Focus on students:
Our most valuable assets

From Nathan to Muttaburra

Two Griffith University students learned a thing or two about real-world Web development while helping the remote Queensland town of Muttaburra, home of the legendary dinosaur Muttaburrasaurus, catalogue 150 years of historical archives.

It's TV, Jim, but not as we know it

In computer terms at least, it's an age-old problem: how to push high-quality video down narrow communications pipes. UTS student Christian Kent, fresh off a rewarding internship working with digital television programming at SBS, believes he's found a way to increase programming density with a new algorithm that squashes video without destroying its quality.

Inspiration, perspiration, authentication

It started off as an idea hatched at WWDC 2002. A year later, University of Newcastle student Heath Raftery's Authoxy software is circulating the globe, giving him a first-hand lesson in the ways of shareware.

Monash International's iMac conversion

Working in a Windows-focused Monash department, IT administrator Jason Smith never thought much about Macs before. So why is he now surrounded by iMacs?

PRODUCT Round UP

EXTRA DIMENSIONS FOR YOUR 3D

Into 3D? Check out Maxon Computer's Cinema 4D 8 XL, a comprehensive 3D design and animation system that includes a full suite of tools for object creation and manipulation.

If you need to do it, Cinema 4D can handle it: there are particle effects, meatballs, spline modelling, inverse kinematics, detailed point and polygon editing, HyperNURBS (standard non-uniform rational b-spline modelling), a Raytrace engine and Cartoon Mode for rendering cells. The workspace is ever-changing, making sure you've got the right tools at the right time.

Cinema 4D 8 XL's Object Manager panel provides a single tree for managing models, deformations, textures, and parent-child relationships with a top-down perspective that lets you keep track of exactly what's happening. Dragging and dropping features from the Object Manager directly onto objects lets you modify their behaviour in real time. The package can output to Shockwave3D and Flash to facilitate online animation.

The base Cinema 4D 8 software costs $1320 inc GST. Cinema 4D 8 XL - which bundles Mocca (character animation), Thinking Particles (particle generation), Pyro Cluster (for smoke, fog, atmospheric effects), and Advanced Render (for radiosity, architectural rendering and so on), and Network-3 (which allows rendering jobs to be split across up to 3 networked machines) - has a rrp of $3575 or costs $400 for students.

Contact Adimex on (02) 9699 1088 or www.adimex.com.au, or visit www.maxoncomputer.com.

QUARK HITS MACOS X AT LAST

It may not be an overstatement to say that delays in the launch of this application have single-handedly prevented many people from upgrading to MacOS X. Wait no more: QuarkXpress 6 for MacOS X is finally here, and it's set to reignite a desktop publishing battle that had all but been given to Adobe InDesign by default.

All the goodies are here, but Quark has given the new version a load of new capabilities that show it obviously has Adobe in its sights. The new version includes direct PDF exporting; the ability to share style sheets, colours, hyphenation settings and lists among layouts; full-resolution preview; better Web design tools including two-position rollovers, cascading menus, font family specification for cascading style sheets, and form controls improvements; and better printing through features such as As Is Color Space and DeviceN.

A full list of the new features can be had at www.quark.com/products/xpress/fullfeatures.html.

QuarkXpress 6 will ship in Australia in August. Contact Modulo Systems on (02) 9387 5300 or visit www.quark.com/products/xpress/macosx.html.

GO BLUE IN THE TOOTH

The short-range Bluetooth wireless protocol is still far from ubiquitous, but it's seen slow but steady adoption as a way of linking mobile phones, PDAs and all manner of interesting gadgets.

Getting your computer in on the wireless game is much easier with D-Link's DWB-120M, a USB Bluetooth adapter that makes it about as simple as it could be to connect your Mac with your other devices. Plug it into your PowerBook and use your mobile as a modem anywhere you go; use it software like iSync to synchronise your address book with the directory on your phone; or simply create ad hoc networks between two or more Bluetooth-equipped machines. It works in the license-free 2.4GHz spectrum and has a range of around 10 metres.

The adapter retails for $99 and is only available here through the Apple Store (www.apple.com.au). Contact D-Link on 1300 766 868.

KICK YOUR WIRELESS INTO OVERDRIVE

It may sound like a lot, but by the time interference and distance have had a crack at the 11Mbps of bandwidth that standard AirPort wireless networks, there's often nowhere near as much speed left as you thought. Enter AirPort Extreme, a turbo-charged wireless base station that combines standard 802.11b support with the new 802.11g standard, running at up to 54Mbps.

That's the theoretical limit, but in practice 802.11g is still two to three times faster than 802.11b networks. If you're supporting lots of wireless users or just want a stronger, faster connection around the office, AirPort Extreme will do the trick.

The new base stations include a USB printer port and a jack for an optional external antenna to increase transmission range, which is around 50 metres tops (speed decreases rapidly the further you go from the base station). Setup is brainless - just plug it in and go. There's password security and 128-bit WEP encryption if you want it, a built-in firewall and access control to keep out the nasties, and the ability to reduce base station power so neighbours can't get in on the action so easily.

The AirPort Extreme base station costs $399 (or $499 with a built-in modem) from the Apple Store at www.apple.com.au. The AirPort Extreme Card costs $199. Visit www.apple.com.au/airport/ or call Apple on 133 266 for more information.

STORE YOUR MP3s, 100 DVDs AND YOUR ASSIGNMENTS TOO

Every time we set out to look for great new products released since the last issue, LaCie seems to have crammed more space into its portable hard drives. This issue is no exception: the company's BigDisk 500GB, the latest in its ever-expanding line of portable hard drives, is packing some serious storage space.

Weighing in at 2.5 kg, it's far from a featherweight. But inside the industrial-strength casing is a pair of 3.5" Maxtor DiamondMax 16 ATA/133 hard drives, spinning at 7200 rpm and offering a hefty 467GB of formatted space. There's an external power supply to minimise heat levels, which are low enough that the unit doesn't require a fan.

The BigDisk 500 costs $1979 from LaCie Australia on (02) 9669 6900 or www.lacie.com.au.

GIVE YOUR VIDEO WORK A HAND

If you're into any kind of serious video or audio editing, you'll probably be frustrated with using the mouse and keyboard to do everything. Consider Contour A/V Solutions' ShuttlePro and newer ShuttlXpress, handheld video controllers designed to recreate the look and feel of professional video editing stations.

The ShuttlePro features 13 buttons and a jog and shuttle controller that provides 7 variable speeds, while ShuttlXpress is a smaller version featuring five buttons and the same jog and shuttle controller. Each control on the devices can be customised to suit any application, and both work with a variety of tools, including Final Cut Pro and iMovie, out of the box.

ShuttlePro costs $249, while ShuttlXpress is $129. Contact Macsense on (02) 9319 2288 or visit www.contourav.com for more information.

editorial

FROM THE EDITOR'S DESKTOP

Students, take a bow

It's easy for us to talk with excitement about the many things the AUC is up to, the professional development that we provide for staff at member universities, and the way that Apple technology is continuing to develop its presence in many Australian Universities.

All of this, however, would be irrelevant without acknowledging the many contributions of the students that attend those institutions. We have been working hard in recent years to increase our direct involvement with students, and I applaud those students who have taken the initiative to explore the opportunities the AUC provides.

In this issue, we profile a number of students at AUC member universities. They come from a diverse range of backgrounds, and each is contributing novel work to the AUC community in his or her own way. There are projects involving database-driven Web sites, experimental design, mathematical modeling, innovative digital video streaming, and exploration of the high-end graphics capabilities of MacOS X.

Congratulations to all, and to the many other students pursuing interesting projects that we didn't have the space to cover. We are always eager to hear what you've been up to, so don't hesitate to drop me a line and let me know about it.

