Data pipelines

From zero to cloud scale.

About me

- → My name is **Artem Pyanykh**.
- → Ex Head of Analytics @ Toptal.
- → Ex CTO @ Boomstarter.
- → Onto a new venture to change retail landscape! We're hiring 😉
- → Proficient in data engineering, ML and making mistakes [0].
- → λ = ❤!

[0] ... which I hopefully learn from.

Without further ado...

What is the essense of data processing

Just kidding

Although, it's not too far from the truth:

False dilemma of data engineering

Standing on the shoulders of giants

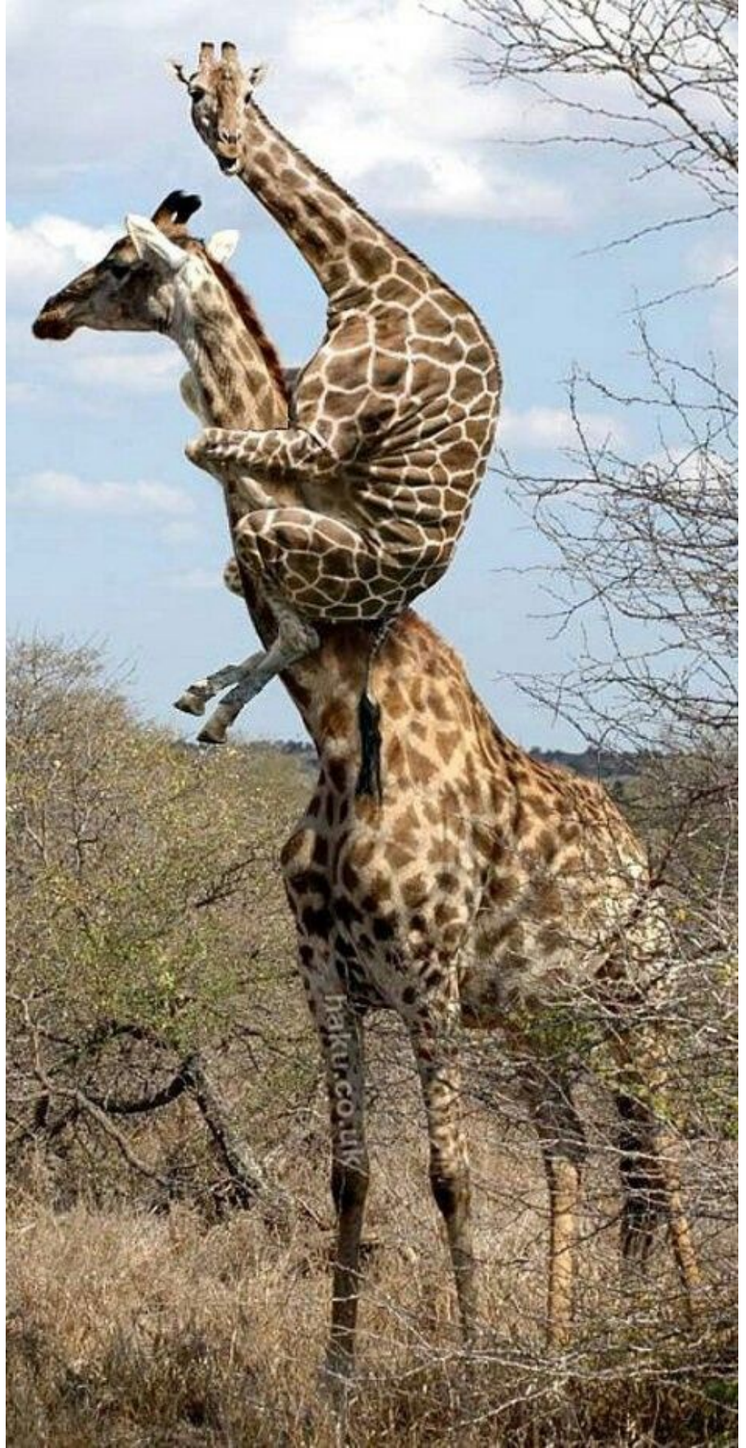
Data processing got much more accessible. Nowadays you can:

→ start small,

→ build a no BS solution,

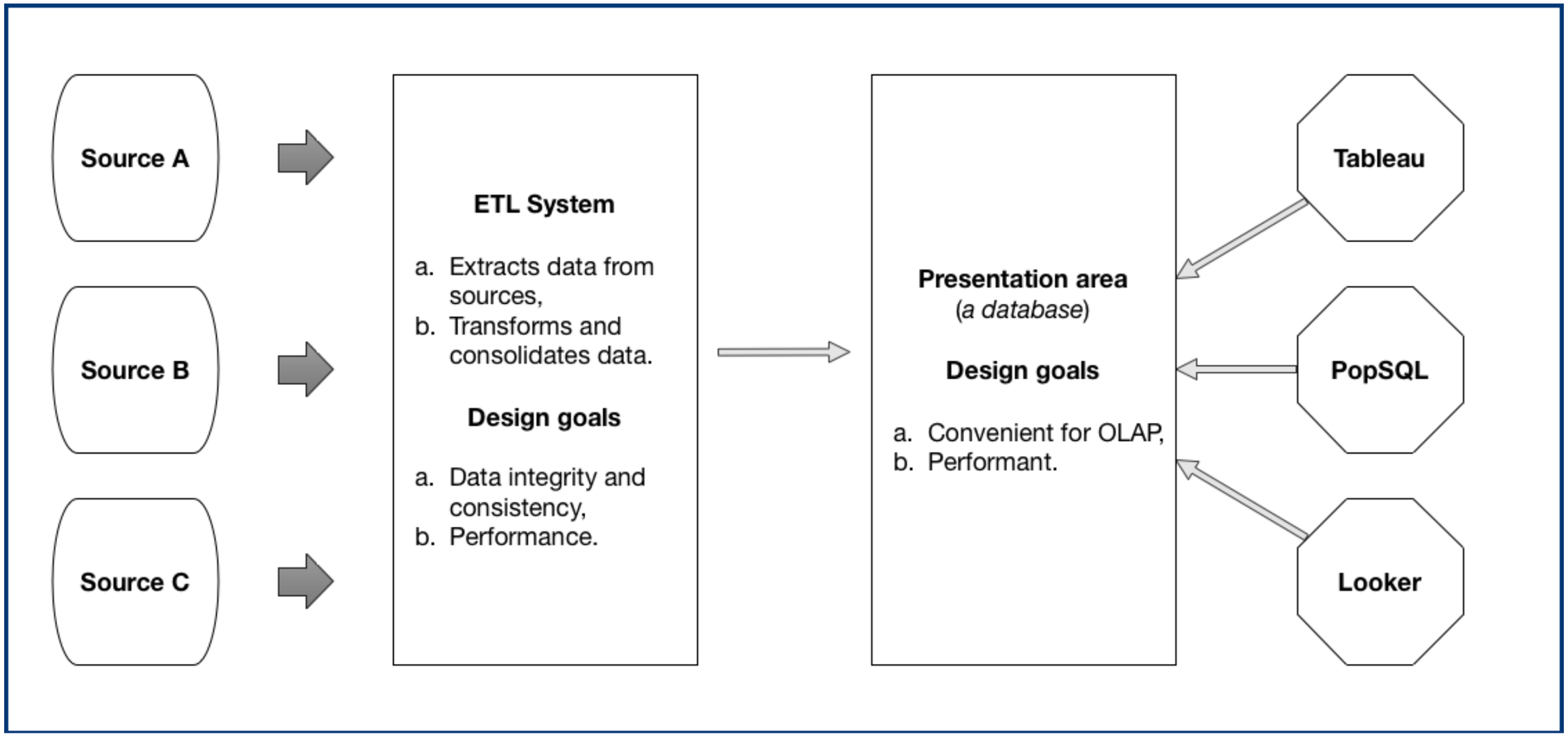
→ that delivers business value from day 1, and

→ has great potential for scaling.



