HEALTHCARE MANAGEMENT SYSTEM

Project Database Report

Database Management Systems (CSN-351)

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PURPOSE

The purpose of this software is to provide the patients a user friendly online platform to search nearby doctors (particular or based on his/her specialisation and rating) easily and make an appointment with them to get prescribed and/or treated.

This document contains the description about the construction of database which will be used in the software.

FEATURES

Healthcare Management System contains following database features:

1. **Users** (not doctors): On signup user details asked includes name, email Id, password, dob, gender, city, state, contact no., image URL. Name, email Id and password are compulsory.
2. **Doctors**: On signup doctor details include his basic information including his specialization, hospital associated with, fee, etc. Doctors have particular time slots for appointments i.e he/she will take appointments only between their given slots.
3. **Hospitals**: Includes doctors details associated with it along with facilities like ICU, etc available. This will help user to approach doctor who not just have specialization but also appropriate labs, etc.
4. **Feedback**: User could review his doctor after successful meetup by rating(out of 5) and commenting it. This feedback (average of rating) is used for future doctor suggestion to other users.

ASSUMPTION

1. One doctor will be associated with at most one hospital at a time and is specialized only in one field.
2. One patient can visit a particular doctor only once per day.
3. Contact No. in a single valued attribute.
4. The fee charged is the appointment fee of that doctor. It does not consist any other chargeable fee. We are not considering the charges of Hospital as this app only meant for doctors and patients.

PROCEDURE

Entites and Attributes:

1. User/Patient : p_id, p_name, p_email_id, p_password, dob, gender, contact_no, image_url, city, state, pincode, a_id.
2. Doctor : d_id, name, d_name, specialisation, fee, d_email_id, d_password, image_url, certificate_url, contact_no., work_timeslot, rating, a_id, h_id.
3. Hospital : h_id, h_name, city, state, pincode, doctor_id, contact_no, website, facility.
4. Appointment: a_id, p_id, d_id, date, issue, prescription.

Attributes	-	Mapped into
p_id	-	A
p_name	-	B
p_email_id	-	C_1
d_email_id	-	C_2
p_password	-	D_1
d_password	-	D_2
dob	-	E
gender	-	F
contact_no	-	G
image_url	-	H
city	-	I
state	-	J
pincode	-	K
d_id	-	L
d_name	-	M
specialisation	-	N
fee	-	O
rating	-	P
certificate_url	-	Q
work_timeslot	-	R
h_id	-	S
h_name	-	T
website	-	U
facilities	-	V

a_id	-	W
date	-	X
issue	-	Y
prescription	-	Z

Functional Dependencies

$A \rightarrow BC_1D_1EFGHIJK$
$C_1 \rightarrow AD_1$
$C_2 \rightarrow D_2L$
$K \rightarrow IJ$
$L \rightarrow MNOPC_2D_2HQGRS$
$S \rightarrow TIJKGUV$
$W \rightarrow ALXYZ$
$AL \dashrightarrow W$

Minimal Cover

Step 1: Replace each functional dependency $X \rightarrow \{A_1, A_2, ..., A_n\}$ in F by the n functional dependencies $X \rightarrow A_1$, $X \rightarrow A_2$, ..., $X \rightarrow A_n$.

$A \rightarrow B$
$A \rightarrow C_1$
$A \rightarrow D_1$
$A \rightarrow E$
$A \rightarrow F$
$A \rightarrow G$
$A \rightarrow H$
$A \rightarrow I$
$A \rightarrow J$
$A \rightarrow K$
$C_1 \rightarrow A$
$C_1 \rightarrow D_1$
$C_2 \rightarrow D_2$
$C_2 \rightarrow L$
$K \rightarrow I$
$K \rightarrow J$

