KF

Project number: WP11

INCREASE OF EFFICIENCY AND INTEGRATION OF TECHNOLOGY AT THE DEPARTMENT OF RESIDENTIAL SERVICES OF WORCESTER POLYTECHNIC INSTITUTE

An Interactive Qualifying Project Report

Submitted to the faculty of

WORCESTER POLYTECHNIC INSTITUTE

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Degree of Bachelor of Science

By

Timothy D. Bonci

John C. Woodhull

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Assistant Professor Kathi Fisler, Advisor

I. Abstract

This project studies the paper system employed for key records of the Department of Residential Services at WPI and finds that efficiency is lacking due to the system. We interviewed Tracy Cree, Associate Director of Residential Services, and Philip Clay, Director of Residential Services, and other staff members of the Department of Residential Services of WPI in order to determine what procedures were employed in their record keeping. We also made contact with students at RPI, Ithaca, and Endicott. Those students relayed interview questions to the staff at their respective Residential Services Departments. This gave us a description of the systems used at four different colleges. We then studied those systems to determine the time consumed on transactions involving student room keys. We then considered ways to make these procedures more efficient. Our conclusion is that an upgrade to a computerized database would best suit the needs of the Department of Residential Services at WPI and other universities using the same or similar inefficient, paper-based systems for key record keeping. We then implemented a database using Microsoft Access and trained the Residential Services Staff in its use.

II. Introduction

1. Residential Services

"At Residential Services, we provide students with a safe, healthy, and functional living environment which supports the educational mission of the University. We promote personal growth and development in a diverse residential community, consisting of 1250 students in 6 residence halls, 2 apartment complexes, and 5 residential houses. In addition, we offer support services to students seeking off-campus housing in the area." (Worcester Polytechnic Institute)

One of the tasks involved in providing housing to students is key tracking. Students who misplace keys and get locked out of their rooms need new keys. In order for the housing to remain secure, Residential Services must keep track of the set of leased keys. Other tasks of the department are placing students in on-campus housing, training Residential Advisors, providing information concerning off-campus housing, providing various supplies to residents living in on-campus apartments, processing work orders for repairs, and planning activities to create community. Through interviewing Tracy Cree, the Associate Director of Residential Services, we identified key tracking as the system which required the most improvement.

2. Project Goals

This project is intended to increase the efficiency and ease of key transactions performed by Worcester Polytechnic Institute's Department of Residential Services. These tasks currently involve many hard copy transactions which reduce efficiency by requiring an inordinate amount of time to access various data, including student and residence hall information, on large stacks of computer printouts. Using a computerized system would greatly reduce the amount of time used in looking up information for these transactions. The team analyzed the current systems in place at WPI and other similar institutions focusing on those that are computerized and determined the best system in terms of cost efficiency, ease of use and training, and availability. The team then initiated implementation of the system and training of the staff.

III. Background

Residential Services at Worcester Polytechnic Institute is the entity responsible for the on-campus student community. The department employs a staff to live with the on-campus residents and a staff to run the central office. The office staff has a number of duties which include day-to-day office operations, dealings with other departments, and student based transactions. One of the more common student transactions that occurs deals with keys.

Students misplace and sometimes lose their keys, and, consequently, cannot get into their rooms. Residential Services lends spare keys in these circumstances. The process of the transaction is as follows: A student comes into the office, needing a spare key. One of the staff members looks up the student in a stack of paper printouts to verify his or her identity. Once the staff member verifies the room information with the paper printout, they retrieve the key from its cabinet, and record the transaction in a binder. The information that they record is: the name of the resident, the room, the key code, and the date. There is also a field to record the date a key is returned. Every few days, a staff member will flip through the binder scanning for old dates and unreturned keys, and contact the tardy residents via phone or email.

Other transactions in the office also involve the paper printouts used for key transactions. Information lookups for mailings, census information, and contact information are commonplace. The printouts, therefore, have become central to office operation. The functions of the Department of Residential Services are dependant upon the paper printouts which store student information. The printouts are many and varied,

and time is spent determining which one to use. A computerized system could also make these types of transactions easier and faster.

IV. Methodology

The first stage of our project involved determining whether the current paper-based systems at Residential Services were inefficient, and if so, whether we could improve upon the systems using computerized technology. The second stage entailed determining the specifications for a computerized system which would improve the efficiency of the ineffective systems. Stage three included constructing the computerized system and integrating it into the Residential Services Department. The fourth and final stage concerned training the staff of Residential Services in the use of the new system. This chapter describes how we went about that process.

In order to get a feel for the workings of the office, we conducted interviews of the staff. We conducted surveys at WPI to determine which processes students were concerned about and how the processes were related to the efficiency of the office. We gathered information from contacts at other colleges to determine the systems used at those colleges and the efficiency of those systems.

