ZUTACORE™
UNLOCKING THE POWER OF COOLING

Next Gen Cooling
Direct On Chip Dielectric Cold Plate

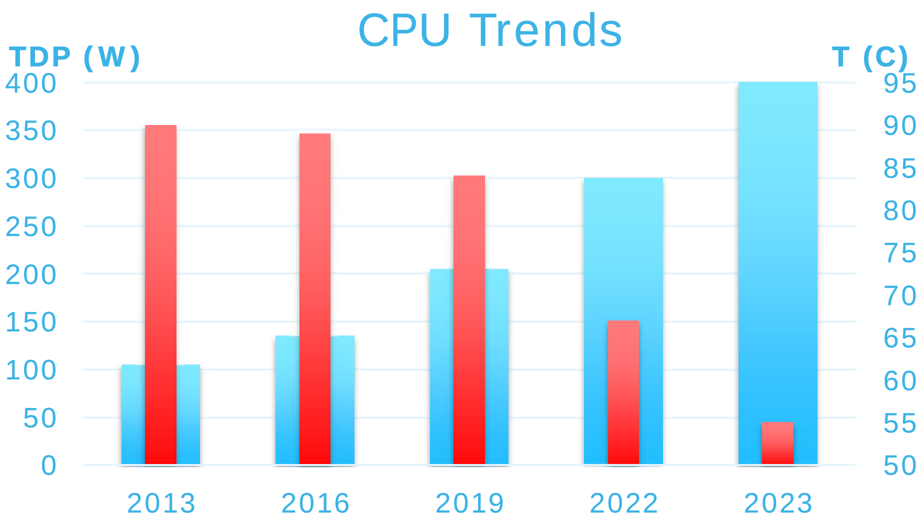
Shahar Belkin
EVP, Product and Innovation

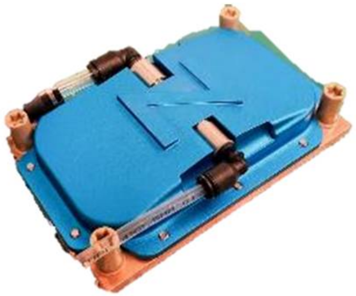
May 24, 2022

The **Why** Behind ZutaCore

The thought process leading us to HyperCool™

Market Trends – Liquid Cooling is Now Mainstream





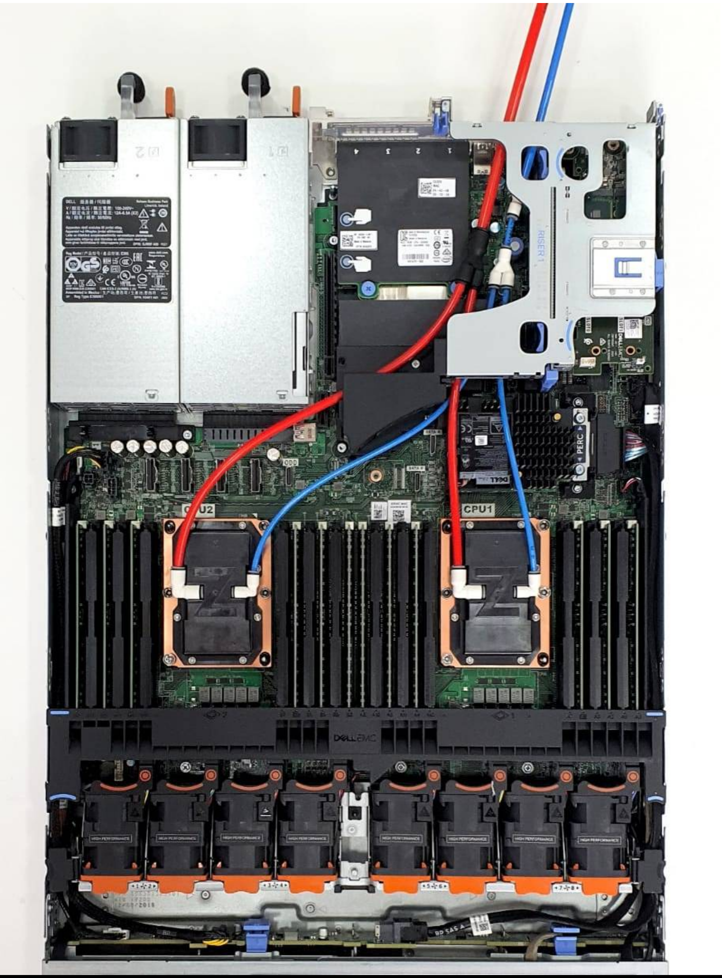
Servers are the Revenue Generators

Cooling system will not compromise Server integrity

Maximize Server lifespan

- Leaks will not short-circuit the server
  - Using dielectric liquid

- Eliminating the need for server material compatibility
  - No direct contact between coolant and server components



