AUSTRALASIAN

WHEELS

for the mind

Hands-on Surgery

Medical students are learning the ins and outs of paediatric cardiology from some of Australia's best cardiothoracic surgeons – without stepping into an operating theatre

Building the new AUC

Expansion of the Apple University Development Fund underscores Apple's renewed commitment to the university development community

The art of ONLINE collaboration

A new online system is set to help students and instructors in Sydney University's Faculty of Arts work better together

QuickTime MULTIMEDIA revolution

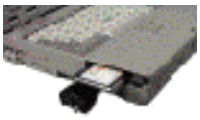
QuickTime technology is making archived film and music resources far more accessible by preparing them for instant delivery, online

Poor man's supercomputer

Think iMacs are just for fun and learning? A team of Melbourne University researchers is planning to harness a team of iMacs to unravel some of Nature's most elusive secrets

PRODUCT Round UP

VIDEO CAPTURE FOR TRAVELLERS



Travelling video producers will want to check out PAR Technologies' iREZ CapSure, a PC Card solution that allows PowerBook users to capture video input from any composite or S-video input source.

Using CapSure, you can grab video from your VCR, video camera, DVD, digital camera, and any other source that outputs standard video signals. CapSure's resolution of up to 640 by 480 pixels, and speed of 30 frames per second, gives it excellent quality for most multimedia productions. Its use of the PowerBook's ZoomedVideo technology allows the video signals to be sent straight to the laptop without any decrease in processing speed.

Once your videos have been captured into the PowerBook, use video editing software such as Adobe Premiere, Macromedia Director or iREZ's own MoviEdit to string them together and edit them to your heart's content.

The CapSure card comes complete with onboard digital signal processor, Apple Video Player software, ZoomedVideo drivers and support for PAL, NTSC, and any other video standard in the world. Brightness, contrast, hue and saturation can be added on the fly, and future software upgrades will support features such as mirroring and digital zoom.

CapSure requires a ZoomedVideo compatible PowerBook or Windows 95/98 PC, 16MB RAM, System 7.6.1 or higher.

For more information about Capsure contact Macsimise on (03) 9521 4877 or www.macsimise.com.au

PC PRINTER

PRINT TO ANY PC PRINTER

If you're travelling a lot or just surrounded by PC users, consider looking into InfoWave's PowerPrint utility.

This handy application allows Macintosh users to print to nearly any PC-compatible laser printer, inkjet printer, specialty printer or multi-function devices. It's ideal for travellers who can't find a Macintosh printer to use, people wanting to save money by buying less-expensive PC printers, people sharing printers with PC users, and those needing access to specialty printers such as poster-sized printers or plotters.

The package includes PowerPrint software, which are new Macintosh drivers that support more than 1600 PC compatible printers. Also included is a USB to parallel port converter cable, which lets you connect to the PC printer using the USB (universal serial bus) port on the back of your Macintosh.

A version is also available that includes a USB to serial port converter cable, for use with printers supporting a direct serial connection. InfoWave also recently shipped PowerPrint for Networks, which allows Macintosh users to print to PC printers attached to 10 or 100Mbps Ethernet networks.

For more information about PowerPrint contact Macsimise on (03) 9521 4877 or www.macsimise.com.au

Touch ScreenMac

FIRST iMAC TOUCHSCREEN

Multimedia designers wanting to roll out their applications in public kiosks will benefit from the first touchscreen made specifically for the Apple iMac. Designed and manufactured in Melbourne, MicroTouch Systems' ClearTek capacitive touchscreen and controller technology have been custom modified to be integrated into the iMac without compromising the system's design.

The iMac's all-in-one computer and monitor design makes the system an ideal kiosk device for use in applications such as information desks, multimedia events, interactive research materials, providing easy student access to CD-ROM presentations, public Web browsing stations, and point-of-sale retail environments.

The ClearTek's five-wire design and treated glass front provide a sensitive yet scratch and vandal-resistant surface that makes it ideal for public use.

Contact MicroTouch on (03) 9582 4799 or www.microtouch.com

PROTECT YOURSELF FROM THE NET

These days, connecting a network to the Internet without the protection of a firewall is about as safe as skydiving without a parachute. For businesses and schools of any size, a good firewall will go a long way towards keeping unwanted intruders off of sensitive internal networks – while at the same time letting networked students get onto the Net without interference.

With a focus on ease of use and configuration, Sonic's SonicWALL Internet firewall appliances save you the trouble of complicated firewall setup. Simply plug in your network and WAN and away you go.

Integrated firewall software includes content filtering capabilities that let network administrators limit student access to objectionable Web sites, while logging and reporting features let administrators keep tabs on which sites the network users are visiting.

Three members of the SonicWALL family cater for different environments:

SonicWALL protects small networks, and comes in 10-user, 50-user or unlimited-user versions. The optional add-on SonicWALL VPN Upgrade provides IPSec tunneling so students can establish a secure Virtual Private Network connection via the Internet when accessing the network from home.

SonicWALL PRO, on the other hand, is aimed at branch offices and large networks and includes VPN capabilities, content filtering, Fast Ethernet support, and other capabilities.

And SonicWALL DMZ includes an additional port for a "demilitarised zone" that gives networked students seamless access to public Web, FTP and other servers.

For more information about SonicWALL contact Macsimise on (03) 9521 4877 or www.macsimise.com.au

editorial

FROM THE EDITOR'S DESKTOP

As we move closer to the next millennium, I guess we all think about "What will be next?" What new technology will revolutionise how we use our workstations? How will this effect education services?

These questions are great and we must spend time thinking and theorising about their answers -- for without thought we only remain stagnant.

Wheels for the Mind has always aimed to celebrate and showcase how thoughts are being turned into reality, and this Winter edition is no exception. In this edition you can read about five different development projects that have been finished, or are currently nearing completion, at AUC member Universities around Australia. All are interesting, innovative and useful, and provide a valuable contribution to their respective fields of study.

And all have been made easier and better through the use of Apple technology.

Also a new section launched in this edition of *Wheels for the Mind* is "What's new in the AUC". Designed to showcase the latest achievements and changes in the AUC, in this particular edition you will find information about new AUC programmes and how Apple is encouraging our developers both at a national and international level. I would encourage you to read this section and to consider how your University might be able to gain access to the development programmes that have now been put in place.

I would also encourage you to look at our technology feature, which provides an enlightening view of the way QuickTime technology is helping change the way education is delivered at two US universities.

And as the feature of our regular focus on Apple in the Asia-Pacific, this issue we turn our attention to the University of Melbourne, where researchers are figuring out how to turn a laboratory full of iMacs into a networked supercomputer able to tackle complex mathematical and scientific mysteries.

All in all, I hope that you enjoy this Winter edition of *Wheels for the Mind* and encourage your feedback via e-mail or by sending in the reader response card.

