

Neptune Liquid Cooling solutions

Different types of Neptune Liquid Cooling

Lenovo

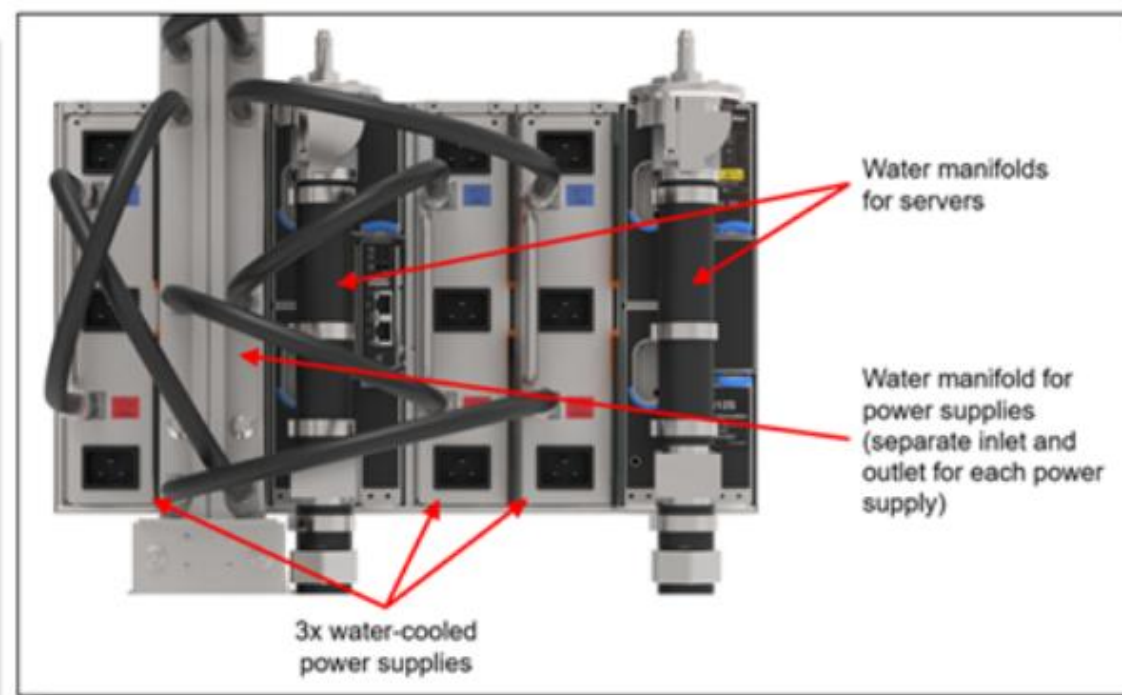
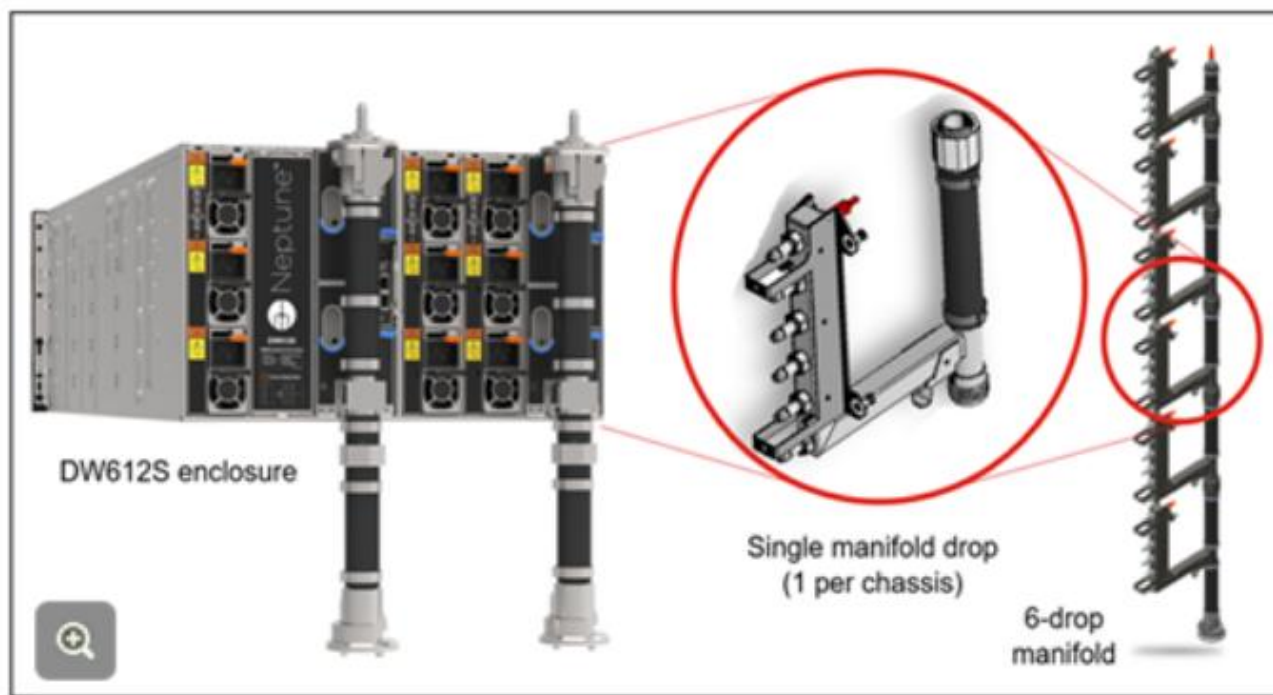
Types of Neptune Liquid Cooling module

