MIND

Wheels for the

Xsan-powered
STORAGE
FOR ANU STUDENTS

aussie student
INTERNS SAVOUR CUPERTINO

OLD HABITS
DIE HARD

win an
**ipod**
shuffle

Animators
Riding High

• **A magazine for academic staff, students and IT professionals**

GET ON SPEAKING TERMS WITH WMV

You may love QuickTime, but Microsoft's sheer market size means you can't write off Windows Media Video (WMV). If you're delivering content into a predominantly Windows environment, you'll need a way to move your projects into WMV format. Telestream's Flip4Mac WMV Studio Pro, a set of QuickTime plugins that enable video playback and creation in WMV version 9 format, is one such way. The $US49 program is accessible from most video-aware programs, includes presets for different bandwidth speeds and also comes in a $US99 Professional version that adds two-pass encoding, support for HD video and the 96 kbps sampling and 5.1 surround sound of Windows Media Audio 9.1 Professional.

Visit www.flip4mac.com for more information.
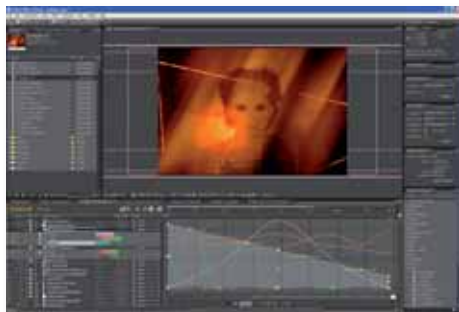
AFTER EFFECTS GETS LONG-DESERVED MAKEOVER

It may have taken nearly two years, but Adobe has finally given its seminal After Effects video compositing and production tool a significant makeover. After Effects 7 improves usability, adds powerful new tools, and speeds performance. A new Curves editor eases keyframe tuning; a single Graph view for viewing multiple curves; animation presets can be applied to any effect; a Pixel Motion option tracks every pixel in a frame to smooth time remapping; and the Professional version's new Timewarp option creates convincing motion blur even from sharp frames. If you're into video, odds are there's something new to love in this version.

Visit www.adobe.com/products/aftereffects to download a 30-day trial.

FIND IT FASTER, BETTER, EASIER ON THE NET

If you spend a lot of time looking for information, you may want to look into DEVONtechnologies DEVONagent, a search tool that automatically runs queries against any of more than 130 online search engines and databases on your behalf (and yes, you can use XML to write your own interfaces). Instead of just presenting online links, the system categorises, sorts and visualises the results to help you find relevant information more quickly. Searches can be stored, scheduled and delivered automatically via email.

Visit http://devonthink.com/products/devonagent/ to download a free trial or buy it for $US49.95.
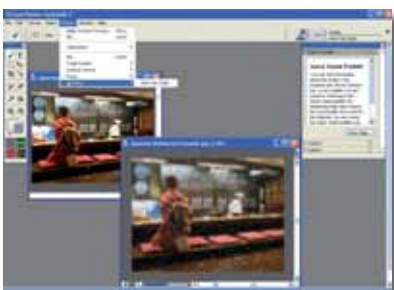
ART FOR THE PAINTING-CHALLENGED

Even if you find the process of creating digital art daunting, you may find something to love in Corel Painter Essentials, a stripped down version of Corel's popular Painter IX tool for turning digital photographs into painting-style images. Oil paint, watercolours, pastel – whatever your preferred medium, you're likely to find it here. Use graphics tablets or the mouse to smoothly and quickly paint-ify your images, then export them in a variety of formats. Learn more, or download a trial version, at www.corel.com. Buy it online for $199 at www.itdlogistics.com.au.

AT LAST: HELP FOR THE SCATTERBRAINED

The process-oriented minds of most software developers are well served by existing development tools, but where do the right-brained creative types go to get organised? Zengobi's Curio is a good place to start. Billed as a 'brainstorming studio', Curio provides tools for thinkers to organise and build relationships between various types of content – allowing the creation of complex mind maps that can improve the execution of projects, manage the content throughout the project, and keep everything in one comprehensive digital workspace. Download a trial, then buy at "substantial" academic discounts, at www.zengobi.com.

THROW OUT THE STICKY NOTES

If your monitor is blanketed with little yellow notes, you may want to look into a digital alternative in the form of Bare Bones Software's Yojimbo. Designed as a single repository for even the smallest bits of information, Yojimbo accepts everything from plain text to PDF files, images, bookmarks, and even your random thoughts. Information can be sorted into folders, synchronised between locations using .Mac Sync Services, searched using Spotlight, and generally organised into submission. Educational pricing is $US29.

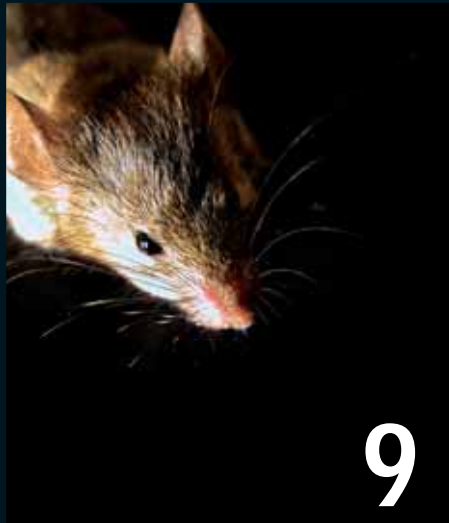Visit www.barebones.com/products/yojimbo/ for more information and to download.

CONTENTS

EDITORIAL

This autumn edition of Wheels for The Mind has a slightly new look and additional features to keep you more engrossed than ever before.

You'll find a crossword puzzle with the prize of an iPod shuffle and some good old-fashioned humour between the pages to give you a different perspective on what's currently happening out there. Remember you can email me at any time if you have great ideas for future articles or columns.

The big news of course is the release of the Intel based Macs – with the option for dual booting either MacOS X or Windows in the next major release of software. How this affects Higher Education is yet to be seen, although you can read inside how Curtin University applied the new faster Intel based iMac to speech and graphics processing with pleasing results.

