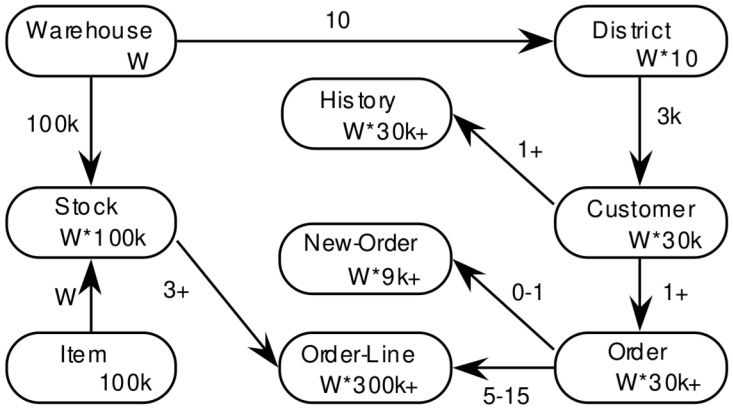
Customers call the Company to place a new order or request the status of an existing order. Orders are composed of an average of 10 order lines (i.e., line items). One percent of all order lines are for items not in-stock at the regional warehouse and must be supplied by another warehouse.

The Company's system is also used to enter payments from customers, process orders for delivery, and examine stock levels to identify potential supply shortages.

1.2 Database Entities, Relationships, and Characteristics

1.2.1 The components of the TPC-C database are defined to consist of nine separate and individual tables. The relationships among these tables are defined in the entity-relationship diagram shown below and are subject to the rules specified in Clause 1.4.



Legend:

- All numbers shown illustrate the database population requirements (see Clause 4.3).
- The numbers in the entity blocks represent the cardinality of the tables (number of rows). These numbers are factored by W, the number of Warehouses, to illustrate the database scaling. (see Clause 4).
- The numbers next to the relationship arrows represent the cardinality of the relationships (average number of children per parent).
- The plus (+) symbol is used after the cardinality of a relationship or table to illustrate that this number is subject to small variations in the initial database population over the measurement interval (see Clause 5.5) as rows are added or deleted.

1.3 Table Layouts

1.3.1 The following list defines the minimal structure (list of attributes) of each table where:

- **N unique IDs** means that the attribute must be able to hold any one ID within a minimum set of N unique IDs, regardless of the physical representation (e.g., binary, packed decimal, alphabetic, etc.) of the attribute.
- **variable text, size N** means that the attribute must be able to hold any string of characters of a variable length with a maximum length of N. If the attribute is stored as a fixed length string and the string it holds is shorter than N characters, it must be padded with spaces.

- **fixed text, size N** means that the attribute must be able to hold any string of characters of a fixed length of N.
- **date and time** represents the data type for a date value that includes a time component. The date component must be able to hold any date between 1st January 1900 and 31st December 2100. The time component must be capable of representing the range of time values from 00:00:00 to 23:59:59 with a resolution of at least one second. Date and Time must be implemented using data types that are defined by the DBMS for that use.
- **numeric(m [,n])** means an unsigned numeric value with at least m total decimal digits, of which n digits are to the right (after) the decimal point. The attribute must be able to hold all possible values which can be expressed as numeric(m,n). Omitting n, as in numeric(m), indicates the same as numeric(m,0). Numeric fields that contain monetary values (W_YTD, D_YTD, C_CREDIT_LIM, C_BALANCE, C_YTD_PAYMENT, H_AMOUNT, OL_AMOUNT, I_PRICE) must use data types that are defined by the DBMS as being an exact numeric data type or that satisfy the ANSI SQL Standard definition of being an exact numeric representation.
- **signed numeric(m [,n])** is identical to numeric(m [,n]) except that it can represent both positive and negative values.
- **null** means out of the range of valid values for a given attribute and always the same value for that attribute.

Comment 1: For each table, the following list of attributes can be implemented in any order, using any physical representation available from the tested system.

Comment 2: Table and attribute names are used for illustration purposes only; different names may be used by the implementation.

Comment 3: A **signed numeric** data type may be used (at the sponsor's discretion) anywhere a **numeric** data type is defined.

WAREHOUSE Table Layout

Field Name	Field Definition	Comments
W_ID	2*W unique IDs	*W Warehouses are populated*
W_NAME	variable text, size 10	
W_STREET_1	variable text, size 20	
W_STREET_2	variable text, size 20	
W_CITY	variable text, size 20	
W_STATE	fixed text, size 2	
W_ZIP	fixed text, size 9	
W_TAX	signed numeric(4,4)	*Sales tax*
W_YTD	signed numeric(12,2)	*Year to date balance*

Primary Key: W_ID

DISTRICT Table Layout

Field Name	Field Definition	Comments
D_ID	20 unique IDs	*10 are populated per warehouse*
D_W_ID	2*W unique IDs	
D_NAME	variable text, size 10	
D_STREET_1	variable text, size 20	
D_STREET_2	variable text, size 20	
D_CITY	variable text, size 20	
D_STATE	fixed text, size 2	
D_ZIP	fixed text, size 9	
D_TAX	signed numeric(4,4)	*Sales tax*
D_YTD	signed numeric(12,2)	*Year to date balance*
D_NEXT_O_ID	10,000,000 unique IDs	*Next available Order number*

Primary Key: (D_W_ID, D_ID)