Elsewhere in this issue, we've got the usual assortment of interesting stories. Andrew Jeffrey tries on Apple's new iLife software suite; Charles Sturt University's Leslie Burr sounds off on one of interactive multimedia's biggest failures; we find out how Monash International has made the switch to the iMac; and offer some eLearning advice courtesy of Paul McKey, Managing Director of Brisbane solution provider Redbean Learning Solutions. We also visit RMIT University's Faculty of Art, Design and Communications and, of course, talk about the AUC's latest activities.

I hope you enjoy the issue, and as always welcome your feedback.

Peter Sharpe, Editor
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contents

From **Dinosaurs** to Darwin

By David Braue

The central Queensland town of Muttaburra, population 100, isn't the kind of place you'd expect to find university students plying their Web development skills. But it's exactly where Nick Loeve and Håvard Eide, third-year students at Griffith University in Brisbane, found themselves engaged in their first-ever commercial project as part of their degrees.

Simply communicating with their customers, Loeve found, was challenging. "It was hard to relate technically to the [town's representatives]," he explains. "When you're in the multimedia industry in Brisbane you're used to everyone knowing what you're talking about. But once they got caught up in it, they had their own ideas."

It was an awakening for the pair, who were contracted to develop a comprehensive database-driven Web site that would contain and index over 150 years of school, teacher, cemetery, business, hospital, and war records previously consigned to boxes in the town's archives but now digitised and available for all. The site (www.muttaburra.com) also links to information on Muttaburrasaurus langdoni, a 7.5-metre herbivorous dinosaur discovered in the town in 1963, that remains its biggest claim to fame.

For Loeve and Eide, the project was an excellent opportunity to cut their teeth on a real-life real-time Web site that is, despite its austere appearance, more complex in the back end than anything they'd done before.

"It was a very big learning experience," Loeve recalls. It was the first commercial project I'd done that involved a fair bit of money, and we underestimated what was involved – especially about transferring historical records that weren't really referenced or stored in any way. A lot of it was digitised, but not in the format we needed."

The large volume of unstructured information required Eide and Loeve to undertake a significant data normalising effort that included the creation of a complex Java program and scripts that extracted data into a MySQL database. Deduping, restructuring and organising the data were also part of the project, which recently went live after considerable effort.

The site, along with its back-end supporting technology, was built within MacOS X, which both students have come to favour after years of developing in Windows and Unix environments. Their experience has given them strong technical roots and an appreciation of the architectural design of Apple's operating system, which they've used for a broad range of work apart from the Muttaburra portal.

Loeve, for one, is a strident advocate of the open-source movement and has found a philosophical home with Apple's Darwin platform and other open-source tools including the PHP (www.php.net) scripting environment and Apache Web server. He's recently begun dabbling in enterprise Java development, and is exploring the technology underlying the KDE desktop environment with an eye to building project management software that works seamlessly across desktop and handheld environments.

Investing in students: the best kind of ROI

By Stephen Young

Since 1999, the AUC has been working especially hard to engage with students. The work we do with and for staff is still important, but at that point we realised we didn't have any programs of direct benefit to students. With MacOS X on the horizon, we also hoped to encourage a new generation of software developers to work with the Macintosh, especially developers who might well produce software relevant in higher education.

We created a special category of AUDF grant, the Seeding Grant, intended mostly for student applicants. In 2000, we started providing scholarships to help students attend Apple's World Wide Developer Conference (WWDC), and we also started encouraging member universities to send students to our bi-annual Academic & Developers Conference. In 2002, the Student WWDC scholarships were awarded on a national competitive basis, and this was so successful that the competitive principle has been applied to some staff scholarships in 2003.

Those who've been at our recent General Meetings will be well aware of how valuable these programs are for student developers. In September, and again in November, student presentations were included in the agenda; we've heard from Penny Wyatt, Christian Kent, Heath Raftery and Jake McMullin.

Those presentations convinced me that our Student WWDC scholarships, and our other student programs, are an excellent investment in Australia's future. And it's an investment that pays off in the short term too: in 2002 Heath Raftery published Authoxy and Jake McMullin published JJEdit. Both are great products, both are good fits with the needs of students in Australian universities.

Here's hoping those successes are just the start…

Stephen Young
Chair, Australian Apple University Consortium
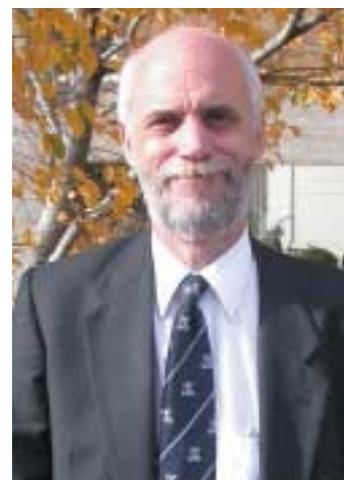
Loeve's devotion to the Mac is a relatively recent phenomenon: he first experienced MacOS X after buying an iBook less than two years ago, and quickly began using it for all his development work.

"It's really good to be able to do things like Flash, then turn around and be able to back-end Unix programming on the same system," he says. "Graphically, OS X is awesome and keeps getting better. Now I'm looking into it as an application server environment, since a lot of my development is PHP based or Java. I've got this little mini Unix box I can test things out on. As a development machine, it's much better than using Windows."

Eide, who maintains the www.phpvolcano.com PHP Web site and recently contributed to a book called Advanced PHP for Flash, is equally new to the Mac, having switched two years ago after realising it offered him many capabilities Windows and Unix couldn't.

"The Mac had everything there," he says. "Multimedia development is just excellent; I can't see any other platform that can match it. I want to get into the Cocoa application more than I have before, and I'm doing a lot of Java. But my main interest is developing dynamic Web applications with PHP, especially with PHP 5 coming out."

Brimming with ideas, Eide this year got the chance to back his creativity with technical knowledge after receiving a WWDC scholarship from the AUC, which took him to San Francisco to join Apple's annual global mind meld. Planning for the conference was hard due to the wealth of content available, but Eide's interests had seen him focus his plans for the conference on Cocoa, Java, QuickTime, and open source sessions.

"I'm running around here waiting for the chance to see the new stuff that's coming out," he said while packing for the conference earlier in June. "I didn't even think I would get the scholarship in the first place, but I applied and got in. I'm so excited!"

Eide and Loeve's enthusiasm extends well into the future: their shared love of open-source technology, combined with the business acumen they've developed with the Muttaburra project and other Web site development run through their own companies, has directed them towards careers as consultants, in which they will seek to add business value around Darwin and other open-source technologies.

"I can see how using Darwin as the platform can be the basis for consultancy and development," says Loeve. "Because it's not as big and widespread as Linux, and doesn't have as many inputs, the Darwin project is more cohesive. Instead of having a wide variety of not too complex libraries, it builds up a specialty base. I'm thinking of taking the idea further to make it not just multimedia based but also incorporating software engineering and straight IP-based development using open source.

That's one of the driving reasons I want to explore everything Apple has."

Java for the masses

Designing reliable surveys can be a complex task, but it's equally challenging to make sure those surveys are backed by an information system that provides reliable and accurate data collection.

For Flavia Morello, this truth became evident after years spent working in marketing, where increasing technological sophistication forced the company up a steep learning curve as it sought to deliver ever more information to its clients online. The Web was the solution, with reports from client visits entered directly into an online system that was also accessible to the clients.

The problem: it wasn't always that easy. In her last position "we did this Web-based work, but most of the problems seemed to be in integrating the back end with clients," Morello recalls. "Because we were Microsoft-based, it was easier to produce everything that way. But I found Windows a bit limiting, and I was interested in seeing what technologies were available, how systems could be better integrated and how more open-source technology could be used."

Morello's curiosity about the mechanisms of company-client interaction led her to begin her PhD in the Faculty of IT at the University of Technology, Sydney. Now, designing a three-year research project that will track Australia's largest companies' perceptions of e-procurement over time, she's finding that the right technological approach is critical to making smooth, large-scale online communication a reality.

