

# Production Readiness Testing Using Apache Spark

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salesforce

# Background: Salesforce App Cloud

## FORCE

Model-driven  
development  
platform

## HEROKU

Polyglot platform for  
elastic scale

## APP EXCHANGE

Enterprise App  
Marketplace



## LIGHTNING

Visual Development  
Platform

## THUNDER

Stream & event based  
primitives



# Background: Apex

## STRONGLY TYPED

Direct references to schema objects

## LOOKS LIKE JAVA

Acts like database stored procedures

## OBJECT ORIENTED

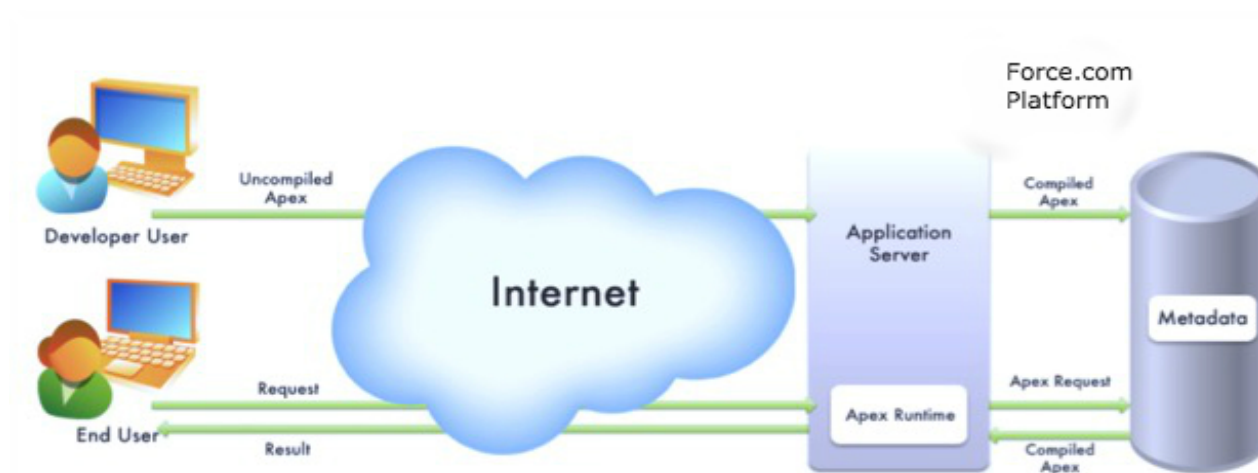
Visual Development Platform

## CLOUD HOSTED COMPILER

Interpreted & executed on on multitenant environment