There are currently four types of Neptune Liquid Cooling system:

- Direct water cooling enclosures
- Open-loop water cooling modules
- Closed-loop water cooling modules
- Liquid to air modules (L2AM)

Direct water cooling enclosures

The DW612 and DW612S are 6U enclosures that feature Neptune direct water cooling designs and house up to six ThinkSystem SD series servers – for example, the SD650 V3 or SD650-N V3.

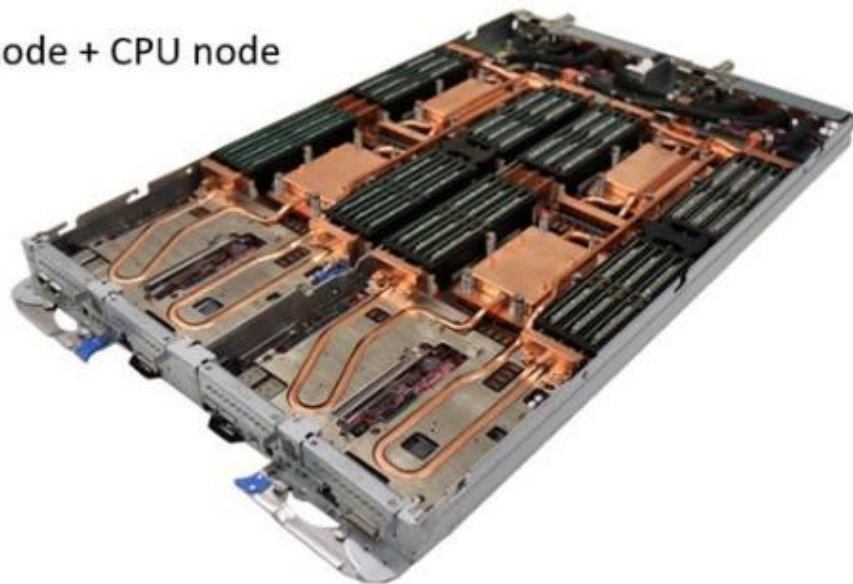


Open-loop water cooling modules for ThinkSystem SD servers

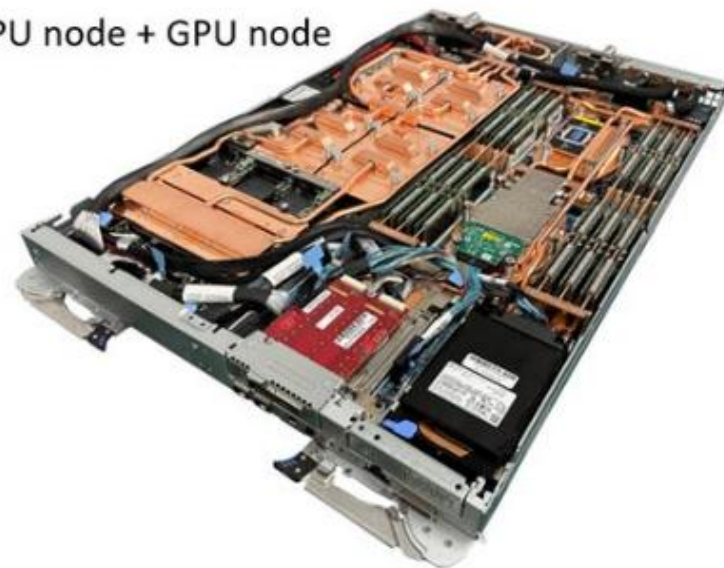
ThinkSystem SD servers are designed for DW612 and DW612S Neptune DWC enclosures. They have either two CPU nodes or one CPU node and one GPU node mounted on a shared 1U tray. With Direct Water Cooling (DWC) technology, major heat-generating components such as processors, memory, drives, and adapters from both nodes can be efficiently cooled, ensuring optimal thermal management and system performance.

- Click the pictures below for more detailed images of the two configurations.

