Foundations of Databases, A.Y. 2020/2021
Master Degree in Computer Engineering
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Homework 1 – Requirements Analysis
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Group Corona Vaccine	Project Covid-19 Patient Track System	
Last Name	First Name	Student Number
Agurenko	Alina	2005631
Norhen	Abdennadher	2014408
Sahnoun	Achraf	2014407
Ulas	Emre	2005537
Yuksel	Yusuf Taylan	2005536

Objectives of the System

It is aimed to develop an application that controls and monitors the pandemic period by making the most of the opportunities offered by information and technology during the fight against the pandemic.

This database will be built to provide a safe social life to citizens in all social areas such as workplaces, restaurants, transport vehicles, taxis, public events such as weddings, institution visits. With this database, it is possible to observe whether the citizens are at risk, whether they come into contact with risky people, and the following and security of the places they are located. The aim is to minimize the risk of all social areas.

Interviews

Several interviews have been done to define the system requirements. In particular, we interviewed:

- **Clinicals** to decide the submission rules for COVID test results
- **Business owners or Agents of the Building** to define the best way to check the COVID status and to add information about visits and new citizens
- **Ministry of Health technicians** to understand how to organize the data to be analyzed

Users and Stakeholders of the System

The users of the system are:

- **Citizens:** they will have access to a part of the database, but they will have only the right to read information which would be very helpful for them to know how risky are their own and social areas. The citizen will have the right to check if a specific building is safe to visit or not at a specific time.

- **Business owners or Agents of the Building:** Apart from the ordinary medical procedures that are usually done before entering social places, the agents of each building will have access to the database. In fact, they will search by ID to check the medical status (If he is a carrier of COVID-19 or not) of every person who wants to enter the building. And if the visitor is safe, the agents of the building will add his personal information to the database, and the time of his entering and his living.

- **Ministry of Health:** It will be able to more easily follow the situation of COVID-19 in the country and take precautions accordingly. They can identify positive cases or people in contact with the patient more quickly and take the necessary treatment and precautions.

- **Clinics and medical labs:** These users will have the right to edit the database. In fact they can add new persons to the database (after accomplishing the PCR test) or they can modify the medical status of an existing person in the database.

Natural Language Sentences

The COVID-19 disease causes a wide range of respiratory illnesses from the common cold to more severe disease including pneumonia and mode of transmission is predominantly by droplet spread. To reduce the risk of person to person transmission of the coronavirus during COVID-19 pandemic, various national governments have introduced extensive 'lockdown' measures such 'social distancing' and 'shielding' of risk individuals. Lockdown measures limits movement of people in communities while allowing essential services to continue in an attempt to curb the spread of coronavirus outbreak. Consequently the effect of COVID-19 has had a significant impact on daily life including health care and disruption of economic, social and supply chain sectors.

According to the statement above, governments need a patient follow up system. In this way, they can easily follow the health status of the social areas and citizens and help the citizens to easily sustain their lives in this period. We can define the features and benefits that this application supports:

- During controlled social life conditions, this application helps you safely share your Covid-19 risk status with institutions and individuals for activities like transportation

or visit. Shared person's risk status can be checked through the app or services provided to institutions.

- If someone, who currently or recently has shared the same environment with user, is diagnosed as coronavirus positive, it will help the Clinic to contact that user as rapid as possible and provide healthcare and counselling services.

- If citizens have to meet with someone else, they can communicate with each other more securely by sharing their risk status.

- Agents of the Building will be able to follow the number and situation of people entering the building more easily. It will also help it not exceed the maximum people capacity to enter the building.

- The buildings will be quarantined according to the number of positive cases that have entered.

- The Ministry of Health will be able to report and analyze about Covid-19 status in the country.

Working flow of safe area application: Agents of the building will set up systems at the entrances of the buildings. Citizens share their risk status while entering the building and are registered in the system. This risk situation will be defined by color: RED = person who is the positive case, YELLOW = person who has been in contact with a positive case at the same time period and same building and GREEN = person who is a negatif case, and by default everyone is GREEN. With this coloring method, red and yellow citizens will be prevented from entering the building. Only citizens whose risk status is green will be able to enter the building. However, after the person entering the building as a GREEN visitor, is determined to be a positive case later, the risk status will be changed to RED. With this positive case, the risk status of people who are in the same building at the same time will be changed to YELLOW. In addition, this application will be used in intercity transportation. While citizens are buying tickets, their risk status will be checked and the ticket purchasing process will be completed accordingly. In this way, people who are in the same building and the same time period with the positive case detected later are notified, and the Clinic will be informed about the health and counseling services.

Filtered Sentences

- **Citizen**
    - Each patient who has had a COVID-19 test.
    - If someone had a positive result, he/she provides information about people with whom they've recently had close contact.
    - Can login to the DB to check the building's status.
    - Is defined by her/his ID, name, surname, address, gender, birthday, and phone number.

- Citizens who haven't had the COVID-19 test, they are GREEN by default.

