.conf2015

Splunk and Spark

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splunk>

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Agenda

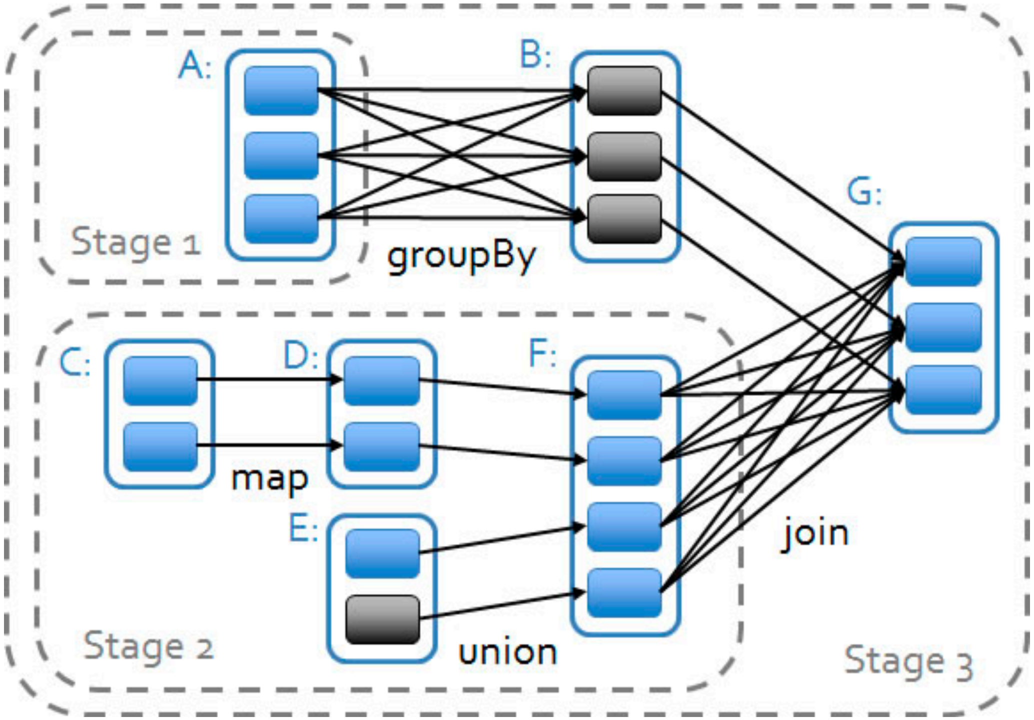
- Background: Spark
- Motivation
- Spark on Splunk – Splunk data as Spark external dataset
- Splunk with Spark – Extend Splunk search with Spark's computing power

Review: Spark basics

What is Spark?

