Mouseworld: Knowledge Graphs for Network Digital Twins

IETF 123 Hackathon

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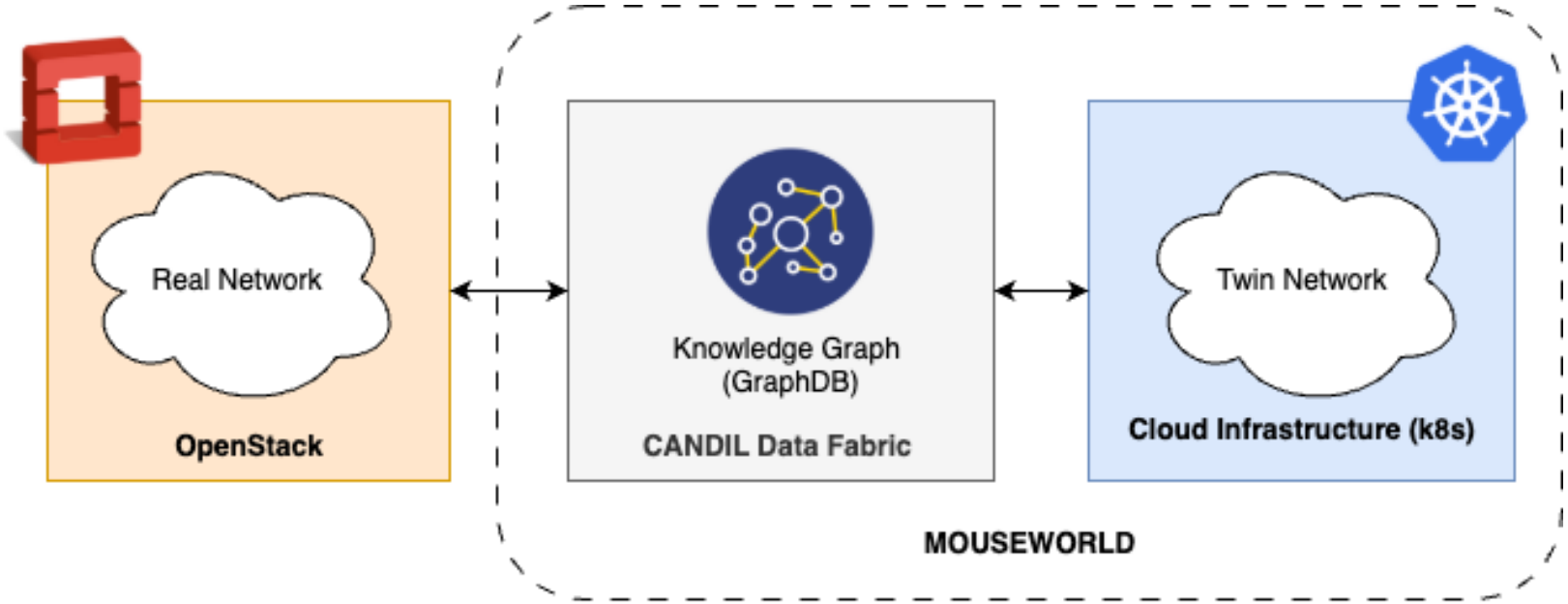
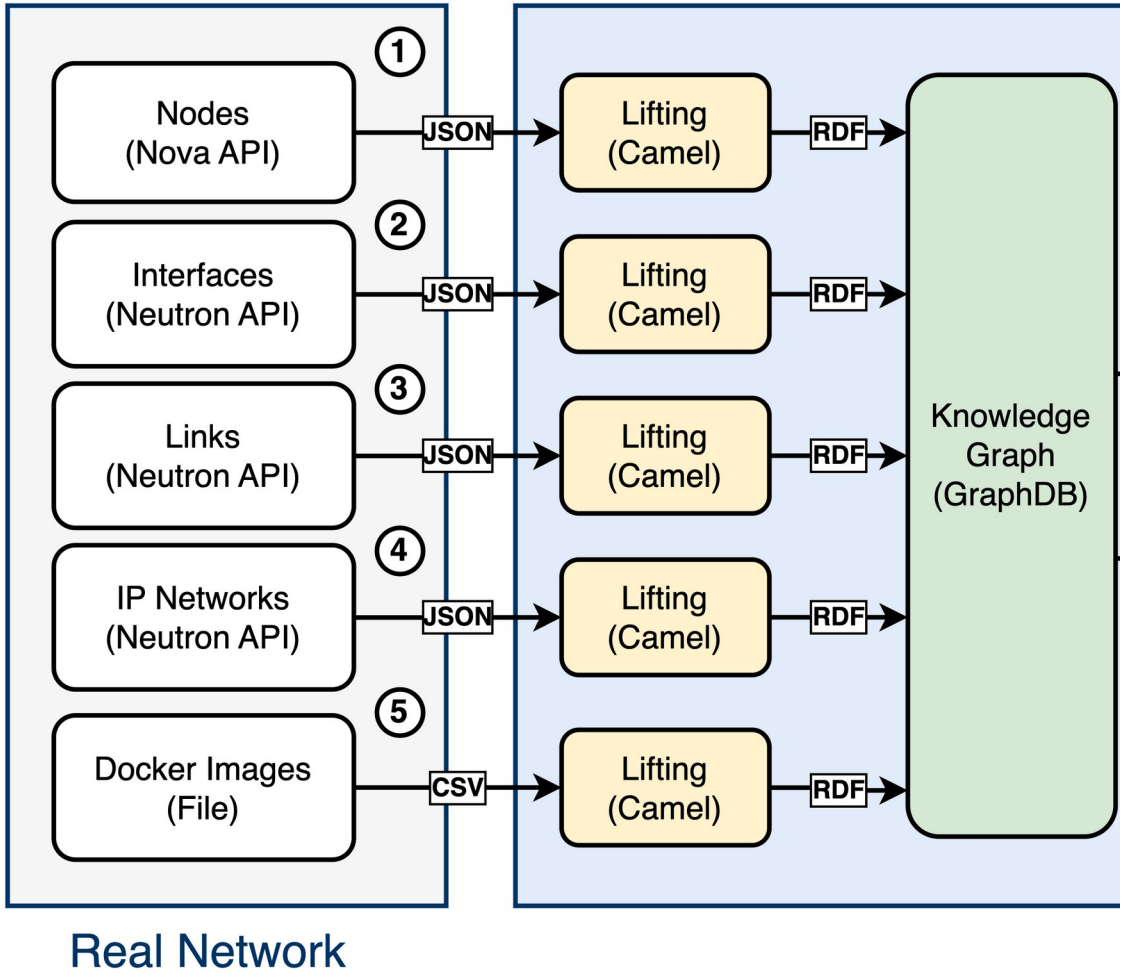
The Mouseworld framework

