EVENT-DRIVEN MESSAGING AND ACTIONS USING APACHE FLINK AND APACHE NIFI

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Comcast Corporation

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DataWorks Summit – Washington, DC – 2019

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COMCAST NBCUNIVERSAL

A global media and technology company with several businesses, including Comcast, NBCUniversal, and Sky.

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xfinity x1
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COMCAST BUSINESS
COMCAST SPOTLIGHT
FREEWHEEL A COMCAST COMPANY

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NBCSN
OLYMPIC CHANNEL
GOLF
SYFY
MSNBC
OXYGEN
bravo

Broadcast

NBC
TELEMUNDO
NBCUniversal Owned Television Stations
NBC Owned Television Stations
Telemundo Station Group
NBC Sports
NBC NEWS
TeleXitos
COZI
NBC
NBC SPORTS REGIONAL NETWORKS

Film

UNIVERSAL A COMCAST COMPANY
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UNIVERSAL PICTURES HOME ENTERTAINMENT
UNIVERSAL BRAND DEVELOPMENT
DREAMWORKS
ILLUMINATION ENTERTAINMENT

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UNIVERSAL STUDIOS HOLLYWOOD
UNIVERSAL ORLANDO RESORT
UNIVERSAL STUDIOS JAPAN
UNIVERSAL STUDIOS SINGAPORE

Digital & Other

Snap Inc.*
MOVIES.COM
FANDANGO
VOX MEDIA*
BuzzFeed
cinepapaya
sportsengine
hulu*
GOLFNOW
bluprint
Flixster
Rotten Tomatoes

sky

Products & Services

sky Q
sky mobile
sky store
NOW TV
sky broadband
sky go

Channels & Content

sky atlantic
sky one
sky sports
sky news
sky cinema
sky box sets
sky original productions
sky VR
sky KIDS

*Minority interest and/or non-controlling interest.
Slide is not comprehensive of all Comcast NBCUniversal assets
Updated: December 03, 2018

COMCAST CUSTOMER RELATIONSHIPS

30.7 MILLION OVERALL CUSTOMER RELATIONSHIPS AS OF Q1 2019

INCLUDING:

- 27.6 MILLION HIGH-SPEED INTERNET
- 21.9 MILLION VIDEO
- 11.4 MILLION VOICE

ONE MILLION CUSTOMER NET ADDITIONS IN 2018

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DELIVER THE ULTIMATE CUSTOMER EXPERIENCE

IS THE CUSTOMER HAVING A GOOD EXPERIENCE WITH OUR PRODUCTS AND SERVICE?

IF THE CUSTOMER ENGAGES US DIGITALLY, CAN WE OFFER A SELF-SERVICE EXPERIENCE?

GUIDE THE CUSTOMER THROUGH A JOURNEY WITH DIGITAL COMMUNICATIONS

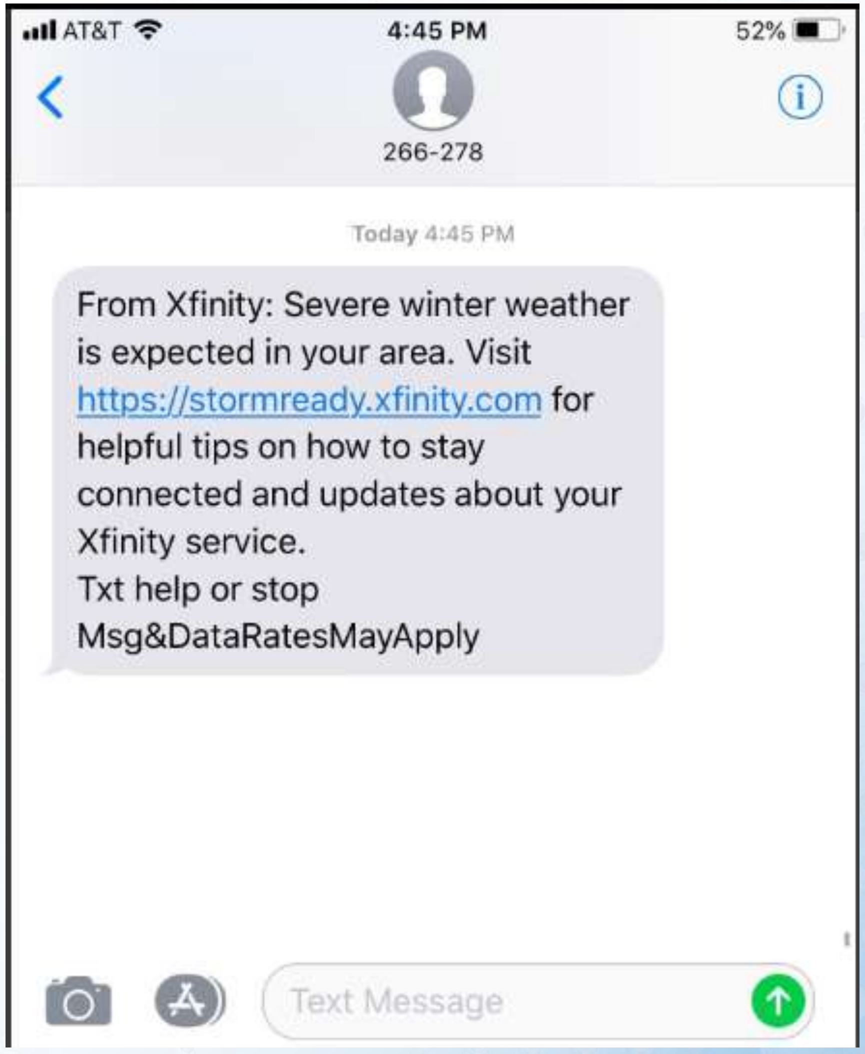
KEEP THE CUSTOMER INFORMED WITH THE RIGHT MESSAGE TO THE RIGHT PERSON AT THE RIGHT TIME

REDUCE TIME AND COST TO THE BUSINESS AND THE CUSTOMER

How do we personalize the conversation?

Comcast collects, stores, and uses all data in accordance with our privacy disclosures to users and applicable laws.

EXAMPLE ONE-TIME MESSAGE



From Xfinity: Severe winter weather is expected in your area. Visit https://stormready.xfinity.com for helpful tips on how to stay connected and updates about your Xfinity service.
Txt help or stop
Msg&DataRatesMayApply

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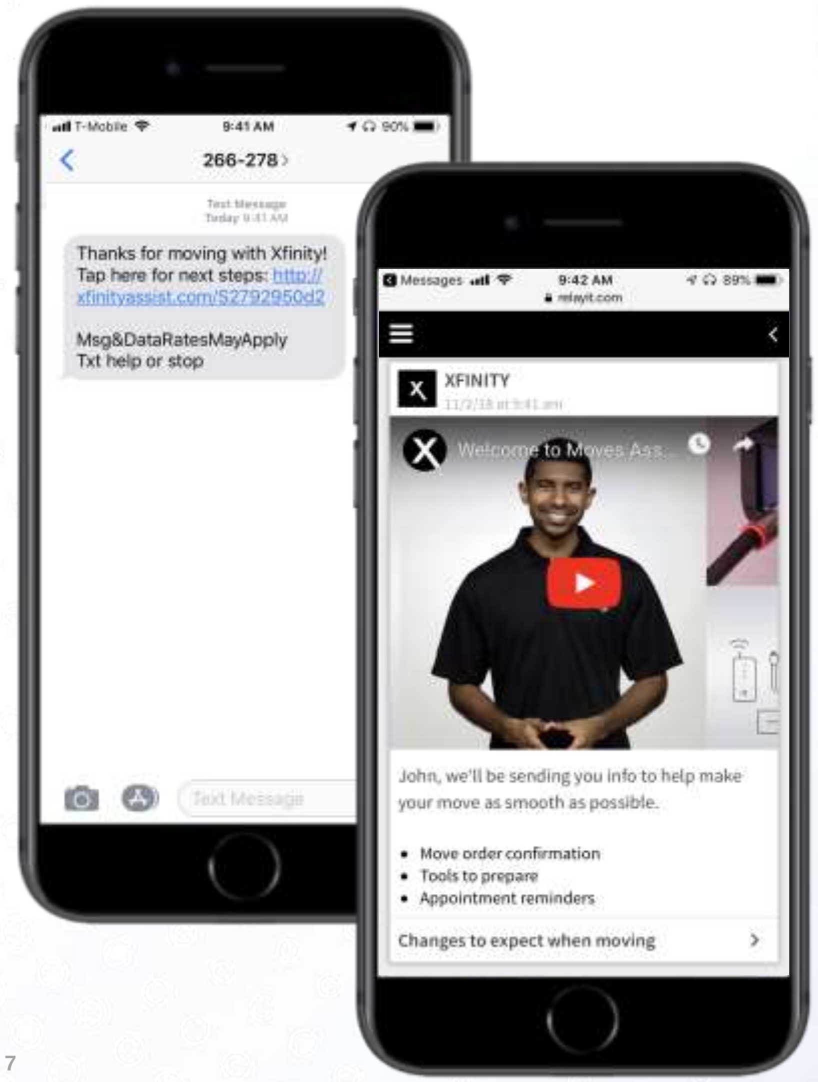
EXAMPLE – NEW SERVICE INSTALL


T-Mobile 9:41 AM 90%

266-278

Text Message
Today 9:41 AM

Thanks for moving with Xfinity! Tap here for next steps: http://xfinityassist.com/S2792950d2

Msg&DataRatesMayApply
Txt help or stop

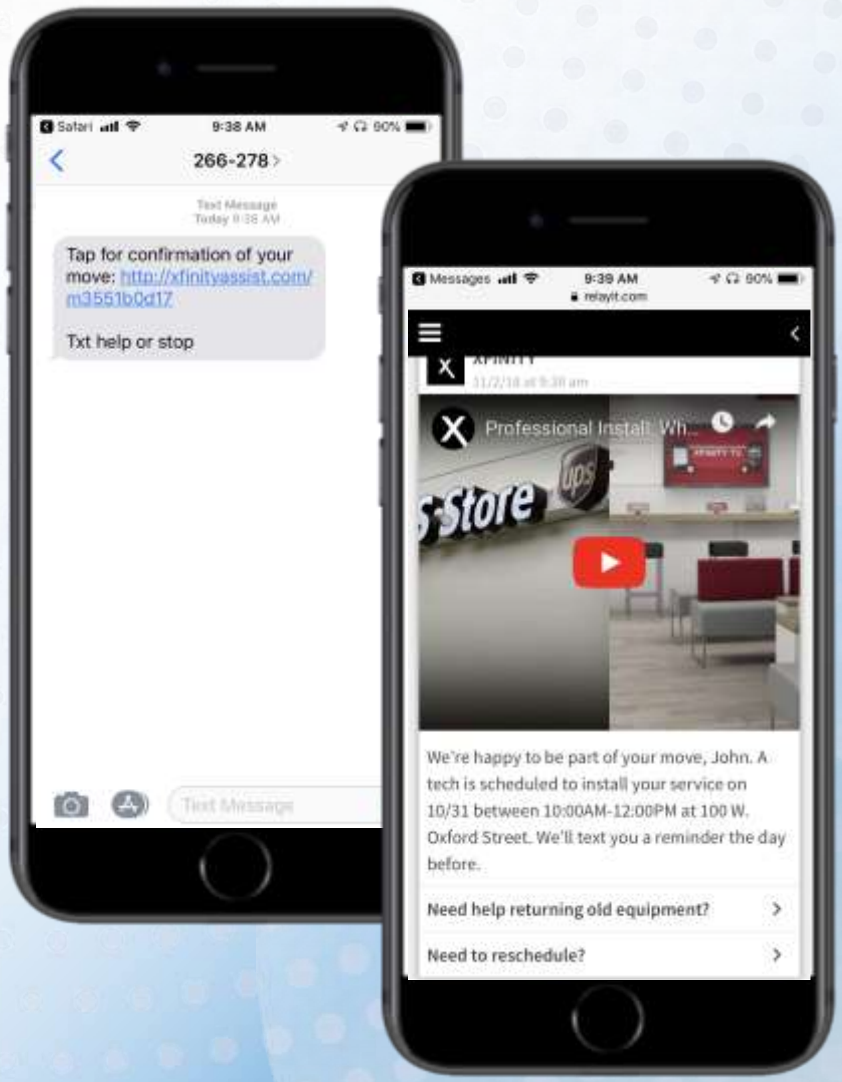
Messages 9:42 AM 89%
relayit.com

XFINITY
11/2/18 at 9:41 am

John, we'll be sending you info to help make your move as smooth as possible.

- Move order confirmation
- Tools to prepare
- Appointment reminders

Changes to expect when moving


Safari 9:38 AM 90%

266-278

Text Message
Today 9:38 AM

Tap for confirmation of your move: http://xfinityassist.com/m3551b0d17

Txt help or stop

Messages 9:39 AM 90%
relayit.com

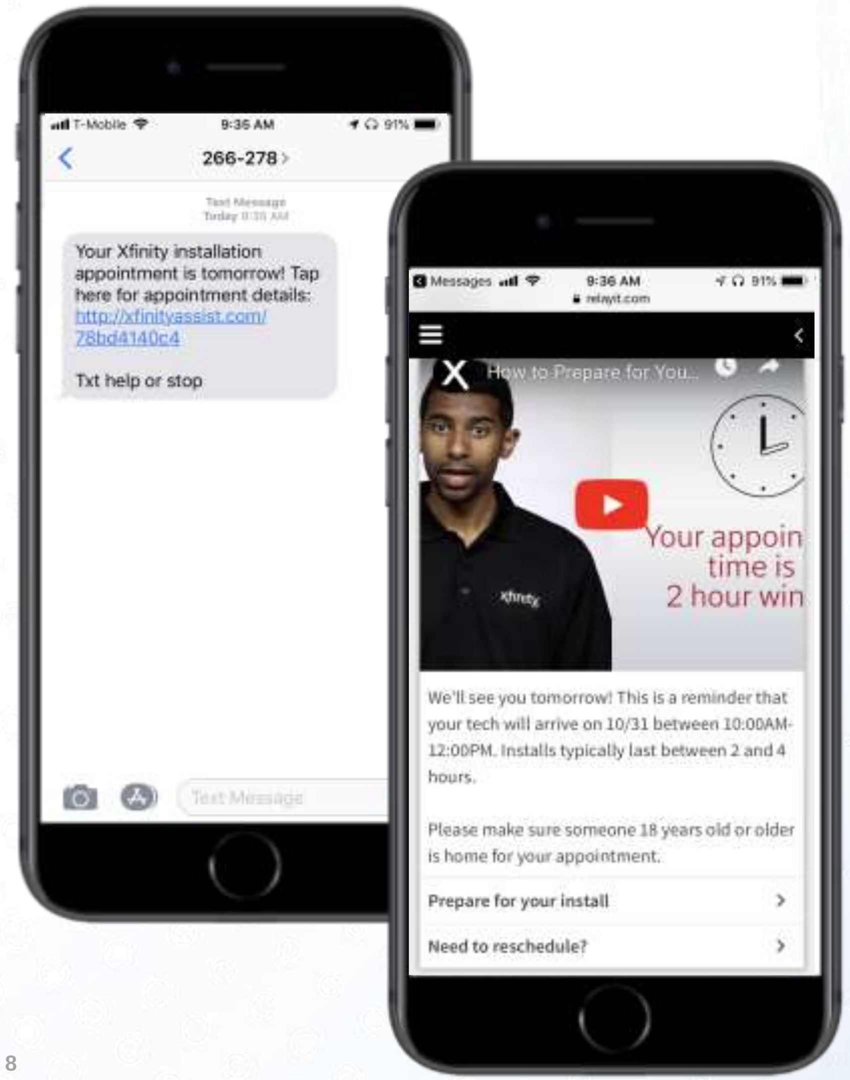
XFINITY
11/2/18 at 9:38 am

We're happy to be part of your move, John. A tech is scheduled to install your service on 10/31 between 10:00AM-12:00PM at 100 W. Oxford Street. We'll text you a reminder the day before.

