

# **SMARTron Software Requirements Specification**

*Version 0.2*

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# Mission Statement

Creating a headless scantron analyzer that comes with a companion website which allows managing exams that have previously been scanned.

## 1 Introduction

### 1.1 Purpose

The purpose of this document is to give a detailed description of the requirements for the SMARTron software. It will illustrate the purpose and complete specifications for the development of the system. It will also explain the constraints, interfaces and interactions with other external applications. This document is primarily intended to be proposed to a stakeholder for its approval and a reference for developing the first version of the system for the development team.

### 1.2 Scope

SMARTron will be an automatic grading program maintaining compatibility with existing 200-answer Scantron answer sheets. The program will allow the user to maintain a familiar workflow of scanning answer sheets and receiving an email containing the results. This will be accomplished by a headless answer sheet analysis program that receives emails containing an answer key and student answer sheets from any scanner, and emails results to the instructor.

SMARTron will also include a web app providing benefits over the current Scantron workflow. Scanned exams are associated with an instructor's LakerNet ID, and they can log in to the web app to view and edit scanned exams. The web app will provide functionality to make corrections to answer keys and rename exams. Users will also have the option to create an answer key in-app and generate a custom answer sheet compatible with the analysis program.

### 1.3 Definitions

This section provides information about the terminology used throughout the document in order to increase the reader's ability to understand the content. This includes specific definitions, abbreviations and acronyms.

*Table 1: Definitions and Abbreviations*

<b>Term</b>	<b>Definition</b>
<i>User</i>	An individual who utilizes the system
<i>Scantron sheet</i>	A paper form that contains fields for answering multiple choice questions with a fixed layout
<i>PC</i>	Personal Computer
<i>SMARTron Analyzer</i>	The headless application that receives and processes Scantron sheets and emails results
<i>SMARTron Web App</i>	The web app that provides the user interface for viewing and correcting scanned exams
<i>LakerNet ID</i>	The username/identification a user will provide, specific to SUNY Oswego

## 1.4 Overview

## 2 Overall Description

### 2.1 Product Perspective

#### 2.1.1 User interfaces

The user will interact with a physical scantron sheet and a web-based client that allows for re-execution of the program with different inputs.

#### 2.1.2 Hardware interfaces

The user will have access to and utilize a faculty scanner. There he will be able to scan all scantron sheets including the answer key without leaving his building. The user's PC is where he will interact with the email containing all data and statistics from the test results.

#### 2.1.3 Software interfaces

The user will be able to utilize his existing Oswego email, which is a Google account, to initiate scanning the hard copy scantrons as well as receive the test results upon completion of the analysis by the program. The user will also be interacting with the SMARTron software in order to access results, create and edit answer keys. Microsoft Excel is the other software that the user wants to synchronize with SMARTron. Once the results have been emailed to the user, they should have the ability to upload/copy the results into a current Excel spreadsheet.

#### 2.1.4 Communications interfaces

Computer

Email

Scanner

## 3 Specific Requirements

### 3.1 Use Cases

<b>Use Case UC-1</b>	<b>Email Scanned Scantron Sheets to SMARTron Analyzer</b>
<b>Related Use Cases</b>	TBD
<b>Initiating Actor</b>	A User
<b>Actor's Goal</b>	To successfully email all scanned Scantron sheets to the SMARTron analyzer
<b>Participating Actors</b>	Scanner, SMARTron analyzer
<b>Preconditions</b>	There must be an existing scanner and Scantron sheets; the SMARTron analyzer must be running and have an associated email address
<b>Postconditions</b>	The Scantron sheets are successfully scanned and emailed to the SMARTron analyzer

	<b>Flow of Events for Main Success Scenario</b>
<b>1.</b>	The user arrives at the scanner and inputs the email address associated with the SMARTron Analyzer
<b>2.</b>	The user places all Scantron sheets into the scanner and presses the “start” button
<b>3.</b>	The scanner scans all the sheets
<b>4.</b>	The scanner emails the scanned files to the SMARTron analyzer

	<b>Flow of Events for Alternate Scenario</b>
<b>1.</b>	The user arrives at the scanner and inputs their email
<b>2.</b>	The user places all Scantron sheets into the scanner and presses the “start” button
<b>3.</b>	The scanner scans all the sheets

4.	The scanner attempts to email the SMARTron analyzer the scanned files
5.	The SMARTron analyzer fails to receive the scanned files

