# Matching Algorithm to Connect Preceptors with Medical Students

Software Requirement Specification

Version 3.0

Date: 03/07/25

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Prepared For: CMPSC 488, Juliann Peters

## Version History

| Version | Date | Authors | Description |
|---|---|---|---|
| **1.0** | 12/01/24 | Samantha Dennison, Faiza Jilani, Taylor Willis | First Draft |
| **2.0** | 12/10/24 | Samantha Dennison, Faiza Jilani, Taylor Willis | Final Draft |
| **3.0** | 03/07/25 | Samantha Dennison, Faiza Jilani, Taylor Willis | Updated sections to reflect progress with project |
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**Table of Contents**

# 1 Introduction

## 1.1 Purpose

The purpose of this software requirements specification is to concisely outline the features and requirements for the system. The audience should have a clear understanding of the planned development for the application.

## 1.2 Scope

The data will be integrated into Salesforce for security and usability. Furthermore, the system will also ensure compliance with HRSA and DOH information requirements. The software will be used by medical students, preceptors, and PA AHEC teams across the state.

Students and preceptors will not be directly interacting with the system. Medical students needing to complete rural clinical rotations will fill out a medical student form while preceptors will fill out a preceptor form. The data from these forms will be stored within Salesforce. The system will not modify the data, but rather use the data to best match a medical student with a preceptor.

PA AHEC will use the system to approve the medical student and preceptor pairing. Traditionally in medical training, the student is matched to the preceptor. However, in recent years, there have been less preceptors available in rural areas to mentor medical students. To encourage more preceptors to become involved and to incentivize preceptors to return for future rotations, the system will match preceptors to students to enrich the mentorship experience for both preceptors and students.

## 1.3 Client Information

Juliann Peters works for Pennsylvania AHEC (Area Health Education Center), and will be the primary point of contact. Her focus is rural healthcare, specifically relaying information to medical students and professionals. Her main goal for the system is to connect medical students, living in rural areas, with preceptors. Pennsylvania AHEC coordinates medical education and training networks across the state of Pennsylvania. They aim to improve the distribution and quality of the health professional workforce, particularly for rural and underserved communities. There are seven centers throughout the state. One program office is the HUB, stationed at Penn State Hershey. This program is 100% grant-funded and partners with HRSA and the Department of Health to help continue their mission. Her email is jpeters7@pennstatehealth.psu.edu and her phone number is 724-622-9395.

## 1.4 Definitions, Acronyms, and Abbreviations

Student: A medical student who will be filling out the student form.

Preceptor: A medical professional who will be filling out the preceptor form.

PA AHEC: A member of PA AHEC (Pennsylvania Area Health Education Center) with authorized access to administrative permissions within the system.

Mentor Team: The collective name for an approved mentorship between a student and preceptor.

User: PA AHEC.

Weight System: Questions appearing on the student and preceptor forms will have varying weights based on the question's priority.

Potential Match: All potential and unapproved mentor teams.

Form: The collection of all required questions intended for students and preceptors.

DOH: Department of Health

HRSA: Health Resources and Service Administration

Rural: The Center for Rural Pennsylvania's definition of rural and urban is based on population density. Population density is calculated by dividing the total population of a specific area by the total number of square land miles of that area.

CORE Rotation: Community Oriented Rural Education Rotation

Learner Type Requirements: The medical student must be a MD/DO student, PA/NP student, dental student, primary care residents (including Fam Med) General Pediatrician, General Medicine, OB/GYN, or Psychiatry.

Minimum Rotation Duration: 8 weeks requirement or 4 weeks for residents.

Preference: If there are multiple students who are candidates to be matched to one preceptor, a student with preference will break the tie.

Question Pair: A question from the student form and a question from the preceptor form that will be compared to determine a potential match.

# 2 User Requirements

## 2.1 Summary

The system is meant to match preceptors with students, based on the information provided in the forms. The goal is to create a positive experience and a successful mentorship. The student form and the preceptor form will have similar questions. The system will find the student and preceptor with the most common responses using a weight system. Once a match is found, the system will send all potential matches to PA AHEC. PA AHEC must approve the potential match.