In past editions we talked about the ubiquitous nature of computing. If you were to choose an ideal teaching environment, then you couldn't go wrong surrounded by the natural beauty of Stradbroke Island. This is where the University of Queensland have been studying neuron activity, facilitated by the AUC's Classroom-in-a-box. In this edition, read how Professor Sah ran a successful three-week intensive workshop in this idyllic spot – and still managed to get all his students back.

Talking of returning students, interns Ashley, Brett and Wade reveal what they have learnt and how their outlook has changed after working for three months with elite Apple engineers and programmers at Apple HQ in Cupertino.

You can also find out how Australia's first post-graduate animation degree, the Master of Animation at University of Technology Sydney, gets a six-times speed injection as they upgrade to Quad G5 machines and reap the creative benefits.

With Apple now celebrating 30 years growth, I'm sure you'll agree that the whole field of Education has been clearly advantaged by what has been a remarkable partnership with Apple technologies – one I'm sure you will join me on behalf of the AUC in wishing for its continued success.

Stephen Johnston
s.johnston@ecu.edu.au

Apple interns back in *Oz*

While most Australian university students were finishing up their semesters and dreaming of the beach late last year, three keen Mac developers were packing their bags to get ready for the trip of a lifetime.

Over the next three months, they would live, work, eat and play alongside the best of Apple's developers as part of a three-month internship based out of Apple headquarters in Cupertino, California.

During their time in Cupertino, the three students – Wade Tregaskis from La Trobe University, Brett Brooks from Central Queensland University, and Ashley Butterworth from the University of NSW – each worked on a variety of development projects related to their own interests.

All three were among the first to get a hands-on look at the new Intel-based Macs, which at that point were still several months from being released. Better still, much of their work related to helping the effort to convert Apple's entire internal tool set to support the new environment.

Wade, for one, got involved with the maintenance of an internal Apple development framework and helped port a number of third-party open source applications to the new Intel architecture. Working with a group of a half-dozen other interns, he also spent time rejigging internal tools, adding new features – and learning all the while.

"It was cool," he recalls. "I could go in and look at things and say "so that's how they do that!'". I got to answer those questions that had been bugging me for years."

> **"It was so cool, I could go in and look at things and say 'so that's how they do that!'**

Brett's experience was equally revelatory. After realising that he had some very good Cocoa experience, Brett's supervisor scrapped his initial assignment – porting a range of code to the Intel systems – and instead set him on the task of developing a Cocoa interface for an internal Apple application that technical support people use to author and publish Tech Notes.

The application was built around a convoluted, proprietary tag structure that Brett worked hard to decipher. He then built a translator to convert these tags into HTML using extensive PHP scripting. After weeks of largely unsupervised work, Brett delivered the final product: a polished, Cocoa-based standalone application that would let support people author and publish Tech Notes from anywhere they happened to be. Finishing touches, such as a built-in preview mode and easy editing, improved upon the original application and earned kudos from the Apple supervising developers.

"We were pretty happy with the application in the end," Brett recalls. "I learned a lot as far as integrating with things like PHP, which was pretty new to me. They threw me in the deep end from the beginning, and it was an awesome experience; I expected it to be good, but it exceeded my expectations."

Ashley was equally rapt about his internship, the tone of which was set when the boys were let loose on the new Intel-based Macs on their first day at the Apple site. Building on his extensive interest in embedded systems, Ashley soon found his pace within the section responsible for Core Audio development. His work involved the testing and debugging of APIs and low-level drivers that provide interfaces between Core Audio and the system hardware.

One of the products of Ashley's time at Apple was a new testing tool that had been partly developed by an Apple developer but remained incomplete. He "put a nice Cocoa GUI on it and added a lot more functionality" to produce a tool that is now used to test the new APIs as they are developed and debugged. He also "got a bit of code" in the Apple FireWire driver after noticing some API calls that remained unimplemented.

"Being Apple, everybody's on a tight deadline and nobody's not busy," Ashley says. "But they're pretty laid back about how they work, and it's certainly a very enjoyable environment. It's amazing looking through all that code because you can see the tricks they use to make it more efficient and cleaner looking. It changed my coding style slightly, in terms of efficiency and layout to make it much more readable. The whole experience was amazing."

Classroom in paradise

Delivering a three-week course amidst the natural beauty of Queensland's Stradbroke Island may sound like a dream job to many, but providing appropriate IT at the site was proving difficult for organisers of the Australian Course in Advanced Neuroscience.

The AUC's Classroom In a Box helped University of Queensland neuroscience students make the most of their three-week intensive on Stradbroke Island.

Offered as an intensive experience for 12 students from across Australia and New Zealand, the course is run by the University of Queensland's Queensland Brain Institute (QBI) at the university's Marine Institute on Stradbroke Island, where – unlike at U of Q's home campus in St Lucia – there is enough laboratory space to accommodate the class.

QBI all but standardised on Macs long ago, so it was easy to pick Macs as the computers of choice to support the course when it began two years ago, says QBI Professor Pankaj Sah. When it came to deciding which systems to get, however, the choice was more difficult.

"Technology is changing all the time," Sah explains. "What we didn't want to do was to go out and buy computers and find that next year something will change; then you go out and buy the new lot, and what do you do with the old ones? In this way, we thought we would go with the AUC's Classroom In A Box [CIAB]."

Available to AUC members at no cost on a loan basis, the CIAB includes 15 PowerBook notebook computers with 15" LCD screens, 1.25GHz G4 processors, 768MB RAM, 80GB hard drives, SuperDrives, Bluetooth and Airport Extreme wireless. Also loaded are the latest version of Mac OS X, iLife suite, Xcode Development Environment; and Graphic Convert 5, as well as an AirPort wireless LAN base station and all the necessary power boards, cables and adapters needed to get the systems up and running. All are packed into air and water-tight shipping containers that can be freighted anywhere in Australia.

