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 ?= QC

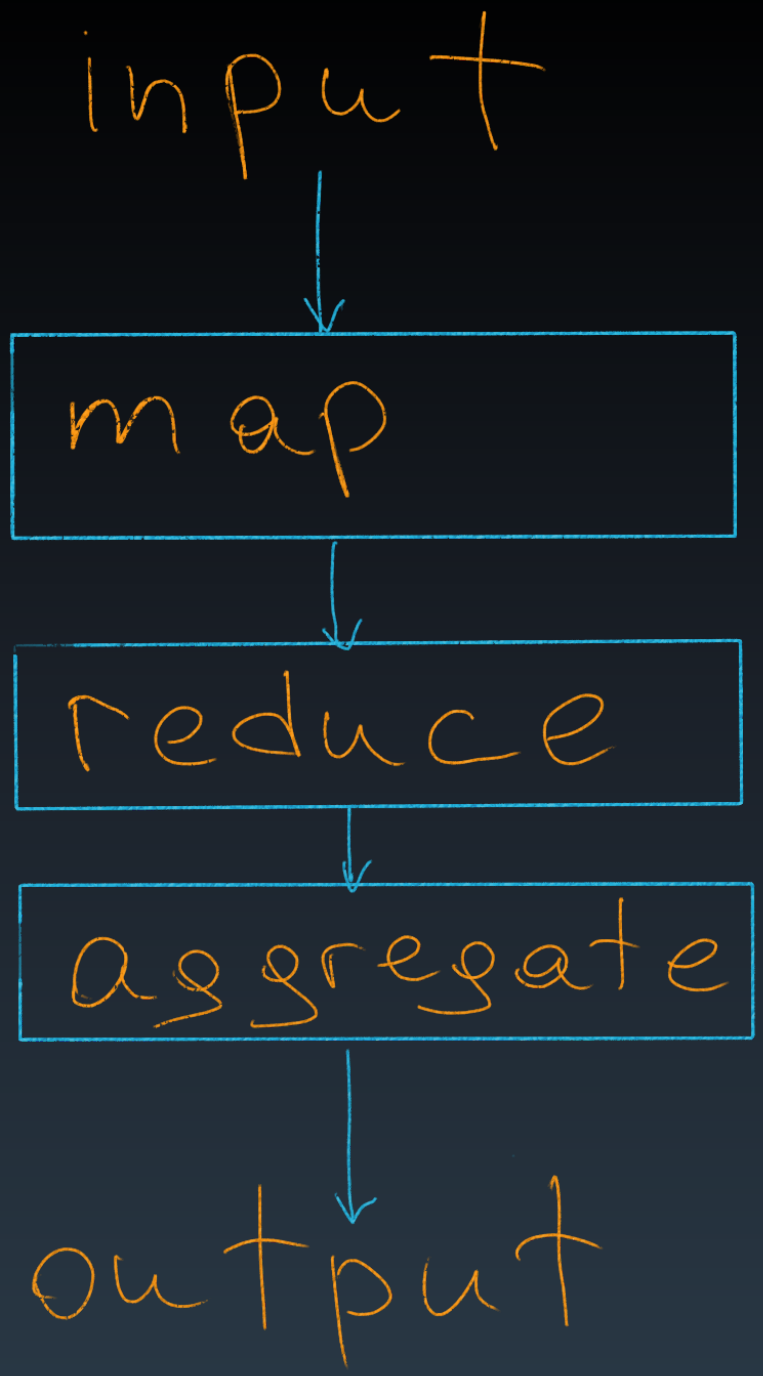
QA of pipeline

QA ≠ 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

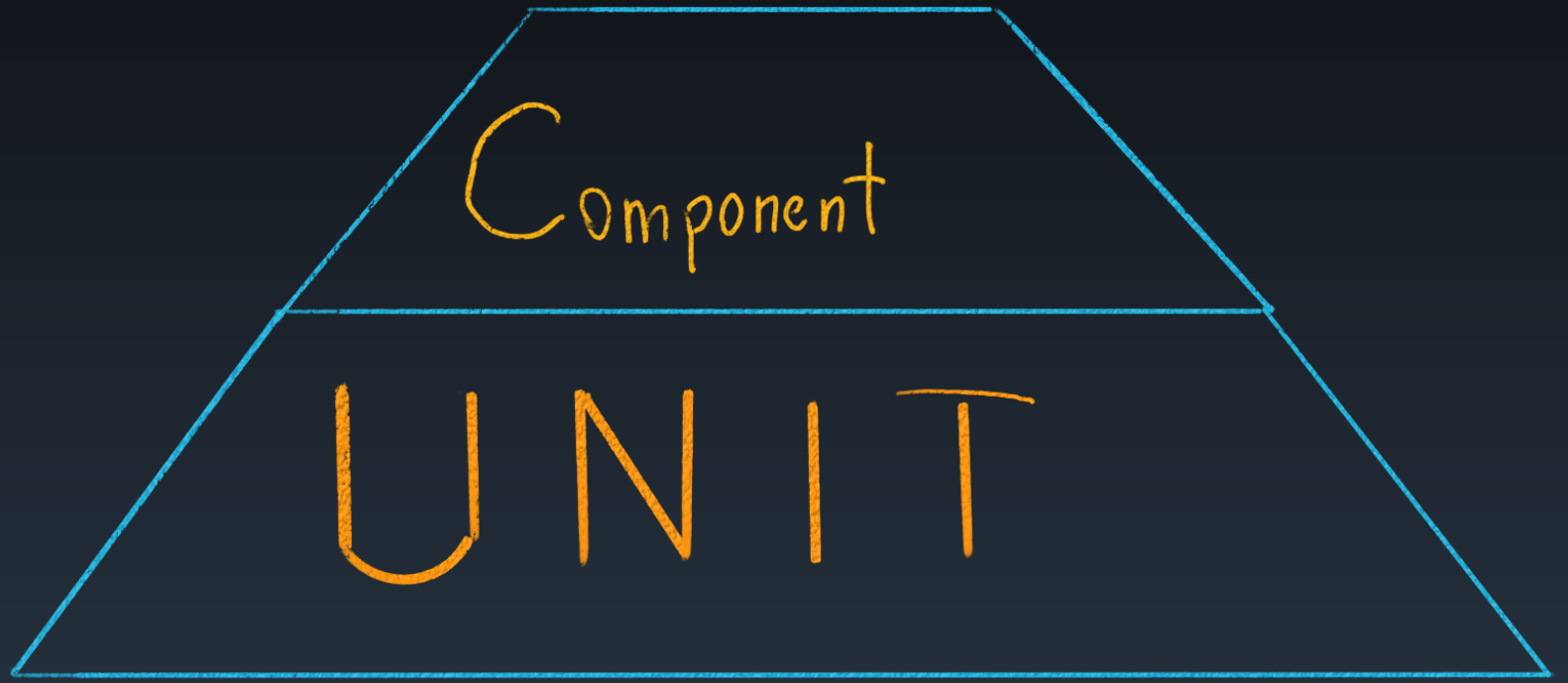
Reference data at the end of pipeline

Separate Function

Tools

holdenk/spark-testing-base ← Tools to run tests
MrPowers/spark-daria ← tools to easily create test data

