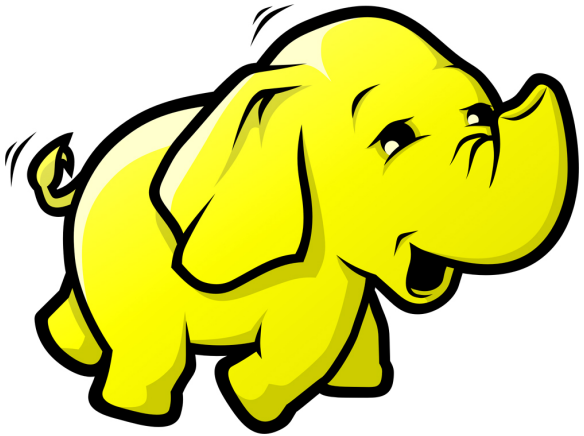
Big Data at Netflix: Faster and Easier

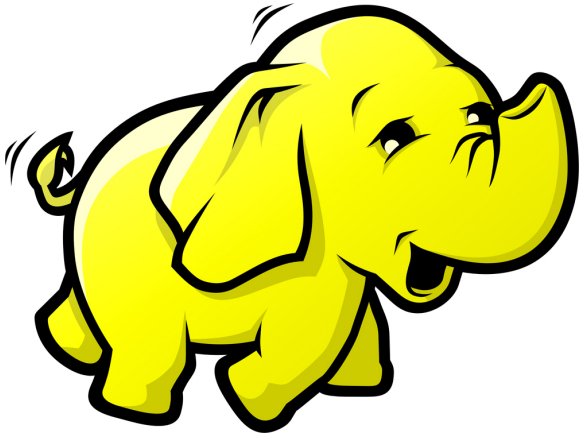
Kurt Brown


NETFLIX

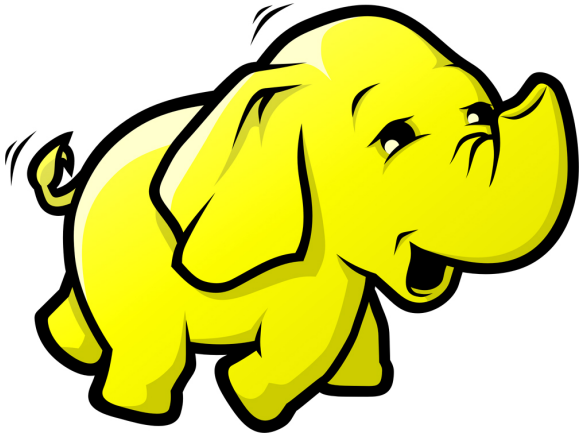
- 1/3+ Internet traffic (NA / peak)
- 100+ Million hours per day
- 65+ Million members / 50+ countries
- Outside the US – streaming only


amazon
web services™






HDFS

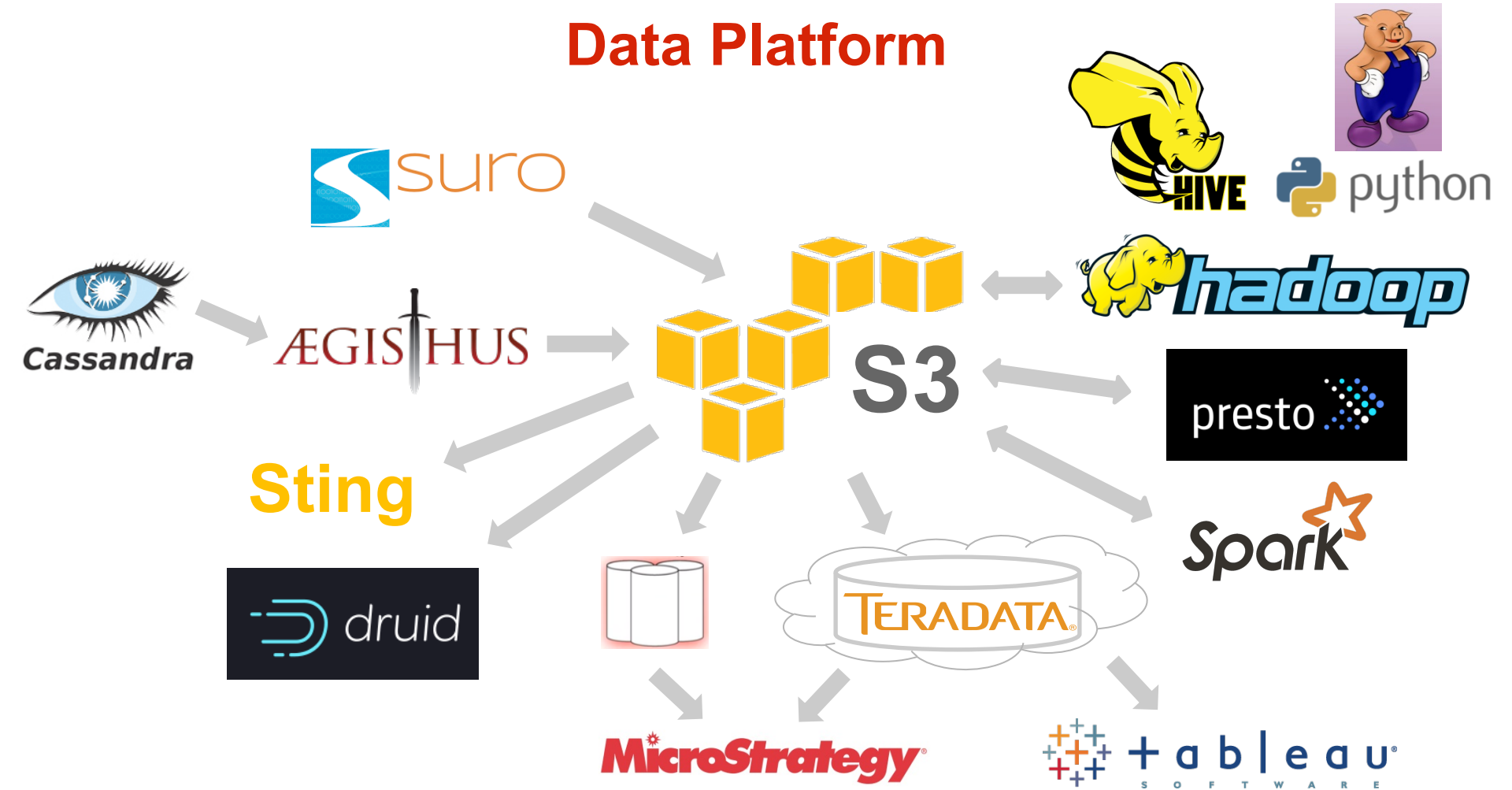



S3


500 Billion Events / Day


Come In
WE'RE
OPEN

Data Platform



Faster


presto

Why Presto (vs. Alternatives)?

- AWS Interplay
- Open Source
- Java
- Real-world Big Data
- Future

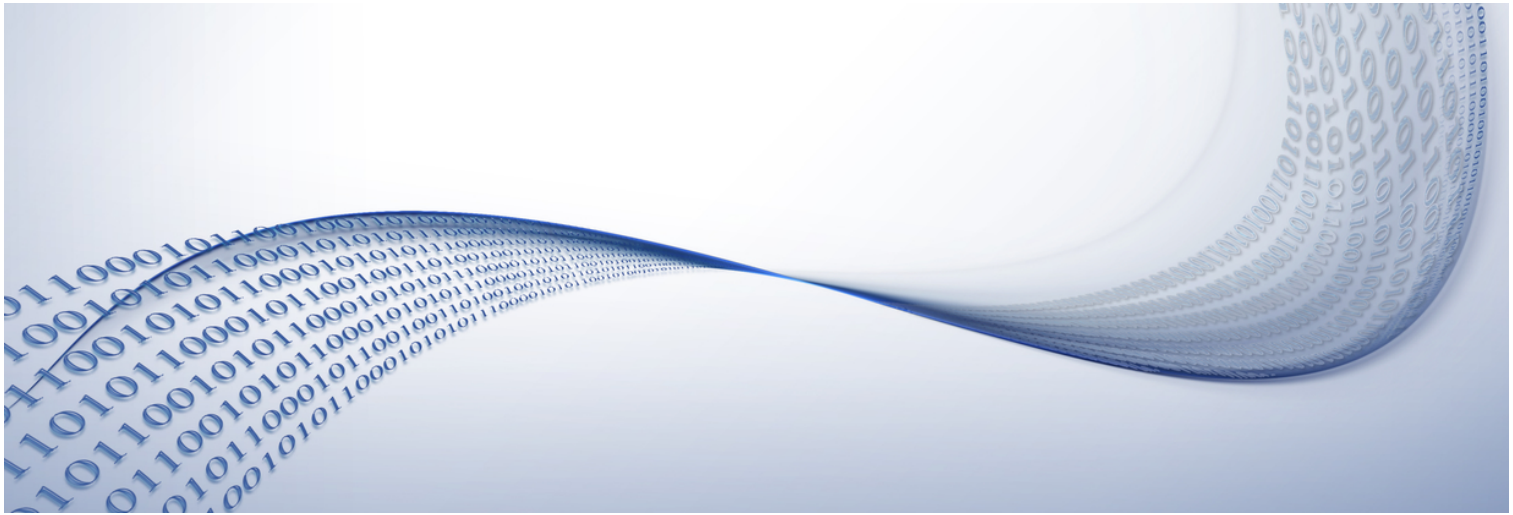

Spark

Takeaways – “Good”