- **COVID result**
    - The result of the test can be positive or negative.
    - Refers to one citizen and one clinic.
    - Is defined by date, test result.

- **Risk status**
    - Can be green, yellow or red.
    - If the test is positive then a red flag is added to the DB, if negative it's a green flag. When someone is added as a contacted person they get a yellow flag.
    - If a building is opened then it has a green status, if the maximum capacity is reached it's a yellow status, when it's closed for quarantine it has a red status.
    - Refers citizens and buildings.

- **Social areas and Buildings**
    - Social places, houses, offices, malls, stores etc.
    - For public areas maximum capacity can be defined.
    - Is defined by unique ID, name, address, type of the building.

- **Clinics and medical labs**
    - Can add and modify information about citizens and COVID tests.
    - Is defined by unique ID, name of the clinic, address.

- **Agents of the Building**
    - Can check the risk status of the citizen who is visiting the place.
    - Can add information about visits to the place.
    - Can add information about a new citizen if he/she hasn't had a test before.
    - Is defined by unique ID, name.
    - Is related to Social areas and Buildings.

- **Visit**
    - When a citizen visits a building having GREEN status, a visit should be added to the database.
    - Is defined by date of enter and leaving.
    - Is related to citizens and building.

Term Glossary

Term	Description	Synonyms	Connection
Clinic	Makes the PCR Test and Therapy for the Positive cases	Medical Clinic, Hospital, Laboratory	Citizen, COVID test

Citizen	A generic user can be tested and enters the buildings	Building's visitors or citizens who have had the PCR test, or public transportation users, clients...	Clinic, COVID test, Risk Status, Visit
Agent of the Building	Manages the buildings which need to be tracked. (workplaces, restaurants, transport vehicles, taxis, public events such as weddings, institutions etc.)	Managers	Building, Visit
COVID test	Based on the PCR Test result, cases status get defines	Case, test result	Citizen, Clinic
Building	Based on the number of positive cases, area status changes to different colors	Social area	Agents of the Building, Visit, Building Status
Visit	The visit is defined by the date, the time of entering the building and the time of living it. Each visitor can have one or more visits.	The access to a specific building.	Building, Citizen, Agent of the Building
Risk Status	Status defined three different types as green, red or yellow. If it's about citizens: GREEN is for those who have no contact with any of the positive cases or a negative test result or have not done any test yet. YELLOW, those who have contact with positive cases. And RED for the positive case. If it's about buildings: If a building is opened then it has a GREEN status, if the maximum capacity is reached it's a YELLOW status, when it's closed for quarantine it has a RED status.		Citizen, Building

Functional Requirements

The database has to store informations about coronavirus cases in every country and information about the country's buildings, so let's take a deeper look on what the database should store:

There will be interoperability capabilities to receive input from the public health authorities (PHA) (including local, state, tribal, and territorial public health departments), information systems and/or laboratory systems, either via import or real-time synchronization with our database.

- Identifier, name and other information about the ones who made the COVID-19 test.
- The result of the test for each one and the status of this person:
    o If the test is positive: store RED as status.
    o If the test is negative: store GREEN as status.
- Store everyone's status as GREEN by default (if the citizen didn't take a COVID-19 test).
- Store YELLOW as status if the citizen contacted a person who has had a positive test result for COVID-19.

Every building representatives or agents will have access to the database:

- Store the name of the building and the address.
- Store the Identifier and the password of the building agent who will access the database for authentication.
- Store the Identifier, name, surname and phone number of the building visitors.
- Store the date and the exact time of the visitor's arrival and departure.
- Store updates about the corona viruses cases.
- Compare the Id of new cases with the Id's of the previous visitors of the building a week ago. If there's a match we should replace the status of all the people who were there at the same period of time and date with the new positif case, to the yellow status.
- Extract all information about visitors who were present in the building with the new positive COVID-19 cases.
- Counting and storing the state of these citizens as YELLOW.
- Counting and storing the number of people who have been in the building and have tested positive for COVID-19.
- Counting and storing the number of people present in the building at a certain time (people who enter – people who leave).
- Define and store the status of the building:
    o RED status: if the number of RED and YELLOW cases exceeded a certain limit, it is closed for the quarantine period.
    o YELLOW status: if the building reaches the maximum capacity.
    o GREEN status: otherwise, and it's opened and safe.

Non Functional Requirements

This database should performs well:

- The transfer of information from the public health authorities to the database should be done fastly with real-time synchronization.
- It should be easy to use and to manage.
- It should handle the errors.
- Protecting individual privacy is top of mind as well (citizen's privacy is our first concern).
- Authentication of a building's agent is mandatory (username and password) in order to have access to the database to ensure everyone's privacy.

Constraints

The DBMS application should satisfy the following additional constraints:

- Be implemented with PostgreSQL
- Client side implemented as a Web application, to guarantee easy management through different devices. Html, CSS and JavaScript will be needed
- Database and Server connection will be provided by Hibernate
- Server side implemented using Tomcat, java servlet, JSP and REST web services