

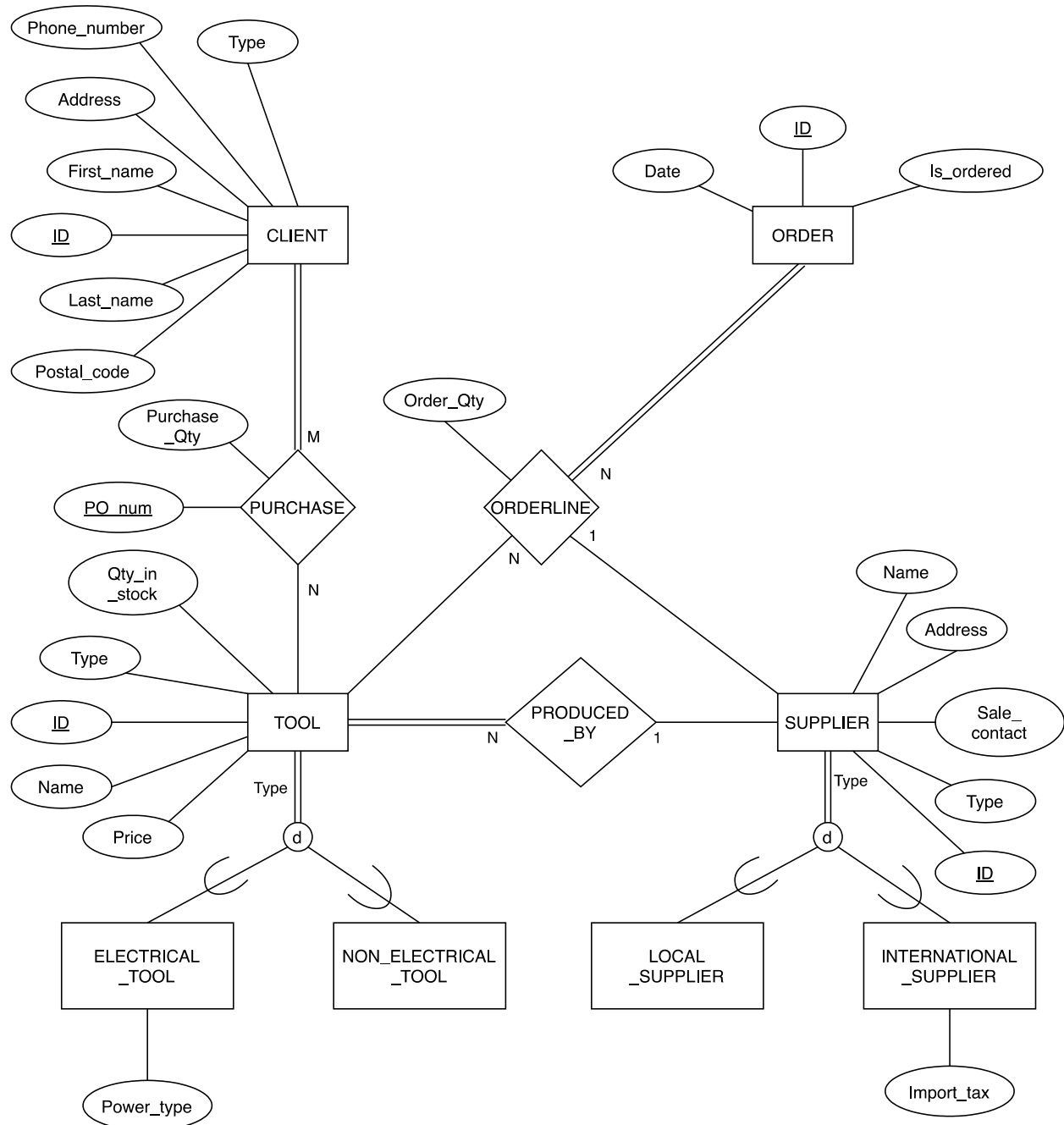
ENSF 608 Project

Conceptual & Logical Design

Completed by: Tong Xu, Michael Lasby

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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 further specialized 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. We have assumed that each TOOL ID is unique, for example, a SKU number. We also have assumed that each tool entity has a single supplier.

