

The Rutgers Green Computing Initiative General Program Announcement Computing Coordination Council (CCC)

Second Call for Proposals (Deadline 04/06/09)

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Motivation: Computing and communications are an integral part of society's IT infrastructure, affecting every aspect of life, including services related to health, banking, commerce, defense, education and entertainment. The increasing demands for computing and storage, and as a result, the growing scales of enterprise computing environments, networks and datacenters have made issues related to power consumption, heat generation and cooling requirements of critical concern – both in terms of the growing operating costs (power and cooling) as well as their environmental and societal impacts. Many current datacenters consume more power than the cities they are in, which is not a sustainable model as the rate at which we are adding computing resources far exceeds the available and planned power capacities. The EPA recently reported that energy used by datacenters by 2011 is estimated to cost \$7.4 B (15 power plants, 15 Gwatts/hour peak). In fact, one survey by the Uptime Institute (<http://uptimeinstitute.org/>) showed that 42% of respondents claim that they would run out of power capacity in 2-5 years. Power and cooling rates are increasing by an alarming 8 fold every year and are becoming the dominant part of IT budgets.

Green computing is the study and practice of realizing environment friendly computing ecosystems, and includes issues ranging from maximizing energy efficiency and power and cooling requirements to promoting recyclability or biodegradability of defunct products and factory waste. This is a topic of current interest in both industry and academia, and motivates a number of challenging research issues ranging from low-power hardware design to power efficient protocols and software.

Objective: The overarching goal of the **Rutgers Green Computing Initiative** is to build upon existing strengths and ongoing research efforts at Rutgers to nucleate a university-wide multi-disciplinary research and education program that will establish Rutgers as a national and international leader in this emerging and important area. This initiative plans to bring together faculty, researchers, graduate and undergraduate students, as well as industrial partners to conduct fundamental and applied multi-disciplinary research in the field of green computing and communications.

At the same time, the CCC Green Computing Initiative aims at changing the way research and education are coupled together, by providing students with new and attractive opportunities to study inter-disciplinary and multi-disciplinary green computing-infused programs. It is also expected that this initiative will provide great opportunities for technology transfer into new products as well as the development of a highly trained workforce in the field.

Research Challenges & Opportunities: This research initiative will explore conceptual and technological research opportunities necessary to realize green computing and fundamentally address the challenges outlined above, including opportunities in the areas of energy conservation, resources efficiency, and autonomic management and control through technologies such as virtualization, autonomic/self*

management, thermal and power awareness, etc. Key research challenges and opportunities include energy efficient designs of hardware and software for:

- Computer systems & platforms:
 - Computing infrastructures (clusters, grids, datacenters, clouds)
 - Storage infrastructures (disk farms, SANs)
 - Hardware platforms (processors, blades, GPGPUs, accelerators, etc.)
- Software systems
 - Operating systems, virtualization and VMMs
 - Middleware services for communication, runtime management, etc.
 - Application systems/frameworks
 - Large-scale (Internet-based) distributed applications
- Networks and wireless systems
 - LAN switches and Internet routers
 - Radio devices and sensor networks
- Design of end-to-end green computational ecosystems integrating sensing systems with application and infrastructure management
- Applications and business process impacts of Green computing
- Feasibility and impact of alternate energy sources for computing infrastructures

For further information about this initiative, please visit <http://nscac.rutgers.edu/greencomputing/> or contact Manish Parashar at parashar@rutgers.edu or Dipankar Raychaudhuri at ray@winlab.rutgers.edu.

Second Call for Proposals: Seed-funding for Multi-disciplinary Research Initiatives in Green Computing: Limited funding for young faculty (Assistant and Associate Professors) will be available to seed multi-disciplinary collaborative projects relative to the focus theme of green computing. The program will be managed by the office of the VP of Research and Graduate and Professional Education in consultation with CCC members. A key goal of the funding is to seed cross-disciplinary collaborations across Rutgers that are responsive to current or upcoming initiatives at the state and federal levels. Proposal will be due in on April 06, 2009, and funding decisions will be made in 4-6 weeks. Note that the proposals must have an Assistant or Associate Professor as lead PI. The proposal may however include senior faculty members as Co-PIs. Additional details, including proposal format and other requirements and submission details, will be posted at the website listed above. Please contact Mike Pazzani, VP Research and Graduate and Professional Education at pazzani@rutgers.edu or Dipankar Raychaudhuri at ray@winlab.rutgers.edu for more information on the program.

Call for Participation: Investigative Workshop on Green Computing: The CCC will host an investigative workshop aimed at identifying opportunities and for cross-disciplinary research synergies and collaborations at Rutgers. The workshop will be scheduled in Spring 2009 semester (tentatively on March 11, 2009) and will involve invited presentations, discussion about applications, technologies and underlying research issues relevant to green computing, and as well as current and upcoming national initiatives and funding opportunities. Additional information will be posted at the website listed above. The workshop organizing committee will include faculty from related units at the university. Individuals interested in presenting or participating in the workshop should contact Manish Parashar at parashar@rutgers.edu.