DBMS Project

Hostel Management System

Team Members:

Name: Aniket Dasurkar	Roll No: 197109	Section: A
Name: Gayathri Magesh	Roll No: 197229	Section: B
Name: S. S. Lakshayapriya	Roll No: 197270	Section: B

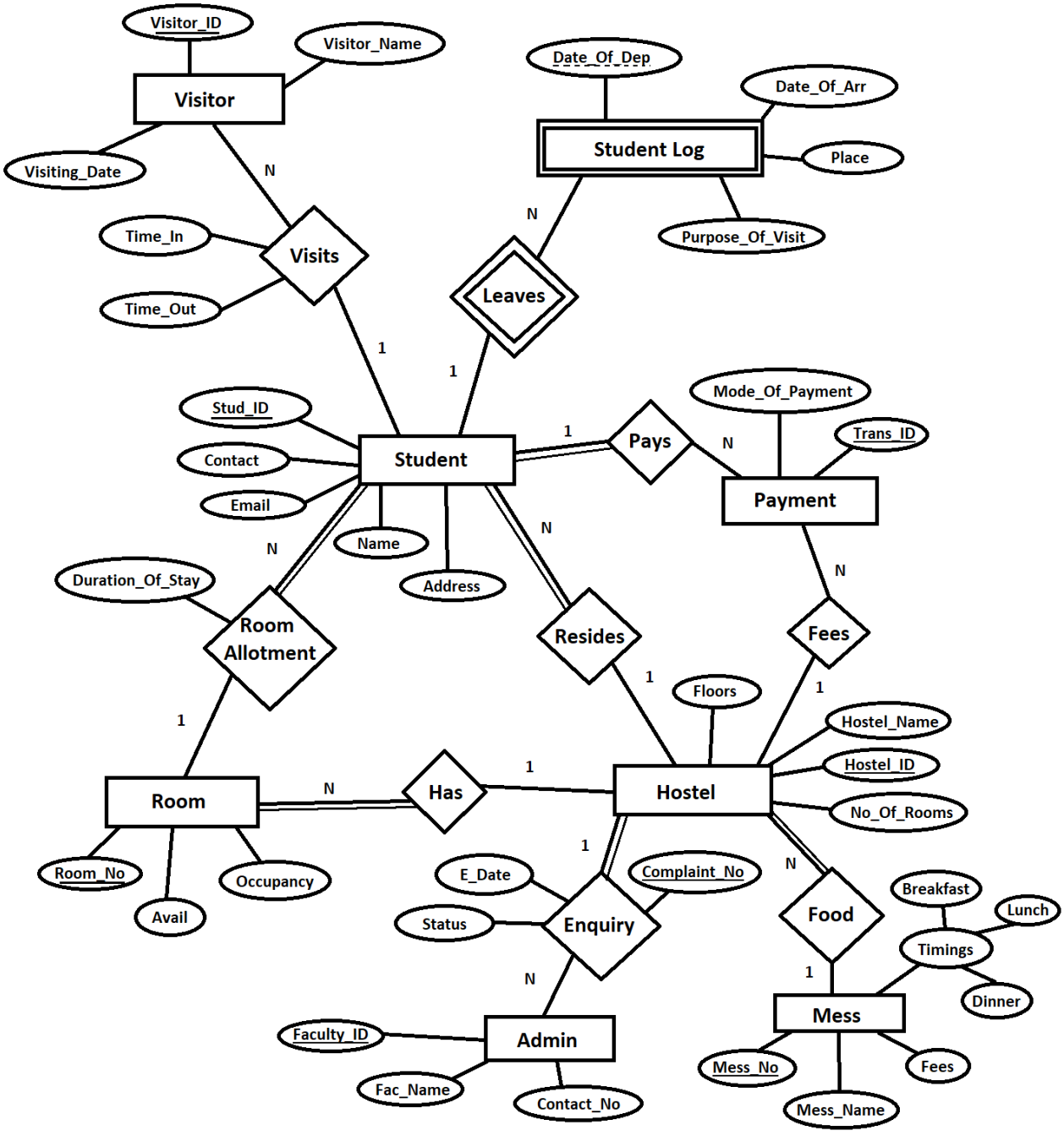
Introduction

In this project, we have designed a database management system to organise and store information about college hostels. This database contains information about students, the rooms, hostels and messes they are assigned to, a visitor and student log etc. It also stores admin information and complaints that are lodged by the students. The main aim of this project is to efficiently store and retrieve student information. Our design helps facilitate convenient management of data, by computerizing most of the work and getting rid of manual entry and record systems.

ER Model Assumptions

- A Student can reside in one hostel room. Multiple students can stay in a single hostel room. Each student is allotted a hostel room.
- Each hostel is assigned a mess. A mess can provide food for multiple hostels.
- A student can have multiple visitors.
- Every student has to make a payment towards the hostel. A student can make multiple payments too.
- Admins are allotted to each hostel. A hostel can have multiple admins.
- A student can have multiple logs in STUDENT_LOG, for each time they leave the hostel.

Entity- Relationship Diagram



Creation Of Tables

1. Table MESS

```
CREATE TABLE MESS (
MESS_NAME VARCHAR2(30),
MESS_NO NUMBER PRIMARY KEY,
BREAKFAST VARCHAR2(30),
LUNCH VARCHAR2(30),
DINNER VARCHAR2(30),
FEES NUMBER
);

INSERT INTO MESS VALUES ('IFC A', 201, '7:00 AM - 8:00 AM', '11:30 AM - 12:30 PM', '7:00 PM - 8:00 PM', 200);
INSERT INTO MESS VALUES ('IFC B', 202, '7:30 AM - 8:30 AM', '1:30 PM - 2:30 PM', '8:00 PM - 9:00 PM', 350);
INSERT INTO MESS VALUES ('IFC C', 203, '7:00 AM - 8:00 AM', '12:00 PM - 1:00 PM', '7:00 PM - 8:00 PM', 175);
INSERT INTO MESS VALUES ('Kaveri', 204, '8:00 AM - 9:00 AM', '11:30 AM - 12:30 PM', '7:00 PM - 8:00 PM', 250);
INSERT INTO MESS VALUES ('Godavari', 205, '7:00 AM - 8:00 AM', '11:30 AM - 12:30 PM', '7:30 PM - 8:30 PM', 300);
INSERT INTO MESS VALUES ('Ganga', 206, '7:00 AM - 8:00 AM', '1:00 PM - 2:00 PM', '8:00 PM - 9:00 PM', 150);
INSERT INTO MESS VALUES ('Yamuna', 207, '7:30 AM - 8:30 AM', '11:30 AM - 12:00 PM', '7:00 PM - 8:00 PM', 225);
INSERT INTO MESS VALUES ('Narmada', 208, '7:00 AM - 8:00 AM', '1:00 PM - 2:00 PM', '8:30 PM - 9:30 PM', 320);
INSERT INTO MESS VALUES ('Indus', 209, '8:30 AM - 9:30 AM', '12:00 PM - 1:00 PM', '7:00 PM - 8:00 PM', 200);
INSERT INTO MESS VALUES ('Krishna', 210, '7:00 AM - 8:00 AM', '12:30 PM - 1:30 PM', '7:30 PM - 8:30 PM', 400);
```

	MESS_NAME	MESS_NO	BREAKFAST	LUNCH	DINNER	FEES
1	IFC A	201	7:00 AM - 8:00 AM	11:30 AM - 12:30 PM	7:00 PM - 8:00 PM	200
2	IFC B	202	7:30 AM - 8:30 AM	1:30 PM - 2:30 PM	8:00 PM - 9:00 PM	350
3	IFC C	203	7:00 AM - 8:00 AM	12:00 PM - 1:00 PM	7:00 PM - 8:00 PM	175
4	Kaveri	204	8:00 AM - 9:00 AM	11:30 AM - 12:30 PM	7:00 PM - 8:00 PM	250
5	Godavari	205	7:00 AM - 8:00 AM	11:30 AM - 12:30 PM	7:30 PM - 8:30 PM	300
6	Ganga	206	7:00 AM - 8:00 AM	1:00 PM - 2:00 PM	8:00 PM - 9:00 PM	150

