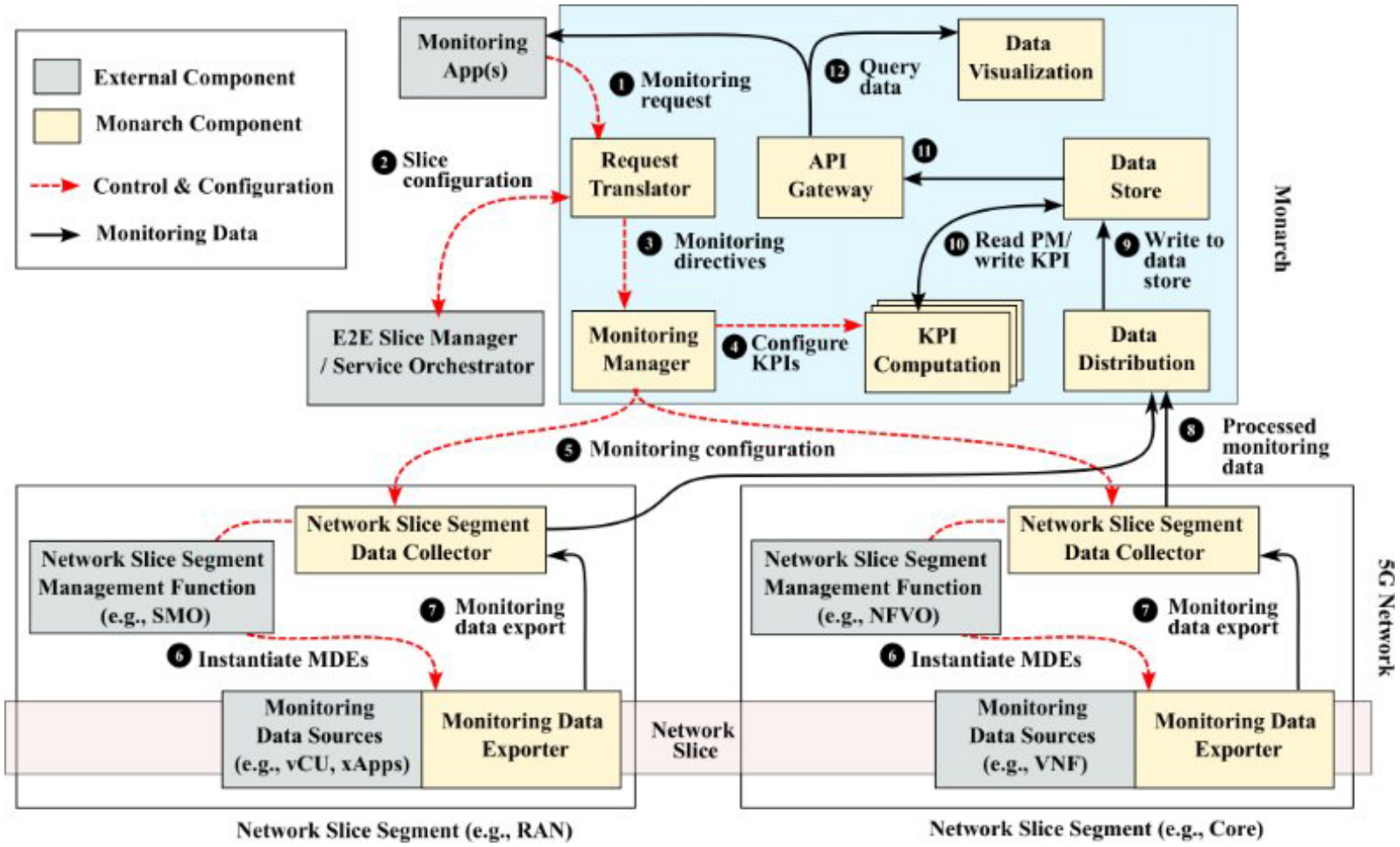
Workshop 1: 5G Core Slicing

Scalable Data Ingestion, Processing, and Visualization

Raouf Boutaba
David R. Cheriton School of Computer Science
University of Waterloo

