DBMS Lab - Spring 2023

Assignment - 1

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Assignment 1: Database Design: COVID-19 Tracking Information System

Problem Statement:
Design the E-R diagram to capture the logical data organisation for the COVID-19 tracking system described below. Convert the E-R diagram to relational tables.

Upload a pdf file with the E-R diagram and the table definitions to moodle. Credits will be given based on the richness of the design and the number of functionalities that may be supported.

System Description:

A large-scale pandemic creates confusions and leads to spread of rumours. We would like to build an information system where a user can access verified information about the pandemic. We obtain data from the following sources:

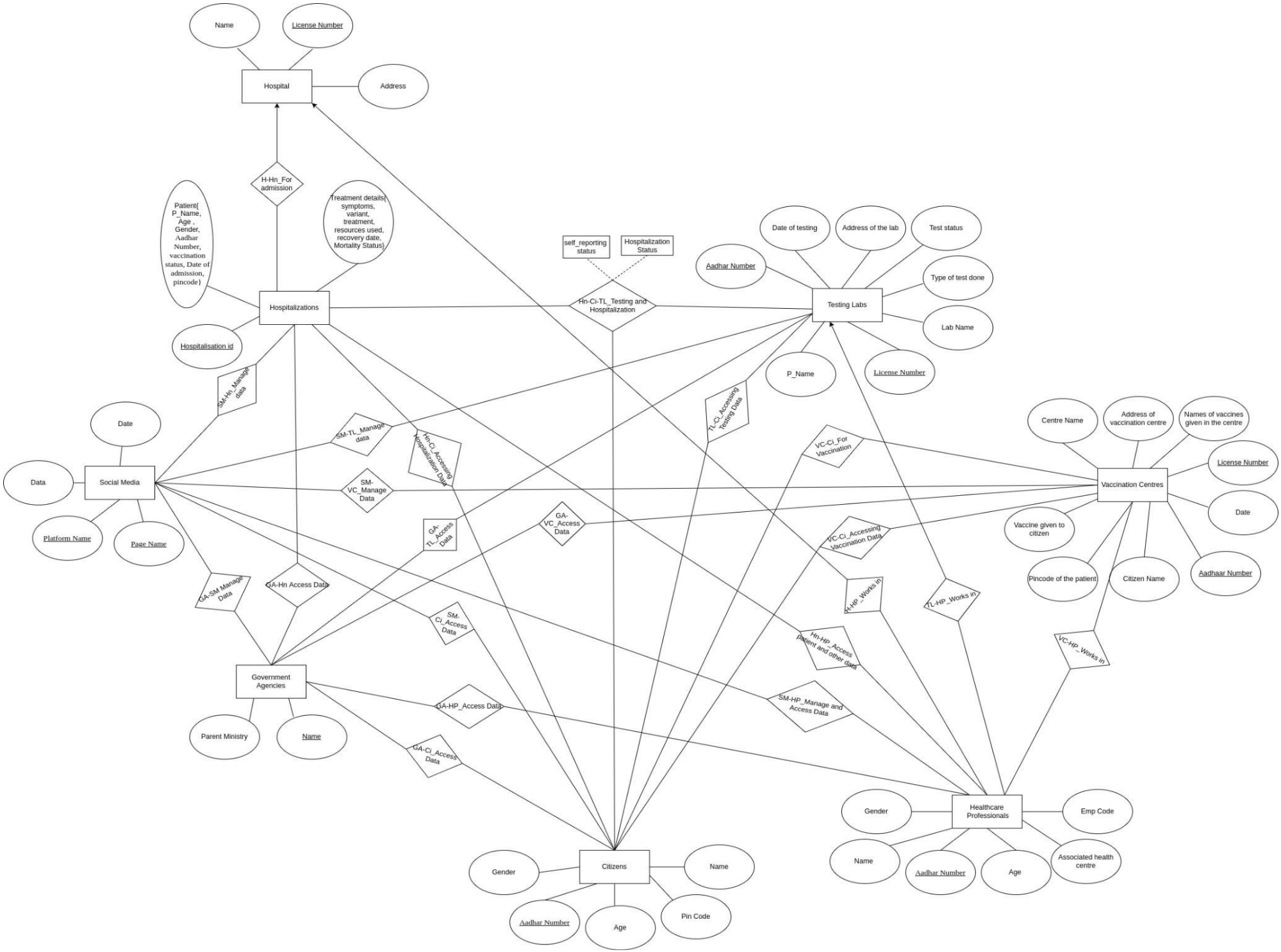
1. Hospitalizations: including patient information including location, symptoms, treatments involved, and healthcare resources used.
2. Self-reporting from affected citizens
3. Testing labs
4. Vaccination centres
5. Social media

The system is supposed to cater to the information needs of following users.
1. Citizens: for information gathering about various facets of the pandemic
2. Healthcare professionals: for patient profile, disease and symptom tracking
3. Government agencies: for resource mobilisation and infrastructure readiness

Various features of the system include – i. reporting the prevalence and progress of pandemic with time, among various patient profiles, geographical units like districts and states, ii. tracking symptoms and variants that are currently common, iii. use of healthcare resources and inventory management for future readiness, iii. contact tracing, iv. any other functionality that you want to support.