- Cohesive Environment
- Multiple Language Support
- Performance (100X???)
- Community
- Future

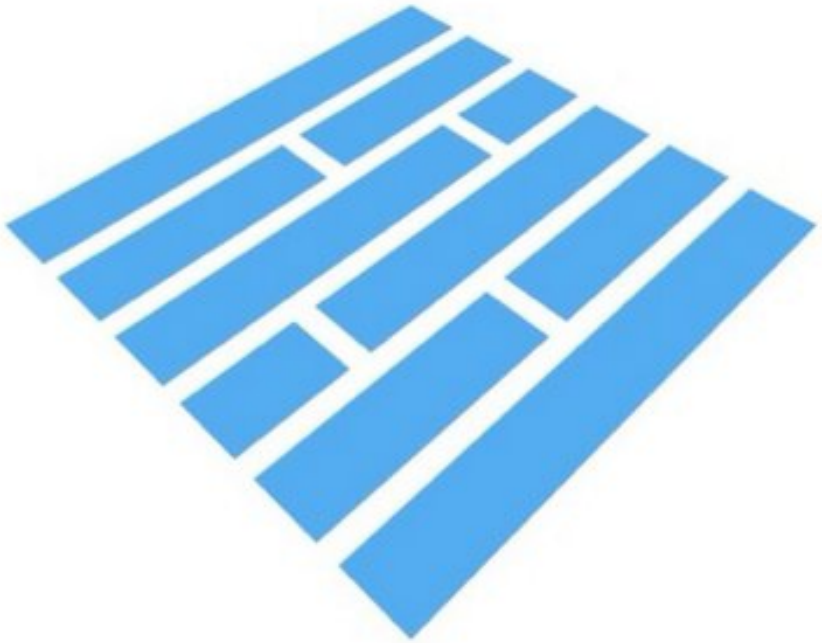
Takeaways – “Bad”

- Maturity
- Running at Scale
- Multi-tenancy / Concurrency
- Tuning?
- Scala?
- Current Investments?



Stream Processing

- Consistency / Ready for use
- Latency
- Scaling
- Storm? Samza? Spark?