CPU node + CPU node



CPU node + GPU node



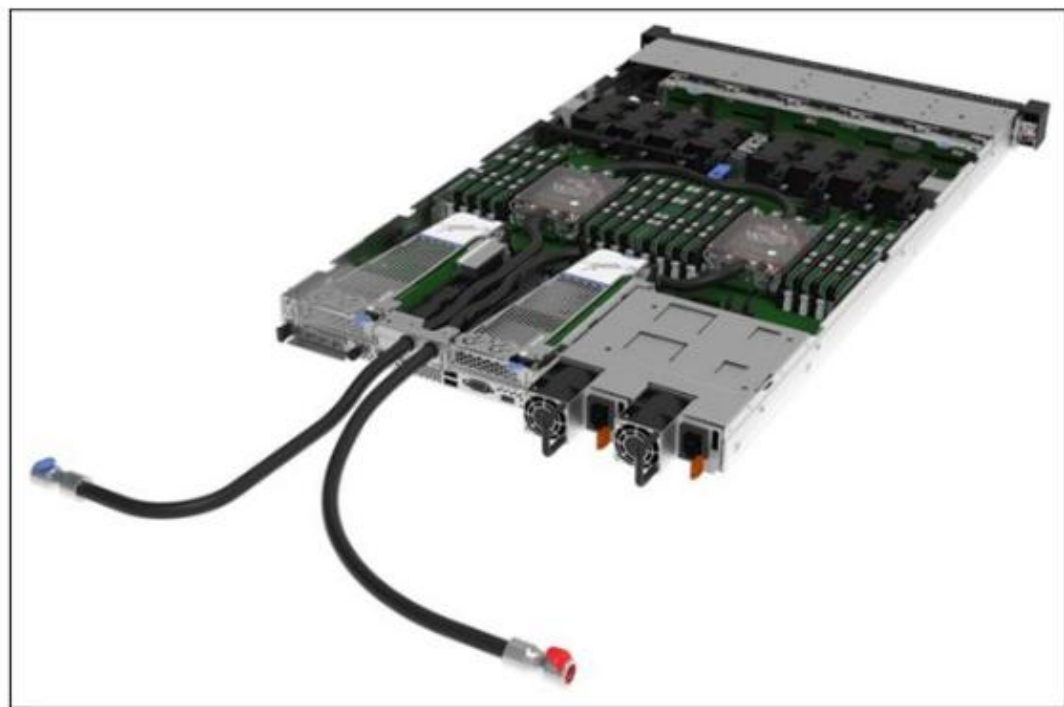
Open-loop water cooling module for ThinkSystem SR servers

This module implements a liquid cooling solution where heat from the processors is removed from the rack and the data center using an open loop and coolant distribution units.

With the Direct Water Cooling Module (DWCM), also known as the Processor Neptune Core Module, all heat generated by the processors is removed from the server using water. This results in lower overall power consumption and lower costs.



