

System and Software Architecture Description (SSAD)

Mission Science Information and Data Management System 3.0

Team 03

Fei Yu: Project Manager, Life Cycle Planner

Yinlin Zhou: Prototyper, Operational Concept Engineer

Yunpeng Chen: Requirements Engineer

Jingwen Peng: Builder, UML Modeler

Chenguang Liu: System Architect

Steven Lee: Requirements Engineer, IIV&V, Quality Focal Point

9 December 2013

Version History

Date	Author	Version	Changes made	Rationale
09/27/13	CL	2.0	<ul style="list-style-type: none">Initial release	<ul style="list-style-type: none">Initial Team 03 draft of System Software Architecture Description
10/23/13	SL	2.1	<ul style="list-style-type: none">Update content for grammar, spelling, and term consistency	<ul style="list-style-type: none">Final draft for DC package.
11/30/13	CL	3.0	<ul style="list-style-type: none">Update the process diagram, System Context Diagram Artifacts and Information Diagram, User GridAdd Deployment diagram	<ul style="list-style-type: none">Draft for TRR package.
12/09/13	CL	3.1	<ul style="list-style-type: none">Add Use Grid	<ul style="list-style-type: none">Final for TRR package.

Table of Contents

SYSTEM AND SOFTWARE ARCHITECTURE DESCRIPTION (SSAD)	I
VERSION HISTORY	II
TABLE OF CONTENTS	III
TABLE OF TABLES.....	IV
TABLE OF FIGURES.....	V
1. <i>Introduction</i>	<i>I</i>
1.1 Purpose of the SSAD	1
1.2 Status of the SSAD	1
2. <i>System Analysis</i>	2
2.1 System Analysis Overview	2
3. <i>Technology-Independent Model</i>	<i>11</i>
3.1 Design Overview	11
4. <i>Architectural Styles, Patterns and Frameworks</i>	<i>13</i>

Table of Tables

<i>Table 1 Actors Summary.....</i>	<i>2</i>
<i>Table 2 Artifacts and Information Summary</i>	<i>4</i>
<i>Table 3 Process Description.....</i>	<i>5</i>
<i>Table 4 Typical Course Action</i>	<i>5</i>
<i>Table 5 Alternate Course of Action</i>	<i>5</i>
<i>Table 6 Process Description.....</i>	<i>6</i>
<i>Table 7 Typical Course of Action</i>	<i>6</i>
<i>Table 8 Process Description.....</i>	<i>6</i>
<i>Table 9 Typical Course of Action</i>	<i>7</i>
<i>Table 10 Exceptional Course of Action</i>	<i>7</i>
<i>Table 11 Process Description.....</i>	<i>7</i>
<i>Table 12 Typical Course of Action</i>	<i>7</i>
<i>Table 13 Alternate Course of Action</i>	<i>8</i>
<i>Table 14 Process Description.....</i>	<i>8</i>
<i>Table 15 Typical Course of Action</i>	<i>8</i>
<i>Table 16 Alternate Course of Action</i>	<i>8</i>
<i>Table 17 Process Description.....</i>	<i>9</i>
<i>Table 18 Typical Course of Action</i>	<i>9</i>
<i>Table 19 Alternate Course of Action</i>	<i>9</i>
<i>Table 20 Process Description.....</i>	<i>9</i>
<i>Table 21 Typical Course of Action</i>	<i>10</i>
<i>Table 22 Process Description.....</i>	<i>10</i>
<i>Table 23 Typical Course of Action</i>	<i>10</i>
<i>Table 24 Software Component Description.....</i>	<i>12</i>

Table of Figures

<i>Figure 1 System Context Diagram.....</i>	<i>2</i>
<i>Figure 2 Artifacts and Information Diagram</i>	<i>4</i>
<i>Figure 3 Process Diagram.....</i>	<i>5</i>
<i>Figure 4 Software Component Description</i>	<i>11</i>
<i>Figure 5 Deployment Diagram.....</i>	<i>12</i>

1. Introduction

1.1 Purpose of the SSAD

The SSAD serves to document the architecture, and more specifically, the object-oriented analysis and design of the Mission Science 3.0 system. The SSAD is to be used by the builder in building the prescribed system. The system should remain faithful to the prescribed architecture of the SSAD, or the SSAD should be updated to match the latent architecture. The SSAD is used as reference by the maintainers once the system is delivered.

