

UNIVERSITY OF LOUISIANA
AT LAFAYETTE

STEP Committee

Technology Fee Application

**Equipment for High Performance and Cloud
Computing (HPCC) Laboratory**

Title

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Name (Submitter)

Computer Science Program, School of Computing and
Informatics

Organization

Title: Equipment for High Performance Cloud Computing (HPCC) Lab.

Date: 1/16/2018

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ABSTRACT:

High Performance, Cloud, and Big Data Computing are prominent areas of research and practice in the computer science and technology world. However, our school of Computing and Informatics is in shortage of a laboratory that focuses on these areas. We have recently established the High Performance Cloud Computing and Big Data (HPCC) laboratory within the School. The laboratory is being utilized by students who take the Cloud computing and Big Data course, researchers who work in this area, and students in other disciplines (e.g., Math, Physics, Biology, and Electrical Engineering) who require access to high performance and Big Data computing facilities. To equip the laboratory, we have purchased a Cluster that will be used as a private Cloud infrastructure and can be used by all students and researchers within the school, college, and University. However, the server we purchased only provides the compute nodes of the cluster (i.e., worker nodes). We urgently require a management (control) server to make the private cloud fully operational and usable. The activation of private cloud will greatly improve the level of knowledge in this important area of computer science and prepare our students better for the competitive job market. We have also established Cloud Computing and Big Data concentration within the Computer Science undergraduate program. The HPCC laboratory will serve as the main laboratory with the required facilities for this concentration. In the long run, the concentration will increase the enrolment in both undergraduate and graduate level of the Computer Science program.

Proposal Description

A) Purpose of grant and impact to student body as a whole

The purpose for this grant is to equip the HPCC lab at the School of Computing and Informatics. This includes purchasing and completing the setup of a private Cloud for the laboratory. Activating the private cloud cluster will impact the student body of the School of Computing and Informatics and, more generally, College of Sciences to access resources for high performance and Big Data applications. It will also enable researchers in the area of Cloud computing and Big Data to increase their knowledge by accessing resources and tweaking that for different research projects. This will significantly improve the knowledge of students in this important area of computer science and it is missing currently in the School of Computing and Informatics.

We have recently received the approval to add a concentration in the area of Cloud Computing and Big Data. The concentration will start from the next year. In addition, we currently have the Scientific Computing concentration in the program and we are planning to enrich it with offering new courses and providing facilities for students in the area of Parallel and Distributed Computing. Adding new concentrations will attract more students to our Computer Science program and will increase the enrollment in near future.

To Support our plans for the new undergraduate concentrations and to boost the graduate research in the area of Cloud Computing and Big Data, we have recently established the HPCC laboratory. The server that will be purchased through the STEP funding will be used to complement our already purchased server and enable creating a private cloud computing for the undergraduate and graduate students at the School of Computing and Informatics. They will be also utilized for interdisciplinary collaborations with other departments and schools within UL Lafayette. Specifically, the resources will be shared with other departments to enable them run high performance computing applications for their research works.

Impact to the student body

Based on the provided justifications, we expect the following impacts on the student body:

- Improving Computer Science students' abilities and expertise in the area of High Performance Computing, Cloud, and Big Data.
- Enabling the Computer Science program to establish new concentration and enrich current concentrations (e.g., scientific computing). This will attract more students to the Computer Science and will increase the number of enrollments in the program.

- Enabling students in other department and schools, such as Electrical and Computer Engineering, Physics, Math, Geology, and Biology to access high performance computing resources.

B) Projected lifetime of enhancement

We believe that the cluster that will be purchased for private Cloud within the HPCC laboratory can work perfectly for at least 5 years. After that period, we can upgrade the cluster resources and make it usable for longer time (totally 8 to 10 years).

C) Person(s) responsible for

1. Implementation

Will be carried out with the help of the School of Computing and Informatics (CMIX) system administrator (Dr. Robert Minvielle), Dr. Mohsen Amini Salehi, and his undergraduate and graduate students.

2. Installation

Will be carried out with the help of the School of Computing and Informatics system administrator (Dr. Robert Minvielle), Dr. Mohsen Amini Salehi, and his undergraduate and graduate students.

3. Maintenance

Will be carried out with the help of the School of Computing and Informatics system administrator (Dr. Robert Minvielle), Dr. Mohsen Amini Salehi, his undergraduate and graduate students.

4. Operation

Will be carried out with the help of the School of Computing and Informatics (CMIX) system administrator, Dr. Mohsen Amini Salehi, his research lab students, students from other departments (Math, Physics, Geology, Biology, Electrical and Computer Engineering, Petroleum Engineering).

5. Training (with qualifications)

Dr. Mohsen Amini Salehi and his research team members that will include graduate and undergraduate students. Also, a general training document will be prepared to teach other users on how to access and work with the system.

D) Grant purpose and justification

Our intention of the purchase of the cluster is to enable the private Cloud within the school of Computing and Informatics. We have purchased part of the cluster last year. However, our system administrator has informed us that the current purchased server is not sufficient to build a private cloud. Therefore, we need to buy another server to operate as the “control” node for the private cloud. Once we get the private cloud working, it will be used by students and researchers within the school to run high performance and big data applications.

Budget Proposal

1) Equipment		\$25,500.00
A 32-node cluster	Total: \$25,000.00	
2) Supplies		\$500.00
Networking facilities \$500		
3) Maintenance		\$0.00
None. Initial installation will be handled by the system administrator and his student workers.		
4) Personnel		\$0.00
None. Initial installation will be handled by the system administrator and his student workers.		
TOTAL:		\$25,500.00

Previously funded STEP projects:

\$27,700 STEP Program Grant (Fall 2016) Dr. **Mohsen Amini Salehi** and Dr. Ashok Kumar. Equipment for High Performance and Cloud Computing (HPCC) Laboratory. A server and 34 Raspberry PIs were purchased to equip the HPCC lab.