2. Table HOSTEL

```
CREATE TABLE HOSTEL (
HOSTEL_ID NUMBER PRIMARY KEY,
HOSTEL_NAME VARCHAR2(30),
FLOORS NUMBER,
NO_OF_ROOMS NUMBER,
MESS_NO NUMBER,
FOREIGN KEY (MESS_NO) REFERENCES MESS(MESS_NO)
);

INSERT INTO HOSTEL VALUES(101,'SAROJINI',10,50,201);
INSERT INTO HOSTEL VALUES(102,'PRIYADARSHINI',8,30,203);
INSERT INTO HOSTEL VALUES(103,'1.8K ULTRA MEGA HOSTEL',11,100,201);
INSERT INTO HOSTEL VALUES(104,'1K HOSTEL',12,70,204);
INSERT INTO HOSTEL VALUES(105,'ISH',10,40,202);
INSERT INTO HOSTEL VALUES(106,'BOSE',6,40,203);
INSERT INTO HOSTEL VALUES(107,'AMBEDKAR',12,120,205);
INSERT INTO HOSTEL VALUES(108,'SARABHAI',10,100,206);
INSERT INTO HOSTEL VALUES(109,'GANDHI',6,80,202);
INSERT INTO HOSTEL VALUES(110,'TAGORE',5,120,206);
```

	HOSTEL_ID	HOSTEL_NAME	FLOORS	NO_OF_ROOMS	MESS_NO
1	101	SAROJINI	10	50	201
2	102	PRIYADARSHINI	8	30	203
3	103	1.8K ULTRA MEGA HOSTEL	11	100	201
4	104	1K HOSTEL	12	70	204
5	105	ISH	10	40	202
6	106	BOSE	6	40	203
7	107	AMBEDKAR	12	120	205
8	108	SARABHAI	10	100	206
9	109	GANDHI	6	80	202
10	110	TAGORE	5	120	206

3. Table ROOM

```
CREATE TABLE ROOM (
ROOM_NO NUMBER PRIMARY KEY,
OCCUPANCY NUMBER,
AVAIL VARCHAR2(30),
HOSTEL_ID NUMBER,
FOREIGN KEY(HOSTEL_ID) REFERENCES HOSTEL(HOSTEL_ID)
);

INSERT INTO ROOM VALUES(101, 4, 'YES', 101);
INSERT INTO ROOM VALUES(102, 4, 'YES', 101);
INSERT INTO ROOM VALUES(201, 2, 'YES', 102);
INSERT INTO ROOM VALUES(203, 2, 'NO', 102);
INSERT INTO ROOM VALUES(301, 1, 'NO', 103);
INSERT INTO ROOM VALUES(302, 1, 'YES', 103);
INSERT INTO ROOM VALUES(401, 2, 'YES', 104);
INSERT INTO ROOM VALUES(405, 2, 'YES', 104);
INSERT INTO ROOM VALUES(501, 2, 'NO', 105);
INSERT INTO ROOM VALUES(502, 2, 'NO', 105);
INSERT INTO ROOM VALUES(601, 1, 'YES', 106);
INSERT INTO ROOM VALUES(602, 1, 'YES', 106);
```

```
INSERT INTO ROOM VALUES(701, 3, 'YES', 107);
INSERT INTO ROOM VALUES(703, 3, 'YES', 107);
INSERT INTO ROOM VALUES(801, 3, 'YES', 108);
INSERT INTO ROOM VALUES(802, 3, 'YES', 108);
INSERT INTO ROOM VALUES(901, 1, 'YES', 109);
INSERT INTO ROOM VALUES(902, 1, 'NO', 109);
INSERT INTO ROOM VALUES(1001, 2, 'NO', 110);
INSERT INTO ROOM VALUES(1002, 2, 'YES', 110);
```

	ROOM_NO	OCCUPANCY	AVAIL	HOSTEL_ID
1	101	4	YES	101
2	102	4	YES	101
3	201	2	YES	102
4	203	2	NO	102
5	301	1	NO	103
6	302	1	YES	103
7	401	2	YES	104
8	405	2	YES	104
9	501	2	NO	105
10	502	2	NO	105
11	601	1	YES	106
12	602	1	YES	106
13	701	3	YES	107
14	703	3	YES	107
15	801	3	YES	108
16	802	3	YES	108
17	901	1	YES	109
18	902	1	NO	109
19	1001	2	NO	110
20	1002	2	YES	110

4. Table ADMIN

```
CREATE TABLE ADMIN (
FACULTY_ID NUMBER PRIMARY KEY,
FAC_NAME VARCHAR2(20),
CONTACT_NO NUMBER,
```

```
HOSTEL_ID NUMBER,
FOREIGN KEY (HOSTEL_ID) REFERENCES HOSTEL(HOSTEL_ID)
);

INSERT INTO ADMIN VALUES (401, 'Rajesh Shukla', 8912348761, 106);
INSERT INTO ADMIN VALUES (402, 'Srinidhi Prasad', 8937347821, 104);
INSERT INTO ADMIN VALUES (403, 'M. Sashi ', 9123763348, 101);
INSERT INTO ADMIN VALUES (404, 'K. Nirmala', 7341981233, 107);
INSERT INTO ADMIN VALUES (405, 'Rohit Nishad', 8563413123, 105);
INSERT INTO ADMIN VALUES (406, 'Rashmi Suresh', 7453312786, 109);
INSERT INTO ADMIN VALUES (407, 'Umesh Yadav', 7344123121, 101);
INSERT INTO ADMIN VALUES (408, 'Ravi Kumar', 8945321231, 108);
INSERT INTO ADMIN VALUES (409, 'Joseph Davidson', 9464312212, 102);
INSERT INTO ADMIN VALUES (410, 'Gopi Krishna', 8989576231, 107);
INSERT INTO ADMIN VALUES (411, 'D. Bhargavi', 9543423121, 102);
INSERT INTO ADMIN VALUES (412, 'Rohan Malik', 9656342131, 110);
INSERT INTO ADMIN VALUES (413, 'Kiran Kumar', 7452349871, 105);
INSERT INTO ADMIN VALUES (414, 'Priya Varshini', 8213786845, 103);
INSERT INTO ADMIN VALUES (415, 'Asim Das', 8458423578, 106);
```

	FACULTY_ID	FAC_NAME	CONTACT_NO	HOSTEL_ID
1	401	Rajesh Shukla	8912348761	106
2	402	Srinidhi Prasad	8937347821	104
3	403	M. Sashi	9123763348	101
4	404	K. Nirmala	7341981233	107
5	405	Rohit Nishad	8563413123	105
6	406	Rashmi Suresh	7453312786	109
7	407	Umesh Yadav	7344123121	101
8	408	Ravi Kumar	8945321231	108
9	409	Joseph Davidson	9464312212	102
10	410	Gopi Krishna	8989576231	107
11	411	D. Bhargavi	9543423121	102
12	412	Rohan Malik	9656342131	110
13	413	Kiran Kumar	7452349871	105
14	414	Priya Varshini	8213786845	103
15	415	Asim Das	8458423578	106

5. Table ENQUIRY

```
CREATE TABLE ENQUIRY (
COMPLAINT_NO NUMBER PRIMARY KEY,
HOSTEL_ID NUMBER,
FACULTY_ID NUMBER,
E_DATE DATE,
STATUS VARCHAR(20)
FOREIGN KEY(HOSTEL_ID) REFERENCES HOSTEL(HOSTEL_ID),
FOREIGN KEY(FACULTY_ID) REFERENCES ADMIN(FACULTY_ID)
);
```

```
INSERT INTO ENQUIRY VALUES(1,104,402,'26-JAN-20','PENDING');
INSERT INTO ENQUIRY VALUES(2,101,403,'22-APR-19','PENDING');
INSERT INTO ENQUIRY VALUES(3,102,411,'12-MAR-20','RESOLVED');
INSERT INTO ENQUIRY VALUES(4,102,409,'07-FEB-19','PENDING');
INSERT INTO ENQUIRY VALUES(5,101,407,'21-JUN-20','RESOLVED');
INSERT INTO ENQUIRY VALUES(6,103,414,'15-JUL-20','PENDING');
INSERT INTO ENQUIRY VALUES(7,106,415,'14-AUG-19','RESOLVED');
INSERT INTO ENQUIRY VALUES(8,107,404,'30-JAN-19','RESOLVED');
INSERT INTO ENQUIRY VALUES(9,110,412,'12-OCT-20','PENDING');
INSERT INTO ENQUIRY VALUES(10,109,406,'02-JUL-19','PENDING');
INSERT INTO ENQUIRY VALUES(11,106,415,'21-DEC-20','RESOLVED');
INSERT INTO ENQUIRY VALUES(12,110,412,'13-FEB-20','RESOLVED');
INSERT INTO ENQUIRY VALUES(13,102,409,'18-JUN-19','PENDING');
```