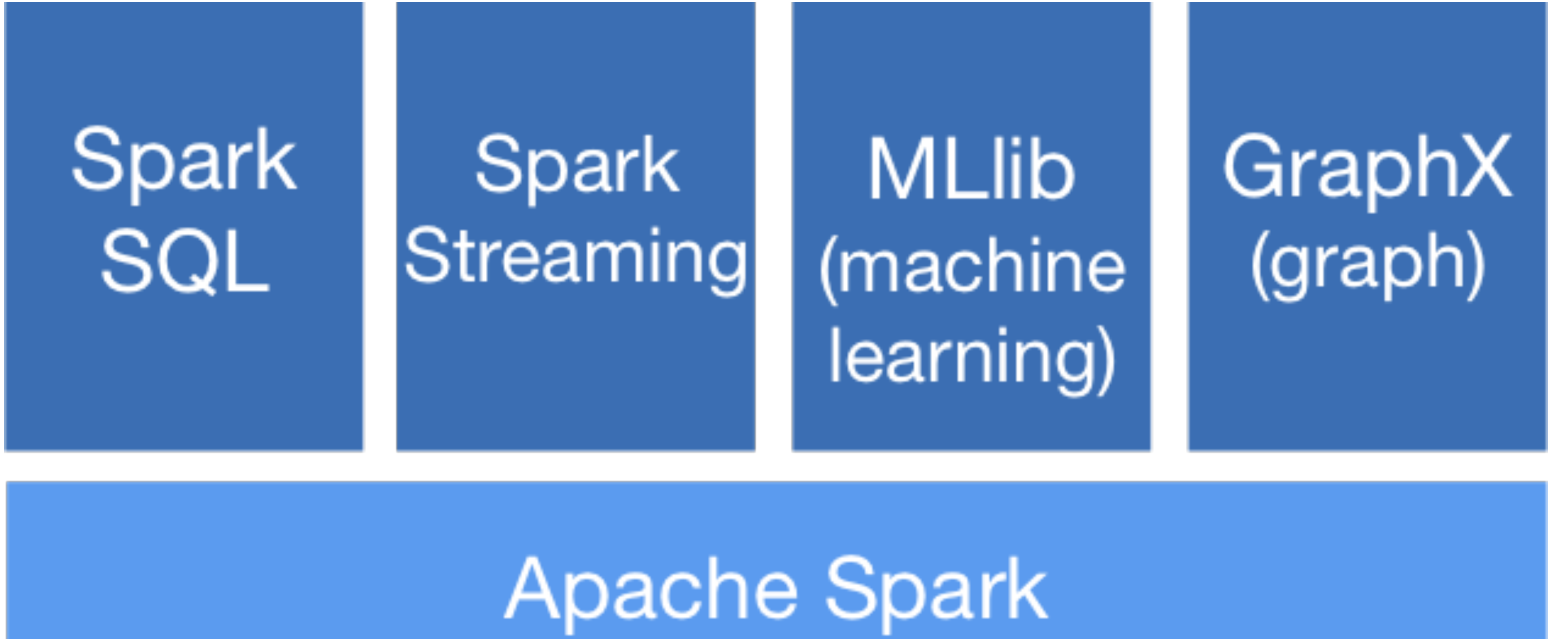
- “Apache Spark is a fast and general-purpose cluster computing system.”
- Abstract data as a distributed collection of RDD that can be operated in parallel.
- RDD have operations
  - Transformations: create a new dataset from an existing one
  - Actions: return a value after running a computation on the dataset.

Spark RDD



source: kmoses

Spark Stack



Spark SQL

Spark Streaming

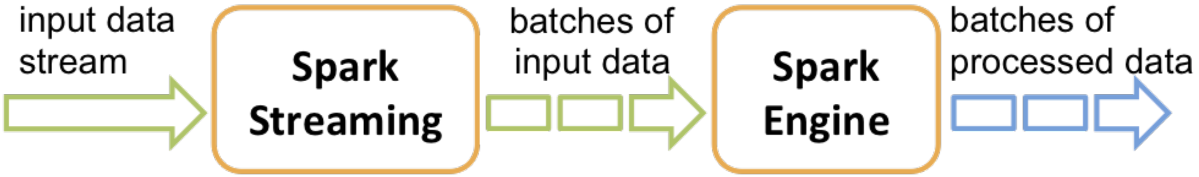
MLlib (machine learning)

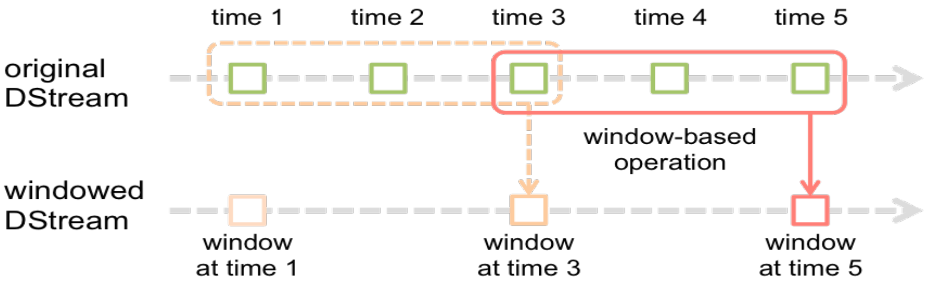
GraphX (graph)

Apache Spark

source: apache spark

Spark Streaming





source: apache spark

Spark on Splunk

What Splunk Brings To Spark

Splunk

- Great support on data ingestion
- Unstructured/semi-structure data indexing
- Powerful runtime data 'wrangling' through splunk search language
  - eventtypes
  - fields extractions
  - tags
  - lookups

Spark supported datasets

- Local filesystem
- Hadoop HDFS
- Cassandra
- Hbase
- Amazon S3

Spark on Splunk

- SplunkRDD
  - RDD from splunk search results
- SplunkDStream
  - DStream from splunk realtime search
- SplunkUtils
  - createRDD
  - createStream