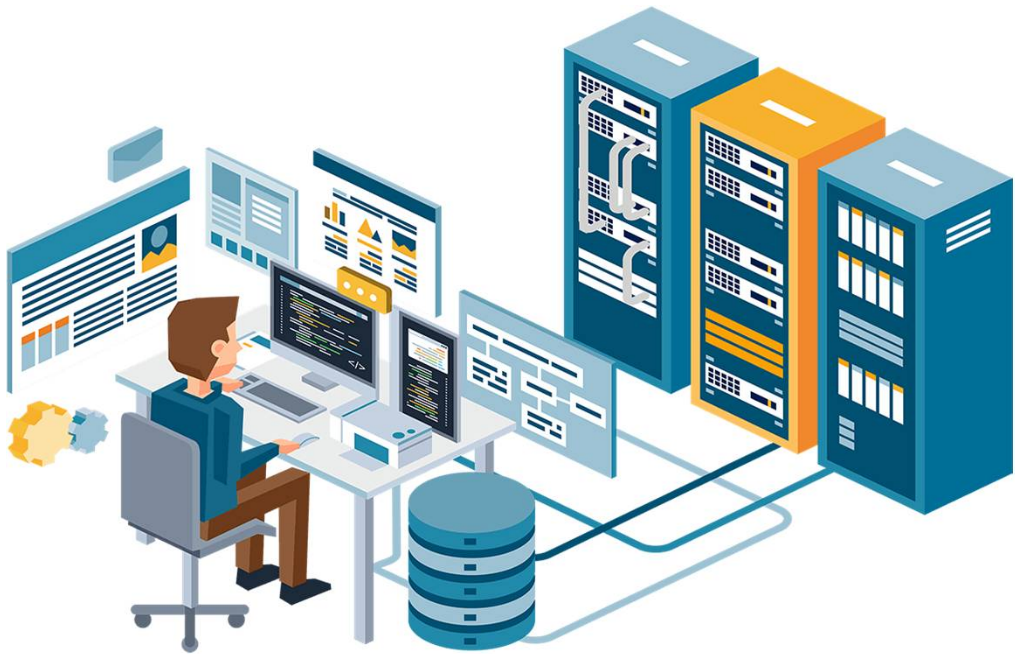
Standard Infrastructure

Quick and simple Server maintenance

Optimal use of real-estate, Standard racks

Weight, no need for reinforcement

- Minimal, to no changes to:
    - Data center infrastructure
    - Rack, and server design
    - Datacenter maintenance and operation
    - Full use of height
    - Standard wight