## 2.2 Requirement Elicitation

### *2.2.1 Student Form*

The student must first complete and submit a form. The form is accessible outside the system. Once the student completes the form, the responses from the form are pulled into Salesforce. Prior to being considered for matching with a preceptor, a student must meet the learner type requirements and must be available to complete the minimum rotation duration.

After the student is approved for consideration, the student will be given preference if the student is a Pennsylvania native, has a rural background, is committed to a rural practice, or is an AHEC Scholar. A student may meet one or more of the criteria to be given preference.

### *2.2.2 Preceptor Form*

The preceptor must first complete and submit a form. The form is accessible outside the system. Once the preceptor completes the form, the responses from the form are pulled into Salesforce. The responses from the preceptor form will be used to compare against the student form responses.

### *2.2.3 PA AHEC Account Requirements*

PA AHEC must be able to view all potential matches and must have the ability to approve potential matches.

## 2.3 High-Level Functionalities

The system will compare the corresponding question pairs between students and preceptors. The system finds the potential matches with the most similarities and displays the potential matches to PA AHEC. PA AHEC will review the match and approve the mentor team.

# 3 System Requirements

## 3.1 High-Level Functionalities

The system must approve a student for consideration then compare the question pairs among preceptor and student forms. PA AHEC must have the ability to review all potential matches. Approving a mentor team is a functionality reserved for PA AHEC.

## 3.2 Functional Requirements

### *3.2.1 Student Approval for Consideration*

#### *3.2.1.1 A student must be approved to begin the matching process.*

***Description:*** *Prior to pulling student data to be compared with preceptor data, the student must meet certain requirements. If the requirements are not met, the student will be withdrawn from the system. The requirements are the student must meet the learner type requirements and must be available for the minimum rotation duration. Both these requirements are posed as questions on the form.*
***Importance: High***
***Dependencies: None***

#### *3.2.1.2 A student meeting certain criteria must be given preference.*

***Description:*** *For each preferred criteria a student meets, the student is given one preference point. The preferred criteria is if the student is a Pennsylvania native, has a rural background, is committed to a rural practice, or is an AHEC Scholar. If a student does not meet the preferred criteria, the student will still be considered for a match. The higher preference a student has, the more likely the student is to be matched with a preceptor.*
***Importance: High***
***Dependencies: 3.2.1.1***

### *3.2.2 Matching Requirements*

#### *3.2.2.1 Develop new fields needed to match preceptors to students.*

***Description:*** *The system must be developed within Salesforce, which uses objects to contain fields. Therefore, to monitor which questions result in a match, new fields must be added to existing objects.*
***Importance: High***
***Dependencies: None***

***3.2.2.2 A student with restrictions must not be matched with a preceptor not meeting the requirements.***
***Description:*** *If a student's program mandates the student must work with a certain type of provider, the student may only be paired with a preceptor of that provider type. This will be the first question pair to be compared in the algorithm. If the question pair match fails, no other question pairs will be compared.*
***Importance: High***
***Dependencies: None***

***3.2.2.3 Fuzzy matching algorithm must be used with text type responses.***
***Description:*** *For question pairs that have one question of text type, fuzzy matching will be used to determine if the question pair is a match. Other response types like picklist will not use fuzzy as these questions require an exact match.*
***Importance: Medium***
***Dependencies: 3.2.1.2, 3.2.2.1, 3.2.2.2***

***3.2.2.4 When a question pair match is made, the weight of the question pair will be added to the overall match score.***
***Description:*** *For question pairs that require fuzzy matching, the ratio of similarity will be multiplied by the weight of the question then added to the overall matching score. For other question types, the weight of the question pair will be added to the overall matching score as an integer value.*
***Importance: High***
***Dependencies: 3.2.2.3***

### *3.2.3 Potential Matches*

***3.2.3.1 Students with preference are more likely to be guaranteed a match.***
***Description:*** *Previous rotations indicate there will be more students than preceptors, thus there will be more students than open positions. If multiple students are matched to the same preceptor, the tie will be broken by the student with the highest preference.*
***Importance: High***
***Dependencies: 3.2.1.2***