1.2 Status of the SSAD

The SSAD has also been revised to more accurately document the architecture of the system as more information has been discovered. The Artifact diagrams are much more accurate, and directly from the database system with two major views: Student and Project. Grammar has been revised. Use cases are clearer and more correct. General formatting is easier to read. The references to Administrator have been corrected to Coordinator for consistency.

2. System Analysis

2.1 System Analysis Overview

The primary aim of the Mission Science 3.0 Access Database is facilitate teaching STEM lessons to elementary children. This includes maintaining the system for Maintainer. It also includes managing STEM project, activity and Search functions for Administrator. Student worker could manage survey, sub activity, sign in sheet, reserve inventory and input results for survey.

2.1.1 System Context

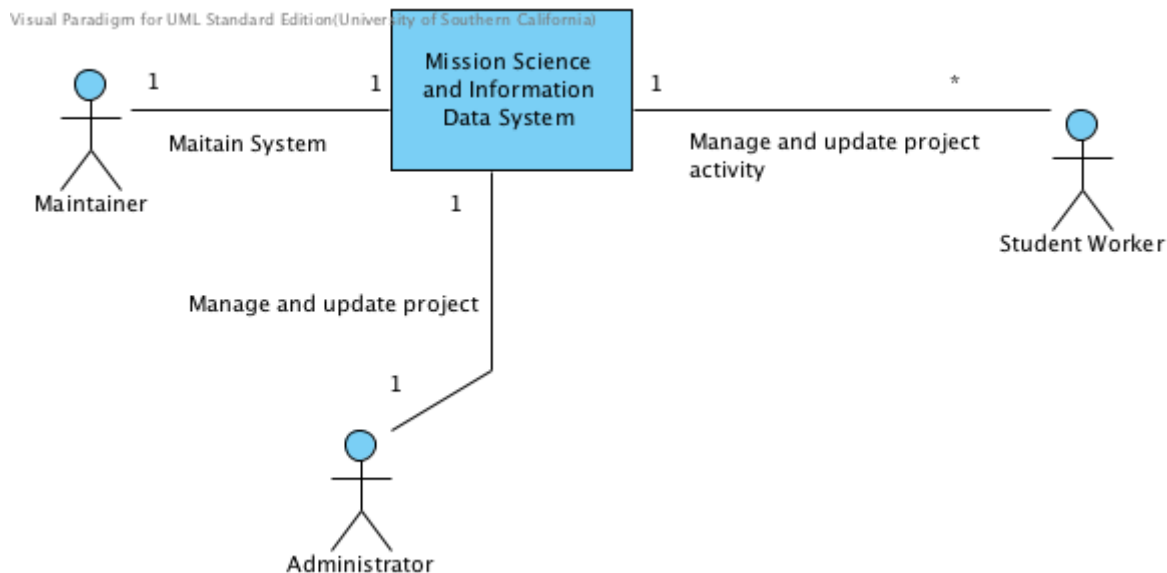


Figure 1 System Context Diagram

Table 1 Actors Summary

Actor	Description	Responsibilities
Administrator	Manager of the database system and coordinator of Mission Science efforts	<ul style="list-style-type: none"> • Manage STEM project • Manage activity • Search
Student Worker	Viterbi/USC graduate student visits the various STEM school locations to teach the specified lesson plan(s).	<ul style="list-style-type: none"> • Manage survey • Manage sub activity • Sign in sheet • Reserve inventory • Input results for survey

Actor	Description	Responsibilities
Maintainer	One of the team members will maintain the system	<ul style="list-style-type: none"> Maintain the system