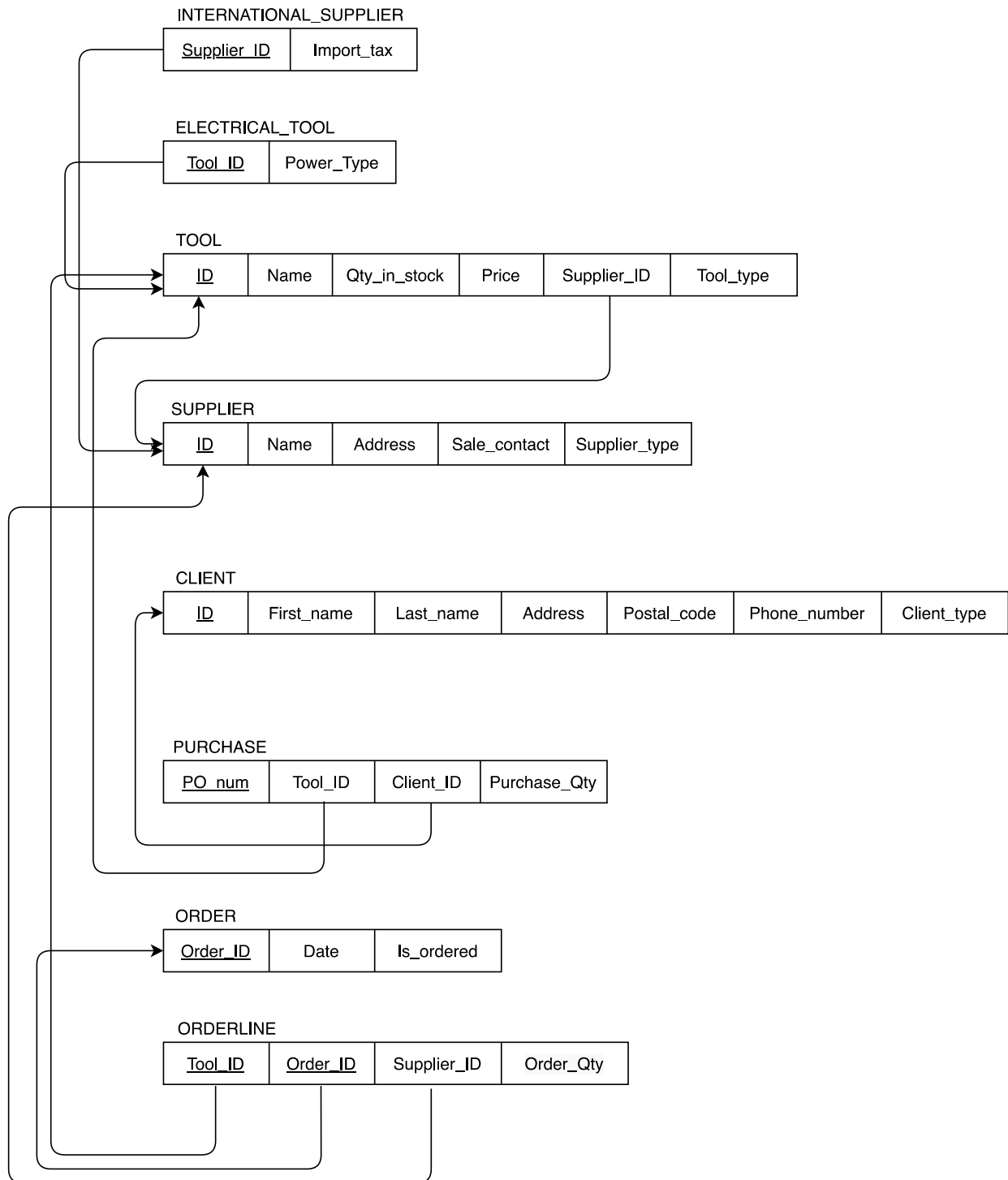
SUPPLIER is identified by its key attribute ID and includes simple attributes Type, Name, Address, and Sale_contact. SUPPLIER can be further grouped into LOCAL_SUPPLIER and INTERNATIONAL_SUPPLIER for an attribute-defined specialization (based on Type). This is a total disjoint specialization. LOCAL_SUPPLIER 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, creating a N:1 relationship between TOOL and SUPPLIER. TOOL has 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 and includes simple attributes 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 the first request to restock is received on a given day). 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 and includes 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. CLIENT has a total participation in this relationship because CLIENT information is only saved onto the database when they make a purchase. 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 attribute 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 differentiate between the tuples.

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