Purdue Projects and Weekly Assignments – Level 5

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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.

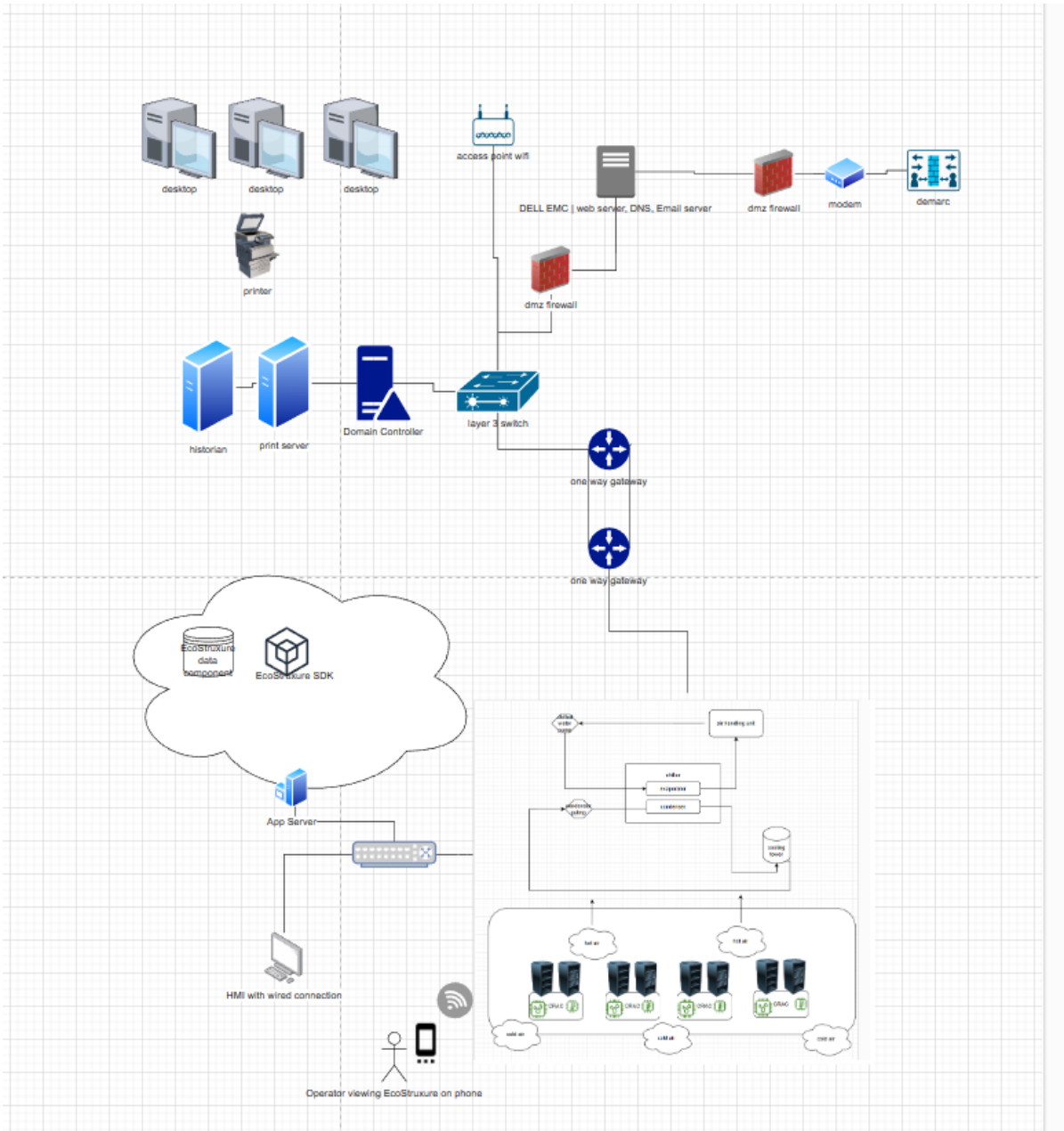
At level 3, also commonly referred to as the supervisory control layer, supervisory control and coordination is provided. When working with EcoStruxure, data from level 1 and 2 devices is organized by the software in a meaningful way to display both historical data and real-time data to operators. Computers,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

EcoStruxure includes a mryiad 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.

A demilitarized zone (DMZ) is used to create a physical separation between SCADA and ICS operations in the manufacturing zone and encompassing cell / area zone from the Enterprize zone at level 4. At level 4, there is greater risk due to increased internet connectivity vital for business operations and general desktop use. One-way diodes or gateways are commonly used to separate these critical networks from business networks.

At level 5, there is the greatest risk of threats as layer 5 servers as the internet DMZ where all external connection attempts will be made. At the demarcation point, a leased connection from a provider is connected to the organization. A leased connection from an ISP can range in cost. AT&T business costs $993 to $1770 a month for a dedicated 1Gbps line.

The internet DMZ is where an organization's external facing on-premises infrastructure is. For example, a DNS server, web server, and email server are all common services hosted on-premises and located immediately after the demarcation in the internet DMZ. With virtualization, all these services can be hosted on a single physical server, but it also isn't uncommon for different services to be hosted on their own individual servers. While the price of physical hardware varies, according to Dell's product page, a PowerEdge R250 Rack server starts at $1109.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DELL EMC | web server, DNS, Email server
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dmz firewall
historian
print server
Domain Controller
layer 3 switch
one way gateway
one way gateway
EcoStruxure data component
EcoStruxure SDK
App Server
HMI with wired connection
Operator viewing EcoStruxure on phone

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