***3.2.3.2 The potential match is determined by the highest overall matching score.***
***Description:*** *The student and preceptor pair with the highest overall matching score is sent to PA AHEC for approval. The next highest potential matches will also be sent to PA AHEC.*
***Importance: High***
***Dependencies: 3.2.1.2, 3.2.2.4, 3.2.3.1***

### *3.2.4 PA AHEC*

***3.2.4.1 Create a screen flow for the PA AHEC employee to access potential match information.***
***Description:*** *Some PA AHEC employees do not have programming knowledge, therefore the purpose of creating a screen flow is to enhance the user friendliness of the system. The employee must be able to view all potential matches, details about the match, and information regarding the preceptor. The employee must be able to easily view the availability of the preceptor, the preceptor site, the availability of the preceptor site, and if there are multiple preceptors at a site.*
***Importance: High***
***Dependencies: 3.2.3.2***

***3.2.4.2 Create documentation to help train PA AHEC Employees.***
***Description:*** *Once the project is developed, there should be a mock screen flow with documentation to assist PA AHEC employees in learning how to use the system. The documentation should consist of a training video with a walkthrough example and written instructions with screenshots. The mock screen flow will aim to answer questions PA AHEC employees might have and train the employees on how to use all the features of the system.*
***Importance: Low***
***Dependencies: 3.2.4.1***

## 3.3 Non Functional Requirements

*3.3.1 The data from the forms will be stored securely in Salesforce.*

*3.3.2 The application must be compatible with the existing Salesforce infrastructure.*

*3.3.3 The system must comply with HRSA and DOH information requirements.*

# 4 System Stakeholders

Juliann Peters is directing the system, and is responsible for providing the project's requirements. She will be the main point of contact.

The director of PA AHEC, Dr. N. Ben Fredrick, and project manager, Pat Bricker, will provide the necessary information through Juliann.

Rural medical students who otherwise do not have access to a preceptor are system stakeholders. The system aims to provide opportunities to students deprived of guidance due to location restrictions.

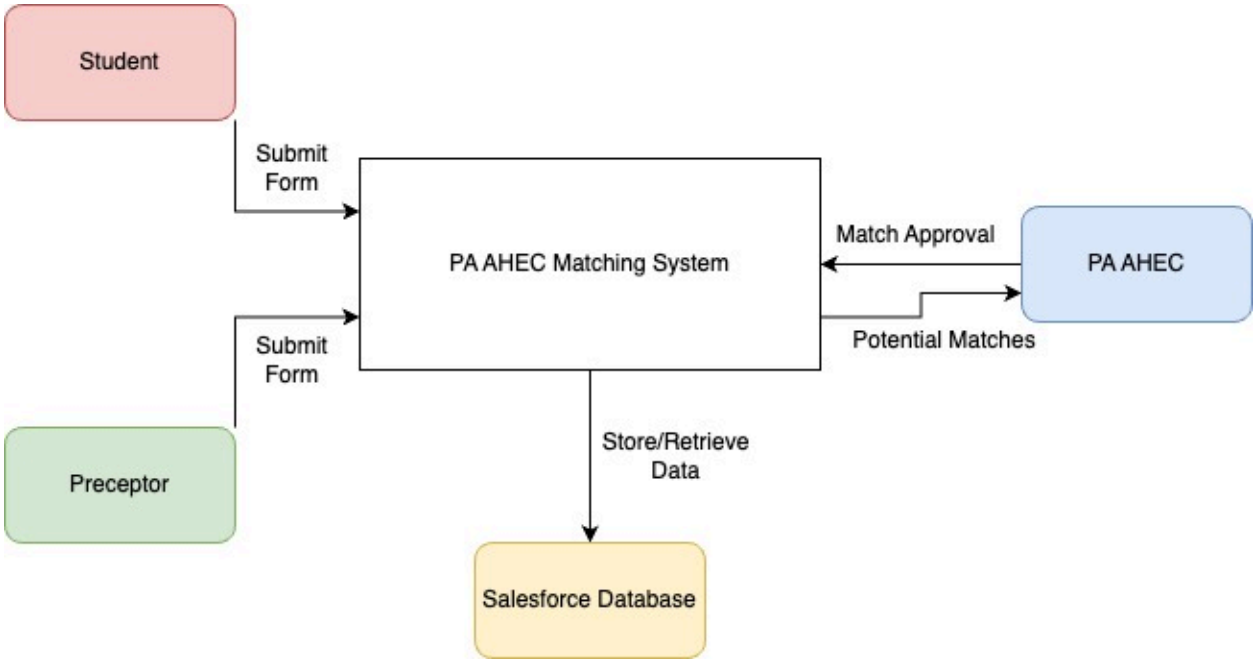
Other system stakeholders include preceptors. This system aims to encourage preceptors to offer their experience and wisdom to students. Preceptors are working medical professionals with busy schedules. In rural areas, the ability to precept is much more cumbersome, as there are not as many qualifying preceptors in rural areas as there are in urban areas of Pennsylvania. The matching process is meant to entice more preceptors to volunteer by making the mentorship as enjoyable as possible.