Monarch Architecture



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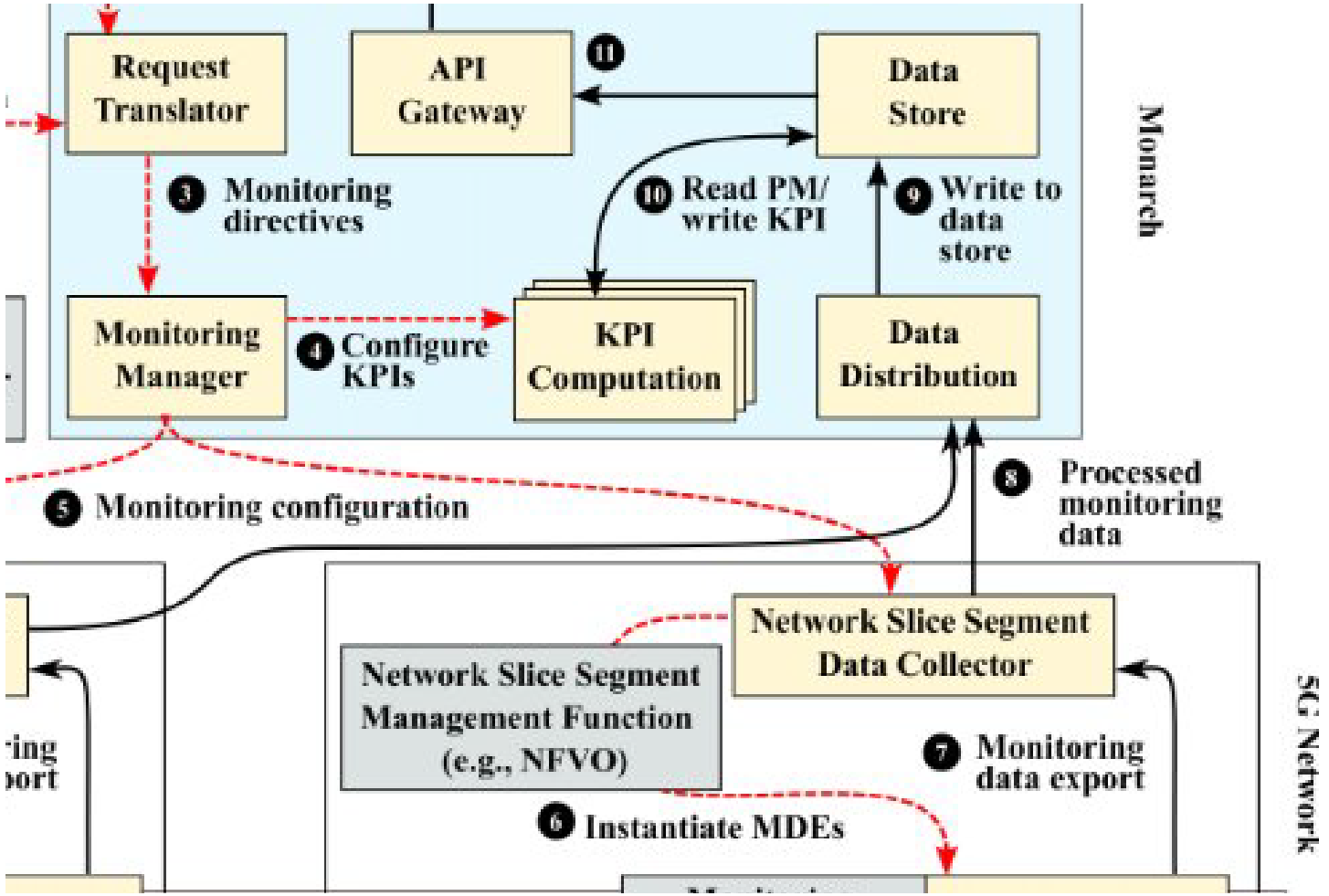
Monarch Architecture



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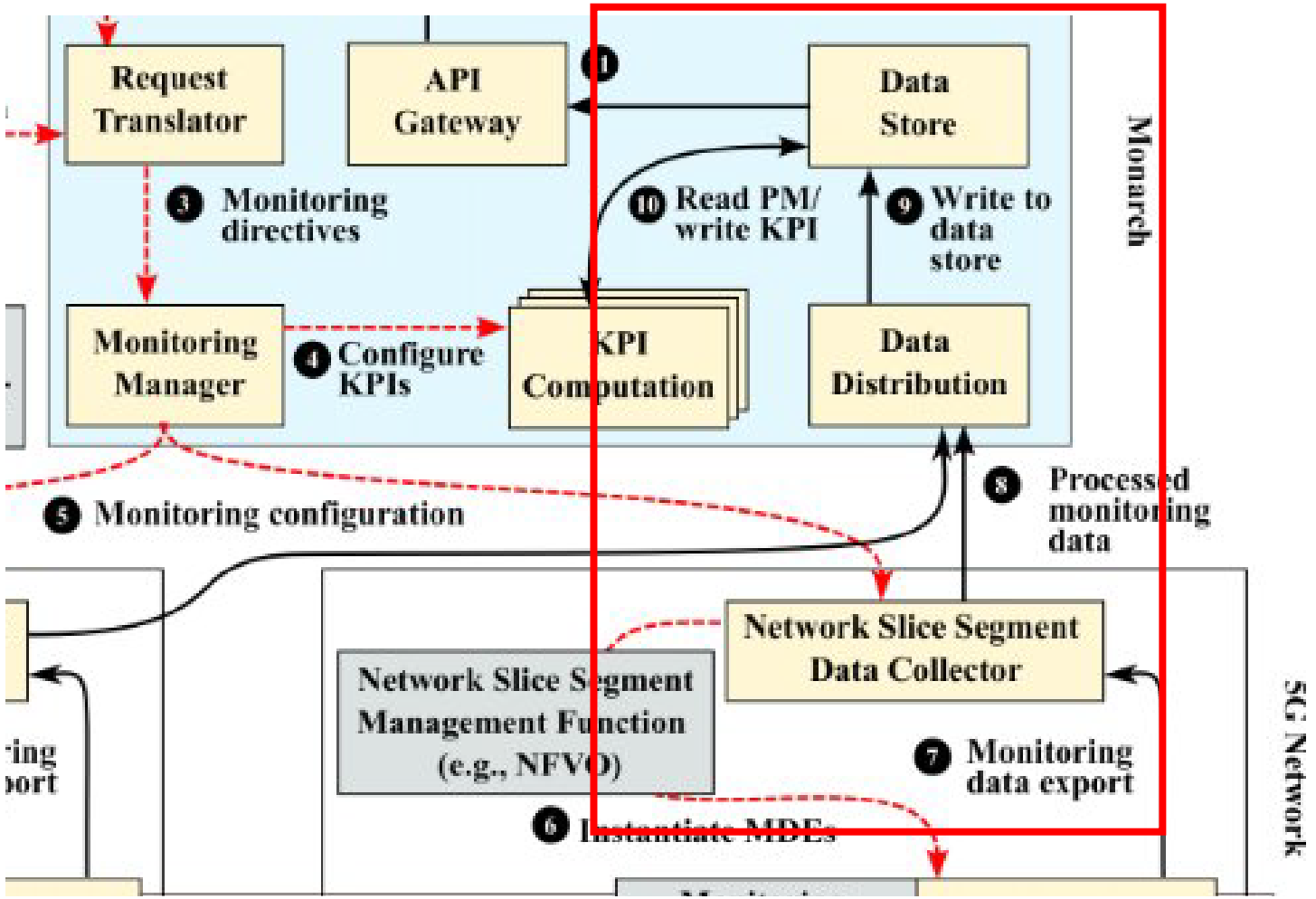

