

Himalayan Peaks of Testing Data Pipelines

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Who we are

What is Big Data

Who are DEs?

What is pipeline?

Who needs pipelines

QA of pipeline

QA \neq QC

QA of pipeline

QA \neq QC

QA is about processes, and not only about software quality.

Pyramid of testing. Unit



Typical pipeline



Unit testing of pipeline

What may we test here?

A pipeline should transform data correctly!

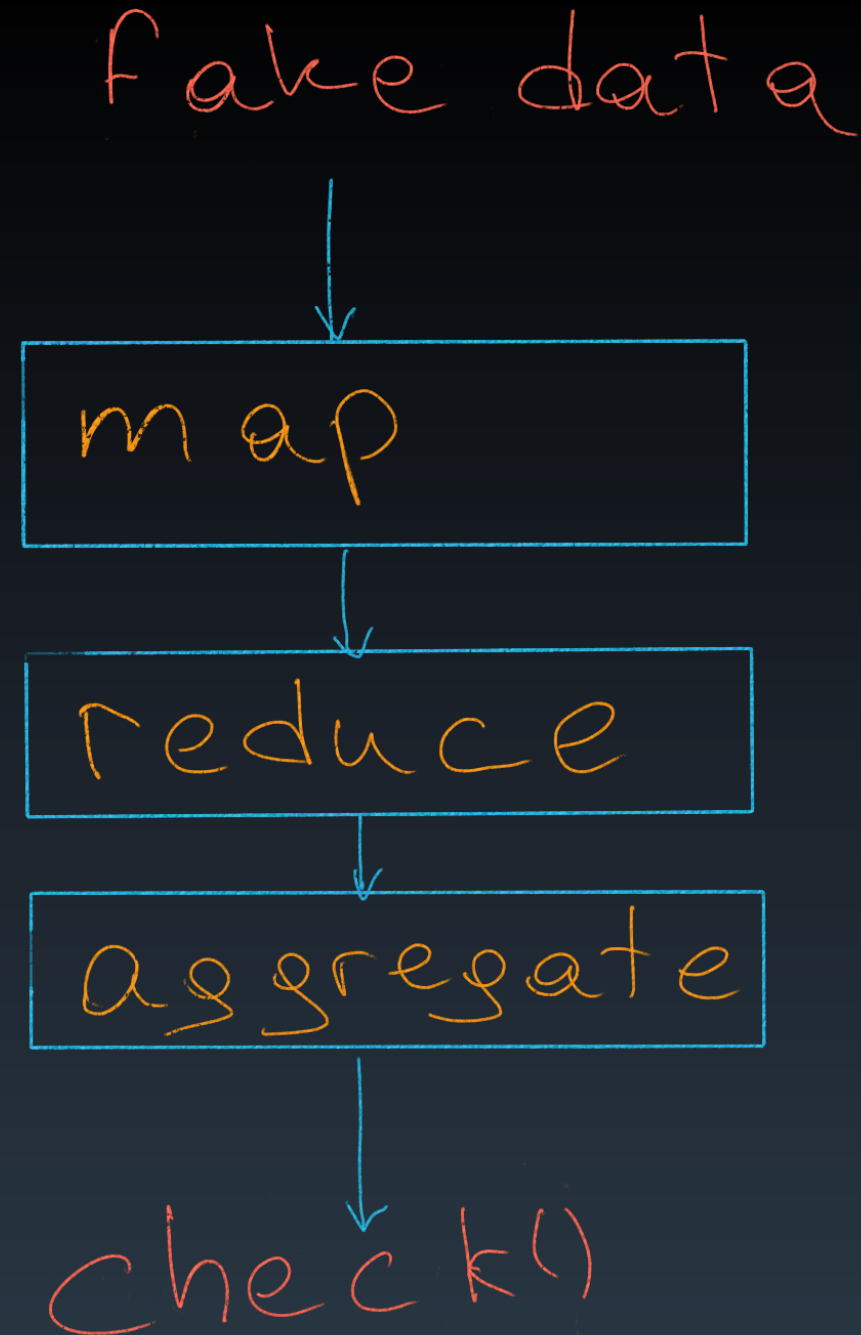
Correctness is a business term

Let's paste fakes!

