Extending OpenMP and OpenSHMEM for Efficient Heterogeneous Computing

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Abstract—Heterogeneous supercomputing systems are becoming mainstream thanks to their powerful accelerators. However, the accelerators’ special memory model and APIs increase the development complexity, and calls for innovative programming model designs. To address this issue, OpenMP has added target offloading for portable accelerator programming, and MPI allows interoperability between different devices. Moreover, OpenSHMEM adds support for heterogeneous computing. This paper reviews the design and implementation of OpenMP and OpenSHMEM extensions and discusses their benefits and challenges.