Parquet

Parquet

- Columnar
- Cross-project
- Community
- Contributions

TEZ

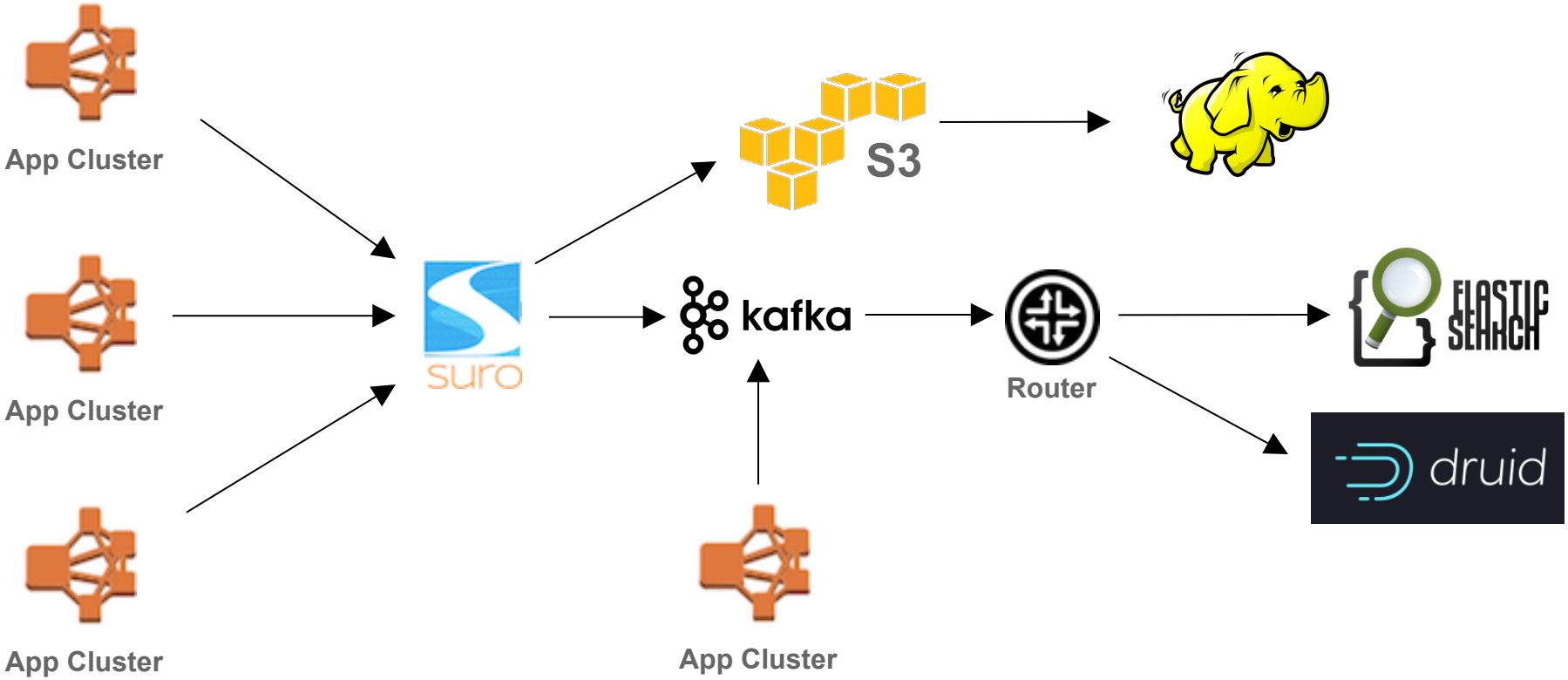
Easier


kafka

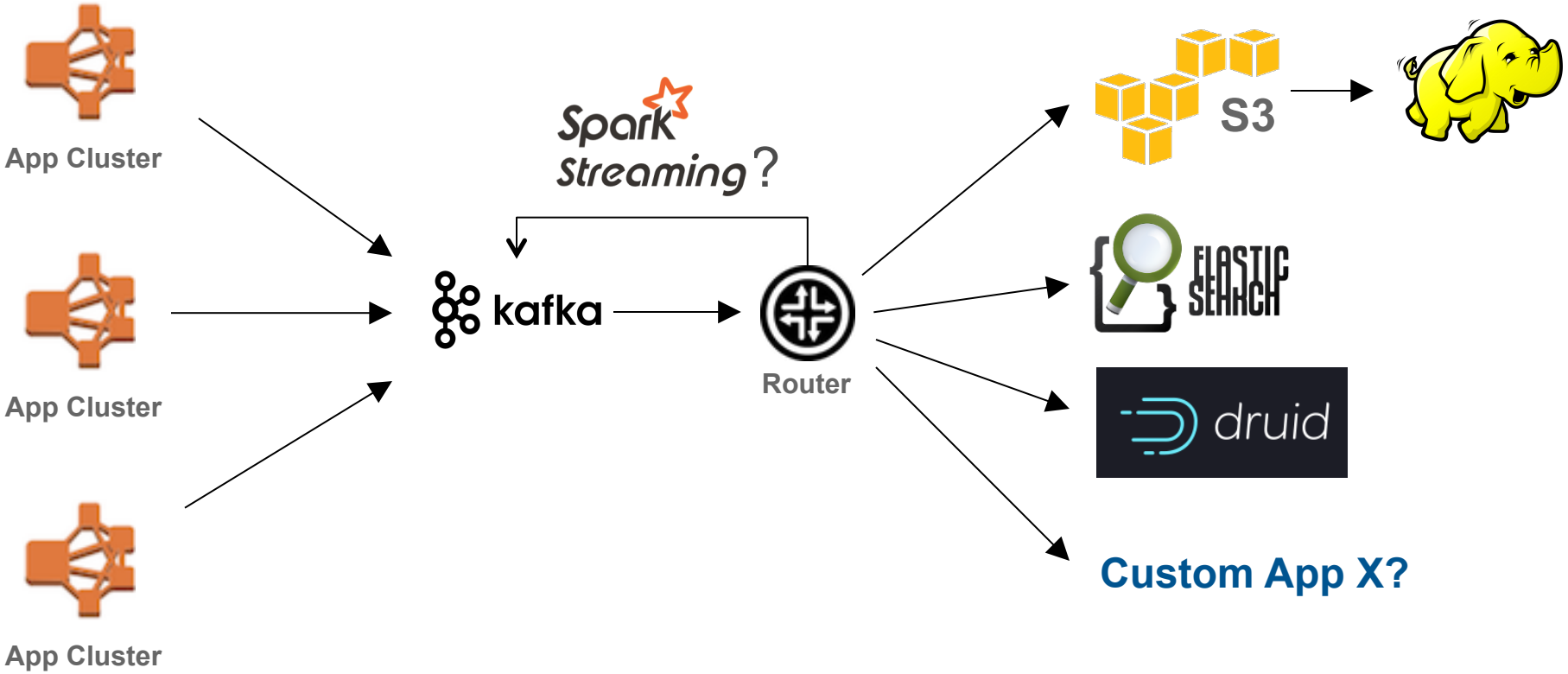
Kafka

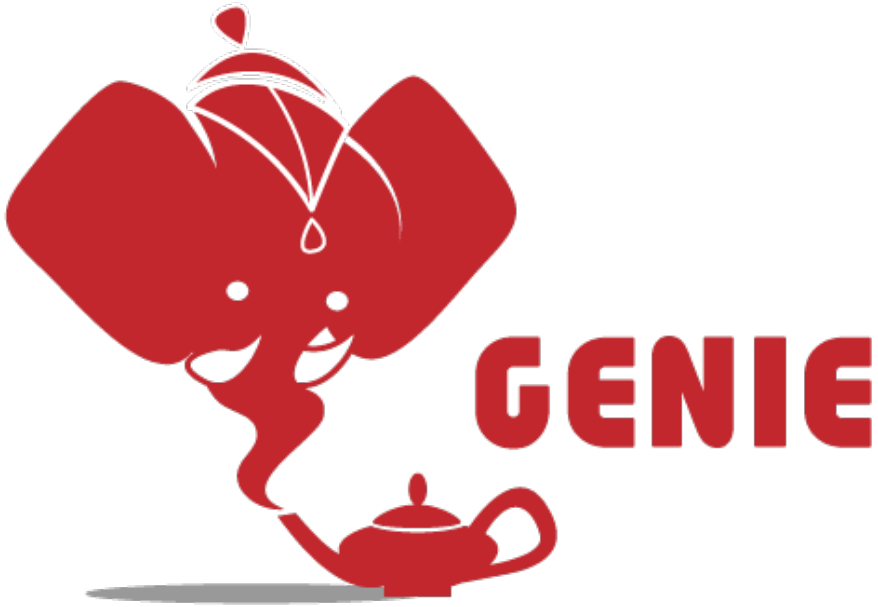
- Simplify our Architecture
- Durability
- Community

