

N7 Grid Simulation using Smart Meter Data

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Most electric distribution companies are, or will be, required to roll out smart meters in the near future – mostly for flexible billing purposes. But this presents an opportunity to perform engineering analysis of the low voltage (N7) grid that has hitherto been unavailable. The volume of data and size of the distribution grid – in terms of number of nodes and edges – requires “Big Data” techniques and large clusters of compute and database servers to provide solutions in a timely fashion.

This talk covers how the CIM network model is being used in Apache Spark and Cassandra clusters to successfully handle these computing challenges and identifies some key lessons learned along the way. The talk is geared towards researchers and programmers in the field of distribution level simulation and modeling, but several concepts presented will be applicable and of interest to non-programmers such as speeds and feeds and graphical display of results.

Topics to be covered include:

- CIM modeling – element classes in the “profile” used
- Ingest – reading meter data from the head end system into Cassandra
- Topological Partitioning – identifying the 'islands' of transmission service areas
- Baseline Simulation – simulation at periodic “snapshot” intervals using Spark
- Typical Engineering Use-Cases:
 - N-1 transformer redundancy
 - new EnergyConsumer(s)
 - added photovoltaic and/or battery installation



Derrick Oswald studied electrical engineering at the University of Waterloo before computers were cute. He's been doing scientific programming at various companies for over 40 years and is now consulting in big data for electric utilities.