THE MASS OPEN CLOUD ALLIANCE

ACCELERATING THE PACE OF DISCOVERY AND INNOVATION IN AN OPEN PRODUCTION RESEARCH FOCUSED CLOUD

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The Mass Open Cloud (MOC) Alliance enables the same rich interactions between research, development, and production that are common to today's public clouds, but does so in a production cloud that is uniquely designed for research. The MOC Alliance provides an attractive alternative to commercial cloud vendors that engages a broad community of domain and system researchers as well as open-source developers, in a cost-effective research-focused environment.

The MOC Alliance is currently seeking founding industry partners to help us create a national, open production research-focused cloud.

The Challenge Public clouds have fundamentally transformed domain research and have become a critical area of systems research. Much of the success of public clouds has come from the ability of cloud vendors to internally research new technologies, develop them into products, and deploy them at scale in an agile way through close collaboration between system researchers, cloud operators, and technology developers. Unfortunately, public clouds present challenges for both domain and systems researchers. For domain researchers who simply wish to use the cloud, the public clouds are unpredictably expensive, tether them to a specific cloud vendor, lock them into a specific set of tools, and lack the facilitator resources that are so critical to enabling high performance computing environments. While public clouds introduce new and fascinating problems, it is difficult for systems researchers to innovate or work on them unless employed by one of the major cloud vendors.

The Story With seed funding and support from the Massachusetts Technology Collaborative (MTC), the MOC was launched in 2013 with the vision of creating a production cloud that enables innovation by a broad industry and research community. Over the years, the MOC has been used by thousands of students and researchers. It has also become a laboratory for cloud research and innovation – attracting tens of millions of dollars in research funding and producing numerous contributions to open-source software and hundreds of publications. Since its inception, a myriad of interrelated projects has grown around the MOC and the Massachusetts Green High Performance Computing Center (MGHPCC), a 90,000 square foot carbon free data center in Western Massachusetts where it is housed. [The MGHPCC consortium is owned, operated, and used by the same five universities involved in the MOC: Boston University, Harvard University, Northeastern University, Massachusetts Institute of Technology, and the University of Massachusetts.]

The MOC Alliance was launched in the Spring of 2020 in response to this growth to support the expansion of the original MOC initiative and act as a forum for the different projects to interact and coordinate with partners, stakeholders, and special interest groups. Housed at Boston University's Rafik B. Hariri Institute for Computing and Computational Science & Engineering, the MOC Alliance brings together academic, non-profit, and industry partners, providing predictable low-cost resources and facilitator support for domain researchers. Existing projects operate at a substantial scale with over 800 servers and 156 PB of storage

"Red Hat has been able to broadly expose its technology to university students via production offerings, operated and facilitated by institutional IT organizations. Also, Red Hat has become a highly sought-after employer for students with relevant interest and knowledge—we have already hired many students as full-time employees."

Hugh Brock, Director of Engineering, Red Hat

.The creation of the MOC Alliance has been spurred by numerous large-scale investments and development projects. Among these, the National Science Foundation (NSF) awarded a five year, $5M project to create the Open Cloud Testbed (OCT), expanding the MOC's reach from regional to national cloud computing researchers. The Commonwealth of Massachusetts provided further seed funding to explore expanding the service to the 160,000+ students and researchers at the MGHPCC institutions, and eventually to 500,000+ students across all higher education institutions in the Commonwealth. Red Hat renewed their partnership in the Red Hat Collaboratory, committing $20M in research funding over five years, and contributed a significant software donation valued at over $500M (list price). Boston University and Harvard University committed resources to operate and facilitate production cloud services through the New England Research Cloud (NERC), supported by their own professional research IT resources following a pilot phase that was sponsored by MTC and in-kind matching from each institution. Collaborative efforts with Boston Children's Hospital are beginning to develop HIPAA services, which will enable involvement of the large community of hospitals and medical researchers in the region.

The Vision The MOC Alliance is a partnership between higher education, medical research centers, government, and industry to provide the structure and resources that will enable collaboration between operators of production cloud services for domain researchers, the open-source community developing cloud technologies, and system researchers innovating in the cloud. Development is informed by the needs of a production cloud with real users which relies on developers to jump in and resolve problems when they occur. Researchers and open-source developers can explore innovative ideas based on real data about cloud usage. They can work together on compelling ideas, enabling realistic systems research on open-source systems at scale, providing a rapid path for integration of research ideas into upstream software (with potentially new or prototype hardware), exposing new ideas as experimental services to domain researchers, and working with operations to integrate those ideas in production when they have demonstrated value.

The MOC Alliance supports an open production cloud that:

- ☁ Provides domain researchers with predictable low-cost resources and facilitator support
- ☁ Enables academic researchers and developers in the open-source community to participate in the close collaboration between research, development, and operations that has resulted in countless innovations in today's public clouds

"The MOC Alliance enables us to engage with technology partners, the open source community, and academia to prepare open source offerings for large-scale operations."

Jon Stumpf, Managing Director—Infrastructure Engineering, Two Sigma

The Opportunity Want to accelerate discovery and innovation? Join the MOC Alliance in creating a national, open production research-focused cloud. The MOC Alliance seeks founding partners to help create its organizational principles, governance structure, and strategy for engaging and onboarding other contributors. Industry engagement has been crucial to the success of the legacy MOC initiative, in particular, the engagement by its existing core partners (Red Hat and Two Sigma) who have been instrumental to helping steer its direction and facilitate its growth. Founding partners of the MOC Alliance will be willing and able to provide similar guidance and support for the significantly larger scale and scope of the MOC Alliance, helping to ensure its ability to accelerate the pace of discovery and innovation in an open production research-focused cloud.

To learn more about the MOC Alliance and how you can be involved, please contact:

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