Peter Sharpe
Editor
p.sharpe@its.unimelb.edu.au

contents

AUC MEMBER UNIVERSITIES

AUSTRALIA

Australian National University
Curtin University of Technology
Edith Cowan University
Macquarie University
The Flinders University of South Australia
The University of Adelaide
The University of Melbourne
The University of South Australia
The University of Southern Queensland
The University of Sydney
The University of Tasmania
The University of Wollongong
University of Technology, Sydney
University of Western Sydney
The University of New England
The University of Western Australia

NEW ZEALAND

Massey University
The University of Auckland
The University of Otago
The University of Waikato
University of Canterbury
Victoria University of Wellington

AFFILIATED UNIVERSITIES

Australian Defence Force Academy
University of Canberra

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Cover photograph: Multimedia is giving Australian medical students a front row seat to watch leading cardiothoracic surgeons in action.

What's NEW in the AUC

Encouraging development: building the new AUC

More than 12 years ago, Apple created the Apple University Consortium, a select group of America's most influential centres of higher learning, and provided them with compelling reasons to begin software development on the newly introduced Macintosh. Graduating students took the knowledge of this new campus computer standard and fought to effect the adoption of the Macintosh inside their new companies.

The K-12 market quickly followed the lead of these forward-thinking universities and together they made the Macintosh the dominant platform in education. Due to these and many other interrelationships between higher education, K-12, and enterprise and small businesses, it is simply a forgone conclusion that Apple's success has been and remains inexorably tied to the strength of its commitment to this vital higher education market.

Apple has never wavered from its commitment to the higher education computer market it pioneered almost two decades ago. A new Apple University Consortium was formed last year out of a group of nearly two dozen universities who together make up a representative sample of the higher education market in North America. They meet on a regular basis with members of Apple's executive team, engineers, product marketing managers, and sales executives to share their insights into the higher education marketplace - ensuring that Apple's products and services meet and exceed the needs of these customers.

In short, the Apple University Consortium is a strategic programme between Apple Computer and selected higher education customers designed to reinvigorate the relationships that have helped Apple achieve its historical leadership in this market and beyond.

Local change

The AUC has been active within Australia since 1984, and in that time has grown to include a dozen of the country's leading universities. As intended, the strong penetration of Macintosh technology within these universities has strengthened Apple's position as a major supplier of computers to the educational market.

In the past, membership in the AUC has entailed a number of commitments from member universities, not the least of which is establishment of a campus shop dedicated to selling and supporting Apple products.

Although this model has helped increase student awareness and use of Apple equipment, it has also had the undesirable effect of excluding many universities that might otherwise have derived immense benefit from membership in the AUC.

In order to help other universities realise these benefits, during 1999 the AUC has undergone a major restructuring that has changed the requirements placed upon AUC member universities.

Most notably, member universities may now choose from three forms of Apple representation on their campus:

- They can, of course, continue to serve students through a dedicated campus shop, which provides a margin opportunity for the university and gives on-campus Apple customers the peace of mind of having Apple support and service staff nearby.
- Alternatively, AUC member universities may now choose to meet their membership commitment through appointment of a campus agency. This approach takes the university out of the computer supply business by relying on a self-employed agent based on campus full-time. The agent has a higher minimum purchase commitment than the campus shop, and Apple determines the prices the agent charges.
- Under the third option, the university contracts with an off-campus reseller to sell and support Apple technology to on-campus students and staff. This option attracts a minimum purchase commitment of $500,000, and pricing is determined by Apple.

AUC members can switch from one model to another without affecting their membership.

Member universities will also need at least one Apple registered developer on campus, and will need to appoint a Development Fund co-ordinator who will serve as the university's liaison for the activities of the Apple University Development Fund (AUDF).

Membership benefits

In exchange for their commitment to Apple, membership in the AUC provides universities with a number of important benefits.

For example, the AUC actively seeks out opportunities to fund professional development for university IT support staff; last year, the AUC offered each member four places on the Apple Technologies troubleshooting course.

Apple is also committed to software developers at member universities, and last year funded two week-long intensive workshops on WebObjects. The AUC also sent 32 developers to Apple's World Wide Developers Conference in San Jose, California this May. During 1999, the AUC has budgeted a doubling of its training commitment.

To address the changing needs of university researchers, the AUDF has been restructured, and has been opened to students of AUC member universities.

Grants now include three award tiers:

- AUDF Seeding Grants, funded in conjunction with Metrowerks, are grant packages for AUC university students and staff intended to give young developers an opportunity to get started. The 100 seeding grants include CodeWarrior Professional, paper-based training and CD-based reference materials.
- AUDF Pilot Grants – between five and ten awards of $5,000 to $10,000 each -- support prototype and proof-of-concept projects, with a strong preference towards projects that will produce useful and shareable products. Grant funds can be used for equipment, time-release, software, or support and consultants, but not for contracting out development itself.
- AUDF Major Grants – two grants each worth $20,000 to $30,000 – will support major projects where developers make a commitment to share their finished project with other AUC members on a preferential basis.

To foster collaboration with software developers, the AUC and Apple will be providing speakers and financial support for the AUC Academic and Developers Conference in April 2000. From 2000, the AUC has also committed $40,000 to funding a number of Honours level HECS scholarships for students whose research projects are likely to lead to useful products that are relevant to use of Apple technology in higher education.

Moving forward, together

These changes represent the beginning of a new era for the AUC, as Apple updates the programme to match the changing needs of its university partners.

So far, the changes appear to be working: since their implementation, the AUC has welcomed the University of Western Australia, the University of South Australia, the University of Southern Queensland and Macquarie University as new members.

"These changes have made access available to a much greater number of universities," says Warren Bruce, national education manager, Apple Australia. "It's quite dramatic not only in terms of Apple's relationship with our customers, but also in terms of the interaction between the universities from an IT perspective. The AUC really is a consortium, and we expect membership to grow from what has been twelve to twenty soon. By the end of the year, this will be more towards 30. We are also investigating the possibility of collaboration with universities in Asia."

Apple and the AUC share many of the same challenges that the world's colleges and universities face – such as rapid, sometimes fundamental change, increasing competition, and the need to do more with fewer resources. Moreover, just as higher education institutions seek to cooperate in meeting these challenges, Apple and the AUC see a mutual opportunity to augment each other's success in meeting the needs of our customers and partners, particularly in the education marketplace.

Apple shares its hardware and software directions with AUC members and details its product strategy in order to obtain their input and to gain the feedback that will continue to ensure that Apple's products best suit the needs of the higher education market. AUC customers also help ensure that Apple's products attain a high quality level by assisting Apple's Customer Quality Feedback (CQF) programme.

The AUC provides the tools, support, information, and technical resources needed to stimulate development of educational solutions and services that ensures Apple's products are uniquely suited to the needs of the higher education market. These developments, and the endorsements of Apple by these AUC member universities, strengthen Apple's position in the broader higher education market. Apple's ongoing commitment to AUC underscores its renewed commitment to all our higher education customers.

