IBM Academic Initiative eServer – BladeCenter Proposal

Dr. Lixin Tao
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Pace University

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1 Pace University contact information

Name of University or College:    Pace University
School:                       School of Computer Science and Information Systems
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2 Brief description of the School of CSIS, Pace University

2.1 School objectives and mission

The School of Computer Science and Information Systems aspires to innovative leadership in preparing men and women for meaningful work, lifelong learning and responsible participation in a new and dynamic information age. The School does this through a broad spectrum of educational programs on campuses in New York City and Westchester County, and at other locations with corporate partners from the local and global community.

The School has a unique role: it provides professional education in the computing disciplines, supporting education for programs in the other schools, general education for all students, and continuing education. Because change characterizes information technology, programs build upon a strong foundation in the arts and sciences, and emphasize competency in the theory and methodology of the computing disciplines. At the same time, programs are responsive to the rapid pace of technological development.

The School was founded in 1983 in creative response to the educational challenge and opportunity inherent in emerging disciplines, and is characterized by its core values:

- excellent teaching that is informed by scholarship, professional practice and community service,
- the integration of theory and practice in teaching and scholarly activity,
- currency in new technology and its application,
- creative programs and partnerships with the local and global community,
- attentiveness to professional and social responsibility.
The School values diversity and welcomes qualified students of various experiences and origins, whether regional, national, or international. It provides excellent service to students both within and outside the classroom. It uses the power of technology to offer broad opportunity to students and to enable them to achieve excellence. Throughout its programs and services, the School of Computer Science and Information Systems consistently recognizes that information technologies are tools for the empowerment of people.

2.2 Key skills developed by the School of CSIS

Currently CSIS offers the following undergraduate/graduate programs:

- Undergraduate Programs:
  - B.S. in Computer Science
  - B.A. in Computer Science
  - B.S. in Information Systems
  - B.A. in Information Systems
  - B.S. in Technology Systems
  - A.S. in Applied Info Systems
  - B.S. in Prof. Computer Studies
  - B.S. in Prof. Technology Studies

- Graduate Programs:
  - Doctor of professional studies in computing
  - M.S. in Computer Science
  - M.S. in Information Systems
  - M.S. in Internet Technology
  - M.S. in Telecommunications
  - M.S. in Software Development

3 Contact information for the faculty member submitting the proposal

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Dept: Computer Science

4 Department which will use eServer for educational purposes

Departments: Computer Science (Pleasantville) and Computer Science (NYC)
Dept Chairs: Dr. Narayan Murthy (Pleasantville) and Dr. Sotirios Skevoulis (NYC)
Department Mission:

The B.S. in computer science provides a college education steeped in the liberal arts with specialized emphasis in the theory and practice of software development. Students graduate with the soft and the technical abilities to begin careers as software professionals and remain effective as technology advances. Internships are advocated. CSIS maintains an environment that encourages individual accomplishment and the cohesiveness of the student body.

Department Objectives:

1. Students will receive a broad general education as specified by the Pace University Core Curriculum. This includes the development of written and oral presentation abilities (see Objective 2 also) as well as courses in literature, the fine arts, the social sciences, and foreign cultures and languages.
2. Students will develop oral and written communication skills.
3. Students will develop collaborative skills.
4. Students will understand and be able to discuss issues of social salience and will be equipped to perform as ethical professionals.
5. Students will acquire an appropriate foundation in quantitative reasoning and skills.
6. Students will develop proficiency in object-oriented programming techniques and strength in designing solutions to programming problems.
7. Students will develop an understanding of the foundational principles of computer science.
8. Students will develop an understanding of the deeper principles of computer science.
9. Students will acquire an acquaintance with the conceptual foundation, current practices, and technology associated with data communications.
10. Students will acquire an understanding of the principles of software engineering and experience in applying contemporary best practices in software design, construction, and maintenance.
11. All students will develop a familiarity with two specializations.
12. Students will be acquainted with the needs for information assurance and familiarized with the measures to promote secure computing.
13. All students will have the opportunity to preview the computing profession.
14. Graduates will be prepared for careers as computing professionals and/or graduate school.
15. Alumni, over time, will build successful careers supported by ongoing learning and effective response to change.
16. To offer a supportive climate for learning both instrumentally and interpersonally.

5 Describe how the eServer will be integrated into instruction and/or research

5.1 What courses will be taught? Please provide an abstract

The following two graduate courses, CS644 and CS646, have been offered at Pace for two to three years. They will be revised to integrate IBM WebSphere and IBM eServer BladeCenter server technologies. In particular,
• WebSphere will replace the current WebLogic and Sun Borland Application Server as the main Web/application server platform;
• Each student will have his/her own WebSphere server instance(s) hosted on the IBM eServer BladeCenter during the courses for acquiring hands-on experience with WebSphere Web/application servers;
• Course material and lab sessions will be developed to introduce new topics like Web server clustering and application server clustering, server scalabilities, load balancing, distributed transactions, and server security.

5.1.1  CS644: Internet Computing with Distributed Components

Fundamental concepts of Internet computing and component-based software engineering as well as the latest J2EE Web server and application server technologies. Topics include Web application architecture; HTTP protocol; presentation tier techniques including servlets, JavaServer Pages, JSP custom tags and JavaServer Faces; Enterprise JavaBeans application server technique including stateless and stateful session beans, container-managed and bean-managed entity beans, and message-driven beans; server scalability; server clustering and load balancing; and introduction to Web services. WebSphere will be the main teaching platform. Each student will be assigned his/her own WebSphere server instances hosted on the IBM eServer BladeCenter and learn to configure and manage them.