Current Data Pipeline

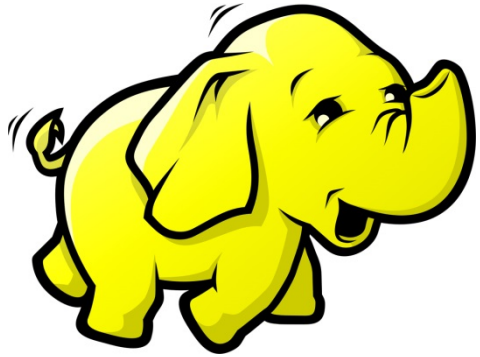


Future Data Pipeline

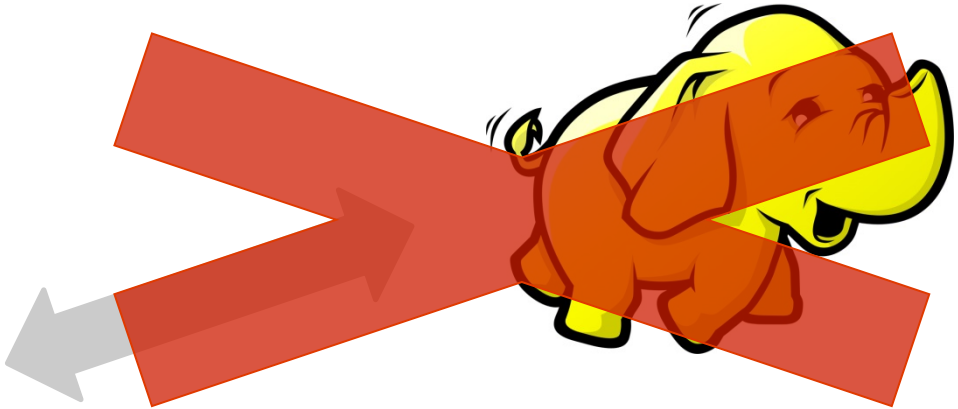



GENIE

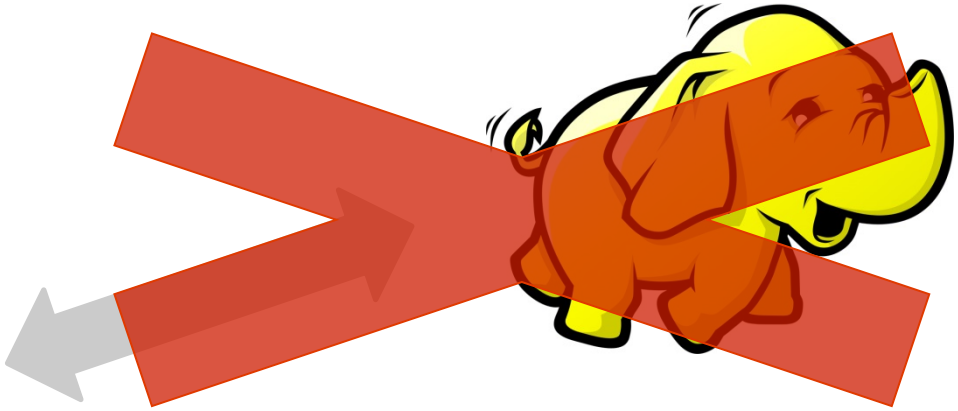

S3

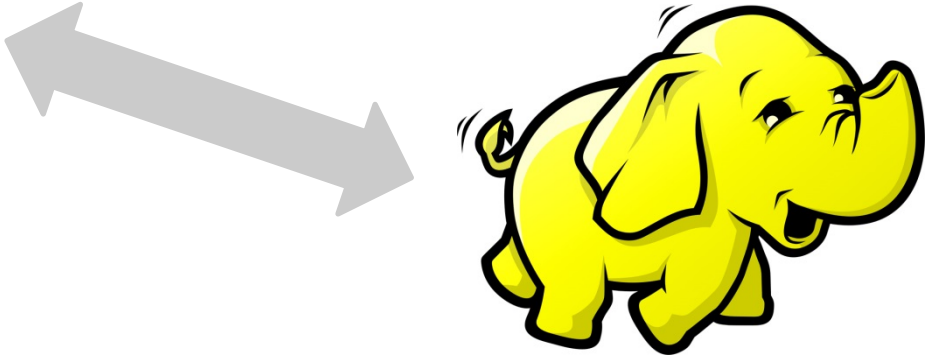


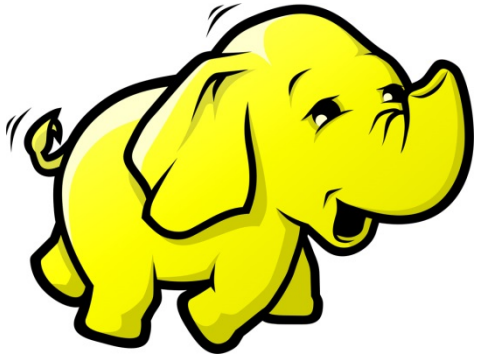

S3



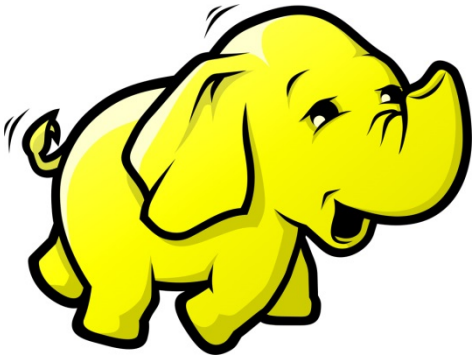

S3





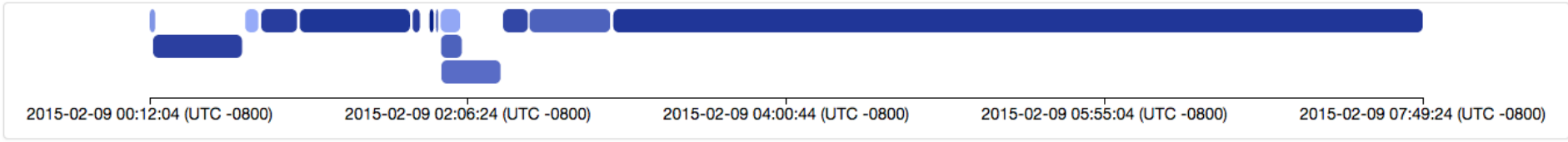


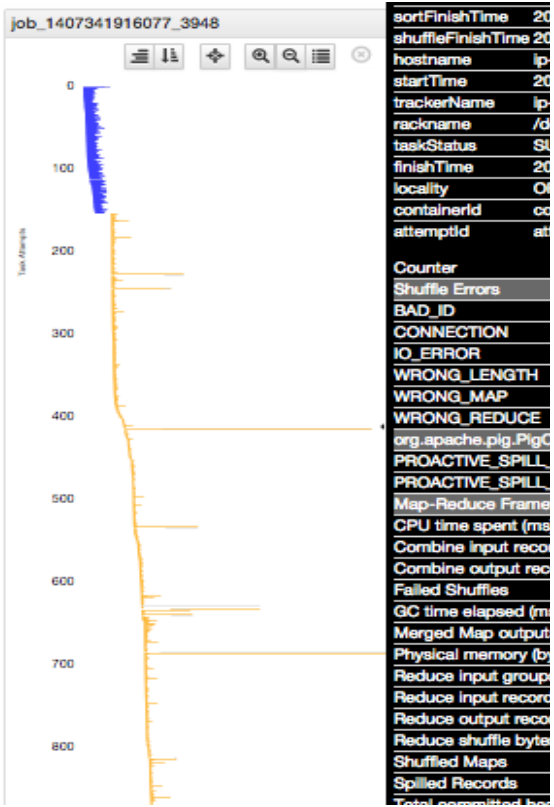
High SLA



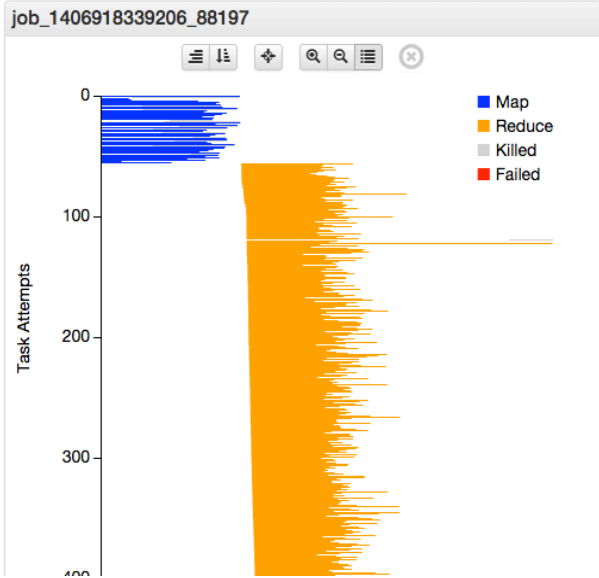
Query


inviso


2015-02-09 00:12:04 (UTC -0800)
2015-02-09 02:06:24 (UTC -0800)
2015-02-09 04:00:44 (UTC -0800)
2015-02-09 05:55:04 (UTC -0800)
2015-02-09 07:49:24 (UTC -0800)


job_1407341916077_3948
sortFinishTime
shuffleFinishTime
hostname
startTime
trackerName
rackname
taskStatus
finishTime
locality
containerId
attemptId
Counter
Shuffle Errors
BAD_ID
CONNECTION
IO_ERROR
WRONG_LENGTH
WRONG_MAP
WRONG_REDUCE
PROACTIVE_SPILL
Map-Reduce Frame
CPU time spent (ms
Combine output rec
Failed Shuffles
GC time elapsed (m
Merged Map output
Physical memory (b
Reduce input group
Reduce input record
Reduce output reco
Reduce shuffle byte
Shuffled Maps
Spilled Records


job_1407268826556_5014
NODE_LOCAL
RACK_LOCAL
OFF_SWITCH
Task Attempts


job_1406918339206_88197
Map
Reduce
Killed
Failed
Task Attempts

Task Visualization

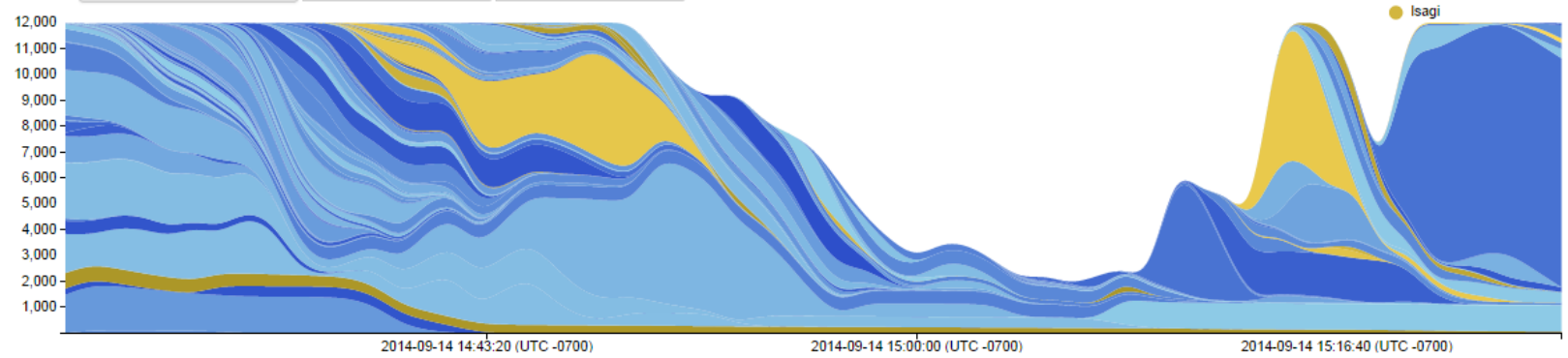
ec2-54-80-244-67.compute-1.amazonaws.com:7001/#cluster

