

# **If You Can't Buy It, Build It: Adapting a Generic Commercial Application to Meet Specific Organisational Goals**

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## ***Abstract***

*What do you do if you need solutions to ensure the equitable use of computing facilities in a public context, have pre-purchased a commercial package to ensure this happens but realised that due to software compatibility issues beyond your control it will not function at present? The answer for City Library was to utilise the technical, logistical and project management skills that existed in-house, use a Microsoft product and transform it into a robust automated computer booking system with the features that were needed in less than three months. This paper outlines the steps that were taken by the City Library Information Services Team in developing that system including the strategic, technical, training and operational challenges that were encountered and how they were overcome.*

# Introduction

City Library was launched at 8 am on the 31<sup>st</sup> of May 2004. The vision for a public library in the heart of Melbourne was the brainchild of the CAE (Centre for Adult Education) and the City of Melbourne. City Library has a comprehensive 100 000 item multi-format collection. It fulfills the needs of those studying a variety of short and accredited courses provided by CAE and is also a community hub, a place where people meet for recreation, information and to foster a love for life-long learning, not only to borrow books.

City Library is operated by the Yarra-Melbourne Regional Library Corporation (YMRL), which gives members direct catalogue access to a further 300 000 items that can be brought in from YMRL's inner-city libraries: Carlton, Collingwood, Fitzroy, North Fitzroy, North Melbourne, East Melbourne and Richmond. The popularity of the library has exceeded all expectations.

After a successful first year and up until July 2005, City Library had:

- Over 24 000 people join the library as members
- Over 700 000 items borrowed
- On average, 2,500 people accessing the space on a daily basis – in the first year of operation the library had over 435 000 people through the door
- In conjunction with CAE a popular series of events, including; Artists in Conversation, Philosophy lectures, and the buzz of jazz piano, acoustic and multicultural events in the Gallery space
- A number of artists and organisations exhibiting in the Gallery and art sourced for the Digital Projections program which runs on screens throughout the day
- Many organisations who use the space for seminars, meetings and public events

As well as our collection and community programs City Library has 28 computers which are available to all library users. All computers in the library have Internet access and word processing capabilities and all the computers in the Frank Crean Independent Learning Centre - a space for people to independently develop their IT and English language skills, have access to a wide selection of software and databases (*see Appendix 1 for a list of software and databases available as at September 2005*).

The administration of all computers and the software contained on them is provided by an outsourced IT vendor and the systems architecture is based on a Citrix server and Windows environment. Computers are available to users for up to three hours per day, with different conditions and fees depending on membership status.

To ensure equitable use by all, a commercial automated booking system was purchased. However, it was soon discovered that this application would not operate in a Citrix environment. As a result, when City Library began operation, bookings for computers were taken on paper divided into 30-minute blocks. This system, whilst previously satisfactory, was impractical and cumbersome as members increased. Clearly the library needed a better system to enable staff to book and monitor computer use more efficiently.

The broad outcomes that the project needed to achieve were:

- To find a way of automating the booking process as an interim measure.
- To ensure a robust operational system, with features such as the ability to monitor client hours used, ensure equity, easily show availability of computers, change password access daily and produce statistics on usage.
- To do it with a minimum of expenditure.
- To make the system easy to implement and train all staff in its operation.

## **Strategic Issues**

As mentioned above there were a number of reasons to have an automated system to book computers. This section will expand the issues that were of an overarching nature to the project.

The Information Services Team (IST) has high technical abilities in the development of information technology and systems, skills in the management of projects and in developing training for stakeholders. As we were a new team that had not undertaken any projects together, this was seen as a great opportunity to build on team strengths, previous knowledge and experience. It was a perfect opportunity to develop as a team by developing ownership and cohesion together. It was also the chance to develop belief and confidence in the Information Services Teams' abilities to solve technical challenges and deliver training to staff, so that they in turn would have confidence in the system and their competence in operating it.

The system, when released after thorough testing, was a huge improvement on the previous paper based computer assignment method, and it solved a number of the problems that were evident when providing access to computers for users. The library now had greater control over its resources and their use. The system also has the ability to monitor booking patterns and to help ensure equity through the use of daily passwords etc.

Training was provided to all users and documentation that was needed was written and refined through testing new versions of the system and workshopping issues that were brought to our attention. This was a great opportunity for the project team, as it allowed IST to demonstrate training capability and emphasise the vital position training has within the organisation and how IST could deliver this effectively.

