

Datacenter Automation

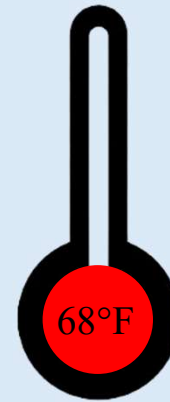
Student: Collin Lee

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School: Quince Orchard High School

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Build a Linux-based automation system for the NCNR datacenter that monitors the power and temperature conditions to respond properly at any given time.



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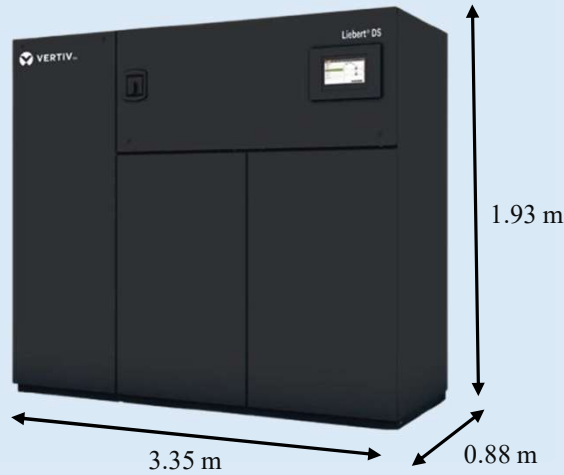
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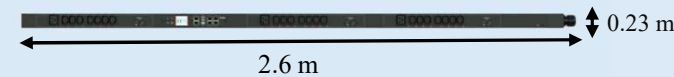
Core Infrastructure



Toshiba G9000 UPS

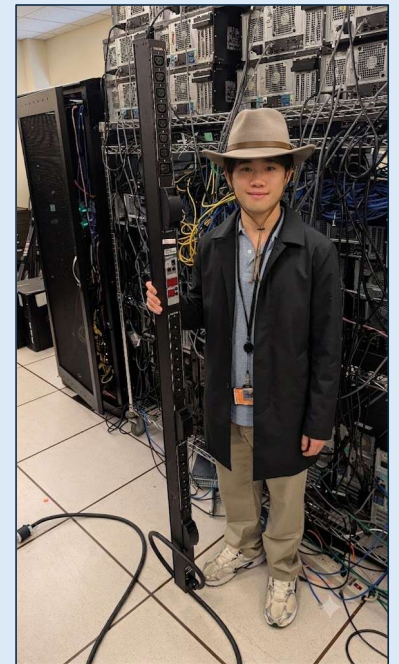


Liebert DS Cooling



Raritan PX3-5523 PDU

Inside the Data Center



How do I get this information?



SNMP walk
(Simple Network Management Protocol)