	COMPLAINT_NO	HOSTEL_ID	FACULTY_ID	E_DATE	STATUS
1	1	104	402	26-01-20	PENDING
2	2	101	403	22-04-19	PENDING
3	3	102	411	12-03-20	RESOLVED
4	4	102	409	07-02-19	PENDING
5	5	101	407	21-06-20	RESOLVED
6	6	103	414	15-07-20	PENDING
7	7	106	415	14-08-19	RESOLVED
8	8	107	404	30-01-19	RESOLVED
9	9	110	412	12-10-20	PENDING
10	10	109	406	02-07-19	PENDING
11	11	106	415	21-12-20	RESOLVED
12	12	110	412	13-02-20	RESOLVED
13	13	102	409	18-06-19	PENDING

6. Table STUDENT

```
CREATE TABLE STUDENT (
STUD_ID NUMBER PRIMARY KEY,
NAME VARCHAR2(30),
YEAR_OF_STUDY NUMBER,
CONTACT NUMBER,
EMAIL VARCHAR2(50),
ROOM_NO NUMBER,
ADDRESS VARCHAR2(30),
HOSTEL_ID NUMBER,
FOREIGN KEY(ROOM_NO) REFERENCES ROOM(ROOM_NO),
FOREIGN KEY(HOSTEL_ID) REFERENCES HOSTEL(HOSTEL_ID)
);

INSERT INTO STUDENT VALUES(1970,'LAKSHA', 2,
9827234567,'1970laksha@student.nitw.ac.in', 101, 'CHENNAI',101);
INSERT INTO STUDENT VALUES(1971,'GAYATHRI',
2,9787894567,'1971gayathri@student.nitw.ac.in', 101, 'CHENNAI', 101);
INSERT INTO STUDENT VALUES(1972,'KAJAL', 2,
9820934267,'1972kajal@student.nitw.ac.in', 101, 'MUMBAI', 101);
INSERT INTO STUDENT VALUES(1973,'ANIKET', 3,
9827000987,'1973aniket@student.nitw.ac.in', 102, 'KOCHI', 101);
INSERT INTO STUDENT VALUES(1974,'RAJESH', 3,
9927234567,'1974rajesh@student.nitw.ac.in', 102, 'BANGALORE', 101);
INSERT INTO STUDENT VALUES(1975,'ROHAN', 3,
9827234567,'1975rohan@student.nitw.ac.in', 102, 'CHENNAI',101);
INSERT INTO STUDENT VALUES(1976,'OMAR', 3,
8834934267,'1976omar@student.nitw.ac.in', 201, 'HYDERABAD',102);
INSERT INTO STUDENT VALUES(1977,'AASHNA', 2,
9820002167,'1977aashna@student.nitw.ac.in', 302, 'DELHI',103);
INSERT INTO STUDENT VALUES(1978,'ABHISHEK', 3,
9880934208,'1978abhishek@student.nitw.ac.in', 401, 'KOLKATA',104);
```

```
INSERT INTO STUDENT VALUES(1979,'KARTIK', 3,
9767834267,'1979kartik@student.nitw.ac.in', 401, 'MUMBAI', 104);
INSERT INTO STUDENT VALUES(1980,'VENKAT', 2,
9841278327,'1980venkat@student.nitw.ac.in', 405, 'HYDERABAD',104);
INSERT INTO STUDENT VALUES(1981,'RIDDHI', 2,
7312343902,'1981riddhi@student.nitw.ac.in', 405, 'DELHI',104);
INSERT INTO STUDENT VALUES(1982,'KHUSHI', 3,
9735168313,'1982khushi@student.nitw.ac.in', 601, 'BIHAR',106);
INSERT INTO STUDENT VALUES(1983,'VINAY', 3,
81246706421,'1983vinay@student.nitw.ac.in', 602, 'KOLKATA',106);
INSERT INTO STUDENT VALUES(1984,'ANSILA', 2,
9849514939,'1984ansila@student.nitw.ac.in', 701, 'PUNE',107);
INSERT INTO STUDENT VALUES(1985,'PRANITHA', 2,
9917351846,'1985pranitha@student.nitw.ac.in', 701, 'JAIPUR',107);
INSERT INTO STUDENT VALUES(1986,'SUMAN', 2,
7761945190,'1986suman@student.nitw.ac.in', 701, 'DELHI',107);
INSERT INTO STUDENT VALUES(1987,'VARUN', 4,
8414561804,'1987varun@student.nitw.ac.in', 703, 'MUMBAI',107);
INSERT INTO STUDENT VALUES(1988,'SHARATH', 4,
8073158532,'1988sharath@student.nitw.ac.in', 703, 'BHOPAL',107);
INSERT INTO STUDENT VALUES(1989,'MOHAN', 4,
9974159084,'1989mohan@student.nitw.ac.in', 703, 'KOCHI',107);
INSERT INTO STUDENT VALUES(1990,'AYUSH', 3,
9743243817,'1990ayush@student.nitw.ac.in', 201, 'CHENNAI',102);
INSERT INTO STUDENT VALUES(1991,'DEVDUTT', 3,
9545234576,'1991devdutt@student.nitw.ac.in', 801, 'PUNE',108);
INSERT INTO STUDENT VALUES(1992,'VIRAT', 2,
9634275665,'1992virat@student.nitw.ac.in', 801, 'KOLKATA', 108);
INSERT INTO STUDENT VALUES(1993,'SHAHBAZ', 2,
9403335435,'1993shahbaz@student.nitw.ac.in', 801, 'LUCKNOW', 108);
INSERT INTO STUDENT VALUES(1994,'HARSHAL', 3,
9403232123,'1994harshal@student.nitw.ac.in', 802, 'DELHI', 108);
```

```
INSERT INTO STUDENT VALUES(1995,'ANANYA', 3,
9827213532,'1995ananya@student.nitw.ac.in', 802, 'AHMEDABAD',108);
INSERT INTO STUDENT VALUES(1996,'GLEN', 3,
9814326543,'1996glen@student.nitw.ac.in', 802, 'CALICUT',108);
INSERT INTO STUDENT VALUES(1997,'RAVINDRA', 4,
9321147837,'1997ravindra@student.nitw.ac.in', 901, 'VIZAG', 109);
INSERT INTO STUDENT VALUES(1998,'PRIYA', 2,
9232991017,'1998priya@student.nitw.ac.in', 1002, 'DARJEELING',110);
INSERT INTO STUDENT VALUES(1999,'PRIYANKA', 2,
9328881201,'1999priyanka@student.nitw.ac.in', 1002, 'SRINAGAR', 110);
```

	STUD_ID	NAME	YEAR_OF_STUDY	CONTACT	EMAIL	ROOM_NO	ADDRESS	HOSTEL_ID
1	1970	LAKSHA	2	9827234567	1970laksha@student.nitw.ac.in	101	CHENNAI	101
2	1971	GAYATHRI	2	9787894567	1971gayathri@student.nitw.ac.in	101	CHENNAI	101
3	1972	KAJAL	2	9820934267	1972kajal@student.nitw.ac.in	101	MUMBAI	101
4	1973	ANIKET	3	9827000987	1973aniket@student.nitw.ac.in	102	KOCHI	101
5	1974	RAJESH	3	9927234567	1974rajesh@student.nitw.ac.in	102	BANGALORE	101
6	1975	ROHAN	3	9827234567	1975rohan@student.nitw.ac.in	102	CHENNAI	101
7	1976	OMAR	3	8834934267	1976omar@student.nitw.ac.in	201	HYDERABAD	102
8	1977	AASHNA	2	9820002167	1977aashna@student.nitw.ac.in	302	DELHI	103
9	1978	ABHISHEK	3	9880934208	1978abhishek@student.nitw.ac.in	401	KOLKATA	104
10	1979	KARTIK	3	9767834267	1979kartik@student.nitw.ac.in	401	MUMBAI	104
11	1980	VENKAT	2	9841278327	1980venkat@student.nitw.ac.in	405	HYDERABAD	104
12	1981	RIDDHI	2	7312343902	1981riddhi@student.nitw.ac.in	405	DELHI	104
13	1982	KHUSHI	3	9735168313	1982khushi@student.nitw.ac.in	601	BIHAR	106
14	1983	VINAY	3	81246706421	1983vinay@student.nitw.ac.in	602	KOLKATA	106
15	1984	ANSILA	2	9849514939	1984ansila@student.nitw.ac.in	701	PUNE	107
16	1985	PRANITHA	2	9917351846	1985pranitha@student.nitw.ac.in	701	JAIPUR	107
17	1986	SUMAN	2	7761945190	1986suman@student.nitw.ac.in	701	DELHI	107
18	1987	VARUN	4	8414561804	1987varun@student.nitw.ac.in	703	MUMBAI	107
19	1988	SHARATH	4	8073158532	1988sharath@student.nitw.ac.in	703	BHOPAL	107
20	1989	MOHAN	4	9974159084	1989mohan@student.nitw.ac.in	703	KOCHI	107
21	1990	AYUSH	3	9743243817	1990ayush@student.nitw.ac.in	201	CHENNAI	102
22	1991	DEVDUTT	3	9545234576	1991devdutt@student.nitw.ac.in	801	PUNE	108
23	1992	VIRAT	2	9634275665	1992virat@student.nitw.ac.in	801	KOLKATA	108
24	1993	SHAHBAZ	2	9403335435	1993shahbaz@student.nitw.ac.in	801	LUCKNOW	108
25	1994	HARSHAL	3	9403232123	1994harshal@student.nitw.ac.in	802	DELHI	108
26	1995	ANANYA	3	9827213532	1995ananya@student.nitw.ac.in	802	AHMEDABAD	108
27	1996	GLEN	3	9814326543	1996glen@student.nitw.ac.in	802	CALICUT	108
28	1997	RAVINDRA	4	9321147837	1997ravindra@student.nitw.ac.in	901	VIZAG	109
29	1998	PRIYA	2	9232991017	1998priya@student.nitw.ac.in	1002	DARJEELING	110
30	1999	PRIYANKA	2	9328881201	1999priyanka@student.nitw.ac.in	1002	SRINAGAR	110