By taking this inclusive approach and only moving to implement the project once assured that the system was robust and that staff had confidence in their abilities to use it, resistance was minimal. Extra training and refining of the system based on feedback was undertaken at every opportunity after implementation as well.

The project was implemented with minimal cost due to the use of in-house skills. In dollar terms it was inexpensive, however IST investment in terms of staff hours was high as was the time needed to ensure effective training for users.

As well as achieving all the things that IST had hoped the system would do, the project has given staff and patrons the opportunity to become used to the idea of a more fully automated booking system and to increase IT skills. The project also allowed the IST to continue to

develop a strong and responsive relationship with the IT service vendor, which has been invaluable over the ensuing months.

## Technical Considerations

Whilst there were a number of facets to be considered before the automated system could be produced, the most crucial to the success of the project were the technical issues.

### Challenges

After initial inspection of the project brief, it was apparent that there were a number of challenges that needed to be overcome to produce a system that could satisfy operational expectations.

Some of these were:

- Differing access conditions for diverse user groups created a need for complex system functions. For example, CAE students studying an accredited course can have up to 3 hours access per day for no charge, while general members are limited to 1 hour of internet usage free of charge and 2 hours of word processing for a fee of \$2.20 per hour per day (*See Appendix 2 for the comprehensive terms and conditions of computer use for City Library users*).
- CAE tutors may book the whole Frank Crean Independent Learning Centre (18 PCs) or any number of PCs in a group for their teaching needs. Because of the nature of the base script, this needed to be a different form that allowed multiple bookings easily.
- Due to the on-going access and maintenance needs of the IST and the external IT service provider, the public PCs need to be able to be taken out of service and then restored to service easily at any time by all staff members.
- The flexibility for patrons with different needs to be provided with particular PCs for their use, for example those computers with a CD-ROM drive or those with a floppy disk drive, machines with ESL software or just Word and internet access, half-an-hour express or one-hour PC access etc.
- The booking data needed to be kept separate for further concurrent analysis or investigation without influencing the performance of the run-time application.
- The prospective application needed to be compatible with the server and library network and have minimum impact on the maintenance/access needs of the IT service provider.
- A limited time frame and resources for the system development life cycle, as well as ongoing application support and security needs.
- The need to take into account the different levels of IT skills among library staff for ease of system operation.

## Solutions

To solve the above challenges the following strategies were implemented:

- The application was developed using Microsoft Access 2002, with a SQL and VBA programming platform. Because City Library has a site license for Microsoft Office, the development tool was cost-effective, easy to build and maintain, and has an interface that is well known to users, as well as being very reliable.
- Adoption of a Rapid Application Development (RAD) process.  
This development methodology was used because:
  - The project scope was well defined and narrow.
  - The project development team was small; therefore decisions about operability and usability could be made very quickly.
  - The technical architecture of MS Access is well defined and clear, and the key technology components are in place and thoroughly tested and developed by previous information architecture specialists, ensuring high functionality and robustness.

The major ways we adopted this methodology were:

- Prototyping: create a demonstrable result as early as possible and refine that result based on the feedback of the end users gradually.
- Iteration: use an open approach in the development stage, following design, demonstration, redesign and re-demonstration, to create maximum automation of the computer booking system, based on identified needs and the existing library service.

IST also put a large effort on thorough system testing before final release. The major three steps of testing were:

- Self-testing by the technical developer (IT Services Officer) and finalisation of the testing plan.
  - Alpha testing by the project team.
  - Beta testing on site in operational mode.
- Simplification of the table structure keeps the interface user friendly. Two separate forms were built, one for individual bookings and one for the group bookings needed by CAE Tutors. On each form, staff can easily add, change or delete a booking, check all available PCs for any particular time, check any outstanding bookings, select any particular PC to accommodate patron needs, withdraw a problem PC from service and reinstate it easily. For the individual booking form, staff can easily see the whole computer usage duration of each patron per day/week. The system can prevent a patron booking more than one hour of Internet time and it also automatically reminds staff about fee charging according to patron user groups when a patron wants to book time for word processing.
  - Install the application on the file server, which uses Windows Server 2003. Because the current library management system (Dynix) is installed on a Citrix Server, the separation of the application and the LMS would limit any negative influence on the library circulation operations.
  - A function to export the public PC booking data into an excel spreadsheet on the file server and clear the data on the 'live' system on a weekly basis. This function is

needed to separate the run-time operation and allow for ongoing data analysis, which ensures the performance of the application and sufficient time for statistical reporting.