Starting small

Data processing pipeline



Necessary components

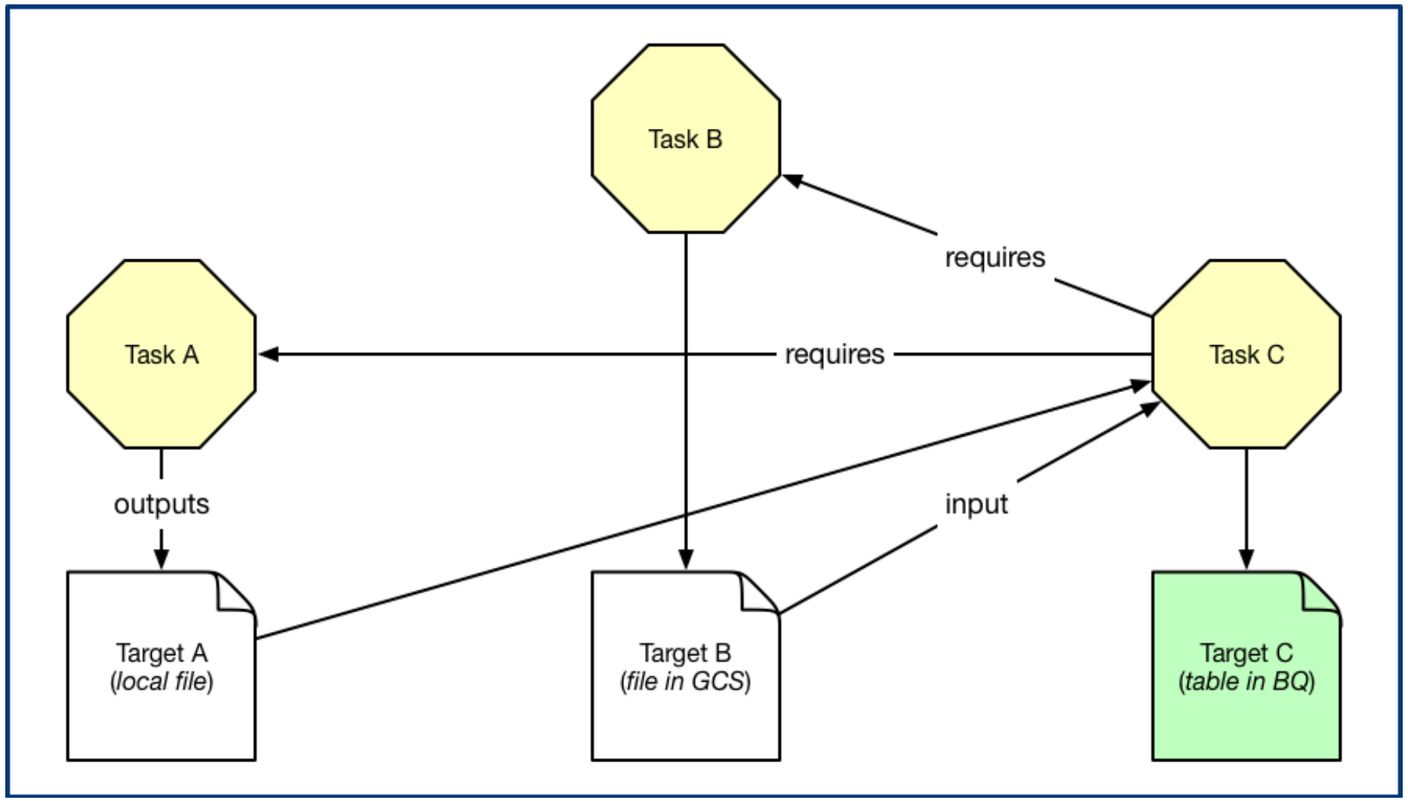
Component	
Computing	?
Storage	?
Prog. Lang.	?
Dependency Manager	?
Frontend DB	?

Minimal setup

Component	
Computing	Linux Box
Storage	Local Disk
Prog. Lang.	Python
Dependency Manager	Luigi
Frontend DB	PostgreSQL

A word on Luigi

Luigi has **tasks**, **targets** and **requirements**. When a **target** is **absent** a **task** is being **run**.

