WiP Abstract: Transactive Energy Demo with RIAPS Platform

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ABSTRACT

This work presents a platform for decentralized distributed computing called Resilient Information Architecture for the Smart Grid (RIAPS) through a transactional energy and a traffic application.

CCS CONCEPTS

•Computer systems organization → Dependable and fault-tolerant systems and networks; •Hardware → Smart grid;

KEYWORDS

Smart Grid, Distributed application platform

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1 DEMONSTRATION

We present the current capabilities of the RIAPS platform[1], a decentralized fog computing architecture for geographically dispersed smart systems. These include decentralized resource discovery, component-based application design, managed interaction patterns, decentralized deployment, time synchronization, and support for device interface actors. The test bed for the demonstration consists of four single board computers, a router and a machine for running simulations. Grafana is used for visualization of sensor data [2].

1.1 Transactional Energy Application

This is a distributed control application (fig 1) where consumers vary power consumption in response to the price set by producers and producers vary production in response to demand.

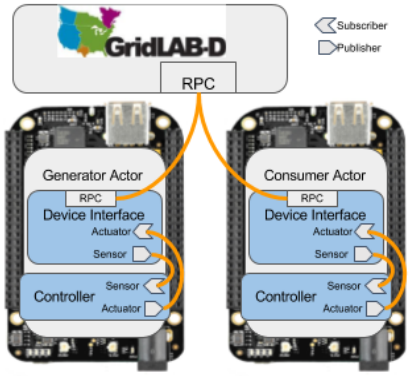

Figure 1: Transactive energy application architecture.

The control application is deployed to RIAPS nodes using a deployment manager GUI according to a deployment specification file. Once deployed the RIAPS Actors register with the Discovery service. This information is shared between nodes so they can connect. The Discovery service also allows nodes to find each other. The sensor input is from a power distribution system simulation and analysis tool GridLAB-D [3].

1.2 Traffic Control

This is a more general smart system application. Traffic controllers are deployed to intersections simulated in Cities: Skylines[4]. The demonstration shows via console the deployment of the RIAPS actors on the RIAPS nodes, which communicate via UDP with the simulation. Based on sensor data from the game and the messages from neighboring traffic lights each RIAPS node changes the traffic light state using threshold based controller logic. Actuations of the lights are visible in the game.

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[1]RIAPS, https://riaps.github.io/
[2]Grafana. http://grafana.org/

[3]Gridlab-d http://www.gridlabd.org/
[4]Cities skyline. http://www.citiesskylines.com.

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