Project Title: Hospital Management System Database

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Section I: Product Summary

There is a hospital named First Choice Hospital and they focus on treating people with all kinds of illnesses. They are a hospital that treat their patients, employees, and partners as family. They need a database to keep their Employees', patients', and hospital's general data. The hospital decides to use EDB database to manage their data. When a Hospital is registered with EDB they are able see their Employees' data such as their name, date of birth, address, experience, department(s), role(s), and seniority level such as a intern, supervisor, manager, medical student, head of department, medical director, etc. When a patient uses First Choice Hospital they either login as returning patient or new patient. If they are a new patient, a receptionist creates a Patient Profile for them. If they are a returning patient they are able to log in with the patient_id.

EDB Database makes sure all their patients' and employees' data is organized and structured for any new changes the company wants to add. EDB also ensures that any data saved is secure for both Employees and Patients. For example, only an Employee that is a Doctor can prescribe medication to a Patient and save it to the system because this requires a permission only a Doctor can give.

Also an Employee who is Director can make changes to a Department with the Director

Permissions. Only a Manager and a Director can hire and remove employees from a department. These permissions ensure that any important decisions made at First Choice Hospital are made by an Employee who has these required permissions.

Section II: Use Cases

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1) Steve Wilson is the president of First Choice hospital and he is looking for a database management system. He decides to use EDB database and decides to register his hospital with EDB. Steve enters the hospital's name, president, address, phone number(s), and directors. At this step Steve can set up root admin permissions for his directors for each department which is the highest level of permissions in the EDB database. Steve knows that Directors have root admin privileges and can give admin permissions to supervisors and managers for certain departments in First Choice Hospital.
2) Lesly Otrega was assigned by Steve as the Director from the emergency department. As the director, Lesly can hire employees, remove employees, and promote employees to become managers or supervisors.
3) John is a new patient with First Choice Hospital and is registered as a patient by the receptionist. John's information like his first name, last name, phone number, emergency contacts, address, date of birth, and medical insurance are inserted into EDB and a profile is created for him. John is also assigned a Doctor for each of his appointments.
4) Jane is a manager of the emergency department. As manager Joe can hire and register new employees such as receptionists, janitors, nurses, and doctors.

5) Jessica is a Doctor in the emergency department besides attending patients with Procedures, she has permissions to prescribe patients to medications.
6) Bob is a returning patient to First Choice Hospital, he is able to update his emergency contact or any of his personal information on his Patient Profile and reach out to his Doctor for any questions. Bob also has a medical record of all his appointments and procedures over the years.

Section III: Database Requirements

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1) Hospital:
    a) A Hospital shall create one Account
    b) A Hospital shall have many Departments
    c) A Hospital shall have many Employees
    d) A Hospital shall have many Patients
    e) A Hospital shall have many Addresses
    f) A Hospital shall have many phone numbers
    g) A Hospital has many Health Insurance

2) Account
    a) An Account belongs to one and only on Hospital

3) Employee
    a) An Employee belongs to at least one Hospital
    b) An Employee shall have only one Profile
    c) An Employee shall have at least one Permissions
    d) An Employee shall work for at least one Departments
    e) An Employee shall have at least one Health Insurance
    f) An Employee shall have at least one address
    g) An Employee will have one seniority level
    h) An Employee is a Doctor
    i) An Employee is a Nurse
    j) An Employee is a Director

4) Patient
    a) A Patient shall have only one Patient Profile
    b) A Patient belongs to one or many Hospitals
    c) A Patient shall have at least one phone numbers
    d) A Patient shall have at least one Emergency Contact
    e) A Patient shall have at least one Address
    f) A Patient shall have one or many Appointments
    g) A Patient shall have only one Doctor
    h) A Patient shall have one or many Nurses

i) A Patient shall have at least one Procedures
j) A Patient shall have one to many Health Insurance
k) A Patient shall have only one Medical Record

5) Address
   a) An Address shall belong to one Hospital
   b) An Address shall belong to many Employee
   c) An Address belongs many Patients