AUC

From the AUC Chair

THE NEW AUC

At its February General Meeting, the Australian Apple University Consortium made some important and exciting decisions. Each, on its own, is perhaps just an evolution of the Apple University Development Fund. As a package, they represent a new direction, even a re-invention, of the AUC.

Stephen Young

While we've not neglected developers, I think it's fair to say that over the years, it has been the supply channels (in most cases, the Computer Shop in each member University) which have had centre stage in AUC affairs.

That's no longer the case. Centre stage is now very much shared by the developers, and potential developers. Not least in the "potential developer" category are our students, who will benefit from the one hundred new AUDF Seed Grants being offered to encourage new developers.

We'll also be funding scholarships for sending developers to Apple's annual World Wide Developers Conference in San Jose, as well as HECS scholarships to fund researchers working at any AUC member university. We will be holding residential courses for developers and aspiring developers, with the AUC covering the cost of attendance for two representatives from each university. As I write, the details of the first course – an introduction to programming the Mac in Java – are being finalised.

To run from April 26 and 28, 2000, the next AUC conference will expand its previous Academic orientation to include developers. Themed "New Millenium, New Technology, New Ways of Learning", we're planning three major streams: "Dreamworld" -- visions of what is and what will become possible; "Realworld" -- sharing actual experience and results; and "Underworld" -- the world of the developer burning the late night oil, and the tools and techniques they use to create great software.

I'm excited about these initiatives -- new programmes for new times. I believe we can look forward to a substantial increase in membership, which will benefit all members. Further, we're building international links. We continue to enjoy a good relationship with the AUC New Zealand, and with Apple we're looking for more ways to enable New Zealanders to take part in Australian AUC programmes. We're making new links with the re-formed AUC in North America, and there is interest from Asia in our programmes.

None of this would be possible without the work of the AUC Executive, and I thank them all for their hard work and dedication. Dare I say it: these are not just exciting times, these are good times!

Stephen Young, Chair
Apple University Consortium
ITS, University of Melbourne
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COVER STORY: by David Braue

The HEART of the matter

Dr Pete Smith

One of the most compelling benefits of interactive multimedia is that it lets students explore and manipulate things they might never get to experience in real life. Medical students at Australia's ten medical schools will experience this first-hand as they begin reaping the benefits of a massive development project that this year produced what is believed to be the most complete multimedia car diology resource in the world.

The functioning and repair of the heart are essential subjects of study for most medical students, but getting access to surgery theatres to view complicated heart operations in progress can be extremely difficult. And, of course, students cannot experiment with hearts on their own time; if anything, they are given sheep hearts that are largely similar to those of humans.

In surveying a number of medical students as to which areas of medicine would most benefit from being given the multimedia treatment, cardiology was one of the top-ranking subjects. So in 1995, Dr Pete Smith of the Flinders University School of Medicine's Department of Paediatrics began an ambitious project – with the encouragement of Dr Kevin Forsythe, head of Flinders' Paediatrics Department – to develop a learning resource that would help students better understand this crucial area of medicine.

In the four years since, nearly 40 people have spent an estimated 4000 hours designing the CD-ROM multimedia package, writing scripts, digitising photographs, videotaping patient examinations, and building animations. They also called upon more than 20 leading cardiologists throughout Australia and New Zealand to contribute video vignettes that highlight important anecdotes and tips for students, and videotaped dozens of heart operations at the Royal Melbourne Children's Hospital and Sydney's New Children's Hospital at Westmead.

All told, the package, called Paediatric Cardiology, spans two CDs and includes over 1.3 gigabytes of data – made up of more than 400 videos, 150 animations, 200 'talking head' vignettes, and more. Also on the CD-ROM are several hundred picture files, including real-life diagnostic tools such as X-rays, MRI images, angiograms, electrocardiogram traces and more.

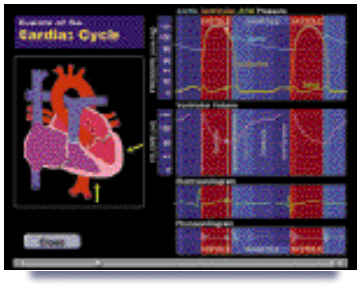
Additional realism has been added to the package through inclusion of a range of sound files, including what Dr Smith says is the best collection of heart sounds in the world. These 23 sounds were sourced from a doctor in Canada, and are used on the CD-ROM to give students an idea of what they might hear during an examination. The CD-ROM also includes an interactive gene mapper, provided by a leading cardiologist in Rome, that lets students explore which genes might be involved in certain cardiac conditions.

Launched in February, Paediatric Cardiology has received a warm welcome from doctors and medical students around the country, and is being distributed to every Australian medical school.

"There are some diseases that are very important that students may not get to see," says Dr Smith, a paediatrician by training who has previously been involved in multimedia CDs addressing childhood seizures and paediatric treatment techniques.

"The whole idea is to try and provide students with contact with some of the leading paediatric cardiac surgeons. Students can't go in and see cardiac operations; the view they get would be of the surgeon's back. But this has the surgeon's eyes, which we've combined with our clinical diagnostic skills, our vision of the patient, sound and other forms of imaging. This is why I think Paediatric Cardiology is one of the best examples of multimedia in medicine."

On-disc heart sounds teach students what they would hear through a stethoscope. A consultant is standing by to provide additional comments.



Animated sequences show students the interrelationship between heart muscle contraction, pressure, volume and how they look on monitoring equipment.

A variety of Macintosh equipment was used to build the content for the multimedia package. Team member Anthony Couche handled the digitising of video recorded on a Sony VX1000 digital video camera, using Power Macintosh 8500s and 9600s to handle the translation. Flinders' Computer Assisted Learning facility staffer Neil Huggett used Macromedia Director and Illustrator to build the animations, often turning to Fractal Design Poser to develop images involving the human body.

AUDF funding, first secured by Dr Smith in 1996, was crucial to the project – providing the Power Macintosh 8500, video capture card and a drive to store the massive multimedia files involved in the product's development (over 40 CDs' worth of unedited video footage and other content was generated during production).

To help students make best use of the CD-ROM, individual areas of content have been hyperlinked to other related topics. The CD-ROM also includes a series of self-assessment examinations, which let students chart their progress through the on-disk content.

"This package was designed for a high medical student level," says Dr Smith. "Showing how operations are performed, and how different parts are cut and connected, can be quite difficult to understand and convey. Using the CD-ROM, students can navigate around according to what their educator thinks are the most important topics for their level. They can go in there, play around and choose what they want to learn."

