K.I.S.S.
Keep It Simple and Speedy

When requested by a Faculty member to create a system that would solve his VERY Large Class Attendance problems, two Computer Science students were put to work. Their Computer Science education/training lead them to create a system that would take into consideration every possible situation, for every possible type of class. However, they were not prepared for the basis of the needs for this faculty member, simplicity. Not everyone needs to cover ALL possible scenarios. A new theory was introduced to these students. The theory: The best system for a user, is the system that does the necessary work, while also being most convenient and understandable for the user; and therefore meets the needs of the user. In other words: K.I.S.S.; Keep It Simple and Speedy.

The Problem:
The faculty member has classes with 150-200 students. It is an “exit” class that requires attendance and the completion of certain projects (ie. Resume and career file creation). The projects are either completed or not, with no grading or ranking of quality.

The current hand system has a student TA taking attendance cards, alphabetizing them and recording into a ledger. A seating chart is created and attendance is manually recorded. Each class meeting takes about 2 hours for the 150-200 students. Each assignment is manually collected, dated, alphabetized, recorded and placed on file for later use. Each project assignment takes about 2-5 minutes per student or 5-10 hours total. The student worker, staff and faculty member take 20-30 hours per semester on course management.

With the retirement of the previous faculty member that was teaching this class, the new faculty member wants to automate and streamline the process. Dr. Swanson hopes to save considerable man-hours.

Problem Statement:
Create a system that will record student attendance and class assignments very quickly, lessen the workload, while not impeding upon class time.

The Solution:
Use POS Scanners and computer to record student attendance. A simple database was discussed, whether to use a spreadsheet or Microsoft Access. Access was selected because of the student programmer’s experience with it and for the belief that it could simplify the input and output. A spreadsheet would also be able to complete the task, but would require more faculty intervention.

As the students come to class, they will display their student ID card, called “MavCard” for our Minnesota State University, Mankato Mavericks sports teams. Their student ID card has a barcode for a unique Library ID. This barcode will be scanned, recording into the database the date that they attended class. When the student turns in an assignment, their MavCard will again be scanned, with the assignment number and the date recorded.

At grading time, an Access report is generated that gives the count of attendances and assignments. If a student questions the validity of grades, Access reports produce the detail of exact dates of attendance or assignments.
Data Base:
Three tables were designed in Access:

Students – contains limited pertinent student information.
Library ID entered by POS scanning at first class meeting.
Student Name, Student number, Tech ID.
Entered by student assistant from MavCard during first class meeting.

Attendance – contains the student ID and dates that the student attended class.
Entered by POS scanning as student enters the classroom. This process should go pretty quickly once students get used to swiping their MavCard in front of the POS scanner.

Assignments – contains the student ID, assignment number and date the assignment was completed. Entered by POS scanning of MavCard as student turns in assignment.

Equipment:
POS Scanner Symbol LS400i series – purchased through faculty travel monies
IBM Thinkpad A20m – provided by the College

Programming
Two Computer Information Sciences student employees of MSU’s Academic Computer Center spent approximately 80 hours programming and testing the Access 2000 system. This also includes two demonstration meetings with the faculty member.
These students also attended the first 4 class sessions as observers and technical support.

K.I.S.S.
Keep It Simple for Swanson ☺
The first demonstration meeting:
In the first meeting with Dr. Swanson the students demonstrated their all-encompassing system based upon their Computer Science training. Dr. Swanson helped the students to quickly realize that their system would take too long, and had too many “bells and whistles”. With this realization, the students, Dr. Swanson and myself came together with a redesign that would place speed and simplicity at the top of the list of design criteria.

The students programming efforts have evolved to the following K.I.S.S system.
The Access system K.I.S.S. boots to a main menu with 7 items to select from. This is minimized to maintain the simplicity for the faculty member.

The Swanson Attendance System

Data Entry   Quick Data Entry   Reports

Add Assignment  Attendance  View Student Assignments
Add Student     Assignments  View Student Attendance

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Data Entry and Quick Data Entry
To add students to the system, the student will scan their MavCard Library ID number into the Barcode field and then type in their Tech ID and name.

