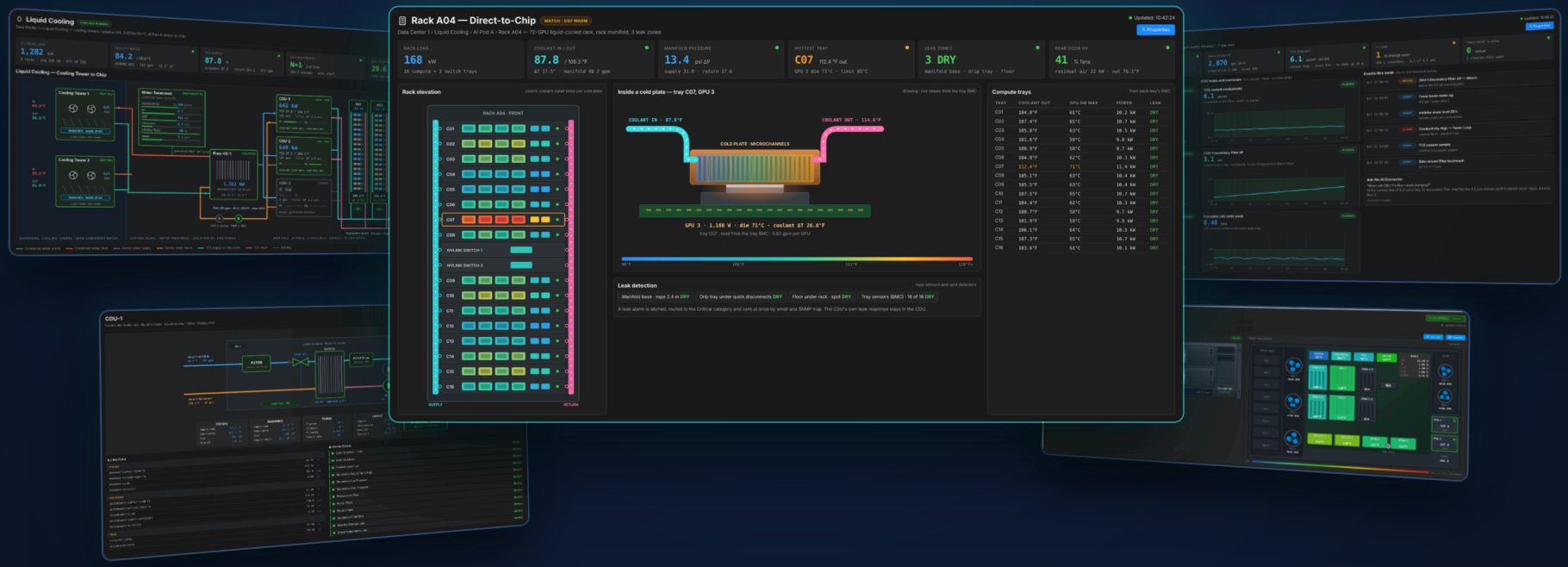
PYTHIA TECHNOLOGIES

DM FOR LIQUID COOLING

From cooling tower to cold plate. One console.

Every layer of your liquid cooling, live in one place: towers, water treatment, heat exchangers, CDUs, rack manifolds and the servers they cool. With alarms, trends and dashboards, shared with your BMS, your NMS and your AI assistants.



Every layer

Towers, treatment, CDUs, rear doors, manifolds and servers in one site tree.

Leaks first

Leak alarms routed as Critical and sent at once by email and SNMP trap.

Ahead of trouble

Filter, dew point and redundancy alarms before they cost cooling.

Ask it

The AI Connector answers questions from live loop data.

WHY IT MATTERS

More heat. More water. Seconds to react.

Air alone can't carry the heat of a modern GPU rack. Coolant now runs through a cold plate on every processor, and the heat leaves the building through a chain of equipment. A problem anywhere in that chain reaches the chip within seconds.

132 kW

Power in a single NVIDIA GB300 NVL72 rack, all of it carried away by liquid.

Source: Supermicro SRS-GB300-NVL72 rack specification

~30 seconds

When CDU pumps stop, coolant stops moving in about 10 seconds. Beyond about 30 seconds, GPUs face thermal shutdown.