## EASY TO TEST

Built-in support for creation & execution of unit tests



# Background: Hammer Process (Aka Production Readiness Testing)

## CUSTOMER UNIT TESTS ARE EXECUTED TWICE

in Salesforce secured environment in data centers

1<sup>st</sup> EXECUTION CALLED THE **BASELINE**

on current production version

2<sup>nd</sup> EXECUTION CALLED THE **UPGRADED**

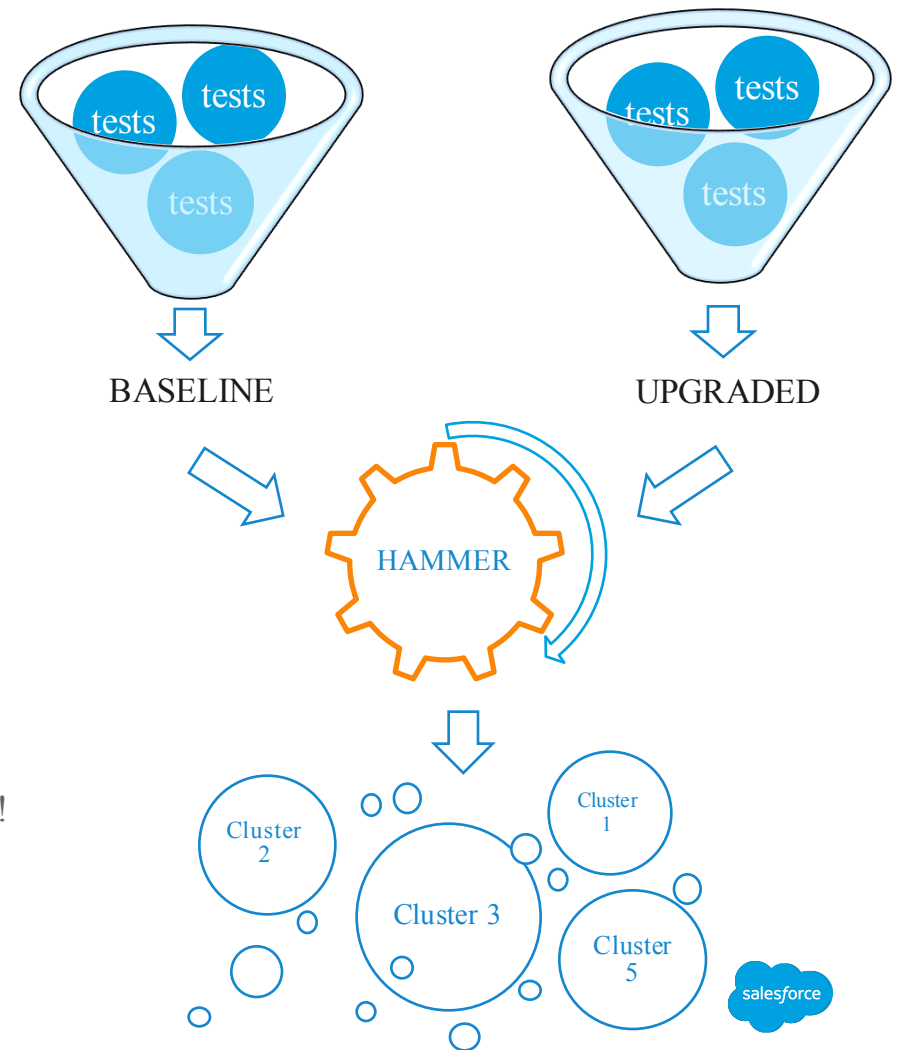
on release candidate version

## UPGRADED AND BASELINE RESULTS ARE COMPARED

When a test passes, it should pass in both versions.

When a test fails, it should fail in both versions.

Any other outcome is a potential bug in release candidate version!