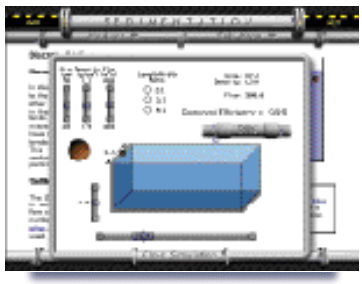
For more information, contact Dr Smith on p.smith@ich.ucl.ac.uk.

Getting STUCK into SEDIMENTATION

Most people might not give it a second thought, but the process of sedimentation plays an important role in every aspect of our lives. A term for describing the way suspended particles fall to the bottom of a liquid solution, it is the way drinking water is purified before being delivered to our taps, and how waste water is cleaned before being returned to the ocean. It shapes the beaches we walk across, the rivers we play on, and even the quality of the rain that falls on our heads.

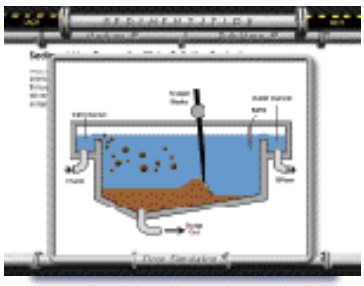
But for environmental engineering students, grasping the mechanics of the sedimentation process can often be quite difficult. While it's relatively easy to understand how a basic sedimentation tank works (water is poured into a tank and allowed to sit until the particles have sunk to the bottom), in the real world sedimentation tanks are constantly being filled with new suspension and clean liquid is siphoned off continually.

Lecturers have traditionally used still-frame photographs to illustrate the process to students, but static images cannot convey the many dynamic forces that affect the way sedimentation occurs. Although field trips give students an excellent view of how the process works, such trips are very expensive and time-consuming, and therefore are difficult to organise with any frequency.



Students can adjust environmental variables and watch their effect on sedimentation.

With its ability to illustrate moving mechanical systems using an interactive graphical interface, multimedia is a natural medium for helping students learn more about the sedimentation process. Over the past year, a team of three researchers at AUC member universities have been driving efforts to produce a six-part multimedia CD-ROM and Web site that let students explore the mechanisms of sedimentation in real time.



Diagrams illustrate the processes by which sedimentation tanks function.

"In the case of water treatment, there are a lot of processes used in the field," says Dr Dharma Dharmappa, a senior lecturer in the University of Wollongong's Department of Civil, Mining and Environmental Engineering.

"Most students tend to think it is a batch process, but I've found that they have difficulty understanding how sedimentation tanks work on a continuous basis."

"It takes substantial imagination and a practical perspective to gain a complete understanding of the operation and design principles involved in sedimentation, but you can't take a tour every time you introduce a new concept to show them how it works. These sorts of demonstrations can be easily done using the sorts of animations and demonstrations that you can build into a CD-ROM."

Along with Dr P Hagare from the University of Technology Sydney and Mr Bob Corderoy from the University of Wollongong, Dr Dharmappa headed a development and graphical design team that last year began developing animated Web presentations illustrating the six major processes of sedimentation.

These include coagulation (making particles sticky so they will join together and fall to the bottom faster); flocculation (the actual process in which particles join together); sedimentation (when the particles settle towards the bottom of the tank); flotation (when particles that are lighter than water are scraped from the top of the solution); granular filtration (when particles are trapped by a porous medium, such as sand, on the bottom of the tank); and disinfection (removing the chemicals used during coagulation and other contaminants from the filtered liquid).

Realising that the Web's bandwidth and technology limitations were compromising the quality of the online animations, the team began redeveloping the presentations using Macromedia Director to produce an interactive CD-ROM. Like the Web-based project last year, the CD-ROM port was supported through an AUDF grant that provided equipment for the software production.

"We've found the Macintosh has a better flexibility than PCs in multimedia development, especially the integration of sound and video onto the CD-ROM," says Dr Dharmappa. "Many packages don't have many animations and simulations, but in engineering we have to have animations."

The full CD-ROM, due to ship shortly, includes videos, animations, textual and spoken explanations, and graphics. It also includes an invaluable interactive model that lets students design their own sedimentation tank and manipulate the many variables involved in the process. Through a graphical representation of the mathematical models that describe key sedimentation processes, the CD-ROM lets students see just how the changes affect the rate and type of sedimentation.

For example, changing the size of the sand at the bottom of the tank affects the speed of the granular filtering stage, as well as the size of the particles that are removed from the filtered water.

Because it relates to processes that apply equally around the world, Dr Dharmappa expects the CD-ROM will enjoy some success being marketed to Engineering departments at universities throughout Australia and overseas.

For more information, contact Dr Dharmappa on dharma@uow.edu.au.

Online **COLLABORATION** changing Arts education

With tens of thousands of students each, universities are natural targets for the benefits of intranets – mini-Internets running over an internal network. By providing a common interface between students, teachers and other involved people, intranets allow creation of a tight online community that can easily be extended around the world via the Internet.

Most universities either have set up their intranets already, or are in the process of doing so. But it is only recently that they have seriously begun looking at ways to make the most of the connectivity that their intranets provide. At Sydney University, the result of this examination has been an ambitious new project – Arts Online – that will eventually bring thousands of students and their instructors together in an online forum, where education can take place twenty-four hours a day.

Technology driving education

As in most universities, Sydney University's Faculty of Arts has long invested in the use of new technologies to improve the teaching process. In 1993, for example, it used HyperCard to develop authoring templates that teachers could use to build their own educational and assessment materials.

But this was in the days before the Internet had gained the momentum it currently enjoys, and access to the client/server HyperCard presentations was limited to students sitting in front of a Macintosh in a computer lab.

By 1997, however, a development team had begun transferring the concept onto the Internet, leveraging the power of the university's developing network and intranet to extend the system's reach outside of computer labs.

For the past two years, developers have worked to build Arts Online, an online system that is expected to give students an unprecedented measure of control over the direction and type of their learning.

"We needed to develop the same level of interactivity on the Web as we had with the HyperCard application, so students can actually do their assessment activities from home or from other computer labs," says Dr Marie-Thérèse Barbaux-Couper, director of the Arts Information Technology Unit within the Faculty of Arts. "Arts Online is a Web learning environment that is individually customised for students and teachers."