Source: Vertiv, Aug 2026

53 %

Share of AI chips that are liquid cooled in 2026, up from about a third in 2025.

Source: TrendForce, Aug 2026

WHAT GOES WRONG

Six ways a liquid loop fails. The DM watches for all of them.

Leaks
Quick disconnects, hoses and manifolds are the usual sources. Rope and spot sensors under manifolds, CDUs and floors, plus tray sensors read from each server, raise a Critical alarm.

Loss of flow
A pump fault or a clogged filter starves the cold plates. The DM watches pump status, flow, differential pressure and how fast each filter is loading.

Condensation
Coolant below the room's dew point wets the electronics. The DM tracks the margin between supply temperature and dew point and alarms before it closes.

Water chemistry drift
Scale and fouling block the fine channels in a cold plate. Conductivity, pH, oxidizer, corrosion rate and inhibitor feed are trended against their bands.

Lost redundancy
A CDU group keeps cooling with one unit down, until a second one trips. The DM tells you the moment N+1 becomes N.

Warm facility water
On a hot day, tower water can rise above its design class. The DM compares supply temperature with the site's ASHRAE W-class and the CDUs' approach.

1
Facility water
Cooling towers, dry coolers or chillers reject the heat. Warm-water designs run facility water up to the ASHRAE W32, W40 or W45 classes.

2
Water treatment
Conductivity, pH, oxidizer and inhibitor are held in band to stop scale, corrosion and biological fouling.

3
CDUs
Coolant distribution units separate the facility water from the IT loop and hold its temperature, pressure and flow.

4
Racks and chips
Rack manifolds feed cold plates on each server tray. Rear-door heat exchangers take the heat the air still carries.

