Bilkent University



Department of Computer Engineering

CS319 TERM PROJECT

Section 3

Group Lux Æterna

Bilkent Pandemic Manager

Analysis Report

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Introduction

As our group, we decided to implement a pandemic manager application that tries to make Bilkenters' life easier by tracking their Covid-19 status in the campus because Covid-19 outbreak is still continuing and education life has been suspended for a while. Yet, students should not lag behind their rivals since online education is not as efficient as face to face. Therefore, it is important to implement such an application to keep track of students and instructors while they are in the face to face system.

In the light of the needs of a pandemic manager, it is decided to have different features for both students and instructors because they will get through the pandemic in different ways. We, as the group, decided to implement a pandemic manager since it is crucial to prevent more losses from this outbreak now on. Thus, the application has the following features:

- Add/Update HES codes, vaccination cards, and Covid-19 test results
- Add/Eject nearby students
- Access which student is diagnosed
- Warnings for infected students and their instructors
- Covid-19 questionnaires
- Covid-19 Stats in Bilkent

2. Proposed System

The application will have a login page for all users including students, instructors, and admins. They can easily access the main page from the same login page. After that, they can use the functionalities in the main page such as add/update HES codes, vaccination cards and Covid-19 results. Other than that, students can keep track of their nearby classmates in courses page while instructors keep track of who is diagnosed. Moreover, users can see Covid-19 stats in Bilkent and more specific places such as dorms and courses and users can also take questionnaires and tests to know about their sensitivity to Covid-19.

2.1. Functional Requirements

2.1.1. Login Page

The application will have a login functionality that appears when entering the application:

- Asks for username (ID number) and password
- All users (students, instructors, admin) will have the same interface.
- Forget password option that renews password in case of forgetting their password
- This page directs all users to the main page that is designed differently for admin and students/instructors.

2.1.2. Main Page

The page when the user logged in will be the main page that has the following functionalities with three boxes in the interface for users and 2 boxes for admins while there is always a sidebar on the left most part and a profile icon and search bar at the rightest top of the page.

- Sidebar will have 6 buttons. These are called the main page,
 courses, dorms, risk calculator, covid-19 reports, and news. It
 will be the same for both users and admins and will not change during the actions.
- Profile part will consist of the user's avatar or profile photo and their status such as riskless or contaminated.
- Users can search any keyword on the search bar.
- Students/Instructors can add or update their HES codes on the first box in the middle. After they upload their HES codes, they are able to see if they are risky or not while seeing the last update date.
- In the second box, students/instructors can see their vaccination cards if they are uploaded, otherwise, they need to upload it first and wait until the admin approves that the vaccination card is valid and true for the student. They can upload vaccination cards for both Turkey and other countries since there will be some people vaccinated abroad. If the user does not want to get vaccinated, they can prefer to take PCR or the Diagnovir test

- every 72 hours which is required to access the campus and its facilities.
- In the third box, students/instructors can add new diagnoses such as PCR, X-Ray or tomography with their date and files. In case of forgetting or adding wrong files they can update those files in the system. Also, they can see their Covid-19 test history. If their Covid-19 test results are approved and positive, the nearby students and roommates will be notified by email to tell them that they might be infected and need to take Covid-19 test as soon as possible. After they take the Covid-19 test, they have to update the test results constantly every 72 hours to get on campus. Since they are contact students, they will be labeled as contact and risky in the application so the instructor will know their status.
- In the first box of the admin's main page, there will be an approval list from students and instructors about their HES codes, vaccination cards, and test results that awaits approval of admins.
- In the second box of the admin's main page, admin can access
 and find a user by searching their name. After finding that
 specific user, admins can update their information such as
 course or dormitory.

2.1.3. Courses Page

Courses page that users can see and control the courses will have the following functionalities:

- Instructors will be able to see who is diagnosed positive for
 Covid-19 in each of their courses by selecting the course in the
 box. After selecting the course, they can see enrolled students
 and their diagnosis status in the new interface. So, they will
 know who should be in quarantine or not.
- Students will be able to see their course codes, course names
 and number of close seating classmates immediately. Also
 students will be able to select their close seating classmates by
 clicking the select button at the right. They can add or remove
 their classmates in this new page. Selected classmates appear or
 disappear in button below after clicking add or remove buttons.
- Admin will have the authority to create courses by clicking the create course button in the middle, after that they can add students and instructors to that course in the new interface.
 Since there will be many students like up to 60 students, there will be both manual and excel file upload selection to add students.

2.1.4. Dorms

In this page, statistics about the dorms will be displayed only to the admin:

Admin will have the authority to create dorms by clicking the
create dorm button in the left box, after that they can add
students to that dorm room in the right box as specified. Admin
can add students in the same block in an excel file to make it
more practical.

2.1.5. Risk Calculator

Users can take tests to learn how likely it is to get infected by coronavirus. It has the following functionalities:

- Students/Instructors can solve the Risk Calculator test to learn which risk group they are in according to their health conditions, current international criteria etc.
- They can also take the Am I Corona test to check out if they are currently showing Covid-19 symptoms or not according to criteria of all diseases.

2.1.6. Covid-19 Reports

There will be three types of reports that are open to both students and instructors which have different functionalities:

 Instructors can specifically see who is diagnosed positive for Covid-19 in their courses. They can also see an overall report that does not specifically show who is diagnosed. Instructors naturally cannot see dorms' statistics. Students cannot specifically see who is diagnosed positive for Covid-19 in their courses but they can see numbers. They can also see anonymous statistics for their dorms and see the overall report of Bilkent University.

2.1.7. News

News will contain current news about Covid-19 pandemic around the world. It will automatically fetch data from Google News API

2.1.8. Send Feedback

Users can send feedback to improve the application in its further version.

2.3. Non-Functional Requirements

2.3.1. User-Friendly Interface

The application is designed to not be eye-straining since nobody would want an application that is too complicated and difficult to do actions. Therefore, this application's interface is kept simple to avoid confusion. For example, there are not many options on the sidebar while their functionalities are seen as plain and goal-oriented. On the other hand, using the right colors and designs such as user-friendly buttons will make sure that the users will be more eager to use this application more.

