Research Bytes

Welcome **to this Spring term issue of *Research Bytes***

In this issue we have featured

Discovery Net

DTI Beacon Awards

We hope that you enjoy reading about these and it inspires you to contribute We aim to produce this periodical once a term. Its frequency depends on *you!*. We are always looking for good copy, so please let Androulla have your ideas and material.

Chris Hankin, Director of Research

Discovery Net wins the Most Innovative Data Intensive Application Award at Supercomputing 2002

Moustafa Ghanem, Yike Guo & Michelle Osmond

The Discovery Net project at the **Department of Computing won the "Most Innovative Data Intensive Application" award** in the High Performance Computing Challenge at the Conference in a head-to-head challenge of 6 international finalist teams. The announcement and awards ceremony was held in Baltimore, Maryland, USA at the 15th Annual Supercomputing Conference and Exhibition (SC2002).

Discovery Net ***is a £2.08 Million project*** funded by the UK e-Science Programme and is one of the UK's key e-science pilot projects. Based at Imperial College in London, the project focuses on the development of technology for real-time scientific and business analysis with project partners in the Department of Computing, Department of Physics, Department of Earth Sciences and the Department of Biological Sciences.

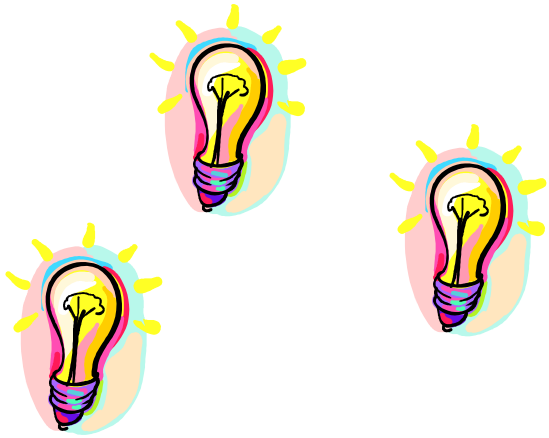
For the Challenge, Discovery Net researchers demonstrated their innovative ability to analyse large-scale genomic data in real time using cross-continent distributed computing resources. In the live demo conducted from Baltimore, they showed how data generated from Malarial DNA-sequencing systems operating in London could be combined with reference genomic data on the Internet and submitted for integrated analysis on a GRID-based computing infrastructure. The application highlighted the advantage of using technology developed by Discovery Net for exploiting diverse information resources available worldwide to speed the identification of new therapeutic agents.

Discovery Net's main goal is to develop an infrastructure which supports collaborative and grid-based data integration and analysis. The pluggable architecture developed allows for access to a changing set of remote data sources and computational services, as well as providing the usual knowledge discovery services such as access and construction of local datasets, and pre-defined data mining algorithms. The design and features of the Discovery Net architecture were originally developed from the needs of the knowledge discovery process as applied to the field of bioinformatics, where complicated data analysis workflows are typically constructed in a data-pipelined approach. The discovery pipelines make use of distributed data and analysis services, feeding results from one stage to the next to develop further models. This discovery process has been shown to be applicable to many other fields such as geological analysis,

environmental sciences, astronomy, and particle physics.

