



**MIDDLE EAST
TECHNICAL UNIVERSITY**



**COMPUTER ENGINEERING
DEPARTMENT**

SENIOR PROJECT PROPOSAL REPORT

SciComp

FALL - 2008

INFORMATION

Company: SCICOMP

Quote: “Scicomp; can be your psychomp..”

Company Members:

Gatekeeper, Recorder

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Team Leader, Contact Person, Initiator

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Contact Information:

We have chosen a leader who is responsible for group interaction and communication with instructors.

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Also all your mails to scicomp@googlegroups.com will be sent to all members of the company.

PROJECT INFORMATION

We are interested in converting a well established library, that is also being frequently used by our department, to a parallel library working in a cluster; so that it is going to be ready for High Performance Computing.

- ***Project Scope, Definition and Aim:***

Parallel computing is a form of computation in which many instructions are carried out simultaneously^[1], operating on the principle that large problems can often be divided into smaller ones, which are then solved concurrently ("in parallel"). It has been used for many years, especially in **High Performance Computing**.

There are many challenging problems that require a heavy loaded computation, although their algorithmic complexities are as low as they can be. From the middle of 20th century, mankind paid attention to increase the computation power of computers. The clock rates increase, faster CPU's are developed, frequency scaling was introduced (for details: Moore's Law^[2]). However, the need of higher computation abilities and the restriction of power consumptions pushed the engineers to develop a new technology called **Parallel Computing**.

Nowadays, the world revolves around the technology called *parallel computing*. Any kind of research including NASA Space Investigations, CERN's LHC calculations are all based on high performance computing tools.

As our department has HPC computer called NAR, a 340 core cluster containing blade servers, all we need is to produce a noticeable advance in integrating our department's researches through the mighty world of clustering.

Our aim is to parallelize a commonly used and well-founded library so that it can be used within the cluster. We hope our project will trigger the scientific research rate and ease the calculation processes.

- ***Initial Ideas and Technology:***

We are considering to deepen our investigation. First, we need to determine which library we are planning to convert as a parallel implementation, as time between the announcement of the projects and the deadline of the project proposal report was too short to decide. Seperate conversations with laboratories of our department would be beneficial in terms of selecting the suitable library for our project.

A google group has been created and working as a mailing list. Several discussions on project selection have been made through this list. Any further contact between the company members is going to be logged in this mail-list.

A version control system is going to be used, Subversion is preferred. Git may be an alternative to svn.

We plan to use C/C++ languages and python wrappers in designing the implementation of our project. Erlang implementations would be designed too.

- **Potential Risks**

- The workload of other lectures.
- Lack of detailed investigation on the topic.
- Possible health issues may affect the schedule.
- Disagreements in the group.

References:

[1] Almasi, G.S. and A. Gottlieb (1989). Highly Parallel Computing. Benjamin-Cummings publishers, Redwood City, CA.

[2] Moore's Law, http://en.wikipedia.org/wiki/Moore's_law