

Managing Supercomputing Resources at the University of Manchester

Mike Pettipher
(m.pettipher@man.ac.uk)

Date 15th May 2003
Event: Cray User Group
Venue: OSC, Columbus, Ohio



THE UNIVERSITY
of MANCHESTER

Manchester Computing

Supercomputing, Visualization & eScience

*The University of Manchester
and Manchester Computing*



THE UNIVERSITY
of MANCHESTER

University of Manchester

- Established 1851
- One of the largest in the UK
 - Student numbers
 - Research Income
 - ...
- One of the best in the UK
 - Research quality
 - Graduates getting jobs
 - Teaching



Manchester Computing users

- University of Manchester
 - Administrative computing, academic computing, telecoms
- UK Academia
 - Supercomputing (CSAR)
 - Information & data services (MIMAS)
 - Major node in UK Academic Network
 - Managing agent for Net NorthWest
 - Used by HE, FE & RCs
- International
 - MIMAS
 - International AVS Centre
- Government, Commerce & Industry
 - Supercomputing
 - Networks and hosting
 - IFL
 - R&D



Supercomputing @ Manchester: A Brief History

Year	MFlops	Machine
1948	0.0007	Williams-Kilburn Baby
1972	12	CDC 7600/ICL1906A
1977	12	CDC 7600/ICL1904S
1983	192	CDC Cyber 205/Amdahl 470
1988	576	Fujitsu VP1200
1993	2,200	Fujitsu VPX 240/10
1998	0.7M	Cray T3E 1200e, 576 PE
2000	1M	T3E upgrade to 816 PE
2000	0.1M	SGI Origin2000, 128 PE
2001	~0.5M	SGI Origin3800, 512 PE

Others

Sun

Cray CS6400

Meiko (80PE)

KSR

IBM SP (146PE)