5.1.2  CS646: Enterprise System Integration with Web Services

In-depth study of cross-platform enterprise system integration with Web services. Topics include enterprise computing challenges and Service-Oriented Architecture (SOA); functions of XML and Web services in B2B system integration; introduction to XML, Web architecture, and HTTP protocol; Web services architecture; Web Service Definition Language (WSDL); Simple Object Access Protocol (SOAP); UDDI Web service registries; improving Web services performance with EJB application servers; Web service security; fast transformation of legacy systems for providing online services; and implementation and consumption of Web services on at least two platforms. WebSphere will be the main teaching platform. Each student will be assigned his/her own WebSphere server instance hosted on the IBM eServer BladeCenter and learn to configure and manage it.

CS644 and CS646 have also been offered as doctoral courses DCS803 and DCS860D for Pace CSIS’s doctoral DPS in Computing program in the last three years. The adaptation of these two courses for the CSIS undergraduate programs is under the way.
5.1.3 A new course on grid computing to be developed

Pace CSIS is planning to develop a new graduate course on IBM grid computing techniques. Dr. Lixin Tao has a long track record on the research and teaching of the related areas. The new course will introduce the fundamental concepts of parallel and distributed computing; cluster computing; the architecture and design of IBM grid solutions; programming languages and toolkits for parallel and distributed computing; performance modeling of grid computing on the IBM eServer BladeCenter; and application development based on the IBM grid computing and eServer BladeCenter technologies.

Under the supervision of Dr. Tao, some DPS doctoral students have started their research on grid computing. The prototype of an extremely-small-footprint toolkit for running parallel programs on clusters of Pace DoIT lab PCs is under the way.

5.2 Will any research be involved?

Dr. Lixin Tao (http://csis.pace.edu/~lixin/), an IEEE senior member, will lead the Pace research team in the investigation of the performance modeling and optimization of running clustered Web and application servers on the IBM eServer BladeCenter. New dynamic, instead of entry-point, load balancing schemes will be proposed and implemented as general-purpose utilities for the eServer BladeCenters.

Industry standard based message-passing interfaces like MPI and PVM will be investigated for their suitability for supporting software development on the IBM eServer BladeCenters, and the optimized mappings of the interface features to the BladeCenter resources will be studied for maximizing the eServer performance.

5.3 Related qualification of the faculty member responsible for the eServer related teaching and research

Dr. Lixin Tao is a tenured full professor with the Pace University, and he has a long track of research and teaching in the areas of parallel and distributed computing, Internet and Web computing, and system performance optimization. In the last four years he has graduated seven doctoral students and four Master students all with dissertations or theses in the above areas. Dr. Tao is an IEEE Senior Member, and a national ABET/CAC evaluator for computer science. The following are his selected related publications. More information on Dr. Tao is available at http://csis.pace.edu/~lixin/.


5.4 Will course content be required from IBM?

IBM’s product documentation and existing course content are valuable to Pace’s curriculum development, based on which Pace will develop its own courseware on the eServer BladeCenter that will be shared with IBM and other institutions.

6 Will any business partnership be involved? If so, please describe
Pace will work closely with IBM researchers and technical staff in the course development and research programs based on the eServer BladeCenter. The current communications and collaborations between Pace and IBM are mainly through the following four contacts:

- JoAnn Winson, *IBM Academic Initiative, ISV & Developer Relations*, JoAnnWinson@us.ibm.com
- Matt Ganis, Senior Technical Staff Member, *IBM Ambassador*, ganis@us.ibm.com
- Dr. Pat Wong, STSM, CRM/Siebel Chief Infrastructure Architect, Customer Collaboration Service Delivery, patwong@us.ibm.com

7 Please describe the desired results of your program

- Number of student participating
  - 40 DPS doctoral students
  - 50 Master students
  - 50 undergraduate students

- Number of students graduating from program
  - 20 DPS doctoral students
  - 25 Master students
  - 20 undergraduate students

- Type of skills developed
  - J2EE Web server and application server technologies based on the IBM WebSphere line of products
  - Configuration, application deployment, and management of WebSphere servers
  - Clustering of WebSphere server instances on the BladeCenter platform and its performance fine-tuning
  - Parallel/grid computing on the BladeCenter platform
  - Configuration and customization of IBM blade servers of the BladeCenter running Linux

8 Please inform IBM of what type of eServer is requested:

- iSeries _______
- zSeries _______
- BladeCenter _x__
- Please describe any specific eServer requirements: N/A
9 Pace CSIS support for this proposal

- Dr. Susan Merritt, the Dean of the School of Computer Science and Information Systems, Pace University, strongly supports this BladeCenter proposal. Dr. Merritt has been consistently encouraging the adoption of IBM open-source/standard technologies in the Pace CSIS curricula and research.

- Pace CSIS has a strong team of technical supporting staff, headed by Mr. Matthew Poli, who will be in charge of the installation of the BladeCenter as well as Linux and IBM software on the BladeCenter, the application of necessary software fixes, and the management of the hardware. Pace CSIS staff has been providing server-hosted Linux server instances for supporting the School’s academic programs over the past five years and has rich experience in both hardware and software installation and management.

- Dr. Lixin Tao has been assigned the responsibility for the course development and research programs, in cooperation with IBM, on the BladeCenter.

- Pace CSIS has an industry advisory board consisting of local IT leaders, as well as a Pace CSIS alumni committee, both could provide direct feedbacks about potential industry applications and challenges for adopting the IBM BladeCenter and its related server technologies, and forge partnership of the local businesses with Pace and IBM.