

SQL Advanced Queries

Transaction: Functional, with correct isolation level, at least two advanced queries, control structures (e.g., IF statements), and application utility.

```
IF NOT EXISTS (SELECT UserID FROM User WHERE UserName = "username" THEN
    INSERT INTO User
    VALUES("00000", "username1");
END IF;
```

```
UPDATE User
SET UserName = "newusername"
WHERE UserName = "username"
```

```
START TRANSACTION;
```

```
SELECT r.RecipeTitle, r.Ingredients, r.Directions
FROM Recipe r
JOIN Food f ON r.Ingredients LIKE CONCAT('%', f.FoodName, '%')
WHERE f.Category IN (
    SELECT Category
    FROM Food
    GROUP BY Category
    HAVING AVG(Protein) > 15
) LIMIT 15;
```

```
(
SELECT r.RecipeTitle, r.Ingredients, r.Directions
FROM Recipe r
JOIN Food f ON r.Ingredients LIKE CONCAT('%', f.FoodName, '%')
WHERE f.Category = 'Dairy products'
)
INTERSECT
(
SELECT r.RecipeTitle, r.Ingredients, r.Directions
FROM Recipe r
```

JOIN

```
mysql> START TRANSACTION;
Query OK, 0 rows affected (0.00 sec)

mysql>
mysql> SELECT r.RecipeTitle, r.Ingredients, r.Directions
-> FROM Recipe r
-> JOIN Food f ON r.Ingredients LIKE CONCAT('%', f.FoodName, '%')
-> WHERE f.Category IN (
->   SELECT Category
->   FROM Food
->   GROUP BY Category
->   HAVING AVG(Protein) > 15
-> ) LIMIT 15;

+-----+-----+-----+
| RecipeTitle | Ingredients | Directions |
+-----+-----+-----+
| Apple Nut Ring | ["1 1/3 c. oil", "2 c. sugar", "2 eggs", "3 c. flour", "1/4 tsp. salt", "1 tsp. baking soda", "2 tsp. cinnamon", "1 can apple pie filling", "1 c. chopped pecans"] | ["Beat together first three ingredients.", "Mix together in separate bowl all dry ingredients.", "Add oil mixture to dry mixture.", "Puree apple pie filling and add to mixture along with chopped pecans.", "Bake at 350\u00b0 in greased and floured tube pan for 1 hour and 15 minutes.", "Freezes well."] |
| Creole Green Beans | ["1 green pepper, chopped", "1 onion, chopped", "2 tbsp. bacon drippings", "1 tbsp. flour", "1 tsp. salt", "1 tsp. sugar", "dash of paprika", "1 (16 oz.) can tomatoes", "1 (16 oz.) can green peas"] | ["Saute green pepper and onion in hot bacon drippings until tender. Add flour, salt, sugar and paprika.", "Stir until blended. Add tomatoes and simmer for about 15 minutes.", "Stir in green peas; heat through and serve."] |
| Banana Bread | ["2 eggs", "3 bananas, cut in small pieces", "1 stick butter, cut in small pieces", "1 c. sugar", "1 3/4 c. flour", "3/4 tsp. soda", "1 1/4 tsp. cream of tartar", "1 c. chopped nuts (optional)"] |
```

Food f ON r.Ingredients LIKE CONCAT('%', f.FoodName, '%')
WHERE f.Category LIKE '%Seafood'
) LIMIT 15;

COMMIT;

Description: This transaction combines some of our advanced queries together to perform them together and see for the success of both. Our first query uses WHERE and GROUPBY to select recipes where average protein is > 15. We also select recipes that are dairy products, intersected with seafood foods. Running both ours our