She had already had some Java knowledge and experience using Macs — most notably during a project that saw her translating software from a Japanese Macintosh version to an English Windows version. "The software we had for Windows was awful, and it was amazing to see the difference between the two," she recalls.

Her early experiences with Macs were reinforced last year, when she received an AUDF Seeding Grant that put her in contact with a 700MHz iBook, Apple Developer Connection student membership, CodeWarrior, MacOS X, and O'Reilly's *Learning Cocoa* book.

That award was enough to convince Morello to give the Mac even more attention, and she hasn't looked back. CodeWarrior and WebObjects are "great," she says. "From a learner's point of view it's fantastic."

As the survey continues to develop, Morello is using the Mac environment to build tools that will support the three-year project. For example, a computerised literature database has helped her research team set up a concise filing system that's proved to be much more efficient than "shuffling documents about." Many custom-built Java applications provide specific features for the survey and for her general knowledge.

Her exploration of the MacOS X environment has resulted in loads of Java code that may or may not make it into the final project. "Because I'm just in the early stages of my work, I'm not sure whether the Java applications I'm developing will be part of my final project or just to help me understand what's going on," Morello says.

"At the moment, I'm looking at it to see how I can use it to replicate some of the things I've done in the past. [Developing on the Mac] has been great. It's said that Mac people tend to be very obsessed and hard to change, but I find that I've become one myself."

Flavia Morello

Broadcast Views

Digital television has been a long time coming, but Christian Kent believes it is soon going to change the broadcasting world. He should know: after a year-long internship exploring digital TV applications at SBS in Sydney, he's had an unprecedented chance to taste the technology and is hungry for more.

Kent, who is currently pursuing a Bachelor of Science (Information Technology) at the University of Technology, Sydney, fell into what he calls "the dream job that I had wished for" during the one-year industry placement that's a mandatory part of his degree.

During his time at SBS, he was one of two programmers building Java-based interactive TV applications of the type that are expected to become common as televisions gradually catch up with the computer age. He also got the change to explore HDTV (High Definition TV), the next-generation broadcast standard offering computer-like resolutions.

"It is still purely in the embryonic stage," Kent says. "It was the perfect mix of AV and IT. There was a very good alignment of the stars: the head of new media there saw my resume and crafted the perfect job for me. It became a dream run."

Now that his work at SBS has concluded, Kent is hooked on digital video. He's recently been exploring the technical structure of MPEG-2 (used on DVDs) and MPEG-4 (a more efficient, emerging standard), projects for which his long-time affinity for Apple technology – he began programming on the Apple][many years ago – has made him perfectly suited.

His love of Mac technology has only increased with time, particularly as demanding video applications become more and more commonplace. "I find QuickTime and digital video very inspiring," he says. "You can now do things with standard definition video on a Mac that would have been way out of your league five years ago. The numbers you deal with now are astronomical; I bought the largest disk I could, and I immediately ran out of space. HD video breaks the rule even quicker."

Kent has become an informal advocate for iBooks, pointing out that their low cost and significant capabilities make them well-suited as student computers. "The iBook has really made a sea change of a difference," Kent says. "Students are comparing it to Toshiba and IBM, but the iBook is a premium product like they are. Then you show them what MacOS X can do, and that sells it. It's so much easier to sell something with a command line on it, where you can instantly put to good use everything you've learned at the uni."

Kent's latest project is construction of a QuickTime export module to support a highly efficient video compression technique that Kent recently developed – "something impossible before breakfast", as he puts it. The technology, he says, allows a video signal to be squeezed into a lower-bandwidth video stream – HDTV into a conventional broadcast stream or a widescreen broadcast into a normal aspect ratio mode. He believes this sort of technology could have significant implications in digital TV broadcasting, where radio frequency spectrum is at a premium and the massive size of HDTV broadcasts remains an issue.

Last year, Kent received an AUC WWDC scholarship, an experience that he found so broadening that he applied for, and received, a second scholarship to attend this year's show. "The AUC is in danger of underestimating the good effect of having a large representation of Australians at the conference," Kent says. "We punch well above our weight, but the Australians would have very little mindshare with the Apple engineers in the US were it not for the AUC."

Kent's experience at the SBS confirmed that broadcast video is the direction he wants to direct his career. After graduation, he plans to head to the UK, where interactive TV has a relatively long history and cutting-edge digital broadcast technologies are far better entrenched than in Australia. "BBC R&D would be the plum thing for me," he says with a smile.

Inspiration, Perspiration, Authentication

By David Braue

Heath Raftery's big idea came shortly after his return from the 2002 Apple Worldwide Developers Conference, which the University of Newcastle student attended courtesy of an AUC scholarship.

Last year, that idea became reality when Raftery released Authoxy, a small software package designed to fix a very real problem. That problem was the fact that many applications designed to communicate over the Internet were being hindered by the proxy HTTP servers that now mediate access to the Net at universities, companies and other organisations.

Such HTTP proxies require users to directly log in, so they can confirm that users and their applications are allowed to reach the outside. This requirement causes serious problems for applications like QuickTime, iTunes and other programs, which are more focused on getting about their job than ensuring they have the right credentials to pass any authentication challenges they may face on the way out of the network.

The University of Newcastle used such a proxy, the fact that drove Raftery to prioritise the creation of Authoxy over several other WWDC-driven ideas. Authoxy effectively works as its own proxy server, automatically authenticating attached computers whenever proxy-unaware applications try to break through to the outside.

Raftery initially built Authoxy for his own use, but after posting the software online and forming HRSoftWorks (http://hrsoftworks.hopto.org), a company to support it, he began hearing from people at other universities. After a series of software updates and growing distribution, he re-released the freeware as shareware.

He now estimates there are over 5000 Authoxy users out there, and has taken the task of supporting them seriously. There are emails to answer, mailing lists to distribute, and a Web site to maintain. But most of all, there are paying customers. "I've been pretty blown away with the distribution it's had, and surprised with how much work it is to support," he says. "Word got around and it got pushed around the world; people are using it in all sorts of situations I wouldn't have imagined."

The process of publishing and publicising Authoxy has given Raftery a new perspective on the knowledge he's learning in his combined Bachelor of Computer Engineering and Bachelor of Maths degrees, of which he is currently in his fourth year out of six. He's also gaining experience in industry through an industrial placement with CCI Pope, where he's gaining experience in industrial process monitoring and artificial intelligence-style algorithms.

His love of problem-solving reflects his years of experience with computers and programming. A Mac user since one appeared in his house around the age of ten, Raftery is still taken by the Mac's "class, style, and attention to detail. It's really nice to be able to play with the technologies that people have worked on so hard, then come up with something that looks awesome very quickly."

Raftery recently got another chance to build out his Mac knowledge, having received a WWDC scholarship this year to match the one he received in 2002. Given his continually expanding knowledge of all things Mac, Raftery hopes the trips to the US will give him even more ideas on how to expand his shareware hobby "outside of Authoxy and possibly making a few bucks out of it. I've been absolutely stoked by the response of the AUC and the Apple community. It's quite an experience indeed, and it's what I always hoped it would be like."

Getting into the **Game**

It's all fun and games for Jason Thorne, a 2001 AUC Seeding Grant recipient who's currently lecturing as part of Charles Sturt University's innovative Bachelor of Computer Science (Computer Games) degree.

While the subject matter may sound fun, however, the study of computer gaming is a high-tech endeavour if ever there was one. In today's games, many complex 3D models interact continuously with each other, with detailed images represented graphically onscreen by sophisticated ray tracers churning through complex mathematical formulae at unimaginable speeds.

Not only does the game have to look good, though – it also has to run fast. And that focus has guided Thorne's pursuit of newer and better algorithms over a course that took him from earlier work in matrix arithmetic to the PhD he's currently pursuing from Sydney University.