Having instant access to the CIAB machines helped ensure the neuroscience students had the portable computing power they needed during the intensive. The Macs were put to work on a variety of tasks ranging from acquisition of fluorescence images from CCD cameras, to cell and neuron simulation program Neuron, and Axon Instruments AxoGraph software used for recording and analysing neuron signals from specialised USB-connected equipment used throughout the course.

Teaching with Classroom In A Box was so successful the Professor Sah has committed to using it again for the next batch of new students. "The systems worked very well," he explains, "and when they come from the AUC they're completely loaded with word processing and all sorts of other software the students can use. It really just suited our needs."

UTS

ANIMATORS RIDING HIGH ON THE FARM

> "Sheer processing performance is only the beginning of UTS's rendering revolution"

Years ago, animation stopped being about the drawing of pictures, and more about the manipulation of characters in a computerised virtual space.

These days, university animation classes are taught almost exclusively on amped-up digital workstations that churn through the massively complex calculations required to turn files from tools like Alias Wavefront Maya into 3D

characters, complemented by complex shading, light tracing, and other visual effects that produce the resulting eye candy.

Handling the calculations inherent in just one animated film requires even powerful computers to work for hours at a time. Throw in the demands of 62 full-time students, multiple re-renderings as projects continually develop,

and the deadline pressures of Australia's first postgraduate degree in animation, and you get an idea of the challenge facing Jason Benedek and his team at the University of Technology Sydney (UTS).

Benedek started working at the UTS Faculty of Design, Architecture and Building at the beginning of last year, around the same time that the 18-month Master of Animation degree was introduced. A huge success so far, the course has been turning applicants away and many of its 62 students have already been hand-picked by industry players for jobs after they graduate.

Supporting the students' technology requirements are a 21-seat computer lab and 48-node render farm, which was initially based on dual-CPU G4 Macintoshes that were repurposed from other tasks to support the then-new course.

While effective, those systems were suffering from regular bottlenecks due to the intense demands placed upon them by the large and active student body. "You've got 60-odd students doing these animations and have feature films that have to be finished and they're all going to be doing it during the same two weeks of the semester [before the exam]," Benedek explains. "Add these projects together and it's clear why you need dedicated machines to do the rendering."

With limited computing resources, however, students were using the same systems to run Maya animation software, Shake compositing, and other relevant applications. Spare CPU cycles were apportioned to rendering jobs when available, but the whole system was soon showing signs of strain.

Once the leases on the G4s expired at the beginning of this year, the department got a major boost as a fleet

"The stuff produced on the G4s was excellent, but the G5s are in another league "

of quad-CPU G5s replaced the old G4 systems. To avoid conflict between rendering and student usage, a purpose-built script now extracts the G5s from the Rush Render Queue managed computing cluster when students log on – and then returns the G5s to the rendering pool once the students are finished.

The move to G5 systems provided an immediate performance boost: "We found that a single G5 rendered about six times faster than a dual G4," says Benedek, "and that was when we weren't even using all four processors."

"MPEG encoding is on the order of 30 times faster, and we expect the quad-CPU machines are actually ten times faster at rendering if they're running flat-out. Students are submitting things that would previously have taken three days to render, and finding they're done in an hour or two. The improvement has been astounding."

Sheer processing performance is only the beginning of UTS's rendering revolution, however. The department has already taken delivery of 19 Apple XServes and is in the process of configuring them as a dedicated, networked render farm connected to the primary farm using 10Gbit Ethernet over fibre-optic cabling.

When brought fully online, the 19 XServes will provide 24-hour rendering support that complements the existing 48 workstations, which will soon be increased to 60. Offloading much of the

rendering burden from the department's workstations, however, is expected to further free students to explore their creativity and strengthen portfolios that are soon scheduled to start doing the rounds at local art festivals.

"The stuff produced on the G4s was excellent, but the G5s are in another league," says Benedek. "Students have more time for the business of animating, and they can go back and tweak things without waiting for days to see the changes. The quality of work is increasing all the time because there is more time allowed for creativity. That's really what the hardware does: open up new spaces for creativity rather than number crunching."

Choose a new NLTKCocoa task:

Batch   Quick Tokenize   Quick Tag   Quick Parse

Shoebox Data   Grammar

Enthusiasm over Apple's clustered computing technologies has grown steadily since the landmark 2004 announcement that the University of Virginia had created a clustered supercomputer using a large number of standard Xserve G5s. Ever since Apple formalised a method for creating Mac-based computing grids with the release of its Xgrid application, those same techniques have increasingly gained followers amongst academic researchers in all types of disciplines.

BUILDING A VIRTUAL TEAM OF LINGUISTS

For Baden Hughes, a research fellow in the Department of Computer Science and Software Engineering at the University of Melbourne, the clustering capabilities of Xgrid were irresistible. A long-time researcher in language processing and Web data mining, Hughes immediately recognised the potential for an Xgrid cluster to speed the processing of data-heavy linguistic models.

After considering how to best explore this potential, Hughes proposed a major development project that would build a new interface into the Natural Language Toolkit (NLTK, at http://sourceforge.net/projects/nltk) using conventional Mac programming tools. NLTK is an open-source collection of objects for Python programmers that encapsulate key linguistic analysis functions such as syntax trees, word frequency analysis, and so on.

"There was appeal in having some kind of parallel processing interface," Hughes explains. "Most language processing tasks are CPU intensive and long running, but the sort of tasks I'm interested in don't require high performance on any particular node; their performance is based largely on the degree of parallelism. Xgrid had the right level of simplicity to be able to build that bridge between it and the NLTK."

A ten-year veteran of Macintosh development,

Hughes already had experience with the Mac interface side of the project. To support his work, Hughes applied for and received a substantial grant from the Apple University Development Fund.

His first task was to build an Xgrid cluster on which to experiment while working out the rest of the project. That cluster gradually took shape over a period of six months, utilising one XServe and eight Mac minis (four of which came through the AUDF grant) that were configured as the control node and processing slaves within the Xgrid environment.

Hughes' cluster wasn't massive, but its innovative design attracted widespread attention and was ultimately the subject of an academic paper that compared the Xgrid approach with other clustering options. That success carried its momentum into the second half of the project, in which Hughes coded the actual software bridge between the Python-based NLTK and the Xgrid environment.

