Streaming datasets for Personalization

Shriya Arora

Senior Data Engineer
Personalization Analytics

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What is Netflix's Mission?

Entertaining you by allowing you to stream content anywhere, anytime

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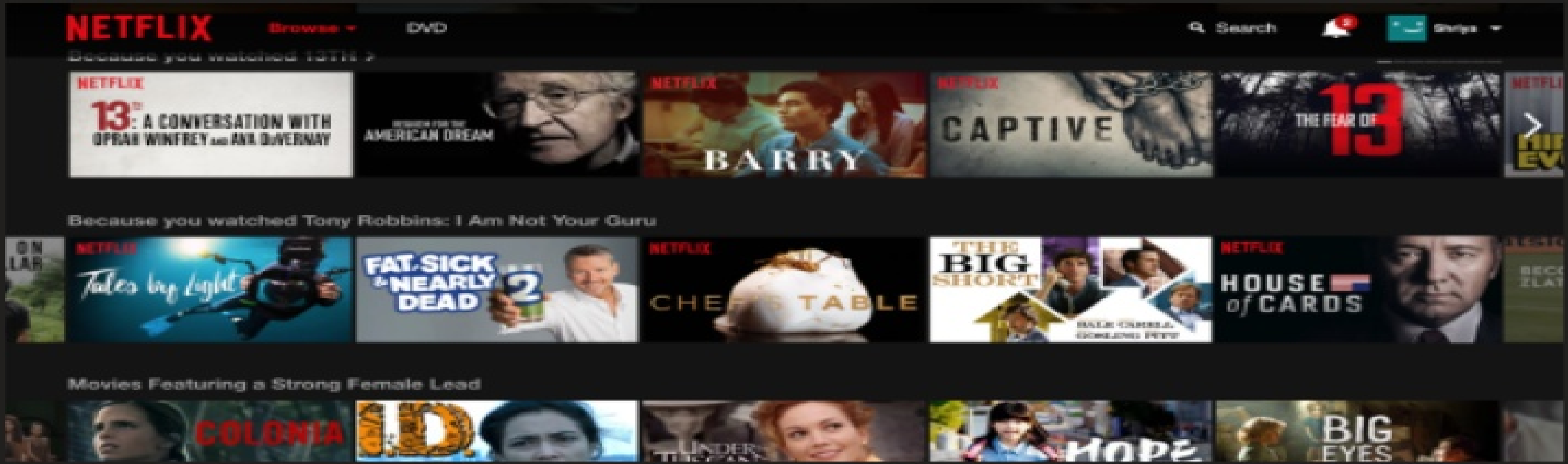

