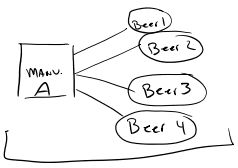
4/14/21
Wednesday, April 14, 2021 11:03 AM

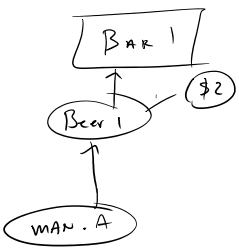
Sells { Beer, Bar, Price, Manufacturer }
# # # #

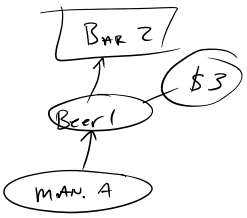
Repeated Info: Even if Removed, from the data, you Know what it is.

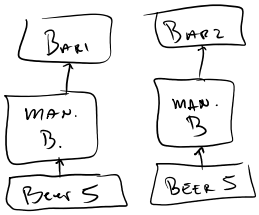
Bar 1	Beer 1	$2	man. A
Bar 2	Beer 1	$3	man. A

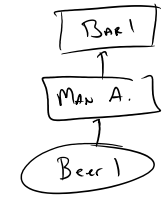
Repeated Info.

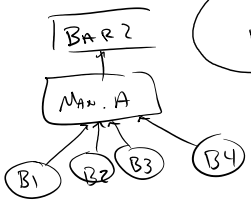




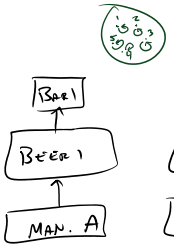








P ↦ P | (Beer, Price) ↦ Price



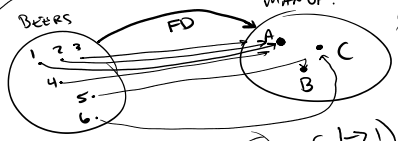
"Sells"

		Price	
Bar 1	Beer 1	$2	A
Bar 2	Beer 2	$4	A
Bar 3	Beer 1	$3	A
Bar 4	Beer 2	$3	A

If Beer i, occurs >1 times, Then Manuf(Beer i) is repeated info

A ≥ 1 columns
B ≥ 1 columns

Functional Dependency (FD) := A ↦ B "FD(A) = B"



"Total Function"

FD(Beers) ↦ Manuf.
Many ↦ One

(1↦1) Injective

"No Beers have a Null Manuf."

Key(Bar, Beer)
* Beer is not a SuperKey *

Beer ↦ Manuf

INERSERT INTO
Sells Values (Bar B, Beer i, Price, Manuf(i))

Repeated Info. Can Only exist when Inputs (Beer or Bar) can Repeat.
- Constraints Can Be Placed on the inputs ex. PRIMARY KEY or UNIQUE.

Bars Table

Bar	Address
B1	A1
B2	A2
B3	A3
B1	A1
B2	A2

Repeated Info

Bar ↦ Address

{ FD Still In Place }

Constraint: Primary Key(Bar)

Now Defined as a SUPERKEY for such Input.

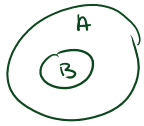
here Bar is A Super Key.

A ↦ B

If (A ≠ SUPERKEY) then (A & B can Repeat) → A ↦ B is not A trivial FD

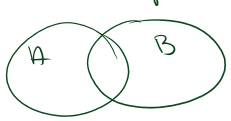
Thus B is Repeated Information.

Trivial FD := A is a SuperSet, or Equal to B
A ↦ B
A ⊇ B



A NONTRIVAL FD, A ↦ B, indicates (repeated information) if A is not a SuperKey (redundancy)

ex.



Non-Trivial FD
"Minimal SuperKey"
G(Bar, Beer) ↦ Price "FD1"

Sells

Sells

Bar	Beer	Price	Man.

Non-Trivial FD's

"Minimal Super Key"

↳ (Bar, Beer) ↦ Price "FD1"

(Beer) ↦ Man. "FD2"

~~(Bar, Beer) ↦ Man.~~ "Infered"

ex.

Super Key Identification Given the FD's Algorithm.

Super Keys (minimal)

Primary Key (Bar, Beer)

~~Unique N/A~~

Super Set

: +(Bar, Beer, Price) + (Bar, Beer, Man.)

+ (Bar, Beer, Price, Man)

Consider Table R w/ Columns C_i

FD($A \mapsto B$) indicates Redundancy.

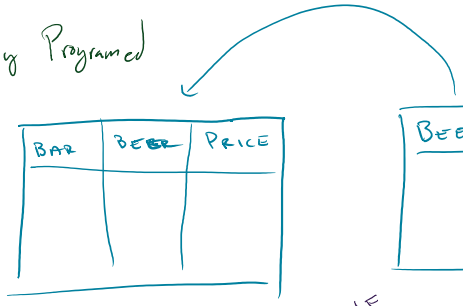
Break into Table $R_o[A,B]$ &

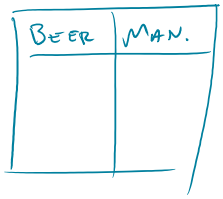
$R_N[C_i - B]$

$R = [R_N + R_o - A]$

* Only the Minimal Super Key Should Be Explicitly Programed

1. Does it have Repeats?
2. How to Fix?





$R = R_o$ (Natural Join)

$R_{o,N}$ = R Project, Delete ...

1NF

2NF

(3NF) - 3rd

(BCNF) - Boyce-Codd

↓ For General DD Knowledge: FD / Normalization / Normal Forms

BCNF := There is No Redundancy from any FD.

"For any Non-Trivial FD ($A \mapsto B$), A is a SuperKey of B"

1st NF := Each Column, C_i, Should Be Single Valued

ex. Address ↦ Street, City, Zip

2nd NF : . . . .

3rd NF := Let Columns C_i exist, $A \mapsto B$, but $A \in C$ & $B \notin C$ {C}

Keeps ALL FD's, although allows for some

[3 NF]: Keeps ALL FD's, although allows for some Repeated Info. (Puts B in C)

ex.

C_1	C_2	C_3
Street	City	Zip

BCNF Loses Constraints

FDs { ZIP → CITY - FD1 (Redundant), (STREET, CITY) → ZIP - FD2 (Non-Redundant) }

Minimal Super Keys: (Street, City), (Street, Zip)