SOEN 490 - Capstone Software Engineering Design Project
Version 1

Lock & Learn Software Architecture Document

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Document history

Date	Version	Description	Author
27/09/23	1.00	Added Section 1, 2, 3 & 4	Georgia Pitic, Fatema Akther

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1.Introduction

Lock & Learn is a learning application that can be installed on phone, tablet, computer, and any other electronics that a child could be using within a home. This application, upon configuration of the parent, will block all applications and prompt the child to do their homework. Once the child studies and passes a quiz on the study material, they will be able to unlock some free iPad use. This application has the purpose of offering a way for parents to encourage their kids to do their studying without the child being able to fool the parent. Changing the device would not work because the application can be installed on all devices and they will all be blocked until the child completes his study material.

1.1 Purpose

The purpose of this Software Architecture Document is to help stakeholders to better understand the system we are designing. This document also helps to keep all team members on the same page about what should be implemented. The diagrams this document contains helps understand the way our system is designed.

1.2 Scope

This Software Architecture document contains the design of our Lock & Learn application. This is the SAD document for our SOEN - 490 Capstone project. This document is a representation of our system overall using diagrams and explanations but it does not go into detail of how the system will be implemented. The intended audience for this document is our stakeholders, this document is to be presented to them to help them to better understand our system.

Definitions, acronyms, and abbreviation

Lock & Learn	The application described in this document.
Instructor	Person adding teaching material on the App.
Parent	The parent of the child that is using the app for studying purposes.
Child	Children using the app to study.
Study Material	Quizzes and notes made by instructors
SAD	Software architecture document

2.Stakeholders & Concerns

2.1 Stakeholders

There will be 3 main users of our application: The Parent, The Child, and The Instructor.

Parent: A person wanting to control their kid's playtime and studying
Child: A person using the application to study and take quizzes
Instructor: A person uploading study material onto the application

For the delivery of this Project, Dr. Ali Akgunduz will be the product owner, every iteration will be presented to him. The team developing the application also has weekly meetings with Dr. Akgunduz to talk about our progress and validate with him that he agrees with how this project is going.

Also, Dr. Peter Rigby is the one that decides the delivery dates for each sprint.

2.2 Concerns

In the development of our software system, several key concerns have been identified that are critical to the success and sustainability of our architecture. These concerns contain a range of topics, from performance and scalability to security and maintainability. Below, we outline these concerns and provide insights into how they are being addressed within the architecture:

Performance and scalability: This is the concern that our system performs optimally, and can scale to accommodate an increased number of users and volume of data. To address this concern, our architecture shows how our data will be stored and our application deployed.

Security: The main issue in our architecture linked to security is the fact that sensitive data must be protected. Not only do we want to avoid unauthorized access to our system, but since the application will be used by children, security must be even more robust to keep a person of ill intent from uploading inappropriate content to our application. To address this concern, we will implement robust authentication and security systems that will filter the data uploaded to our system and make sure that nothing inappropriate is being added.

Availability, reliability, and user experience: This is the concern that the users will have a bad experience with our system if there are any downtimes, disruptions, or if the system is too complicated and confusing to use. To resolve this issue, we make sure to work on the UI of our system before implementing it, that way everything is thought of in advance and implemented with care to make the user experience as good as possible. Also, the technologies we pick in implementing our architecture are

well researched and will be able to accommodate the number of users and data that we plan on allowing on our application.

