Codd's Rules

Codd's Rules #1

Information rule: All information in the relational database is represented in exactly one and only one way – by values/stored data in cells of tables.

Example from project:

CREATE TABLE SPECIALIST (

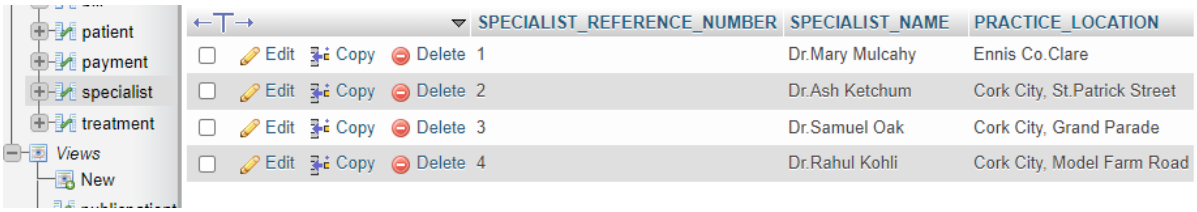
SPECIALIST_REFERENCE_NUMBER INT(11) NOT NULL,

SPECIALIST_NAME CHAR(50) NOT NULL,

PRACTICE_LOCATION CHAR(50) NOT NULL,

PRIMARY KEY (SPECIALIST_REFERENCE_NUMBER));

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	SPECIALIST_REFERENCE_NUMBER	int(11)			No	*None*			Change Drop More
2	SPECIALIST_NAME	char(50)	utf8mb4_general_ci		No	*None*			Change Drop More
3	PRACTICE_LOCATION	char(50)	utf8mb4_general_ci		No	*None*			Change Drop More



Codd's Rule #2

Guaranteed Access Rule: Each and every value is guaranteed to be logically accessible by resorting to a combination of table name, primary key value, and column name.

Example from project:

SELECT DESCRIPTION from appointment where APPOINTMENT_REFERENCE_NUMBER=5;

DESCRIPTION
Broken tooth requires crown

Codd's Rule #3

Systematic Treatment of NULL values: NULL values are supported in the fully relational DBMS for representing missing information in a systematic way, independent of data type. We must be able to use NULL values irrespective of data type. NULL values are distinct from empty character strings or zeros.

Example from project:

SELECT PATIENT_REFERENCE_NUMBER, PATIENT_NAME, EMAIL, LAST_VISIT_DATE FROM PATIENT WHERE LAST_VISIT_DATE IS NULL;

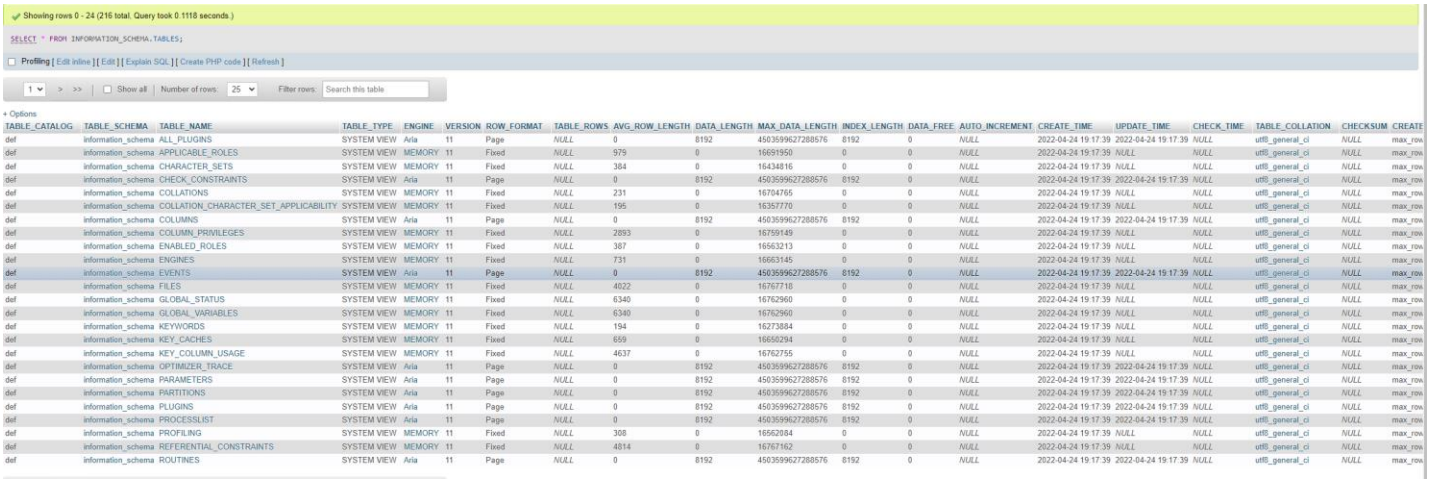
PATIENT_REFERENCE_NUMBER	PATIENT_NAME	EMAIL	LAST_VISIT_DATE
7	John Lyons	LYONSJ@GMAIL.COM	*NULL*

