SOLAR ENERGY TECHNOLOGIES OFFICE
U.S. Department Of Energy

GEDI SI

# Distribution State Estimation (DSSE)

Demonstration on IEEE-123 bus system

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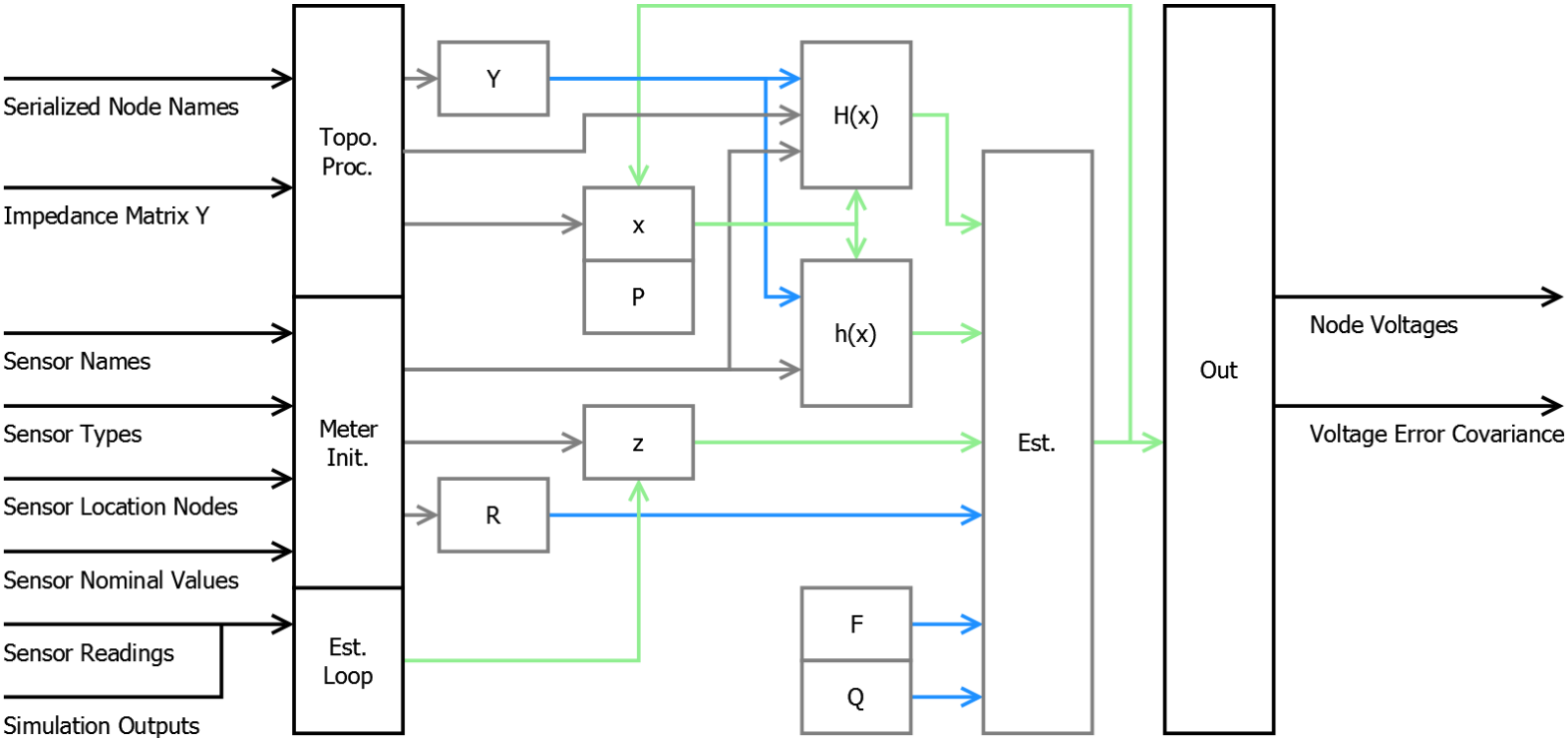
Pacific Northwest National Laboratory