1. Interviews

Timothy conducted face-to-face interviews with two of the head staff members of Residential Services. Tracy Cree, the Associate Director of Residential Services was the first; Philip Clay, the Director of Residential Services, was the second. We did not take notes in either case, but we did address a few specifics. The conversations focused on

analysis of the current paper record system, improvements that the staff would like to see, and possibilities for future improvements. The current system is a binder full of paper records to which the staff must add new records whenever a transaction occurs. The staff must then search through the binder visually when they wish to look for any overdue keys. The directors expressed a desire to improve the efficiency of key transactions and key tracking. For the key transactions, this meant reducing the amount of time taken per transaction. For key tracking, the desire was to have a greater recovery rate on borrowed keys.

We made more informal consultations with other staff members who work in the office. These staff members were the ones who most frequently conduct the business dealings that involve the public, such as key transactions. The purpose of these consultations was to get a feel for the perceptions and needs of the people who would be most affected by a change in the office.

2. Surveys

The purpose of interviewing the staff was to determine their needs in regards to increased efficiency, especially with respect to a new system. The other demographic involved in the business of Residential Services is the student body. We planned to measure their needs in this area through surveys.

The interviews we conducted gave us some idea as to what information we needed to gather from the student body. We developed a set of eight questions (see Appendix A) to gather information on transactions the students have had at Residential

Services, including frequency, purpose, and length of transaction involved. We also included two questions to collect statistical data on the graduating class of the student and their residence hall at the time of the transaction. See Section V.2. for the Survey Analysis.

3. Other Systems

We identified five other schools in the Worcester area and contacted the Department of Residential Services at each of those colleges. They were: Becker College, Assumption College, Clark University, College of the Holy Cross, and Anna Maria College. We chose colleges from the Colleges of Worcester Consortium, Inc. (a group of thirteen colleges cooperating to further higher education in the central Massachusetts area). These colleges, we felt, would be more likely to provide us with useful information regarding the systems they use in their Departments of Residential Services (or facsimile thereof). We asked them a series of questions directed at garnering information about the systems they used and the efficiency of those systems. We wanted to know what systems were being actively used in other schools to see if any of them would work for WPI. We also asked the other schools how they generated their student identification numbers because we noticed that WPI uses social security numbers for its student identification numbers. We felt that this raised some privacy issues since, at WPI, student staff is given access to lists of every student's identification number. If other schools also use social security numbers for this purpose and give students access to their records, it may be a common practice and thus not of great concern. However, if

this system is unique to WPI, it might need to be immediately changed to eliminate the privacy risk.

4. Implementation

We developed a set of requirements based upon the information we gathered from the students and staff at WPI and the staff at the colleges of the Worcester Consortium. Having identified the requirements for implementation, we designed a system which would increase the efficiency of key transactions at WPI. We decided that Microsoft Access, a program already available to Residential Services, would provide the framework necessary to build the new system. We created a set of tables, queries, forms and reports (see Section VII. System Implementation for details) that fit the requirements of the system and aided user training.

5. User Training

Introducing a new system into the department would have caused confusion and mistakes resulting in inefficiency unless we also provided training for the staff who would use the system. By using Microsoft Access, we provide a system with a well-known user interface. This makes training much easier due to the users' familiarity with the interface common to Microsoft products. However, it was still necessary to provide training in the idiosyncrasies of Access and the custom made tables, queries, etc. that we created. We authored a user manual (see Appendix C) for the new computerized system

which contained information on basic Access operation and the navigation of the newly designed system. We also provided private training sessions for each staff member using the system, tailored to their specific application of the system. During these training sessions, we answered any additional questions the users had and provided working demonstrations.

V. Analysis

During the interviews, the paper record system emerged as an area of concern, especially when dealing with transactions involving keys. Key loss has been an issue in the past, and the paper record system does not make key tracking an easy task. We consulted everyone on the staff who deals with the key transaction system and they all agreed that the system needed improvement. Suggestions for solutions to the problem included making an electronic database to manage the keys. Another popular proposed solution involved getting rid of keys altogether and switching to a centrally controlled key-card system. We greatly preferred the electronic database because a centrally controlled key-card system is expensive and even if it were implemented, an electronic database would still be of great use for room assignments and changes. Also, a key-card system would not prevent students from locking themselves out of their residence halls. Therefore, an electronic database may still be needed to keep track of master cards or keys.

1. Key Statistics

Over the month of September, 2002, Residential Services had 44 student key transactions. The number of transactions each day ranged from 0 to 5 transactions. The office was only open 21 days in September, so we can calculate 44/21 key transactions per day average, or about 2.09524 key transactions per day. If this can be assumed to be the average for a day the office is open when classes are in session, we can calculate the

year's total for key transactions. There are four terms of seven weeks each of which have five days during which residential services is open. 4 x 7 x 5 = 140 school days, during all of which the office is open. So our average times our total days yields approximately 293 key transactions per year. For a worst case scenario of 5 minutes per transaction with the current system, 5 x 293 = 1465 minutes, or about 24.41667 hours per year. If the time for each transaction can be cut down to a minute (due to the speed of an electronic search), the amount of time spent per year on key transactions would be 293 minutes, or about 4.88333 hours per year, saving about 19.53333 hours per year. This would increase the efficiency of key transactions 400%. Demonstrations of the system during user training suggest that a key transaction using the electronic system would take on average less than a minute.