# 5 Software Engineering Tools

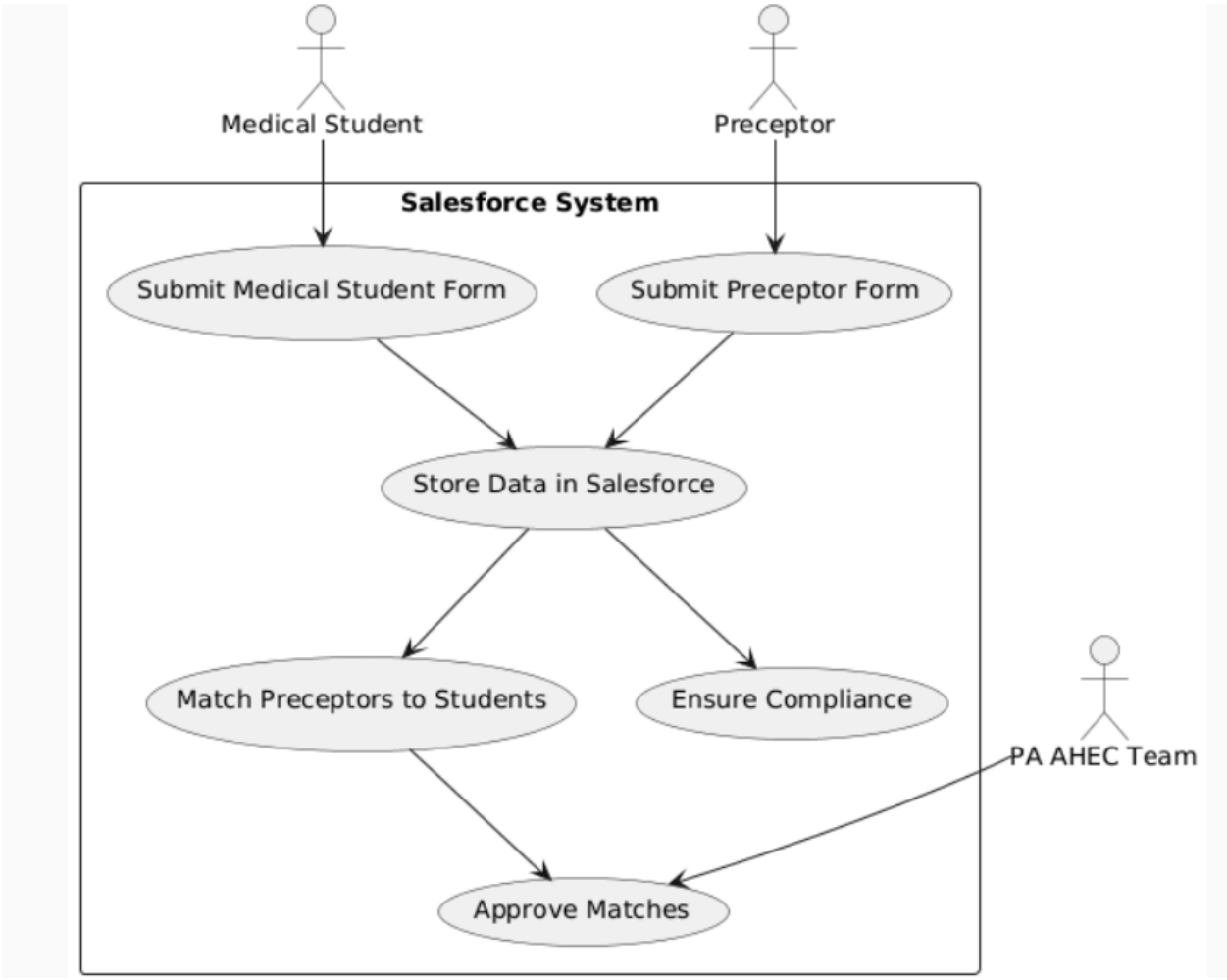
- Development Tools: Salesforce, APEX, SOQL
- Database: Salesforce Native Database
- Version Control: GitHub

