**Database Your Way, LLC**

*"Databases by Design"*
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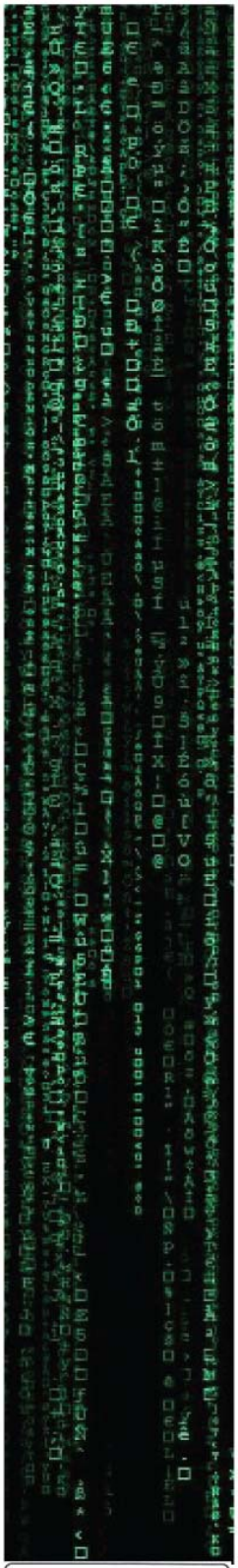
# Case Study #2
## A moderately sized, moderately complex database



### Situation:

The organization concerned is an Army National Guard Regional Training Institute (RTI). This is a self-contained facility. All personnel, operational and logistical support, as well as the instructor staff are integrated into one organization, all in support of training soldiers.

### Scope:

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Three years ago, the RTI initiated a phased program to replace hard-copy student material with laptop computers. The goal was to pre-load all instructional and reference material on a laptop, and issue one such to each student at the beginning of the course. Among other things, this would ease the logistical load of each student (carry a laptop rather than a stack of books), and also facilitate more efficient updating of course material. The end result would be a paperless classroom. (Paperless being a relative term – no way to get out of that all together!)

A need exists for a method of maintaining accountability and operational status of several hundred computers. A secondary issue is generating logins for the students.

Using the basic principles of good database design, we looked at who needed data, what data they needed, what form that data would take, getting input from all who would be impacted by this project. Additionally, we needed to know where the data would come from, and how the data would be input.

The instructors would be responsible for taking possession of a group of computers, and subsequent issuance to the students under their control. As this database primarily served a logistical purpose, the individuals responsible for maintaining overall accountability had the most significant input.

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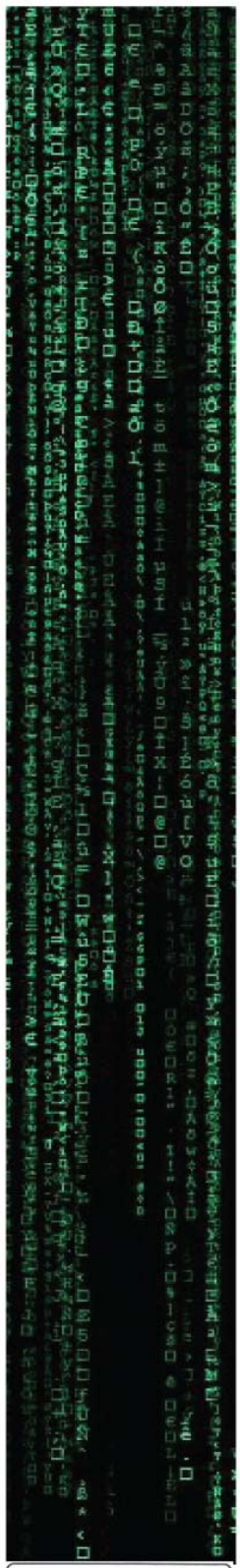

The basic data that needed to be tracked was:

- Computer model
- Computer serial number
- Computer MAC address
- Computer status (operable, or if inoperable, why and what was being done about it)
- Who currently has possession of the computer
- Instructor names
- Computer assigned name (based on classroom)

Various reports were identified:

- Equipment receipt
- Computer status report
- List of students

Knowing what data needed to be tracked, we built tables to hold related information. Since one of the end results would be an equipment receipt to the student, we determined more than just a list of student names would be needed. By linking to tables in a database previously created for this organization, we eliminated redundancy and reduced the quantity of new data that would otherwise have to be entered manually at the start of each new class.