Cray EL98

Compaq

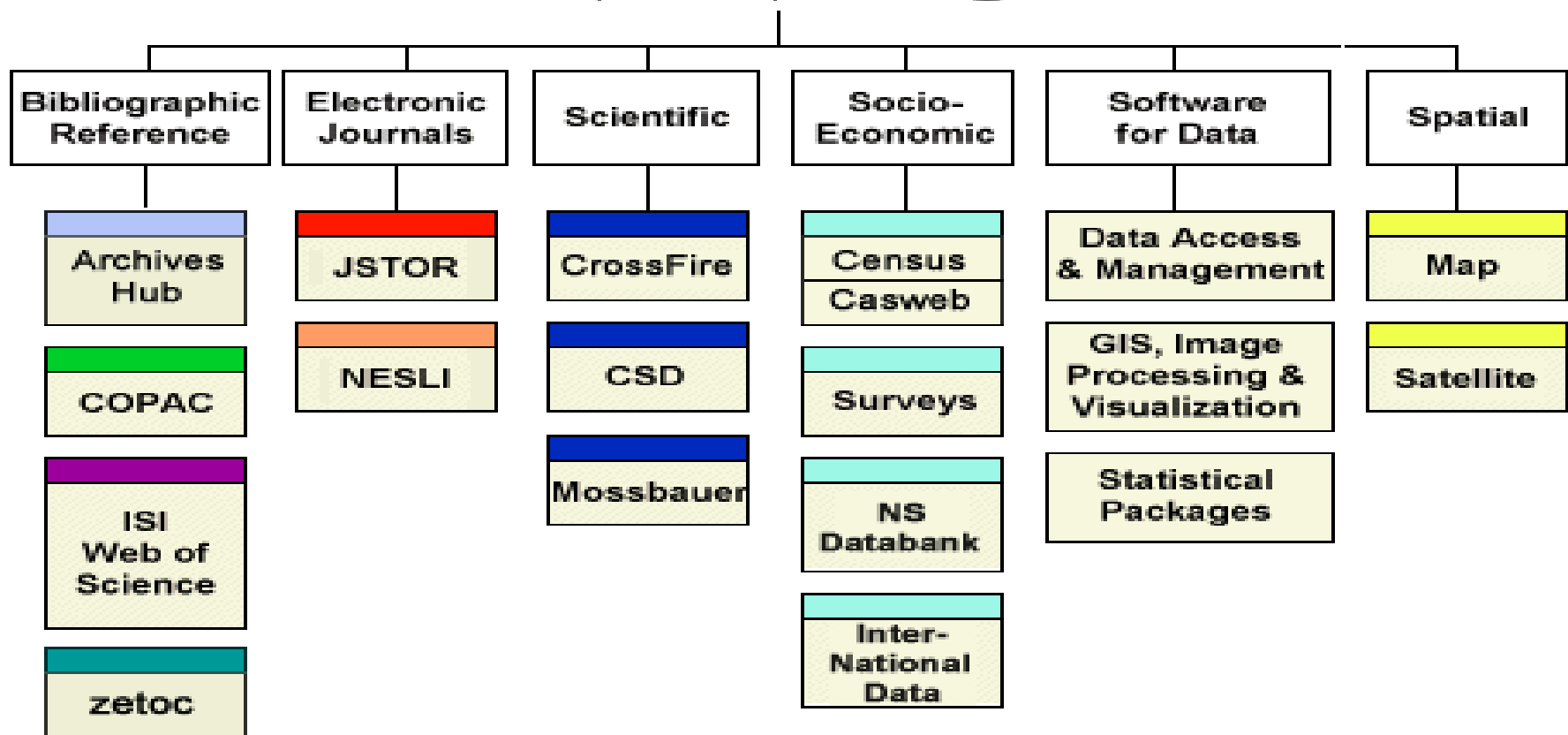
Amdahl

Fujitsu

Digital

National Datasets

MIMAS



Machine Room

- **MIMAS**
 - Sun E6500 (MIMAS), E4500, E4000 (JSTOR)
- **CSAR**
 - Cray T3E-1200E
 - SGI Origin 3800
 - SGI Origin 2000
 - SGI Altix (soon)
- **Manchester**
 - IBM RS6000/SP 146 PEs
 - Beowolf cluster 204 Pentiums
 - SGI Origin : >5



Manchester Computing – Managing Resources

- **Structure**
 - Administration
 - Communications, Operations and Systems (COS)
 - Information Services (IS)
 - Manchester Computing Informations System Office (MCISO)
 - Manchester Information and Associated Services (MIMAS)
 - Supercomputing, Visualization and e-Science (SVE)
- System administration managed by COS group at MC, except for CSAR – managed by CSC.
- **Devolvement**
 - Faculty Support Units
 - Principal Investigators
 - End users

Manchester Computing

Supercomputing, Visualization & eScience

Introduction to UK (Academic) High End Computing



THE UNIVERSITY
of MANCHESTER

UK High End Computing

- High End Computing
 - National supercomputing facilities
 - SRIF/JREI funded local HPC/cluster facilities
 - Locally/other funded institution/department HPC/cluster facilities
- Money from Research Councils UK (RCUK)
 - Managing agent is EPSRC
- Strategy and implementations formed by
 - HPC Strategy Committee
 - Technology Watch Panel
 - Private Consultants
 - National HPC Services

National HPC services

- UK has 2 national supercomputing services:
- CSAR, provided by CfS consortium:
 - University of Manchester (SVE Group)
 - Computer Sciences Corporation (CSC)
 - SGI
 - A Private Finance Initiative (PFI) procurement.
- HPCx, provided by HPCx consortium:
 - Edinburgh Parallel Computing Centre (EPCC)
 - Daresbury Laboratory (DL)
 - IBM
 - Not a PFI

Manchester Computing

Supercomputing, Visualization & eScience

CSAR Access



THE UNIVERSITY
of MANCHESTER

How it works

- Principal Investigator
 - Scientific Case
 - Justify resources
 - List of resources

- RC
 - Referees report
 - Comments from CSAR

- Allocation of Tokens

Applying for Resources

- CSAR Resource Application Form
- Class 1: Full Peer Review
- Class 2: Pump-priming
- Class 3: New application areas
- Class 4: 'Commercial' use

Getting Resources

- PI applies to RCs (with advice/help from us)
- We comment upon application
- We enter resources into database (as proposed)
- We complete initial capacity plans
- RCs approve grant. PI gets tokens
- We change proposed -> live
- We perform trades and update capacity plans if necessary
- PI invited to register – we approve
- PI invites colleagues to register
- User fills in web page
- PI gets email and through web page approves user
- User gets email with username

- Every month RCs are invoiced for tokens used

'Purchasable' Resources

- Turing, Fermat, Green and Wren cpu time
- Turing, SAN (Origin) disk
 - (can use either on the 'other' machine)
- Tape storage
 - (much cheaper than disk)
- Training Courses
- Optimisation/Application support
- Guest System resources

CSAR Resource Calculator

The screenshot shows a web browser window titled "The CSAR Resource Calculator - Microsoft Internet Explorer". The address bar contains the URL "http://www.csar.dti.ac.uk/cgi-bin/wo-calc/calculator.py". The page features a navigation menu with buttons for "Administration", "PI Admin", "Register", "Quality", "Resources", "Reports", "Apps/Ops", "Forms", "Accounts", "Help/Search", and a set of tabs for "General", "Using", "Admin", "Software", and "R & D". A large "CSAR" logo is positioned in the top right corner. The main heading is "The CSAR Resource Calculator". Below this, a text prompt asks the user to use a form to indicate project details. A bulleted list specifies: "The proposed start date of your project", "The proposed length of your project", and "The resource types that you will require". A note states: "All information can be changed later. Please click [here](#) for more information on the various resource types and the units used." The form includes a date selection field for the start date, a duration field set to "36" months with the instruction "(please round up to the nearest six months)", and a section for selecting resource types with checkboxes for "SGI Origin (Green/Fermat/Wren)", "Cray T3E (Turing)", "Guest Service", "Tape", and "Training and Support". At the bottom of the form are "Submit" and "Reset" buttons. The browser's taskbar at the bottom shows the Start button, a Microsoft PowerPoint window, and the current CSAR Resource Calculator window.