Future-proof

Power consumption and heat is increasing

Echo-friendly solution is a must

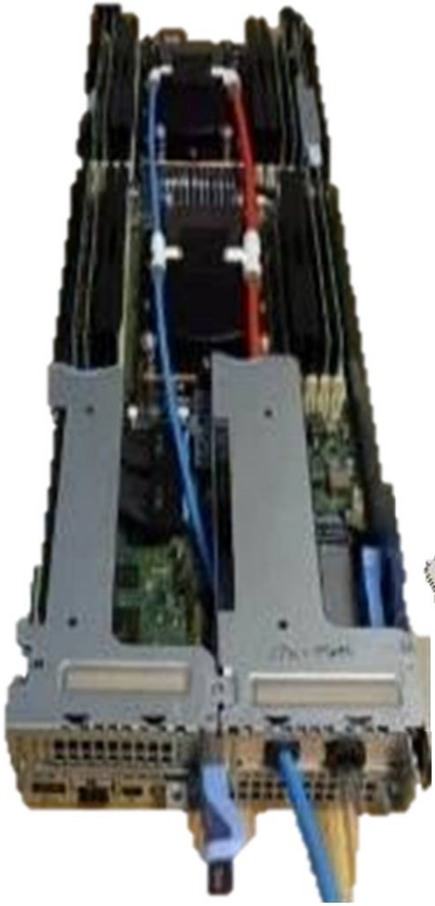
Supporting efficient heat reuse

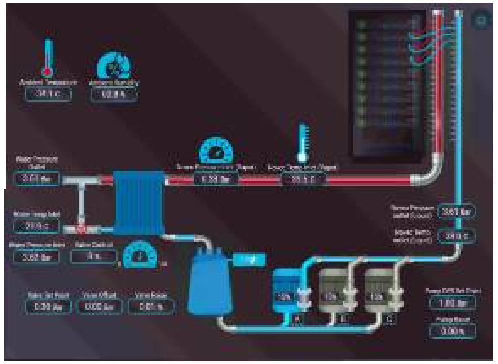
- Future-proof cooling solutions needs:
    - Support High power processors crossing the 1000W
    - Environmentally safe & preventing vapor emissions
    - Providing constant high output temperature maximizing reuse of heat

What is ZutaCore Providing

HyperCool™

HyperCool™ System, Direct On Chip Dielectric Cold Plate

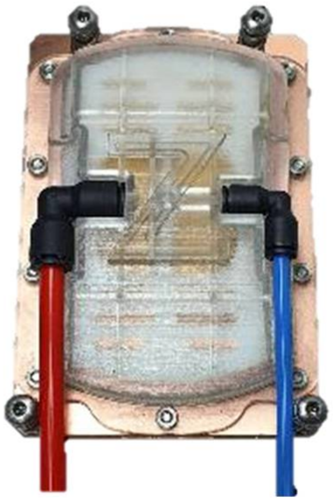


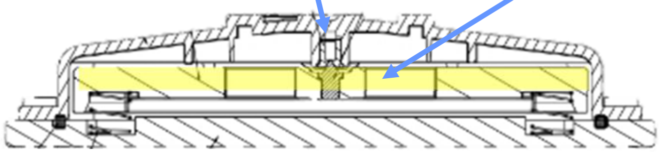


ENE (Enhanced Nucleation Evaporator)

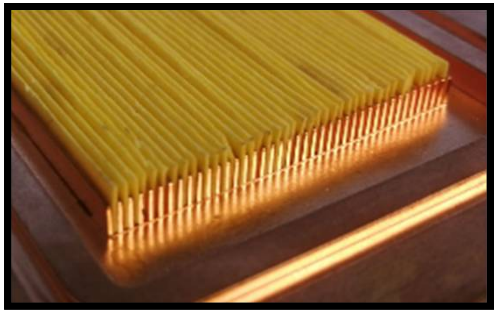
Pool Boiling Evaporator

- ✓ Dielectric liquid
- ✓ Even cooling over the die/s
- ✓ Immediate cooling response
- ✓ Self regulated
- ✓ Scalable infrastructure
- ✓ Small form factor & simple tubing
- ✓ Bolt-on solution





ENL (Enhanced Nucleation Layer)



Fins + Wick = Patented

- Heat flux higher than 250 $\left[\frac{W}{cm^2}\right]$
- Refrigerant flow 1.8 $\left[\frac{Liter}{hour}\right]$ @100 W

ZutaCore Product Portfolio

Enhanced Nucleation Evaporator - ENE

Intel
Skylake

Intel
Ice lake

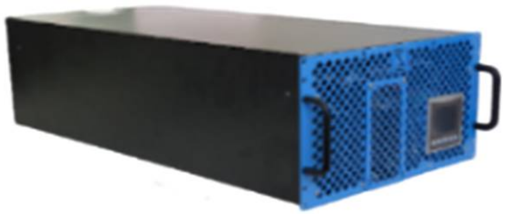
AMD
Rome/Milan
SP-3

Intel
Sapphire rapids

AMD
Genoa SP-5

Intel
Vertical
Sapphire rapids

6U-HRU-Air



- CPU Cooling 15KW
- Total Rack 20KW
- Ambient 25 °C
- Rack Space 6 U

6U-HRU-Water

- CPU Cooling 70 kW
- Total Rack 100 kW
- Facility Water 35 °C
- Maximize Heat Reuse
- Rack Space 6 U

Rear Door Condenser RDC

- CPU Cooling 35 kW
- Total Rack 55 kW
- Ambient 35 °C
- Rack Space 0 U

Validated by World's Leading Silicon Providers

AMD | *AMD Confidential—Advance Information*

Thermal Design Guide for Family 17h Models 00h–0Fh, Models 30h–3Fh, and Family 19h Models 00h–0Fh Processors 55423 Rev. 1.06 October 2021

4.3 Reference Design Thermal Solutions

Two passive heatsinks and one cold-plate in the 1U form factor have been developed for Socket SP3 processor-based systems.