<b>Use Case UC-2</b>	<b>Login to SMARTron Web App</b>
<b>Related Use Cases</b>	TBD
<b>Initiating Actor</b>	A User
<b>Actor's Goal</b>	To access the SMARTron web app
<b>Participating Actors</b>	The SMARTron web app
<b>Preconditions</b>	The user must have an existing LakerApps account
<b>Postconditions</b>	The user has access to the features of the SMARTron web app

	<b>Flow of Events for Main Success Scenario</b>
<b>1.</b>	The user opens the SMARTron website in their web browser
<b>2.</b>	The user is prompted to login to the SMARTron web app
<b>3.</b>	The user enters their proper credentials (email and password)
<b>4.</b>	The user is redirected to the Logged-In home page on the SMARTron website

	<b>Flow of Events for Alternate Scenario</b>
<b>1.</b>	The user opens the SMARTron website in their web browser
<b>2.</b>	The user is prompted to login to the SMARTron web app
<b>3.</b>	The user enters their credentials (email and password)
<b>4.</b>	The SMARTron system displays an error message to the user that they entered an invalid username/password



<b>Use Case UC-3</b>	<b>Edit Answer Key</b>
<b>Related Use Cases</b>	TBD
<b>Initiating Actor</b>	A User
<b>Actor's Goal</b>	To successfully edit an existing answer key
<b>Participating Actors</b>	The SMARTron web app
<b>Preconditions</b>	There must be an existing account on SMARTron; there must be an existing answer key to edit
<b>Postconditions</b>	The answer key is edited to the user's preferences

	<b>Flow of Events for Main Success Scenario</b>
<b>1.</b>	The user logs into their SMARTron account
<b>2.</b>	The user navigates to their answer key file
<b>3.</b>	The user makes their desired changes to the answer key
<b>4.</b>	The user saves the changes to the answer key

	<b>Flow of Events for Alternate Scenario</b>
<b>1.</b>	The user logs into their SMARTron account
<b>2.</b>	The user navigates to their answer key file
<b>3.</b>	The user attempts to makes their desired changes to the answer key
<b>4.</b>	The user saves the changes to the answer key
<b>5.</b>	The SMARTron system displays an error message to the user that the answer key could not be edited

<b>Use Case UC-4</b>	<b>Correctly Grade Exams</b>
<b>Related Use Cases</b>	TBD
<b>Initiating Actor</b>	Computer System
<b>Actor's Goal</b>	To successfully grade every test
<b>Participating Actors</b>	The SMARTron system
<b>Preconditions</b>	There must be an answer key to follow; There must be a test/tests sent to the SMARTron system.
<b>Postconditions</b>	The tests have the proper grades assigned.

	<b>Flow of Events for Main Success Scenario</b>
<b>1.</b>	The SMARTron receives all the students' tests.
<b>2.</b>	The SMARTron reads in the answer key.
<b>3.</b>	The SMARTron grades each test appropriately.

	<b>Flow of Events for Alternate Scenario</b>
<b>1.</b>	The SMARTron receives all the students test.
<b>2.</b>	The SMARTron reads in the answer key.
<b>3.</b>	The SMARTron fails to grade each test appropriately.

<b>Use Case UC-5</b>	<b>Correctly Match Grades to Corresponding Student</b>
<b>Related Use Cases</b>	TBD
<b>Initiating Actor</b>	A User
<b>Actor's Goal</b>	To successfully track each answer given by a student.
<b>Participating Actors</b>	The SMARTron system, A User
<b>Preconditions</b>	There must be at least one graded test from the SMARTron system; The user must have received an email to view the SMARTron results.
<b>Postconditions</b>	The SMARTron system displays the students answers; A user can navigate to individual tests for a given student

	<b>Flow of Events for Main Success Scenario</b>
<b>1.</b>	The user receives an email from the SMARTron system
<b>2.</b>	The user opens the email from the SMARTron system
<b>3.</b>	The SMARTron system displays the test results
<b>4.</b>	The user navigates to given student's answers
<b>5.</b>	The SMARTron system displays the student's answers

	<b>Flow of Events for Alternate Scenario</b>
<b>1.</b>	The user receives an email from the SMARTron system
<b>2.</b>	The user opens the email from the SMARTron system
<b>3.</b>	The SMARTron system displays the test results
<b>4.</b>	The user navigates to given student's answers
<b>5.</b>	The SMARTron system displays the student's grades but fails to provide the user with a student's answers

<b>Use Case UC-6</b>	<b>Email Grade Spreadsheet to User</b>
<b>Related Use Cases</b>	UC-1
<b>Initiating Actor</b>	SMARTron Analyzer
<b>Actor's Goal</b>	To automate grading of Scantron sheets.
<b>Participating Actors</b>	User
<b>Preconditions</b>	There must be an existing SMARTron system; the user must scan the Scantron sheets.
<b>Postconditions</b>	The user has received a CSV file of exam grades

	<b>Flow of Events for Main Success Scenario</b>
<b>1.</b>	The SMARTron system emails the user.
<b>2.</b>	The user opens the email from the SMARTron system.
<b>3.</b>	The email displays the test results.
<b>4.</b>	The user receives the grade spreadsheet as an email attachment.