Administration

PI Admin	Register	Quality	Resources	Reports
Apps/Ops	Forms	Accounts		Help/Search

General Using Admin Software R & D

The CSAR Resource Calculator

Please use the form below to indicate:

- The proposed start date of your project.
- The proposed length of your project.
- The resource types that you will require.

All information can be changed later. Please click [here](#) for more information on the various resource types and the units used.

Please give the intended start date: [] [] [] []

And the project duration: [36] months. (please round up to the nearest six months)

Please choose the types of resources you are interested in (tick all that apply):

- SGI Origin (Green/Fermat/Wren)
- Cray T3E (Turing)
- Guest Service
- Tape
- Training and Support

Submit Reset

Resources Applied For

The CSAR Resource Calculator - Microsoft Internet Explorer

Address: <http://www.csar.chi.ac.uk/cgi-bin/tes-calc/calcforn.py>

CSAR Resources Applied For - Summary

Resource	Jun 2003 - Nov 2003	Dec 2003 - May 2004	Jun 2004 - Nov 2004	Dec 2004 - May 2005	Jun 2005 - Nov 2005	Dec 2005 - May 2006	Total Resources	Generic Service Tokens	Notional Cost
Green Cpu (CPU Hours)	10000	10000	10000	10000	10000	10000	60000	3135.12	£25343.15
Fermat Cpu (CPU Hours)	500	500	500	500	500	500	3000	116.55	£942.18
Wren Cpu (CPU Hours)	500	500	500	500	500	500	3000	148.63	£1201.49
San Mpdisk (GByte Years)	10	10	10	10	10	10	60	107.14	£635.33
San Hvdisk (GByte Years)	50	50	50	50	50	50	300	268.34	£1590.48
Turing Cpu (PE Hours)	10000	10000	10000	10000	10000	10000	60000	1450.71	£12630.95
Turing Disk (GByte Years)	10	10	10	10	10	10	60	178.57	£1004.95
Support Optimisation (Person Days)	10	5	5	0	0	0	20	588.24	£4965.66
Support Training (Days)	10	5	0	0	0	0	15	161.29	£1347.98
Totals:							6154.699	£49662.18	

This form may need to be printed in "landscape" format. Thank you.

Start Microsoft PowerPoint - [res... The CSAR Resource ... 11:48

Registration (Resource Management) System



General Requirements

- Minimise administration
- Make it `easy' to register
- Rapid response
- Web based
- Hierarchical structure to allow delegation/devolvement. 'Approved users' (e.g. Principal Investigator) should be able to manage as many of the resources as possible.

CSAR Requirements

- Self Registration.
- Allocate any resource.
- Resource trading.
- Facility for sub-project management.
- Individual user allocations.
- Usage reporting.
- Capacity Planning.
- Principal Investigator is primary administrative level. Must be able to:
 - Authenticate users.
 - Sub-allocate resources within group or consortium.
 - Change users allocations and disk quotas.

Local HPC Requirements

- Subset of CSAR facilities:
 - Similar organisation using PIs, but registration managed centrally.

MIMAS Requirements

- Registration of the MIMAS service users (~7500 users).
 - Central registration.
 - Resource management (changing passwords, disk quota etc.) devolved to site representatives
- Crossfire service:
 - Self registration for users (~13000 users).
 - Authentication by Athens service.
- Some requirements shared with CSAR; others specific to MIMAS.

Other Requirements

- Logging of all transactions.
- Live and test sites to allow continued development.
- On-line help.
- Compatibility with Grid activities.
- Integration with query management system.
- Feedback from user community.

Self Registration

CSAR self-registration - Microsoft Internet Explorer

Address <https://ureg.mcc.ac.uk/CSAR/selfreg.html>

CSAR **Unix User Registration**

Self-Registration

Host:

Access Username:

Access Password:

Existing Username:

Existing Password:

Register for each machine that you require, in turn. Of course the next time round, you will then have an existing Unix username and password to enter below.

The [access control username and password](#), are obtained from your principal investigator. They define your institution, and the project on which you will be working.

If you do not have an access control username and password, you cannot self-register.

If you already have a [Unix username and password at Manchester](#) (not AFS), enter them here. Otherwise leave these fields blank. When you fill in these fields, the registration system uses information we already

Local intranet

Single person, multiple usernames

The screenshot shows a web browser window with the following content:

Service Quality Tokens

Token	Service	Changed	Comment
	CSAR	26Apr2000	

Hint: Click the tokens, which may be blank, for further details.