Demo

Buttercup Games *(limited in preview, will enrich the content)*

Splunk with Spark

Beyond Data Processing

- Ability to perform analysis and machine learning on data
- Challenges:
  - Algorithms could be complex and not expressible by splunk search language
    - Custom search commands
  - Wide variety of models and algorithms
    - Search commands overload
  - Dataset-dependent
    - Search command parameters overload
  - Repeated trial, training, testing and fine-tuning

Extend Splunk with Spark

- Distributed computing for complex operations
- Impressive arsenal by Spark stack is readily available
- Users write their own spark programs tailored to their dataset
- Connect other data sources, through RDD/DStream

Problem Statement

- Study data
- Experiments
  - Select algorithms/models
  - train
  - Test
  - Validate
- Apply to production
- Monitor and fine-tune

Design Goal

Make it natural to perform analysis and learning in splunk

- ☑Study data
- Experiments
- Production
- *Monitor
- *Fine-tune

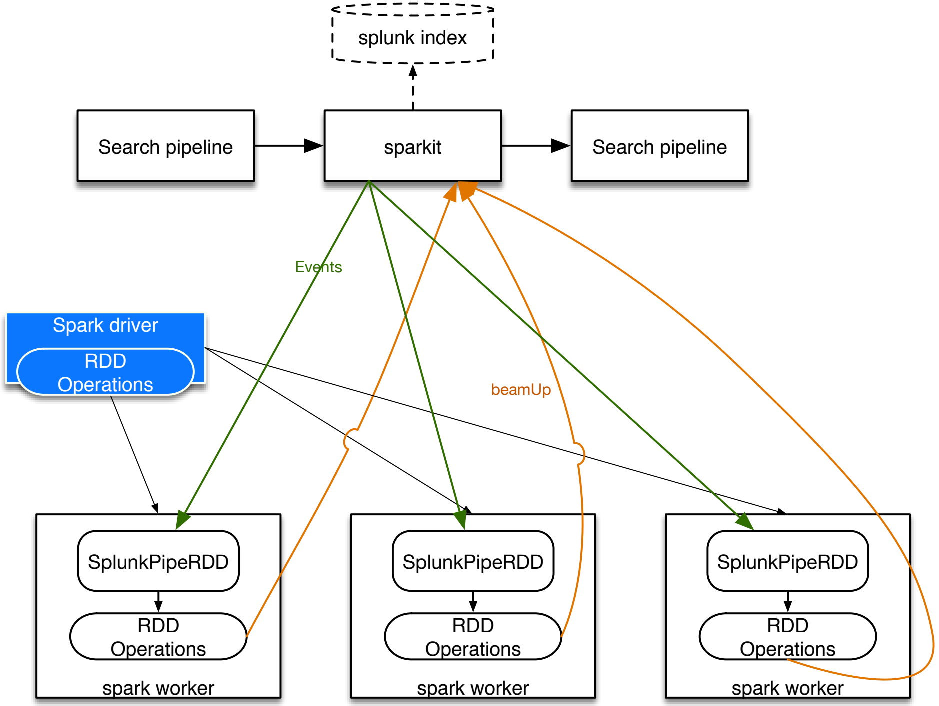
Design Choices

- Integrate spark into splunk search language
  - Spark becomes an extended context of Splunk for complex computations
- Simple command interface
- Do not impose limitations on operations that can be run on Splunk events
- Do not run user codes within splunk process
- Interactive inspection and tuning
- Splunk for ML 'Experiment' management

