
PASSCOM



**Intelligent Agent for Student Advisement
Software Architecture Document**

Version 1.0

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Revision document History

Date	Version	Description	Author
12/01/2006	0.1	Initial document.	Brydon Pavlovic' (CA)
12/02/2006	1.0	Added all diagrams, explanations.	Kelsey Begaye (RM) Juan Martinez (BA) Brydon Pavlovic' (CA)

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4. Glossary

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Software Architecture Document

1. Introduction

This document represents a design description for the behavior of the Intelligent Agent system as specified in the Software Requirements Specification. It includes a set of analysis classes to represent the static view of the system, as well as sequence diagrams and activity diagrams to represent the dynamic view.

1.1 Purpose

This document serves as a guideline for software developers about the design of the system and how they should go about implementing the Intelligent Agent.

1.2 Scope

This document is in association with a joint effort between the Business and Industry Institute division of Mesa Community College and a software enterprise course provided by Arizona State University.

1.3 Definitions, Acronyms and Abbreviations

- AC: Analysis Class
- ASU: Arizona State University
- B&II: Business and Industry Institute division
- BA: Business Analyst
- BE: Backend (of Intelligent Agent application)
- CA: Chief Architect
- FE: Front-end (of Intelligent Agent application)
- IA: Intelligent Agent
- LMS: Mei Suo Learning Management System
- MCC: Mesa Community College
- MON: Monitoring node
- MSG: Messaging node
- NF: Non-functional
- PRE: Pre-enrollment node
- Q&A: Question and answer node
- RM: Requirements Manager
- RUP: Rational Unified Process
- SEQ: Sequence Diagram
- SDP: Software Development Plan
- SRS: Software Requirements Specification
- TBD: To be Determined
- UI: User Interface

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1.4 References

Business and Industry Institute:	http://bii.mc.maricopa.edu/degrees.htm
Blackboard:	http://www.blackboard.com/us/
Intelligent Agent definition:	http://en.wikipedia.org/wiki/Artificial_intelligence_agent
Mesa Community College:	http://www.mc.maricopa.edu/
Rational Unified Process:	http://en.wikipedia.org/wiki/Rational_Unified_Process
rSmart Group:	http://www.rsmart.com/
Sakai Learning Environment:	http://www.sakaiproject.org/

1.5 Overview

This document is presented in the following manner. Section 2 will discuss the use-cases diagrams developed for the Software Requirement Specification (it is recommended that the reader have this document present as well to cross-reference with the requirements of the system). Section 3 will discuss the logical view of the system through its static and dynamic components.

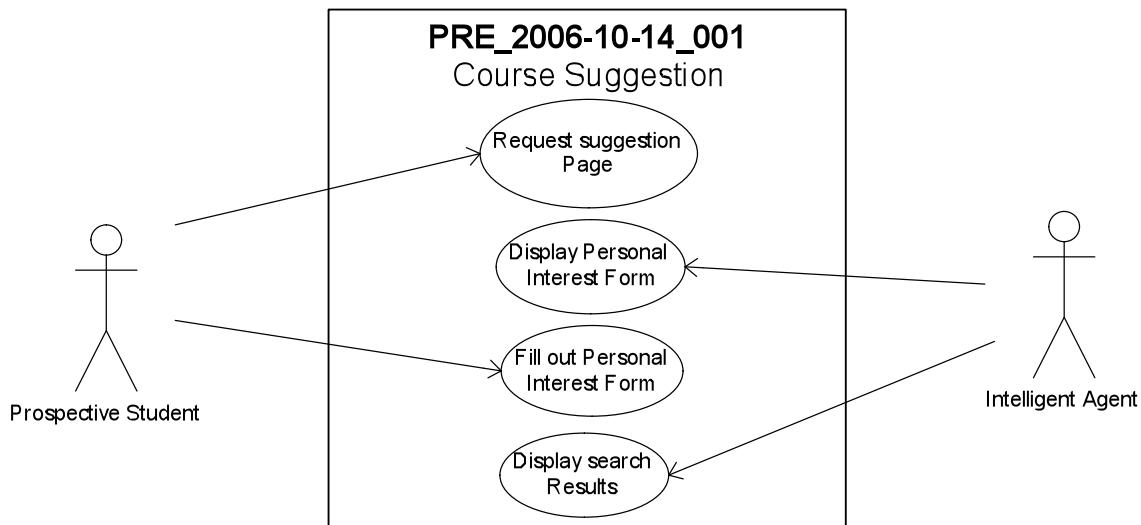
2. Use-Case View

This section will discuss the use -case diagrams from the SRS, with the goal of explaining the features of the system. The use cases will appear first, followed by a description of that feature (cross-reference with SRS document to get a more complete picture). The Logical View that follows should be used in conjunction with these diagrams to understand the system.

2.1 Pre-enrollment Features

The Intelligent Agent will have the ability to aid prospective students in the enrollment process by either suggesting courses to the student or allowing them to find their own courses, and then finally through registration.

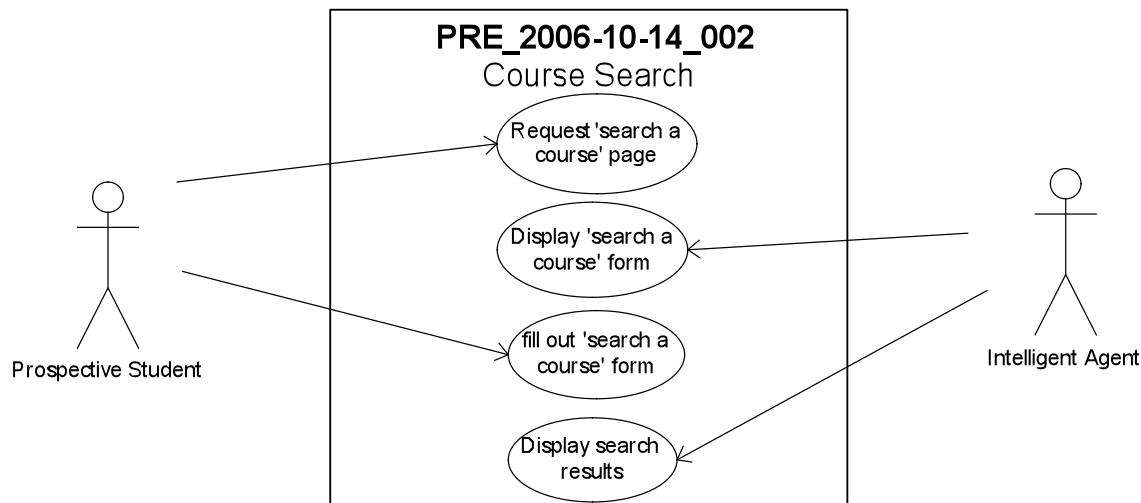
2.1.1 PRE_2006-10-14_001 Course Suggestion



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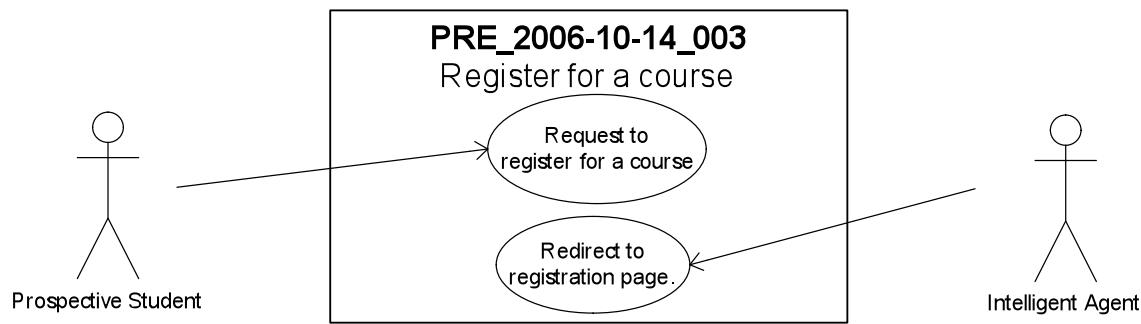
When initiated, the Intelligent Agent will help the prospective student choose a course by suggesting courses to the prospective student. The prospective student will first request to be sent to the “Course Suggestion” page, therein resides a “Personal Interest Form” that will allow the student to fill out fields (interests fields, what days and time the prospective student wants, and a delimiter for general studies course) which the Intelligent Agent will use to suggest a course to the student. Once the suggestion has been made, the student will have the option to add selected courses to a “shopping cart”. When they want to register for their selected courses, they will go to the “shopping cart” page and be able to register from there.

2.1.2 PRE_2006-10-14_002 Course Search



When initiated, the Intelligent Agent will help the prospective student find a course by allowing them to search an online course catalog. The prospective student will first request to be sent to the “Course Search” page, therein resides a “Search for a Course Form” that will allow the student to fill out fields (course prefix, number, section line number, days, times, etc) which the Intelligent Agent will use to narrow down the search for the prospective student. After displaying the search results, the student will have the option to add courses to a “shopping cart”. When they want to register for their selected courses, they will go to the “shopping cart” page and be able to register from there.

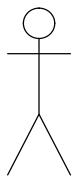
2.1.3 PRE_2006-10-14_003 Register for a Course



The prospective student will be allowed to register for courses (currently, this is just a hypothetical redirect to an online registration system that does not exist).

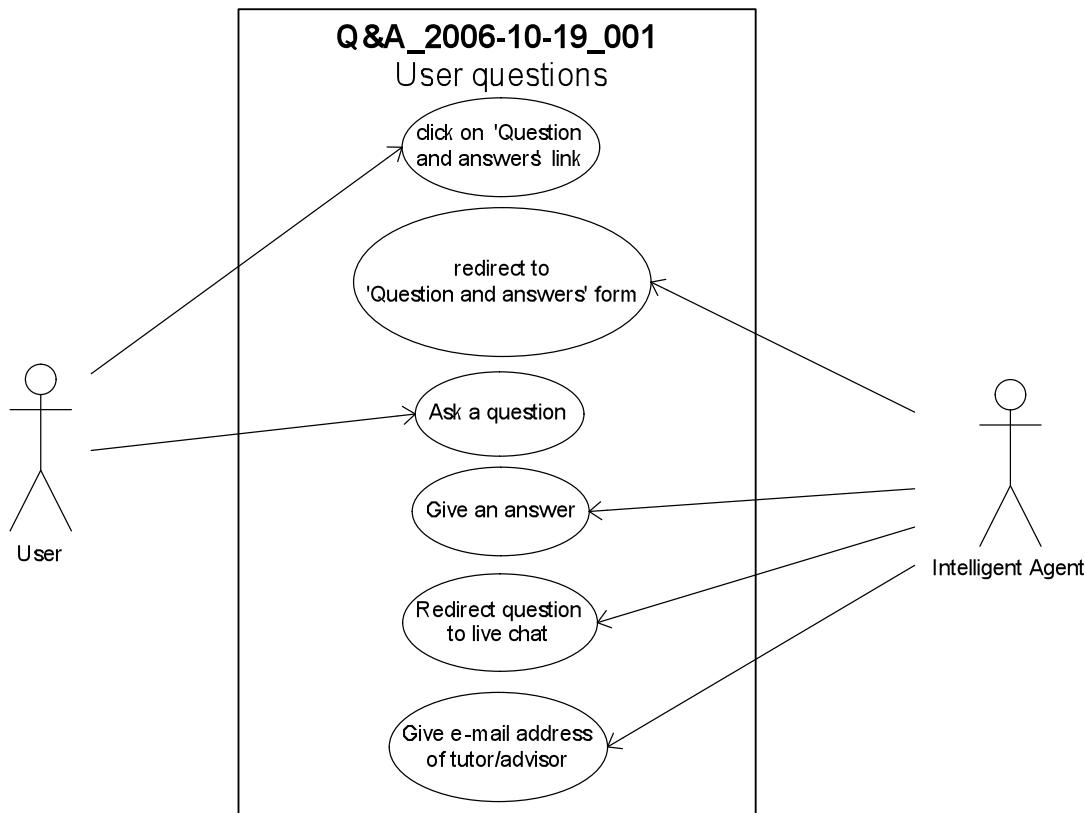
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2.1.4 PRE_2006-10-14_004 Pre-enrollment Main Page



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2.2.1 Q&A_2006-10-19_001 User Questions



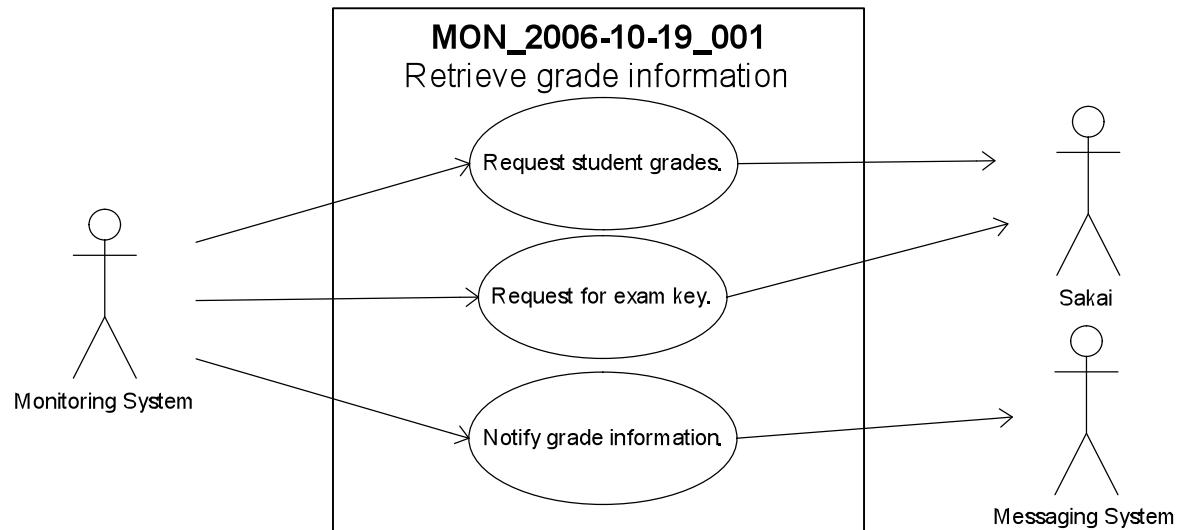
If a user (regarded as anyone at this point; they do not have to be a student necessarily), has a question about something related to the college, they can go to the “Questions and Answers Page” where they can ask their question. The IA will then attempt to answer the question by matching keywords in its answers database. If it can not provide an answer, it will have the options to redirect the user to a live chat session (through Illuminate) with an advisor, tutor, or whoever the question might be answered by (advising and tutoring are the definite functions at this point though). The other option is to allow the user to leave an email with the appropriate administrator (advisor or tutor).

2.3 Monitoring System Features

When students logs in to the Sakai system, the Intelligent Agent (its Monitoring System) will start-up and begin monitoring that student's course data (grades, assignments, exams, etc). The Monitoring System will then determine if any of the data it receives applies to a set of business rules it contains. If there are matches, then the Monitoring System relays the message to the IA's Messaging System which relays the message to the student. It is recommended to look at the Messaging System Features below in conjunction with these features to see the complete scenario.