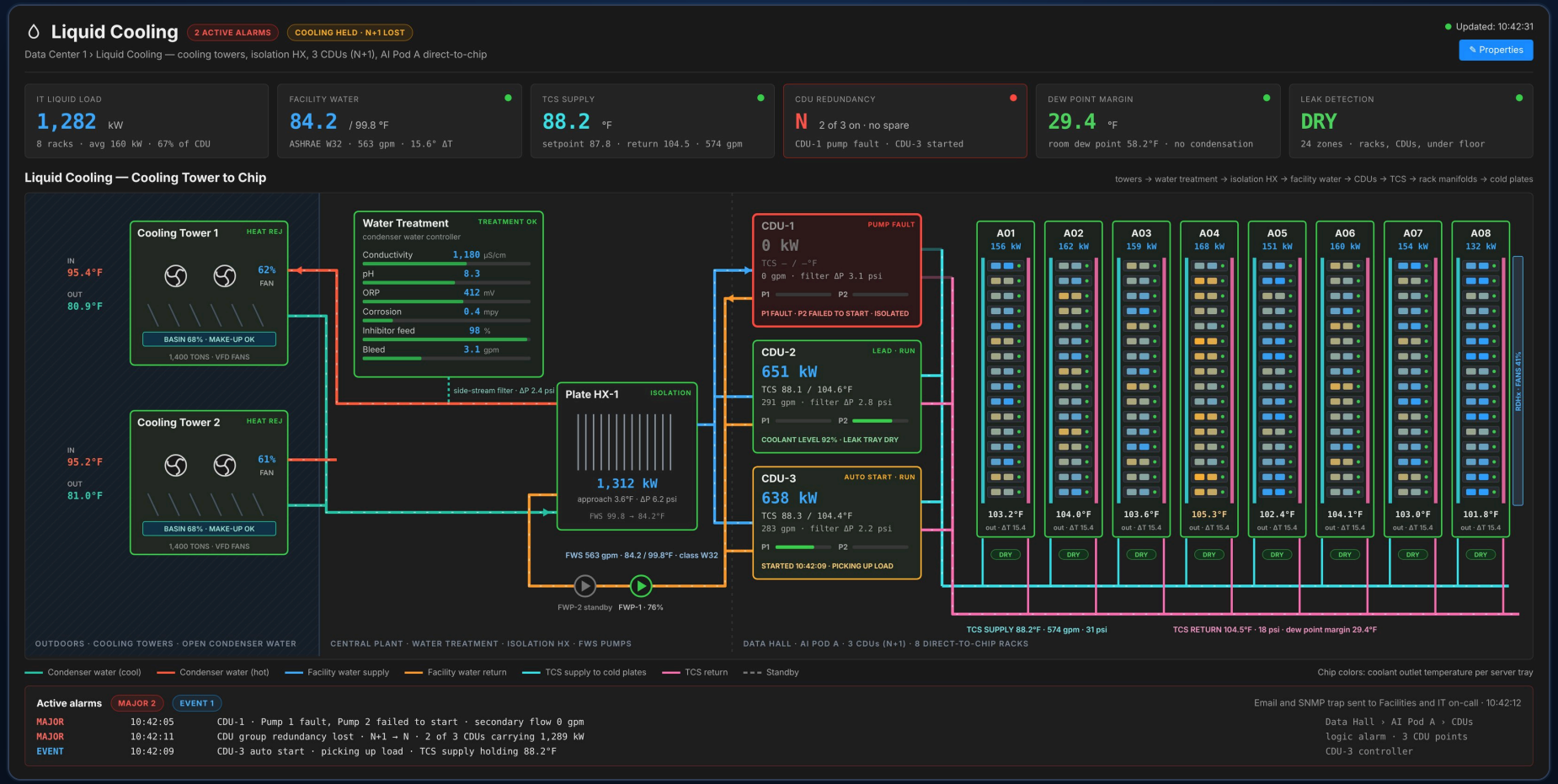
EVERY LAYER, ONE CONSOLE

Cooling towers & dry coolers · Chillers · Water treatment · Isolation heat exchangers · Facility pumps · CDUs · Rack manifolds · Rear-door heat exchangers · Leak detection · Liquid-cooled servers

IN THE CONSOLE

When the loop breaks, you see it at once.

CDU-1 loses both pumps. Within seconds the plant page turns it red, CDU-3 starts on its own, and the DM raises redundancy lost and sends it to facilities and IT.



The fault, found

The failed CDU, its pumps and its flow are shown where they sit in the loop, not buried in a list.

