CLOUD COMPUTING

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Cloud computing is emerging as the disruptive technology that can change the way users, especially scientists and engineers, design, develop, deploy, utilize, and disseminate their applications and data. Cloud computing decouples the lower-level computer system details from application development, thus freeing users to focus on their technical/scientific mission, and has the ability to impact our lives in profound ways. Computer-based simulations and applications are now considered a "third-pillar" of scientific discovery complementing the traditional pillars of theory and experimentation. Currently, such computer use is confined to only the seasoned computer scientists and requires significant investment on acquiring and maintaining the system infrastructure. Cloud promises to lower such an entry barrier, and allows for easily integrating the knowledge gained from observational science and for predicting future responses or outcomes. This session aims to highlight some of the recent advances in technologies that are shaping modern cloud computing paradigm. The talks will cover a range of cloud aspects from designing innovative computer systems to how such systems can be used and employed by users in an energy-efficient way.

Armando Fox will start the session by providing a view of how next-generation clouds should look. Based on user feedback and a survey of requirements, he will discuss the main thrusts now being followed by computer scientists in realizing future clouds and making them amenable to wide-scale use and adaptation. Next, Luiz Andre Barroso will discuss the basics of cloud computing: namely, how such systems are realized, the challenges faced in providing transparent interfaces to the users while maintaining unfathomable scale, and how user applications are supported in a seamless world-wide "supercomputer" that is the cloud. In the third talk, YY Zhou will focus on the challenges of storing massive amounts of data in the cloud, and how resiliency can be achieved. Finally, Parthasarathy Ranganathan will discuss the implications of using hundreds and thousands of computing nodes at a central location on the energy-consumption and environmental ramifications of such large systems. The discussion will include techniques, from building architecture to software design, which can reduce the carbon footprint of the supporting cloud infrastructure. The session is concluded with a panel where the experts address questions from the audience, covering issues such as privacy and security in the cloud.