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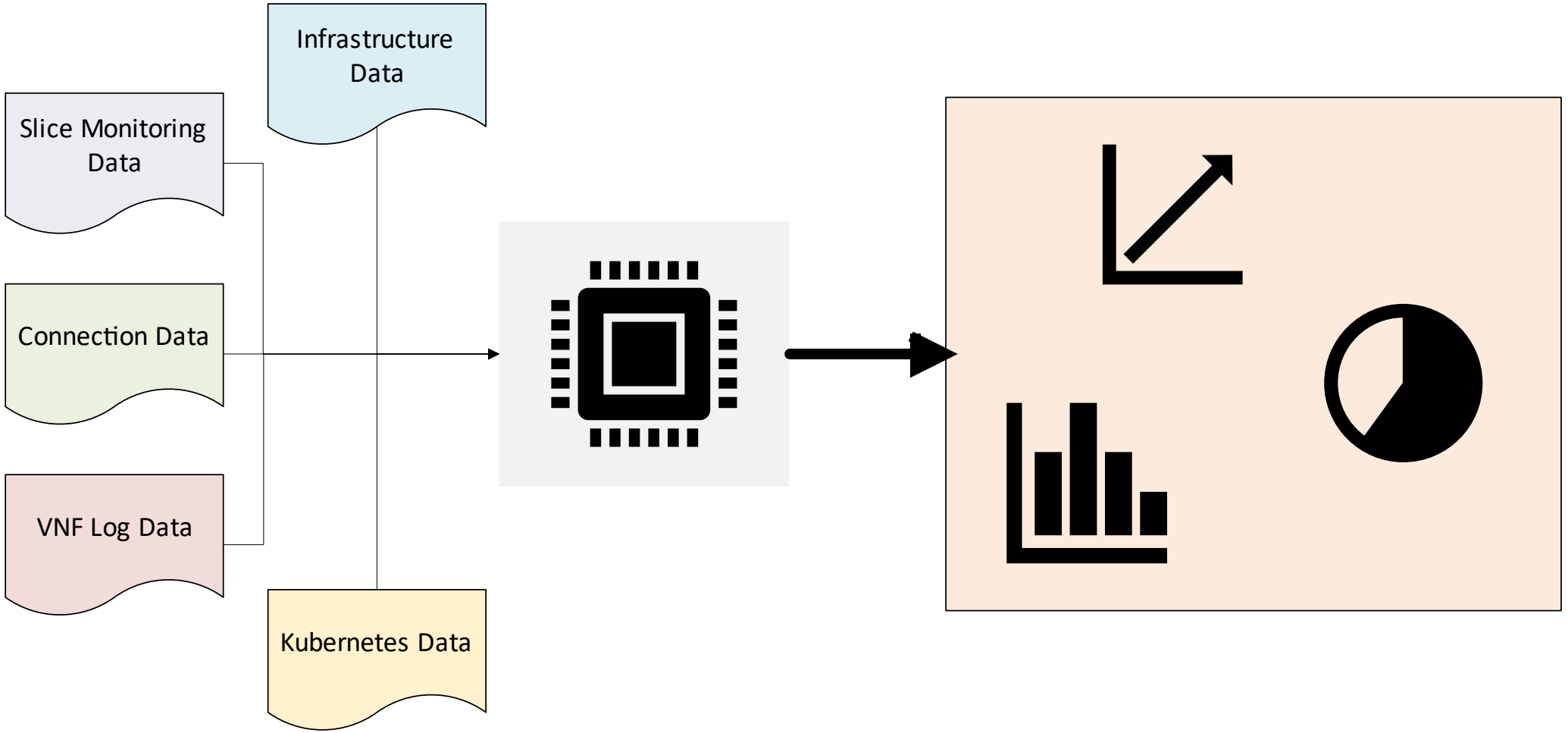
Data Pipeline Architecture



Designing a Data Pipeline

- Three key questions:
  - What do I want to know?
    - Resource allocation
    - Error monitoring
    - Security
  - What data is necessary to know?
  - How do I obtain the necessary data?

Designing a Data Pipeline

- Three key questions:
  - What do I want to know?
  - What data is necessary to know?
    - Collecting resource usage
    - Server up/down status
    - Network information
  - How do I obtain the necessary data?