The response, confirmed

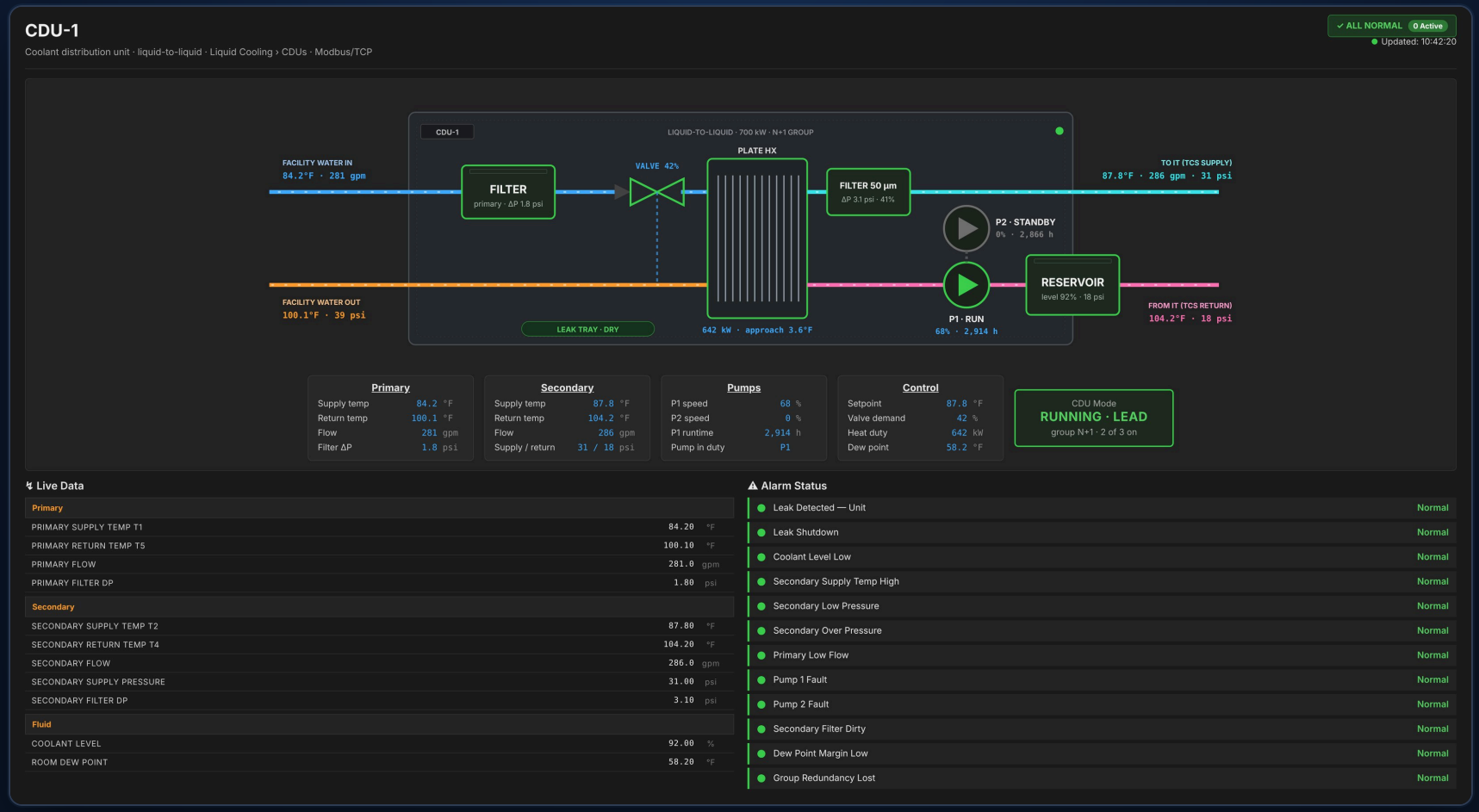
See the standby CDU pick up the load and the supply temperature hold, live.

The margin, measured

N+1 becomes N on the page and in your inbox, before a second failure costs cooling.

CDUS

Every CDU, inside and out.



Both loops

Facility water in and out, the plate heat exchanger and valve, and the supply to the IT loop.

Pumps and filters

Lead and standby pumps with speed and run hours. Filter ΔP trended, so a dirty filter shows up days early.

