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Fostering Open Community Development of Science Gateways and Scientific Workflows with Apache Airavata

Dr. Pierce is the Assistant Director for the Science Gateways Group in Research Technologies Applications at Indiana University. Dr. Pierce received his Ph.D. Florida State University (Physics) in 1998 in computational condensed matter physics. His current research and development work focuses on computational sciences with an emphasis on Grid computing and computational Web portals. Prior to forming the Science Gateway Group, Pierce served as assistant director for the Community Grids Laboratory at Indiana University's Pervasive Technologies Institute. Pierce supervises the research activities of software engineering staff and Ph.D. students, and serves as principal investigator on multiple federally-funded research projects. Dr. Pierce leads research efforts in the following areas: the application of service-oriented architectures and real-time streaming techniques to geographical information systems and sensor networks; the development of open source science Web portal software for accessing Grid computing and data resources; and Grid-based distributed computing applications in computational chemistry and material science, chemical informatics, and geophysics.

Dr. Marru leads the service oriented architectures and scientific workflow efforts. He is a Co-Principal Investigator on the NSF funded Open Gateway Computing Environments and its predecessor Open Grid Computing Environments. Through his multiple roles, Marru was instrumental in success of the Linked Environment for Atmospheric Discovery (LEAD) project. He was a Co-Principal Investigator on the LEAD Project leading the Portal & Orchestration thrust group. Marru coordinates the TeraGrid Grid Infrastructure Group’s science gateways program at Indiana University and has been working very closely with GridChem, UltraScan, BioVLAB and OLAS gateway projects.

Dr. Marru received a B.E. in Electrical and Electronics Engineering from Osmania University, India and an M.S in Electrical and Computer Engineering from University of Oklahoma.

DATE: Friday, Sept. 5, 2014
TIME: 11:00 am
ROOM: LD027
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Abstract for Dr. Marlon Pierce and Dr. Suresh Marru
September 5, 2014

Science gateways (or science portals) and scientific workflows are two aspects of a general problem: improving the usability of distributed computing resources (cyberinfrastructure) in order to better enable scientific investigation and education. In this talk, we present Apache Airavata, an open source, open community software framework that can be used to build science gateways and execute scientific workflows. Despite their similarities, gateways and workflows present different challenges to software. Gateways typically support relatively simple execution patterns (single jobs or simple workflows) but must do so at scale reliably since they are used by hundreds to hundreds of thousands of users. Workflows on the other hand are more specialized to a specific researcher’s problem but may encapsulate very complicated execution patterns that utilize multiple computing resources. In Airavata, we are designing for both scenarios, and we summarize our efforts here. In summary, we are developing a component-based system with well-defined developer and internal programming interfaces that allow for us to explore issues such as scheduling and workflow algorithm development, component elasticity on clouds, and relational vs. non-relational data storage. As an open community framework, Apache Airavata accepts contributions and encourages a broad community of stakeholders. We conclude with remarks on how interested groups can become involved.