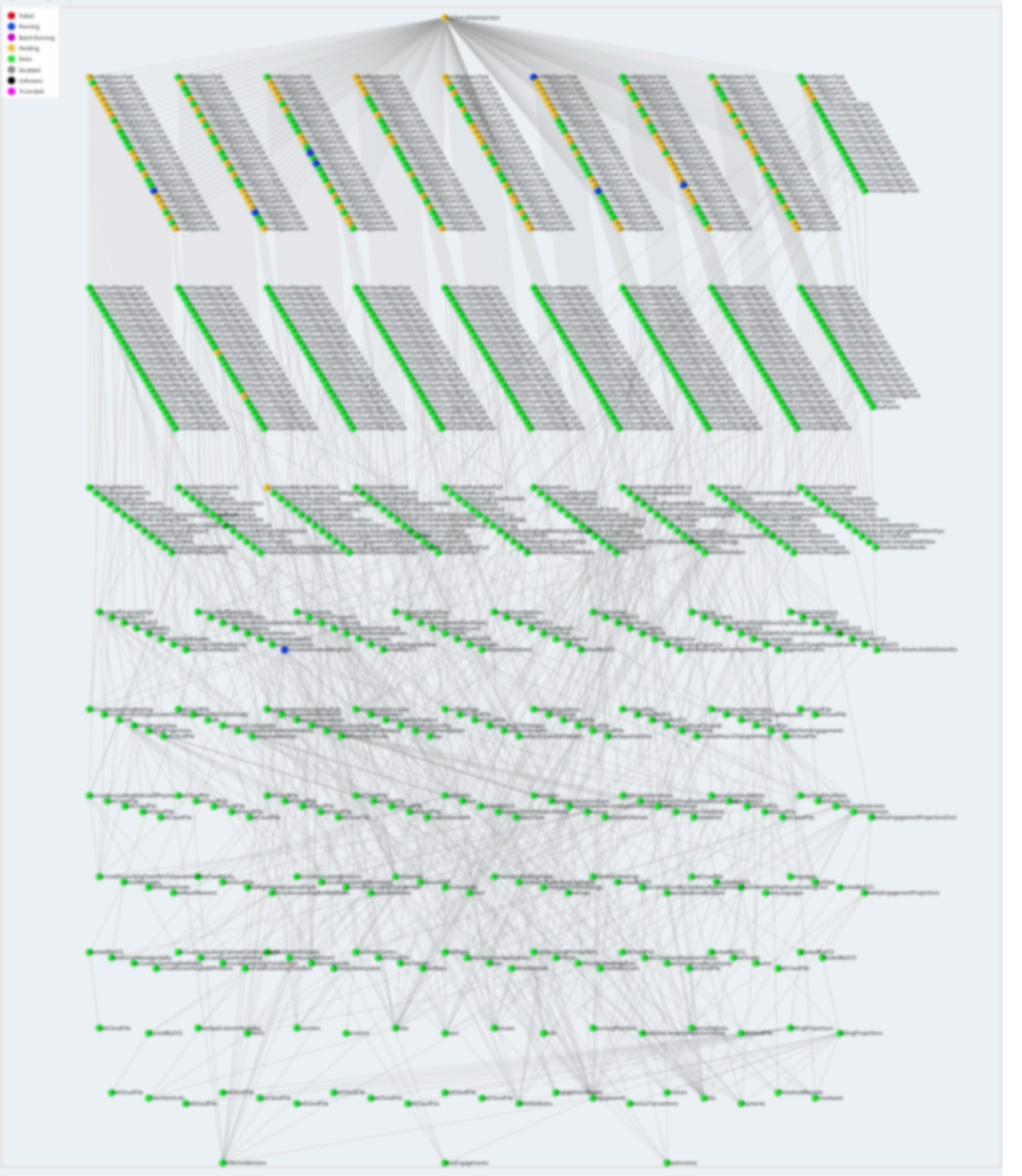


And that's it!

The **power** comes from these facts:

1. Tasks can be parameterized.
2. Targets can be pretty much anything.
3. Batteries included.

A sample from our production ETL



Hands on time

going BIG

Missing pieces

We need these things in place to scale out:

1. durable and scalable storage,
2. distributed processing,
3. scalable OLAP Database.

Let's see what GCP[1] can offer

[1] Google Cloud Platform. Not affiliated, just happened to use at work.

Storage

Google Cloud Storage is

1. **Durable**. Over 9000 9's durability! Actually, it's 99.999999999%, but you get the point.
2. **Available**. 99.95% availability for Multi-Regional storage.
3. **Scalable**.
4. **Fully managed**.

Processing

Google Dataflow

1. Supports **distributed** computing via Apache Beam, which is a map-reduce like toolkit.
2. Fully **managed**.
3. Automatically horizontally **scalable**.
4. Integrates perfectly with other pieces of infrastructure inside GCP.

Scalable OLAP Database

We want an OLAP Database to be

1. Highly available.
2. Scalable around data ingestion and OLAP workload.
3. Flexible in regard to security and permissions.
4. Familiar to analysts.

We don't want to spend time managing OLAP Database.

Is Google BigQuery the right choice?

1. Highly available ✅
2. Scans TB of data in seconds ✅
3. Permissions management is somewhat limited 😐
4. Good old SQL ✅

And the **web-interface** is rather slick!

Cloud setup

Component	
Computing	Google Dataflow
Storage	Google Cloud Storage
Prog. Lang.	Python[4]
Dependency Manager	Luigi
Frontend DB	Google BigQuery

[4] You can also use Java + Beam SDK or Scala + Scio.

Hands on time

Costs

Largest lines of expenditure

1. Cloud Storage is around $26 per TB/month.
2. Querying BigQuery is $5 per TB (first 1TB is free).
3. Computing costs ~$1.25/hr for 16CPU 100GB RAM or around $130/mo if cooked properly[5].

[5] Assuming that ETL is continuously running for 3.5 hours a day on avg.

What about AWS?

Similar setup in **Amazon** would include:

1. Amazon S3 which costs around $25 per TB of standard storage.
2. Amazon Athena which costs $5 per TB (*no first 1TB free*).

→ In contrast to BigQuery **Athena works directly with files in S3**.

→ So, if you scan a 1TB file while running a query, it'll cost you $5.

→ But if you compress this file to 500GB, running the same query would cost you just $2.5.

Athena pricing is more predictable in this regard.

But then you need to be mindful about **choosing appropriate storage format** like Parquet or **partitioning data** to restrict the amount of data scanned.

Wrap up

1. Building a reasonable data processing solution is becoming easier these days.
2. You don't need to spend man-years to get something up & running.
3. Recurring infrastructure costs for start-ups and SMB can be less than a monthly supply of cookies for the team.

Thanks for your attention!

Questions?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