ThinkSystem SR630 V3 with a water-cooling module installed in a rack

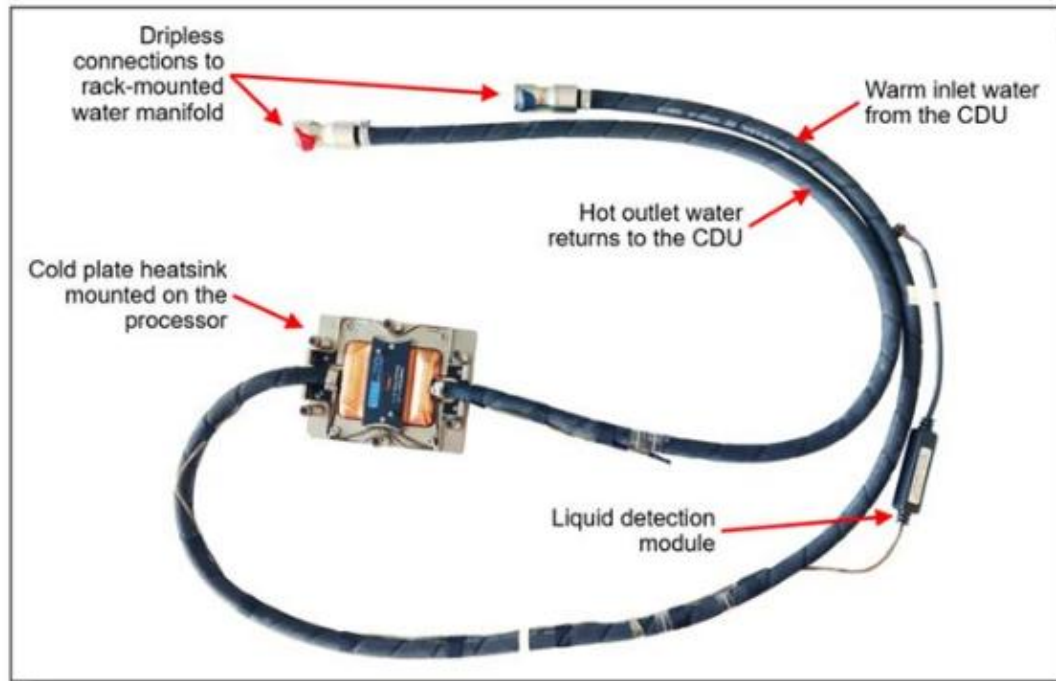


Open-loop water-cooling module installed in the ThinkSystem SR630 V3

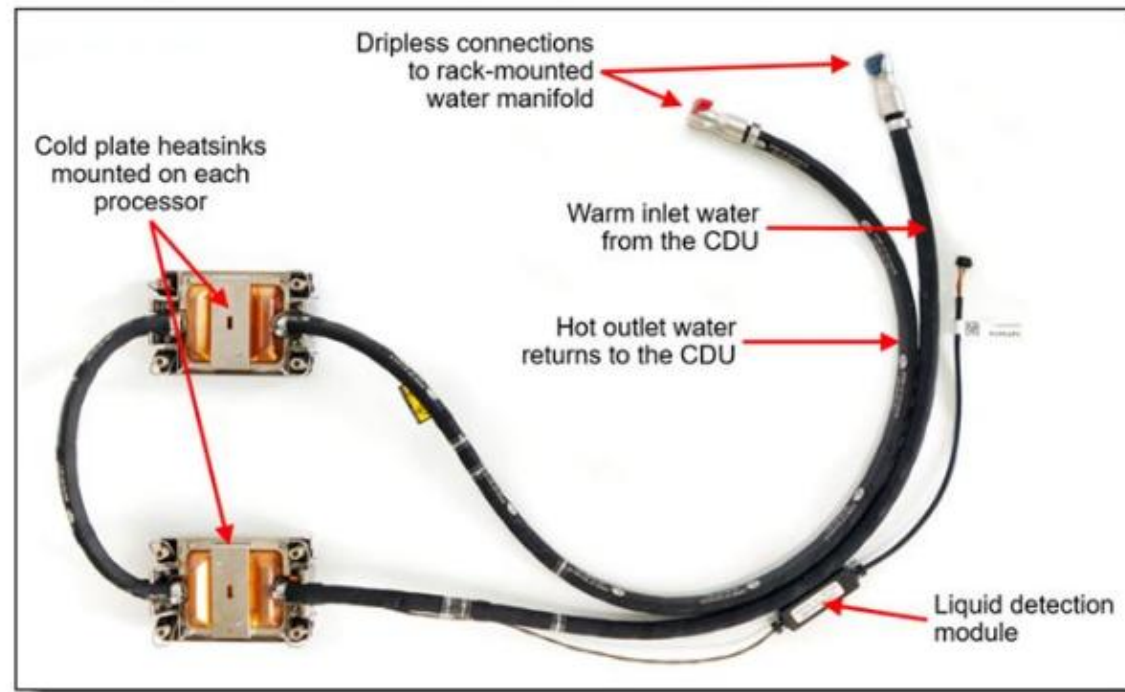
Open-loop water cooling module for ThinkSystem SR servers – example

As of Q4 2024, the open-loop water-cooling module for the ThinkSystem SR series supports one or two processors.

ThinkSystem SR645 V3 (one processor)



ThinkSystem SR630 V3 (two processors)



Note: The new generation of DWCMs is designed slightly differently, particularly with regards to the water collection tray. (Click [HERE](#) for details.)



