Navigating a Data Warehouse via CLI

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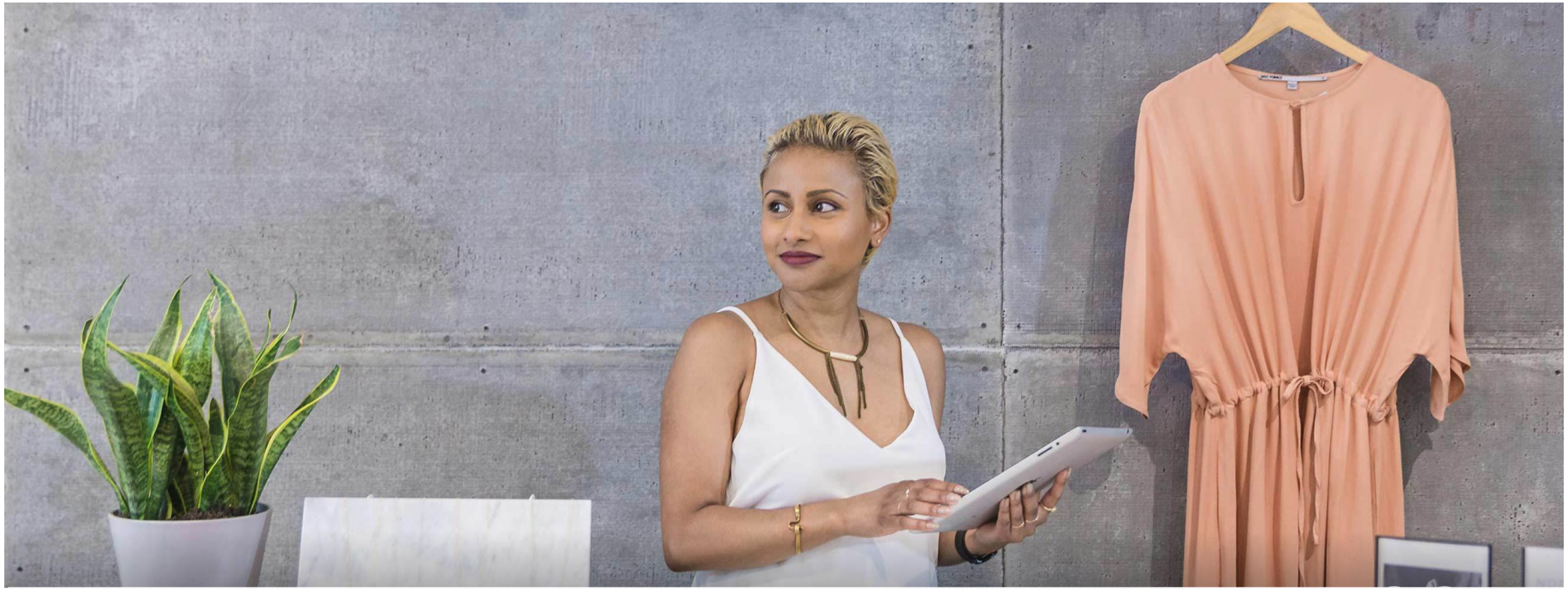
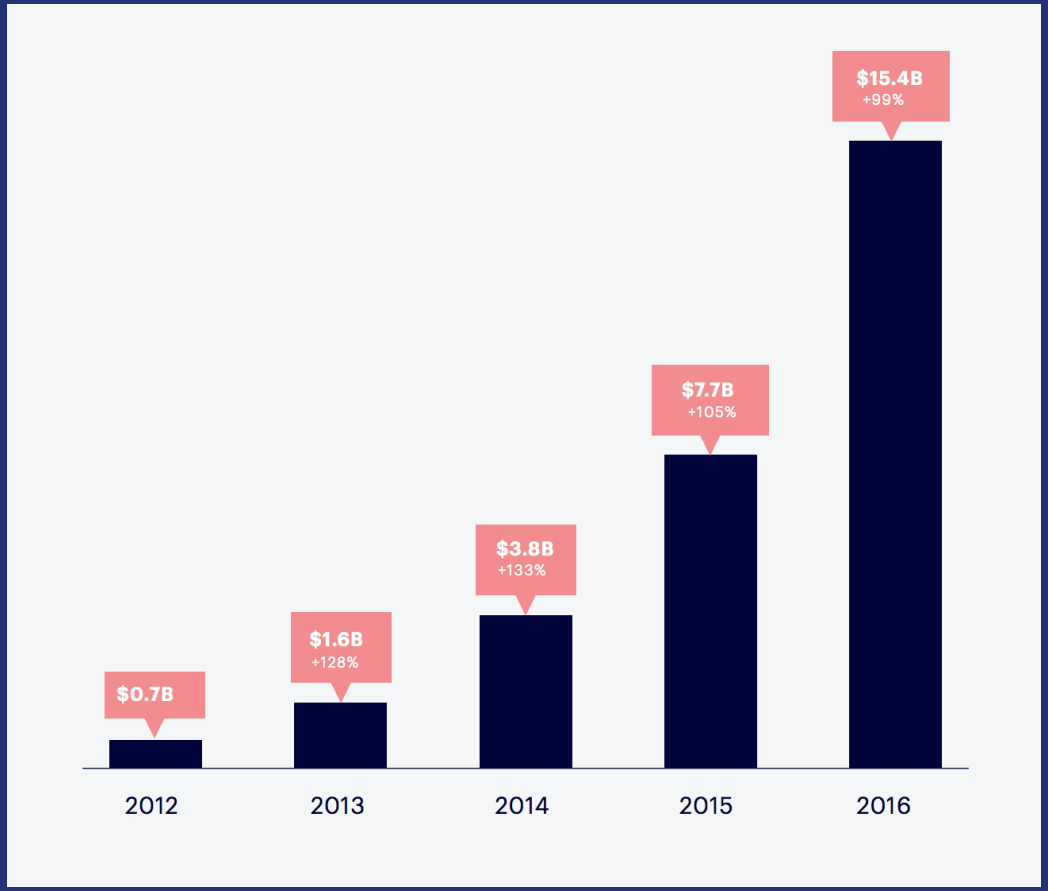


