Personnel Involved in Project

1. PI: Honggao Liu, Deputy Director, Center for Computation and Technology (CCT), XSEDE/TeraGrid Site Lead, Louisiana Optical Network Initiative (LONI), honggao@cct.lsu.edu, 225-578-0235, 220 Johnston Hall, Louisiana State University (LSU);

   Honggao Liu is the Deputy Director of CCT. Liu works closely with the CCT Director in developing strategies to build an internationally competitive and recognized center for computational sciences and is responsible for the day-to-day activity, operation and management of the CCT. Liu has been the Principal Investigator on the LSU/LONI's HPCOPS project funded by NSF in 2007 to bring LONI's HPC resources into the national TeraGrid, and on the TeraGrid Extension: Bridging to eXtreme Digital (XD) project to extend LONI's operations on TeraGrid/XSEDE through March 20123. Liu was the the Director of HPC at LSU and LONI in 2008-2011, and managed over 20 professional staff who maintained HPC hardware and software resources and provided supports to the research computing community. Liu has overseen all HPC activities and led the HPC development efforts at LSU and LONI, and been instrumental in establishing HPC at LSU as a nationally recognized facility for providing HPC services and production cycles to researchers on campus, in the state, throughout the nation, and across the world. Liu researched on multiphase reactive polymer flow in porous media and reservoir simulations during 1997-2002. He got his Ph.D in Chemical Engineering from LSU in 2002 and also had a B.S. in Chemical Engineering from Xi'an Jiaotong University and two M.S. degrees in Chemical Engineering from Tianjin University and LSU.

2. Co-PI: Mark S. Jarrell, Professor, Department of Physics and Astronomy & CCT, LSU;

   Mark Jarrell is a Professor of Physics and the CCT. He was a Professor at the University of Cincinnati from 1990-2009. He received his PhD in theoretical physics at the University of California at Santa Barbara in 1987. He is an expert in massively parallel implementation of many body methods for correlated systems, including quantum Monte Carlo methods. He is one of the developers of Dynamical Mean Field Theory and its cluster extensions such as the Dynamical Cluster Approximation. At LSU, he led the effort to form LA-SiGMA, Louisiana Alliance for Simulation-Guided Materials Applications, which is a $20M NSF EPSCoR statewide graduate research and education virtual organization. LA-SiGMA is composed of several teams of researchers, including a interdisciplinary GPU team of over 25 professors, postdocs, and students from Chemistry, Physics, Biology, and Mechanical and Computer Engineering. This team is working to develop a new generation of GPU enhanced codes for materials simulation.

3. Co-PI: Jagannathan Ramanujam, Ritter Distinguished Professor, Department of Electrical and Computing Engineering & CCT, LSU;

   J. (Ram) Ramanujam is currently the John E. and Beatrice L. Ritter Distinguished Professor in the Department of Electrical and Computer Engineering at Louisiana State University (LSU). In addition, he holds a joint faculty appointment with the LSU Center for Computation and Technology. He received the Ph. D. degree in Computer Science from The Ohio State University. His research interests are in compilers and runtime systems for high-performance computing, GPUs, domain-specific languages and compilers, parallel computing, and embedded systems. He has participated in several NSF-funded projects including the Tensor Contraction Engine and the Pluto project for automatic parallelization. He has published more than one hundred and fifty refereed journal and conference papers. He has taught a number of recent conference tutorials on programming models and compiler optimizations for GPUs and general-purpose multicores. Additional details can be found at http://www.ece.lsu.edu/jxr/.

4. Co-PI: Hartmut Kaiser, Research Professor, Department of Computer Science & CCT, LSU;

   Hartmut Kaiser is Adjunct Associate Professor at the Louisiana State University (LSU) Department of Computer Science, and senior researcher at the Center for Computation and Technology (CCT). Since

receiving his Ph.D from the Technical University Chemnitz (Germany) in 1989 he has engaged in applied research in related fields associated with spatial information systems, C++ library development, and distributed and parallel computing systems in industry and academia. Hartmut Kaiser currently leads the STE| |AR research group to design and implement High Performance ParalleX (HPX), a first software implementation of a new class of runtime systems supporting the ParalleX model of computation. He holds three patents.