Pictures:

```

| Directions
+-----+-----+-----+
| Apple Nut Ring | ["1 1/3 c. oil", "2 c. sugar", "2 eggs", "3 c. flour", "1/4 tsp. salt", "1 tsp. baking soda", "2 tsp. cinnamon", "1 can apple pie filling", "1 c. chopped pecans"] | ["Beat together first three ingredients.", "Mix together in separate bowl all dry ingredients.", "Add oil mixture to dry mixture.", "Puree apple pie filling and add to mixture along with chopped pecans.", "Bake at 350\u00b0 in greased and floured tube pan for 1 hour and 15 minutes.", "Freezes well."] |
| Creole Green Beans | ["1 green pepper, chopped", "1 onion, chopped", "2 tbsp. bacon drippings", "1 tbsp. flour", "1 tsp. salt", "1 tsp. sugar", "dash of paprika", "1 (16 oz.) can tomatoes", "1 (16 oz.) can green peas"] | ["Saute green pepper and onion in hot bacon drippings until tender. Add flour, salt, sugar and paprika.", "Stir until blended. Add tomatoes and simmer for about 15 minutes.", "Stir in green peas; heat through and serve."] |
| Banana Bread | ["2 eggs", "3 bananas, cut in small pieces", "1 stick butter, cut in small pieces", "1 c. sugar", "1 3/4 c. flour", "3/4 tsp. soda", "1 1/4 tsp. cream of tartar", "1 c. chopped nuts (optional)"] |
```

```
|
| Cornbread Salad | ["2 pkg. jiffy cornbread mix, cooked, cooled and crumbled", "1 1/2 c. chopped onion", "1 medium green pepper, chopped", "3 med  
ium firm tomatoes", "8 to 10 slices bacon, cooked, drained and crumbled", "1 1/2 c. cubed light velveeta cheese", "1 1/2 c. salad dressing or mayo", "2 tbsp. mus  
tard", "salt and pepper to taste"] | ["Mix well and let set overnight.", "Will make 2 quarts and 1 pint.", "You can cut this in half."]"
Ham And Rice Casserole,["1 can cream of mushroom soup", "1/2 c. milk", "1 1/3 c. precooked rice", "1 c. diced ham"]

|
| Corn Okra Casserole | ["1 green pepper, sliced", "1 onion, sliced", "1/2 lb. bacon, fried and crumbled", "1 can whole kernel corn, drained", "1 can  
creamed corn", "1 can okra and tomatoes or frozen okra or fresh smothered okra (much better)", "8 to 10 oz. grated cheddar cheese"]
| ["Put in buttered baking dish a layer of okra, layer of creamed corn, layer of onion, green pepper, bacon and 1  
ayer of whole kernel corn.", "Top with grated cheese.", "Cover and bake for 1 hour at 375\u00b0. Serves 6 to 8."]"
Apple Crisp Pie,["1 graham cracker crust", "1 large egg yolk", "5 1/2 c. sliced apples", "1 tbsp. lemon juice", "1/2 c. sugar", "1/4 c. light brown sugar", "3 t  
bsp. all-purpose flour", "1/4 tsp. salt", "1/2 tsp. ground cinnamon", "1/4 tsp. ground nutmeg", "3/4 c. all-purpose flour", "1/4 c. sugar", "1/4 c. light brown s  
ugar", "1/3 c. butter"]
| Clam Chowder | ["6 to 8 lean slices diced bacon", "2 c. diced, cooked potatoes", "1 c. diced onion", "2 cans minced clams, drained (reserve 1  
c. clam juice)", "2 c. half and half", "1 c. water", "2 tbsp. butter", "salt and pepper to taste"]
| ["Dice bacon and onion. Saute in soup pot. Add remaining ingredients.", "Heat; do not boil.", "May be thickened  
, if necessary."]"
Easy Cranberry Relish,["2 small pkg. fresh cranberries", "1 c. sugar (or more if you like)", "1 whole orange", "walnuts"]
```

```
|
| Brown Gravy | ["4 tbsp. bacon drippings", "1 tsp. salt", "3 tbsp. self-rising flour", "2 c. whole milk"]
| ["Add bacon grease, salt and flour.", "Stir until brown.", "Add milk slowly, stirring until thickens.", "Serves  
8."]"
```

```
Italian Pasta And Bean Soup(Pasta E Fagioli),["1 clove garlic, crushed", "3 tbsp. oil", "1 (16 oz.) can tomatoes or 2 c. chopped fresh tomatoes", "2 (13 3/4 oz.  
