

# **Electronically Returned Assignments**

## **Project Design Specification v1.0**

This document is a representation of the product that the Development Team, Product Owner, and Project Oversight agree upon will be made.

### **Development Team**

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### **Product Owner**

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### **Project Oversight**

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# **Project Specification - Electronically Returned Assignments**

## **1. INTRODUCTION**

### **1.1. Business and Domain Description**

Our client, Dr. Myron Jones, wants to create an application that makes it easier to return assignments to students. The current process that is being used is suboptimal, as handing back several hundred tests to a large class wastes time. The software being developed is intended to be used by the entire Department of Chemistry at SIUE, and could very likely be used in other departments as well. Instructors will use this software to hand back all types of graded material, not being limited to just exams.

### **1.2. Purpose**

Our purpose is to make the process of returning tests to students more convenient for both the instructor and the student.

### **1.3. Concept or Proposed System**

Electronically Returned Assignments (ERA) will give instructors at SIUE an alternate method of returning graded material to students. This system will make use of QR codes that will be placed on the top of the assignment, associating the respective student with their test. The system will then scan all of the tests with the QR codes as PDFs and upload them to a server which the student will have access to. This will make students test more secure and more readily available.

### **1.4. Product Overview**

#### **1.4.1. Product Perspective**

System Interfaces - The Uploader will be on the Instructor's local machine and associate the PDF documents with a student. It will then upload the documents to the Server (hosted by SIUE), which will be the tool students and instructors will use to access the files remotely.

User Interfaces - Students will be able to view their documents through a Web Browser. Instructors will be able to process and upload documents on a Desktop Application.

Hardware Interfaces - Scanner (see 3.1) to turn the paper documents into a digital form.

Software Interfaces - SIUE's authentication server (see 3.1) to allow students and instructors to log into the server using their SIUE credentials.

Memory Constraints - Potential memory constraint when processing PDF documents

Operations - Students must be able to view all of their assignments over the internet by accessing the remote server. Instructors must be able to process the PDF documents and upload them to the server associating each document with the respective student. Instructors must also be able to archive an entire semester's worth of files for backup and future access.

#### **1.4.2. Product Functions**

The software developed will take image files in as input, and use QR codes on the tests to associate each test with a student. The software will then allow the instructor to upload the PDF version of the assignments to a database. The system will ensure that multipage tests are in the correct order, and that the pages are oriented correctly. Our program will also archive assignments from previous semesters in the database. The software must also be able to generate and print a sheet of QR code stickers for a specific assignment. The student will be able to log into the server to view their assignments. The software must allow instructors to add assignments to classes, and add courses to semesters. It must also allow instructors to work offline and upload their work whenever they go online. Lastly the software must give the user an error whenever something goes wrong with scanning the image files.

#### **1.4.3. User Characteristics**

The intended users for this software are of two different types, graders and students.

Graders are classified as both SIUE faculty members and TAs associated with their courses. SIUE faculty members and TAs alike value their time. It is for this reason they would like to expedite the process of returning assignments. For this reason the software system developed should be easy to use, responsive, and fast. Professors using this software system will on average be technically proficient enough to utilize it effectively. However, this may be the first time a Grader has been exposed to such a software system and as such may require some training on general functionality based on their familiarity with similar systems.

Students are those currently enrolled at SIUE and taking a course where a Grader will be using the software. The average student will have ample proficiency with technology to utilize the functionality the software system will provide them with, i.e. to view assignments being hosted on the server.

#### **1.4.4. Limitations**

The system only supports Windows, MacOS, and Linux based operating systems. The uploader will require a Java Runtime Environment compliant with Java SE 8. The server will require a Java Runtime Environment compliant with Java SE 8 and a MariaDB database server.

### **1.5. Glossary**

FERPA - Family Educational Rights and Privacy Act. The US law that protects the privacy of students records

## **1.6. Stakeholders**

The stakeholders for this software system are as follows:

- 1) ITS
- 2) SIUE Faculty Members
- 3) TAs
- 4) Students

## **2. REFERENCES AND OTHER STANDARDS**

The academic journal outlining the initial concept of the product:

<http://pubs.acs.org/doi/pdf/10.1021/ed500577x> -- Journal

The Family Educational Rights and Privacy Act (FERPA). The US federal law that protects the privacy of student records.

<https://www2.ed.gov/policy/gen/guid/fpco/ferpa/index.html>

## **3. SPECIFIC REQUIREMENTS**

### **3.1. External Interfaces**

Scanner: Electronically Returned Assignments will take in photo scanned input in either PDF, TIFF, or XPS format. The eventual file format will be chosen during the implementation of the product. Interfacing with these formats will allow graders from SIUE's Department of Chemistry to use our system, as those files are the output of their scanner. Electronically Returned assignments will take in documents outputted by that scanner, read any valid QR codes on those documents, and come up with the association between students and that document. Those documents should have a valid QR code that was generated by our system. Those QR codes cannot be altered in any way from the originally generated QR codes.