4.3.1 Thermal Solution Design

One of the passive heatsinks is an extruded aluminum heatsink, and the other is a vapor chamber base heatsink. The vapor chamber heatsink consists of a vapor chamber base with aluminum bonded fins. The cold-plate consists of a two-phase, enhanced nucleation evaporator (ENE), with a copper base. Figure 7 shows the three solutions, and Table 2 shows the comparison between the designs.

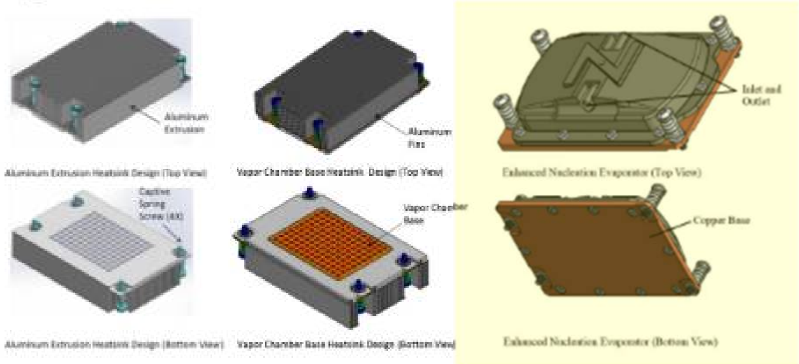


Figure 7. 1U Reference Thermal Solution Designs for Socket SP3 Processors

intel.

Table 11-2. Additional Cold Plate Options

Supplier	Supplier Part Number	Single- / Two-Phase	Fluid Compatibility Includes: [4]
ZutaCore*	SAS-000303	Two-Phase	3M Novec 7000*
CoolIT*	820-02021	Single-Phase	ReoChem PG25*

NOTES:

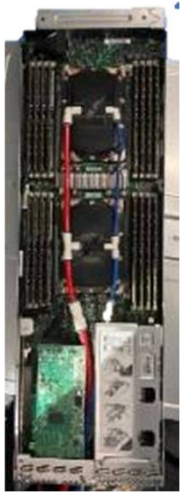
1. Supplier content is provided by Intel as a convenience to its customers. Intel does not make any representations or warranties regarding the quality, reliability, functionality, or compatibility of these devices. Customers must evaluate performance and reliability against their own product requirements.
2. In all cases, contact the supplier for additional detail and qualification data on their product offering.
3. Intel conducted limited verification testing for stack, structural requirements, and provided guidance to the supplier for reliability and design qualification data:
   - Intel verified time 0 thermal performance.
   - Meets LGA4677 Thermal Solution Stiffness Guideline Application Note (#613922) per Intel testing.
   - Meets Thermal Solution Interface Control Drawing (ICD) in Eagle Stream and Fishhawk Falls Platform Socket Enabling Components Mechanical Drawings (#609848)
     - Flatness measured by supplier and verified by Intel.
     - Other details based on supplier's declaration of compliance. Not verified by Intel.
   - Uses Intel Heatsink Hardware from enabled suppliers.
     - Based on supplier's declaration of compliance. Not verified by Intel.
4. Fluid compatibility is based on supplier's declaration of compatibility and has not been verified by Intel. Contact cold plate supplier for additional detail on fluid compatibility with their product.