Fake/mock input data

Reference data at the end of pipeline

Separate
Function

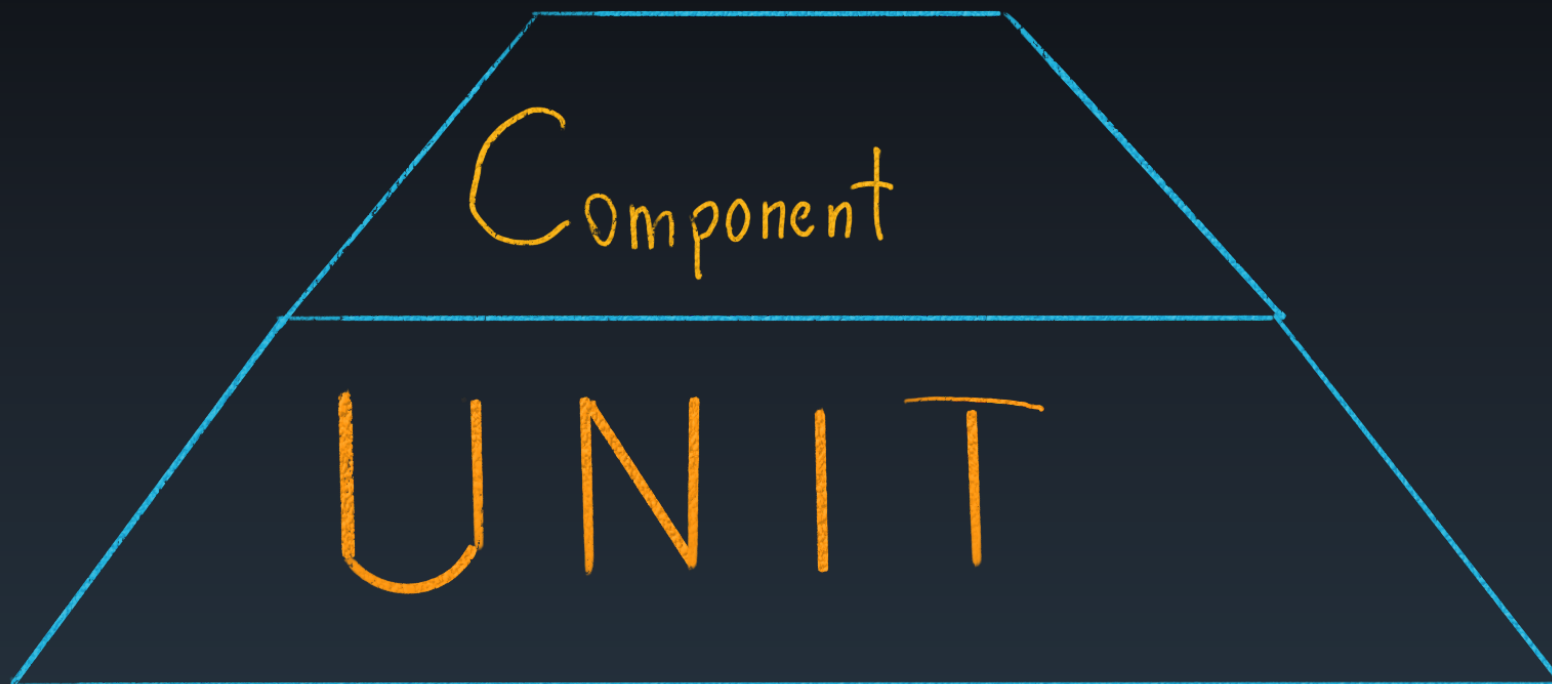


Tools

[holdenk/spark-testing-base](#) ← Tools to run tests

[MrPowers/spark-daria](#) ← tools to easily create test data

Component testing

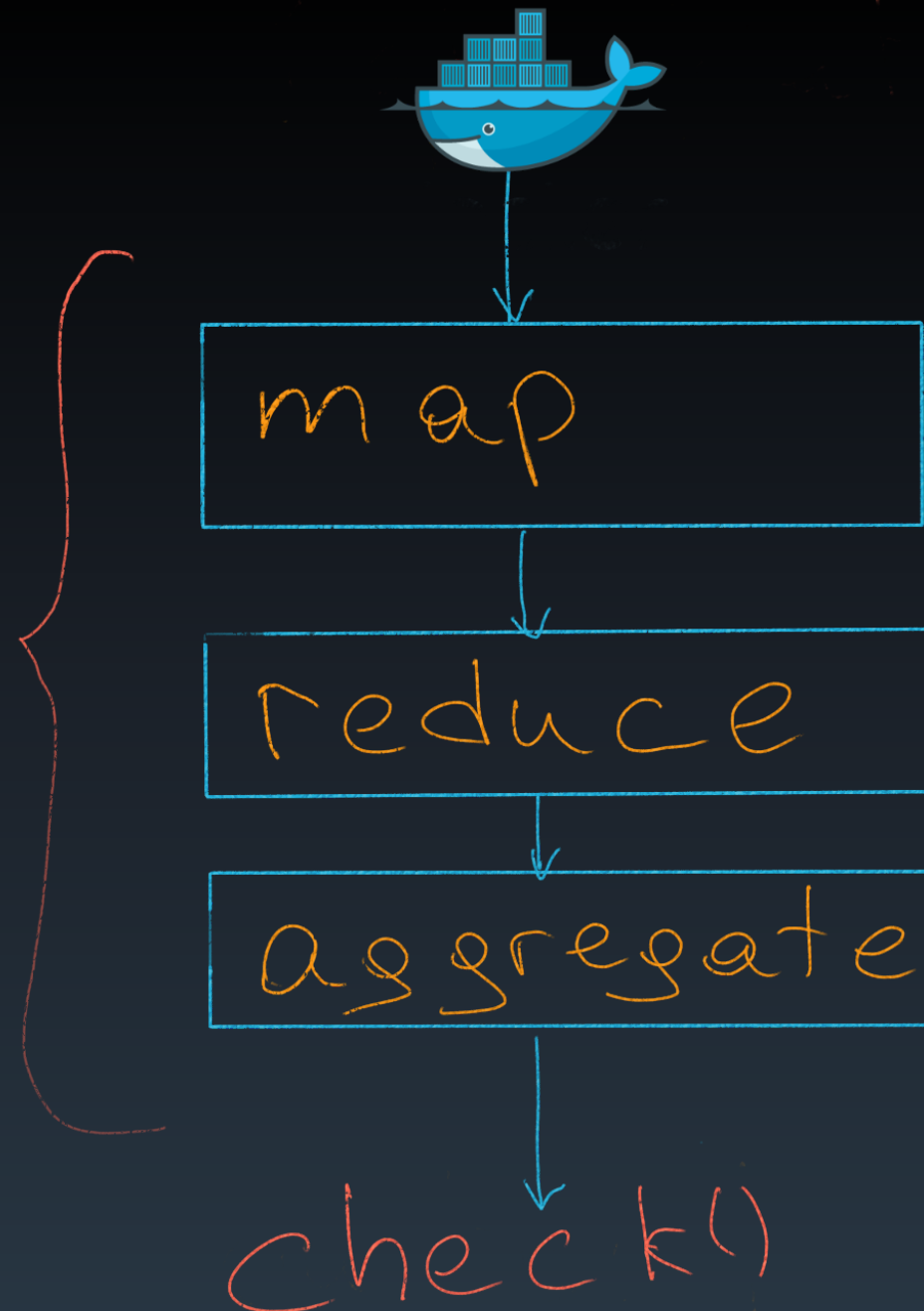




TESTCONTAINERS

TestContainers

Separate
Function



TestContainers

Supported languages:

- Java (and compatibles: Scala, Kotlin, etc.)
- Python
- Go
- Node.js
- Rust
- .NET

Test Containers

```
import sqlalchemy
from testcontainers.mysql import MySQLContainer

with MySQLContainer('mysql:5.7.17') as mysql:
    engine = sqlalchemy.create_engine(mysql.get_connection_url())
    version, = engine.execute("select version()").fetchone()
    print(version)    # 5.7.17
```

Integration Tests

Why test containers are not enough?