Getting organised in groups

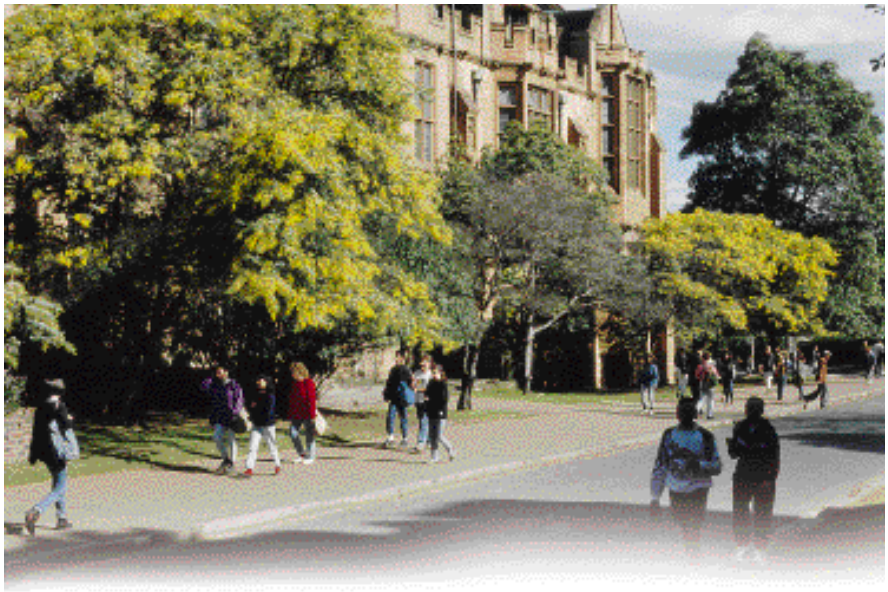
When students log onto Arts Online, they are presented with a list of the subjects they are taking as well as any messages that lecturers may have sent their students. Using the online system, students can find which students are in the class, read lectures and tutorial materials, and access other information relevant to their course.

Arts Online's purpose is to facilitate collaboration between the many people involved in a particular course. Students, tutors and lecturers can enter notes into the system about any lecture, reading or other course material. These notes can be accessed by any student with appropriate access rights, and tutors or lecturers might choose to permanently integrate particularly insightful comments into future printed and online course materials.

"This is how the personalisation starts," says Barbaux-Couper. "If students do a group work activity and have to write something, for instance, starting from the lecture or tutorial notes they can write their own notes and decide it can be visible by so-and-so. Every time they log in, those notes will be visible."

Teachers, too, will benefit from Arts Online features designed to make their lives easier. Its built-in publishing engine lets them easily generate online exercises, for example, which can be administered to students on-line and automatically scored by the computer.

Because it supports a range of multimedia content, teachers can also use the system to organise their lectures – storing presentations, tutorials, lectures, assignments and other content online. The system has been designed so teachers can build their own content without needing to know anything about Web or multimedia development.



An engine for collaboration

Arts Online is based around the NeXT-Apple WebObjects application server, which maintains a massive online database containing the lessons, assessment exercises, lecture notes, exchanges between students and teachers, and whatever else students care to post.

Student access profiles are controlled through integration with USydNet, another major intranet project recently launched for use by nearly 40,000 students and teachers across Sydney University. As the university's major repository of student course and profile information, USydNet will give Arts Online the data it needs to determine which class information to show for each student.

The system has initially been developed using Microsoft Windows NT because WebObjects was initially only available on that platform. But with MacOS X due to get into their hands any day now, developers plan to port the entire system to that platform before the upcoming Arts Online pilot test is completed. That version will be run on a pair of G3 servers acquired with AUDF funding, which also paid for the WebObjects software and overseas WebObjects training for several staff members.

Using MacOS X will also be important in that it will allow the system to more closely integrate with Sydney University's existing base of Macintosh student computers. This will be particularly important within computer laboratories, where the university uses a MacOS-based lab management environment to maintain the configuration of lab computers.

"We'll be able to integrate our Web framework with the security, file management and other aspects of the lab management system," says Barbaux-Couper. "That's a major plus, and we'll have the whole remote access capability from the MacOS X server that Windows NT can't provide.

Rather than having three or four different applications to do these things, we will be able to have just one."

Getting Arts Online off the ground

The Arts Online system will go into a faculty-wide pilot test during the second semester of 1999, when some 600 students in six different departments will begin using the system in conjunction with their classes.

Barbaux-Couper hopes the system will go fully live by the beginning of the 2000 academic year, when the 7000 students in the Faculty of Arts will begin using it as an integral part of their classes.

Arts Online has already attracted the interest of other parts of the university, with a number of faculties keeping a keen eye on the project's progress.

The collaborative framework enabled by Arts Online will also be used for an online literacy programme, which Barbaux-Couper's team is developing to help non-computer literate students gain the skills they need to make full use of Arts Online. Staff will also participate in the programme, ensuring that everybody within the faculty has equitable access to Arts Online and other online university services.

Over time, the ability to remotely collaborate with other students and staff will revolutionise the delivery of education at Sydney University. It may well serve as a model for other universities to follow, as mainstream academic communities around the globe awaken to the possibilities of online, interactive multimedia.

"This kind of interactivity is fairly productive," says Barbaux-Couper. "It gives students a very good way of inputting their own ideas into course content. It's giving them more control, and they're also more involved psychologically."

For more information, contact Marie-Thérèse Barbaux-Couper on mtb@artsit.usyd.edu.au.

Accessing Sydney University's enrolment database in real time lets Arts Online generate customised interfaces listing information relevant to each course in which the student or instructor is involved.

Students can easily retrieve information about lecture content, workgroup partners, examination schedules and results through the single Arts Online Interface.

Arts Online allows instructors to deliver course content and examinations to students, and allows automated assessment as well as inclusion of a variety of multimedia content.

Something in the WATER

Dr Maheshwari

It's no exaggeration to say that water, in its many forms and uses, is the lifeblood of humanity. Yet controlling and using the world's water r esources is an ongoing challenge for the people that rely upon water for their livelihoods.

Controlling water pollution, designing effective irrigation plans, and adjusting agricultural strategies to compensate for water quality are all amongst the skills taught to agriculture and environmental science students at the University of Western Sydney – Hawkesbury (UWSH) in New South Wales.

With an emphasis on self-directed and hands-on learning, students are encouraged to gain real-world experience in water management as part of their studies. This includes an eight-week stay at a remote farm, during which students assist property owners in designing and managing water control strategies and other relevant agricultural management work.

The full range of water management techniques can take years to learn properly, but a group of researchers in UWSH's Faculty of Environmental Management and Agriculture has spent nearly eighteen months developing a multimedia CD-ROM that students can use to increase their knowledge about a broad range of water and water management related topics.

Animated sequences illustrate the best way to drain water pollutants during irrigation.

The CD-ROM, entitled Sustainable Water Use in Agriculture (SWAG), includes four major sections: Water on the Earth, the Hydrological Cycle, Water in Australia, and Water Quality and Management.

The first three sections are primarily reference-oriented, using graphical animations and narrative texts to describe the distribution and lifecycle of the earth's water. It is the fourth section, Water Quality and Management, which really provides the meat of the CD-ROM.

Images of water affected by problems such as algal bloom help students see the real world effect of water management concepts.

Water Quality and Management covers a broad range of aspects dealing with agricultural water management. Issues such as pesticide contamination, irrigation strategies, water pigmentation and salinity, soil management practices, and the relationship between water quality and crop fertility can be explored using a variety of pictures, videos, sound, cartoons, and interactive exercises.

