NASA's first prototype module was built to house standard, air-cooled compute racks. Housing the initial implementation of the Electra supercomputer, the module has built-in cooling elements that take advantage of the moderate climate of the San Francisco Bay Area. Over the 2017 fiscal year, this module achieved a Power Usage Effectiveness (PUE) measurement of under 1.03 while providing an essential boost in computing capability to NASA's supercomputing user community. *Marco Librero, NASA/Ames*

Building on the success of the first prototype, NASA expanded Electra into a second module designed with new technologies that support more, higher-density compute systems. The new module can hold twice the nodes and has double the power capability of the first, at 1.2 megawatts. By moving the cooling elements outside the module, we had room to install compute racks in the entire area inside the module, while maintaining a PUE of 1.03. When fully populated with Intel Skylake nodes, this module will allow Electra to expand to over 8 petaflops. *Derek Shaw, NASA/Ames*

National Aeronautics and
Space Administration

NASA Blazes a Different Path to Energy-Efficient Supercomputing

In its first full year of operation, NASA's prototype modular supercomputing facility exceeded expectations, driving down energy consumption needed for cooling the deployed Electra system. Our cooling energy goal of 6% of total consumption was surpassed, with annual cooling energy measured at below 3% of total consumption—compared to an industry average of 80%. Building on this success, we recently deployed a second module. With technology advances, the second module can house twice the number of nodes as the first and has 140% more electrical power capability, paving the way for even more powerful nodes. The amount of energy needed to cool the new module beat our goal of 8% of total consumption, with initial results under 5%.

William Thigpen, NASA Ames Research Center