

A1

## A1: Analyzing the Problem

### **Introduction:**

Mr. Buskey is a math teacher and the Boy's Lacrosse Coach at Gar-Field. As a coach, he is required to keep track of records on the team and the players, currently through a manual log. After approaching Mr. Buskey, offering to create a program to help automate his record keeping, he explained that he could use help in automating the process of tracking padlocks he assigns to players every season for their lockers.

Every player on athletic teams assigned a team locker room is given a padlock for their locker in that locker room. The coach is required to track these padlocks, including information on which player it is assigned to, which locker that player uses, etc.

He would like an automated solution to this problem to help expedite the assignment of locks, and allow him more time to coach. Mr. Buskey wishes to be able to enter the information quickly, sort it, and search through it. If a database does indeed make this process more efficient for him, he plans to share it with other coaches. Though he plans to share the program with other staff, he would prefer to have the program made to primarily his specifications.

### **Information Gathering**

I conducted an interview with Mr. Buskey, discussing both general, and more specific, information about his needs and desires for the program. New concerns and requirements raised by comments in the prototyping phase are also included.

Also, I collected a sample of the current system's data, and compiled examples of current solutions to database type problems.

### **Interview #1:**

Q: Please describe your problem in your own words

A: I need a database where I can take all of these locks that I have and save them. This will include the lock number and combination. The lock number and combination will stay the same from season to season, but the player will not.

What else I need, is to be able to enter a lock number, and to have the information about that lock displayed. It doesn't matter to me how that information is displayed, either one at a time or as a table.

Q: How do you currently deal with this information?

A: I, and every other coach, literally open a book up, look at the lock number, and go through the book to find that listing, find the combination, and write in the player name. I went a step further and entered that data into an excel spreadsheet.

Q: Do you have any sample data?

A: Yes, I have some excel spreadsheets I made based on the data from the book last year.

Q: What format will the data be in?

A: Combinations: 3 pairs of 2 digit numbers

Lock Numbers: 5 or 6 digit numbers

Q: What sort of processing will be needed for the data?

A: I want to be able to sort and search through it so that I can print a particular set of locks.

Q: What kind of editing is done after having entered the information the first time?

A: Very little.

Q: Will there be multiple users of this program?

A: Yes, myself and other coaches.

Q: Will there be a need to track who makes an edit to the database?

A: Yes, a log would be nice.

Q: How could the data be stored? In a central location, a local file on each user's computer, or shared by email?

A: We would store it on the I-drive[the school server]

Q: Just to make sure, this would be for a Windows computer?

A: Yes. Though just so that you know, we're shifting to Windows 7.

Q: What data fields will you need for each lock?

A: The lock number, combination, locker number, player name, and sport/team they belong to.

Q: Would the ability to add fields in the use of this program be helpful?

A: If that's possible, then yes.

Q: Are there any security concerns that should be considered?

A: No, not really.

Q: Are back-ups of the data important to you?

A: The I-drive is automatically backed up by the school.

Q: Is there any need to access archived records, such as for past seasons?

A: No, I would like to just be able to delete the player information. I don't care about who had the lock, only who has it.

**Notable Prototype Comments:**

- I plan to only use one file, and won't need the ability to change the file location.
- I don't plan to sort by individual fields too much as by lock number, and which locks are unreturned however, so I'd like the option to sort by 'returned' locks.
- I'd need the ability to add [teams options] as well

**Further Prototype Discussion:**

Q: So, you've changed your mind about security?

A: Yes, as you brought up, students aren't very friendly to files they find on the server.

Q: Alright. Well, what I had in mind was that I would label the file as something inconspicuous, other than 'padlocks,' and that it would use a simple cipher.

A: That sounds good. What do you mean by simply exactly? And also, I think that we'll need to implement a password in that case.

Q: I'll make sure to include the password, yes. And for the cipher, I'm thinking something to keep a student from being able to discern what the file actually says, but by no means military grade.

A: That sounds reasonable.

Q: Also, with the sort function, you asked that there be an option to sort by 'returned'?

A: Yes

Q: How would you like that to be determined? By when the 'delete' function is used?

A: Yes, definitely. But also, perhaps after finishing editing, I'd like it to check whether all fields are blank, and if so, mark the lock as returned.

