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DUX : A remote-access on-line information system

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Abstract

One of the aims of academic administration systems is to provide a variety of services to students. These services, however, normally require the attendance of the students at the institution and the presence of administrative staff to effect the transaction.

Deakin University has installed a voice-response administration system to allow certain functions to be initiated by students over the public telephone system 24 hours per day, 365 days per year. This paper discusses the structure of the system and describes its method of operation.

1. BACKGROUND - THE STRUCTURE OF DEAKIN UNIVERSITY.

Deakin is Australia's sixth largest university, with a total student body in excess of 26,000. The university is situated in the state of Victoria and has five campuses. Three of these campuses are situated in the eastern suburbs of metropolitan Melbourne, Victoria's capital city, one is situated at Geelong - one of Victoria's largest regional centres located some 70 kilometres from Melbourne and the remaining campus is at Warrnambool, approximately 250 kilometres from Melbourne.

Deakin has a large off-campus enrolment, enabling students to study in distance education mode from any part of Australia or overseas. Deakin has off-shore study centres in Malaysia and Hong Kong.

Deakin also has a large involvement with a number of professional bodies, including the Association of Professional Engineers and Scientists of Australia and the Australian Society of Certified Practising Accountants. The university provides course delivery and examination facilities for these bodies and their candidates are enrolled as external students of the university.

All of this makes for a large commitment of resources to enrol students, make changes to their enrolment details, disseminate examination results and field enquiries. Given the geographical dispersion of the student body (some serve onboard ships), there are problems

relating to students' being able to attend one of the campuses to transact their business with the university, being able to check on exam results, etc. These problems are partly related to distances and partly related to time zone differences, the latter causing problems even for normal person-to-person telephone operations.

The means by which Deakin has chosen to provide at least a partial solution to these problems is to make use of the telephone technology which is available 24 hours per day for 365 days per year on a world-wide basis.

This technology , in the form of electronic mail, has been used in the teaching and learning process for a number of years. Its introduction to administrative systems, at least within Australia, is relatively new.

2. DUX - THE SOLUTION

DUX, Deakin University Exchange, provides a means by which students may access certain administrative functions by telephone using either touch tones, dialling or voice recognition.

A menu of ten operations is currently provided, see Attachment 1. On dialling the DUX number a recorded voice asks the caller to transmit the number "one" to ascertain the technical capacity of the caller's handset. The caller may then transmit their response by touching the 1 button on a touch-tone handset, dialling 1 on a decadic handset or by speaking the word "one". The DUX system will then branch to a routine which will communicate with the caller in their chosen mode of operation.

A recorded dialog leads the caller through the steps needed for the operation selected, including multiple prompts if errors are detected in responses.

The DUX system provides the caller with on-line access to the university's database in the same manner as would be provided for an internal, staff operator. Students are able to interrogate their examination results, to add and/or delete units in which they are enrolled and to obtain a statement of the units comprising their current enrolment. In a menu selection not yet implemented, they will be able to quote a credit card number for the payment of their fees.

A function about to be implemented will allow callers to record text data, such as changes of address, to be acted upon later by operators who retrieve the message and manually enter the required data.

3. SYSTEM SECURITY AND LIMITATIONS

Some of the considerations involved in using the system are inherent in the current state of the art of the technology and others are the result of its mode of operation.

Given that the ideal vehicle for interaction with a system such as DUX is the touch-tone telephone, Australia's current 15-20% of touch-tone phone penetration is the largest single impediment to a wider use of these applications. This is changing at a steady rate and will eventually be a minor irritation only.

One limitation imposed by the technology is the necessity for all input to be numeric. While it is possible for touch-tone phones to signal alphabetic characters by the use of the numeric keys, the practical difficulties of differentiating between numeric and alphabetic input mean that, for practical purposes, the system is limited to numeric input. This necessitates all information to be coded entirely in numeric terms.

Spoken input could offer a means of overcoming the limitation to numeric input only. There are difficulties, however, with voice recognition and DUX voice input is limited to the spoken digits 0 to 9 together with "yes" and "no".