This bridge links the two worlds, providing a Cocoa front-end GUI that provides an easy interface for users. The GUI supports a range of functions including batch and non-batch modes, tokenisation, part-of-speech tagging, parsing and construction of trees. "These are the sorts of things computational linguists want to do," says Hughes. "They take a

syntactic parse of a sentence and construct a hierarchy of meanings."

"The challenge," he continues, "is that for most language processing, you need a large amount of training data – in the order of 100 million to a billion words – to build accurate models. You then want to run some analysis over an equally large corpus. The benefit of having high-performance computing is that it's relatively easy to parallelise a bunch of natural language processing tasks; they're easy to push onto a grid."

After nine months of coding, Hughes' development project – helped along with the help of student developer Mohammed Tabbara – finally reached completion, three months earlier than expected. Much of the code has been contributed back to the NLTK project, where subsequent versions will incorporate some of the code that the project produced.

The final report on the project is still being written, but Hughes has deemed it a success overall. "I'm optimistic about the fact that we've built something that people are going to be using," he explains. "I'm also optimistic that the AUDF will be happy as well; we have delivered a concrete outcome, and from all points of view I think it has been successful."

Of mice and then…

Old habits die hard, they say, and one of the hardest to break in computing circles is the use of the mouse as a pointing device.

Although it's possible to produce amazing art using the humble mouse, many design and graphical artists who try touch-sensitive tablets find their artistic horizons broadened so much that they never go back. The challenge, however, is getting students to break their umbilical connection to the mouse – and Justin Randall knows this can be easier said than done.

A lecturer in Curtin University of Technology's Department of Design, Randall and his fellow staff members recently began actively encouraging students to try using tablets instead of conventional mice for their graphical endeavours. "For those who do make the change, it's a radical improvement as an interface tool," Randall explains. "It really does make the process a lot more intimate if you're sketching."

Intimacy aside, however, many students have balked at the price tag of the pressure-sensitive Wacom Intuos3 tablets that he says offer the best control, and even the less-expensive Graphire models are far more expensive than a good mouse.

For those who have taken the plunge, however, the rewards have been considerable. Around 20 third-year students in the Digital Image Design course have adopted the tablets, which have also been popular in the second-year Design Image Techniques course. Students who, like Randall, are left-handed have been particularly advantaged by the devices, since they don't favour one handedness over the other.

Despite the slow uptake so far, Randall is hoping that growing acceptance of the alternative input devices – and the eye-popping results students are getting when extending their reach past Photoshop to artist-friendly applications like Corel Painter – will increase their uptake over time.

Using tablets, "I can teach students to do photographic renderings within six weeks without even having very good drawing skills," Randall says. "When you're doing things like digital portraits and trying to do hair realistically, your job is made so much easier with a tablet. Still, we find a lot of students are just scared of making that change."

The new flavour of Apple

The Announcement sent shock waves through the entire computer industry: Apple, which since its inception had used purpose-built Motorola and IBM processors for its computers, was going to make another architectural shift and instead adopt Intel's new Core Duo processors.

A flood of discussions on the topic ranged from the technical hurdles that might be involved, to the potential for running Mac OS X and Microsoft Windows (bootcamp) on the same machine. Months later, however, the growing availability of shipping Intel-based product has made it clear to users that Apple's efforts to smooth the transition to Intel processors is paying off manifold.

Universal Binary support, which allows developers to support both new Intel-based systems and legacy Macs with a single code base, offers a clean path for moving applications to the new platform. The process for creating Universal Binary code is among the many issues covered in Apple's Developer Transition Kits, which have already helped many developers recompile their own applications in the dual-headed format.

While this process may be relatively straightforward for developers working with their own applications, those depending on third-party applications will need to be in direct contact with their suppliers to ascertain Universal Binary availability. This issue will be particularly important for media, graphics, animation and design departments that regularly rely on advanced tools which may be out of the reach of Apple's Rosetta emulation software.

Movement of applications to the new platform is one part of the transition, but not the only important issue surrounding the migration. Apple has already released three Intel-based systems – 17″ and 20″ iMacs with 1.83 and 2.0GHz Intel CPUs, an Intel-based Mac mini, and the well-received MacBook Pro notebook with 2.0 or 2.16GHz Intel CPUs. All include iLife '06, a built-in iSight video camera, Front Row media player capabilities, DVD-burning SuperDrive, and Mac OS X 10.4.4.

These different form factors cross the breadth of the usability models that universities will need to consider as they plan their future Mac purchasing strategies. Cycle times for lab PCs, field research machines, staff desktops and other systems will all potentially be affected by the Intel changeover, as will device management strategies.

Throughout the rest of this year, Apple will transition the rest of its systems to Intel processors, increasing overall performance and completing its third-ever platform migration. Previous CPU changes have been smoothly handled using bridging software and dual-mode applications, and initial response to this architecture transition suggests that the move to Intel processors will happen just as smoothly.

YOUR MULTIMEDIA LIFE: NOW ON INTEL

One of the biggest questions on everyone's minds is how well Apple's core applications will make the transition to the new Intel processors.

Any lingering questions will likely be dispatched with after seeing the smooth performance of Apple's core video and audio production tools, now available in the Universal Binary format necessary to support new Intel-based iMacs, Mac minis, MacBook Pros as well as existing systems.

First off the bat with dual-code treatment was iLife '06, a broadly targeted suite of multimedia tools that features updates to core applications including iPhoto 6, iMovie HD 6, iDVD 2, GarageBand 3 and iTunes 6.

As usual, the new versions of the applications include both refinements to existing features and completely new additions. iPhoto 6's Photocasting feature, for example, builds on .Mac services to allow publication of online photo albums to which other people can subscribe, and automatically receive new photos as they're posted.

iMovie HD 6 improves the quality of produced video with new features such as motion themes, cinematic titling and support for editing and moving clips between multiple videos at once. iDVD 6 improves support for widescreen video production, with features such as 16:9 menus and improved widescreen video manipulation, while the new Magic iDVD feature lets users create an entire DVD with just a few clicks.

