Channel Islands
CALIFORNIA STATE UNIVERSITY

# Materials, Services, Facilities and Technology Fee
# Fiscal Year 2017-2018 Budget Request Form*

**DUE: Friday, January 20, 2017 @ 5:00 P.M.**
**Please return completed requests via email to gina.matibag@csuci.edu**

If you have questions about this form, please contact Gina Matibag at (805) 437-3320
For additional information please consult the MSFT web page.

Project or Activity Title: **Networking and Security Lab**

Name of organization requesting funds: **Computer Science Program** Date: 01/20/2017

Requestor: **Pawel Pilarczyk** Phone: **(805) 437-1648** E-mail: **pawel.pilarczyk@csuci.edu**

Amount of MSFT Funding Requested: **$42,700**

Date Funding Needed by: **07/01/2017**

Will you receive funds from any other source(s)? **NO**
*If yes, please detail amount requesting from other source(s) as well as your total request for fiscal year 2016-2017 (including request from MSFT).*

Has this project or activity previously received MSFT funding? **NO**
If yes, please attach copy of report

Please describe how the use of MSFT funds for this project or activity will benefit the CI student body.

Please provide the following in your application. You may attach additional pages and materials (applicants may be requested to meet with the committee to discuss proposals):

1. **Brief Project Description.** Describe the project and its benefits to the educational or co-curricular experience of students at CI. Please provide specific information about how MSFT funds will be used and their impact on the campus. Please describe how this project benefits CI students? Please describe items and provide justification if your request includes the purchase of computers, equipment, furniture or other materials. Please provide a timeline for implementation of the proposed project. If physical improvements are requested please describe need, scope and impact of work to be completed. If the project includes provision of services please indicate the type of service, personnel costs and level or quantity of service to be provided with project funds.

The funds are requested in order to equip the new Networking and Security Lab (SIE 1131) with professional quality yet reasonably priced equipment that would enable hands-on experience in teaching a variety of concepts relating to computer networking and security, with other applications including high performance computing and data mining.

The Lab is equipped with 8 large 19" rack cabinets (45" internal height) designed to hold professional networking and server equipment. However, these cabinets are currently empty, and therefore the lab is not being utilized as it was intended. The only networking equipment available in the classroom consists of 8 Cisco 2611 routers, 8 Cisco 2950 24-port switches, 21 Netgear FS 108 unmanaged switches, 16 ASUS RT-N66U wi-fi routers, and some Ethernet and console cables. The Cisco equipment is very old (the routers celebrated their End of Sale in 2003, the switches in 2008) and many items are not fully functional. The equipment is obsolete. The 24+1 workstations at the desks are connected to the University wi-fi network, and it is not even possible to establish network connections between them to work with network applications.

It is proposed to purchase contemporary professional networking equipment consisting of Cisco 2801 routers, Layer 7 Firewalls, Cisco Internet telephones, and several Intel NUCs (Next Unit of Computing); the university already owns almost 50 Cisco 3750 switches, which can be transferred to the Lab, resulting in great savings. Identical configurations of the equipment would be installed in each of the 8 rack cabinets, thus allowing the students to work in groups of 3. Due to security reasons, it is not possible to connect the workstations already present at the desks to the insecure networks, especially that penetration testing and hacking is going to be included among the planned activities; therefore, additional NUCs are going to be placed next to the current desktop workstations, and will share the keyboard, the monitor, and the mouse through KVM ("keyboard-video-mouse") switches. In order to save costs and simplify the maintenance, all the NUCs are going to boot from USB sticks. In particular, this will allow to instantly reconfigure the entire lab for another activity by simply rebooting the computers and plugging in another set of USB sticks.

The new equipment will allow the students to get hands-on experience with modern networking equipment and to practice a variety of basic networking concepts, which is not possible using the currently available equipment. This includes but is not limited to setting up local area networks, joining or splitting these networks, configuring Cisco equipment and related software (like for the CCNA = Cisco Certified Network Associate exam), setting up and configuring IP telephone office networks, practicing server virtualization, developing and running networking applications. This equipment would also allow to experience the concepts of High Performance Computing (HPC) in practice, like setting up, administering and using a computer cluster (e.g. Beowulf cluster), deploying a local cloud (e.g. Ubuntu OpenStack), practicing distributed computing (e.g. development of software using MPI), or exploring big data computing using software like Apache Spark.

