

# *SUPER DUPER* MICRO BREWERY

## 1. Requirements Analysis

### **Introduction**

#### Purpose

The main objective for any micro brewery is to brew tasty beers. Usually, a microbrewery brews multiple types of beers that use different ingredients, have different brew times, and result in beers with different attributes such as alcohol percentage and bitterness. Once brewed, each batch of beer needs to be packaged into cases before shipment to customers. The brewing, packaging, and sales processes require some machinery and equipment that also require staff to operate and maintain. Finally, throughout this process, the inventory of beer, ingredients, and equipment need to be updated and monitored. This database system is designed to help the Super Duper Microbrewery manage the information for each of these objectives.

#### Scope and Special Requirements

Our database for the Super Duper Microbrewery is for a single location, not a network of breweries. Shipping/delivery is outsourced so is not accounted for in this database. Purchasing (of ingredients, equipment, and all other resources) is externally managed and thus not included in our scope. The same can be said for payment, hiring, leave management, and other administrative processes.

#### Terminology

ABV - Alcohol By Volume

IBU - International Bitterness Units

Beer - Fun Juice

#### Resources

Draw.io and Google Docs were also used as resources for this project.

## Database description

### Entities and their attributes:

The following entities will be stored in tables of a relational database:

**Beer:** A type of beer, determined by its inputs: ingredients and brew time. The resulting beer will have attributes of: name, alcohol by volume (ABV), international bitterness units (IBU).

*[Example: Cranberry Sour Ale, 6.0%, 15 IBU, "Hops-1kg, high-acidity yeast-0.05kg, sugar-0.05kg, cranberries-0.2kg.", 42 days]*

**Batch:** Beers are brewed in batches, each batch is a weak entity can be identified by a unique batch number for the type of beer (the foreign key). Other attributes of a batch are the batch size and the date made.

**Case:** Each batch is packaged into cases (of bottles) for sale to customers. We store the case price and the case size.

**Ingredients:** An ingredient is representative of the name of what ingredients are present in each type of beer, akin to what would be printed on the back of an ingredients label for each bottle.

**Inventory:** The inventory is an overarching entity that contains the name and amount of how many ingredients, equipment, batches, and cases of beer are being held in the microbrewery itself. Each inventory item is uniquely identified by the name of the stock, and the amount in stock is also recorded.

**Equipment:** Special equipment used for the brewing of beer that needs to be maintained by the maintenance staff and regularly inspected to ensure that beer can be brewed correctly.

**Employee:** Employees exist in the database to be linked to other entities and track which employee interacts with which other items. Employees are identified by a unique employee ID, other attributes include name, salary, address, and date of start of employment. The subclasses of employee are detailed below.

**Brewer:** The brewer is a subclass of employee that must be linked to each batch of beer to know who brewed what beer on which dates.

**Sales:** The sales employee interacts with customers and secures business deals, and in the database needs to be linked to which customers the sales employee is able to secure.

**Maintenance:** The maintenance staff is an employee who is in charge of maintaining all the equipment pertinent to the brewing of beer, and performs regular inspections to ensure the quality of all piece of equipment.

**Customer:** The customer is a person who buys cases of beer from the microbrewery, and has their information stored in the database. Customers are identified by a unique customer ID, other attributes include name, email address, and delivery address.

Relationships:

**Batch of:** A batch consists of entirely one type of beer, so this relationship is used to describe what beer each batch is made of.

**Case of:** Every batch of beer can fill many cases of beer, but every case can only consist of one batch of beer.

**Recipe:** Every type of beer is made of its own unique ingredients.

**Ingredients\_Stored In\_Inventory:** Ingredients that are used in recipes need to be tracked to see how much of each ingredient is being held in the micro brewery's inventory.

**Has:** Equipment needs to be stored in the inventory as well, to keep track of what is currently available to be used by the brewers.

**Maintains:** The maintenance staff needs to maintain the equipment to make sure it's running up to par, and also keep track of the latest inspection date to know when each equipment needs to be inspected next.

**Add:** Sales representatives need to add customers to the database after they secure business deals, and customers need to also be paired to the sales representative that partnered them.