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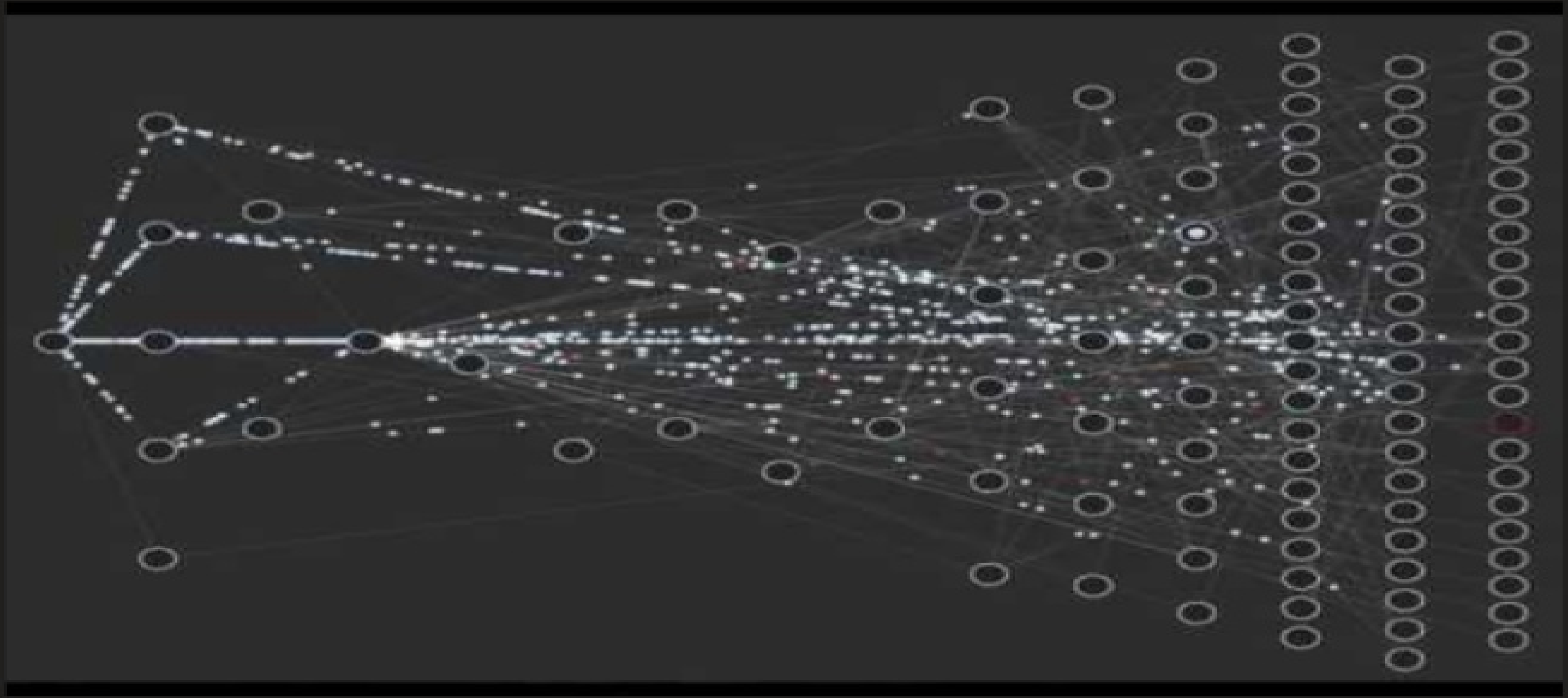
How much data do we process to have a personalized Netflix for everyone?

- 93M+ active members
- 125M hours/ day
- 190 countries with unique catalogs
- 450B unique events/day
- 600+ Kafka topics

A SERIES OF PLAYBACK EVENTS



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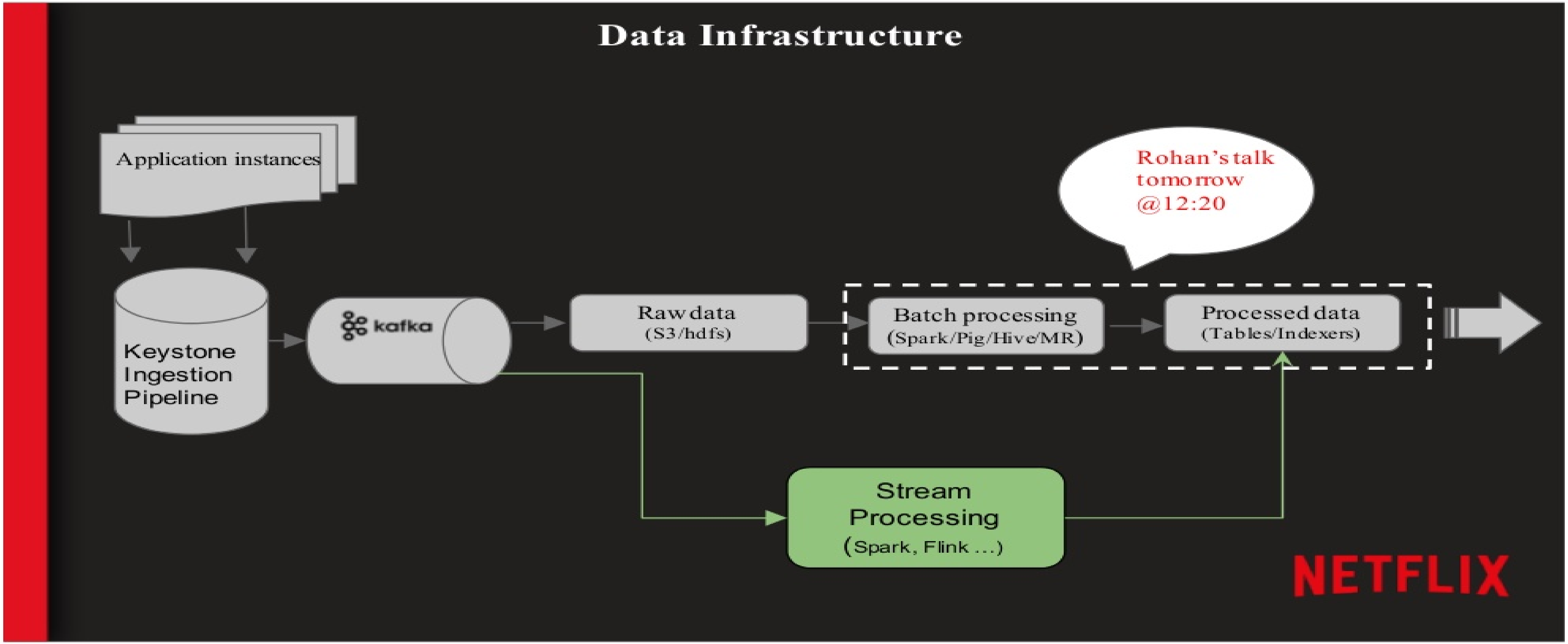
Data Infrastructure
Application instances
Keystone Ingestion Pipeline
kafka
Raw data (S3/hdfs)
Batch processing (Spark/Pig/Hive/MR)
Processed data (Tables/Indexers)
Rohan's talk tomorrow @12:20
Stream Processing (Spark, Flink ...)
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Our problem: Using user plays for feature generation, discovery, clustering ..

