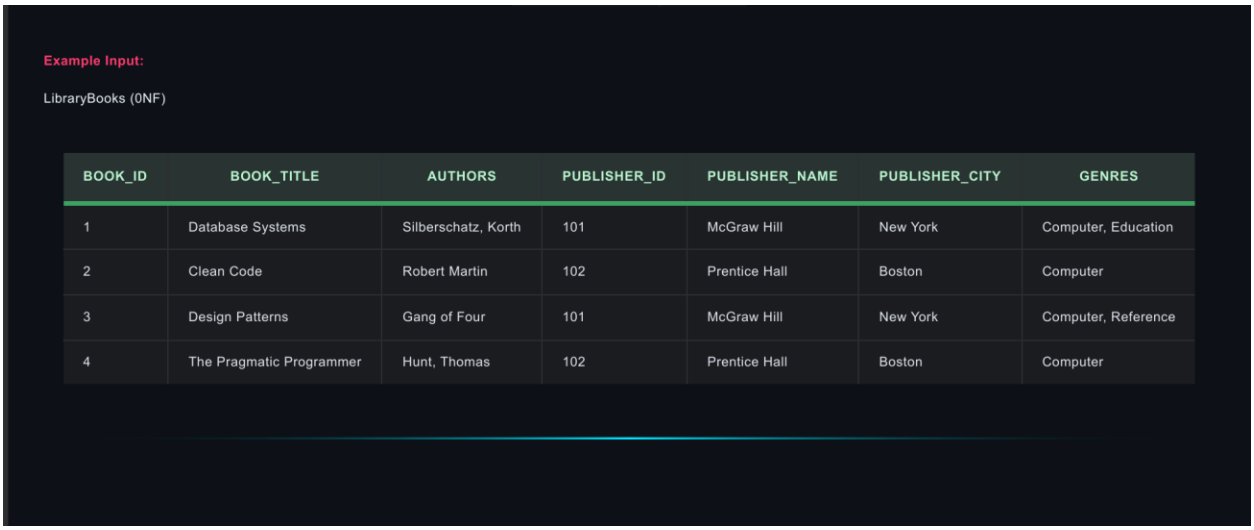
Problem 8



Example Input:

LibraryBooks (0NF)

BOOK_ID	BOOK_TITLE	AUTHORS	PUBLISHER_ID	PUBLISHER_NAME	PUBLISHER_CITY	GENRES
1	Database Systems	Silberschatz, Korth	101	McGraw Hill	New York	Computer, Education
2	Clean Code	Robert Martin	102	Prentice Hall	Boston	Computer
3	Design Patterns	Gang of Four	101	McGraw Hill	New York	Computer, Reference
4	The Pragmatic Programmer	Hunt, Thomas	102	Prentice Hall	Boston	Computer