2. Survey Analysis

We found it necessary to identify how our system will be of use to the students at WPI. We needed to know how it would affect their use of Residential Services. We also needed to know if they wanted such a system to begin with and, if so, what features they would want in it. In order to accomplish this, we decided to conduct a survey that was administered by sending it to every undergraduate student at WPI via email. Of the approximately 2,800 undergraduates at WPI, 95 replied to our survey. We were also able to get 8 students to take our survey on paper.

a. Survey Hypothesis:

The purpose of our survey was multifaceted. We wanted to discover how much the students at WPI know about the transactions that take place in the Residential Services Office. We also wanted to find out what they think can be done to make Residential Services better serve them. But most importantly, we wanted to know if losing or misplacing keys is a serious enough problem to warrant creating a system specially designed to increase the efficiency of transactions involving keys.

It was our hypothesis that a significant portion of the transactions that take place in Residential Services of which the students are participants involve lost or misplaced keys. We also believed that these transactions represent a significant amount of the workload at the Residential Services Office. We suspected that keys are more often misplaced than lost, and that they are misplaced inside the rooms of the owners. It was our opinion that most of the people who misplace or lose their keys are in their first or second years and live in the residence halls adjoining the Quad (Morgan, Daniels, and Sanford-Riley). This is because, by the time they are in their third year at college, most students have become accustomed to always having their keys with them. We believed that the atmosphere and security present at the residence halls on the Quad are such that they diminish the chances of getting back into a room if the keys have been left there.

b. Survey Results:

We found from our survey that most students at WPI have visited Residential Services at least once. The most common reason for these students to visit was because

of lost or misplaced keys. About half of the students surveyed replied that their visits took less than 5 minutes (which supports our worst case analysis of key transaction times, since the amount of time spent at Residential Services would be greater than that of their transaction time) and 80% of the students that had visited Residential Services felt that their transactions did not take an excessive amount of time. The most common reasons cited for the length of transactions were the amount of paperwork involved, incompetence among the staff and the way the current system works. This tells us that while lost or misplaced keys represent a significant portion of the transactions that take place in Residential Services, it is not important that the speed of these transactions be increased, at least as far as the students are concerned. Therefore, in this respect, students may be excluded as stakeholders in our system. Therefore, the focus turns to making a system that is more efficient for the Residential Services staff.

Our survey also showed that most of the students surveyed knew that Residential Services provided replacement keys and apartment listings, but few knew that they provide apartment supplies and deal with work orders. The most common suggestions for additional electronic, automated, or online services that students thought that Residential Services could provide were electronic locks, online apartment listings, and online work orders. This was particularly interesting because Residential Services currently does provide online apartment listings, suggesting that additional advertising for their online services might be necessary. Our survey also showed that Morgan Hall, Sanford-Riley Hall, and Stoddard Hall were the buildings in which students most frequently lost or misplaced their keys. Students in Healthy Alternatives, Institute, Elsworth Apartments, and Founders lost or misplaced their keys less frequently. This

supports our hypothesis that students are more likely to get locked out of the residence halls adjacent to the Quad. We also found that freshmen and sophomores are far more likely to lose or misplace their keys than juniors and seniors.

3. Other Systems

Only three of the five schools we contacted sent us responses. They were Clark University, Anna Maria College, and Becker College. All three of these colleges use electronic key cards to restrict access to their residence halls, as well as physical keys to restrict access to each room within the residence halls. Becker and Anna Maria both loan keys to students who have locked themselves out and keep records of such transactions. This indicates that the systems that they use to keep track of keys may be viable for WPI, since WPI also loans physical keys to students and keeps track of the transactions. All three colleges restrict access to any records they keep to staff and faculty. Only two of the three colleges use computerized systems: Clark uses Banner and Microsoft Excel and Anna Maria uses Microsoft Access. Becker reported that its department uses handwritten records. The Department of Residence Life at Clark University informed us that staff spend approximately one to two hours per day at the beginning of each semester loaning keys to students and one to one and a half hours per week doing so later in the semester. Becker College reported that its staff spends less than an hour per week throughout the year performing key transactions. We also determined that Clark uses social security numbers to uniquely identify its students, Becker uses students' names with numbers appended where necessary, and Anna Maria uses both social security numbers and student name.

We looked at each solution that the three schools provided for our problem. The Department of Residential Services at WPI already uses the Banner system and decided that it did not provide the necessary functionality and ease of use. A handwritten system will not reduce the amount of time spent performing key transactions or provide any other benefits. Microsoft Excel meets all of our requirements, as does Microsoft Access. However, Microsoft Access is both easier to use and would be just as if not more efficient than Excel.

4. Social Implications

The introduction of a more efficient data system at Residential Services will benefit both students and staff. The students' needs and requirements would be dealt with in less time, as their transactions with Residential Services would be more automated and, therefore, executed more quickly thus saving time for the students. This benefits the staff as well. They will spend less time dealing with the students and their problems, and therefore have more time to spend on other duties. This could lead to a loss in work for some staff members as their tasks are streamlined enough to make paying them no longer a good investment.