1.8.23.8.1.2

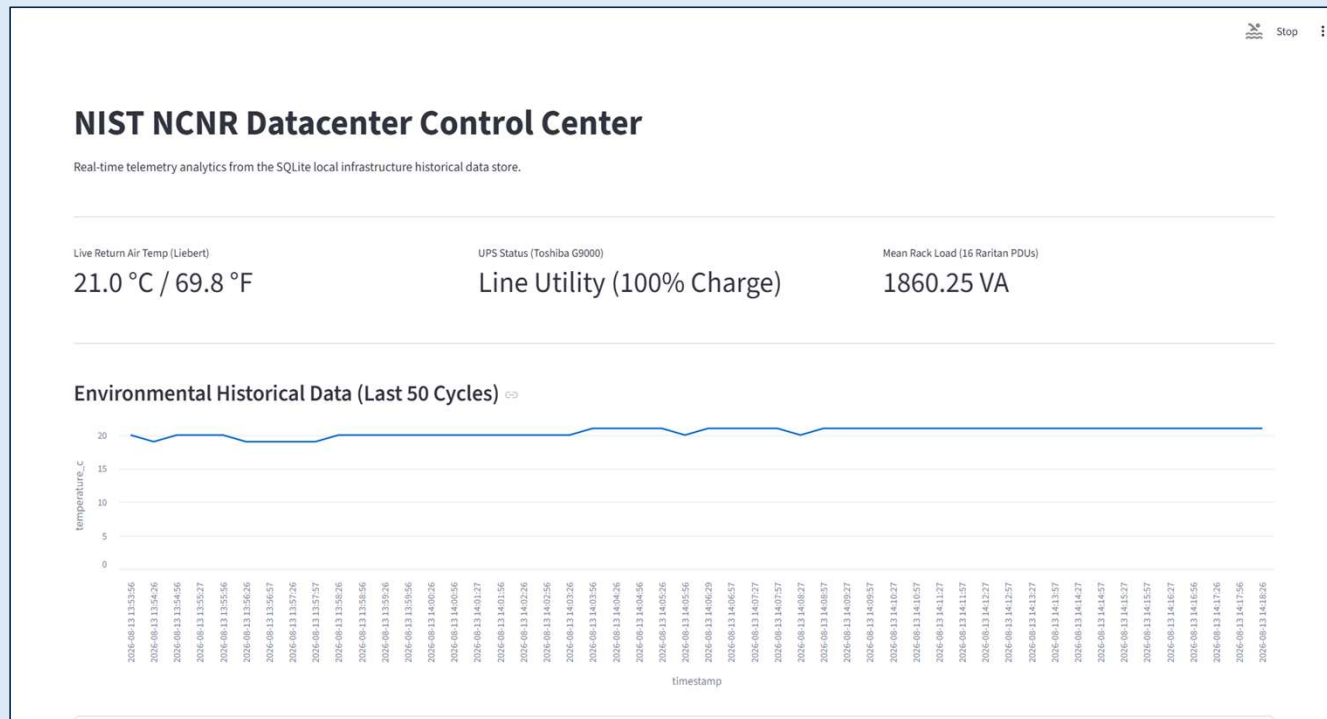


OIDs
(Object Identifiers)
1.3.6.1.2.1.1.1.0

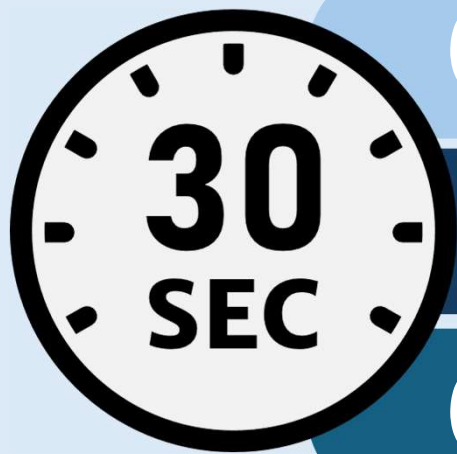


MIB
(Management Information
Base)