- Different levels of administration, so that all staff could run the application while only the project group could modify the backend code and change parameters for usage if necessary. This makes administrating the run-time application feasible without disturbing circulation operations.

In the end, the whole system deployment life cycle (from initial functionality design to final release) was reduced to around 90 days (*see Appendix 3 for the project timeframe*).

## Training and Implementation Issues

Before implementing the new booking system, it was necessary to do extensive testing of the system, and from that testing process to then design and produce user manuals (*For a sample of one of the operation manual documents see Appendix 4*). The next step was to ensure that all permanent and casual staff received extensive training in all facets of the systems' use.

The staff at City Library have a range of IT skill levels, but most are familiar with MS products and GUI environments. So the use of MS Access as the base for the system allowed the training to be achieved much more effectively than if another platform was used.

When testing of the system began it was found that some buttons needed removing or renaming to make their function clear, also that there needed to be changes to the functionality to make it more user friendly. For example in the prototype version it was found that it was possible to double book a machine and so the programming script was changed to prevent this occurring as long as the booking procedure was fully completed. There were many examples of this type and it cannot be emphasised enough that this testing and debugging process needs to be rigorous and comprehensive. If a new system goes to implementation and then has a problem, confidence may be destroyed from the outset. IST ensured that the system was as close to perfect as it could be before implementation, even though as shown below there were still problems when it was rolled out.

The next and equally important consideration is the training of staff. As there are a number of components to the system and a range of IT skills amongst staff, training was broken up into various sessions and people that had lower IT skills than others were given more intensive training. Another condition that had to be taken into account was that staff training had to fit around other essential duties such as Circulation Desk duties. IST made themselves available for questions and feedback and extra training if it was desired. This openness on the part of IST was well received and many people took the opportunity for further training.

Training was delivered two ways. First, an overview where staff watched the operation of the system on a data show projector and secondly work through operation with the Training Officer providing guidance. It was imperative that staff not only be competent, but confident that they could use the application. The system was going to be used by everyone and it was going to be used for a job that people demand is right the first time. Seamless implementation of initiatives requires attention to detail in the planning and training phases.

On the day assigned for the roll out, there was some nervousness as to whether the system would work properly. However IST had high confidence in the system, the training and the abilities of staff and so the system was implemented on the planned day. A different member

of IST was on hand for all shifts those first few days to help people with any problems they might encounter. The main problems were that staff were not following the process through to the end and so were not fully making a booking. However, staff very quickly came to grips with the system and so did patrons. From these first few days, further modifications were made to the system and other training was targeted to users who were having the most trouble.

The system has now been operating continuously for almost a year and it is extremely robust; in fact the system has never had downtime and is used heavily all day. Staff now have the concept of automated booking of computers and it should make it easier to develop and implement the original commercial system in the near future. Patrons too have accepted the idea of an automated system, and they should be able to adapt more easily to the commercial system (*For statistics on the use of computers at City Library see Appendix 5*).

## **Some Implementation Problems**

Of course with any new system being implemented for the first time there are bound to be some initial problems. Some of the problems IST encountered were:

- Problems with the printing of booking receipts. The original script that was written into the City Library booking system was producing receipts with poor formatting, and had to be modified in consultation with the IT service provider. Receipts are now correctly formatted and contain information vital to the patron, such as the machine booked, time, date and password for the day.
- Because of the possibility of the base code of Access being overwritten when data is input from more than one source, the system can only be operated on one terminal at any one time. This reduced the flexibility to provide multiple service points and required the 'splitting' of users into those wishing to book computers and those wishing to access other library services. This was confusing to some at the outset and required new signage and crowd control.
- Even with intense staff training and retraining at all levels there are problems with the procedure from time to time. The main problems occur when staff are using functions that they do not often need to use. For example, when booking CAE Tutors in group bookings, staff must use a different form, as mentioned above. As this procedure is not often done, it can be a little daunting for some staff. The same can be said for 'backing up' the booking data at weekends. However a few 'cheat' sheets have helped this problem.
- If a booking is not taken to the end of the process, it is still possible to cause double bookings of machines, and in the first days of operation it was necessary to heavily reinforce the need to complete the procedure. Some staff were quick to blame the system, but IST knew through their thorough testing that it was human error that was causing the problem. With further training, this problem has all but been eliminated, except on rare occasions.
- One unforeseen problem was that patrons expected the system to perform beyond its capabilities, such as being able to book computers online. The system, while taking a great deal of time and expertise to design and implement, is in fact an electronic version of a paper sheet, though more efficient to use. These expectations are still raised from time to time and it is vital to take the time to explain to patrons the limits of the system. However, as mentioned above, it is preparing patrons for a much more technologically advanced commercial product that has been purchased.