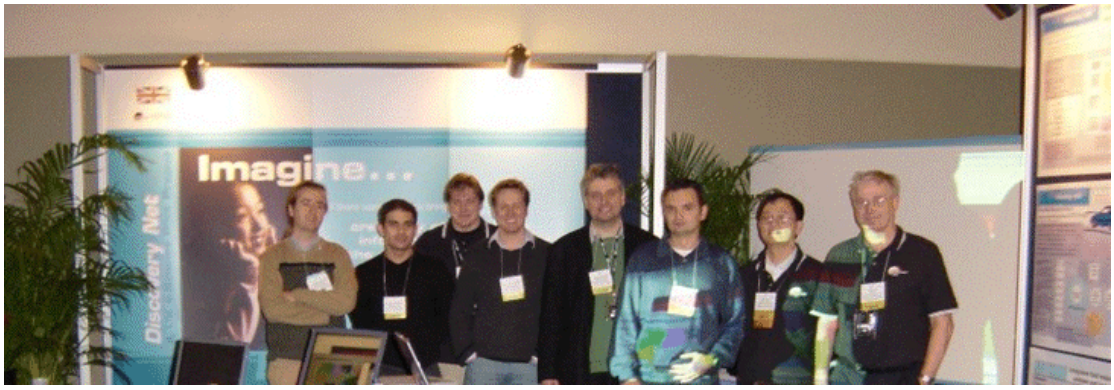
The application demonstrated at SC2002 was a workflow performing real-time genome annotation. A genome sequence is the map of an organism's genetic information. Sequencing of a genome is only the first step in understanding it - typically, a complex and lengthy annotation process follows, where significant regions of the sequence (e.g. known or suspected genes) are labeled and linked to relevant publications or other information. There are three levels of annotation - nucleotide-level, protein-level, and process-level. Annotation is currently performed in a semi-automatic way using various software tools and web resources, executed by a large number of collaborating scientists. Currently, it takes a long time to produce an entire genome sequence for an organism. However new gene sequencing technologies promise much faster production of genome sequences, which will shift the bottleneck to the annotation stage. Automating and integrating the various tools used for annotation should significantly speed up the process, and this of course was the focus of our demonstration.

In collaboration with researchers from the John Hassard group at the Department of Physics at Imperial College and from the Sanger Institute at Cambridge, a genome annotation environment was built on top of Discovery Net by integrating a heterogeneous set of remote databases, analysis and visualisation tools as new components. Annotation workflows were then built which combined these components. The annotation pipe-line was executed using a mixture of high-performance resources hosted by the London E-Science centre, locally executing servers in Baltimore and data from various geographically distributed bioinformatics databases. DNA sequencing equipment at deltaDot Ltd. in London was used as a real-time data source, and the annotations generated were uploaded to a distributed annotation warehouse. The application was validated by domain experts, **and won an award for the most innovative data intensive application**.



The *Discovery Net* team members based at the Department of Computing include:

Yike Guo (Principal Investigator), Moustafa Ghanem (Project Manager), Salman Al-Sairafi, Peter Au, Jaturon Chattratichat, Vasa Curcin, Filippia-Sofia Emmanouil, Nikolaos Giannadakis, Mohammed Ali Jafri, Anton Oleynikov, Michelle Osmond, Anthony Rowe, Jameel Syed, Huy Vu, Patrick Wendel, Zheng Ye and Yong Zhang.



***Extracts from the recent Press Release on* Cutting edge Imperial research wins 'chunk' of UKP 8million - DTI Beacon fund**

Two new technologies being developed at Imperial College London have won almost a third of a new UKP 8 million research programme funded by the Department of Trade and Industry (DTI), launched on 20th November 2002.

The Beacon research programme, which is part of a DTI initiative to provide a platform for UK world-class research in the areas of bioinformatics, bio-imaging and nanotechnology, will focus on developing technologies that will provide novel healthcare solutions.

Paul French, Professor of Physics in the Department of Physics will lead a team, drawn from every faculty of Imperial, in developing fluorescence-imaging technology that will improve non-invasive detection of diseased cells in the body. In addition, the project will provide a novel way of investigating the trafficking and communication between proteins in the body.

Stephen Muggleton Professor of Bioinformatics in the Department of Computing will lead a team in developing computer technology to fine-tune therapeutic drug design. Using expertise from biological science, medicine and computing the team will develop an industrial-strength computing tool that will allow the modeling of disease pathways and predict the toxicity of potential drugs. This tool will assist in the search for

effective drugs and reduce the expense in their development.

"Research and development in the pharmaceutical industry involves laboratories of chemists synthesising and testing hundreds of compounds often at great expense," said Professor Muggleton.

"It is now possible to construct 'rules' that predict whether drugs will work from examples of drugs with known medicinal activity. The accuracy of the rules has been shown to be slightly higher than traditional statistical methods used in drug development.

"During the 21st century, it is already clear that computers will play an increasingly central role in supporting the fundamental formulation and testing of scientific hypotheses," he added.