PUBLISHER_ID , PUBLISHER_NAME , PUBLISHER_CITY → Repeating Groups

AUTHORS , GENRES → Multivalued attributes

1NF 2NF 3NF

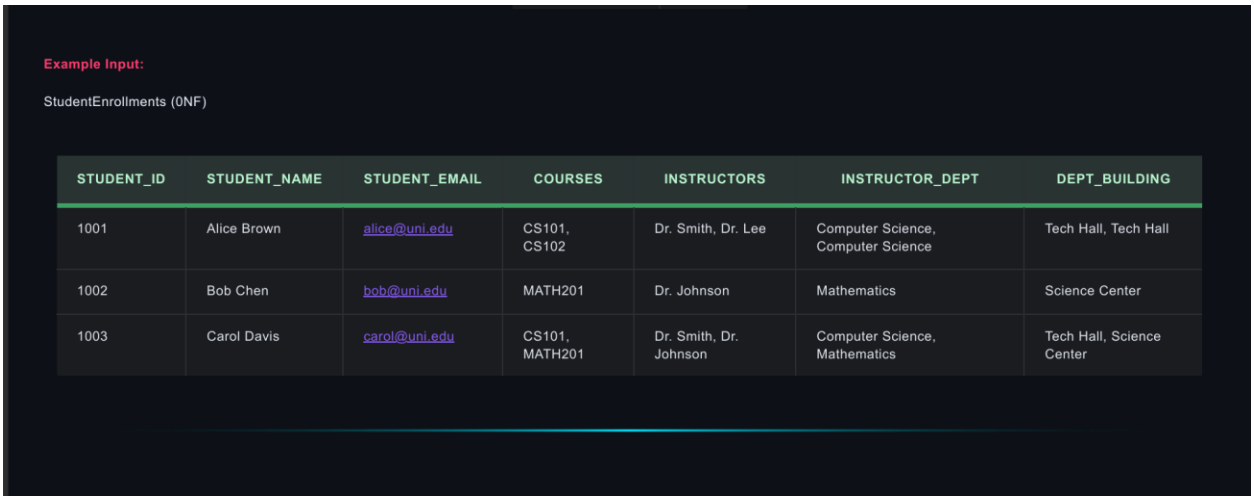
BOOK_ID	BOOK_TITLE	PUBLISHER_ID
1	Database Systems	101
2	Clean Code	102
3	Design Patterns	101
4	The Pragmatic Programmer	102

BOOK_ID	AUTHORS
1	Silberschatz
1	Korth
2	Robert Martin
3	Gang of Four
4	Hunt
4	Thomas

PUBLISHER_ID	PUBLISHER_NAME	PUBLISHER_CITY
101	McGraw Hill	New York
102	Prentice Hall	Boston

BOOK_ID	GENRES
1	Computer
1	Education
2	Computer
3	Computer
3	Reference
4	Computer

Problem 9



Example Input:

StudentEnrollments (0NF)

STUDENT_ID	STUDENT_NAME	STUDENT_EMAIL	COURSES	INSTRUCTORS	INSTRUCTOR_DEPT	DEPT_BUILDING
1001	Alice Brown	alice@uni.edu	CS101, CS102	Dr. Smith, Dr. Lee	Computer Science, Computer Science	Tech Hall, Tech Hall
1002	Bob Chen	bob@uni.edu	MATH201	Dr. Johnson	Mathematics	Science Center
1003	Carol Davis	carol@uni.edu	CS101, MATH201	Dr. Smith, Dr. Johnson	Computer Science, Mathematics	Tech Hall, Science Center

INSTRUCTORS , INSTRUCTOR_DEPT , DEPT_BUILDING → Repeating Groups

COURSES → Multivalued attributes

1NF 2NF

STUDENT_ID	STUDENT_NAME	STUDENT_EMAIL
1001	Alice Brown	carol@uni.edu
1002	Bob Chen	bob@uni.edu
1003	Carol Davis	carol@uni.edu

STUDENT_ID	COURSES
1001	CS101
1001	CS102
1002	MATH201
1003	CS101
1003	MATH201

COURSES	INSTRUCTORS	INSTRUCTOR_DEPT	DEPT_BUILDING
CS101	Dr. Smith	Computer Science	Tech Hall
CS102	Dr. Lee	Computer Science	Tech Hall
MATH201	Dr. Johnson	Mathematics	Science Center

INSTRUCTORS → INSTRUCTOR_DEPT … TFD

INSTRUCTOR_DEPT → DEPT_BUILDING … TFD

3NF

STUDENT_ID	STUDENT_NAME	STUDENT_EMAIL
1001	Alice Brown	carol@uni.edu
1002	Bob Chen	bob@uni.edu
1003	Carol Davis	carol@uni.edu