Data Warehouse

Platform to collect, store, analyze, and report on data

Gross Merchandise Volume



Batch jobs

(E)xtract (T)ransform (L)oad

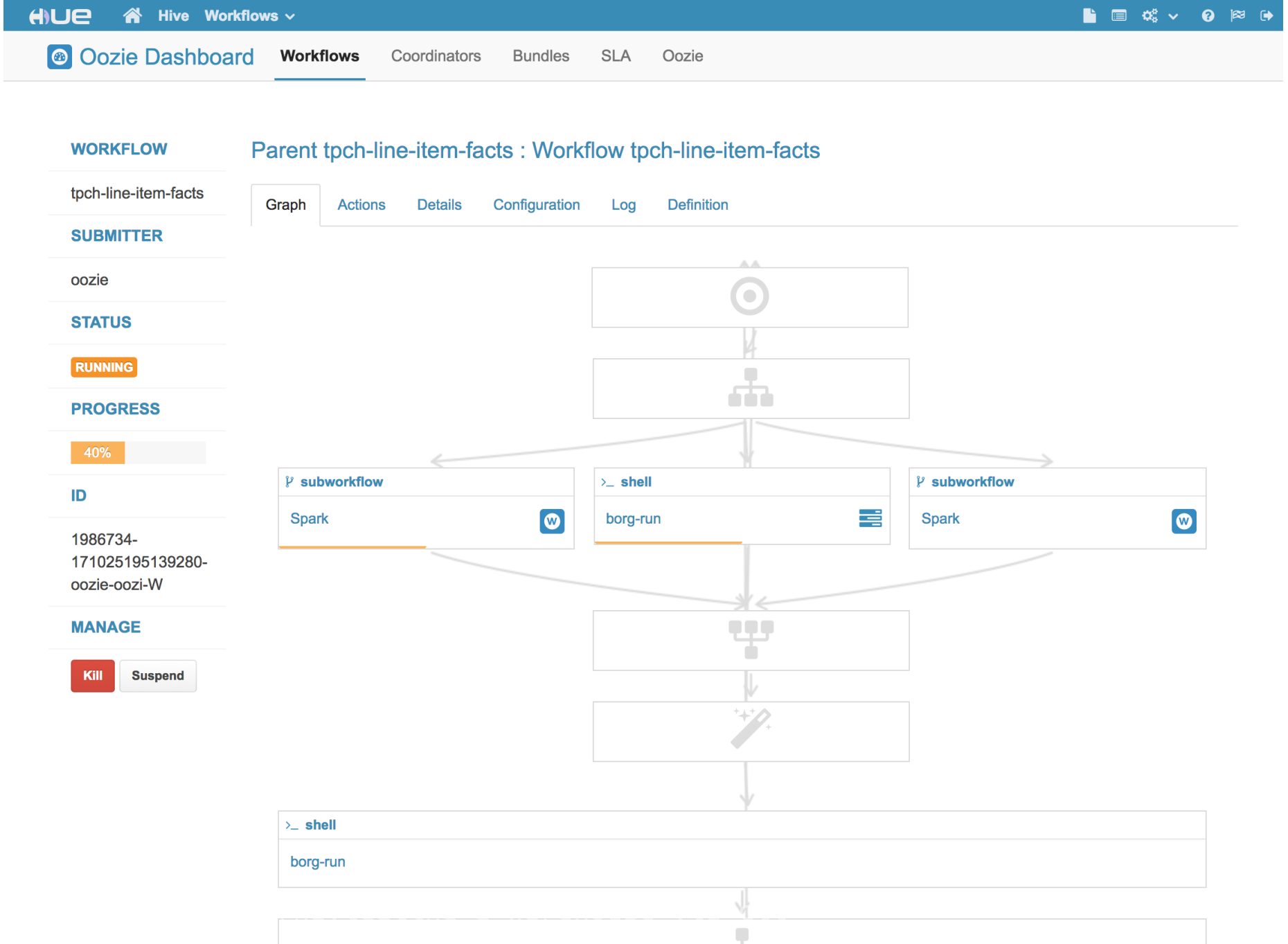
Development speed

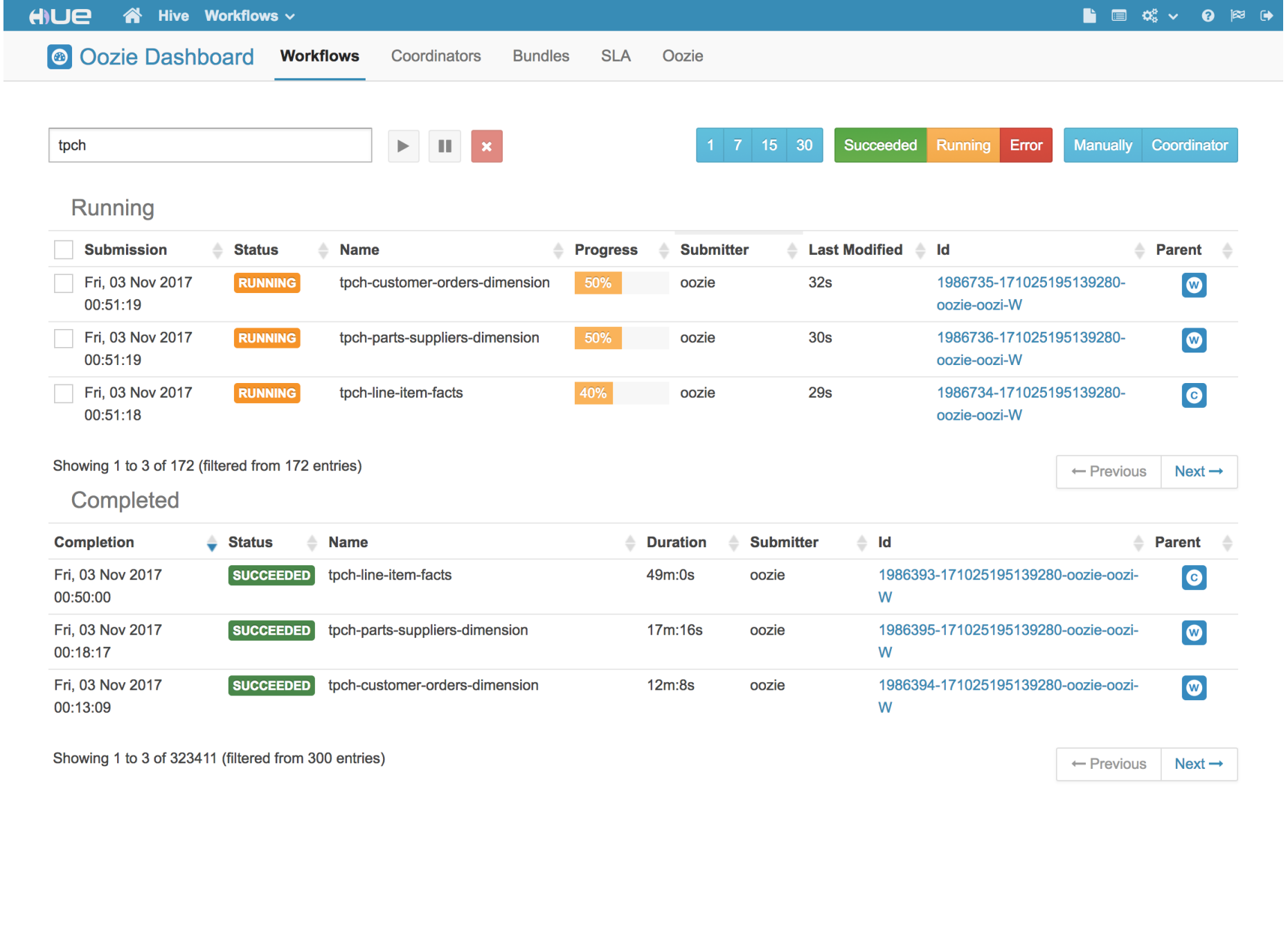
3000+

ETL jobs
(as of Nov 1017)

15.2

Deploys per day
on avg (±8.6 std dev)


Hue
Hive
Workflows
Oozie Dashboard
Workflows
Coordinators
Bundles
SLA
Oozie
WORKFLOW
tpch-line-item-facts
SUBMITTER
oozie
STATUS
RUNNING
PROGRESS
40%
ID
1986734-171025195139280-oozie-oozi-W
MANAGE
Kill
Suspend
Parent tpch-line-item-facts : Workflow tpch-line-item-facts
Graph
