SIDN Your world. Our domain.

ENTRADA: Background, Use-Cases and Project Ideas

2017-09-07 | SWITCH Security Tools Hackathon

SIDN LABS

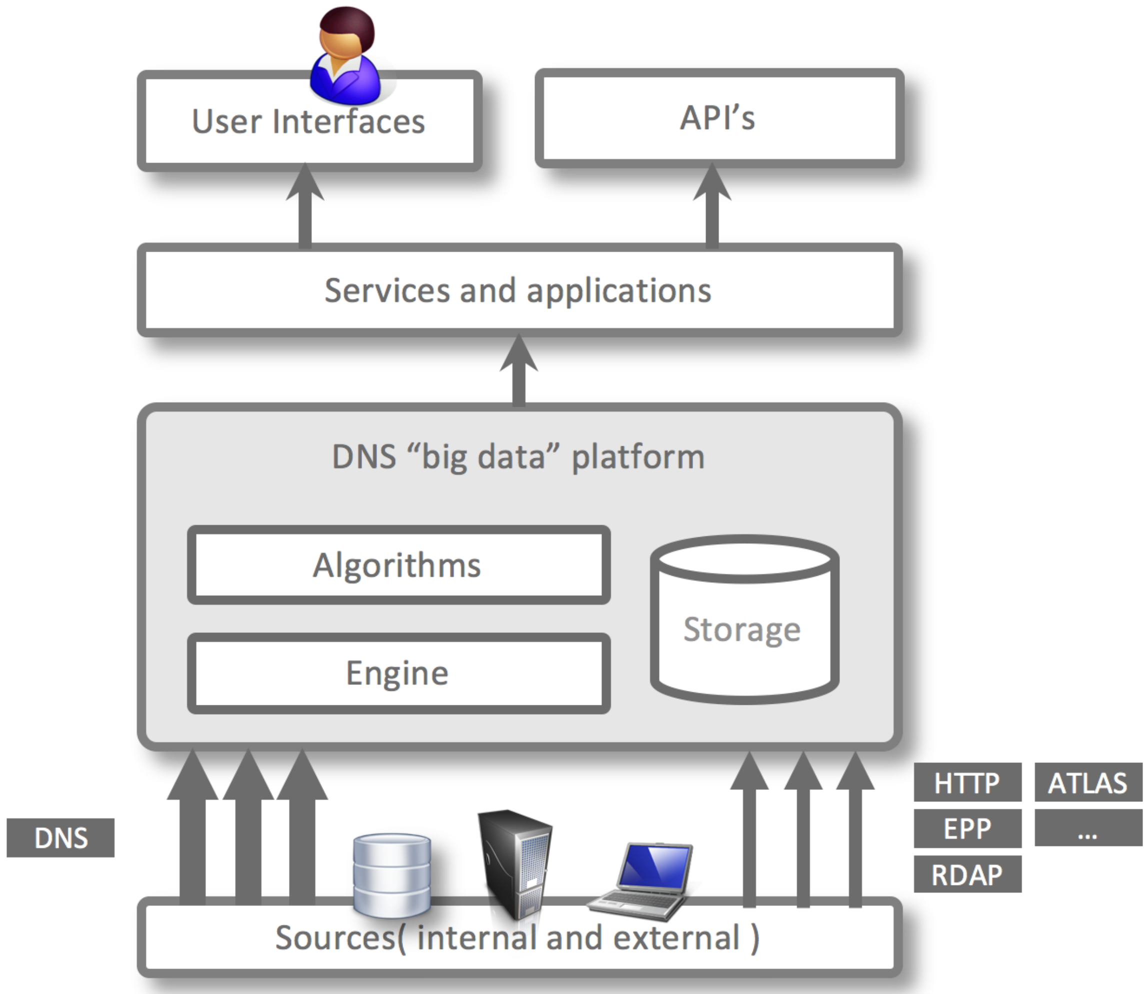
Agenda

- Technical Background of ENTRADA
- Use Cases
- Ideas for the Hackathon

ENTRADA Architecture