Approach

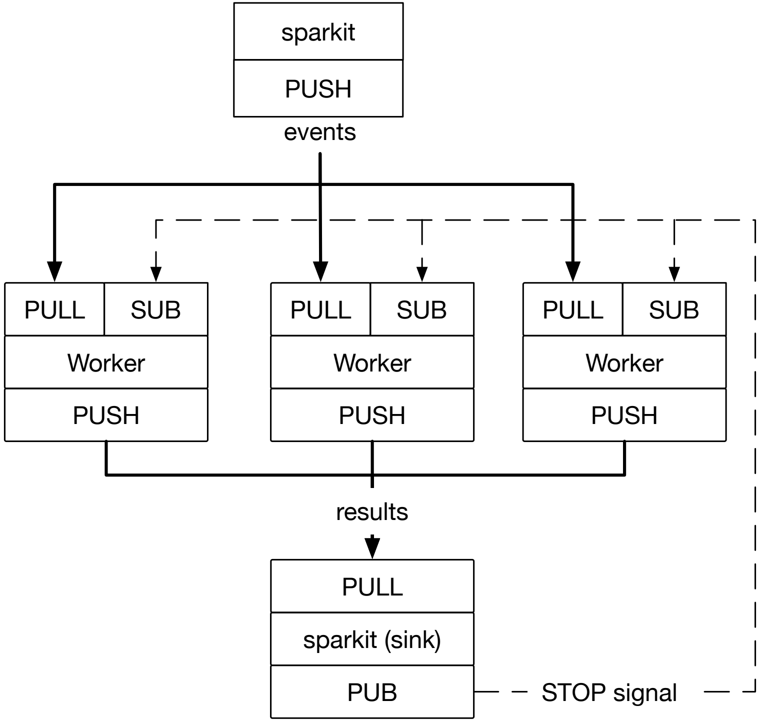
- Search command “sparkit”
  - starting point to distribute search pipeline results to spark
- SplunkPipeRDD
  - RDD that pulls data from search pipeline (sparkit)
- Custom RDD operation “beamUp”
  - Push computation results to search pipeline (sparkit)

Architecture



Implementation

ØMQ for communicating data and results



Demo

- *(limited in preview, will enrich before .conf)*

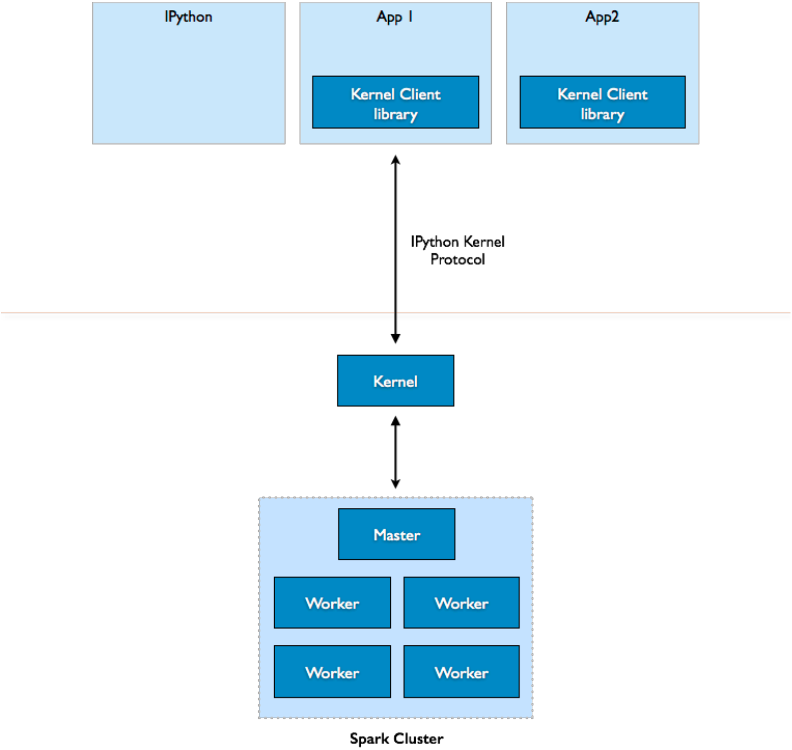
Future Works - Features

- Splunk for ML ‘Experiment’ management
  - Index ‘sparkit’ results into a separate index, each run given some sort of id
- Use IPython kernel approach (spark kernel) for better flow control
- DataFrame
- ML model or “computation” registration

ML Management

- Write results to ‘experiment’ index
  - Enables tapping in realtime or post-mortem
- Search by job-id to retrieve testing/training/production results for further investigation
- Add metadata for experiments management

Spark Kernel



source: [spark kernel project]()

DataFrame and SparkSQL

- “Spark SQL is a Spark module for structured data processing. It provides a programming abstraction called DataFrames and can also act as distributed SQL query engine.”
- DataFrame: SQL/table-like query and operations; enables many new optimizations starting Spark 1.5

```
df.select(df("name"), df("age") + 1).show()
// name    (age + 1)
// Michael null
// Andy    31
// Justin  20
```

- SplunkRDD automatically create schema from extracted fields

Future Works - Technical

- SplunkContext(?)
  - auto-discover mundane settings
- Splunk indexer and search-head clustering environment
- Performance, scalability
- Fault tolerance, stability

THANK YOU