Authentication Server: Electronically Returned Assignments will also interface with SIUE's Central Authentication Service to allow students and graders to login to our system using their SIUE e-id and password.

### **3.2. Functions**

The uploader should scan and process documents in parallel. The uploader must also limit the amount of processing documents in memory to prevent the system from running out of memory.

### **3.3. Usability Requirements**

The system should be usable by students and graders. The students must be able to find their documents on server clearly based on the classes they are in. The graders must be able to easily input document files into the system, store the files locally on their own machines, and upload the documents to the server.

### **3.4. Performance Requirements**

Performance Requirements for the product are as follows:

- 1) The software will support 1 or more terminals.
- 2) The software will allow for 1 authenticated user per terminal.
- 3) The software will process 200+ .PDF scans of individual multi-page assignments.
- 4) The software will process a batch of scans in parallel to expedite execution.
- 5) The software will process at minimum 95% of all scans with correctable errors.
- 6) The software will associate all assignments with their associated individual student.
- 7) The database will store all assignments in a secure manner.
- 8) The software will archive all documents present in the database into a single .zip file.
- 9) The software will run on Mac, Windows, and Linux.
- 10) The software will ensure the local database does not run out of memory.
- 11) The server will ensure it does not run out of memory.

### **3.5. Logical Database Requirements**

Logical requirements for the database are as follows:

- 1) The Database must be capable of receiving and responding to concurrent requests.
- 2) The Database must save PDFs associated with student e-ID.
- 3) The Database must be accessible from off-campus networks.
- 4) The Database must securely store the data of the student information.
- 5) The Database must be archived. The Database must run continuously.

### **3.6. Design Constraints**

- The Scanner exports images in PDF, TIFF, or XPS format.
- The data for each individual student shall only be accessible by the professor and that student, in accordance with FERPA.

### **3.7. Software System Attributes**

Software System Attributes are as follows:

- 1) Reliability - The Software must successfully store data in the database and retrieve the data successfully. The Software must also read and process QR Codes correctly.
- 2) Availability - The Database must be accessible from off campus networks, and be able to be accessed from computers running software and students logging in from personal devices.
- 3) Security -
  - i) Uploader and Server shall use Authentication using SIUE Central Authentication Service
  - ii) Server shall have Password-Protected Database

### **3.8. Supporting Information**

- This software will solve the problem of distributing assignments to students in a timely efficient process.

### **3.9. Course-Specific Content**

The developers will share any and all documentation requested by the client and assist in the client's understanding. If said documentation shows the developers to be in error of the intended product they are developing by the client, the developers will make the necessary changes. Throughout development the software development will, when possible, present the current form of the project for demonstration to the client. Each sprint the development team will meet with the client for a progress report on the current state of the project.

## **4. VERIFICATION**

The types of Quality Assurance and Verification completed by the developers include the following. Unit testing will be used to verify that individual parts of the software work as intended. Client acceptance testing will be conducted to ensure that the customer is pleased with the software provided. Field testing using the scanner, printer, and computer that will eventually be used with the software will be conducted as well. Usability testing for both the instructor view as well as the student view may also be conducted.

## **5. APPENDICES**

### **5.1. Requirements-Stories Traceability Matrix**

Functional requirements of the Electronically Returned Assignments system:

1. Uploader must be able to read a qr code from the top of a scanned sheet.
2. Uploader must generate a sheet of qr codes based off of a list of tests and a list of students.
3. Server must present tests as a pdf document to students.
4. Uploader must generate the sheet of qr codes when a student is inputted into a class.



- The functional requirements (FR) map to the user stories (US) in the following manor:

[illegible]

## **5.2. Assumptions and Dependencies**

- Electronically Returned Assignments will assume that the file format for the inputted assignments will be either PDF, TIFF, or, XPS

## **5.3. Acronyms and Abbreviations --**

- **FERPA:** The Family Educational Rights and Privacy Act of 1974. A law that protects the privacy of student education records.
- **PDF** - Portable Document Format. A file format that provides an electronic image of text or text and graphics that looks like a printed document and can be viewed, printed, and electronically transmitted.
- **QR Code:** Quick Response Code. A machine-readable code consisting of an array of black and white squares, typically used for storing URLs or other information.
- **Tiff:** Tag Image File Format. A common format for exchanging raster graphics (bitmap) images between application programs, including those used for scanner images.
- **XPS:** XML Paper Specification. It is a page description language which can describe a single page or a document containing multiple pages. The description includes all the text and graphics that appear on the page(s)