) cans beef broth", "1 tbsp. minced parsley", "1/2 tsp. salt", "1/4 tsp. fresh ground pepper", "1/8 tsp. basil", "1/8 tsp. oregano", "1 (16 oz.) can white beans,  
drained", "1/2 lb. ditalini pasta or elbow pasta, cooked \al dente\"", "grated cheese"]
|
| Broccoli-Raisin Salad | ["1 bunch broccoli heads", "2 stems green onion (single stalks) or 1/2 medium whole onion", "1/4 c. sunflower seeds", "1/2 c.  
raisins", "6 slices bacon, fried and cooled", "1/2 c. mayonnaise", "2 tbsp. vinegar", "1/8 c. sugar"]
| ["Mix broccoli, onion, sunflower seeds, raisins and bacon."]"
"Low-Fat "French Fries"
```

```
|
| Broccoli Cauliflower Salad | ["1 head broccoli, chopped", "1/2 head cauliflower, chopped", "red onion, chopped to taste", "shredded low-fat cheese", "bacon  
bits", "1 c. fat-free miracle whip", "3 pkg. sweet 'n low", "2 tbsp. vinegar"]
| ["Mix together the Miracle Whip, Sweet 'N Low and vinegar.", "Pour over chopped vegetables.", "Add bacon bits a  
nd cheese.", "Best if chilled a couple of hours before serving."]"
Pepper Steak And Rice,["1 pkg. round steak", "green onion", "1 jar sliced mushrooms", "1 hot pepper", "3 tbsp. soy sauce", "1 beef bouillon cube", "1 small box  
rice"]
```

```
|
| Blt Bites | ["16 to 20 cherry tomatoes", "1 lb. bacon, cooked and crumbled", "1/2 c. mayonnaise", "1/3 c. chopped green onion", "3 tbsp. g  
rated parmesan cheese", "2 tbsp. parsley"]
| ["Cut a thin slice off of each tomato top.", "Scoop out pulp. Invert the tomatoes on paper towel to drain."]"
Tostado Casserole,["1 lb. ground beef", "15 oz. can tomato sauce", "1 envelope taco seasoning mix", "2 1/2 c. corn chips", "15 1/2 oz. can refried beans", "2 oz  
. (1/2 c.) shredded cheddar cheese"]
```

```
|
| Beans, Beans, Beans! | ["10 slices bacon", "1 c. chopped onion", "1 large garlic clove, chopped", "1 (1 lb.) can butter beans, drained", "1 (1 lb.) c  
an lima beans, drained", "1 (1 lb.) can kidney beans, drained", "1 (15 oz.) can pork and beans, not drained", "3/4 c. brown sugar", "1/2 tsp. dry mustard", "1/2
```

```
c. white wine vinegar", "1 tsp. ground pepper"] | ["Preheat oven to 350\u00b0.", "Brown bacon in skillet.", "Drain, crumble and set aside.", "Add onion and garli  
c to bacon drippings in pan; saute until onion is soft.", "Combine all ingredients in a casserole dish and bake for 1 1/2 hours."]"
Butter Creams,["3 oz. cream cheese", "1/2 c. margarine", "4 c. powdered sugar", "1 1/2 tsp. vanilla", "melting chocolate"]
```

```
|
| Baked Beans | ["2 slices bacon", "3 tbsp. chopped onion", "1/2 c. brown sugar", "3 tbsp. cornstarch", "2 tbsp. mustard", "1/2 c. catsup", "1  
(1 lb. 12 oz.) can pork and beans"]
| ["Fry onion and bacon.", "Add remaining ingredients. Bake in bean pot at 350\u00b0 for 35 to 40 minutes."]"
Cranberry Relish,["1 lb. cranberries", "1 c. raisins", "1 2/3 c. sugar", "1 c. water", "1 1/2 tsp. ginger", "1 tsp. cinnamon", "1/2 tsp. cloves", "1/2 c. celery  
", "1 c. chopped apple"]
```

```
|
| Bacon-Flavored Chicken Breasts | ["8 boneless chicken breasts", "1 jar chipped beef", "8 slices bacon", "1 can cream of mushroom soup", "1 c. sour cream"]
| ["Sprinkle chipped beef in bottom of baking dish.", "Wrap chicken breasts with bacon.", "Mix sour cream and sou  
p together and pour over chicken.", "Bake at 350\u00b0 for about 1 hour."]"
Decadent Fudge Cake,["1 c. butter or margarine, softened", "1 1/2 c. sugar", "4 eggs", "1/2 tsp. baking soda", "1 c. buttermilk", "2 1/2 c. all-purpose flour",  
