Hardware Management for Liquid Cooling
Overview of Progress
HMLC - Cooling Profiles

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HMLC - Scope

• Kicked off April 6th, 2022
• Creation of a template and schema which supports all liquid cooling environments within OCP
• Interface with Redfish DCIM taskforce and DMTF
• Harmonize current requirements, whitepapers, specs and other documentation with work done in DMTF Thermal and Power management project
• 6 months for initial deliverables
• Longer period for whitepaper content and descriptive deliverables;
• On-going (low intensity) content maintenance
HMLC – What to manage?

- Illustrative diagram of Liquid Cooling High Level topology
- Does not illustrate all possible scenarios or interconnections
HMLC - Progress

- Full schema for all/any liquid cooling technology;
  - Immersion – Draft released Dec 2021
  - Door HX – In progress
  - Cold Plate – In progress
  - ACF – Pending
  - Heat Re-use - Pending
- Message Registries; Events and Alarms - Pending
- OCP Profile(s) - Pending
- Requirements for qualification - Pending
- Security requirements - Pending
HMLC - Profiles

• Profiles liquid cooling technology;
  • Door HX – Draft v0.5 exists at https://github.com/opencomputeproject/HW_mgmt-OCP-Profiles/tree/master/RackAndPower
    • To be updated and version sync’ed with latest Redfish schema.
  • Cold Plate – In progress
  • CDU - Pending, maybe a separate profile TBD
  • ACF – Pending; maybe multiple profiles TBD
  • Heat Re-use - Pending
  • Immersion – Pending
HMLC – Door Heat Exchanger

- Door HX mapped to Redfish DCIM WIP schema for Thermal
- Abridged - does not show upstream resources or resource connections

Legend
- A singleton resource
- A collection of resources
- A resource present in schema, but not relevant to Door HX

https://drive.google.com/file/d/16lUmwMg0sMI3Br1QCyWet5wDjCcGLhYQ/view?usp=sharing
HMLC – Cold plate

- Cold plate mapped to Redfish DCIM WIP schema for Thermal
- Abridged - does not show upstream resources or resource connections

Legend
- A singleton resource
- A collection of resources
- A resource present in schema, but not relevant to Door HX

https://drive.google.com/file/d/16IUmwhg0sMi3Br1QCwRet5wDjCcGLhYP/view?usp=sharing
HMLC – Sensors

Sensors identified for Door HX; commonality to be established

- Supply Temperature (coolant/air °C)
- Return Temperature (coolant/air °C)
- Fan speed (rpm)
- State/Health (Redfish standard)
- Valve position (on/off or %)
- Flow rate (coolant l/s)
- Pressure (Coolant or Δ air PA)
- Leak detection
- Particulate sensor (*subject to local regs)
HMLC – Controls

*Controls identified for Door HX; commonality to be established*

- Control Method (one of)
  - Diff air pressure
  - Outlet Air temperature
  - Return coolant temperature
  - Manual (cede control to upstream)
- Power Control
  - Safety cut-off to ITE
- Fan Speed
  - %
- Coolant Valve
  - On/Off
  - % open
Next Steps

• Continue discovery for remaining sub-projects; ACF, Heat re-use
• Collaborate with DMTF Redfish to complete and publish WIP schema
• Publish mockups
• Review/Iterate/Approve schema and mockups
• OCP Profiles and qualification requirements
• Security requirements