Thorne's AUC project – "Using Mathematical Manifolds in Computer Vision" — marked the beginning of his quest, and resulted in the development of a large number of arithmetic routines optimised for C development in the Carbon environment. Those routines (downloadable from http://athene.riv.csu.edu.au/~jthorne/Macintosh.html) facilitate many of the complex calculations involved in crunching the large volumes of data involved in applications such as computer games, all the while maintaining efficient memory usage in order to keep performance to a maximum.

His analysis of the maths underlaying large matrix manipulation segued into his current work, which involves the use of Markov models to analyse and improve the efficiency data queuing. This type of queuing is critically important in online games, in particular, since gaming performance can be significantly affected by poorly performing interconnections. Effective use of Markov models can help project resource requirements based on network performance – for example, allowing a Web browser to dynamically resize its memory cache depending on how quickly data is flowing.

A Unix developer for years, Thorne has been working in Windows due to the ubiquity of DirectX for games, but wants to see more of a focus on OpenGL and its implementation on the Mac. "We have a lot of people here that only believe in OpenGL, and it would be nice to get another subject including the Macintosh," he says. "I like the Mac, and being a Unix developer OS X is even more attractive to me. It would be good to have a heterogeneous environment so they could come out and look at the advantages [of OpenGL]."

This year, Thorne received an AUC scholarship to Apple's WWDC in San Francisco, where he has been almost overwhelmed by the breadth of content available to attendees.

With his dual interest in graphic technologies and network performance analysis and optimisation, Thorne saw value in streams on technologies like Rendezvous, MacOS X's implementation of OpenGL, Quartz, wireless networking, USB as well as the ability to interact with developers working on similar projects elsewhere in the world. "There's so much to go to that I'm finding it pretty hard to cross things off the list," he said in the leadup to the conference.

Ultimately, Thorne envisions that his work in applying mathematical models to gaming platforms could further improve the efficiency that's become a critical part of game programming. And as he further explores the interactions between network performance and game coding, he believes the Mac will hold its own as a key platform for applying the knowledge he gains.

"I've been surprised at the quality of some of the Mac games," he says. "The quality is incredible, and I'm going to be looking at some of the advantages it offers as a development platform. We have a bit of a hole here for [the study of] network games, and Macs have always been pioneers for computer networks. As a university it's good to diversify a bit: if the Mac implements the concepts in an academic way, then it may be a better platform to use."
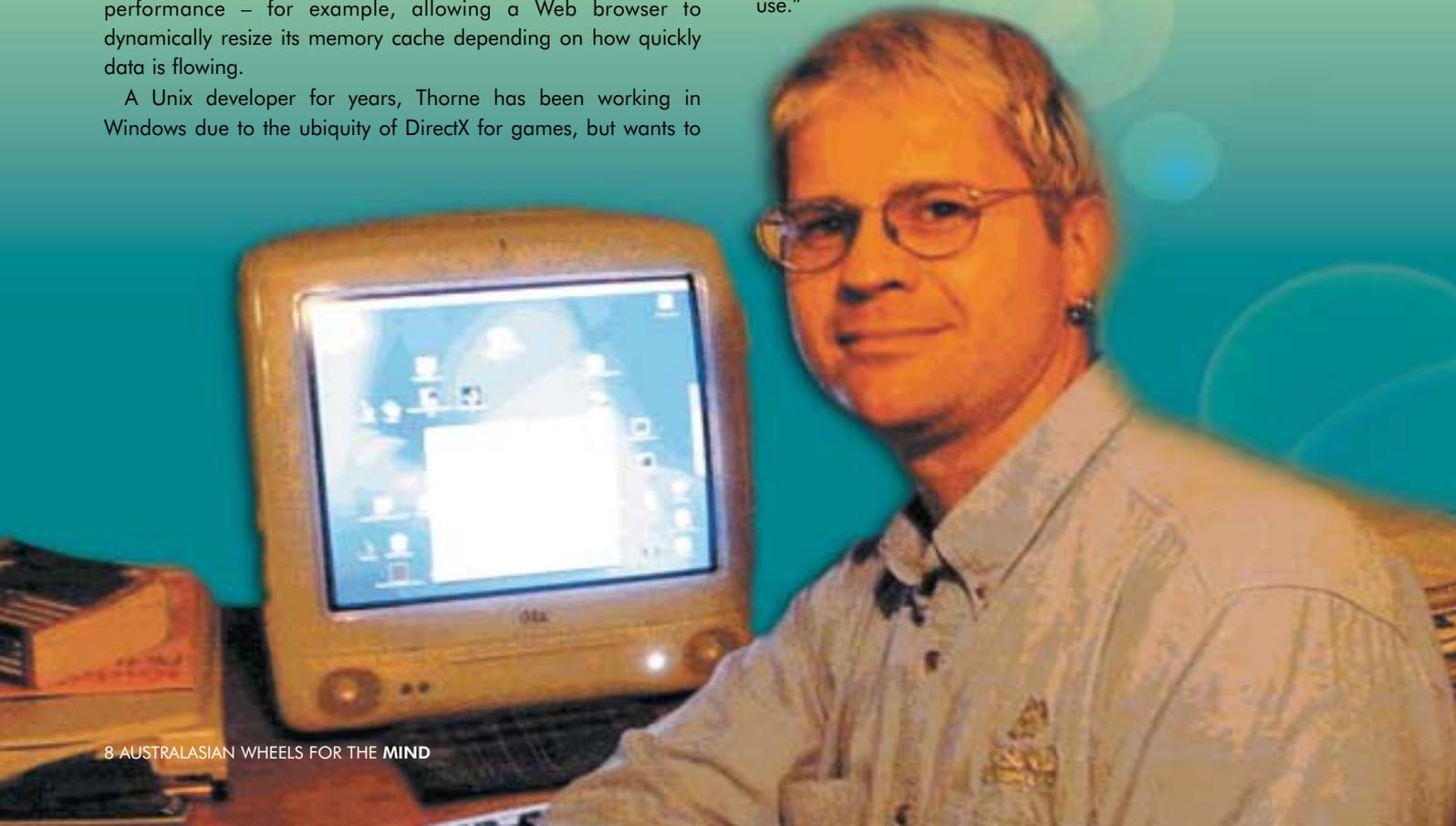
Helping RMIT students trail the BLEEDING EDGE

RMIT's David Bellchambers

By David Braue

The synthesised drum track reverberating through the small room, three RMIT University undergraduates huddle over a Mac-based audio mixing console with enough dials jutting out of it to make gadget-phile James Bond green with envy. Behind thick glass, musician Thomas Kness alternatively talks with the sound engineers, then claps something resembling a handheld fan over the end of PVC pipes tuned to a number of different musical notes.

Such is everyday life within RMIT's Faculty of Art, Design and Communications (ADC), where computers – particularly Macs, which make up two-thirds of the nearly 1000 systems installed – have become as fundamental to learning as learning itself.

As at every faculty in every university, behind the scenes this arsenal of sophisticated technology requires the constant attention of a 17-member team of technical gurus handling everything from system reconfiguration to laboratory upgrades and network troubleshooting. Charged with the unenviable task of cleaning up labs full of computers that are often misconfigured in the name of high-tech exploring, this is a constant challenge.

In a faculty as distributed as RMIT ADC – which has nearly 40 computer labs spread across a handful of buildings in Melbourne's CBD, and also spans several outlying campuses – the constant attention required by the systems means that technological self-sufficiency is a particularly desirable trait.

"With 40 labs and a computer lifecycle of three years, we're looking at a lab rollover every three weeks on average," says David Bellchambers, ADC's IT manager. "You name the Mac system, and we've probably got it running somewhere. This has made logistics a big issue: it all needs to be properly managed."

To make these rollovers as efficient as possible, Bellchambers' IT team recently sketched out a new standard operating environment (SOE) that replaces well-worn MacOS 9 with MacOS X 10.2. Three labs have been rolled out so far, and more are coming as the team irons out the last few wrinkles – mostly related to integration with the university's previous Novell NetWare 5.1 network operating system.

