

Automation of Hospital Database Management

Abstract

In order to maintain records and data in every sphere, the IT companies develop and introduce new database management software everyday. They specially wish to develop software which can successfully fulfil the demands of the particular field for which the software has been designed. In this article I have presented a hospital database management model which will be helpful in developing hospital database management software.

Keywords: Hospital database management model, XAMPP Integrated Package, MySQL Administrator program, MySQL Query Browser program, MySQL Workbench program, InnoDB.

Introduction

In this technological era today, computers are replacing old techniques of keeping records and other information in bulks of files. The tradition of maintaining files manually is replaced by saving records online or offline. This method is adopted in every field like banks, companies, telecommunication, airlines, railways, hotels etc. Hospitals are not an exception in this regard.

In view of the requirements of a hospital, I have designed a hospital database management model.

Review of Literature

In India, the existing system for database management is manual in working in many hospitals. There are several people required for managing this manual system so there is wastage of human power. Several files are used for recording the information about the patient. In file system various types of error can occur like inconsistency in database and redundancy of data. There is wastage of time for gathering any type of typical information about the patient. The files are not secure and there are chances of losing data. Billing for patients is also time consuming and a difficult task. There is no backup data, in case any mishappening occurs. Through the existing system if at any time you require instant report about patient's details, then it would require a lot of time, and there is a probability of errors also.

Aim of the Study

To design a model for hospital database management.

Scope

The proposed model can act as a basis for developing hospital database management software. That software can be used in any hospital, clinic or dispensary.

Source of Data

Primary data: It is collected from Jawaharlal Nehru Medical College and Hospital, Aligarh Muslim University, Aligarh.

Tools Used

Installer Package Used

XAMPP Integrated Package for installing MySQL, Apache, PHP and Pearl on Windows.

Graphical Clients Used

Mysql Administrator Program

It is a graphical tool to perform most database administration from within a graphical environment.

Mysql Query Browser Program

It allows running SQL queries from within a graphical environment and views the results.

Mysql Workbench Program

It is a powerful visual database design tool.



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Table Type used- InnoDB

The InnoDB type is the heavy weight, reliable, high performance choice for large scale, highly reliable applications.

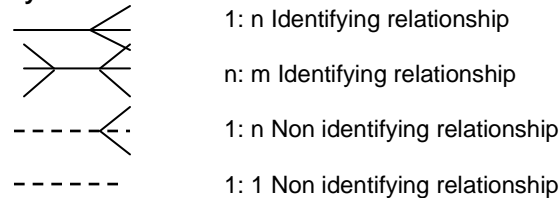
Key Features of the Proposed Model

1. It helps to computerize the process of gathering, assembling and retrieving patient information. Thus it would help to improve the reply time to the demands of patient care. It can generate precise information relating to the patient on time that helps in clinical audit.
2. It records information about the availability of doctors, their field of specialization, experience and other relevant matters.
3. This model facilitates complete and smooth running of the reception.
4. It manages the allocation of different rooms to the patients of the hospital.
5. It manages the equipments.
6. It facilitates the treatment and the cost required.
7. This model also manages the scheduling of both the nurses and the doctors.
8. It maintains a detailed account of all the medicines available in the hospital.
9. It stores information about the nursing staff as well as the receptionists.
10. The model is able to keep track of the information relating to patients admitted to the hospital earlier. This helps further investigation like tracing the history of the patients.

ER Diagram of the Model

(Please see on last page)

Symbols used



Database Design

Following are the data tables used in designing this model:

Table Name: Patient

Primary key: idpatient

Foreign key: ---

Index Name	Type
PRIMARY	PRIMARY

Column Definition

Column Name	Data Type	Width	Not Null
idpatient	INT		√
name	VARCHAR	30	
sex	VARCHAR	6	
address	VARCHAR	45	
age	VARCHAR	20	
date admitted	DATE		
date discharge	DATE		
contact number	VARCHAR	45	
pat_info	VARCHAR	45	
pat_status	VARCHAR	20	

Table Description

Column Name	Description
idpatient	Patients' id
name	Patients' name
sex	Patients' sex
address	Patients' address
age	Patients' age
date admitted	Date on which patient is admitted in the hospital
date discharge	Date on which patient is discharged from the hospital
contact number	Patients' contact number
pat_info	It includes the name of the disease the patient is suffering from
pat_status	Status of the patient. This status is active until the patient is admitted in the hospital. When he is discharged from the hospital, his status becomes inactive.

Explanation

This table stores the information related to patients. In the given database, the status of the patient is checked on 30th Jan 2016, and accordingly the status is recorded in the table.