Inviso Search Cluster Profiler Search Contact Help

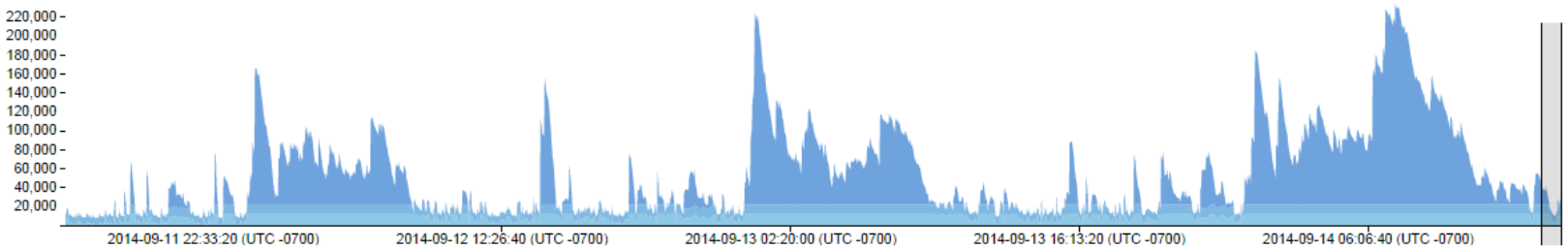
Cluster: bdp_h2prod

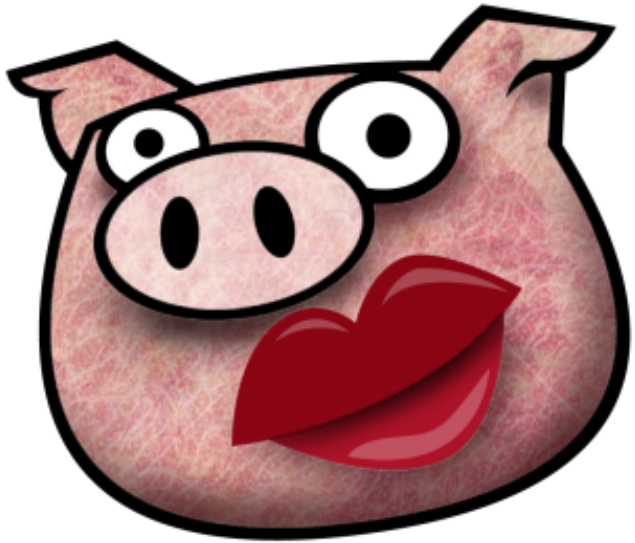
Cluster Container Stream

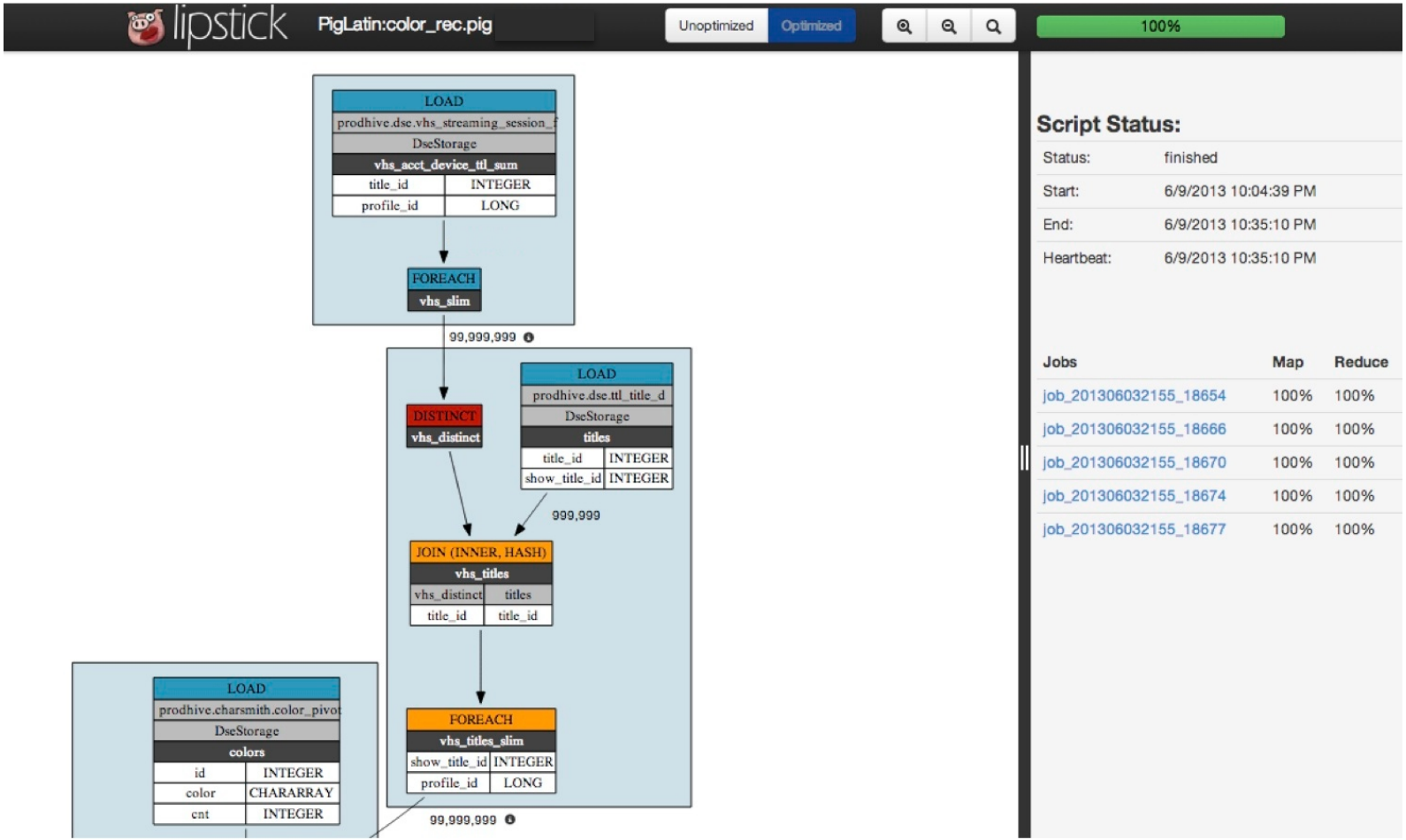
Group By: Application | Isagi | Filter

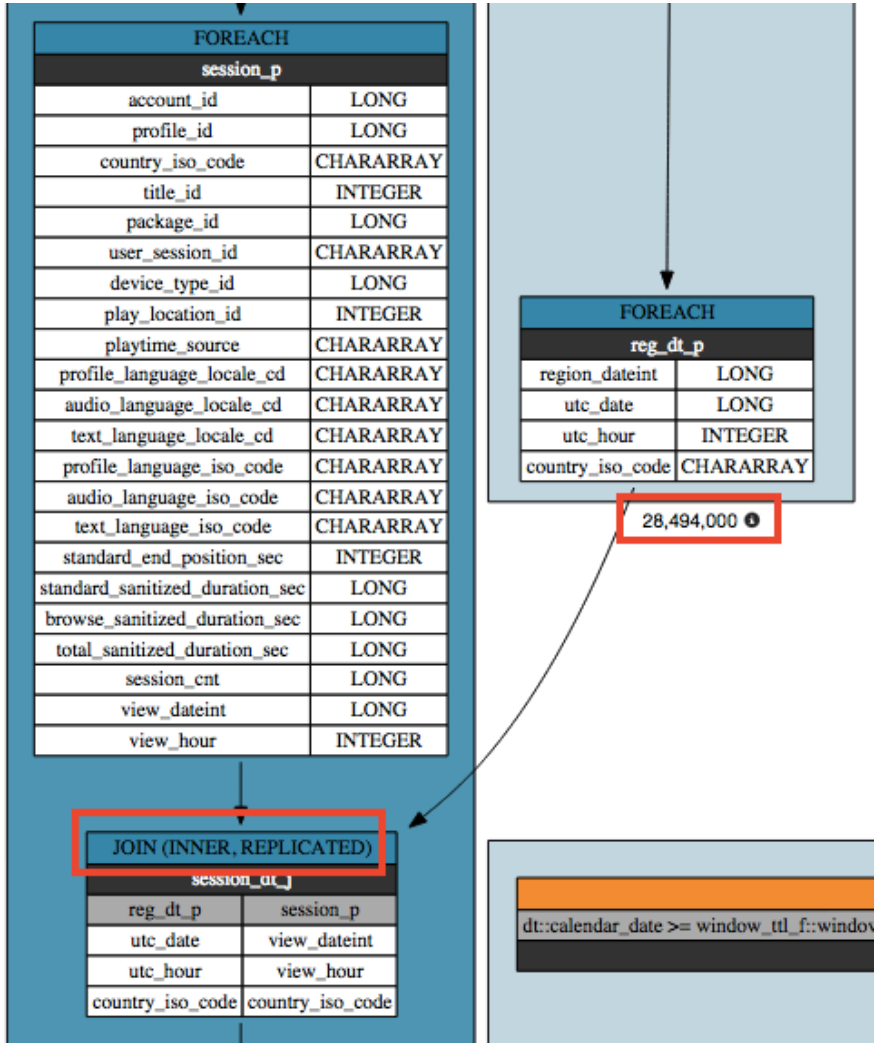


Cluster Resource Stream



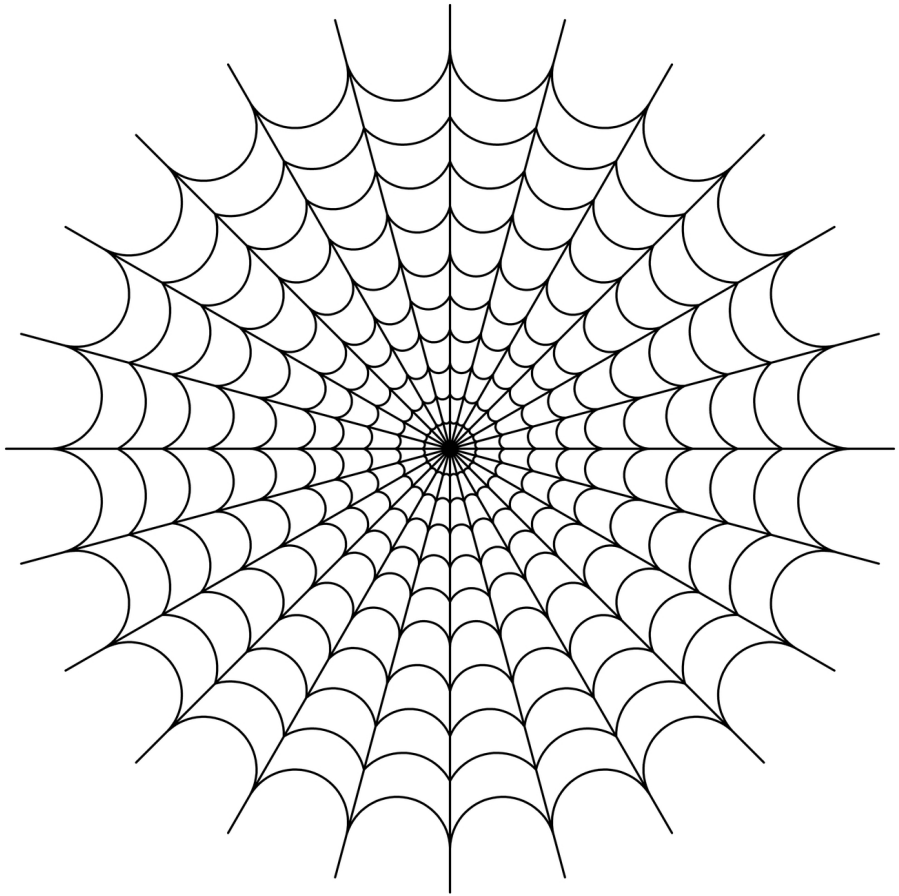



lipstick
PigLatin:color_rec.pig
Unoptimized
Optimized
100%
LOAD
prodhive.dse.vhs_streaming_session_f
DseStorage
vhs_acct_device_ttl_sum
title_id INTEGER
profile_id LONG
FOREACH
vhs_slim
99,999,999
LOAD
prodhive.dse.ttl_title_d
DseStorage
titles
title_id INTEGER
show_title_id INTEGER
DISTINCT
vhs_distinct
999,999
JOIN (INNER, HASH)
vhs_titles
vhs_distinct titles
title_id title_id
LOAD
prodhive.charsmith.color_pivot
DseStorage
colors
id INTEGER
color CHARARRAY
cnt INTEGER
FOREACH
vhs_titles_slim
show_title_id INTEGER
profile_id LONG
99,999,999
Script Status:
Status: finished
Start: 6/9/2013 10:04:39 PM
End: 6/9/2013 10:35:10 PM
Heartbeat: 6/9/2013 10:35:10 PM
Jobs Map Reduce
job_201306032155_18654 100% 100%
job_201306032155_18666 100% 100%
job_201306032155_18670 100% 100%
job_201306032155_18674 100% 100%
job_201306032155_18677 100% 100%


