

# Supercomputing in Oxford



Where we are and where we are going

# Topics

- High Performance Computing in Oxford
- OSC Facilities & services
- How to use the centre
- Future plans
- Please ask questions and discuss points!

# HPC: Department to UK



HPCX

Level 1  
National Facility

National Grid Service



Campus Grid

Level 2  
Campus Facility



Oxford Supercomputing Centre

Level 3  
Departmental Facility

Physics, Stats, Earth Sciences,  
Chemistry, etc

# The OSC Mission

- A “one-stop-shop” for high performance computing which is available to any OU based researcher
- To promote the value of HPC and encourage researchers to use it

# OSC Organisation

OSC policies are decided by a committee of active users



The OSC is based in the ComLab

OSC Staff



Jo Shields  
Systems Administrator



Joe Pitt-Francis  
Scientific Programming

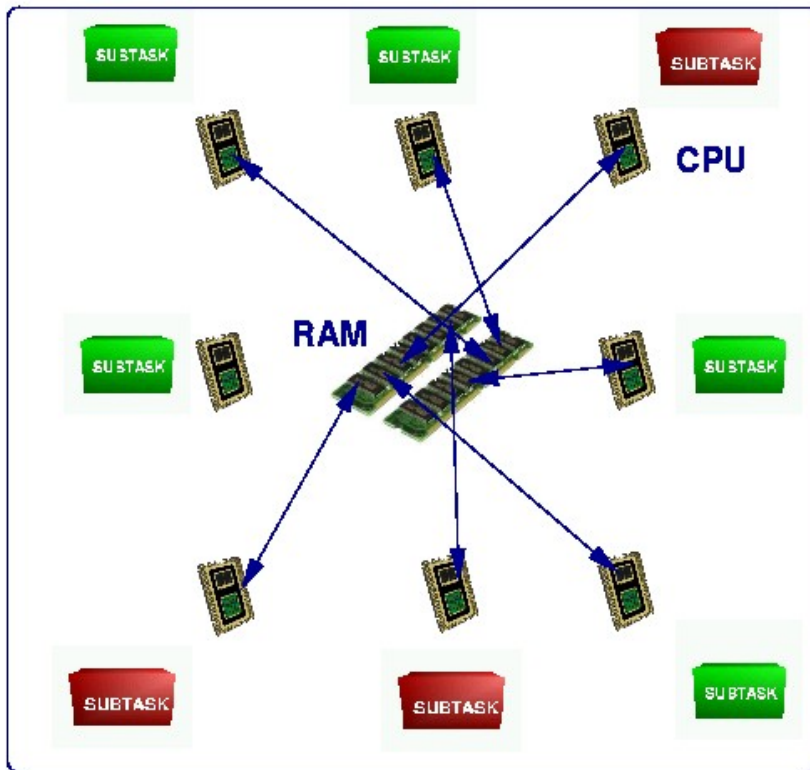


Jon Lockley  
Systems Manager

# Facilities

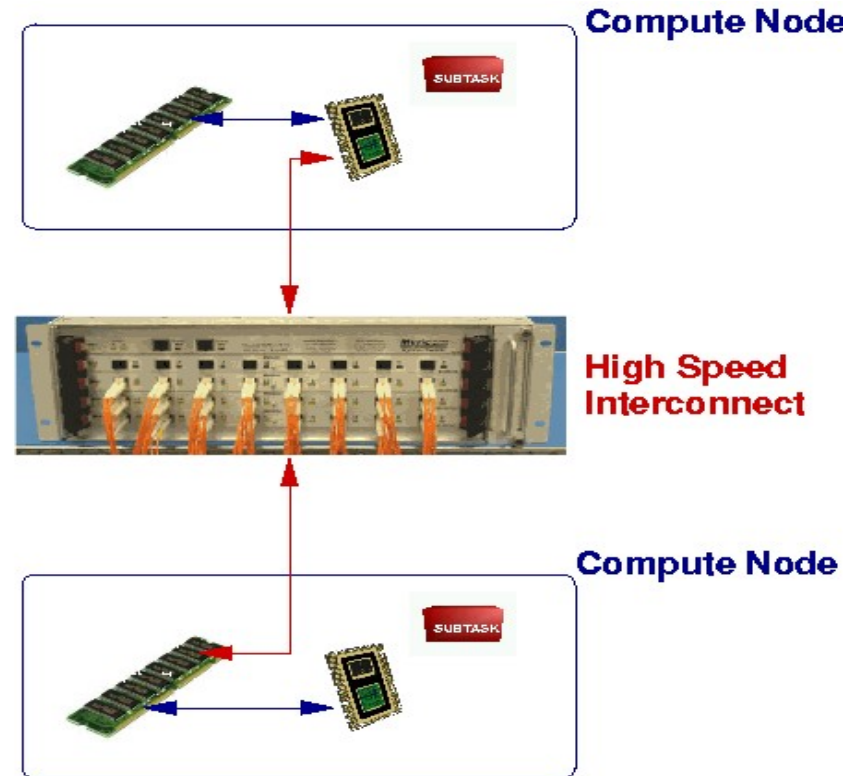
- We currently specialise in capability (as opposed to capacity) computing
- Our hardware and software reflect a specialisation in parallel, scientific computing
- Two systems to reflect the two main ways of doing parallel computation
  - Shared Memory