To facilitate organization and chain of custody, issuance of laptops was grouped by classroom and specific instructor, linking the table of computers with the table of instructors.

The equipment receipt is the primary means for assigning accountability to the student, as well as the instructors. The official form used for this purpose was reconstructed as a report in Access. Information could be pulled from the linked tables, allowing a specific computer (along with certain accessories) to be signed for by a specific student.

With a large number of computers constantly in use, some of them are going to fail. As all the courseware used by the student is on their issued computer, there could be no lag time in getting the student back in operation in the event of failure. If a laptop could not be fixed on the spot, a replacement would have to be issued.

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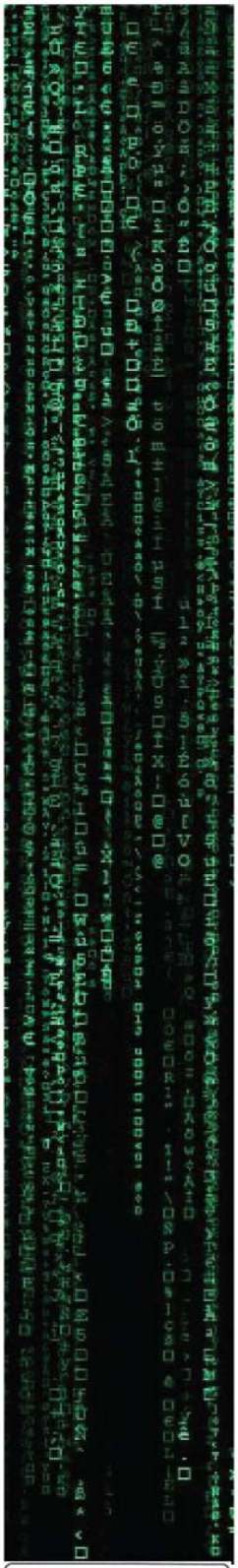

Use of this relational database greatly facilitates on-the-spot substitution of equipment. Relief of responsibility for a withdrawn computer, maintenance of chain of custody in substitution, and availability of up-to-date status of each computer in the inventory all aid the organization in supporting the paperless classroom project, and help minimize interruption in training.

In addition to the logistical requirements of the database, a need was identified for generation of student login names. The current network in use at this organization utilizes Active Directory. The students are temporary – usually enrolled for at most two weeks – thereby making a permanent addition to AD an unwieldy solution, and regulatory constraints prohibit use of "guest" accounts.

Network configuration is out of the scope of this case study, but is brought up to explain the need for login names. A report was designed, for each course, to generate a list of names in the Active Directory style, that is, firstname(dot)mi(dot)lastname. The network guru then developed a script to import this list into AD. Talking about script development is again out of scope for this case study, but does illustrate how end-requirements help determine the basic database design, which sometimes requires thinking outside the box.

Now we have tables and reports. To get data from one table to another, to get data to populate a report, to change (update) data, we need queries. Queries are the engines of the database, and can vary tremendously in complexity, depending on what you're trying to do. Some of the things we used queries for were to select specific data, update specific data, and perform calculations. Some queries you want to run singly or independently, some you may want to run in sequence through the use of macros.

With the basic database designed, forms were designed to facilitate local data entry. The forms were based on the underlying table the data needed to go into, and organized in a manner that made sense to the people that would have to actually enter the data. Throughout the form design process, we always kept in mind the concept of "user friendly".

Some of the forms were designed to accommodate more than just data entry, by utilizing command buttons to automate the process as much as possible. (Though it may not be politically correct to say, we also tried to incorporate the concept of "idiot proof".)