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Why have data later when you can have it now?

- **Business Wins**
  - Algorithms can be trained with the latest + greatest data
  - Enhances research
  - Creates opportunity for new types of algorithms
- **Technical Wins**
  - Save on storage costs
  - Avoid long running jobs

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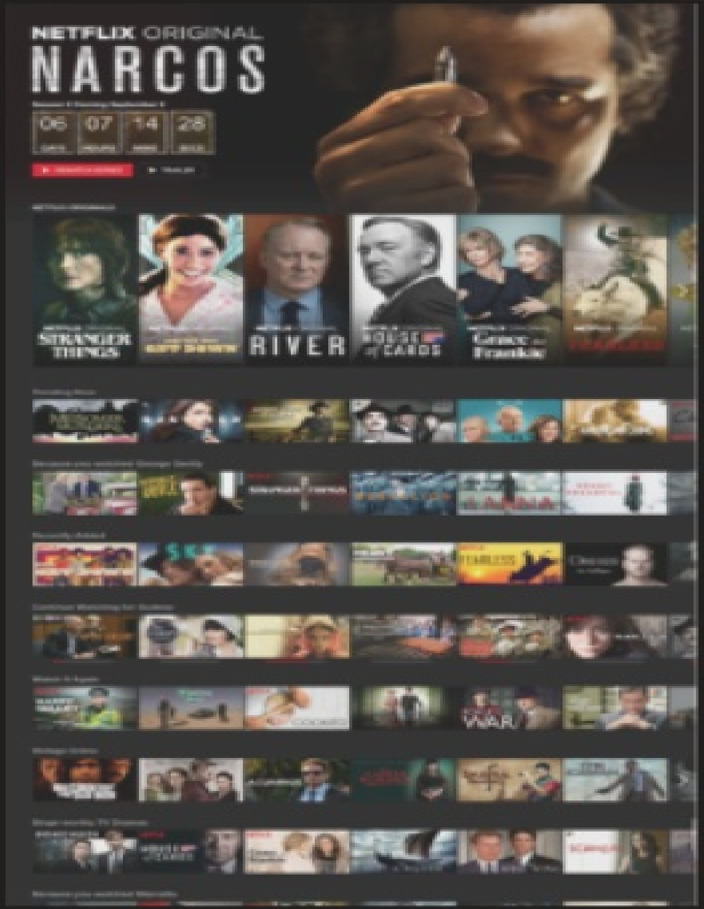
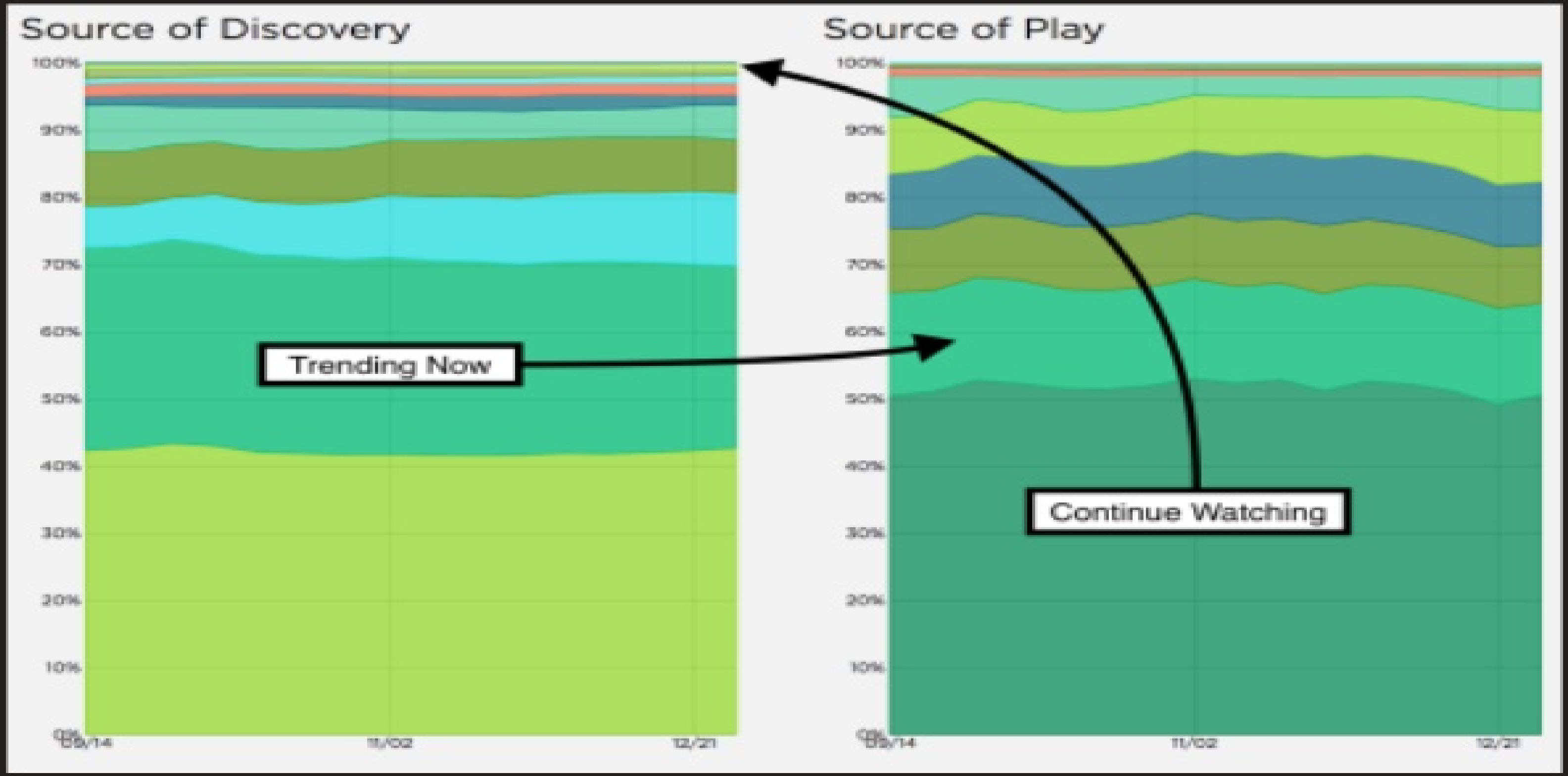
Source of Discovery / Source of Play