Need help returning old equipment?

Need to reschedule?

EXAMPLE - APPOINTMENT REMINDERS



Your Xfinity installation appointment is tomorrow! Tap here for appointment details: http://xfinityassist.com/78bd4140c4

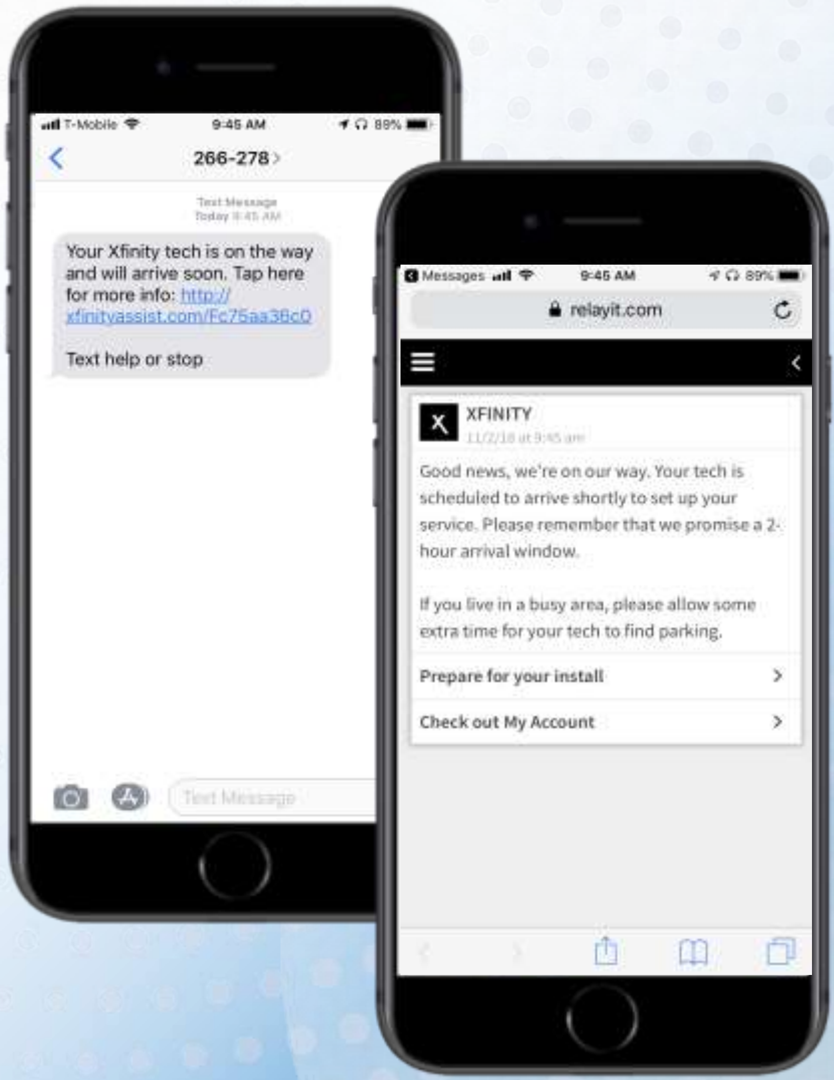
Txt help or stop

We'll see you tomorrow! This is a reminder that your tech will arrive on 10/31 between 10:00AM-12:00PM. Installs typically last between 2 and 4 hours.

Please make sure someone 18 years old or older is home for your appointment.

Prepare for your install

Need to reschedule?



Your Xfinity tech is on the way and will arrive soon. Tap here for more info: http://xfinityassist.com/Fc75aa36c0

Text help or stop

Good news, we're on our way. Your tech is scheduled to arrive shortly to set up your service. Please remember that we promise a 2-hour arrival window.

If you live in a busy area, please allow some extra time for your tech to find parking.

Prepare for your install

Check out My Account

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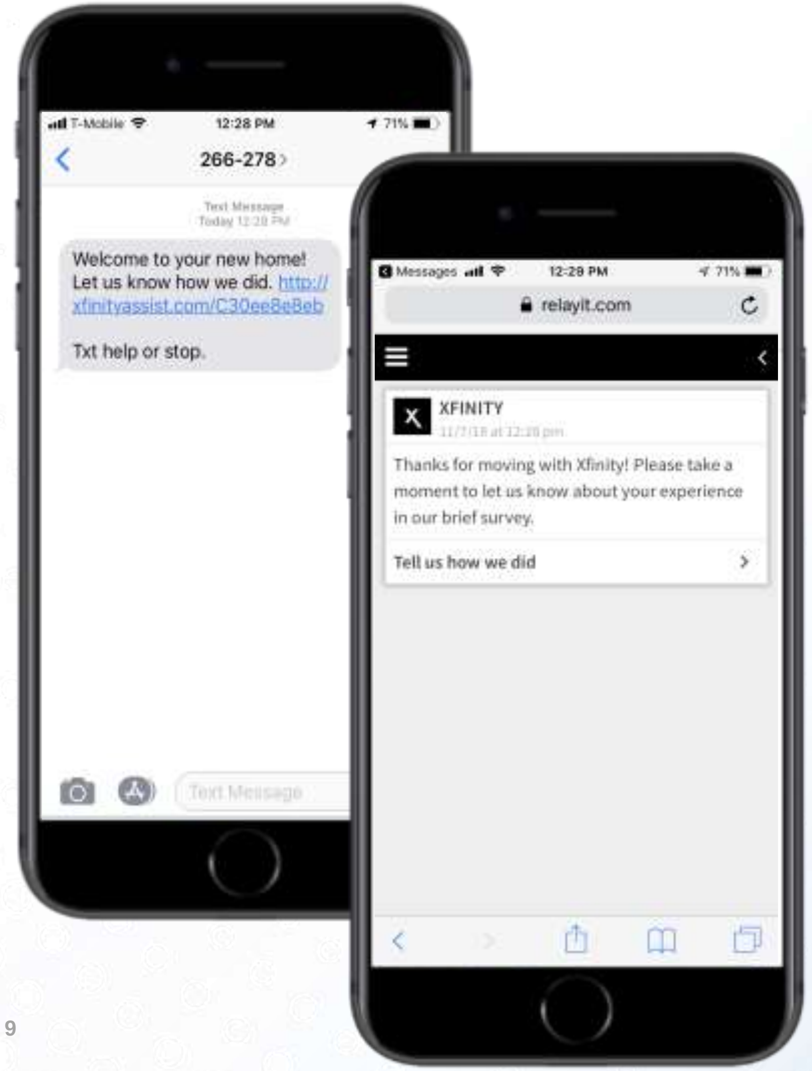
FOLLOW UP SATISFACTION AND SURVEY



266-278

Text Message
Today 12:28 PM

Welcome to your new home! Let us know how we did. http://xfinityassist.com/C30ee8e8eb

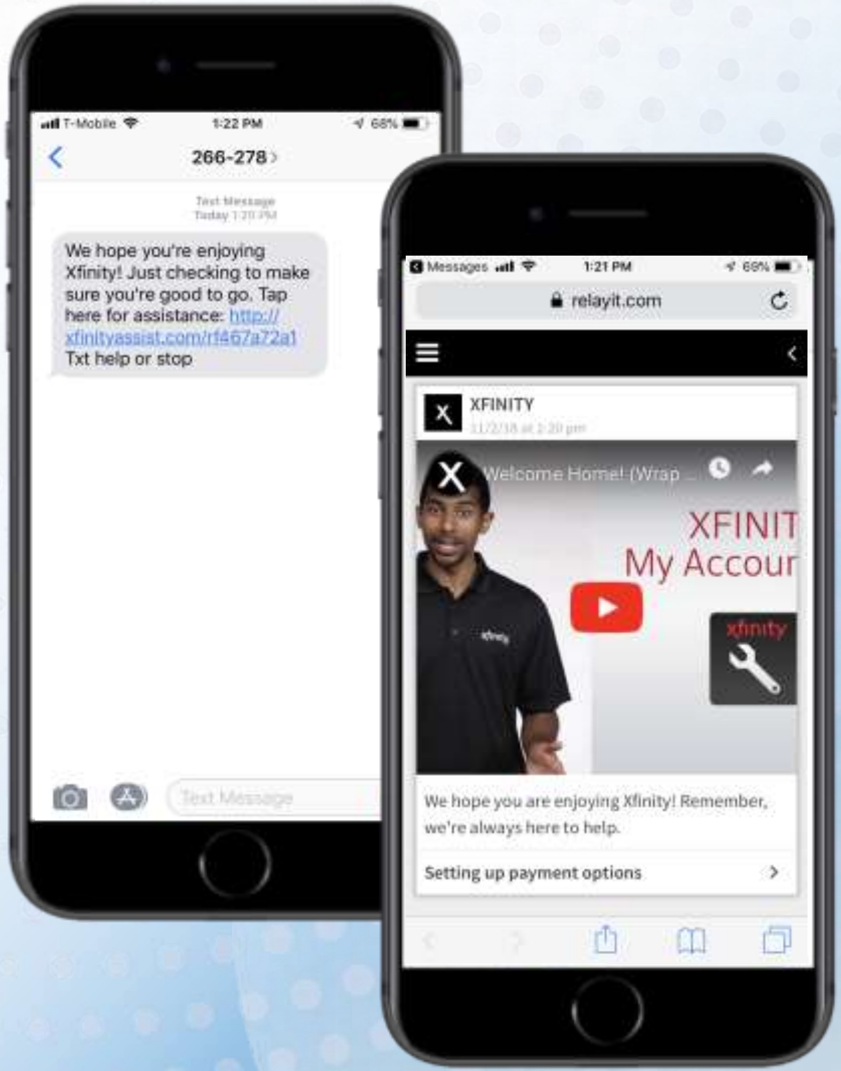
Txt help or stop.

relayit.com

XFINITY
11/7/18 at 12:28 pm

Thanks for moving with Xfinity! Please take a moment to let us know about your experience in our brief survey.

Tell us how we did



266-278

Text Message
Today 1:20 PM

We hope you're enjoying Xfinity! Just checking to make sure you're good to go. Tap here for assistance: http://xfinityassist.com/rf467a72a1
Txt help or stop

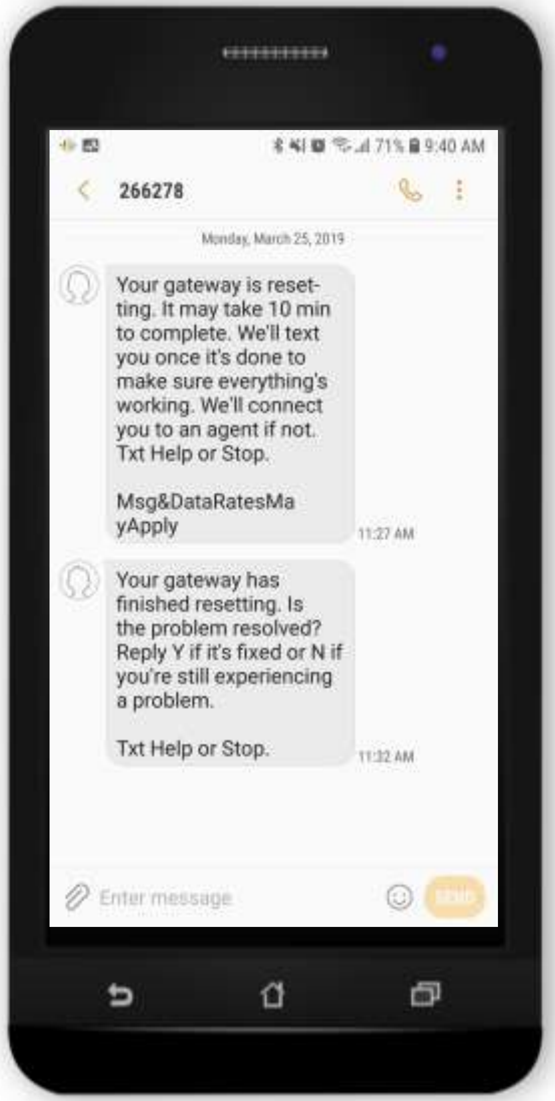
relayit.com

XFINITY
11/2/18 at 1:20 pm

We hope you are enjoying Xfinity! Remember, we're always here to help.

Setting up payment options

EXAMPLE WITH SMS RESPONSES



Your gateway is resetting. It may take 10 min to complete. We'll text you once it's done to make sure everything's working. We'll connect you to an agent if not. Txt Help or Stop.

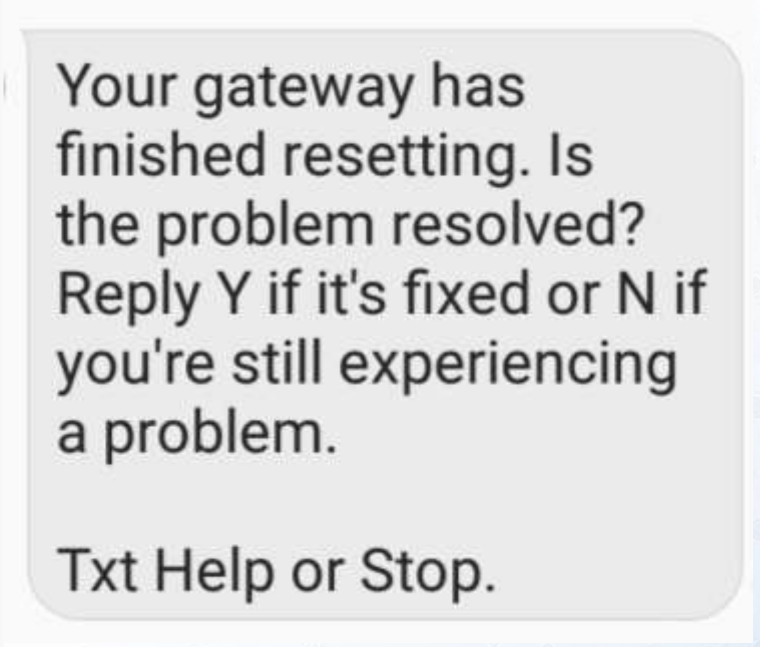
Msg&DataRatesMayApply

11:27 AM

Your gateway has finished resetting. Is the problem resolved? Reply Y if it's fixed or N if you're still experiencing a problem.

Txt Help or Stop.

11:32 AM



Your gateway has finished resetting. Is the problem resolved? Reply Y if it's fixed or N if you're still experiencing a problem.

Txt Help or Stop.

FOLLOWING UP ON THE INTERACTION:

Is the problem resolved?

If so, great!

If not, offer to talk with an agent.