Every alarm it can raise

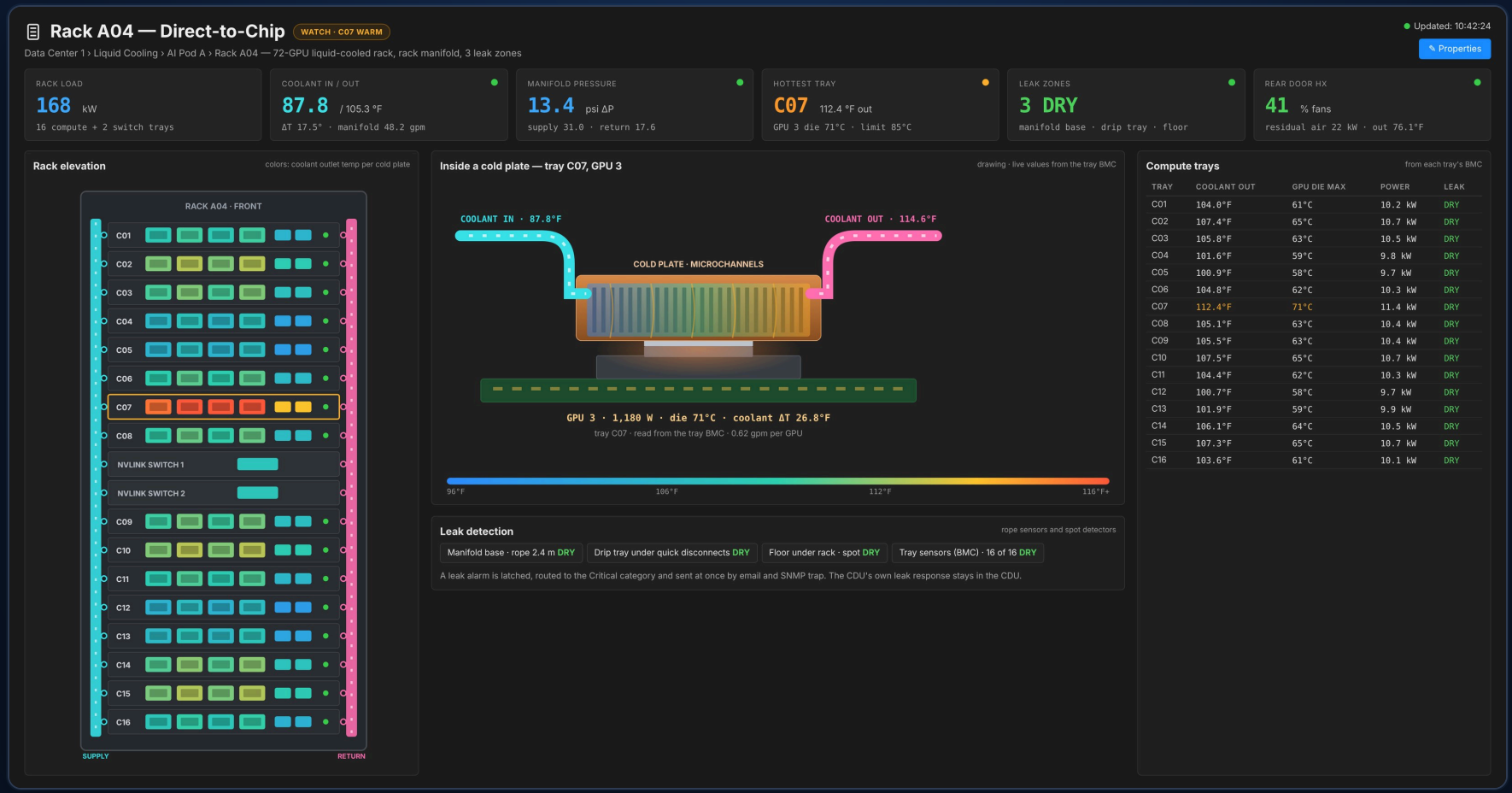
Leak, coolant level, supply temperature, pressure, pump faults and group redundancy.

Any make

Every CDU lands with the same names, units and alarm settings, whoever built it.

DOWN TO THE CHIP

See the warm tray before it throttles.



Every cold plate, colored

The rack elevation colors each tray by its coolant outlet temperature, so the hot spot jumps out.