The project is not likely to have any consequences outside of the university, but at the level of the college, it may have an effect. If the system is really successful, other departments on campus may want to acquire the same or similar systems, leading to increased efficiency for the university.

5. Potential Privacy Concern: Social Security Numbers

When a student comes to the Department of Residential Services to request help, a staff member must determine and verify his or her identification before addressing the student's problem. WPI uses Social Security Numbers for student identification. Social Security Numbers are unique identification numbers issued by the United States Government for the original purpose of Social Security benefits. Due to the fact the numbers are unique and assigned by the federal government, many businesses and other record keeping entities consider these numbers to be convenient identification. Their use has become so widespread that most employers, schools, banks, etc. require a social security number for their record keeping. This creates the possibility of abused information. A person in possession of someone else's Social Security Number can gain access to personal records including school grades and bank accounts. A thief can even create new records (such as credit history) with the stolen number. The Department of Residential Services employs students for some of the daily tasks in their office and this means a classmate could access another student's records. No student expects nor wants the Residential Services staff to have access to his or her personal and private information.

Many universities (such as Metropolitan Community College of Omaha, Nebraska and the University of Illinois) are taking steps to assure the privacy of their student records and record keeping methods. Some schools have set tight policies on who has access to Social Security Numbers and to which documents they are granted

access, as well as who can access that information from outside the university. Other schools have stopped using Social Security Numbers altogether and have begun using other identifiers unique to the institution. Other colleges, like WPI, do not place restrictions on their use of Social Security Numbers. Metropolitan Community College, for example, says, "Unique identifiers (such as social security numbers) are collected to verify the user's identity, for use as account numbers in our record system, and for other purposes." This statement was found on the college's web page describing the use of information collected by the site. (Metropolitan Community College of Omaha, Nebraska)

The University of Illinois has an entire section of their web site devoted to their social security policy. Their policy states that they have started using UINs (Unique Identification Numbers, sometimes called University Identification Numbers) instead of Social Security Numbers. They say, "Social Security numbers are highly confidential and legally protected data. The University of Illinois is committed to protecting the privacy of the members of the University population." (University of Illinois)

There is an Act being pushed through Congress called the "Freedom and Privacy Restoration Act (H.R. 220). Representative Ron Paul (R-TX) is a proponent of this Act that will limit the use of Social Security Numbers to only purposes related to Social Security. He stated:

> "[S]ince the creation of Social Security in 1935, there have been almost 40 congressionally authorized uses of the number as identification for non-Social Security programs. 'Such congressional actions do not reflect the intent of the

Congress that created the Social Security system as that Congress in no way intended to create a national identifier,' he said. 'In fact, Congress never directly authorized the creation of the Social Security number, they simply authorized the creation of an "appropriate record keeping and identification scheme." The Social Security number was actually the creation of the Internal Revenue Service!'"

(Institute For Health Freedom)

At WPI, there is not yet a policy for dealing with the privacy of Social Security Numbers. The numbers are used for primary identification of students and employees in the administrative systems. The employees are beginning a movement to evaluate the need for Social Security Numbers and their ability to cut out unnecessary use of and greater protection of the numbers. Eventually, this may cross into the handling of student records as well, but there are no plans as of yet to implement such a change with student records. (Clay)

VI. Database Requirements

Through several interviews with Tracy Cree, we were able to establish a list of requirements that the database must meet in order for it to be a viable solution.

- Searchable List of all students on campus
- Searchable List of all students with keys out
- Searchable List of all rooms
- Settable time limit for keys that have been taken out
- Daily alert of all past due keys
- Interface for editing student information
- Interface for editing key status
- Ability to sort records alphabetically by student name, by room number and building, and by key code
- Intraoffice accessibility
- Ease of use when making room changes

These requirements may be broken down into three different groups: those requirements that represent the core functionality of the database, those requirements that are necessary to support the functionality of the system, and those requirements that are additional features. The first group encompasses both interfaces and the ability to sort records by student name, room number, or key code. The second group contains all three searchable

lists. The third group consists of the settable time limit, the daily alert, intraoffice accessibility and ease of use when making room changes.

The first functional requirement is an interface for editing (or adding) student information. This information includes the student's ID number, name, room number, building, and whether the student is currently borrowing a key from Residential Services. This interface will be used at the beginning of every school year when the new room assignments are made and also whenever a student switches rooms mid-year. The second interface is for editing the status of the keys at Residential Services and contains the code of every key, the date the key is borrowed, and how many days the student has to return the key. It will be used whenever a student wishes to borrow a key from Residential Services. The third functional requirement is the ability to sort records by student name, room number and building, and key code. Records will be sorted by student name when the student information needs to be updated at the beginning of the school year and whenever a student's information (ID number or name) is looked up to verify which room and building the student lives in, such as when a student requests to borrow a key. Records will be sorted by room number and building whenever it is necessary to determine what key code is associated with a particular room, such as when a student requests to borrow a key. Finally, records will be sorted by key code when it is necessary to determine to what room a key belongs, such as when a lost key is returned to Residential Services.

