PRICE-HISTORY

| SName | PName | Start-date | End-date | Price |  |
| --- | --- | --- | --- | --- | --- |
|  | Note 5 | 3 | 4 | $100 |  |
|  | Note 5 | 4 | 4 | $120 |  |
|  | Note 5 | 5 | 5 | $100 |  |
|  | Note 5 | 7 | 7 | $120 |  |
|  |  |  |  |  |  |

Assumptions:

* No price change within the same day

Functional Dependencies:

1. PName,SName,Start-date, End-date -> Price

Finding the key of PRICE-HISTORY:

{PName}+ = {PName}

{ SName }+ = { SName }

{ Start-date }+ = { Start-date }

{ End-date }+ = { End-date }

{ Price }+ = { Price }

{ PName, SName }+ = { PName, SName }

{ PName, Start-date }+ = { PName, Start-date }

{ PName, End-date }+ = { PName, End-date }

{ PName, Price }+ = { PName, Price }

{ SName , Start-date }+ = { SName , Start-date }

{ SName , End-date }+ = { SName , End-date }

{ SName, Price }+ = { SName, Price }

{ Start-date, End-date }+ = { Start-date, End-date }

{ Start-date, Price }+ = { Start-date, Price }

{ End-date , Price }+ = { End-date , Price }

{ PName, SName, Start-date }+ = { PName, SName, Start-date, End-date, Price }

{ PName, SName, End-date }+ = { PName, SName, Start-date, End-date, Price }

{ PName, SName, Price }+ = { PName, SName, Price }

{ PName, SName, Start-date, Price }+ = { PName, SName, Start-date, End-date, Price }

Key:

* PName, SName, Start-date
* PName, SName, End-date

Primary key:

* PName, SName, Start-date

3NF:

* FD-1 has key on the LHS and is non-trivial
* FD-2 has key on the LHS and is non-trivial
* PRICE-HISTORY is in 3NF

~~Minimal Basis:~~

* + ~~Step 1: Transform so that RHS only one attribute~~
* ~~PName,SName,Start-date -> Price~~
* ~~PName,SName,Start-date -> End-date~~
* ~~PName,SName,End-date -> Price~~
* ~~PName,SName,End-date -> Start-date~~
  + ~~Step 2 :Remove redundant FDs, assume FD doesn’t exist, does LHS closure contain RHS?~~
* ~~Remove PName,SName,Start-date -> Price?~~
  + ~~{PName,SName,Start-date}+ = {PName,SName,Start-date,End-date}~~
  + ~~PName,SName,Start-date -> Price is redundant~~
  + ~~Remove PName,SName,Start-date -> Price~~
* ~~Remove PName,SName,Start-date -> End-date?~~
  + ~~{PName,SName,Start-date}+ = {PName,SName,Start-date,Price}~~
  + ~~PName,SName,Start-date -> End-date is not redundant~~
* ~~Remove PName,SName,End-date -> Price?~~
  + ~~{PName,SName,End-date}+ = {PName,SName,Start-date,End-date}~~
  + ~~PName,SName, End-date -> Price is not redundant~~
* ~~Remove PName,SName,End-date -> Start-date?~~
  + ~~{PName,SName,End-date}+ = {PName,SName, End-date,Price}~~
  + ~~PName,SName, End-date -> Start-date is not redundant~~
* ~~FDs:~~
  + ~~PName,SName,Start-date -> End-date~~
  + ~~PName,SName,End-date -> Price~~
  + ~~PName,SName,End-date -> Start-date~~
  + ~~Step 3 (Composite LHS, remove each one and check if closure still contains RHS):~~
* ~~NA~~
* ~~FDs:~~
  + ~~PName,SName,Start-date -> End-date~~
  + ~~PName,SName,End-date -> Price~~
  + ~~PName,SName,End-date -> Start-date~~

~~Computing Closures:~~

* ~~{PName,SName,End-date}+ = {PName,SName,Start-date,End-date,Price}~~

~~LHS of non-trivial FD-1 does not contain the key. It is not in BCNF.~~

~~LHS of all other non-trivial FDs contains the key.~~

~~RHS of FD-1 is part of the key. Therefore PRICE-HISTORY is in 3NF.~~

~~The left-hand side of functional dependency 1 contains a key. ORDERS is in the third normal form.~~

Consideration:

* add sname?
* use SPID?
* <https://stackoverflow.com/questions/58996506/does-always-weak-entity-need-a-partial-key>

