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Faculty of Engineering and Built Environment

Portal-based Support for Mental Health Research

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Introduction

In Australia there are two major sources of competitive research funding

- The Australian Research Council (ARC)
- The National Health & Medical Research Council (NHMRC)

Typical projects request funding for equipment (i.e. computers)

- This increases the size of the grant
- Machines are often underutilized

Typical projects request funding for travel

- Distances in Australia can involve ~4,000 km

The ARC wishes to demonstrate to researchers that Grid technology provides a viable alternative

- hence award of funding in 2005/06 to support sample projects

Schizophrenia Research

Schizophrenia is an illness suffered by 0.6 – 1.5% of the population

but, by its nature it affects many more (e.g. family, friends, carers)

Cost to the community is high (A$35,000 per patient per year)

Research into the cause centres on monitoring of brain function

through post-mortem studies of the brain tissue

through neuroimaging (e.g. MRI and fMRI)

Scans are not a routine part of treatment

they are expensive (>A$1,000 per scan)

they allow observation of function of living brains

There are multiple Australian groups with small scan collections

collecting these to form a critical mass would allow more definitive studies

The ARC has funded establishment of a Globus-based Grid to support such research

New NHMRC and Pratt Foundation funding will extend this infrastructure, including collection of new data

Requirements

Collect a critical mass of brain scans

Abstract over differences in data format and resolution

Protect patient confidentiality

Be accessible to any authorized user with Internet access

Provide access to computational power

Develop wizards to speed set-up of similar systems

Use Globus Toolkit

A critical mass of brain scans

Collecting new data

- Funding has been provided to start the collection of new scans

Combining disparate collections from around Australia

- Abstract over different collections using GridFTP, RLS, and OGSA-DAI
- Users see a single data collection, though data actually located on many different servers

Abstracting over data format

Groups store scans in different formats

- Machines may come from different manufacturers
- May be run at a different resolution
- Software used may require data in a certain form

Fortunately, most of these formats can be converted between each other

- OGSA-DAI activities that support this conversion have been prototyped

Protecting patient confidentiality

Patient confidentiality is vital

- Ethics Approvals govern researcher behavior for each data collection and/or study
- The data collection must ensure compliance with Ethics Approvals

Absolute de-identification is not desirable because it would preclude application of helpful results to contributors

- An over-seeing Board will facilitate result -> patient activity

CAS can provide support for role-based access control

- GridFTP has built-in support
- OGSA-DAI can be extended to have support

Provide access to any authorized user

Any authorized user should be able to access the system provided they have an Internet connection

- Use of a Web portal does not require special software on client machines

Gridsphere with GridPortlets (and GT4Portets) gives access to required Grid services

- PURSe portlets added to make credential management transparent to researchers
- Support for CAS added

Providing access to computational power

WS GRAM allows jobs to be executed through Globus

- Users need to choose which machine will run any given job

Gridbus Broker automatically selects which compute server to use

- Users simply start the job and don't worry about where it will be run

Sample portlets exist

- Require users to enter XML description of the tasks to be performed

Wizards to ease set-up of similar systems

We are developing a wizard to create portlets for common workflows using the Gridbus Broker

- Easier to use interface for researchers
- No need to learn XML format required by the Broker

We will also build a wizard to help access OGSA-DAI resources

- Have already developed simple OGSA-DAI portlets
- Need to improve their support for security

Current state of the project

A pilot implementation exists linking separate networks located in Newcastle, Australia

- This is termed the ASRB Grid
- The ASRB Grid provides secure access to data stores distributed across these sites
- Rudimentary support for distributed computation is available
- Incorporation of specialised software into new sites is aided by existence of wizards

Work has commenced on development of data analysis tools and their incorporation into the Grid infrastructure

Collection of new data is due to commence in early 2007, requiring

- Commissioning of a new server
- Set-up of a new Certificate Authority with full security functionality to replace the current test Authority

The future

Sites from all around Australia will be added to the ASRB Grid

Talks have begun to incorporate UCLA in early 2007

Will be “the world’s biggest online collaborative mental health research facility”

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Questions/Thank you etc.

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