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# Challenges

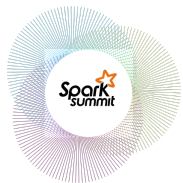
150+ million customer tests and growing

Infrastructure setup to execute hammer on two different platform versions

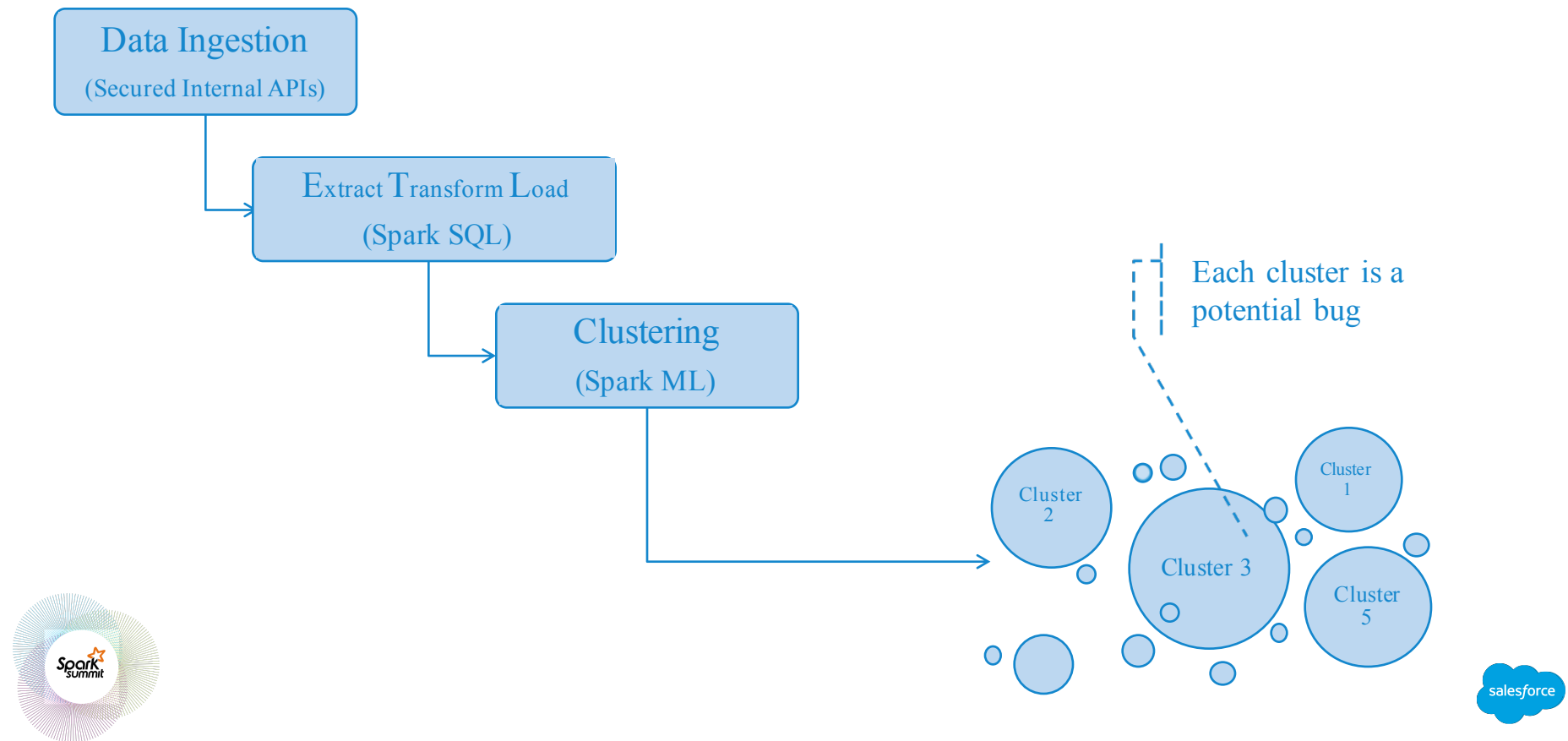
Persist and compare test execution results