7. Table PAYMENT

```
CREATE TABLE PAYMENT (
TRANS_ID NUMBER PRIMARY KEY,
MODE_OF_PAYMENT VARCHAR2(20),
HOSTEL_ID NUMBER,
STUD_ID NUMBER,
FOREIGN KEY (HOSTEL_ID) REFERENCES HOSTEL(HOSTEL_ID),
FOREIGN KEY (STUD_ID) REFERENCES STUDENT (STUD_ID)
);

INSERT INTO PAYMENT VALUES (1789675, 'NEFT', 101, 1970);
INSERT INTO PAYMENT VALUES (1781491, 'UPI', 101, 1971);
INSERT INTO PAYMENT VALUES (1789416, 'CASH', 101, 1972);
INSERT INTO PAYMENT VALUES (1791357, 'RTGS', 101, 1973);
INSERT INTO PAYMENT VALUES (1784910, 'DEBIT CARD', 101, 1974);
INSERT INTO PAYMENT VALUES (1700532, 'PAYTM WALLET', 101, 1975);
INSERT INTO PAYMENT VALUES (1711508, 'UPI', 102, 1976);
INSERT INTO PAYMENT VALUES (1724097, 'NEFT', 103, 1977);
INSERT INTO PAYMENT VALUES (1787646, 'NEFT', 104, 1978);
INSERT INTO PAYMENT VALUES (1754769, 'CREDIT CARD', 104, 1979);
INSERT INTO PAYMENT VALUES (1712345, 'NEFT', 104, 1980);
INSERT INTO PAYMENT VALUES (1798765, 'UPI', 104, 1981);
INSERT INTO PAYMENT VALUES (1774643, 'PAYTM WALLET', 106, 1982);
INSERT INTO PAYMENT VALUES (1723878, 'RTGS', 106, 1983);
INSERT INTO PAYMENT VALUES (1783123, 'NEFT', 107, 1984);
INSERT INTO PAYMENT VALUES (1703232, 'NEFT', 107, 1985);
INSERT INTO PAYMENT VALUES (1785322, 'UPI', 107, 1986);
INSERT INTO PAYMENT VALUES (1776362, 'RTGS', 107, 1987);
INSERT INTO PAYMENT VALUES (1708998, 'NEFT', 107, 1988);
INSERT INTO PAYMENT VALUES (1712324, 'DEBIT CARD', 107, 1989);
INSERT INTO PAYMENT VALUES (1787612, 'CREDIT CARD', 102, 1990);
INSERT INTO PAYMENT VALUES (1778451, 'CASH', 108, 1991);
```

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INSERT INTO PAYMENT VALUES (1709543, 'RTGS', 108, 1992);
INSERT INTO PAYMENT VALUES (1712589, 'UPI', 108, 1993);
INSERT INTO PAYMENT VALUES (1721569, 'NEFT', 108, 1994);
INSERT INTO PAYMENT VALUES (1705121, 'NEFT', 108, 1995);
INSERT INTO PAYMENT VALUES (1711451, 'DEBIT CARD', 108, 1996);
INSERT INTO PAYMENT VALUES (1724078, 'CASH', 109, 1997);
INSERT INTO PAYMENT VALUES (1782324, 'NEFT', 110, 1998);
INSERT INTO PAYMENT VALUES (1721397, 'RTGS', 110, 1999);
INSERT INTO PAYMENT VALUES (1739862, 'RTGS', 107, 1984);
INSERT INTO PAYMENT VALUES (1723687, 'NEFT', 101, 1972);
INSERT INTO PAYMENT VALUES (1974102, 'RTGS', 109, 1997);
INSERT INTO PAYMENT VALUES (1701479, 'CASH', 104, 1978);
INSERT INTO PAYMENT VALUES (1895420, 'DEBIT CARD', 102, 1990);
```

	TRANS_ID	MODE_OF_PAYMENT	HOSTEL_ID	STUD_ID
1	1789675	NEFT	101	1970
2	1781491	UPI	101	1971
3	1789416	CASH	101	1972
4	1791357	RTGS	101	1973
5	1784910	DEBIT CARD	101	1974
6	1700532	PAYTM WALLET	101	1975
7	1711508	UPI	102	1976
8	1724097	NEFT	103	1977
9	1787646	NEFT	104	1978
10	1754769	CREDIT CARD	104	1979
11	1712345	NEFT	104	1980
12	1798765	UPI	104	1981
13	1774643	PAYTM WALLET	106	1982
14	1723878	RTGS	106	1983
15	1783123	NEFT	107	1984
16	1703232	NEFT	107	1985
17	1785322	UPI	107	1986
18	1776362	RTGS	107	1987
19	1708998	NEFT	107	1988
20	1712324	DEBIT CARD	107	1989
21	1787612	CREDIT CARD	102	1990
22	1778451	CASH	108	1991
23	1709543	RTGS	108	1992
24	1712589	UPI	108	1993
25	1721569	NEFT	108	1994
26	1705121	NEFT	108	1995
27	1711451	DEBIT CARD	108	1996
28	1724078	CASH	109	1997
29	1782324	NEFT	110	1998
30	1721397	RTGS	110	1999
31	1739862	RTGS	107	1984
32	1723687	NEFT	101	1972
33	1974102	RTGS	109	1997
34	1701479	CASH	104	1978
35	1895420	DEBIT CARD	102	1990

8. Table VISITOR

```
CREATE TABLE VISITOR(
VISITOR_ID NUMBER PRIMARY KEY NOT NULL,
VISITOR_NAME VARCHAR2(50) NOT NULL,
STUD_ID NUMBER,
VISITING_DATE DATE,
TIME_IN VARCHAR2(15),
TIME_OUT VARCHAR2(15),
FOREIGN KEY (STUD_ID) REFERENCES STUDENT(STUD_ID)
);

INSERT INTO VISITOR VALUES(701,'MOHIT
KUMAR',1975,'04-JAN-21','17:35','19:10');
INSERT INTO VISITOR VALUES(702,'VIJAY RAJESH',1979,'07-JAN-21','09:21','12:17');
INSERT INTO VISITOR VALUES(703,'RAJASHREE
SHARMA',1991,'12-FEB-21','16:15','19:23');
INSERT INTO VISITOR VALUES(704,'VINAY KOSHY',1983,'13-FEB-21','08:19','10:54');
INSERT INTO VISITOR VALUES(705,'MAHESH
MEHTA',1985,'16-FEB-21','17:33','19:04');
INSERT INTO VISITOR VALUES(706,'ARJUN
PRASAD',1989,'21-FEB-21','15:43','19:02');
INSERT INTO VISITOR VALUES(707,'LAVANYA
RAJESH',1971,'22-FEB-21','13:35','17:07');
INSERT INTO VISITOR VALUES(708,'ROHAN
MALLYA',1977,'26-FEB-21','12:12','16:23');
INSERT INTO VISITOR VALUES(709,'SIDDHARTH
SINGH',1998,'27-FEB-21','10:32','11:06');
INSERT INTO VISITOR VALUES(710,'SWETHA
AGARWAL',1997,'15-MAR-21','19:43','21:07');
INSERT INTO VISITOR VALUES(711,'MAYANK
KHATRI',1974,'17-MAR-21','17:31','20:11');
```

