

# Liquid Cooling Made Easy

Liquid cooling has become essential for high-performance accelerated computing. Air cooling was practical when chip densities were lower. Yet, these densities have skyrocketed, placing more pressure on traditional air cooling until it become increasingly unmanageable. So, new approaches for heat removal are needed to avoid the risk of hot spots that lead to equipment failure and downtime.

Direct liquid cooling is not a product – it is an architecture supported by critical systems including coolant distribution units. Direct liquid cooling however is a bit more than the name implies, as it includes the air cooling and heat rejection units (e.g., chillers) you are already familiar with and prevalent within data centers today.

## Complementary Air Cooling

Air cooling complements liquid cooling and is needed to reject heat from the air-cooled components in the IT space.

This includes but not limited to computer room air conditioning and air handler, fan wall, traditional perimeter, InRow, and rear door heat exchanger.

## Heat Rejection Units

Heat rejection units, including chillers, dry coolers and cooling towers, are used to reject heat in Technical Cooling System loop to the outdoors.

## Liquid Cooled Servers

Direct-to-chip is the preferred method today, where liquid coolant is pumped through a cold plate attached directly to the chip. Cold plates can also be attached to other hot components such as memory.

Immersion is another method where components are fully or partially immersed in liquid coolant.

## Coolant Distribution Unit (CDU)

CDU isolates the Technical Cooling System loop from the rest of the cooling system and controls temperature, flow, pressure, fluid treatment, and heat exchange.

CDUs vary in type of heat exchange, capacity, and form factor (rack- vs. floor-mounted).

## Chip-to-Chiller

3 main elements in a liquid cooling ecosystem

Heat Capture Within the Server

Heat Exchange Inside the Data Center

Method of Rejecting Heat to the Outdoors

Navigate liquid cooling