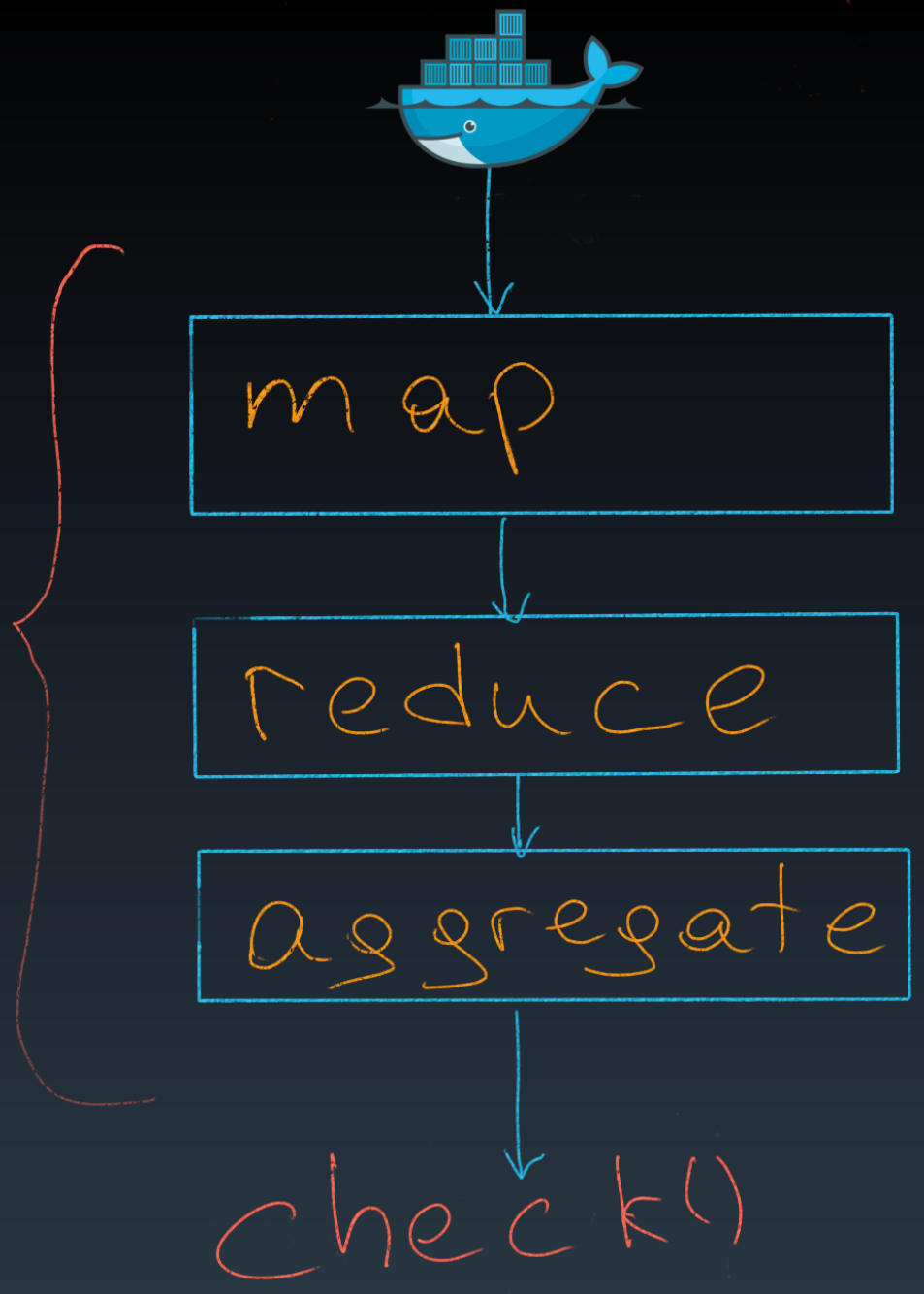
Component testing



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

[Visualizing Data Timeliness]

End-to-End tests

Compare with reports, old DWH

Multiple dimentions:

- data
- data latency
- performance, scalability

Performance Tests

Best performance test - initial data load

(image with initial data load + next microbatches loading)