Software Requirements Specification

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einsNull

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1. Introduction

einsNull shall act as an improved contending product for „…“. It is supposed to support students in the process tp prepare for their exams at the end of the semester.

For the time being the goal is to implement a solution for myself. Contents of the modules that students want to reinforce by using einsNull shall be hosted on the desktop device. By synchronizing the data onto a mobile device it is supposed to be possibly to study on the run.

There are two kinds of studying types. Sprinters and marathon runners. The main differences between these are:

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Sprinter → start just before the exams and concentrate on a single subject which its exam is coming up next in the schedule. They study a lot in short period of time but still pass the exams.

Marathon runner → some even start studying just after the first lecture. They must study over long period of time, otherwise they do not remember the contents good enough to pass the exam. They need not to study a lot every single day, but need to stay consistent in their studying routine.

As a result the software must provide both opportunities to study all the subjects and study single subjects just before an exam.

Also it must be possible to prioritize certain subjects by the user him:herself. During the studying process the software is supposed to dynamically adjust the set priority by asking the user. The user will have to reply if the question was „easy“, „medium“ or „hard“ for him or her to answer. The priority will be the key to the frequency how often a question will occur again.

If the first implementation is succesful, a scenario for the future is to publish the software to other students. An interesting feature for this scenario could be the possibility to create studying groups where students can share their summeries of different or the same subject.

2. Goals

Categorie	Goal	Priority
Time	14.03.2022	1
Software	working desktop application	1
Software	working mobile application	1
Software	working synchronization desktop to mobile	2
Design	attractive and intuitive Interface for mobile application	3
Design	attractive and intuitive Interface for mobile application	3
Design	Design System for Interfaces	3

3. Components

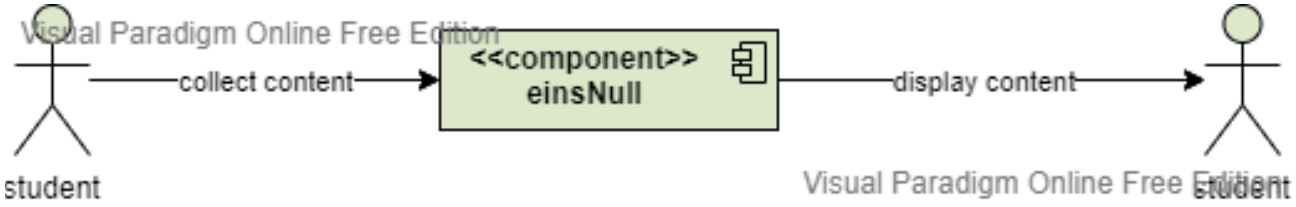

Image 1

User role	Description
student	User who may add learning content to their account and study with the app.

4. Functional Requirements

ID	FR-00001	Categorie	login
Description	The system must allow a student to create an account with username and password		
reason	Needed for log in		
test	Student can create an account when using the software for the first time		
note	Account must be available on both desktop and mobile application regardless of he or she created the account with the desktop or mobile application		

ID	FR-00010	Categorie	login
Description	The system must safe the username and password, picked by the student		
reason	Needed to verify if user has right to access contents		
test	Print user login details on console		
note	If the software is published it is essential to meet the needed data security guidelines. At first there is no need for this, because there will only be one user		

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ID	FR-00011	Categorie	login
Description	The system must allow a student to login his or her account with username and password		
reason	Needed so student has access to their content		
test	Student can login into his or her account		
note	FR-00001, FR-00010		

ID	FR-00100	Categorie	Add content
Description	The system must allow a student to create a new subject		
reason	Needed so student is able to study a certain subject just before an exam		
test	Student can create a new subject; subject occurs on main screen and can be selected		
note	A subject can have multiple topics		

ID	FR-00101	Categorie	Add content
Description	The system must allow a student to create a new topic		
reason	Needed so student is able to study a certain topic just before an exam		
test	Student can create a new topic; topic occurs on survey screen of subject		
note	The answer to the topic must be added by the user		

ID	FR-00110	Categorie	Add content
Description	The system must safe the subjects and topics		
reason	Needed so student is able to study the subjects and topics		
test	Subjects and topics are accessible after creation		
note	If software is published desktop or mobile device can be used for storage by each user		

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ID	FR-00111	Categorie	edit content
Description	The system must allow a student to edit a subject		
reason	Needed so student is able to the subjects title		
test	Subject with new title occurs after confirmation on main screen		
note			

ID	FR-01000	Categorie	edit content
Description	The system must allow a student to edit a topic		
reason	Needed so student is able to change the topics title and answer		
test	Changes to topic occur on survey view of subject after confirmation of changes		
note			

ID	FR-01001	Categorie	Delete content
Description	The system must allow a student to delete a topic		
reason	Needed if storage of topic is no longer necessary or user wants to change title and/or answer after creation was confirmed		
test	Topic is no longer visible in survey screen of subject; Data is no longer in storage		
note	If a student deletes a topic, the related answer is deleted as well → **FR-01011**		

ID	FR-01010	Categorie	Delete content
Description	The system must allow a student to delete a subject		
reason	Needed if storage of subject is no longer necessary; user wants to change the title; clear storage for new subjects		
test	subject is no longer visible on the main screen; Data is no longer in storage		
note	If a student deletes a subject, the related topics (and answers **FR-01001**) are deleted as well → **FR-01100**		

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ID	FR-01011	Categorie	Storage management
Description	The system must delete the answer to a topic automatically, when the user confirmed the deleting process of the topic		
reason	Answer is no longer needed to be stored when topic is deleted		
test	Answer is no longer stored on device		
note	Remove redundant data → keep occupied storage low		

ID	FR-01100	Categorie	Storage management
Description	The system must delete all topics of a subject automatically, when the user confirmed the deleting process of the subject		
reason	Topics are no longer needed to be stored when subject is deleted		
test	topics are no longer stored on device		
note	Remove redundant data → keep occupied storage low		

5. Non-functional Requirements

ID	NFR-00001		
Priority	1	Categorie	Prioritise topics
Description	The student must be able to set a priority for topics and subjects		
reason	Needed to prioritise certain topics and subjects to concentrate on them just before an exam		
test	The student is able to choose one out of three priority classes or none of them		
note			

ID	NFR-00010		
Priority	1	Categorie	Prioritise topics
Description	The system must show a dialog window in which the user can choose if the question was „easy“, „medium“ or „hard“		
reason	Needed to prioritise topics dynamically during the studying process		
test	getPriority() returns… … 1 if user selected „hard“ … 2 if user selected „medium“ … 3 if user selected „easy“		
note			

ID	NFR-00011		
Priority	1	Categorie	Prioritise topics
Description	Topics must be prioritised dynamically during the studying process		
reason	Important to focus on difficult questions		
test	Topics with a higher priority occur more frequently than others		
note	NFR-00010		

ID	NFR-00100		
Priority	1	Categorie	Error message
Description	If the student enters the wrong login details, the system shall denie the login request		
reason	Important so there is no unauthorized access to the stundents content possible		
test	The student recieves an error message and is still on the login screen when he/she enters the wrong login details		
note	NFR-00101		

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ID	NFR-00101		
Priority	1	Categorie	Error message
Description	If the student enters the wrong login details, the system shall show an error message		
reason	Important so the student know that the login process failed		
test	The system shows a dialog window in which the student must confirm or decline the addition of the topic and subject		
note			

ID	NFR-00110		
Priority	2	Categorie	synchronization
Description	The student must be able to synchronize the added content from the desktop to the mobile device		
reason	The application is meant to enable the student to study on the run		
test	The student can start a synchronisation process to get the content on his/her mobile device		
note	In the future it should be possible to synchronize the content in both directions. Either desktop to mobile or mobile to desktop		

ID	NFR-00111		
Priority	2	Categorie	synchronization
Description	The system must support the TCP/IP protocol for the synchronization		
reason	Best known practice for synchronization so far		
test	The system synchronizes the content itself when the synchronization process has been started by the student		
note	In the future it should be implemented that the content is synchronized by the system automatically		

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ID	NFR-01000		
Priority	2	Categorie	synchronization
Description	The system must support the TCP/IP protocol for the synchronization		
reason	Best known practice for synchronization so far		
test	The system synchronizes the content itself when the synchronization process has been started by the student		
note	In the future it should be implemented that the content is synchronized by the system automatically		

ID	NFR-01001		
Priority	2	Categorie	confirmation
Description	The system must ask for confirmation to delete topics and subjects		
reason	Important so there is no chance to delete data unintentionally		
test	The system shows a dialog window in which the student must confirm or decline the deletion of the topic and subject		
note			

ID	NFR-01010		
Priority	2	Categorie	confirmation
Description	The system must ask if information shall be added or deleted if the student leaves the adding screen without confirming the addition		
reason	Important so there is no data loss due to the student forgetting to complete the adding process		
test	The system shows a dialog window in which the student must confirm or decline the addition of the topic and subject		
note			

ID	NFR-01011		
Priority	2	Categorie	Data storage
Description	All topics of a certain subject shall be written in a .txt file which is read during the studying process		
reason	Easiest way to store the topics and answers of a subject		
test	Add subjects and topics and print the .txt file on the console		
note	Find a more practical way to store the data		

ID	NFR-01100		
Priority	2	Categorie	Data storage
Description	The .txt file must match the subjects title		
reason	Easiest way to find the .txt file for reading it		
test	When the .txt file is created, the filename is extracted from the subjects title		
note			

ID	NFR-01101		
Priority	3	Categorie	Data security
Description	The login details shall be stored in a Map for the first implementation		
reason	For the first implementation with just one user, there is no need of a data security concepts		
test	Print map of login details on console		
note	In the future when the app is published there must be a data security concept that reliably secures the login details **NFR-01110**		

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ID	NFR-01110		
Priority	3	Categorie	Data security
Description	The storage of the login details must meet the data security guidelines		
reason	Important to ensure that there is no unauthorized access to a students content		
test	Only one who is in possession of the login details has access to the contents belonging to the login details		
note			

ID	NFR-01111		
Priority	4	Categorie	Grouping topics
Description	A student shall be able to sum up certain topics to a group		
reason	Important to be able to devide huge subjects into certain parts		
test	The student is able to create a group and add topics to it		
note	i.e. Like creating a playlist in spotify		

ID	NFR-10000		
Priority	5	Categorie	UI/UX Design
Description	The usage of the application shall be easy and intuitive		
reason	Using the application must not demotivate students by its complicated structure		
test	A student is able to add a subject and topic after completing a tutorial once		
note	The tutorial shall occur when the application is used for the first time. It is necessary that the tutorial can be completed at another time as well		

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ID	NFR-10001		
Priority	5	Categorie	UI/UX Design
Description	Colour fields to contrast different subjects shall be added automatically by the system		
reason	Important for visual hierarchy between the subjects and there is no storage needed for pictures or other visuals		
test	Create a subject and go back on main screen		
note	Colour fields must have enough contrast between each other		

ID	NFR-10010		
Priority	5	Categorie	UI/UX Design
Description	Colour fields to contrast different topic groups shall be added automatically by the system		
reason	Important for visual hierarchy between the topic groups and there is no storage needed for pictures or other visuals		
test	Create a topic group and go back on the subject screen		
note	Colour fields must have enough contrast between each other		

ID	NFR-10011		
Priority	6	Categorie	Tutorial
Description	The system shall provide a tutorial		
reason	Easy entry in usage of the application		
test	When the student uses the application for the first time, the system guides the student through the using process of the app		
note	NFR-10000		

ID	NFR-10100		
Priority	6	Categorie	Special
Description	A student can extract a subject or topic group as PDF		
reason	Some students still prefer to study on real paper		
test	Extract subject or topic group as PDF; open with Adobe Acrobat		
note	Shall be possible on both mobile and desktop device		

