



MULTOS Case Study

Hong Kong university makes the most of MULTOS Smart Card

Students and staff at The Chinese University of Hong Kong (CUHK) are using a MULTOS-based smart card for a range of purposes on campus, including identification and access control, administration, and Mondex stored-value and ATM banking transactions.

The card – known as the CU Link – was launched jointly by CUHK and the Hang Seng Bank during the academic year 1999-2000. Today it is used by all students and staff at CUHK – more than 23,000 cards are currently in circulation, and around 9,000 are issued each year.



One of the many uses for CU Link is to borrow books from the university library

Multi-application

As well as replacing the university's general campus identification card, CU Link is used at the library, computer laboratories, canteens, swimming pool, self-service kiosks, and to settle payment with Mondex on and off the campus. The card uses a token system which students can get from charging stations positioned around the university, using either credit or cash to load the card.

Philip Leung, Assistant Director of Information Technology Services Centre of the university, said: "CUHK is the first institution in Hong Kong to make use of, and develop, its own MULTOS application, on a single microprocessor chip shared by both the University and the collaborating bank. In fact, CUHK is amongst the first organisations in the world to employ Mondex on the MULTOS platform.

"CU Link is a state-of-the-art device for the convenience of students and staff in the digital age. It provides multiple functions of identification, physical access control, electronic cash and banking services. At the same time, it is a tool for CUHK to enhance its services.

The card contains a Mondex application and an ID application written by CUHK. Originally Hitachi 8k devices, the latest cards are 16k which allows enough memory to accommodate an X.509 certificate for electronic signing of documents.

Philip said MULTOS was chosen because of its ability to provide a highly secure multi-application platform that runs on a single microchip. "Applications for various purposes can run independently in harmony," he said. "That is, even though they sit on the same chip, each of them will not – and cannot – interfere with the others' operation or read/write the others' data.

"As a result, different organisations can provide different applications to the same cardholder community – a key for us with so many uses for both students and staff."

Easy access

All door access is controlled through CU Link and doors can be set to be freely opened, card enabled or using card and PIN. Each door can have appropriate permission set, although most doors are set to require PIN and card after 5pm. "A major advantage of the scheme is that the PIN is stored only on the card and not centrally – so that the processor on card could validate the holder while the PIN does not need to travel around in a network," said Philip.

The Physical Education Unit (PEU) loans equipment for physical exercise using CU Link. The student places the card into a reader at the booking desk and the receptionist uses pre-printed codes to identify the equipment loaned. The information is stored in the PEU PC so that the item can be easily booked back after use.

CU Link use

- Registration, course and exam fees and admin
- Building access
- Library use
- IT Services fees
- Photocopying
- Sale of books
- PE/swimming admission, membership and guest tickets
- On-site merchants: barber/beauty, supermarket, canteen, snack bars
- Air conditioning/laundry tokens
- Event booking/ticketing/analysis
- Class/seminar attendance

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Event Management

Many CUHK events – especially those that require pre-booking – use an e-ticketing system stored on the card. “The student books through the intranet, reserves a seat and makes any payment that might be necessary,” he explained. “Portable terminals are placed at the entry to the hall to validate the registration status of the student card and to collect statistics on who have attended. Staff can then use a PDA to download the attendance records for analysis and reporting.”

In student dormitories, air conditioning is provided on a pay per use basis, with one token representing an hour of use.



An efficient and time-saving ‘key’

“The student places the card into a terminal over the a/c unit and authorises the use of an e-token,” said Philip. “A similar scheme is in operation in the laundry, with five tokens providing one complete washing/drying cycle.”

The Campus Security Unit also uses CU Link to validate university members and to allocate parking spaces, he added. “In the old days, the cards used to show an expiry date. But if students extended their period of study, or staff members wished to extend their contracts, new cards had to be issued. Now the process is electronic with a saving in cards.”

In the library, turnstile access is activated by CU Link. To cater for visiting patrons not eligible for a CU Link, the turnstile readers are programmed to concurrently accept a Schlumberger card issued by the library.

“CU Link sets loan conditions so that a professor may have a loan for two months, whereas a typical student may only borrow for two weeks before renewal,” explained Philip. “Access to terminals within the library is also controlled by the card.

No URL’s are stored however and the card doesn’t control access to content – CUHK believes in a liberal and democratic approach and privacy is highly respected,” he added.

The latest CU Link cards are tied to a Hang Seng credit card system and an EPS debit system. Card holders can now use either payment system to pay for tokens which are then loaded on to the CU Link card through a dual-card self-operated terminal.



A new self service kiosk is currently being experimented that allows students to change their PIN, check return dates on library books, book for lectures and order document transcripts, which are then delivered by e-mail. “Digital signing is also gaining ground, allowing holders access to a broader range of services provided more widely across the university,” Philip said.

The University is also exploring the feasibility of visitor cards based on CU Link. “Tokens can be loaded and used on campus and the card depicts scenes from CUHK so it doubles as a souvenir!”

The Chinese University of Hong Kong

Rising from Tolo Harbour just north of Sha Tin, the Chinese University of Hong Kong covers 134 hectares with more than 130 state-of-the-art building.

It offers 53 full-time and two part-time undergraduate programmes.

There are 61 departments within seven faculties ranging from arts, business administration and education to engineering, medicine, science, and social science.

The university offers postgraduate diploma, masters, and doctoral programmes.

There are 9,330 undergraduates and 6,178 postgraduate students, with around 4,900 employees of which more than 1,800 are in teaching and research.

*** NOTE: As a result of changes at Hang Seng Bank, the Mondex payment system at the Chinese University has been retired.**