```
INSERT INTO VISITOR VALUES(712,'PRIYANKA
AHUJA',1988,'02-APR-21','18:24','21:02');
INSERT INTO VISITOR VALUES(713,'VEENA
PATEL',1987,'07-APR-21','07:36','10:20');
INSERT INTO VISITOR VALUES(714,'BHARGAVI
REDDY',1980,'11-APR-21','14:41','18:05');
INSERT INTO VISITOR VALUES(715,'SOURAV
DHAWAN',1990,'20-APR-21','12:37','15:58');
```

	VISITOR_ID	VISITOR_NAME	STUD_ID	VISTING_DATE	TIME_IN	TIME_OUT
1	701	MOHIT KUMAR	1975	04-01-21	17:35	19:10
2	702	VIJAY RAJESH	1979	07-01-21	09:21	12:17
3	703	RAJASHREE SHARMA	1991	12-02-21	16:15	19:23
4	704	VINAY KOSHY	1983	13-02-21	08:19	10:54
5	705	MAHESH MEHTA	1985	16-02-21	17:33	19:04
6	706	ARJUN PRASAD	1989	21-02-21	15:43	19:02
7	707	LAVANYA RAJESH	1971	22-02-21	13:35	17:07
8	708	ROHAN MALLYA	1977	26-02-21	12:12	16:23
9	709	SIDDHARTH SINGH	1998	27-02-21	10:32	11:06
10	710	SWETHA AGARWAL	1997	15-03-21	19:43	21:07
11	711	MAYANK KHATRI	1974	17-03-21	17:31	20:11
12	712	PRIYANKA AHUJA	1988	02-04-21	18:24	21:02
13	713	VEENA PATEL	1987	07-04-21	07:36	10:20
14	714	BHARGAVI REDDY	1980	11-04-21	14:41	18:05
15	715	SOURAV DHAWAN	1990	20-04-21	12:37	15:58

9. Table STUDENT_LOG

```
CREATE TABLE STUDENT_LOG(
STUD_ID NUMBER,
DATE_OF_DEP DATE,
DATE_OF_ARR DATE,
PLACE VARCHAR2(30),
PURPOSE_OF_VISIT VARCHAR2(30),
PRIMARY KEY(STUD_ID, DATE_OF_DEP),
FOREIGN KEY (STUD_ID) REFERENCES STUDENT(STUD_ID)
);
```

```
INSERT INTO STUDENT_LOG VALUES(1970, '19-NOV-20', '29-NOV-20', 'CHENNAI',
'VACATION');
INSERT INTO STUDENT_LOG VALUES(1972, '20-NOV-20', '28-NOV-20', 'MUMBAI',
'VACATION');
INSERT INTO STUDENT_LOG VALUES(1973, '20-NOV-20', '28-NOV-20', 'KOCHI',
'VACATION');
INSERT INTO STUDENT_LOG VALUES(1984, '21-NOV-20', '29-NOV-20', 'PUNE',
'VACATION');
INSERT INTO STUDENT_LOG VALUES(1991, '21-NOV-20', '29-NOV-20', 'PUNE',
'VACATION');
INSERT INTO STUDENT_LOG VALUES(1986, '09-DEC-20', '12-DEC-20', 'DELHI',
'EMERGENCY');
INSERT INTO STUDENT_LOG VALUES(1975, '22-DEC-20', '30-DEC-20', 'CHENNAI',
'VACATION');
INSERT INTO STUDENT_LOG VALUES(1976, '22-DEC-20', '30-DEC-20',
'HYDERABAD', 'VACATION');
INSERT INTO STUDENT_LOG VALUES(1979, '22-DEC-20', '30-DEC-20', 'MUMBAI',
'VACATION');
INSERT INTO STUDENT_LOG VALUES(1981, '22-DEC-20', '30-DEC-20', 'DELHI',
'VACATION');
INSERT INTO STUDENT_LOG VALUES(1983, '06-JAN-21', '12-JAN-21', 'KOLKATA',
'EMERGENCY');
INSERT INTO STUDENT_LOG VALUES(1985, '09-JAN-21', '14-JAN-21', 'JAIPUR',
'EMERGENCY');
INSERT INTO STUDENT_LOG VALUES(1993, '12-JAN-21', '17-JAN-21', 'LUCKNOW',
'VACATION');
INSERT INTO STUDENT_LOG VALUES(1994, '12-JAN-21', '17-JAN-21', 'DELHI',
'VACATION');
INSERT INTO STUDENT_LOG VALUES(1995, '12-JAN-21', '17-JAN-21',
'AHMEDABAD', 'VACATION');
INSERT INTO STUDENT_LOG VALUES(1973, '22-JAN-21', '17-JAN-21', 'KOCHI',
'EMERGENCY');
```

INSERT INTO STUDENT_LOG VALUES(1981, '03-FEB-21', '17-JAN-21', 'DELHI', 'VACATION');
INSERT INTO STUDENT_LOG VALUES(1994, '14-FEB-21', '17-JAN-21', 'DELHI', 'VACATION');

	STUD_ID	DATE_OF_DEP	DATE_OF_ARR	PLACE	PURPOSE_OF_VISIT
1	1970	19-11-20	29-11-20	CHENNAI	VACATION
2	1972	20-11-20	28-11-20	MUMBAI	VACATION
3	1973	20-11-20	28-11-20	KOCHI	VACATION
4	1984	21-11-20	29-11-20	PUNE	VACATION
5	1991	21-11-20	29-11-20	PUNE	VACATION
6	1986	09-12-20	12-12-20	DELHI	EMERGENCY
7	1975	22-12-20	30-12-20	CHENNAI	VACATION
8	1976	22-12-20	30-12-20	HYDERABAD	VACATION
9	1979	22-12-20	30-12-20	MUMBAI	VACATION
10	1981	22-12-20	30-12-20	DELHI	VACATION
11	1983	06-01-21	12-01-21	KOLKATA	EMERGENCY
12	1985	09-01-21	14-01-21	JAIPUR	EMERGENCY
13	1993	12-01-21	17-01-21	LUCKNOW	VACATION
14	1994	12-01-21	17-01-21	DELHI	VACATION
15	1995	12-01-21	17-01-21	AHMEDABAD	VACATION
16	1973	22-01-21	17-01-21	KOCHI	EMERGENCY
17	1981	03-02-21	17-01-21	DELHI	VACATION
18	1994	14-02-21	17-01-21	DELHI	VACATION

Normalisation:

1. Table MESS

Functional Dependencies:

MESS_NO → MESS_NAME, BREAKFAST, LUNCH, DINNER, FEES
MESS_NAME → MESS_NO, BREAKFAST, LUNCH, DINNER, FEES

Closure of MESS_NO:

MESS_NO$^+$ = {MESS_NO, MESS_NAME, BREAKFAST, LUNCH, DINNER, FEES}

Closure of MESS_NAME:

MESS_NAME$^+$ = {MESS_NAME, MESS_NO, BREAKFAST, LUNCH, DINNER, FEES}

Candidate Keys: MESS_NO, MESS_NAME
Primary Key: MESS_NO

The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (MESS_NO, MESS_NAME) for the relation.

2. Table HOSTEL

Functional Dependencies:

HOSTEL_ID → HOSTEL_NAME, FLOORS, NO_OF_ROOMS, MESS_NO
HOSTEL_NAME → HOSTEL_ID, FLOORS, NO_OF_ROOMS, MESS_NO

Closure of HOSTEL_ID:

HOSTEL_ID$^+$ = {HOSTEL_ID, HOSTEL_NAME, FLOORS, NO_OF_ROOMS, MESS_NO}

Closure of HOSTEL_NAME:

HOSTEL_NAME$^+$ = {HOSTEL_NAME, HOSTEL_ID, FLOORS, NO_OF_ROOMS, MESS_NO}

Candidate Keys: HOSTEL_ID, HOSTEL_NAME
Primary Key: HOSTEL_ID

The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (HOSTEL_ID, HOSTEL_NAME) for the relation.

3. Table ROOM

Functional Dependencies:

ROOM_NO → OCCUPANCY, AVAIL, HOSTEL_ID

Closure of ROOM_NO:

ROOM_NO$^+$ = {ROOM_NO, OCCUPANCY, AVAIL, HOSTEL_ID}

Candidate Keys: ROOM_NO
Primary Key: ROOM_NO
The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (ROOM_NO) for the relation.

4. Table ADMIN

Functional Dependencies:

FACULTY_ID → FAC_NAME, CONTACT_NO, HOSTEL_ID
FAC_NAME → FACULTY_ID, CONTACT_NO, HOSTEL_ID

Closure of FACULTY_ID:

FACULTY_ID$^+$ = {FACULTY_ID, FAC_NAME, CONTACT_NO, HOSTEL_ID}

Closure of FAC_NAME:

FAC_NAME$^+$ = {FAC_NAME, FACULTY_ID, CONTACT_NO, HOSTEL_ID}

Candidate Keys: FACULTY_ID, FAC_NAME
Primary Key: FACULTY_ID

The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (FACULTY_ID, FAC_NAME) for the relation.

5. Table ENQUIRY

Functional Dependencies:

COMPLAINT_NO → HOSTEL_ID, FACULTY_ID, E_DATE, STATUS

Closure of COMPLAINT_NO:

COMPLAINT_NO$^+$ = {COMPLAINT_NO, HOSTEL_ID, FACULTY_ID, E_DATE, STATUS}

Candidate Keys: COMPLAINT_NO
Primary Key: COMPLAINT_NO
The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (COMPLAINT_NO) for the relation.

6. Table STUDENT

Functional Dependencies:

STUD_ID → NAME, YEAR_OF_STUDY, CONTACT, EMAIL, ROOM_NO, ADDRESS, HOSTEL_ID
ROOM_NO → HOSTEL_ID

Closure of STUD_ID:

STUD_ID$^+$ = {STUD_ID, NAME, YEAR_OF_STUDY, CONTACT, EMAIL, ROOM_NO, ADDRESS, HOSTEL_ID}

Closure of ROOM_NO:

ROOM_NO^{+} = {ROOM_NO, HOSTEL_ID}

Candidate Keys: STUD_ID
Primary Key: STUD_ID

The given relation is not in BCNF because the LHS of the functional dependency ROOM_NO → HOSTEL_ID i.e ROOM_NO, is not a super key.

The given relation is not in 3NF because a transitive functional dependency exists. In the functional dependency ROOM_NO → HOSTEL_ID, both the LHS and RHS are non - prime attributes and therefore the relation is not in 3NF.

The given relation is in 2NF because there are no partial dependencies, i.e. the proper subset of any candidate key doesn't determine a non prime attribute.

To convert the given relation to a higher normal form, we decompose it into the following relations STUDENT and ACCOMMODATION:

- **Table STUDENT**