The ER diagram given on the next page is not clear because of its large size.
A clearer picture is given here:
https://drive.google.com/file/d/12itVDwMG3Rz8fM9Qwk_SGSIkGw2mHLAC/view?usp=sharing

ER Diagram of COVID-19 Tracking Information System


Name
License Number
Hospital
Address
H-Hn_For admission
Patient(P_Name, Age , Gender, Aadhar Number, vaccination status, Date of admission, pincode)
Treatment details(symptoms, variant, treatment, resources used, recovery date, Mortality Status)
Hospitalizations
Hospitalisation id
self_reporting status
Hospitalization Status
Hn-Ci-TL_Testing and Hospitalization
Aadhar Number
Date of testing
Address of the lab
Test status
Type of test done
Lab Name
Testing Labs
P_Name
License Number
SM-Hn_Manage data
TL-Ci_Accessing Testing Data
Date
Data
Social Media
Platform Name
Page Name
SM-TL_Manage data
Hn-Ci_Accessing Hospitalization Data
SM-VC_Manage Data
GA-VC_Access Data
GA-TL_Access Data
VC-Ci_For Vaccination
VC-Ci_Accessing Vaccination Data
Centre Name
Address of vaccination centre
Names of vaccines given in the centre
License Number
Vaccination Centres
Date
Vaccine given to citizen
Pincode of the patient
Citizen Name
Aadhaar Number
GA-SM Manage Data
GA-Hn Access Data
SM-Ci_Access Data
H-HP_Works in
TL-HP_Works in
VC-HP_Works in
Hn-HP_Access Patient and other data
Government Agencies
Parent Ministry
Name
GA-HP_Access Data
GA-Ci_Access Data
SM-HP_Manage and Access Data
Gender
Healthcare Professionals
Emp Code
Name
Aadhar Number
Age
Associated health centre
Gender
Citizens
Name
Aadhar Number
Age
Pin Code

Description :

- Various entities in the ER diagram of the system are :
  - **Hospital**
    - Has three attributes namely, Name , Licence Number (Primary Key), Address
    - This is related to the “Hospitalisation” by the relation “For Admission”
  - **Hospitalisation**
    - Has three attributes namely, Patient(a composite attribute), Treatment details (a composite attribute) and Hospitalisation id (Primary key)
    - It is related to various entities like Healthcare professionals (for patient profile, disease and symptom tracking), Government agencies (for resource mobilisation and infrastructure readiness) and citizens (for covid 19 hospitalisation info).
    - It is also connected by a ternary relation with testing labs and citizens which is represented by the relation “Testing and hospitalisation”. This denotes that Patients get themselves tested and if positive they may be hospitalised. The relation has two attributes of its own namely “self reporting status” and “hospitalisation status”.
  - **Testing labs:**
    - Has various attributes like Date of testing, address of the lab, licence number (Primary Key), patient details(eg: Aadhar(Primary Key)) etc.
    - Related to various entities like government agencies (for resource mobilisation and infrastructure readiness), citizens (for information and testing), healthcare workers (who work at a particular lab), social media (for collecting/ updating data) etc.
  - **Vaccination centres**
    - Has various attributes like Centre name, Licence number (Primary Key), Date, patient details (eg: Aadhar(Primary Key) etc.), names of vaccines that are given in the centre etc.
    - Related to various entities like social media (for managing information), Healthcare professionals (who work at the centre), Citizens (for vaccination and getting vaccination related information), Government agencies etc.
  - **Social Media**
    - Has 4 fields namely, Date, Data (or Post) , Platform Name (Primary Key) (like Facebook, twitter etc.), Page Name (Primary Key) (Page name can also be a thread name, account name, subreddit etc.).
    - It is related to various entities primarily for data accessing and management.
  - **Citizens**
    - Has 5 fields namely, Gender, Aadhar Number (Primary Key), Name, Age, Pincode (For location tracking, contact tracing and symptom tracing etc.like purposes).

