

159.403/703 Assignment

Due day: 15/10/2004

Submit both soft and hard copy of your assignment with your name and ID number.
The assignment is due 5:00 pm 15/10/2004

However, if the hard copy is submitted to the institute office **before 11:59 am 18/10/2004 (NZ time)** and the soft copy is submitted by emailing me (r.wang@massey.ac.nz) before 11:59 am 18/10/2004 (NZ time), your assignment will be consider as submitted on time.

No other extension will be given. No mark will be given if you submit your assignment (**either the hard copy or soft copy**) after 11:59 am 18/10/2004 (NZ time).

This assignment is to ask everyone to write two project proposals.

1. A short version (one page) of project proposal on any topic that you are interested in
2. A full version of project proposal on *Grid Computing System Development*
You need to clearly show me how to implement the proposed project in your project proposal.

A sample for the short version see below and a template for the full version are provided.

The following paragraphs provide some information on the project, Grid Computing System, which your full version project proposal will base on.

The following paragraphs also service as a sample for the short version project proposal.

This project is to develop a Grid System, which provides a Grid Computing platform.

Parallel Programming has been taught as part of the Advanced Computer Systems (159.403/703) paper since last year at the Turitea campus. In this paper, students learn how to implement parallel programming, to understand the principles of parallel algorithm design, and to be able to program a parallel problem using the Message Passing Paradigm. All these points are cornerstones of contemporary supercomputing (also known as High Performance Computing (HPC) or Clustering).

Grid Computing is an evolution of High Performance Computing, and is at the heart of our current target plan for innovative teaching of the paper 159.403/703.

A Grid System is a virtual single system that integrates computational and collaborative environments. It integrates individual and non-homogeneous software and hardware components into a combined networked resource (regardless of the geographical locations of the software or hardware components) to solve large-scale compute- and data-intensive problems in science, engineering and commerce. A user uses the system as if s/he is using a single cluster, although the software and/or hardware components may be spread hundreds of miles away from each other and from the user. Unlike supercomputers and distributed computing systems, which normally requires physical proximity and operating homogeneity, Grid Computing integrates vast and disparate IT resources, regardless of their operating systems and platforms. For example, through a Grid System, our cluster in Palmerston North can link to the Helix cluster (in Albany) and other local area networks in other campuses. All these resources combined can be visualised as a single system.

Grid Computing incorporates all of the latest innovations that integrate distributed computing, the World Wide Web, peer-to-peer computing and virtualization technologies. It normally has the same interface as a cluster does, i.e. MPI (Message Passing Interface).

Methodology

In order to set up a Grid System, we need to integrate individual software and hardware components into a single system image. A Grid System accesses all kinds of globally-distributed resources through the Internet. The resources can be PCs, clusters, workstations and with different operation systems, such as Unix, Linux or Windows. In order to integrate these different resources, two levels of middleware will be employed; Core Grid middleware and User-level Grid middleware. Currently, both middleware components have many versions. They are free and open source software, however, the challenge is how to evaluate, compare and select them.

When the software is installed and configured, a Grid Portal is required to be developed in order to offer a web-enabled service so that users are able to submit and collect results for their jobs on remote resources through the web.

Therefore, the project requires to evaluate, install and configure the middleware components, and design and implement the web-based Grid Portal.

Outputs

The main output of this proposal is a small scale Grid System to be developed as part of 159.407/703 will enable to teach Grid Computing at Massey. To our knowledge, no university in New Zealand has been teaching Grid Computing. So far, only few universities (e.g. University of Melbourne) in Australia have begun to teach Grid Computing since 2003. Using a Grid System, students can learn all necessary knowledge on Parallel Computing; also learn more advanced techniques of Grid Computing, such as computational resource management, data management and scheduling.

Apart from the benefit for the teaching process, the outcome of this project can enhance research in Grid Computing, which may provide a solution for the need of High Performance Computing (HPC) power at Massey. On the one hand our demands for HPC keeps on increasing and we try to match the demand by building expensive clusters (e.g. Helix costs about \$250K and on-going cost is not included). On the other hand, we have an enormous number of computers (e.g. the computers in the student labs) are idle in most of the time. The computing power can be utilized by the Grid Computing paradigm. To develop a Grid System (even on a small scale) will also provide a test bed for future development in this field.

This project will be jointly investigated by YOUR NAME, Dr. Ruili Wang and Firas Al-Ali.

>>>>>>>

Additional information

The assessment of Parallel Computing (50% of 159.403/703) will be based on a combination of marks from presentation and assignment.

Assignment: 35% towards the final marks of the whole paper

Presentation: 15% towards the final marks of the whole paper.

There will be no lecture on 13/10/2004. Any person has not given his /her presentation; he/she has to do it Tuesday 12/10/2004.

Template OF A RESEARCH PROPOSAL FOR 4th YEAR PROJECT, MSc or PhD

Descriptive Title of Your Research Project

(Also indicate that this proposal is for 4th year, MSc and /or PhD)

Your name

Your Supervisor's name

The Department/Institute/University that you will study

Expected date of enrolment in the programme and completion

CONTENTS

PAGE Nos.

Background	3
Objective	6
Scope	7
Methodology and Approach	8
Facilities	10
Budget.....	11
Deliverables and Programme Schedule	12
References	13

The proposal may be written in 10-12 font size and should be limited to 15 pages.

BACKGROUND (Important part)

Describe current state of the art to answer following questions

- Why is this research (and/ or project) needed?
- Outline previous work in this field (i.e. literature search).
- How would the results of the proposed research fill this need and be beneficial?

Note: all with references

OBJECTIVE (s)

"The objective(s) of this research project are to....."

SCOPE

Following tasks will be undertaken as a part of the proposed research-

Task 1

Task 2

Task 3, etc.

METHODOLOGY AND APPROACH

This section needs to answer self-imposed questions and should reflect that you has good understanding of the problem and of the barriers in the path. Some of the questions that should be answered include-

- (a) (a) What are the constraints (if any)?
- (b) (b) What are the technical challenges and uncertainties?
- (c) (c) What are the different approaches to this problem?
- (d) (d) What is your preferred approach and why?

Explain your methodology to conduct the research and to obtain the stated objectives.

FACILITIES TO BE USED

Explain the facilities to be used.

- (a) (a) Is all the necessary hardware/software in place?

- (b) (b) if not, how will it be acquired and how long will it take to put everything in place?
- (c) (c) Does it have any resource implication? (This must be prepared in view of the Budget below.)

BUDGET

- (a) (a) What is the total budget for the project?
- (b) (b) Have the funds been already acquired?
- (c) (c) If not, where is the money coming from?
- (d) (d) How long will it delay the process?
- (e) (e) Will it impact the thesis work and/or are there other remedies to the problem?

DELIVERABLES AND PROGRAM SCHEDULE

Milestones and stages

Month from the Start of the research

1 2 3 4 5 6 7 8 9 10

Task 1 x x x

Task 2 x x x x

Task 3 x x x

Itemize the list of deliverables with specific dates so that you can make concerted effort to achieve them.

REFERENCES

List of all the references here.