Table Name: medicines

Primary key: med_code

Foreign key: ---

Index Name	Type
PRIMARY	PRIMARY

Column Definition

Column Name	Data Type	Width	Not Null
med_code	INT		√
med_price	DECIMAL		
med_name	VARCHAR	45	

Table Description

Column Name	Description
med_code	Medicines' code
med_price	Medicines' price
med_name	Medicines' name

Explanation

This table stores information of medicines along their names, codes and prices.

Table Name: Equipments

Primary key: equip_no

Foreign key Name	Referenced Table
idpatient	`mydb`, `patient`

Index Name	Type
PRIMARY	PRIMARY
idpatient	INDEX

Column Name	Data Type	Width	Not Null
equip_no	INT		√
equip_price	DECIMAL		
equip_name	VARCHAR	45	

Table Description

Column Name	Description
equip_no	Equipment number
equip_price	Price of the equipment
equip_name	Name of the equipment

Explanation

This table includes information about the equipments used in the hospital. The name of each equipment along with its price is mentioned in this table.

Table Name: rooms

Primary keys: room_no, patient_idpatient

Foreign key Name	Referenced Table
fk_rooms_patient1	`mydb`, `patient`

Index Name	Type
PRIMARY	PRIMARY
fk_rooms_patient1	INDEX

Column Definition

Column Name	Data Type	Width	Not Null
room_no	INT		√
room_type	VARCHAR	30	
patient_idpatient	INT		√
patient_idpatient1	INT		√

Table Description

Column Name	Description
room_no	Room number
room_type	Room type
patient_idpatient	Patients' id
patient_idpatient1	System generated id

Explanation

This table stores information about the rooms of the hospital, types of rooms and ids of the patients admitted in those rooms.

Table Name: receptionist

Primary key: recep_id

Foreign key: ---

Index Name	Type
PRIMARY	PRIMARY

Column Definition

Column Name	Data Type	Width	Not Null
recep_id	INT		√
recep_name	VARCHAR	30	
recep_salary	DECIMAL		
recep_contact_no	VARCHAR	20	

Table Description

Column Name	Description
recep_id	Receptionists' id
recep_name	Receptionists' name
recep_salary	Receptionists' salary
recep_contact_no	Receptionists' contact number

Explanation

This table contains information related to receptionists working in the hospital.

Table Name: record

Primary keys: rec_no

Foreign key Name	Referenced table
fk_record_receptionist1	`mydb`, `receptionist`

Index Name	Type
PRIMARY	PRIMARY
fk_record_receptionist1	INDEX

Column Definition

Column Name	Data Type	Width	Not Null
rec_no	INT		√
rec_pat_info	VARCHAR	75	
rec_appointment	DATETIME		
receptionist_recep_id	INT		√

Table Description

Column Name	Description
rec_no	Record number
rec_pat_info	It contains patients' id
rec_appointment	It contains the date and time at which the patient is admitted in the hospital.
receptionist_recep_id	Receptionists' id

Explanation

This table stores the patients' id, the date and time at which he is hospitalised and also the receptionists' id.

Table Name: doctor

Primary key: doc_id

Foreign key: ---

Index Name	Type
PRIMARY	PRIMARY

Column Definition

Column Name	Data Type	Width	Not Null
doc_id	INT		√
doc_name	VARCHAR	30	
doc_salary	DECIMAL		
doc_qualification	VARCHAR	45	
doc_experience	VARCHAR	20	
doc_contact_no	VARCHAR	20	
doc_specialization	VARCHAR	30	

Table Description

Column Name	Description
doc_id	Doctors' id
doc_name	Doctors' name
doc_salary	Doctors' salary
doc_qualification	Doctors' qualification
doc_experience	Doctors' experience
doc_contact_no	Doctors' contact number
doc_specialization	Doctors' specialization

Explanation

This table stores the information related to doctors who are working in the hospital.

Table Name: doctor_has_patient

Primary keys: doctor_doc_id, patient_idpatient

Foreign key Name	Referenced table
fk_doctor_has_patient_patient1	`mydb`, `doctor`
fk_doctor_has_patient_doctor1	`mydb`, `patient`

Index Name	Type
PRIMARY	PRIMARY
fk_doctor_has_patient_patient1	INDEX
fk_doctor_has_patient_doctor1	INDEX

Column Definition

Column Name	Data Type	Width	Not Null
doctor_doc_id	INT		√
patient_idpatient	INT		√

Table Description

Column Name	Description
doctor_doc_id	Doctors' id
patient_idpatient	Patients' id

Explanation

This table specifies the doctor patient relationship, assigning a number of patients to a single doctor and also keeping a record of all doctors catering to particular patients' medical needs.