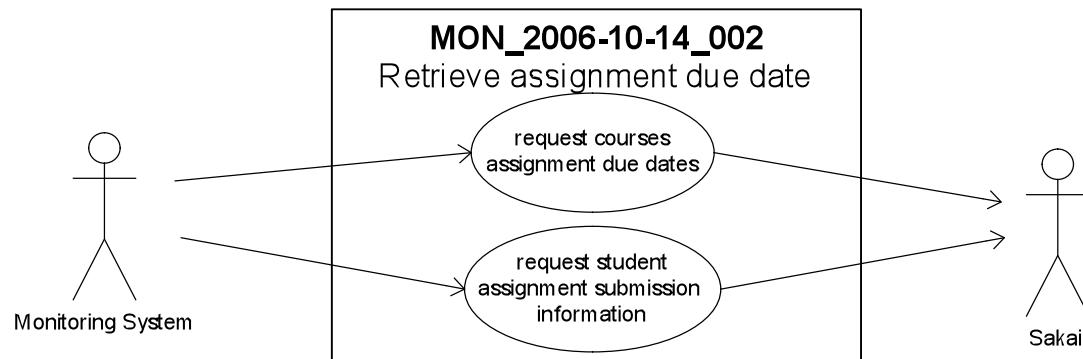
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2.3.1 MON_2006-10-19_001 Retrieve Grade Information



When a student logs in to Sakai, the Monitoring System will startup and begins monitoring student grades. The grades it monitors are current overall grades, recent assignment grades, and the last exam grade. It also fetches the exam key, if needed.

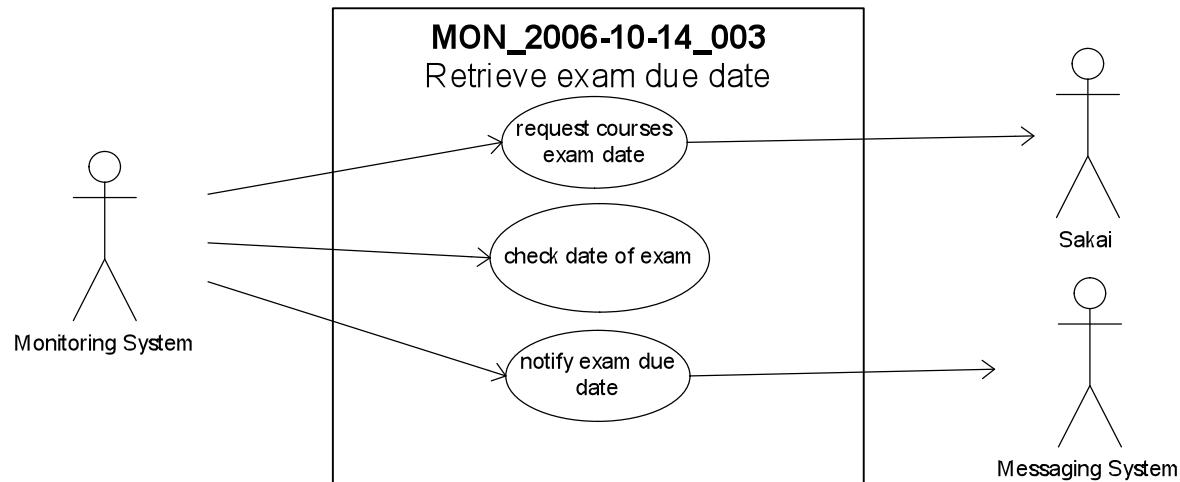
2.3.2 MON_2006-10-14_002 Retrieve Assignment Due Date



In parallel to MON_2006-10-14_001, the Monitoring System will fetch future assignment due dates. If an assignment is due within a certain time period, then the Monitoring System will relay the information to the Messaging System which then relays this information to the user.

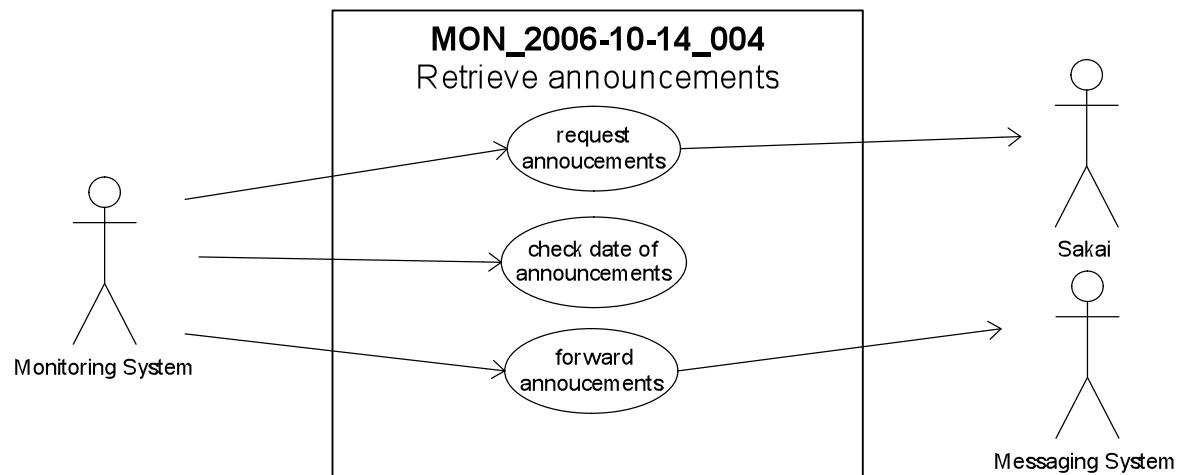
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2.3.3 MON_2006-10-14_003 Retrieve Exam Due Date



In parallel to MON_2006-10-14_001, the Monitoring System will fetch upcoming exam dates. If an exam is scheduled within a certain time period, then the Monitoring System will relay the information to the Messaging System which then relays this information to the user.

2.3.4 MON_2006-10-14_004 Retrieve Announcements

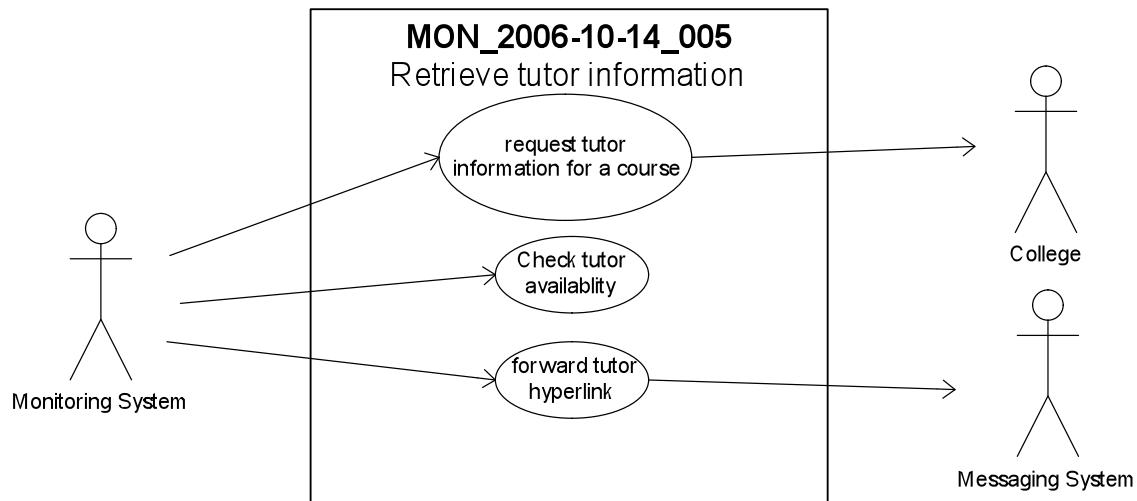


In parallel to MON_2006-10-14_001, the Monitoring System will fetch announcement data for the course. If an announcement was entered within the last seven days, then the Monitoring System will relay the information to the Messaging System which then relays this information to the user.

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2.3.5 MON_2006-10-14_005

Retrieve Tutor Information



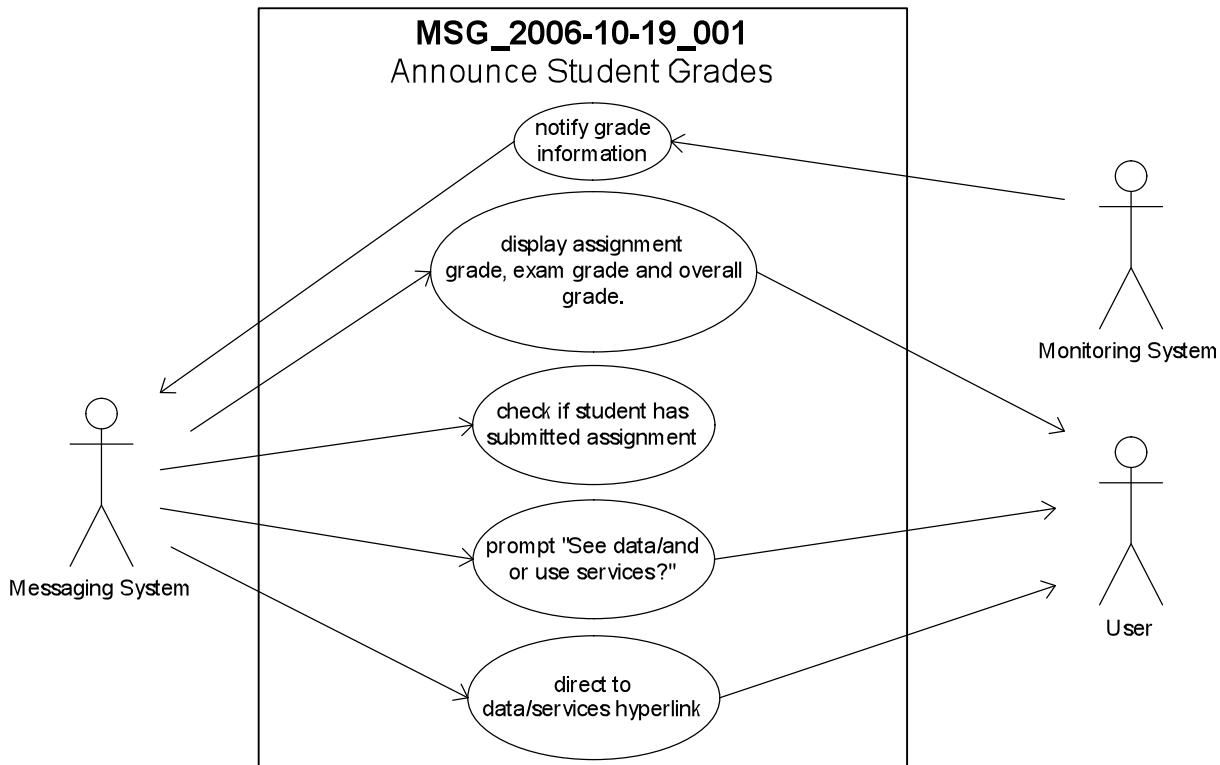
In parallel to MON_2006-10-14_001, the Monitoring System will fetch tutor information. If a tutor is available and the student is in need of tutoring, then the Monitoring System will relay the information to the Messaging System which then relays this information to the user.

2.4 Messaging System Features

When students log in to the Sakai system, the Intelligent Agent (its Monitoring System) will start-up and begin monitoring that student's course data (grades, assignments, exams, etc). If the Monitoring System finds something worth mentioning, it passes it along to the Messaging System. The Messaging System's responsibility is to display this information to the user.

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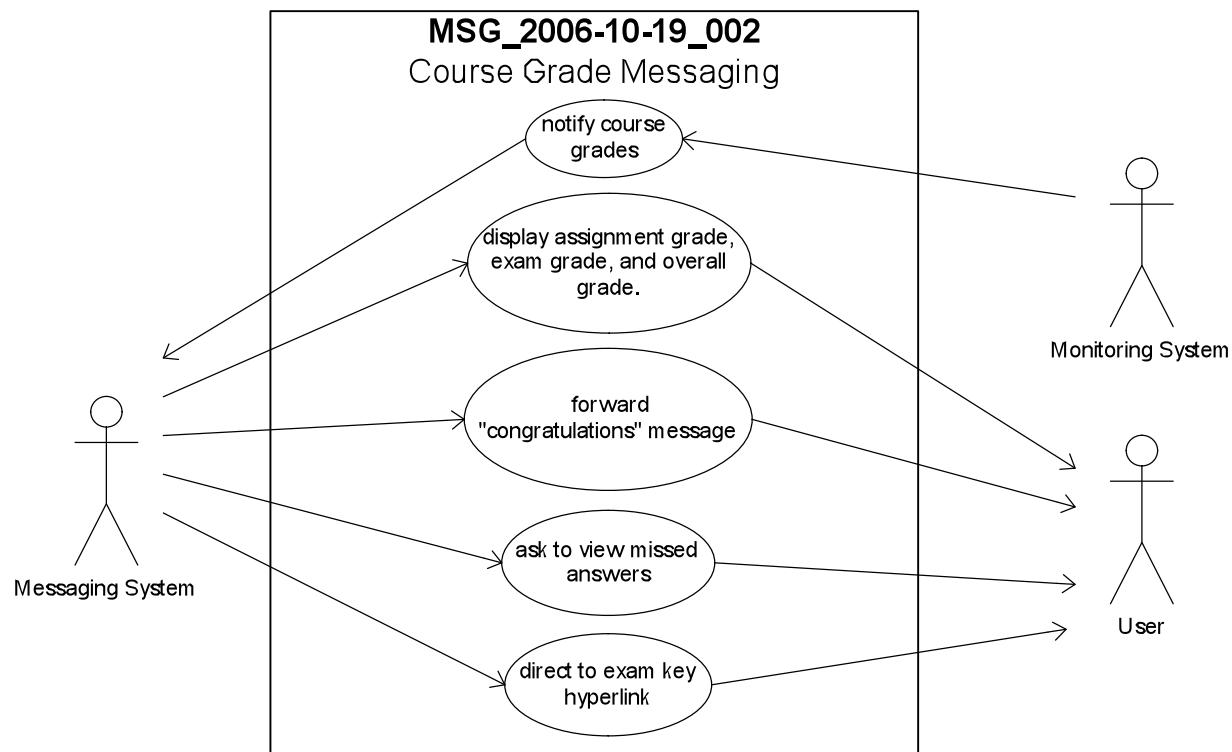
2.4.1 MSG_2006-10-19_001 Announce Student Grades to Struggling Student



The Messaging System will primarily wait for messages from the Monitoring System. This particular piece of the Messaging System waits for decisions from the Monitoring System that involve grades for a struggling student. Currently, the definition of a struggling student is someone has a grade of less than “C” (70%). When a notification has been received, it sends a message to the user.

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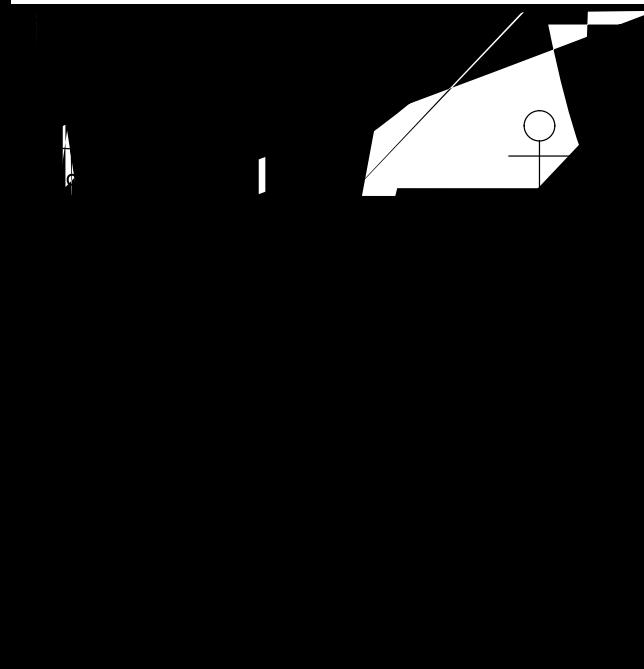
2.4.2 MSG _2006-10-19_002 Announce Student Grades to Exemplary Student



The Messaging System will primarily wait for messages from the Monitoring System. This particular piece of the Messaging System waits for decisions from the Monitoring System that involve grades for a exemplary student. Currently, the definition of an exemplary student is someone that has a grade of a B and higher (80% and up). When a notification has been received, it sends a message to the user.