D_W_ID Foreign Key, references W_ID

CUSTOMER Table Layout

Field Name	Field Definition	Comments
C_ID	96,000 unique IDs	*3,000 are populated per district*
C_D_ID	20 unique IDs	
C_W_ID	2*W unique IDs	
C_FIRST	variable text, size 16	
C_MIDDLE	fixed text, size 2	
C_LAST	variable text, size 16	
C_STREET_1	variable text, size 20	
C_STREET_2	variable text, size 20	
C_CITY	variable text, size 20	
C_STATE	fixed text, size 2	
C_ZIP	fixed text, size 9	
C_PHONE	fixed text, size 16	
C_SINCE	date and time	
C_CREDIT	fixed text, size 2	*"GC"=good, "BC"=bad*
C_CREDIT_LIM	signed numeric(12, 2)	
C_DISCOUNT	signed numeric(4, 4)	
C_BALANCE	signed numeric(12, 2)	
C_YTD_PAYMENT	signed numeric(12, 2)	
C_PAYMENT_CNT	numeric(4)	
C_DELIVERY_CNT	numeric(4)	
C_DATA	variable text, size 500	*Miscellaneous information*

Primary Key: (C_W_ID, C_D_ID, C_ID)

(C_W_ID, C_D_ID) Foreign Key, references (D_W_ID, D_ID)

HISTORY Table Layout

Field Name	Field Definition	Comments
H_C_ID	96,000 unique IDs	
H_C_D_ID	20 unique IDs	
H_C_W_ID	2*W unique IDs	
H_D_ID	20 unique IDs	
H_W_ID	2*W unique IDs	
H_DATE	date and time	
H_AMOUNT	signed numeric(6, 2)	
H_DATA	variable text, size 24	*Miscellaneous information*

Primary Key: none

(H_C_W_ID, H_C_D_ID, H_C_ID) Foreign Key, references (C_W_ID, C_D_ID, C_ID)

(H_W_ID, H_D_ID) Foreign Key, references (D_W_ID, D_ID)

Comment: Rows in the History table do not have a primary key as, within the context of the benchmark, there is no need to uniquely identify a row within this table.

Note: The TPC-C application does not have to be capable of utilizing the increased range of C_ID values beyond 6,000.

NEW-ORDER Table Layout

Field Name	Field Definition	Comments
NO_O_ID	10,000,000 unique IDs	
NO_D_ID	20 unique IDs	
NO_W_ID	2*W unique IDs	

Primary Key: (NO_W_ID, NO_D_ID, NO_O_ID)

(NO_W_ID, NO_D_ID, NO_O_ID) Foreign Key, references (O_W_ID, O_D_ID, O_ID)

ORDER Table Layout

Field Name	Field Definition	Comments
O_ID	10,000,000 unique IDs	
O_D_ID	20 unique IDs	
O_W_ID	2*W unique IDs	
O_C_ID	96,000 unique IDs	
O_ENTRY_D	date and time	
O_CARRIER_ID	10 unique IDs, or null	
O_OL_CNT	numeric(2)	*Count of Order-Lines*
O_ALL_LOCAL	numeric(1)	

Primary Key: (O_W_ID, O_D_ID, O_ID)

(O_W_ID, O_D_ID, O_C_ID) Foreign Key, references (C_W_ID, C_D_ID, C_ID)

ORDER-LINE Table Layout

Field Name	Field Definition	Comments
OL_O_ID	10,000,000 unique IDs	
OL_D_ID	20 unique IDs	
OL_W_ID	2*W unique IDs	
OL_NUMBER	15 unique IDs	
OL_I_ID	200,000 unique IDs	
OL_SUPPLY_W_ID	2*W unique IDs	
OL_DELIVERY_D	date and time, or null	
OL_QUANTITY	numeric(2)	
OL_AMOUNT	signed numeric(6, 2)	
OL_DIST_INFO	fixed text, size 24	

Primary Key: (OL_W_ID, OL_D_ID, OL_O_ID, OL_NUMBER)

(OL_W_ID, OL_D_ID, OL_O_ID) Foreign Key, references (O_W_ID, O_D_ID, O_ID)

(OL_SUPPLY_W_ID, OL_I_ID) Foreign Key, references (S_W_ID, S_I_ID)

ITEM Table Layout

Field Name	Field Definition	Comments
I_ID	200,000 unique IDs	*100,000 items are populated*
I_IM_ID	200,000 unique IDs	*Image ID associated to Item*
I_NAME	variable text, size 24	
I_PRICE	numeric(5, 2)	
I_DATA	variable text, size 50	*Brand information*

Primary Key: I_ID

STOCK Table Layout

Field Name	Field Definition	Comments
S_I_ID	200,000 unique IDs	*100,000 populated per warehouse*
S_W_ID	2*W unique IDs	
S_QUANTITY	signed numeric(4)	
S_DIST_01	fixed text, size 24	
S_DIST_02	fixed text, size 24	
S_DIST_03	fixed text, size 24	
S_DIST_04	fixed text, size 24	
S_DIST_05	fixed text, size 24	
S_DIST_06	fixed text, size 24	
S_DIST_07	fixed text, size 24	
S_DIST_08	fixed text, size 24	
S_DIST_09	fixed text, size 24	
S_DIST_10	fixed text, size 24	
S_YTD	numeric(8)	
S_ORDER_CNT	numeric(4)	
S_REMOTE_CNT	numeric(4)	
S_DATA	variable text, size 50	*Make information*

Primary Key: (S_W_ID, S_I_ID)

S_W_ID Foreign Key, references W_ID

S_I_ID Foreign Key, references I_ID