2.3.2. Maintainability

Since the application will be designed in an OOP language, it will not be a problem to add or remove some features and fix the bugs because it will not affect the legacy code.

Therefore, there will be no confusion or conflicts in the code while fixing the bugs and adding or removing some features.

2.3.3. Compatibility with Real Life

Since the application will totally be integrated in campus life of students and instruction to maintain and keep track of their Covid-19 status, it can be said that it is fully compatible and integrated with real life. For example, students will add their nearby students from their

actual, real classes. Or, they can be notified when there is someone near to them who is infected.

2.3.4. Safety

The courses will be assigned for each student by the admin so they cannot enroll in another course they are not supposed to do so. Also, students will not be able to see specifically who is diagnosed in their courses since it is confidential and private information of the student. Only the instructors will see who is diagnosed which is necessary to maintain the students' health.

2.4. Pseudo Requirements

The application will be implemented nicely and be supported by all types of operation systems (Windows, Linux etc.). Java and Spring Framework will be used to create the application since they are the most suitable and extensive languages.

2.5. System Models

2.5.1 Scenarios

Use Case 1

Use Case Name: Add/Update Corona Files **Participating Actor:** Instructor and Student

Stakeholders and Interests: User wants to add his corona files to the system

or wants to update the files **Entry Condition:** None

Exit Condition: User successfully add or update the file

Main Flows of Events:

- User add his hes code
- User add his vaccination card
- User add his test result
- Test result is negative

Alternative Flows of Events:

- User add his hes code
- User add his vaccination card

- User add his test result
- Test result is positive
- An email is sent to User's nearby friends in courses and User's roommates in the dormitory to warn that they were in contact with a positive user.

Use Case 2

Use Case Name: Approbation of Corona Files

Participating Actor: Admin

Stakeholders and Interests: Admin checks if the added corona files are

valid

Entry Condition: There should be requests in Admin's approval list

Exit Condition: Admin approves or rejects the file

Main Flows of Events:

• Admin checks if there is approval request

- If there is, he checks if the request is valid
- According to the request Admin approves the file or rejects the file

Use Case 3

Use Case Name: Create Course **Participating Actor:** Admin

Stakeholders and Interests: Admin can create a course

Entry Condition: None

Exit Condition: Successfully creating a course

Main Flows of Events:

- Admin creates a new course
- Admin adds instructor to the course
- Admin adds students to the course

Use Case 4

Use Case Name: Add Nearby students

Participating Actor: Student

Stakeholders and Interests: Student can add his nearby student in a specific

course

Entry Condition: User has to attend a course

Exit Condition: User successfully add or eject his nearby friends

Main Flows of Events:

- User select a course
- User finds his friend from the student list
- User add his friend ass nearby

Alternative Flows of Events:

- User selects a course
- User indeliberately add wrong student
- User ejects the wrong student
- User adds his nearby friend

Use Case 5

Use Case Name: Add Student to a Dormitory

Participating Actor: Admin

Stakeholders and Interests: Admin adds students to dormitories

Entry Condition: Student must stay at dormitory Exit Condition: Successfully adding the student

Main Flows of Events:

Admin chooses a dormitory

• Admin adds student's floor, block and room number

Use Case 6

Use Case Name: Solve Calculate Your Risk Tests **Participating Actor:** Instructor and Student

Stakeholders and Interests: User can solve questions to see his risk level of

fatal impact from corona or to see if he shows corona symptoms

Entry Condition: None

Exit Condition: User finishes the test

Main Flows of Events:

User choose the test typeUser answer the questions

User submit the test

• User receive his test result

Use Case 7

Use Case Name: Check News

Participating Actor: Admin, Instructor, Student

Stakeholders and Interests: User can check daily Covid-19 news

Entry Condition: None

Exit Condition: User exit from news section

Main Flows of Events:

User enter news sectionUser checks daily news

Use Case 8

Use Case Name: Send Feedback

Participating Actor: Instructor and Student

Stakeholders and Interests: User can send feedback to admin about his

complaints

Entry Condition: None

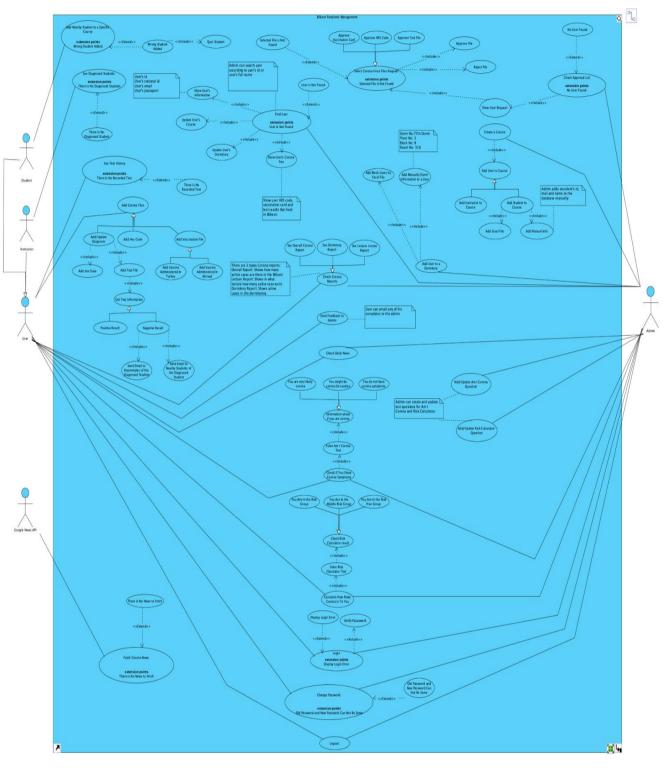
Exit Condition: User successfully send his feedback

Main Flows of Events:

User writes his feedback

• User send his feedback

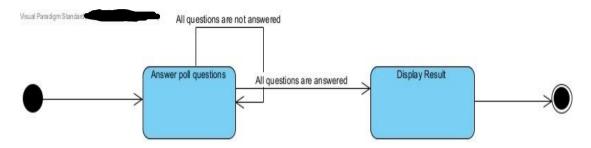
2.5.2. Use Case Model



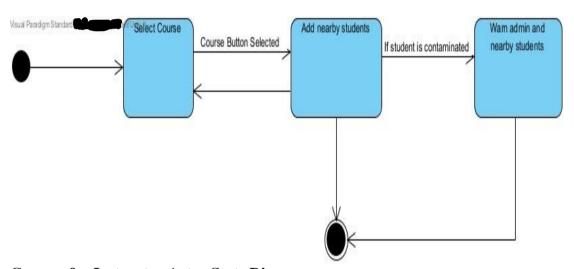
2.5.3. Dynamic Models

2.5.3.1 State Diagrams

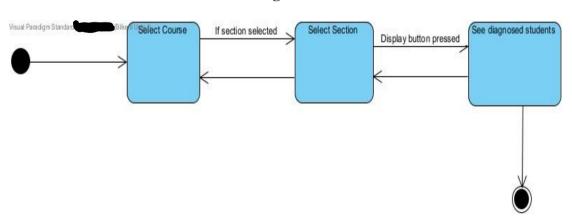
Risk Calculator State Diagram



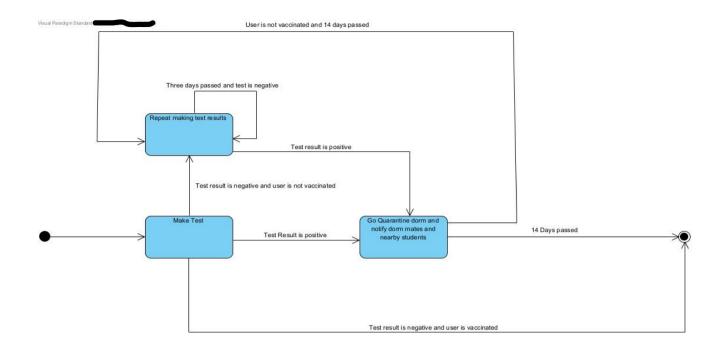
Courses for Student Actor State Diagram



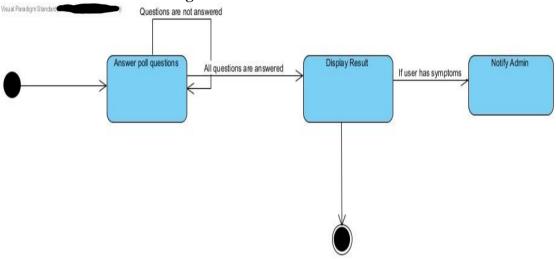
Courses for Instructor Actor State Diagram