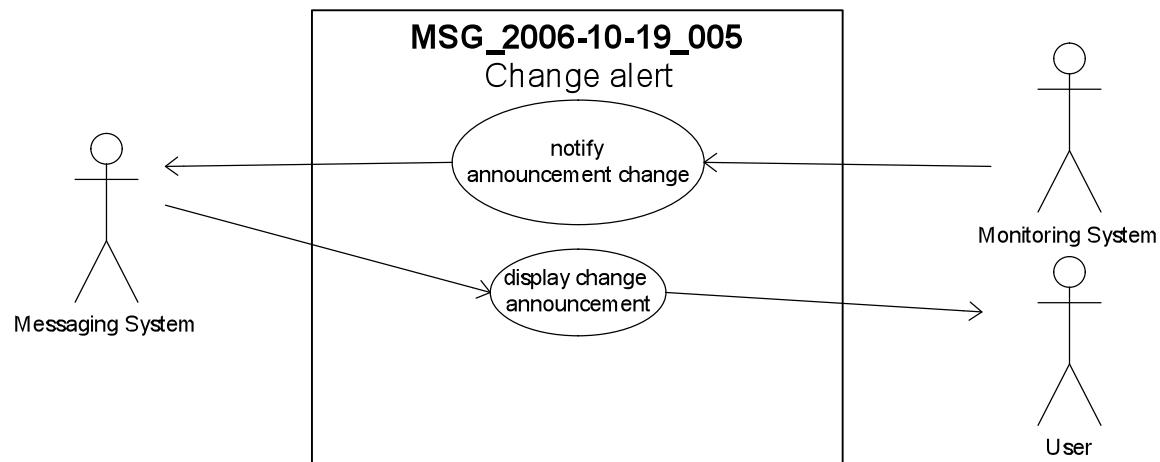
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Upcoming Assignment Due Dates Message



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2.4.5 MSG _2006-10-19_005 Change Alert



The Messaging System will primarily wait for messages from the Monitoring System. This particular piece of the Messaging System waits for decisions from the Monitoring System that involve new announcement notifications. When a notification has been received, it sends a message to the user.

3. Logical View

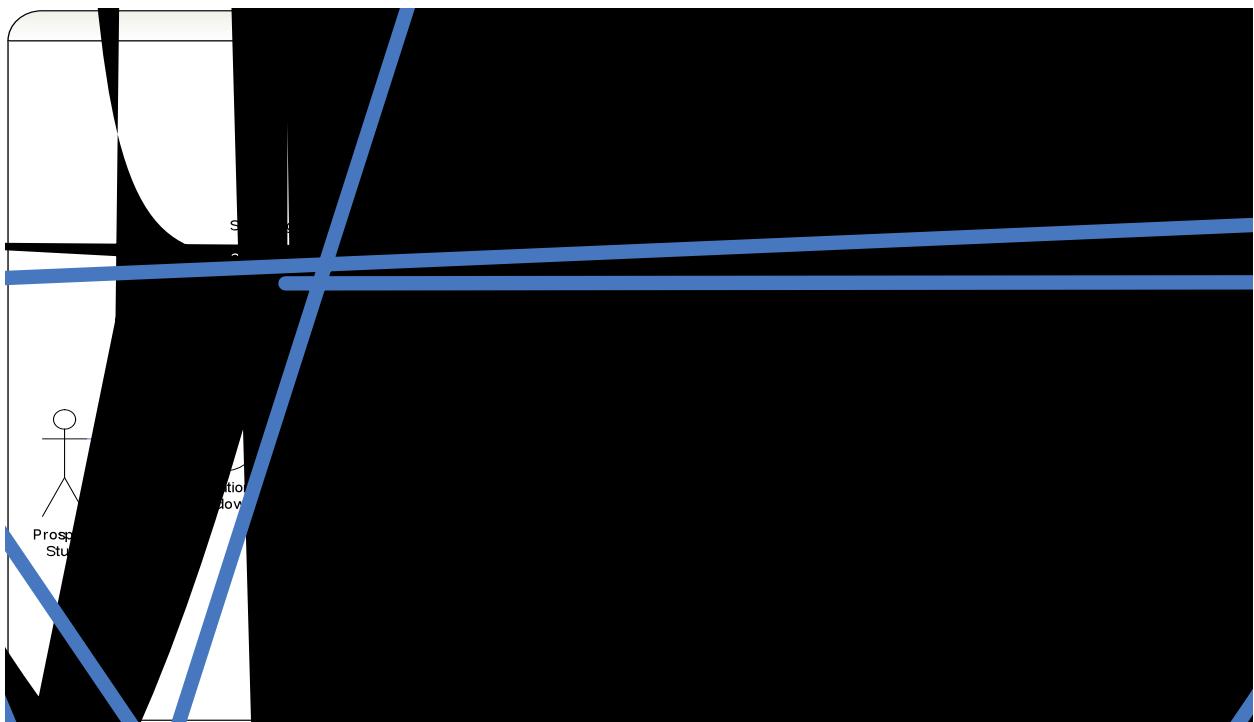
This section will discuss the static and dynamic views of the system through Activity Classes and Sequence Diagrams respectively. For each feature, the Analysis Class for that feature will be displayed followed by a “Happy Case” sequence diagram. Afterwards, a description of the sequence diagram will be given, going through each step. Taken together, both diagrams will explain the system fully.

3.1 Pre-enrollment Features

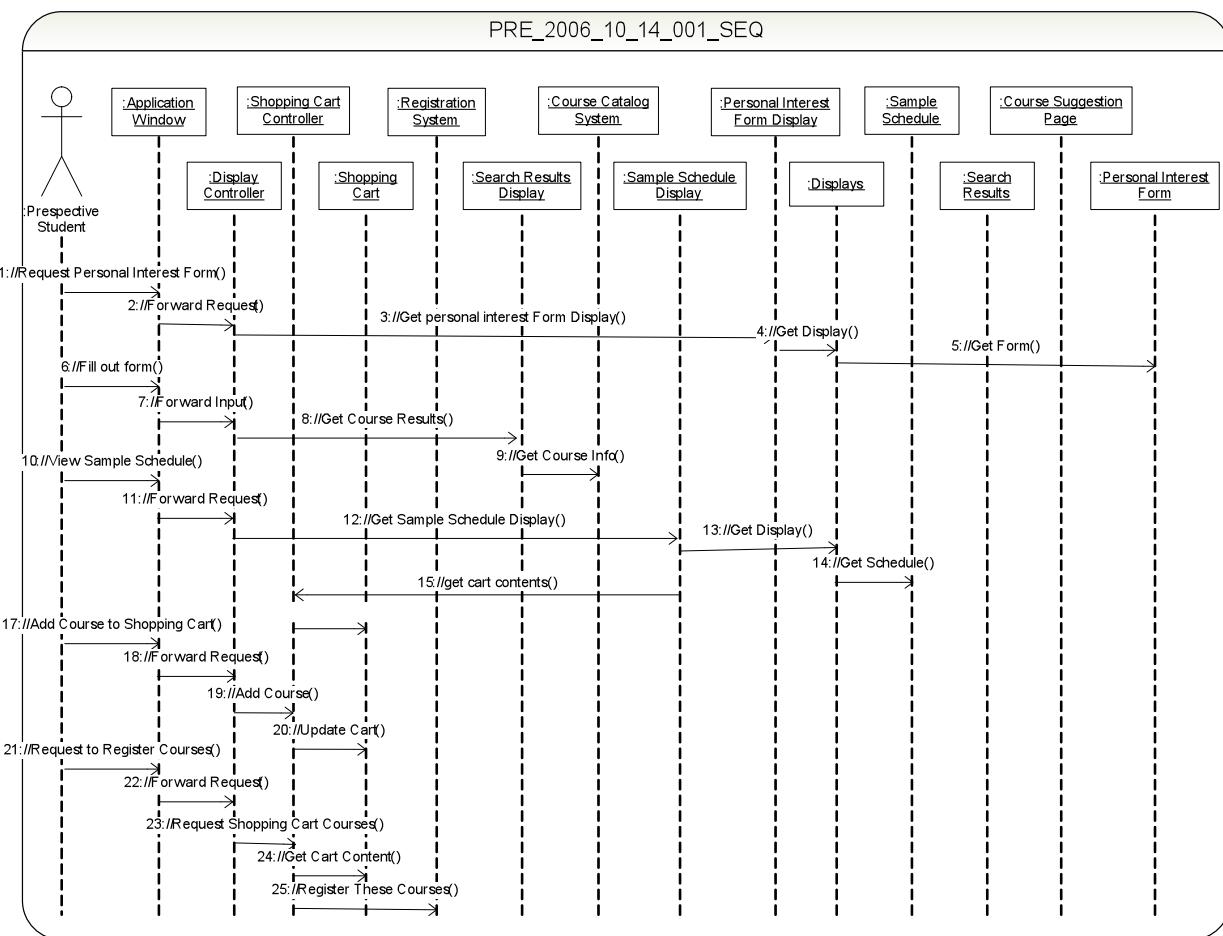
The Intelligent Agent will have the ability to aid prospective students in the enrollment process by either suggesting courses to the student or allowing them to find their own courses, and then finally through registration.

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3.1.1 PRE_2006-10-14_001 Course Suggestion

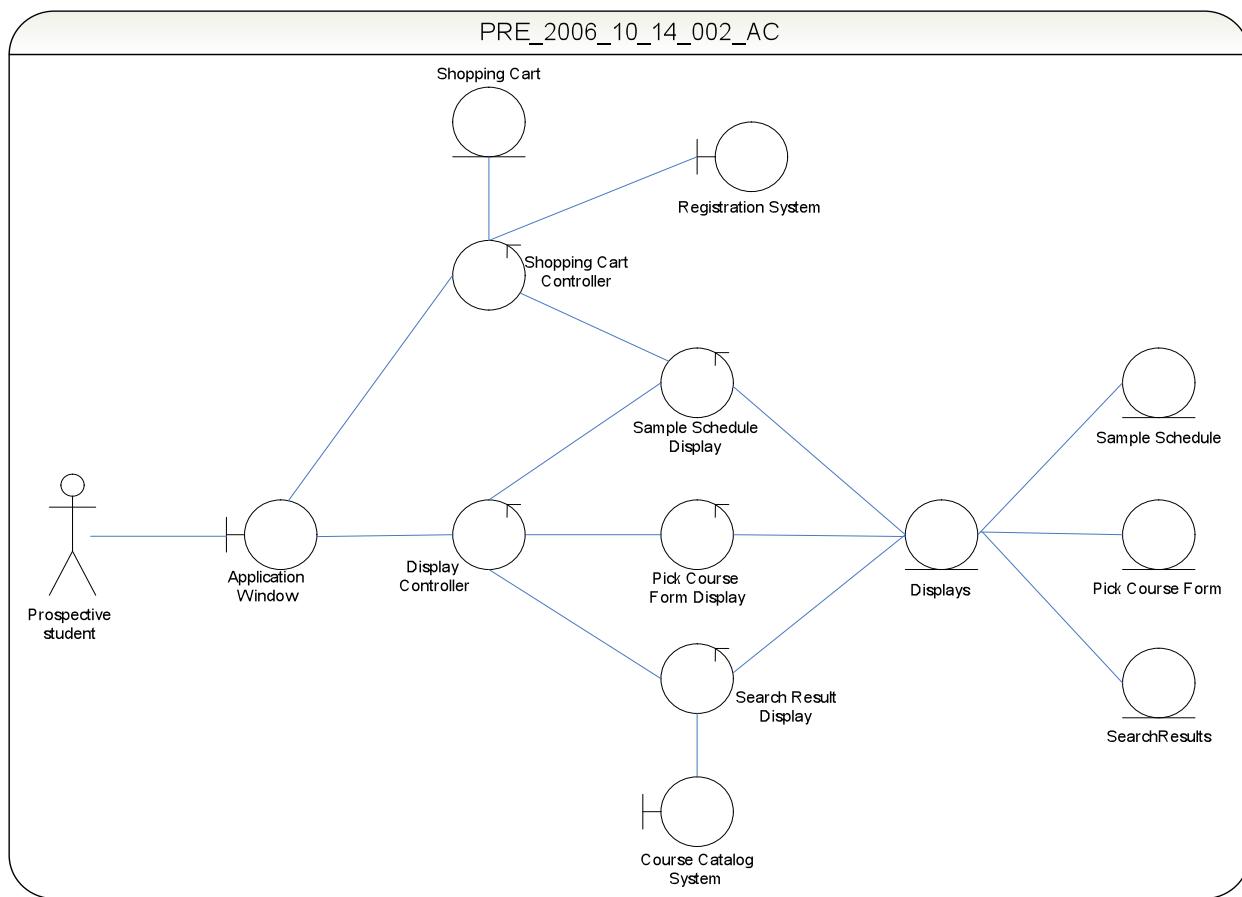


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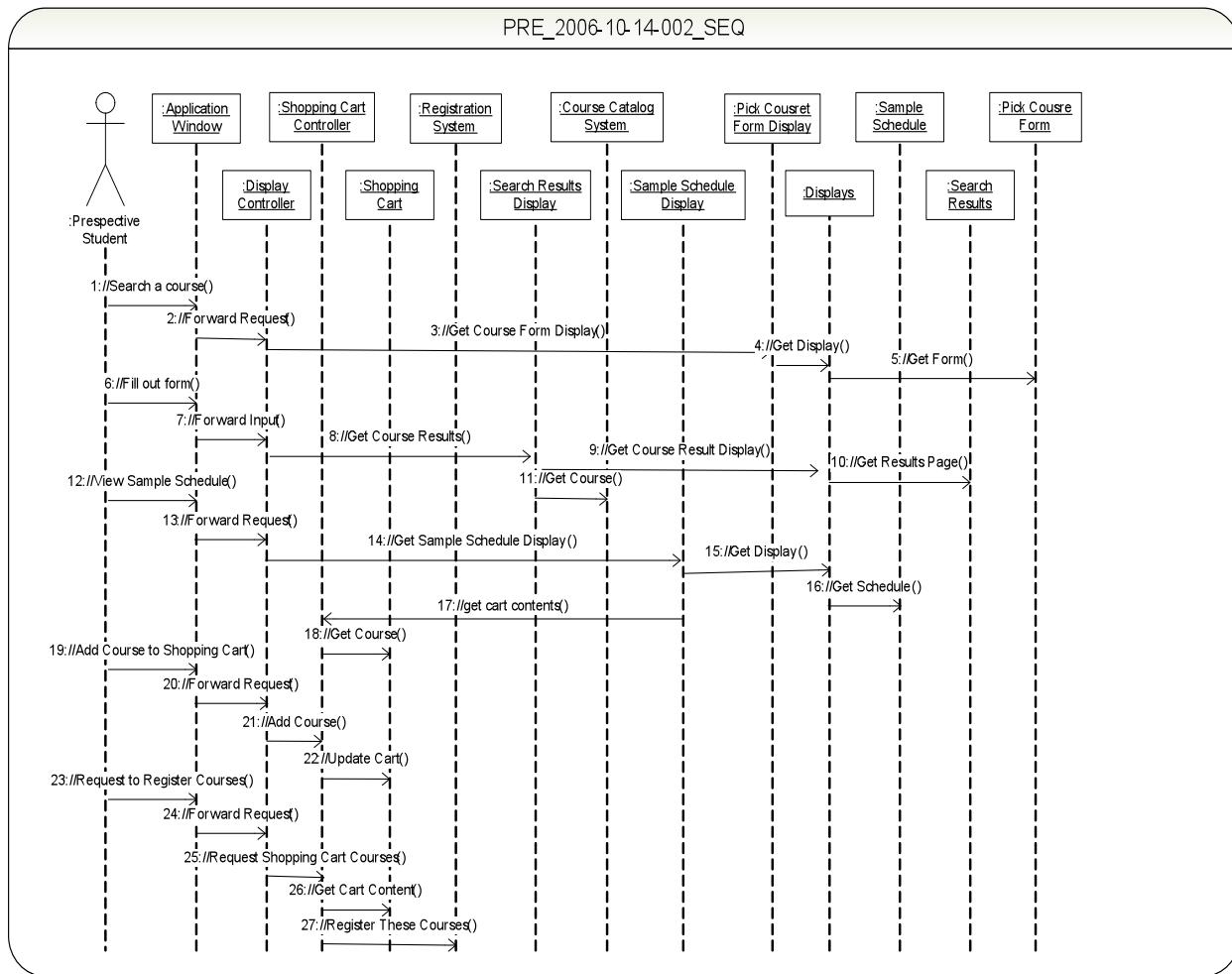