Userids

Username	Uid	Machine	Description
mrgodk	5501	AFS	The Manchester AFS system
mrgodk	5501	Fermat	CSAR - SGI Origin 2000, Fermat
mrgdan	23145	Fermat	CSAR - SGI Origin 2000, Fermat
mrgodk	5501	Fourier	CSAR - Fourier
mrgodk	5501	Fuj	CSAR - Fujitsu VPP 300, Fuj
dan	1198	Green	CSAR - SGI Origin 3000, Green
mrgodk	5501	Green	CSAR - SGI Origin 3000, Green
mrgodk	23388	Irwell	Mimas - Sun E6500, Irwell
mrgodk	5501	Kelvin	CSAR - Compaq, Kelvin
mrgodk	5501	Kilburn	Manchester HPC - Kilburn
mrgodk	5501	Turing	CSAR - Cray T3E, Turing
mrgdan	23145	Turing	CSAR - Cray T3E, Turing
mrgodk	5501	Wren	CSAR - SGI Origin 300, Wren
mrgdan	23145	Wren	CSAR - SGI Origin 300, Wren

Project Resources - PIs

Display Affiliation - Microsoft Internet Explorer

Address: <https://ureg.mcc.ac.uk/csar-bin/kreg12.pl>

Resources

Host	Resource	Allocation	Used	Default allocation	Allocated from	Usage last updated
Fermat	Generic	0 Token	0 Token	0 Token	Master	
Fermat	MP_Disk	750 GByteYear	24.11 GByteYear	0 GByteYear		17 Jan 2002, 06:06
Fermat	QUOTA	110,000 Mb	28,582.76 Mb	1,000 Mb	Engineering	17 Jan 2002, 04:00
Fermat	SMP_CPU	4,045.18 Hour	1,735.82 Hour	0 Hour		17 Jan 2002, 06:06
Fermat	Support	15 PersonDay	0 PersonDay	0 PersonDay		
Fermat	Tape	1,375 GByteYear	198.04 GByteYear	0 GByteYear		17 Jan 2002, 06:06
Fermat	Training	6 Day	0 Day	0 Day		
Fuji	CPU	257.14 Hour	0 Hour	0 Hour		17 Jan 2002, 06:06
Fuji	Fuji_Disk	0.56 GByteYear	0 GByteYear	0 GByteYear		17 Jan 2002, 06:06
Green	Green_CPU	655,628.04 Hour	97,700.19 Hour	0 Hour		17 Jan 2002, 06:06
Turing	HP_Disk	650 GByteYear	34.55 GByteYear	0 GByteYear		17 Jan 2002, 06:06

Done Local intranet

Usage Report - daily

CSAR Usage Report for user ltacc in project csn001

year	month	day	project	Turing	Fermat		Green
				CPU (PE Hours)	CPU (Hours)	HSM/Tape (GByte Years)	CPU (Hours)
2001	11	01	csn001	0.0026	0.9592	2.9418	2385.7478
2001	11	02	csn001	0.0000	0.0000	2.9418	0.0000
2001	11	03	csn001	1325.9760	0.0831	2.9418	0.0000
2001	11	04	csn001	2671.6839	0.1136	2.9418	3155.3333
2001	11	05	csn001	2650.5288	2.1573	2.9418	0.0000
2001	11	06	csn001	1334.0467	0.4336	2.9418	3413.6000
2001	11	07	csn001	1334.7230	0.9546	2.9418	0.0000
2001	11	08	csn001	0.0000	0.3973	2.9418	5220.0875
2001	11	09	csn001	0.0000	0.3139	2.9418	2433.4667
2001	11	10	csn001	0.0000	0.0000	2.9418	0.0000
2001	11	11	csn001	0.0000	0.0000	2.9418	0.0000
2001	11	12	csn001	1358.2621	0.5456	2.9418	0.0000
2001	11	13	csn001	1348.0911	0.5521	2.9418	0.0000

Capacity Plans

Capacity Plan - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discs

Address <https://ureg.mcc.ac.uk/csr-bin/ureg2.pl?1912...> Go Links

Advice on completing this form is available [here](#).

Resource	Host	2002 Months 1-6	2002 Months 7-12	2003 Months 1-6	2003 Months 7-12	2004 Months 1-6	2004 Months 7-12	Total planned	Units alloc'd	Units used
MPP PE CPU (PEHour)	Turing	400000	400000	440000	0	0		1240000	1388400	49661.311
HP Disk (GByteYear)	Turing	100	125	150	200	250		825	650	34.547
SMP CPU (Hour)	Fermat	1000	250	250	250	250		2000	4045.184	1735.821
MP Disk (GByteYear)	Fermat	100	100	150	150	150		650	750	24.11
HSM/Tape (GByteYear)	Fermat	300	350	400	500	600		2150	1375	198.04
Green CPU (Hour)	Green	150000	150000	90000	90000	90000		570000	655628.039	97700.194
VPP CPU (Hour)	Fuji	150	0	0	0	0		150	257.141	0
Fuji Disk (GByteYear)	Fuji	0.5	0	0	0	0		0.5	0.564	0

<https://ureg.mcc.ac.uk/doc/ureg2.html#Resource> Local Internet

Additional Reporting – Select Turing

The screenshot shows a web browser window titled "Reg home page - Microsoft Internet Explorer". The address bar contains "https://uneg.mcc.ac.uk/cgi-bin/uneg.pl". The page header features the Manchester Computing logo and the title "Unix User Registration".