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APACHE nifi

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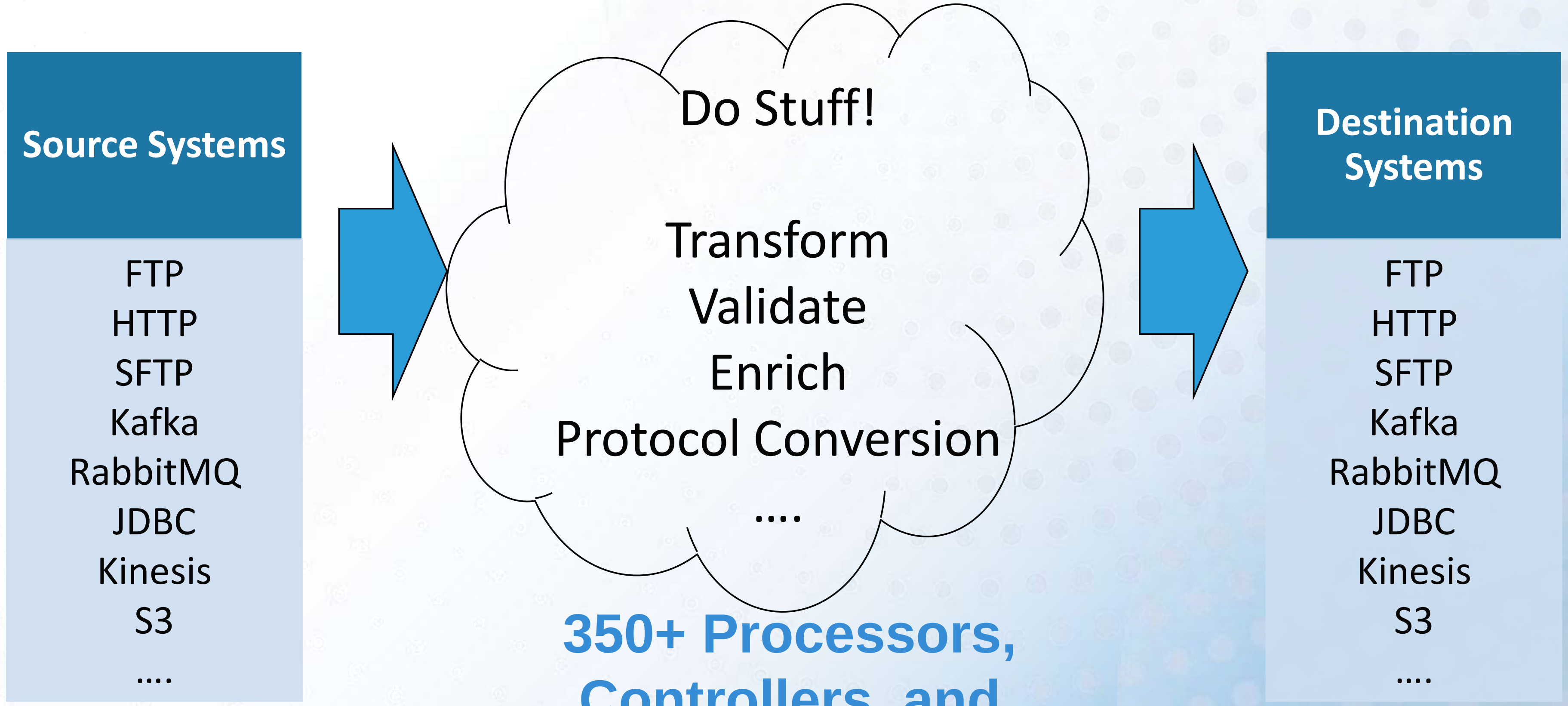
WHAT IS APACHE NIFI?

ENTERPRISE DATA FLOW…. GET STUFF *FROM* SOMEWHERE *TO* SOMEWHERE ELSE



350+ Processors, Controllers, and Reporting Tasks

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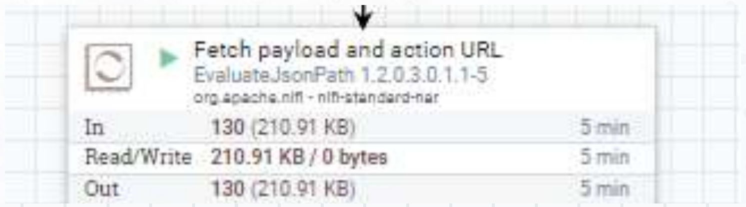
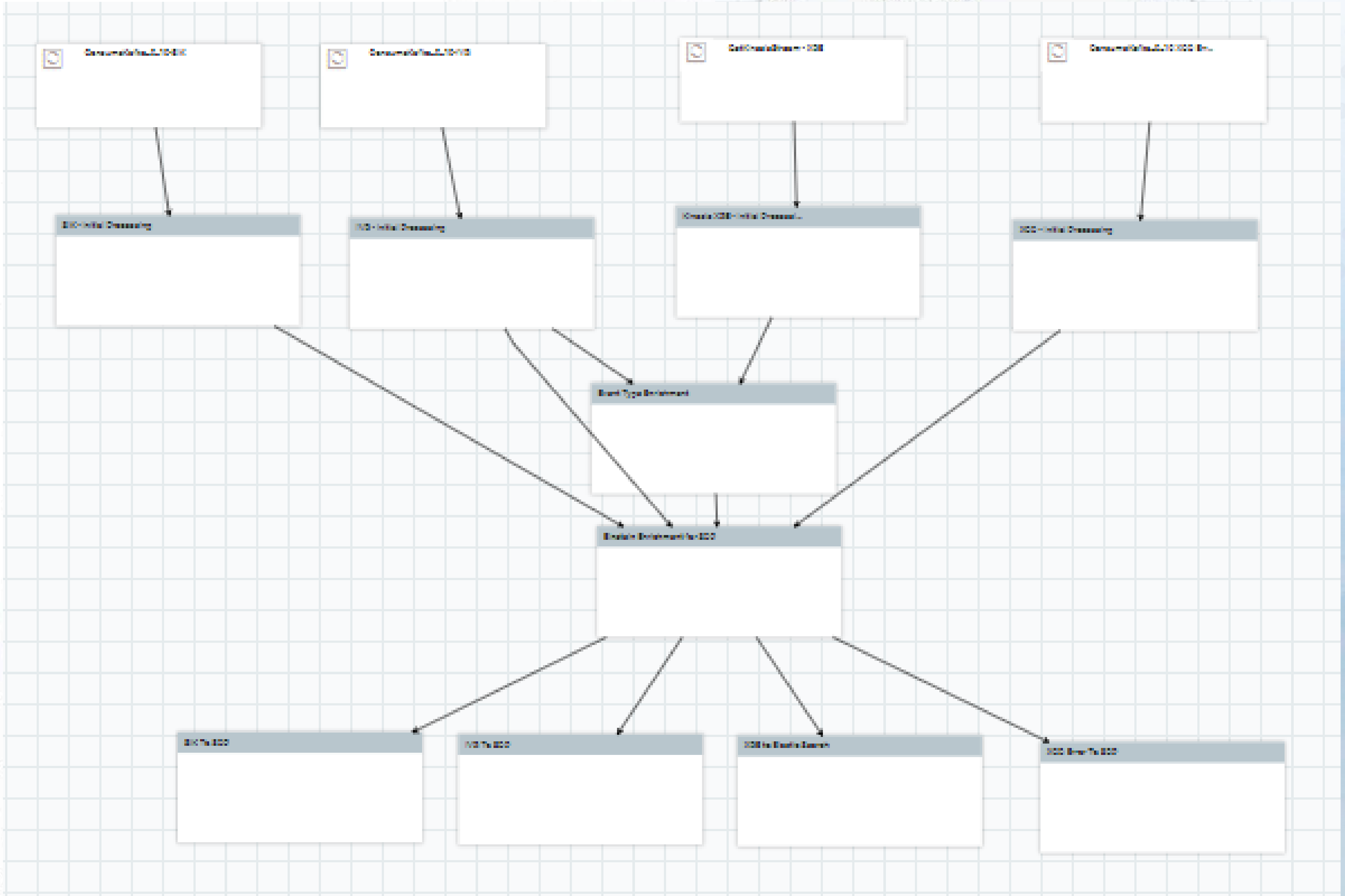
EXAMPLE NIFI FLOW


Fetch payload and action URL
EvaluateJsonPath 1.2.0.3.0.1.1-5
org.apache.nifi - nifi-standard-nar
In
130 (210.91 KB)
5 min
Read/Write
210.91 KB / 0 bytes
5 min
Out
130 (210.91 KB)
5 min



WHAT IS NIFI GOOD FOR?

ASYNCHRONOUS AND STATELESS STREAM PROCESSING

- PROTOCOL CONVERSION
- FORMAT CONVERSION AND TRANSFORMATION
- PUSH AND PULL SCENARIOS E.G. FTP
- LOTS OF DIFFERENT SOURCE AND SINK TYPES

MILD CONTENT ENRICHMENT

- SERVICE CALLS / REST CALLS
- JDBC / CACHE LOOKUP

RAPIDLY CHANGING BUSINESS LOGIC***

RAPID PROTOTYPING***

CONFIGURE RATHER THAN CODE ***

EXTENSIBILITY (SCRIPTING PROCESSORS, CUSTOM (JAVA) PROCESSORS)

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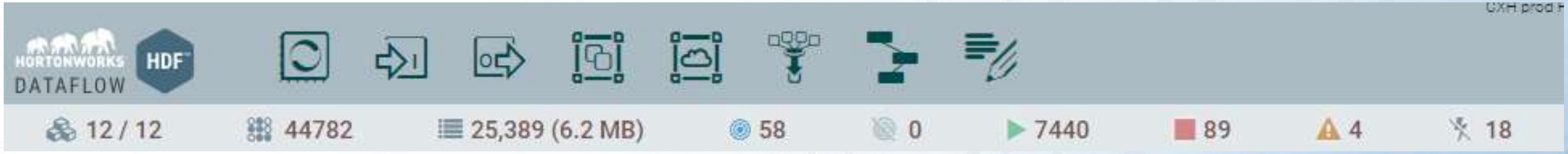
OUR TEAM'S HISTORY WITH NIFI

FIRST PRODUCTION WORKFLOW MAY 2016

RECENT SNAPSHOT:



- 65+ USE CASES
- 900+ PROCESS GROUPS
- 7400+ PROCESSORS
- 44000+ THREADS
- 12 NODE PRIMARY PRODUCTION CLUSTER (16VCPU/32GB)

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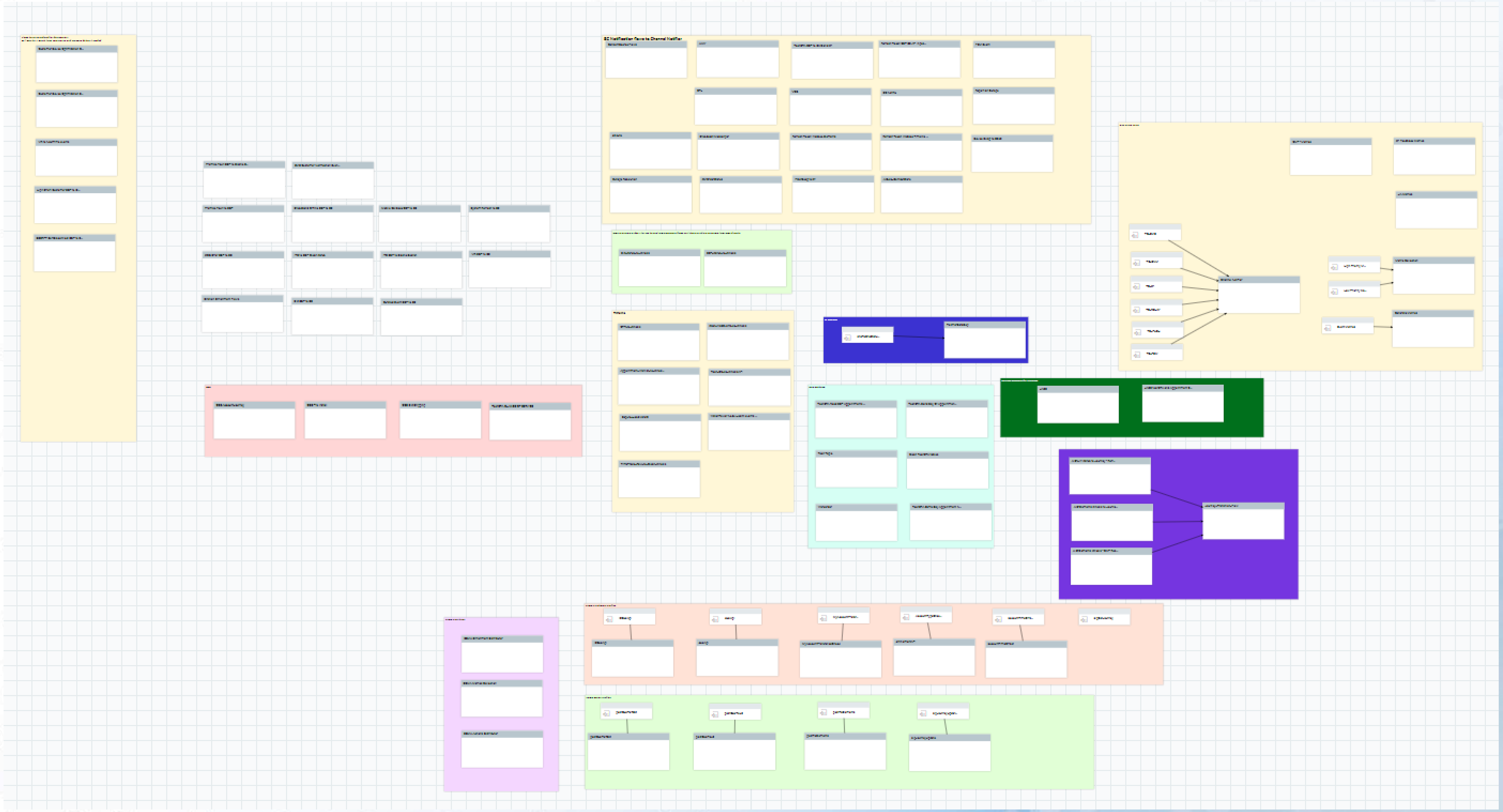
NIFI –TOP LEVEL



TOP PROCESSORS IN OUR NIFI CLUSTER

PROCESSING		COMMUNICATION	
1114	UpdateAttribute	207	InvokeHTTP
923	RouteOnAttribute	128	PutSql / ExecuteSql
732	JSON-related (incl. 240 JOLTTransformJson)	39	ConsumeKafka
729	ReplaceText	10	PublishKafka/PutKafka
527	ExecuteScript (many for HTTP Retry Logic)	41	GetKinesisStream
516	LogAttribute	6	PutKinesisStream
162	ControlRate	2	PutSFTP
98	AVRO-related	2	Consume AMQP
87	ExtractText		

APACHE FLINK

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WHAT IS APACHE FLINK?

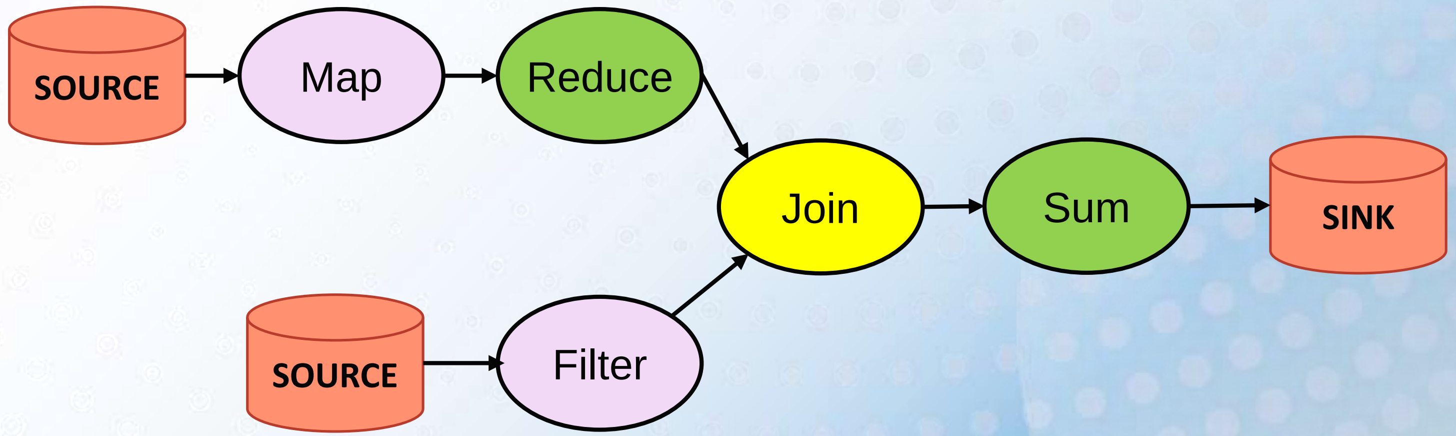
REAL-TIME STREAM PROCESSING FRAMEWORK

DISTRIBUTED PARALLEL COMPUTE ENGINE

SIMILAR API STYLE TO APACHE SPARK

LOW LATENCY, HIGH PERFORMANCE

STATEFUL



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FLINK STREAMING API STYLES

DATASTREAM API

MAP / REDUCE / FOLD

FILTER

AGGREGATIONS (SUM, MIN, MAX)

WINDOWS

- TIME AND COUNT
- TUMBLING, SLIDING

STREAM UNION, JOIN, CO-MAP

ITERATIONS

NOTE: THERE IS ALSO A BATCH API

TABLE / SQL API

SQL PROVIDED BY APACHE CALCITE

SELECTS, JOINS, GROUP-BY, AGGREGATIONS

WINDOWS

- TIME AND COUNT
- WINDOW-BASED JOINS
- WINDOW-BASED AGGREGATIONS

TEMPORAL TABLES

UDF (USER-DEFINED FUNCTIONS)

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EXAMPLE “WORD COUNT” CODE

```
DataStream<WordWithCount> windowCounts = textInputStream
        .flatMap(new FlatMapFunction<String, WordWithCount>() {
                public void flatMap(String value, Collector<WordWithCount> out) {
                        for (String word : value.split("\\s")) {
                            out.collect(new WordWithCount(word, 1L));
                        }}
                })
        .keyBy("word")
        .timeWindow(Time.seconds(5))
        .reduce(new ReduceFunction<WordWithCount>() {
                public WordWithCount reduce(WordWithCount a, WordWithCount b) {
                        return new WordWithCount(a.word, a.count + b.count);
                }
                });
```

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WHAT IS FLINK GOOD FOR?

