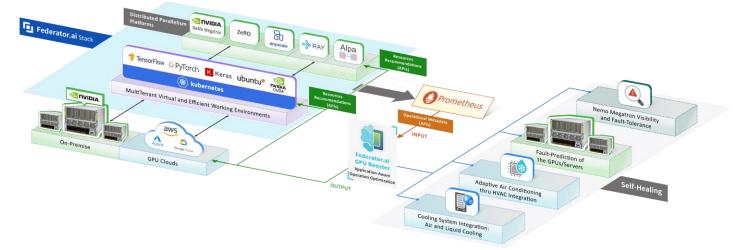


# Federator.ai Smart Liquid Cooling®

# The Future of AI Data Center Cooling: Predictive and Adaptive

## **Transforming the Operation of AI Data Centers**



Federator.ai Smart Liquid Cooling is a patent-pending, advanced solution that combines GPU workload optimization with dynamic cooling management to enhance the efficiency and reliability of data centers. This innovative integration with Supermicro SCC (SuperCloud Composer) ensures workload-aware cooling by leveraging predictive analytics, real-time metrics, and intelligent controls to maintain the optimal state during uptime, improve Power Usage Effectiveness (PUE), and lower operational costs by reducing unnecessary energy consumption.

### **Benefits**

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The key benefits of Federator.ai Smart Liquid Cooling include:

- Enhanced GPU Resource Management: Monitors and optimizes GPU workloads to maximize performance and minimize energy consumption.
- Intelligent Cooling Adjustments: Dynamically adjusts cooling flow rates to stabilize GPU temperatures and fluctuations and reduce power usage.
- Improved Data Center Efficiency: Lowers Power Usage Effectiveness (PUE) by aligning cooling strategies with workload demands and predictions.
- Extended Component Lifespan and SLA Compliance: Enhances component life and reliability through proactive thermal management, ensuring adherence to Service Level Agreements.

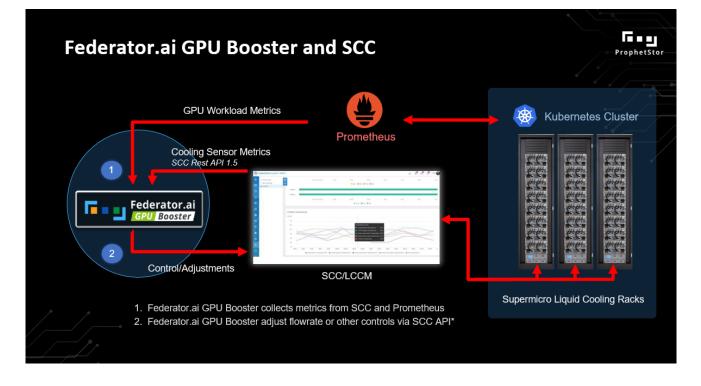
### **Prerequisites**

Before initiating the installation, ensure your system meets the following hardware requirements:

- CPU: Intel Xeon E3 or above
- Memory: Minimum of 64GB
- GPU: Nvidia H100/H200/GB200 recommended
- Network: At least 1 NIC
- Local Storage: 1TB SSD recommended
- Persistent Storage: (Optional) 500GB NFS storage

#### **Features**

- 1. **GPU Workload Metrics:** Tracks GPU utilization, power consumption, and temperature in real time.
- 2. Predictive Analytics: Identifies workload distribution patterns and predicts cooling needs.
- 3. **Dynamic Cooling Control:** Adjusts flow rates and other cooling parameters using SCC API.
- 4. Simulator Mode: Provides simulation of GPU servers and CDUs for testing and optimization.



▲ Workflow of continuous metric collection and dynamic cooling adjustment

Ĭ	Smart Cooling / Coolant Distribution Units								im 🔺 🌲 💶	
	CDUs	GPU Nodes	Physical GPUs	Running GPU Workloads	Avg. Coolant Return Temp.		Max Coolant Return T	emp.	Total GPU Power Usage	
	3	12	96	264	33.89	°C	50.58° <sup>c</sup>		35461w <del>5</del>	
Data Ce	nter smc-dc	✓ Group US-West production	V CDU All							
	Rack ID CDU		Cod	Coolant Supply Temperature		Coolant Return Temperature		Lowe	Lowest GPU Temperature	
>	Lucci-rack	A0029348	19.4	1'C	27.7°C		37.92°C prom7198.mwwgpu-simulated-2/G	20.73	*C 198 mwwgpu-simulated-1/GPU4	
~	Lucci-rack-1	A0029349	24.1	24.75*C		52.94°C		<b>28.1°</b> iPU2 prom7	C 198.mwwgpu-simulated-4/GPU1	
	Cluster	Node GPU 0	GPU 1	GPU 2	GPU 3	GPU 4	GPU 5	GPU 6	GPU 7	
	prom7196	mwwgpu-simulated-3	62.24 °C 29.16	°C 74.03 °C	84.48 *C	29.25 ℃	39.83 °C	54.31 °C	47.87 °C	
	prom7196	mwwgpu-simulated-4	59.75 °C 28.1 °	C 82.14 *C	73.64 °C	28.81 °C	39.16 *C	52.79 °C	46.21 °C	
	prom7196	mwwgpu-simulated-5	72.64 °C 29.16	°C 89.42 °C	■■■■ 86.11 °C	<b>29.56</b> °C	39.83 °C	51.42 °C	50.75 °C	
	prom7196	mwwgpu-simulated-6	〕74.82 ℃     28.46	°C 82.44 °C	75.72 °C	28.75 °C	39.99 °C	57.24 °C	46.3 °C	
>	Lucci-rack-2	A0029350	19.7	5°C	28.48°C		40.47*C prom7198:mwwgpu-simulated-9/G	<b>21.35</b> IPU2 prom7	*C 198 mwwgpu-simulated-10/GPU1	

#### ▲ Displaying hotspots in the rack



▲ CDU temperature sensors and GPU util/power usage



▲ Recommended flow rate to lower GPU temperatures



▲ Dynamic flow rate adjustment to control GPU temperature fluctuation

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### **Technical Specifications**

The system includes the following components and capabilities:

- Integration with SCC REST API 1.5: Ensures seamless communication for real-time control. •
- Support for Prometheus: Collects detailed metrics on GPU workloads and cooling systems.
- Hardware Requirements: Designed to operate with Supermicro Liquid Cooling Racks and CDUs.
- Workload-Based Prediction Models: Trained using real-world metrics to enhance accuracy.

Federator.ai Smart Liquid Cooling revolutionizes data center operations by combining GPU workload optimization with intelligent cooling management. With predictive analytics and real-time control for liquid flow rate, it ensures enhanced efficiency, lower power consumption, and reliable GPU operations with supported SLA.

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