

Relational Data Concepts:

- Data is stored in tables (2-dimensional - like a Spreadsheet)
- Tables has a set of **related** rows
- Row is collection of **related** columns
- Column - a single value
- Tables may be **related** to other tables (parent / dependent)
  - Parent tables have primary keys
  - Dependent tables have foreign keys

**Referential Integrity (RI)** - DBMS Enforcement of the Parent-Dependent relationship  
ie. DBMS Ensures that every foreign key value has a matching primary key

Relational Tables may have multiple types of keys (identifiers):

- Primary Key** - Column is part of the unique identifier for a row in the table  
UNIQUE and NOT NULL are implied  
when specified for a table it makes the table a potential parent table in an RI relationship  
a table is not a parent until a foreign key matches to it (it has a dependent)
- Foreign Key** - Column is part of a foreign key for the table.  
Value must have a matching value in the primary key of the parent table  
Establishes the parent-dependent relationshipspecified for a table  
makes the table a dependent in an RI relationship
- UNIQUE** - Column value must be unique with the table

**TL;DR:** If tables have Primary Keys and Foreign Keys you may not be able to do certain  
INSERT, UPDATE, DELETE operations.

Referential Intergrity (Parent/Dependent relationship) limits what INSERT, UPDATE and DELETE can do  
RI adds constraints to INSERT, UPDATE, DELETE)

**INSERT** - parent table - always allowed  
  
dependent table - allowed only if the foreign already has a matching primary key in the parent  
  
we can always INSERT a row to a parent table  
  
we can only INSERT a row into a dependent table if it's Foreign Key(s) matches existing  
Primary Key value(s) in it's parent  
  
Always populate parent table(s) before their associated dependent tables

**UPDATE** - *parent table* - a Primary Key value cannot be updated if it has existing dependents  
(at least one Foreign Key matches it) UNLESS...  
the update CASCADE option is specified in the Foreign Key clause  
when the dependent relationship is defined  
which means if the Primary Key value changes  
all matching Foreign Key values will also change

*dependent* - a Foreign Key may only be changed to an existing Primary Key value

**DELETE** - *parent* - a parent row cannot be deleted if it's Primary Key has matching Foreign Keys  
UNLESS the DELETE SET NULL option is specified specified in the Foreign Key  
clause when the dependent relationship is defined  
which means all Foreign Keys matching the Primary will be set to NULL  
the null value in the Foreign Key must be changed to match an existing Primary Key  
before you can do anything with the dependent table  
  
for DELETE SET NULL to be valid, the Foreign Key cannot be defined as UNIQUE  
or NOT NULLit also cannot be part of the Primary Key of the dependent table  
OR the DELETE CASCADE option is specified for the parent table  
which means a delete of a parent rows also deletes all dependent rows (**DANGEROUS!**)

*There are no restrictions on deleting rows in a dependent table*

Tables may also be defined with additional attributes, such as:

- CHECK** - Specifies acceptable values for a column - any simple WHERE predicate is allowed
- DEFAULT** - Specify a default value for column if no value is supplied on INSERT

**TL;DR:** One to Many relationships are what the Relational Model is based on and is the most efficient  
and managable relationship;

Table relationships fall into 3 categories:

- One to One** - For each row in the parent table it's primary key values may only appear  
once in the dependent table foreign key values;  
Each parent row has exactly one dependent row  
(*not desirable in the Relational Data Model*)
- One to Many** - For each row in the parent table it's primary key values may appear  
many times in the dependent table foreign key values;  
Each parent row may have multiple matching dependent rows  
(*Goal in the Relational Data Model*)
- Many to Many** - For many rows in the parent table it's primary key values may appear  
many times in the dependent table foreign key values  
Many rows in the parent match many rows in the dependents  
(*difficult and very inefficient in the Relational Data Model*)