

LANSA Case Study

eBOS puts Australian high schools online

The Board of Studies New South Wales is responsible for the content, distribution and logistics of syllabus materials and the School Certificate (SC) and Higher School Certificate (HSC) examinations for NSW the most populous state in Australia. The Board uses the Internet and LANSA for the Web for a growing number of its interactions with schools.

Dr John Bennett, Director Information Services, says, "The Web has fundamentally changed the way we work with schools. We have many interactions with schools that used to require huge numbers of forms. In the past schools often had to wait for weeks to receive confirmation of the information they sent to us. Now schools can use our online service to enter, browse and update student information and print confirmation reports instantly."



The Challenge

There are approximately 900 schools in NSW that have students sitting for the School Certificate (SC) in Year 10 and Higher School Certificate (HSC) in Year 12. Every year the board collects the enrollment details for about 80,000 students in Year 10, 70,000 students in Year 11 and 65,000 students in Year 12. Each of those students typically takes between five and ten courses.

Jim Watterson, senior IT consultant at the Board of Studies (the Board) explains "The enrolment is the start of the yearly school cycle and a huge logistic task. Traditionally we would send out over 200,000 paper entry forms each year. The students complete the forms and these are collected and checked by their teachers, and then mailed back to the Board. The forms would be manually checked by Board staff and then sent off to be punched onto tape. Only when these tapes were loaded onto our system could we begin checking the accuracy of the data and begin to clean it up."

"During the year there is a lot of data collection work as well. The school provides grades or assessments to the Board for each of the courses taken by Year 10 to 12 students. So there is a massive collection process in which 1.2 million grades and assessments are collected for over 140,000 students."



Dr John Bennett, Director Information Services - Board of Studies New South Wales.

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"There is a complex scheduling function as well. We have to schedule examinations for over 140,000 students (Years 10 and 12) and appoint the 4,000 supervisors for the 700 examination centers. The board has to arrange the marking process, which involves about 8000 teachers and 800 clerical assistants in twenty marking centres for a period of four weeks."

"We are in constant dialog with the schools and their staff. After the first term, a large number of students tend to change their mind about what courses they want to do. Through the year we get thousands requests to change courses which, again, used to come in on a pieces of paper and be entered manually by Board staff."

The Solution

The Board of Studies has used LANSA and the AS/400 for basically all its development since 1990. When LANSA for the Web came out in 1997, Aspect Computing invited Jim and his colleague senior IT consultant **Muir Mathieson** over for a demonstration.

Jim continues "We have a brief to look out for new technologies that can make a difference to the Board and we could immediately see that LANSA for the Web would provide significant benefits for the Board and schools. We developed a sample Web application that allowed a school to change its own address details and showed this to our management. We also set up an extensive security system and got the go ahead."

Jim and Muir created a subset of functions which they made available by secured access to a trial group of about 70 schools in the first term of 1998. During most of 1998 additional functions were created and the feedback from the schools was used to fine-tune the system. From the third term of 1999 the system was made available to all schools.

The Benefits

Muir explains "If you make a change online you can see immediately that it has changed. In the past schools had no idea when or if the change was made until we send them a confirmation.

"When you have on-line entry, the data is validated immediately and schools find out instantly whether there are any problems. We only get clean data into our system. Schools can request a confirmation report on-line and will receive that within seconds."

"One of the biggest events of the year is the distribution of the HSC results. We used to print at least three documents per student and deliver the results to the students and schools across the state on exactly the same day. Traditionally this was done in the first week of January. This year, using LANSa and the Web, we made the results available on 17th December. The advantage of making the results available before Christmas gives the students a lot more time to apply for universities and to change their preferences if required."

The results were opened on 17 December at 5.00 am. The first student inquiry came in about 1 second past five and the first school downloaded its Principal's Result List about one minute past five. The vast majority of schools logged on to download their results that day and a huge number of students accessed the Board's AS/400 Web server and its Student Results backup system at ISP OzEmail.

Jim comments "The AS/400 didn't break into sweat, but we did have some problems with our communication line capacity. We have upgraded our communication lines since then. Because so many schools and students got their results off the Web right away on the first day, we consider it a big success."

"LANSA provides rapid Web application development. The development staff we have are all AS/400 and LANSa experts. There are not a lot of tools on the AS/400 that allow you to do rapid application development. In effect we are using the same skills that we already have. We are building upon our use of LANSa for programming and the data dictionary that was already behind our applications. We are not duplicating our data in any way. We are also running on a secure platform that we already own. Without LANSa for the Web we would not be anywhere near this far advanced. We can develop a complex interactive browser application in about half a day."

The Future

"We are looking at running eCommerce this year as well because the Board sells a lot of products, such as syllabus materials, CDs and books. We also have a warehouse and a stock management system. We plan to offer an on-line order entry function developed using LANSa for the Web."

"We have a lot of other processes that go on with schools. We will be looking at these processes to see where further advantages for schools and the Board can be achieved by using the Web. In many cases we believe the Web applications will give a positive result to both parties. It is a win-win. It gives a reduction in paper work and reduction in delays," concludes Jim.

"We have a small in-house team but a 'customer base' that includes every student in the entire NSW school system. LANSa provides us with a development environment in which we can rapidly develop and modify applications to suit our policy and educational needs, while protecting our previous

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investment in applications development. IBM eServer technology provides us with an application server platform that is integrated, easy to manage, secure and increasingly flexible," concludes Dr Bennett.

The Story behind the 2001 HSC Results (update)

With the attention of all the Australian press, the HSC results are a good example of a secure high-risk-high-load site with LANSa for the Web.