2.1.2 Artifacts & Information

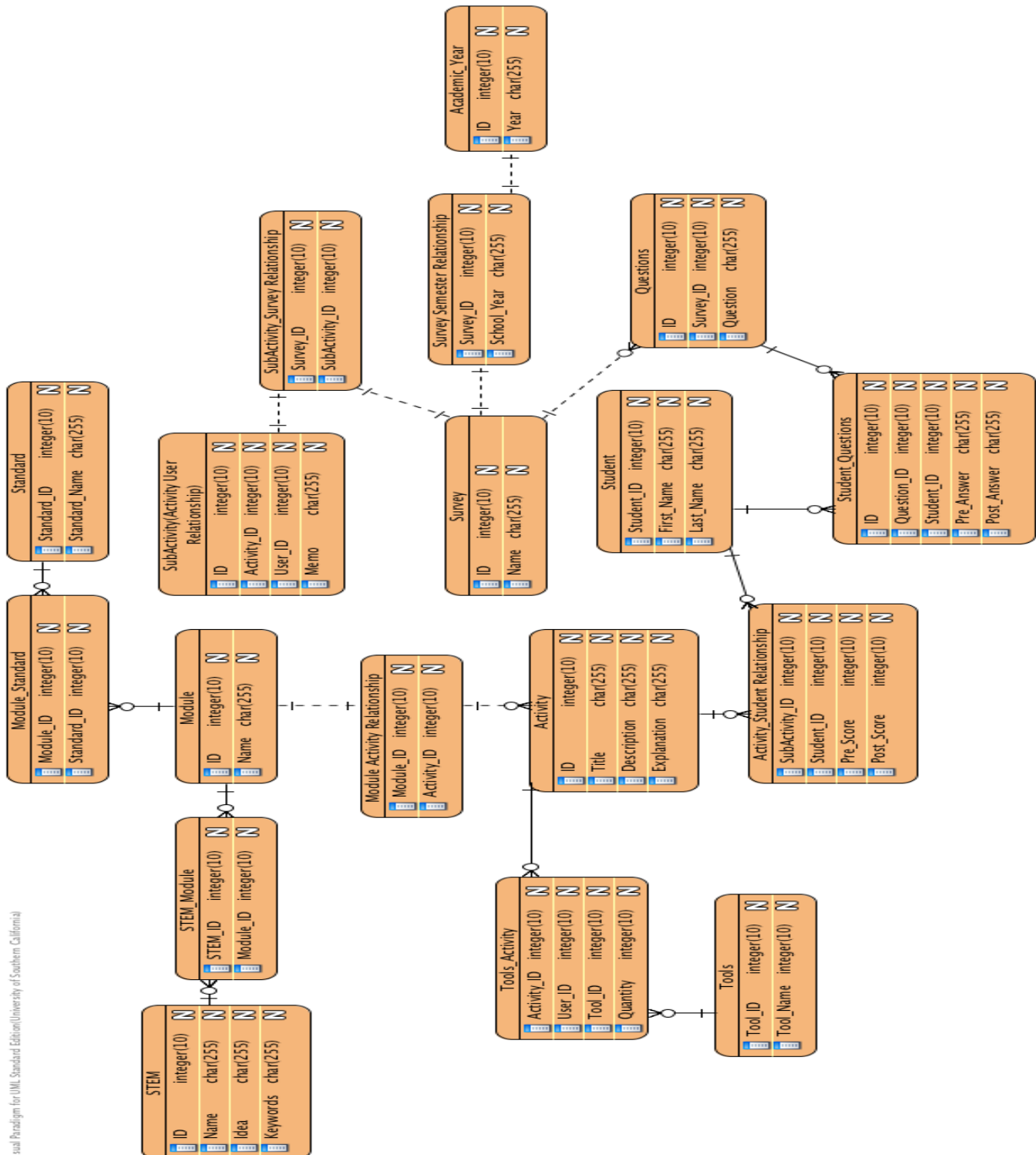


Figure 2 Artifacts and Information Diagram**Table 2 Artifacts and Information Summary**