1. Find people
The search will be performed on the first field containing data.

Existing Unix userid: *Specify this if the user already has an existing userid.*
Surname:
ATHENS username: *Specify this if the user has an ATHENS username.*
Affiliation code: *To find people affiliated to a particular site.*

2. Userids on a machine by affiliation

On host:
Showing Resource:
Affiliation code:

The affiliation code is frequently a userid prefix.

3. Project/Aff

The browser's taskbar at the bottom shows several open windows: "Start", "Andrew Jones - Microsoft...", "Command Prompt", "Microsoft Paint", and "Reg home page - Mic...". The system clock in the bottom right corner displays "16:34".

Select Home Directory Quota

The screenshot shows a Microsoft Internet Explorer browser window displaying the CSAR Unix User Registration page. The page title is "Unix User Registration" and the URL is "http://ungr.ncz.ac.uk/czar-bin/vreg.pl".

1. Find people
The search will be performed on the first field containing data.

Existing Unix userid: *Specify this if the user already has an existing userid.*
Surname:
ATHENS username: *Specify this if the user has an ATHENS username.*
Affiliation code: *Find people affiliated to a particular site.*

2. Userids on
On host: *The affiliation code is frequently a userid prefix.*
Showing Resource:
Affiliation code: *cs501@*

3. Project/Affiliation Management

The dropdown menu for "Affiliation code" is open, showing the following options:

- Home directory quota
- VFP_CPU [Fuj]
- Green CPU [Green]
- MPP-PE CPU [Turing]
- Disc quota on /work [Fuj]
- Disc quota on /work1 [Fuj]
- Disc quota on /work2 [Fuj]
- Disc quota on /work3 [Fuj]
- Disc quota on /work4 [Fuj]
- Disc quota on /d [Wren]
- Disc quota on /v [Wren]

The "On host" dropdown is also open, showing the following options:

- Home directory quota

The "Showing Resource" dropdown is also open, showing the following options:

- Home directory quota

Buttons: "List userids", "Clear Fields", "Clear Fields", "Clear Fields".

Individual quotas on Turing

CSAR **Unix User Registration**

Usersids on Turing

[cs5010 Apps / Ops](#)

Resource	Allocated	Used	Available for sub-allocation	Available for sub-allocation to users	Usage last updated
MPP PE CPU	26,406.97 PEHour	23,941.7 PEHour	-466.8 PEHour	8,806.97 PEHour	6 May 2003, 06:04
HP Disk	78.3 GByteYear	66.6 GByteYear	10.03 GByteYear	38.3 GByteYear	6 May 2003, 06:04
Disc quota on /ehome	14,000 Mb	3,716.34 Mb	83.95 Mb	83.95 Mb	6 May 2003, 07:00

Created	Person	Userid	Name	Disc quota on /ehome (Mb)	Usage (Mb)
15 Apr 2002	Ms Zoe Chaplin	zzzquz	Zoe Chaplin	1,000	994.53
24 May 2002	Ms Fiona Cook	zzzquf	Cook Fiona	5	0.26
26 Mar 2001	Mr Mike Daw	zzzqud	Mr Mike Daw	50	30.9
7 Feb 2002	Mr Rupert Ford	zzzquc	Mr Rupert Ford	50	40.98
23 Feb 1999	Dr Martyn Foster	mza_poo	Martyn Foster	499	492.08
28 Feb 2001	Dr Jonathan Gibson	zzzqug	Jonathan Gibson	200	27.33
18 Jul 2001	Claire Green	zzzquh	Ms Claire Green	50	0.51
30 Oct 2002	Claire Green-Deletedusers	zzzqudel	Claire Green-Deletedusers	1,500	27.34
★★★★★ 2 Feb 2001	Miss Kawkab Jaffri	zzzquj	Kawkab Jaffri	1	0.08
15 Apr 1999		zzzquop	Kawkab Jaffri	1	0.08

Trading Resources

Trade Project Group Resource Tokens - Microsoft Internet Explorer

Address: https://uniprnc.ac.uk/cse/cis/tp_trade1.cgi

trade, click the button. A deselected trade will be omitted from the list of confirmed trades in the following page.