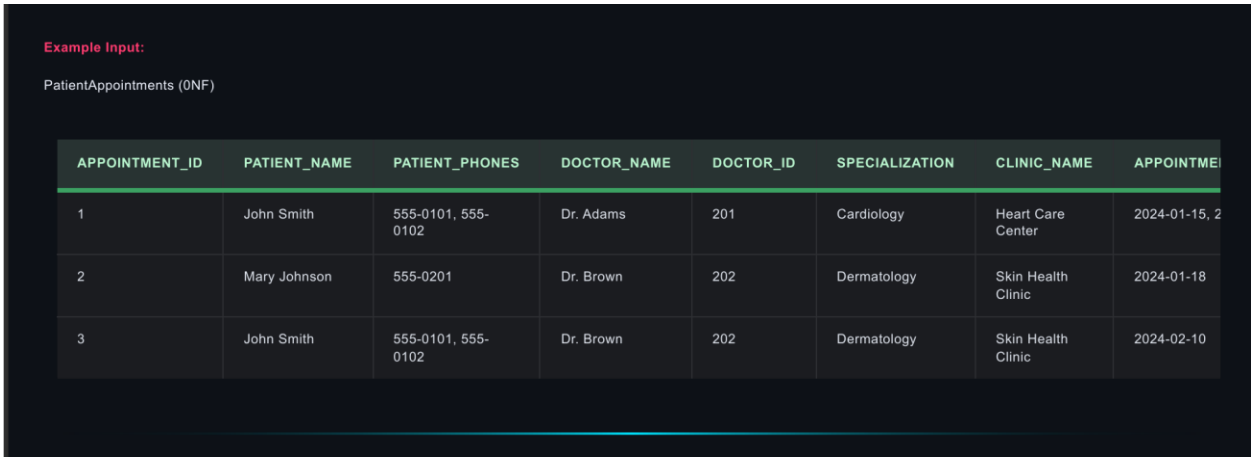
STUDENT_ID	COURSES
1001	CS101
1001	CS102
1002	MATH201
1003	CS101
1003	MATH201

COURSES	INSTRUCTORS
CS101	Dr. Smith
CS102	Dr. Lee
MATH201	Dr. Johnson

INSTRUCTORS	INSTRUCTOR_DEPT
Dr. Smith	Computer Science
Dr. Lee	Computer Science
Dr. Johnson	Mathematics

INSTRUCTOR_DEPT	DEPT_BUILDING
Computer Science	Tech Hall
Computer Science	Tech Hall
Mathematics	Science Center

Problem 10



Example Input:

PatientAppointments (0NF)

APPOINTMENT_ID	PATIENT_NAME	PATIENT_PHONES	DOCTOR_NAME	DOCTOR_ID	SPECIALIZATION	CLINIC_NAME	APPOINTME
1	John Smith	555-0101, 555-0102	Dr. Adams	201	Cardiology	Heart Care Center	2024-01-15, 2
2	Mary Johnson	555-0201	Dr. Brown	202	Dermatology	Skin Health Clinic	2024-01-18
3	John Smith	555-0101, 555-0102	Dr. Brown	202	Dermatology	Skin Health Clinic	2024-02-10

PATIENT_PHONES → Multivalued attributes

1NF

PATIENT_NAME	PATIENT_PHONES
John Smith	555-0101
John Smith	555 0102
Mary Johnson	555-0201

APPOINTMENT_ID	PATIENT_ NAME	DOCTOR_ NAME	DOCTOR_ID	SPECIALIZATION	CLINIC_NAME	appointment_ date
1	John Smith	Dr. Adams	201	Cardiology	Heart Care Center	2024-01-15
2	John Smith	Dr. Brown	202	Dermatology	Skin Health Clinic	2024-01-18
3	Mary Johnson	Dr. Brown	202	Dermatology	Skin Health Clinic	2024-02-10

DOCTOR_ID → DOCTOR_NAME, SPECIALIZATION, CLINIC_NAME … PFD

2NF 3NF

PATIENT_NAME	PATIENT_PHONES
John Smith	555-0101
John Smith	555 0102
Mary Johnson	555-0201

DOCTOR_ID	DOCTOR_ NAME	SPECIALIZATION	CLINIC_NAME
201	Dr. Adams	Cardiology	Heart Care Center
202	Dr. Brown	Dermatology	Skin Health Clinic

APPOINTMENT_ID	PATIENT_NAME	DOCTOR_ID	APPOINTMENT_DATE
1	John Smith	201	2024-01-15
2	John Smith	202	2024-01-18
3	Mary Johnson	202	2024-02-10