MacOS X "is still a bit new, but in terms of stability it's turned out to be rock-solid," says Bellchambers. "Its interfacing, protected memory, security, multitasking, and not having apps crash other apps – all have been terrific. The transition from an applications

Nick Moran (standing) and Andrew Bennett use a Mac-equipped RMIT lab to shape the music of Thomas Kness (in studio, at right)

point of view is not too difficult. Once students and staff get around the new look and feel of the desktop, and how things are arranged, they settle in pretty quickly."

Increased stability in ADC's Mac labs should mean Bellchambers' team spend less time fixing systems, and more time planning their upgrade strategy. That strategy has recently been amended to include the eMac, whose excellent price/performance equation has seen them installed in several labs within ADC.

Still another lab is full of high-end 'WindTunnel' PowerMac G4s, which provide the grunt for the high-end video and multimedia editing applications becoming increasingly common as new media – High Definition TV, for example – becomes integrated into ADC's courses. Equipped with a full suite of Macromedia and Adobe applications as well as specialised tools like Lightwave and Apple's Final Cut Pro 2, the systems are the latest weapons in ADC's constant battle to keep students riding the technology curve.

RMIT was among the first Australian universities to experiment with Apple's XServe server after its release last year, and ADC system administrator Peter Varitimidis says he was impressed. "There are huge benefits to be had from MacOS X anyway, and that translates nicely across onto the server side. There's a lot more you can offer staff and students, and a lot more services and features we can provide – for example, roaming profiles, authenticating to a wide range of environments and to other systems — that we never really had the ability to do under OS 9."

Desktops and servers aren't the only item on the support team's roster. As well as delivering the tools students need, the RMIT team is constantly working behind the scenes to evaluate new technologies, maintain consistent desktop management policies, improve student and staff authentication using LDAP (Lightweight Directory Access Protocol) and the university's massive directory service, and other tasks.

Keeping it all running, so students can always get at the tools they need, requires a considerable amount of co-ordination and hard work. But it pays off in the end, particularly when the team successfully navigates one of the many hurdles that presents itself. "For these applications, we're pretty much bleeding edge," says Bellchambers. "The only problem with being bleeding edge is that you bleed a lot."

It's my iLife!

By Andrew Jeffrey

The Mac's reputation as the centerpiece of a digital media strategy is legendary. With the latest upgrades to its iTunes, iPhoto, iMovie and iDVD software, Apple has recognized this by bundling the lot into a new suite called iLife.

iLife consists of the following applications: iTunes 3, iPhoto 2, iMovie 3 and iDVD 3. You can download the first three freely from Apple's web site (www.apple.com/download) but the only way to get iDVD 3 – which requires an internal Apple SuperDrive – is to purchase the iLife box.

Although the applications are a bundle and not tightly integrated to each other, they all add new features that make them complementary parts of the greater whole that is iLife. Improvements to each application vary, but here's a brief rundown of what to expect.

iMovie 3

iMovie 3 packs unprecedented simplicity and power into a consumer-level video editing program that's a must-have application if you want to edit your home movies.

The new version adds more transitions and effects than previous versions, and you can buy hundreds of extra effects from third-party vendors. One particular standout is one called the 'Ken Burns Effect', which turns your high-resolution photos (dragged from iPhoto, if you want) into a video clip complete with a slow pan across, up or down the image. You can also add flare, letterbox, glitter and even aged film effects.

iMovie 3 includes a number of changes to make it easier to work with. It no longer takes up the entire screen, for example, but can be contained in a resizable window. It also includes a better controlled Timeline that lets you raise and lower audio levels anywhere during a video clip – not just at the beginning and end as in iMovie 2. In addition, iMovie ships with a number of new sounds from Skywalker Sound. iMovie 3 also integrates itself with your iTunes music library, so you can add anything from your iTunes audio library without having to launch iTunes.

If you're into DVD creation, iMovie 3 includes new features you'll like. For example, you can create 'chapters' in your movie that, when burned onto a DVD using iDVD 3, will allow you to create scenes like you would have on a professionally mastered DVD. In addition, you no longer need to export your iMovie into iDVD format before burning it. Just select 'send to iDVD' and you are ready to start using iDVD.

iDVD 3

iDVD 3 is the only iLife program that is not freely available for Internet download. This powerful application makes it child's play to create DVD menus and chapters, then burn your video to a DVD-R disc so that it can be played by nearly any consumer DVD player or computer on the market. It includes a tutorial that will walk you step-by-step through the process of creating your own DVD movies.
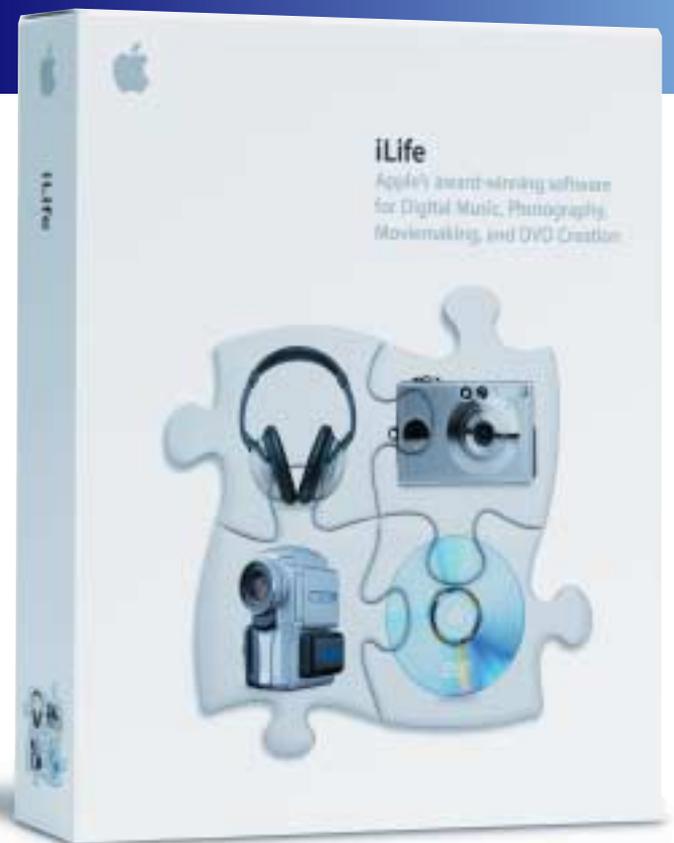
To import from iMovie 3, click the iDVD button to transfer your project (don't forget the 90 minute limit on iDVD and to have created chapter markers). iDVD 3 will now start up and prompt you for a project name so that it can save the project later. A default theme for the menus will be selected and if you have chapter markers, they will automatically be set up, too. Click the Customise button to pick a new theme or to change the way your DVD is laid out. iDVD 3 comes with a number of new themes and you can customise any theme and save it as a new theme.

Adding video to your DVD is as simple as dragging any Final Cut Pro, Final Cut Express or QuickTime movie onto iDVD. A new entry will be created in the DVD menu for that video or project. Use the Customise sidebar to change how the button for that video looks.

If you have 60 minutes or less of video on the DVD, iDVD 3 uses a high quality encoding rate, so that the video will look really great. If you add more video or data than about 60 minutes worth, iDVD 3 automatically switches to a slightly lower-quality encoding rate so that it can fit about 90 minutes of video on a disc.

iDVD includes one very nice timesaver: as you add video to your iDVD project, iDVD starts encoding the video into the proper DVD format in the background, while you continue to work. This can cut hours off of the time-intensive encoding process, which must be completed before burning can continue.

iDVD can handle slideshows of photos, too. You control transition timing between pictures, or allow the user to control when the pictures change (using a DVD remote). You can drag pictures directly from your iPhoto library into iDVD. You can add audio to the slideshow, too, simply by dragging audio from your iTunes library.

iTunes 3 and 4

iTunes 4 was recently released, but the only major change it adds is the incorporation of Apple's Music Store and support for the new AAC audio format. The main features of iTunes 3 remain the same.

