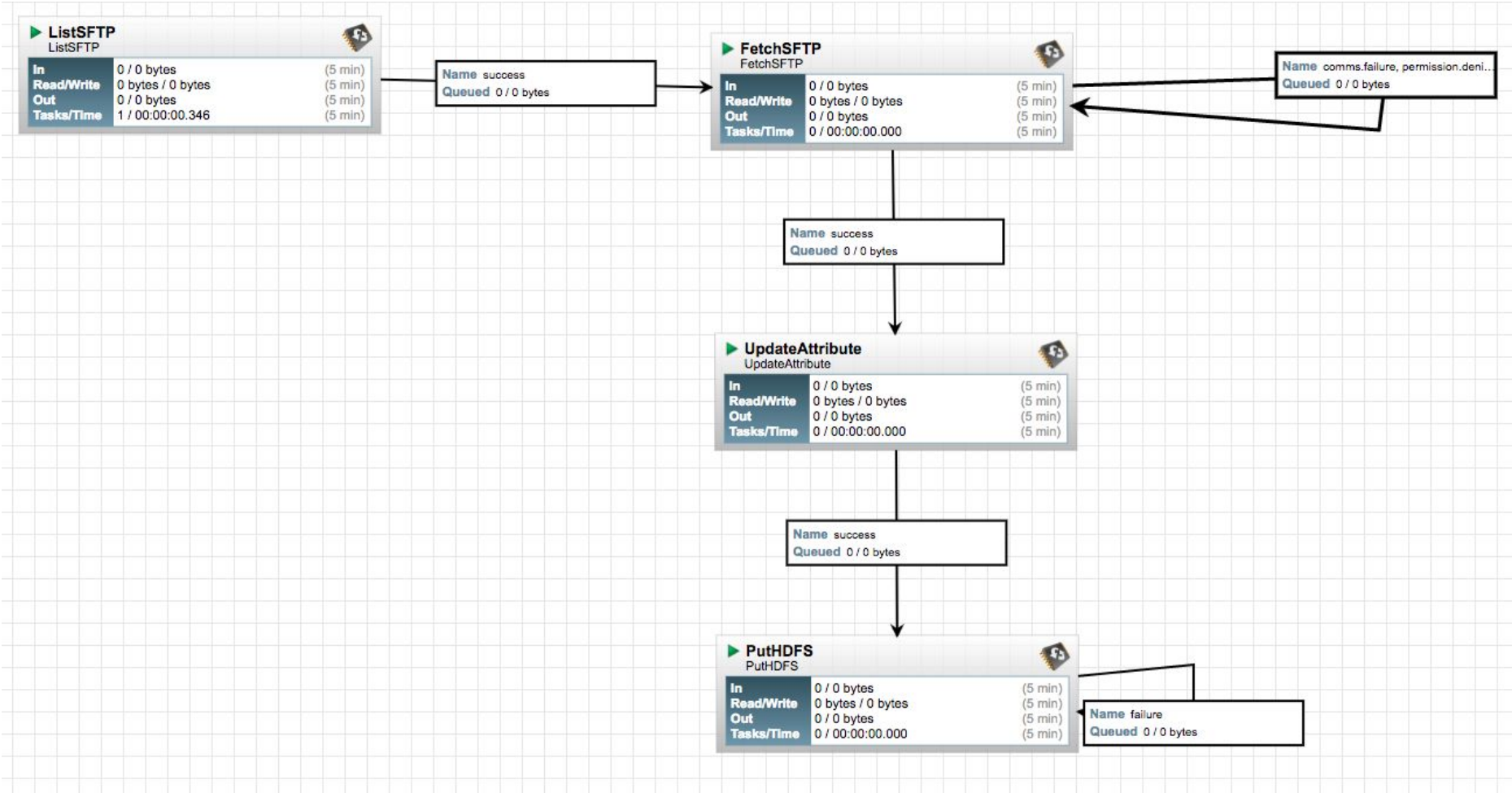
AWS - Hadoop Ingestion



Kafka Reprocessing



sFTP - HDFS Ingestion



Let’s break something ;)

Use Cases Summary

- Web User Interface
- Configurable
- Scalable
- Easy to Manage
- Designed for Extension

Q & A

THANK YOU