3NF justification:

1NF: There are no composite of multi-valued attributes in logical design, such that every attribute is atomic.

2NF: All non prime attributes are fully functionally dependent on the primary key of every table. Let us show that this is in 2NF by categorizing the tables by tables with primary keys of one attribute and tables with primary keys of multiple attributes. The tables with primary keys of one attribute is 2NF trivially, it is not possible to have a key to represent non-prime attributes if you remove the only prime attribute. For multi-attribute primary keys in this database, the keys are fully functionally dependent because they all fall into subcategories: N:M relationship relation, weak entities, specialization/generalization/subset, and multivalued attributes. Each subcategory needs multiple attributes for the primary key or else it would not fully identify the tuple (or the non-prime attributes).

3NF: This table is in 3NF because it's in 2NF and every non-prime attribute is non-transitively dependent on every key. All of the simple attributes are non-unique such that a simple attribute can not be functionally dependent on other simple attributes. Therefore, there is no denormalization in this design.

	Primary key	Foreign Key(s)
Employees	id	reportsTo(employees)
Orders	orderNum, customerID	customerID (customer)
Customer	registrationId	N/A

Stores	state, city, zip	managerID(employees)
Online Store	url, state, city, zip	state(stores), city(stores), zip(stores)
Merchandise	brand, model	N/A
Online Order	orderNum, CustomerId	orderNum(orders), customerId(orders)
MerchandiseType	serial	brand(merchandiseType), model(merchandiseType), state(stores), city(stores), zip(stores), orderNum(orders), customerId(orders)
Phone	brand, model	brand, model (merchandiseType)
Laptop	brand, model	brand, model (merchandiseType)
Desktop	brand, model	brand, model (merchandiseType)
Colors	brand, model, color	brand, model (phone)
Carriers	brand, model, carrier	brand, model (phone)
Works At	state, city, zip, id	state, city, zip (store) id (employee)
Reviews	reviewId	customerId(customer), brand, model (merchandiseType)