Artifact	Purpose
Project	Project means new STEM project here. STEM means science, technology, engineering and mathematics.
Module	Each project includes several modules.
STEM_Module	The relationship table for STEM project and Module.
Standard	The standard that government formulated should be consistency with the STEM project.
Module_Standard	Relationship table for Module and Standard.
Activity	Each module includes sever Activities.
Module_Activity	Relationship table for Module and Activity.
Tools	All possible tools and materials that are documented.
Tools_Activity	Relationship table for Tools and Activity.
Student	The Student take all the projects.
Activity_Student	Relationship table for Activity and Student.
Questions	Relationship table of Questions and Survey.
Student Questions	This table includes all the answers of students.
Survey	The survey for each Sub activity.
SubActivity	Relationship table for Activity and User.
SubActivity_Survey	Relationship table for Module and Standard
AcademicYear	Students have information associated for each Academic Year.
Survey_AcademicYear	Relationship table for Module and Standard

2.1.3 Behavior

Visual Paradigm for UML Standard Edition(University of Southern California)

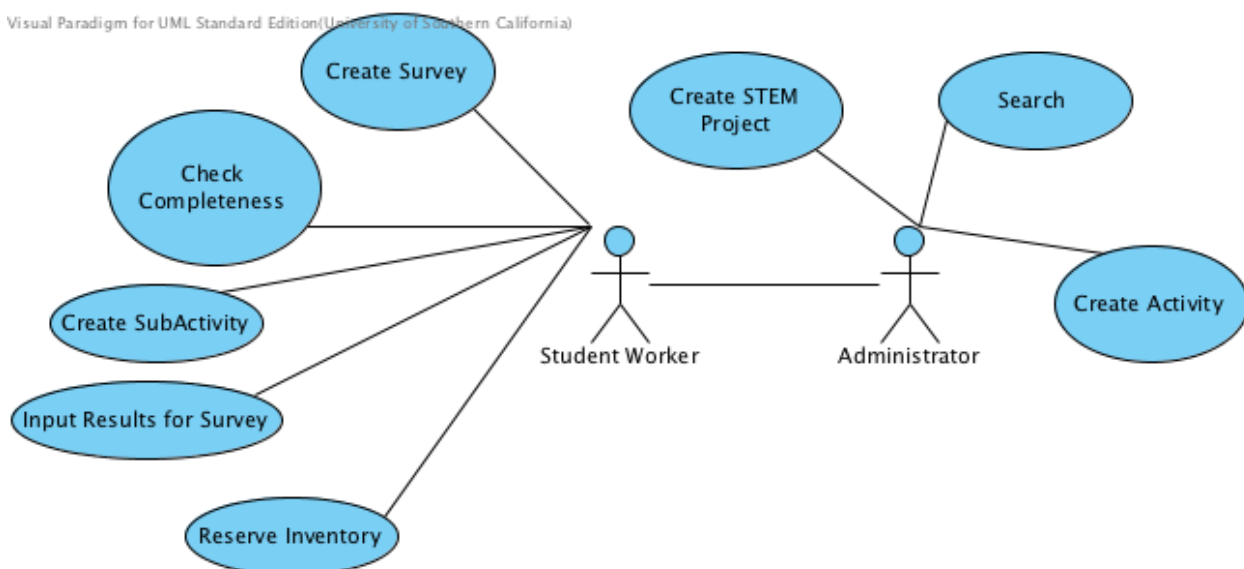


Figure 3 Process Diagram**2.1.3.1 Administrator Behavior****2.1.3.1.1 Create STEM Project****Table 3 Process Description**

Identifier	UC-1: Create STEM Project
Purpose	Add and update information about STEM Project
Requirements	Administrator has designed the STEM Project
Development Risks	STEM project information may be incomplete
Pre-conditions	A particular project should not already be in the database.
Post-conditions	The particular project will be recorded in the database

Table 4 Typical Course Action

Seq#	Actor's Action	System's Response
1	Input project name and main idea	
2	Choose a module or add a new module	
3	Choose a keyword or add a new keyword	
4	Click Create	
5		Show the message "Successfully Created"

Table 5 Alternate Course of Action

Seq#	Actor's Action	System's Response
1	Input project name and main idea	
2	Choose a module or add a new module	
3	Choose a keyword or add a new keyword	
4	Click create	
5		Show the message "This project has been created."
6	Decide to change information, or not enter project	