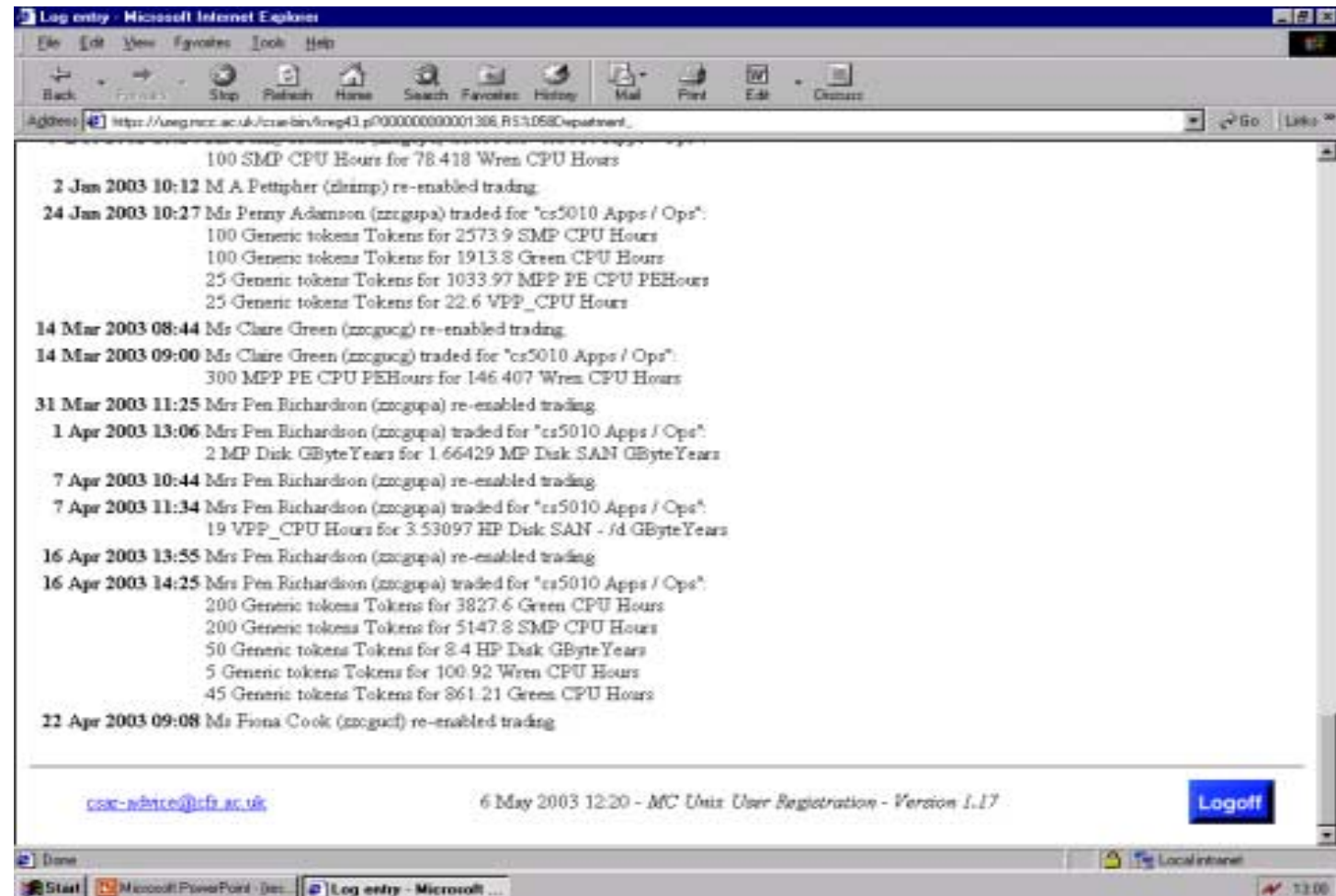
Requested Trades So Far...		Deselect
1,000 MPP PE CPU PEHours [Turing] of group resources for 462.7323 Green CPU Hours [Green] from pool	<input type="checkbox"/>	<input type="checkbox"/>
1,000 SMP CPU Hours [Fermat] of group resources for 21.718 HV Disk SAN /v GByte Years [Wren] from pool	<input type="checkbox"/>	<input type="checkbox"/>

[Try Trade](#) [Reset](#)