$L \rightarrow M$

$L \rightarrow N$

$L \rightarrow O$

$L \rightarrow P$

$L \rightarrow C_2$

$L \rightarrow D_2$

$L \rightarrow H$

$L \rightarrow Q$

$L \rightarrow G$

$L \rightarrow R$

$L \rightarrow S$

$S \rightarrow T$

$S \rightarrow I$

$S \rightarrow J$

$S \rightarrow K$

$S \rightarrow G$

$S \rightarrow U$

$S \rightarrow V$

$W \rightarrow A$

$W \rightarrow L$

$W \rightarrow X$

$W \rightarrow Y$

$W \rightarrow Z$

Closures:

$A^+ = \{A,B,C_1,D_1,E,F,G,H,I,J,K\}$

$C_1^+ = \{A,B,C_1,D_1,E,F,G,H,I,J,K\}$

$C_2^+ = \{D_2,L,M,N,O,P,C_2,H,Q,G,R,S,T,U,V\}$

$K^+ = \{K,I,J\}$

$L^+ = \{L,M,N,O,P,C_2,D_2,H,Q,G,R,S,T,U,V\}$

$S^+ = \{T,I,J,K,G,U,V\}$

$W^+ = \{W,A,B,C_1,D_1,C_2,D_2,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,X,Y,Z\}$

Step 2 : For each functional dependency $X \rightarrow A$ in F

for each attribute B that is an element of X

if $\{ \{F - \{X \rightarrow A\} \} \cup \{ (X - \{B\}) \rightarrow A\} \}$ is equivalent to F

then replace $X \rightarrow A$ with $(X - \{B\}) \rightarrow A$ in F.

$A \rightarrow B$

$A \rightarrow C_1$
$A \rightarrow D_1$
$A \rightarrow E$
$A \rightarrow F$
$A \rightarrow G$
$A \rightarrow H$
$A \rightarrow I$
$A \rightarrow J$
$A \rightarrow K$
$C_1 \rightarrow A$
$C_1 \rightarrow D_1$
$C_2 \rightarrow D_2$
$C_2 \rightarrow L$
$K \rightarrow I$
$K \rightarrow J$
$L \rightarrow M$
$L \rightarrow N$
$L \rightarrow O$
$L \rightarrow P$
$L \rightarrow C_2$
$L \rightarrow D_2$
$L \rightarrow H$
$L \rightarrow Q$
$L \rightarrow G$
$L \rightarrow R$
$L \rightarrow S$
$S \rightarrow T$
$S \rightarrow I$
$S \rightarrow J$
$S \rightarrow K$
$S \rightarrow G$
$S \rightarrow U$
$S \rightarrow V$
$W \rightarrow A$
$W \rightarrow L$
$W \rightarrow X$
$W \rightarrow Y$

$W \rightarrow Z$

No functional dependencies removed.

Step 3 : For each remaining functional dependency $X \rightarrow A$ in F

if {F – {$X \rightarrow A$} } is equivalent to F,

then remove $X \rightarrow A$ from F.

$A \rightarrow B$

$A \rightarrow C_1$

$A \rightarrow E$

$A \rightarrow F$

$A \rightarrow G$

$A \rightarrow H$

$A \rightarrow K$

$C_1 \rightarrow A$

$C_1 \rightarrow D_1$

$C_2 \rightarrow L$

$C_2 \rightarrow D_2$

$K \rightarrow I$

$K \rightarrow J$

$L \rightarrow M$

$L \rightarrow N$

$L \rightarrow O$

$L \rightarrow P$

$L \rightarrow C_2$

$L \rightarrow H$

$L \rightarrow Q$

$L \rightarrow G$

$L \rightarrow R$

$L \rightarrow S$

$S \rightarrow T$

$S \rightarrow K$

$S \rightarrow G$

$S \rightarrow U$

$S \rightarrow V$

$W \rightarrow A$

$W \rightarrow L$

$W \rightarrow X$

W → Y
W → Z

Removed dependencies:

A → D_1
A → I
A → J
L → D_2
S → I
S → J

Final minimal cover:

A → BC_1EFGHK
C_1 → AD_1
K → IJ
L → MNOPC_2HQGRS
C_2 → D_2L
S → TIJKGUV
W → ALXYZ
AL -->>W

DECOMPOSITION:

For User/Patient :

1NF:

