**Data Warehouse Indexes**

**1 ) Pure Bitmap**

* It consists of a collect of bitmap vectors each of which is created to represent each distinct value of the indexed column , array of bits is utilized to represent each unique column value of each row in a table

**Advantages**

* + It is well suited for low cardinality columns
  + It utilizes bitwise operations

**Disadvantages**

* It performs inefficiently with high cardinality data
* It does not handle spare data well.

**2 ) Encoded Bitmap Index**

* It consists of a collect of bitmap vectors each of which is created to represent each distinct value of the indexed column , The index is the binary Bit-Sliced Index built on the attribute domain **Advantages**
  + It uses space efficiently.
  + It performs efficiently with wide range query

**Disadvantages**

* It performs inefficiently with equality queries.
* It is very difficult to find a good encoding scheme

**3 ) Bitmap Join Index**

* A Join Index is built by translating restrictions on the column value of a dimension table (i.e., the gender column) to restrictions on a large fact table. The index is implemented using one of the two representations
* **Advantages**
  + It is flexible
  + It supports star queries

**Disadvantages**

* The order of indexed column is important

**4 ) B-Tree**

* B-tree index is organized like an upside-down tree. The bottom level of the index holds the actual data values and pointers to the corresponding rows, much as the index in a book has a page number associated with each index entry.

**Advantages**

. It speeds up known queries.

. It is well suited for high cardinality

**Disadvantages**

. The indexes cannot be combined before fetching the data

. It performs inefficiently with low cardinality data

**3 ) Projection Index**

* A Projection Index on an indexed column A in a table T stores all values of A in the same order as they appear in T. Each row of the Projection Index stores one value of A. The row order of value x in the index is the same as the row order of value x in T

**Advantages**

. It speeds up the performance when a few columns in the table are retrieved

**Disadvantages**

. It can be used only to retrieve raw data