2.1.3.1.2 Create Activity

Table 6 Process Description

Identifier	UC-3: Create Activity
Purpose	Add and update information about activity
Requirements	The student worker designs an activity and knows which Project it belongs to.
Development Risks	Activity information may be incomplete
Pre-conditions	A particular activity should not already be in the database
Post-conditions	The particular activity will be recorded in the database

Table 7 Typical Course of Action

Seq#	Actor's Action	System's Response
1	Input activity name	
2	Input description and explanation of this activity	
3	Select a module	
4	Select a standard and add it	
5	Select a national standard and add it	
6	Select a next standard and add it	
7	Click create	
8		Show the message "Successfully Created."

2.1.3.1.3 Search

Table 8 Process Description

Identifier	UC-4: Search
Purpose	Search something special information by an item
Requirements	There exists the item the user want to Search
Development Risks	The particular item doesn't exist or exists duplicate items.
Pre-conditions	
Post-conditions	If the item is existed, show the search result. If not, show no result is found

Table 9 Typical Course of Action

Seq#	Actor's Action	System's Response
1	Input something need to be searched	
2	Choose the item searched by	
3	Click Search button	
4	Double click the item	
5		Show the search result

Table 10 Exceptional Course of Action

Seq#	Actor's Action	System's Response
1	Input something need to be searched	
2	Choose the item searched by	
3	Click search button	
4		Show no search result is found
5	Re-input something need to be searched	

2.1.3.2 Student worker Behavior

2.1.3.2.1 Create SubActivity

Table 11 Process Description

Identifier	UC-3: Create SubActivity
Purpose	Add and update information about SubActivity
Requirements	The student worker designs a subactivity and knows which activity it belongs to.
Development Risks	SubActivity information may be incomplete.
Pre-conditions	A particular subactivity should not already be in the database.
Post-conditions	The particular subactivity will be recorded in the database.

Table 12 Typical Course of Action

Seq#	Actor's Action	System's Response
1	Select a particular activity	
2	Select a user	
3	Input memo	
4	Select Tools and add them	
5	Input survey name	
6	Add questions	
7	Click create	
8		Show message "Successfully Created."

Table 13 Alternate Course of Action

Seq#	Actor's Action	System's Response
1	Select a particular activity	
2	Select a user	
3	Input memo	
4	Select Tools and add them	
5	Input survey name	
6	Add questions	
7	Click create	
8		Show message "This subactivity has been created."
9	Decide to change information, or not enter subactivity	

2.1.3.2.2 Create Survey**Table 14 Process Description**

Identifier	UC-2: Create Survey
Purpose	Add and update information about Survey
Requirements	The administrator has designed the Survey
Development Risks	Survey information may be incomplete
Pre-conditions	A particular survey should not already be in the database
Post-conditions	The particular survey will be recorded in the database

Table 15 Typical Course of Action

Seq#	Actor's Action	System's Response
1	Input survey name	
2	Choose survey year	
3	Input questions	
4	Click create	
5		Show message "Successfully Created."

Table 16 Alternate Course of Action

Seq#	Actor's Action	System's Response
1	Input survey name	
2	Choose survey year	
3	Input questions	
4	Click create	
5		Show message "This survey has been created."

6	Decide to change information, or not enter survey	
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2.1.3.2.3 Input Results for Survey

Table 17 Process Description

Identifier	UC-7: Input Results for Survey
Purpose	Input students result of survey
Requirements	The student worker has designed the question
Development Risks	
Pre-conditions	A particular survey result should not already be in the database
Post-conditions	The particular survey result will be recorded in the database

Table 18 Typical Course of Action

Seq#	Actor's Action	System's Response
1	Input student name	
2	Choose survey year	
3	Click Search button	
4	Input result	
5		Show message "Successfully Input."