Both Imperial projects will harness the strong interdisciplinary and entrepreneurial culture at Imperial to develop new drugs and deliver improved detection and treatment of disease.

Science and Innovation Minister, Lord Sainsbury announcing the grants said:

"These projects will develop new and exciting techniques to tackle disease and have the potential to revolutionise the future of healthcare. This work will also capitalise on the excellent science available in this country and will help the UK maintain its global position at the leading edge of bioscience and biotechnology. The awards are an example of how DTI is supporting the development of new technologies that enhance the future competitiveness of UK industry."

Imperial scientists joined representatives from the four other Beacon projects and Lord Sainsbury in celebrating the research programme launch at the Globe Theatre, London on 20 November 2002.

1. Details of the winning Imperial projects:

Title**: Functional Bio-imaging using Fluorescence lifetime imaging –**
Lead researcher: Professor Paul French, Department of Physics
Award: UKP 1,446,000

Title: **MetaLog – Integrated Machine Learning of Metabolic Networks applied to Predictive Toxicology**
Lead researcher: Professor Stephen Muggleton, Department of Computing
Award: UKP 1,145,343

The projects will run between 3 and 5 years, and DTI will be working closely with project leaders and companies interested in the technologies to ensure that the work remains timely and relevant for industrial application.

The selection process for these projects was conducted in consultation with the relevant Research Councils: **Biotechnology and Biological Sciences Research Council (BBSRC), Engineering and Physical Sciences research Council (EPSRC), and Medical Research**

Council (MRC). Key factors in selecting the projects were;

- the degree of innovation involved; and,
- the interest and enthusiasm of potential industrial users of the technology.

25th International Conference on Software Engineering – ICSE 2003

Jeff Kramer will be one of the recipients of the MIP Award (Most Influential Paper), in a ceremony of the 25th ICSE-2003 to be held in Portland, Oregon, USA, in May 2003. The Award is presented at each ICSE meeting to the author(s) of the paper from the ICSE meeting of 10 years ago that is judged to have had the most influence on the theory or practice of software engineering during the 10 years since its original publication.

The award-winning paper is entitled "Expressing the Relationships Between Multiple Views in Requirements Specifications" and was co-authored by Bashar Nuseibeh, Jeff Kramer and Anthony Finkelstein and published in the IEEE Proceedings of ICSE-93 held in Baltimore, USA, in May 1993.

Philip Leverhulme Prize

As a former Reader in the Department and currently a Visiting Research Fellow, Professor Bashar Nuseibeh has been awarded a Philip Leverhulme Prize for outstanding research contributions at an international level while under the age of 36. The prize comes with £50,000 award to be used for furthering Prof Nuseibeh's research.

Library services for the Department of Computing

A new faculty Help Desk on Level 4 of the Central Library will soon replace the Level 3 Help Desk, which closed at the beginning of November 2002. It is intended the new desk will serve the needs of users of the faculty collections in the Central Library. Staff at this desk will be happy to respond to your queries or requests.

There will continue to be a Help Desk on Level 2 for general enquiries.

Ellen and Heather, who look after the computing material in the Central Library, can also be contacted directly by phone on 020 7594 8831 (x48831), or by e-mail:

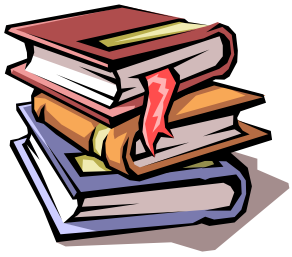
Ellen Haigh, Liaison Librarian: ebh@doc.ic.ac.uk
Heather Chesters, Senior Library Assistant: h.chesters@ic.ac.uk

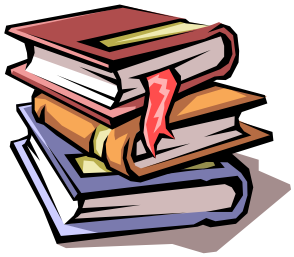
Goodbye to paper!