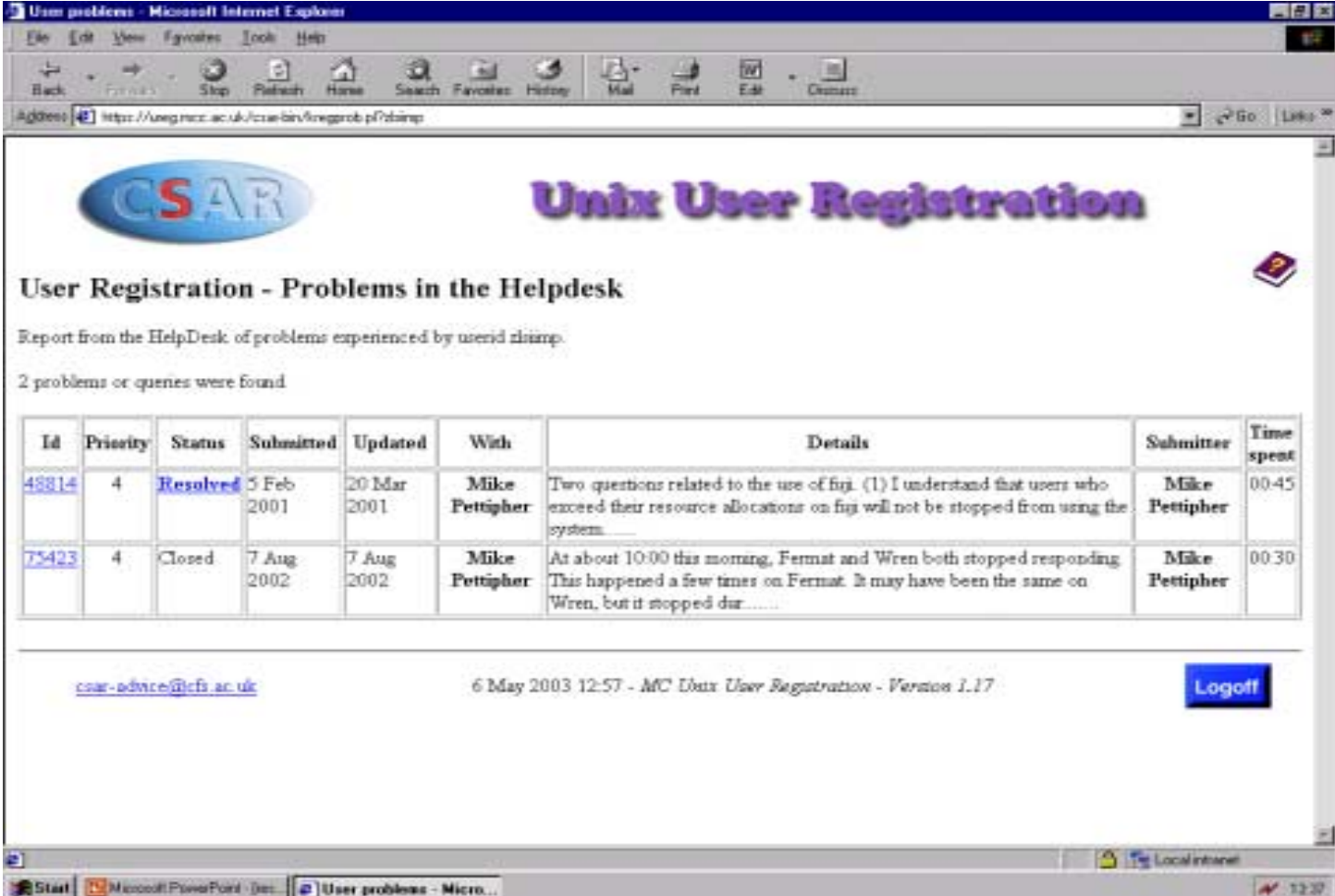
Current Group Resources			Predicted Group Resources		
Resource	Amount		Resource	Amount	
Turing - MPP PE CPU	2,465.2678	PEHours	Turing - MPP PE CPU	1,465.2678	PEHours
Turing - HP Disk	11.6993	GByteYears	Turing - HP Disk	11.6993	GByteYears
Wren - Wren CPU	216.4542	Hours	Wren - Wren CPU	216.4542	Hours
Wren - HP Disk SAN - /d	2.6175	GByteYears	Wren - HP Disk SAN - /d	2.6175	GByteYears
Wren - MP Disk SAN	1.6643	GByteYears	Wren - MP Disk SAN	1.6643	GByteYears
Wren - HV Disk SAN /v	3.9005	GByteYears	Wren - HV Disk SAN /v	25.6185	GByteYears
Fermat - SMP CPU	5,944.2495	Hours	Fermat - SMP CPU	4,944.2495	Hours
Fermat - MP Disk	5.5341	GByteYears	Fermat - MP Disk	5.5341	GByteYears
Fermat - HSM/Tape	15.5583	GByteYears	Fermat - HSM/Tape	15.5583	GByteYears
Green - Green CPU	5,619.9866	Hours	Green - Green CPU	6,082.7189	Hours
Fuji - VPP CPU	0.9197	Hours	Fuji - VPP CPU	0.9197	Hours
Fuji - Fuji Disk	0.7569	GByteYears	Fuji - Fuji Disk	0.7569	GByteYears

Taskbar: Start | Microsoft PowerPoint - [det] | Trade Project Group ... | Local intranet | 13:11

Transaction logging



Managing Queries



The screenshot shows a Microsoft Internet Explorer browser window displaying a web page titled "Unix User Registration". The page features the CSAR logo and the heading "User Registration - Problems in the Helpdesk". Below the heading, there is a report from the HelpDesk and a table listing two problems or queries.

CSAR **Unix User Registration**

User Registration - Problems in the Helpdesk

Report from the HelpDesk of problems experienced by userid zisamp.

2 problems or queries were found

Id	Priority	Status	Submitted	Updated	With	Details	Submitter	Time spent
48814	4	Resolved	5 Feb 2001	20 Mar 2001	Mike Pettipher	Two questions related to the use of Fiji. (1) I understand that users who exceed their resource allocations on Fiji will not be stopped from using the system.	Mike Pettipher	00:45
75423	4	Closed	7 Aug 2002	7 Aug 2002	Mike Pettipher	At about 10:00 this morning, Fermat and Wren both stopped responding. This happened a few times on Fermat. It may have been the same on Wren, but it stopped dur.....	Mike Pettipher	00:30

csar-advice@cfb.ac.uk 6 May 2003 12:57 - MC Unix User Registration - Version 1.17 [Logoff](#)