The first support requirement is a searchable list of all students on campus. The list will contain the student's ID number, name, room number, building, and whether they have a key out. This list will support the interface used for editing student information

and the ability to sort alphabetically by student name and by room number and building. The searchable list of all students with keys out will contain the student's ID number and name, the number of the key that was borrowed, the date the key was borrowed, and the number of days left until the key is past due. This list will support the interface used for editing key status. The third list consists of the number of each room in every building and the key codes for each room. It supports the ability to sort by key code.

The first feature is a settable time limit for keys that have been taken out. Since some students need more than three days before they can return the keys they borrow, the staff at Residential Services needs to be able to adjust the number of days until the keys are overdue. The daily alert will inform the users of any keys that are overdue and who has them out. Intraoffice accessibility is important so that the system can be used from any computer in the office. Finally, we noted that the process of making room changes needs to be easy so that it takes a minimal amount of time. This will make the transactions more efficient overall.

VII. System Implementation

1. Implementation Details

Microsoft Access provides a framework which makes it simple to implement every requirement we have been given. Forms are interfaces in which the user adds, edits and deletes records. Forms are powered by queries which are sets of predefined searches which sort the information in the database. The queries operate on tables which are lists of records. A record is a specific set of data. For instance, we might have a record in our table for Tim Bonci who has ID number 012-34-5678 and who lives in Elsworth Apartments 010B . This set of information would be represented as a record. Our two interfaces are implemented as forms (see Appendix B Page 7 for a picture). Our sort functions are implemented as queries (see Appendix B Page 6). Our searchable lists are implemented as tables. This leaves the settable time limit, the daily alert, the intraoffice accessibility and the ease of use when making room changes. The settable time limit is implementable as a field in one of the tables. The ease of use is handled by making the forms for editing student and room information easy to use. This means that the forms are easy to understand and that there are as few steps to making room changes as possible. Any staff member familiar with Microsoft Access should be able to perform a room change without requiring reference materials.

There are two ways intraoffice accessibility can be handled. We can host the database on one computer and create links in Microsoft Windows to the database on each computer that requires access. Alternately, we can create two versions of the database in

Microsoft Access, one which contains all the data for every record and one which has links to the information in the other version of the database. The latter version of the database would be distributed to all the computers which require access to the database, while the version which contains all the data would be hosted on a single computer.
A major issue occurs when allowing multiple computers to access the same database. This issue arises when two users try to save information to the database at the same time and it is called exclusion. Microsoft Access handles exclusion by keeping the information that is saved last. We know how Microsoft Access deals with exclusion when we implement intraoffice accessibility inside Microsoft Access (the second method discussed), but not how it is handled when we implement intraoffice accessibility in Microsoft Windows. Therefore we chose to use the second implementation, inside Microsoft Access. The daily alert is implemented with a report (see Appendix B Page 10), another Microsoft Access tool, which will open every time the database is opened and display the names of all the students who have overdue keys.

These changes should increase the efficiency of transactions, making them smoother and shorter time-wise for staff and students. This system allows for increased security for the keys than the previous system did, as it will be more difficult to miss a key that has not been seen for some time. All in all, the increase in technology should make the workings of the office less complicated and less error prone. Therefore key transactions in the Department of Residential Services would operate in a more efficient manner.

2. Maintenance

The system we implemented will require some annual maintenance by the staff at Residential Services. At the end of every school year, the records of the graduating students need to be removed from the database. At the beginning of every school year, a new record must be entered for every incoming freshman. The records of all students who remain on campus have to be updated with their new housing information. The records of all students who move off-campus have to be deleted. We expect this maintenance to take about 20 hours. One of the permanent staff members will be trained to perform this maintenance.

VIII. Evaluation

The system we implemented using Microsoft Access met all of the requirements outlined by the staff. Besides being less error prone then the paper system, the new system only requires one click to sign a key in or out, and is therefore more efficient than writing two to four fields worth of information. The intraoffice accessibility is functional and stable. The staff went through training without major difficulty, and is pleased with the new system. Lastly, the goals of our project were attained as stated in Project Goals.

IX. Conclusions

After consulting with the staff at the office, we drew the conclusion that, contrary to student opinion, the paper record system is indeed a source of inefficiency and needs to be changed. Searching for data takes a substantial amount of time, as does rummaging from one stack of paper to another to find a different type of data. The key tracking deserves special consideration. There has been loss of data and property possibly due to flaws in the system. Since the paper system needs to be searched by hand, a staff member can miss some entries of borrowed keys. Consequently, those keys are never tracked down, and often never returned. This results in a permanent loss of keys. With the database in place, the staff will be able to do a thorough, fast, and accurate search of their records. This should reduce the instances of lost keys due to a record being overlooked by the staff. It will also reduce the amount of time needed to enter new records and retrieve old records, which will increase the efficiency of key transactions.