```
CREATE TABLE STUDENT (
STUD_ID NUMBER PRIMARY KEY,
NAME VARCHAR2(30),
YEAR_OF_STUDY NUMBER,
CONTACT NUMBER,
EMAIL VARCHAR2(50),
ROOM_NO NUMBER,
ADDRESS VARCHAR2(30),
FOREIGN KEY(ROOM_NO) REFERENCES ROOM(ROOM_NO)
);

INSERT INTO STUDENT VALUES(1970,'LAKSHA', 2,
9827234567,'1970laksha@student.nitw.ac.in', 101, 'CHENNAI');
```

```
INSERT INTO STUDENT VALUES(1971,'GAYATHRI',
2,9787894567,'1971gayathri@student.nitw.ac.in', 101, 'CHENNAI');
INSERT INTO STUDENT VALUES(1972,'KAJAL', 2,
9820934267,'1972kajal@student.nitw.ac.in', 101, 'MUMBAI');
INSERT INTO STUDENT VALUES(1973,'ANIKET', 3,
9827000987,'1973aniket@student.nitw.ac.in', 102, 'KOCHI');
INSERT INTO STUDENT VALUES(1974,'RAJESH', 3,
9927234567,'1974rajesh@student.nitw.ac.in', 102, 'BANGALORE');
INSERT INTO STUDENT VALUES(1975,'ROHAN', 3,
9827234567,'1975rohan@student.nitw.ac.in', 102, 'CHENNAI');
INSERT INTO STUDENT VALUES(1976,'OMAR', 3,
8834934267,'1976omar@student.nitw.ac.in', 201, 'HYDERABAD');
INSERT INTO STUDENT VALUES(1977,'AASHNA', 2,
9820002167,'1977aashna@student.nitw.ac.in', 302, 'DELHI');
INSERT INTO STUDENT VALUES(1978,'ABHISHEK', 3,
9880934208,'1978abhishek@student.nitw.ac.in', 401, 'KOLKATA');
INSERT INTO STUDENT VALUES(1979,'KARTIK', 3,
9767834267,'1979kartik@student.nitw.ac.in', 401, 'MUMBAI');
INSERT INTO STUDENT VALUES(1980,'VENKAT', 2,
9841278327,'1980venkat@student.nitw.ac.in', 405, 'HYDERABAD');
INSERT INTO STUDENT VALUES(1981,'RIDDHI', 2,
7312343902,'1981riddhi@student.nitw.ac.in', 405, 'DELHI');
INSERT INTO STUDENT VALUES(1982,'KHUSHI', 3,
9735168313,'1982khushi@student.nitw.ac.in', 601, 'BIHAR');
INSERT INTO STUDENT VALUES(1983,'VINAY', 3,
81246706421,'1983vinay@student.nitw.ac.in', 602, 'KOLKATA');
INSERT INTO STUDENT VALUES(1984,'ANSILA', 2,
9849514939,'1984ansila@student.nitw.ac.in', 701, 'PUNE');
INSERT INTO STUDENT VALUES(1985,'PRANITHA', 2,
9917351846,'1985pranitha@student.nitw.ac.in', 701, 'JAIPUR');
INSERT INTO STUDENT VALUES(1986,'SUMAN', 2,
7761945190,'1986suman@student.nitw.ac.in', 701, 'DELHI');
```

```
INSERT INTO STUDENT VALUES(1987,'VARUN', 4,
8414561804,'1987varun@student.nitw.ac.in', 703, 'MUMBAI');
INSERT INTO STUDENT VALUES(1988,'SHARATH', 4,
8073158532,'1988sharath@student.nitw.ac.in', 703, 'BHOPAL');
INSERT INTO STUDENT VALUES(1989,'MOHAN', 4,
9974159084,'1989mohan@student.nitw.ac.in', 703, 'KOCHI');
INSERT INTO STUDENT VALUES(1990,'AYUSH', 3,
9743243817,'1990ayush@student.nitw.ac.in', 201, 'CHENNAI');
INSERT INTO STUDENT VALUES(1991,'DEVDUTT', 3,
9545234576,'1991devdutt@student.nitw.ac.in', 801, 'PUNE');
INSERT INTO STUDENT VALUES(1992,'VIRAT', 2,
9634275665,'1992virat@student.nitw.ac.in', 801, 'KOLKATA');
INSERT INTO STUDENT VALUES(1993,'SHAHBAZ', 2,
9403335435,'1993shahbaz@student.nitw.ac.in', 801, 'LUCKNOW');
INSERT INTO STUDENT VALUES(1994,'HARSHAL', 3,
9403232123,'1994harshal@student.nitw.ac.in', 802, 'DELHI');
INSERT INTO STUDENT VALUES(1995,'ANANYA', 3,
9827213532,'1995ananya@student.nitw.ac.in', 802, 'AHMEDABAD');
INSERT INTO STUDENT VALUES(1996,'GLEN', 3,
9814326543,'1996glen@student.nitw.ac.in', 802, 'CALICUT');
INSERT INTO STUDENT VALUES(1997,'RAVINDRA', 4,
9321147837,'1997ravindra@student.nitw.ac.in', 901, 'VIZAG');
INSERT INTO STUDENT VALUES(1998,'PRIYA', 2,
9232991017,'1998priya@student.nitw.ac.in', 1002, 'DARJEELING');
INSERT INTO STUDENT VALUES(1999,'PRIYANKA', 2,
9328881201,'1999priyanka@student.nitw.ac.in', 1002, 'SRINAGAR');
```

	STUD_ID	NAME	YEAR_OF_STUDY	CONTACT	EMAIL	ROOM_NO	ADDRESS
1	1970	LAKSHA	2	9827234567	1970laksha@student.nitw.ac.in	101	CHENNAI
2	1971	GAYATHRI	2	9787894567	1971gayathri@student.nitw.ac.in	101	CHENNAI
3	1972	KAJAL	2	9820934267	1972kajal@student.nitw.ac.in	101	MUMBAI
4	1973	ANIKET	3	9827000987	1973aniket@student.nitw.ac.in	102	KOCHI
5	1974	RAJESH	3	9927234567	1974rajesh@student.nitw.ac.in	102	BANGALORE
6	1975	ROHAN	3	9827234567	1975rohan@student.nitw.ac.in	102	CHENNAI
7	1976	OMAR	3	8834934267	1976omar@student.nitw.ac.in	201	HYDERABAD
8	1977	AASHNA	2	9820002167	1977aashna@student.nitw.ac.in	302	DELHI
9	1978	ABHISHEK	3	9880934208	1978abhishek@student.nitw.ac.in	401	KOLKATA
10	1979	KARTIK	3	9767834267	1979kartik@student.nitw.ac.in	401	MUMBAI
11	1980	VENKAT	2	9841278327	1980venkat@student.nitw.ac.in	405	HYDERABAD
12	1981	RIDDHI	2	7312343902	1981riddhi@student.nitw.ac.in	405	DELHI
13	1982	KHUSHI	3	9735168313	1982khushi@student.nitw.ac.in	601	BIHAR
14	1983	VINAY	3	81246706421	1983vinay@student.nitw.ac.in	602	KOLKATA
15	1984	ANSILA	2	9849514939	1984ansila@student.nitw.ac.in	701	PUNE
16	1985	PRANITHA	2	9917351846	1985pranitha@student.nitw.ac.in	701	JAIPUR
17	1986	SUMAN	2	7761945190	1986suman@student.nitw.ac.in	701	DELHI
18	1987	VARUN	4	8414561804	1987varun@student.nitw.ac.in	703	MUMBAI
19	1988	SHARATH	4	8073158532	1988sharath@student.nitw.ac.in	703	BHOPAL
20	1989	MOHAN	4	9974159084	1989mohan@student.nitw.ac.in	703	KOCHI
21	1990	AYUSH	3	9743243817	1990ayush@student.nitw.ac.in	201	CHENNAI
22	1991	DEVDUTT	3	9545234576	1991devdutt@student.nitw.ac.in	801	PUNE
23	1992	VIRAT	2	9634275665	1992virat@student.nitw.ac.in	801	KOLKATA
24	1993	SHAHBAZ	2	9403335435	1993shahbaz@student.nitw.ac.in	801	LUCKNOW
25	1994	HARSHAL	3	9403232123	1994harshal@student.nitw.ac.in	802	DELHI
26	1995	ANANYA	3	9827213532	1995ananya@student.nitw.ac.in	802	AHMEDABAD
27	1996	GLEN	3	9814326543	1996glen@student.nitw.ac.in	802	CALICUT
28	1997	RAVINDRA	4	9321147837	1997ravindra@student.nitw.ac.in	901	VIZAG
29	1998	PRIYA	2	9232991017	1998priya@student.nitw.ac.in	1002	DARJEELING
30	1999	PRIYANKA	2	9328881201	1999priyanka@student.nitw.ac.in	1002	SRINAGAR

Functional Dependencies:

STUD_ID → NAME, YEAR_OF_STUDY, CONTACT, EMAIL, ROOM_NO, ADDRESS

Candidate Keys: STUD_ID

Primary Key: STUD_ID

The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (STUD_ID) for the relation.

- **Table ACCOMMODATION**