Add Student
Fill in the required information and click save to add a student to the database. If you want to view previous students, click previous or next to navigate. If you alter any previously stored students, click save to update the information.

If an error is received, press ESCAPE and either try again or close the form.

Barcode:
Tech ID
First Name
Last Name

Previous Student  Next Student  Save  Close Form

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Data editing techniques will not allow a student to be ADDed multiple times. However, a student misspelling their name will make it to the database. The time to enter this student information will take some time out of the first class period. However, this time loss will more than be made up through the rest of the semester with recording attendance and assignments.
To minimize the interference to the first class period, students will leave their MavCards with a student TA as they enter the classroom. The student TA will scan the barcode and enter the name data. The data entry of all 150-200 students should be completed during the first class period. After data entry the MavCards will be placed into 4-5 boxes (i.e. A-G, H-M, N-S, T-Z) to aid in the students retrieving their MavCards after class.

An attendance screen was designed to quickly register the students as they come to class.

Notice the simplicity of this input screen. The only data input is the Student Barcode (Library ID), which comes from scanning the students MavCard. Clicking Submit enters the ID and day/time from the CPU into the students record.

To record assignment completion required a preliminary setup screen, where the assignment number is entered, and a student screen.

Assignments must be created in the Database before they can be used. The Add Assignment screen allows the faculty member to enter an Assignment Number and Description. This can be done at the beginning of the semester when time allows.
The Record Assignment screen allows the faculty member to identify the assignment that is to be turned in by the students.

When the Begin Accepting Assignments button is clicked, a screen to input student barcodes is brought up. This screen can be placed along side the Attendance Screen to allow a student to be scanned for both attendance and submitting an assignment.

To increase speed, only the student Barcode is scanned from their MavCard, while the assignment number, date/time turned in and the barcode are entered automatically onto the student’s record.
Reporting:
The reporting functions are completed through selection of three reports. If the faculty member needs specific detail on attendance or assignments, they may select the appropriate report. If they are completing a grade report, they can use a report that summarizes the attendance and assignment detail.

The Student Attendance report provides the detailed dates of when a student attended class. The report is in Alphabetic order by name.
The Student Assignment report provides the detail of which assignments were turned in on which date. This report is sorted in Alphabetic order by name.

### Student Assignments

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Test ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ausland</td>
<td>Allende</td>
<td>2232</td>
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<tr>
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<td>9/10/20</td>
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<tr>
<td></td>
<td></td>
<td>9/17/20</td>
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<td>12/18/20</td>
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<td>12/20/20</td>
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<tr>
<td></td>
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<td>12/31/20</td>
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</tbody>
</table>

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To complete a grade report, the faculty member would use the summarization of the Assignments and Attendance Report. This lists in alphabetic order, the students' name, tech ID (to aid in entering on the Grading Roster) and total number of attendance and assignments.

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>TechID</th>
<th>Attendance</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith</td>
<td>John</td>
<td>1122</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Jones</td>
<td>Jane</td>
<td>1133</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
Time Savings:
The system saved a great deal of time from the previous manual system. There were times when the entering of data extended into class time, but as the students get used to the process of scanning their MavCards, this time will be greatly reduced. The time to record assignments should greatly be reduced from the manual system.

Actual System time:
First Class meeting took 1.5 hours to scan barcode and type student data from MavCards.
Second Class meeting took 1 hour to scan student attendance.
Third Class meeting took 1.5 hours to scan student attendance and assignments.
Fourth Class meeting took 30 minutes to scan student attendance.
Grading for the class took 2.5 hours to record grades from the K.I.S.S. system to the grade roster.

The 7 hours it took for the K.I.S.S. system is a great improvement over the 20+ man-hours with the previous manual system. More timesavings will come with increased familiarization with the system.