3. Diagrams

3.1 Component Diagram

The purpose of a Component Diagram is to show the main components that will be used in our Lock & Learn system. This Diagram also shows the main users and the backend server. There are 3 users in our system: Parents, Teachers, and Children. The parents are the ones that can set up an account, purchase study material for their children, as well as monitor their childrens' progress and grades. The teachers can upload study material and create quizzes for the study material they upload. The children will use the study material, and take the quizzes. We also want to add some third-party services. A payment service to facilitate the link between the parents paying for study material and teachers getting paid for the material they upload, an authentication service, allowing parents to create their account, and a correction service which will correct the long text answers. The back-end server will be divided into 2 databases: the Profiles Database and the Study Material Database.
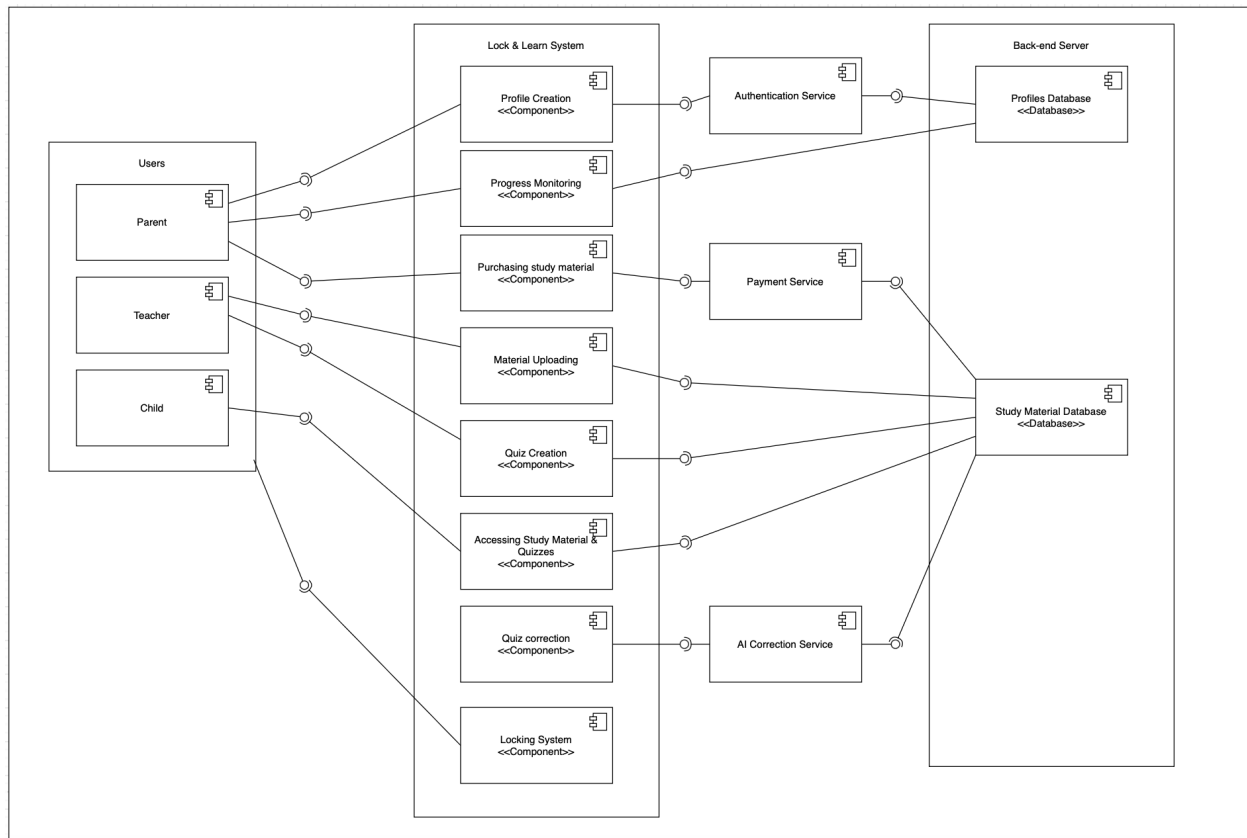