Table 19 Alternate Course of Action

Seq#	Actor's Action	System's Response
1	Input student name	
2	Choose survey year	
3	Click Search button	
4	Input result	
5		Show message "This survey result has been created."
6	Decide to change information, or not enter survey result	

2.1.3.2.4 Sign In Sheet

Table 20 Process Description

Identifier	UC-5: Sign in sheet
Purpose	Check if the student complete this lesson
Requirements	The student, sub activity has been created in the database
Development	No this sub activity in the database.

Risks	
Pre-conditions	A particular student has not signed in a particular project
Post-conditions	A particular student has signed in a particular project

Table 21 Typical Course of Action

Seq#	Actor's Action	System's Response
1	Input student name	
2	Select a semester year	
3	Click Get Student Button	
4	Select project name	
5	Select project date	
6	Select user name	
7	Check the student who took the lesson	
8		Show message "Successfully Input."

2.1.3.2.5 Reserve Inventory**Table 22 Process Description**

Identifier	UC-8: Reserve Inventory
Purpose	Reserve inventory
Requirements	The tools existed in the database
Development Risks	Reservation might be less than zero.
Pre-conditions	A particular tool should not be reserved.
Post-conditions	A particular tool will be reserved.

Table 23 Typical Course of Action

Seq#	Actor's Action	System's Response
1	Input project name	
2	Input tools name	
3	Click Search button	
4	Double one item	
5	Input number need to be reserved	
6		Show message "Successfully Input."