## What we achieved

City Library IST was and is very happy with the way the automated booking system was designed, developed and implemented. The project helped IST to build a high level of teamwork. Here is an excerpt from the final report to the City Library Manager stating some of what the team achieved:

The Information Services Project Development Team:

- Responded to an operational need. The team accepted that there would be a delay in the anticipated integrated system and that the existing process of booking computers using a paper based system was inefficient and allowed for inequality. This was compounded by the number of terminals and the dispersed locations; it was impossible for the staff to monitor computer access and use visually.
- A system was designed in house utilising in house staff skills, expertise and resources to provide a solution.
- The system was introduced on time in October 2004 and at no additional cost to the service, although to allow the team to train the staff and design the system a small proportion of desk shifts were back filled.
- Trained all staff including casuals.
- Implementation was smooth with minimal inconvenience to staff and patrons.
- In general patron feedback was positive although it has increased patron expectation in terms of functionality ('can I book a PC through the website?')
- The system has provided useful statistics and guidelines to assist in the introduction of the commercial system.
- The system has been robust and stable.
- Computers are booked on average for 75 % of total available hours with weekend access on average exceeding 80% booked hours.

# Appendix 1 - City Library Public Access Software and Databases

## Software Available in the Frank Crean Independent Learning Centre

<b>Operating System</b>	<b>Office Applications</b>	<b>Graphic Design</b>
Microsoft Windows XP,	MS Word, Excel, Access, PowerPoint	Adobe Acrobat Professional Adobe Illustrator Adobe Image Ready Adobe Photoshop Adobe Distiller Adobe Indesign Quark Express Microsoft Publisher
<b>Web Design and Publishing</b>	<b>Accounting</b>	<b>Programming</b>
Macromedia Dreamweaver Macromedia Fireworks Macromedia Flash Macromedia Contribute Macromedia Extension manager Macromedia Freehand MS FrontPage	MYOB	Visual C++ Visual Basic
<b>Adaptive/Assistive Software</b>	<b>ESL Software</b>	
JAWS WiVik Dragon Naturally Speaking MAGic	Academic Writing Clarity Study Skills Connected Speech CyberMail English for Everyone Click into English IELTS Tutor Interactive Picture Dictionary Issues in English Measuring Up That's Life The Alphabet	

## Databases City Library Subscribes to

### Access only from within the Library

These databases require a password and can only be accessed in the library through staff.

- CHOICE Online - Australian Consumers' Association Magazine (password required for some sections, ask staff to log you in)
- Ozjac Online - Australian Courses and Careers (password required)
- Echo - a specialised database for Secondary Schools and has many extra services such as a chat facility. Indexes daily papers - by keyword, title, and contributor - from a VCE perspective. Current awareness articles; sample essays; web links to related information.

### Use from home or work

Britannica Online - from the Library (requires your library barcode)

NoveList - guide to fiction (requires your library barcode)

Oxford Reference Online (requires your library barcode)

Grove Art and Grove Music and Musicians (requires your library barcode)

Gulliver Databases (requires your library barcode)

- Biography Resource Centre & the Complete Marquis Who's Who
- The Health and Wellness Resource Centre

ProQuest General Science (requires your library barcode)

Webster World

Grolier Online

Safari Tech Books Online (requires your library barcode)

Global Books in Print (requires your library barcode)

Superstar - Chinese Literature - download SSreader from the website to enable full text viewing. (requires your library barcode)

## **Appendix 2 – Using Computers @ City Library**

City Library has 28 computers available for library members to use. They are located throughout the library, with 18 machines in the Computer Lab, 5 on Level 1, 3 on the ground floor (30 minute bookings only), 1 on the Mezzanine level and 1 machine dedicated for use by our younger members. The computers in the lab have a range of software installed to support our users' learning needs.