The basic assumption on which the system is predicated is that students are basically responsible people and that they will assume liability for their actions. If an enrolment is altered capriciously, the student will be the ultimate loser in the long term. Each student has a personal identification number, or PIN, which provides them with the means of protecting the integrity and confidentiality of their data. This PIN is initially set to a 4-digit number comprising the day and month of the student's date of birth. Students are encouraged to alter their PIN (menu choice 1) as often as needed to preserve the security of their information.

Transactions involving the change of a student's enrolment have implications related to course regulations concerning numbers and types of units able to be taken, together with the satisfaction of prerequisites, etc. In order to minimise the connection time of any one transaction, such changes entered via DUX are processed without validation during the on-line operation. They are then subsequently checked in batch mode and potential errors are detected. These changes, highlighting any anomalies, are included on a report which the system automatically produces for the academic staff. If the staff wish to query the transaction, they may use the DUX system to generate a letter which is produced and mailed to the student, indicating the existence of a potential problem. At the same time, a future reminder notice is placed on file and brought to the staff member's attention in due course to remind them to follow up the transaction and determine whether or not any corrective action has been taken by the student. If none has been taken, the staff member may countermand the student's original action.

For operations which may potentially be undertaken by all students at the same time, such as re-enrolments, the students are allocated a time slot for their use. Students attempting to effect such a transaction outside their allotted time are automatically denied access to that function. This measure was introduced only as a result of bitter experience. Several Telecom exchanges were brought down initially as the result of some hundreds of callers attempting to access DUX simultaneously.

4. TECHNICAL SPECIFICATIONS

The DUX system as configured by Deakin, see Figure 1, consists of 72 incoming lines split into 6 groups of 12 lines each. Each 12-line group feeds into the administrative information management system via two hardware units supplied by Alcatel. The first of these, a Vbot, determines whether the input is digital or spoken. If the information is spoken, the Vbot translates the voice input to its digital equivalent. Remember that all input is numeric. So, a spoken input of "one four zero six" becomes 1406. The translated value is repeated back to the caller by the Vbot and the caller is asked for "yes" or "no" to verify the number or to request a repeated input.
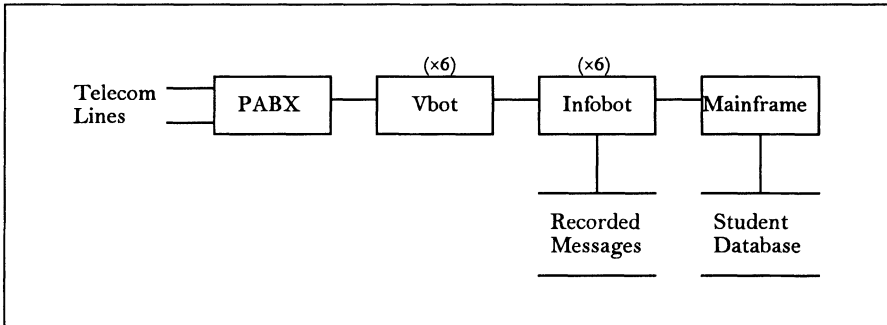
Figure 1   The components of the DUX system

In the case of an initial digital input from a touch or dialled phone, or the translated output from a Vbot, the input is next handled by the second of the hardware devices, an Infobot.

The Infobot has access to a number of digitally recorded messages which it uses to converse with the caller. Its essential function, however, is to take the digital input and to make it appear as input from a normal video monitor to the application software. Hence the application procedure which accepts a student ID number and function code from an operator, accesses the student database and replies with a list of subject codes or exam marks is unaware that the origin of the enquiry was from a telephone rather than from an operator at a screen. It is similarly unaware that its displayed output is being interpreted by the Infobot and converted to spoken form over the line to the caller.

The input/output operations are therefore isolated from the database access and update operations. The university's database management system is about to change from UNIFY to ORACLE and no alteration to the DUX interface will be needed.