HIGH THROUGHPUT STREAM PROCESSING

“MAP / REDUCE” STYLE PARALLEL COMPUTING

STATEFUL PROCESSING

AGGREGATIONS AND TIME WINDOWS

MULTIPLE-STREAM OPERATIONS

SQL-ON-STREAM

HOWEVER…

- LIMITED “ORCHESTRATION”
- LIMITED SOURCE / SINK TYPES

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FLINK CONNECTORS

FLINK PROJECT:

- APACHE KAFKA (SOURCE/SINK)
- AMAZON KINESIS STREAMS (SOURCE/SINK)
- RABBITMQ (SOURCE/SINK)
- APACHE NIFI (SOURCE/SINK)
- APACHE CASSANDRA (SINK)
- ELASTICSEARCH (SINK)
- HADOOP FILESYSTEM – HDFS (SINK)
- TWITTER STREAMING API (SOURCE)

ALSO VIA APACHE BAHIR:

- APACHE ACTIVEMQ (SOURCE/SINK)
- APACHE FLUME (SINK)
- REDIS (SINK)
- AKKA (SINK)
- NETTY (SOURCE)

OUR TEAM’S HISTORY WITH FLINK

USED FOR 4+ DIFFERENT KINDS OF USE CASES

FIRST DEV – NOV 2016

FIRST PRODUCTION – MAY 2018

CUSTOMER EXPERIENCE USE CASE:

- 7 BILLION DATA POINTS PER DAY

PRODUCTION SIZE FOR ABOVE:

- 14 FLINK APPLICATION CLUSTERS
- 150 VMS
- 1100 VCPU
- 5.8 TB RAM

NIFI / FLINK MAJOR DIFFERENCES

NiFi	Flink
Distributed-capable	Distributed by nature
Lineage, queues, buffering	Straight-through processing
100’s of processor types	Stream-oriented operators
Limited state processing	Natively stateful if desired
UI-driven visual development	Code / compiled / deployed

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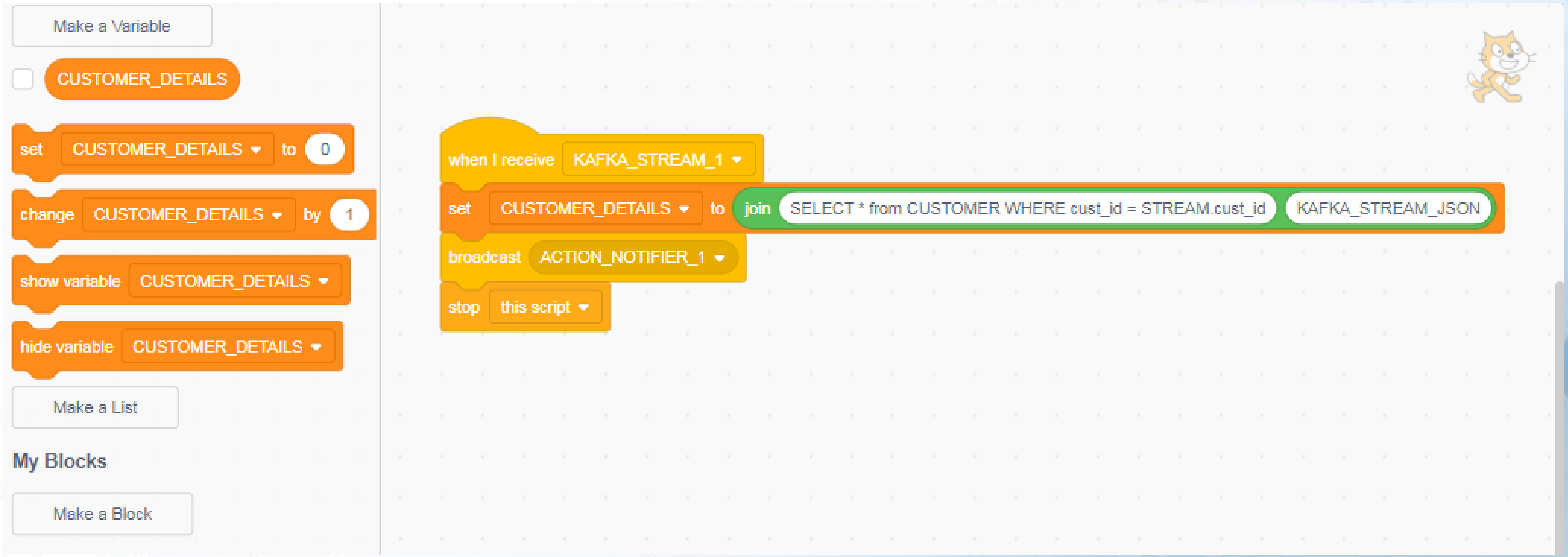
“CONFIGURE NOT CODE”



Make a Variable

CUSTOMER_DETAILS

set CUSTOMER_DETAILS to 0

change CUSTOMER_DETAILS by 1

show variable CUSTOMER_DETAILS

hide variable CUSTOMER_DETAILS

Make a List

My Blocks

Make a Block

```
when I receive KAFKA_STREAM_1
set CUSTOMER_DETAILS to join SELECT * from CUSTOMER WHERE cust_id = STREAM.cust_id KAFKA_STREAM_JSON
broadcast ACTION_NOTIFIER_1
stop this script
```

Scratch Website - http://scratch.mit.edu/

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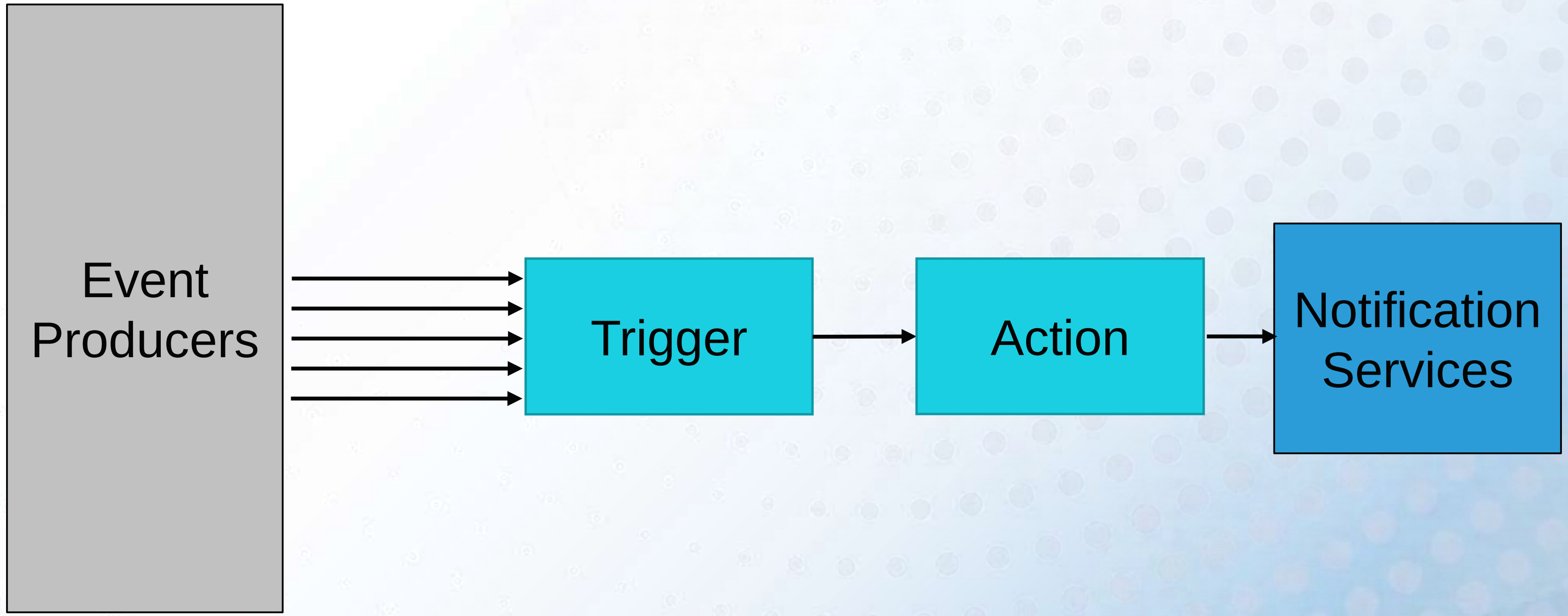
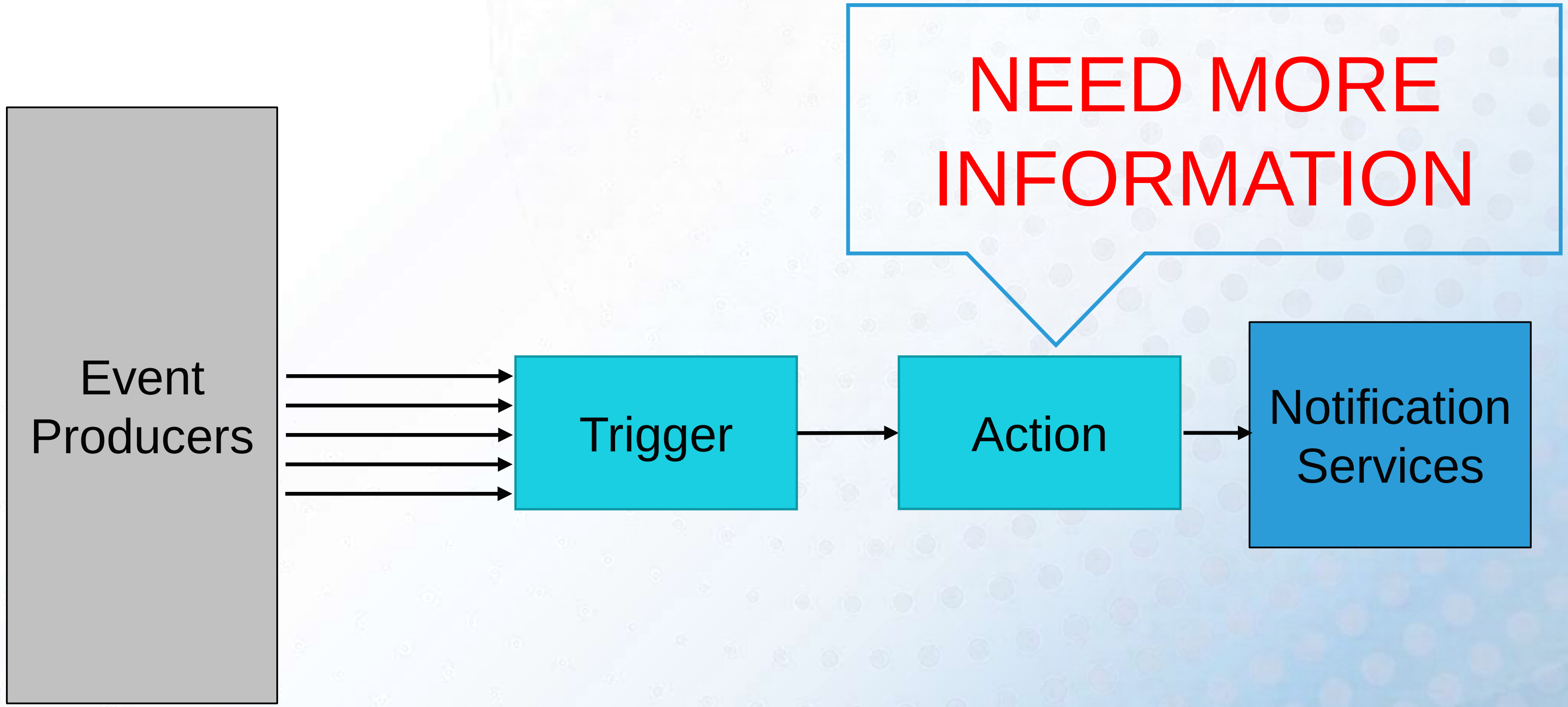
MESSAGING USE CASE

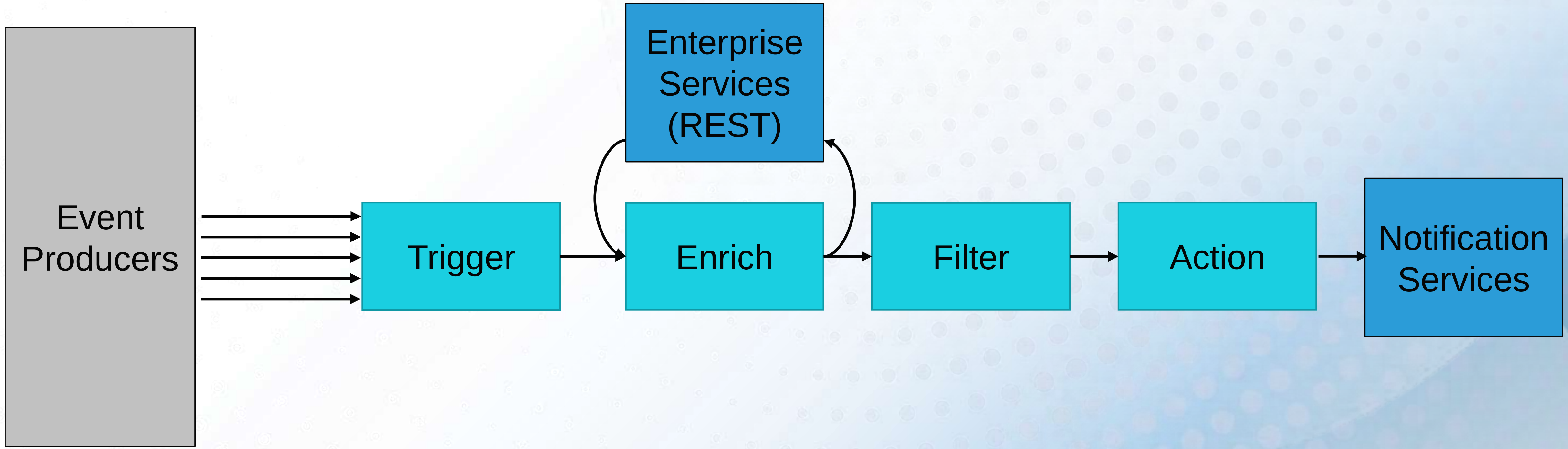
START SIMPLE (EVENT, CONDITION, ACTION)



