**Technical Design Decisions**

**CSM # 2 (Machine Shop Inventory System)**

The following report details the technical design decisions we have made during our project. Each decision was made based on the needs of our system and the requirements given to us by our client.

**Decision # 1: Using Java to develop the system**

Our choice to use Java as our language platform was an easy one. Our application is fairly straightforward, without a lot of fancy graphics or math involved – one could say it is a basic business application. The main benefit of Java is that it is cross-platform. Almost any computer can run Java, and since we weren’t sure which type of machine Dr. Moore would want to use for our application, we decided to make something that could easily run on many types of machines. Since our program needs to connect to two different databases, we also wanted a language that supported an API for these databases. Java is a universal programming language, and will make our product easier to extend if anyone decides to do so in the foreseeable future.

**Decision # 2: Using MongoDB for persistent storage**

We decided early on to use MongoDB (A NoSQL document-oriented database) to persist the data used by our program. One factor that led to this decision was Mongo’s flexibility. We knew we only had 6 weeks to complete this project, and that we would be making frequent changes to the database schema. With a traditional relational database, we would not have been able to make these schema changes quickly enough to support our rapidly changing and limited time-budget project. Another factor was that MongoDB is free, and setting up a practice account online to use while developing was fast and easy. One more benefit of using MongoDB is its JSON-format storage. Translating Java objects into JSON is quite easy, and doesn’t involve complex SQL queries to retrieve pertinent data.

**Decision # 3: Using the Banner/Trailhead database to validate new users**

Our system will be used almost exclusively by Mines students and faculty members. The system keeps track of users and adds new users to the database any time a student scans their Blastercard for the first time. In order to know that a student is entering a valid CWID, we decided to use the existing Mines records to make sure the student exists before adding them to the database. This decision was made mostly for security purposes. The entire reason we are developing this system is to make the Machine Shop safer, and this is one way to make sure that the activity in the shop is effectively monitored and logged.

**Decision # 4: Creating three permission levels for system users**

In our application, a user can either be a basic user, an administrator, or a system administrator. Users can only log in, check out tools and use machines, and log out. Administrators (such as Dr. Moore) can do everything a basic user can, plus generate reports and statistics about the activities in the shop. System Administrators have complete control over the system, including generating reports, adding/removing tools and machines, locking/unlocking users, adding/removing users, and updating machine certifications and user permissions. We decided to use these three levels because we knew that only the shop supervisor (John Jezek) would really need all the functionality to change the database, but that other department officials (such as Dr. Moore) would want to view reports, but might also want to actually make use of the system for tool checkout/machine use as well.