  - Distributed Memory

# SHMEM vs DMEM



SMP NODE

Shared memory



Distributed memory

# Shared Memory - OSWELL

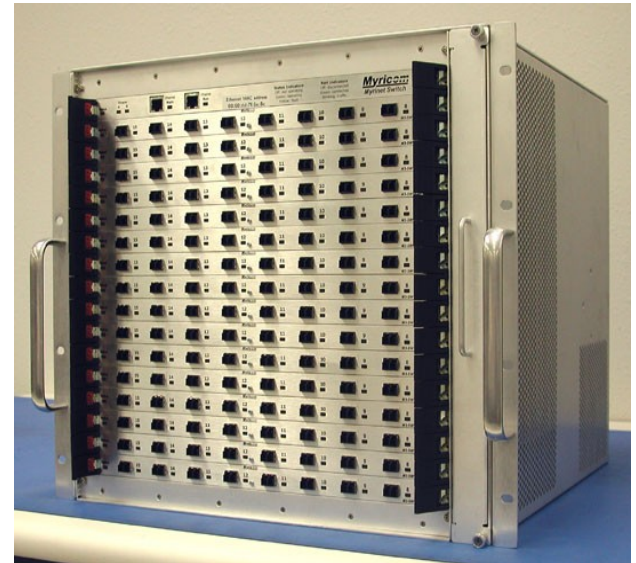
- Jan 2002
- Four, SunFire 6800s
- 84 900MHz Ultra SPARC3 CPUs
- 168 GB RAM
- Solaris 9
- 151 Gflop
- £750,000





# Distributed Memory - Zuse

- June 2005
- 48 1U Servers (Dell SC1425)
- 96 3.6GHz Xeons
- 192 GB RAM
- Myrinet interconnect
- RHEL 3
- 691 Gflop
- £60,000



# Services

- Systems management
  - Hardware & OS support
  - Service provision & monitoring
- Software
  - Compilers, debuggers & libraries are provided
  - Job scheduling
  - Installation of new software for users
- User training (UNIX & parallel programming)
- Advice on running departmental clusters

# New Service!

- The OSC has also volunteered to run a license server for scientific (and related) software
  - Portland Compiler
  - Intel Compiler
  - Others?
- All hosted products are free to use for all University departments
- Access by application (see our website)

# Using the OSC Computing Systems

- Any Oxford researcher can use the OSC parallel computing systems
- Apply at [www.osc.ox.ac.uk](http://www.osc.ox.ac.uk)
- Users are put into groups
- Two types of membership: full & guest