Tests are executed highly secured data centers

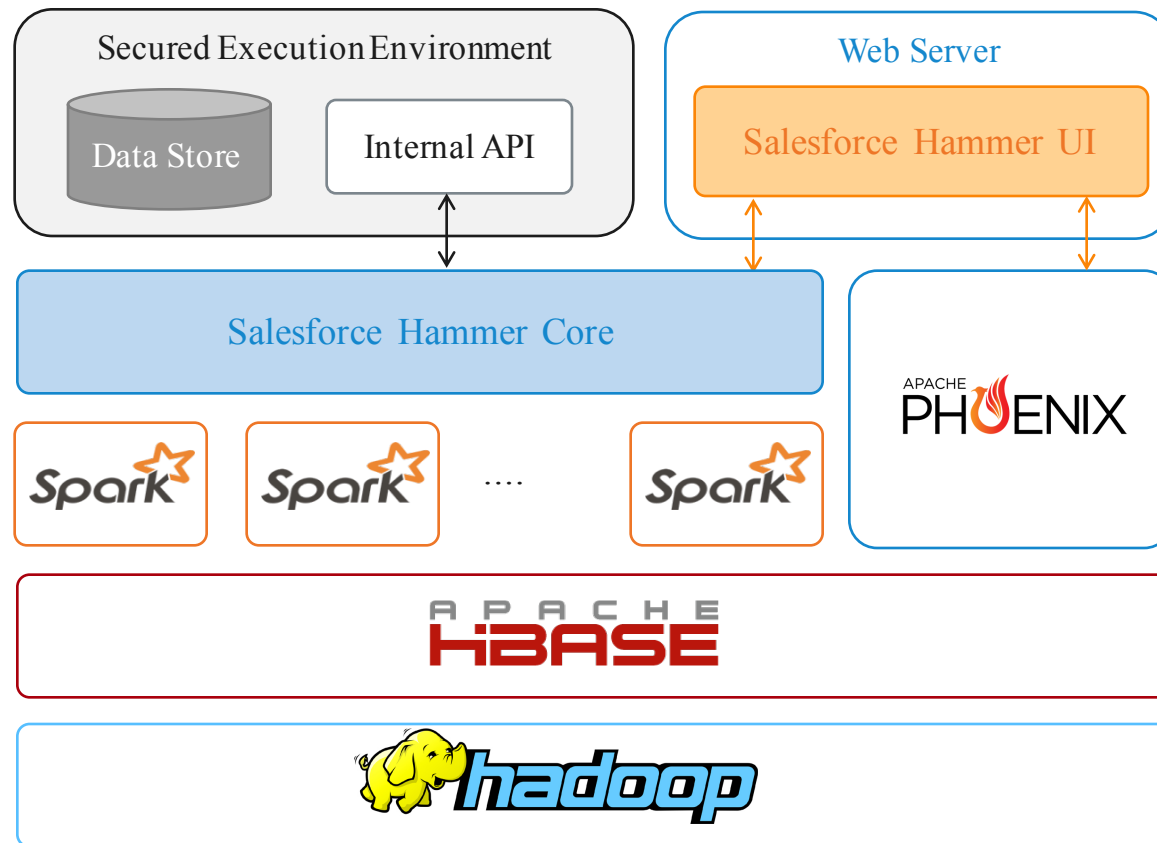
Internal SLA to keep these mammoth efforts to under 3 weeks



# Hammer Core: A Functional Overview



# Hammer: The Architecture



# Data Preparation (ETL): Using Apache SparkSQL

Example of typical test execution result

	Transformation	Output
Baseline : Expected: 10, Actual: 10 Upgrade : Expected: 10, Actual: 10	PASS - PASS	NOT A BUG
Baseline : NullPointerException: Attempt to de-reference a null object Upgrade : NullPointerException: Attempt to de-reference a null object	FAIL - FAIL	NOT A BUG
Baseline : Expected: 10, Actual: 10 Upgrade : NullPointerException: Attempt to de-reference a null object	PASS - FAIL	FOR FURTHER ANALYSIS
Baseline : Expected: 10, Actual: 21 Upgrade : Expected: 10, Actual: 51	FAIL - FAIL'	FOR FURTHER ANALYSIS





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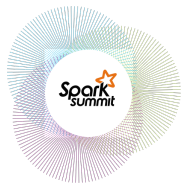
# Spark Machine Learning Pipeline

Designed to operate on records marked “FOR FURTHER ANALYSIS”

