Next Generation Data Centers

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The total cost of ownership (including real estate, power, amortization and maintenance of equipment, personnel and information technology (IT) costs) of a fully managed data center is tremendous and increasing. The annual cost to power and cool IT equipment in a data center is soon expected to surpass the cost of IT equipment acquisition. Computer manufacturers are leading an effort to significantly reduce this total cost of ownership on three fronts: Computer hardware design, software design and facilities design and operation. The effort will require multi-disciplinary collaboration between computer science, computer architecture and mechanical engineering.

The Next Generation Data Center Session will present some of the research topics in the fields of mechanical engineering and computer science that are currently underway to reduce data center total cost of ownership. The session will highlight research into the optimization of data center IT and facilities design to promote increased efficiency by improving operational management across all three layers (i.e. software, hardware and facilities), while accommodating increases in power density which typically leads to increased operational costs.

In the service management layer, for example, automation of operations promotes reducing human tasks and cuts operational costs. But there are various types of policies and constraints in Data Center Management. Even if the request rises, there might be a restrictive policy on energy consumption that can limit the servers' ability to accommodate the request. Automation process should be carefully validated in advance or some undesirable operations should be protected at run time.

The optimization of Data Center Management needs consideration from many disciplines. The collaboration of many technologies from mechanical engineering to computer science is important and will be discussed in the session.