START SIMPLE (EVENT, CONDITION, ACTION)



STATELESS USE CASE



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EXAMPLE: VIDEO ON DEMAND

EVENT:

RECEIVE “VIDEO ON DEMAND” MESSAGE

TRIGGER:

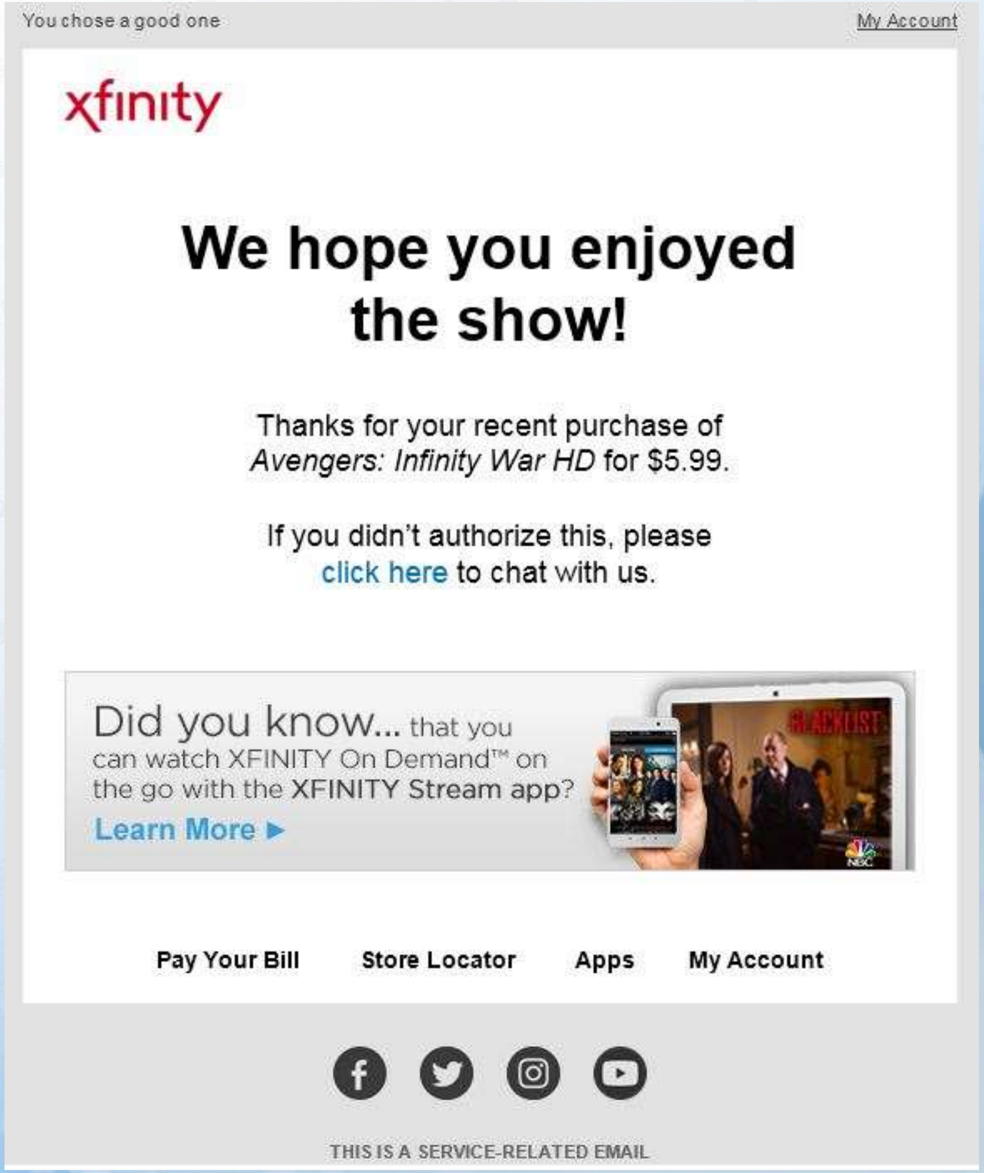
IF (PRICE > 5) AND (TYPE = ‘RENTAL’)

ENRICH:

PREFERRED COMMUNICATION (EMAIL OR SMS)

ACTION:

SEND CONFIRMATION EMAIL OR SMS



You chose a good one

My Account

xfinity

We hope you enjoyed the show!

Thanks for your recent purchase of *Avengers: Infinity War HD* for $5.99.

If you didn’t authorize this, please click here to chat with us.

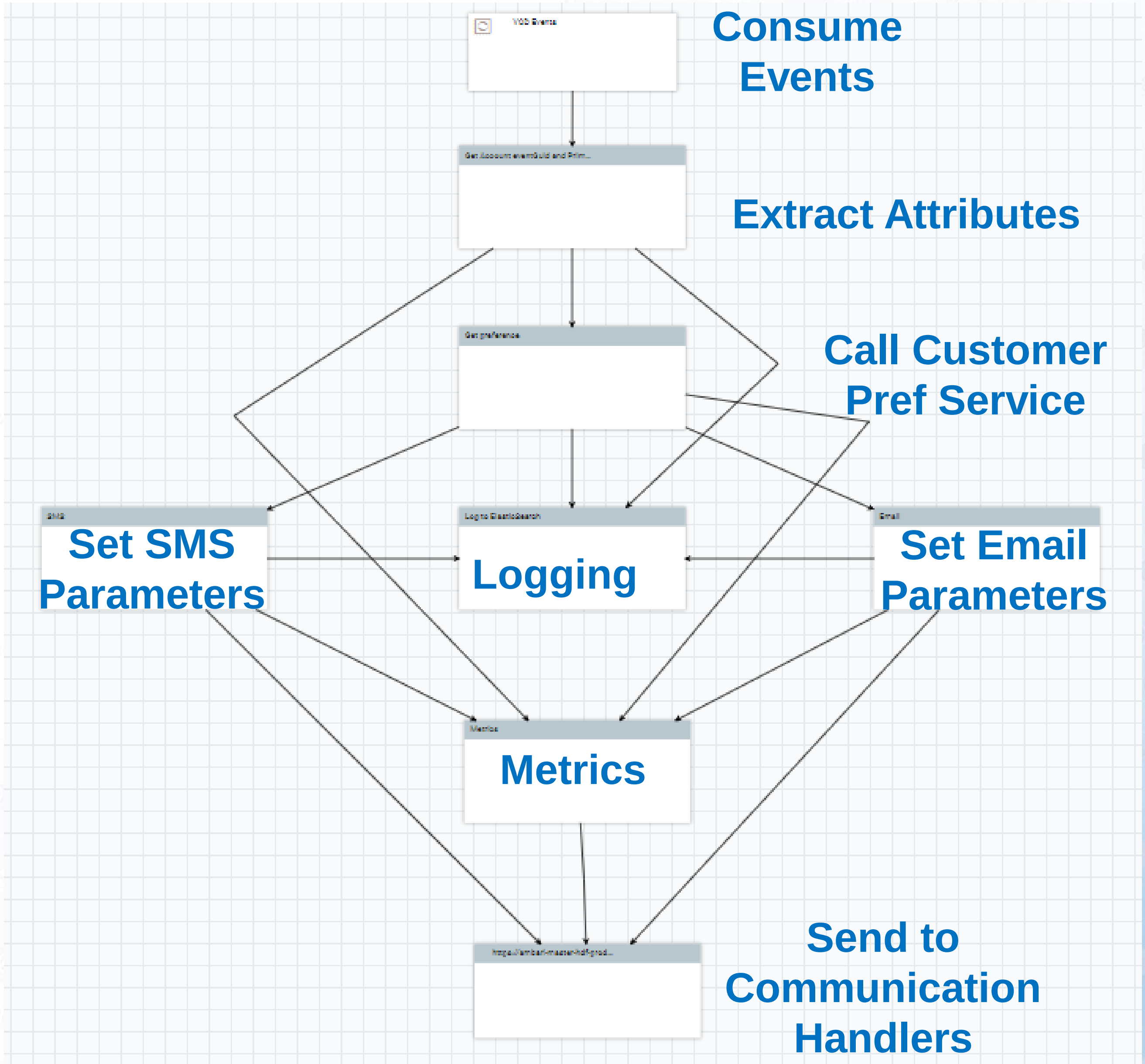
Did you know... that you can watch XFINITY On Demand™ on the go with the XFINITY Stream app?

Learn More ▶

Pay Your Bill Store Locator Apps My Account

THIS IS A SERVICE-RELATED EMAIL

NIFI VERSION



TRIGGERS

SQL ON STREAM – APACHE CALCITE

FLINK APPROACH - SQL

```
    // SQL query with an inlined (unregistered) table
    Table table = tableEnv.fromDataStream(ds, "user, product, amount");
    Table result = tableEnv.sqlQuery(
      "SELECT SUM(amount) FROM " + table + " WHERE product LIKE '%Rubber%'");
```

NIFI APPROACH – TRADITIONAL

- EVALUATEJSONPATH / EXTRACTTEXT
- NIFI EXPRESSION LANGUAGE + ROUTEONATTRIBUTE

NIFI APPROACH - CALCITE

- QUERYRECORD PROCESSOR
- RECORDREADER / RECORDWRITER PATTERN

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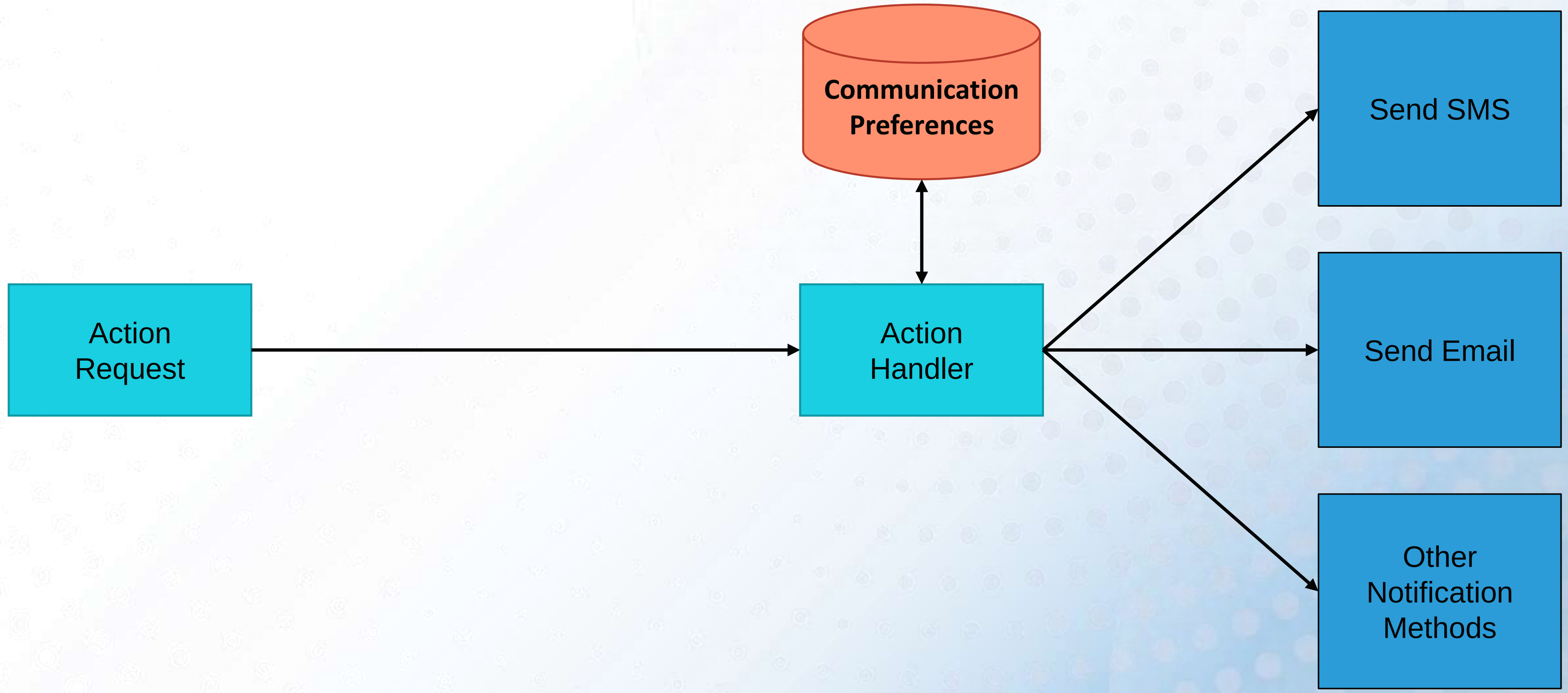
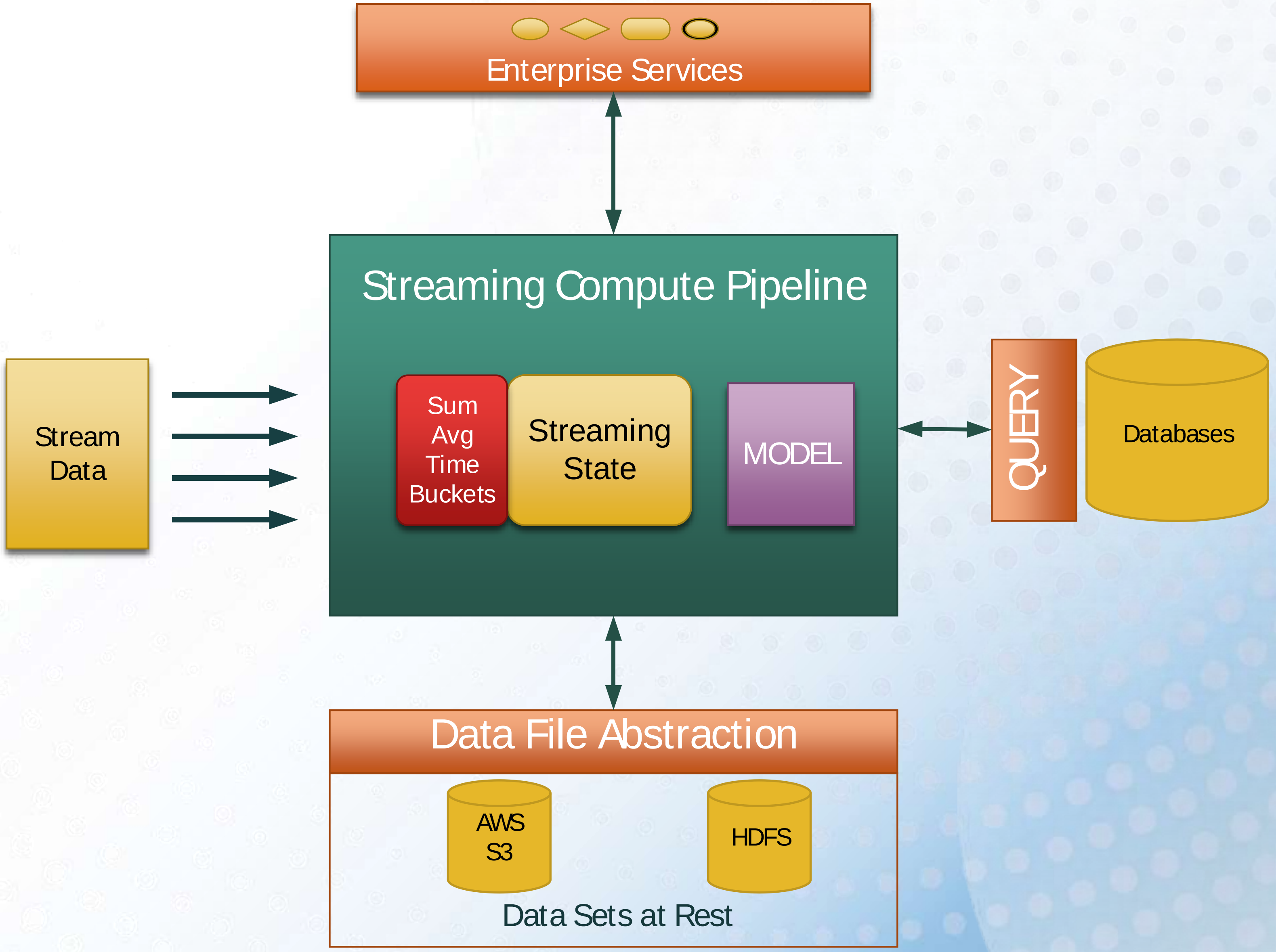
ENRICHMENT AND ACTIONS