        - Related to Hospitalisations and Testing lab (For testing and hospitalisation and related data), Vaccination centres (For information and getting vaccinated), Social media etc.
    - **Government agencies**
        - Has two fields namely, Name (Primary Key) and Parent Ministry
        - Connected to various fields like Hospitalisations, testing labs, Vaccination centres (for resource mobilisation and infrastructure readiness), Social Media (For Managing Covid-19 info) etc.
    - **Healthcare Professionals**
        - Has 6 fields namely Name, Age, Gender, Employee code, Associated health centre, Aadhar number (Primary Key)
        - Related to various entities like Vaccination Centre (workplace), similarly for hospitals and testing centres, Hospitalizations (or patient profile, disease and symptom tracking), Social Media etc.
        -
- Few relations are many - one like:
    - Healthcare Professionals - Hospitals and Healthcare Professionals - Testing Labs because many professionals can work only in a hospital or lab but they can't work at simultaneously two or more hospitals or labs.
    - Hospitalisations - Hospitals because multiple hospitalisations can be there in a hospital but not vice-versa at a point of time (assuming no referrals).
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- This system can be used for various purposes like:
    - For information gathering about various facets of the pandemic (Citizens):
        - Citizens can access data related to testing, positivity, vaccination and hospitalisation from various sources like querying into social media, data available from testing labs, vaccination centres, hospitalizations etc.
    - For patient profile, disease and symptom tracking(Healthcare Professionals):
        - Healthcare professionals can query into hospitalisations to get patient data, diseases and the various symptoms for contact tracing, variant tracing etc.
    - for resource mobilisation and infrastructure readiness (Government Agencies):
        - Government Agencies can get the resources used and infrastructure related data from various sources like hospitalisations, testing centres and vaccination centres etc. which it can use for resource mobilisation and infrastructure readiness.
    - The system can also be used for getting prevalence and progress of pandemics with time, among various patient profiles, geographical units like districts and states (Data from Hospitalisation), variants in circulation(Data from Hospitalisation), positivity rate(From testing labs) in various regions, symptoms, resource mobilisation and other needs.
    - This system can also be used for tracking mortality rate and vaccination percentage in various regions. Also it can give the number of hospitalisations and self-reports in different areas.

All the entities are created to cater to the above mentioned needs.

Relational Schema:

Entities:

1. Hospital (Name, License Number, Address)
2. Hospitalisation (P_Name, Age, Gender, Aadhar Number, Vaccination status, Date of admission, Pincode, Symptoms, Variant, Treatment, Resources used, Recovery date, Mortality Status, Hospitalisation id)
3. Testing Lab (Lab Name, License Number, Address of the lab, Test status, Date of testing, Type of test done, P_Name, Aadhar Number)
4. Vaccination Centre (Centre Name, Address of vaccination centre, Names of vaccines given in the centre, License Number, Date, Citizen Name, Aadhaar Number, Pincode of the patient, Vaccine given to citizen)
5. Social Media (Date, Data, Platform Name, Page Name)
6. Government Agencies (Parent Ministry, Name)
7. Citizens (Gender, Aadhar Number, Name, Pin Code, Age)
8. Healthcare Professionals (Gender, Name , Aadhar Number, Age , Associated health centre, Emp Code)

Let us use the following abbreviations:

Hospital - H, Hospitalisation - Hn, Testing Lab - TL, Vaccination Centre - VC, Social Media - SM, Government Agencies - GA, Citizens - Ci, Healthcare Professionals - HP

Relations: (E1-E2_<*relation name*> refers to the relation (relation name) between E1 and E2**)**

1. GA-SM_Manage Data (Name, Platform Name, Page Name)
2. GA-Hn_Access Data (Name, Hospitalisation id)
3. GA-TL_Access Data (Name, License Number, Aadhaar Number)
4. GA-VC_Access Data (Name, License Number, Aadhaar Number)
5. GA-Ci_Access Data (Name, Aadhar Number)
6. GA-HP_Access Data (Name, Aadhar Number)
7. SM-Hn_Manage data (Platform Name, Page Name, Hospitalisation id)
8. SM-TL_Manage Data Data (Platform Name, Page Name, License Number, Aadhaar Number)
9. SM-VC_Manage Data (Platform Name, Page Name, License Number, Aadhaar Number)
10. SM-HP_Manage and Access Data (Platform Name, Page Name, Aadhar Number)
11. SM-Ci_Access Data (Platform Name, Page Name, Aadhar Number)
12. Hn-Ci_Accessing Hospitalization Data (Hospitalization id, Aadhar Number)
13. Hn-HP_Access patient and other data (Hospitalization id, Aadhar Number)
14. Hn-Ci-TL_Testing and Hospitalization (Hospitalization id, License Number, Aadhaar Number, self_reporting status, Hospitalization Status)
15. H-Hn_For Admission (Hospitalization id, License Number)
16. H-HP_works in (License Number, Aadhar Number)
17. TL-Ci_Accessing Testing Data (Ci_Aadhar Number, TL_Aadhar Number, License Number)
18. TL-HP_works in (Ci_Aadhar Number, TL_Aadhar Number, License Number)

19. VC-Ci_For Vaccination (Ci_Aadhar Number, VC_Aadhar Number, License Number)
20. VC-Ci_Accessing Vaccination Data (Ci_Aadhar Number, VC_Aadhar Number, License Number)
21. VC-HP_works in (Ci_Aadhar Number, TL_Aadhar Number, License Number)