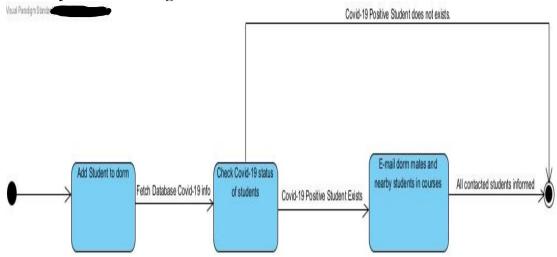
Covid-19 Test Sequence State Diagram



Do I Feel Corona State Diagram

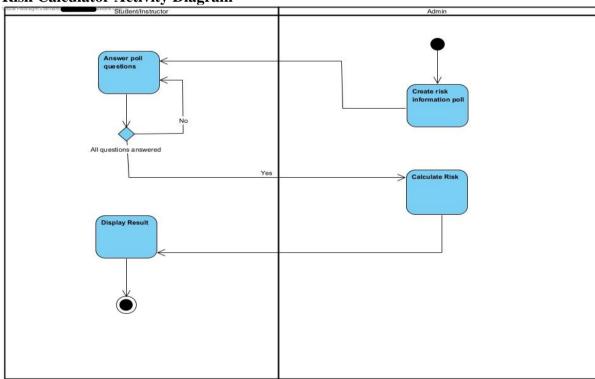


Dorm System State Diagram

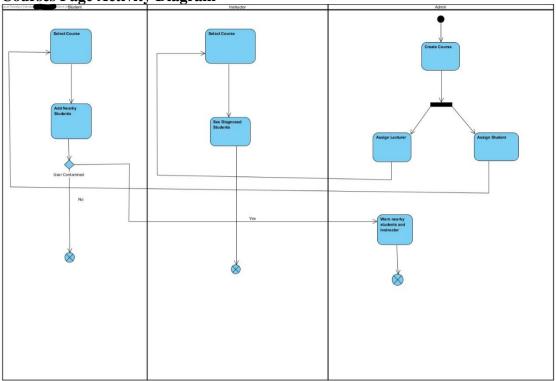


2.5.3.2 Activity Diagrams

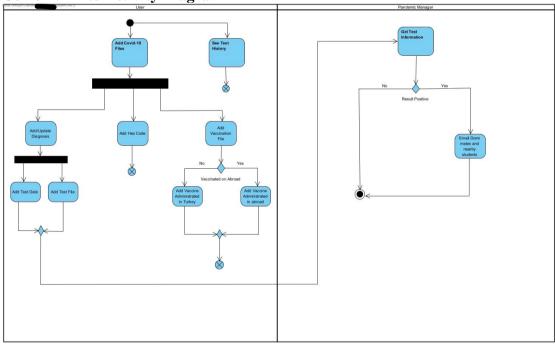
Risk Calculator Activity Diagram



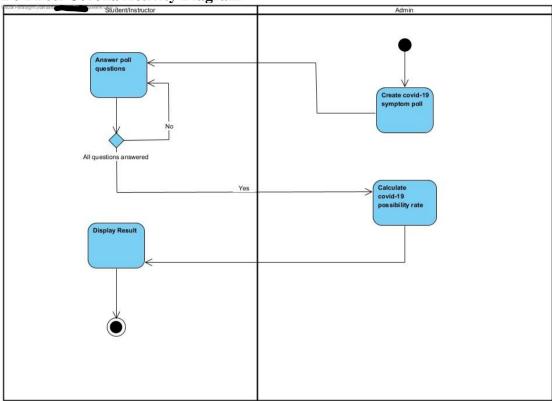
Courses Page Activity Diagram



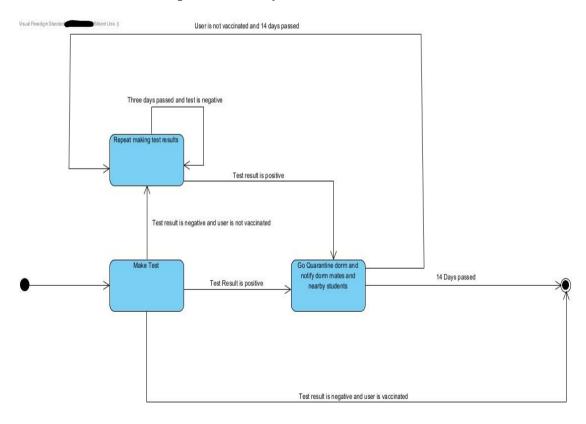
Covid-19 Files Activity Diagram



Do I Feel Corona Activity Diagram

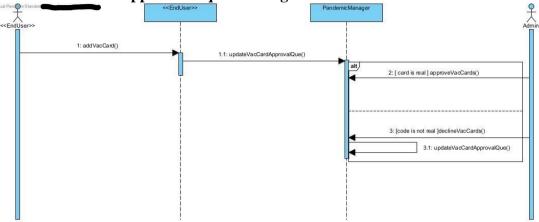


Covid-19 Test State Sequence Activity

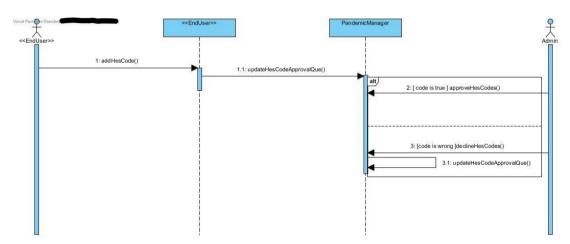


2.5.3.3 Sequence Diagrams

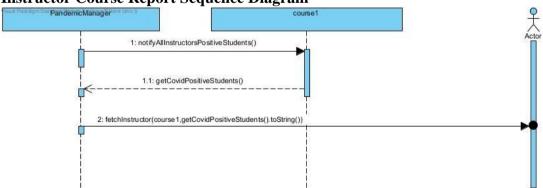




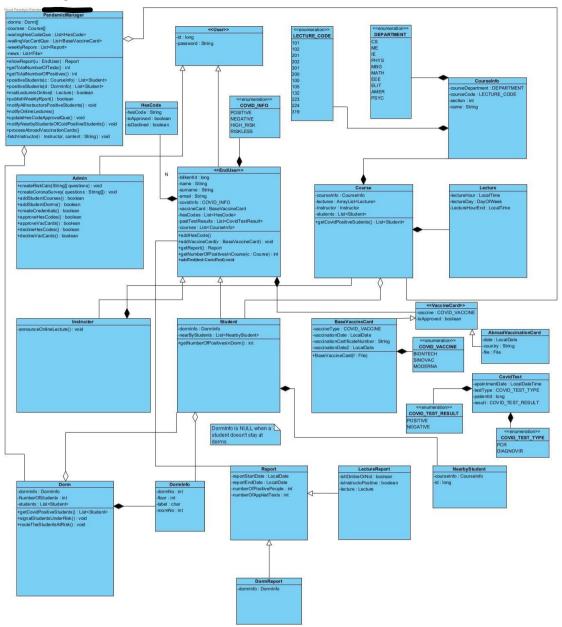
HesCode Approval Sequence Diagram







2.5.4. Object and Class Model



Further Explanation for Object and Class Model

PandemicManger: This class is where the actual management happend. Collected vaccination cards and hescodes are stored here before approval lest it is wrong. Later, added to db if approved.

Course: Since the courses are the one of the main meeting reasons of people in a university it needs its own set of functionality.

CourseInfo: CouseInfo object creates an ease of use since courses taken by a student is an aspect of Student object and Students are an aspect of Course objects. In order to avoid infinite recursive cases it is added.

DEPARTMENT: Predetermined Enum for department codes to make editing easier.

LECTURE_CODE: Predetermined Enum for lecture codes to make editing easier.

COVID_INFO: POSITIVE is covid positive, NEGATIVE is covid negative and riskless HIGH_RISK is for people who were near positive people.

Lecture: Lecture object is a way to create regular informing gaps for EndUsers who are part of that Course object. Since POSITIVE students are not allowed in a lecture, Instructors must know covid POSITIVE students before every lecture.

DormInfo: DormInfo object creates an ease of use since the dorm of a student is an aspect of Student object and Students are an aspect of Dorm objects. In order to avoid infinite recursive cases it is added.

Dorm: Since the Dorms are again a place for crowds or close contacts, it needs its own set of functionality. Positive students must go to quarantine dorms and their roommates must be labeled as HIGH_RISK covid info.

User: It is an abstract class to keep the code DRY. Since everybody has to have a Bilkent Pandemic Manager id it is required.

EndUser: It is an abstract class to group the similar requirements of Student and Instructor. Every user that is not admin must be an EndUser.

Student: Different from Instructor object, student object has dorm information which is null if student is not staying at dorms and nearby student information.

Instructor: Since the absence of Instructor because of covid creates different scenarios such as lectures being online if Instructor is covid positive this class is needed.

Report: Report object is required to determine the formation of a report that is fetched to EndUser.

DormReport: A special type of Report object which contains the information of dorm and covid POSITIVE students.

CourseReport: A special type of Report object which contains the information of course and covid POSITIVE students.

VaccineCard: VaccineCard is an abstract class to store both BaseVaccineCard objects and AbrodaVaccineCard objects in the same que.

BaseVaccineCard: Vaccine cards given in turkey stored and processed via this object.