ACTIONS


Communication Preferences
Action Request
Action Handler
Send SMS
Send Email
Other Notification Methods

ENRICHMENT DATA PLANE



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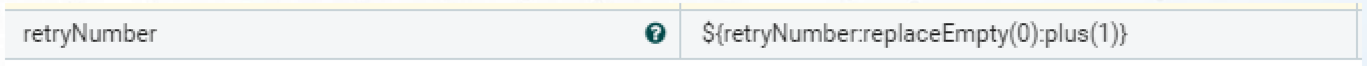
CALLING SERVICES - NIFI

INVOKEHTTP PROCESSOR

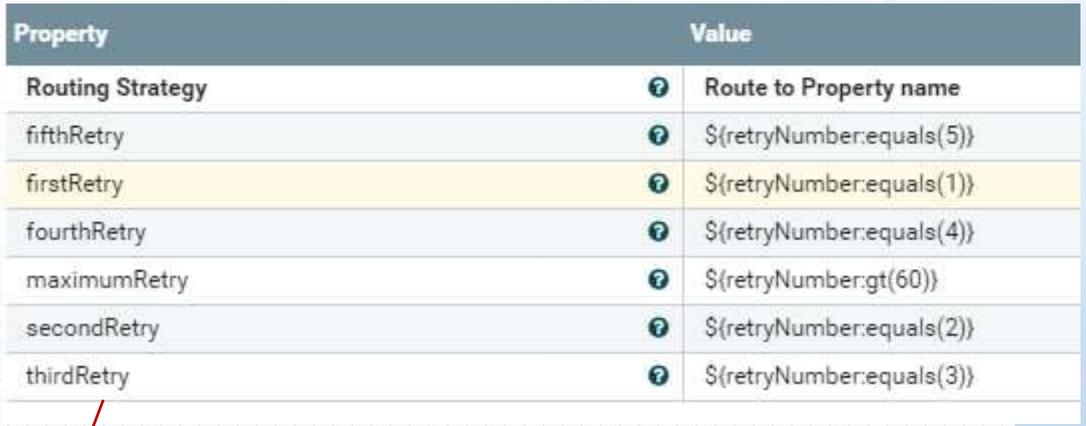
NIFI GOOD FOR

- REQUEST PREPARATION
- RESULT TRANSFORMATION
- HTTP ATTRIBUTE HANDLING
- FAILURE AND RETRY LOGIC

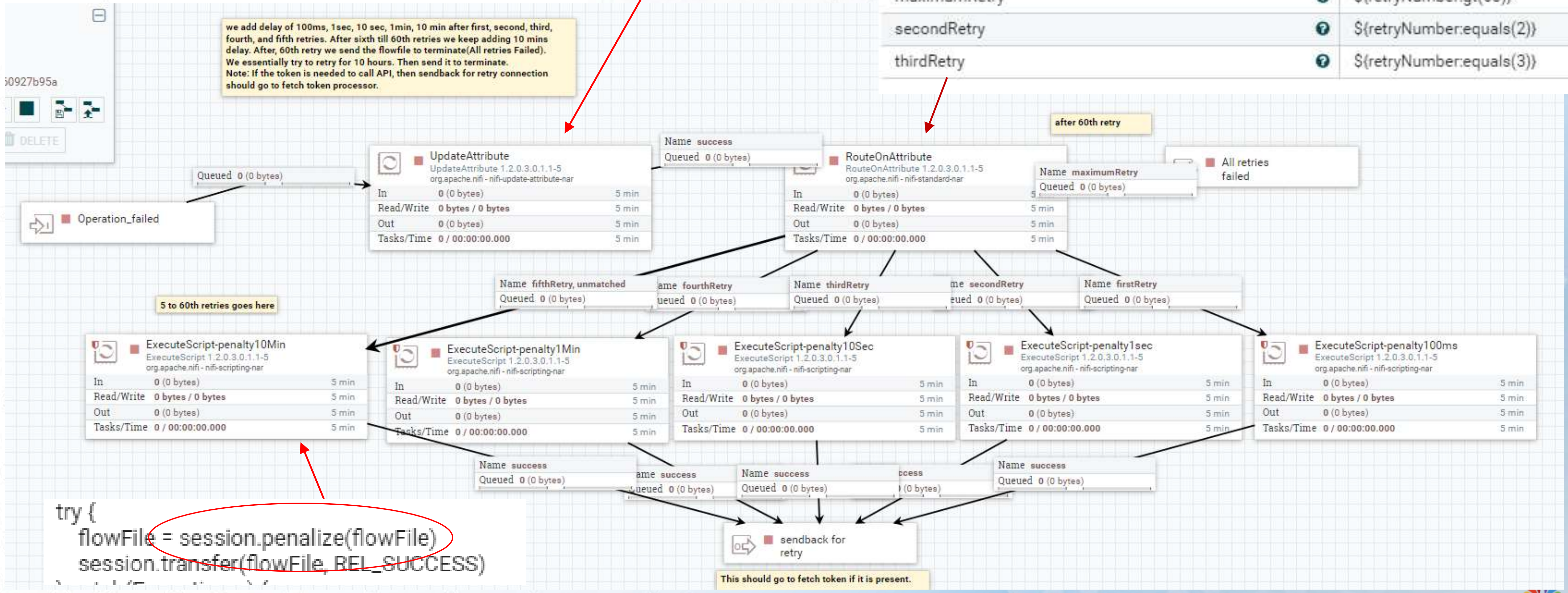
NIFI - RETRY LOGIC



retryNumber	${retryNumber:replaceEmpty(0):plus(1)}



Property	Value
Routing Strategy	Route to Property name
fifthRetry	${retryNumber:equals(5)}
firstRetry	${retryNumber:equals(1)}
fourthRetry	${retryNumber:equals(4)}
maximumRetry	${retryNumber:gt(60)}
secondRetry	${retryNumber:equals(2)}
thirdRetry	${retryNumber:equals(3)}



we add delay of 100ms, 1sec, 10 sec, 1min, 10 min after first, second, third, fourth, and fifth retries. After sixth till 60th retries we keep adding 10 mins delay. After, 60th retry we send the flowfile to terminate(All retries Failed). We essentially try to retry for 10 hours. Then send it to terminate.
Note: If the token is needed to call API, then sendback for retry connection should go to fetch token processor.

after 60th retry

5 to 60th retries goes here

This should go to fetch token if it is present.

```
try {
    flowFile = session.penalize(flowFile)
    session.transfer(flowFile, REL_SUCCESS)
```

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FLINK METHOD FOR CALLING SERVICES

ASYNC I/O OPERATOR

WORKS WITH ASYNC-CAPABLE POOLS

- HTTP
- JDBC

CODE-YOUR-OWN

NO BUILT-IN RETRY CAPABILITY

TIMEOUTS CAN LEAD TO FLOW FAILURE

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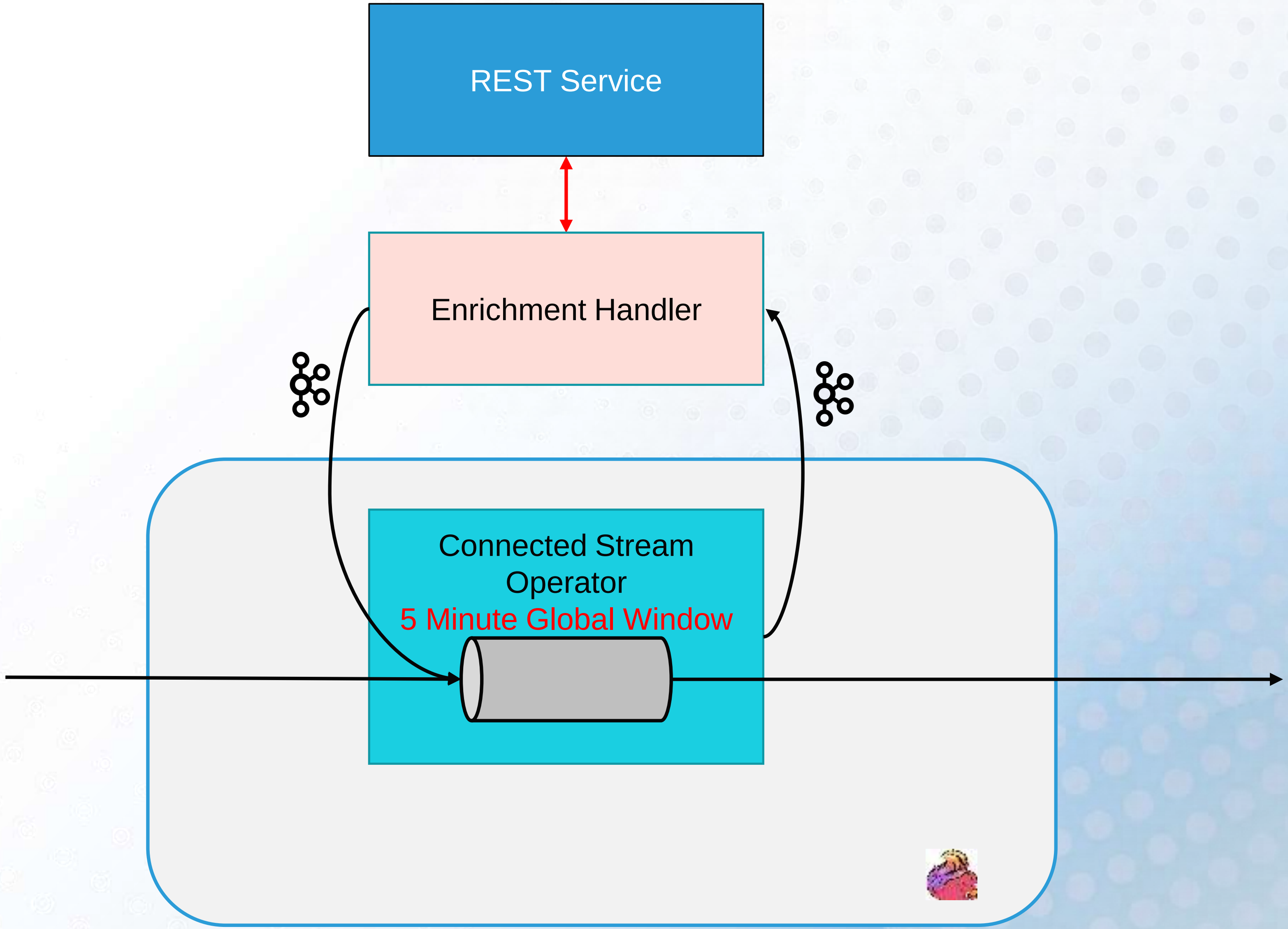
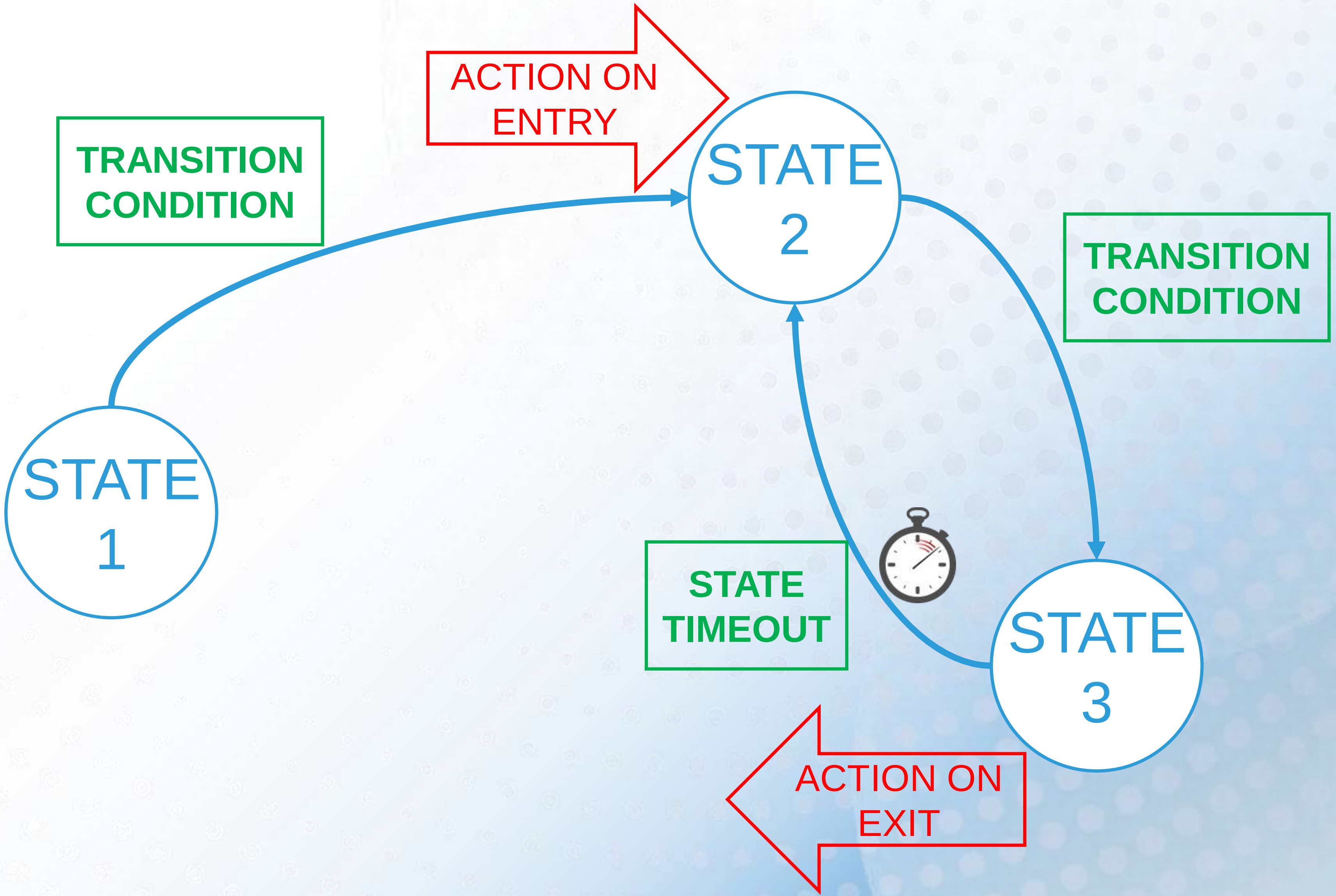
FLINK CONNECTED STREAM PATTERN