### **Booking a Computer**

It is essential that members who want to use a computer make a booking. Bookings can be made in person at the dedicated terminal with your library card, or by phone using your library card barcode number. Access to the Internet is available to all library users free of charge for up to one hour per day. Please note the last computer booking will finish 30 minutes prior to the library closing.

Word processing is available at City Library for up to two hours per day and is charged at \$2.20 per hour \$1.10 for 30 minutes. CAE accredited course students are exempt from this charge.

A minimum booking is 30 minutes and is available on the hour and half hour. You may make one booking in advance within the following week.

You must have your library card when making a booking in person or coming to collect your password. Unfortunately we are unable to give you access to the computers without your card.

### **Printing and Photocopying**

In order to print or photocopy your City Library membership card must be credited using the Monitor credit facility in the Print Centre on the Ground Floor. Printing and photocopying is available at a cost of 20 cents per A4 page, 40 cents per A3 page. This machine takes coins only and we can not refund any credit left on your card, however, the unused portion of credit on your card will remain available for next time.

There are three print stations located around the library and each prints jobs from different machines. Staff will be happy to indicate where they are located or click this link to see a map of the library's computers and printing stations. We ask that you use paper supplied by us at all times in order to avoid paper jams.

YMRL card holders will need to obtain a facilities card from the Circulation Desk and then charge that with credit. Unused credit will not be refunded.

### **Disks**

Floppy disks are available at the Circulation Desk for \$2.75 each.

### **Cancellations**

Please notify us if you need to cancel your booking. This will give others the opportunity to book a session. Please remember that if you do arrive late you are only able to use the computer until the end of the booked session.

**User Etiquette**

At the end of your session please log off the machine ready for the next user to enter their username and password. Users must not attempt to make any changes to the set-up or configuration of the software or hardware. When viewing websites or programs that have sound, please respect other users by using your own headphones or by exchanging your library card at the desk for a set.

## Appendix 3 – Project Timeline

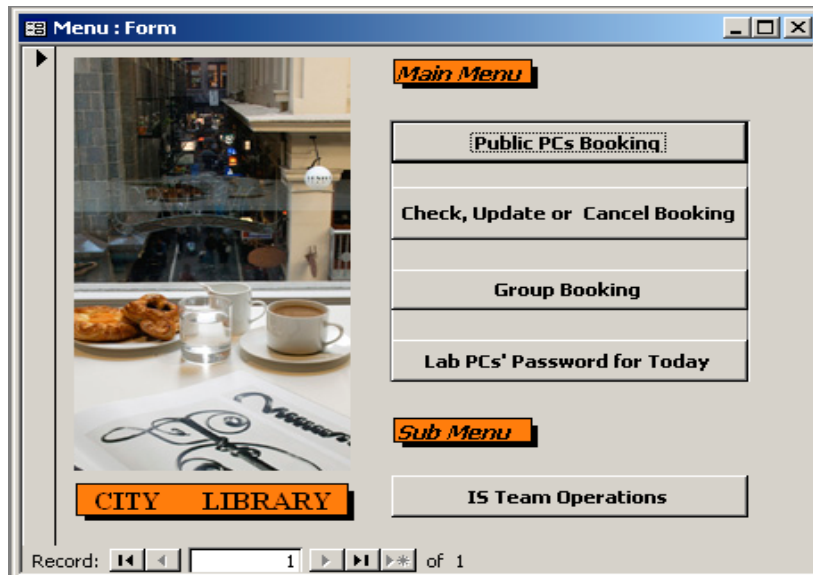
The whole system development life cycle included the following stages:

STAGE	JOB	STAFF	START	TIME FRAME
1	Functionality design	Sarah, Zan	06-08-2004	2 days
2	Prototype design, development	Zan	08-08-2004	10 days
3	Prototype demonstration, feedback, modification	Sarah, Zan, Tony	23-08-2004	1 day
4	Database application design, development	Zan	24-08-2004	7 days
5	Application demo to network provider – IT service vendor	Sarah, Zan, Tony, Sarah H, Joe	30-08-2004	1 day
6	Testing plan documentation, unit testing, modification, redesign and redevelopment	Zan	31-08-2004	21 days
7	Upload application to file server and on site configuration	Zan, Sarah H	20-09-2004	3 days
8	Alpha testing (indoors), modification and redevelopment	Tony, Zan, Sarah,	23-09-2004	18 days
9	Beta testing (on site)	Zan	25-09-2004	7 days
10	Design procedure and release timeframe, advertising, set up password sheet.	Sarah	11-10-2004	7 days
10	Training	Tony	10-10-2004	14 days
11	Preparation and release	Tony, Zan	22-10-2004	2 days
12	On site training	Tony, Zan	25-10-2004	7 days
13	On site bug fixing	Zan	26-10-2004	1 day
14	Ongoing support	Sarah, Tony, Zan	Up to now	