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ID	**NFR-10101**		
Priority	**6**	**Categorie**	**Special**
Description	A student can view his/her statistics		
reason	Motivation by displaying productivity		
test	Track and print statistics on console		
note	Number of subjects, topic groups, topics (easy, medium, hard), time studied In total and subject specific		

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6. Use Cases

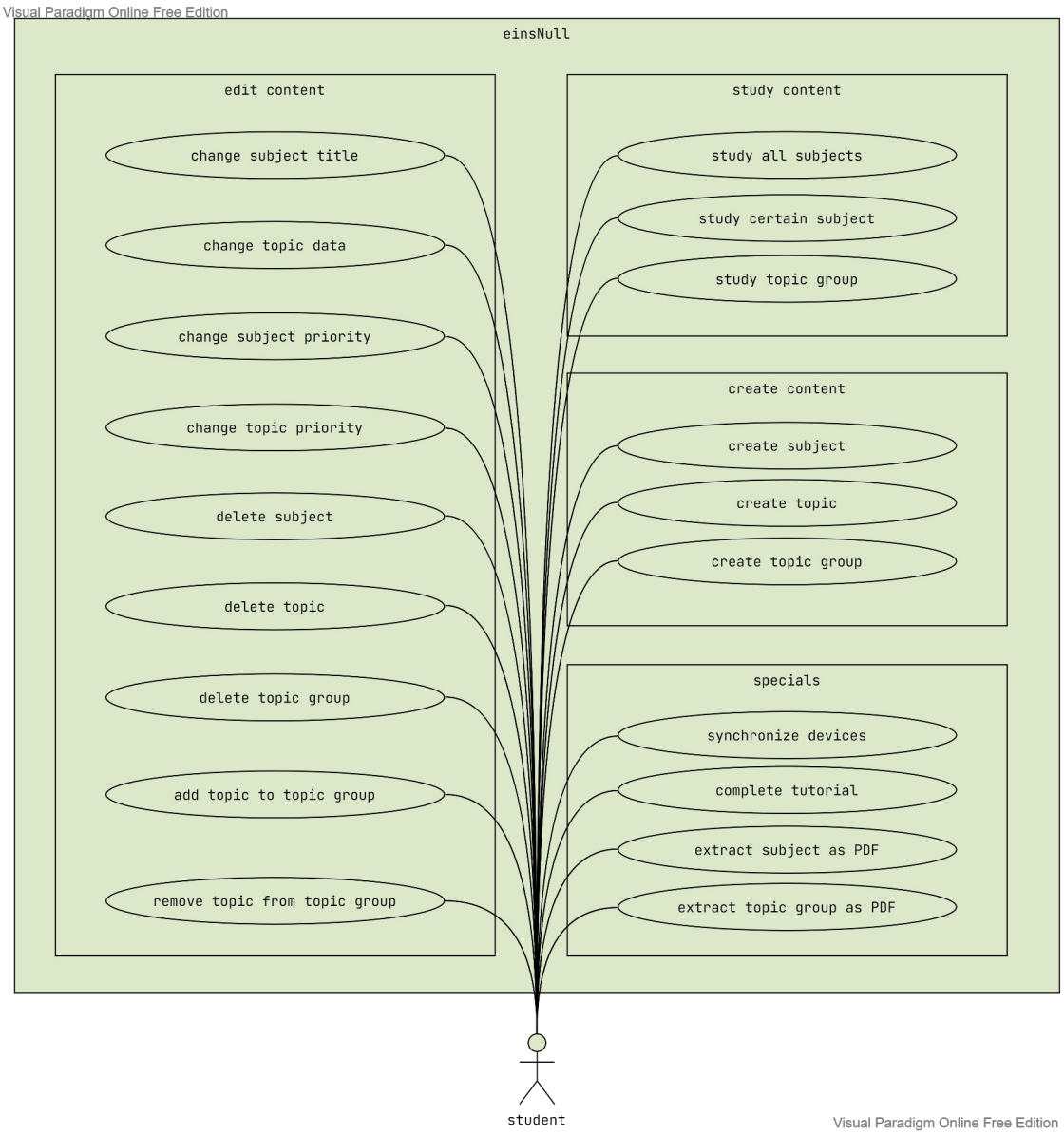

Image 2

6.1 Create Content

6.1.1 create subject

a student opens the application to create a new subject. Therefore he/she creates a new subject and adds a title.

6.1.2 create topic

a student opens the application to create a new topic. Therefore he/she selects a subject, creates a new topic and adds a title and answer.

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6.1.3 create topic group

a student opens the application to create a new topic group. Therefore he/she selects a subject, creates a new topic group and adds a title.

6.2 Edit Content

6.2.1 change subject title

a student wants to change the title of a subject. Therefore he/she selects a subject and selects „edit“. The system displays the editing dialog window where the student can change the subjects title.

6.2.2 change topic data

a student wants to change the data of a topic. Therefore he/she selects a topic and selects „edit“. The system displays the editing dialog window where the student can change the topics title and answer.

6.2.3 change subject priority

a student wants to change the priority of a subject. Therefore he/she selects a subject and selects „edit“. The system displays the editing dialog window where the student can change the subjects priority.

6.2.4 change topic priority

a student wants to change the priority of a topic. Therefore he/she selects a topic and selects „edit“. The system displays the editing dialog window where the student can change the topics priority.

6.2.5 delete subject

a student wants to delete a subject. Therefore he/she selects a subject and selects „edit“. The system displays the editing dialog window where the student can select „delete“.

6.2.6 delete topic

a student wants to delete a topic. Therefore he/she selects a topic and selects „edit“. The system displays the editing dialog window where the student can select „delete“.

6.2.7 delete topic group

a student wants to delete a topic group. Therefore he/she selects a topic group and selects „edit“. The system displays the editing dialog window where the student can select „delete“.

6.2.8 add topic to topic group

a student wants to add a topic to a topic group. Therefore he/she selects a topic and selects „add to topic group“. The system displays all topic groups of the relevant subject. The student selects a topic group.

6.2.9 remove topic from topic group

a student wants to remove a topic from a topic group. Therefore he/she selects the topic in a topic group and selects „remove“.

6.3 Study Content

6.3.1 study all subjects

A student wants to study all subjects. Therefore he/she selects „study all“ in the main screen.

6.3.2 study certain subject

A student wants to study a certain subject. Therefore he/she selects a subject. The system displays the subject survey screen and the student selects „study“.

6.3.3 study topic group

A student wants to study a topic group. Therefore he/she selects a topic group. The system displays the topic group survey screen and the student selects „study“.

6.4 Specials

6.4.1 synchronize devices

A student wants to synchronize the contents from the desktop to the mobile device. Therefore he/she selects „synchronize“ in the main screen on the mobile device first and then on the desktop device.

6.4.2 complete tutorial

A student wants to complete the tutorial after the first usage. Therefore he/she selects „complete tutorial“ in the main screen.

6.4.3 extract subject as PDF

A student wants to extract all topic groups and topics from a subject as PDF to print it. Therefore he/she selects a subject. The system displays the subject survey screen and the student selects „extract as PDF“.

6.4.4 extract topic group as PDF

A student wants to extract all topics from a topic group as PDF to print it. Therefore he/she selects a topic group. The system displays the topic group survey screen and the student selects „extract as PDF“.

6.5 Tables and Diagrams

6.5.1 create subject

Title	Create subject
ID	UC-001
Actor	student
Motivation	The student wants to create a new subject
Short Description	Create a new subject
Cross-reference	The student has access to the application; **image 3**
Precondition	The student needs a verified username and password
Required Data	Title
Result	New Subject
Postcondition	
Invariants	
Standard procedure	1) Student opens the application 2) System displays main screen 3) Student selects „add subject“ 4) System displays „add subject“ dialog window 5) Student enters data 6) Student selects „save“ 7) System saves subject data 8) System shows main screen
Alternative procedures	About 5) If the student does not select a priority, the system sets the priority to 0(=yet undefined) About 6) If the student leaves the screen without selecting „save“ or „dismiss“ the system displays a dialog window where the student has to choose if the subject shall be saved or dismissed