**Current System:**  
An excel spreadsheet.

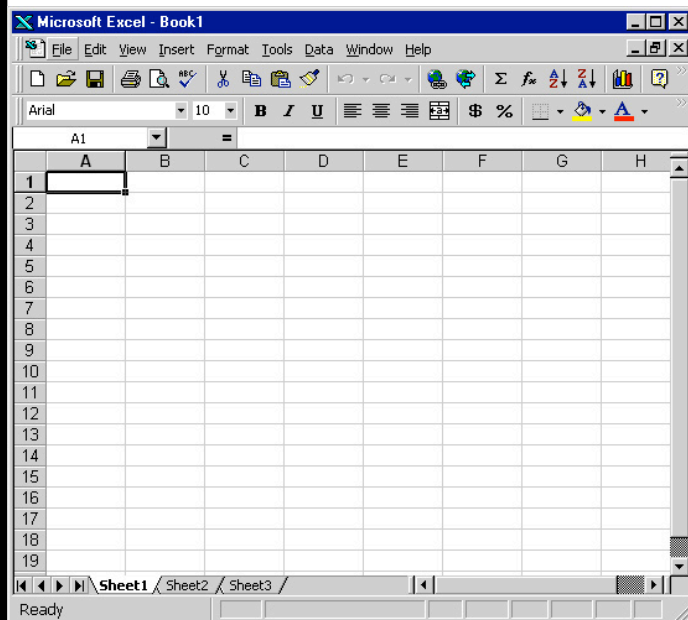
Last Name	First Name	Locker	Locker number	Combination	Initial
			<b>10209</b>	<b>14-24-18</b>	
			10129	10-12-6	
			84155	25-32-25	
			10825	39-1-35	
			10878	21-23-5	
			10989	38-12-18	
			<b>10855</b>	<b>26-8-2</b>	
			10983	28-30-8	
			10891	0-10-28	
			10974	18-24-14	
			11497	36-10-20	
			10257	6-24-38	
			<b>10829</b>	<b>8-18-4</b>	
			10783	0-18-36	
			10981	4-6-36	
			14076	16-38-12	
			712477	14-32-10	
			10104	30-8-38	
			<b>10906</b>	<b>20-26-16</b>	
			11037	28-30-36	
			84176	26-28-34	
			10985	22-36-2	
			709028	14-32-22	
			704740	36-22-12	
			<b>84183</b>	<b>10-32-18</b>	
			10876	19-25-35	
			10852	34-16-22	
			403544	26-32-26	
			403518	2-24-18	
			11663	36-22-8	
			<b>10307</b>	<b>24-6-16</b>	
			10787	7-17-35	
			10905	14-0-10	
			14030	10-16-26	

Analysis of Current System:

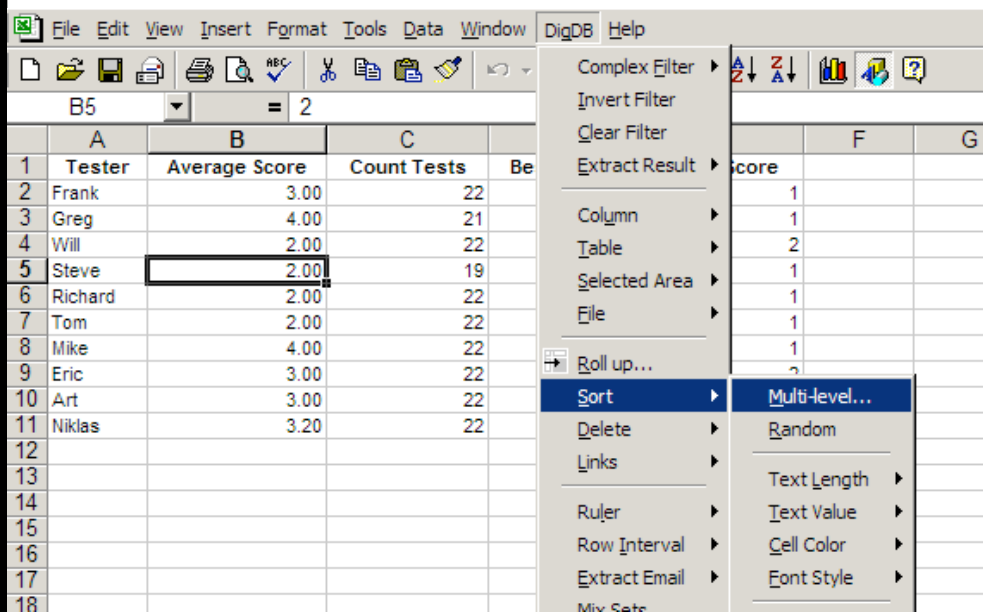
- Fields needed include the last name, first name, locker number, lock number, combination, and the ability for a user to “initial” their entry
- The old data was indeed erased as locks were returned. However, the lock number and combination were retained.