Table Name: Nurse

Primary key: nurse_id

Foreign key: ---

Index Name	Type
PRIMARY	PRIMARY

Column Definition

Column Name	Data Type	Width	Not Null
nur_id	INT		√
nur_name	VARCHAR	30	
nur_salary	DECIMAL		
nur_contact_no	VARCHAR	20	
nur_experience	VARCHAR	10	

Table Description

Column Name	Description
nur_id	Nurses' id
nur_name	Nurses' name
nur_salary	Nurses' salary
nur_contact_no	Nurses' contact number
nur_experience	Nurses' experience

Explanation

This table contains information related to the nurses working in the hospital.

Table Name: nurse_has_rooms

Primary keys: nurse_nur_id, rooms_room_no, rooms_patient_idpatient

Foreign key Name	Referenced table
fk_nurse_has_rooms_nurse1	`mydb`, `nurse`
fk_nurse_has_rooms_rooms1	`mydb`, `rooms`

Index Name	Type
PRIMARY	PRIMARY
fk_nurse_has_rooms_nurse1	INDEX
fk_nurse_has_rooms_rooms1	INDEX

Column Definition

Column Name	Data Type	Width	Not Null
nurse_nur_id			√
rooms_room_no			√
rooms_patient_idpatient			√

Table Description

Column Name	Description
nurse_nur_id	Nurses' id
rooms_room_no	Room no
rooms_patient_idpatient	Patients' id

Explanation

A single nurse could be assigned to serving multiple patients while a single patient could have multiple nurses taking care of him.

Table Name: treatment

Primary key: treat_id

Foreign key: ---

Index Name	Type
PRIMARY	PRIMARY

Column Definition

Column Name	Data Type	Width	Not Null
treat_id	INT		√
treat_cost	DECIMAL		

Table Description

Column Name	Description
treat_id	Treatments' id
treat_cost	Treatments' cost

Explanation

This table lists different treatments given to the patients.

Table Name: medicines_has_patient

Primary keys: medicines_med_code, patient_idpatient

Foreign key Name	Referenced table
fk_medicines_has_patient_medicines1	`mydb`, `medicines`
fk_medicines_has_patient_patient1	`mydb`, `patient`

Index Name	Type
PRIMARY	PRIMARY
fk_medicines_has_patient_patient1	INDEX
fk_medicines_has_patient_medicines1	INDEX

Column Definition

Column Name	Data Type	Width	Not Null
medicines_med_code	INT		√
patient_idpatient	INT		√

Table Description

Column Name	Description
medicines_med_code	Medicines' code
patient_idpatient	Patients' id

Explanation

This table lists the medicines given to different patients admitted in the hospital. Any patient can be associated with any number of medicines given to him during his treatment. It is also possible that more than one patient is associated with the same medicine.

Table Name: treatment_has_patient

Primary keys: treatment_treat_id, patient_idpatient

Foreign key Name	Referenced Table
fk_treatment_has_patient_treatment1	`mydb`, `treatment`
fk_treatment_has_patient_patient1	`mydb`, `patient`

Index Name	Type
PRIMARY	PRIMARY
fk_treatment_has_patient_treatment1	INDEX
fk_treatment_has_patient_patient1	INDEX

Column Definition

Column Name	Data Type	Width	Not Null
treatment_treat_id	INT		√
patient_idpatient	INT		√

Table Description

Column Name	Description
treatment_treat_id	Treatments' id
patient_idpatient	Patients' id

Explanation

A single treatment could be given to different patients for a common disease. On the other hand, a single patient could have multiple treatment procedures in the course of his stay at the hospital.

Sample data for table 'patient'

Idp- Atient	Name	Sex	Address	Age	Date Admitted	Date Discharge	Contact Number	Pat_Info	Pat_Status
76	Suresh	M	Avantika phase 2	20	2016-1-6	NULL	453	Bone tumour	Active
77	Saloni	F	Gagan Nagar	89	2016-1-6	2016-1-8	398	Sinusitis	Inactive
91	Faisal	M	Paan wali kothi	49	2016-1-15	2016-1-30	398	Case of burns	Active
101	Kavita	F	Azra Appartments	20	2016-1-24	2016-1-30	987	Piles	Active
103	Farhen	F	Shamshad market	5	2016-1-24	2016-1-30	467	Stoneproblem	Active
106	Faiz	M	Sami Manzil	51	2016-1-26	2016-1-30	283	UTI	Active
111	Manish	M	Civil Lines	34	2016-1-29	NULL	237	Hypertension	Active
112	Muneet	M	Sir Syed nagar	89	2016-1-30	NULL	387	GIT	Active
113	Haleem	M	New Sir Syed Nagar	34	2016-1-30	NULL	676	Meningitis	Active