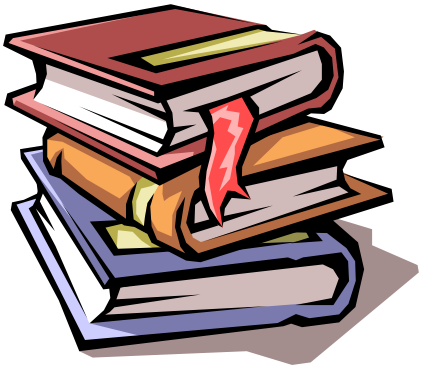
From January 2003, journals published by the following publishers have been available in electronic format only:
Academic Press (e.g. Computer Vision and Image Understanding, Information and Computation, Journal of Parallel and Distributed Computing)
Wiley (e.g. Concurrency and Computation, Journal of Software Maintenance & Evolution, Software: Practice & Experience)

Full-text access to the library's electronic journal collection is available from http://www.lib.ic.ac.uk/ejournals/ejnls.htm

If you register with one of the alerting services to which the library subscribes, you will receive e-mail alerts when the latest copies of your favourite journals become available. The British Library's Zetoc (http://zetoc.mimas.ac.uk/) alerting service covers titles published by both Academic Press and Wiley. The Science Direct (http://www.sciencedirect.com/) alerting service also covers titles published by Academic Press.







EU Framework 6 FET Information Event 13th-14th Jan 2003

By way of a brief report I attended the Future and Emerging Technology info-event for the Framework 6 first call in the IST area. FET is the successor to Long Term Research and Basic Research, and retains provision for reactive "Open", submissions of smaller projects (STRPs), Networks of Excellence, etc. The FET part of the call is focused on proactive programmes in three main areas, with sub-areas in the Beyond Robotics initiative.

1. The Disappearing Computer 2
2. Beyond Robotics
    a. Cognitive Companions
    b. Human Augmentation
    c. Robot Ecologies
3. Complex Systems

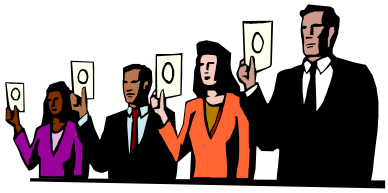
The emphasis is on Integrated Projects in the above areas- see *big change*, below. Future calls may be more amenable for smaller projects.

The web site
http://www.cordis.lu/ist/fethome.htm
provides details of presentations, background papers, and how to make proposals. Ask me for further nuances. I did not think this call very favourable for DoC, but Complex Systems embraces the internet of 2025, whatever that may be, and there is determination to keep FET receptive and open. Other FP5 areas like Global Computing and Nanotechnology may re-appear in later calls. The current proactive calls involved a 2 stage submission, as it seems will be the case with many of the future FET calls and "instruments" (to use the jargon), but not the open STRPs.

Overall, F6 embraces practically all EU R&D areas, and has a budget of more than £10,000,000,000 (yes that is 10 Billion), but this is over its lifetime (>4 years). The total for the IT society area is about £3B, much the same as for F5. Again most is for Industry linked R&D, but many such projects have in the past had University participation. There are separate pots for Networks of Excellence etc. The FET pot is about10%, and in the past has been managed more with Universities in mind. So far as I can gauge, the funding mechanism will be similar, providing supplementary costs only, with similar provision for overheads under the university model, so this will remain a sensitive point. Follow call details from the above link to get the full list of areas for the current

The ***big change*** in F6 is that the previous implicit progression towards larger projects has been made explicit, except that they are called Integrated Projects. So far as FET are concerned the IPs are seen as integrated research programmes rather than projects. The main driver for this thrust toward Integrated Projects is to export the management from the directorate to the recipients, so that the programme looks more efficient. A real killer is that explicit management costs of the IPs are limited to 7%, not the previous implicit 10%, yet there seems to be more management, not less. (I think the 7% can also be fully funded for industry). Of course, programme technical or scientific leadership is seen as scholastic contribution in itself at some institutions. One model might be to see an integrated project as a better funded and more directed Network of Excellence, a form of funding where academic leadership has benefited younger researchers. An Integrated Project can (in effect) issue its own calls for proposals.