Visual Dashboard



Process



01 Polling

02 Telemetry

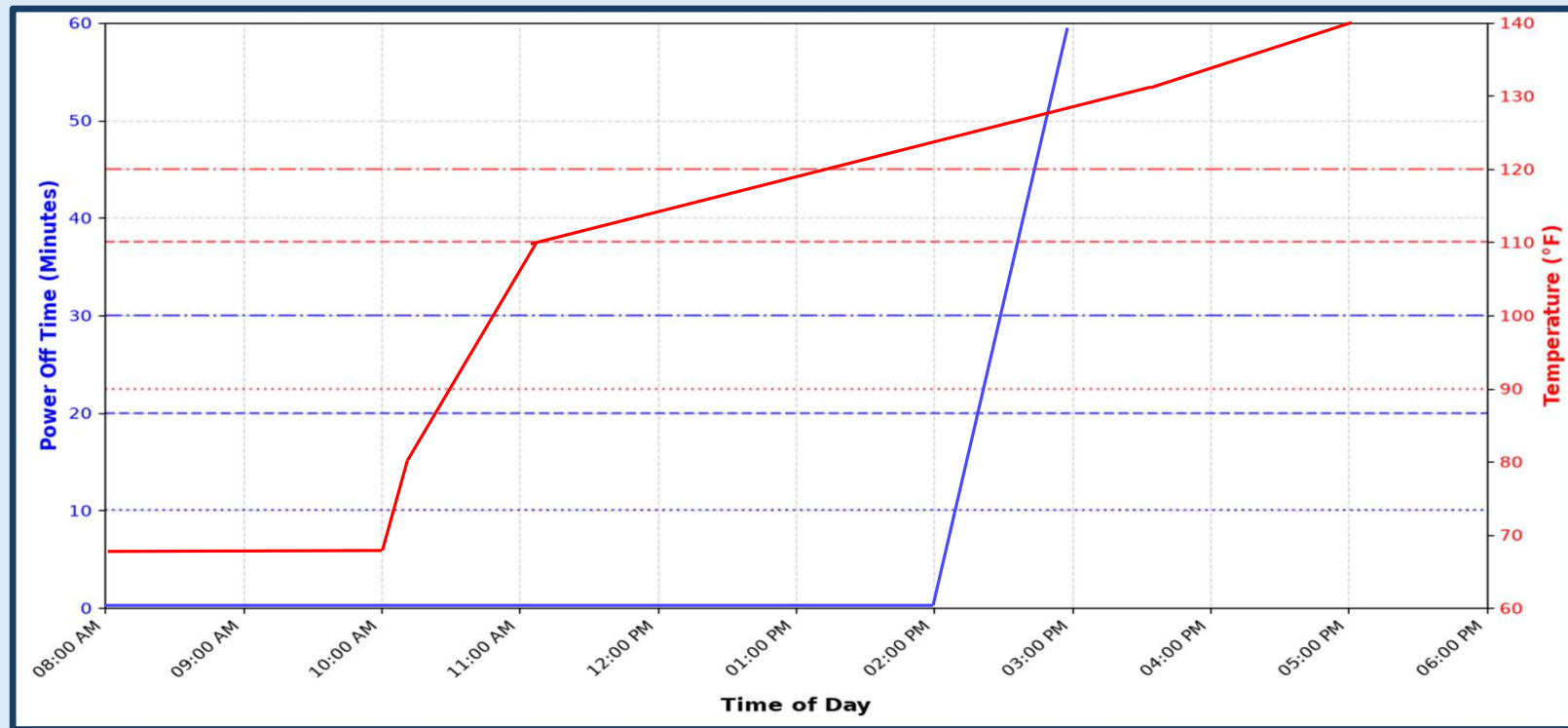
03 Thresholds

Thresholds

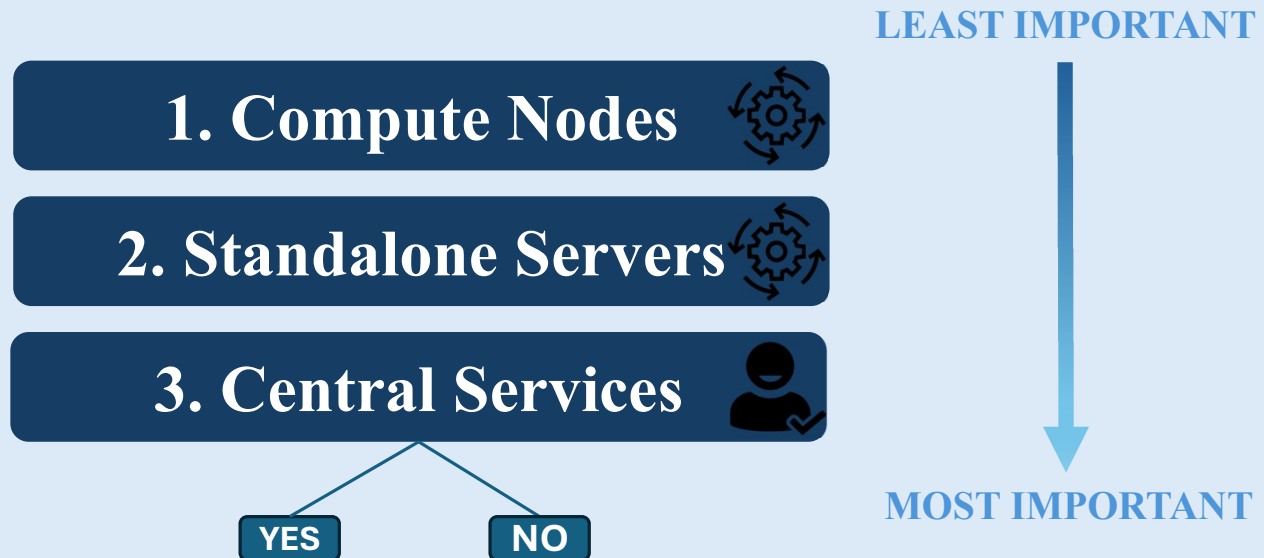
**STAGE 1: 90F or
Power Off for 10 min**