Designing a Data Pipeline

- Three key questions:
  - What do I want to know?
  - What data is necessary to know?
  - How do I obtain the necessary data?
    - Deploying collection agents
    - Data transformations
    - Data storage

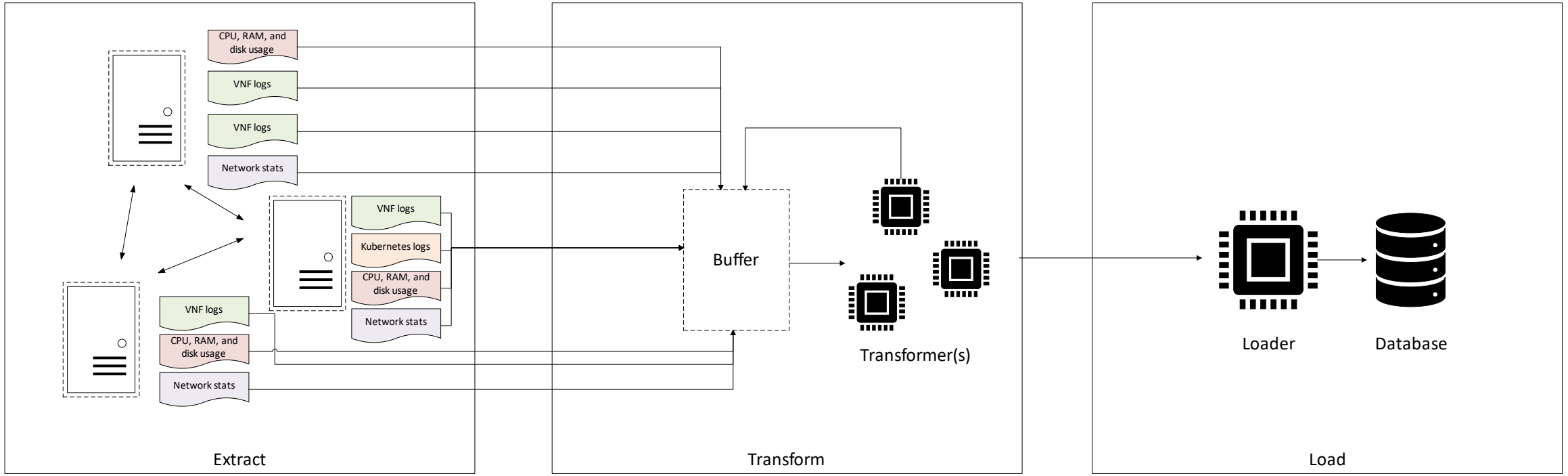
Session Outline

- Introduce the core components of a data pipeline
- Present commonly-used software in a data pipeline
- Discuss challenges of implementing and maintaining a data pipeline in practice
- Hands-on labs:
  - Show how a data pipeline in the 5G core network can be integrated
  - Utilize the data stored by the data pipeline to build dashboards

DATA PIPELINE COMPONENTS

What are the key components of a data pipeline?

- Extract, (buffer), transform, load (ETL)



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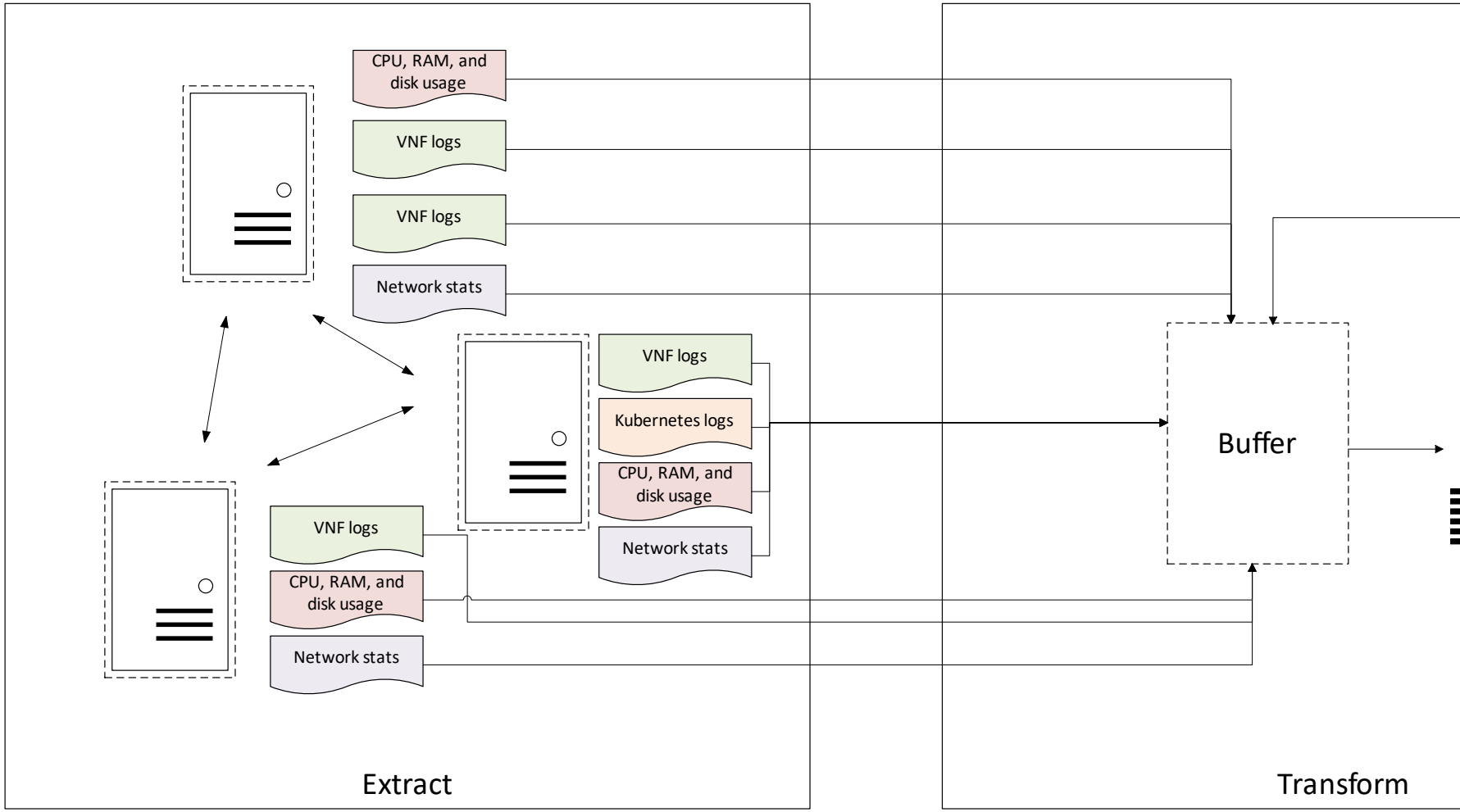