Cold plate heatsinks
mounted on each
processor

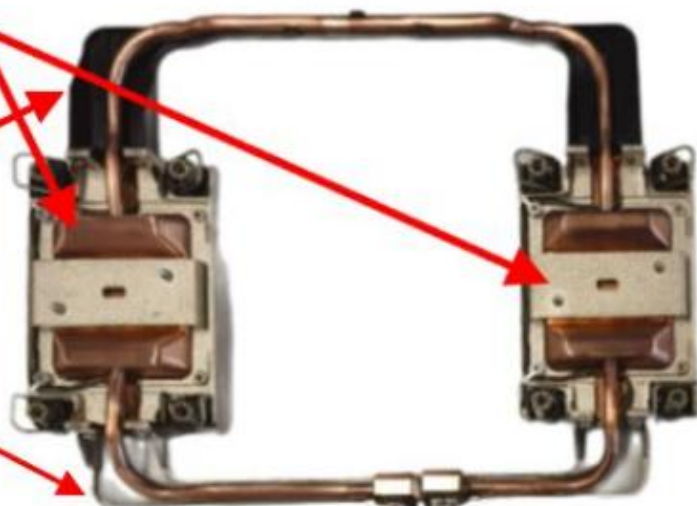
Water
collection
tray

Dripless connections
to rack-mounted
water manifold

Hot outlet water
returns to the CDU

Warm inlet water
from the CDU

Liquid detection
module



Open-loop water cooling modules for the SR780a V3

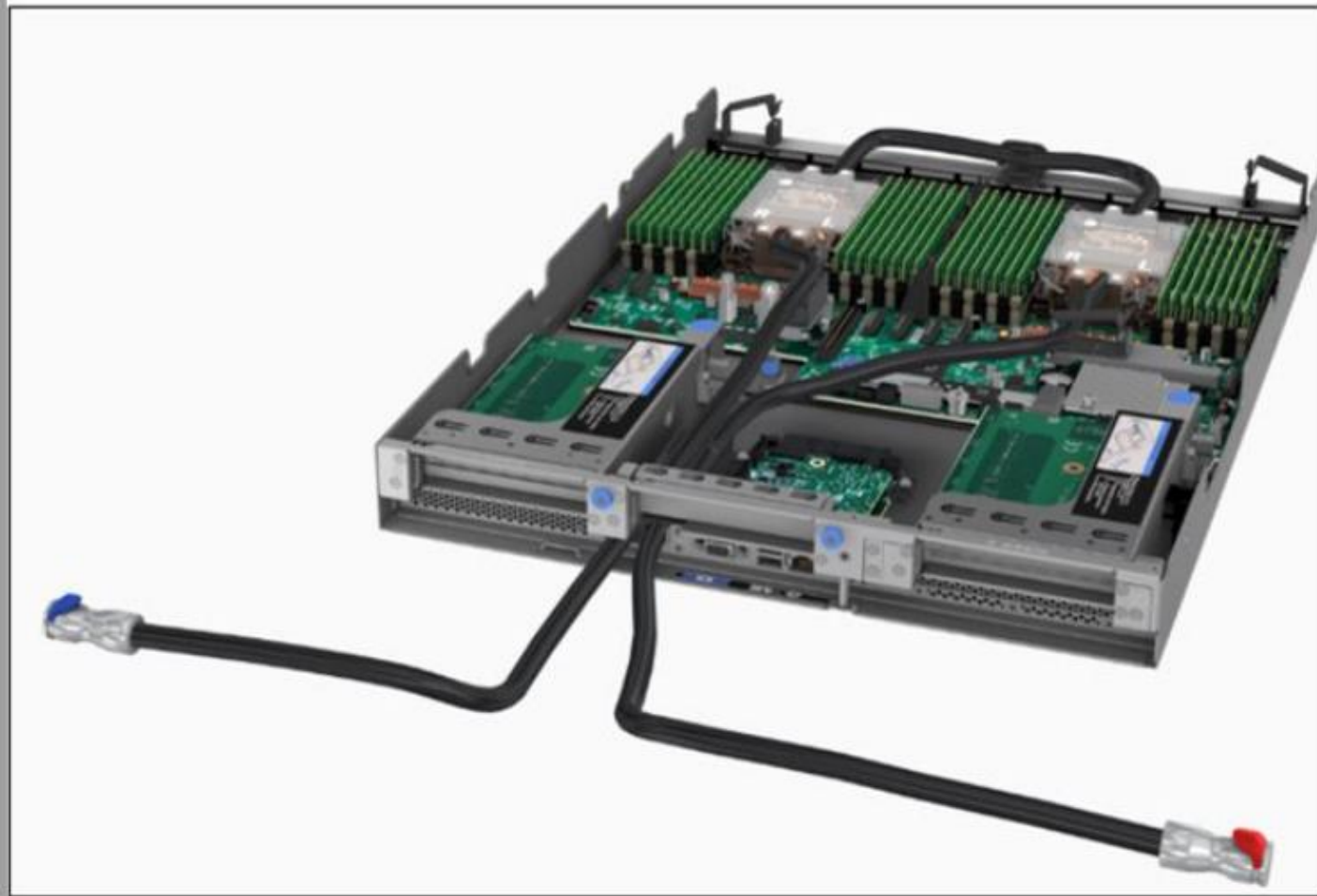
The ThinkSystem SR780a V3 server is a 5U rack server with NVIDIA SXM GPU configurations that support the Neptune Liquid Cooling solution. The water cooling solution has two parts: [a module for the processor](#) and [a module for the GPU assembly](#).

- Click the descriptions to see more information.