Figure 1: Component Diagram

3.2 Use Case Diagram

The purpose of this use case diagram is to visualize the functional requirements of our system. This diagram plays a vital role in making sure the system satisfies the requirements of our stakeholders. The main users of the system are the Parent, Teacher, and Child. They are shown on the left side of the diagram. There are also third-party systems shown on the right side of the diagram.
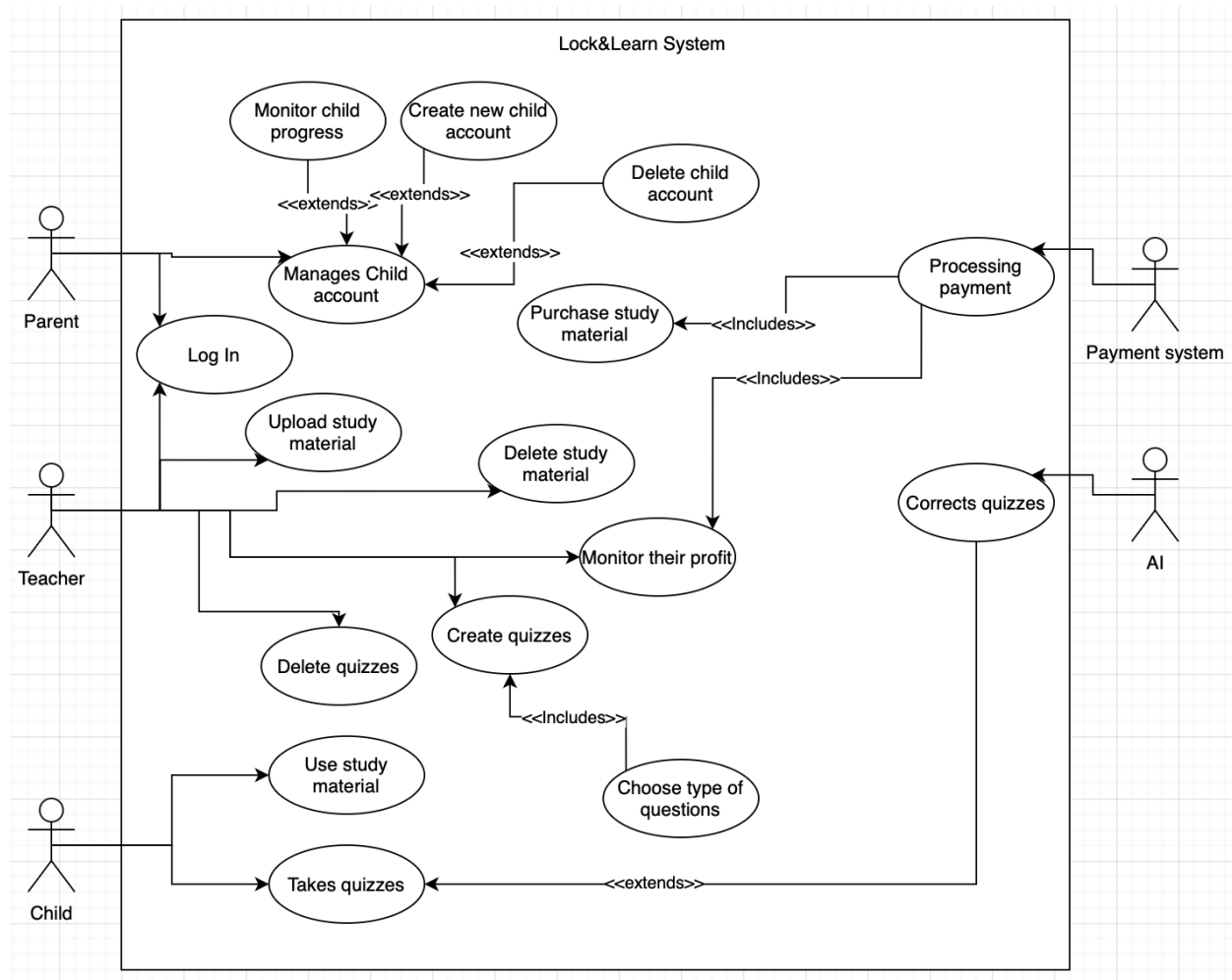