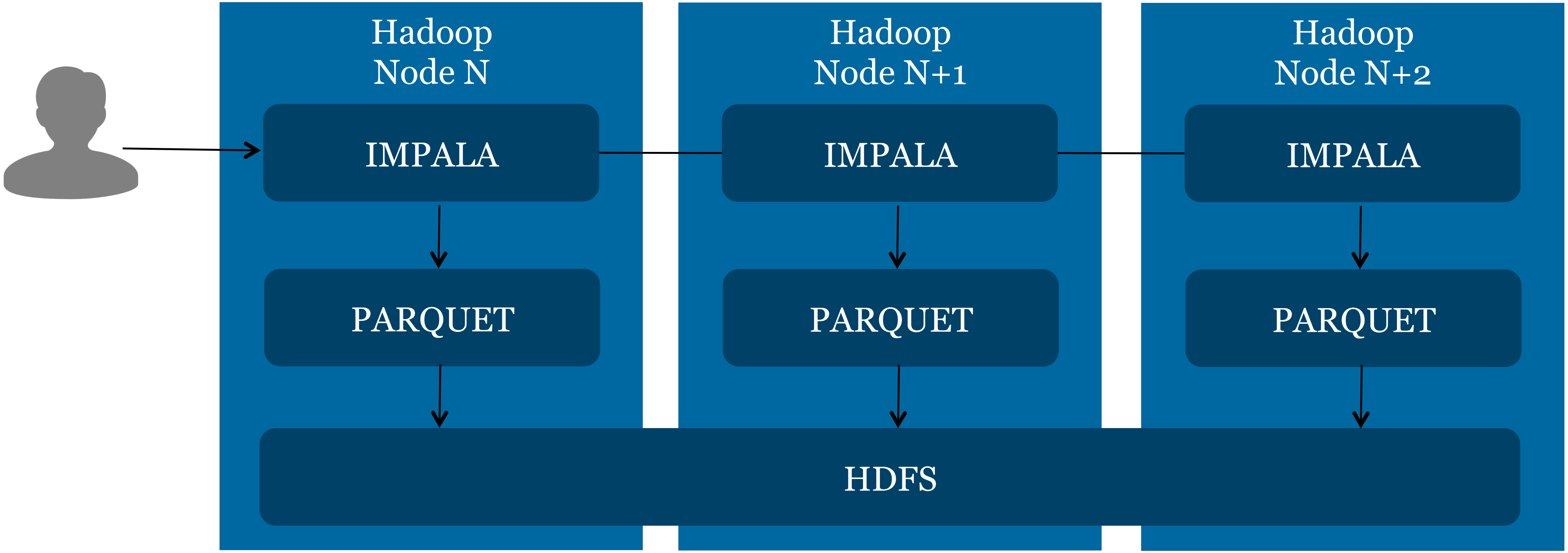
Main components

- Data sources
- Platform
- Applications and services
- Privacy framework



SQL on Hadoop

Best fit for our requirements



Impala

Data formats

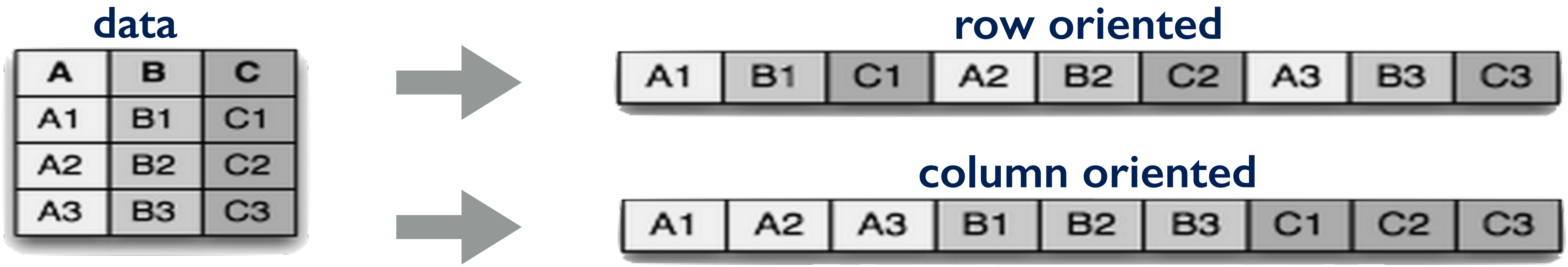
- Text
- Hadoop formats
- Apache Avro
- Apache Parquet