"At this university we have an experiential learning programme, and we emphasise self-directed learning where students work on their own," says Dr Basant Maheshwari, a senior lecturer in irrigation management at UWSH and a major force behind SWAG's development.

"We act as resource people and facilitators of students' learning, so this sort of multimedia resource fits in very nicely. It's more about learning concepts than just modelling. Students can learn at their own pace, and explore what they want to know in terms of water and its management."

"SWAG is especially handy for students that might be 500 km from Sydney, in the middle of nowhere, during the eight-week farm stay that is part of their course," he adds. "They are on their own out there, and this means they can take the CD-ROM with them to learn the things they need to learn."

To bring SWAG to life, a team of four multimedia developers and content designers from UWSH's Information Technology Centre worked on and off for nearly eighteen months to write scripts, record voiceovers, digitise videos and design the CD-ROM layout. Macromedia's Director was used to design the CD-ROM animations, while Macromedia Authorware was used to map out and compile the structure of the CD-ROM.

SWAG was developed using a PowerPC Macintosh, digital camera, laser printer and scanner purchased using funds from an AUDF grant. Additional funding was provided by the federal Department of Education, Training and Youth Affairs.

Designed for high school students, first-year agricultural and environmental science students, SWAG is now commercially available and has been well-received within Australia.

Earlier this year, SWAG won second prize in the Educational Section of the Royal Agricultural Society of NSW's Australian Farm Software Competition.

Given the success of the SWAG-Water CD-ROM, the Faculty is now planning to develop and release three additional CD-ROMs covering other issues of importance to its students. Future modules will provide more in-depth information specifically focused on the areas of irrigation, hydrology and water management.

SWAG, which Dr Maheshwari believes is the first CD-ROM package of its kind in the world, has also garnered strong attention from international educators.

"I just put one message in an Internet discussion group, and the next day I got four requests that they want to buy SWAG or try it out," he says. "We've had requests from as far away as the United States, the United Kingdom and Spain. Developing SWAG was a really good experience, and we got something out of it that people can see and use and feel."

For more information, contact Dr Maheshwari on b.maheshwari@uws.edu.au.

Music to their EARS

When groups of international musicians get together for a jam session, the result – after some practice – is often a beautiful piece of music that reflects each player's individual cultural identities and musical tastes.

But what happens when the musicians have never been in the same country together, much less the same room? Melanie Knight-Smith, a computer engineer and 10-year veteran of classical violin, knows because she's done it.

Together with several other musicians around the world, she has been regularly collaborating via the Internet with a variety of cutting-edge instrumentalists, creating a singularly unique sound that powerfully illustrates the way digital technologies are shaping the future of music.

Knight-Smith, who works within the Western Australian Academy of Performing Arts at Perth's Edith Cowan University, has always had an interest in cutting-edge musical technology. But until she discovered some other musicians with similar interests on the Net, she thought she was pretty much alone in her endeavours – at least in Australia.

With the help of the Net and some very late-night jam sessions, she has become a regular member of F-Time -- an international, online ensemble with members as far afield as San Francisco, Paris, and Canberra. Using their Macintosh PCs and Real Networks' RealAudio software, the group combats time zone differences to jam together. Knight-Smith's Bridge digital violin is joined by a MIDI saxophone, a guitarist, bass player and several other instruments.

Each player sends their playing in real-time to a server in San Francisco, where group leader Jesse Gilbert mixes the streams and rebroadcasts them as a RealAudio stream back to the players.

Due to delays on the Net, it can take nearly ten seconds between when a musician plays a note and when the note comes back as part of the mix. But despite the lack of synchronisation, says Knight-Smith, the real excitement of the project is that it can be done at all.

"This came about because we have Master of Music students doing experimental electronic music," she says. "I thought I was alone in the stuff I was doing, but since I've been doing this project I've found other people pushing the limit. It's given it an ethno-music flavour, because now we can play with people around the world. It's so exciting to see it all happening at the same time.

> "It's given it an ethno-music flavour, because now we can play with people around the world."
>
> Melanie Knight-Smith

Some of the players are broadcasting from their kitchens."

Funding from the AUDF is proving critical to Knight-Smith's endeavours, having covered the cost of the Bridge violin, G3-based server and ProTools 24 music mixing system. "Macs are musos' machines," she says. "The processor was originally designed for audio and graphics, but PCs were never designed for that and have never gotten it right."

With a wide array of digital tools and broadcasting resources at her fingertips, Knight-Smith is working on improving the synchronisation and quality of the musical collaboration technology. By inserting markers into the digital score, for example, she hopes to help players compensate for the widely varying transmission delays on the Internet. And improved digital music toolboxes will ultimately enable the computers to analyse individual players' technique and building real-time digital scores based on that information.

"This is all developing towards an intelligent interface that musicians and performers can log into, and perform over the Internet," she says. "They will perform, put the music in a library and people can pick out parts from that."

Interestingly enough, the Net adds its own flavour to the online ensemble's creations.

"The quality is alright now, but you get a lot of ether noise," says Knight-Smith. "We've had people getting all sorts of weird sounds making wire noise off of telegraph poles, but this is quite eerie because you can actually hear the Internet. It's a pretty modern audio aesthetic."

For more information, contact Melanie Knight-Smith on m.knight_smith@cowan.edu.au. F-Time's Web site, which includes audio recordings of their jam sessions, is at turbulence.org/Works/drone/indexnew.html.

Dr Stephen Jones

QuickTime revolutionising FILM & MUSIC education

When we think of the traditional approach to education, we envision a classroom of students dutifully attempting to pay attention to the source of knowledge standing in front of them, the teacher. Students take written notes in order to capture and document the stream of information that is being delivered verbally and through diagrams on the chalkboard.

But even though he is surrounded by others, the student is literally isolated in his solitary role as receptor of information. Often, the student's sole accomplishment after the class is having copied the lecture notes onto paper. Where no knowledge is transferred, no learning can take place.

Now imagine a classroom in which students and teachers are both actively engaged in the learning process. Together they explore information from vast repositories presented to them through the richness of text, images, sounds and video.

Three-dimensional animations come to life to help learners better understand, experience and internalise complex concepts.

Interactive environments immerse learners in virtual worlds where students experience subjects from within.

Students reach out over the Internet and learn any place, anywhere, any time.

Learners collaborate globally with each other, with industry, and with educators near and far. Critical thinking and problem solving is improved.

Learning becomes the reward

Imagine no more. This vision of knowledge transfer and interaction is already taking root throughout the world. Today students learn faster, with enhanced understanding and better retention, when multimedia enriches the learning process. Through the use of QuickTime and other digital technologies, faculty and students work with whatever media is appropriate — allowing them to remove the limits of expression and understanding.