Also enhanced is GarageBand 3, which has been refined for the podcasting generation with radio-like jingle sound effects, chapter artwork, URL links, and the ability to simultaneously hold a videoconference in iChat AV and podcast it using GarageBand 3.

The newest addition to the iLife suite, however, may find the most new fans. iWeb, a powerful but easy-to-use tool for creating Web sites, blogs, online photo albums and blogs, works seamlessly with the rest of the iLife '06 suite. Drag-and-drop, template-driven creation of Web pages and one-click publication to a .Mac account all make iWeb simple to use for even the earliest novice.

iLife isn't the only Apple suite to get the Intel makeover however: iWork '06 includes the updated Pages 2 and Keynote 3 applications, which run even more smoothly on Intel Core processors and add features such as three-dimensional charts, iPhoto-like image editing and masking, and spreadsheet-like tables. Improved mail merge, document templates, thumbnail and search views all strengthen the feature set of this rapidly expanding productivity suite.

Thirdly, Apple has recently addressed one of the biggest concerns many users had with the transition to Intel processors: the smooth portability of high-end applications. At the end of March, such concerns were addressed with the release of Final Cut Studio 5.1, a Universal version of the Final Cut Studio suite that bundles Soundtrack Pro, Motion 2, and DVD Studio Pro 4.

These applications complement Logic Pro 7.2, which in February became the first Universal-compatible version of the company's professional media creation tools. In April, the range was expanded with Aperture 1.1, a Universal version of the increasingly popular post production tool for photographers.

Apple benchmarks confirm that the new tools are far faster than their predecessors: DV and HDV rendering from a Timeline was twice as fast on a MacBook Pro with 2.16GHz Intel Core Duo than a PowerBook G4 with 1.67GHz PowerPC processor. MPEG-2 encoding is up to 2.5 times as fast, while Logic 7.2 can simultaneously process 135 PlatinumVerb plugins and 8 Sculpture software instruments in a single Logic session on the MacBook Pro; compare this with 30 PlatinumVerbs and four Sculpture instruments on a PowerBook G4.

Intel-based Macs have proved a productivity boost for Iain Murray (left) and developer Kierin Eaton.

Intel iMacs prove accessible to Curtin developers

The transition has been very very smooth, and you wouldn't even know that you're using an Intel machine

Now that Apple's path towards the Intel Architecture is set in stone, the biggest question on everybody's lips is just how difficult the transition will be.

For Iain Murray, that question was particularly pointed since the products of his team's research work use complex speech and graphics algorithms that, he feared, would not survive the move to the new architecture intact. These concerns led to the purchase of an Apple Developer Transition Kit (DTK) and the later receipt of an AUC-loaned Intel-based iMac for testing.

The verdict? "We had no conflicts or problems at all," says Murray, a lecturer in the School of Electrical and Computer Engineering at Curtin University of Technology. "Because we do a lot of speech and graphics processing, we were a little concerned that our applications would cease to function. But it was nice to know they would run in the new environment."

Those applications focus on the facilitation of human-computer interaction for people with hearing and vision impairments: for example, the team has authored a system called iView that zooms in on lecture hall whiteboards for display on a notebook's screen. Another system – co-sponsored by Cisco Systems – enables speech-based monitoring and control of computer networks.

Because Murray's team has developed the applications on its own, recompiling them as universal binaries was a relatively straightforward effort – and the new applications worked seamlessly. There were "some issues" with third-party libraries, Murray concedes, but those were out of the team's control and easily worked around during testing. Extensive scripting within Quartz Composer, used particularly for trying out new methods of enhancing poor-quality images, also proved to be a smooth transition during the experiments.

One of the team's vision-impaired programmers has been working on the Intel-based iMac for some time without any problems. And, given the organisation's successful trials, Murray is confident that the Intel-based Macs are reliable enough to make them the main desktop platform purchased into the future.

"The transition has been very very smooth, and you wouldn't even know that you're using an Intel machine," says Murray. "Everything is changing over to Intel and I can't see any disadvantage with getting the Intel systems – but I can see quite a few advantages compared to the G4s."
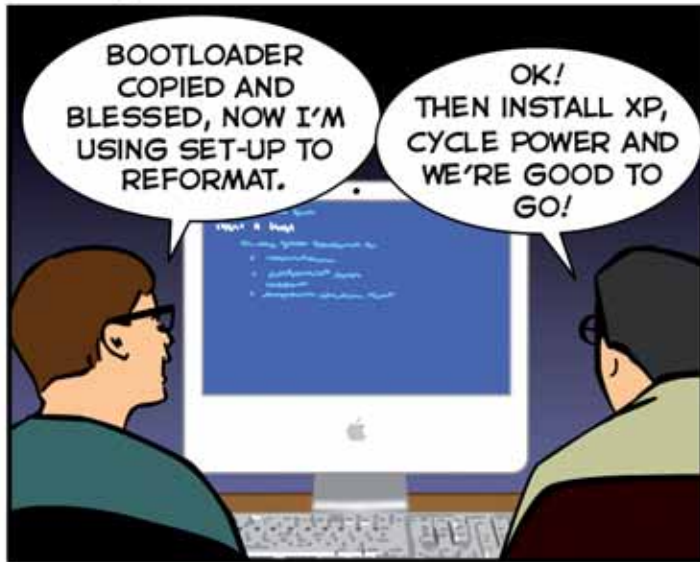
Registering at the AUC Conference in Hobart

A bit of light entertainment



In Conference

What are we all waiting for?

Wheels turning in Hobart

The AUC's Academic & Developers Conference is always loaded with interesting information, and the most recent event didn't disappoint.

Held at the Wrest Point Hotel, Hobart from 25 to 28 September last year, the conference brought together many of the people at the forefront of Apple utilisation within Australian and New Zealand universities.

For those interested, the full 170-page conference proceedings document is available at www.auc.edu.au/conf/conf05/pdf/AUC_Conf_2005_Proceedings.pdf. In the meantime, here are a few pictures from the sessions.