Interfaces

- Web-based GUI
- Command line (impala-shell)
- Python (Impyla)
- JDBC

Apache Parquet

- Why not just use the PCAP files?
  - Reading (compressed) PCAP data is just too slow
  - Analytical engines cannot read PCAP files



data

A	B	C
A1	B1	C1
A2	B2	C2
A3	B3	C3

row oriented

A1	B1	C1	A2	B2	C2	A3	B3	C3

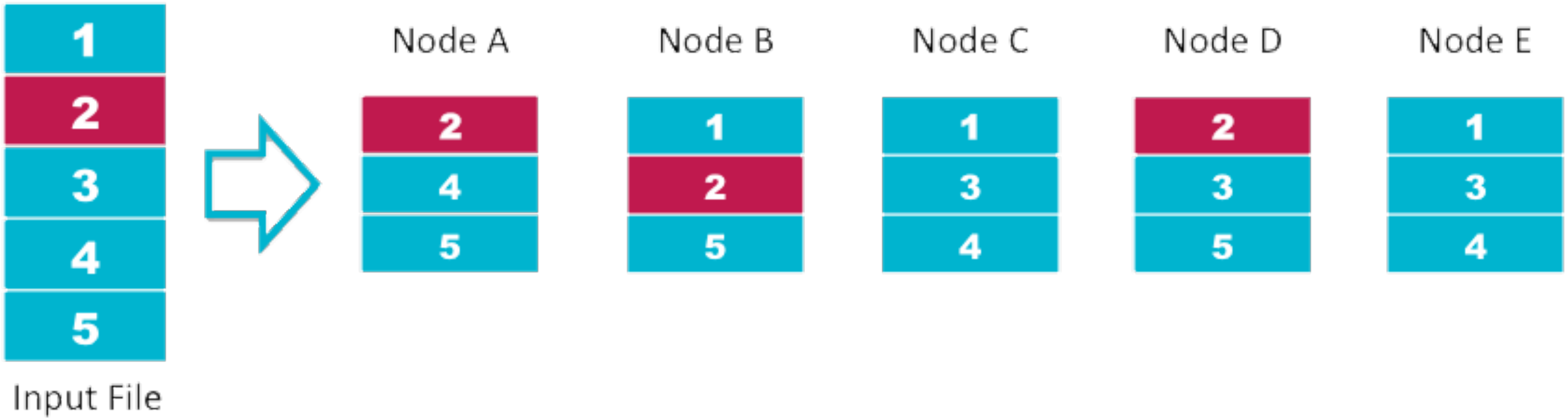
column oriented

A1	A2	A3	B1	B2	B3	C1	C2	C3

HDFS

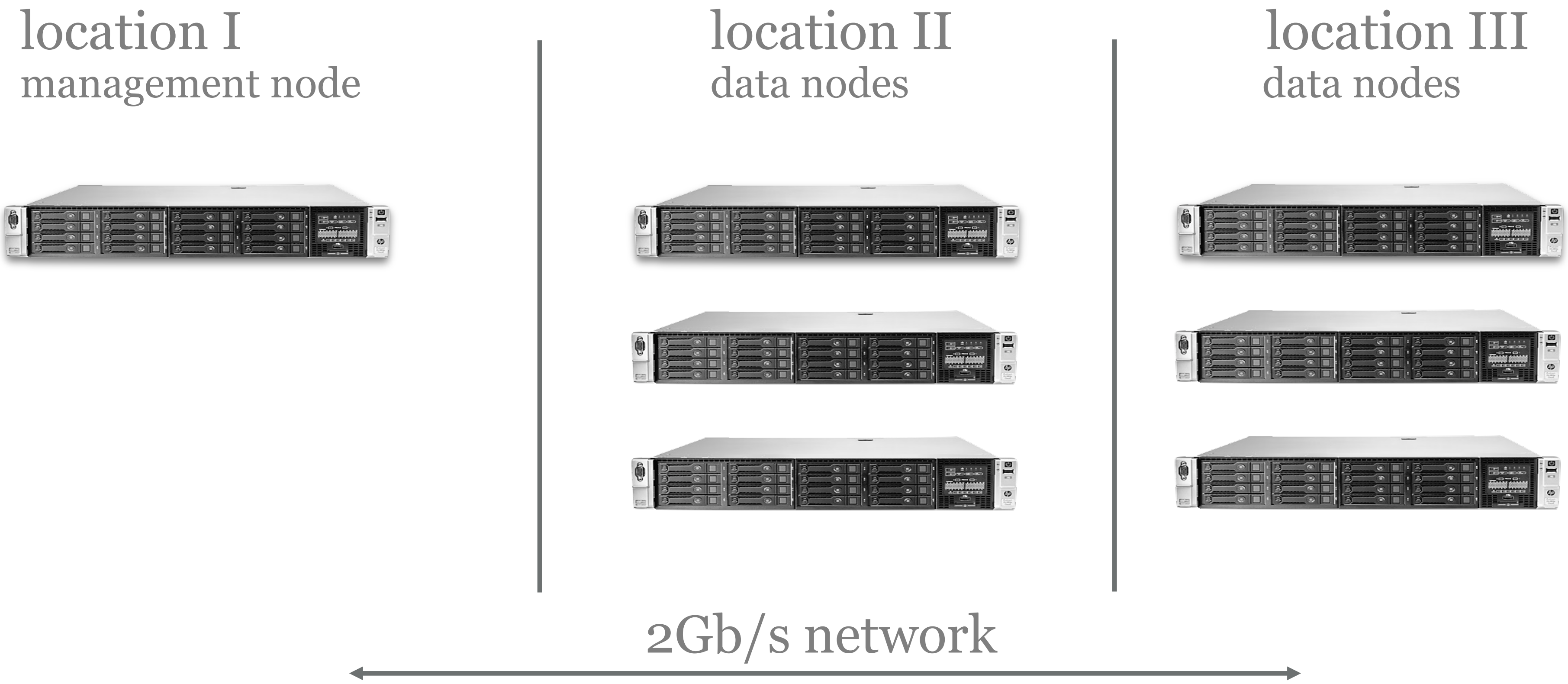
- Distributed file system for storing large volumes of data
- High availability through replication of data blocks
- Scalable to hundreds of PB’s and thousands of servers