Actions
Details
Configuration
Log
Definition
subworkflow
Spark
shell
borg-run
subworkflow
Spark
shell
borg-run


Hive
Workflows
Oozie Dashboard
Workflows
Coordinators
Bundles
SLA
Oozie
tpch
1
7
15
30
Succeeded
Running
Error
Manually
Coordinator
Running
Submission
Status
Name
Progress
Submitter
Last Modified
Id
Parent
Fri, 03 Nov 2017 00:51:19
RUNNING
tpch-customer-orders-dimension
50%
oozie
32s
1986735-171025195139280-oozie-oozi-W
Fri, 03 Nov 2017 00:51:19
RUNNING
tpch-parts-suppliers-dimension
50%
oozie
30s
1986736-171025195139280-oozie-oozi-W
Fri, 03 Nov 2017 00:51:18
RUNNING
tpch-line-item-facts
40%
oozie
29s
1986734-171025195139280-oozie-oozi-W
Showing 1 to 3 of 172 (filtered from 172 entries)
← Previous
Next →
Completed
Completion
Status
Name
Duration
Submitter
Id
Parent
Fri, 03 Nov 2017 00:50:00
SUCCEEDED
tpch-line-item-facts
49m:0s
oozie
1986393-171025195139280-oozie-oozi-W
Fri, 03 Nov 2017 00:18:17
SUCCEEDED
tpch-parts-suppliers-dimension
17m:16s
oozie
1986395-171025195139280-oozie-oozi-W
Fri, 03 Nov 2017 00:13:09
SUCCEEDED
tpch-customer-orders-dimension
12m:8s
oozie
1986394-171025195139280-oozie-oozi-W
Showing 1 to 3 of 323411 (filtered from 300 entries)
← Previous
Next →