(Photographer Paul Godfrey).
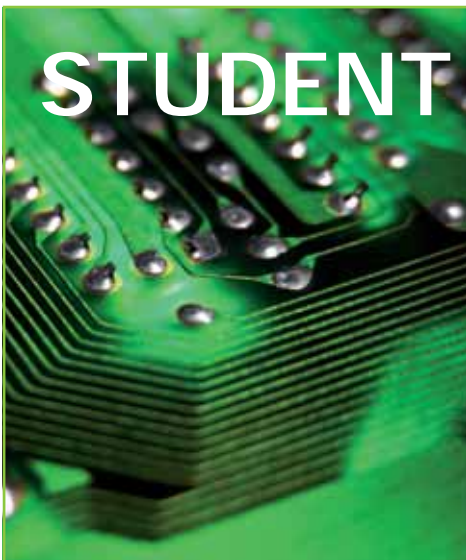
STUDENT SCHOLARSHIPS

AUC OFFERS COCOA WORKSHOP STUDENT SCHOLARSHIPS

One student from each AUC member university is eligible for a travel and accommodation scholarship to the first AUC Cocoa Workshop, a three-day course which will be held at the UNSW Kensington campus in Sydney on July 5 and 10. These workshops will promote an understanding and appreciation of Cocoa and related Mac OS X development technologies. A maximum of 16 people can attend each workshop, so seats will be allocated on a first-come, first-served basis.

For more information, visit www.auc.edu.au/training/cocoa_wkshop

CROSSWORD COMPETITION

WIN an iPod shuffle

For your chance to win, complete the crossword below (you will find the answers throughout the articles); and take the letters from the green boxes and re-arrange them to form a word.

Send this to: crossword@auc.com.au

Competition closes at 5pm on 30th June, 2006

Across

2. Jason's full time load (page 6)
5. The 'other' Steve (page 15)
6. Rodwell not here at this time (page 19)
7. Compositing can make you rattle'n'roll (page 7)
9. Seek grant here (page 8)
11. Justin Randall broke this cord (page 9)
15. "South-paws" are advantaged by these (page 9)
16. Just turned 30 (page 15)
17. It's a very, very smooth one for Iain Murray (page 12)
18. Boxed up in Paradise (page 5)
20. AFP2 lacked this support (page 18)
24. Emulation by any other name (page 10)
26. Twin-state with wide application (page 10)
27. Baden Hughes finds these irresistible (page 8)

Down

1. Twice the 'seeds' in this processor (page 11)
3. Wade, Brett and Ashley won one (page 4)
4. A dozen of these at ANU Home Directories (page 19)
8. Get to the source of this Sun-god (page 19)
10. He won an AAUT prize (page 17)
12. Apple HQ (page 4)
13. Chocolate connections perhaps! (page 4)
14. New feature in iPhoto 6 (page 11)
19. Windows on Mac (for Private use!) (page 10)
21. UTS needs 19 of these (page 7)
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23. This music writer is crystal clear (page 12)
25. It's now inside (page 10)

30 YEARS… of thinking different

It may be hard to appreciate, but April 1 marked the 30th year since Steve Jobs and Steve Wozniak sold off their prized HP calculator and van to raise the money to establish Apple. In the three decades since, Apple has repeatedly reinvented itself to stay at the vanguard of computer technology. It is appropriate, then, that this year be the time when Apple reinvents itself once again with the shift to Intel architecture hardware and a dual-boot strategy for expanding the usefulness of its technology to users in all walks of life.

Happy birthday, Apple!

Top,from left: Lesley Instone (Charles Darwin Uni), Helen Rysavy (CDU), Penny Wurm (TS CRC) and Kate Parr (Bushfire CRC/CSIRO):

Centre right: Dr Michael Bulmer (UQ): Far right, clockwise from from upper left: Michael Christie, John Greatorex, Betty Marranganyin and Waymamba Gaykamangu (all of CDU)

Multimedia-powered teaching sets the pace

Sometimes, a little technology can make all the difference between a good teacher and an excellent teacher. It is, therefore, with great honour that the AUC acknowledges the awards recently won by excellent teachers affiliated with member universities.

One of those teachers was Dr Michael Bulmer, a senior lecturer in mathematics and statistics at the University of Queensland, who received a $40,000 prize after being declared the winner in the Physical Sciences category of the 2005 Australian Awards for University Teaching (AAUT).

For several years, Bulmer has been investigating the use of new techniques to help first-year students get involved and to master the high volume of memorisation work involved in introductory statistics classes. For example, a demographic survey given to students at each semester's beginning provides a wealth of relevant statistical information that is used throughout the rest of the class.

"I've tried to make it very hands-on," he says. "We have a diversity of students, many in biological sciences and many in other fields, and with around 700 students each year we have been looking for ways to cater to that diversity to make the most of it."

Each student is expected to choose, design and undertake a research project throughout the course. To assist in student understanding, Bulmer developed a Mac-based application package, funded by the AUDF, that uses a large number of QuickTime movies to allow students to experiment with the virtual growing of a range of plants.

Students control a number of environmental variables, then let the plants grow and statistically analyse their enlargement. "Something that can normally take a few weeks to grow, can be done in an hour," says Bulmer.

More recently, Bulmer has built on the success of the plant simulator to offer students a people simulator, which allows students to collect and analyse physiographic information about a population of 'virtual humans'.

Designed to appeal to the many students that will go on to pursue medicine and other related fields, the system includes around 6000 images of a range of virtual humans.

Students use the virtual humans to chart body size measurements and other relevant data. Response to the virtual humans has been strong so far, and a coming second version will add QTVR movies for a more realistic and useful experience.

"The awards recognise something innovative that has obvious benefit," says Bulmer. "What we've tried to do with

"Something that can normally take a few weeks to grow, can be done in an hour"

the technology is to develop virtual worlds that can provide a context for the data. The fact that we used technology to do things that we wouldn't be able to otherwise, gives students a sense of ownership of the process."

Educators in the Top End were also celebrating recently, after two separate groups of Charles Darwin University staff were recognised with prestigious awards for their work.