HyperCool™ – Production Ready Server Kits

HP DL380 Gen10

Dell PowerEdge R640

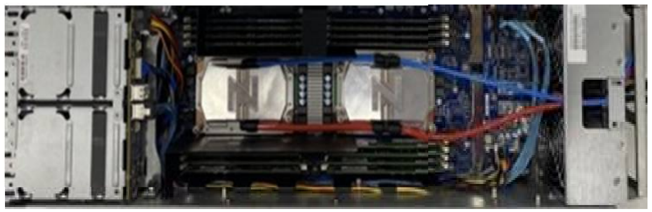
Cisco C125



Dell PowerEdge C6525

Penguin T182-Z60-ZB

Gigabyte TO22-Z61



Supermicro BigTwin®

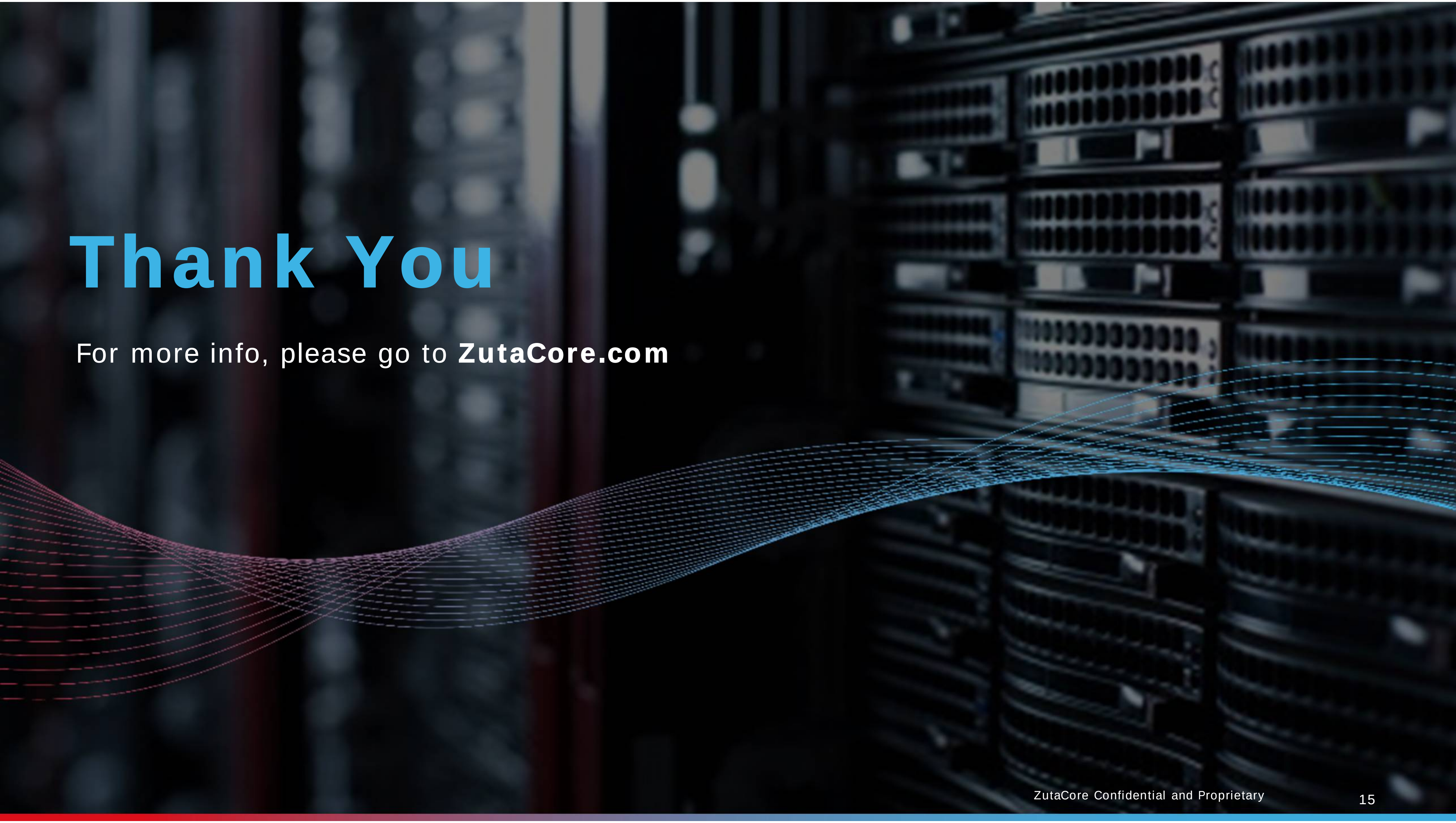
SDC – Software Defined Cooling

Data Driven Approach – from servers' perspective:

- Collects data from all CPUs and servers
- Creates Big Data analysis
- Correlates and analyzes information
- Builds holistic data center monitoring
- Up to 35% data center power saving
  - o Dynamic frequency scaling
  - o Maximum temperature output

Summary

- **HyperCool™ direct on chip cooling solution**
  - Fit's the market needs
  - Overcome the drawbacks of liquid cooling
  - Future-proof
- **HyperCool™ direct on chip cooling solution**
  - Is ready, tested and recommended by leading silicon vendors
  - Provide a full and integrated, rack level cooling solution
  - Power saving and maximizing heat reuse



Thank You

For more info, please go to **ZutaCore.com**