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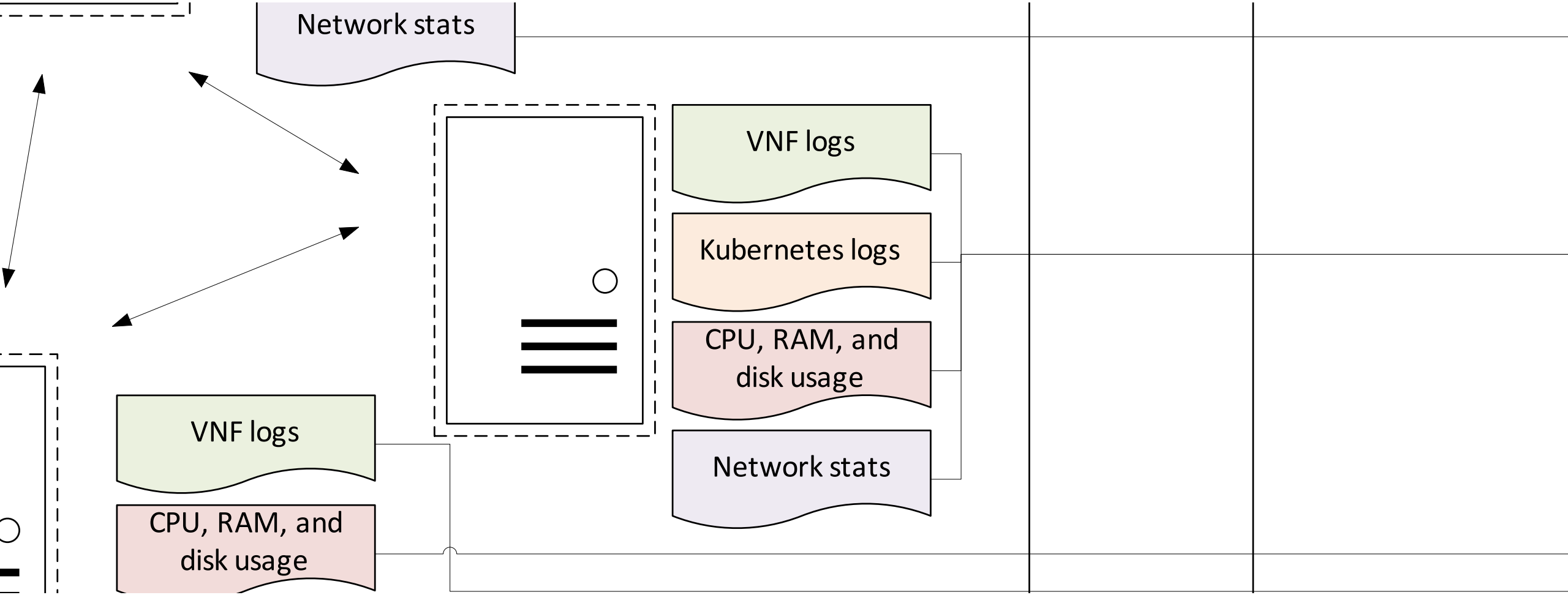

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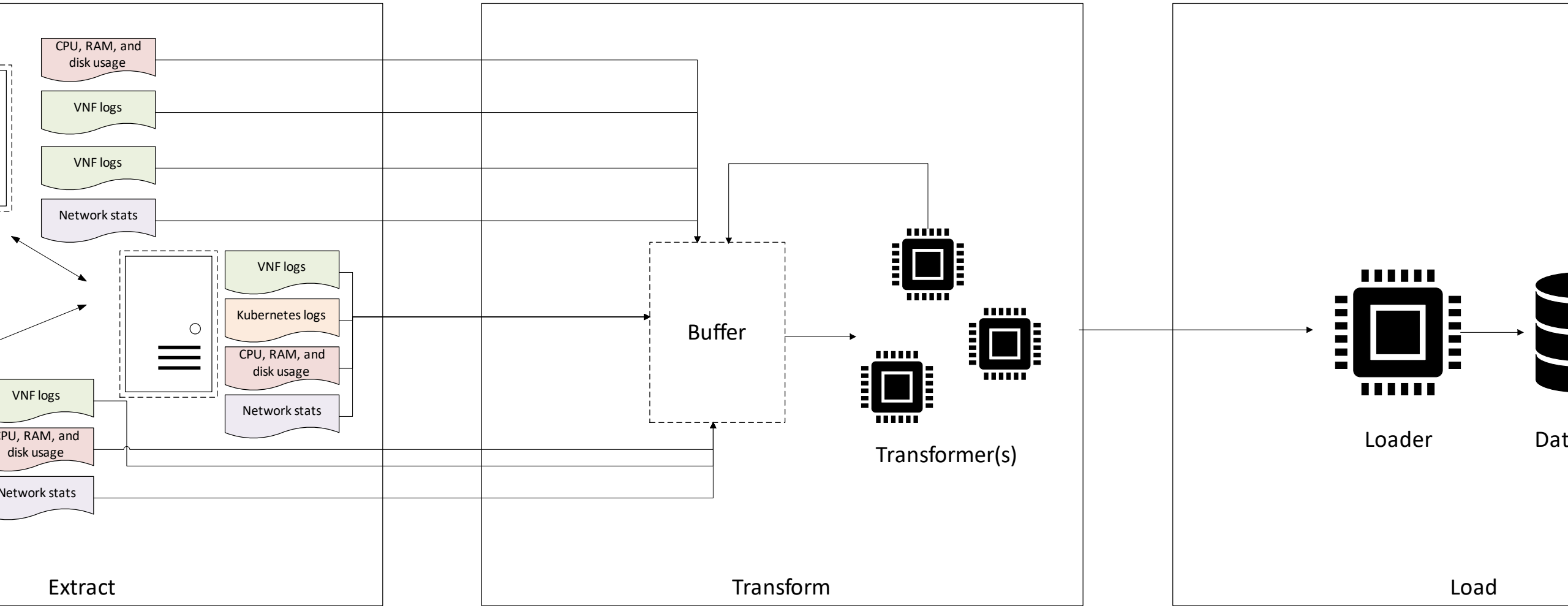