6) Department
   a) A Department belongs to many Hospitals
   b) A Department shall have many Employees

7) Phone Number
   a) A phone number belongs to one Hospital
   b) A phone number belongs to many Employees
   c) A phone number belongs to many Patient

8) Emergency Contact
   a) Belongs to many Patients

9) Procedures
   a) A Procedures shall have many Patients
   b) A Procedure shall have belong to many Doctor
   c) A Procedure shall have many Nurse
   d) A shall have many appointments

10) Doctors
   a) A Doctor shall belong to only one Hospital
   b) A Doctor shall have only one Employee Profile
   c) A Doctor shall have at least one Permission
   d) A Doctor shall have at least one Patient
   e) A Doctor shall have at least one Appointment
   f) A Doctor shall have at least one Procedures

11) Nurses
   a) A Nurse is an Employee

b) A Nurse shall have many Patients
c) A Nurse shall have one Employee Profile
d) A Nurse shall have at least one Permission

12) Director
a) A director shall direct at least one departments
b) A director shall work for only one hospital
c) A director shall have at least one permission
d) A director has only one employee profile

12) Profiles
a) A Profile shall have only one Patient
b) A Profile shall have only one Employee
c) A Profile is a Employee Profile
d) A Profile is a Patient Profile

13) Health Insurance
a) Health Insurance belongs to many Patients
b) Health Insurance belongs to many Employees
c) Health Insurance shall belong to many Hospitals

14) Medical Records
a) A Medical Record shall belong to many Patients

15) Room
a) A Room shall have many Patients
b) A Room shall have many Appointments
c) A Room shall have many Nurses(add)
d) A Room shall have many Doctor (add)

16) Appointments
a) An Appointment shall belong to only one Patient
b) An Appointment shall belong to only one Room
c) An Appointment shall have at least one Procedure involved

17) Medical Prescription
a) A medical prescription shall belong to many patients

b) A medical prescription shall require only one doctor permission

18) Permissions
   a) An Permission shall belong to many Employees

19) Seniority Level
   a) A seniority level belongs to many Employees

Section IV: Main Entities, Attributes and Keys

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1. Hospital (Strong)
    a. hospital_id: key, numeric
    b. name: alphanumeric
    c. account: weak key, numeric
    d. directors: weak key, numeric
    e. departments: weak key, numeric
    f. employees: weak key, numeric
    g. patients: weak key, numeric
    h. addresses: weak key, numeric
    i. phone numbers: weak key, numeric
2. Account (Weak)
    a. account_id: key, numeric
    b. date: multivalue, timestamp
    c. hospital: weak, numeric
3. Employee (Weak)
    a. employee_id: key, numeric
    b. hospital: weak key, numeric
    c. type: alphanumeric
    d. first_name: alphanumeric
    e. middle_name: alphanumeric

f. last_name: alphanumeric
g. date_of_birth: alphanumeric
h. address: weak, numeric
i. profile: weak, numeric
j. permission: weak, numeric
k. department: weak, numeric
l. health insurance: weak, numeric
m. seniority_level: weak, numeric
n. phone_number: weak, numeric

4. Patient (Weak)
    a. patient_id: key, numeric
    b. first_name: alphanumeric
    c. middle_name: alphanumeric
    d. last_name: alphanumeric
    e. patient_profile: weak, numeric
    f. hospitals: weak, numeric
    g. phone number: weak, numeric
    h. emergency contact: weak, numeric
    i. addresses: weak, numeric
    j. appointment(fix)
    k. doctor: weak, numeric
    l. nurse

5. Address(Strong)
    a. address_id: key, numeric
    b. street_address: alphanumeric
    c. state: alphanumeric
    d. city: alphanumeric
    e. zip_code: numeric
    f. employee(review): weak, numeric
    g. patients: weak, numeric
6. Department(Strong)
    a. department_id: key, numeric
    b. name: alphanumeric
    c. hospital: weak, numeric
    d. employees: weak, numeric
    e. directors: weak, numeric
    f. managers: weak, numeric
    g. supervisors: weak, numeric
7. Phone Number (Strong)
    a. phone_number_id: key, numeric
    b. number: composite, alphanumeric
    c. hospital : weak, numeric
    d. employee: weak, numeric
    e. patient: weak, numeric