Sources Consulted

Andersen, Virginia. Access 2000: The Complete Reference. New York: Osborne/McGraw-Hill, 1999.

This book provided a great reference for building our database. We used it to design our tables, queries, forms and reports. It was especially helpful for figuring out how to use relationships.

Clay, Philip. Personal interview. October 2002

Philip Clay is the Director of Residential Services at WPI. We interviewed him to obtain permission for our IQP and to discuss WPI's policy regarding the use of social security numbers as student identifiers and allowing student staff to have access to these identifiers.

Cree, Tracy. Personal interview. November 2002

Tracy Cree is the Associate Director of Residential Services at WPI. We interviewed her to determine what system is currently in place at Residential Services. We also discussed the requirements for the new system and acquired approval of the new system from her.

Institute for Health Freedom: Congress Holds Hearing on. Institute For Health Freedom. June 14, 2000. <forhealthfreedom.org/Publications/Privacy/CongHearing.html>

This website contains information regarding the congressional hearing held on May 18, 2000 concerning limiting the use of social security numbers to only matters related to social security.

Kaufeld, John. Access 2000 For Windows For Dummies. New York: Hungry Minds Inc., 1999

We used this book while writing our user manual. It is a great example of technical writing that is easy to understand, even for laymen. We used it to figure out what we needed for our manual and how to write an easily understandable reference guide for our database.

Metropolitan Community College of Omaha, Nebraska. Metropolitan Community College of Omaha, Nebraska. Dec. 11, 2002. <www.mccneb.edu/privacy.asp>

This website provides a description of the Metropolitan Community College of Omaha, Nebraska's policy on the collection, use, and distribution of Social Security numbers.

Social Security Number. University of Illinois. Oct. 11, 2002. <www.ssn.uillinois.edu/ssn.html>

This website provides a description of the University of Illinois' policy on the collection, use, and distribution of Social Security numbers.

*WPI Residential Services.*Worcester Polytechnic Institute. Nov 25, 2002. <www.wpi.edu/Admin/RSO>

This website provides a description of the mission statement for WPI's Department of Residential Services.

Appendix A.

Efficiency and Technology at Residential Services IQP Survey

We are looking into automating some of the transactions that occur at WPI's Residential Services Office. In particular, we will be focusing on transactions that involve dormitory keys. Please take a few minutes to answer the following questions.

1. Have you ever been to the Residential Services Office before?

2. Please list all reasons for your visit(s) there.

3. How long did your transaction(s) take?

4. Do you feel that this is too long to wait for the type of transaction(s) that took place?

5. In your opinion, what were the major factors contributing to the length of time your transaction took (i.e. lots of paperwork involved, complex problem, poor traning)?

6. Please mark all of the following services that you were aware Residential Services offers:

   Keys Apartment Supplies Work Orders
   Providing Miscellaneous Information Apartment Listings

7. What additional electronic, automated, or online services do you feel Residential Services should offer?

8. How often have you had to call or visit Residential Services because you were locked out?

9. What dorm were you locked out of?

10. What class were you when you were locked out?

If you are willing to answer follow-up questions, please put your email address below.

Appendix B.

User Manual for Key Tracking Database

Created by
Tim Bonci
John Woodhull

Revision 2.0

12/10/02

Table of Contents

Background Information:

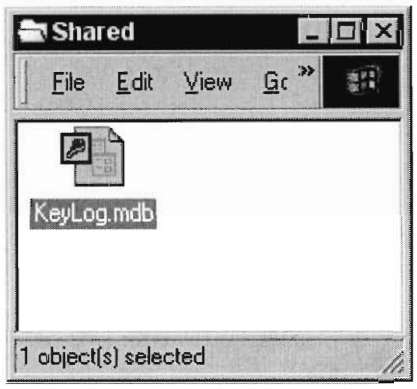
In this section we will cover many of the terms commonly used when talking about databases. This information will help you to understand the rest of this document. We assume that you have read this section and are comfortable with all the terminology discussed herein before reading the rest of the manual. It is also assumed that you will have the database open while you are reading the manual (do not worry if you don't know how to open the database now, we tell you how to do it later).

The first question many people have when learning about database software, such as Microsoft Access, is What is a database? "A **database** is a collection of information that's related to a particular subject or purpose, such as tracking customer orders or maintaining a music collection(Access Help)." All the information that is related to a particular instance of a subject, such as a specific customer's order, is called a **record**. A **table** is a collection of related records, such as the contact information for all your customers. The records stored in tables are sorted using **queries**. **Forms** allow you to easily search through and edit existing records or to add new records to your tables. When you want to analyze or print data in a specific layout you open a **report**. Further detail may be found in the Microsoft Access help system.