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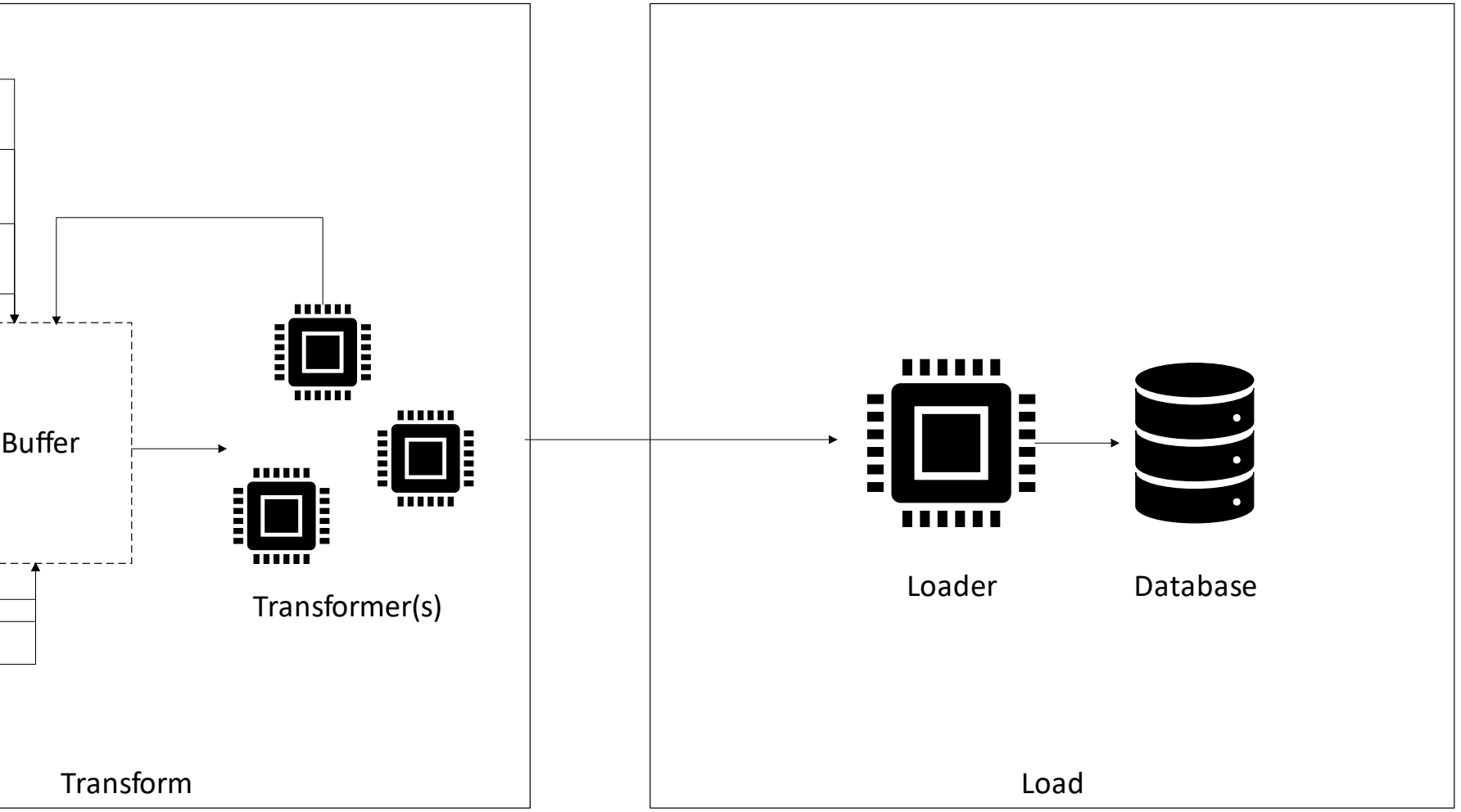


COMMON SOFTWARE

Extraction

- Generally, the type of extraction software depends on:
  - Data you want to ingest,
  - Output format,
  - Resource requirements
- Common extraction-type utilities:
  - Syslog
  - Fluent bit
  - Beats

Buffer

- Depending on the use-case, buffers may not be necessary
- Buffer-type utilities:
  - Apache Kafka
  - RabbitMQ

Transformation

- Transformation-type utilities:
  - Logstash
  - Fluentd
  - Apache NiFi
  - Data computation programs, e.g., Apache Spark, Ray