It is significant that the programming of the Infobots was carried out by one of the student administration staff rather than needing the resources of the central computing staff.

5. THE ADVANTAGES OF THE DUX SYSTEM

The advantages as seen by the university are :

For students :

•   The service is accessible from wherever the student happens to be.

•   The student has 22-hour access each day to enrolment details. (The other 2 hours are devoted to database maintenance functions.)

•   Students can make changes right up to the associated deadline.

•   Students have control over enrolment details at all times.

- Students do not have to attend the university to enrol or to change enrolments, saving loss of working or leisure time.

- Queues on enrolment days are eliminated or reduced.

- It is a paperless transaction. The trees thank you.

- Long-distance telephone calls may be made at nights, taking advantage of cheaper rates.

For the University :

- Changes in statistical data are reflected immediately, eliminating the delays associated with manual keying of data.

- Class lists are up to date and available to staff promptly.

- Enables early ability to predict class enrolment numbers.

- Reduction in mail handling and postage charges.

- Reduction of congestion on enrolment days.

- Saves tying up staff to process enrolment changes.

- Elimination of lost paperwork and errors in processing.

6. CONCLUSION

Very few Australian educational institutions currently have systems as sophisticated as DUX. In its operation, however, the telephone interface to the conventional database functions is both easy to implement and simple in its operation.

Deakin is currently looking to a number of other administrative areas, such as student and staff elections, in which to utilise telephone input.

The technology and method of operation used in DUX will become refined and simpler to install and use within the immediate future. It provides clear advantages to both the provider and user of computer-based services.

DUX

DEAKIN UNIVERSITY EXCHANGE

Easy as using your phone

Deakin University Exchange (DUX) is the University's convenient phone-in service for students.

Within the next twelve months DUX will be providing a wide range of services:

- adding units
- deleting units
- assessment results
- variations to enrolment
- payment of fees and charges
- supplementary assessment detail
- examination centre information for off-campus students

DUX services will soon be available to all Deakin students. Mid-year assessment results will be available through DUX for students on all campuses from 16 July. For on-campus students re-enrolling for 1994, DUX will be the accepted method of re-enrolment.

For students who do not have access to a "keypad" telephone, voice recognition technology is provided, with DUX interpreting the spoken commands of the student. The voice recognition technology is being further refined and adapted to local requirements.

All transactions are printed and mailed to students as confirmation.

Touch-tone (keypad) telephones have been installed in prominent locations on each campus. Calls to DUX on these telephones is free of charge. A tutorial DUX DEMO facility is available for people wishing to sample DUX.

DUX is secure because students access it via the student ID number and a personal identification number (PIN) issued to each student. Security is maintained because students are able to use DUX itself to alter the PIN. Re-enrolling students are guided in the selection of their units by face-to-face consultation with faculty staff, and by a Course Re-enrolment Advice Sheet which sets out clearly the structural details of the course. These details are provided by the faculties to enable Student Administration to print and distribute the sheets.

The students' unit selections are provided to Faculty Enrolment Officers in the form of an Audit Report which includes a copy of the student's academic history, a listing of the current units selected, and an alert if any audit checks have failed.

DUX can monitor such things as credit point loadings per semester, and can limit cross-mode, cross-campus and cross-faculty enrolments as required.

Information about DUX will be released progressively as developments occur. DUX information presentations will be conducted on all campuses in the second half of 1993.

For further information about DUX, contact Student Administration at Burwood, Geelong or Warrnambool. DUX can be sampled by dialling into the DUX DEMO (menu choice 6).

The Dux Menu
0 Exit
1 Change PIN
2 Add units*
3 Delete units*
4 List of units enrolled in
5 Assessment results
6 DUX demo
7 Change address*
8 Pay fees*
9 List menu choices
10 Obtain examination centre details*
    Currently being developed

DUX Numbers
Geelong (052) 27 2121
Metropolitan (03) 244 6121
Warrnambool (055) 633 121

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