— Hot water
— Cold water

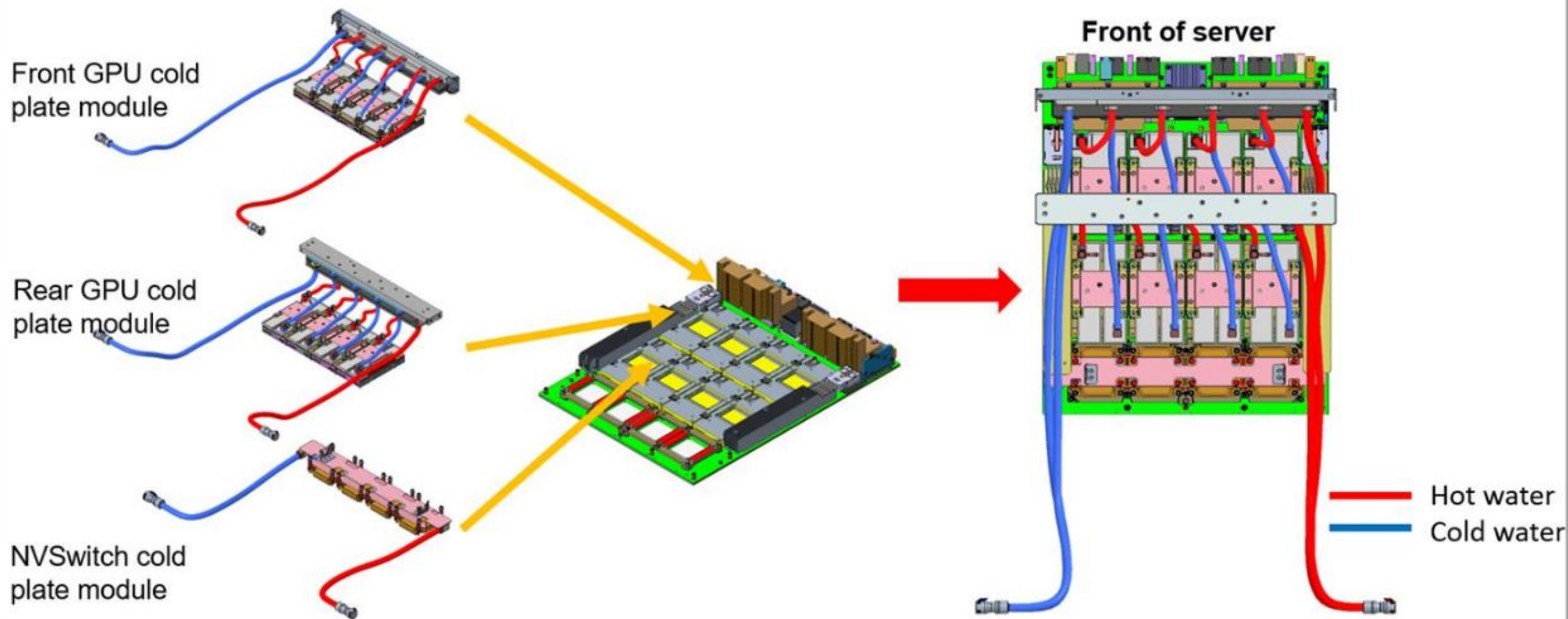
SR780a V3 processor open-loop water cooling module



Front of server



SR780a V3 GPU assembly open-loop water cooling module



Closed-loop water cooling module for ThinkSystem SR servers

The Neptune Liquid Assisted Cooling Module (LACM) is a closed-loop, water-cooled processor heat sink. On ThinkSystem 1U servers, it helps lower power consumption by reducing fan speeds.

Cold plates are mounted on top of each processor and connected via aluminum tubes to a radiator located in front of the system fans. These tubes contain a mixture of water and ethylene glycol (EGW), which is actively pumped through the pipes in a closed loop to remove heat from the processors.

Since all liquid circulates within the server, no external manifold is required.

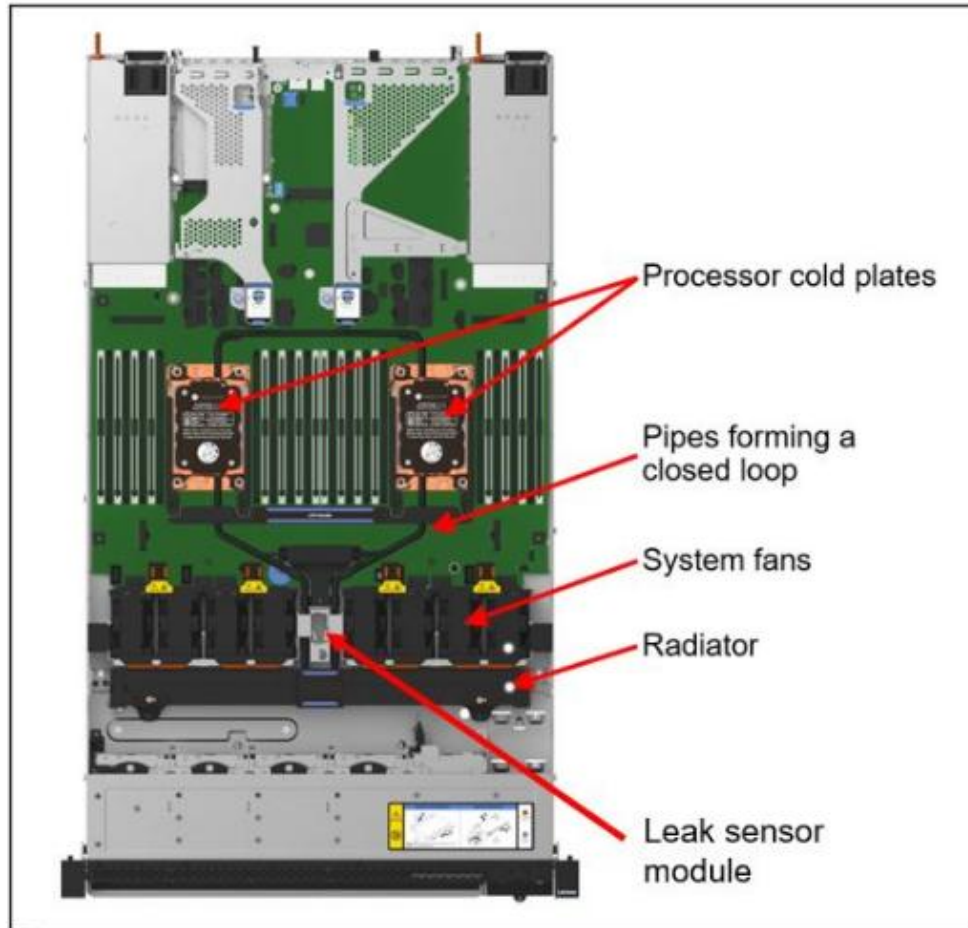
- For V3 servers using Intel CPUs with a TDP greater than 300 W or AMD CPUs with a TDP greater than 320 W, the closed-loop water cooling module is supported.
- For V3 servers using Intel CPUs with a TDP less than 300 W or AMD CPUs with a TDP less than 320 W, a traditional heat sink is still used.
- For V4 servers using Intel CPUs with a TDP between 250 W and 300 W, the closed-loop water cooling module is supported.