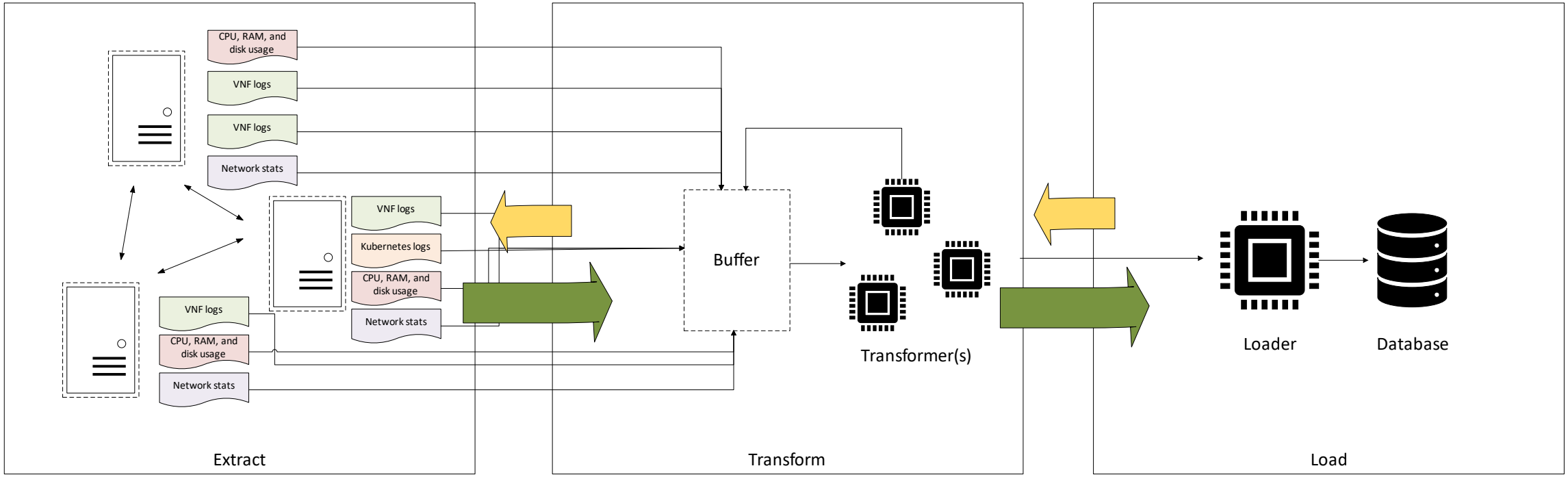
Loading

- Loading-type utilities:
  - Usually integrated with the transformation software
  - Examples include:
    - Logstash
    - Fluentd
    - Apache NiFi

DATA PIPELINE CHALLENGES

What are the challenges of a data pipeline?

- Backpressure!



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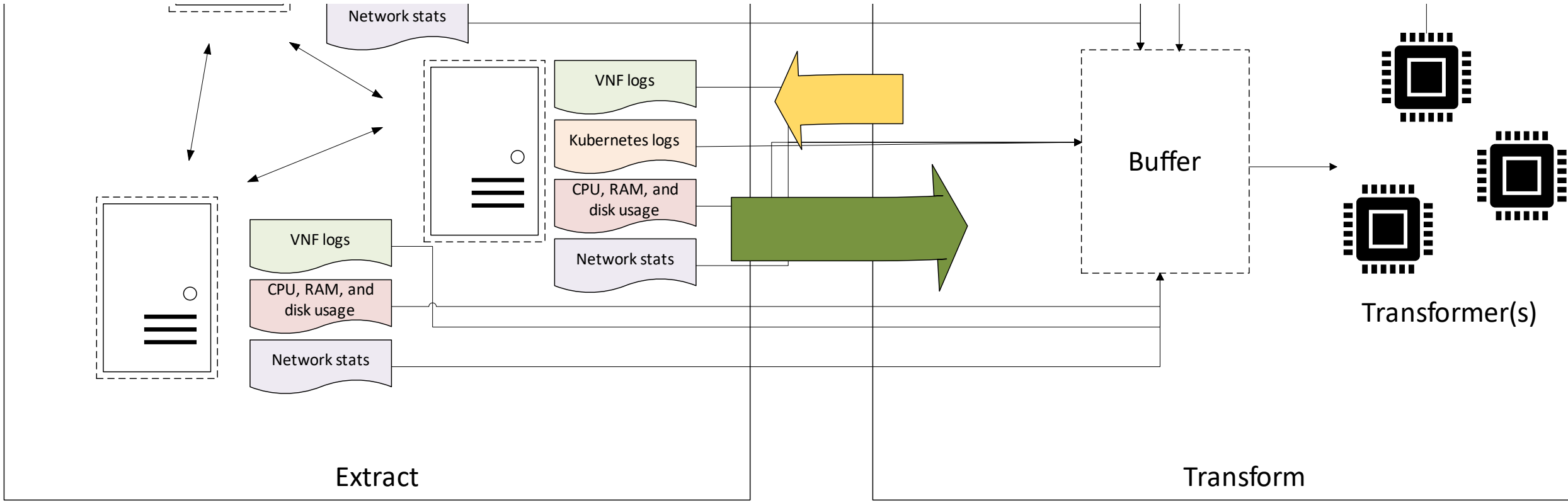