```
CREATE TABLE ACCOMMODATION (
ROOM_NO NUMBER PRIMARY KEY,
HOSTEL_ID NUMBER,
FOREIGN KEY(ROOM_NO) REFERENCES ROOM(ROOM_NO),
FOREIGN KEY(HOSTEL_ID) REFERENCES HOSTEL(HOSTEL_ID)
);

INSERT INTO ACCOMMODATION VALUES (101,101);
INSERT INTO ACCOMMODATION VALUES (102,101);
INSERT INTO ACCOMMODATION VALUES (201,102);
INSERT INTO ACCOMMODATION VALUES (302,103);
INSERT INTO ACCOMMODATION VALUES (401,104);
INSERT INTO ACCOMMODATION VALUES (405,104);
INSERT INTO ACCOMMODATION VALUES (601,106);
INSERT INTO ACCOMMODATION VALUES (602,106);
INSERT INTO ACCOMMODATION VALUES (701,107);
INSERT INTO ACCOMMODATION VALUES (703,107);
INSERT INTO ACCOMMODATION VALUES (801,108);
INSERT INTO ACCOMMODATION VALUES (802,108);
INSERT INTO ACCOMMODATION VALUES (901,109);
INSERT INTO ACCOMMODATION VALUES (1002,110);
```

	ROOM_NO	HOSTEL_ID
1	101	101
2	102	101
3	201	102
4	302	103
5	401	104
6	405	104
7	601	106
8	602	106
9	701	107
10	703	107
11	801	108
12	802	108
13	901	109
14	1002	110

Functional Dependencies:
ROOM_NO → HOSTEL_ID

Candidate Keys: ROOM_NO
Primary Key: ROOM_NO

The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (ROOM_NO) for the relation.

To ensure that the functional dependencies are preserved, let
F1: STUD_ID → NAME, YEAR_OF_STUDY, CONTACT, EMAIL, ROOM_NO, ADDRESS
F2: ROOM_NO → HOSTEL_ID

F1 U F2 = {STUD_ID → NAME, YEAR_OF_STUDY, CONTACT, EMAIL, ROOM_NO, ADDRESS, ROOM_NO → HOSTEL_ID}

Now we find the closures of STUD_ID and ROOM_NO from F1 U F2,
$STUD\_ID^{+}$ = {STUD_ID, NAME, YEAR_OF_STUDY, CONTACT, EMAIL, ROOM_NO, ADDRESS, HOSTEL_ID}
$ROOM\_NO^{+}$ = {ROOM_NO, HOSTEL_ID}
As the closures are the same, the *dependencies are preserved*.
For lossless decomposition; R1 ∩ R2 → R1 (or) R1 ∩ R2 → R2
Here, STUDENT ∩ ACCOMMODATION = ROOM_NO
ROOM_NO → HOSTEL_ID in ACCOMMODATION
i.e, STUDENT ∩ ACCOMMODATION → ACCOMMODATION

Hence this *decomposition is lossless*.

7. Table PAYMENT

Functional Dependencies:

TRANS_ID → MODE_OF_PAYMENT, HOSTEL_ID, STUD_ID
STUD_ID → HOSTEL_ID

Closure of TRANS_ID:

$TRANS\_ID^+$ = {TRANS_ID, MODE_OF_PAYMENT, HOSTEL_ID, STUD_ID}

Closure of STUD_ID:

$STUD\_ID^+$ = {STUD_ID, HOSTEL_ID}

Candidate Keys: TRANS_ID
Primary Key: TRANS_ID

The given relation is not in BCNF because the LHS of the functional dependency STUD_ID → HOSTEL_ID i.e STUD_ID, is not a super key.

The given relation is not in 3NF because a transitive functional dependency exists. In the functional dependency STUD_ID → HOSTEL_ID, both the LHS and RHS are non - prime attributes and therefore the relation is not in 3NF.

The given relation is in 2NF because there are no partial dependencies, i.e. the proper subset of any candidate key doesn't determine a non prime attribute.

To convert the given relation to a higher normal form, we decompose it into the following relations PAYMENT and RESIDENCE:

- **Table PAYMENT**

```
CREATE TABLE PAYMENT (
TRANS_ID NUMBER PRIMARY KEY,
MODE_OF_PAYMENT VARCHAR2(20),
STUD_ID NUMBER,
FOREIGN KEY (STUD_ID) REFERENCES STUDENT (STUD_ID)
);

INSERT INTO PAYMENT VALUES (1789675, 'NEFT', 1970);
INSERT INTO PAYMENT VALUES (1781491, 'UPI', 1971);
INSERT INTO PAYMENT VALUES (1789416, 'CASH', 1972);
INSERT INTO PAYMENT VALUES (1791357, 'RTGS', 1973);
```