Opening The Database:

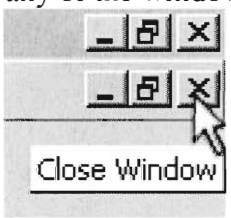
Step 1: Double-Click on SHARED on RESLIFE-98

Step 2: Double-Click on KeyLog.mdb



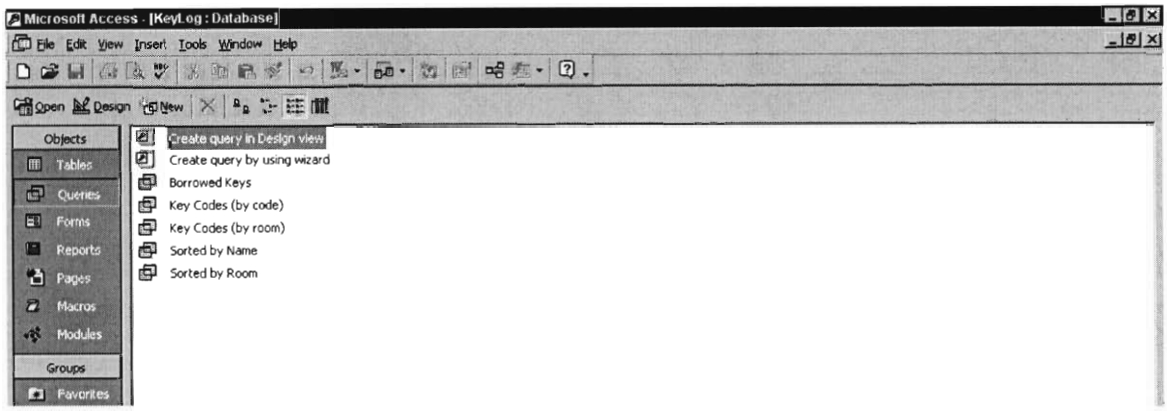
The Key Tracking Database:

The first thing you see when you open the database should be a list of all students with overdue keys. You can close this list by pressing CTRL-F4 or by clicking on the lower X in the top right of the screen (as shown below). The same methods may be used to close any of the windows we open within Microsoft Access.



The Main Window:

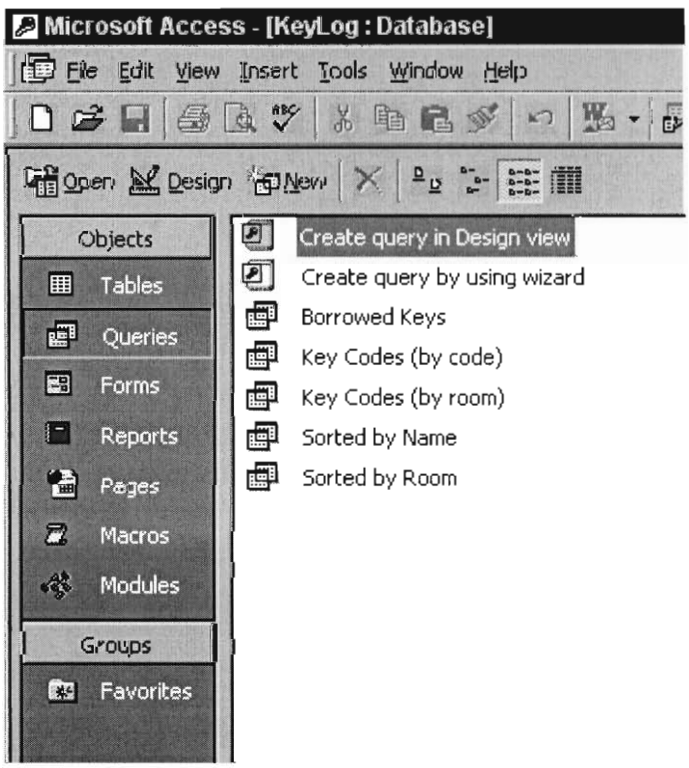
Once you have closed the list, you should see the main database window.



The menu located on the left side of the window allows you to choose the different types of objects available in the database. You should only need to use the Forms and Reports.

The Query Window:

This is the menu you access to see the electronic rosters of the students and rooms. To access the roster of the rooms and their key codes, click on "Key Codes (by room)" to see the records sorted by room or "Key Codes (by code)" to see the records sorted by code.



The rosters of student are accessible "Sorted by Name" and "Sorted by Room".

Room	Key Code
16E 000	47C-1
16E 001	47C-2
16E 002	47C-3
16E 003	47C-4
16E 004	47C-5
16E 005	47C-6
16E 006	47C-7
16E 007	47C-8

