

**Purdue Projects and Weekly Assignments – Level 3**

Joseph A. Brinkman

Omaha Metropolitan Community College

23SS\_INFO\_2123\_HSA – Intro to SCADA Security

Mr. Gary Sparks

July 18th, 2023

### **Purdue Projects and Weekly Assignments – Level 3**

Power distribution, cooling systems, fire detection and suppression, physical security, environmental monitoring, and equipment monitoring are all processes that take place in a data center. According to streamdatacenters, the average enterprise data center costs between \$10 million and \$12 million per megawatt to build and \$10 to \$25 million to operate. SCADA processes help data centers increase their efficiency and automate repetitive work.

It is crucial to monitor environmental conditions in data halls. SCADA can monitor and manage cooling equipment such as chillers, air conditioning units, fans, and water pumps.

Chillers are large cooling units that remove heat by circulating chilled water. Temperature settings and flow rates can be measured by sensors and later used by the SCADA system to make decisions with PLCs and actuators by controlling valves, pumps, and fans.

Environmental sensors are implemented throughout a data hall to monitor and manage the performance of cooling equipment, optimize energy use, ensure proper airflow, and alert personnel when events take place.

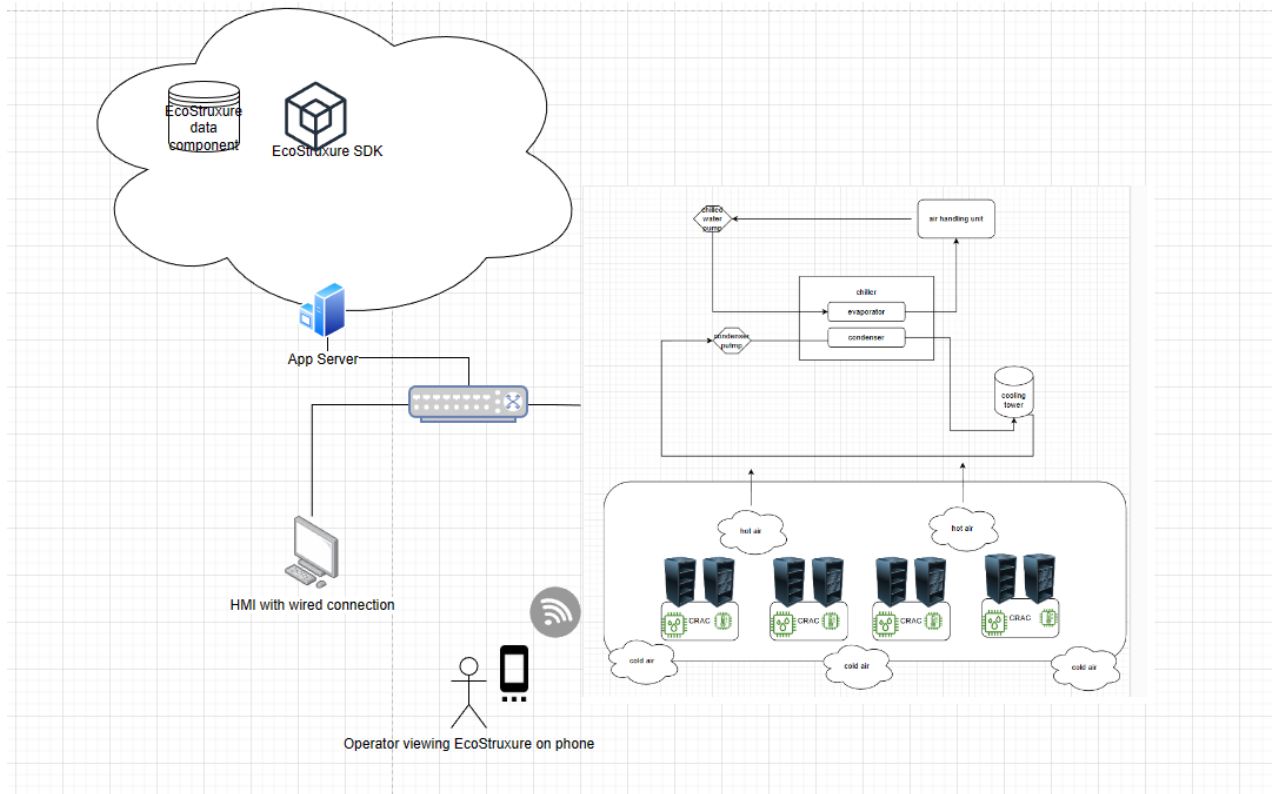
HMIs are used throughout a datacenter to provide operators with a user-friendly interface to monitor, manage, and control data center infrastructure. Data centers require precise control of environmental conditions to ensure optimal performance and equipment reliability. HMIs enable operators to monitor temperature and efficiency. They can adjust parameters in cooling systems such as airflow and humidity levels.