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PRE_2006-10-14_002 Course Search



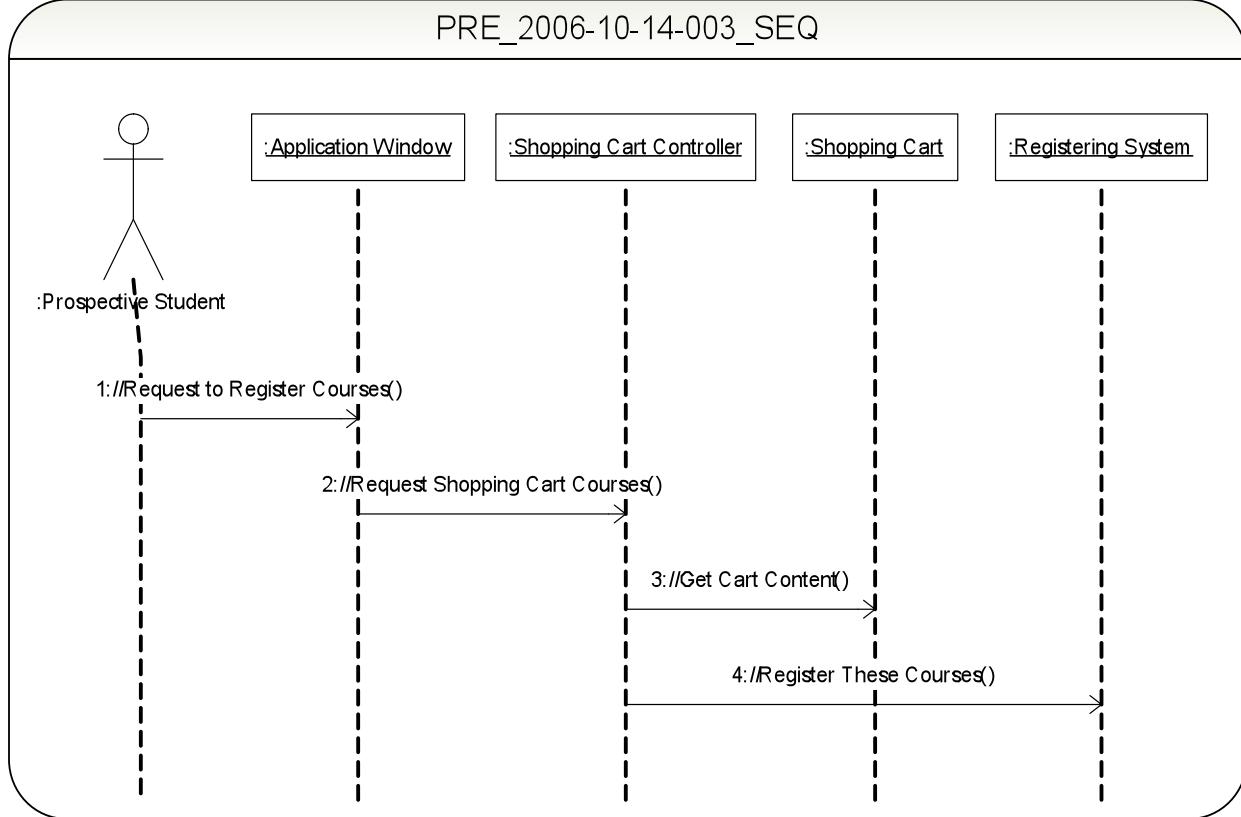
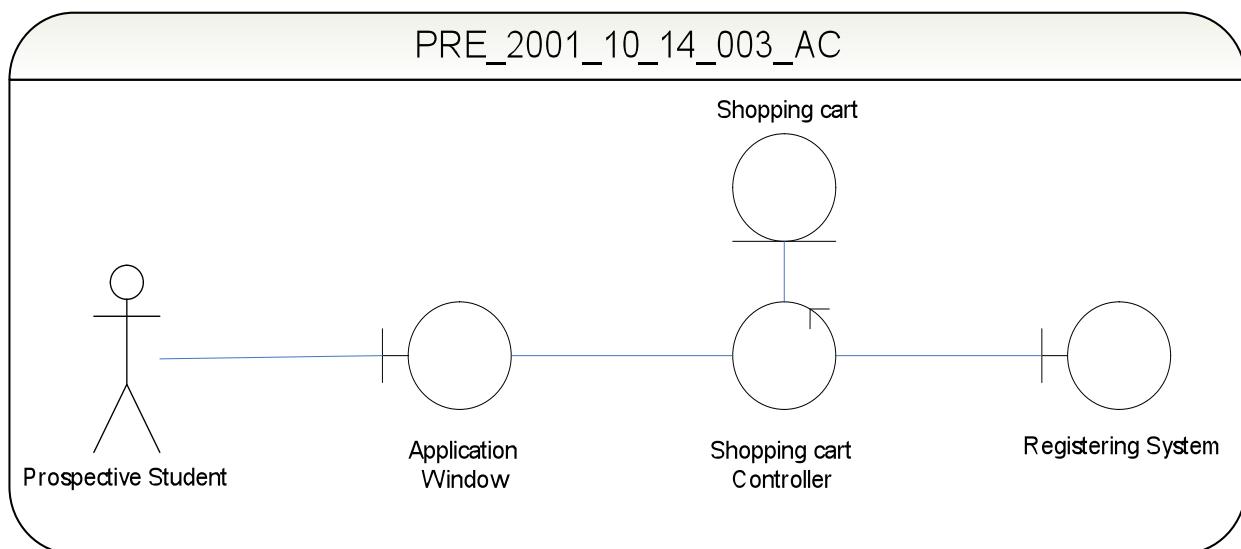
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In this happy day scenario, the prospective student's goal is to select a course from the catalog and register for that course. The prospective student will interface with the application window and click a link to get to the course search. From there, the prospective student will enter some search criteria and submit the query. The IA will then generate the search results. The prospective student will then request a sample schedule based on the items in their shopping cart. The student then sees that they can add the course. The prospective student will then choose the course they were looking for and add it to their shopping cart. Then the prospective student will navigate to their shopping cart page and choose to register for their course. They will then be redirected to the registration system with that course already entered (this last part is theoretical).

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PRE_2006-10-14_003 Register for a Course

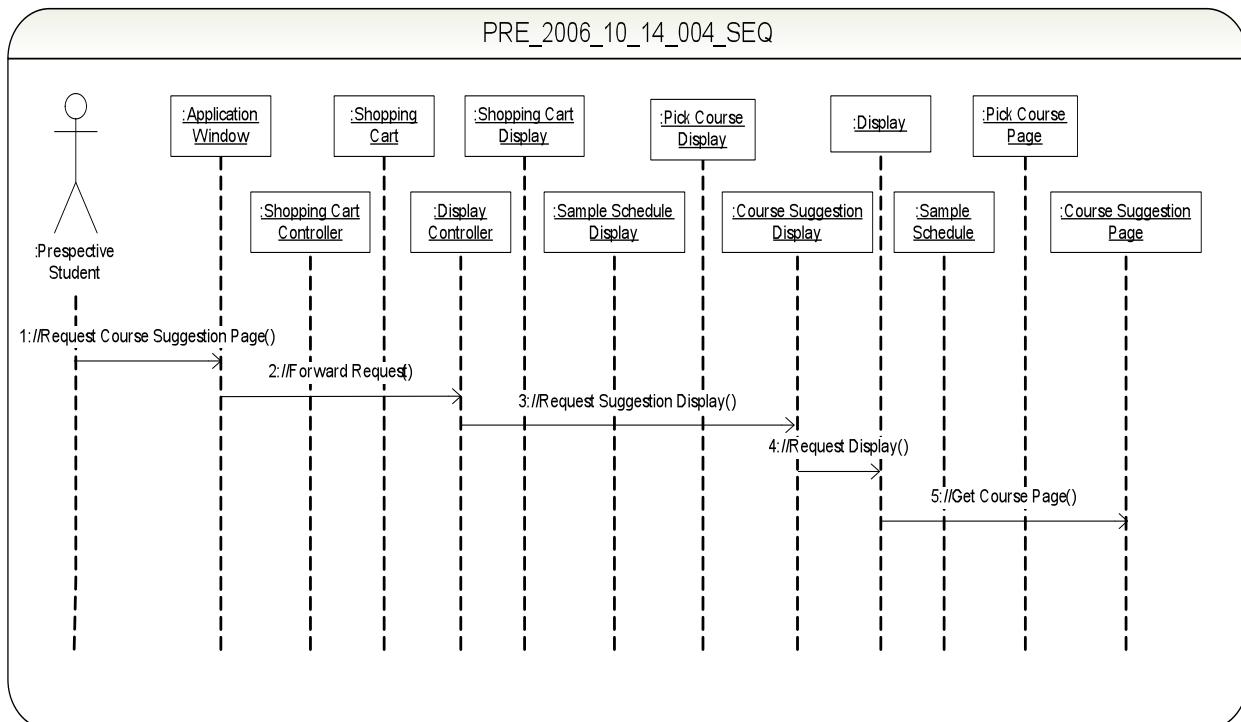
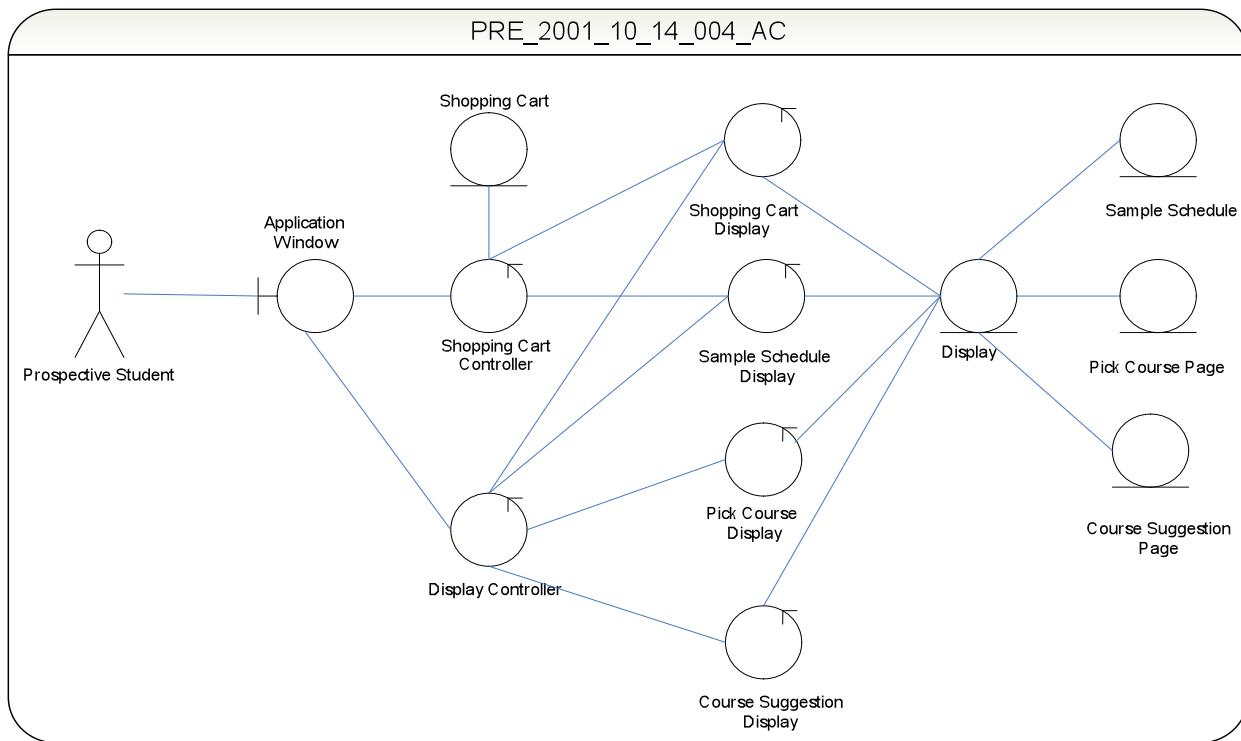


In this theoretical scenario, the prospective student can register for courses in their shopping cart. From the shopping cart page, they will directed to the registration system where their shopping cart should appear in the appropriate fields (section line numbers, etc).

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PRE_2006-10-14_004

Pre-enrollment Main Page



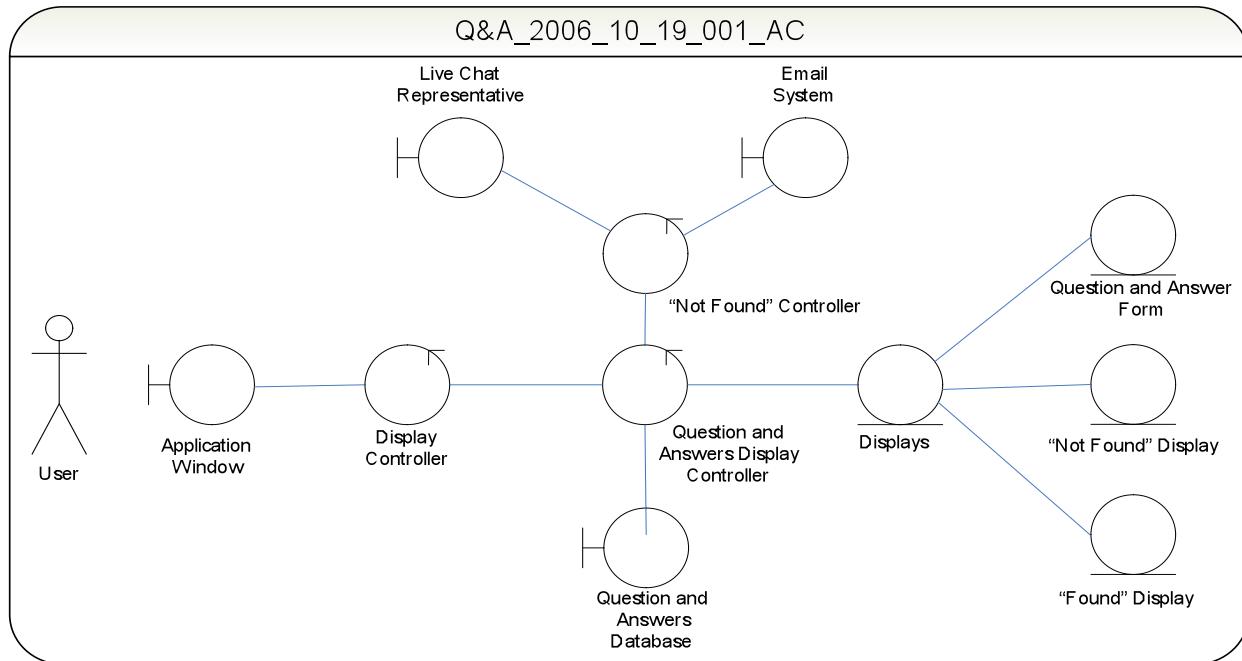
In this scenario, the prospective student wants to go to the course suggestion page, although this scenario can apply to any of the other pages (course search, shopping cart).