## Current Solutions:

### Microsoft Excel:



<http://homepage.cs.uri.edu/tutorials/csc101/pc/excel97/excel.html>



[http://www.digdb.com/excel\\_add\\_ins/sort\\_multiple\\_levels/](http://www.digdb.com/excel_add_ins/sort_multiple_levels/)



JFrame Components:

From <http://docs.oracle.com/javase/tutorial/uiswing/components/>

- **JTable**

The Header contains  
Column labels

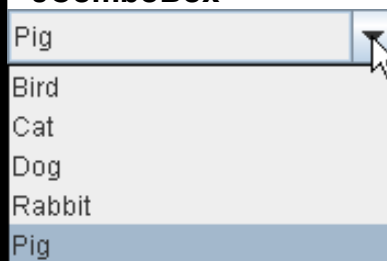
First Name	Last Name	Sport	# of Years	Vegetarian
Kathy	Smith	Snowboarding	5	<input type="checkbox"/>
John	Doe	Rowing	3	<input checked="" type="checkbox"/>
Sue	Black	Knitting	2	<input type="checkbox"/>
Jane	White	Speed reading	20	<input checked="" type="checkbox"/>

Each Cell displays  
a data item

Each Column displays  
one type of data

JTable comes with methods and configurations to select rows and select column headers