8. Emergency Contact (Strong)
    a. emergency_contact_id: key, numeric
    b. first_name: alphanumeric
    c. middle_name: alphanumeric
    d. last_name: alphanumeric
    e. relationship: alphanumeric
    f. patient: weak, numeric
9. Procedures (Strong)
    a. procedure_id: key, numeric
    b. type: alphanumeric
    c. description: alphanumeric
    d. patient: weak, numeric
    e. doctor: weak, numeric
    f. nurse: weak, numeric
    g. appointment: weak, numeric
10. Doctors (Weak)
    a. doctor_id: key, numeric
    b. first_name: alphanumeric
    c. middle_name: alphanumeric
    d. last_name: alphanumeric
    e. hospital: weak, numeric
    f. employee_profile: weak, numeric

g. permission: weak, numeric

h. patient: weak, numeric

i. appointment: weak, numeric

j. procedure: weak, numeric

11. Nurses (Weak)

a. nurse_id: key, numeric

b. first_name: alphanumeric

c. middle_name: alphanumeric

d. last_name: alphanumeric

e. hospital: weak, numeric

f. patient: weak, numeric

g. employee_profile: weak, numeric

12. Director(Weak)

a. director_id: key, numeric

b. first_name: alphanumeric

c. middle_name: alphanumeric

d. last_name: alphanumeric

e. phone_number: weak, numeric

f. address: weak, numeric

g. permissions: weak, numeric

13. Profiles(Weak)

a. profile_id: key, numeric

b. employee_profile: weak, numeric

c. patient: weak, numeric

14. Health Insurance(Strong)

a. health_insurance_id: key, numeric

b. name: alphanumeric

c. type: alphanumeric

15. Medical Records(Strong)

a. Medical_record_id: key, numeric

b. patient: weak, numeric

c. description: alphanumeric

16. Room (Strong)

a. room_id: key, numeric

b. room_number: numeric

c. patient: weak, numeric

d. appointment: weak, numeric