```
INSERT INTO PAYMENT VALUES (1784910, 'DEBIT CARD', 1974);
INSERT INTO PAYMENT VALUES (1700532, 'PAYTM WALLET', 1975);
INSERT INTO PAYMENT VALUES (1711508, 'UPI', 1976);
INSERT INTO PAYMENT VALUES (1724097, 'NEFT', 1977);
INSERT INTO PAYMENT VALUES (1787646, 'NEFT', 1978);
INSERT INTO PAYMENT VALUES (1754769, 'CREDIT CARD', 1979);
INSERT INTO PAYMENT VALUES (1712345, 'NEFT', 1980);
INSERT INTO PAYMENT VALUES (1798765, 'UPI',  1981);
INSERT INTO PAYMENT VALUES (1774643, 'PAYTM WALLET', 1982);
INSERT INTO PAYMENT VALUES (1723878, 'RTGS',  1983);
INSERT INTO PAYMENT VALUES (1783123, 'NEFT', 1984);
INSERT INTO PAYMENT VALUES (1703232, 'NEFT', 1985);
INSERT INTO PAYMENT VALUES (1785322, 'UPI', 1986);
INSERT INTO PAYMENT VALUES (1776362, 'RTGS', 1987);
INSERT INTO PAYMENT VALUES (1708998, 'NEFT', 1988);
INSERT INTO PAYMENT VALUES (1712324, 'DEBIT CARD', 1989);
INSERT INTO PAYMENT VALUES (1787612, 'CREDIT CARD', 1990);
INSERT INTO PAYMENT VALUES (1778451, 'CASH', 1991);
INSERT INTO PAYMENT VALUES (1709543, 'RTGS', 1992);
INSERT INTO PAYMENT VALUES (1712589, 'UPI', 1993);
INSERT INTO PAYMENT VALUES (1721569, 'NEFT', 1994);
INSERT INTO PAYMENT VALUES (1705121, 'NEFT', 1995);
INSERT INTO PAYMENT VALUES (1711451, 'DEBIT CARD', 1996);
INSERT INTO PAYMENT VALUES (1724078, 'CASH', 1997);
INSERT INTO PAYMENT VALUES (1782324, 'NEFT', 1998);
INSERT INTO PAYMENT VALUES (1721397, 'RTGS', 1999);
INSERT INTO PAYMENT VALUES (1739862, 'RTGS', 1984);
INSERT INTO PAYMENT VALUES (1723687, 'NEFT', 1972);
INSERT INTO PAYMENT VALUES (1974102, 'RTGS', 1997);
INSERT INTO PAYMENT VALUES (1701479, 'CASH', 1978);
INSERT INTO PAYMENT VALUES (1895420, 'DEBIT CARD', 1990);
```

	TRANS_ID	MODE_OF_PAYMENT	STUD_ID
1	1789675	NEFT	1970
2	1781491	UPI	1971
3	1789416	CASH	1972
4	1791357	RTGS	1973
5	1784910	DEBIT CARD	1974
6	1700532	PAYTM WALLET	1975
7	1711508	UPI	1976
8	1724097	NEFT	1977
9	1787646	NEFT	1978
10	1754769	CREDIT CARD	1979
11	1712345	NEFT	1980
12	1798765	UPI	1981
13	1774643	PAYTM WALLET	1982
14	1723878	RTGS	1983
15	1783123	NEFT	1984
16	1703232	NEFT	1985
17	1785322	UPI	1986
18	1776362	RTGS	1987
19	1708998	NEFT	1988
20	1712324	DEBIT CARD	1989
21	1787612	CREDIT CARD	1990
22	1778451	CASH	1991
23	1709543	RTGS	1992
24	1712589	UPI	1993
25	1721569	NEFT	1994
26	1705121	NEFT	1995
27	1711451	DEBIT CARD	1996
28	1724078	CASH	1997
29	1782324	NEFT	1998
30	1721397	RTGS	1999
31	1739862	RTGS	1984
32	1723687	NEFT	1972
33	1974102	RTGS	1997
34	1701479	CASH	1978
35	1895420	DEBIT CARD	1990

Functional Dependencies:

TRANS_ID → MODE_OF_PAYMENT, STUD_ID

Candidate Keys: TRANS_ID

Primary Key: TRANS_ID

The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (TRANS_ID) for the relation.

- **Table RESIDENCE**

```
CREATE TABLE RESIDENCE (
STUD_ID NUMBER PRIMARY KEY,
HOSTEL_ID NUMBER,
FOREIGN KEY (HOSTEL_ID) REFERENCES HOSTEL(HOSTEL_ID),
FOREIGN KEY (STUD_ID) REFERENCES STUDENT (STUD_ID)
);

INSERT INTO RESIDENCE VALUES (1970, 101);
INSERT INTO RESIDENCE VALUES (1971, 101);
INSERT INTO RESIDENCE VALUES (1972, 101);
INSERT INTO RESIDENCE VALUES (1973, 101);
INSERT INTO RESIDENCE VALUES (1974, 101);
INSERT INTO RESIDENCE VALUES (1975, 101);
INSERT INTO RESIDENCE VALUES (1976, 102);
INSERT INTO RESIDENCE VALUES (1977, 103);
INSERT INTO RESIDENCE VALUES (1978, 104);
INSERT INTO RESIDENCE VALUES (1979, 104);
INSERT INTO RESIDENCE VALUES (1980, 104);
INSERT INTO RESIDENCE VALUES (1981, 104);
INSERT INTO RESIDENCE VALUES (1982, 106);
INSERT INTO RESIDENCE VALUES (1983, 106);
INSERT INTO RESIDENCE VALUES (1984, 107);
INSERT INTO RESIDENCE VALUES (1985, 107);
INSERT INTO RESIDENCE VALUES (1986, 107);
INSERT INTO RESIDENCE VALUES (1987, 107);
INSERT INTO RESIDENCE VALUES (1988, 107);
INSERT INTO RESIDENCE VALUES (1989, 107);
INSERT INTO RESIDENCE VALUES (1990, 102);
INSERT INTO RESIDENCE VALUES (1991, 108);
INSERT INTO RESIDENCE VALUES (1992, 108);
INSERT INTO RESIDENCE VALUES (1993, 108);
INSERT INTO RESIDENCE VALUES (1994, 108);
```

```
INSERT INTO RESIDENCE VALUES (1995, 108);
INSERT INTO RESIDENCE VALUES (1996, 108);
INSERT INTO RESIDENCE VALUES (1997, 109);
INSERT INTO RESIDENCE VALUES (1998, 110);
INSERT INTO RESIDENCE VALUES (1999, 110);
```

	STUD_ID	HOSTEL_ID
1	1970	101
2	1971	101
3	1972	101
4	1973	101
5	1974	101
6	1975	101
7	1976	102
8	1977	103
9	1978	104
10	1979	104
11	1980	104
12	1981	104
13	1982	106
14	1983	106
15	1984	107
16	1985	107
17	1986	107
18	1987	107
19	1988	107
20	1989	107
21	1990	102
22	1991	108
23	1992	108
24	1993	108
25	1994	108
26	1995	108
27	1996	108
28	1997	109
29	1998	110
30	1999	110

Functional Dependencies:

STUD_ID → HOSTEL_ID

Candidate Keys: STUD_ID

Primary Key: STUD_ID

The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (STUD_ID) for the relation.

To ensure that the functional dependencies are preserved, let
F1: TRANS_ID → MODE_OF_PAYMENT, STUD_ID
F2: STUD_ID → HOSTEL_ID

F1 U F2 = {TRANS_ID → MODE_OF_PAYMENT, STUD_ID, STUD_ID → HOSTEL_ID}

Now we find the closures of TRANS_ID and STUD_ID from F1 U F2,
$TRANS\_ID^+$ = {TRANS_ID, MODE_OF_PAYMENT, STUD_ID, HOSTEL_ID}
$STUD\_ID^+$ = {STUD_ID, HOSTEL_ID}
As the closures are the same, the *dependencies are preserved*.

For lossless decomposition; R1 ∩ R2 → R1 (or) R1 ∩ R2 → R2
Here, PAYMENT ∩ RESIDENCE = STUD_ID
STUD_ID → HOSTEL_ID in RESIDENCE
i.e, PAYMENT ∩ RESIDENCE → RESIDENCE

Hence this *decomposition is lossless*.

8. Table VISITOR

Functional Dependencies:

VISITOR_ID → VISITOR_NAME, STUD_ID, VISITING_DATE, TIME_IN, TIME_OUT
VISITOR_NAME → VISITOR_ID, STUD_ID, VISITING_DATE, TIME_IN, TIME_OUT

Closure of VISITOR_ID:
$VISITOR\_ID^+$ = {VISITOR_ID, VISITOR_NAME, STUD_ID, VISITING_DATE, TIME_IN, TIME_OUT}
Closure of VISITOR_NAME:
$VISITOR\_NAME^+$ = {VISITOR_NAME, VISITOR_ID, STUD_ID, VISITING_DATE, TIME_IN, TIME_OUT}

Candidate Keys: VISITOR_ID, VISITOR_NAME

Primary Key: VISITOR_ID

The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (VISITOR_ID, VISITOR_NAME) for the relation.

9. Table STUDENT_LOG

Functional Dependencies:

STUD_ID, DATE_OF_DEP → DATE_OF_ARR, PLACE, PURPOSE_OF_VISIT

Closure of (STUD_ID, DATE_OF_DEP):

(STUD_ID, DATE_OF_DEP) $^{+}$ = {STUD_ID, DATE_OF_DEP, DATE_OF_ARR, PLACE, PURPOSE_OF_VISIT}

Candidate Keys: {STUD_ID, DATE_OF_DEP}
Primary Key: {STUD_ID, DATE_OF_DEP}

The given relation is in it's highest normal form i.e, BCNF, since the LHS of all the functional dependencies are superkeys (STUD_ID, DATE_OF_DEP) for the relation.

Relational Schema with Normalised Tables