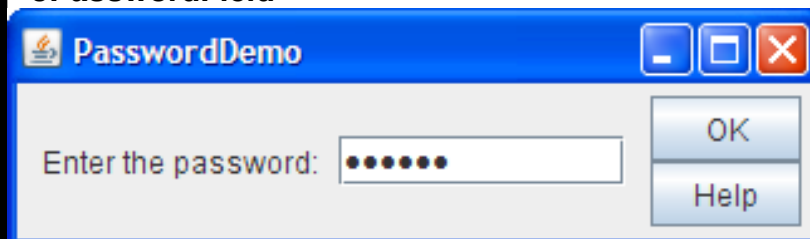
- **JComboBox**



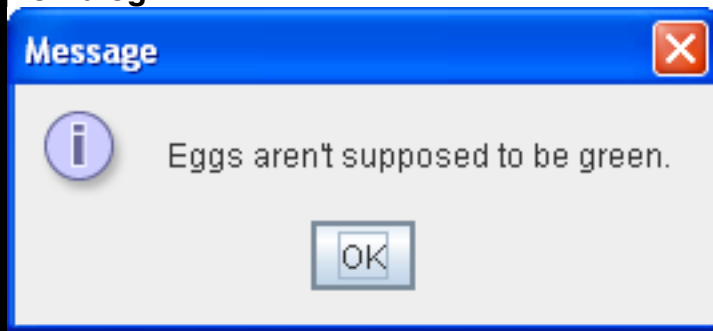
- **JLabel**



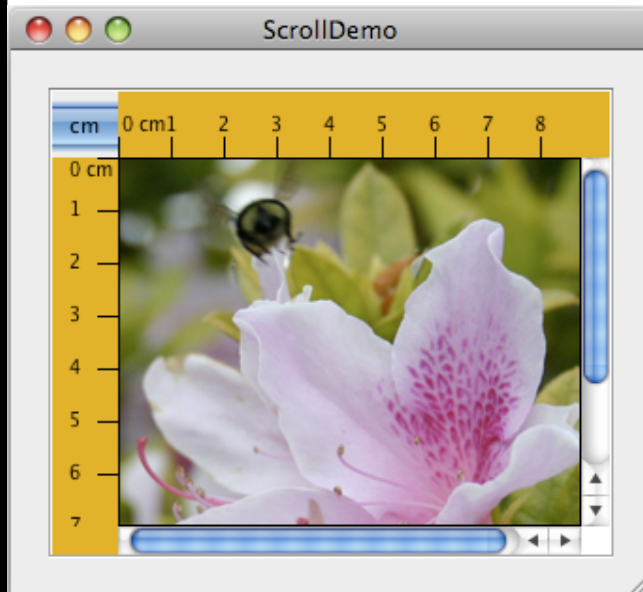
- **JPasswordField**



- **JDialog**

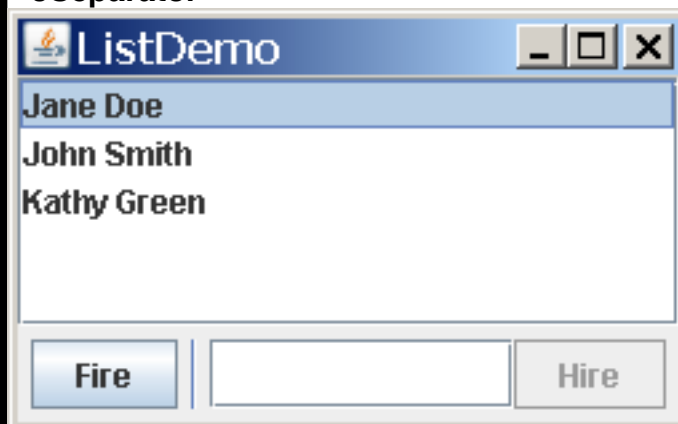


- **JScrollPane**



-Can be used with any JFrame Component

- **JSeparator**



### Analysis of Current Solutions:

- In excel, I most like the ability to sort a column with one click at the top of the column
- My biggest problem with Excel is that it is not personalized for a particular problem, but rather it is a large program with bulky inputs
- The JFrame components can be used to incorporate both the column sort, and the personalization that I want.
- I would like to incorporate many of these JFrame components into the end program as a means to input data, and view output.

### **Input/Output:**

#### IO Chart:

Input	Output
Username & Password	A cipher protected database file
Sort Key	A plain text log of edits
Search Key	Sorted Listing of Padlocks
New Lock Information	Searchable Padlock Information
Edited Lock Information	Customizable Padlock Information
Command to Delete a Lock, Field, or Team	Editable Padlock Database
New Field Names	
Team Options	
New Password	
The Above, from a file	
Log Information From a File	

Notes:

- A single file can be used, in the same location as the program
- Lock number, combination, name of player, locker number, and team are default fields. A 'returned' value will also need to be set. In addition, user defined field data will be recorded
- An option to delete all lock information, except lock number and combination, will be needed
- Lock numbers, combinations, and locker numbers could be of any data type, including alphanumeric

A2

## A2: Criteria For Success

### **Criteria for Success:**

- I. Ability to validate password, and edit that password
- II. Cipher Protected database file
- III. Maintain an Edit Log, and corresponding file
- IV. Ability to Sort Padlocks by various attributes
- V. Ability to Search Padlocks by various attributes for a given key value
- VI. Ability to define user attributes for Padlocks
- VII. Ability to define team options
- VIII. Ability to maintain a database of Padlocks
  - A. Database
    - 1. Add Lock
    - 2. Delete Lock - Including the ability to clear all information but number and combination
    - 3. Edit Lock Information
    - 4. Access Lock Data
  - B. Padlocks
    - 1. Lock number, combination, name of player, locker number, team
    - 2. 'returned' value set automatically
    - 3. User defined field data

**Security:**

Security of the file is a concern. To protect the database file, it will be named something inconspicuous, such as “file.txt” or “data.in”. This file will be written and read according to a simple cipher to prevent unauthorized user from reading the data. Also, a password will be needed to protect the program from being used by anybody to decrypt the file. This password will be common among all users. It will be changeable.

Back-ups will be performed automatically by the storage system, and so will not be the responsibility of the program.

**Performance:**

All processes in this project are planned to be online. No significant delays are expected, nor are they a concern beyond for effective usability.