Playlists are supported in most audio players, but iTunes takes the concept further with Smart Playlists that filter your music library based on criteria you set. Plus, you can have the Smart Playlist update itself on the fly as you add or change files in your Library. So for example, you can create a Smart Playlist that contains only the last 25 songs you've played in iTunes, or create one that contains all of the classical music in your collection.

iTunes isn't only about playing music, however: it can rip songs from a CD to an AIFF or MP3 file (or AAC, in iTunes 4) at lightning speed, thanks to dual processor and G4 Altivec support. Most songs can be automatically named after they're looked up on the Gracenote CD Database.

There are lots of other nice extras buried within iTunes, particularly in providing more information that can be used to build Smart Playlists. For example, you can rate songs with a 1 to 5 star system to create a playlist with only your favourite songs. iTunes also tracks how many times you play a given song and on what date it was last played.

iTunes also offers a 'sound check' feature that scans songs and adjusts their volume so you don't have to keep one hand on the volume knob while the CD is playing. iTunes also lets you access and burn Audible.com content or transfer it to an iPod.

iPhoto 2

iPhoto lets you connect digital cameras to your Mac and not have to worry about drivers, proprietary software or managing those photos once you've gotten them off the camera. You can also drag and drop pictures, whole folders or volumes (including Kodak Photo CDs) and iPhoto will make a copy of those pictures and add them to its own picture library.

The iPhoto interface shows dynamically resizable thumbnails of the pictures in the currently selected album. You can drag a small slider under this window to resize the thumbnails in real time to make them larger or smaller, depending on your needs. By default, this view shows your pictures taken in chronological order, but you can drag around pictures or groups of pictures (by holding down shift when you select picture thumbnails) to rearrange them in any order you like. Further, you can rename each picture so you get something more meaningful than PIC35454.jpg.

One thing that iPhoto is great at is providing simple yet creative ways of sharing your photos with others. You can e-mail pictures to anyone, print a single photo or a group of photos on a single page, or even create a 'picture package' like you get from a portrait studio. iPhoto also allows you to upload your photos to your .Mac account and share them with the world via a custom homepage. You can also create slideshows that you can view in iPhoto or export as a MacOS X screensaver, burn your photos to CD or DVD, or export them in QuickTime movie format as a shareable slideshow.

In Summary

All the applications in iLife work well together and integrate fairly tightly. If you have a large broadband connection, you can download the three free applications (iTunes, iPhoto & iMovie) but you will still need to buy the package to get iDVD. If you only have a modem connection, buy the box! It will save you hours of downloading and give you everything you need.

Capture and track your music on iTunes

Organise and improve your images using iPhoto

Use iMovie to combine your sounds and images with your home videos

Use iDVD to add menus, thumbnails, backgrounds and sounds, then write the whole thing to DVD

The Interactive Digital Ceiling

*By Leslie Burr, Deputy Director, Student Services,
Charles Sturt University*

During the 1980's I had some hope for the interactive video disc. Ignoring the obvious disadvantages of an inability to write to the disc, and the fact that it needed a mechanism approaching the mass of a Sherman tank to play it, the disc had the ability to store large amounts of data and rapidly retrieve content in a non linear manner, based on an embedded menu function. More sophisticated hardware provided an interface to a personal computer, which, if combined with the then rapidly developing platform of computer aided learning (CAL), promised an enriched learning environment.

My enthusiasm for the technology inspired me to write a conference paper on the learning benefits of the system. However, during the process of researching and writing, the inevitable occurred.

Firstly, no sooner had I completed the paper extolling the virtues of the video disc, than the main thrust of development work was to transfer existing non-linear video tape content onto video disc so that it could be more accurately indexed to enable faster retrieval.

This was not a poor use of the technology in itself, but hardly the enriching learning experience I had envisaged. Hand written manuscripts to print, tableau to film, talking heads to television: the theory of recycling old content to new media had again embedded itself.

By the time I came to presenting the paper, every advantage of the new media — including event driven interaction, very high quality images and multiple high quality sound tracks — had been overtaken by the pariah of pragmatism.

Secondly, the same recurring question was being asked about this educational technology as had been asked about every other educational technology before and every educational technology since: "do students learn better?" Findings relating to this question generally indicate no significant difference, nor that student learning is more readily facilitated by the technology. But more often than not, the technology was described as interactive, generally with no accompanying definition.

So, whether it be interactive tee shirts where you can play together (by rearranging the velco letters), an online interactive church where you can pray together or a museum which proudly advertised that children can "interactively use the interactives", I was left wondering if there was anything left that was no longer interactive.

Using a lexicographic approach, I analysed several conference proceedings consisting of approximately 400 instances of the word 'interactive'. Analysis of the data indicated that there existed a definitional continuum consisting of a base level of interaction with technology and delivery mechanisms, through interaction with subject matter or content, to higher level interactions with fellow learners. These levels can be referred to as system, content and learner interactions.

In the case of the interactive video disc (for example), interaction was directed towards the content level by the disc responding to answers provided by CAL driven multiple choice questions. However, most interaction reverted to system level interaction, where users merely accessed content via an embedded menu driven index.

Many would argue that 'rich' active learning takes place within the constructivist framework of learner to learner engagement (learner interaction). The fact that the interactive video disc was unable to provide an environment for this higher learning meant that its future as a learning technology was marginal – as it was and is for any technology that does not enable learner to learner interaction.

The online environment provides an obvious medium for learner to learner interaction. Of course, the usual evolutionary cycle of educational media – old content being transferred to the new media and the same recurring question being posed – is in progress.

However, the underpinning online technology which enables learner interaction is far more powerful than previous technologies. Furthermore, the educational setting is being driven by the learner. If an online discussion environment is not provided to students, they are just as likely to form their own in a different Web space – as they will with a chat room, email or instant messaging.

The "now" challenge for online learning environments is not to provide deeper and deeper indexed menus (system interaction) leading to all sorts of multimedia content (content interaction), but to provide collaborative tools that can be proactively managed by teachers and allow learners to engage with others within communities of learners (learner interaction).

The challenge for all educators is to ensure that we do not transplant old methodologies into new delivery technologies and proclaim that we have made advances in the science of learning and teaching. An understanding of the nature of interaction may help in the development of new strategies in order to both engage learners and to deliver great services.

iMacs go International at Monash

By David Braue

Jason Smith never thought much about Macs, having spent much of his professional career managing Windows machines. But when it came time to look into desktop options for an expansion of Monash International – Monash University's private conduit for international students – he was surprised to find that the all-in-one iMac actually offered better value.

"In doing a fair bit of research last year, I was looking at Windows-based machines versus the Apples and which way we were going to go," Smith recalls. "It was very interesting when we got to a cost side of things: if you compare an all-in-one Windows-based machine in a similar configuration, the iMacs actually worked out cheaper as a unit."

The all-in-one design, paired with the iMac's ergonomically adjustable 15" LCD screen, made it the ideal system for a new computer lab being set up to support the new Monash College Diploma of Art & Design Sturies, which began this year as a way of acclimating overseas students to life and studying in Australia before they're immersed in a full Art and Design degree at Monash University.

Some 17 students are now enrolled in the course, and have become the first to enjoy the 28 brand-new iMacs that Monash College has installed in its refurbished site near the university's Caulfield campus.