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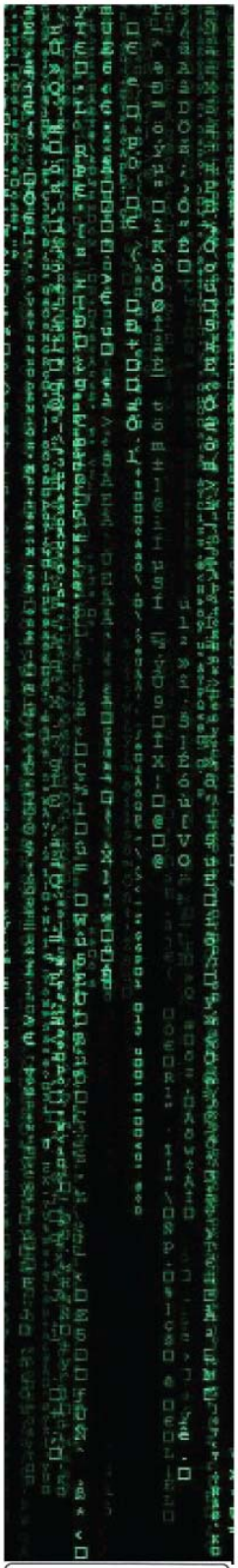

By utilizing command buttons for such things as printing reports, and running queries and macros in the background, the database became much like any other application you would use on a computer, not requiring an in-depth knowledge of what was happening behind the scenes.

The last thing developed was the switchboard interface. The main switchboard uses buttons to list the basic function of the database. Pick a function, click it, and you either go to that function or you're taken to another switchboard page to refine your options. This makes the database easy to navigate. A user who is only concerned with one aspect can navigate directly to that function without wading through all possible functions. The main switchboard page also incorporates the organization's logo.

## Summary

Database design starts with communication. The people who know the nature of the company and what data needs to be tracked, the people who will (or might) need some output from the data, and the people who will be putting the data into the finished database need to be involved with the database designer in the process.

We identified the nature of the organization and the needs of the organization (consulting all the players involved). We vetted the data we needed to capture by looking at the end products desired, and made any necessary adjustments to the data needs. We designed tables to hold that data, remembering the principles of efficiency, isolation, and relationship (that's where the primary keys were identified, allowing this to be a relational database). We made use of linked tables where possible to reduce redundancy and duplication of effort.

We designed reports that gave the end users a product that was useful to them, and developed the queries that would not only populate those reports with data, but make data transfer and modification relatively simple.

We designed macros to automate as many processes as possible, though in this case macros were rarely needed.

We then designed forms as a user interface, not only making the database user-friendly, but attractive as well. The final set of forms designed were those of the switchboard for simple navigation to the desired function, resulting in ease of use, less user frustration, and more user efficiency by not having to waste time wading through the depths of the database.

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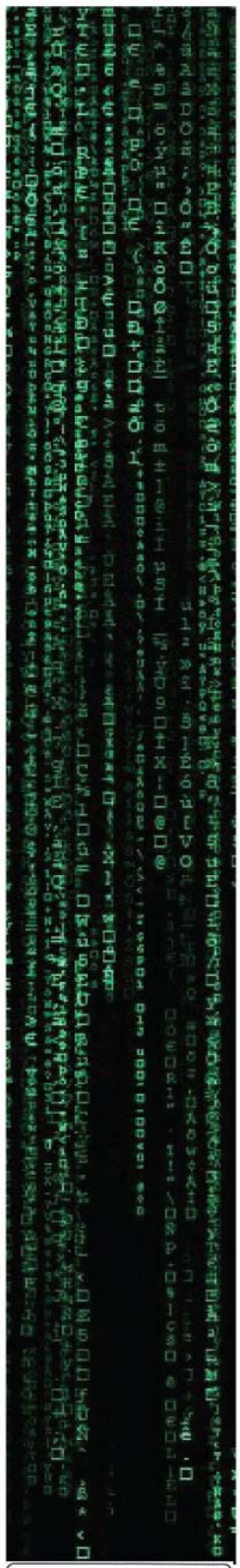

A summary of the organization's situational statistics are as follows:

- Courses of instruction 21
- Classes per year (ave.) 97
- Students per year 4200
- Computers for issue to students 500+

The statistics for the database itself are as follows:

- Linked tables 12
- New tables 11
- Reports 38
- Forms 9
- Queries 30
- Macros 2
- Switchboard pages 20
- Switchboard items 110

The end result is a moderate-sized database, serving the organization's requirements in facilitating a new era in training.

A database should be designed with functionality in mind, not complexity. While this database is not extremely extensive or complex, it is based on the organization's need, and as such serves its purpose.