FOREACH
session_p
account_id LONG
profile_id LONG
country_iso_code CHARARRAY
title_id INTEGER
package_id LONG
user_session_id CHARARRAY
device_type_id LONG
play_location_id INTEGER
playtime_source CHARARRAY
profile_language_locale_cd CHARARRAY
audio_language_locale_cd CHARARRAY
text_language_locale_cd CHARARRAY
profile_language_iso_code CHARARRAY
audio_language_iso_code CHARARRAY
text_language_iso_code CHARARRAY
standard_end_position_sec INTEGER
standard_sanitized_duration_sec LONG
browse_sanitized_duration_sec LONG
total_sanitized_duration_sec LONG
session_cnt LONG
view_dateint LONG
view_hour INTEGER
FOREACH
reg_dt_p
region_dateint LONG
utc_date LONG
utc_hour INTEGER
country_iso_code CHARARRAY
28,494,000
JOIN (INNER, REPLICATED)
reg_dt_p session_p
utc_date view_dateint
utc_hour view_hour
country_iso_code country_iso_code
dt::calendar_date >= window_ttl_f::windo

Metacat

Charlotte



Dependencies

Column: --ALL-- **Type:** --ALL-- **Username:** --ALL--

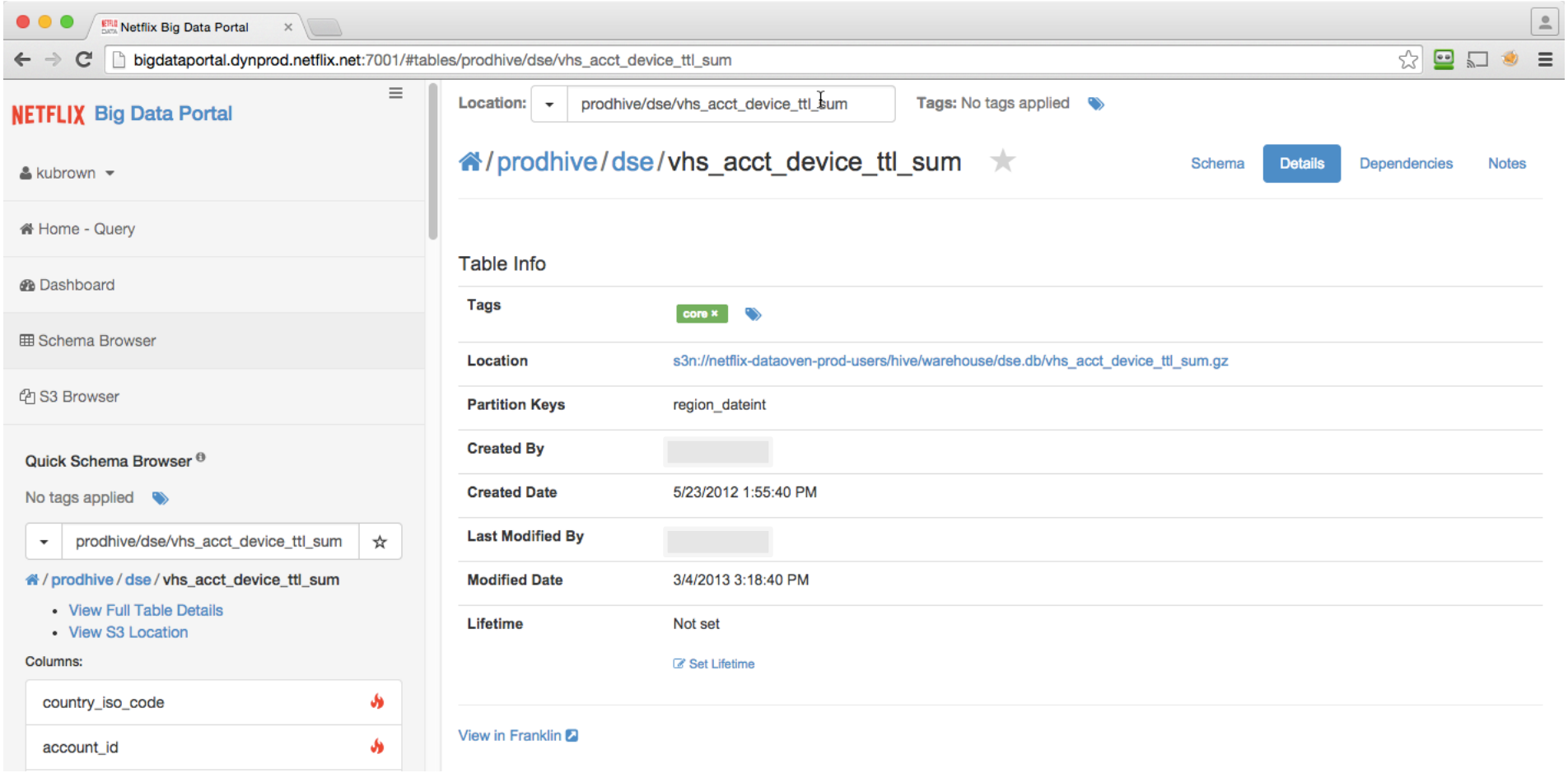
Upstream (1)

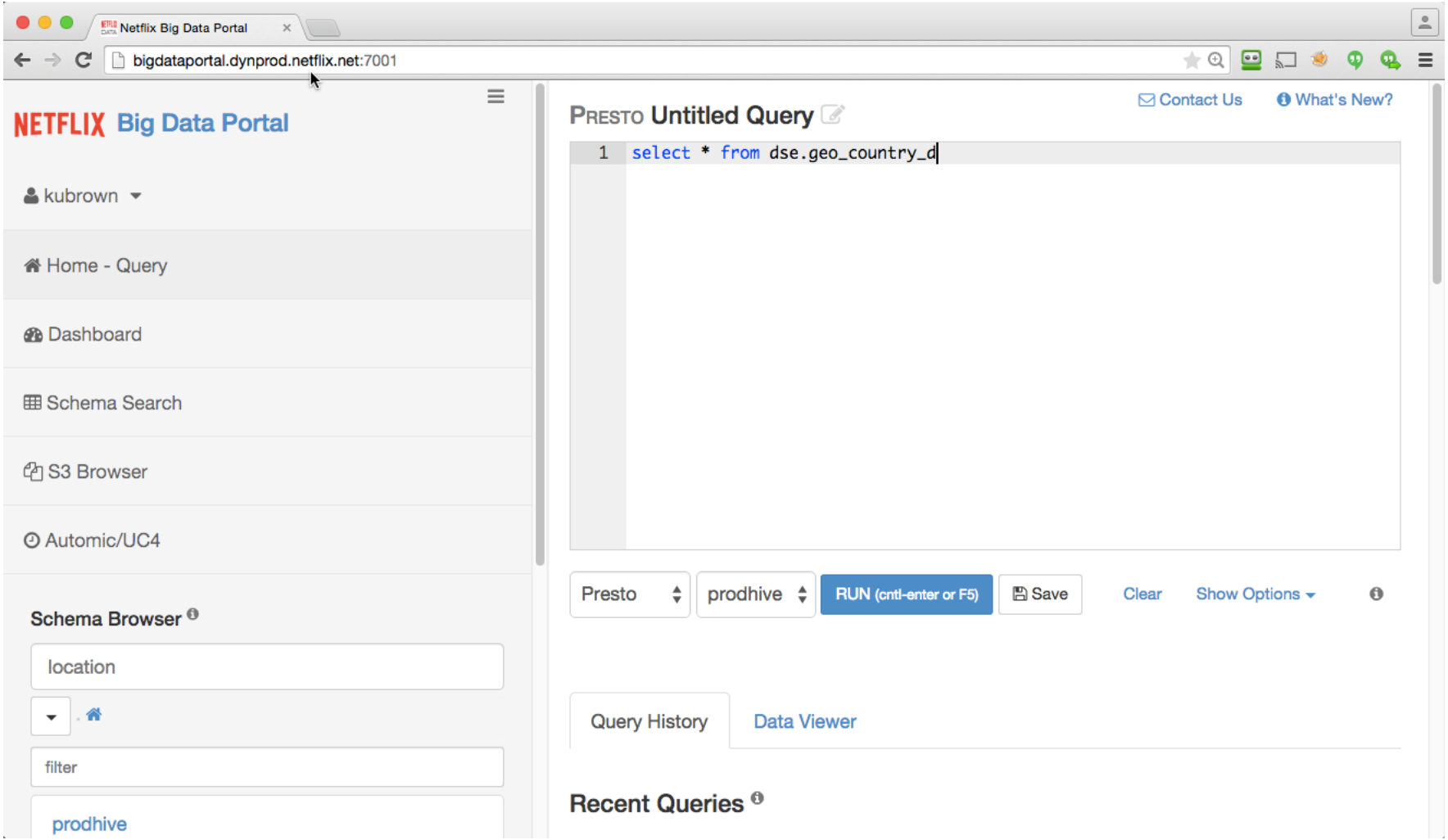
Name	Username	Type	Frequency
PigLatin:vhs_acct_device_ttl_sum.pig		etl	53

Downstream (229)