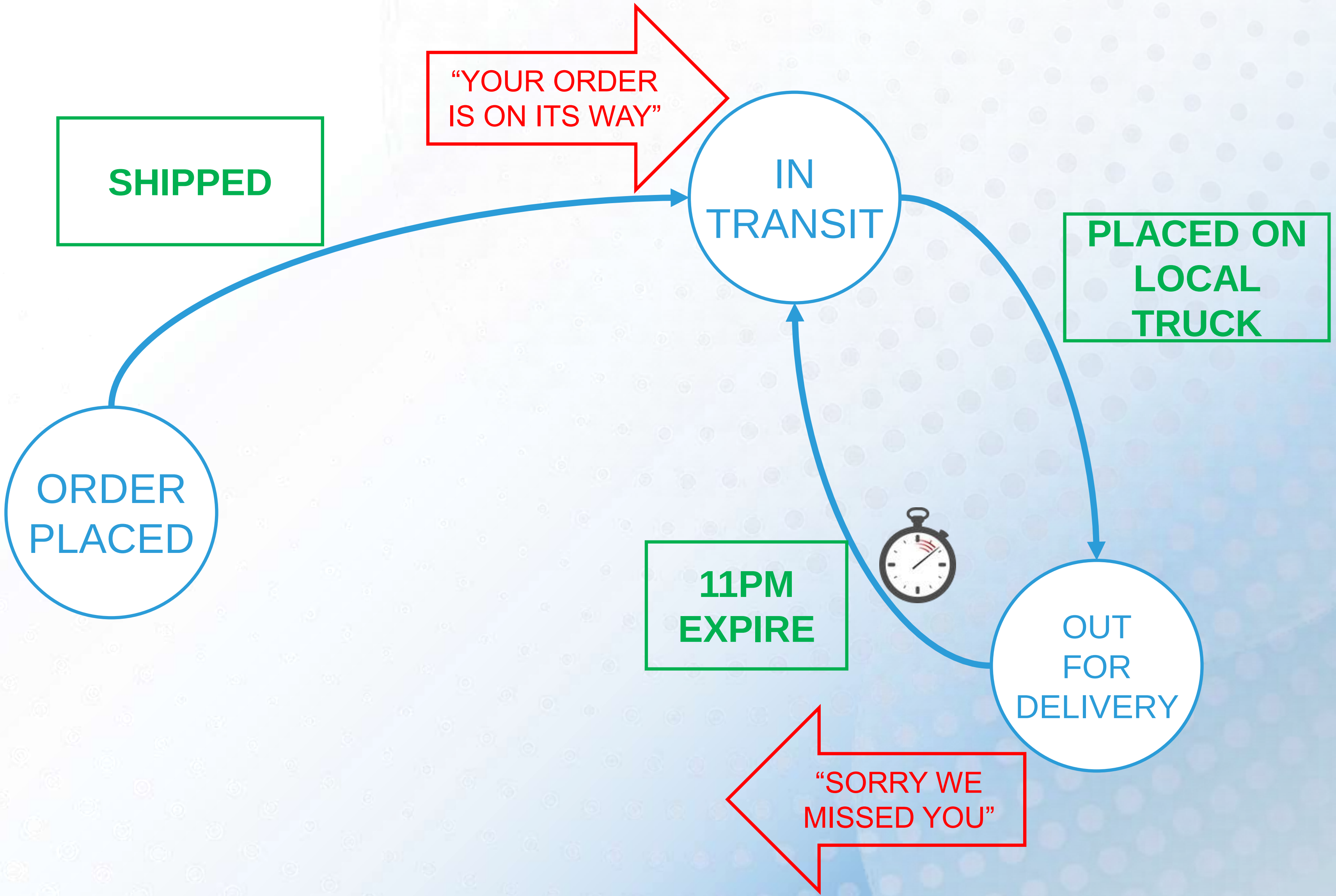


STATEFUL FLOWS

WHAT IS "STATE"?



EXAMPLE STATEFUL JOURNEY



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NIFI STATE

PROCESSOR STATE (LOCAL AND CLUSTERED)

- BACKED BY ZOOKEEPER
- PROCESSORS:
  - UPDATEATTRIBUTE (LOCAL ONLY)
  - ATTRIBUTEROLLINGWINDOW

"DISTRIBUTED" MAP CACHE

- IN-MEMORY OR REDIS-BACKED (NEW IN 1.8)
- NODE-LOCAL OR "SINGLE NODE" CENTRAL CACHE
- PROCESSORS:
  - PUTDISTRIBUTEMAPCACHE, GETDISTRIBUTEDMAPCACHE

CACHE != STATE

(but you can store state in a cache)

BEFORE NIFI 1.8: NO EASY PARTITIONING / SHARDING

1.8 AND LATER: NODE BALANCED CONNECTIONS

PARTITION BY ATTRIBUTE

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USING EXTERNAL STATE WITH NIFI

USE EXTERNAL DATABASE (E.G. MYSQL)

PERIODIC QUERY TO FIND EXPIRED TIMERS

BEWARE OF RACE CONDITIONS / FREQUENT UPDATES

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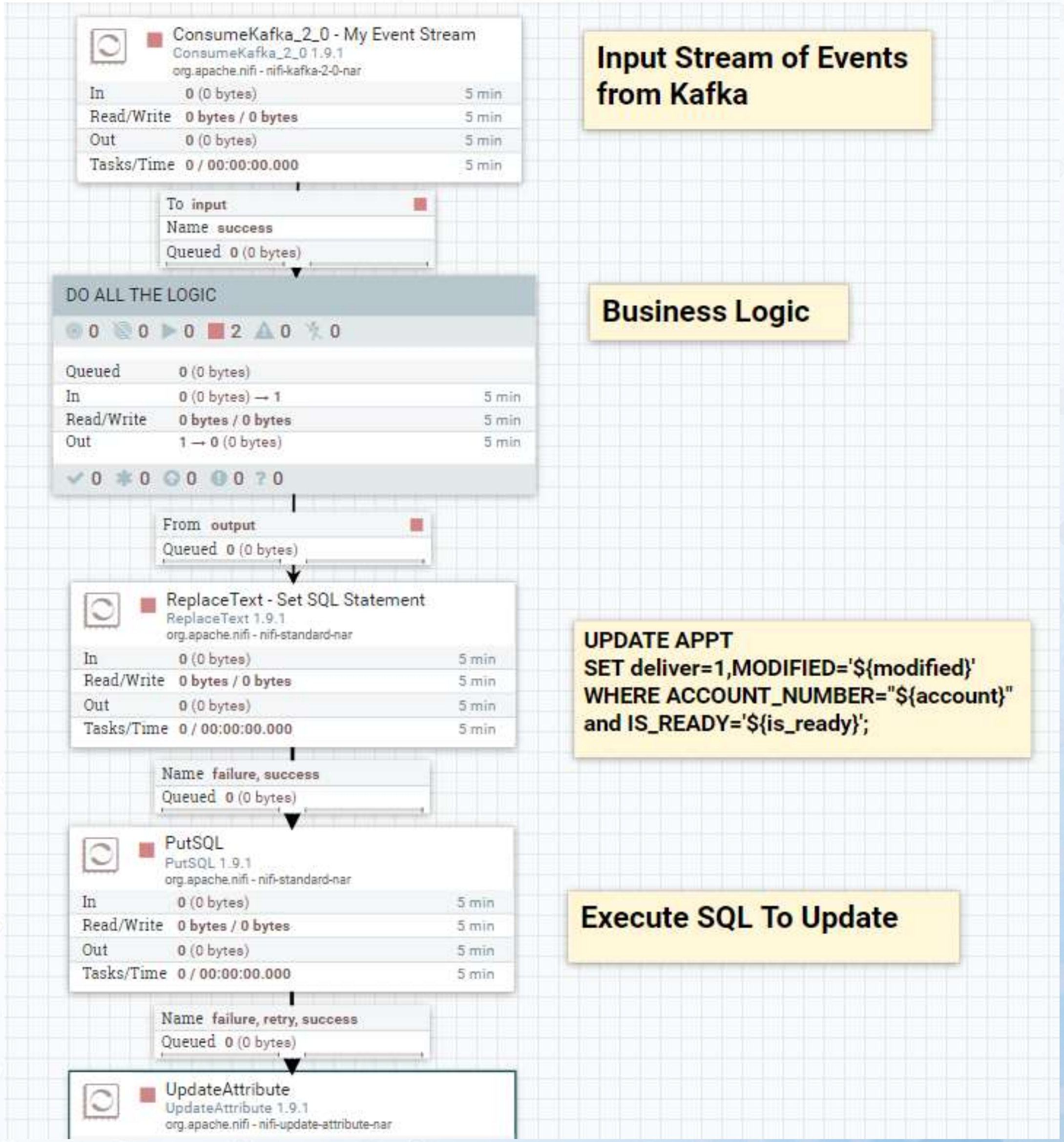
NIFI – SQL BASED STATE (STATE UPDATE)



ConsumeKafka_2_0 - My Event Stream
ConsumeKafka_2_0 1.9.1
org.apache.nifi - nifi-kafka-2-0-nar

In	0 (0 bytes)	5 min
Read/Write	0 bytes / 0 bytes	5 min
Out	0 (0 bytes)	5 min
Tasks/Time	0 / 00:00:00.000	5 min

To input
Name success
Queued 0 (0 bytes)

DO ALL THE LOGIC

0 0 0 2 0 0

Queued	0 (0 bytes)	
In	0 (0 bytes) → 1	5 min
Read/Write	0 bytes / 0 bytes	5 min
Out	1 → 0 (0 bytes)	5 min

0 0 0 0 0

From output
Queued 0 (0 bytes)

ReplaceText - Set SQL Statement
ReplaceText 1.9.1
org.apache.nifi - nifi-standard-nar

In	0 (0 bytes)	5 min
Read/Write	0 bytes / 0 bytes	5 min
Out	0 (0 bytes)	5 min
Tasks/Time	0 / 00:00:00.000	5 min

Name failure, success
Queued 0 (0 bytes)

PutSQL
PutSQL 1.9.1
org.apache.nifi - nifi-standard-nar

In	0 (0 bytes)	5 min
Read/Write	0 bytes / 0 bytes	5 min
Out	0 (0 bytes)	5 min
Tasks/Time	0 / 00:00:00.000	5 min

Name failure, retry, success
Queued 0 (0 bytes)

UpdateAttribute
UpdateAttribute 1.9.1
org.apache.nifi - nifi-update-attribute-nar

Input Stream of Events from Kafka

Business Logic

```
UPDATE APPT
SET deliver=1,MODIFIED='${modified}'
WHERE ACCOUNT_NUMBER="${account}"
and IS_READY='${is_ready}';
```

Execute SQL To Update

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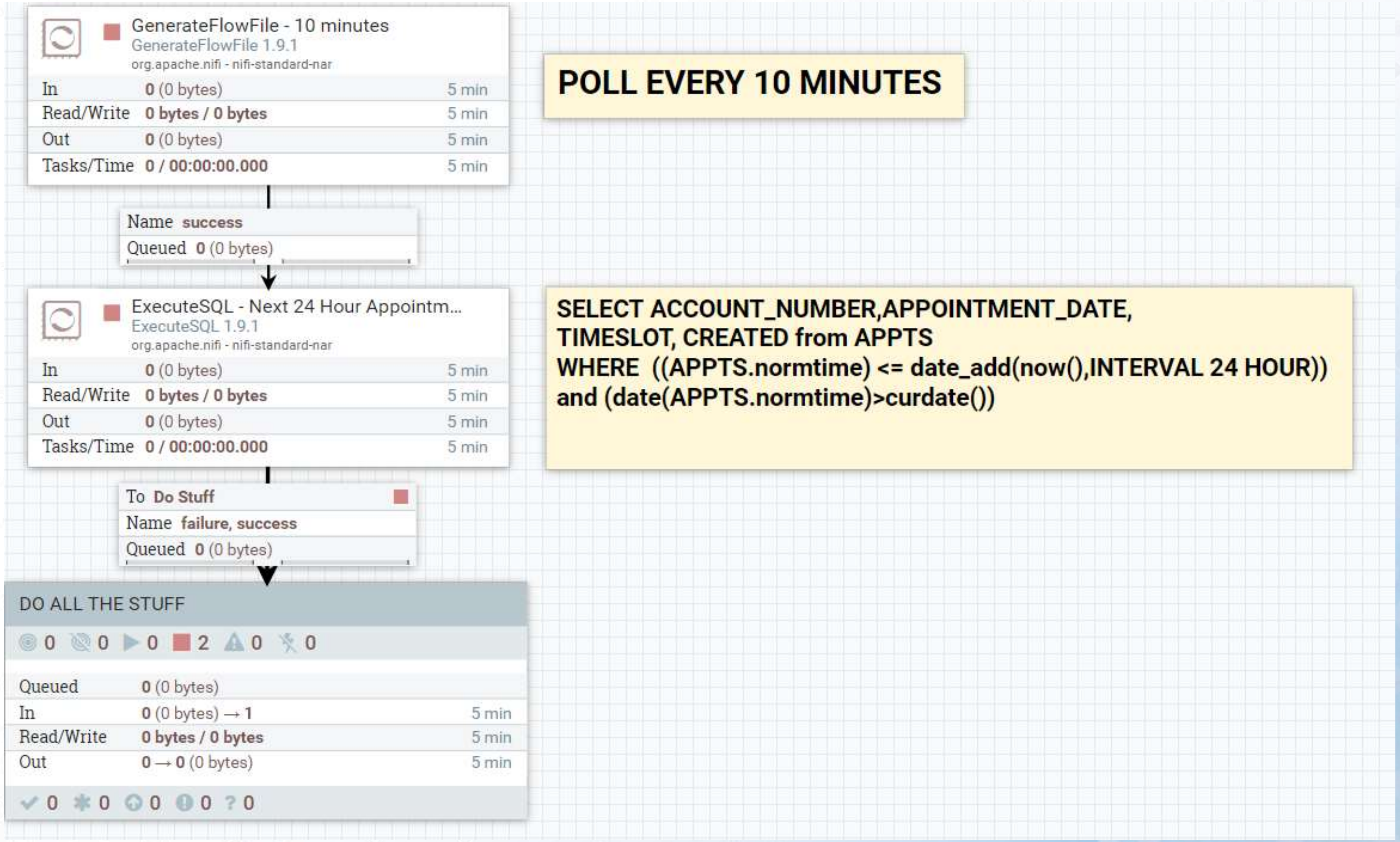
NIFI – SQL BASED STATE (TIMER EXPIRATION)



GenerateFlowFile - 10 minutes
GenerateFlowFile 1.9.1
org.apache.nifi - nifi-standard-nar

In	0 (0 bytes)	5 min
Read/Write	0 bytes / 0 bytes	5 min
Out	0 (0 bytes)	5 min
Tasks/Time	0 / 00:00:00.000	5 min

Name success
Queued 0 (0 bytes)

ExecuteSQL - Next 24 Hour Appointm...
ExecuteSQL 1.9.1
org.apache.nifi - nifi-standard-nar

In	0 (0 bytes)	5 min
Read/Write	0 bytes / 0 bytes	5 min
Out	0 (0 bytes)	5 min
Tasks/Time	0 / 00:00:00.000	5 min

To Do Stuff
Name failure, success
Queued 0 (0 bytes)

DO ALL THE STUFF

0 0 0 2 0 0

Queued	0 (0 bytes)	
In	0 (0 bytes) → 1	5 min
Read/Write	0 bytes / 0 bytes	5 min
Out	0 → 0 (0 bytes)	5 min

✓ 0 ✱ 0 0 0 ? 0

POLL EVERY 10 MINUTES

```
SELECT ACCOUNT_NUMBER,APPOINTMENT_DATE,
TIMESLOT, CREATED from APPTS
WHERE ((APPTS.normtime) <= date_add(now(),INTERVAL 24 HOUR))
and (date(APPTS.normtime)>curdate())
```

FLINK APPROACH TO STATE

KEYED (NODE LOCAL) STATE

WINDOWED OPERATIONS (E.G. 10 MINUTE WINDOW SLIDING BY 1 MINUTE)