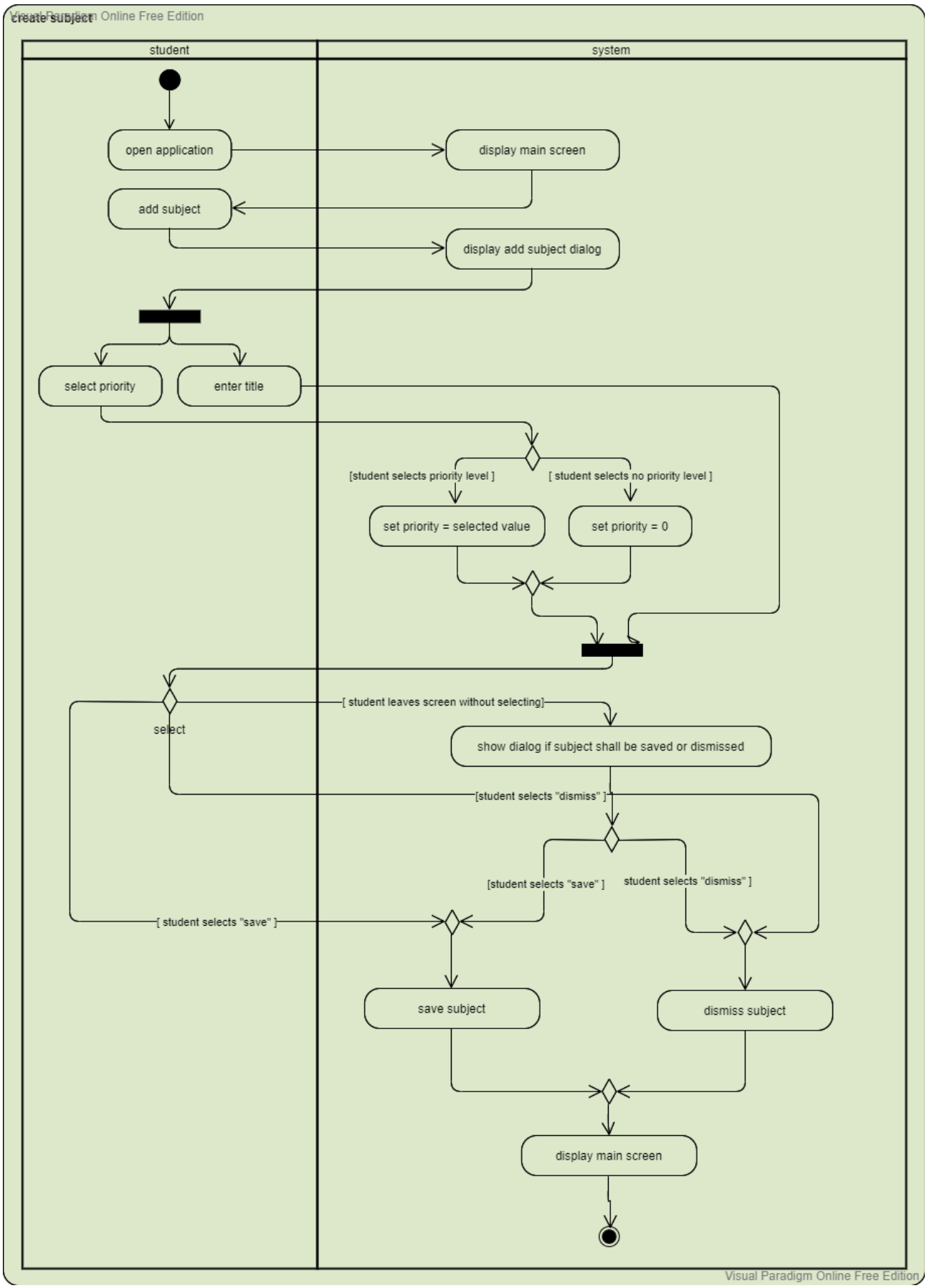

Image 3

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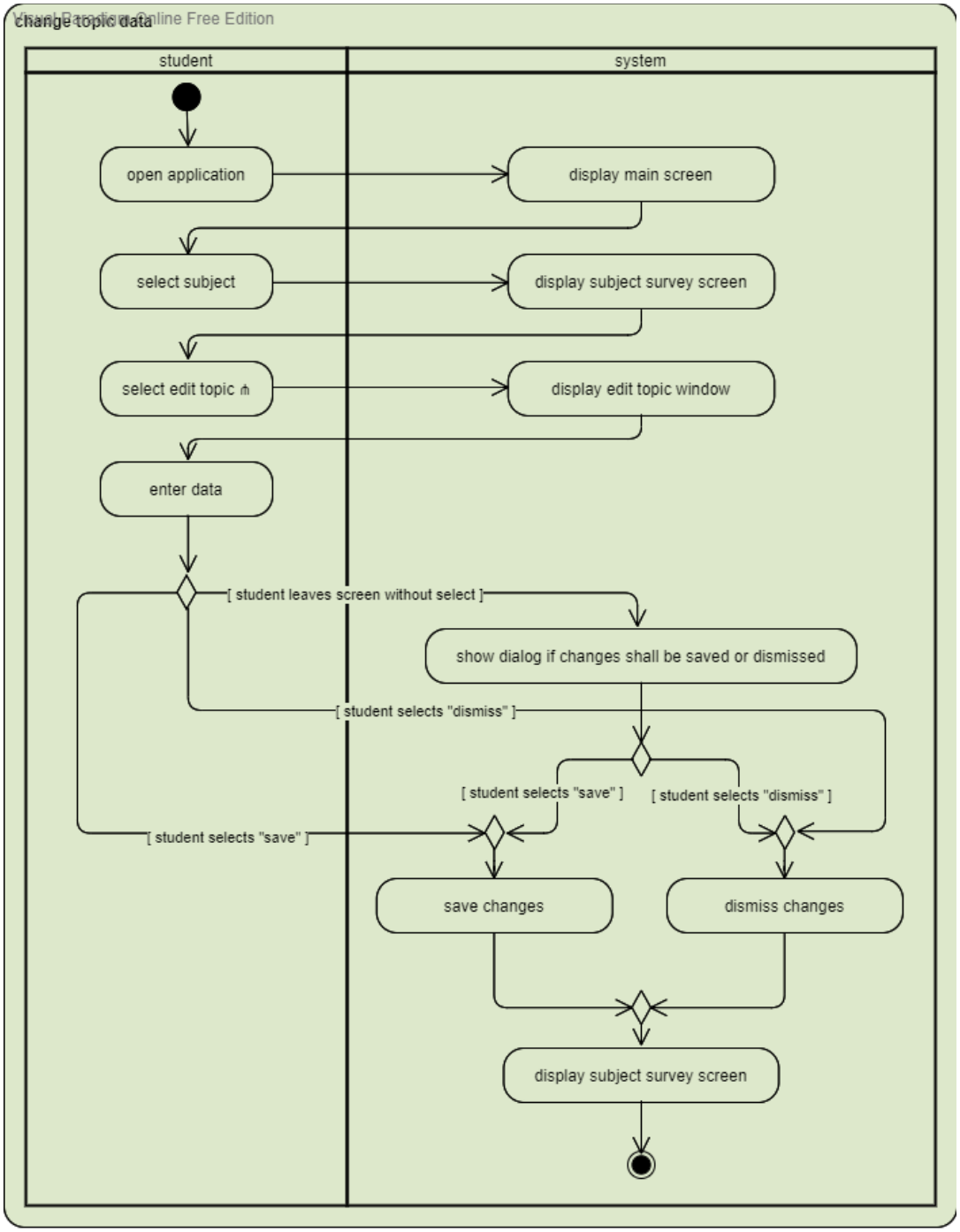
6.5.2 change topic data

Title	Change topic data
ID	UC-010
Actor	student
Motivation	The student wants to change the data of a topic
Short Description	Change topic data
Cross-reference	The student created a subject; **UC-001**; **Image 4**
Precondition	The student created a topic
Required Data	New title and answer
Result	Changed topic
Postcondition	
Invariants	
Standard procedure	1) Student opens the application 2) System displays main screen 3) Student selects a subject 4) System displays subject survey screen 5) student selects edit topic 6) System displays window to edit topic 7) student enters data 8) student selects „save“ 9) system saves changes 10) system displays subject survey sreen
Alternative procedures	About 5) see image 4 for activity „edit topic“ About 8) If the student leaves the screen without selecting „save“ or „dismiss“ the system displays a dialog window where the student has to choose if the subject shall be saved or dismissed



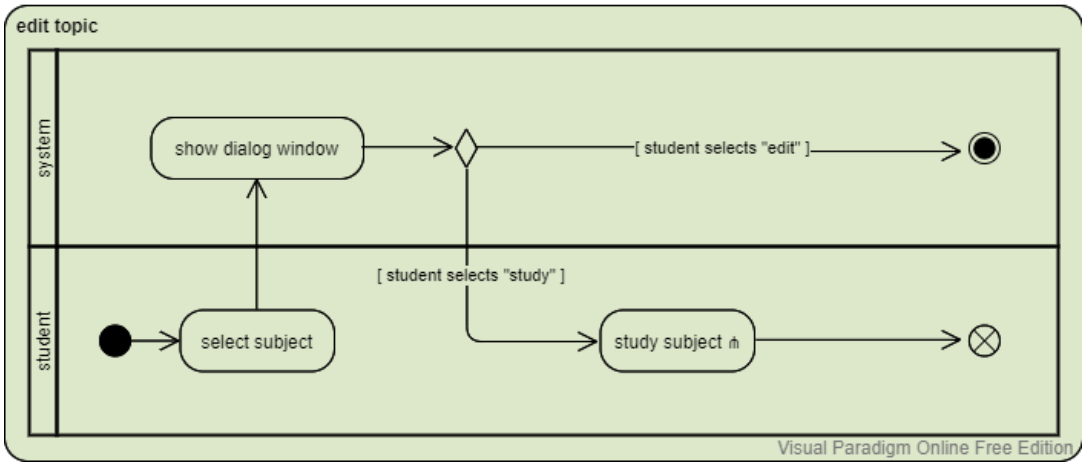


Image 4

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6.5.3 study all subjects

Title	Study all subjects
ID	UC-011
Actor	student
Motivation	The student wants to study all subjects
Short Description	Student studies all subjects
Cross-reference	The student created a subject and a topic; **Image 5**
Precondition	The student created at least one subject with one topic
Required Data	Subject, topic with answer
Result	Studying subjects
Postcondition	
Invariants	
Standard procedure	1) Student opens the application 2) System displays main screen 3) Student selects „study all subjects“ 4) System selects a subject and topic from contents 5) system displays topic 6) student selects difficulty 7) system displays answer 8) student selects „finish“ 9) system displays main screen
Alternative procedures	About 5) see image 5 for activity „display difficulty selection“ About 8) If the student selects „next“ instead, the system reruns the steps 4) through 8)

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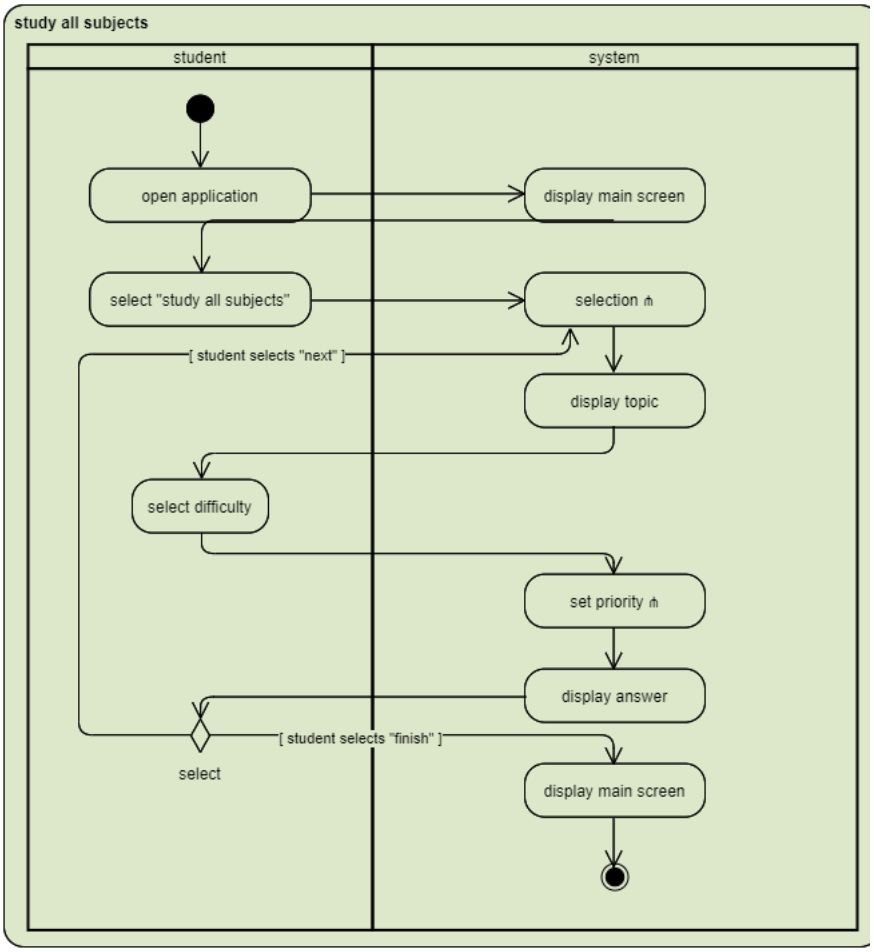

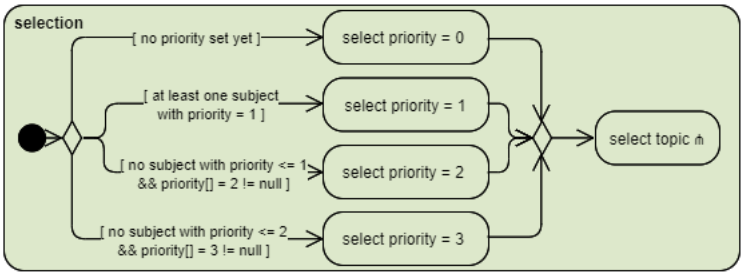

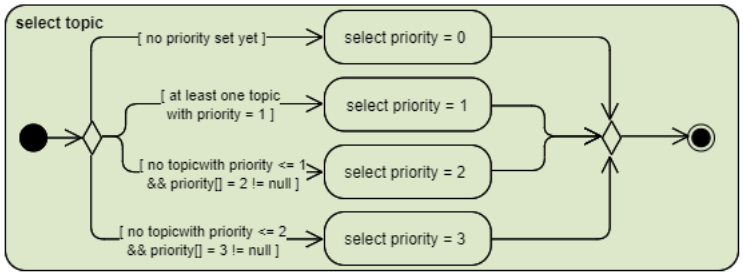

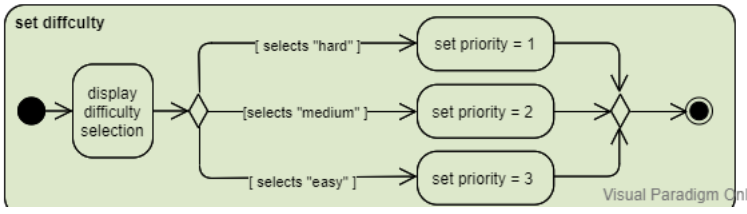

Visual Paradigm Online Free Edition

Image 5

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6.5.4 synchronize devices

Title	Synchronize devices
ID	UC-100
Actor	student
Motivation	The student wants to ssynchronize the contents desktop to mobile
Short Description	Contents are synchronizing from desktop to mobile device
Cross-reference	The system implements the TCP/IP protocol; **Image 6**
Precondition	The connection between desktop and mobile is running
Required Data	Contents that is different from desktop to mobile contents
Result	Contents on mobile are similar to the contents on desktop device
Postcondition	
Invariants	
Standard procedure	1) Student opens the mobile application 2) System displays main screen 3) Student selects „synchronize“ 4) system on mobile awaits connect requests 5) Student opens the desktop application 6) System displays main screen 7) Student selects „synchronize“ 8) system establishes connection to mobile device 9) system synchronizes contents 10) system displays dialog that synchronization was succesful
Alternative procedures	About 10) If the synchronization fails, the system displays an error message