From the server itself

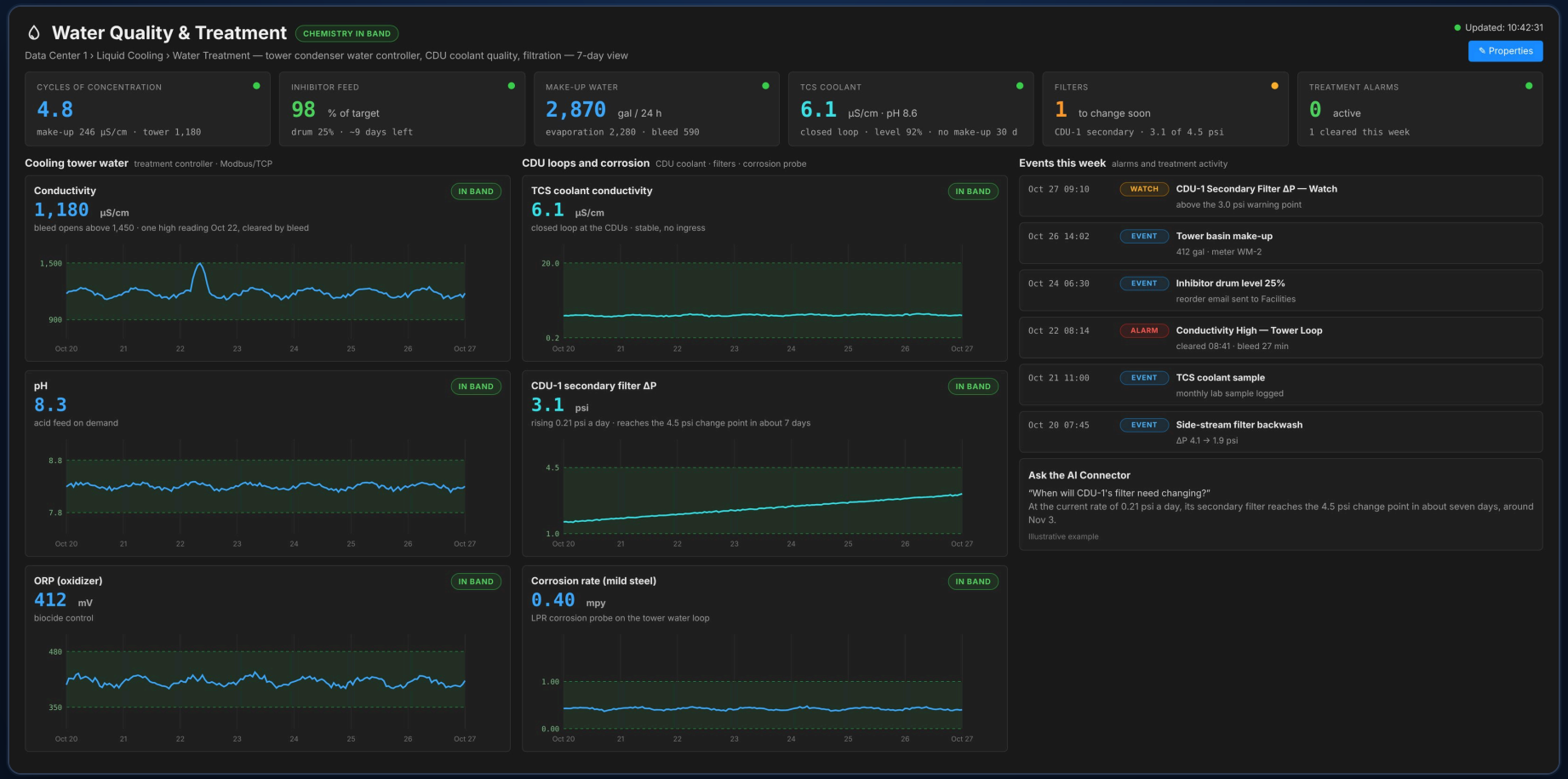
Coolant out, GPU temperature, power and leak status for every compute tray, read from its management controller.

Leaks at the rack

Manifold, drip tray, floor and tray sensors. A leak alarm is latched until someone clears it.

THE WATER BEHIND IT

Clean water keeps cold plates clean.



Chemistry in band

Conductivity, pH, oxidizer and corrosion rate on the tower water, trended against their bands.

Filters, forecast

The rate a filter is loading tells you when it needs changing, before flow suffers.

Events in context

Treatment events, samples and alarms on the same timeline as the readings.

WHAT THE DM CONNECTS TO

Five layers, one console.

The DM polls each piece of liquid cooling equipment in the protocol it already speaks. No controller is replaced, and the equipment's own control and protection stay exactly where they are.

Layer	Typical equipment	What the DM reads	How
Heat rejection and facility water	Cooling towers, dry coolers, chillers, isolation heat exchangers, facility pumps	Supply and return temperatures, flow, approach, fan and pump speed, run status, basin level, make-up water	BACnet/IP, Modbus/TCP, Modbus RTU
Water treatment	Treatment controllers, side-stream filters, make-up and bleed meters, corrosion probes	Conductivity, pH, ORP, corrosion rate, inhibitor feed, bleed, filter ΔP, chemical tank levels	BACnet/IP, Modbus/TCP
CDUs	In-row and in-rack CDUs, including Vertiv CoolChip and Liebert XDU	Primary and secondary temperatures and pressures, flow, heat duty, pump speed and run hours, valve position, filter ΔP, coolant level, dew point, leak, group status	Modbus, SNMP, BACnet
Racks	Rack manifolds, rear-door heat exchangers, leak detection, rack PDUs	Manifold supply and return, ΔT, leak zones, door fan speed and air temperature, rack power	Modbus, SNMP, BACnet, Pythia leak panels
Servers and chips	Liquid-cooled server trays and their management controllers (BMC)	Processor temperatures, coolant temperatures where the platform reports them, tray leak sensors, power	SNMP; other platforms on request

One structure for every site

Liquid Cooling is a location in the site tree, with groups for the plant, treatment, the CDUs and each pod of racks. A CDU in alarm turns its group, the location and the site red.

