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Functional Requirements, Schema and Analysis
Database Systems
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Functional Requirements

The pharmacist will be able to …

1. Search for customers that are currently taking a certain drug.
    a. Find the names and usernames of all customers that are taking 'Humira':
2. Search for customers that see a certain doctor.
    a. Find the names and usernames of all customers that have seen Dr. Micah Blevins.
3. Find all of the drugs that a certain customer has taken.
    a. Find all drugs that Rhia Dillon has taken.
4. Find all of the locations belonging to the chain where the pharmacist works.
    a. List the addresses of all the locations of the chain where Teresa Crawford works.
5. Take inventory of the pharmacy where they work.
    a. Find all the drugs and their amounts that are in stock at the location where Leopold Cortez works.
6. Note when the pharmacist has filled a prescription.
    a. Note that pharmacist Kayleigh Irving filled Rhia Dillon's rheumatoid arthritis prescription on 2/5/19.

The customers will be able to …

1. View their own medical history
    a. Search for all diseases that Jordi Holloway has had or currently has
    b. Search for all diseases that Jordi Holloway with username 'Holloway85' had
2. Search to see if a certain drug is available at a certain store.
    a. Show a list of stores that carry drug Amoxil.
3. Search for doctors that work at a certain hospital.
    a. Show a list of doctors that work at Canton-Potsdam Hospital.
4. Search for doctors with certain specializations.
    a. Show a list of doctors that specialize in Diagnostic radiology.
5. Show all of the customer’s own prescriptions.
    a. Show a list of prescriptions that user Sharpe17 has.
    b. Show a list of drugs that user Sharpe17 need to take as well as their dosage.
6. Find closest stores…
    a. Search for all pharmacies that are in Clinton, NY.

The doctors will be able to:

1. View the medical history of their patients
    a. Show the past diseases or conditions of Jane Doe

2. Find where a patient can buy a certain drug.
3. Search for details of certain drugs.
    a. Search for the side effects of Amoxil.
    b. Search for dosage of Amoxil.
    c. Show all drugs that treat HIV.

Schema

username_password: (username, password, user_type)
chain: (stock_id, name, year_founded, ceo)
location: (address, city, state, zipcode, *stock_id*, manager_name, phone_no)
pharmacist: (*username*, name, *location_address, location_zipcode, location_stock_id*, phone_no, salary, sex, hired_date, home_address)
hospital: (name, address, city, state, zipcode, phone_no)
doctor: (*username*, name, specialization, sex, phone_no, address, dob, *hospital_name, hospital_address, hospital_zipcode*)
customer: (*username*, name, dob, phone_no, sex, address)
visits: (*location_address, location_zipcode, location_stock_id, customer_username)*
manufacturer: (stock_id, name, year_founded, ceo)
drug: (ndc, name, ingredients, side_effects, price, dosage, *manufacturer_stock_id*)
disease: (name, symptoms, disease_type)
treats: (*disease_name*, *drug_ndc*)
diagnosis: (*customer_username*, *doctor_username*, *disease_name*, diagnosis_date)
prescription: (*customer_username*, *doctor_username*, *disease_name*, *diagnosis_date*, no_of_fills, fill_frequency)
prescribed: (*ndc*, *customer_username*, *doctor_username*, *disease_name*, *diagnosis_date*)
filled: (*pharmacist_username*, *customer_username*, *doctor_username*, *disease_name*, *diagnosis_date*, filled_date)
stock: (*address*, *zipcode*, *stock_id*, *drug_ndc*, amount)

4NF analysis

username_password: Each username is unique, and every username is associated with one and only one password and user_type, so it doesn't contain MVD. username >> password, user_type. Since username is its primary key, it is in BCNF as well as 4NF.

chain: Each chain has its unique stock_id. stock_id >> name, year_founded, ceo. Each chain has only one name, year_foundedand ceo, so it doesn't contain MVD. Thus it is in BCNF as well as 4NF.

location: Address, zipcode, stock_id >> city, state, manager_name, phone_no. So it is in BCNF and since it doesn't contain MVD, it is also in 4NF.

pharmacist: username >> name, location_address, location_zipcode, location_stock_id, phone_no, salary, sex, hired_date, home_address. Thus it is in BCNF. Since it doesn't contain MVD, it is also in 4NF.

hospital:address, zipcode >> city, state, phone_no, name. It is in BCNF. Since it doesn't contain MVD, it is also in 4NF.
doctor: username >> name, specialization, sex, phone_no, address, dob, hospital_name, hospital_address, hospital_zipcode. It is in BCNF. Since it doesn't contain MVD, it is also in 4NF.

customer:*username* >> name, dob, phone_no, sex, address.

visits: Since every attribute is a key, it is in BCNF. Since it doesn't contian 4NF, it is in 4NF.
manufacturer: stock_id >> name, year_founded, ceo. It is in BCNF. Since it doesn't contain 4NF.
drug: Since ndc is the only key, ndc >> name, ingredients, side_effects, price, dosage, manufacturer_stock_id. It is in BCNF. Since it doesn't contain MVD, it is also in 4NF.

disease: Disease name is unique and name >> symptoms, disease_type. It is in BCNF. Since it doesn't contain MVD, it is also in 4NF.

treats: Since every attribute is a key and there are only two attributes, it is in BCNF and 4NF.

diagnosis: Since every attribute is a key, it is in BCNF. Since it doesn't contain MVD, it is in 4NF.

prescription: *customer_username*, *doctor_username*, *disease_name*, *diagnosis_date* >> no_of_fills, fill_frequency. Thus it is in BCNF. Since it doesn't contain MVD, it is in 4NF.

prescribed:Since every attribute is a key, it is in BCNF. Since it doesn't contain MVD, it is in 4NF.

filled:pharmacist_username, customer_username, doctor_username, disease_name, diagnosis_date >> filled_date. Therefore, it is in BCNF. Since it doesn't contain MVD, it is also in 4NF.

stock: *address*, *zipcode* , *stock_id*, *drug_ndc* >> amount. Therefore, it is in BCNF. Since it doesn't contain MVD, it is also in 4NF.

As shown in the ER diagram, all the many-to-many relationships we have are customer -- location, prescription -- drug, disease -- drug, prescription -- pharmacist, doctor -- customer. And between each of these relations, we have a bridge table to resolve the MVD, such as the diagnosis table between doctor -- customer, and the prescribed table between prescription and drug. So we don't have MVDs.