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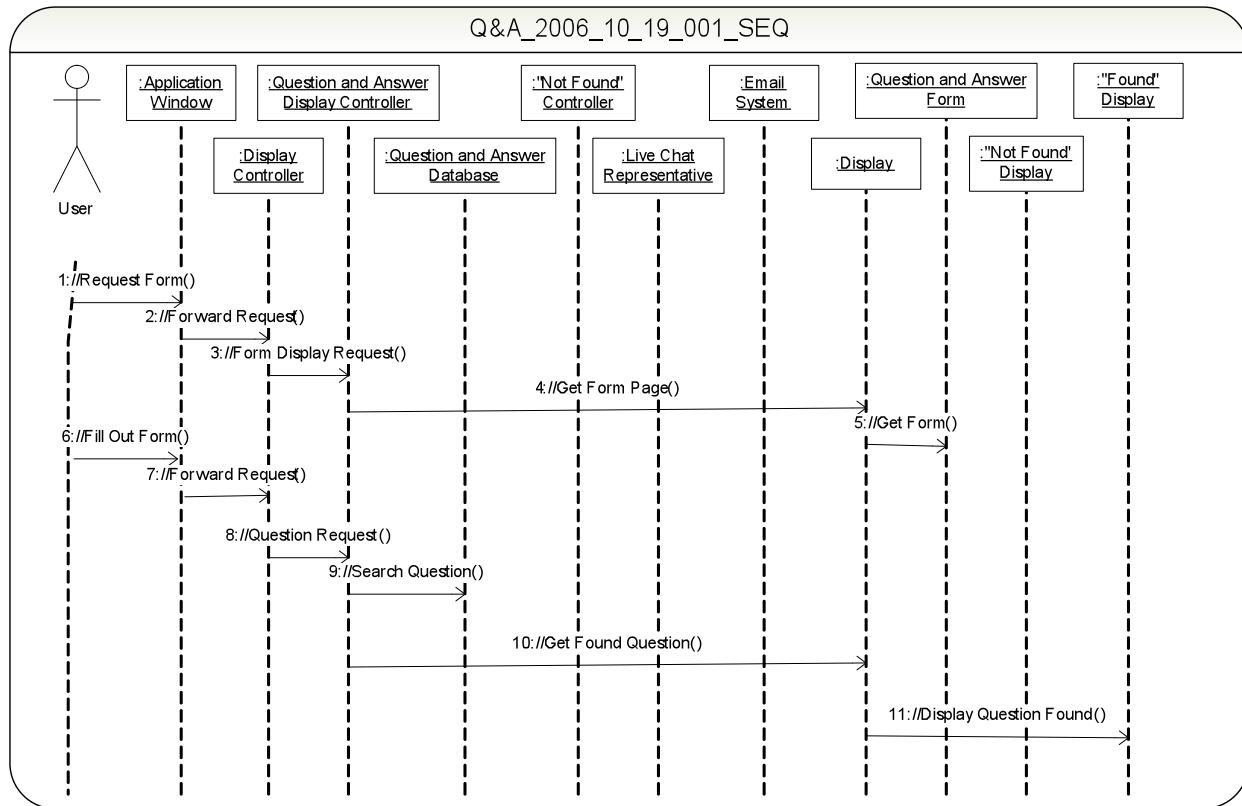
“Questions and Answers” Features

The Intelligent Agent will have the ability to provide “information desk- like” functionality in that it will be able to provide assistance to users who have questions concerning advisement, tutoring, etc.

3.1.2 Q&A_2006-10-19_001 User Questions



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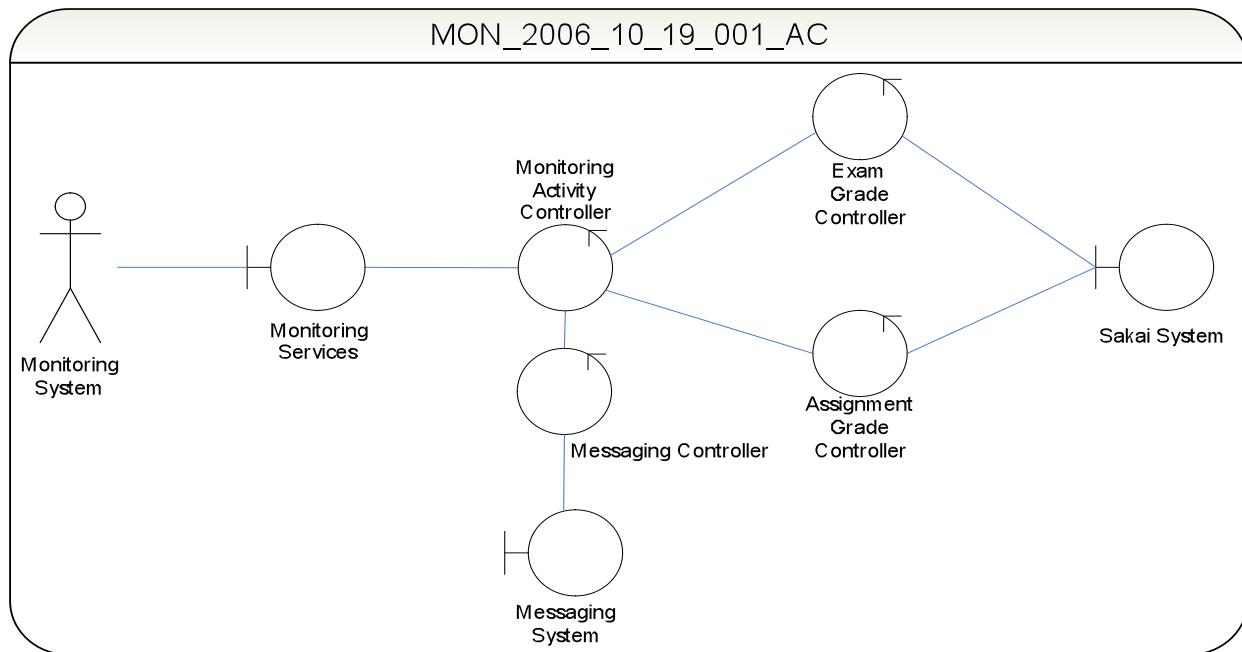
In this scenario, the user wants to ask a question and the IA will have an appropriate answer in its database. The user will navigate to the question and answer form and ask a question. The IA will then break the question up into keywords and query its database for answers that match these keywords. The IA will find appropriate answers in this scenario and display the answers according to relevance.

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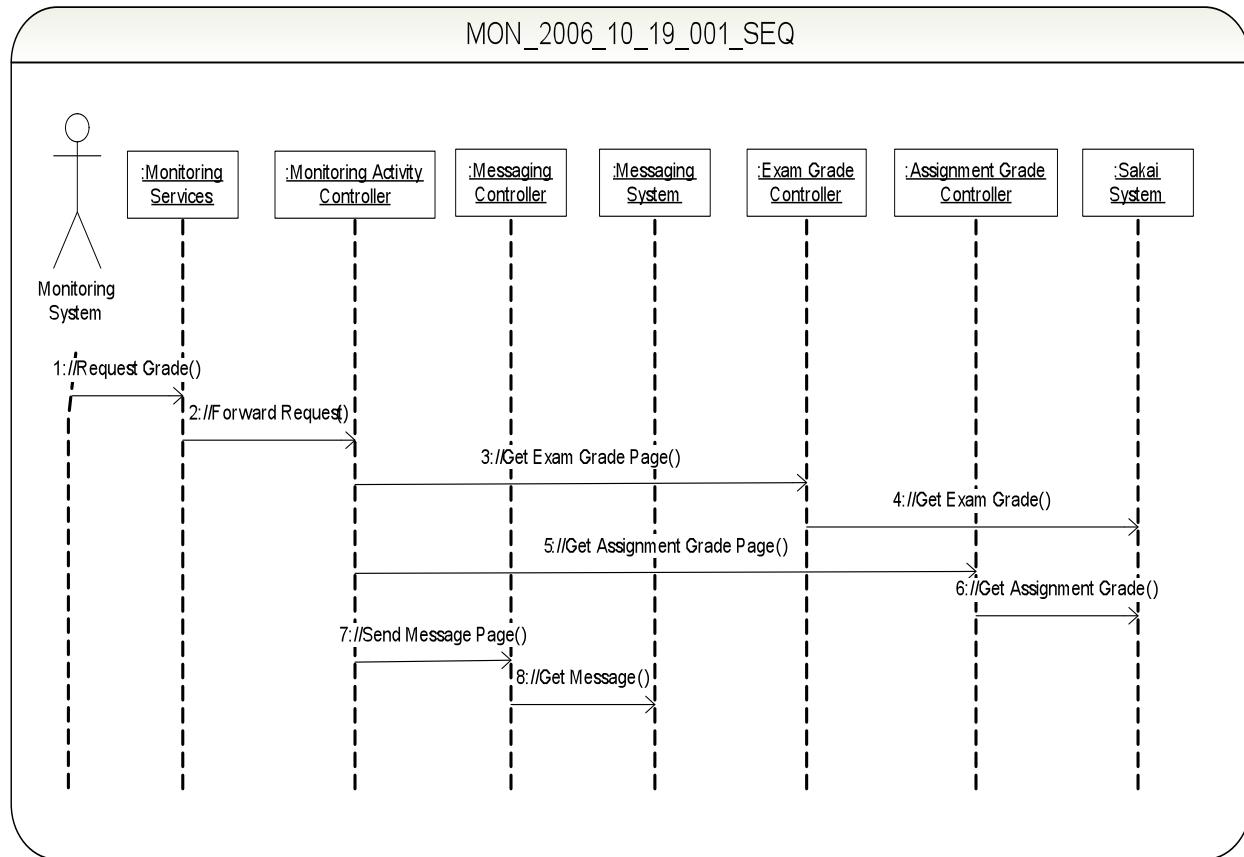
Monitoring System Features

When students logs in to the Sakai system, the Intelligent Agent (its Monitoring System) will start-up and begin monitoring that student's course data (grades, assignments, exams, etc). The Monitoring System will then determine if any of the data it receives applies to a set of business rules it contains. If there are matches, then the Monitoring System relays the message to the IA's Messaging System which relays the message to the student. It is recommended to look at the Messaging System Features below in conjunction with these features to see the complete scenario.

3.1.3 MON_2006-10-19_001 Retrieve Grade Information



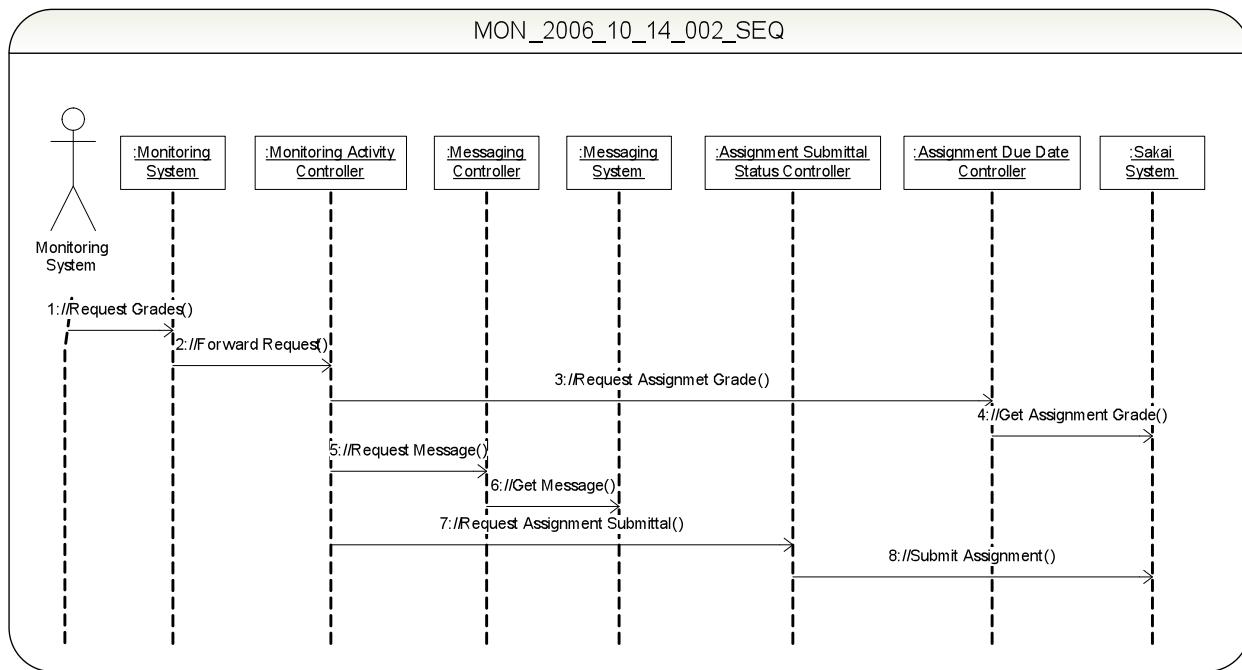
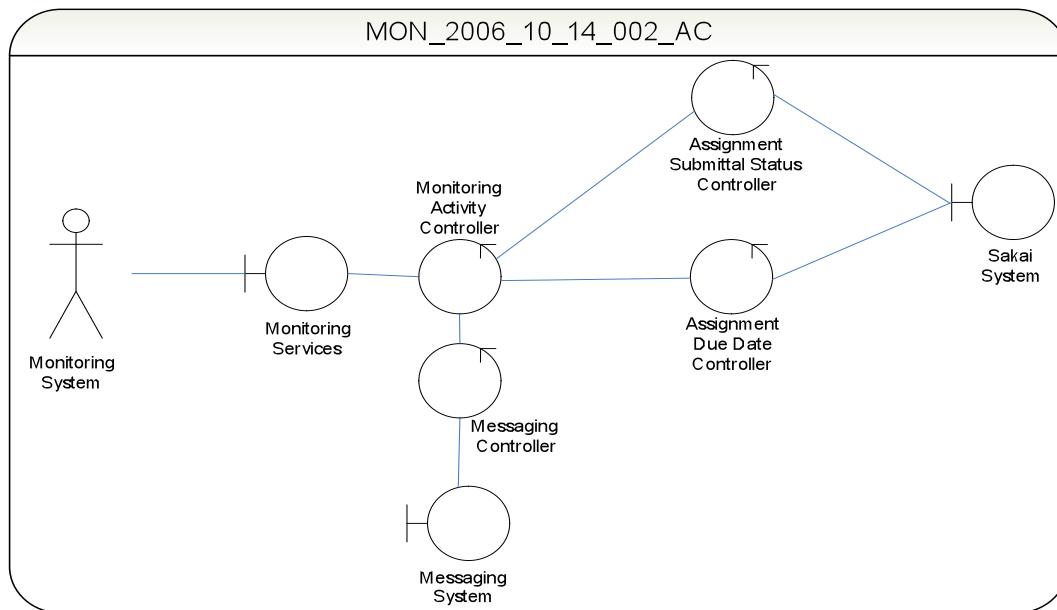
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In this scenario, the Monitoring system is checking the Sakai database for grade information. First the Monitoring system will fetch grade information about the student's current course grade, their last graded assignment, and their last exam score. In this case, the IA will find something noteworthy (either the student has a good grade or a bad grade) and it will send that information to the Messaging system.