One popular vendor for both data center cooling hardware and software is Schneider Electric. EcoStruxure by Schneider Electric is a comprehensive solution that helps optimize the performance and efficiency of data center production and reliability. It provides centralized management, predictive analytics, integration, and security and resilience. It is an open platform

that can integrate with existing systems, supporting a wide range of protocols and standards. EcoStruxure can provide insights into energy consumption patterns and identify energy saving opportunities. It allows for precise control of cooling systems, serving as an HMI for operators. It is important to realize EcoStruxure is not limited to data center cooling systems but serves as a great product to monitor and control cooling systems along with energy consumption and IT systems.

At level 3, also commonly referred to as the supervisory control layer, supervisory control and coordination is provided. When working with EcoStruxure, data from level 1 and 2 devices is organized by the software in a meaningful way to display both historical data and real-time data to operators. Computers, tablets, and mobile devices can be configured to use the EcoStruxure software.

EcoStruxure includes a myriad of software such as a data management component. These capabilities allow for long-term storage, retrieval, and analysis of historical data. EcoStruxure uses these systems at level 3 to connect with business systems like an enterprise resource system (ERP) at higher levels.



## Reference

- Chhabra, A. (2019, May 29). *The Relation between IIOT, SCADA and HMI Explained*. Schneider Electric Blog. <https://blog.se.com/industry/machine-and-process-management/2019/05/28/the-relation-between-iiot-scada-and-hmi-explained/>
- Dewangan, L., Pathak, A., Ojha, D., Pal, S., Sahu, B., & Singh, S. (2017). *Temperature Sensor Using SCADA*. <https://www.ijraset.com/files/serve.php?FID=7835#:~:text=using%20SCADA%20is%20to%20sense>
- HVAC and CRAC Monitoring and Management*. (n.d.). Aggregate.digital. Retrieved July 19, 2023, from <https://aggregate.digital/products/data-center-supervisor/hvac-monitoring.html>
- “SCADA in the Data Center.” *Manufacturing.net*, 21 Apr. 2017, [www.manufacturing.net/software/article/13226710/scada-in-the-data-center](http://www.manufacturing.net/software/article/13226710/scada-in-the-data-center). Accessed 24 June 2023.
- Puccio, Kris. “A Guide to Your Data Center Controls SCADA, PLC, DCS & More.” *Therma*, 11 Jan. 2021, [www.therma.com/plc-scada-los-angeles/](http://www.therma.com/plc-scada-los-angeles/).
- Recommended Practice: Improving Industrial Control System Cybersecurity with Defense-in-Depth Strategies* Industrial Control Systems Cyber Emergency Response Team. (2016). [https://www.cisa.gov/sites/default/files/recommended\\_practices/NCCIC\\_ICS-CERT\\_Defense\\_in\\_Depth\\_2016\\_S508C.pdf](https://www.cisa.gov/sites/default/files/recommended_practices/NCCIC_ICS-CERT_Defense_in_Depth_2016_S508C.pdf)