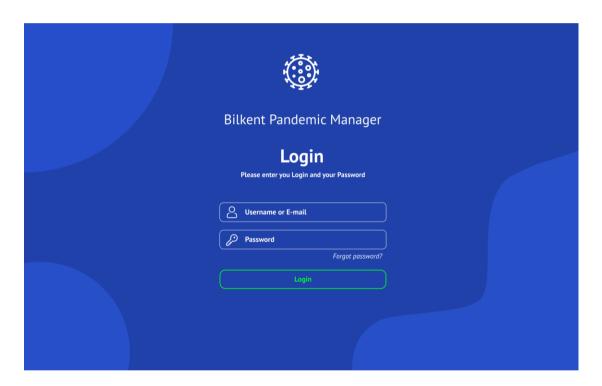
AbroadVaccineCard: Vaccination cards given in Turkey abroad are stored and processed via this object. Since the information contained within these vaccine cards are not known priorly it is stored as a File object.

COVID_TEST_TYPE: in order to differentiate different test types such as PCR and Diagnovir.

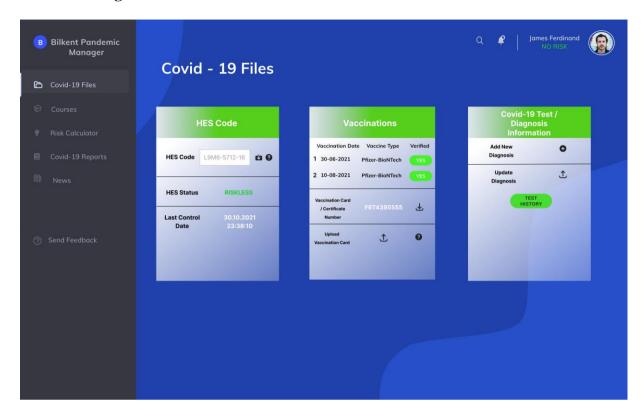
COVID_VACCINE: In order to differentiate different types of vaccines.

2.5.5. User Interface - Screen Mockups

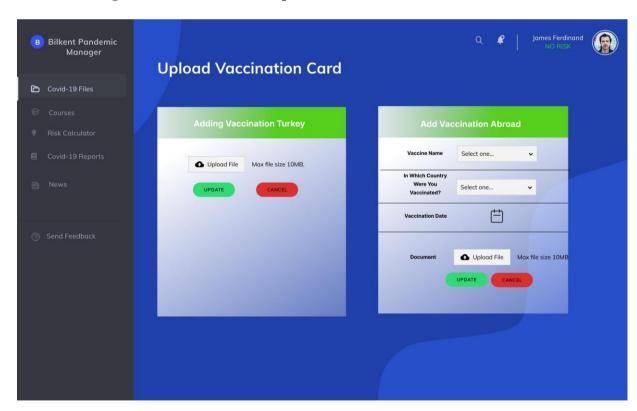
Login Page:



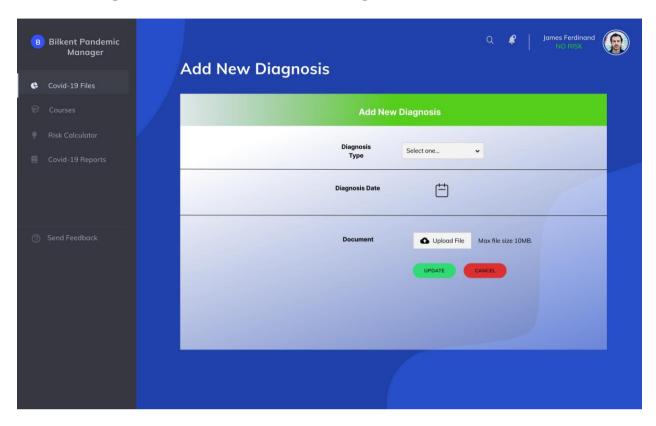
User Main Page -> Covid-19 Files



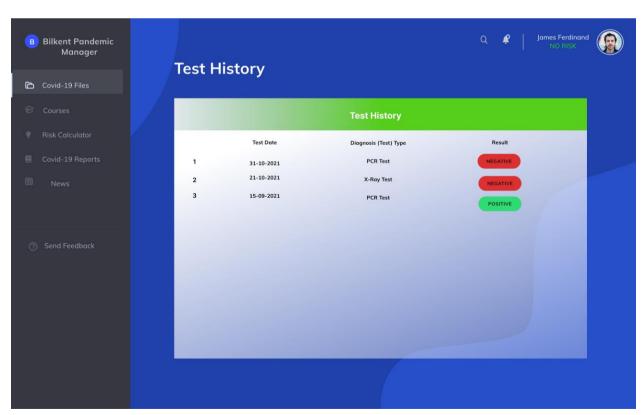
User Main Page -> Covid-19 Files -> Upload Vaccination Card



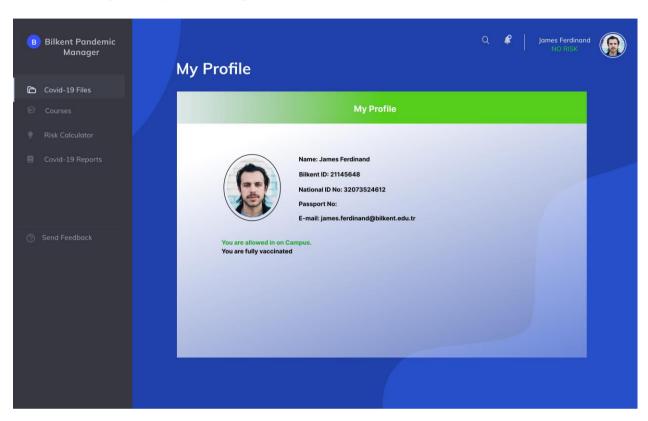
User Main Page -> Covid-19 Files -> Add New Diagnosis



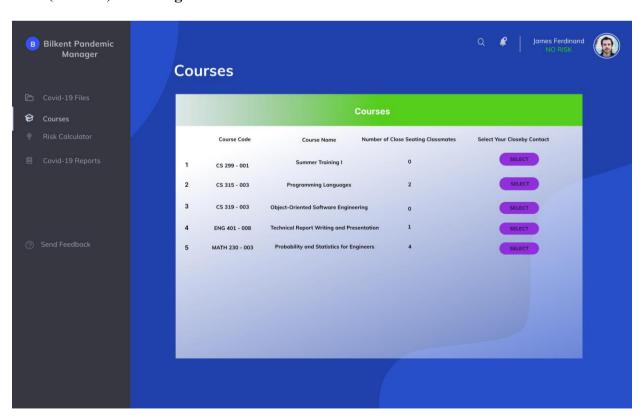
User Main Page -> Covid-19 Files -> Test History