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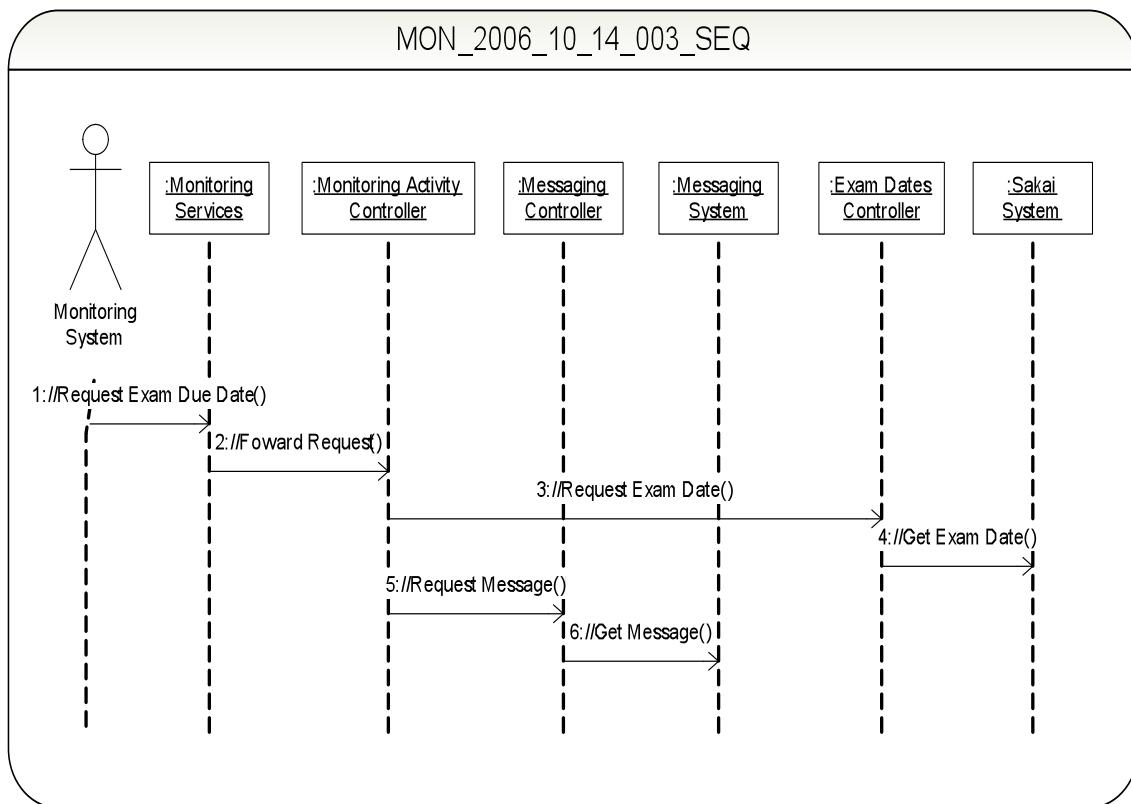
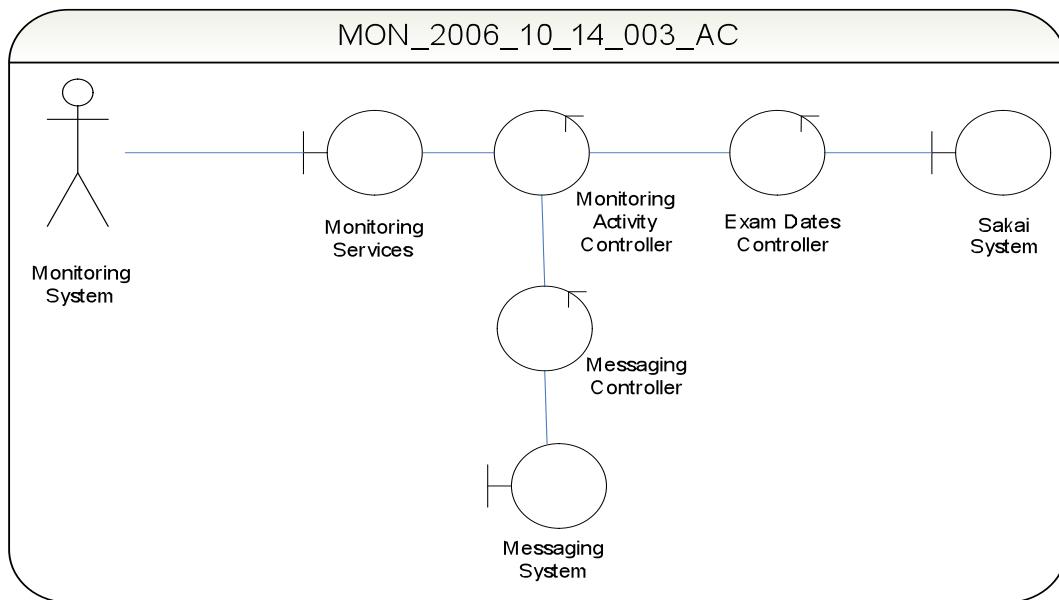
MON_2006-10-14_002 Retrieve Assignment Due Date



In this scenario, the Monitoring system is checking the Sakai database for assignment due date information. First the Monitoring system will fetch the due date information for the student's course. In this case, the IA will find something noteworthy (i.e. an assignment is due today at 3:00pm) and it will send that information to the Messaging system.

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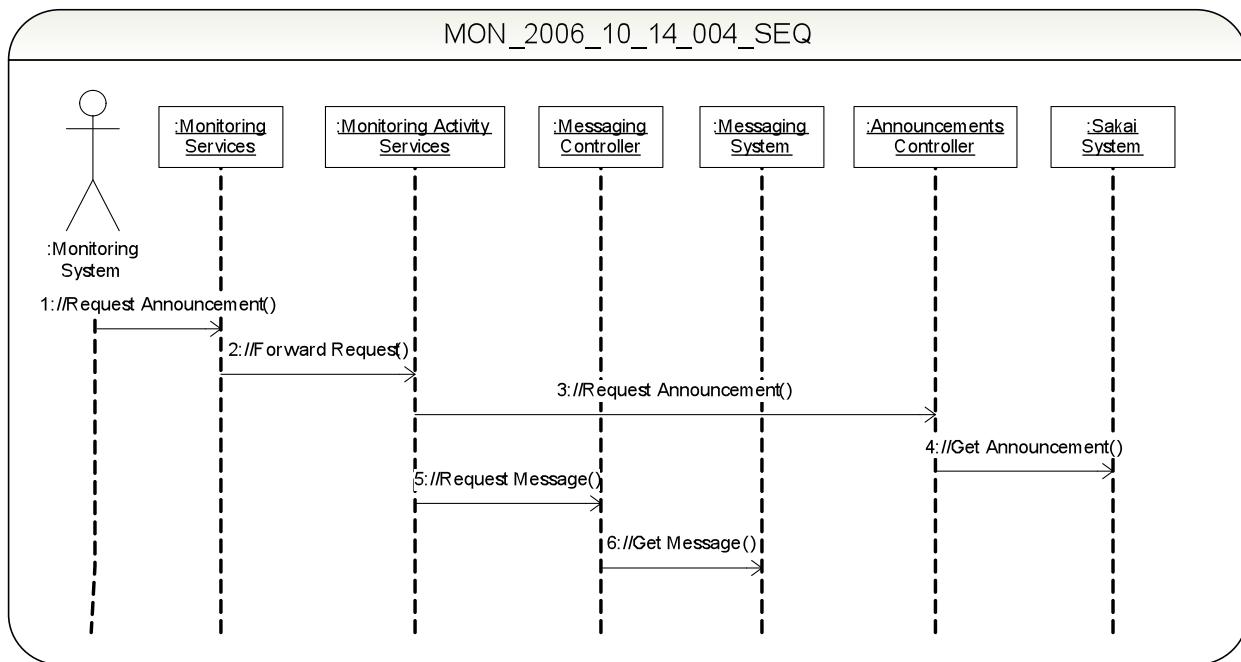
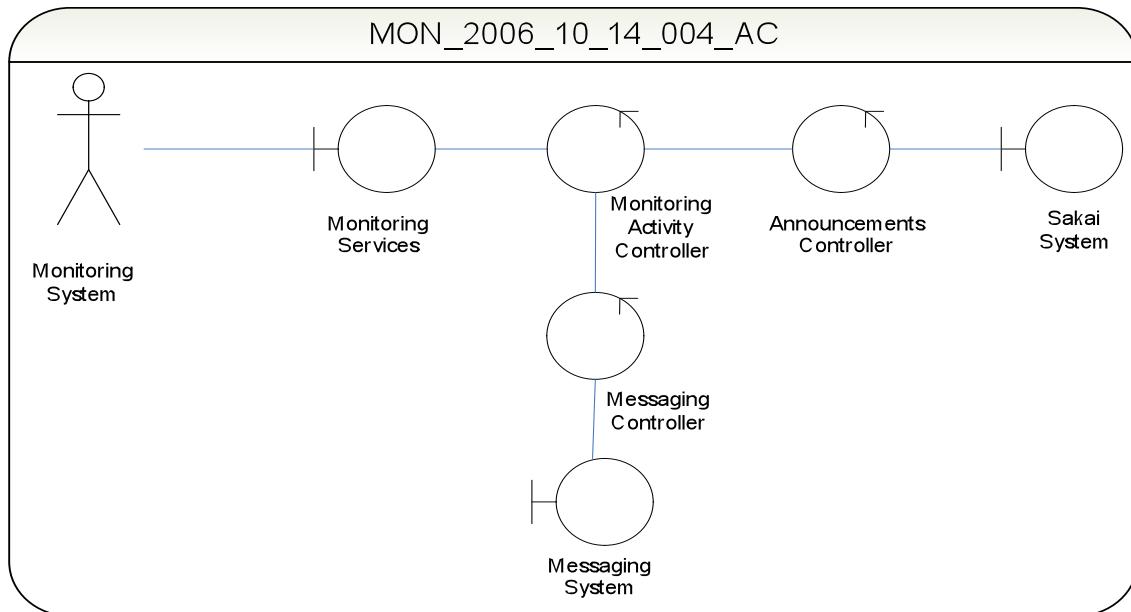
MON_2006-10-14_003 Retrieve Exam Due Date



In this scenario, the Monitoring system is checking the Sakai database for exam date information. First the Monitoring system will fetch the date information for the student's course. In this case, the IA will find something noteworthy (i.e. an exam is scheduled for this Friday) and it will send that information to the Messaging system.

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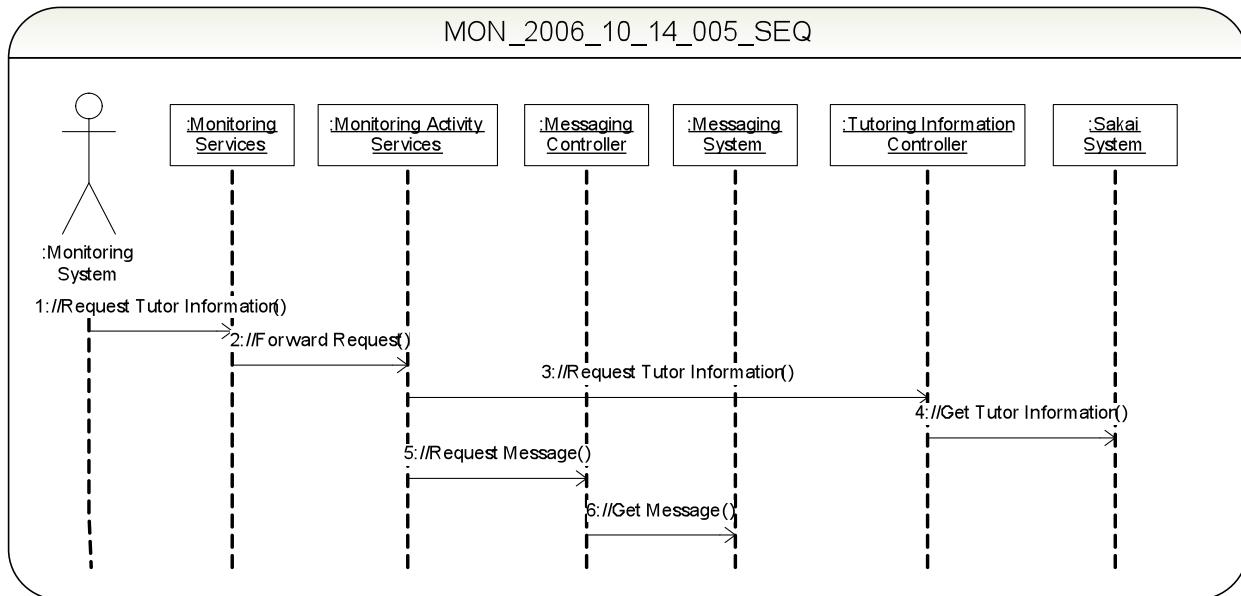
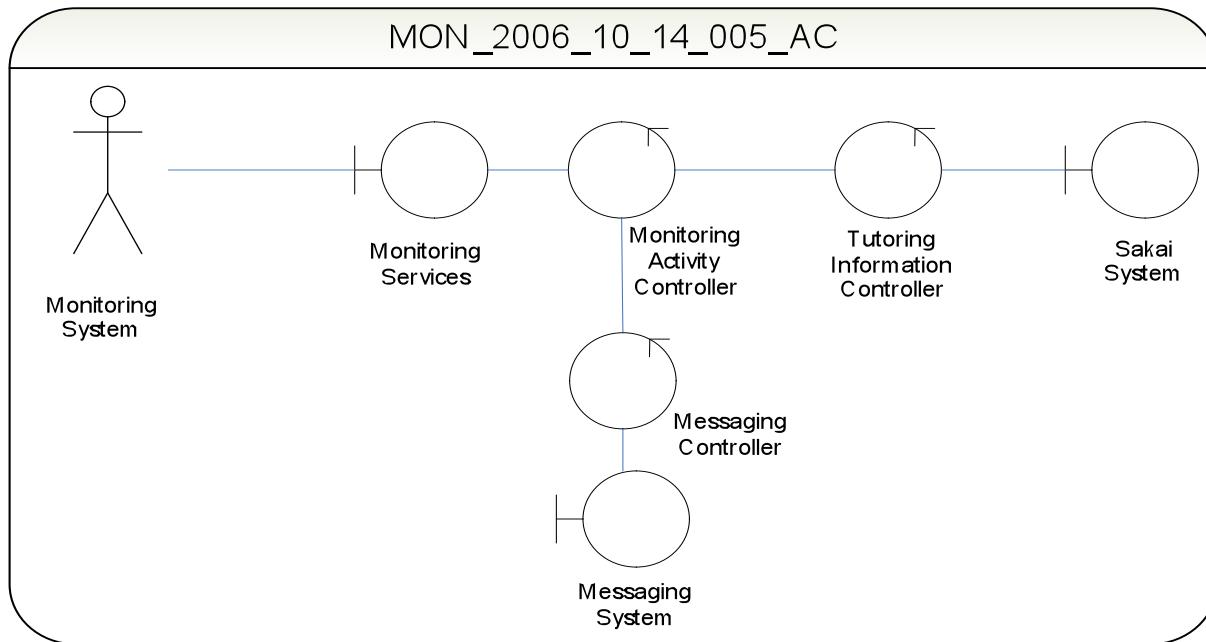
MON_2006-10-14_004 Retrieve Announcements



In this scenario, the Monitoring system is checking the Sakai database for announcement information. First the Monitoring system will fetch the announcement information for the student's course. In this case, the IA will find something noteworthy (i.e. a new announcement has been posted) and it will send that information to the Messaging system.