	<b>Flow of Events for Alternate Scenario</b>
<b>1.</b>	The SMARTron system emails the user.
<b>2.</b>	The user opens the email from the SMARTron system.
<b>3.</b>	The SMARTron system attempts to displays the test results
<b>4.</b>	The SMARTron system displays an error message to the user that the grades were not calculated

<b>Use Case UC-7</b>	<b>Analyze Data for Each Question</b>
<b>Related Use Cases</b>	TBD
<b>Initiating Actor</b>	The SMARTron system
<b>Actor's Goal</b>	To successfully analyze every question
<b>Participating Actors</b>	The SMARTron system; A User
<b>Preconditions</b>	There must be at least one test to analyze and an answer key
<b>Postconditions</b>	The test displays the results and information on each question

	<b>Flow of Events for Main Success Scenario</b>
<b>1.</b>	The SMARTron system receives a test to analyze
<b>2.</b>	The SMARTron system analyzes a test
<b>3.</b>	The SMARTron system returns the results of the test to the user
<b>4.</b>	The user can view data on each question of the test

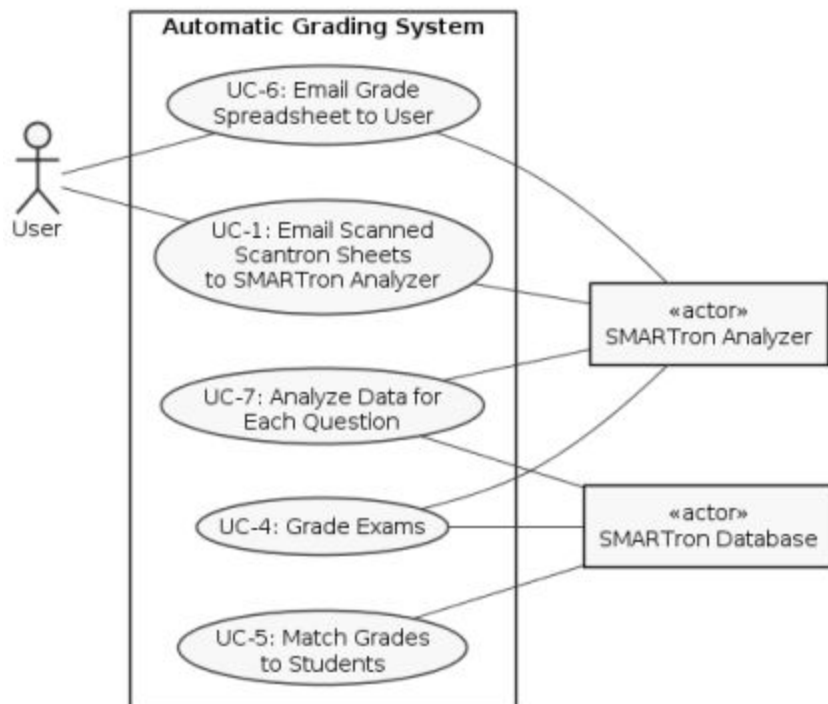
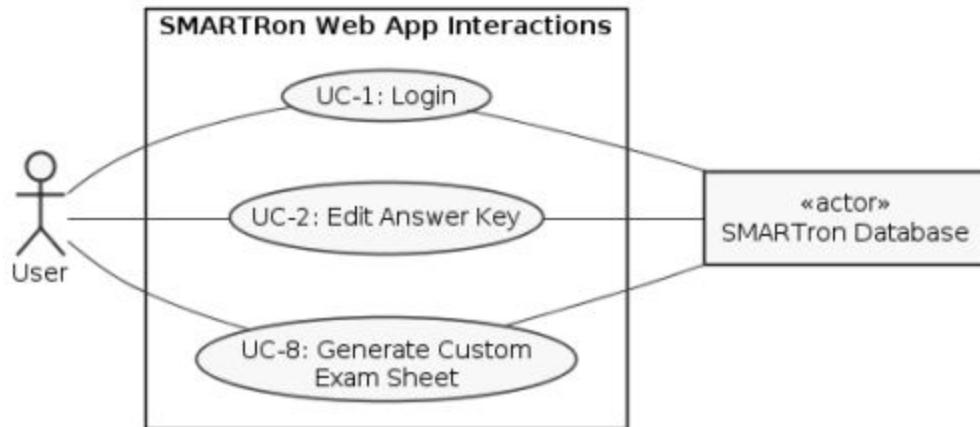
	<b>Flow of Events for Alternate Scenario</b>
<b>1.</b>	The SMARTron system receives a test to analyze
<b>2.</b>	The SMARTron system analyzes a test
<b>3.</b>	The SMARTron system attempts to returns the results of the test to the user
<b>4.</b>	The SMARTron system displays an error message to the user that the data is not currently available.