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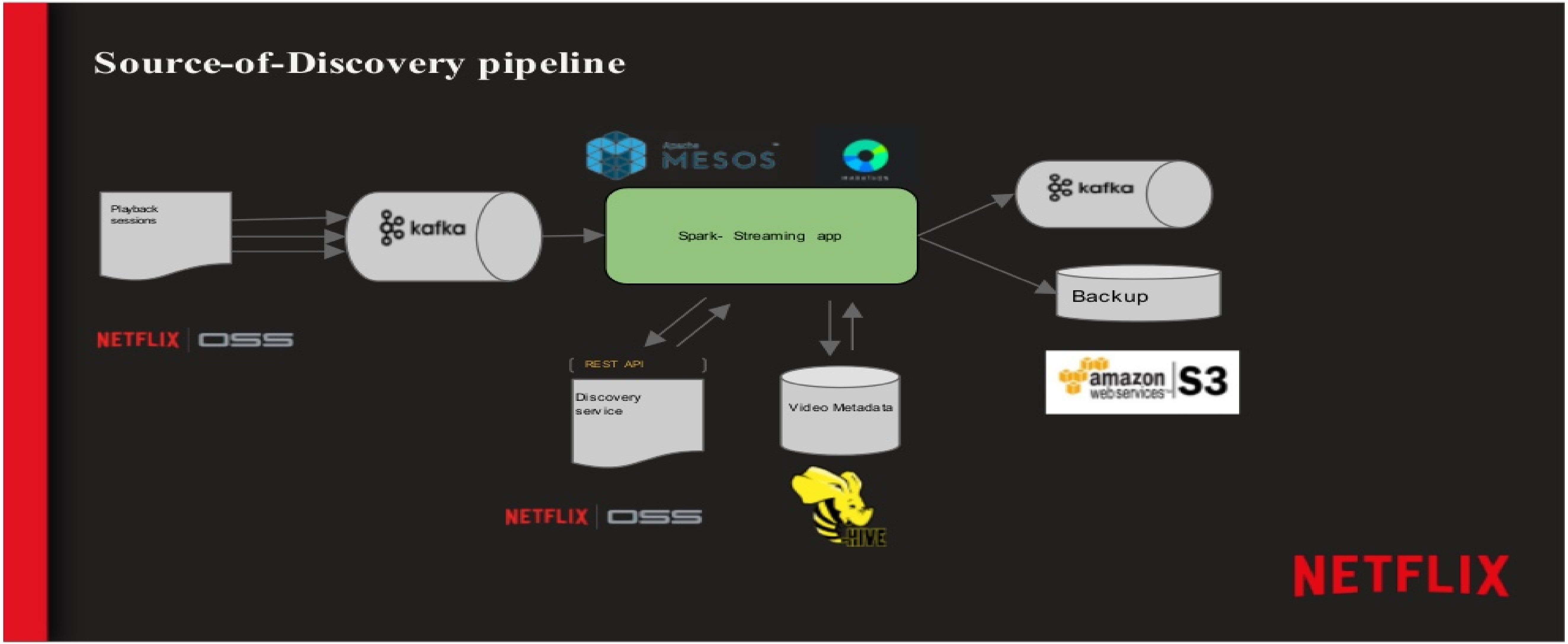
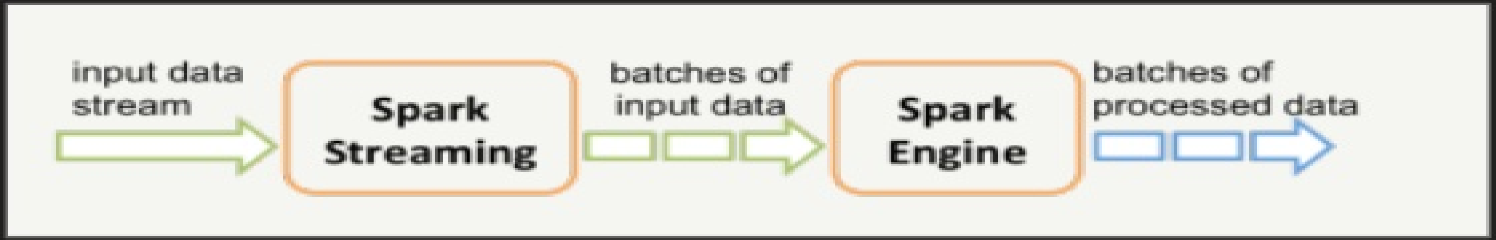

Source-of-Discovery pipeline
Apache MESOS
Playback sessions
kafka
Spark- Streaming app
kafka
Backup
NETFLIX | OSS
REST API
Discovery service
Video Metadata
NETFLIX | OSS
amazon web services S3
HIVE
NETFLIX

Spark Streaming



- Needs a StreamingContext and a batch duration
- Data received in DStreams, which are easily converted to RDDs
- Support all fundamental RDD transformations and operations
- Time-based windowing
- Checkpointing support for resilience to failures
- Deployment

