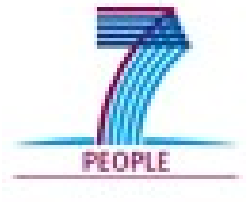

EPIKH

RESEARCH PROGRAMME

OF

SADOK MAZIGH

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Abstract: Fast Fourier Transform (FFT) has been one of the most popular and widely used numerical methods in many areas of scientific computing, including digital speech and signal processing, solving partial differential equations, molecular dynamics, many-body simulations and Monte Carlo simulations. Given its importance, there have been a large number of libraries that provide different implementations of FFT (both sequential and parallel) aimed at achieving high-performance in various environments. This document presents my project, which forms part of research carried out by the Research Unit for Information Technology and Communication (UTIC) in collaboration with the project EPIKH. This project aims to provide a high performance and high scale one/multi dimensional FFT service for grid users.

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1. INTRODUCTION

1.1. PURPOSE OF THE DOCUMENT

The main purpose of this document is to present my research program. It gives a brief description of the program and It describes the main objectives and the steps of its development.

1.2. DOCUMENT ORGANIZATION

This document is organized as follows. In the first section we present the structure of the document. Section 2 describes, mainly, the interests of the program and key objectives. The third section is devoted to the progress of the program and the main steps of completion.

1.3. APPLICATION AREA

This document applies to the maintenance and further development of my research program within the scope of the EPIKH project.

2. RESEARCH PROGRAMME

Fast Fourier transform (FFT) is an efficient algorithm to compute the discrete Fourier transform (DFT) and its inverse. Computation of Fourier transforms arises in many scientific and engineering applications like digital filtering, calculation of auto and cross correlation, solution of partial differential equations etc. The fast Fourier transform algorithm (FFT) computes the transform of a length-N sequence of complex numbers in O(NlogN) time. Given its importance, there have been a large number of libraries that provide different implementations of FFT (both sequential and parallel) aimed at achieving high-performance in various environments.

Several distributions of FFT, on various Supercomputers such as BlueGene, are widely used. View the unavailability of the supercomputer to the large public, our goal is to implement and deployed high performance and large scale FFT for grid environments, which will facilitate the porting of several simulation applications on the grid.

This research program can be divided the in following phases:

Phase 1: Familiarization with the grid environment.

This first phase of the program consist in studying of the principals grid middleware services. I will familiarize myself with the main components of the grid environments for possible optimizations of the target application.

Phase 2: Deployment applications on the grid.

The objective of this phase is to gain good experience in the deployment of applications on the grid and learn how to implement an application as a web service under the architecture of the grid

Phase 3: Deployment of FFT application.

During this phase, I will deploy my application on the grid and I will learn different methods of using the application and how other applications installed on the grid can take advantage of my application.

Phase 4: Experiments

Finally, some experiments will be made in order to validate the application.

3. TIME SCHEDULE AND EXPECTED OUTCOMES

3.1 TIME SCHEDULE

15/07/2010 - 22/07/2010:

- Learn more about the grid architecture.
- Learn how different grid services interact.
- Study of service-oriented architecture of grid.

23/07/2010 - 29/07/2010

- Learn how to deploy grid applications
- Learn how to implement an application as grid service.

30/07/2010 - 10/08/2010

- Deploy the FFT application as grid service
- Learn how other applications can use FFT application.

11/08/2010 - 15/08/2010

- Setup an experiment environment.
- Make some experiments.

3.2 EXPECTED OUTCOMES

- Acquire a better experience on grid computing.
- Get familiar with the use and administration of grid service.
- Deployment of my application as a grid service.