5. Co-PI: David Koppelman, Associate Professor, Department of Electrical and Computing Engineering & CCT, LSU;

   David Koppelman received his Ph.D. in Computer Engineering from Rensselaer Polytechnic Institute in 1988 and is currently an Associate Professor in the Department of Electrical and Computer Engineering at Louisiana State University. His interests include computer architecture, graphics processing units (GPUs), and multiprocessors. His CPU work includes development of CPU architectures that exploit control independence, as well as the development of simulation and visualization tools to support that work. His GPU work includes the tuning of scientific codes for GPU execution, and of performance monitoring tools to support that work. He regularly offers senior- and graduate-level courses in computer architecture, GPU programming, and GPU microarchitecture.

6. Co-PI: Jian Tao, Research Scientist, Center for Computation and Technology, LSU;

   Jian Tao is a research scientist at CCT. He received his Ph.D in computational astrophysics from Washington University in St. Louis. Before joining CCT as a research scientist, he worked at CCT as a postdoc in the XiRel project to build the next generation infrastructure for numerical relativity, and CyberTools project to develop the infrastructures needed for interdisciplinary research. He is actively involved in the Cactus framework group and helps to manage the cyberinfrastructure development of the Northern Gulf Coastal Hazards Collaboratory project. He is currently working on CaKernel, a programming framework to support automatic code generation and optimization for scientific applications on heterogeneous systems. He is also working on a Boussinesq model for ocean surface wave to simulate storm surge and tsunami.

7. Co-PI: Zhifeng Yun; Center for Computation and Technology, LSU;

   Zhifeng Yun is a researcher at Center for Computation and Technology (CCT) of Louisiana State University. He received his Ph.D. degree in Electrical Engineering from Louisiana State University in 2011, with research focusing on Parallel and Distributed Systems, Middleware Development, and Cloud Computing. His current research interests include: Parallel Computing, GPU Code Generation, Performance Tuning, and Domain Specific Language.

8. Co-PI: James A. Lupo, HPC Enablement Manager, Center for Computation and Technology, LSU;

   James Lupo has 25 years of experience with DoD and DOE supercomputers, Much of that time was spent working with molecular dynamics techniques for nanocrystaline metals and biopolymers. He spent 6 years in industry working on the characterization of novel parallel computing architectures. This included communication system modeling and development of applications for sensor fusion and biometrics. He has spent the last 3 years managing advanced user support for LSU, LONI, and TeraGrid HPC environments.

9. Co-PI: Xin Li, Assistant Professor, Department of Electrical and Computing Engineering & CCT, LSU;

   Xin Li is an assistant professor jointly in Department of Electrical & Computer Engineering and in CCT, LSU. He received his Ph.D. in Computer Science from Stony Brook University (SUNY) in 2008. He is now leading the LSU Graphics and Visual Computing (GVC) group consisting of 4 PhD students and 7 MS students. The main research expertise of GVC and their recent projects include geometric

data modeling and processing and their applications in graphics, visualization, vision, robotics, computational medicine, archeology, forensics, and computer-aided design. GVC is actively exploring the applications of GPUs on analyzing and processing of massive-sized geometric and temporal data. Specifically related to this proposal are several ongoing projects extensively using GPUs. These include the radiotherapy planning and optimization based on lung tumor motion modeling from densely sampled 4D CT/MR medical data (IBM faculty award), digital forensic skull evidence modeling and facial reconstruction (Louisiana Board of Regents), massive transportation data analysis and visualization (Louisiana Transportation Department). During the past 6 years, Li and his students have published 20+ journal papers and 30+ conference papers in prestigious peer-reviewed journals/conferences in related fields.