As of Q4 2024, only the following 1U servers support the LACM for processor cooling:

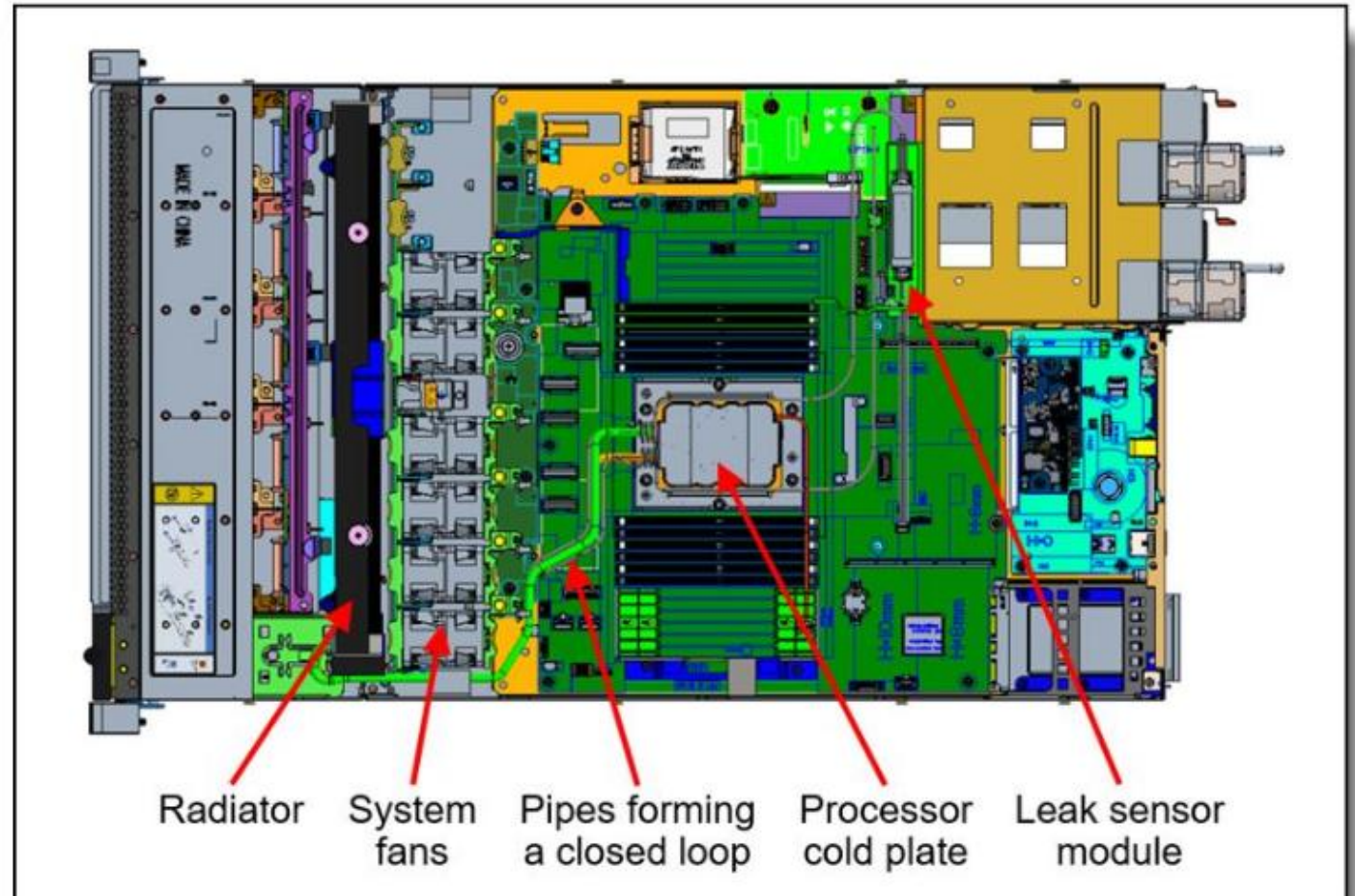
- SR630 V3
- SR635 V3
- SR645 V3
- SR630 V4