Despite early apprehensions about the challenge of administering Macs in a Windows-dominated world, Smith says the new machines have fit right into the existing network – even to the point of seamlessly integrating with Monash's Novell NetWare 6 environment.
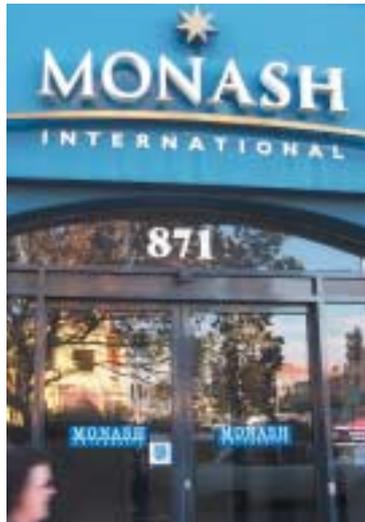
The iMacs are remotely managed from a PowerMac G4 installed at Monash's main Clayton campus, where 150 employees of Monash College recently moved into a purpose-built building. A part-time Mac administrator was brought in to handle the machines, and

"I haven't dealt with Apples really at all in the past, but the iMacs have changed my mind," he says. "I find the operating system [MacOS X 10.2] is brilliant, and once they're set up they're robust and stable. We got them in February, and they were configured and ready to go within a week."

The iMacs run a full suite of Macromedia and Adobe tools as well as Quark and several other relevant applications. In a neighbouring room, a pair of eMacs handle scanning and printing from the lab machines.

Popular as a desktop platform, Smith says the decision to install the iMacs has been popular with the students they were intended to benefit. There have even been a number of enquiries from students and staff who are keen to purchase a notebook and interested in the Apple iBook due to their early exposure to Mac technology in the lab.

With the systems now in and running, Smith says, they've passed the greatest test of all: "In IT, you don't hear anything until something has broken, and then you hear complaints. If you hear nothing, you know everything is going well. And I haven't heard one bad thing about the iMacs; nothing has broken down in the time they've been running."

Monash International's Jason Smith

BACK TO SCHOOL ON E-LEARNING
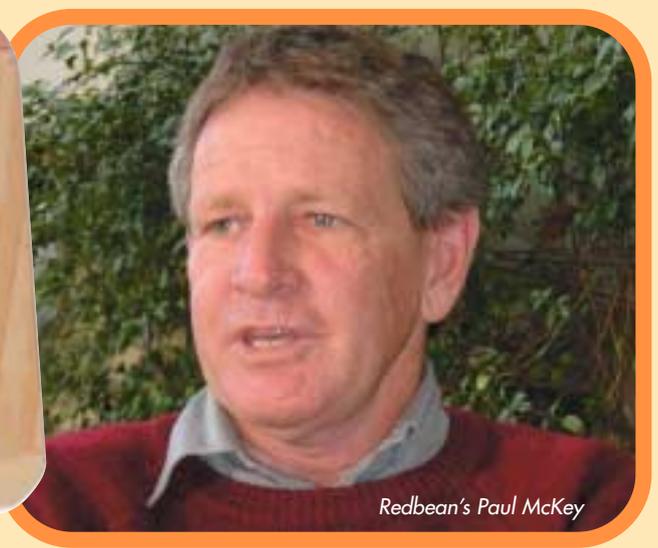
Redbean's Paul McKey

By Paul McKey

Elearning has had a chequered history since it was first implemented in the PLATO system over 40 years ago. A lot of hype and many dollars have been expended on its virtues, yet finally we are starting to see tangible returns.

Still, many individuals and organisations wade into eLearning with both eyes shut. Thinking "this stuff can't be that hard" they embark on a journey that not all of them finish, and even fewer complete to their satisfaction.

Why? Because eLearning is more than playing with computers. eLearning is about a balanced mix of business, purpose, technology and people. Get the mix right and you will have a great program. Get one or more elements either too light or heavy and you will have an (often) expensive failure.

Since most universities choose to develop their own material, I have provided some tips and outlined some areas to keep an eye on when considering the development and implementation of eLearning in your organisation.

Don't under design. Information does not equate to learning. Work with an instructional designer experienced in online development. More resources, activities and interactions and less text is the key to providing stimulating and engaging content and a program which achieves learning outcomes.

Don't over design. Paying developers a small fortune to recreate the already rich human interface design of the Macintosh in Flash is a waste of everyone's time and money. Use XHTML and even SVG when appropriate and keep the Flash for when you really need it — that is, animation, interactions, formative assessment, etc. Effective learning environments can be designed in just HTML or using any of the numerous scripting language/database combinations to provide fast, responsive or even personalised interfaces.

Use Apple's collaborative technology. BigTree OnLine uses the WebDAV features of MacOS X Server to allow contributors to work continuously and remotely on their material if necessary. This ensures all material is fresh and current and development times are vastly improved.

Expensive development does not mean better learning. The ratio of development hours to learning hours can range from 10:1 right through to 100:1 for intensive media driven materials. Ironically, the introduction of more sophisticated tools has increased this ratio, mainly due to developers doing far more sophisticated interactions. Whether these equate to better learning however is debatable. They certainly cost more though!

Work with a custom developer. For many organisations, including universities, the skills required in an eLearning development team are spread thin or non-existent — so the result is often little more than online text. If you need to go beyond 'text and talk', consider working with a custom developer who can give an objective and refreshing view, and provide all the skills you need under one roof. Reduced development time and costs, as well as an innovative product, are often the result.

Beware the Learning Management System. The average LMS comes loaded with features, but it also comes loaded with constraints which you probably won't hit until half through your project. Your choice of LMS will, unfortunately, define and hence limit your learning design. Some universities are now re-considering in-house development as a means to provide flexible and innovative learning design. For instance, you could develop the content management system and purchase the student management system. Continuing standards improvement and compliance is allowing more mix and match, plug and play systems.

University staff need training too! One of the most neglected audiences in the university sector is those non-academic staff, or even academic staff, who need to develop new skills. All the benefits of eLearning now embraced by the corporate and government sectors — such as reduced cost, travel and down time — are key features of eLearning that have not yet been realised internally by the university sector.

Working with a learning and development professional, universities can provide eLearning to support career enhancement through certification programs, plus increase job satisfaction and remuneration through job related training as well as personal and professional development.

ELearning is here to stay and getting more effective every day. Providing a balanced mix of business, purpose, technology and people will ensure the success of your eLearning project from all perspectives, and enhance the reputation of your team or organisation as a provider of quality online learning.

Paul McKey is Managing Director of **Redbean Learning Solutions**, a QLD based Learning and Development consultancy specialising in eLearning. Visit www.redbean.com.au.

Redbean's numerous eLearning projects include:
BigTree OnLine, a Custom Developer which has provided the Apple Certification Programs to Apple Australia for over 8 years – www.bigtree.com.au.
The **Global University Alliance** – as CTO of NextEd a global, multi-lingual online university which includes RMIT University and UniSA as members. Visit www.gua.com.

Learning with the AUC

AUC to offer MacOS X administration training

The Apple University Consortium, in conjunction with Apple Computer Australia, will be holding a two-day, hands-on training event specifically for higher-education technical staff who support and manage MacOS X installations.

X World is a two-day conference that provides delegates with the skills, tools, and knowledge necessary to install, configure and manage multiple Mac OS X users and provide network-based services such as email, printing, file sharing and directory integration and authentication. Delegates will get hands-on experience with Mac OS X solutions and be able to learn how to replicate these in their own environments. A combination of lectures, demonstrations, case studies and hands-on classes will be used to provide practical real-world experience.

X World will be held at the University of Technology, Sydney on 2 and 3 July 2003, and will feature a wide range of presenters from the university sector. Topics to be covered include:

- Migrating from OS 9 to OS X
- AppleScripting MacOS X
- Directory Integration
- Lab Administration
- MacOS X Certification & Career Paths
- CUPS & Print Management
- Building an SOE
- MacOS X Server Set-up
- Asset Management
- Understanding Samba

X World will also feature an update from Apple's World Wide Developers Conference, held the previous week, as well as ample opportunity to network with colleagues at social events.

More information about X World is available at http://auc.uow.edu.au/training/xworld/index.html.