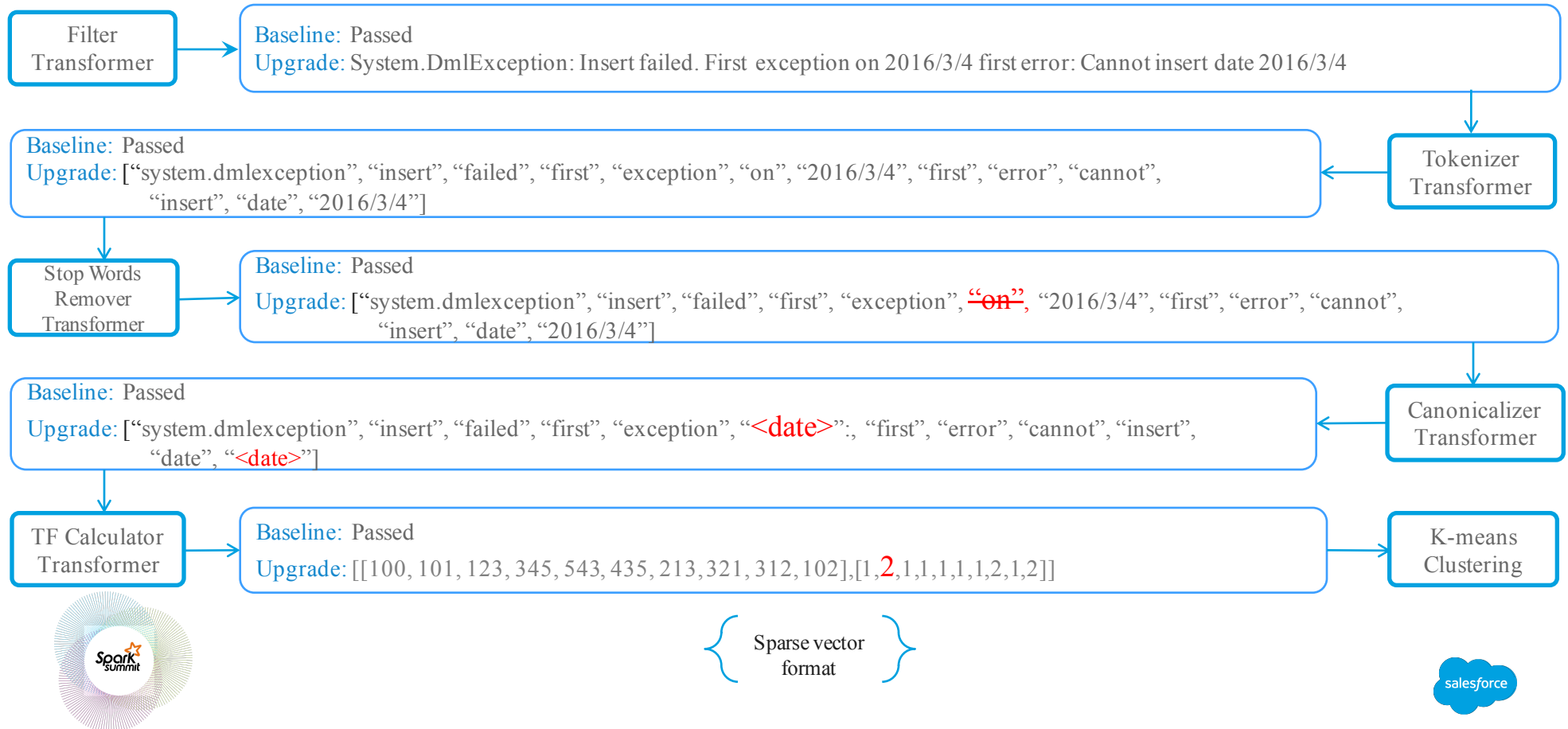
Group test failure records into K Clusters

Each cluster is a potential bug in Salesforce App Cloud platform

Enables inspection of cluster to determine if it's a bug or not



# Clustering Using Apache Spark Machine Learning



# Accomplishments

In Extract Transform Load process -

Test Records Analyzed	Old Hammer Engine (hours)	New Hammer with Spark (minutes)	Speed Improvement
241K	7.5	9	97.9 %
562K	7.8	13	97.2 %
269K	8	11.5	97.6 %
242K	11.2	10	97.9 %
394K	14.2	20	97.0 %
374K	12.5	12	98.4 %



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# Accomplishments

In Clustering Analysis -

Fewer clusters to  
analyze

Well formed clusters  
yielding to good quality  
bugs

Speed – On an average  
clustering took 40 minutes to  
complete for 100K+ records



Q & A



thank you

