Oct 15th, 9:15 AM - 10:30 AM

Educational Equivalency of Raspberry Pi Clusters in High-Performance Computing

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Abstract

High-performance computing is a difficult subject to teach in an academic setting, given the exorbitant costs and technical difficulties. Raspberry Pi single-board computers have been used in recent years to create clusters that function as mini high-performance computers. The purpose of this research is to evaluate the educational equivalence of building a Raspberry Pi cluster in comparison to running a high-performance computing environment. For this research, an eight-node cluster was built and tested in comparison to a laptop. Through the process of building the cluster, skills learned were documented to evaluate the educational value. This research concludes that the adequacy of building the Raspberry Pi cluster to provide an educational equivalent for running a traditional computer is dependent on teaching goals. The educational equivalency for using a Raspberry Pi cluster, meaning focusing education on software implementation, data science, and security, are areas that could be educationally worthwhile and warrant further research.

Keywords: Raspberry Pi, cluster, education, skills, software implementation, Python, high-performance computing