David Arnold, Kristofer Hoadley, Gabriel Martinez
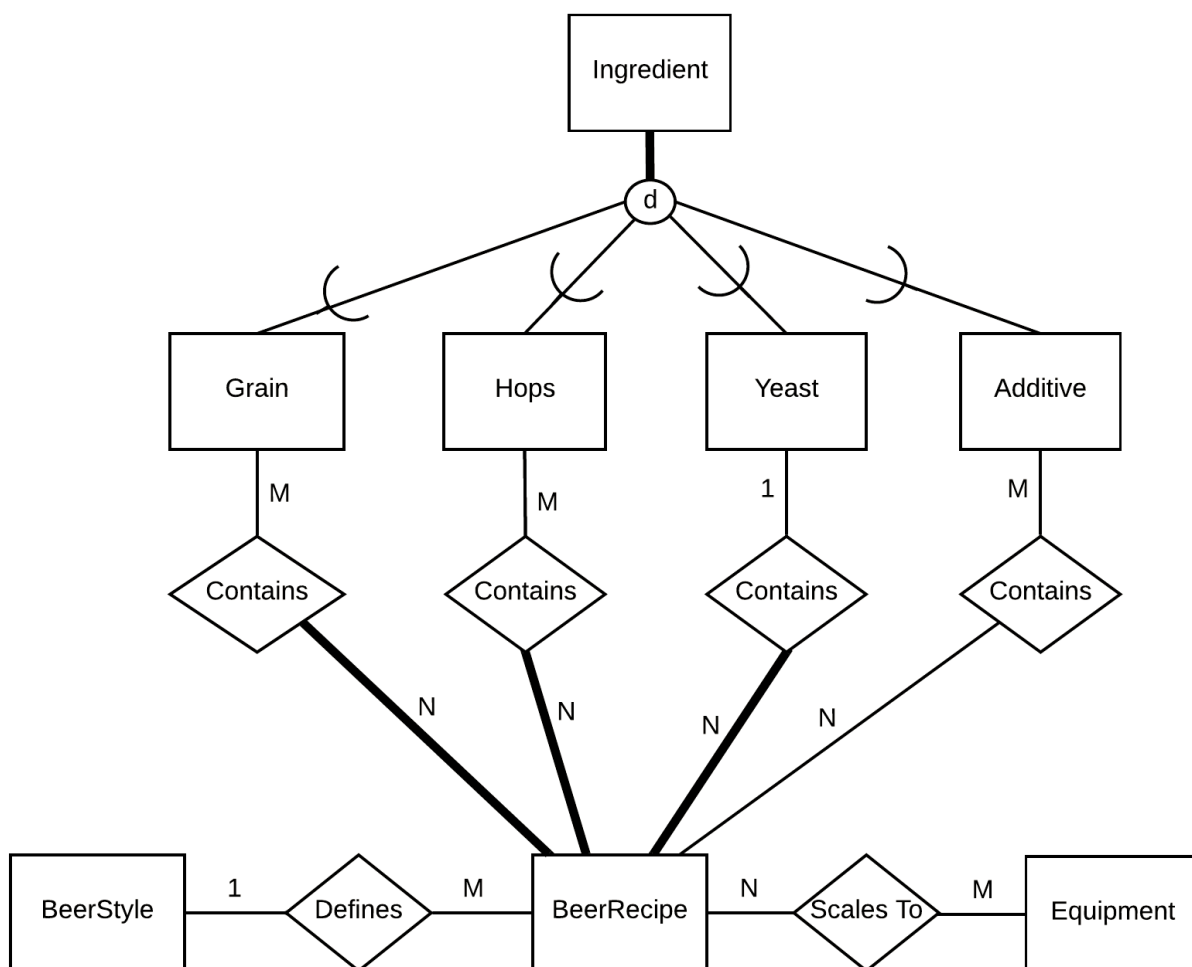SER 222 - ER Modeling - Group Project
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BrewDB Entity Relationship

Database application domain: Provides information on beer brewing recipes. This includes what ingredients are needed, basic information on each ingredient, necessary instructions for someone who is familiar with homebrewing, and the ability to check if a recipe fits a certain style guideline as defined by the Brewers Association. The database application would be able to store information about beer recipes and output expected information about the beer brewed by the recipe, such as bitterness, alcohol content, and color.

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Entity Sets:
1. Ingredient: <u>ingredientID</u>, name, description;
   a. Grain: region, potentialExtract, lovibonds;
   b. Hops: region, alphaAcid, purpose{bitter, aroma}, aroma;
   c. Yeast: brand, region, apparentAttenuation, yeastType{ale, lager};
   d. Additive: use;
2. BeerRecipe: <u>recipeID</u>, name, boilTime, description, instructions;
3. BeerStyle: <u>styleID</u>, name, description, origin, minBitterness, maxBitterness, minColor, maxColor, minABV, maxABV ;
4. Equipment: <u>equipmentID</u>, batchSize, extractEfficiency;

Relationships:
1. Defines: <BeerStyle, BeerRecipe> 1:M Partial/Partial;
2. Contains <BeerRecipe, Hops> N:M Total/Partial amount, exposureTime;
3. Contains <BeerRecipe, Grain> N:M Total/Partial amount;
4. Contains <BeerRecipe, Yeast> N:M Total/Partial;
5. Contains <BeerRecipe, Additive> N:M Partial/Partial amount, exposureTime;
6. Scales To <BeerRecipe, Equipment> N:M Partial/Partial;

Assumptions:
1. Each recipe uses one and only one yeast strain.
2. Each recipe uses at least one grain and at least one hops addition.
3. Batch size is assumed to be 5 gallons. Recipe is scaled if equipment is provided.
4. Providing equipment information is optional.
5. Efficiency of extraction of sugars from grain is 70%. Will scale the output based on user equipment, if provided.
6. Grains are all whole grain, does not allow for malt extract. It is easy to convert a whole grain recipe to malt extract by the user and not a focus of this project.
7. BeerRecipe instructions are optional, they are to provide more detail or clarification for a recipe if needed.
8. The beerRecipe contains hops and additive exposureTime attribute is how many minutes in the boil if greater than zero, at flame out if it is equal to zero, and how many days (absolute value of) dry hopping if less than zero.
9. The amount attribute is measured in lbs for grain, ounces for hops, and grams for additives. Yeast are always added as a single unit, and only 1 per recipe.
10. Ingredient descriptions are optional.
11. Ingredient regions are optional.
12. Hops purpose can be bittering, aroma, or both. It is a set, not an enum.
13. Yeast type can be ale or lager. It is an enum.