- Twin network that emulates real network in a containerized environment
- The knowledge graph enables the creation of the twin network:
  1. KNE topology descriptor (YAML file)
  2. Router configuration files (FRR config files)



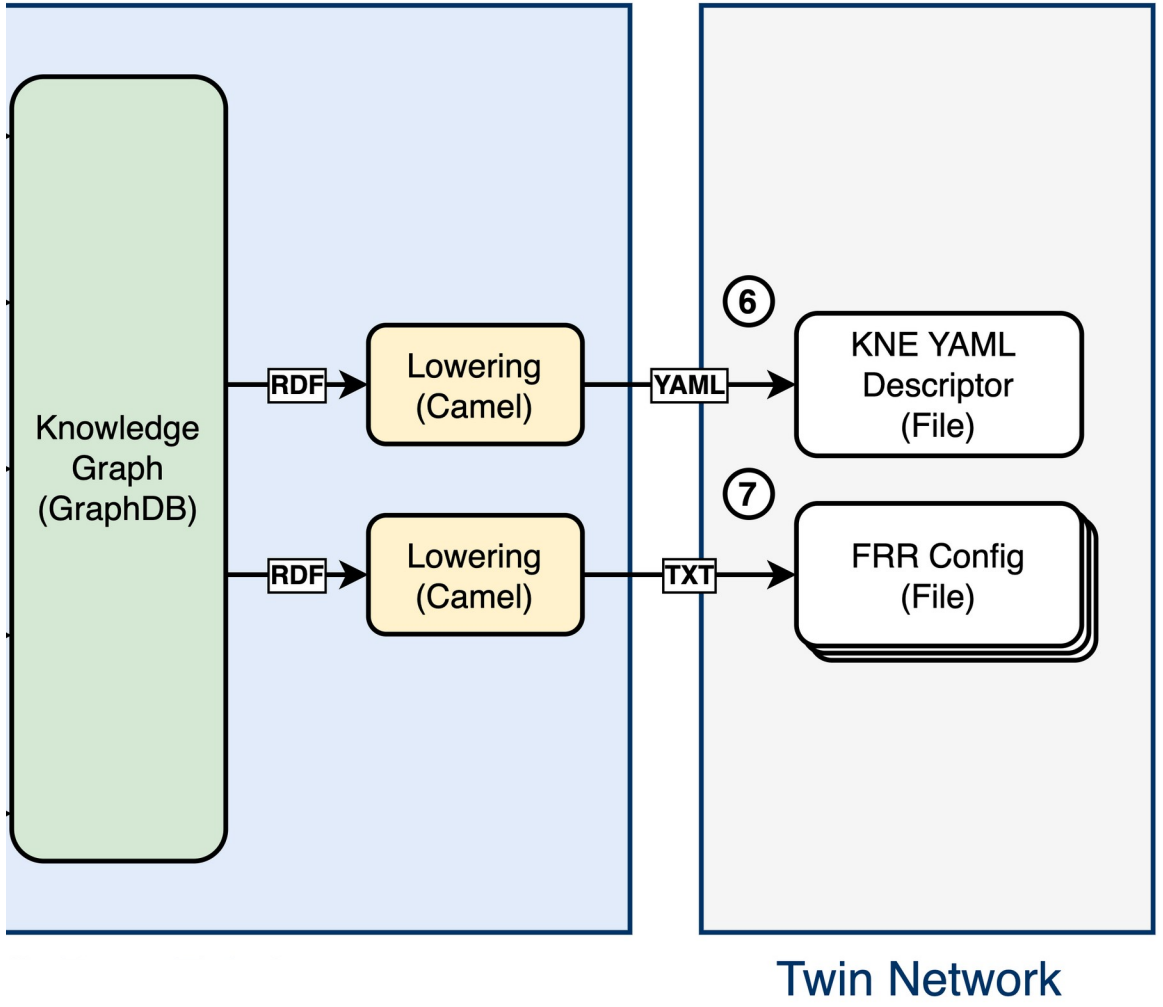
How? Step 1 – Semantic lifting

- Ingest data from data sources
  - OpenStack APIs
- Transform raw data into RDF data
  - Map raw data to the concepts in the target ontology (Mouseworld Ontology)
  - Mapping Template Language (MTL)
- Load RDF data into the knowledge graph database
  - GraphDB
- Using Apache Camel + Chimera open-source tools



How? Step 2 – Semantic lowering

- Retrieves selected data from the knowledge graph database
- Transforms RDF data into consumer's data format and schema
  - YAML format and unstructured text
- Delivers data using the specified methods
  - Stored in files
- Using Apache Camel + Chimera open-source tools



What we achieved and next steps

- Showed benefits of knowledge graphs
  - Data integration
  - Data interoperability

- Extension of the use case
  - Discovery of static routes and OSPF configuration
  - New data sources (e.g., gRPC from devices in the real network)

- KG design team side meeting
  - Tuesday 11:30-13:00 (https://trello.com/c/clRk8Z5X)