Sample data for table 'medicines'

med_code	med_price	med_name
118	89	Losar-H
119	85	Zenflox-OZ
128	200	Ceftum
134	189	Hydrocortisone
135	209	Insulin Aspart
140	46	Glyburide
149	69	Lomustine
153	456	Gastrofoam
156	109	Microzide
158	69	Gelusil
159	90	Silvadene
161	90	Albumin
174	78	Etoposide
183	78	Zometa
192	109	Abraxane
194	78	Nasonex
195	77	Maxidex
211	189	Diodes

room_no	room_type	patient_idpatient
326	Special ward	76
331	Special ward	91
332	Special ward	101
333	Special ward	103
334	Special ward	106
338	Special ward	111
339	Special ward	112
340	Special ward	113

Sample data for table 'receptionist'

recep_id	recep_name	recep_salary	recep_contact_no
61	Akash	20000	100890

Sample data for table 'record'

rec_no	rec_pat_info	rec_appointment	receptionist_recep_id
270	76	2016-1-6 09:00:00	61
275	103	2016-1-24 23:45:00	61
276	106	2016-1-26 10:38:05	61
277	108	2016-1-27 06:00:00	61
278	109	2016-1-28 09:45:00	61
282	113	2016-1-30 11:34:00	61
283	64	2016-1-1 12:34:00	61
284	65	2016-1-1 15:00:45	61

Sample data for table 'equipments'

equip_no	equip_price	equip_name
240	250	Surgical tray
246	500	BP instrument
249	15000	Direct Laryngoscope
253	350	Tongue depressor
254	35000	Fundoscope
255	40000	Bronchoscope

Sample data for table 'doctor'

doc_id	doc_name	doc_salary	doc_qualification	doc_experience	doc_contact_no	doc_specialization
1	Masood Ashraf	70000	MS	15 years	1001211	Surgery
4	Mohd Ajmal	65000	MD	25 years	1001214	Medicine
8	Shaista Mannan	67000	MD	12 years	1001218	Pathology
9	Srivastav	89000	MD	14 years	1001219	Neurology
10	Akram	46000	MS	20 years	1001220	Plastic surgery
12	Dushyant	78000	MD	21 years	1001222	Urology
20	Fazlur Rahman	60000	MS	16 years	1001230	Orthopaedics

Sample data for table 'doctor_has_patient'

doctor_doc_id	patient_idpatient
10	91
1	103
12	106
9	113
8	112
9	111
20	76
4	111
1	106
12	103
1	101

Sample data for table 'nurse'

nur_id	nur_name	nur_salary	nur_contact_no	nur_experience
42	Shushmita	15000	260201	5 years
43	Seema	10000	NULL	3 years
45	Gulshan	15000	260203	5 years
48	Elizabeth	18000	NULL	8 years
49	Maria	10000	260208	3 years
50	Rupa	15000	260209	5 years
51	Kavita	12000	NULL	4 years
56	Rukhsar	10000	281289	3 years
57	Manna	15000	280206	5 years
58	Christina	10000	280207	3 years

Sample data for table 'nurse_has_rooms'

nurse_nur_id	rooms_room_no	rooms_patient_idpatient
42	326	76
43	326	76
45	331	91
48	338	111
49	339	112
50	339	112
50	340	113
51	340	113
56	332	101
57	333	103
57	334	106
58	338	111

Sample data for table 'treatment'

treat_id	treat_cost
214	10000
215	20222
216	30000
218	28000
219	29000
220	40000
225	50000
226	89000
230	49000

Sample data for table 'medicines_has_patient'

medicines_med_code	patient_idpatient
118	111
118	112
119	101
119	112
128	106
134	101
135	101
140	103
149	111
153	111
156	112
158	111
159	112
161	91
174	76
183	76
192	76
194	111
195	76
211	113

Sample data for table 'treatment_has_patient'

treatment_treat_id	patient_idpatient
214	111
215	76
216	76
216	101
218	91
219	103
220	106
225	113
226	112
230	106

Conclusion

This hospital database management model incorporates various essential features which help to run smoothly the regular day to day basis operations of any hospital. It is very useful in taking care of all the aspects of running the hospital in a cost effective manner.

References

1. Tahaghoghi S.M.M, Williams H. E., Learning Mysql, O' Reilly Media, Inc. United States of America, 2006 (First Edition).
2. Bayross I, SQL, PL/SQL The Programming Language Of Oracle, BPB Publications, India, 2009 (Fourth Revised Edition).
3. Silberschatz A, Korth H, Sudarshan S, Database System Concepts, The Mcgraw Hill Companies, Inc. New York, 2011 (Sixth Edition).

Web Links

4. <http://www.Apachefriends.Org/En/Xampp.Html>
5. <http://Dev.Mysql.Com/Downloads>.

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