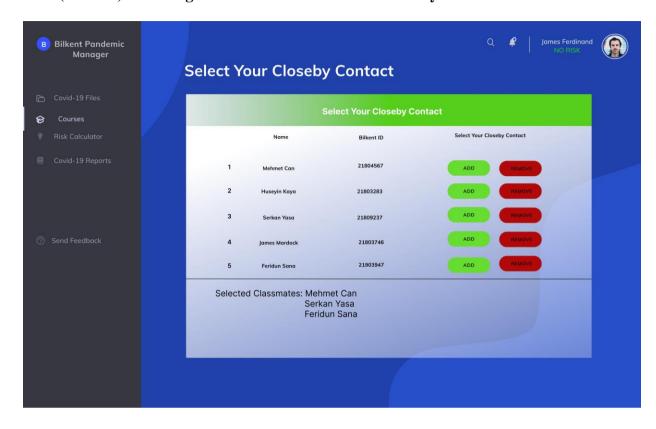
User Main Page -> My Profile Page



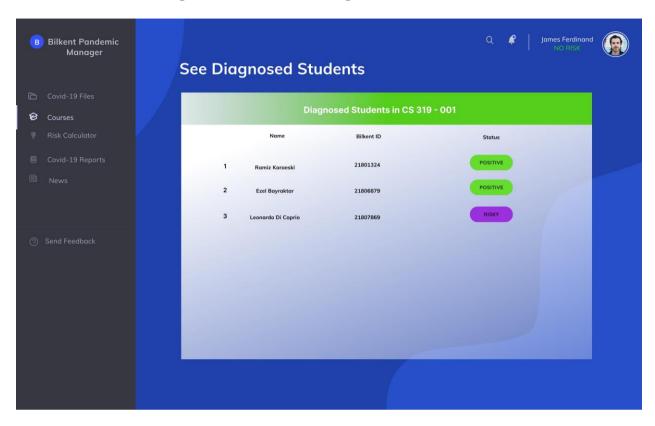
User (Student) Main Page -> Courses



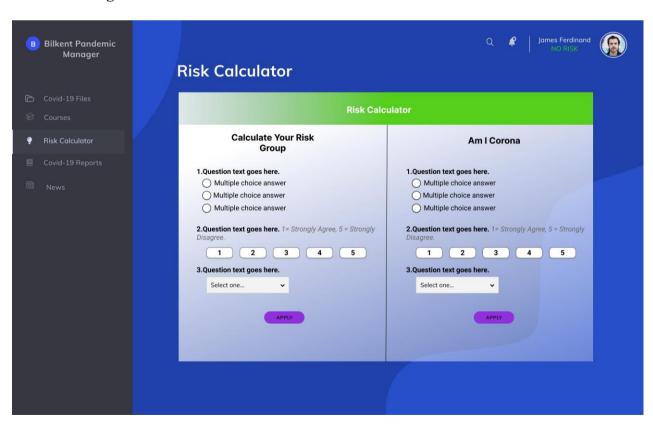
User (Student) Main Page -> Courses -> Select Your Closeby Contact



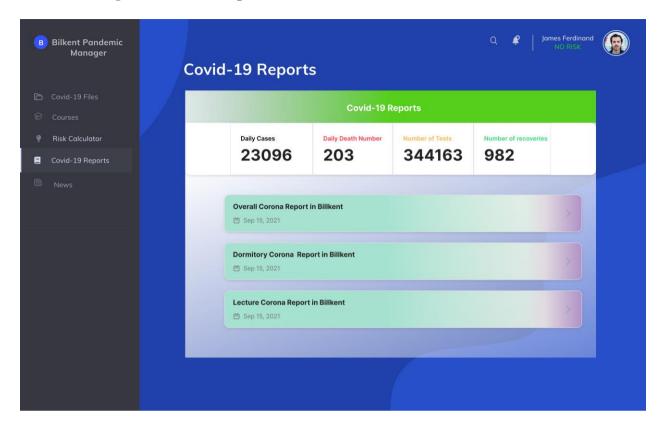
User (Student) Main Page -> Courses -> See Diagnosed Students



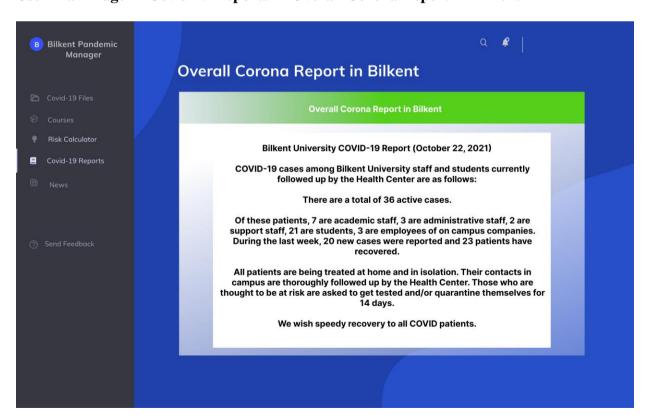
User Main Page -> Risk Calculator



User Main Page -> Covid-19 Reports



User Main Page -> Covid-19 Reports -> Overall Corona Report in Bilkent



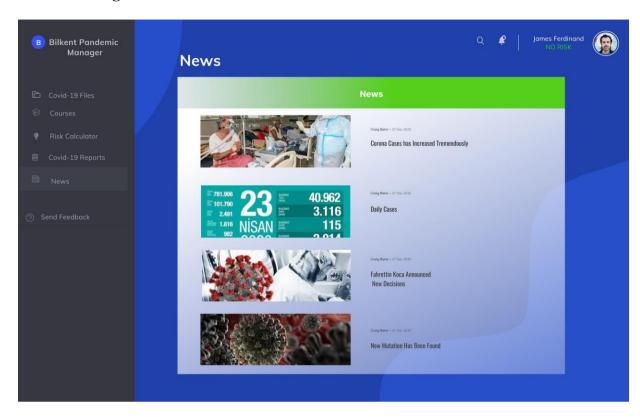
User Main Page -> Dormitory Corona Report in Bilkent