Utilising multimedia in the classroom and publishing information via the World Wide Web, educators add efficiency and impact to their lectures while accomplishing greater instructional outcomes. And because of QuickTime's thoughtful design, educators can accomplish these goals without having to become technological experts. This frees them to focus on a far more important job: teaching.

The Curriculum Development Initiative (CDI), in the College of Fine Arts and Communications at Brigham Young University in the US state of Utah, works with faculty to create multimedia courseware – including simulations, interactive lectures, and tutorial exercises – that support specific learning objectives.

"Glimpsing the potential of multimedia, you rethink your pedagogy – how you teach," says Dr Stephen Jones, assistant dean of the college, associate professor in the School of Music, and head of the CDI. "Multimedia technology offers two key benefits to educators: It engages students, making them more receptive to information, and it enables educators to move from text-only to multiple presentations of information."

Jones and CDI project manager Dave Egbert greeted QuickTime 4 enthusiastically. "The technology advances in QuickTime authoring, combined with its capabilities to contain, sequence, and interact with almost all major media types and formats, make QuickTime enormously interesting and important to educators," says Jones.

One advantage of QuickTime 4 is on-demand streaming, which enables users to view and listen to large files, providing random access to any moment in a long programme – without downloading the file or even making the user wait for the computer to cache the entire file. "With on-demand streaming, accessing long files becomes much more attractive," says Jones.

With on-demand streaming, users can also engage in live conferencing and collaboration. "Web-based videoconferencing has generally been low quality, difficult to implement, and cost prohibitive," Jones

QuickTime over the INTERNET in the QUICKEST time YET

QuickTime is rapidly becoming the most popular distributed media technology for Windows- and Mac OS–based computers. The latest version, QuickTime 4, is poised to become a key component in the delivery of educational content over the Internet.

QuickTime 4 evolves the process of publishing digital media on the Internet into a practical, everyday experience. Through a combination of industry-standard streaming protocols and media compression technology, QuickTime 4 delivers perfectly synchronised audio and video streams with remarkable clarity and quality.

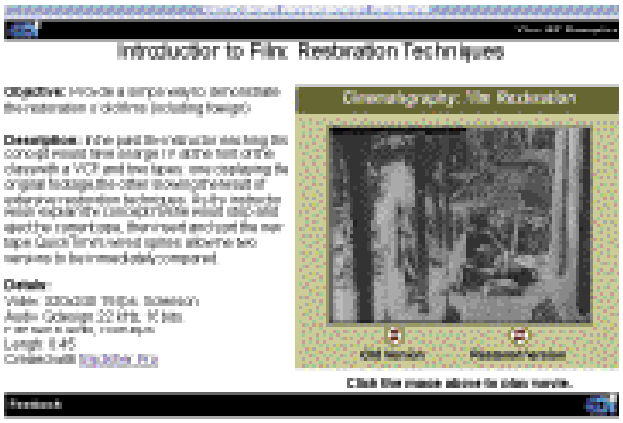
Using QuickTime 4, multimedia authors have access to more than 35 media formats for Web content production. Users can import video, audio, text, graphics, and other elements into a wide variety of authoring programmes such as Final Cut Pro.

Once they've created the content they want to publish, developers can compress it using a QuickTime compressor, such as Sorenson Video 2, or QDesign Music 2. Then they simply save the media file to a system containing QuickTime Streaming Server software, and they can immediately stream the files over the Internet -- media authors no longer need to convert their files from QuickTime to .RA or .ASF formats to stream their content.

The included QuickTime Plug-in enables major Web browsers to display QuickTime-based media within a Web page. The plug-in supports more than 30 different media types, including live and stored streams from QuickTime Streaming Servers and QuickTime VR, and makes it possible to view over 80 percent of all Internet media on the Web.

Get QuickTime 4. Share Your Ideas With the World. Both the Mac OS and Windows versions of QuickTime 4 software can be downloaded free of charge from the Apple QuickTime web site at www.apple.com/quicktime.

Apple Technology by Steve Chazin, Apple Education



says. "With help from third-party providers, live streaming in QuickTime offers a quick, affordable, easy-to-implement, nearly seamless desktop alternative."

Because it allows multimedia authors to create rich interactive applications, QuickTime's scripting capabilities are especially valuable for educators. "QuickTime scriptability is still news to many educational technology specialists – not to mention faculty. It enables the authoring of multimedia objects that have logical, intelligent behaviours and can provide interactive feedback and assessment," says Jones.

"In very basic terms, this means we can do much more than play a file; we can now create files that users can interact with, accessing a greater underlying logic as they do so – to experience choice and an immediate response."

Introduced with version 3, wired sprites add scriptable interactivity. Now third-party developers such as Totally Hip are extending this capability, providing tools and a scripting environment, such as LiveStage, for building more interactivity into QuickTime.

To see examples of how QuickTime is used to supplement Brigham Young University courses, visit cdi.byu.edu/quicktime.

Steve Chazin, Apple Education

Biology and Interactive KNOWLEDGE

Sometime during his graduate studies in embryology, Dr Carey Phillips, professor of biology at Bowdoin College in the north-eastern US state of Maine, had an epiphany.

"I was studying RNA in developing eggs and trying to understand how the concentrations changed over time," he explains. "The concept was very difficult for me to grasp – until, one day, I suddenly got it. Visualising the development in 3D, and then adding a fourth dimension – time – I could see exactly what was happening in my mind's eye."

Phillips used this discovery when he began teaching embryology and tissue development. "I could see that my students also had a hard time visualising what I was describing, so I decided to build a model that could show spatial relationships and dynamic events. I discovered that I could make 3D animations that would show what I was able to see – and then use those animations to more easily convey the concepts to my students."

After obtaining grant money, Phillips purchased several Macintosh computers and set up his own animation studio in the early 1990s. He began exploring animation techniques and a means for delivering the animations, adopting QuickTime when it was introduced in 1991. "Technologies like QuickTime have changed what we can do," says Phillips. "QuickTime enables us to set up exploratory interactions, allowing students to take a non-linear approach to course material. And the technology also encourages us to make it fun, exciting, and efficient."

Phillips presents his courseware on the Web and on CD-ROM, combining video clips, animation, and audio tracks in QuickTime movie files that use "Fast Start" streaming to deliver information efficiently. Fast Start, Apple's HTTP streaming technology in QuickTime 3, enables students to begin playing the graphically rich movies immediately, without waiting for the entire file to download.