R_1(<u>A</u>,B,C_1,D_1,E,F,G,H,I,J,K)
Candidate keys: A, C_1

2NF:

Removing partial dependencies of non-prime attributes, if any:
R_1(<u>A</u>,B,C_1,D_1,E,F,G,H,I,J,K)
Candidate keys: A, C_1

3NF:

Removing transitive dependencies of non-prime attributes, if any:
R_1(<u>A</u>,B,C_1,D_1,E,F,G,H,K)
Candidate keys: A, C_1
R_2(<u>K</u>,I,J)

Candidate keys: K

4NF:

Removing multivalued dependencies, if any:

R_1(<u>A,</u>B,C_1,D_1,E,F,G,H,K)

Candidate keys: A, C_1

R_2(<u>K,</u>I,J)

Candidate keys: K

5NF:

Removing join dependencies, if any:

R_1(<u>A,</u>B,C_1,E,F,G,H,K)

Candidate keys: A, C_1

R_2(<u>K,</u>I,J)

Candidate keys: K

R_3(A,<u>C_1,</u>D_1)

Candidate keys: A, C_1

For Doctor :

1NF:

R_4(<u>L,</u>M,N,O,P,C_2,D_2,H,Q,G,R,S)

Candidate keys: L, C_2

2NF:

Removing partial dependencies of non-prime attributes, if any:

R_4(<u>L,</u>M,N,O,P,C_2,D_2,H,Q,G,R,S)

Candidate keys: L, C_2

3NF:

Removing transitive dependencies of non-prime attributes, if any:

R_4(<u>L,</u>M,N,O,P,C_2,D_2,H,Q,G,R,S)

Candidate keys: L, C_2

4NF:

Removing multi-valued dependencies, if any:

R_4(<u>L,</u>M,N,O,P,C_2,D_2,H,Q,G,R,S)

Candidate keys: L, C_2

5NF:

Removing join dependencies, if any:

R_4(<u>L,</u>M,N,O,P,C_2,H,Q,G,R,S)

Candidate keys: L, C_2

R_5(<u>C_2,</u>D_2,L)

Candidate keys: L, C_2

For Hospital :

1NF:

R_6(S,T,I,J,K,G,U,V)

Candidate keys: S

2NF:

Removing partial dependencies of non-prime attributes, if any:

R_6(S,T,I,J,K,G,U,V)

Candidate keys: S

3NF:

Removing transitive dependencies of non-prime attributes, if any:

R_6(S,T,K,G,U,V)

Candidate keys: S

R_2(K,I,J)

Candidate keys: K

4NF:

Removing multi-valued dependencies, if any:

R_6(S,T,K,G,U,V)

Candidate keys: S

R_2(K,I,J)

Candidate keys: K

5NF:

Removing join dependencies, if any:

R_6(S,T,K,G,U,V)

Candidate keys: S

R_2(K,I,J)

Candidate keys: K

For Hospital :

1NF:

R_7(W,A,L,X,Y,Z)

Candidate keys: W

2NF:

Removing partial dependencies of non-prime attributes, if any:

R_7(W,A,L,X,Y,Z)

Candidate keys: W

3NF:

Removing transitive dependencies of non-prime attributes, if any:

R_7(W,A,L,X,Y,Z)

Candidate keys: W

4NF:

Removing multi-valued dependencies, if any:

R_7(W,X,Y,Z)

Candidate keys: W, ALW

R_8(A,L,W)

Candidate keys: ALW

5NF:

Removing join dependencies, if any:

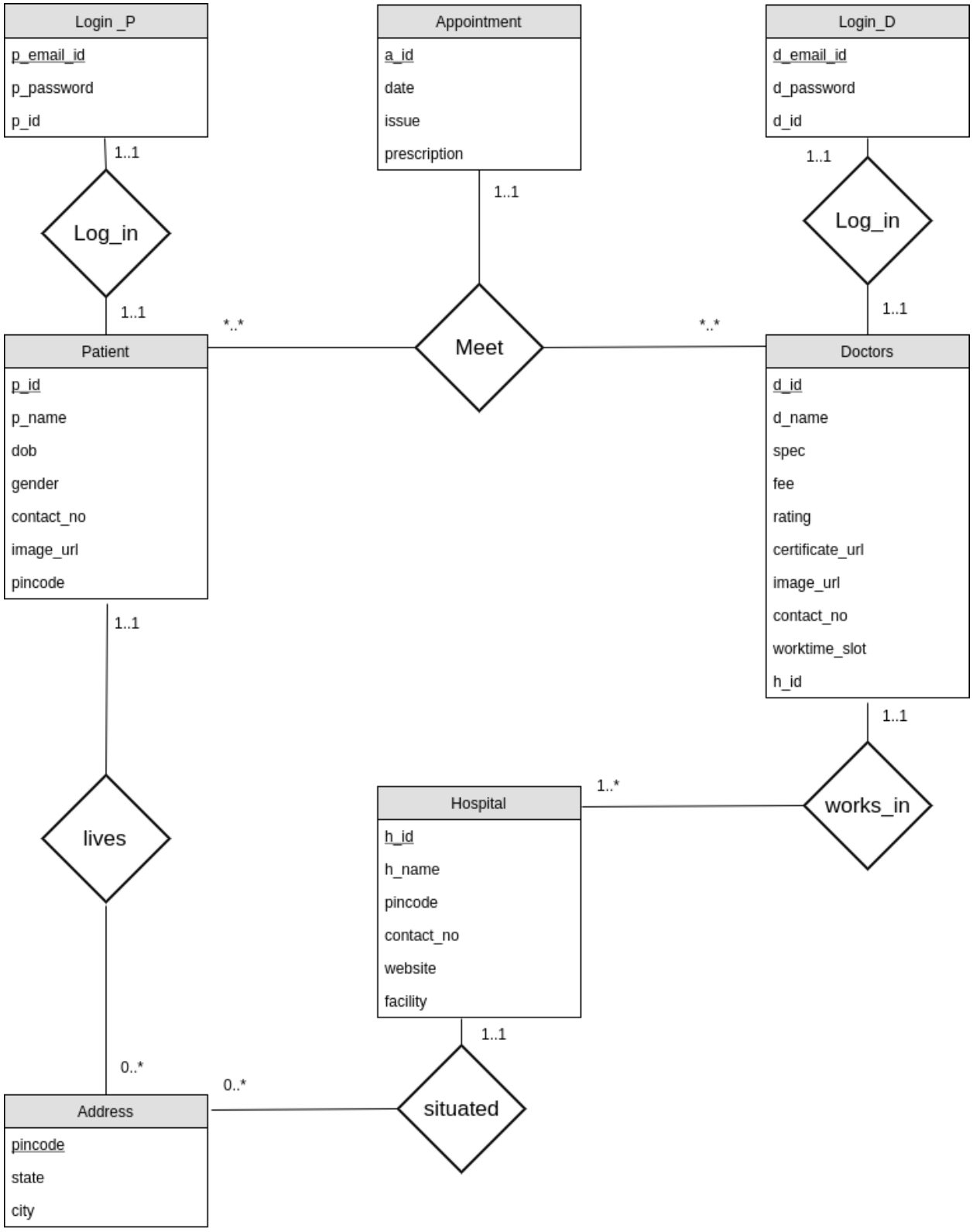
R_7(W,X,Y,Z)

Candidate keys: W, ALW

R_8(A,L,W)

Candidate keys: ALW

ER diagram for MockHMS database :


Login _P
p_email_id
p_password
p_id
Appointment
a_id
date
issue
prescription
Login_D
d_email_id
d_password
d_id
1..1
Log_in
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Patient
p_id
p_name
dob
gender
contact_no
image_url
pincode
Doctors
d_id
d_name
spec
fee
rating
certificate_url
image_url
contact_no
worktime_slot
h_id
1..1
1..1
lives
1..*
Hospital
h_id
h_name
pincode
contact_no
website
facility
works_in
1..1
0..*
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situated
Address
pincode
state
city