Name	Username	Type	Frequency
INSERT OVERWRITE TABL...date,126,'yyyyMMdd')(Stage-4)		adhoc	3228
INSERT OVERWRITE TABL..._date,98,'yyyyMMdd')(Stage-3)		adhoc	1522
INSERT OVERWRITE TABL...c_type, Z.viewhours(Stage-3)		adhoc	1414
PigLatin:PVR Show Pop - 20150204		etl	582
STING.Kids Originals Title SOP SOD		sting	575
CREATE TABLE mjarley.title_streaming_...null(Stage-30)		adhoc	574
CREATE TABLE iyohai.title_streaming_e...null(Stage-15)		adhoc	437

Big Data Portal


Netflix Big Data Portal
bigdataportal.dynprod.netflix.net:7001/#tables/prodhive/dse/vhs_acct_device_ttl_sum
NETFLIX Big Data Portal
kubrown
Home - Query
Dashboard
Schema Browser
S3 Browser
Quick Schema Browser
No tags applied
prodhive/dse/vhs_acct_device_ttl_sum
/ prodhive / dse / vhs_acct_device_ttl_sum
View Full Table Details
View S3 Location
Columns:
country_iso_code
account_id
Location: prodhive/dse/vhs_acct_device_ttl_sum
Tags: No tags applied
/ prodhive / dse / vhs_acct_device_ttl_sum
Schema
Details
Dependencies
Notes
Table Info
Tags
core
Location
s3n://netflix-dataoven-prod-users/hive/warehouse/dse.db/vhs_acct_device_ttl_sum.gz
Partition Keys
region_dateint
Created By
Created Date
5/23/2012 1:55:40 PM
Last Modified By
Modified Date
3/4/2013 3:18:40 PM
Lifetime
Not set
Set Lifetime
View in Franklin


Netflix Big Data Portal
bigdataportal.dynprod.netflix.net:7001
NETFLIX Big Data Portal
kubrown
Home - Query
Dashboard
Schema Search
S3 Browser
Automic/UC4
Schema Browser
location
filter
prodhive
PRESTO Untitled Query
Contact Us
What's New?
1 select * from dse.geo_country_d
Presto
prodhive
RUN (cntl-enter or F5)
Save
Clear
Show Options
Query History
Data Viewer
Recent Queries

Recent Queries

Status Filter: All **Keyword Filter:**

select * from dse.location_d 10:29

Query Text:
select * from dse.location_d

Parameters:

Status: RUNNING KILL JOB

Job Type: PrestoJob
Genie Job Id: 48991974-b865-11e4-96e1-0ab5e51a10cb
Start Time: 2/19/2015 10:29:47 AM
Update Time: 2/19/2015 10:29:48 AM

Links:

Saved Queries

Owned By You

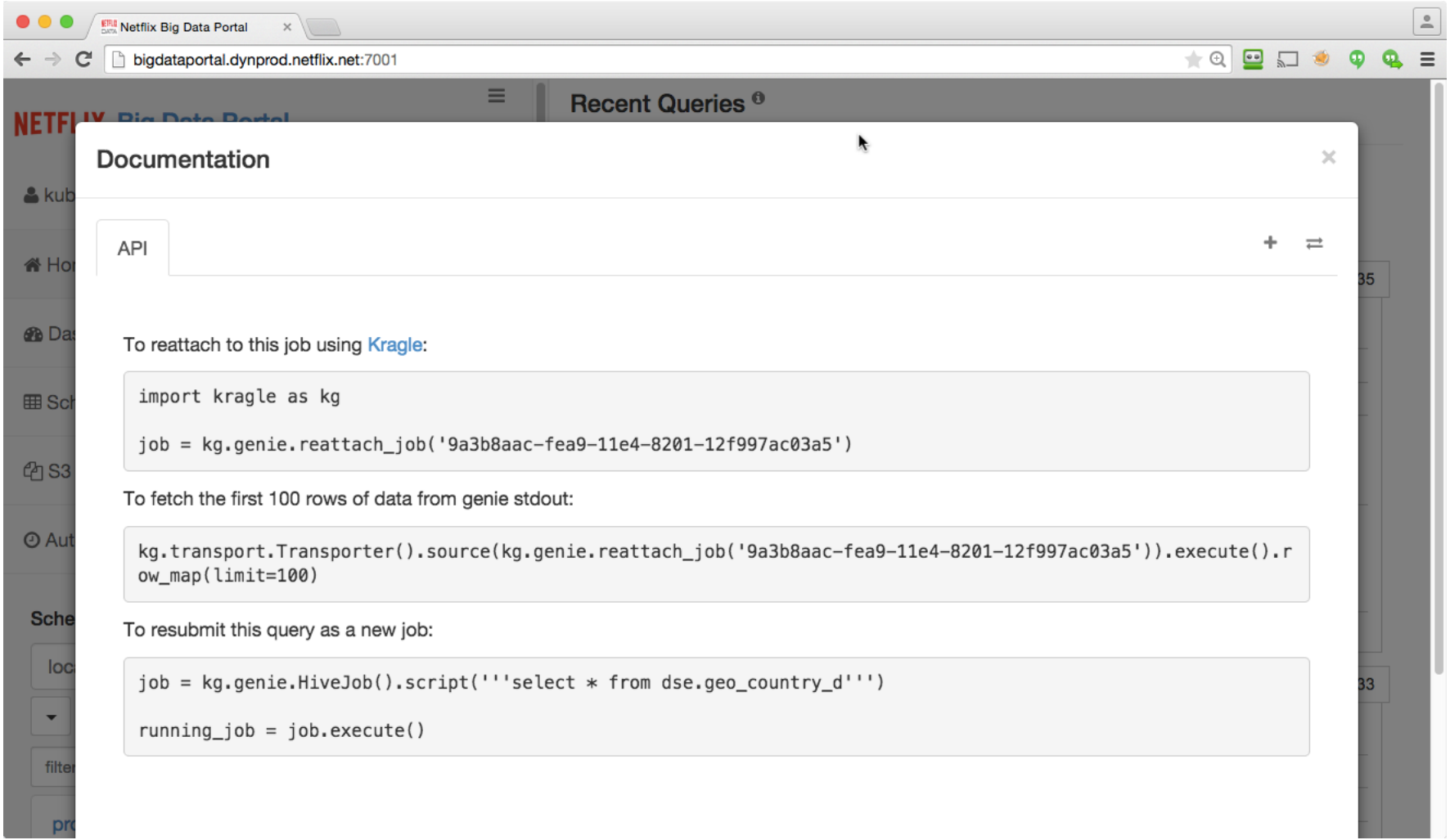
- Chukwa Synthetic Events Compare 1
- kurttest

Shared With You

- presto demo
- geo_country_d

Public

- Query Joining map command audit and request audit tables


Netflix Big Data Portal
bigdataportal.dynprod.netflix.net:7001
Recent Queries
Documentation
API
To reattach to this job using Kragle:
import kragle as kg
job = kg.genie.reattach_job('9a3b8aac-fea9-11e4-8201-12f997ac03a5')
To fetch the first 100 rows of data from genie stdout:
kg.transport.Transporter().source(kg.genie.reattach_job('9a3b8aac-fea9-11e4-8201-12f997ac03a5')).execute().row_map(limit=100)
To resubmit this query as a new job:
job = kg.genie.HiveJob().script('''select * from dse.geo_country_d''')
running_job = job.execute()

Big Data API
(aka Kragle)

IP[y]: Notebook Untitled2 (unsaved changes)

File Edit View Insert Cell Kernel Help

Code Cell Toolbar: None

In [1]:
```
import kragle as kg
```

In [2]:
```
job = kg.genie.PrestoJob() \
    .script('select * from dse.geo_country_d') \
    .headers() \
    .execute()
```

In [3]:
```
job.pandas()
```

Out[3]:

	country_iso_code	country_sk	country_desc	country_full_desc	company_code	subregion_sk	subregion_pd_sk	content_subregion_sk	conter
0	FR	8728	France	France	65	14	14	15	France
1	CM	8700	Cameroon	Cameroon	-1	9	3	9	Other
2	AR	6582	Argentina	Argentina	33	8	4	8	Latin A
3	MD	8788	Moldova	Moldova, Republic of	-1	9	3	9	Other

All about the tech?