<b>Use Case UC-8</b>	<b>Generate Custom Exam Sheet</b>
<b>Related Use Cases</b>	TBD
<b>Initiating Actor</b>	The User
<b>Actor's Goal</b>	To create a customized exam sheet for a multiple-choice test
<b>Participating Actors</b>	The SMARTron web app
<b>Preconditions</b>	The user must have an existing LakerApps account registered to the SMARTron system; the user must be logged into their account
<b>Postconditions</b>	A custom exam sheet is generated for future use

	<b>Flow of Events for Main Success Scenario</b>
<b>1.</b>	The user logs into the SMARTron web app
<b>2.</b>	The user navigates to the “create exam sheet” page
<b>3.</b>	The user customizes an exam sheet using the web app’s user interface
<b>4.</b>	The user saves the custom exam sheet

	<b>Flow of Events for Alternate Scenario</b>
<b>1.</b>	The user logs into the SMARTron web app
<b>2.</b>	The user navigates to the “create exam sheet” page
<b>3.</b>	The user customizes an exam sheet using the web app’s user interface
<b>4.</b>	The SMARTron web app displays an error when the user attempts to save the custom exam sheet

## 3.2 Use Case Diagrams



## Appendix A: 200 Question Scantron Sheet



[illegible]



SIDE 2

101	A B C D E	111	A B C D E	121	A B C D E	131	A B C D E	141	A B C D E
102	A B C D E	112	A B C D E	122	A B C D E	132	A B C D E	142	A B C D E
103	A B C D E	113	A B C D E	123	A B C D E	133	A B C D E	143	A B C D E
104	A B C D E	114	A B C D E	124	A B C D E	134	A B C D E	144	A B C D E
105	A B C D E	115	A B C D E	125	A B C D E	135	A B C D E	145	A B C D E
106	A B C D E	116	A B C D E	126	A B C D E	136	A B C D E	146	A B C D E
107	A B C D E	117	A B C D E	127	A B C D E	137	A B C D E	147	A B C D E
108	A B C D E	118	A B C D E	128	A B C D E	138	A B C D E	148	A B C D E
109	A B C D E	119	A B C D E	129	A B C D E	139	A B C D E	149	A B C D E
110	A B C D E	120	A B C D E	130	A B C D E	140	A B C D E	150	A B C D E
151	A B C D E	161	A B C D E	171	A B C D E	181	A B C D E	191	A B C D E
152	A B C D E	162	A B C D E	172	A B C D E	182	A B C D E	192	A B C D E
153	A B C D E	163	A B C D E	173	A B C D E	183	A B C D E	193	A B C D E
154	A B C D E	164	A B C D E	174	A B C D E	184	A B C D E	194	A B C D E
155	A B C D E	165	A B C D E	175	A B C D E	185	A B C D E	195	A B C D E
156	A B C D E	166	A B C D E	176	A B C D E	186	A B C D E	196	A B C D E
157	A B C D E	167	A B C D E	177	A B C D E	187	A B C D E	197	A B C D E
158	A B C D E	168	A B C D E	178	A B C D E	188	A B C D E	198	A B C D E
159	A B C D E	169	A B C D E	179	A B C D E	189	A B C D E	199	A B C D E
160	A B C D E	170	A B C D E	180	A B C D E	190	A B C D E	200	A B C D E

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# SCANTRON®

## GENERAL PURPOSE ANSWER SHEET

### form no. 4521

#### EXAMPLES

- WRONG**
- 1 1 1 3 4 5
- WRONG**
- 2 1 2 4 5
- WRONG**
- 3 1 2 4 5
- RIGHT**
- 4 1 2 3 5

#### IMPORTANT DIRECTIONS FOR MARKING ANSWERS

- Use #2 pencil only.
- Do NOT use ink or ballpoint pens.
- Make heavy black marks that fill the circle completely.
- Erase cleanly any answer you wish to change.
- Make no stray marks on the answer sheet.

DO NOT WRITE  
IN THIS SPACE

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