# Full membership

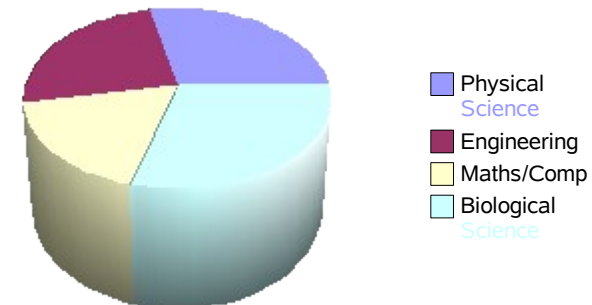
- Each user is part of a full membership group
- New groups can easily be added
- New users in full membership groups automatically added (students need approval from group leader)
- No limit to the size of a group
- Each group pays £5,000 per annum
- Group gets an “equal share” of CPU time

# Guest membership

- Guest users go into the guest group
- Application must be approved by user management committee
- Free but
  - Only lasts six months
  - Limited CPU allocation
  - Must demonstrate that they are likely to pay a full membership fee on expiry

# Current Membership

- 171 users in three years (inc 35 guests)
- Currently about 90 open user accounts
- About 20 full membership groups



# Advantages of Using the OSC

## Departmental Workload

Buying & installing equipment

Hosting (machine room)

Monitoring

User training

Software installation

Software Development

Software Purchase

Job scheduling

OS Optimisation

Backups

Repairs & upgrades

Doing the science



# Advantages of Using the OSC

## Departmental Workload

Doing the science

Software Development  
Software Purchase

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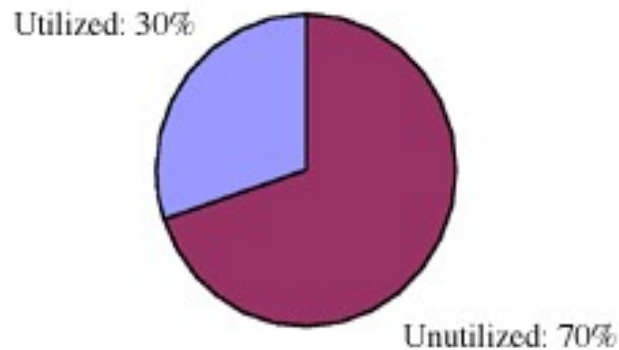
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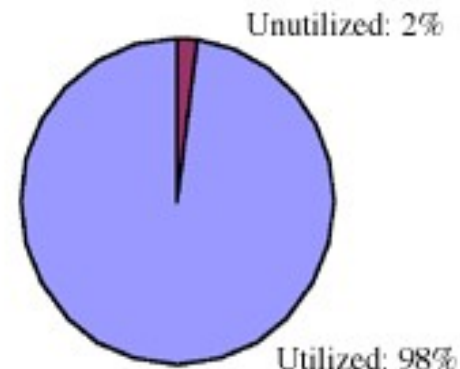
# Advantages of using the OSC

## % Utilization

Unmanaged Clusters



Managed Clusters



# The Future Part 1 - SRIF3

- The OSC has asked for £3million from SRIF3
- £1.8 million for new computing hardware  
ASAP
- £0.6 million for a new machine room
- £0.6 million for later hardware purchases
  - attempt to move to a shorter duty cycle for h/w

# The Future Part 2 - Compute

- Probable move to Linux throughout
- Non x86 platforms?
- Should we continue with large SMP?
  - Poorer theoretical bangs-per-buck
  - More suitable for some problems
  - Differentiates from departments
- Should we spend more on large storage?
- Should we do more capacity computing?
- New machine room being designed – interest in renting space?

# The Future Part 3 – Business Plan

- The OSC may have to move to a charge per CPU hour with the introduction of **fEC**
- The cost will depend on which costs (staff, hardware) have to be recovered – unknown so far.
- Charges passed onto user/group/dept?
- Move to leasing equipment?



fEC!

# Visits

- The OSC Staff are happy to visit departments and give more technical talks on a range of topics. For example:
  - High performance parallel computing (HOWTO)
  - Clusters (HOWTO)
  - How to use the OSC
  - Linux/Unix
- We would also like to hear from research teams as to what HPC hardware/software they would like to see in Oxford – help us create the centre you want to have!

**Questions**