Search YAML schedule definitions

```yaml
gross-merchandise-volume-flow:
  frequency: 2h
  owner: team@example.com

  compute-gmv-job:
    resource_class: xxlarge
    executable: jobs/compute_gmv.py
    inputs:
      - /data/raw/orders/
      - /data/raw/transactions/
    output: /data/frontroom/gmv-facts/

  extract-orders-job:
    ...
```

Tables of metadata

Workflow (group)	Freq. (h)	Job	Resources	Etc.
abiding-poetry	6	comp	small	...
abiding-poetry	6	defeated	medium	
abiding-poetry	6	kind-big	xxlarge	
abiding-poetry	6	load-com	small	
abiding-poetry	6	load-kind-big	xlarge	
abiding-poetry	6	swift-energy	medium	
confused-indy	7	eight	small	
confused-indy	7	load-eight	small	
confused-indy	7	load-two-orig	small	
confused-indy	7	luxury-med	xlarge	

Parse and print metadata

```
for flow in flows:
    for job in flow.jobs:
        print('\t'.join((
            flow.name,
            str(flow.frequency),
            job.name,
            job.resource_class.value,
            job.output
        )))
```

What is piping?

```
python jobs2.py | column -t
```

https://brandonwamboldt.ca/how-linux-pipes-work-under-the-hood-1518/

Piping to head

```
python jobs3.py | head
```

```
Traceback (most recent call last):
  File "jobs3.py", line 13, in <module>
    job.output
BrokenPipeError: [Errno 32] Broken pipe
```

Handling SIGPIPE

```
import signal

def handle_sigpipe(signum, frame):
    sys.stdout.close()
    sys.exit(0)

signal.signal(signal.SIGPIPE, handle_sigpipe)
```

Dataset dependencies & paths

Start	End
/data/orders	/data/gmv_per_shop
/data/orders	gmv_per_shop@db
/data/transactions	/data/gmv_per_shop
/data/transactions	gmv_per_shop@db
/data/gmv_facts	gmv_per_shop@db

What's downstream of a bad dataset?

Start	End
/data/raw/orders	/data/gmv_per_shop
/data/raw/orders	gmv_per_shop@database
/data/raw/transactions	/data/gmv_per_shop
/data/raw/transactions	gmv_per_shop@database
/data/gmv_facts	gmv_per_shop@database

```
python downstream.py | awk '$1 == "bad"'
```

What is downstream of this list of bad datasets?

```
python jobs.py | awk '$2 < 7 && $4 == "small"' > bad

python downstream.py > downstream
```

`join` two files

```
a
b
c
```

```
a    1
b    2
b    3
d    4
```

```
join -1 1 -2 1 file_a file_b
```

```
a 1
b 2
b 3
```

How to trace bad data

1. Find bad jobs/outputs
   - Find properties describing a bug
   - Filter metadata tables for affected jobs

2. Find affected downstream outputs
   - Join affected job outputs to tables of paths to get downstream

UNIX tools for tables

- `head` to truncate
- `column -t` to pretty-print
- `grep` and `awk` to filter
- `wc -l` to count
- `sort` to sort
- `uniq` to dedupe / count freqs. (`-c`)
- `join` to join sorted files

Testing

- Move script code into modules
- Scripts produce parseable output

Performance

- `cProfile`
- Use generators (speeds up `head`)
- Use `pandas` (and `numpy`)
- Make expensive columns flags
  - `--expensive-col`
- Cache output (e.g. `joblib.memory`)

Thanks for listening!