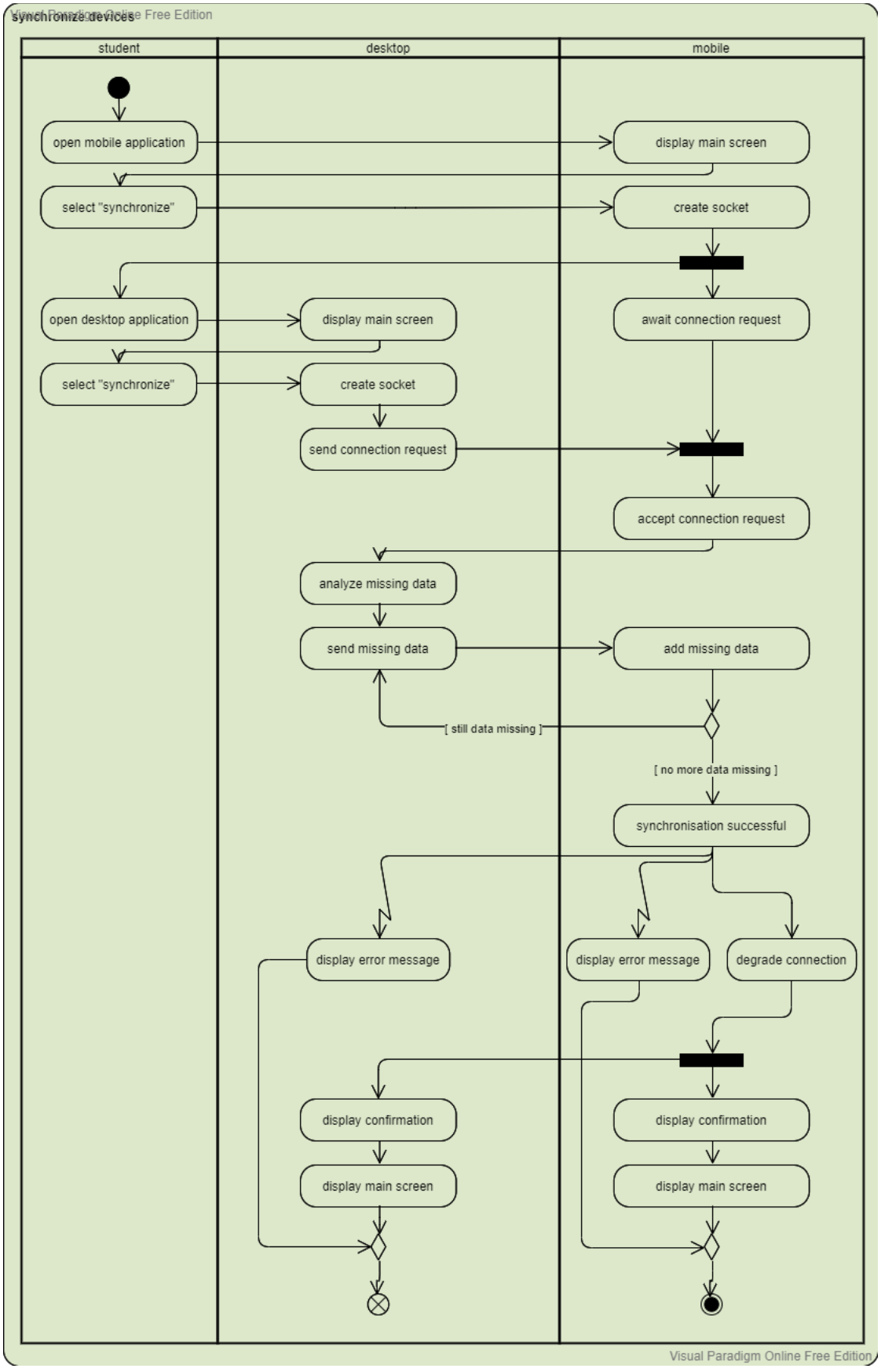

Image 6

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7. Processes and procedures

The following diagram shows the different states a subject can take.

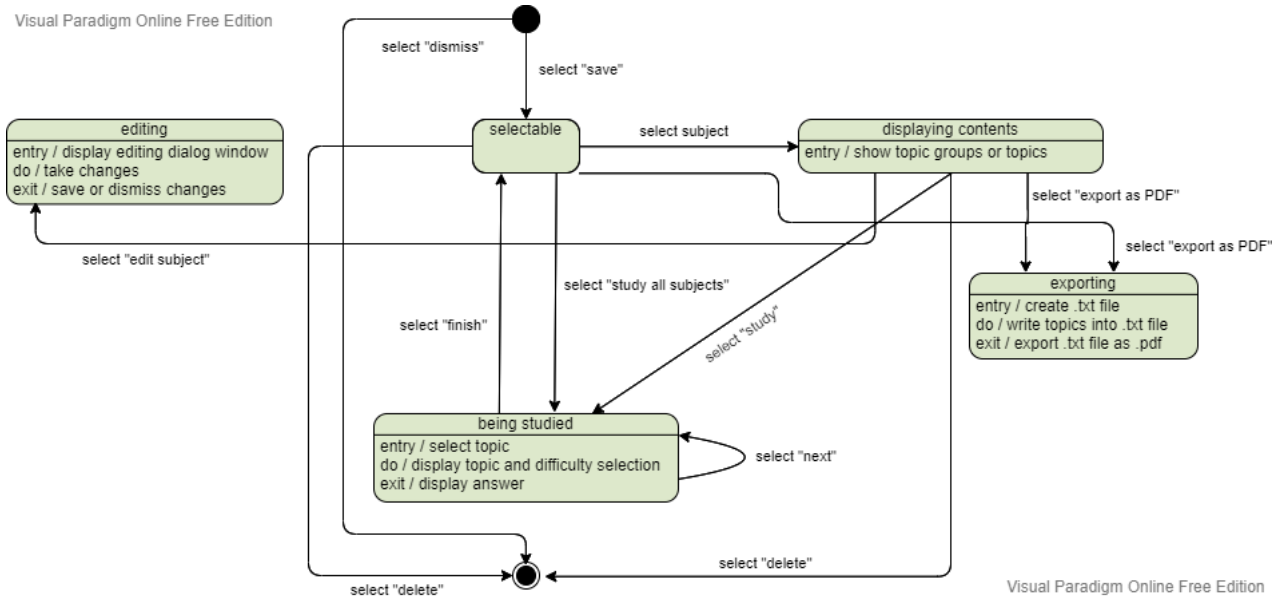

Image 7

8. Data Diagram

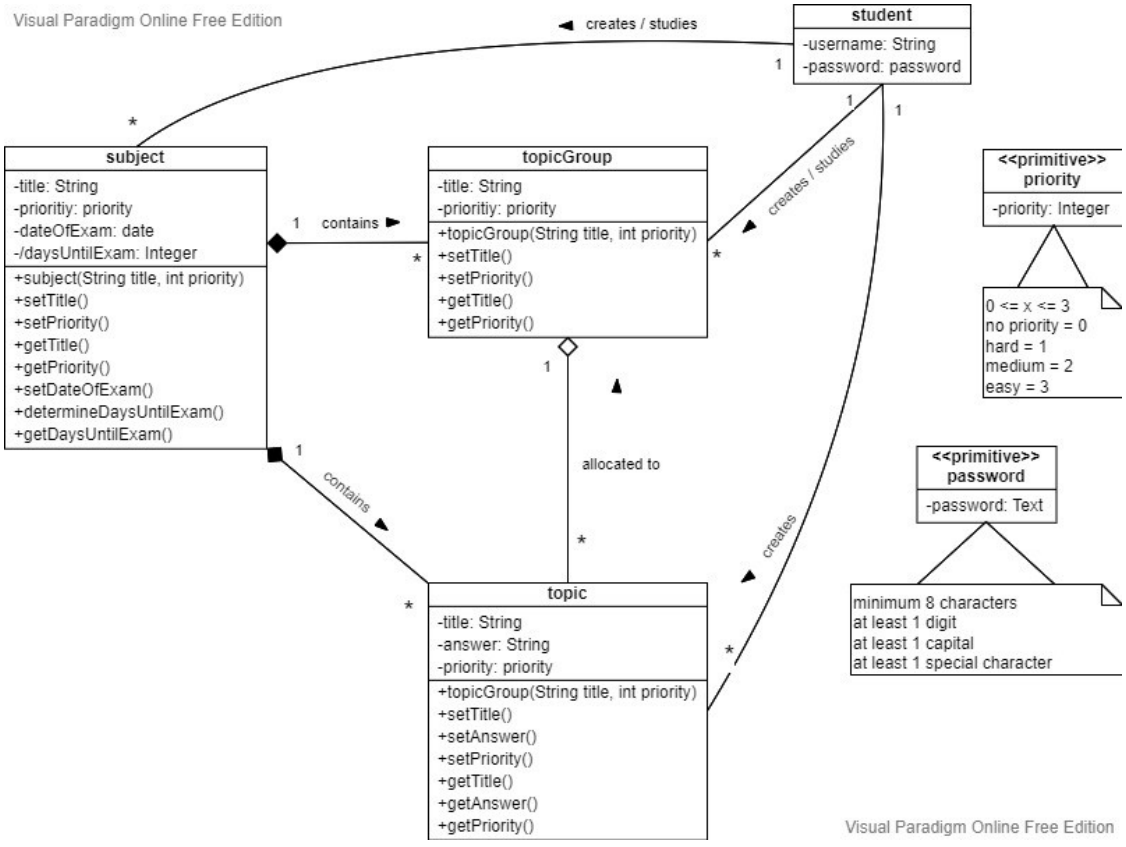

Image 8

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9. Masks and Dialogs

9.1 Desktop application

9.1.1 The following images show the main screen of the desktop application with all the subjects, the statistics after selecting the show statiistcs button and the dialog window to create a new subject

