

OCP HPCM Thermal Management Workstream Minutes

Minutes - 06/19/2024

OCP Local Recording :

https://drive.google.com/file/d/1Ud4wKllapYfFBvnKBr00H9sEu7a035UN/view?usp=drive_link

Meeting Transcript :

https://drive.google.com/file/d/1k2vFUg1t2h8sniFcDHRrUWNfwRT_7ZY5/view?usp=drive_link

Attendees

Attendee	Affiliation	06/19/2024
Allan Cante	Nallasway	x
Peter Salmon	Electronic Innovations	x
Total		2

Zoom Meeting AI Summary

Meeting summary for OCP Server - High Performance Computing (06/19/2024)

Quick recap

Allan and Peter discussed the new frontiers program, focusing on the potential of standalone proposals for research projects and the challenges of securing a system integrator lead. They also explored the issues faced by the Oak Ridge team due to bacterial growth in the water system, potential solutions, and the application of control theory in thermal management. Lastly, they discussed the need for a new, innovative system architecture that integrates various technologies, with a focus on an open, standardized approach.

Next steps

- Peter will prepare and submit a proposal for a New Frontiers project focusing on single-phase, high-density water cooling for the OCP program.
- Allan will provide Peter with the link to the New Frontiers proposal submission for review and guidance.

Summary

New Frontiers Program and PoC Challenges

Allan and Peter discussed the new frontiers program and its budget. Allan expressed concerns about securing a system integrator lead for the whole Proof of Concept (PoC) and suggested that standalone proposals for research projects might be more feasible. He mentioned the potential contribution of these standalone proposals to future projects such as the OI. CF. 7. Peter was unsure about his involvement in the project, and Allan advised him to check. The discussion also touched on the interconnect and thermal management work streams, with Allan proposing a more rigorous paper study and simulations instead of building a complete PoC.

Oak Ridge Team Addresses Frontier Water Issues

Allan discussed the issues faced by the Oak Ridge team due to bacterial growth in the water system at Frontier, which led to system shutdowns and cleanup costs. He proposed investigating a two-phase approach using water, inspired by a specialist company and a university with expertise in the field. Allan suggested this could be a sustainable and cost-effective solution, and could even capture funding from the new Frontier program. Peter agreed, highlighting the potential to avoid blockages by using larger micro channels.

Peter's Cooling System Challenges and Solutions

Peter experienced delays in gathering experimental data due to his planning expert's production problems. However, he remained optimistic about his approach of using single phase water cooling for thermal requirements, believing it to be a practical and bacterially unlikely solution. Allan suggested considering a two-phase cooling system instead, citing the ability to reduce the volume of water. Peter countered that water and pumps were cheap, and his proposed systems offered greater functionality. He planned to provide experimental data in the coming months to support his case.

Discussing Single Phase Cooling System Improvements

Allan and Peter discussed the success of single phase cooling systems, specifically using a mixture of water and dielectric in micro channels for thermal density management. Allan questioned whether this approach was necessary, suggesting that pure water could be sufficient, but Peter argued that there was potential to increase efficiency beyond their current system. In response, Allan proposed that Peter submit a new proposal for the 'New Frontiers' project, which is currently in its draft phase at Oak Ridge National Labs.

Discussing Proposal Funding and Water Solutions

Allan and Peter discussed the process of submitting proposals for funding, with a total of 23 million available for multiple proposals. Allan advised Peter to be realistic about his proposal's funding expectations and to consider the cost and use of the money. They also discussed the potential for increasing water volume to reduce the need for micro-channels and the use of water instead of dielectric. Allan suggested Peter to research Frontier and Blackwell for ideas on infrastructure and cooling systems. They concluded that controlling the vacuum in a dynamic way during the boiling process could be a challenging control problem.

Control Theory Integration in Industries

Allan and Peter discussed the application of control theory in various industries, with a particular focus on thermal management. Allan noted the lack of control theory in the industry and proposed the integration of expert control engineers with advanced control algorithms to improve its performance. They also discussed potential collaboration with 2-phase companies, the ownership of intellectual property in such projects, and the need for a balance between commoditization and monopolistic control. Peter suggested exploring patent protection at the system level for the modular design.

Allan Calls for Open, Standardized Computing Industry

Allan expressed his dissatisfaction with the current state of the computing industry, highlighting that the proliferation of proprietary architectures has made it difficult for individuals to innovate. He compared the situation to the IBM PC of 1981, which allowed for widespread innovation through its standard components. Allan argued that the industry needed to move towards a more open, standardized approach, where anyone could build and innovate. Peter acknowledged Allan's efforts and commended his unselfish approach. Both agreed that change was necessary, but Allan suggested that the industry needed to move towards collaboration in an open way, similar to the Linux software model.

Water Cooling Technology and Strategic Collaboration

Peter shared his vision of developing a portfolio of 12 patents related to water cooling technology. He proposed showcasing a functioning prototype at a conference to attract attention and initiate negotiations. Allan, on the other hand, expressed his challenge as a systems engineer needing collaboration across various silos and his admiration for companies like Nvidia that have managed to establish themselves through strategic moves and government funding. Both agreed on the significant role opportunities played in the shifting world of tech.

Discussing Chip Integration in Water

Allan and Peter discussed the implementation of a chip with insulation in a beaker of water to conduct electricity, a concept similar to the approach used at the University of Illinois. They discussed the potential failures and criticisms of this method, including the lack of reworkability and potential leakage issues. Peter assured Allan that his team's implementation would not have the same failure rate as that demonstrated in a recent University of Illinois paper. They also discussed the scaling-up potential of this method and agreed that the beaker demonstration showed the viability of hermetic coating, which is the biggest concern for most people.

Developing Innovative System Architecture Strategy

Allan and Peter discussed the need for a new, innovative system architecture that integrates various technologies. Allan emphasized the importance of an open, standardized approach that allows different companies to contribute and compete. He also highlighted the need for this new approach to be compatible with existing systems. Peter acknowledged the challenges, but expressed interest in collaborating on a proposal. They agreed to revisit this topic, with Allan promising to send additional resources if needed.

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