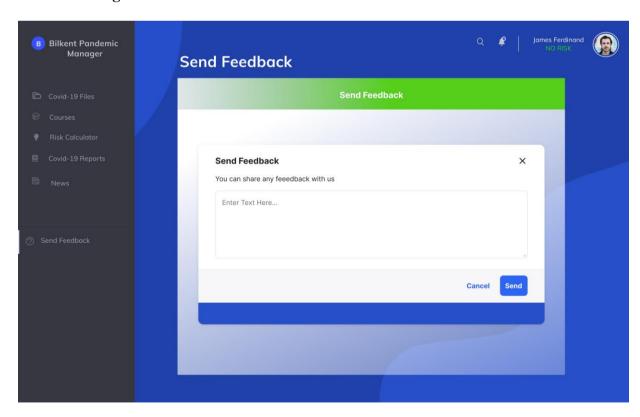
User Main Page -> Lecture Corona Report in Bilkent



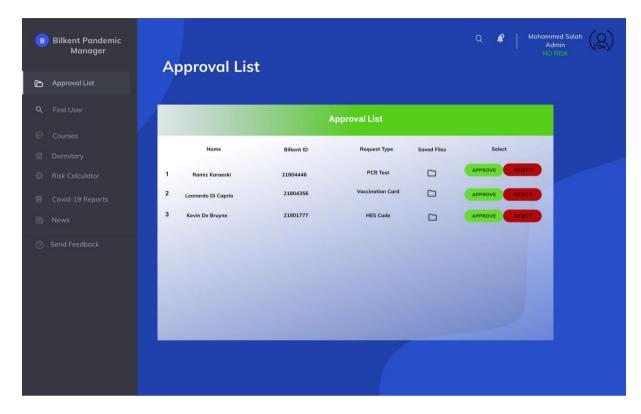
User Main Page ->News



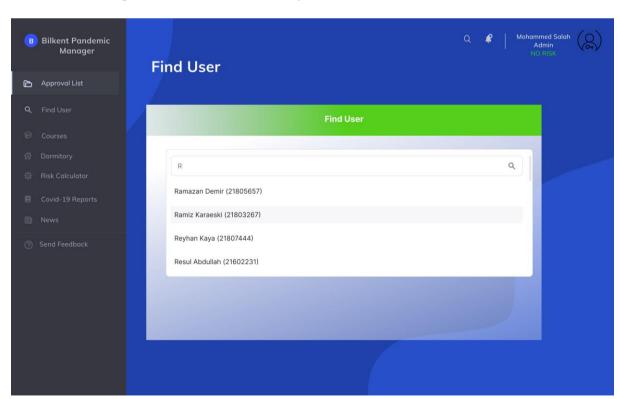
User Main Page -> Send Feedback



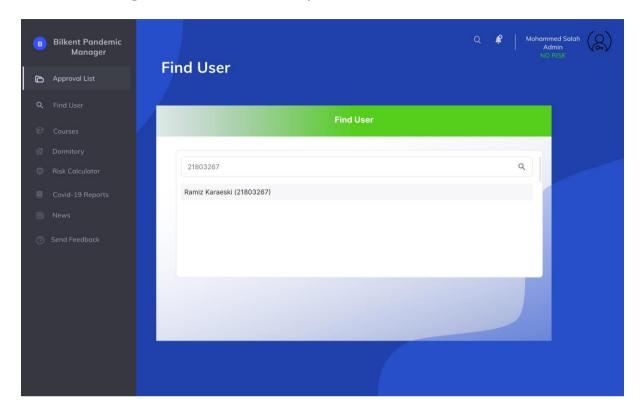
Admin Main Page -> Awaiting Approval List



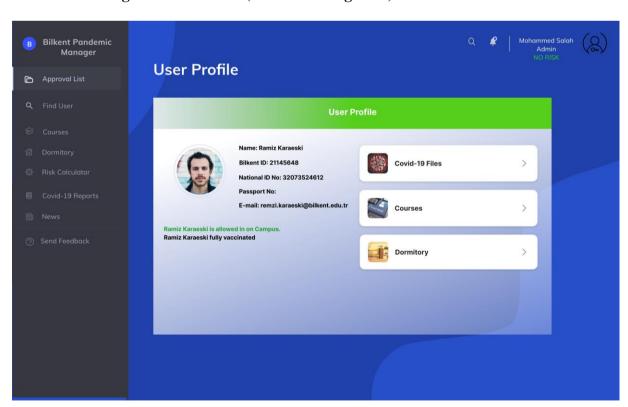
Admin Main Page -> Find User (Search By Name)



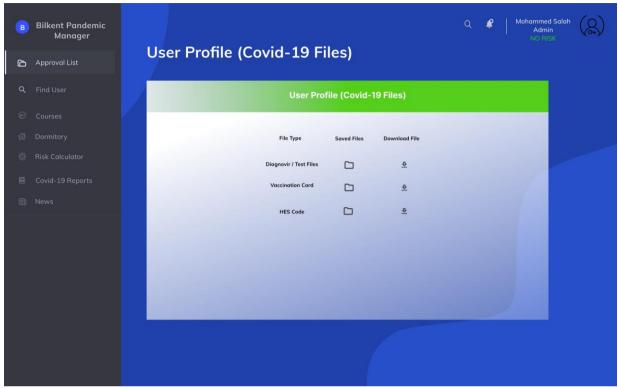
Admin Main Page -> Find User (Search By ID)



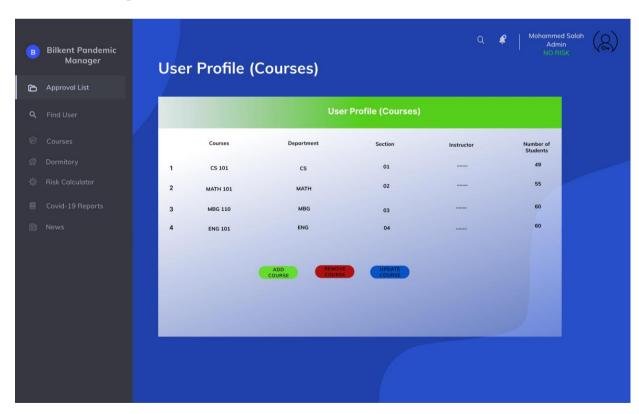
Admin Main Page -> User Profile (After Selecting User)



