

OCP HPCM Thermal Management Workstream Minutes

Minutes - 04/10/2024

Zoom Recording :

https://opencompute-org.zoom.us/rec/play/FRLCyLbr4jXGHyzArg7ygfjFTe_qcL7W94aA8lwXSON6VwKunU3u_JxEXnnNgh7vXiylmbKnMAghy0Q.mQz9Bq9c71k3lzwn?canPlayFromShare=true&from=share_recording_detail&continueMode=true&pwd=7Ufs8Vr4gkyrYhrqGABRsggxHubjubJj&componentName=rec-play&originRequestUrl=https%3A%2F%2Fopencompute-org.zoom.us%2Frec%2Fshare%2FYGdfY6l9iU-NffHqckNVQ568luRqnZkMtpptNXwChEL_V7fYTjDBBO7cRGdqPfVj_2YleE1_mzwg8lkl5%3Fpwd%3D7Ufs8Vr4gkyrYhrqGABRsggxHubjubJj

Attendees

Attendee	Affiliation	04/10/2024
Allan Cattle	Nallasway	x
Peter Salmon		x
Total		2

Zoom Meeting AI Summary

Meeting summary for OCP Server - High Performance Computing (04/10/2024)

Quick recap

Allan and Peter discussed the potential of using a conformal coating approach in their project, with a focus on reducing copper usage and improving thermal efficiency. They also explored the functionalities of a system involving multiple control loops and the implications of using liquid cooling in their prototype machine. The conversation concluded with plans for Peter to contribute content on electronic innovations and the potential for further collaboration to generate more interest and participation.

Next steps

- Peter will create a slide on the 7x efficiency claim, including the base information and links, to present in future OCP meetings.
 - Allan will update the presentation to reflect the correct 7x efficiency multiplication factor based on Peter's input, ensuring the slide accurately reflects the discussion and findings.
 - Allan will reference Peter directly in the updated presentation to give him credit for the 7x efficiency claim.
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Summary

Allan Shares Presentation Again for Peter

Allan and Peter had a discussion about a presentation that Allan had previously shared. Peter confirmed that he hadn't attended the main meeting where Allan presented, so Allan decided to share the presentation again. However, Allan had to take a brief break to transition between meetings. After that, they proceeded to share the screen for the presentation.

Discussing Blackwell's Prototype and Applications

Allan and Peter discussed the latest prototype machine by Blackwell and its potential implications for their own project. Allan pointed out that Blackwell's machine, which uses liquid cooling and has a power delivery system with minimal copper usage, is a step in the right direction. He further suggested that their team could replicate this setup or even surpass it by utilizing their own technology. Peter agreed and showed interest in the advancements. Allan then proposed the idea of using their supercomputer modules as an edge telecom device or even as a home computer, emphasizing the potential for widespread application.

System Control Loops and Reliability Concerns

Allan and Peter discussed the intricacies of a system involving multiple control loops. Allan explained the function of the immersion chamber, temperature monitor, valves, and pumps in the system, which included a liquid ring vacuum pump. The discussion revealed uncertainties about the vacuum pump's ability to handle fluid and gas mixtures, and the need for a control loop to manage its speed. Both agreed on the necessity of expert input to balance and manage the various control loops. Allan pointed out potential reliability issues, but emphasized that the loss of one column wouldn't be catastrophic, as it would only mean the loss of eight modules.

Conformally Coated Copper for Processor Cooling

Allan and Peter discussed the efficiency of using conformally coated copper versus traditional methods in cooling a kilowatt processor. Allan explained that the coated copper was found to be 7 times more powerful per unit volume compared to traditional methods, which could potentially reduce the amount of copper used by 200 times. However, Peter disagreed on the specifics of the multiplication factors applied, and they decided to review the source paper for clarification. Allan also emphasized that their study demonstrated a 740% increase in power per unit volume compared to standard heat syncing methods.

Conformal Coating Approach for Heat Transfer

Allan and Peter discussed the potential of using a conformal coating approach to transfer heat with less copper, potentially reducing water use and environmental impact. They acknowledged challenges such as bacterial growth and material mix issues. Allan proposed a 3D simulation of the water flowing through the module to better illustrate the concept. Peter confirmed the theoretical possibility of reducing copper usage by seven times while maintaining the same thermal performance, though he noted that changes in latent heat of vaporization at lower pressures could impact this. Allan asked if Peter could provide a more accurate calculation of the impact of these factors.

Electronic Innovations and Potential Reductions

Allan and Peter discussed the need for Peter to provide some content for electronic innovations, which Allan agreed to credit to Peter. They also discussed potential reductions in a certain figure, with Peter estimating it might drop to four. Allan offered to link to Peter's website for further information, but Peter indicated he didn't have an available web person to facilitate this. The conversation ended with Allan thanking Peter for his input and expressing hope that their collaboration would generate more interest and participation.

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