**STAGE 2: 110F or
Power OFF for 20 min**

**STAGE 3: 120F or
Power OFF for 30 min**



Shutdown List



Notifications

**Shutdown
+
Threshold breached**



Methods of Shutdown



SSH Access

Logs directly into Linux machines to run shutdown commands



Ansible + vCenter

Orchestrates vSphere API calls to gracefully shut down VMs & ESXi Hosts



SNMP Protocol

Sends Outlet state commands to Raritan PDUs to shed rack power



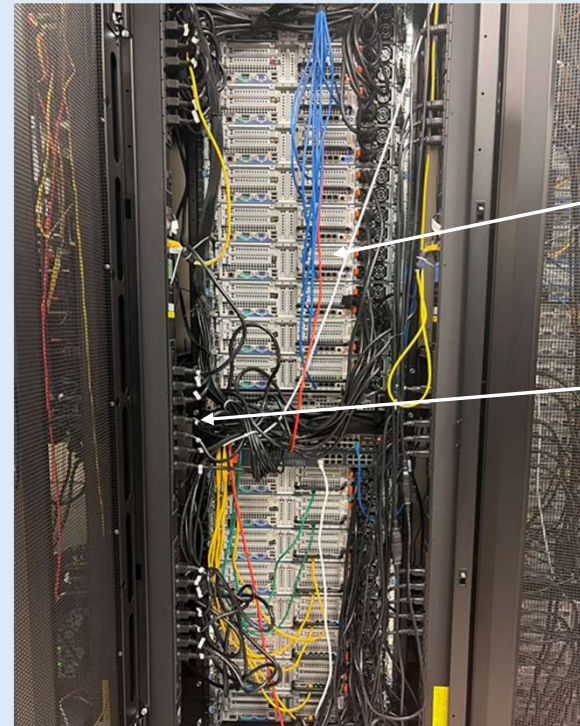
iDRAC

Powers physical servers back ON and windows servers

Outlets



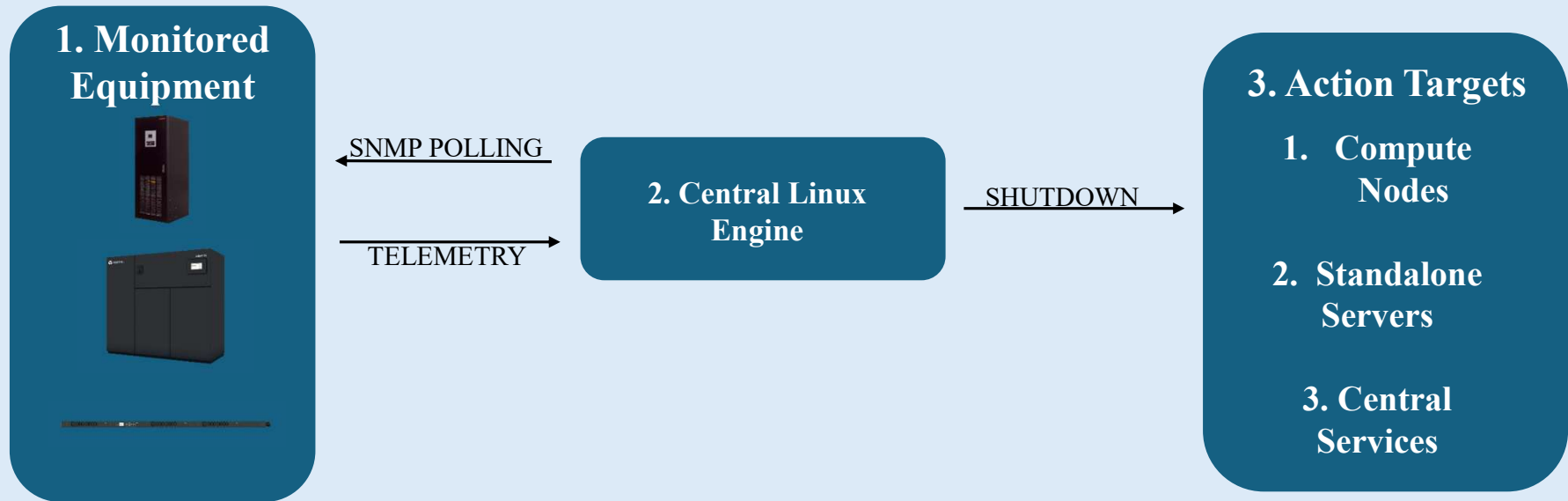
?



Computer

Outlet

Final Overview



Future Work

Validation

Conduct comprehensive testing during scheduled facility maintenance

Checklist

- ☐ Shutdown Sequence
- ☐ Notifications
- ☐ Polling
- ☐ Correct devices

Power On Automation

Create a power-on automation after the automated shutdown

1. Central Services

2. Standalone Servers

3. Compute Nodes

MOST
IMPORTANT



LEAST
IMPORTANT

Acknowledgements

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Rehmann, Dr. Susana Marujo Teixeira

CHRNA

NCNR Staff

NIST SHIP Program

Parents



Thank You!