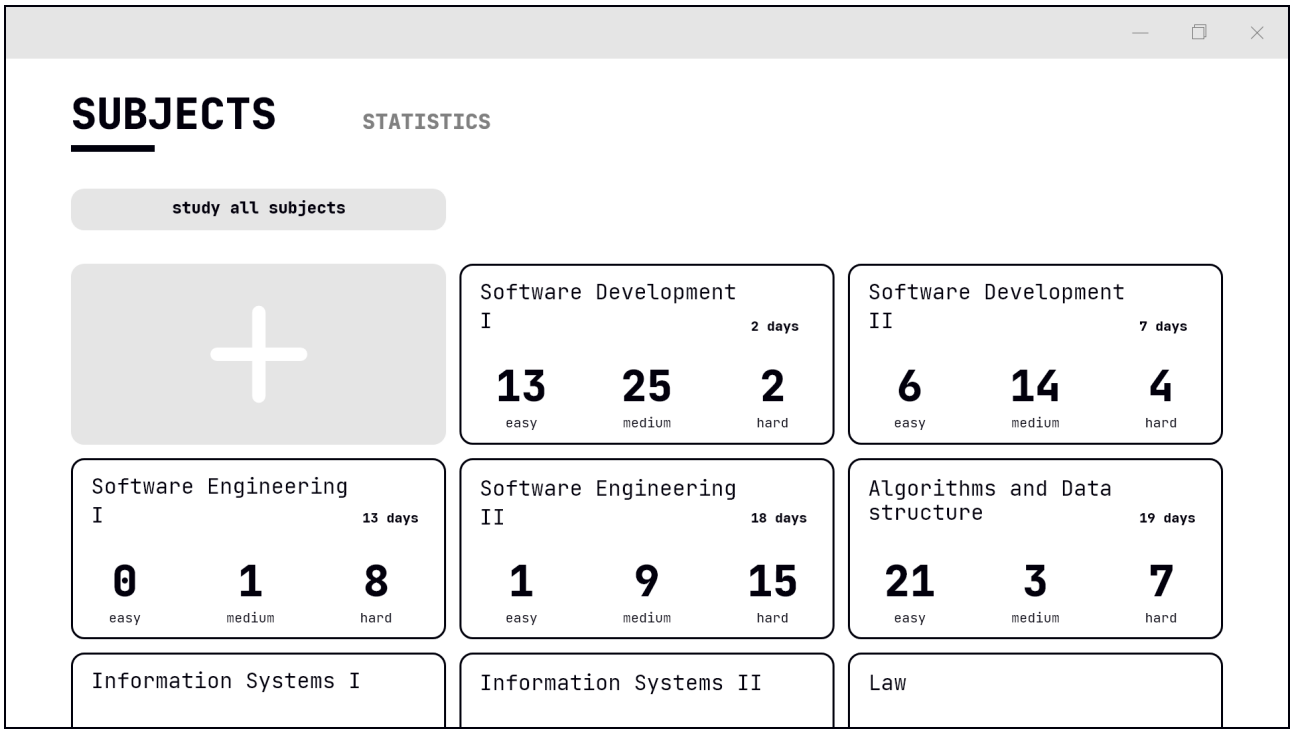

Image 9

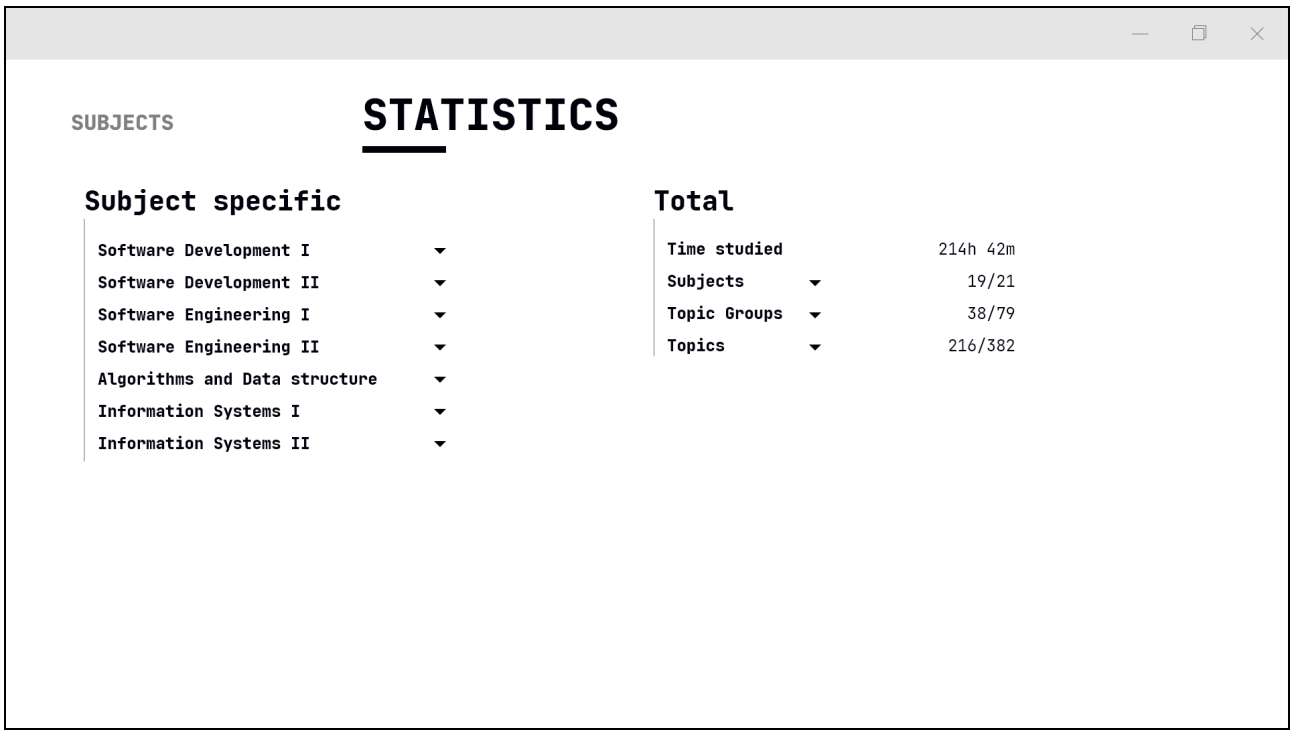

Image 10

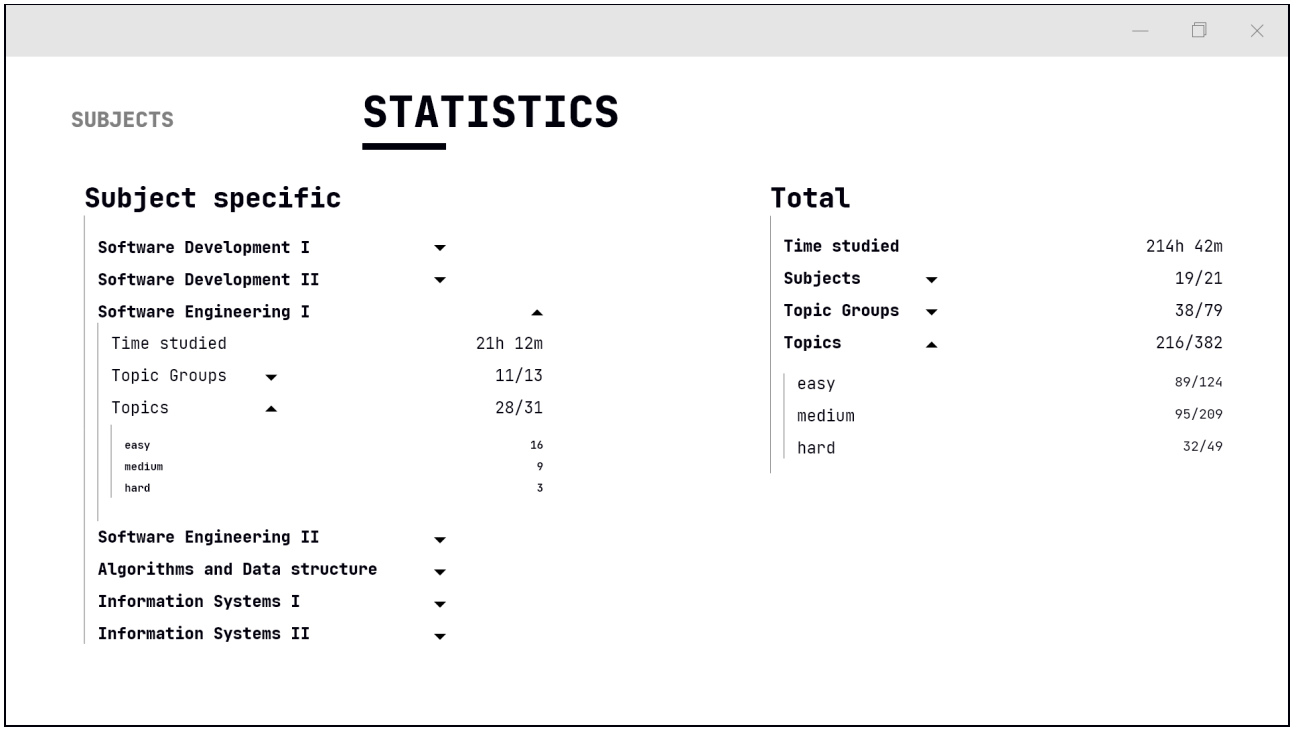

Image 11

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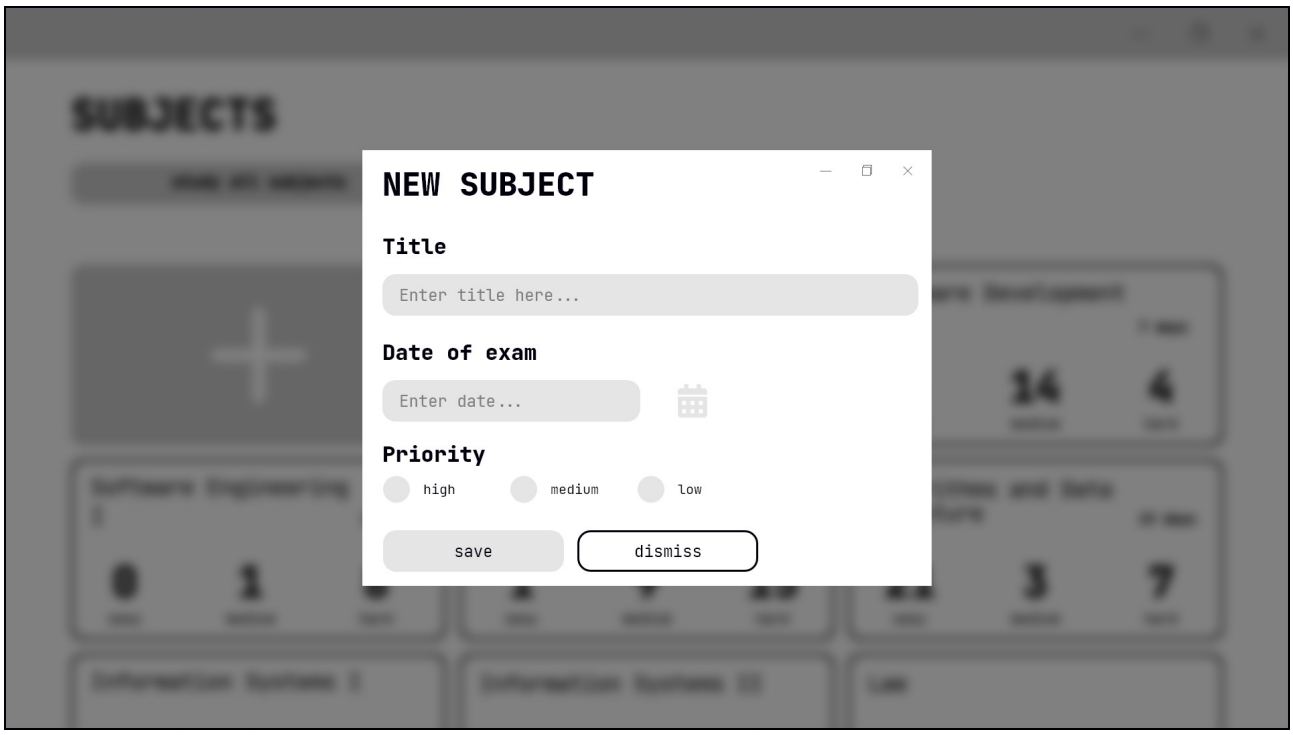