17. Appointment (Weak)

a. appointment_id: key, numeric

b. date: multivalue, timestamp

c. description: alphanumeric

d. procedure: weak, numeric

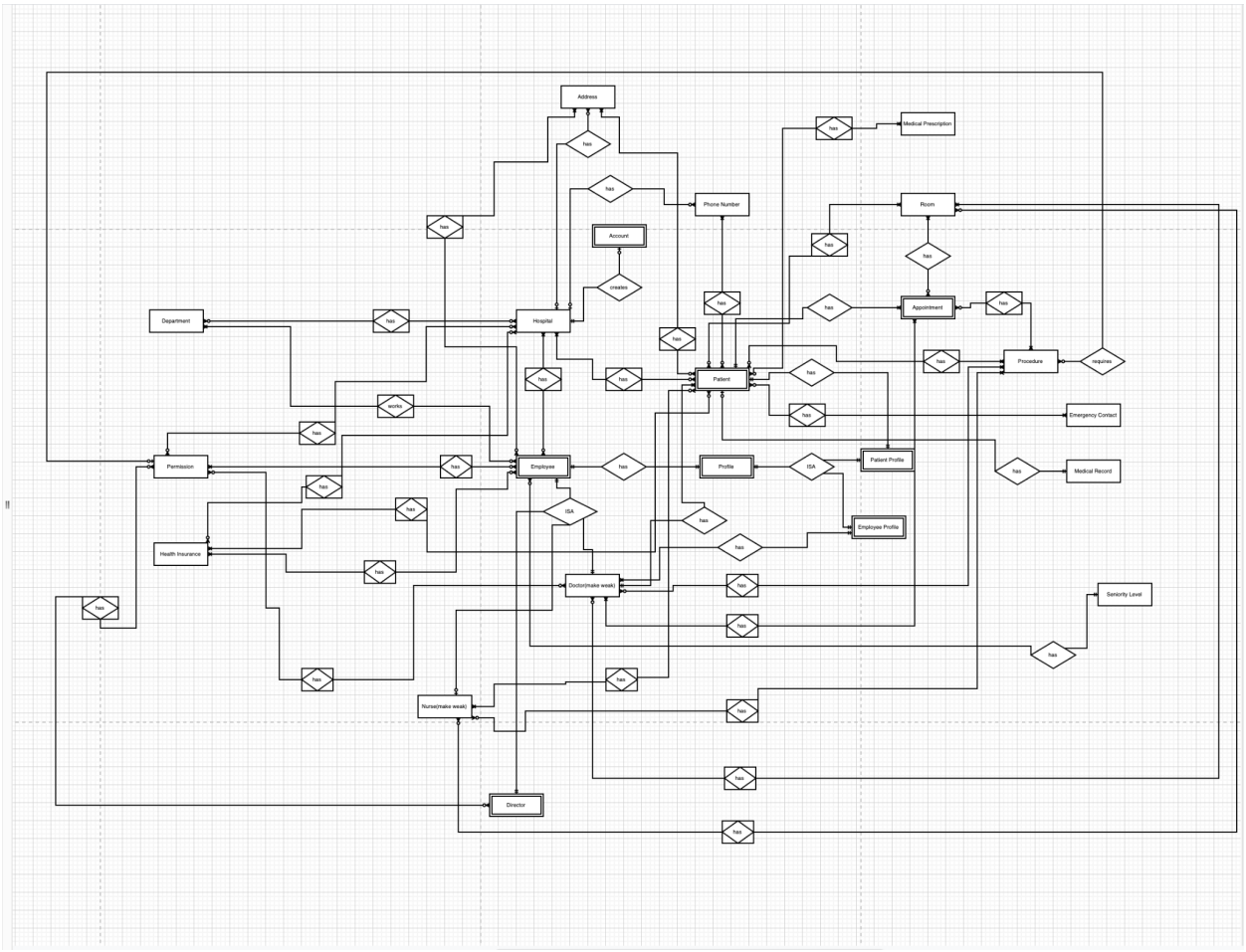
e. patient: weak, numeric

18. Medical Prescription (Strong)

a. medical_prescription: key, numeric
b. title: alphanumeric
c. date: multivalue, timestamp
d. description: alphanumeric
e. type: alphanumeric

19. Seniority Level (Strong)
    a. role_id: key, numeric
    b. title: alphanumeric
    c. date: multivalue, timestamp
    d. description: alphanumeric
    e. permission: weak, numeric
    f. employee: weak, numeric

Section V: ERD



Section VI: Testing Table

Rule	Entity A	Relation	Entity B	Cardinality	Pass/Fail	Error Description
1	Hospital	creates	Account	1-to-1	Pass	None
2	Hospital	has	Director	many-to-1	fail	Director should be a child of Employee in a ISA relationship to avoid duplicated space
3	Hospital	has	Department	many-to-many	pass	None
4	Hospital	has	Employee	many-to-many	pass	None
5	Hospital	has	Patient	many-to-many	pass	None
6	Hospital	has	Address	1-to-many	pass	None
7	Hospital	has	Phone Number	1-to-many	pass	None
8	Hospital	has	Doctor	many-to-many	fail	Doctor should be a child of Employee in a ISA relationship to avoid duplicated space
9	Hospital	has	Nurse	many-to-many	fail	Nurse should be a child of Employee in a ISA relationship to avoid duplicated space
10	Account	belongs	Hospital	1-to-1	pass	None
11	Employee	works	Hospital	many-to-many	pass	None
12	Employee	has	Employee Profile	1-to-1	pass	None
13	Employee	has	Permission	many-to-many	pass	None
14	Employee	has	Department	many-to-many	pass	None
15	Employee	has	Health Insurance	many-to-many	pass	None
16	Employee	has	Address	many-to-many	pass	None