E
K
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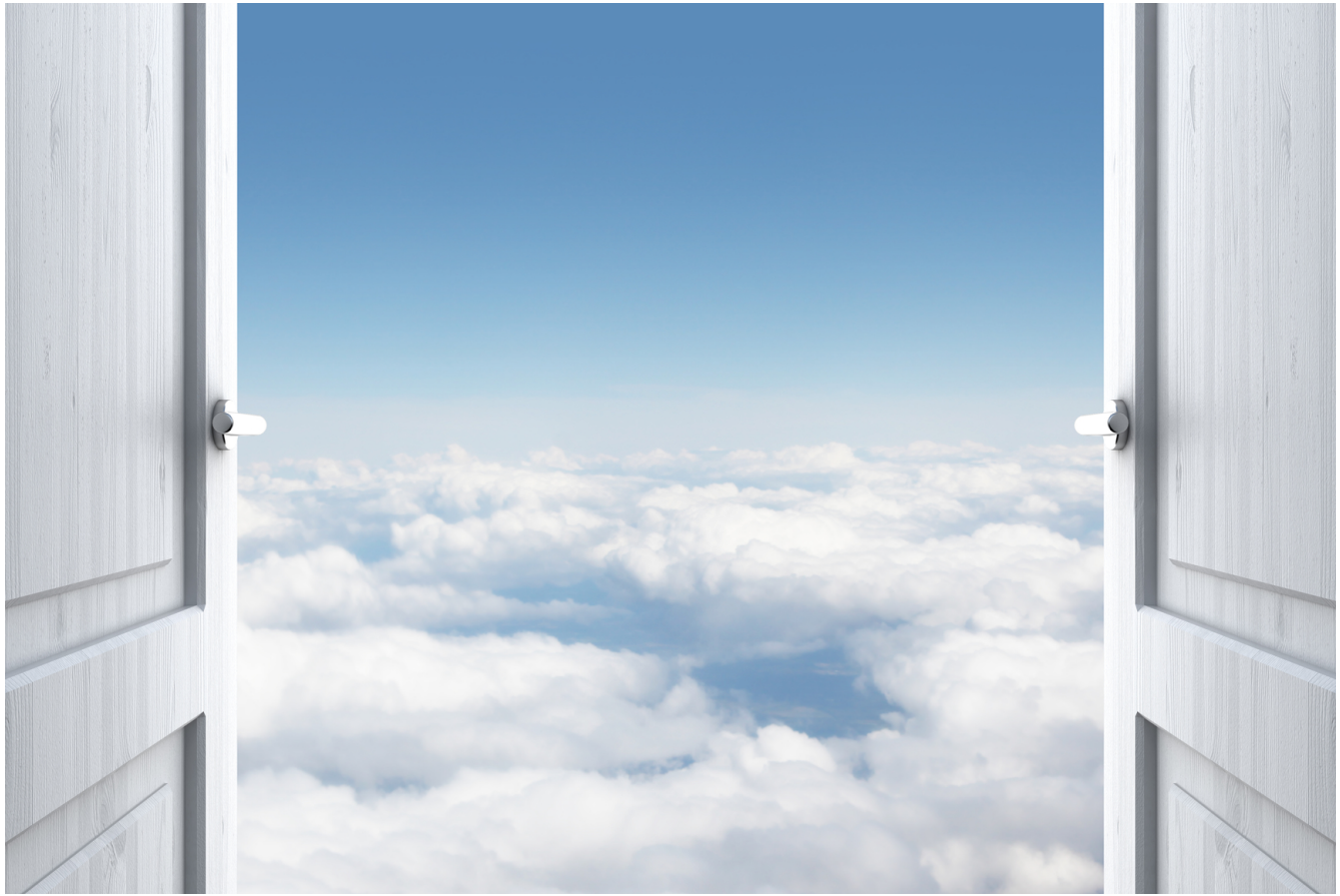
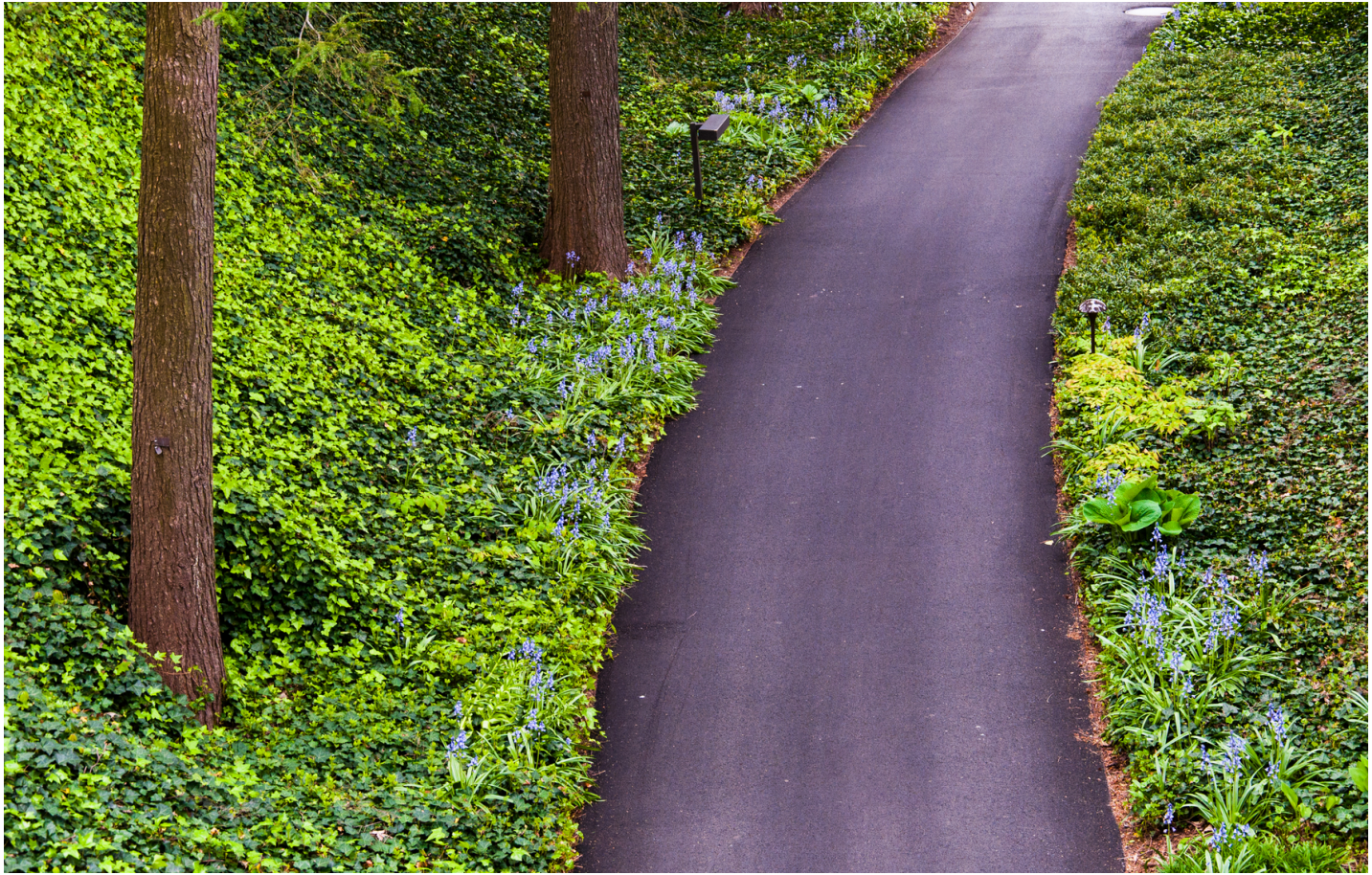
N



Development & Deployment Flow

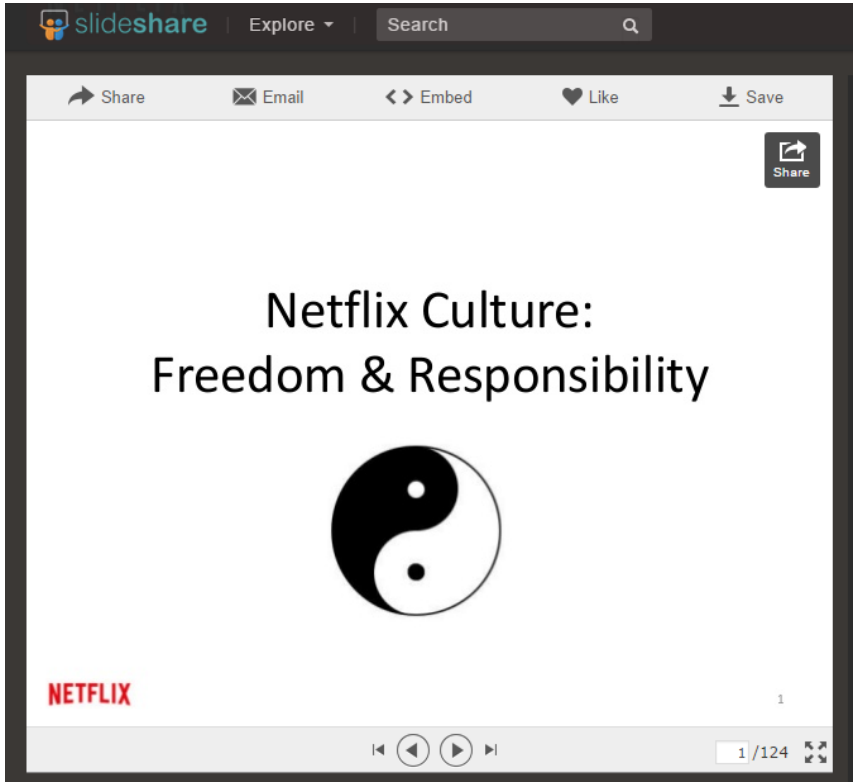
Best Practices → Clean-up

Consultation
Components
Tools
Automation




why?

Netflix Culture Deck



Google Search: "Netflix Culture Deck"

Questions?

http://jobs.netflix.com/
kurtbrown@netflix.com