Image 12

9.1.2 The following images show the subject survey screen of the desktop application with all the topics

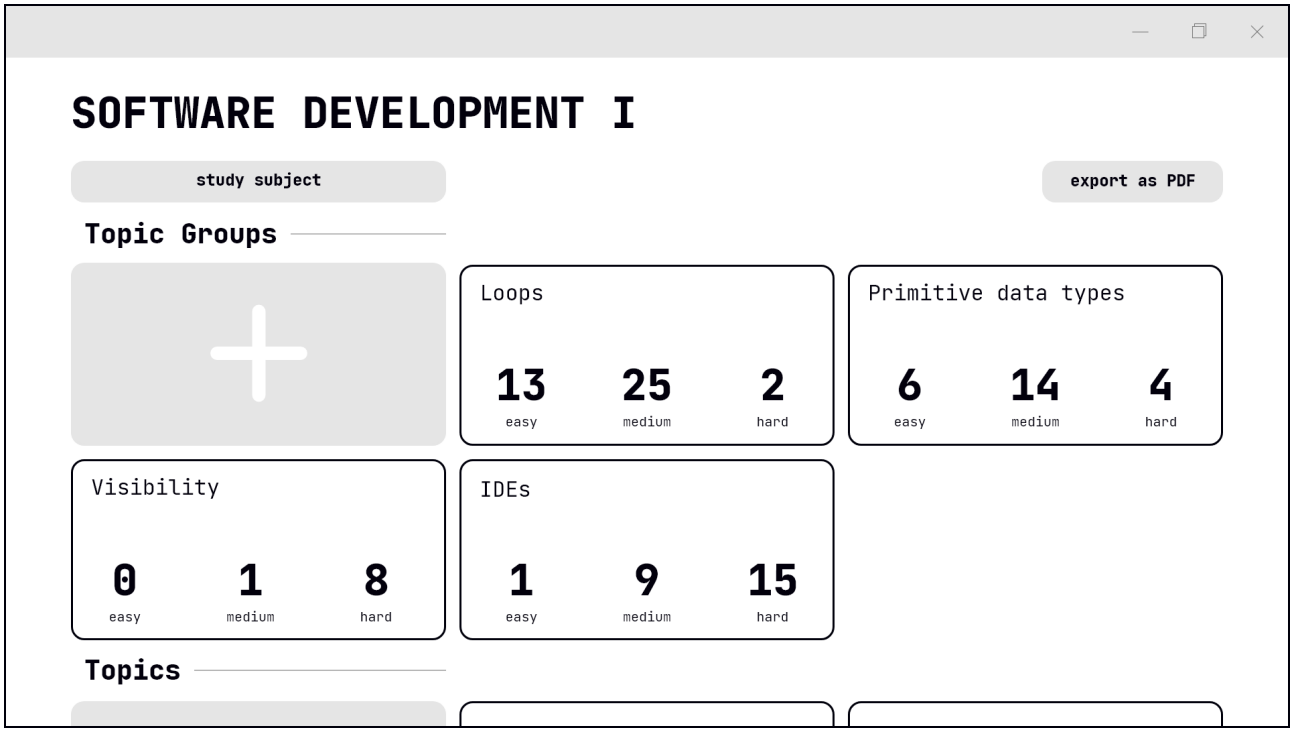

Image 13

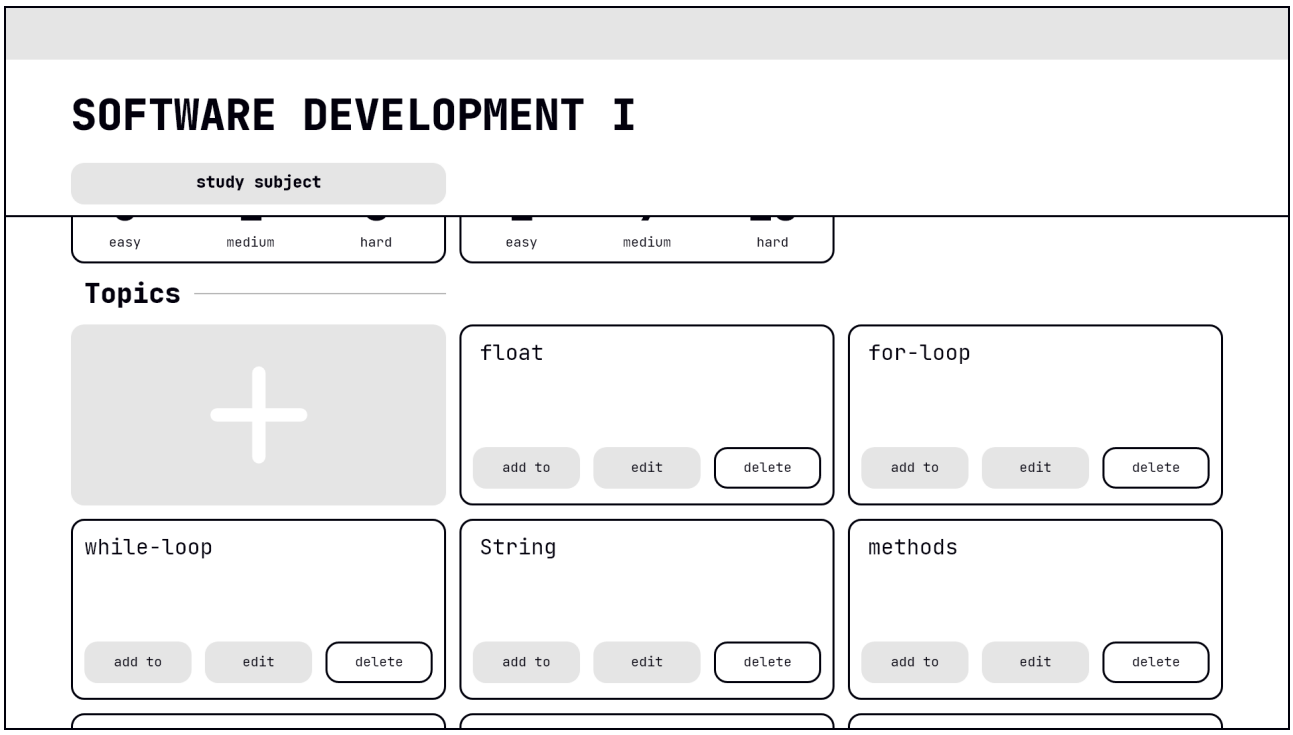

Image 14

9.1.3 The following images show the dialog windows to create a new topic and edit an existing one, as well as the dialog window to choose if the data shall be saved or dismissed, if the student leaves the dialog window without selecting