17	Patient	has	Patient Profile	1-to-1	pass	None
18	Patient	has	Hospital	many-to-many	pass	None
19	Patient	has	Phone Number	many-to-many	pass	None
20	Patient	has	Emergency Contact	many-to-many	pass	None
21	Patient	has	Address	many-to-many	pass	None
22	Patient	has	Appointment	1-to-many	pass	None
23	Patient	has	Doctor	1-to-many	pass	None
24	Patient	has	Nurse	many-to-many	pass	None
25	Patient	has	Procedure	many-to-many	pass	None
26	Patient	has	Health Insurance	many-to-many	pass	None
27	Patient	has	Medical Record	1-to-1	pass	None
28	Address	belongs	Hospital	many-to-1	pass	None
29	Address	belongs	Employees	many-to-many	pass	None
30	Address	belongs	Patients	many-to-many	pass	None
31	Department	belongs	Hospital	many-to-many	pass	None
32	Department	has	Employees	many-to-many	pass	None
33	Department	has	Directors	many-to-1	fail	Director should be a child of Employee in a ISA relationship to avoid using duplicated space
34	Department	has	Manager	many-to-many	fail	I made a Seniority Level table with the different roles for each employee. Such as an intern, supervisor, manager, etc
35	Department	has	Supervisors	many-to-many	fail	Belongs in the Seniority Level table with the

						different roles for each employee. Such as an intern, supervisor, manager, etc
36	Phone Number	belongs	Hospital	1-to-many	pass	None
37	Phone Number	belongs	Employee	many-to-many	pass	None
38	Emergency Contact	belongs	Patient	many-to-many	pass	None
39	Procedure	has	Patient	many-to-many	pass	None
40	Procedure	has	Doctor	many-to-many	pass	None
41	Procedure	has	Nurse	many-to-many	pass	None
42	Procedure	has	Appointment	many-to-many	pass	None
43	Doctor	work	Hospital	1-to-many	fail	Since Doctor is a child of Employee it is redundant to have him point to Hospital when Employee already does
44	Doctor	has	Employee Profile	1-to-1	pass	None
45	Doctor	has	Permission	many-to-many	pass	None
46	Doctor	has	Patient	1-to-many	pass	None
47	Doctor	has	Appointment	1-to-many	pass	None
48	Doctor	has	Procedure	many-to-many	pass	None
49	Nurse	has	Patient	many-to-many	pass	None
50	Director	work	Hospital	many-to-1	fail	Director should be a child of Employee in a ISA relationship to avoid using duplicated space
51	Director	has	Department	many-to-many	pass	None
52	Director	has	Permission	many-to-many	pass	None
53	Director	has	Employee	1-to-1	pass	None

			Profile			
54	Profile	ISA	Patient Profile	1-to-1	pass	None
55	Profile	ISA	Employee Profile	1-to-1	pass	None
56	Patient Profile	has	Patient	1-to-1	pass	None
57	Employee Profile	has	Employee	1-to-1	pass	None
58	Health Insurance	belongs	Patient	many-to-many	pass	None
59	Health Insurance	belongs	Hospital	many-to-many	pass	None
60	Medical Record	belong	Patient	1-to-many	pass	None
70	Room	has	Patient	many-to-many	pass	None
71	Room	has	Appointment	many-to-many	pass	None
72	Room	has	Nurses	many-to-many	pass	None
73	Room	has	Doctor	many-to-many	pass	None
74	Appointment	belongs	Patient	1-to-many	pass	None
75	Appointment	belongs	Room	many-to-many	pass	None
76	Medical Prescription	belongs	Patient	many-to-many	pass	None
77	Medical Prescription	requires	Permission	many-to-1	pass	None
78	Permission	belongs	Employee	many-to-many	pass	None
79	Role	belongs	Employee	1-to-many	pass	None