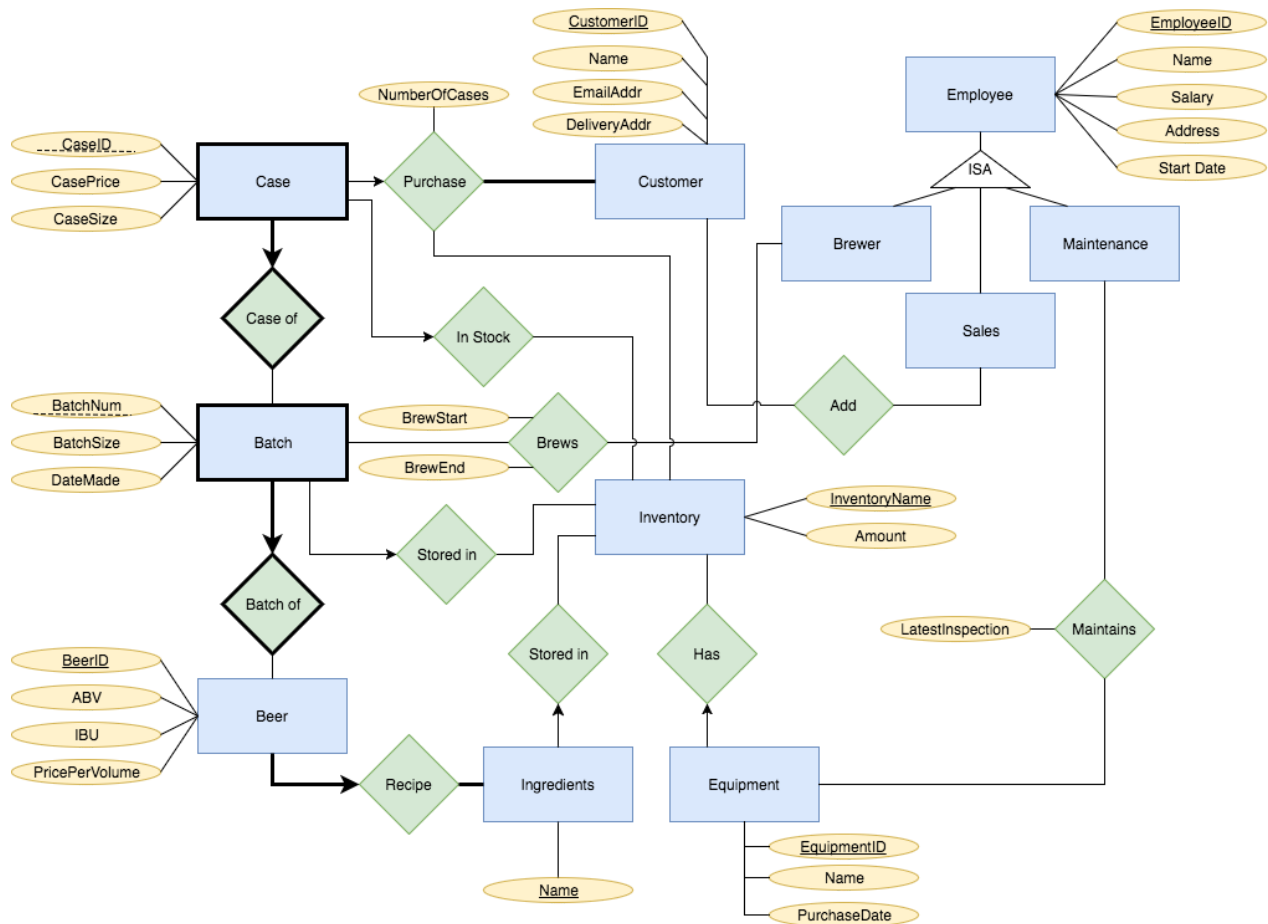
**Brews:** Brewers need to be paired with batches as they are made, and also to know the brew start and end date to know the age of the beer.

**Batch\_Stored In\_Inventory:** Every batch needs to be kept track of in the inventory to know how much is in each batch still, and to know how many barrels exist in the microbrewery.

**In stock:** Cases of beer need to be inventoried to know how much is available in the microbrewery to be sold and consumed.

**Purchase:** Every transaction made by customers needs to be tracked to know which cases of beer and how many are being given to a customer at a time.

## 2. E/R Diagram



<https://drive.google.com/file/d/1gzHSxmmo6gCyBaRgV5FSTvVtE5reG-PR/view?usp=sharing>

## 3. Relations

### Entities:

Beer(BeerID, ABV, IBU, pricePerVolume)

Ingredients(Name)

Inventory(InventoryName, Amount)

Equipment(EquipmentID, Name, PurchaseDate)

Employee(EmployeeID, Name, Salary, Address, Start Date)

Brewer(EmployeeID) (EmployeeID ref Employee)

Sales(EmployeeID) (EmployeeID ref Employee)

Maintenance(EmployeeID) (EmployeeID ref Employee)

Customer(CustomerID, Name, EmailAddress, DeliveryAddress)

**Weak entities:**

Batch(BatchNum, BatchSize, DateMade, BeerID) (BeerID ref Beer)

Case(CaseID, CasePrice, CaseSize, BatchNum, BeerID) (BatchNum ref Batch) (BeerID ref Beer)

**Relationships:**

Batch of(BatchNum, BeerID) (BatchNum ref Batch) (BeerID ref Beer)

Case of(CaseID, BeerID) (CaseID ref Case) (BeerID ref Beer)

Recipe(BeerID, Name) (BeerID ref Beer) (Name ref Ingredients)

Ingredients\_stored\_in\_Inventory(InventoryName, Name) (InventoryName ref Inventory) (Name ref Ingredients)

Has(InventoryName, EquipmentID) (InventoryName ref Inventory) (EquipmentID ref Equipment)

Maintains(LaterstInspection, EquipmentID, EmployeeID) (EquipmentID ref Equipment) (EmployeeID ref Employee)

Add(EmployeeID, CustomerID) (EmployeeID ref Employee) (CustomerID ref Customer)

Brews(BrewStart, BrewEnd, EmployeeID, BatchNum, BeerID) (EmployeeID ref Employee) (BatchNum ref Batch) (BeerID ref Beer)

Batch\_stored\_in\_Inventory(BatchNum, BeerID, InventoryName) (BatchNum ref Batch) (BeerID ref Beer) (InventoryName ref Inventory)

In stock(CaseID, BeerID, InventoryName) (CaseID ref Case) (BeerID ref Beer) (InventoryName ref Inventory)

Purchase(NumberOfCases, CustomerID, CaseID, BeerID) (CustomerID ref Customer) (CaseID ref Case) (BeerID ref Beer)

**Notes:**

- A customer must purchase at least one case of beer
- Each case can only be purchased by one customer
- There is only one inventory
- Each case can only be added to one inventory
- Each batch can only be accounted for in one inventory
- Ingredients can only be stored in the one inventory
- Equipment can only be accounted for in one inventory
- A beer has to have a recipe, which has to have at least one ingredient

## 4. Creativity

- Because of the way that beer production is done in batches, there is unique connection between beers and batches that is separate from the way beer is sold in cases
- The inventory entity needs to be robust enough to track all materials used by the microbrewery from the beer itself to
- There's are 3 different employees that will interact with the database in different ways