# Appendix 4 – Sample Training Documentation

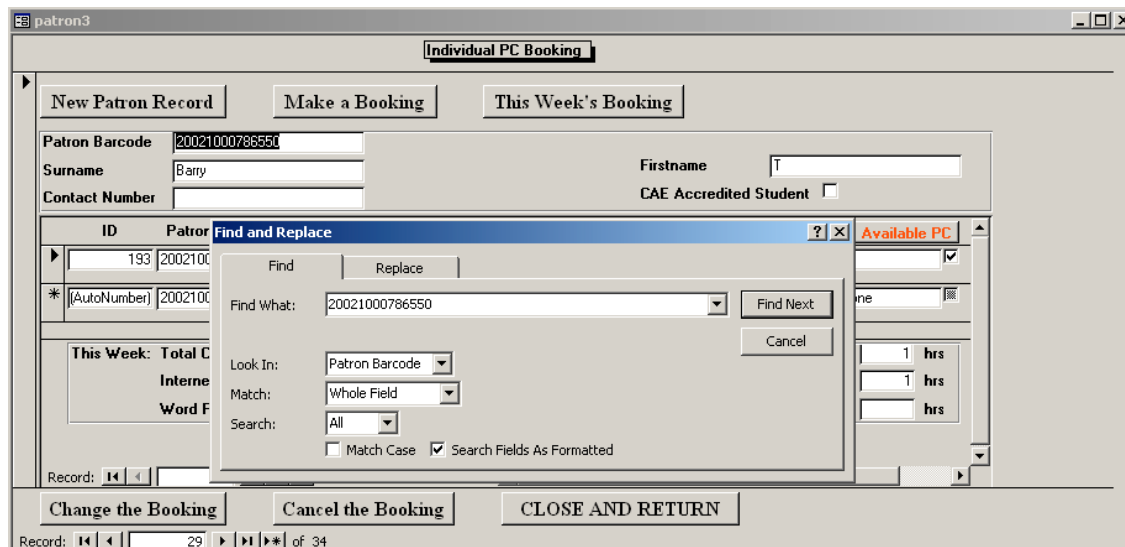
## Make a Booking for an Existing Patron

At the end of this session learners will be able to make a booking for an individual patron that already exists on the data base using other their library card and a barcode scanner.



