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Assignment 03 – Individual Capstone Assessment

For my senior design project, I will be developing the STIMS program—a “Smart Tagged Inventory Management System”. The aim of this project is to create an interface in which physical items can be easily stored in a database through a custom tagging system. The tagging system will aim to be capable of accepting a multitude of common identification systems (such as ISBN, QR, NFC, etc.). The project will include a graphical user interface for end-user ease-of-use when performing database operations. One thing that I aim to implement that other inventory management systems do not make easy is the idea of being able to create custom items with their own attributes depending on the end-users need. I am aiming to make the project customizable with generous documentation and support for users who would like to tailor the program to fit their specific inventory.

During my time at the University of Cincinnati, I have taken many courses that I believe to be influential on this project. One such course was CS3003 Programming Languages. During that course, we had a period in which we focused on the object-oriented programming paradigm. My project will aim to heavily utilize this paradigm for its advantages, such as class inheritance to make user defined item types integrate into the central lending system (the handler for database operations). Another class that I believe to be influential in my decision to pursue this project is a course that I am currently a part of, that being CS6051 Database Theory. In this course, we are learning the mathematical theory behind relational databases, which are the

foundation for many of our database programs today, such as SQL. I believe this course will help me understand the reason why relational databases are structured the way that they are—and that knowledge will be useful to me when I create one for the storage system of tagged items for this project.

I've also had multiple co-ops during my time here at UC as an undergraduate. A company that I worked for during my 3rd co-op rotation, 84.51, will have an impact on this project. 84.51 is a company that focuses on big data analytics and analysis for supermarkets such as Kroger. The experiences that I had there working with large datasets will be good to keep in mind when designing the database portion of this application. For my 1st and 2nd co-op rotations, I worked at a different company named London Computer Systems. There, I worked on a program called Rent Manager—a tool to help companies keep track of their rental properties. I believe that my time working at LCS will be very helpful in the creation of my senior design project, primarily because the Rent Manager program is a great example of a database program at its core that exposes its functionality through an easy-to-understand GUI for the end-user. This is the type of program that I will be creating, so I will keep in mind some of the design decisions of Rent Manager when creating my user interfaces.

I found my motivation for this idea through my time volunteering as a librarian and being tasked with finding a system that could both tag and allow borrowing of print media as well as loaner tools. Existing applications built specifically for libraries do not generally support this type of mixed item tagging and lending well, which is why I believe a more general "tag any item and have it logged properly" implementation would be beneficial. While some projects like Koha, an open-source library system, have custom item support, there is much left to be desired in how items are identified. Take books and a handheld 3D scanner for example—if I were to tag

the book as an item for patrons to check out, I'd be using the ISBN barcode. But what about the scanner? It doesn't have an ISBN like a book, but maybe there could be something like an NFC tag stuck to it that identifies the object. To my knowledge, there does not exist a solution for mixing item identification methods in any existing inventory management program, which is the thing that I am most excited about designing for this project.

My preliminary approach to designing a solution will start with picking an object-oriented language that additionally allows for GUI applications to be built. Next, I'll be creating generic template classes and a main program that handles the databasing portion of storing/retrieving or checking in/out items. I want the main program to be capable of handling not only the generic template classes, but user-defined/more complicated item structures so that any item that the end-user desires can be categorized in an organized way. I hope that I can build a piece of customizable software that many are able to use for their own, unique use-cases. I believe I will be happy with the project when I am able to create and categorize many various types of items from the perspective of an end-user, without touching the underlying database system, from an easy-to-understand GUI. Additionally, as a self-imposed requirement, I want to make sure that the program is not only well commented internally, but proper end-user documentation exists for anyone who might want to utilize the software in the future.