Points that mean the same thing

Every CDU, door and manifold lands with the same names, units and alarm settings, whatever its make.

Alarms built from several readings

Redundancy lost when fewer CDUs run than the load needs, a dew point margin that is closing, or a filter past its warning point while flow is falling.

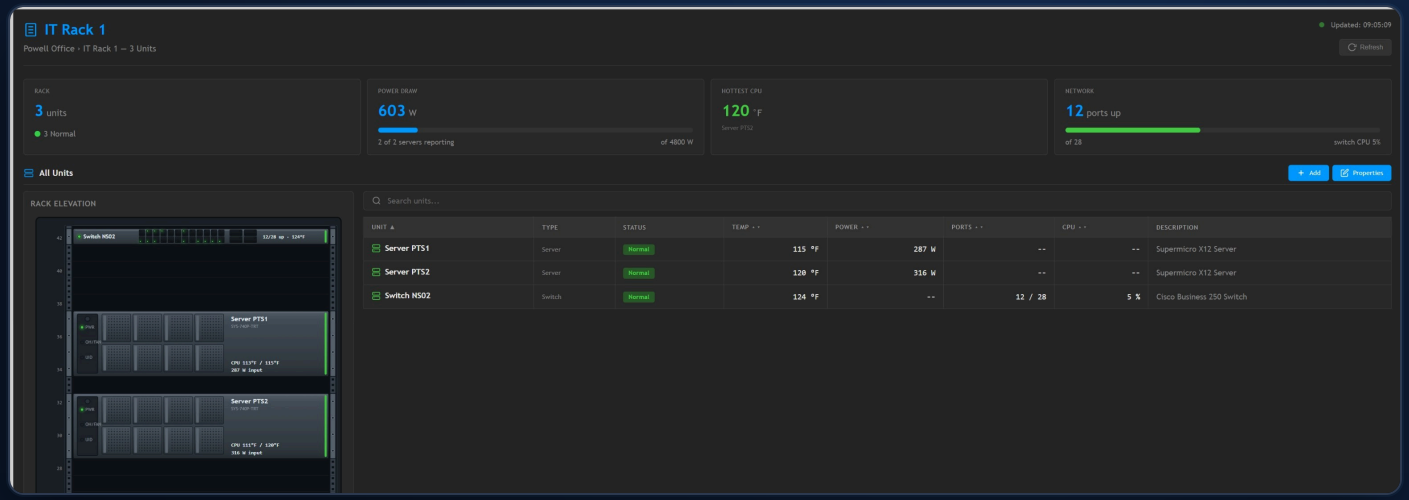
Published to what you already run

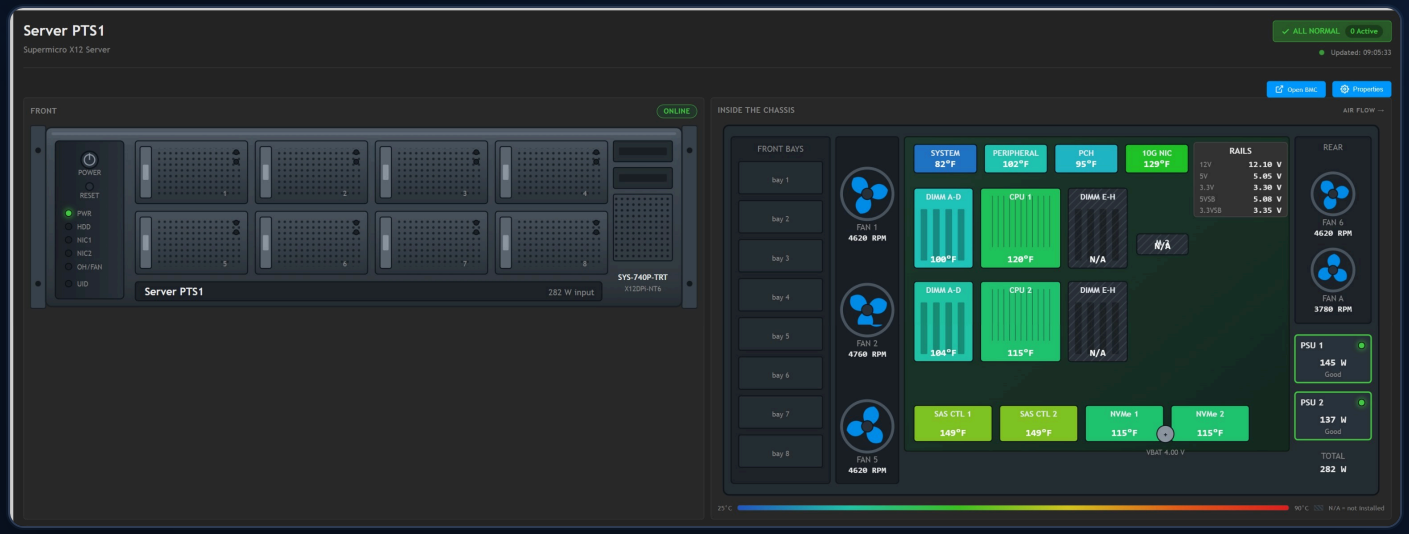
Everything the DM reads is published as BACnet/IP, Modbus/TCP and SNMP, so the BMS and NMS get the whole plant without new integration work.

Running Liebert equipment? The Smart Panel IGM brings Liebert units, including LiquiTect leak detection, onto the same DM over the IGM wiring already in place. Pythia leak detection panels add rope and spot sensors anywhere water can reach. And the same DM runs on a server in the rack, a redundant pair, a Smart Panel on the mechanical room wall, or a dedicated cloud VM.

THE END OF THE PATH

And at the end of every loop, the server.





Rack elevation with live temperature, power and status, and inside each server: processor, memory and storage temperatures, every fan and each power supply's watts, read from its management controller.

The final check

Coolant temperatures say the loop is running. Processor temperatures say it is doing its job. The DM shows both, side by side.

Watts are heat

Every watt a power supply draws is heat the loop has to carry away. Rack power shows the cooling load building before temperatures move.

Controls held back

Power on, off and reset through the management controller are there, but disabled until an operator enables them, so nobody switches a server off by accident.

