***Normalization Example***

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E.g. Billing system of a store. The possible fields are:

Sales Order No. Date, Customer No., Customer Name, Customer Address, Item No., Description, Quantity, Unit Price.

This is un normalized data.

A table is said to be 1NF if it has no repeating groups i.e. for each cell in a table, there can be only one value. If a group of items repeats, it should be split into new table.

The fields Date, Customer No., Customer Name, Customer Address are repeating fields and Item No., Description, Quantity, Unit Price are non repeating fields.

In 1NF, now repeating groups are separated into new table.

Customer

|  |
| --- |
| Sales Order No. |
| Date |
| Customer No. |
| Customer Name |
| Customer Address |

Sales Order

|  |
| --- |
| Sales Order No. |
| Item No. |
| Description |
| Quantity |
| Unit Price |

Here, two tables can be linked together by a common field sales order no. Now these two tables are in first normal form. The header data about customer are not repeated for every line in sales order as they are kept in separate table.

A table is said to be in 2NF if it is already in 1NF and if every non key columns depend on the entire primary key. Lets discuss about sales table

Sales Order

|  |
| --- |
| Sales Order No. |
| Item No. |
| Description |
| Quantity |
| Unit Price |

Here the key field is sales order no. Field description depends upon item no. rather than sales order no.

However quantity and unit price are not dependent on item no. as they may be different for different sales order. Now the table is split again. The column that depend on the key are kept in one table and rest on another table as follows:

|  |
| --- |
| Sales Order No. |
| Item No. |
| Quantity |
| Unit Price |

|  |
| --- |
| Item No. |
| Description |

A table is said to be in 3NF if it is in 2NF and if non key columns are non dependent on each other. There should not be any hidden dependencies among non-key columns.

In customer table

Customer

|  |
| --- |
| Sales Order No. |
| Date |
| Customer No. |
| Customer Name |
| Customer Address |

Here non key fields customer name and address depends upon customer no. but not sales order no. The hidden dependency is removed by splitting table as:

|  |
| --- |
| Customer No. |
| Customer Name |
| Customer Address |

|  |
| --- |
| Sales Order No. |
| Date |
| Customer No. |

Now the final normalized table after 3NF will be as follows

|  |  |  |  |
| --- | --- | --- | --- |
| Customer | Sales order | Sales Detail | Item |
| Customer No. | Sales order No. | Sales order No. | Item No. |
| Customer Name | Date | Item No. | Description |
| Customer Address | Customer No. | Quantity |  |
|  |  | Price |  |