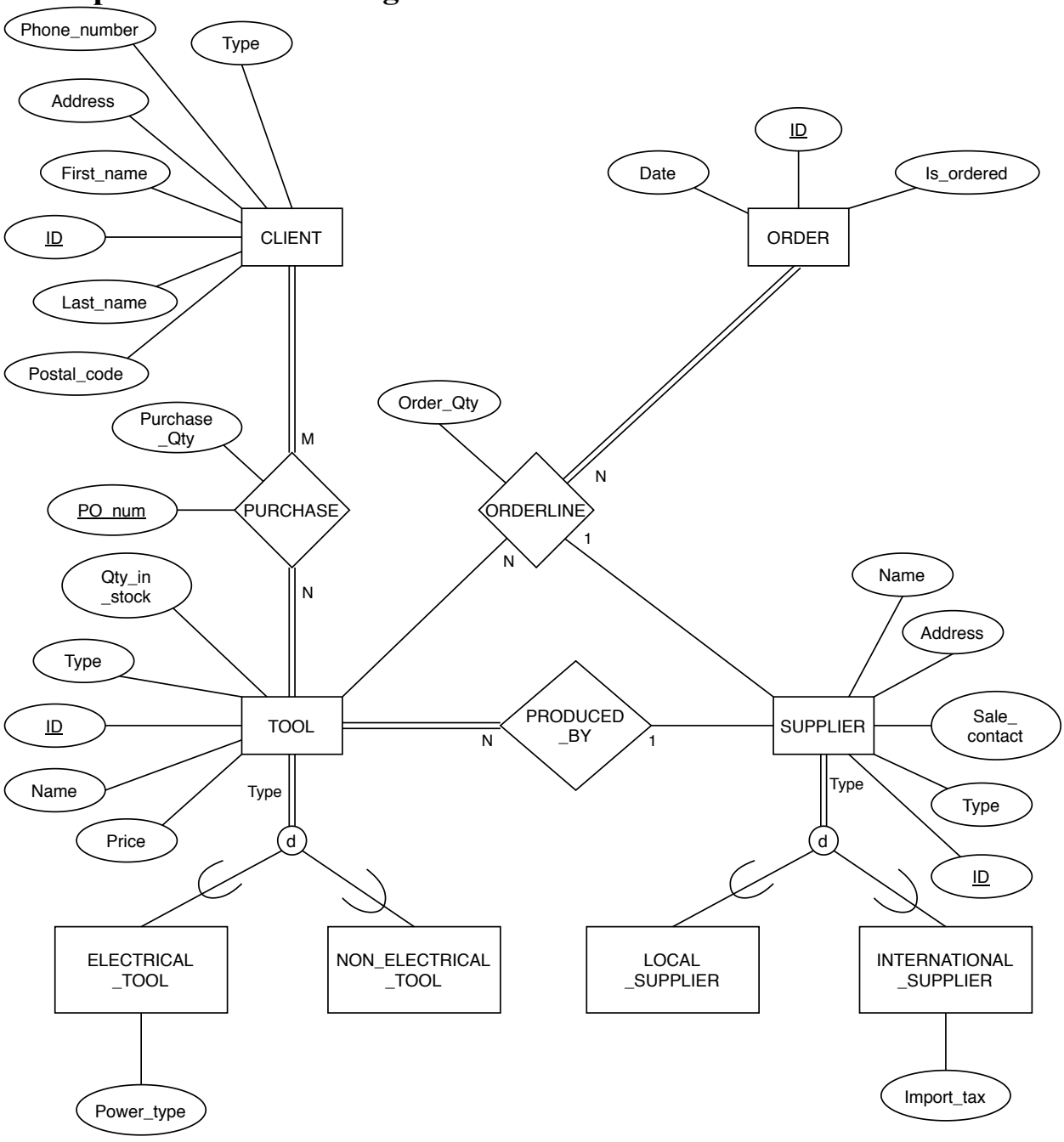
ENSF 608 Project

Completed by: Tong Xu, Michael Lasby
Due Date: Wednesday, Nov 16, 2020, at 11:59 PM

Conceptual Database Design



Design Explanation

From the software requirement, we identified four entities: TOOL, SUPPLIER, ORDER, and CLIENT. TOOL is identified by its key attribute ID, it also has simple attributes including Type, Name, Qty_in_stock, and Price. TOOL can be furthered grouped into ELECTRICAL_TOOL and NON_ELECTRICAL_TOOL for an attribute-defined specialization (based on Type). This is a total disjoint specialization. ELECTRICAL_TOOL and NON_ELECTRICAL_TOOL inherits the attributes from TOOL; ELECTRICAL_TOOL also have a local attribute Power_type.