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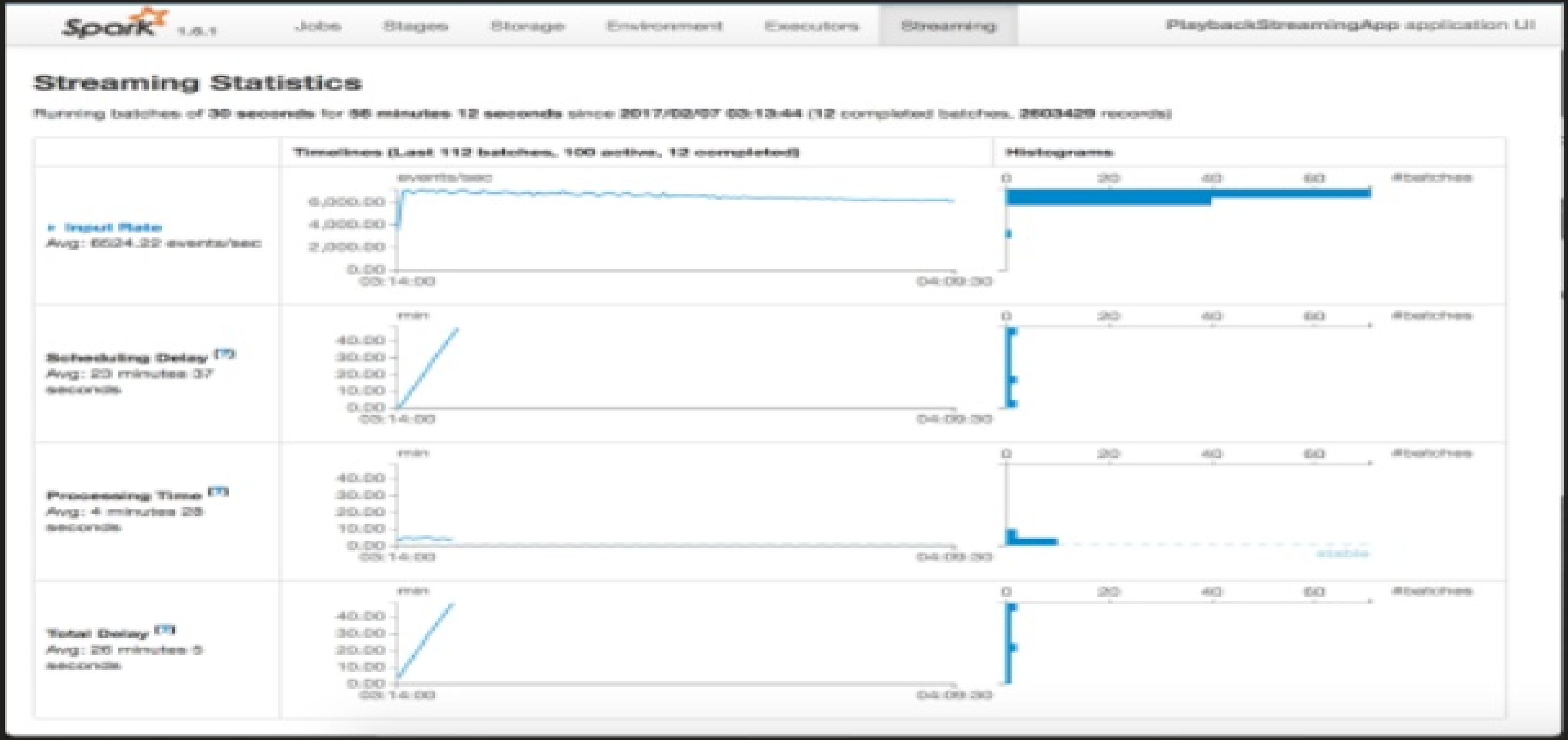
Performance tuning your Spark streaming application



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Performance tuning your Spark streaming application

- Choice of micro-batch interval
  - The most important parameter
- Cluster memory
  - Large batch intervals need more memory
- Parallelism
  - DStreams naturally partitioned to Kafka partitions
  - Repartition can help with increased parallelism at the cost of shuffle
- # of CPUs
  - <= number of tasks
  - Depends on how computationally intensive your processing is

Performance tuning your Spark streaming application

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Challenges with Spark

- Not a 'pure' event streaming system
  - Minimum latency of batch interval
  - Un-intuitive to design for a stream-only world

- Choice of batch interval is a little too critical
  - Everything can go wrong, if you choose this wrong
  - Build-up of scheduling delay can lead to data loss

