**Slowly Changing Dimension**

A Slowly Changing Dimension (SCD) is a critical concept in data warehousing that refers to the management of dimension data that changes over time. In data warehousing, dimensions are descriptive attributes related to the facts (measurable data) in a star or snowflake schema. SCDs track historical changes to these dimensions to enable accurate reporting and analysis over time.

Here are the main types of SCDs:

### **1. Type 1: Overwriting**

* **Description**: In a Type 1 SCD, the existing dimension data is overwritten with new data. Historical data is not retained, which means that any previous values for the changed attributes are lost.
* **Use Case**: Use Type 1 when it is acceptable to lose historical data and you only need to maintain the most current values. For example, if a customer's address changes, you simply update the address in the database without keeping a record of the previous address.

### **2. Type 2: Creating Another Dimension Record**

* **Description**: Type 2 SCDs maintain a full history of dimension changes. When an attribute changes, the current record is marked as inactive (e.g., by setting an is\_current flag to False), and a new record is created with the updated data. This new record becomes the current active record.
* **Historical Tracking**: Each record includes effective dates (e.g., start and end dates) to indicate the period during which the record was valid.
* **Use Case**: Type 2 is useful for tracking changes over time, such as when a customer moves to a new location, and you want to keep a record of their previous addresses.

### **3. Type 3: Creating a Current Value Field**

* **Description**: Type 3 SCDs store both the current and the previous values for selected attributes. This is typically done by adding additional columns to the dimension table (e.g., previous\_address and current\_address).
* **Use Case**: Use Type 3 when you want to keep limited historical information without storing an entire history of changes. For example, you might want to know both the current and the previous value of a customer's address without retaining a complete history.

### **Example Use Case**

For instance, if a customer named Susan moves from Seattle to Paris:

* **Type 1**: The address for Susan is simply updated to Paris, and her old address (Seattle) is lost.
* **Type 2**: Susan's record is updated to mark her Seattle address as inactive, and a new record with her Paris address is created, along with effective dates indicating when she moved.
* **Type 3**: Susan's record would have two columns, one for her current address (Paris) and one for her previous address (Seattle), without the need for additional records.

### **Importance**

Understanding and implementing SCDs is essential for businesses that rely on historical data for analysis and reporting. It ensures that they have accurate and relevant information over time, enabling better decision-making and analysis.