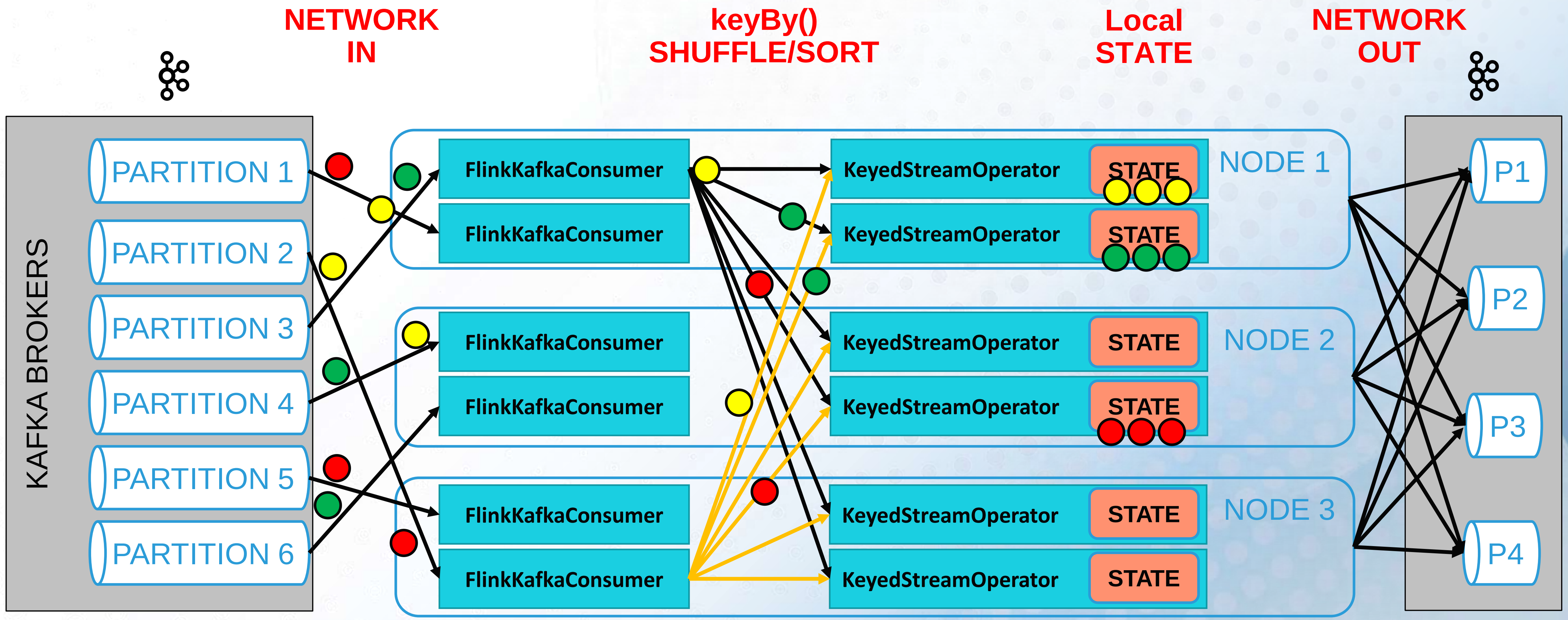
EVERY OPERATOR CAN HAS ITS OWN STATE

QUERYABLE STATE

ROCKSDB (IN-MEMORY + DISK STORAGE)

CHECKPOINTS AND SAVEPOINTS TO DURABLE FILESYSTEM (HDFS, S3)

DISTRIBUTED FLINK STATE



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WORKING WITH FLINK STATE

```
private transient MapState<String, String> myState;

public void open(Configuration config) {
      MapStateDescriptor<String, String> descriptor =
                new MapStateDescriptor<String, String>(
                        “myStateName", // the state name
                        String.class,  String.class); // K/V types
      //get the mapstate for the key
      myState = getRuntimeContext().getMapState(descriptor);
}

public String map(String myField) {
      String myValue = myState.get(myField);
      myState.put(myField, myValue + “ another one”);
}
```

DECLARE VARIABLE

DESCRIPTOR WITH TYPE INFORMATION

INITIALIZE STATE

READ/WRITE STATE

INTEGRATING NIFI AND FLINK

OPTION 1: BUILT-IN FLINK-NIFI CONNECTOR

USES NIFI "SITE TO SITE" PROTOCOL

ENABLES PASSING "FLOWFILE ATTRIBUTE" AND "FLOWFILE CONTENT" INTACT

```
public interface NiFiDataPacket {
        byte[] getContent();
        Map<String, String> getAttributes();
}
```

FLINK BACKPRESSURE CONCERNS

HTTPS://GITHUB.COM/APACHE/FLINK/TREE/MASTER/FLINK-CONNECTORS/FLINK-CONNECTOR-NIFI

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OPTION 2: KAFKA TOPIC

LOOSER COUPLING

ALLOWS MANY “ACTION HANDLERS” (NOT JUST NIFI)

MORE BUFFERING / REDUCE BACKPRESSURE RISK

JSON AS STANDARD PAYLOAD

NIFI + FLINK SOLUTION APPROACH

SOLUTION APPROACH

FLINK AS THE HIGH VOLUME EVENT PROCESSOR

- MANY USE CASES WITH ONE STREAM
- SQL ON STREAM

FLINK-BASED TRIGGER, FILTER, ENRICHMENT REQUEST, AND ACTION REQUEST

Configuration-based use cases in Flink

FLINK MANAGES CUSTOMER JOURNEY STATE

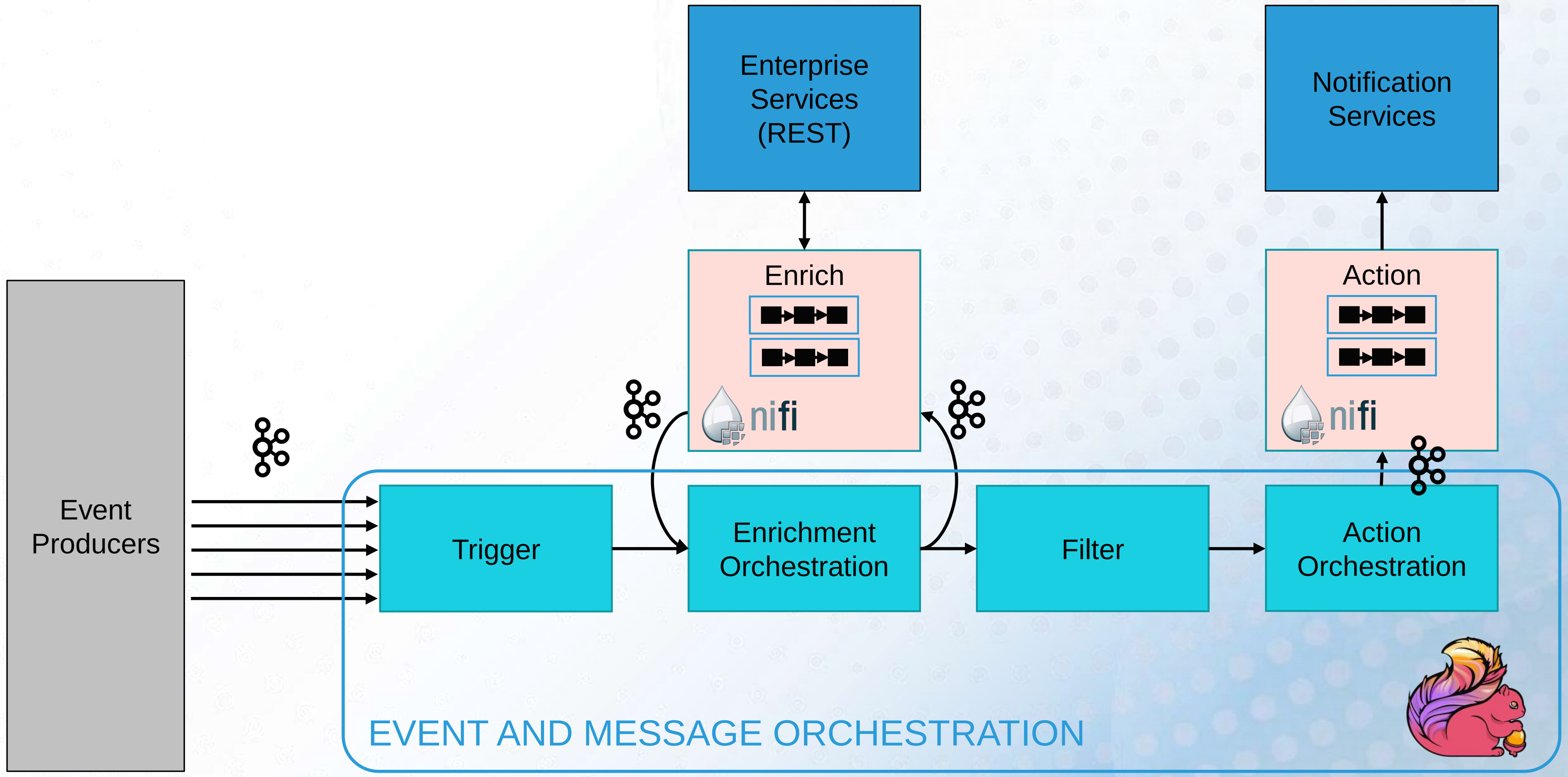
NIFI FOR:

NAMED “PROFILES” FOR ENRICHMENT SERVICES

NAMED “PROFILES” FOR NOTIFICATIONS AND ACTIONS

Library of handlers in NiFi

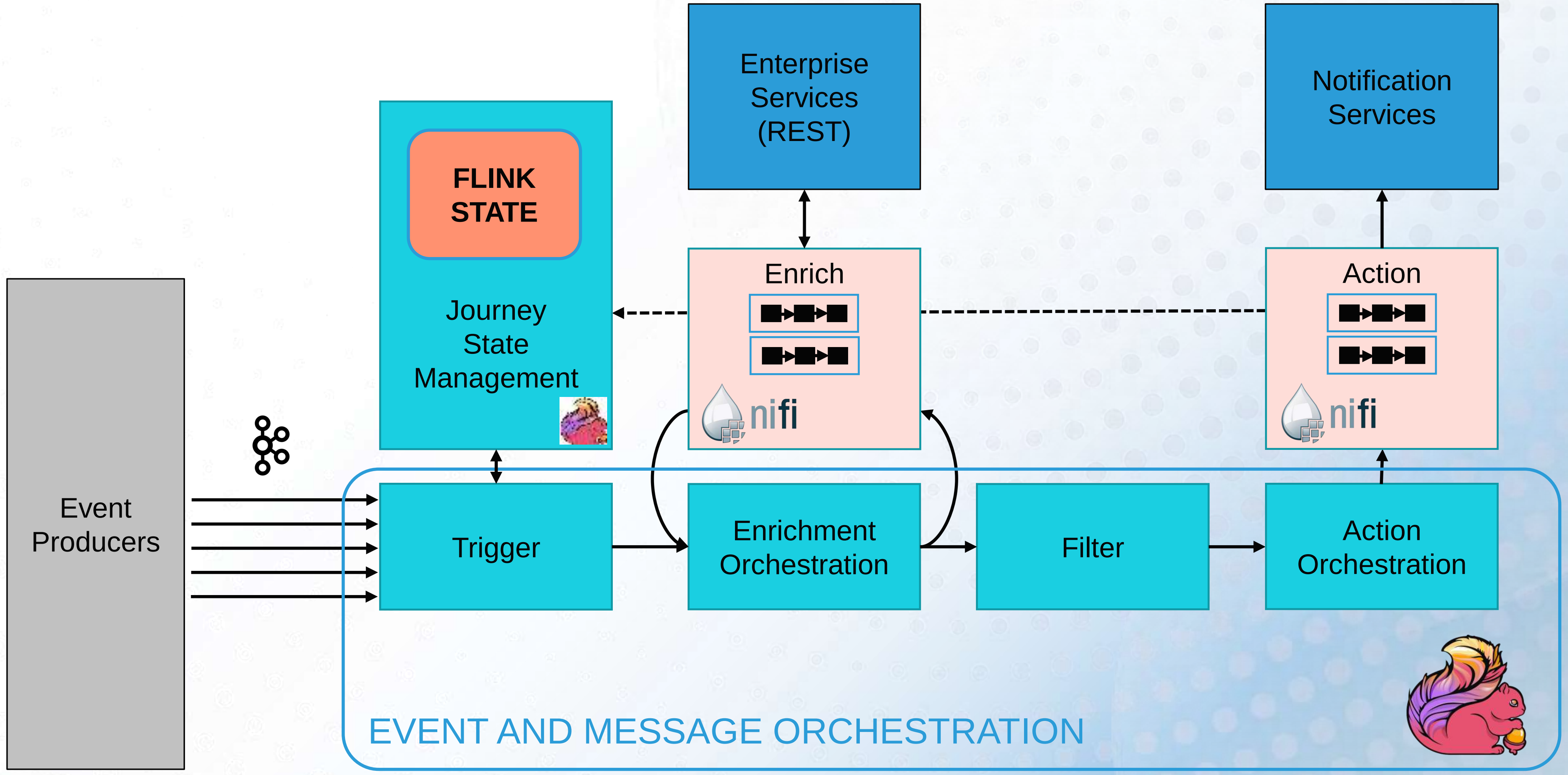
HIGH LEVEL SOLUTION



USE CASE CONFIGURATION (SIMPLIFIED)

```
{  "source": {
        "type": “kafka",
        “name": "vod_event_stream“
         },
    "triggerSql": "data.price > 5 AND data.order_type = 'Rental'“
    “enrichment":
        {“profileName": “communicationprefs"},
    "actions":[
        {“profileName": "email",
                "templateId":"1234",
                “fieldMapping":[ {“field” : “cost”, “source” : “data.price”}] },
         {“profileName": “sms",
                "templateId":“5678",
                “fieldMapping":[ {“field” : “cost”, “source” : “data.price”}] } }
```

HIGH LEVEL SOLUTION (WITH STATE)



NIFI + FLINK SOLUTION SUMMARY

NIFI FOR SERVICES, DATAFLOW, AND TEXT HANDLING

FLINK FOR HIGH-PERFORMANCE STREAM PROCESSING

FLINK FOR COMMON PATTERNS – CONFIG DRIVEN

FLINK FOR STATE MANAGEMENT

DECOUPLED LIBRARY OF ENRICHMENT HANDLERS AND ACTION HANDLERS

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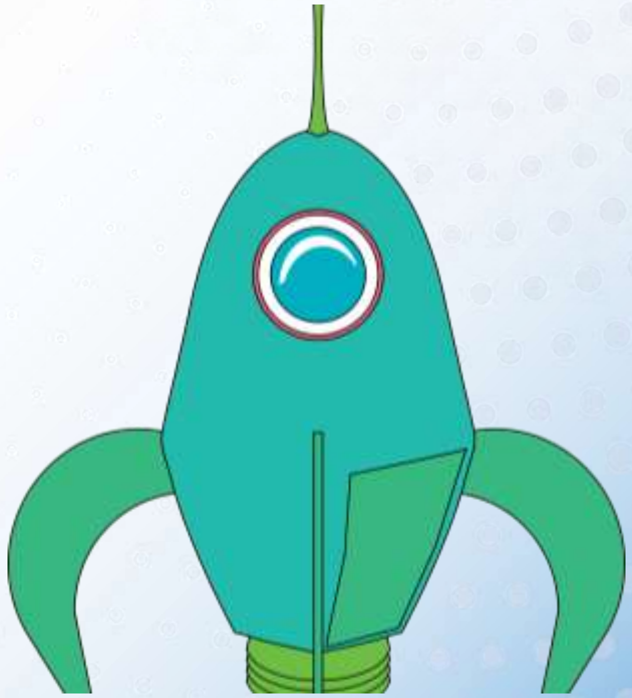
FUTURE WORK

FLINK + NIFI
SELF-SERVICE
USE CASE PORTAL

INCREASE
CATALOG OF
ACTIONS AND
ENRICHMENT
PROFILES

MOVE MORE
COMMON
CAPABILITIES
TO FLINK



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WE’RE HIRING!

PHILADELPHIA

WASHINGTON, D.C.

SUNNYVALE

DENVER

COMCAST

THANK YOU!

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