- vendor lock tools (DB, processing, etc.)
- real data
- external error handling

Integration Tests: How to

- get data samples from prod, anonymize it
- deploy full data backup on stage, depersonalize it (\$\$\$)
- run parallel job with different sink

[Using production data for testing in a post GDPR world](#)

Data expectations

Test:

- ✓ no data
- ✓ valid data
- ✓ empty partitions
- ? invalid data
- ? illegal data format

Data expectations. Tools:

- [great expectations](#),
- [Deequ](#)



Use Dead letter queue pattern for broken data to prevent:

- data loss
- data traffic jam

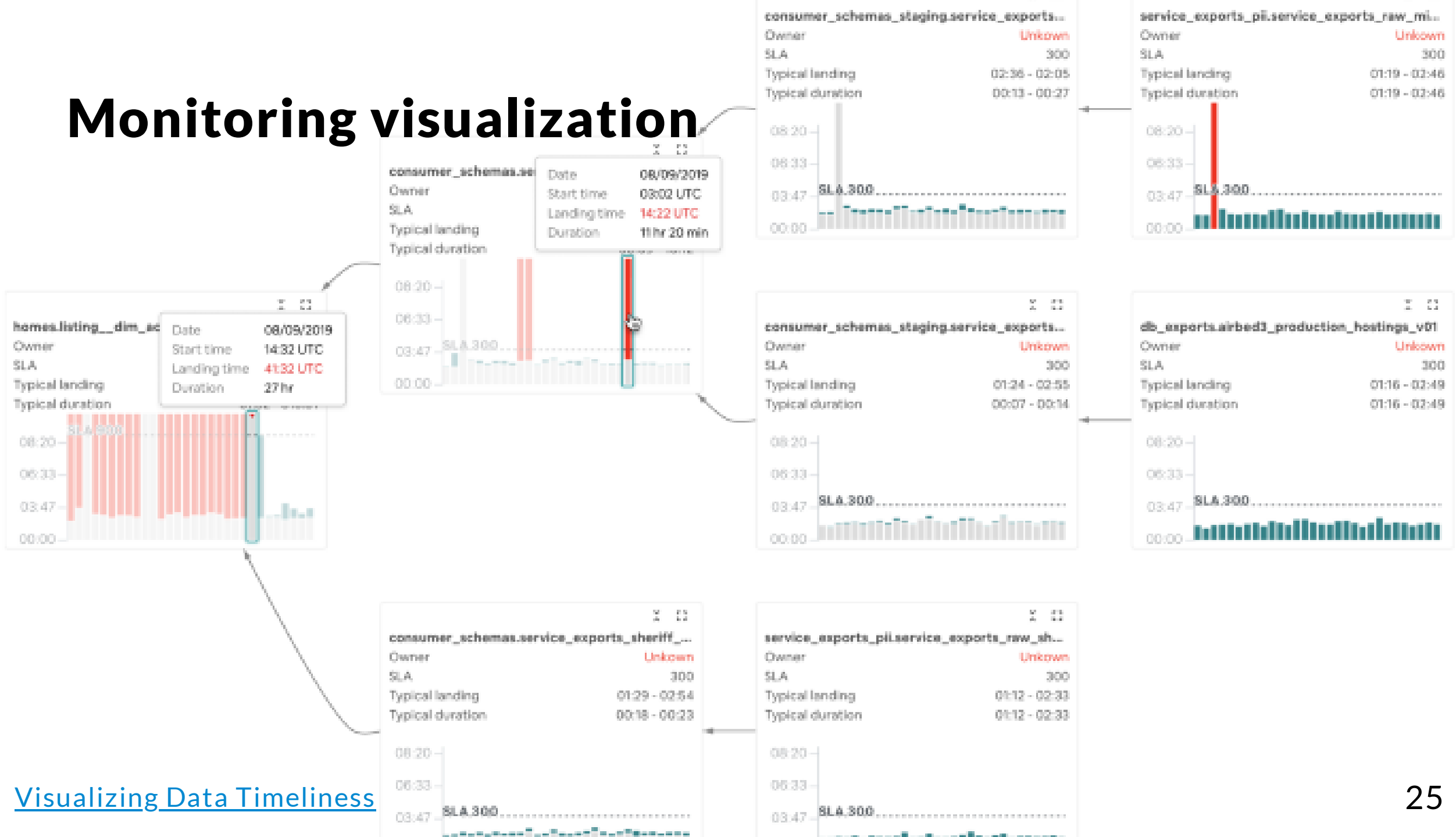
Monitoring

Why?

How to collect:

- StreamingQueryListener, QueryExecutionListener
- foreachBatch aggregates, sink as logs

Monitoring visualization



End-to-End tests

Compare with reports, old DWH

Multiple dimensions:

- data
- data latency
- performance, scalability

Performance Tests

Best performance test - initial data load

(image with initial data load + next microbatches loading)