Figure 2: Use case Diagram

3.3 Domain Model Diagram

The purpose of the Domain Model Diagram is to visually represent the essential concepts, entities, and relationships between them. It helps us clarify and document the core components of our system and their interactions facilitating the understanding of our system to our stakeholders, and the implementation of it for our developers.
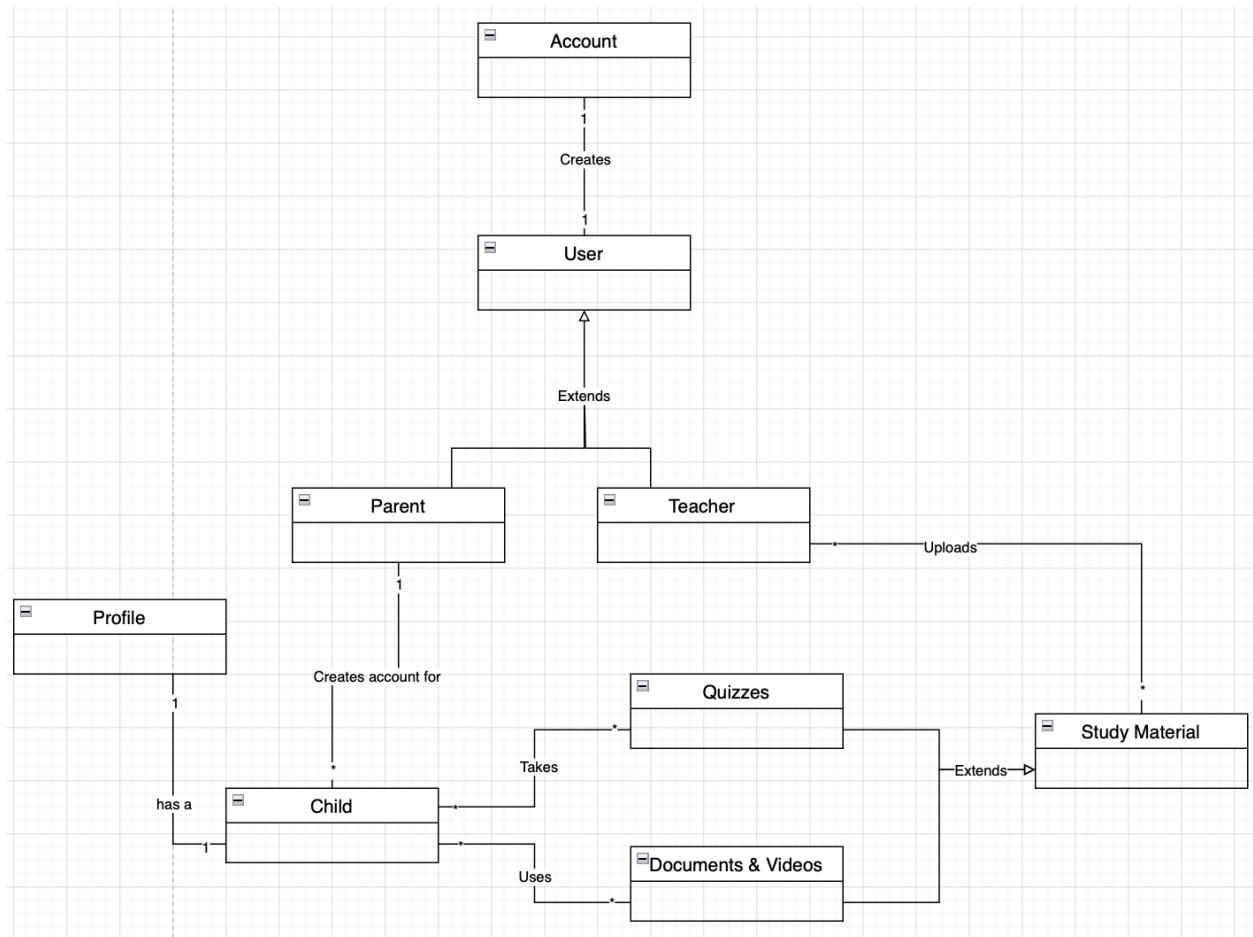