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MON_2006-10-14_005 Retrieve Tutor Information



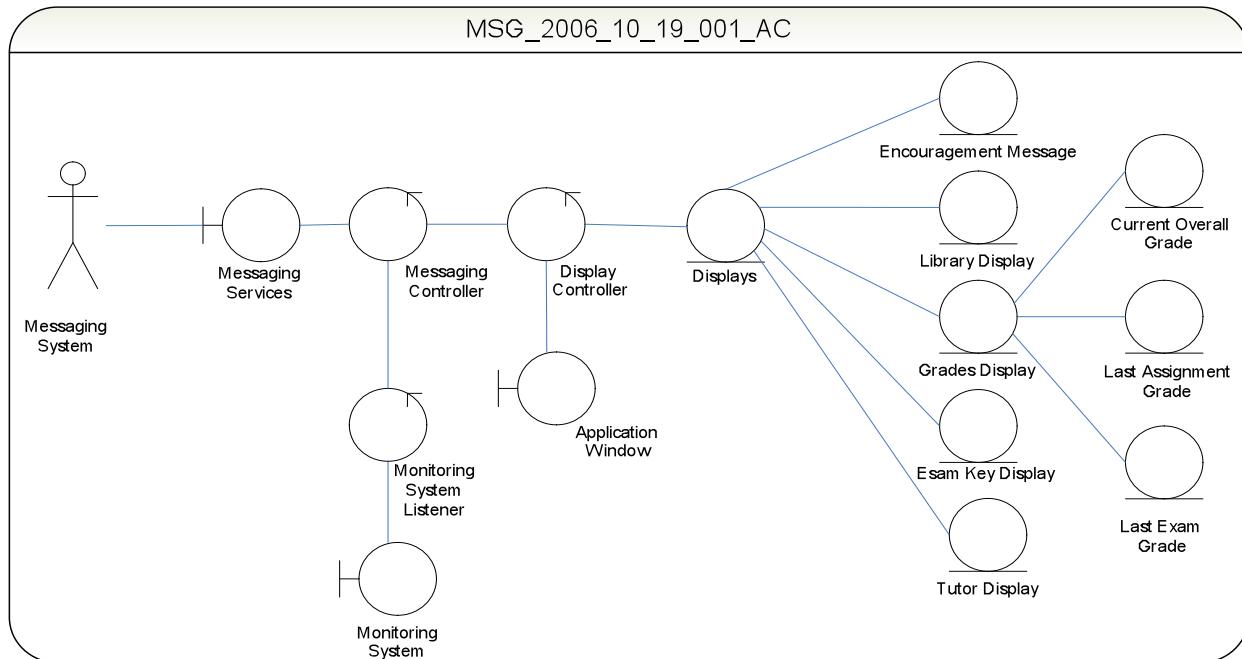
In this scenario, the Monitoring system is checking the Sakai database for tutor information. First the Monitoring system will fetch the tutor information for the student's course. In this case, the IA will relay to the Messaging system the status of a designated tutor for the course.

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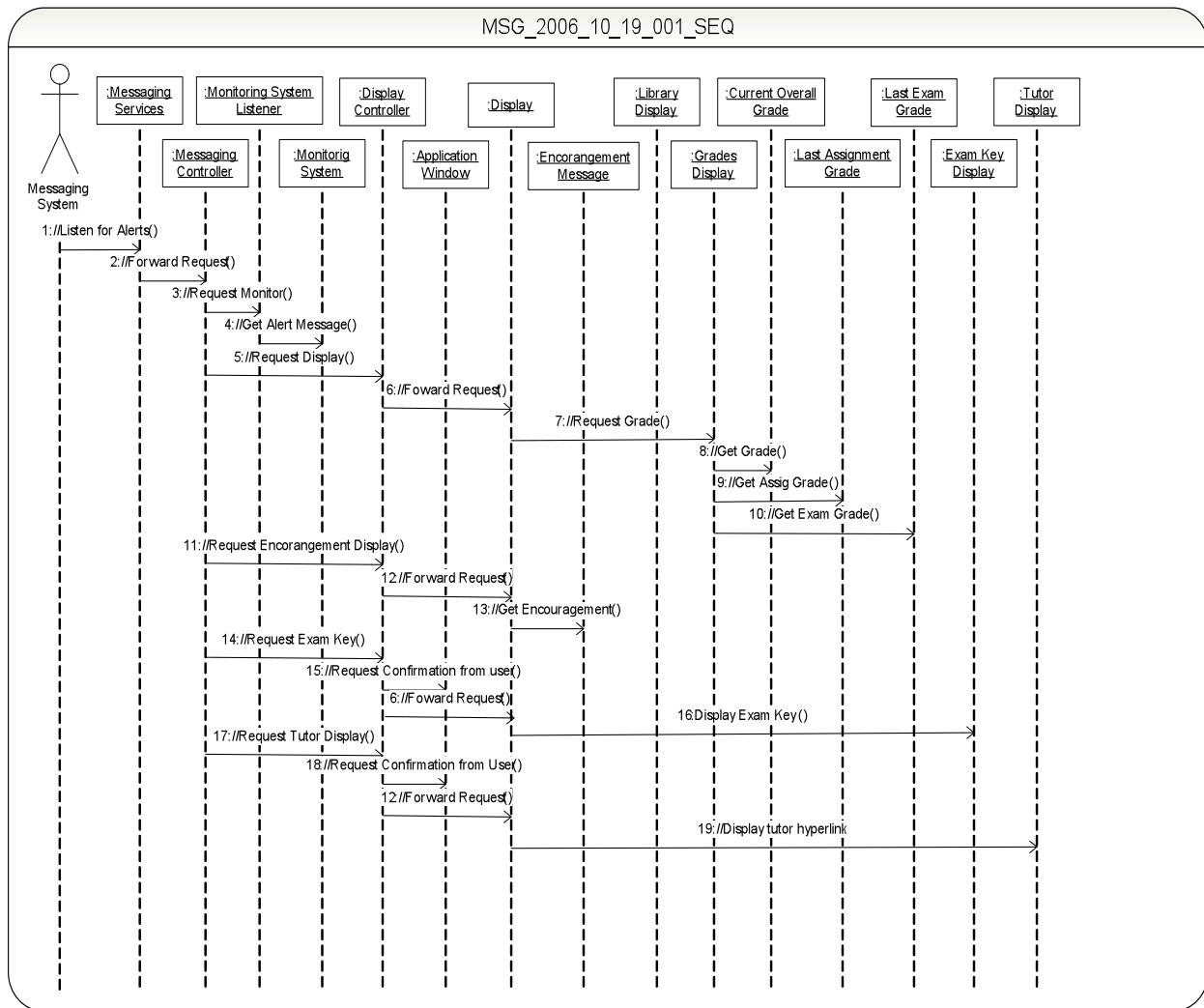
Messaging System Features

When students logs in to the Sakai system, the Intelligent Agent (its Monitoring System) will start-up and begin monitoring that student's course data (grades, assignments, exams, etc). If the Monitoring System finds something worth mentioning, it passes it along to the Messaging System. The Messaging System's responsibility is to display this information to the user.

3.1.4 MSG_2006-10-19_001 Announce Student Grades to Struggling Student



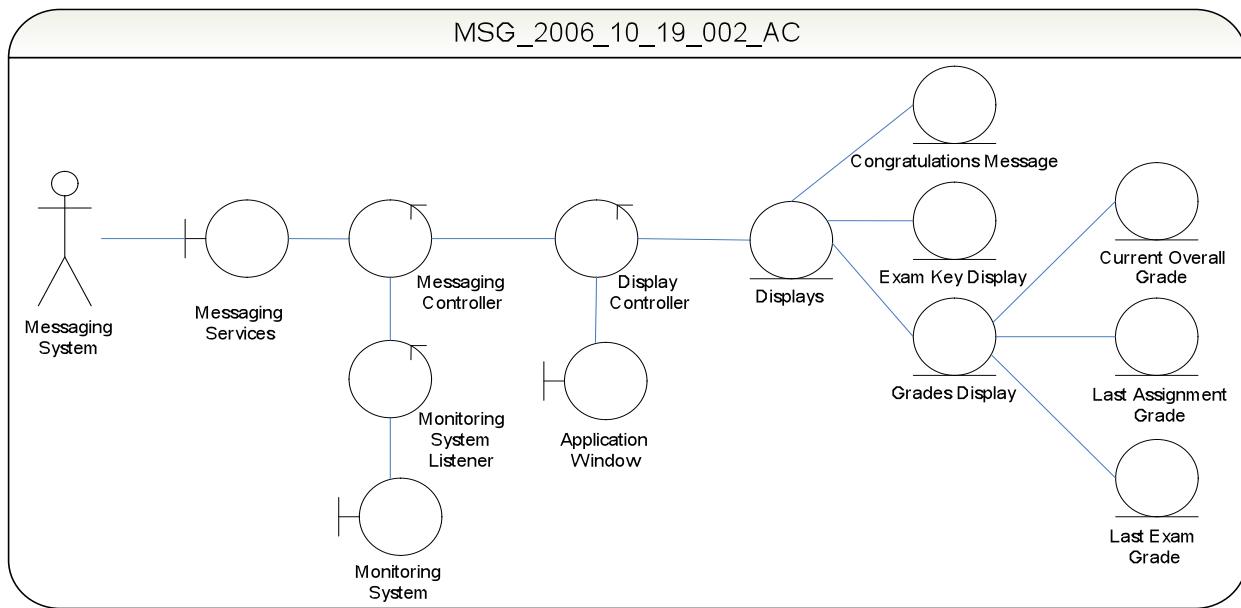
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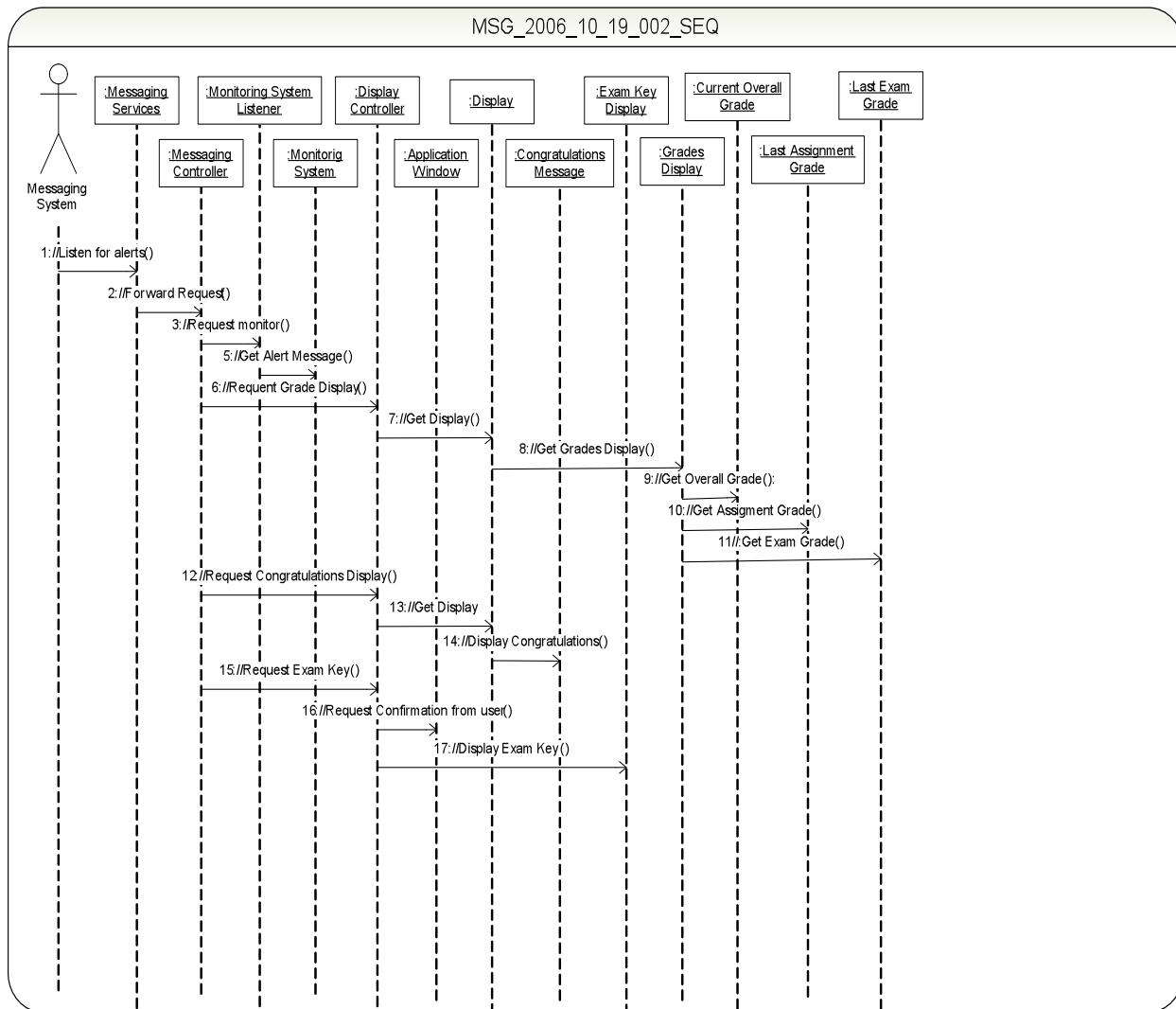
The Messaging system has one job and that's to forward information it receives from the Monitoring system to the student. In this case, the Messaging system will forward grade information to a struggling student.

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MSG _2006-10-19_002 Announce Student Grades to Exemplary Student



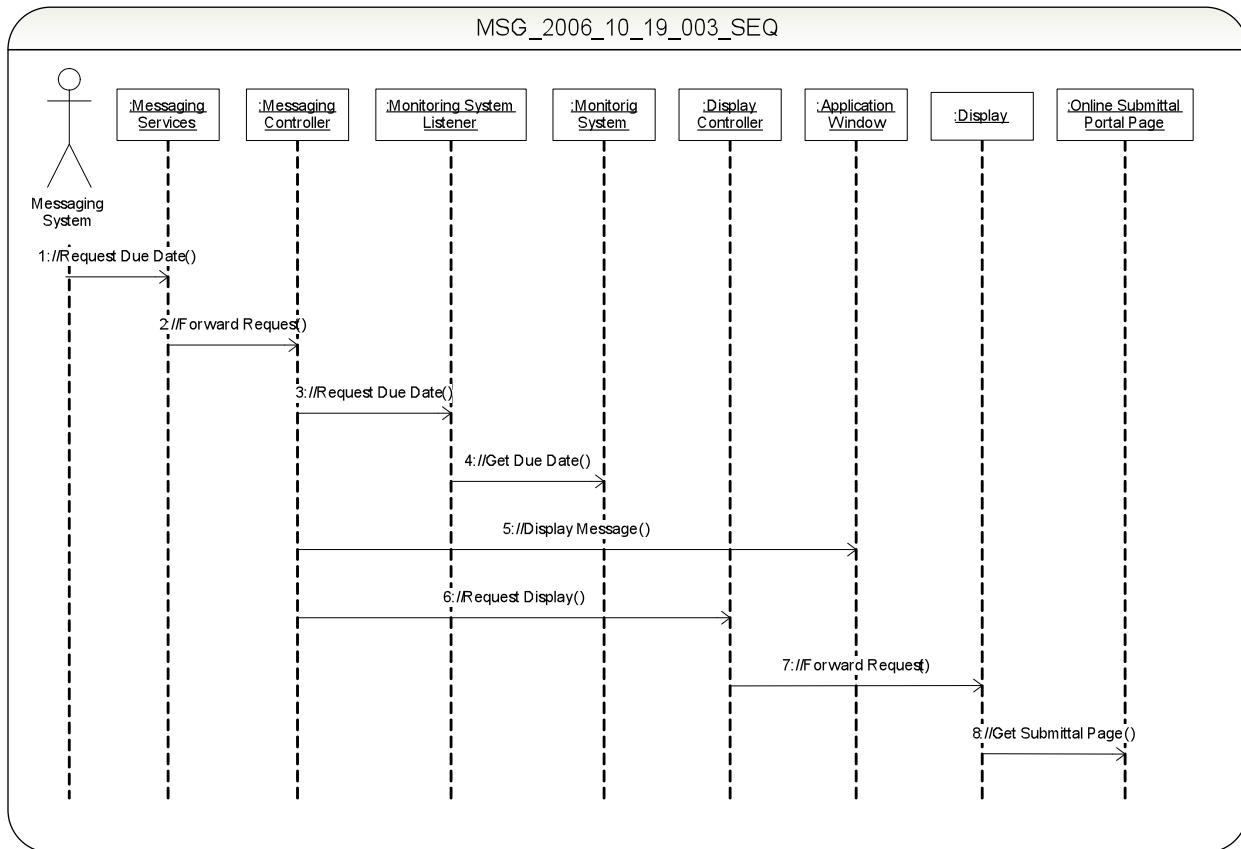
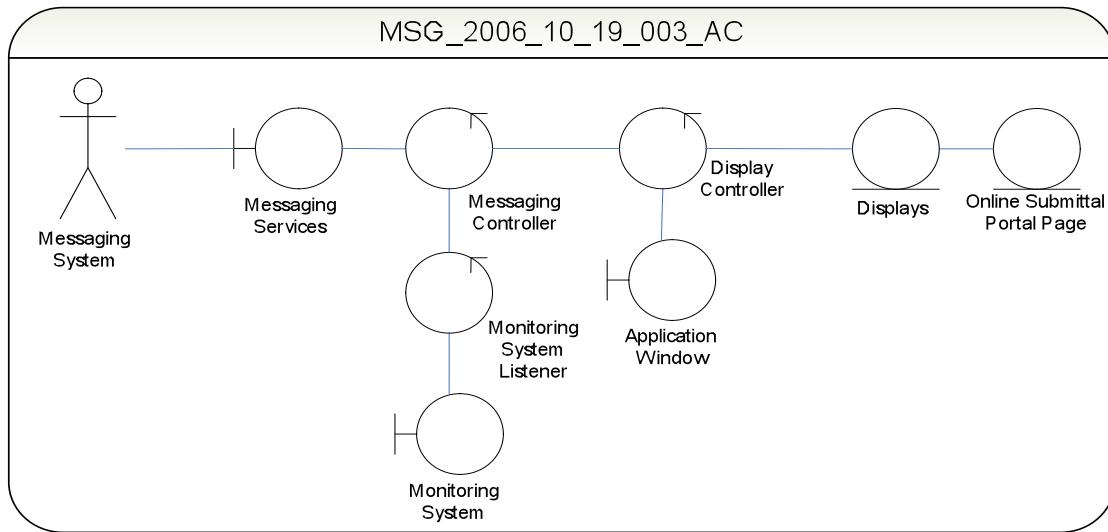
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The Messaging system has one job and that's to forward information it receives from the Monitoring system to the student. In this case, the Messaging system will forward grade information to an exemplary student.