**Scope and Limitations:**Scope Issues:

- The user and the file system will be responsible for backing-up the database
- The program will not be capable of opening archive versions of data, only the particular database it maintains at the time
- The users will have to communicate to prevent simultaneous editing. The program will not support collaborative editing
- The program will not validate usernames, but instead only record the names given. It will be assumed that a person with the password can be trusted to input their username honestly

- The program will not clear the log automatically, it will be the responsibility of the user to periodically delete it, such as at the end of every season.

Limitations of the Program:

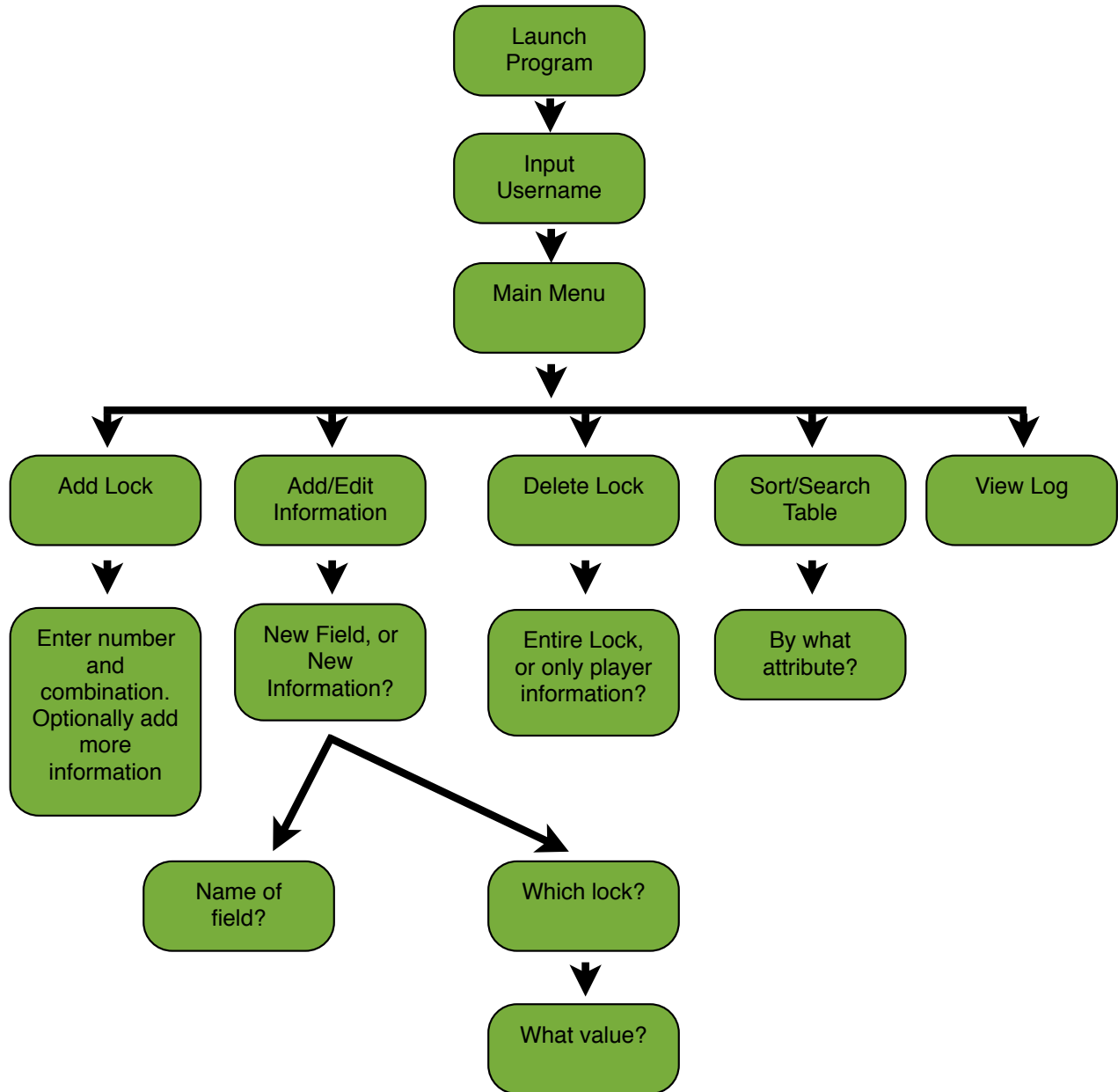
- It will be assumed that the program and data files exist in the same location
- Any corruption of the data will be uncorrectable by the program.
- Certain characters must be restricted from input to allow for delimiters in file
- Locks may not have the same lock number as another
- The backslash character ‘\’ will be illegal in user input, due to file delimiting needs. The use of a forward slash ‘/’ will be encouraged in its place.