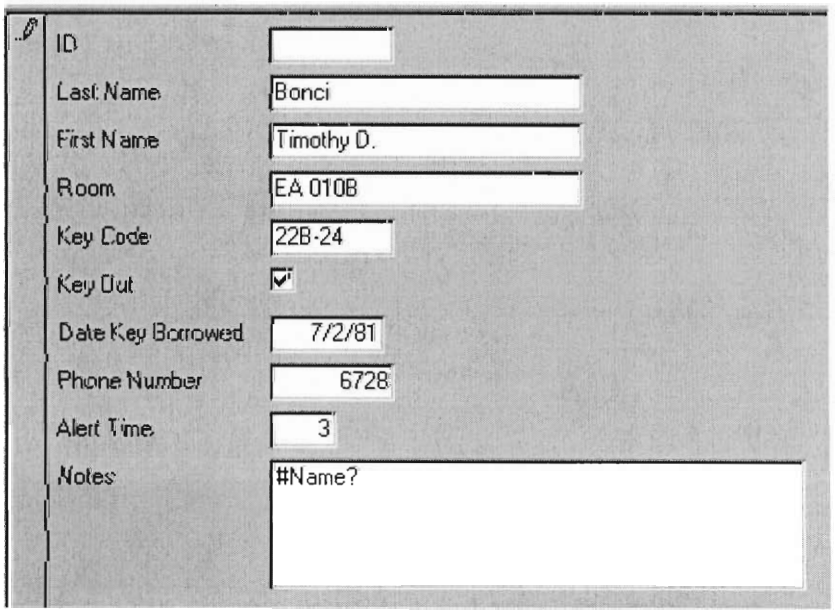
This is an example of the "Key Codes (by room)" query. Below is an example of the student roster "Sorted by Name".

Last Name	First Name	Room
Abrahamsen	Erica L.	MH 210
Abramovich	Daniel N.	FH 209B
Acevedo	James E.	SC 212
Adelino	Miguel J.	SC 201
Alberts	Victor J.	IH 303

The Form Window:

Select the Forms object in the menu. You should see three options appear in the main window.

You do not need to concern yourself with the Create form options. The other option represents the object you will be using the most. This form allows you to view and edit the records in the database. The records are sorted by building and room number. Try opening the Student Information form now by double-clicking on it.



On the bottom of the screen you should see a set of buttons that looks like those shown below.

These buttons allow you to navigate through the records associated with this form. The buttons functions are (in order from left to right) Go to first record, Go back one record, Go forward one record, Go to last record, and Create new record. New records are always created after the last record in the set. Access will sort them the next time the form is opened. If you make changes to a record the changes will not be saved until you either a) move to a different record or b) close the form. This means you can undo any changes you make to a record as long as you are viewing it.

Performing a Search:

Sometimes it is useful to search for a specific record without clicking through other records to get to it. This can be done easily using the Find function. The Find function works in a couple different ways. In the easiest method, the Find function searches a specific field for the criteria you provide. The Find function can also search the entire form for the criteria you provide. However, when using this method, you have to carefully specify your search criteria so that extraneous records are not returned. This can happen if the search criteria match two or more fields that contain similar information. For the purpose of this manual, we describe how to perform a search on a specific field.

Step #1: Click in the field you wish to perform your search on (e.g. ID or Last Name).
Step #1: At the top of the Access window click on Edit.
Step #2: In the resulting menu click on Find (it has a set of binoculars next to it).
Step #3: In the field labeled Find What: enter your search criteria (e.g. "000112222" or "Smith")
Step #4: Click the Find Next button.
Repeat Step #4 until the desired record is found.

Note: This method assumes your search criteria exactly matches the data you are looking for as it is stored in the database. If you want to use criteria that matches only part of the data, perform steps 1-3 listed above and then click on the field labeled Match: and select the "Any Part of Field" option. This means that instead of searching for "000112222" or "Smith" you can search instead for "00011" or "1122" or even "Smi" and still get the same record.

The Report Window:

Close the form and select the Report option in the Objects menu.

You should see three options appear in the main window. Again you can ignore the two Create report options. Double-click on the third option, Students With Overdue Keys. The list that you saw when you opened the database should appear on the screen. You can scroll through this list to view all the students and their contact information. You can get back to the rest of the database by following the Form Window instructions.

Keys Out

Key Out Yes

Date Key Borrowed	ID	Last Name	First Name	Room	Key Code	Phone Number	Time	Notes
12/2/81		Bonci	Timothy D.	EA 010B	22B-24	6728	3	
12/2/02		Skulas	Ann C.	16E 000	47C-1	6686	3	

Key Out No

Date Key Borrowed	ID	Last Name	First Name	Room	Key Code	Phone Number	Time	Notes
		Gonzalez	Ernesto J.	DH 406	12C-6	6593	3	
		Gladu	Jeffery L.	25T 004	47B-4	6823	3	
		Gleason	Matthew A.	SB 213	34B-20	6362	3	
		Gleyzer	Vitaliy	FH 304C	21E-18	6432	3	
		Glynn	Kevin M.	MH 323	23C-18	6921	3	
		Goel	Sandeep	FH 207C	21D-28	6507	3	
		Gogos	Steven T.	EA 015A	22B-34	6480	3	
		Goldberg	Daniel E.	IH 109	46A-5	6235	3	
		Bonatsakis	Nicholas E.	RH 310	35C-13	5172	3	
		Gonsalves	Justin H.	MH 234	23A-29	6941	3	
		Gillis	Dustin J.	EA 007A	22B-15	6415	3	

This shows the Keys Out form. There are 2 sections: Students with keys out, and students who haven't borrowed keys. Those with borrowed keys are at the top of the report sorted by the date they signed keys out.