Integrate PDC Modules into New Computer Science Curriculum

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***Abstract*— Computer science program has been continuously updated since the mid of 1970, to meet the recent demands of the occasion. Through the curriculum, the students will acquire skills and knowledge for parallel and distributed computing.**

Keywords: Parallel Computing; Distributed Computing; Undergraduate CS curriculum.

I. INTRODUCTION

The computer science program has been continuously updated since the mid of 1970, to meet the demands of the occasion. Recently ACM/IEEE Computer Science Curriculum 2013 has been announced and also it has been reviewed [1]. Many universities has adapted the new curriculum for their undergraduate degree program. During the last decade, the size of the contents of Computer Science has been dramatically increased by developing new devices, architecture, and new computing paradigm for solving the problems related big data. In this short paper, we are going to describe how to integrate this new topics into the new CS curriculum at Jackson State University in 2017.

We has adapted new CS curriculum by conducting several changes: i) reducing the required credit hours for the degree from 128 credit hours to 120 credit hours; ii) providing the students with the flexibility in choosing courses adding the four elective courses; iii) setting computer programming language independent course names such as Commuter Science I, and II; and iv) integrating new concepts and skill sets into curriculum.

To adapt the new Parallel and Distributed curriculum requires multiple courses. The courses contain CSC 118 Computer Science I, CSC 119 Computer Science II, CSC 228 Data Structures, CSC 215 Data Analytics, CSC 325 Operating Systems, CSC 360 Client-Server Programming, and CSC 425 Parallel Computing.

2. TRACK OF COURSES FOR IMPLEMENTING PARALLEL AND DISTRIBUTED COMPUTING.

From the CSC 118 Computer Science I, the students are going to learn the sequential programming and general programming environment with a single machine. From CSC 119 Computer Science II, they will learn Object Oriented Programming concepts and enhanced sequential programming skills with a single CPU coding environments. CSC 228 Data Structure course provides the students opportunities to handle a large number of data sets with efficient data structures. CSC 325 Operating Systems course provides the students skills to handle multi-threads and multi-processes in a single processor and a shared memory by understanding how to solve the Critical Section problems. In the course students will have chances to mages processes with C and OpenMP, Open Multi-Processing. CSC 360 Client-Server Programming provides the students with both skill and concepts to understand programming on multi-machines with Java. Through the course, the students will understand the basic concept of the distributed computing. From the CSC 425 Parallel Computing, the students will study of the hardware and software issues in parallel computing. Theoretical and practical survey of parallel processing, including a discussion of parallel architectures, parallel programming languages, and parallel algorithms. Programming on multiple parallel platforms in a higher-level parallel language. It should also be useful for those who want to learn programming multi-core processors. In this course, the students will enhance their skills by using Graphical Processing Units with OpenAcc that allow them to access a large number of Cores on both GPU and CPUs.

3. Summary of the supporting S/W and H/W environment.

i) S/W environment

• CSC 118 Computer Science I: Sequential programming skill with C/C++

• CSC 119 Computer Science II: Sequential and Objects Oriented programming skill with C/C++

• CSC 216 Data Analytics: Programming with multi computers with Hadoop and Map-Reduce

• CSC 325 Operating systems: Understanding multi-process/threads programming with OpenMP

• CSC 360 Clients-Server programming: learning how to develop programs for distributed computing with Java.

• CSC 425 Parallel Programming: learning how to use multi-Processors and GPUs with shared memory with OpenAcc

ii) H/W environment

- One 40 PC Computer Lab for CSC 118 computer Science I and CSC 119 Computer Science II
- One Cluster that consists of 8 nodes of computers for CSC 215 for Hadoop and MPI
- One Server with Tesla K40 Supported by Nvidia Corporation that has for CSC325 Operating Systems and CSC 425 Parallel Computing
- One Server that consists of 4 computer nodes for CSC 360 Client-Server Computing.

Reference:

[1] Mehran Sahami, Steve Roach, Ernesto Cuadros-Vargas, and Richard LeBlanc. 2013. ACM/IEEE-CS computer science curriculum 2013: reviewing the ironman report. In Proceeding of the 44th ACM technical symposium on Computer science education (SIGCSE '13). ACM, New York, NY, USA, 13-14.