AUC hosts webcasts for macosxlabs.org

The AUC is mirroring the archived Webcasts from the macosxlabs.org web site (www.macosxlabs.org), which is the focal point for Higher Education MacOS X Lab Deployment. Their goal is to simplify the task of installing and maintaining MacOS X in a computer lab. They find and document solutions to a host of challenges that commonly arise when deploying labs in a higher education environment. The result is a roadmap for others to use as they plan to roll out Mac OS X at their institutions.

Webcasts available on the AUC web site include: Apple Remote Desktop (ARD), Workgroup Manager, Enterprise Directory Integration, NetInstall in Depth, Radmind - MacOS X File System Maintenance, NetBoot in Depth, UNIX Tools for MacOS X Administrators and MacOS X Server 10.2 New Features.

Webcasts are available at http://auc.uow.edu.au/macosxlabs/webcasts.html.

I left my iBook in San Francisco

In April, the AUC named the 18 staff and 19 students who have been awarded an AUC WWDC Competitive Scholarship. These are in addition to the 18 Allocated Staff Scholarships that are offered on a rotational basis every two years.

WWDC Scholarships include funding to assist in attending Apple Computer's premier World Wide Developers Conference (WWDC), which this year is being held from 23rd to 27th June, in San Francisco, USA.

Each year Apple Computer Inc. holds a developer conference in California, USA. There, over 3000 people gather to listen to the latest innovations and developments that Apple have in the pipeline for the next 12 months. Conference attendance is vital for those who program and develop applications on the Macintosh platform, as it gives them an opportunity to network directly with Apple engineers and also provide feedback to Apple for future improvements.

In 2003, Apple have incorporated QuickTime Live! as part of WWDC so the AUC encouraged QuickTime content developers and producers to apply for a WWDC Scholarship. Over 80 applications from staff and students were received via the AUC web site and the AUDF Review Committee spend many long hours assessing each application in a blind refereeing process.

Scholarships were allocated to the following people:

Allocated Scholarships		Competitive Staff Scholarships		Competitive Student Scholarships	
ANU (incl Canberra & ADFA)	Greg Preston	ANU (incl Canberra & ADFA)	James Steele	ANU (incl Canberra & ADFA)	Daniel Rodwell
Charles Sturt University	Jason Thorne	ANU (incl Canberra & ADFA)	John Tucker	Central Queensland University	Brett Brooks
Deakin University	David Whiteley	ANU (incl Canberra & ADFA)	Jonathon Lowrey	Curtin University of Technology	Paul Fitzpatrick
Edith Cowan University	Steve Doyle	ANU (incl Canberra & ADFA)	Nick Engel	Griffith University	Jolon Faichney
Griffith University	Darryl Rosin	Griffith University	Brook Schofield	Griffith University	Havard Eide
Monash University	Christophe Lefevre	James Cook University	Steven Stanley	Griffith University	Bill Cooney
RMIT University	Peter Varitimidis	Macquarie University	Steven Saunders	Macquarie University	Daniel A. Steffen
Southern Cross University, Lismore	TBA	Murdoch University	Michael Scott	University of Melbourne	Mohammad Tabbara
Flinders University of South Australia	Graham Roberts	Swinburne University	James Verdon	University of Melbourne	Sara Brooks
University of Adelaide	Stephen White	University of Melbourne	Craig McArthur	University of New South Wales	Marc Bown
University of New South Wales	Nigel Kersten	University of Melbourne	Matthew Riddle	University of New South Wales	Jia Yin Pan
University of Queensland	Ian McColl	University of Melbourne	Michael Cutter	University of Newcastle	Heath Raftery
University of Southern Queensland	Ross Bool	University of Queensland	Andrew Brown	University of Queensland	Jared Allen
University of Sydney	Charles Humblet	University of Queensland	Benn Cizauskas	University of Southern Queensland	Hasan Mahmud
University of Tasmania	Tony Gray	University of Queensland	Ian Lister	University of Tasmania	Karl Goiser
University of Western Australia	Sue Powell	University of Western Australia	Shaun Procter	University of Western Australia	Liam Doyle
University of Western Sydney	Roy Tasker	University of Wollongong	Brett Powley	University of Technology, Sydney	Flavia Morello
Victoria University of Technology	Chris Lang	University of Wollongong	Grant Farr	University of Technology, Sydney	Christian Kent
				University of Technology, Sydney	Penny Wyatt

AUC

Apple University Consortium Conference

Academic & Developers

digital voyages

More details at: http://auc.uow.edu.au
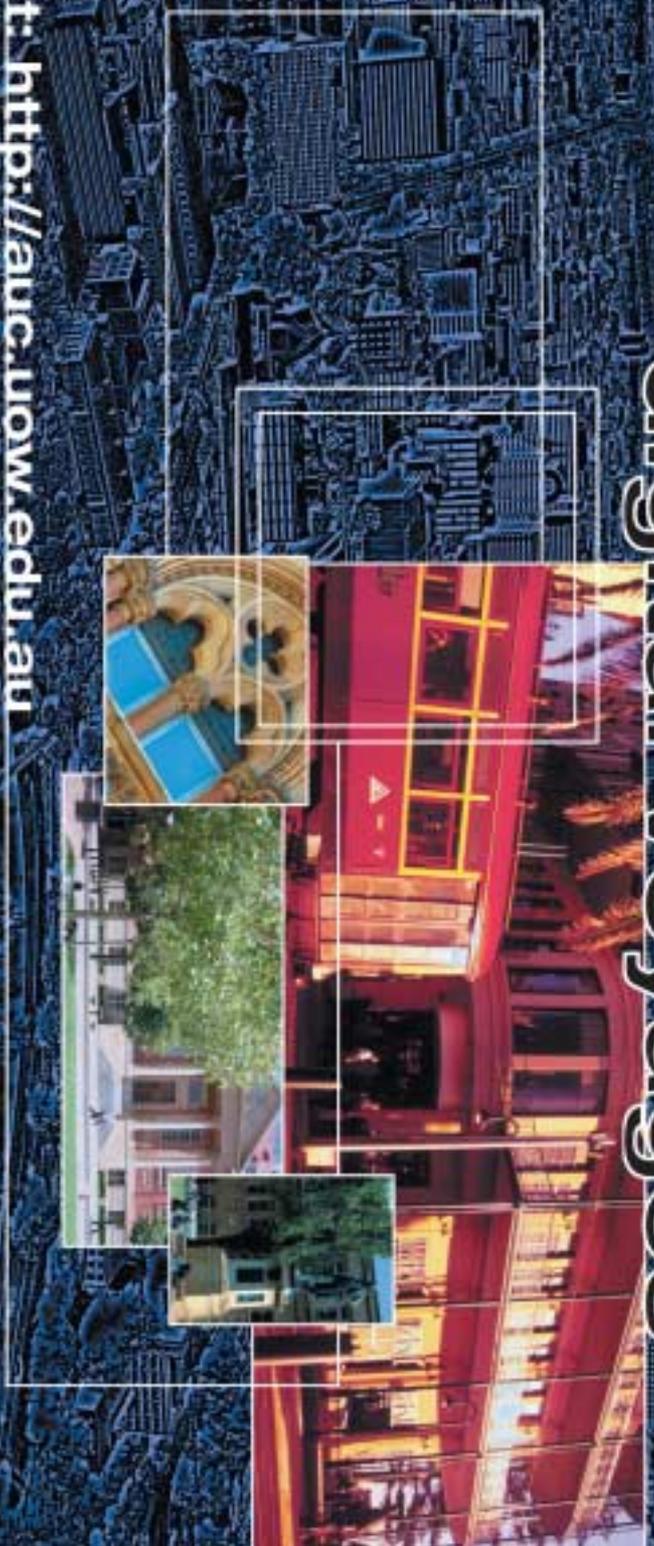
University of Adelaide, 28 September – 1 October 2003