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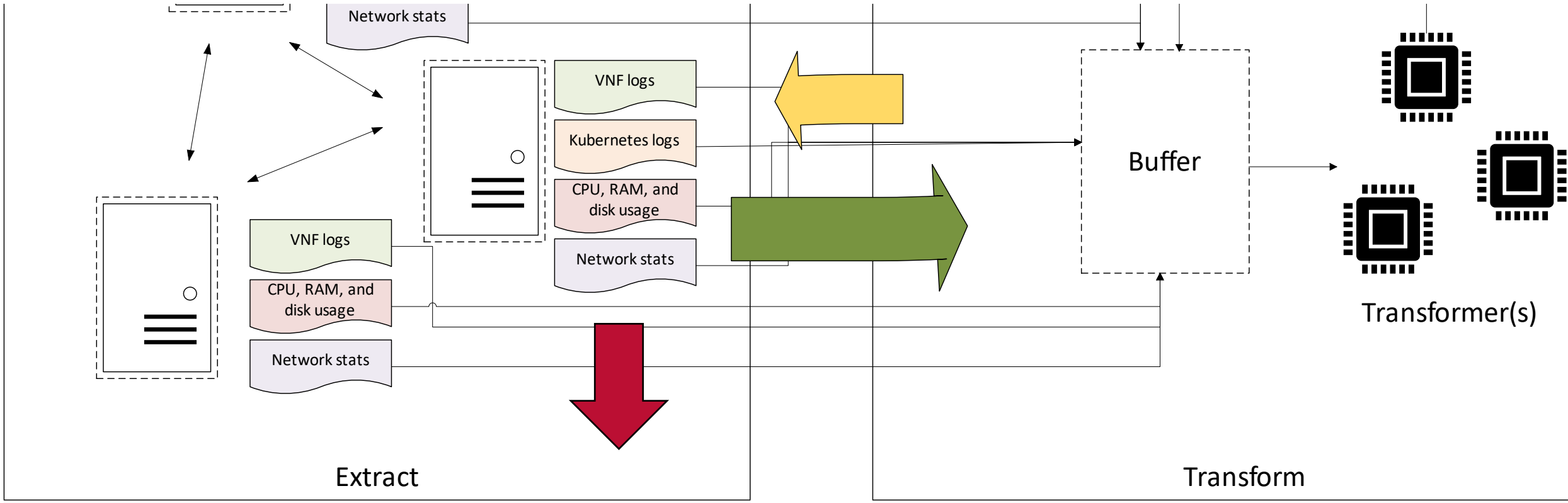

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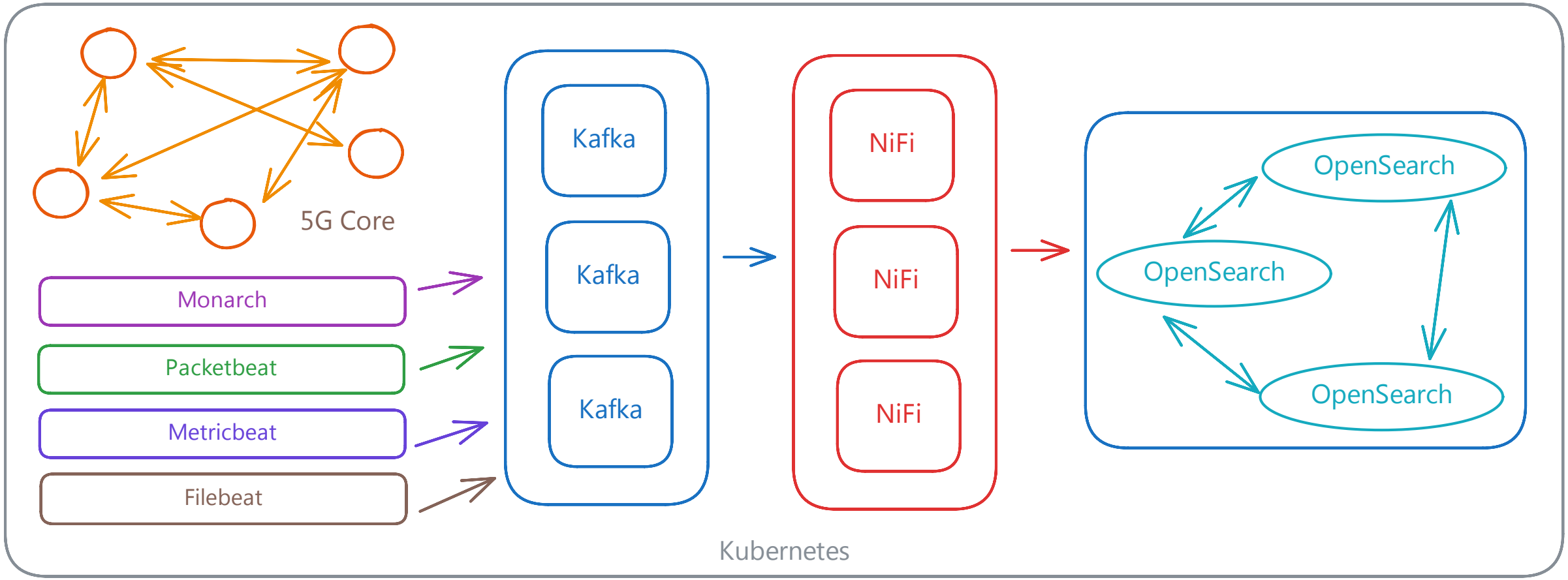
What are the challenges of a data pipeline?

- Changing data formats
  - Examples:
    - New types of data
    - Software updates
    - Configuration file changes
  - These cause subtle incompatibilities that may not be noticed until it is too late to fix
  - Checking data schema in the pipeline itself may be a good idea
    - Dead letter queues

Hands-on Lab



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