Welcome to the first Workshop on Big data Open Source Systems (BOSS)

September 4th, 2015
Co-located with VLDB 2015

Tilmann Rabl
Hands on Big Data

• 8 parallel tutorials
• 8 systems
  • Open source
  • Publicly available
• Presenters
  • System experts
• Hands on
  • This is not a demo!
• You can pick two!
But why?

- Initial idea: Malu Castellanos
- Mike Carey
  - Doing It On Big Data: a Tutorial/Workshop
  - Driving force
- Other people involved
  - Volker Markl
  - Norman Patton
  - Lipyeow Lim
  - Kerstin Forster
- Experiment
  - Tell us what you think
  - Email: rabl@tu-berlin.de
Presented Systems

- Apache AsterixDB
- Apache Flink
- Apache Reef
- Apache Singa
- Apache Spark
- Padres
- rasdaman
- SciDB
Massively Parallel Program

- Bulk Synchronous Parallel
Runtime Environment
Panel – Big Data and Exascale

• Panel Chair
  • Chaitanya Baru, San Diego Supercomputing Center

• Panelists
  • Arie Shoshani, LBNL
  • Guy Lohmann, IBM
  • Mike Carey, UC Irvine
  • Paul G. Brown, Paradigm4
  • Peter Baumann, Jacobs University
  • Volker Markl, TU Berlin
Apache AsterixDB (Incubating)
AsterixDB: “One Size Fits a Bunch!”

Wish-list:

• Able to manage data
• Flexible data model
• Full query capability
• Continuous data ingestion
• Efficient and robust parallel runtime
• Cost proportional to task at hand
• Support today’s “Big Data data types”
Apache Flink
Apache Flink™: Stream and Batch processing at Scale

Marton Balassi  (ELTE/SZTAKI, Hungary)
Paris Carbone  (KTH, Stockholm, Sweden)
Gyula For a  (SICS, Stockholm, Sweden)
Vasia Kalavri  (KTH, Stockholm, Sweden)
Asterios Katsifodimos (TU Berlin, Germany)
What is Flink?

Data processing engines
- MapReduce
- Spark
- Storm
- Tez
- Flink

Applications
- Hive
- Cascading
- Giraph
- Mahout
- Pig
- Crunch

App and resource management
- Yarn
- Mesos

Storage, streams
- HDFS
- HBase
- Kafka
- ...
What can I do with Flink?

Batch processing

Stream processing

An engine that can **natively** support all these workloads.
But what will I do with Flink today?

- **Graph processing**
  - ETL on Datasets
  - Graph creation & analysis

- **Stream Processing**
  - Rolling Aggregates
  - Windows & Alerts
Agenda

• **Introduction**
  • 15’ Overview
  • 15' Gelly (Graph)API

• **30' Break**

• **Graph Processing**
  • 20' DataSet/Gelly Hands-on

• **Stream processing with Flink**
  • 10’ DataStream API
  • 15’ Fault Tolerance Demo
  • 45' Streaming Hands-on
Apache Reef
A meta-framework that eases the development of Big Data applications atop resource managers such as YARN and Mesos

- Reusable control plane for coordinating data plane tasks
- Adaptation layer for resource managers
- Container and state reuse across tasks from heterogeneous frameworks
- Simple and safe configuration management
- Scalable local, remote event handling
- Java and C# (.NET) support

In production use
(Microsoft Azure)
Deep Dive into Apache REEF (Incubating)
Byung-Gon Chun, Brian Cho (Seoul National University)

Tutorial
1. What is REEF?
2. Install REEF
3. Run your first REEF job: HelloREEF
4. Why would you want REEF?
5. Create your own Task Scheduler with REEF

Contact: Byung-Gon Chun bgchun@gmail.com
Brian Cho chobrian@gmail.com
Apache Singa
A General Distributed Deep Learning Platform

- **Motivation**
  - Deep learning is effective for classification tasks, e.g., image recognition
  - Training code is complex to write from the scratch
  - Training is time consuming, e.g., 10 days or weeks

- **Goals**
  - Easy to use
    - General to support popular deep learning models
    - Extensible for users to do customization, e.g., training new models
  - Scalable
    - Reduce training time with more computation resources, e.g. machines
    - Improve efficiency of one training iteration by synchronous training
    - Reduce total number of training iterations by asynchronous training
Apache Spark
Spark Tutorial

Reynold Xin @rxin
Sep 4, 2015 @ VLDB BOSS 2015
Apache Spark

Fast & general distributed data processing engine, with APIs in SQL, Scala, Java, Python, and R

800+ contributors and many academic papers

Largest open source project in (big) data & at Apache
A Brief History

- 2009: started @ Berkeley
- 2010: HotCloud
- 2011: NDSI (RDD)
- 2012: SIGMOD Demo (Shark)
- 2013: OSDI (GraphX)
- 2014: SIGMOD (Shark)
- 2015: SOSP (Streaming)
- Databricks started
- Donated to ASF
- SIGMOD (Spark SQL)
Users

1000+ companies

Distributors + Apps

50+ companies

Logos:
- Goldman Sachs
- Toyota
- Capital One
- Novartis
- Baidu
- Tencent
- Taobao
- Thomson Reuters
- eBay
- Uber
- Salesforce
- Airbnb
- Telefonica
- NBCUniversal
- Databricks
- Hortonworks
- MAPR
- Cloudera
- SAP
- IBM
- Oracle
- DataStax
- Amazon Web Services
- Tableau
- Qlik
- Alteryx
- Informatica
- MicroStrategy
- Tibco
Our Goal for Spark

Unified engine across data workloads and platforms
Agenda Today

Spark 101: RDD Fundamentals

Spark 102: DataFrames

Spark 201: Understanding Spark Internals

(with exercises in Databricks notebooks)
PADRES
Pub/Sub is a communication paradigm / middleware

Communication between information producers (publisher) and consumers (subscriber) is mediated by a set of brokers (p2p overlay).

**Features**
- Content-based routing
- Composite subscription (event $P_1$ and event $P_2$ occurred within 2s)
- Load balancing (offload clients to less loaded brokers)
- Fault tolerance (maintains integrity of broker network)
- Historic access (subscribe to past events)
- System monitoring (overlay monitoring & visualization)
rasdaman
the pioneer Array DBMS: analytics on n-D dense/sparse arrays
optimization & parallel QP on multicore, cloud, modern hw
scalable from cubesat to datacenter federations
seamless integration with R, python, ...
operationally deployed on Petascale, basis for ISO Array SQL

www.rasdaman.org
SciDB:

No cute animals ...
No 5 color marketing brochure ...

... just an ...

Open Source,
Transactional,
Massively Parallel,
Array DBMS with
A Scalable Analytic Query Engine.
Let’s go!

Intro & Panel