ALARMS AND ANSWERS

Alarms that match the risk. Answers when you ask.

Category	Examples	Typical response
Critical	Leak in any zone · CDU leak shutdown · loss of secondary flow · both pumps failed · IT supply temperature high	Immediate email and trap to facilities and IT. Leak alarms can be latched until cleared.
Major	CDU redundancy lost · one pump failed · dew point margin low · facility water above its W-class · coolant level low	Same-shift response: still cooling, but the margin is gone.
Minor	Filter ΔP past its warning point · chemistry out of band · inhibitor tank low · sensor fault	Planned maintenance, days before it becomes urgent.

Each category goes to the right people by email and SNMP trap, with quiet-time exceptions. A fail count keeps a single bad reading from raising an alarm. Leak shutdown, valve isolation and pump changeover stay with each CDU's own controls.

DM AI CONNECTOR

Ask the cooling plant a question.

Which rack has the least cooling margin right now?

Rack A04. Tray C07 is returning coolant at 112.4°F, 7° warmer than the rest of the rack, and GPU 3 is at 71°C. Manifold flow is normal, so check that tray's quick disconnects and cold plate.

When will CDU-1's filter need changing?

At 0.21 psi a day, its secondary filter reaches the 4.5 psi change point in about seven days.

Connect Claude, ChatGPT or any assistant that speaks MCP. New accounts are read-only, and only an administrator can allow changes.

See your liquid cooling plant in the DM.

Ask for a demo. We'll walk you through the plant, CDU, rack and water pages and show how your towers, treatment, CDUs and racks come together in one console.

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