1. Click the 'Public PCs Booking' button

This opens the Individual PC booking screen

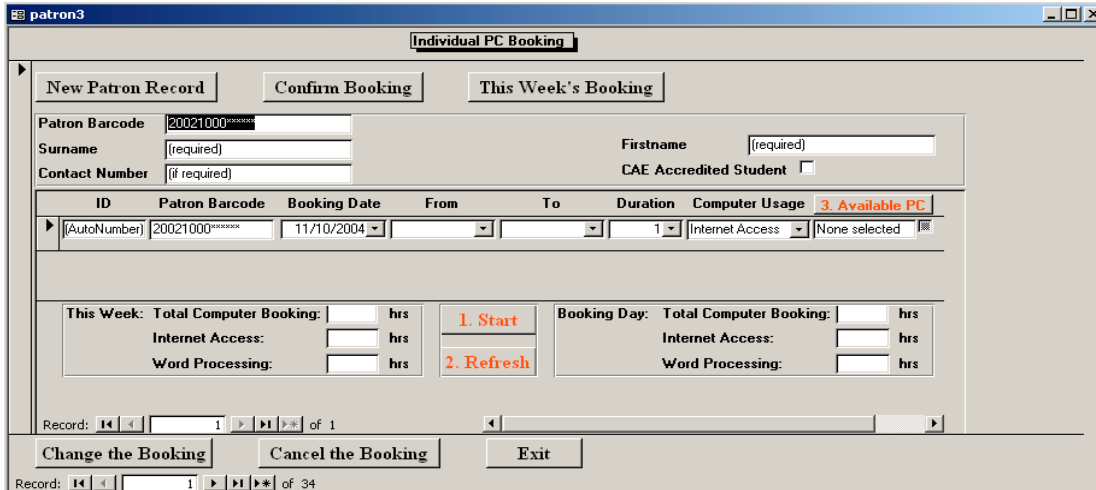


The **Find and Replace** menu automatically opens

2. Wand in Patron barcode.

3. Click **Cancel**.

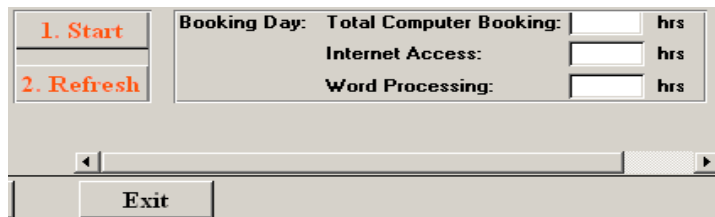
This closes the Find and Replace box and the patron's record is now shown



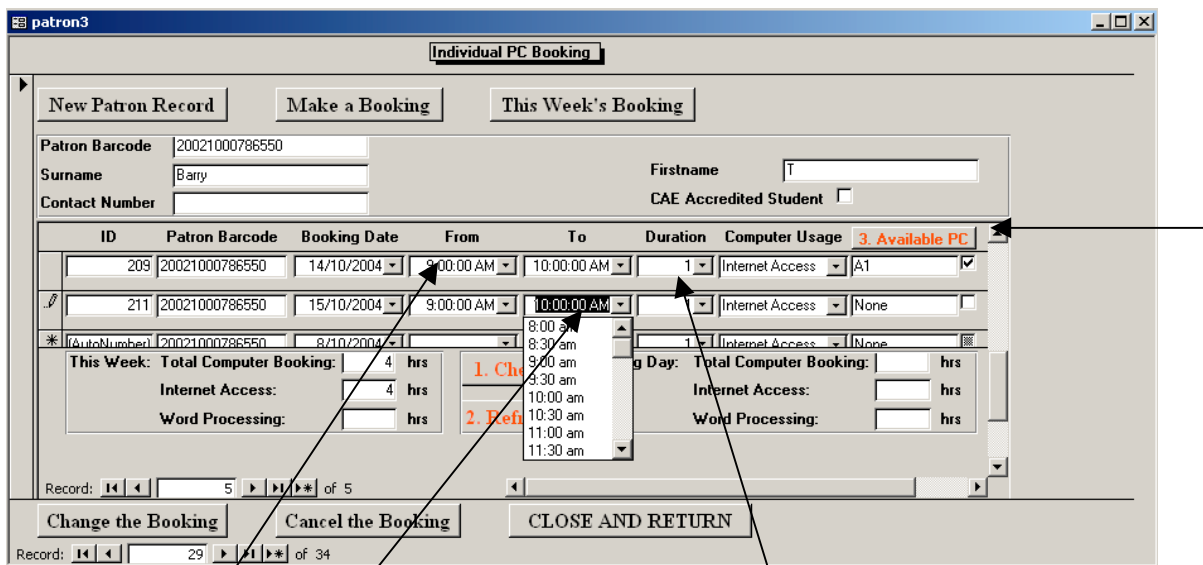
4. Click **Start**.  
Two message boxes will appear.

5. Click **OK** and Click **YES**

You are now able to create a new booking. If they have already had any bookings for today, they will be shown in the bottom right hand part of the screen.

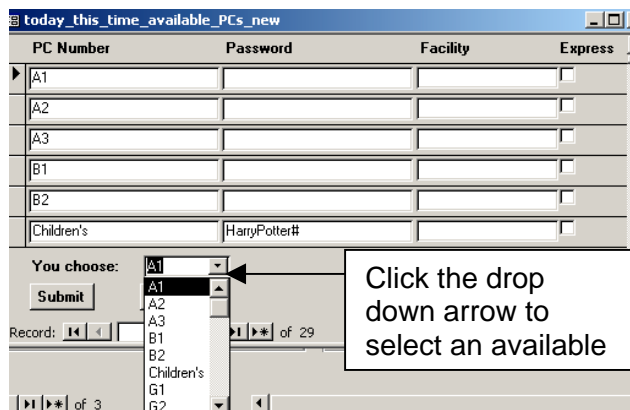


You now need to enter the time of the booking and whether it is for Internet use or word processing.