Specifically, it is planned to install the following equipment in each of the 8 rack cabinets: 3 Cisco 3750 switches, 2 Cisco 2801 routers, 1 Palo Alto PA-200 Firewall, 2 Cisco IP telephones, 2 Intel NUC5CPYH units with 8GB RAM, 2 Intel NUC6I3SYH with 32GB RAM and 120GB SSD, one of them with a 4TB external HDD. One extra NUC5CPYH unit with a USB hub and two 4TB HDDs is needed for the preparation, maintenance, and backup of USB sticks for the labs. It is planned to put a NUC5CPYH unit with an appropriate KVM switch next to each of the 24 desktop computers. Additional rack shelves, cables, a sufficient number of USB sticks for 4 complete lab sets, Kensington locks to protect the equipment, and power strips will also have to be purchased. It is planned that all this equipment will be purchased on July 1, 2017, and installed during the Summer, so that the new lab can start being used for the COMP/IT 429 course already in the Fall 2017, and for other courses shortly afterwards. Since the IT department cannot provide support for the new

equipment in the lab, it is necessary to hire a student assistant to help in installing the equipment, preparing bootable USB sticks, configuring the software and equipment, and to help in the maintenance of the equipment and software during the semester (about 24 hours for the initial setup + 2 hours per week for 16 weeks maintenance + 4 hours after-semester clean-up).

2. **Project/Activity Budget.** Please enclose a complete detailed budget of the entire project. Indicate (in **bold)** specific items of requested MSFT funding including (where applicable) a schedule and priority of project items to be considered if the project is funded at a reduced level. Were other, less costly, approaches considered when preparing the budget for the project? Are there elements that could be eliminated or deferred if funding is not available for the entire project?

In order to respect the limited amount of MSFT funding, the project was prepared in a way that minimizes the costs to absolute essentials. All the proposed items are of the same priority. Any budget cuts will considerably affect the quality of students' experience from using the lab. For example, it might be tempting to replace the Level 7 firewalls with less costly ones. However, any basic Cisco PIX or ASA firewalls will limit the experience to port-based firewall rules. This protection method, however, tends to be outdated, and nowadays the firewalls are moving into protecting layer 7, also introducing the important subject of encryption/decryption of SSL traffic. Buying a smaller amount of these firewalls might be taken into consideration in case of bad shortage of funds, but this will obviously impact the learning experience of students who would have to work on their assignments in larger groups or in shifts.

Moreover, a cheaper solution was being considered if the NUCs were replaced with Raspberry Pi 3 units, at least for the 24+1 workstations at the desks. However, due to the considerably worse performance, inferior technical specifications (in particular, only 1GB RAM), greater fault rate, and much narrower selection of available software, this solution was considered unacceptable.

A detailed budget is attached in an Excel file.

3. **Project Assessment.** Describe how the effectiveness of the project will be assessed and measures that will be used to determine if it has attained its objectives. Please note a report will be due at the end of the semester (or fiscal year for annual projects). If funded, how will the project acknowledge the use of student funds so that students are aware that their student fees made (or helped to make) it possible? If appropriate, indicate how the project or activity promotes sustainability at CI.

Project effectiveness will be assessed by the following means:

(a) timeliness in setting up the lab equipment and software;
(b) specific applications of the lab for students' hands-on experience in the COMP/IT 429 course;
(c) interest and plans for the utilization of the lab for other activities or courses in the future;
(d) we are going to assess COMP 429, and in particular the networking lab, yearly as we assess the entire program.

Student satisfaction with the lab equipment will be gauged in a satisfaction survey every year, as part of the SRT.

To acknowledge the use of student funds, small stickers may be affixed to each device as desired (excluding cables and smaller items). In addition, an acknowledgement will be created and posted in the lab.

4. **Sources of Project Support.** Please list the other sources of funding, and additional support for the activity. If this project or activity has been conducted previously please indicate how it was funded. Please explain if MSFT is the only source of support for the project.

   MSFT is the only source of support for the project.

**Fiscal Management:** Project sponsor's unit or department may be responsible for incurred over and above what is funded through the MSFT. If support is requested for costs beyond initial award, or for use on activities or materials not included in approved proposals, the project sponsor must seek approval from the MSFT committee. The project sponsor will be responsible for managing purchases and transfers of funds related to approved projects.

Please review MSFT web page for information about the fund and its objectives before submitting your application.

| Pawel Pilarczyk | _____ | _____ |
|---|---|---|
| Requestor | Signature | Date |
| _____ | _____ | _____ |
| AVP / Dean | Signature | Date |