The winning of the Prime Minister's Award for University Teacher of the Year marked a significant win for CDU's Yolngu Studies team, which includes a group of senior Yolngu advisors from five major communities. The team is led by CDU lecturers Waymamba Gaykamangu, Michael Christie, John Greatorex and Betty Marranganyin.

Over the past 12 years, the team has developed a range of online and offline resources to assist the program, which is the country's

only Yolngu program that sees Aboriginal teachers teaching their own languages and culture under supervision of their own community elders.

Specific resources include Nhanapinya Rakaranhami, a video and booklet that shares the story of identity of 18 different Yolngu from various clan groups. Another resource is the Gupapuygnu Word List, a bidirectional beginner's dictionary pairing 2000 Gupapuygnu words and their English translations. A CD library of Yolngu literature contains 190 interactive stories in 15 languages, while the Gupapuygnu multimedia CD teaches and tests students on pronunciation, spelling and grammar at 13 different levels. Finally, the Yolngu Studies online database contains text, audio and video files for public access and student use (see http://learnline.cdu.edu.au/yolngustudies).

Also recognised were CDU Teaching and Learning staff Dr Lesley Instone and Web designer Helen Rysavy, who joined Dr Kate Parr, of the Bushfire Cooperative Research Centre and Dr Penny Wurm, of the Tropical Savannas CRC, to develop an online educational resource that was awarded a 2005 National ASCILITE Award for Educational Design & Technology in Tertiary Education.

The award, given for 'exemplary use of electronic technologies in teaching and learning in higher education', recognises the innovation behind the team's online teaching resource focused on fire ecology and management.

The resources, which have been designed to address the real-world environmental conditions of the Top End, have been used as part of several CDU undergraduate programs and encapsulate information from bushfire management professionals, pastoralists and traditional indigenous land owners.

"These graduates work in situations where an understanding of the impact of fire on landscapes and the complex policy issues involved is crucial," said Dr Wurm. "They need to work cooperatively with managers of adjacent lands and appreciate that different groups can have diverse fire management objectives."

Student directories get an Xsan makeover at ANU

Use of new creative technologies has opened up new possibilities for students, but it has also placed a significant burden on IT administrators who must accommodate data growth with increasingly large disk storage volumes.

For Australian National University IT staff, the crunch came as pressure increased on the university's central Sun Microsystems Unix server, which was providing project storage space for the entire student body. The need to keep disk space manageable had forced the team to limit individual storage space to a measly 10MB, but an even bigger problem had arisen as the shift to Mac OS X left the Sun server's AFP2 (Apple File Protocol) support falling behind the curve.

Helios EtherShare software, which had been successfully used to provide AFP2 services in the older Mac environment, had not been upgraded to support the more flexible AFP3 used in Mac OS X. This meant that students trying to store documents with long filenames had those filenames truncated by the server file system. The older version also lacked Unicode support, automatic reconnect and numerous other features that help Mac OS X function optimally.

"The servers were holding us back a bit," says Daniel Rodwell, senior system administrator within the ANU's Division of Information. "When the system was first implemented five years earlier, we had fewer desktops and didn't have people saving 300MB Photoshop files."

Technical limitations were also a problem – most notably, the lack of clustering that left the ANU in the uncomfortable position of having critical files stored on a server with a single point of failure.

"We had 700GB of storage using older-style Sun T3 disk arrays, and this was direct-attached," Rodwell explains. "If the server needed to be rebooted to apply a patch, we had to take everything offline. Helios didn't support clustering, and we had problems with file concurrency and load balancing. We just couldn't have that single point of failure anymore. The driving factor was to try and minimise downtime, and to provide a scalable storage solution that we could easily expand.

AN XSAN SOLUTION

Recognising that the writing was on the wall for its existing storage infrastructure, the ANU team looked around for alternatives. Their investigations quickly hit upon Apple Xsan, which had just been announced at the time and would clearly provide native support for the university's 400 Mac and 800 Windows desktops.

Stuart Fox, a senior systems administrator within the Division of Information, looked into the technology and recommended an implementation, although he cautioned that the scale of ANU's implementation – which can potentially involve access by up to 26,000 students and staff – might be an issue with a version 1.0 product.

ANU, however, had already had a positive experience with Apple storage technologies in the form of XServe RAID, of which 500GB of storage had already been installed "for messing around".

Determined that it was onto the right approach, the ANU team worked with Apple specialists Vanni Sant and Jennifer Walbank to develop a plan for implementation of the new environment.

> **"Use of new creative technologies has opened up new possibilities for students"**

ANU ultimately installed 12 terabytes of home directory storage, spread across four Xserve RAID servers. Xsan's built-in clustering support automatically provides the redundancy and availability that had been lacking in the previous environment. Four dual-CPU 2.3GHz XServe G5 servers, each with 1GB of RAM, do the heavy lifting in managing access to the new storage environment; an additional three Xserve G5 serves as metadata controllers for the Xsan, file servers and administration server.

Another key element of the infrastructure was a Cisco 11506 Content Switch (CCS), which automatically handles load balancing at the network level. The CCS monitors server availability, then automatically shifts user sessions to other systems in the event of a failure.

"For a student, it appears that they're connecting to a single server, but the CCS automatically splits them out to whichever server has the highest available capacity," says Rodwell. "This ensures that we get the highest level of performance and reliability."

THE HARD PART ○ ○ ○

Moving to the new environment took a lot more than just installing the new servers, however; with nearly a terabyte of student data already in place on the old server, the team needed to make sure the move to the new system went smoothly. This meant migrating all of the existing data to the new servers – but there was a hitch.

That hitch had to do with the way the Helios EtherShare software managed file metadata. Because it used a proprietary resource fork to store Mac-specific information about each file, the files couldn't just be transferred to the new system or all of that attribute information would have been lost.

The solution? "We had to find the original format specification for the Helios resource file, and convert that into a resource file that Xsan understood," says Rodwell. "That involved reading the schema for the file format, and deciphering it one byte at a time. We wrote the code in ANSI C to be fast, because we had to cut over more than 700GB of data, in 8 million files, in the space of a single weekend."