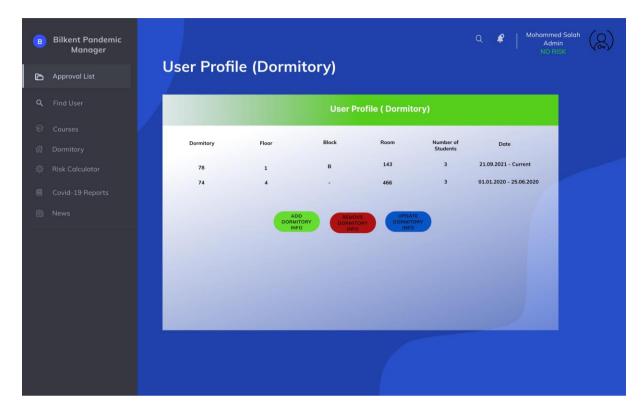
Admin Main Page -> User Profile-> Covid-19 Files



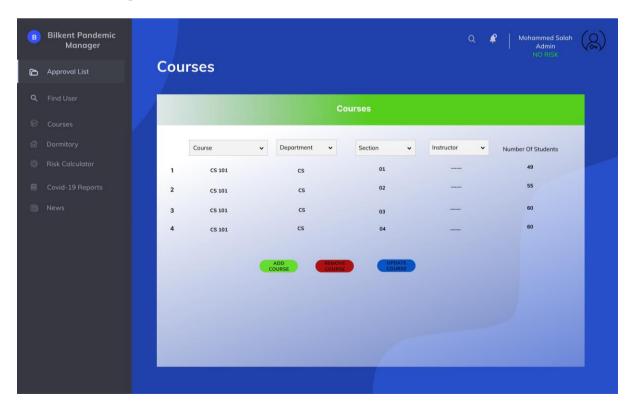
Admin Main Page -> User Profile -> Courses



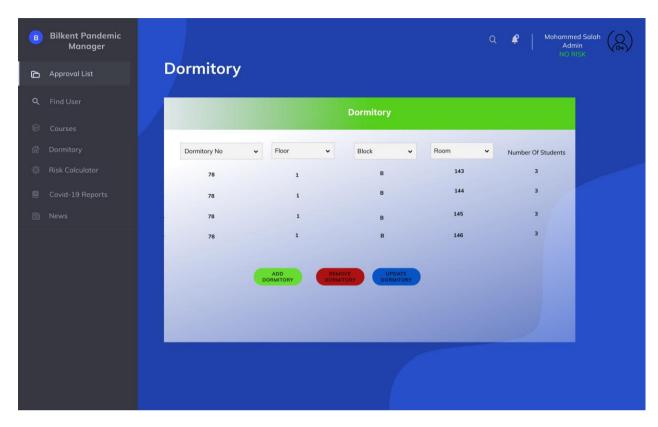
Admin Main Page -> User Profile -> Dormitory



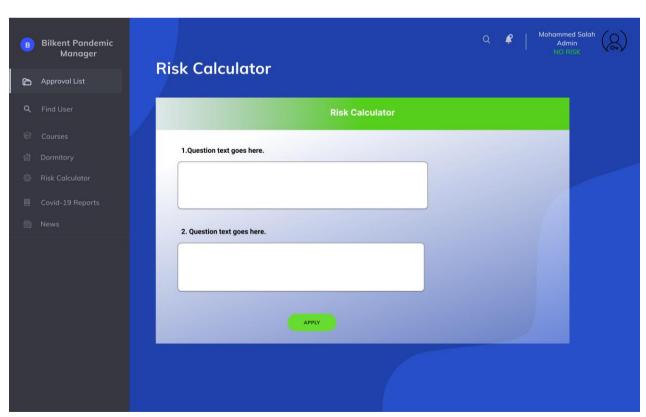
Admin Main Page -> Courses



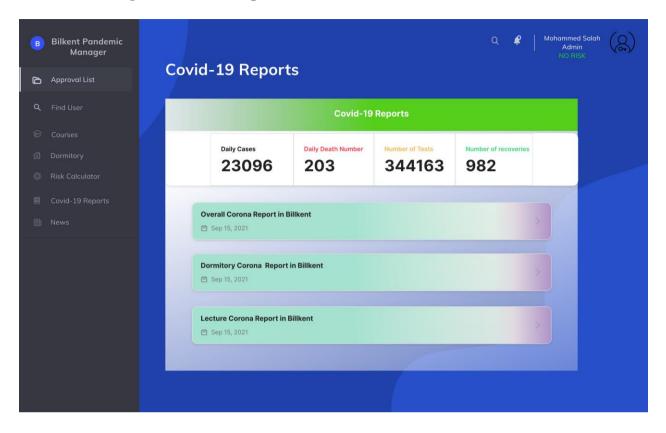
Admin Main Page -> Dormitory



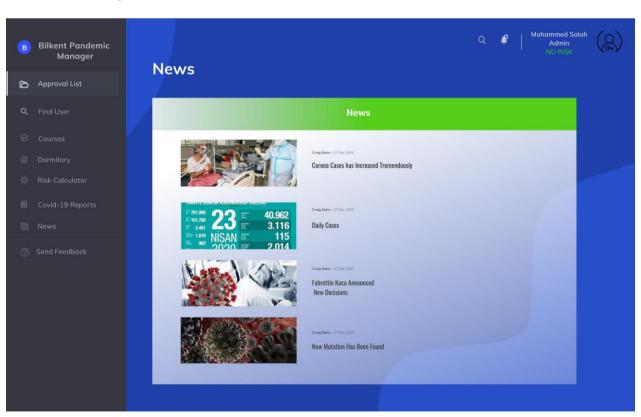
Admin Main Page -> Risk Calculator



Admin Main Page -> Covid-19 Reports



Admin Main Page -> News



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