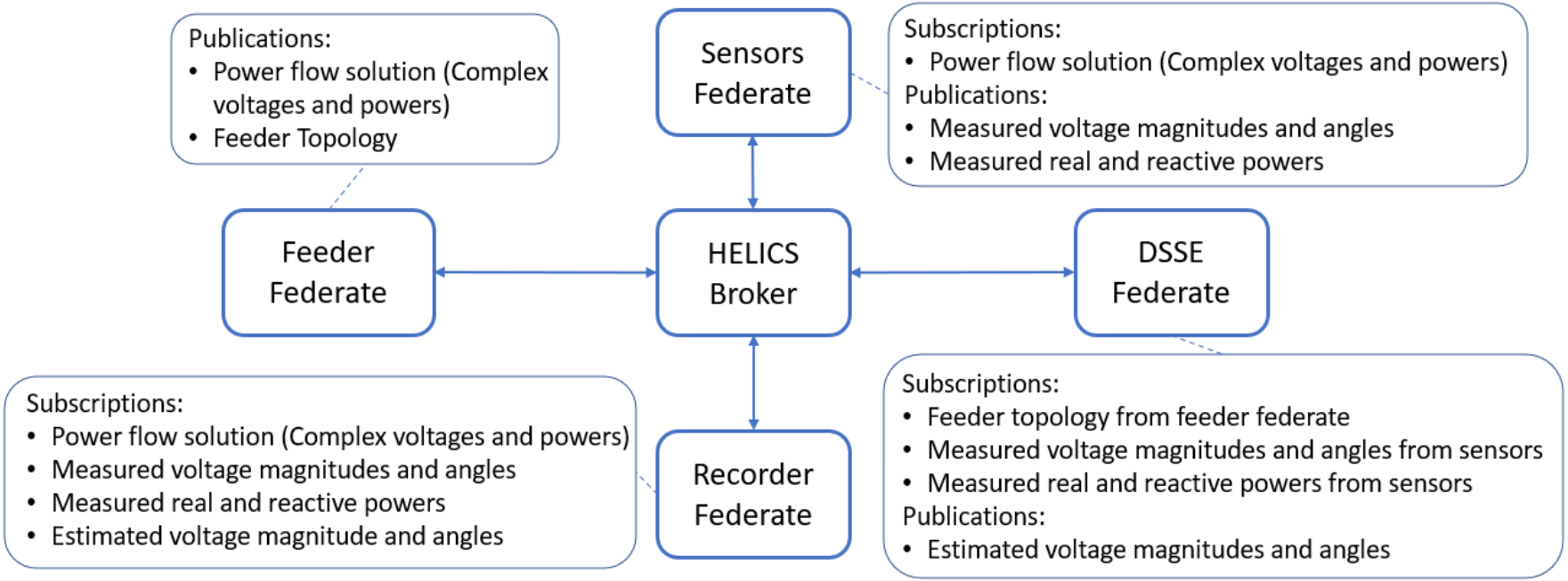
# Use-case Overview

- An Extended Kalman Filter (EKF)-based State Estimation algorithm
- Inputs
  - Node names, nominal node voltages, and angles
  - System Y-bus matrix
  - Location of source bus
  - Nominal active and reactive power loads at all nodes (used for pseudo-measurements)
  - Measurements of voltage magnitudes
  - Measurements of real and reactive powers
  - Location of all measurements
- Output
  - Estimated voltage and estimated angle at all nodes

# DSSE Block Diagram



# DSSE Federate in Co-simulation



# Instructions for Demo

- Prerequisite: Docker and Python
- Download docker image from OEDI website
- Import and execute docker image by running:
  - sudo docker load < gadal_123_v4.tar.gz
  - sudo docker run -it -v $(pwd)/data:/data gadal
- Visualize results by executing:
  - Python Plots.py

- Results are also written in .csv files

# Use-case Outputs and Conclusions