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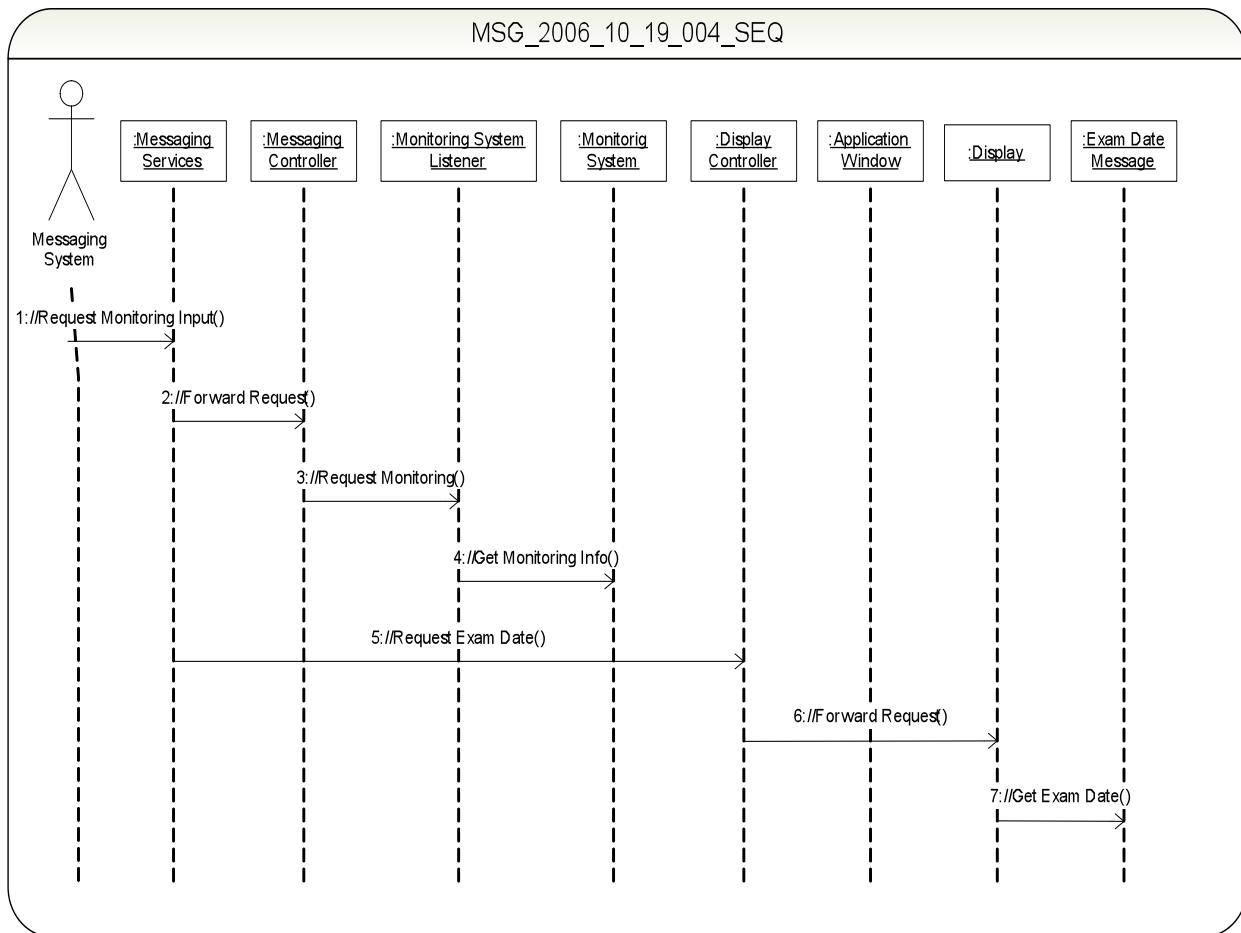
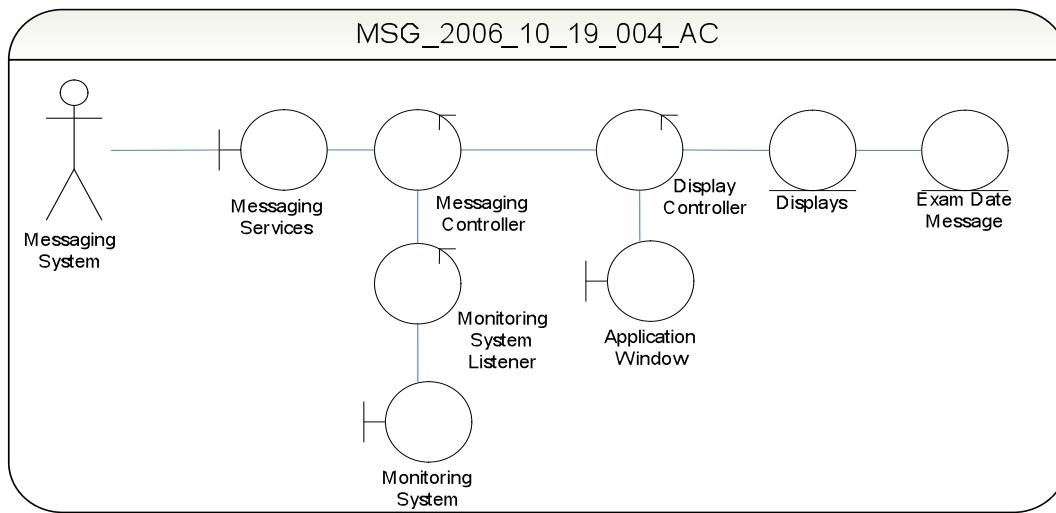
MSG_2006-10-19_003 Upcoming Assignment Due Dates Message



The Messaging system has one job and that's to forward information it receives from the Monitoring system to the student. In this case, the Messaging system will forward assignment due dates to the student.

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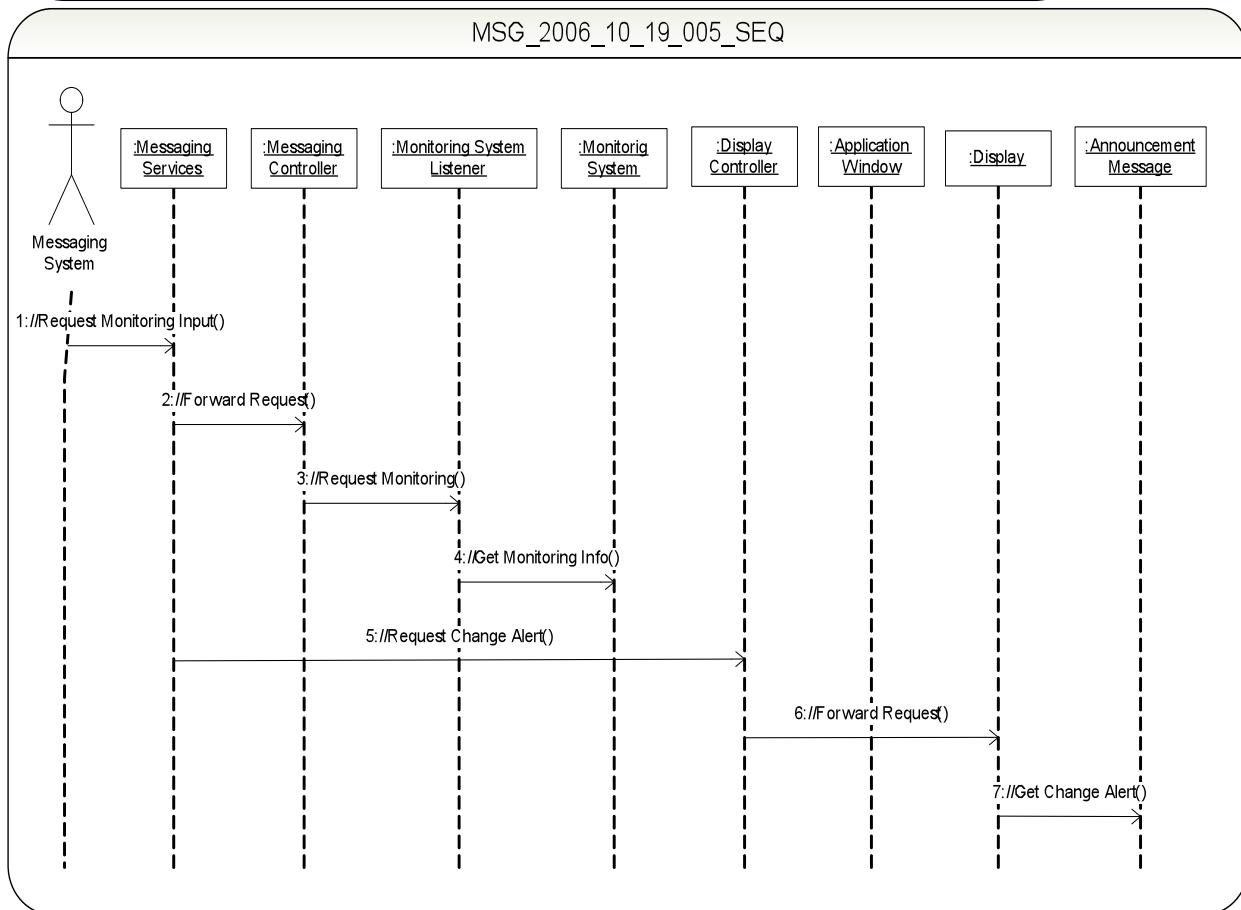
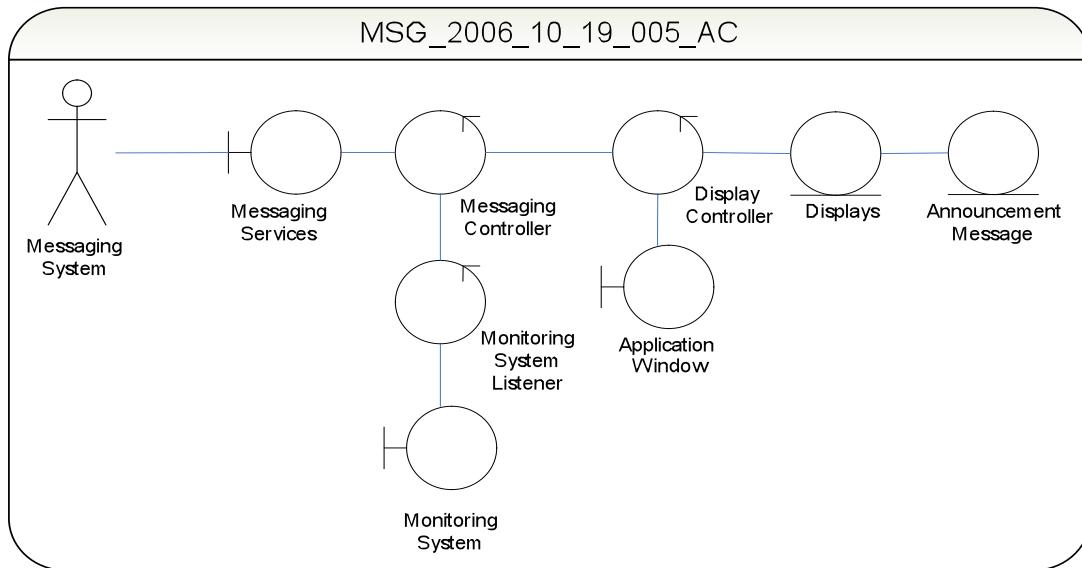
MSG_2006-10-19_004 Announce/remind Student Exam



The Messaging system has one job and that's to forward information it receives from the Monitoring system to the student. In this case, the Messaging system will forward an upcoming exam date.

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MSG_2006-10-19_005 Change Alert



The Messaging system has one job and that's to forward information it receives from the Monitoring system to the student. In this case, the Messaging system will forward new announcements posted for the course.

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4. Glossary

Arizona State University (ASU): a public institution of higher education and research with several campuses located in the Phoenix Metropolitan Area.

Business & Industry Institute (B&II): a division of Mesa Community College. It was developed during the 1980s to focus on the needs of local employers.

Business Analyst (BA): is responsible for analyzing the business needs of their clients and stakeholders to help identify business problems and propose solutions.

Back-End (BE): Back-End of the Intelligent Agent application.

Chief Architect (CA): Provides an overview and vision for the project. Decides and guides courses of action in operations by staff. Oversee the operation and direction of the project

Enrolled Student: registered students enrolled in classes.

Front-end (FE): Front-end of Intelligent Agent application.

Intelligent Agent (IA): is a program that is tailored to aid and meet the needs of students.

Mei Suo Learning Management System (LMS): Learning management system that was adapted by rSmart for the MCC China Project.

Mesa Community College (MCC): Mesa Community College in Mesa, Arizona, is the largest of the 10 community colleges in the Maricopa County Community College District.

Messaging node (MSG): responsible for displaying announcements to the user.

Monitoring node (MON): responsible for monitoring student's performance and interactions with the system.

Non-functional (NF): requirements that specify criteria that can be used to judge the operation of a system, rather than specific behaviors.

Pre-enrollment node (PRE): students who look to register for classes.

Prospective Student: students who look forward to registering with Mesa Community College.

Question and answer node (Q&A): responsible for answering user questions.

Rational Unified Process (RUP): is an iterative software development process created by the Rational Software Corporation, now a division of IBM.

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Requirements Manager (RM): Responsible for Requirements identification and tracking.
Establish a common understanding of the requirements with the customer

rSmart: The company working on the China Project for MCC. They developed the Mei Suo Learning Management System.

Software Development Plan (SDP): A description of the planned tasks and activities to be used by the developer to implement the required develop project.

Software Requirements Specification (SRS): document that provides functional specification for the system.

To be Determined (TBD): To be determined.

User Interface (UI): is the aggregate of means by which the user interacts with the system.