3. Technology-Independent Model

3.1 Design Overview

3.1.1 System Structure

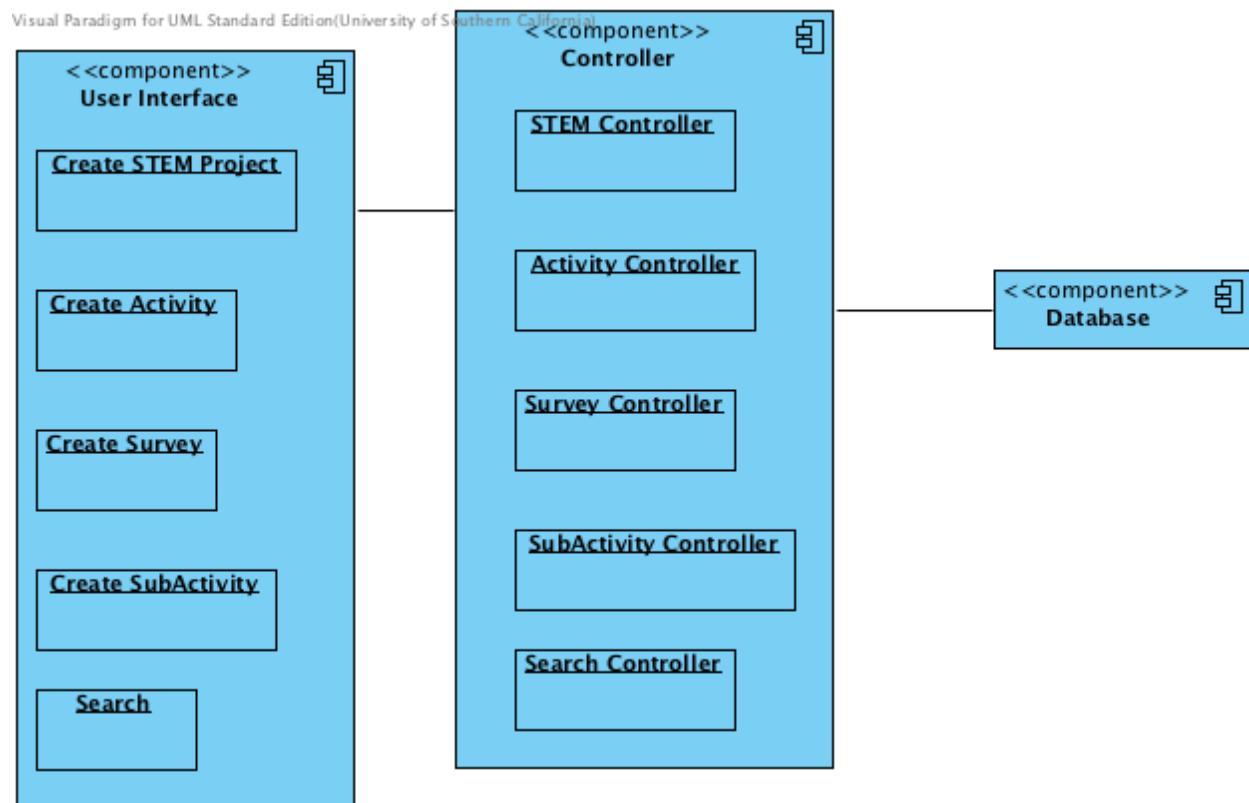


Figure 4 Software Component Description

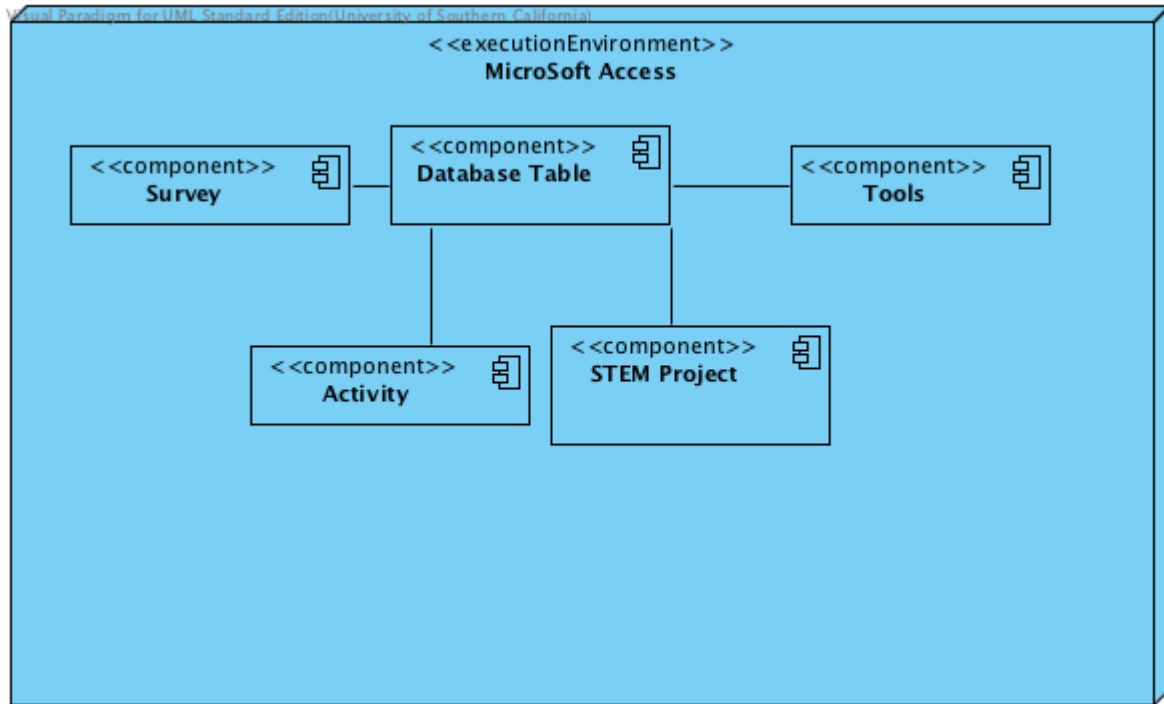


Figure 5 Deployment Diagram

Table 24 Software Component Description

Software Component	Description
User Interface	This item includes STEM project UI, Activity UI, Survey UI, Sub Activity UI and Search UI.
Controller	This item includes STEM Controller, Activity Controller, Survey Controller, Sub Activity Controller and Search Controller.
Database	This item stores all the data.

4. Architectural Styles, Patterns and Frameworks

Table 25 Architectural Styles, Patterns, and Frameworks

Name	Description	Benefits, Costs, and Limitations
Component- based	We separate the system into several components and each team member completes one components.	Benefits: concurrent programing will improve efficiency Limitations: collision between different components and hard to merge