The 2001 High School Certificate (HSC) results became available on Wednesday 19 December, from 5.00 am in the morning. Over 63,000 students were eager to get to their individual HSC results and over 800 principals were about to download their school's result lists.

For that day the Board produced static student result pages for publication on four Windows servers of their ISP, with a link to the Board's dynamic iSeries site at the bottom of each page. The majority of the student requests was handled by the load-balanced Windows servers, but the Board's iSeries still got a few thousand requests that morning when the Windows servers were busy.

The press reported that students could get their results in 3 seconds on the Web for free. The Web based HSC results distribution was considered a big success.

The Windows data was produced by LANSa for iSeries using the Web_Static_Page Built-in function and the fully formatted student pages were written to a single record containing a 32,000 byte field. These 63,000 records, with a database index, were copied onto a CD (275Mb for 63,000 students) and sent to the ISP. The ISP had a simple Web page "Login" that did a lookup on the database and returned the pre-formatted 32,000-byte field with the personalized static HTML page including the results as prepared by LANSa.

The Windows servers were decommissioned after one day and from 20 December onwards the Board's iSeries did it all.

Next to the student results, school results with graphs and charts in PDF format were available for download from the Board's iSeries as well. Over 660 principals downloaded their results before noon on 19 December.

eBOS wins Gold in 2003 (update)

At the NSW Premier's Public Sector Awards 2003, the Office of the Board of Studies won the Gold Award in the eGovernment category for its LANSa and IBM iSeries based eBOS suite of Online Education Services. The eGovernment award is for best practice in the use of information and communications technologies to improve the delivery of government services.

The eBOS Suite of secure online services include Schools Online, Students Online, Markers Online, Authorities Online, VCS Online and RTO Online. eBOS also offers a public shopping site, called eBOS Shop Online, that offers educational materials in support of the K-6 and 7-12 school curriculum.

Dr John Bennett, General Manager of the Office of the Board of Studies, says, "This is a great recognition for the careful planning and hard work put in by the staff over a number

of years delivering services on time and within budget. The eBos suite, together with the Board's Web site provide quality services to teachers, students and the general public."

According to Dr Bennett, around 900 high school principals and nominated staff in NSW now have secure access to the Board's records of their students via the Internet. They can make course changes while the pupil is in their office and any problems, with eligibility for the HSC for example, will be shown immediately. Dr Bennett says this help improves the quality of guidance schools can provide.

"The Office of the Board has a strategy to increase the amount of information available on-line to schools, teachers and students. We were among the first in Australia to deliver on-line results for high school students. Last year our Internet-based results service recorded over 59,000 student accesses on the day HSC results became available. This year students can also register for SMS delivery of results," continues Dr Bennett.

"Around HSC time is undoubtedly the highest peak activity for the Office's online services, but during the year there is a lot of data collection as well. Schools provide grades or assessments to the Board for each of the courses taken by Year 10 to 12 students. There is also complex scheduling of

marking in which over 7,500 teachers and 700 clerical staff are involved, in 25 marking centres for a period of just over a month. This results in a massive collection process in which over 30 million individual marks are collected for over 65,000 HSC candidates."

Enhances Web services with LANSA Integrator in 2008 (update)

The Board of Studies has extended its browser-based services with Web Services, using LANSA Integrator, taking away the need for data entry by schools. The Board is currently implementing Web services to and from TAFE NSW. There is a large overlap in the clientele of The Board and TAFE, the students, and a huge amount of information has to be exchanged and reconciled using mostly manual procedures. Using Web Services, data exchange can be made seamless and automatic.

TAFE is Australia's largest Technical And Further Educational institution and among the largest in the world, offering more than 1200 courses at over 130 locations.

The Board is also using LANSA Integrator to access the Web services of Westpac's, Credit Card authorization and processing. Westpac is one of Australia's major banks.

Company and System Information

- The Board of Studies NSW is responsible for the contents, distribution and other logistics of syllabus materials and SC and HSC examinations.
- The static Web site of the Board is hosted by ISP OzEmail. The dynamic sections are developed with LANSA for the Web and run on the Board's own AS/400 Web server. The Board has one AS/400 640 model 2238. Internally there are 200 users.
- Security: Schools can apply for their own user-id and are issued a Personal Identification Number (PIN). Students use their student-id and are issued a PIN, which allows them only to get their examination results. The AS/400 Web server uses 56bit SSL (Secure Socket Layer) encryption, the strongest form available in this region, meaning that information is unreadable to eavesdroppers during transmission. On top of that there are hardware firewalls, software firewalls and all non-essential TCP/IP ports are closed.
- Web functionality available: Look at and update student information. Look at and print the School Certificate and Higher School Certificate result information for a school's students back to 1991 (start of AS/400 and LANSA examination system). Update school grades, assessments and vocational course modules completed. Look at and print certain key statistical reports, student entry confirmations, and grade and assessment confirmations. Check whether a student is enrolled in the right courses and whether their pattern of courses will meet the requirements for an award. Access SC and HSC results.
- When schools request a report on-line, turnaround is within seconds. The request submits a LANSA job. The LANSA program triggers a call to a product called Elixir Opus running on an NT Server which creates a highly graphical document in Adobe's Acrobat PDF format. This PDF document is written to an AS/400 IFS folder. When a user goes to the download page, a list of all the available PDF documents is generated dynamically. The program checks which documents are available for that specific school and shows hyperlinks to these documents on the generated page.
- The initial examination system was developed with LANSA by Aspect Computing during 1989-1990. Since then additional functions, including the Web functionality are developed by the Board's IT team.
- For more information on the Board of Studies visit: www.boardofstudies.nsw.edu.au

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