6. Select a '**From**' and '**To**' time and make sure the '**Duration**' and the '**Computer Usage**' is accurate, then click '**Available PC**'

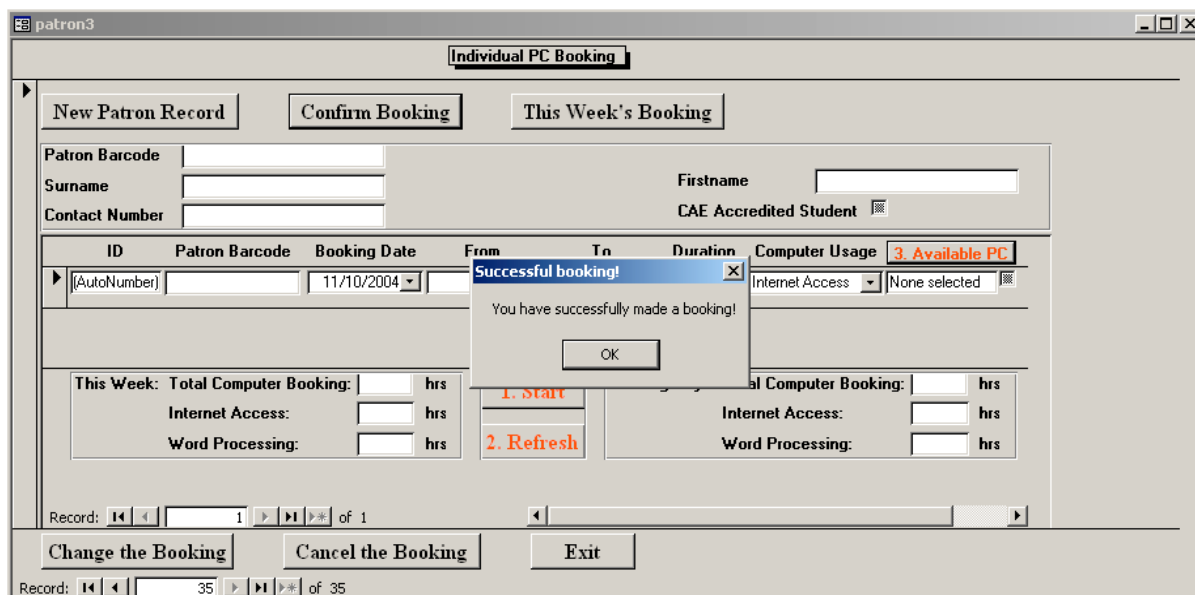
You are now at the screen which shows a list of available PCs



7. Press **Submit**

A pop up box will appear

8. Click **OK** and then **Close**



## IMPORTANT

9. Click **Confirm Booking** – only when you see the successful booking box have you finished making a booking!

10. Click **OK**.

**CONGRATULATIONS!!!!** You have made a successful booking!!!!

# Appendix 5 – Booking Statistics

## Amended Public PCs Booking Weekly Report - 29/08/2005~3/09/2005

### Public PCs Overall Usage

<i>Date</i>	<i>Internet Access</i>	<i>MS Office</i>	<i>Full Lab Class</i>	<i>Small Group</i>	<i>Total Booking</i>
29/08/2005	283	18	0	0	301
30/08/2005	260	16	0	7	283
31/08/2005	257	19	0	23	299
1/09/2005	257	21	0	0	278
2/09/2005	206	8	0	13	227
3/09/2005	62	1	0	0	63

**Total Public PCs Booking of This Week:** 1451

### Top Booked Public PCs

<i>PC Number</i>	<i>Booking Times</i>
G1	107
G2	94
M1	59
A2	58
G3	58
A1	56
L10	55
L11	55
A3	54
B1	53

### Busy Booking Time of a Day

<i>Start from</i>	<i>Booking Times</i>
3:00 PM	92
12:00 PM	91
5:00 PM	86
4:00 PM	86
1:00 PM	76
11:00 AM	73
10:00 AM	69
10:30 AM	69
6:00 PM	68
11:30 AM	68