# 6 System Models

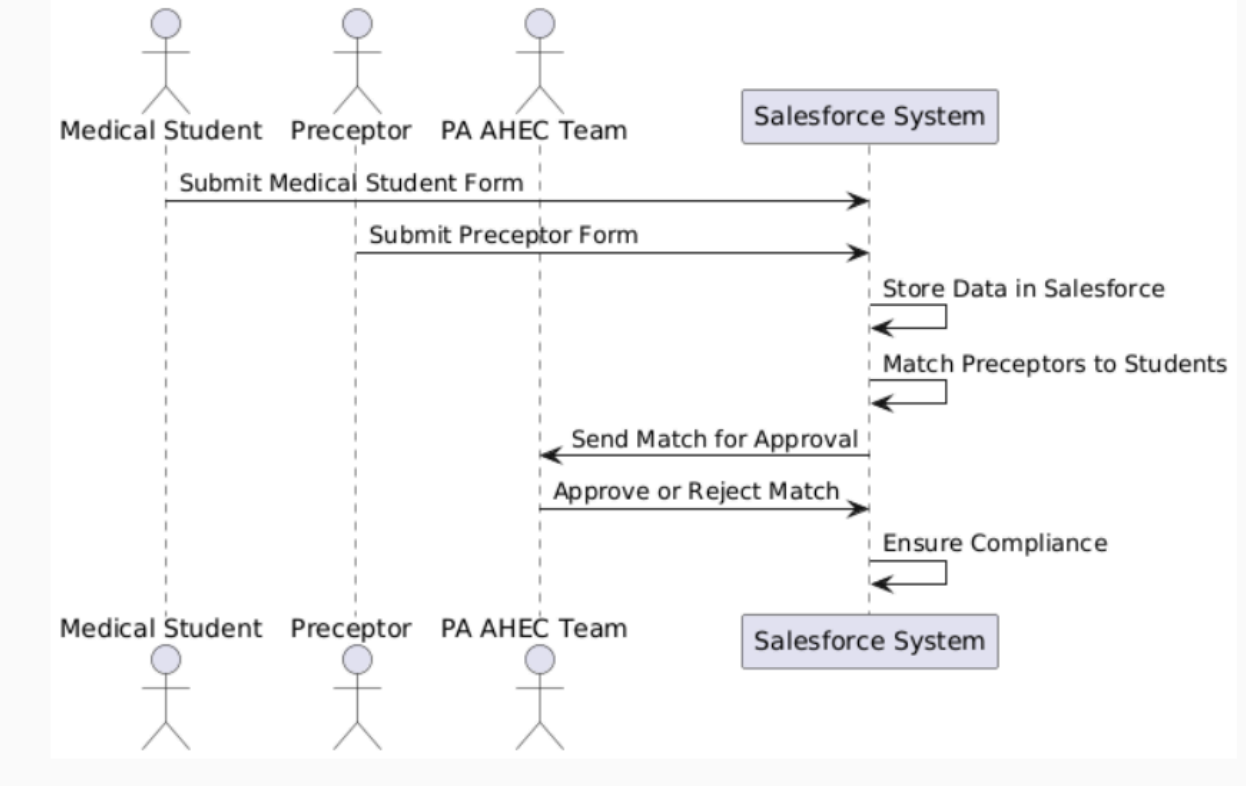
## 6.1 Context Diagram



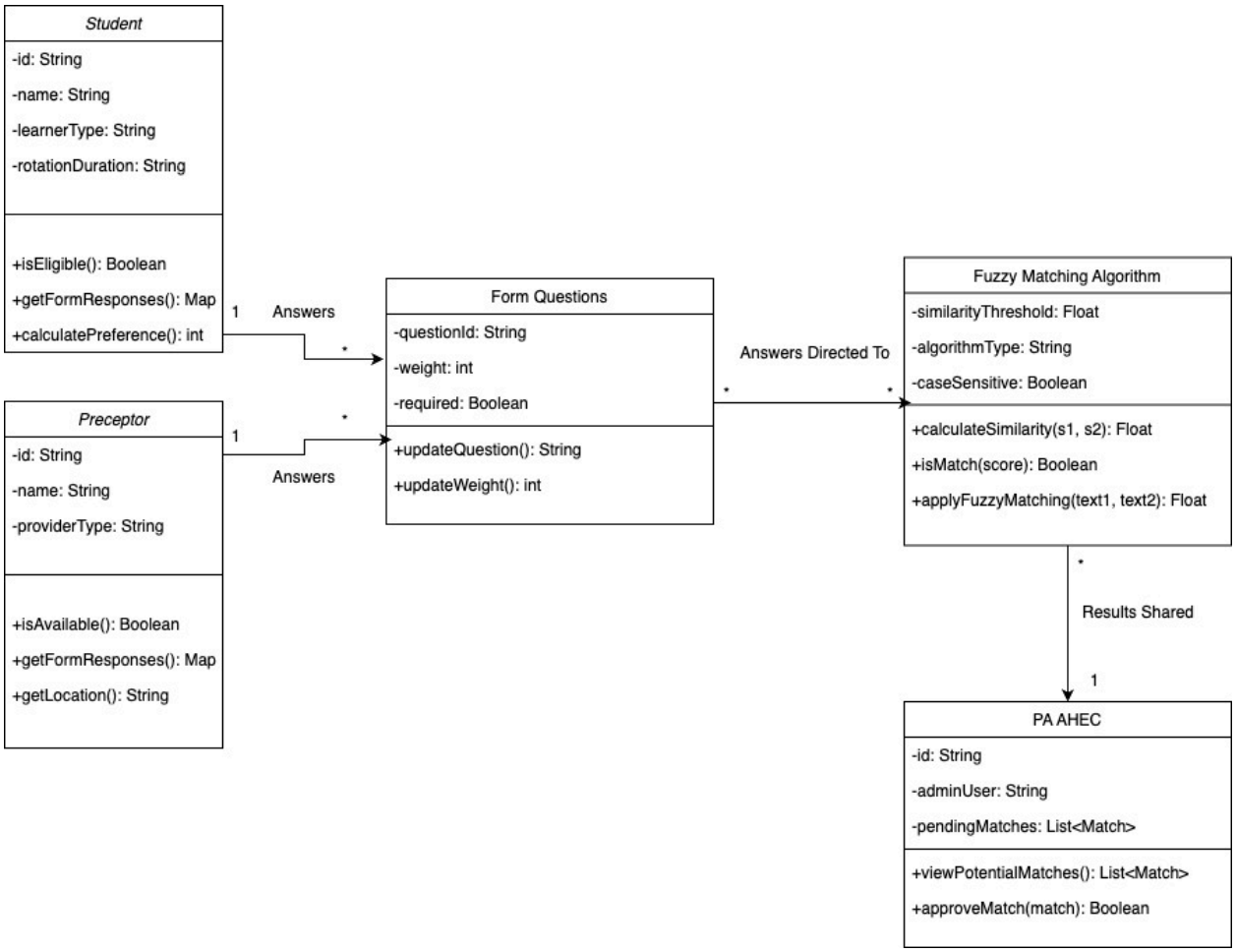
## 6.2 Use Case Diagram



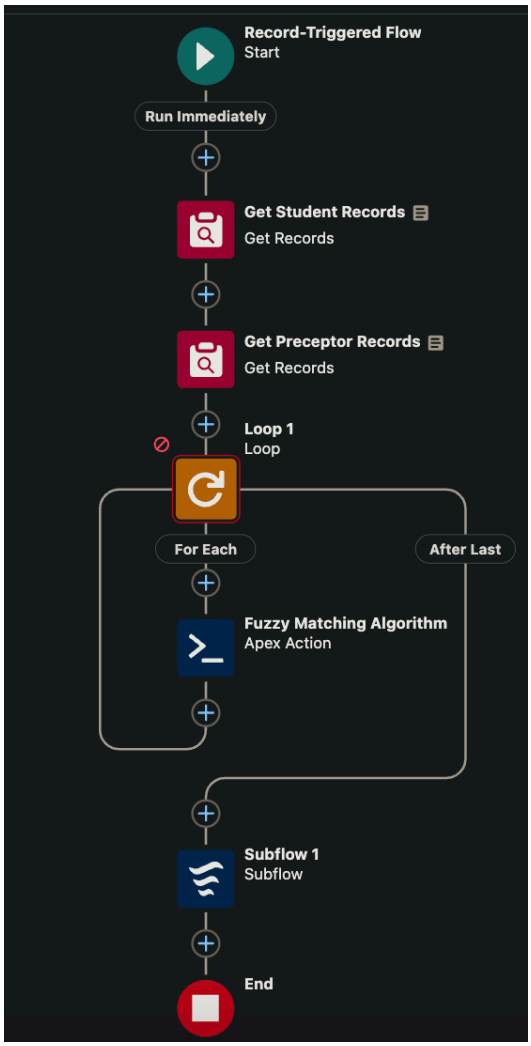
## 6.3 Sequence Diagram

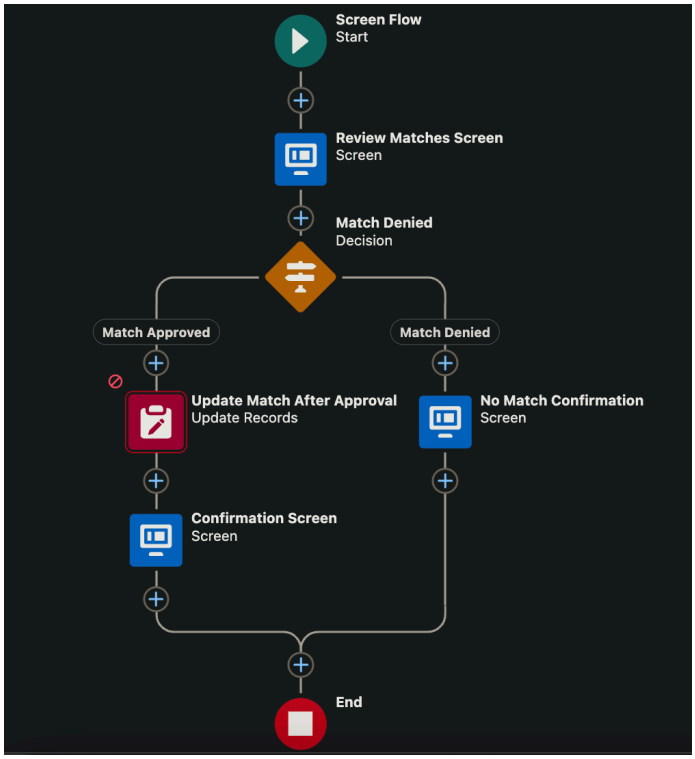


## 6.4 Class Diagram



## 6.5 Activity Diagram

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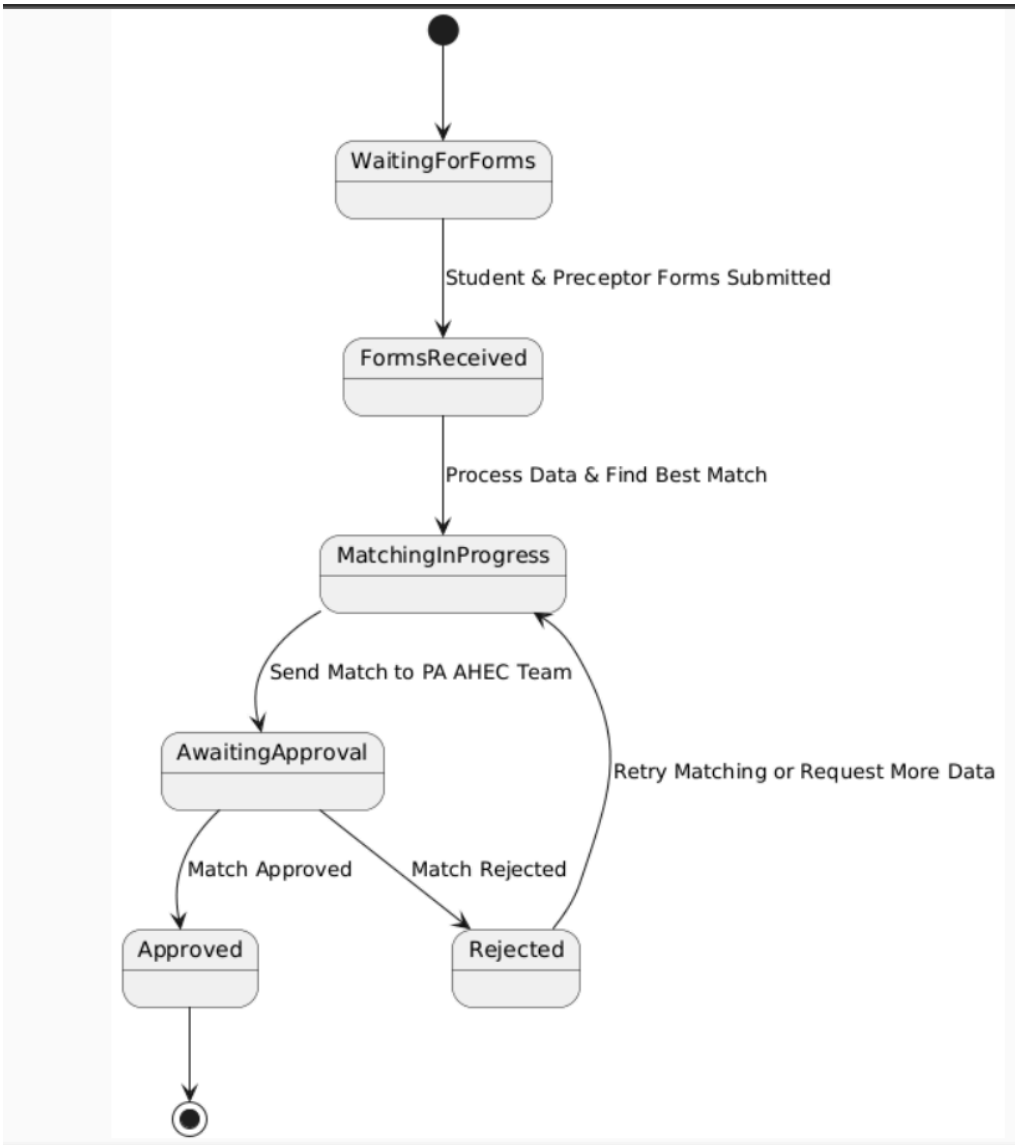
| **Record-Triggered Flow**<br>The flow gathers the records of both students and preceptors. This data is used as variables within the loop, passed into the Apex Action which contains the Fuzzy Matching Algorithm. The algorithm also uses this data directly in the code and calculates a score based on weightings, recommended criteria, and overall similarity between answers. This will continue to loop until a match is found. Once done, it connects to a Screen Flow where the process continues. | **Screen Flow**<br>This screen will contain all matches available for review. The idea is to have button elements that either approve or deny matches. If denied, the student's data will remain in the system. If approved, records will be updated to reflect a match has been found and approved. Either decision made has a confirmation screen. |

## 6.6 State Diagram



# 7 Conclusion

The Matching Algorithm to Connect Preceptors with Medical Students project is vital in creating an organized mentor-matching process for preceptors and medical students by aiming to optimize the success of mentor teams. By integrating the software within Salesforce, the system will provide an efficient and user-friendly solution while also meeting compliance standards.

**Signature: _____ Date: _____**