A3

### A3: Prototyping

#### Initial Design:



## Prototype:

A screenshot of a software window titled "Padlock Database". The window has a grey background and a blue title bar. In the center, it says "Please enter your name:" above a text input field containing "Mr. Buskey". To the right of the input field is a button labeled "Enter". At the bottom left, it says "The current database file location is: I:\User\Documents\data.txt". To the right of this text are two buttons: "Change" and "Quit".

### Comments:

I plan to only use one file, and won't need the ability to change the file location.

A screenshot of a software window titled "Padlock Database". The window has a grey background and a blue title bar. In the center, there is a small window titled "My Computer" showing a file explorer view. Below the "My Computer" window is a button labeled "Enter".

### Comments:

This pane wouldn't be needed

A screenshot of a software window titled "Padlock Database". The window has a grey background and a blue title bar. On the left, there is a table with 5 columns: Lock, Combination, Locker, Name, and Team. The table contains 3 rows of data. To the right of the table are several buttons: "Add Lock", "Edit", "Add Field", "Delete", "Search:", and "View Log". Below the "Delete" button is a text input field containing "A162". Below the "Search:" button is a text input field containing "A162". At the bottom left, there is a button labeled "Quit".

Lock	Combination	Locker	Name	Team
71569	32-56-15	A162	Charlie Brown	Boy's Lax
925	39-01-24	A14	John Doe	Soccer
1234	9-3-17	A74	Joe Brown	Lacrosse

### Comments:

User: Could you explain how the sort control works?

Me: I plan to have it possible to simply click on the column header. If that's not possible, I would add a button and drop down menu.

User: I think that sounds workable. I don't plan to sort by individual fields too much as by lock number, and which locks are unreturned however, so I'd like the option to sort by 'returned' locks.

Add Lock

Number:

Combination:

(Optional): Locker:

Name:  Enter

Team:  Cancel

Comments:

User: Could we make the team field a drop down menu?

Me: Yes. What options would you like there to be?

User: To start with, all of the school's teams, both boy's and girl's. But I'd need the ability to add fields as well.

Add Lock

Number:

Combination:

(Optional): Locker:

Name:  Enter

Team:

Error

Lock Number **12434** already exists

Ok

Comments:

Pedlock Database

Lock	Combination	Locker	Name	Team
71569	32-56-15	A162	Charlie Brown	Boy's Lax
925	39-01-24	A14	John Doe	Soccer
1234	9-3-17	A74	Joe Brown	Lacrosse

Make Change:

Locker:  A162

Search:

Locker:  A162

View Log Done

Comments:

User: Do I need to type in which lock I'm editing?

Me: I plan on being able to simply select a row.

User: That's great

Padlock Database

Lock	Combination	Locker	Name	Team
71569	32-56-15	A162	Charlie Brown	Boy's Lax
925	39-01-24	A14	John Doe	Soccer
1234	9-3-17	A74	Joe Brown	Lacrosse

☐ Begin editing all locks after creation

Add Field

Cancel

Comments:

Make sure to add a way to delete those new columns when needed

Padlock Database

Lock	Combination	Locker	Name	Team	New Field
71569	32-56-15	A162	Charlie Brown	Boy's Lax	
925	39-01-24	A14	John Doe	Soccer	
1234	9-3-17	A74	Joe Brown	Lacrosse	

Make Change:

New Field:

Value:

Skip

Done

Comments:

Padlock Database

Lock	Combination	Locker	Name	Team	New Field
71569	32-56-15	A162	Charlie Brown	Boy's Lax	
925	39-01-24	A14	John Doe	Soccer	
1234	9-3-17	A74	Joe Brown	Lacrosse	

Add Lock

Error

Delete information for lock **A162** including or excluding Number and Combination?

Including Excluding Cancel

View Log

Locker:

Comments:

Okay... I'd like the wording to be a little more simple. Also, if the coach were to select to "delete all lock information," I'd like a confirmation window to come up.