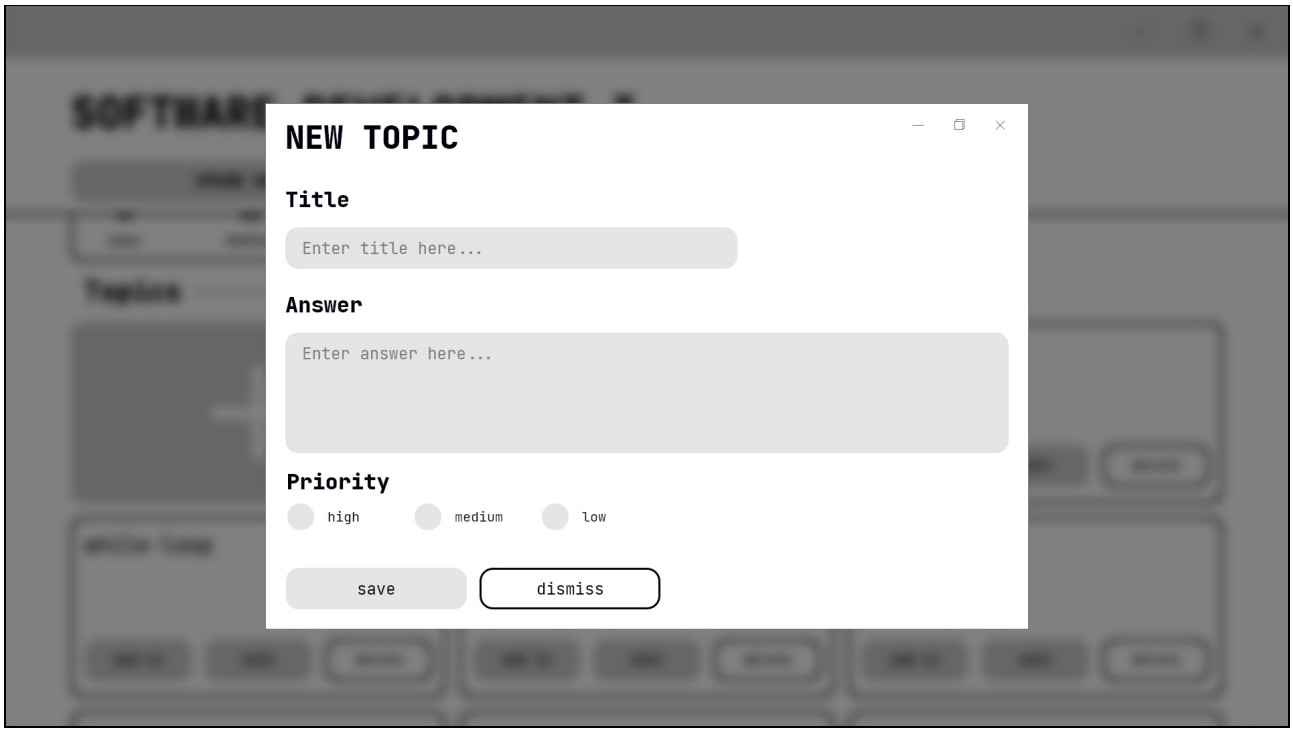

Image 15

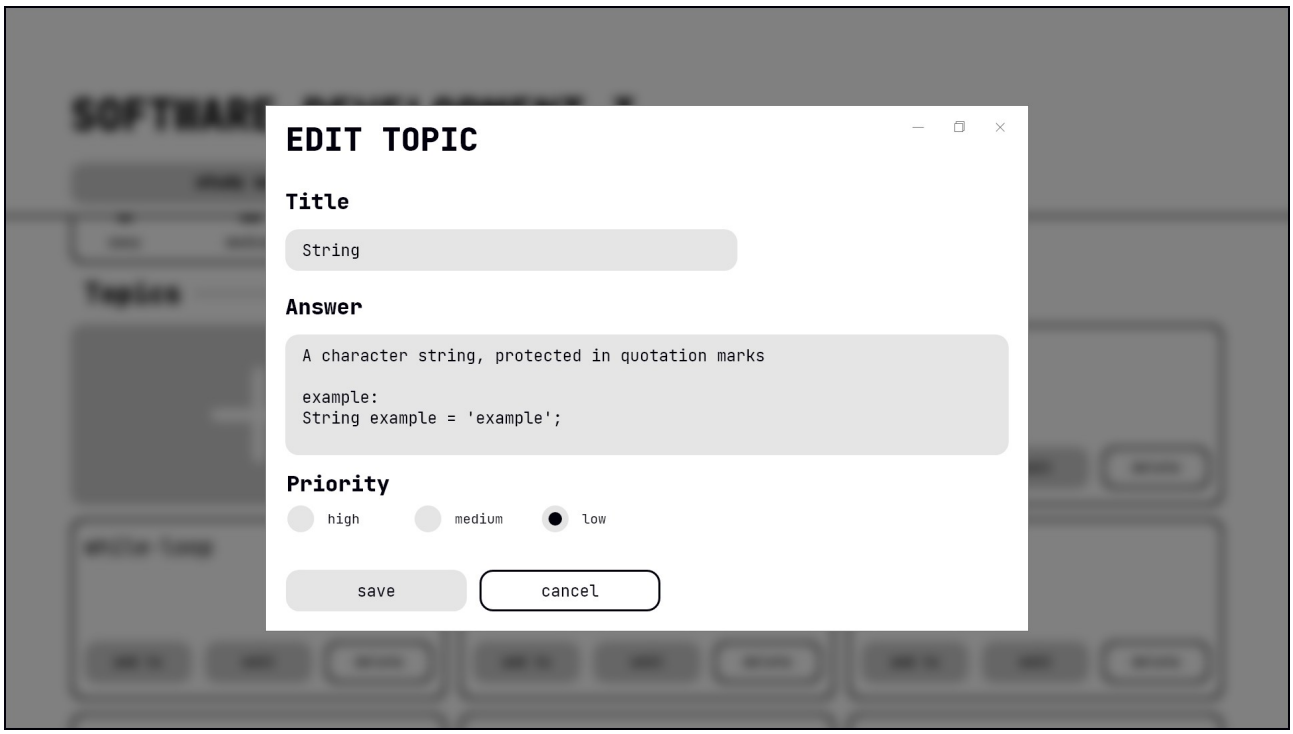

Image 16

Image 17

Author: Tim Freimann

9.1.4 The following images show the dialog windows for studying all subjects

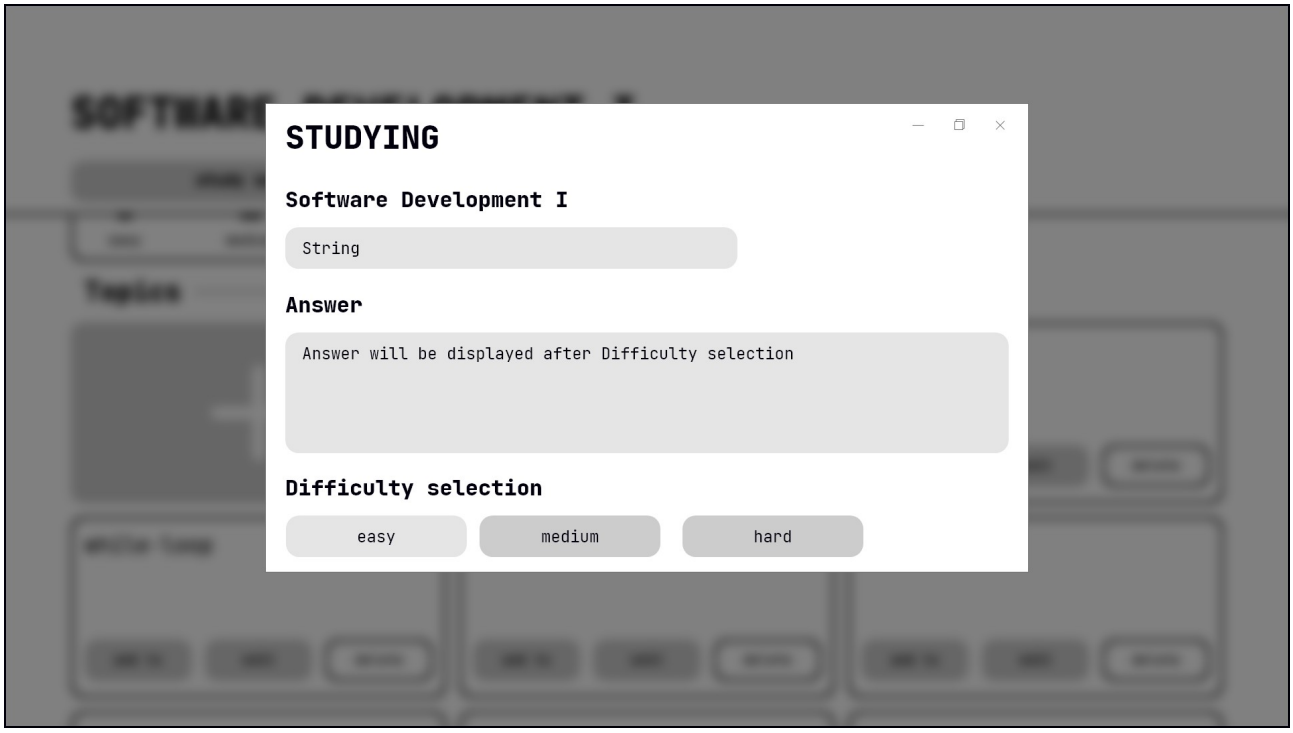

Image 18

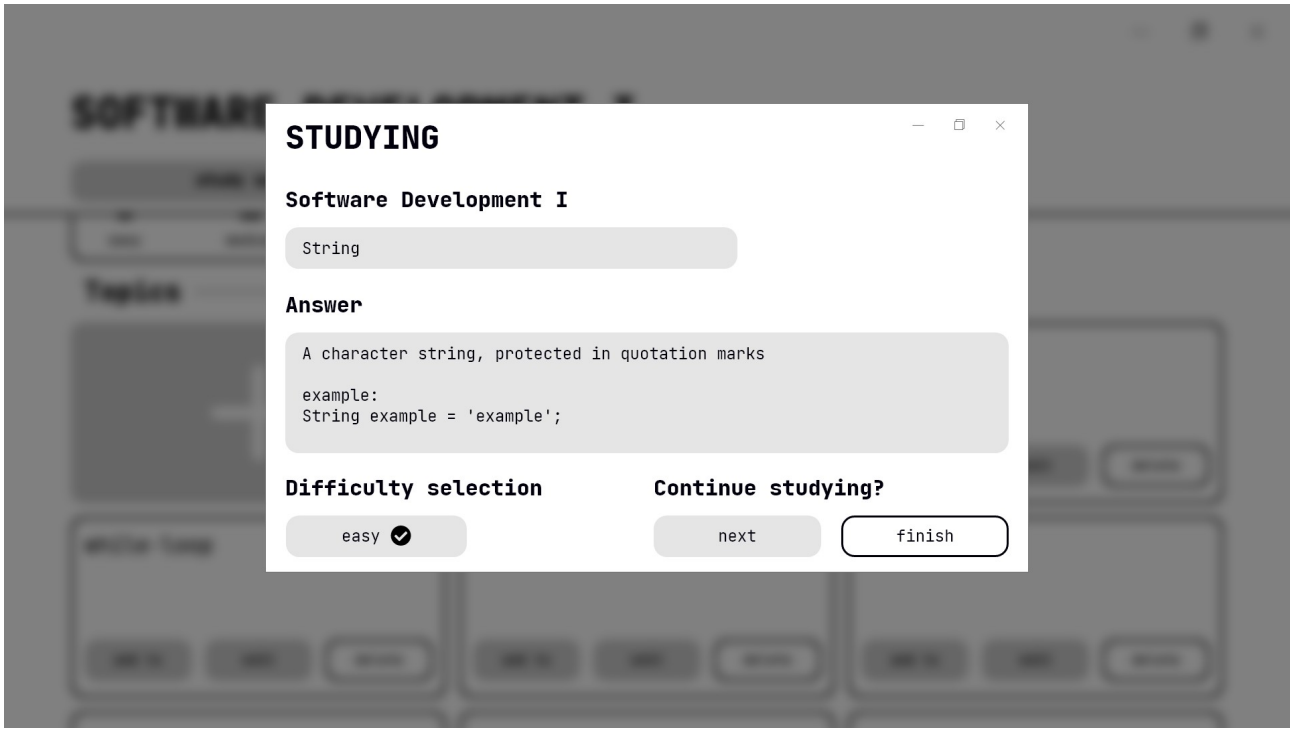

Image 19

9.2 Mobile Application

9.2.1 The following images show the main screen of the desktop application with all the subjects, the statistics after selecting the show statiistcs button and the dialog window to create a new subject