Figure 3: Domain Model Diagram

4. Architectural Requirements

Functional Requirements

			SP	Priority	Risk

1	Upload study material #1	As an instructor, I want to be able to upload study material so I can sell it.	8	1	med
4	buy study material	As a parent, I want to be able to buy study material so that my child can use it.	8	1	high
5	access study material for children	As a parent, I want to be able to access the study material I bought so my child can use it to study and quiz themselves.	5	2	med
10	Tagging study material #10	As an instructor, I want to be able to put tags on the study material I upload, so that the corresponding parents can find it on their suggested feed.	5	3	low
12	configuring device controls (scheduling)	As a parent, I want my device to be able to control my children's devices so they will study at the scheduled time.	3	1	med
13	configuring device controls (passing grade)	As a parent, I want to be able to set a passing grade average depending on each subject my child studies, to ensure that my child is making progress and learning effectively.	3	1	med
14	prioritize learning subject	As a parent, I want to be able to choose which subject to prioritize, so I know my child is improving in it.	3	2	low
15	controlling multiple devices	As a parent, I want to be able to have control over the devices of multiple children, so that I can accommodate each of their needs differently.	8	1	high
16	child's progress bar	As a parent, I want a dashboard of my child(ren)'s progress, so that I can know how they are improving in their subjects.	5	4	low

17	locking device	As a parent, I want to lock my child's device, so they focus on studying.	8	1	high
18	emergency unlocking	As a parent, I want to be able to unlock my child's device, so that they can still use it in case of any emergencies.	8	1	high
19	automatic correcting	As a parent, I want the application to correct my child's tests, so that I can evaluate my child's comprehension of the study material.	5	2	med
20	successful unlocking	As a parent, I want the application to unlock if my child passes the tests, so they can freely use their device.	8	1	high
21	locking multiple devices	As a parent, I want the application to lock all devices connected to my child's account, so it prevents the child from using other devices to get distracted or find answers.	8	2	high
22	reviewing answers	As a student, I want to be able to review my answers on my quizzes so I know how well I'm doing.	5	4	low
26	Login	As a user, I want to be able to login as a instructor or parent, so I can either upload or access study material	5	1	high

Non Functional Requirements

			SP	Priority	Risk

2	verify appropriate content	As a parent, I want to be able to navigate through study material that has been verified so that I can be sure there is no malicious content.	3	2	high
3	categorize study material	As a parent, I want study material to be categorized so that my browsing experience is simplified.	1	4	low
6	diverse study material	As an instructor, I want the application to accommodate various formats of learning so that my teaching material can be diversified.	3	1	med
7	preview study material	As a parent, I want to be able to preview study material so that I can be sure I want to buy it.	2	4	low
8	refund purchases	As a parent, I want to be able to get a refund on the material I don't like so that I feel more secure with my purchases.	3	5	high
9	Review study material #9	As a parent, I want to be able to leave a review on study material I have purchased, so I can let others know about my experience.	2	4	low
11	suggestions of study material	As a parent, I want suggested study material according to my child's school curriculum, so that searching is simplified.	3	4	low
23	sufficient explanations	As a student, I want verification that all quizzes give sufficient explanation to each answer so I understand everything correctly.	3	4	med
24	Alerting interruption #24	As a student, I want a notification before my allotted studying time so I know not to start anything I do not want interrupted.	5	2	med

25	Verify certified professionals #25	As a parent, I want the study material to be uploaded only by certified professionals, so I can ensure that it meets teaching standards.	5	3	high