Codd's Rule #4

Dynamic Online Catalog Based on the Relational Model: The database description is represented at the logical level in the same way as ordinary data, authorized users can apply the same relational language to its interrogation as they apply to regular data. The catalog must be governed by the same rules as the rest of the database. The same query language should be used on the catalog as used to query the database.

Example from project:

```
SELECT * FROM INFORMATION_SCHEMA.TABLES;
```



Showing rows 0 - 24 (216 total, Query took 0.1118 seconds.)

```
SELECT * FROM INFORMATION_SCHEMA.TABLES;
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

1 > >> | Show all | Number of rows: 25 | Filter rows: Search this table

+ Options

TABLE_CATALOG	TABLE_SCHEMA	TABLE_NAME	TABLE_TYPE	ENGINE	VERSION	ROW_FORMAT	TABLE_ROWS	AVG_ROW_LENGTH	DATA_LENGTH	MAX_DATA_LENGTH	INDEX_LENGTH	DATA_FREE	AUTO_INCREMENT	CREATE_TIME	UPDATE_TIME	CHECK_TIME	TABLE_COLLATION	CHECKSUM	CREATE
def	information_schema	ALL_PLUGINS	SYSTEM VIEW	Aria	11	Page	NULL	0	8192	450359962728857	8192	0	NULL	2022-04-24 19:17:39	2022-04-24 19:17:39	NULL	utf8_general_ci	NULL	max_row
def	information_schema	APPLICABLE_ROLES	SYSTEM VIEW	MEMORY	11	Fixed	NULL	979	0	16691950	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	CHARACTER_SETS	SYSTEM VIEW	MEMORY	11	Fixed	NULL	384	0	16434816	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	CHECK_CONSTRAINTS	SYSTEM VIEW	Aria	11	Page	NULL	0	8192	450359962728857	8192	0	NULL	2022-04-24 19:17:39	2022-04-24 19:17:39	NULL	utf8_general_ci	NULL	max_row
def	information_schema	COLLATIONS	SYSTEM VIEW	MEMORY	11	Fixed	NULL	231	0	16704765	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	COLLATION_CHARACTER_SET_APPLICABILITY	SYSTEM VIEW	MEMORY	11	Fixed	NULL	195	0	16357770	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	COLUMNS	SYSTEM VIEW	Aria	11	Page	NULL	0	8192	450359962728857	8192	0	NULL	2022-04-24 19:17:39	2022-04-24 19:17:39	NULL	utf8_general_ci	NULL	max_row
def	information_schema	COLUMN_PRIVILEGES	SYSTEM VIEW	MEMORY	11	Fixed	NULL	2893	0	16759149	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	ENABLED_ROLES	SYSTEM VIEW	MEMORY	11	Fixed	NULL	387	0	16563213	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	ENGINES	SYSTEM VIEW	MEMORY	11	Fixed	NULL	731	0	16663145	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	EVENTS	SYSTEM VIEW	Aria	11	Page	NULL	0	8192	450359962728857	8192	0	NULL	2022-04-24 19:17:39	2022-04-24 19:17:39	NULL	utf8_general_ci	NULL	max_row
def	information_schema	FILES	SYSTEM VIEW	MEMORY	11	Fixed	NULL	4022	0	16767718	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	GLOBAL_STATUS	SYSTEM VIEW	MEMORY	11	Fixed	NULL	6340	0	16762960	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	GLOBAL_VARIABLES	SYSTEM VIEW	MEMORY	11	Fixed	NULL	6340	0	16762960	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	KEYWORDS	SYSTEM VIEW	MEMORY	11	Fixed	NULL	194	0	16273884	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	KEY_CACHES	SYSTEM VIEW	MEMORY	11	Fixed	NULL	659	0	16650294	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	KEY_COLUMN_USAGE	SYSTEM VIEW	MEMORY	11	Fixed	NULL	4637	0	16762755	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	OPTIMIZER_TRACE	SYSTEM VIEW	Aria	11	Page	NULL	0	8192	450359962728857	8192	0	NULL	2022-04-24 19:17:39	2022-04-24 19:17:39	NULL	utf8_general_ci	NULL	max_row
def	information_schema	PARAMETERS	SYSTEM VIEW	Aria	11	Page	NULL	0	8192	450359962728857	8192	0	NULL	2022-04-24 19:17:39	2022-04-24 19:17:39	NULL	utf8_general_ci	NULL	max_row
def	information_schema	PARTITIONS	SYSTEM VIEW	Aria	11	Page	NULL	0	8192	450359962728857	8192	0	NULL	2022-04-24 19:17:39	2022-04-24 19:17:39	NULL	utf8_general_ci	NULL	max_row
def	information_schema	PLUGINS	SYSTEM VIEW	Aria	11	Page	NULL	0	8192	450359962728857	8192	0	NULL	2022-04-24 19:17:39	2022-04-24 19:17:39	NULL	utf8_general_ci	NULL	max_row
def	information_schema	PROCESSLIST	SYSTEM VIEW	Aria	11	Page	NULL	0	8192	450359962728857	8192	0	NULL	2022-04-24 19:17:39	2022-04-24 19:17:39	NULL	utf8_general_ci	NULL	max_row
def	information_schema	PROFILING	SYSTEM VIEW	MEMORY	11	Fixed	NULL	308	0	16562084	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	REFERENTIAL_CONSTRAINTS	SYSTEM VIEW	MEMORY	11	Fixed	NULL	4814	0	16767162	0	0	NULL	2022-04-24 19:17:39	NULL	NULL	utf8_general_ci	NULL	max_row
def	information_schema	ROUTINES	SYSTEM VIEW	Aria	11	Page	NULL	0	8192	450359962728857	8192	0	NULL	2022-04-24 19:17:39	2022-04-24 19:17:39	NULL	utf8_general_ci	NULL	max_row

Codd's Rule #5

Comprehensive Data Sublanguage Rule: A relational system must support at least one relational language that has a linear syntax, can be used interactively and within application programs, supports data definition operations, data manipulation operations, security and integrity constraints, and transaction management operations.

Example from project:

```
UPDATE PATIENT SET EMAIL = 'AARONTALTY@LIVE.COM' WHERE PATIENT_NAME = 'AARON TALTY';
```

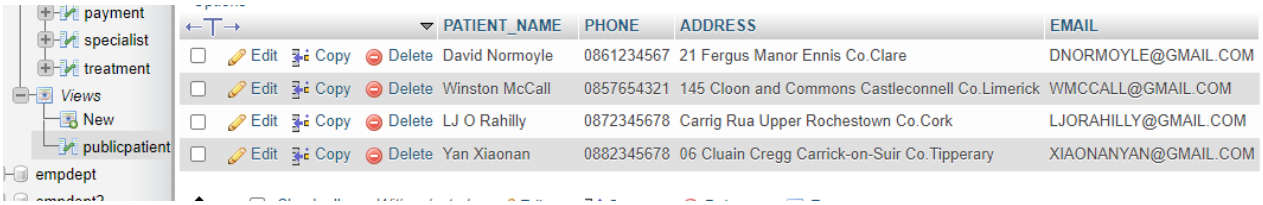
PATIENT_NAME	PHONE	OUTSTANDING_BALANCE	ADDRESS	LAST_VISIT_DATE	DOB	EMAIL
Aaron Talty	0851234567	0.00	46 College Green Clonroadmore Ennis Co.Clare	17-NOV-2021	06-JULY-92	AARONTALTY@LIVE.COM

Codd's Rule #6

View Updating Rule: Views are the virtual tables created by using queries to show the partial view of the table. These partial table views contain few rows and columns, and are also able to be updated.

Example from project:

```
CREATE VIEW PublicPatientInfo AS SELECT PATIENT_NAME, PHONE, ADDRESS, EMAIL FROM PATIENT WHERE OUTSTANDING_BALANCE > 150.00;
```




```
CREATE OR REPLACE VIEW publicpatientinfo AS SELECT PATIENT_NAME, ADDRESS, PATIENT_REFERENCE_NUMBER FROM PATIENT WHERE OUTSTANDING_BALANCE > 150.00;
```

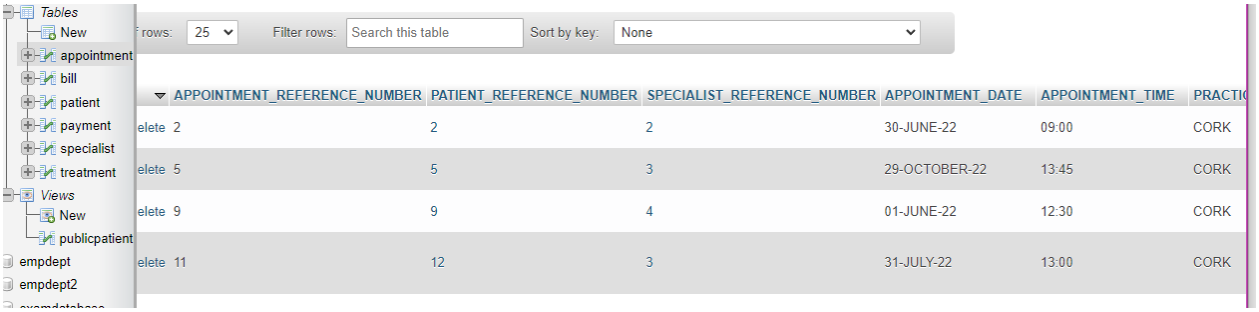
	PATIENT_NAME	ADDRESS	PATIENT_REFERENCE_NUMBER
Edit Copy Delete	David Normoyle	21 Fergus Manor Ennis Co.Clare	2
Edit Copy Delete	Winston McCall	145 Cloon and Commons Castleconnell Co.Limerick	6
Edit Copy Delete	LJ O Rahilly	Carrig Rua Upper Rochestown Co.Cork	13
Edit Copy Delete	Yan Xiaonan	06 Cluain Cregg Carrick-on-Suir Co.Tipperary	14

Codd's Rule #7

High level INSERT, UPDATE, and DELETE: There must be INSERT, DELETE, UPDATE, operations at each level of relations.

Example from project:

```
DELETE FROM APPOINTMENT WHERE SPECIALIST_REFERENCE_NUMBER=1;
```



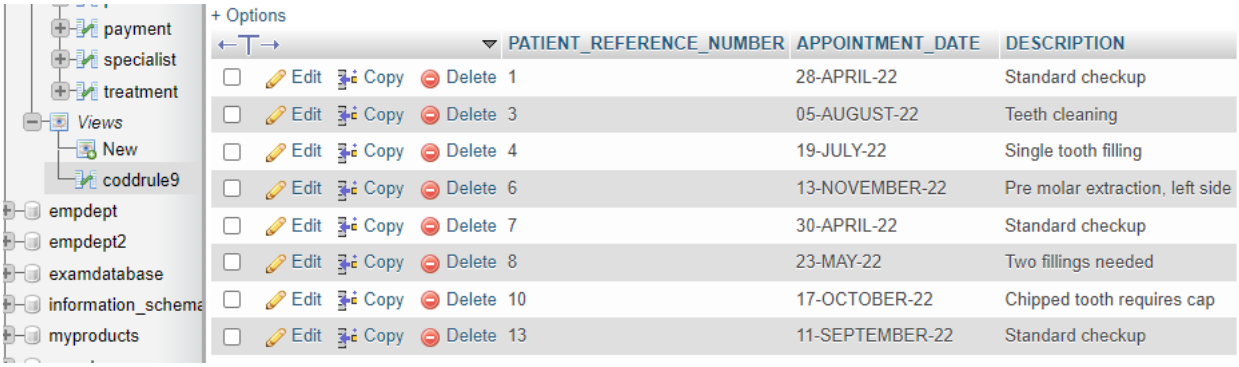
Codd's Rule #8 not required

Codd's Rule #9

Logical Data Independence: The ability to change the conceptual schema without having to change the next higher level external schema. Insulation of application programs and terminal users from the negative effects of information-preserving changes of the logical database schema.

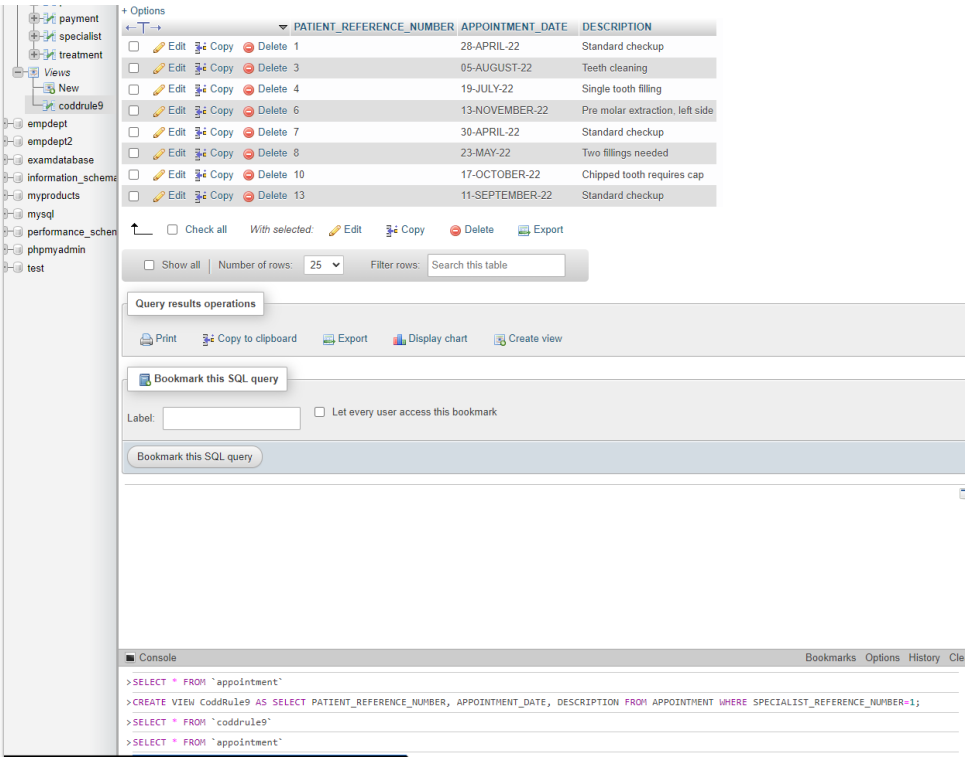
Example from project:

```
CREATE VIEW CoddRule9 AS SELECT PATIENT_REFERENCE_NUMBER, APPOINTMENT_DATE, DESCRIPTION FROM
APPOINTMENT WHERE SPECIALIST_REFERENCE_NUMBER=1;
```