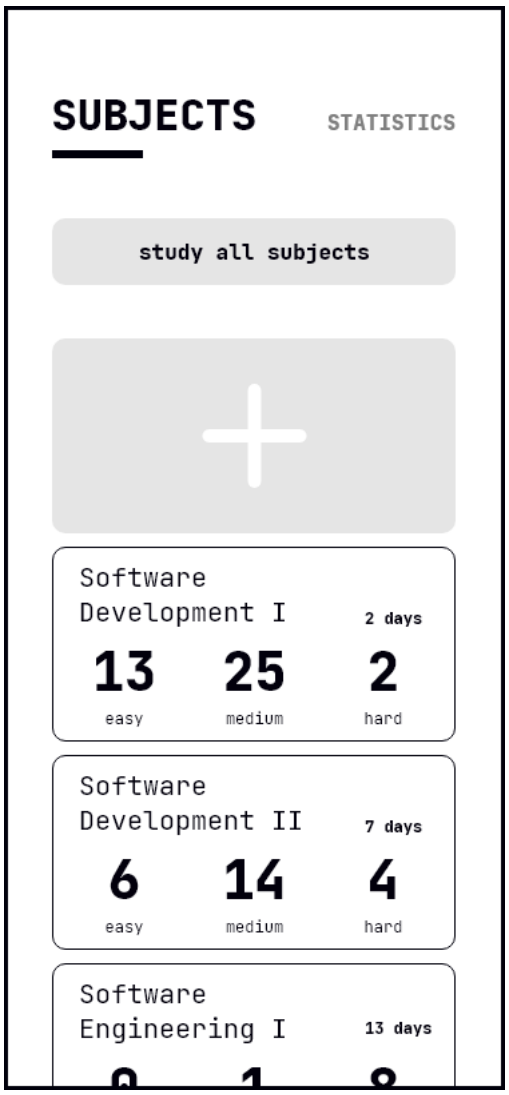

Image 20

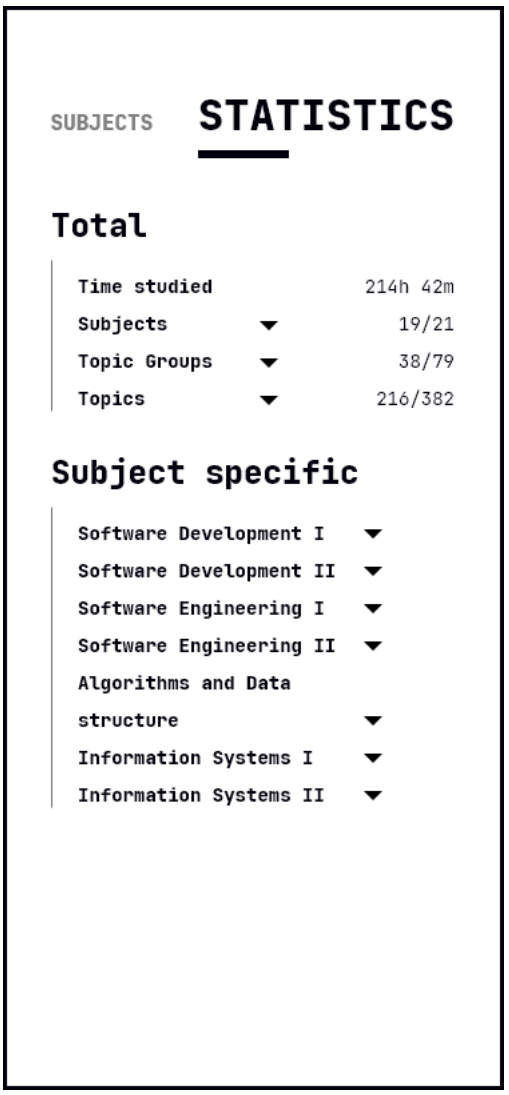

Image 21

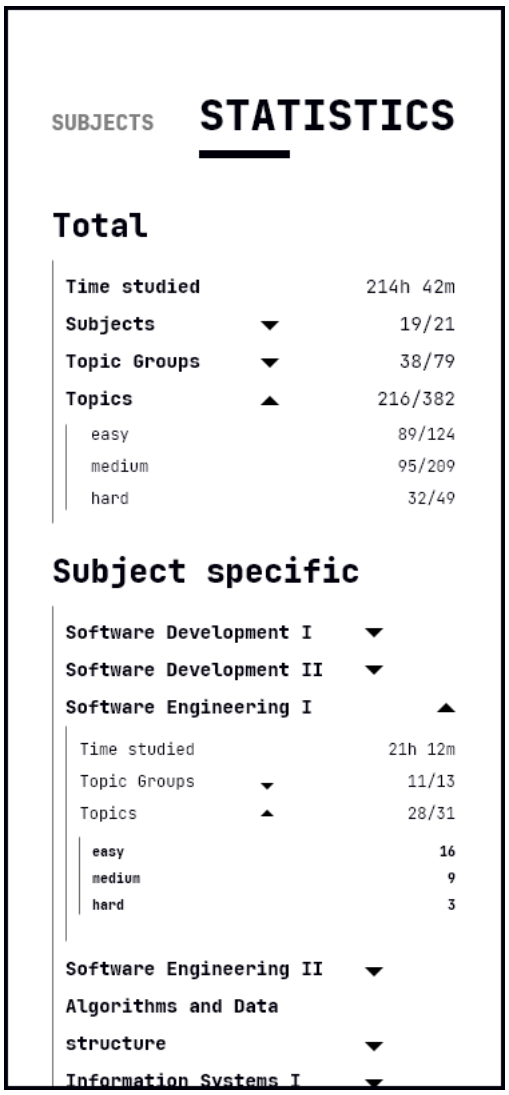

Image 22

Image 23

Author: Tim Freimann

9.2.2 The following images show the subject survey screen of the desktop application with all the topics

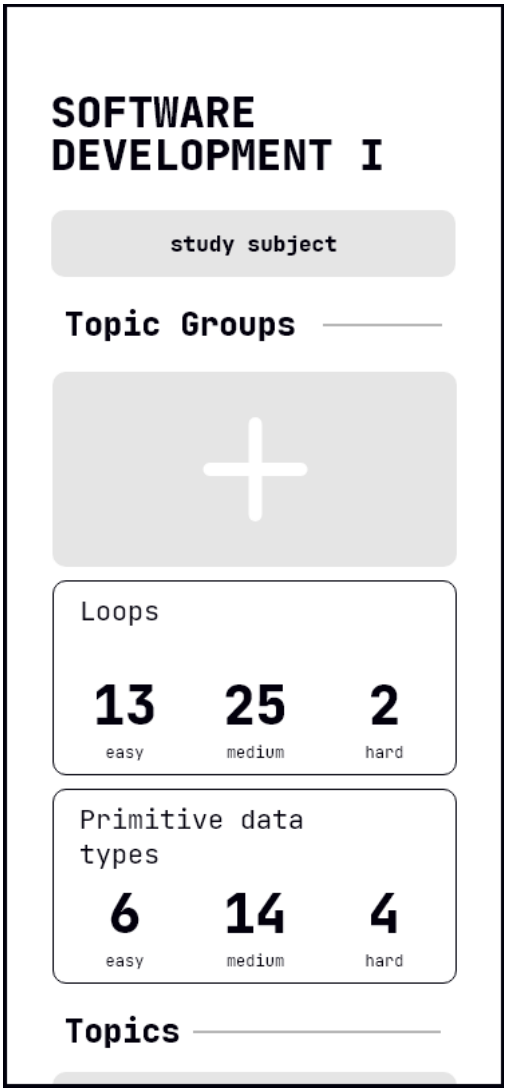

Image 24

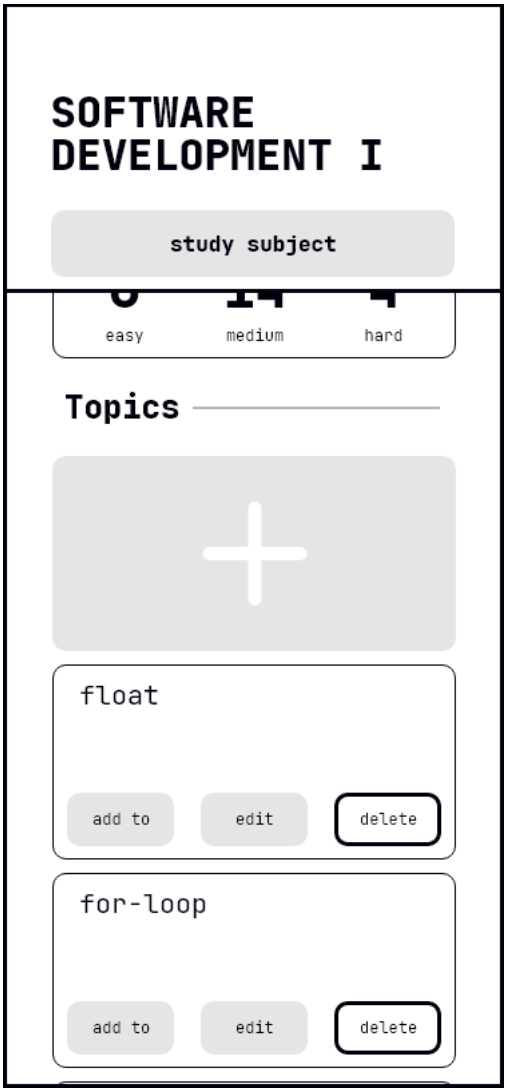

Image 25

9.2.3 The following images show the dialog windows to create a new topic and edit an existing one, as well as the dialog window to choose if the data shall be saved or dismissed, if the student leaves the dialog window without selecting

Image 26

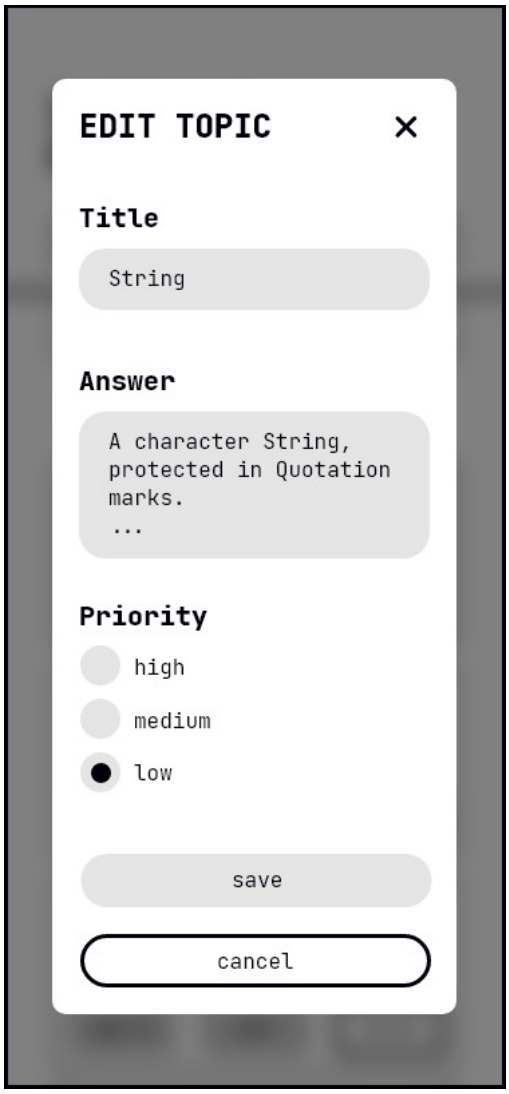

Image 27

Image 28

Author: Tim Freimann

9.2.4 The following images show the dialog windows for studying all subjects

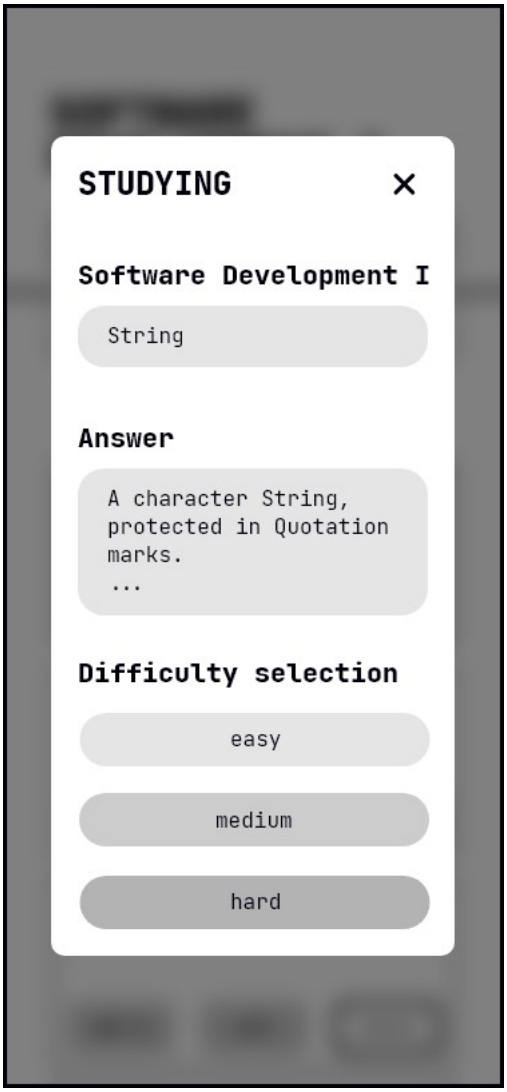

Image 29

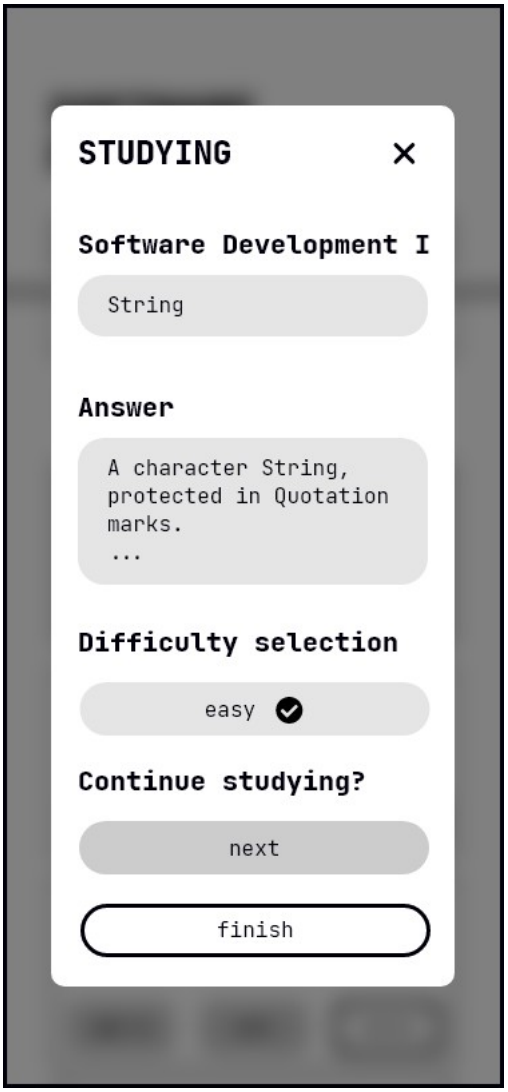

Image 30