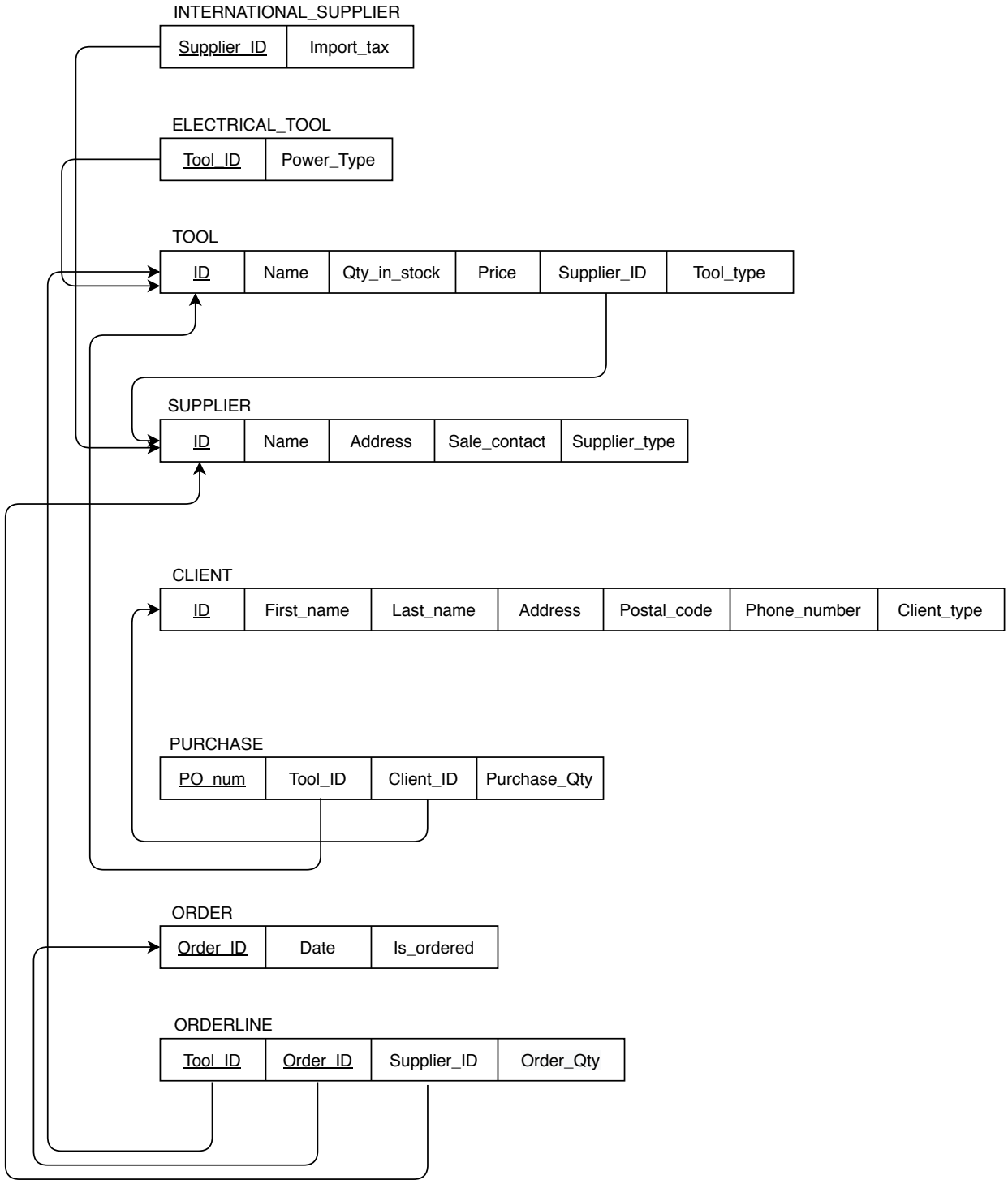
SUPPLIER is identified by its key attribute ID, as well as simple attributes Type, Name, Address, and Sale_contact. SUPPLIER can be further grouped into LOCAL_SUPPLIER and INTERNATIONAL_SUPPLIER for an attribute-defined specialization (based on Type). This is a total disjoint specialization. LOCAL_SUPPLIER and INTERNATIONAL_SUPPLIER inherits the attributes from SUPPLIER; INTERNATIONAL_SUPPLIER also have a local attribute Import_tax.

Every TOOL item is manufactured by a SUPPLIER, and a SUPPLIER can manufacture multiple TOOL items, making it a 1: N relationship between TOOL and SUPPLIER. TOOL have total participation in this relationship. SUPPLIER has partial participation as they may exist in the database because of old merchandise that the shop carries.

ORDER is identified by its key attribute ID, as well as a simple attribute Date and Is_ordered. There is a n-ary relationship ORDERLINE between TOOL, SUPPLIER, and ORDER; it has the attribute Order_Qty. TOOL and SUPPLIER have partial participation (only participate in the relationship if item quantity is low), but ORDER must participate in the ORDERLINE relationship (ORDER is created when restock is required). The cardinality is N:N:1 for TOOL:ORDER:SUPPLIER (there is a single SUPPLIER for each TOOL).

CLIENT is identified by its key attribute ID, as well as simple attributes First_name, Last_name, Address, Postal_code, Phone_number, and Type (Residential or Commercial). The same TOOL item can be purchased by multiple CLIENT and a CLIENT can purchase multiple TOOL items at once, making it a M:N relationship between TOOL and CLIENT. Both the CLIENT and TOOL have total participation in this relationship because CLIENT information is only saved onto the database when they make a purchase and a purchase consist of sales of at least one TOOL items. The relationship PURCHASE is identified by key attribute PO_number (a CLIENT can purchase the same TOOL items multiple times) and simple attribute Purchase_Qty.

Logical Database Design



Design Explanation

Key entity for relationship entity PURCHASE is PO_num. While it is conventional for the key attribute to be a relationship attribute, a CLIENT can make purchase the same TOOL item on different dates, and so we need a PO_num (purchase order number) to distinct the tuples.

We used 8A for mapping the specialization to avoid null values.g