Jim Cunningham



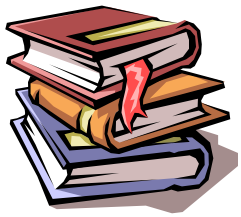
Recent Grant Announcements

EPSRC **are currently delaying the start of all new grants until 1 April 2003. The next issue will include details of grants!!!!**

The British Computer Society's Book of the Month

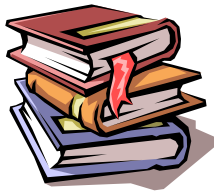
Another 5 stars for the Department!!

The Book of the Month in the November 2002 issue of the BCS featured 'Secure Communicating Systems: Design, Analysis and Implementation" by Michael Huth.



Our congratulations go to Michael **on a book which draws together a number of key themes relating to the detail of networked information security and provides a thorough guide for professionals who want – and need – to know what is happening at the core of their security system.**

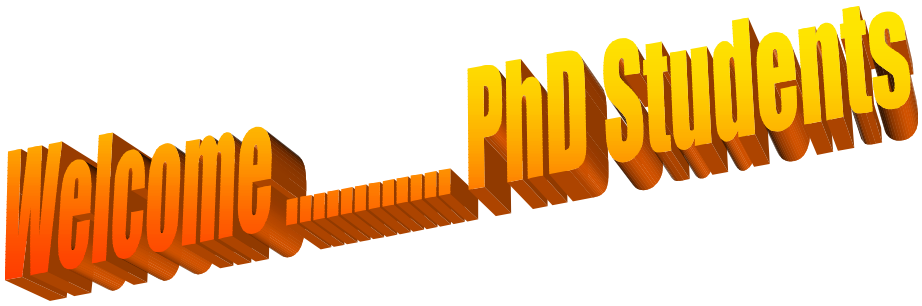
Michael Huth's book **gives an overview of some of the security issues facing us and gives an insight into the operation of public and symmetric key encryption. It discusses the design and analysis of security protocols and considers how to optimize these systems for a particular environment.**



For further details of the review, refer to BCS Bulletin November 2002 issue

Welcome to our new RAs

Jung Wook(Philip) Bang
Alexandros Chortaras
Marcus Ellington
Daniel Heesch
Mohammad Ali Jafri
Timothy Todman
Sebastian Uchitel



Will Heaven
Tero Rissa

(Both joined the Department on 3rd March)

CONGRATULATIONS **to the following who were awarded their MPhil or PhD Degrees during 2002!!!**

Jung Wook (Philip) Bang
Dan Chalmers
Nicodemos Damianou
George Mournos

TERM DATES:

Session 2002-2003
28 September – 13 December 2002
4 January - 21 March 2003
26 April – 27 June 2003

Session 2003-2004
4 October – 19 December 2003
10 January – 26 March 2004
24 April – 25 June 2004

Hold the back page!

Graduate School of Engineering and Physical Sciences
Following on from the Launch of the new Graduate School last October 2002, two Newsletters have been issued. If you are interested in receiving your own copy or back copies, please contact **sophie.white@ic.ac.uk**

The GSEPS held *its first Postgraduate Recruitment Fair* on 7th February – this will be a regular event in the future!!!

******* GSEPS DIARY DATES *******
Summer Research Student Symposium – Wednesday 16th July 2pm, Great Hall, South Kensington campus
Research Bytes…. Research Bytes…… Research Bytes… Research Bytes… Research Bytes … Research Bytes……. Research Bytes

This term College ends on Friday 21st March and begins again on Saturday, 26th April. The Easter dates are Friday 18th-Monday 21st April
Research Bytes…. Research Bytes…… Research Bytes… Research Bytes… Research Bytes … Research Bytes……. Research Bytes

Research Bytes is ***the Research Newsletter for the Department!***
Our aim is to publish 4 times a year – end of October, January, April and July. We aim to include articles such as events for the diary, new funding opportunities, examples of innovative research, visits to conferences etc etc etc. Please send any contributions to Androulla Pieri, Research Secretary – ap15@doc.ic.ac.uk or phone on 020 7594 8220. We reserve the right to edit any contributions!

*******DEADLINE FOR APRIL ISSUE*******
Wednesday, 30th April 2003