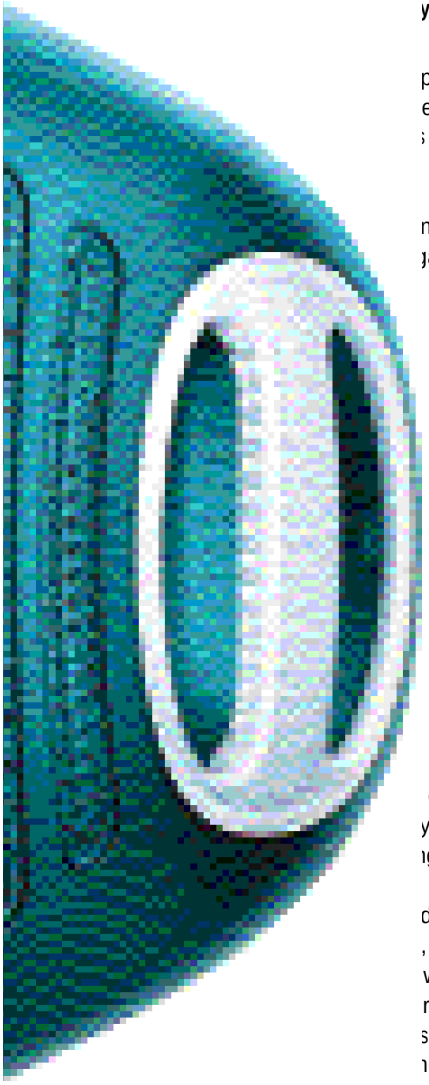
Now, with QuickTime 4 and the incorporation of new streaming technology, students will be able to watch live broadcasts and stored media without downloading anything to their hard disk. "Animation is a wonderful tool, allowing us to pare complicated biological systems down to their essential elements," says Phillips. "After watching animations of processes such as cell division and tissue development, students can return to the 'real' pictures and videos with a new and deeper understanding of the concepts."

See the work of Dr Phillips at www.iknow.net/iknow_pages/celldivision.html.

AUC in the Pacific

Supercomputer POWER, iMac price

It is a miracle of deductive reasoning that researchers are able to use mathematical expressions to model and understand many of nature's most complex and previously mysterious secrets. Yet until large-scale supercomputers began to emerge several decades ago, it was virtually impossible to perform the innumerable y use those expressions for



puters are many times faster ecessors, but price tags in ; of dollars keep them out reach of most universities. in those universities that n afford such computers, aining access to the systems is highly competitive and can be difficult for researchers.

Several groups of researchers around the world have found a way around the scarcity of supercomputer access by creating a 'poor man's supercomputer' that links dozens of PCs together -- applying their combined computing power to solve very complex mathematical problems. Known by the term LOBOS (Lots of Boxes on Shelves), in the past such ystems have been assembled ıg Unix systems, Windows- PCs, midrange and many ds of computers.

, however, been done much which aren't particularly r performance calculating s. Never to be deterred by a ıers at the University of Melbourne's Department of Mathematics and Statistics have contributed to the latest chapter of LOBOS history by planning what could well be the world's largest LOBOS project using off-the-shelf iMacs.

QuickTime iMac computing

The decision to use iMacs came last year, as the department was planning its strategy for upgrading the three-year-old PowerPC-based Macintosh systems in their computer labs. Recognising that the iMacs were very appealing as student workstations, they wondered whether the collective computing power of the iMacs couldn't also be harnessed outside of lab hours to unravel mathematical mysteries.

Such mass Macintosh computing has been done just a few times before, for example in an endeavour known as Project Appleseed conducted at the University of California at Los Angeles. The University of Melbourne endeavour, however, will use at least 54 iMacs compared with the 8 MacOS-based Power Macintosh G3 systems used in Project Appleseed. This number could ultimately expand to 82 as the department mulls over what systems to use as a replacement for obsolete PowerMac 7200s in its other computer lab.

The Macintosh-specific Linux PPC version of Linux formed the basis of another recent iMac clustering project, at the University of Adelaide last year. In this work – a local effort following in the footsteps of global clustering research known as Project Beowulf -- the Department of Computer Science used Linux PPC R4 to link some 38 233MHz revision B iMacs in a parallel computing cluster using a 10Mbps Ethernet network. Another trial increased performance by linking 8 iMacs using Fast Ethernet. However, this work was purely exploratory; in neither case were the iMac clusters applied to actual scientific work.

Steward is confident that using Linux PPC R5 will help the University of Melbourne effort produce much better results than Projects Appleseed or Beowulf, as well as giving researchers easy access to the cluster's computing power.

"We realise Linux is becoming increasingly popular, and we think the iMac is an ideal platform to run it," says lab manager Dr Chris Steward. "The reason we're using Linux is for its speed, configurability and the wealth of options it gives us for configuring our setup. Also, most researchers and postgraduate students are familiar with the Unix environment. If we run Linux, the compilers are free and readily available, so we don't have to purchase additional software. People already have programmes they've been running on parallel clusters, and they don't want to have to modify them much if they port their code to the iMacs. If we install them under Linux, there are common protocols that we can use."

The iMacs will be configured using three partitions that allow students to use them with MacOS during the day, then let researchers boot up Linux for the LOBOS project at night. Throw in the Virtual PC Windows 95 emulator for MacOS, and students will be able to run virtually any application they might need to use.

The poor man's supercomputer

The 8 MacOS-based G3 systems used in Project Appleseed provided an estimated 1 gigaFLOPS (1 billion Floating-point Operations Per Second, which rates a system's performance handling the floating point calculations common in scientific and mathematical computations). "We think we'll get better performance using the iMacs and Linux," Steward predicts.

With so much computing power soon to be harnessed, researchers in the Department of Mathematics and Statistics will finally have a good alternative to the 17 clustered 600MHz

Digital Equipment Corporat
Alpha servers (with 8 gigabytes
of shared memory) the
university currently offers
students for high-end
computing.

Although those systems are
much faster than the iMacs,
they must also juggle the needs
of hundreds of users around the
university. By contrast, the LOBC
project will provide unimped
the iMacs' computing power f
per week.

And what will the researchers

"We're going to do what y
classes of graphs that math
behaviour of polymers," explain
professor of mathematics at the c
of the LOBOS project. "This inclu
do biological polymers fold, and
DNA recognition.

We're trying to understan
fundamental level we can und
proteins, which is kind of mira
giving a huge map with hun
complete idiot and having him
seconds, that's what it's like
computational task."

As Macintosh technology cor
LOBOS project will grow to inco
technologies. For example, the
expected to offer markedly in
capabilities, as well as the abi
processors in the same bus. Thi
provide significantly faster prc
multiple processors working on t
allows much more complicated n

The team is also looking to fu
as FireWire, which would increa
the lab computers can keep in tou
with the central server.

Whatever performance the iM
in, it will be a watershed event fo
within the scientific and mathem
with its vastly lower price, it wi
could prove tremendously va
researchers around the globe.

"At the moment we're doing
Alphas with shared memory," says Guttmann. "This is a machine that cost a couple of million dollars, so it would be fantastic if the Apple architecture lets us do this kind of thing with a few less zeroes on the end."

David Braue

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