- Only time-based windowing*
  - Cannot be used to solve session-stitching use cases, or trigger based event aggregations

*** I used 1.6.1**

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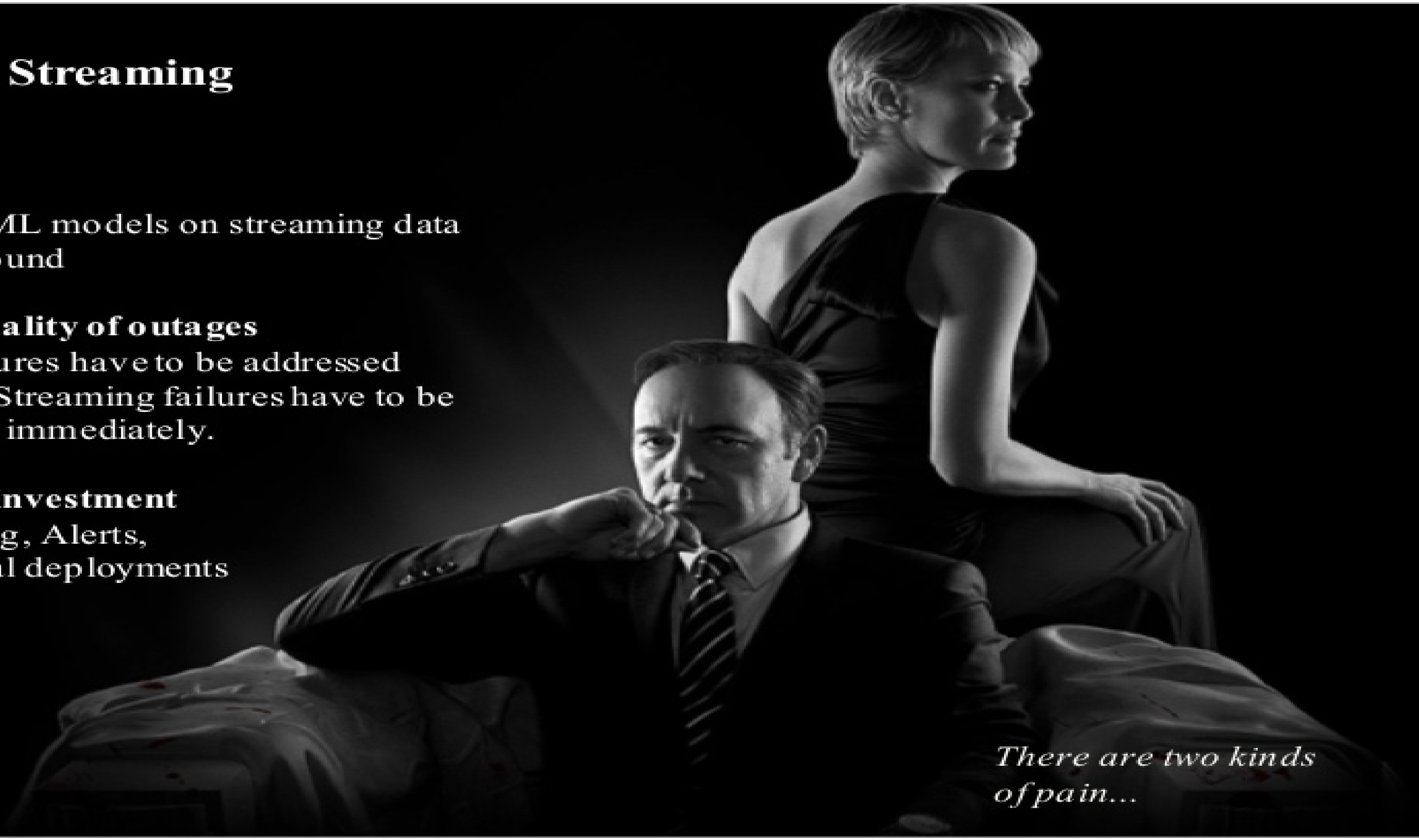
Challenges with Streaming

- **Pioneer Tax**
  - Training ML models on streaming data is new ground
- **Increased criticality of outages**
  - Batch failures have to be addressed urgently, Streaming failures have to be addressed immediately.
- **Infrastructure investment**
  - Monitoring, Alerts,
  - Non-trivial deployments



Questions?

Stay in touch!

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