PRODUCTS-IN-SHOPS

| PName | SName | SPID | SPrice | SQuantity |
| --- | --- | --- | --- | --- |
| Note5 | C | C\_Note5 | 100 | 30 |
| Note6 | C | C\_Note6 | 100 | 30 |
| Note5 | I | I\_Note5 |  |  |
| Note6 | I | I\_Note6 |  |  |

Assumption:

* Not the whole SName is taken as a prefix and whole PName is taken as a suffix

Functional Dependencies:

1. SPID -> SPrice, SQuantity
2. SName, PName -> SPID, SPrice, SQuantity
3. ~~SPID -> SName, PName ? (NO)~~

Finding the key of PRICE-HISTORY:

* { PName }+={ PName }
* { SName }+={ SName }
* { SPID }+={ SPID, SPrice, SQuantity }
* { SPrice }+={ SPrice }
* { SQuantity }+={ SQuantity }
* { PName, SName }+={ PName, SName, SPID, SPrice, SQuantity }
* { PName, SPID }+={ PName, SPID, SPrice, SQuantity }
* { PName, SPrice }+={ PName, SPrice}
* { PName, SQuantity }+={ PName, SQuantity }
* { SName, SPID }+={ SName, SPID, SPrice, SQuantity }
* { SName, SPrice }+={ SName, SPrice }
* { SName, SQuantity }+={ SName, SQuantity }
* { SPID , SPrice }+={ SPID, SPrice, SQuantity }
* { SPID , SQuantity }+={ SPID, SPrice, SQuantity }
* { SPrice, SQuantity }+={ SPrice, SQuantity }
* { PName, SName, SPID }+={ PName, SName, SPID, SPrice, SQuantity }
* { PName, SName, SPrice }+={ PName, SName, SPID, SPrice, SQuantity }
* { PName, SName, SQuantity }+={ PName, SName, SPID, SPrice, SQuantity }
* { PName, SPID, SPrice }+={ PName, SPID, SPrice, SQuantity }
* { PName, SPID, SQuantity}+={ PName, SPID, SPrice, SQuantity }
* { PName, SPrice, SQuantity }+={ PName, SPrice, SQuantity }
* { SName, SPID, SPrice}+={ SName, SPID, SPrice, SQuantity }
* { SName, SPID, SQuantity}+={ SName, SPID, SPrice, SQuantity }
* { SPID , SPrice, SQuantity }+={ SPID, SPrice, SQuantity }
* { PName, SName, SPID, SPrice }+={ PName, SName, SPID, SPrice, SQuantity }
* { PName, SName, SPID, SQuantity }+={ PName, SName, SPID, SPrice, SQuantity }
* { PName, SName, SPID, SPrice, SQuantity }+={ PName, SName, SPID, SPrice, SQuantity }

Key:

* SName,PName

Primary key:

* SName,PName

3NF violation:

* SPID -> SPrice, SQuantity ; LHS is not a key and RHS does not belong to a key

Minimal Basis:

* + Step 1: Transform so that RHS only one attribute
* SPID -> SPrice,
* SPID -> SQuantity
* SName, PName -> SPID
* SName, PName -> SPrice
* SName, PName -> SQuantity
  + Step 2 :Remove redundant FDs, assume FD doesn’t exist, does LHS closure contain RHS?
* Remove SPID -> SPrice
  + {SPID}+ = {SPID, SQuantity}
* Remove SPID -> SQuantity
  + {SPID}+ = {SPID,SPrice }
* Remove SName, PName -> SPID
  + {SName, PName}+ = {SName, PName, SPrice, SQuantity}
* Remove SName, PName -> SPrice
  + {SName, PName}+ = {SName, PName SPID, SPrice, SQuantity}
  + SName, PName -> SPrice is redundant
* Remove SName, PName -> SQuantity
  + {SName, PName}+ = {SName, PName SPID, SPrice, SQuantity}
  + SName, PName -> SQuantity is redundant
* FDs:
  + SPID -> SPrice,
  + SPID -> SQuantity
  + SName, PName -> SPID
  + Step 3 (Composite LHS, remove each one and check if closure still contains RHS):
* Remove SName
  + {PName}+ = {PName}
* Remove PName
  + {SName}+ = {SName}
* FDs:
  + SPID -> SPrice,
  + SPID -> SQuantity
  + SName, PName -> SPID
  + Step 4 (Combine FDs)
* FDs:
  + SPID -> SPrice, SQuantity
  + SName,PName -> SPID
  + Step 4 (create table if none contains key)
* NA
  + Step 5 (remove redundant tables)
* Tables:
  + R(SPID,SPrice,SQuantity)
  + R(SName,PName,SPID)