Closed-loop water cooling module – example

ThinkSystem SR630 V4 (two processors)



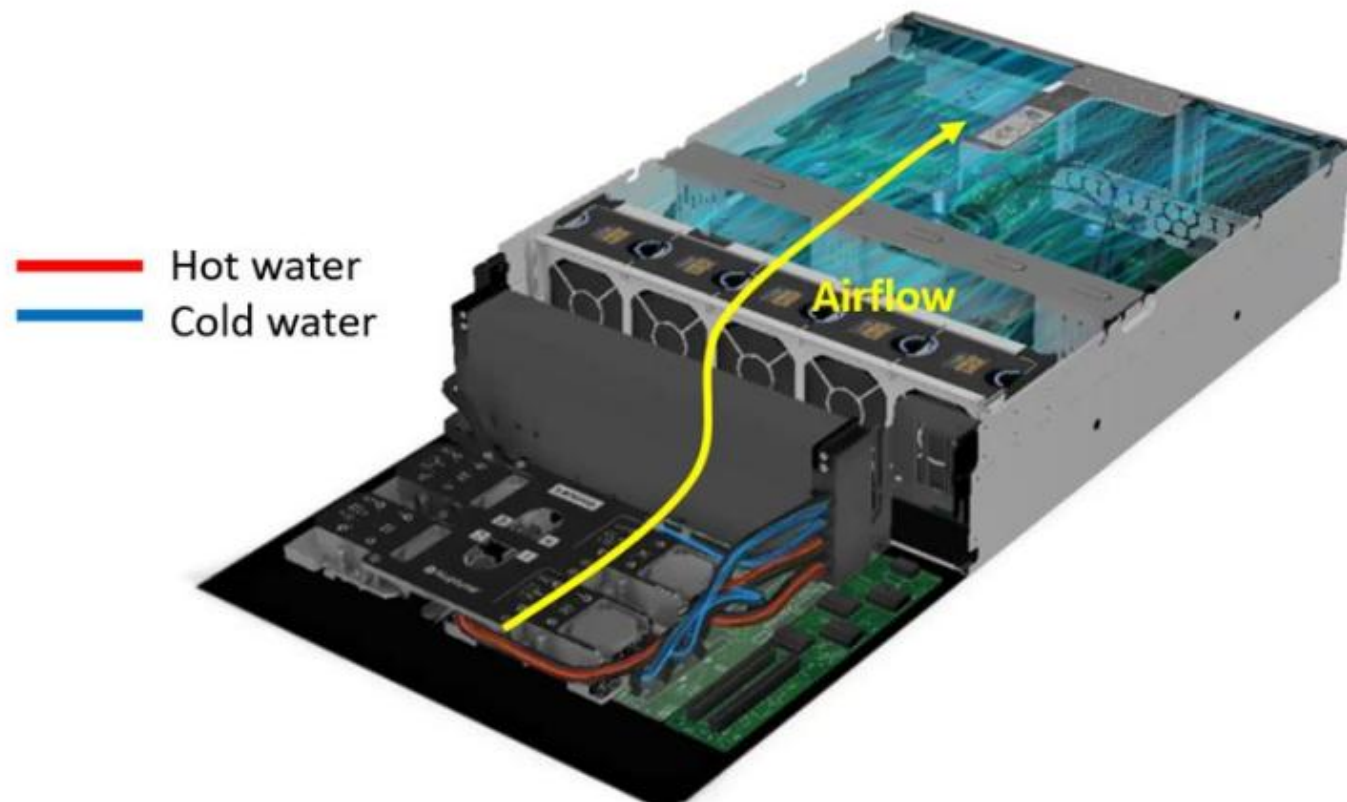
ThinkSystem SR635 V3 (one processor)



Liquid to Air Module for SR67X servers

The ThinkSystem SR670 V2 and SR675 V3 are 3U rack servers with NVIDIA SXM GPU configurations that support the Neptune Liquid to Air Module (L2AM) or the Liquid Assisted Cooling Module (LACM) for GPU cooling.

The L2A module includes water loop tubes and a radiator, so all liquid cycles inside the server and no external manifold is needed.



Liquid to Air Module example: SR670 V2

- Four NVIDIA SXM GPUs under the LACM