Manchester Computing

Supercomputing, Visualization & eScience

Structure



THE UNIVERSITY
of MANCHESTER

Structure of Registration System

- Helpdesk service used for all queries managed by MC, based on Action Remedy System (ARS)
- Underlying database package – Oracle.
- Registration system written in Perl in and built as a layer on top of ARS.
- Executes commands on different systems. Feedback to ensure integrity between database and actual systems.
- Person based – single entry in database for person with (potentially) multiple usernames.
- 4 components:
 - People, affiliation, systems, resources

Manchester Computing

Supercomputing, Visualization & eScience

Future Developments



THE UNIVERSITY
of MANCHESTER

Future Developments

- New version under development.
- General enhancements:
 - Structural:
 - Host machines <-> programs <-> OO Library <-> Database access module <-> database
 - Independence from underlying software – ARS and Oracle.
 - Improve performance for transactions (recent move to multithreaded version of Oracle gave substantial improvements.)
 - Role association, as well as personal.
- Merger of the University of Manchester and UMIST (University of Manchester Institute of Science and Technology) – project Unity.
- Specific Grid-motivated enhancements.

Project Unity

- University of Manchester – one of the largest universities in UK.
 - University registration scheme for all students and staff.
 - Unix user registration scheme for a variety of services managed by Manchester Computing.
- UMIST
 - University registration scheme for all students and staff.
 - Another registration scheme for specific services managed by local computing support unit.
- A new registration scheme, based on the MC unix user registration system, is being developed. This will provide the capability to manage all of the separate schemes mentioned above.

UK Grid Environment

- 2002/2005 – significant funding for e-Science projects and centres.
- How can real science exploit the grid?
- e-Science projects:
 - Industrial projects
 - Pilot projects
 - Interdisciplinary Research projects
 - Demonstrator projects
 - International projects

UK e-Science Centres



UK Grid Resources

- Most e-Science centres have committed resources for grid use.
- The National HPC providers – CSAR and HPCX are both committed to supporting activities on the grid, and will make some national resources available.
 - Globus and UNICORE are installed on the CSAR systems.
- Most e-Science pilot projects have been awarded significant resources on the national HPC services (Cray T3E, SGI Origin, IBM, SGI Altix), and have access to other local and e-Science facilities.

Grid Registration – The Challenges

- Potentially thousands rather than hundreds of HPC users, and tens of thousands social science and library users.
- Centres in general do not own resources being made available to e-Science programme, nor do they necessarily have direct administrative control of them.
- Authentication, Authorisation and Accounting are potential administrative nightmares...

Authentication, Authorisation,

...

- A Globus-based Grid user requires, for each system to be used:
 - A username on the system
 - A personal certificate (X 509), issued (e.g) by the UK e-Science certificate authority (operated by the UK Grid Support Centre).
 - An entry in the grid-mapfile (to map the certificate name to the username).
- Typically entries in the grid-mapfile are managed by the system administrator (by default, the grid-mapfile is owned by root). Need to ensure that the user making the request is the same person as owns the private key of the certificate. Note that a user may legitimately possess multiple certificates, issued by different certification authorities.
- Current, informal procedures where grid-mapfile maintainer knows users personally cannot scale for projected numbers of Grid users.
- Similar model exists in UNICORE, with the UNICORE User Data Base (UUDB) replacing the grid-mapfile.
- ...leads to complicated and excessive administration.

So ...

- As we delegate username creation (to the PI), it makes sense also to similarly delegate control of the grid-mapfile or UUDB entries.
- Can also add digital certificate authentication, as an alternative means to access the registration system (user imports X 509 certificate into browser).
- Can associate one (or more) certificates with the person that owns the accounts.

Accounting

- Most sites providing resources on the Grid need to know to whom the usage should be charged, which means knowing at least the user and the amount of each resource used.
- In the longer term, we need:
 - A logging infrastructure that records resource usage.
 - A commonly understood means of describing charges.
 - A mechanism to negotiate charges between the consumer and the service provider.
 - A secure payment mechanism.
- We are pursuing these issues through the UK e-Science project 'A Market for Computational Services'.

UoM/CSAR Resource Management

- The University of Manchester Unix User Registration System (UURS) already contains many of the features required:
 - Delegate authority/administration as far as possible down the tree – to the Principal Investigator and the end user, thus reducing the burden on system administrators.
 - A single personal authentication, for use with many systems.
 - A charging mechanism for all resources, with the ability to trade resources as required.
 - Capacity planning to address future requirements.
 - Modularity to maximise flexibility.

Summary

- University of Manchester Unix User Registration System handles wide range of resource management activities.
- A major objective has been to devolve administrative tasks as much as possible, to reduce the burden on system administrators and to give the users more control.
- New version under development will provide more flexibility and be capable of supporting a wider range of services both for local and national users of systems based at Manchester, and hopefully also in the Grid environment.
- We are open to suggestions ...

SVE @ Manchester Computing

World Leading Supercomputing
Service, Support and Research

***Bringing Science and
Supercomputers Together***

www.man.ac.uk/sve
sve@man.ac.uk



THE UNIVERSITY
of MANCHESTER