Unexpected Results:
There were several unexpected, significant results from the K.I.S.S. system.
1. Accuracy. The system was viewed as completely accurate. Manual errors were eliminated. There was no questioning about attendance or assignments being missed, which existed in the old system.
2. Student Confrontation. Since the students viewed the system as completely accurate, no students confronted the teacher with complaints of missed assignments or attendance.
3. Teacher Satisfaction. The teacher was much more satisfied with the class because he was not having to deal with student confrontation about grades. This is encouraging the teacher to continue working and not look to retirement to avoid the hassles of answering tedious questions about missing attendance and assignments.
   This system eliminates the bookwork and attendance management of large symposium type classes. This allows the faculty member to move to larger class sizes without the strain of course management, seating charts and attendance rosters.
4. Motivating Factors. The old system required seating charts and rosters for attendance. This was very tedious work for student TA’s, with a high amount of boredom and therefore, errors. It was hard to retain TA’s and keep them interested in mundane labor. Working with the new system, TA’s will be more willing to do the work and be happier with a more interesting duty, by eliminating bookwork and attendance management.

Equipment Problems:
The timesavings were not as great as could be, due to some equipment issues. During each class session, the computer and POS scanner would appear to lock up. This required a reboot to get the system working again. The first class meeting required 4-5 reboots, adding to the time for entering student data. Reboots lessened as we improved familiarity and our operations (sorting MavCards by card type). To further identify the technical problem, a second computer and POS scanner was used during the fourth class. Both computers were run in parallel and worked with equal speed. The second computer never locked up, while the original computer only required 1 reboot. This helped to identify the scanner as having technical problems.
Scanner Details: Symbol LS4000i Series, Cost $575 + $6 shipping.
Barcode Systems Inc.
15665 Medina Road,
Plymouth, Minnesota, 55447,
Phone 1-800-757-2405.
P/N LS4004-1000 Hand Held Barcode Scanner
P/N 25-16458-20 Cable Assembly: SYNAPSE
P/N ST180-0264 Synapse for Laptop PS/2

How to program the LS 4000i Scanner to read MSU barcodes:
Using the LS 4000i Reference guide, turn to the pages and follow the instructions.
5-7 scan enable all defaults
5-11 scan standard rs-232C
5-12 scan IBM PC/AT
5-65 scan enable codabar
5-67 scan codabar – any length
5-69 scan enable NOTIS Editing

In Conclusion:
This system development was a learning process for the Computer Science student programmers, as well as the faculty member. The students learned that a system does not always have to involve every conceivable option to be effective. This system and faculty member required simplicity and speed to fulfill the requirements of the task. The acronym K.I.S.S became both the motto of the system, and the design requirements.

The faculty member learned that the incorporation of technology- scanners, laptop and MS Access- could greatly reduce manual workload for a simple task covering a large number of students. The faculty member was much more satisfied with the course, pleased that there was significantly less student confrontation and improved accuracy in course management.

The results of the K.I.S.S. system according to Dr. Swanson “Conflict of attendance between faculty and students was absolutely eliminated. I was able to address issues within subject material and only deal with a few exceptions (making them manageable). This system probably extended my teaching career.”

Authors:
Professor Wayne Sharp, MBA, Director Academic Computer Center. With 24 years of experience in the computer field, starting off in the mainframe programming area and the last 14 years in the academic area, Wayne has developed many systems designed to meet the needs of the user in the simplest format. Within the Academic Computer Center there is a great learning environment for Computer Science students and technology based systems development.
Professor Richard Swanson, EDD, Finance, Insurance, Real Estate. Dr. Swanson has been a MSU faculty member for 31 Years, including teaching, student counseling and internship coordinator.

TA:
Josh Beer, Sr. Finance & Accounting Major. Josh did the physical work of entering data and scanning MavCards.

Student Programmers:
Ryan Sonnek Computer Information Sciences Major, Graduating Spring 2001. Ryan has accepted a position with Brown Printing in Waseca MN.
David Proehl, Computer Information Sciences Major, Expected Graduation, Spring 2002. David has accepted a Cooperative Internship with IBM, Rochester MN.
David Pagel, Computer Information Sciences Major, Expected Graduation Spring 2003. Dave is the Academic Computer Center student hardware manager, and assisted with the class meetings as technical support.