



**National Science** 

Foundation

**Partnership for International Research and Education** A Global Living Laboratory for Cyberinfrastructure Application Enablement

**Exploring the Application of GPU to Extraction of Key Parameters Towards Seizure Detection** 

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. Research Overview and Outcome

I.I IBM

Memory over commitment in cloud computing has many applications towards VM workload balancing. While at IBM we developed Ginkgo (an application aware memory overcommit framework. Ginkgo monitors the VM's memory requirements by looking at the applications running within, and distributes the available memory among all the VM hosted, while maintaining a preset SLA. By employing Ginkgos we over-committed 64 VMs in a host with only 64GB, giving each machine 1.7GB of RAM.

The work was divided among other IBM researchers, I personally worked on one of the models considered for an APACHE collector. We worked on the Linux environment (Red Hat) and I became familiar with many UNIX commands and data processing tools I have never used before. The data obtained from the study was analyzed by employing a linear

programming model.

The details and results of the project will be published in the 2011 in Salzburg, in a joint paper.

**I.2 UFF** 

While working at UFF I developed a CUDA (fig1) algorithm similar to the one developed last year in Barcelona, to apply the Fourier transform to EEG data. The data Was obtained from a significant sample of 8 patients who underwent epilepsy surgery with subdural recordings.

We performed the transform and compared our results from lasts years, obtained at Marenostrum supercomputer. Our code ran on a TESLA with 4GB of RAM machine. Though our original though was to compare the performance of Marenosatrum vs.. CUDA, we decided that there were many aspects in which such comparison would have been biased. Our results show the comparison of the FFTW running on TESLA vs. FFTW ran on the local CPU (Dual Core). CUDA is about 20 times faster. (Fig 2). We created a Kernel to perform the FFT transform as well as code to format and move the data from main memory to the memory resident on the CUDA device. Then ran the FFT transform and validated our results.





Fig 2: results Time vs. Data Size

## **II. International Experience**

This year I had the luxury of visiting two of the most interesting cities in the world; New York and Rio de Janeiro. I also had the pleasure of working with the IBM team of researcher led by Dr Da Silva, and the team of enthusiastic students under Dr Clua in Brazil. Experiencing the research environment at IBM opened my eyes to how research is done in a large research center. I also met with researchers in other areas, like mathematics. I visited the city of NY several times and also took a quick trip to Niagara Falls.



In Brazil I had a blast working with Esteban, he took time to show us around and introduced us to all the students in the lab, while keeping me busy with several projects, which are becoming now two publications. We did many activities around Brazil, like climbing mountains, the beach, dinning, and visiting most attractions near Rio, including a trip to the nearby city of Angra Dos Reis.



## III. Acknowledgement

The material presented in this poster is based upon the work supported by the National Science Foundation under Grants HRD-0833093, CNS-0837556, CNS-0540592, and CNS-0426125 and OISE-0730065. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.