HDFS Data Distribution



Cluster Design

nano sized



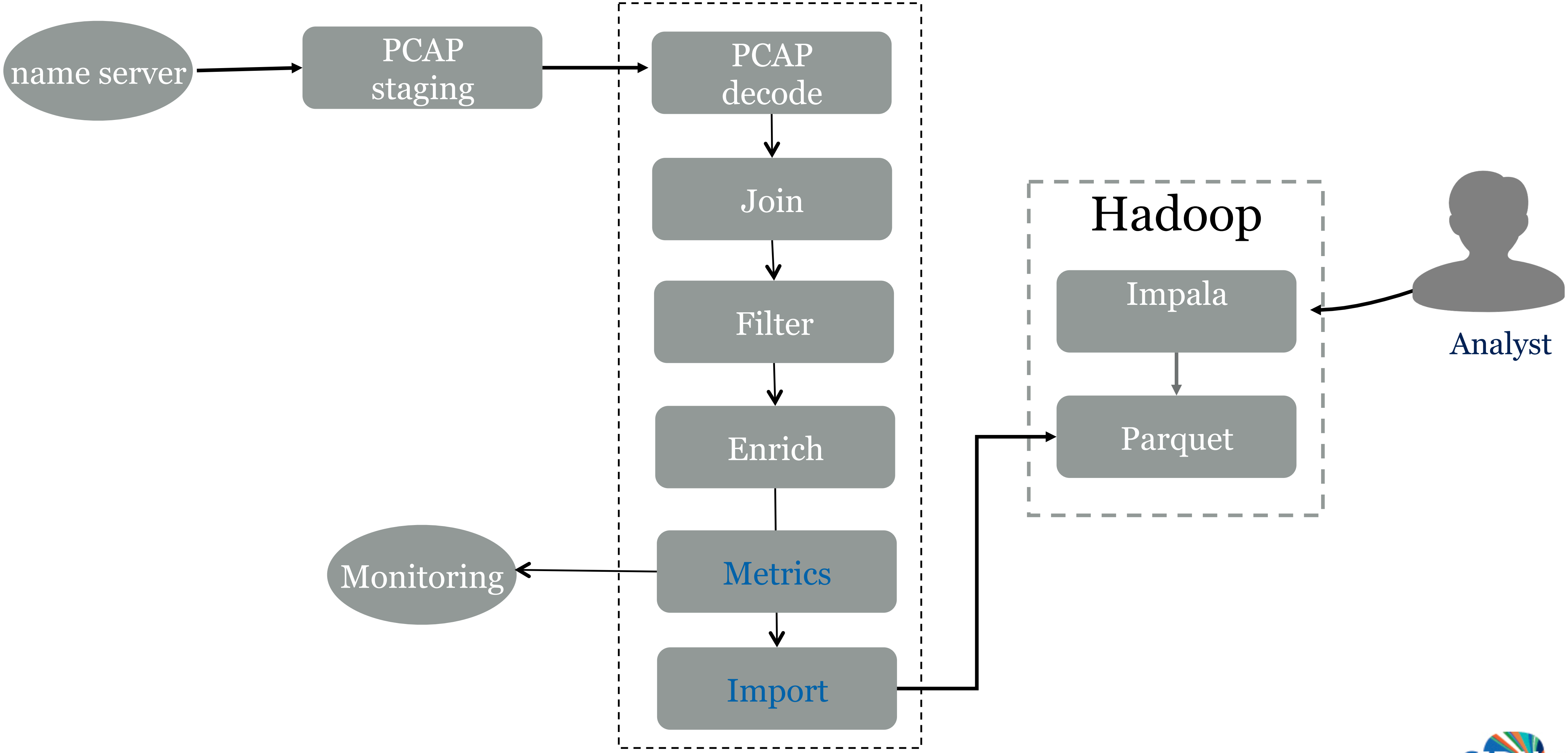
location I
management node

location II
data nodes

location III
data nodes

2Gb/s network

Workflow



Query data available for analysis within 10 minutes

Security Use Cases

- nDEWS: Detection of new malicious domain names
  - checks for every new domain name:
    - number of queries, unique sources, unique ASes, unique countries
    - uses k-means (k=2) clustering to split domains

Security Use Cases

- DGA detection
  - based on lexical features (using tool by [SANS ISC]())
  - and NX queries
  - e.g. vufrx4xjje1y5spwle2kp8g4qn5uag2nq636apww9mhyk03k4z.nl

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- Detect botnet infections
    - Cutwail botnet used for sending SPAM
    - Bots use their own, home-brew, recursive resolver <- does weird things

Other Use Cases

- Stats: stats.sidnlabs.nl
- Research, e.g.:
  - How do recursive resolvers select authoritative name servers? (tech report)
  - How to understand and predict changes of anycast catchments? (tech report)
- Adhoc queries, e.g.:
  - Do we see strange queries for a domain name?
  - What else is a resolver querying?
- Policy changes, e.g.:
  - What happens if we change zone file updates from 2h to 1h?
  - What would happen if QNAME minimization gets widely adopted?

Use cases in other organizations

- DNS Magnitude: Measure the popularity of domain names (nic.at) https://ccnso.icann.org/meetings/copenhagen58/presentation-dns-magnitude-13mar17-en.pdf
- Anomaly Detection
- …

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- *Your use case here!*

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4. ENTRADA + CBOR: Collect queries in lightweight CBOR format at anycast instances and convert it into Parquet
5. Detect related abuse: Which domain names have the same characteristics as known malicious domains?