With the pressure on, the ANU team – in particular, recently appointed graduate Andrew Wellington – worked tirelessly to test, revise and re-test the code they had written, taking nearly two months to ensure that attributes were being correctly transferred and that the file dump would go off without a hitch.

"If we didn't load test, test the migration and test the system's ability to handle the load,

we could have had a serious problem," says Rodwell. "We could have done the transfer again if it didn't work, but the data would have been out of sync – so we had to make sure it was going to work the first time around."

In the course of the project, it also became clear that the project was the first of its kind in the world. Once student exams had finished for the year, the team went into high gear and, with fingers crossed and the confidence of hundreds of hours of automated testing, flipped the switch one Friday afternoon at the end of November.

The extensive testing paid off: the migration went of without a hitch, and the new Xsan based environment was ready to go by Monday morning.

A NEW APPROACH TO STORAGE ○ ○ ○

With the migration completed, the Division of Information has been freed to pursue a more aggressive and relevant strategy for its storage administration. Most visibly, students that once had to cram their work into 10MB of storage now have 250MB each to play with, with some digital media-intensive students getting as much as 10GB.

Using an inhouse-written backup program, the new environment also maintains ten days' worth of data backups, which are stored on a dedicated Xsan volume. This data is accessible by students using a Web-based interface, also written inhouse, that lets them choose and restore deleted files that are required again. All backup is disk-to-disk at this point, although the team is considering the introduction of tape for longer-term backup.

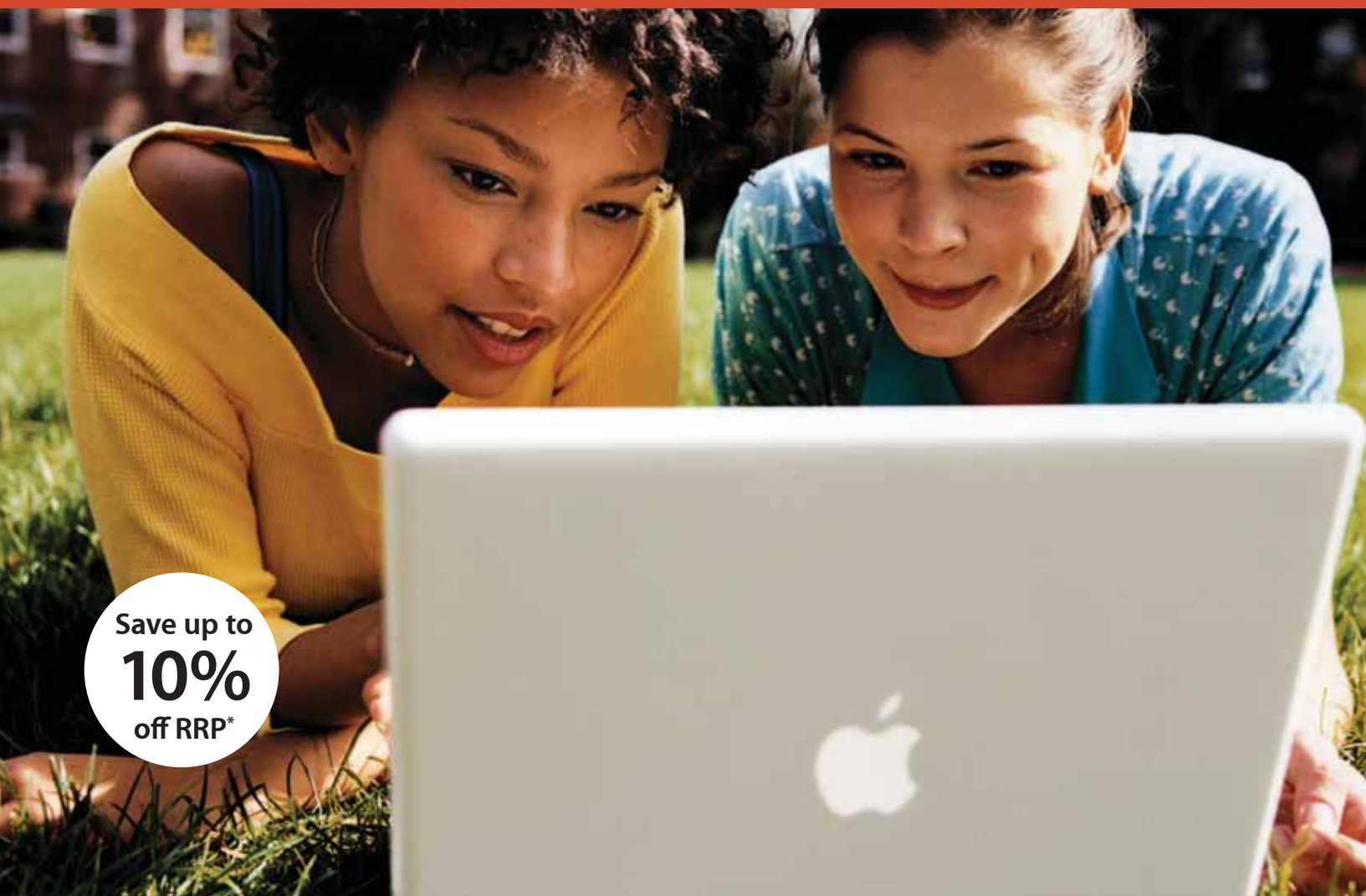Student self-service has proved to be a big time-saver for IT staff, who now spend less time cleaning up after student mistakes. "Once we got past implementing the technology stage, we wanted to reduce our helpdesk support so we had fewer people logging helpdesk jobs," Rodwell explains. "We wanted to reduce calls saying 'I'd like my Word file from yesterday restored' and enable students to do that themselves; we're not here at 11pm when they're working on essays that are due."

As part of the Division's information management services, graduating students are given a CD with the contents of their directory once they graduate. Other services currently in development include detailed usage reporting, which will help students manage their storage use and help storage administrators get a better understanding of how much storage space is appropriate for different types of students.

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