```
ALTER TABLE APPOINTMENT ADD CoddNULL VARCHAR(40);
```

DESCRIPTION	CoddNULL
Standard checkup	*NULL*
Route canal operation	*NULL*
Teeth cleaning	*NULL*
Single tooth filling	*NULL*
Broken tooth requires crown	*NULL*
Pre molar extraction, left side	*NULL*
Standard checkup	*NULL*
Two fillings needed	*NULL*
Specialist consultation	*NULL*
Chipped tooth requires cap	*NULL*
Wisdom teeth extraction, left top and bottom	*NULL*
Standard checkup	*NULL*



The new row was added and the integrity of the table and the view remain intact.

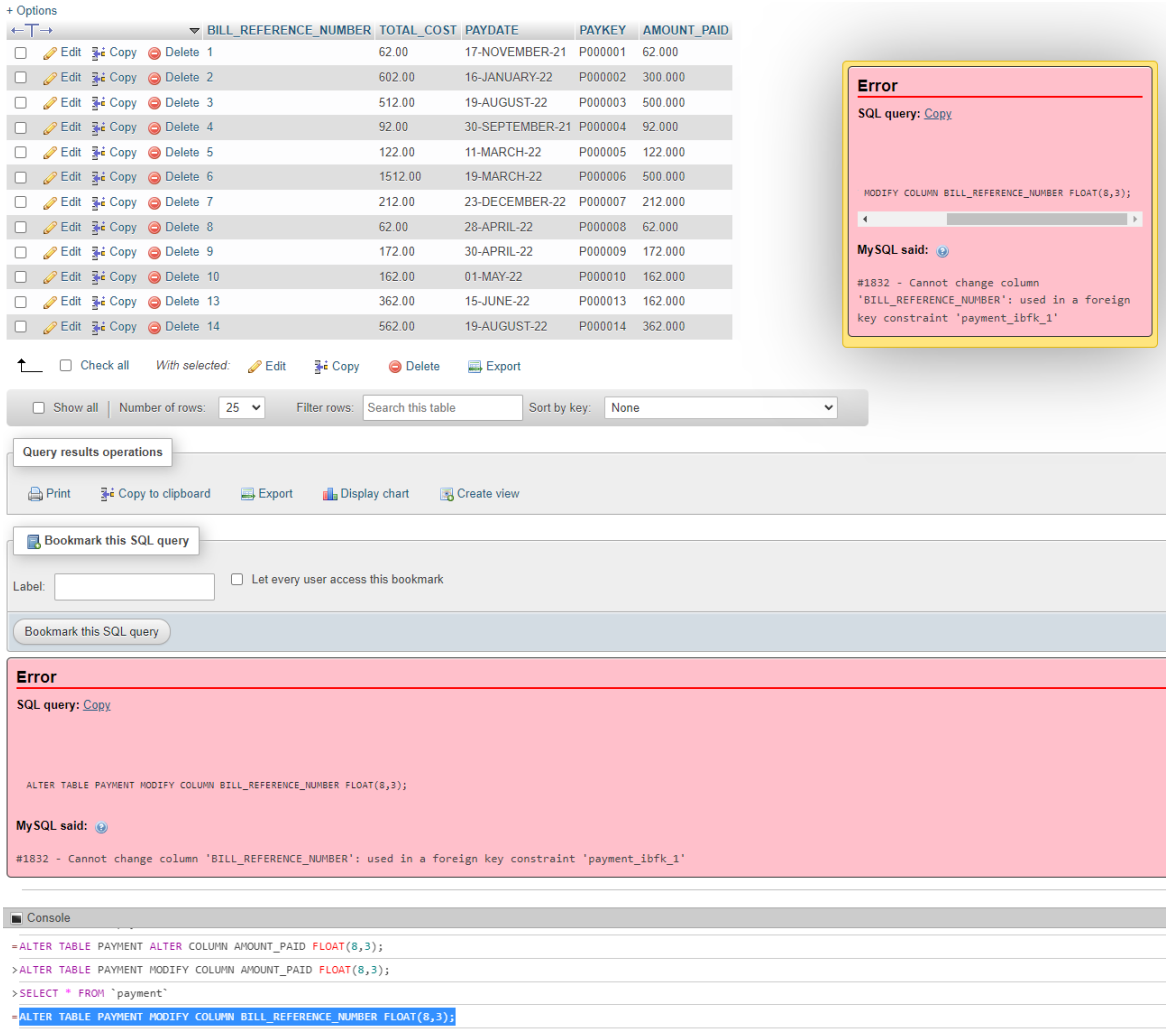
Codd's Rule #10

Integrity Independence: The database should be able to enforce its own integrity rather than using other programs. No records can have NULL in their PRIMARY KEY attribute.

Example from project:

#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
1	BILL_REFERENCE_NUMBER	int(11)			No	None			Change Drop More
2	TOTAL_COST	float(8,2)			No	None			Change Drop More
3	PAYDATE	varchar(25)	utf8mb4_general_ci		Yes	NULL			Change Drop More
4	PAYKEY	varchar(25)	utf8mb4_general_ci		No	None			Change Drop More

```
ALTER TABLE PAYMENT MODIFY COLUMN BILL_REFERENCE_NUMBER FLOAT(8,3);
```



Codd's Rule #11

Distribution Independence: A database should work properly regardless of its distribution across a network. Even if a database is geographically distributed, with data stored in pieces, the end user should get an impression that it is stored at the same place. The data manipulation sub-language of a relational DBMS must enable application programs and terminal activities to remain logically unimpaired.

Codd's Rule #12

Non-Subversion Rule: If a low level access is given to a system it should not be able to subvert or bypass integrity rules to change the data. The system must not have features that allow this bypassing of the security.