"1 1/2 c. semi-sweet chocolate mini morsels, divided", "2 (4 oz.) bars sweet baking chocolate, melted and cooled", "1/3 c. chocolate syrup", "2 tsp. vanilla extr  
act", "4 oz. white chocolate, chopped", "2 tbsp. plus 2 tsp. shortening, divided", "chocolate and white chocolate leaves (optional)"] |
| Bacon Nuts | ["1 can water chestnuts, drained (8 oz.)", "1/4 c. soy sauce", "1/2 lb. bacon"]
```

```
|
| ["Soak water chestnuts in soy sauce for 4 hours.", "Wrap each chestnut in a 1/2 strip of bacon and secure with  
a toothpick. Broil until brown."]"
Pina Colada Cake,["1 box duncan hines butter cake mix", "4 eggs", "1/2 c. oil", "1 c. water", "1 can cream of coconut", "1 can crushed pineapple (optional)", "1  
large cool whip", "flaked coconut"]
```

```
|
```



```
|
| Battered Fried Fish | ["1 (1 lb.) haddock", "salt", "1 egg", "1 1/4 c. evaporated milk", "1 c. flour", "2 tsp. baking powder", "1/4 c. cornmeal"]
|
| ["Cut haddock", "into serving-size pieces, sprinkle lightly with salt.", "Mix 1/4 teaspoon salt with remaining ingredients, dip haddock pieces into", "egg mixture.", "Fry in deep fat at 375\u00b0 for 5 minutes or until brown."]
Vanilla Pudding,["3/4 c. sugar", "2 c. milk, scalded", "5 round tbsp. flour", "2 eggs, slightly beaten", "dash of salt", "1 tbsp. butter or margarine", "1 tsp. vanilla"]

| Cheesy Salmon Loaf | ["1 can salmon, drained and deboned", "1/3 c. celery, chopped", "1/3 c. onion, chopped", "3 eggs", "1 c. cheddar cheese, shredded", "1 tbsp. lemon juice", "1/2 tsp. salt", "1/8 tsp. pepper", "1/2 c. bread crumbs", "1/2 c. mayonnaise"]
|
| ["Combine together all ingredients.", "Bake in a loaf pan at 350\u00b0 for about 45 minutes."]
Tuna Marbels,["1 (8 oz.) can tuna, drained", "1 tbsp. minced onion", "1 tsp. lemon juice", "1/2 tbsp. mustard", "1 egg", "1/2 c. oatmeal", "cracker or bread crumbs"]

| Crab Meat Bisque | ["3 cans cream of celery soup", "3 cans milk", "1/2 tsp. old bay seasoning", "1 box cooked, chopped broccoli", "1 stick butter", "1 lb. crab meat"]
|
| ["Mix and heat ingredients and add crab meat at the end."]
Virginia'S Christmas Salad,["1 (3 oz.) cherry jell-o", "1 c. boiling water", "1/4 c. nuts", "1/2 c. chopped celery", "1 can whole cranberry sauce", "1 c. sour cream", "1/2 c. diced apple"]
```

```
|
| Crab Mold(Dip) | ["1/4 c. mayonnaise", "1 can cream of mushroom soup", "6 oz. cream cheese", "1 envelope unflavored gelatin", "3 tbsp. cold water", "3 green onions, chopped", "1/4 c. chopped celery", "1 small jar chipped pimentos", "dash of salt and pepper or seasoning of choice (Mrs. Dash is good)", "1 (7 oz.) can crab meat"]
|
| ["Cream mayonnaise and cream cheese together.", "Warm soup in small pan.", "Dissolve gelatin in water and add to soup.", "Add onions, celery, pimentos and seasonings into cream cheese mixture.", "Pour soup into cream cheese mixture; stir well.", "Add crab; mix well. Pour into a mold.", "Refrigerate 1 hour or more.", "Can serve from bowl like a dip or loosen by setting mold in hot water until side of mixture loosens from mold pan, then turn onto dish and serve with crackers or vegetables."]
Fruit Dip,["3 oz. pkg. instant vanilla pudding", "8 oz. cool whip", "1 tsp. cinnamon", "1/2 tsp. cloves", "1/2 tsp. nutmeg", "2 to 3 tbsp. amaretto"]

| Crab Spread(Appetizer) | ["8 oz. cream cheese", "1 tbsp. mayonnaise", "1 tbsp. worcestershire sauce", "1 tsp. lemon juice", "garlic to taste", "parsley flakes", "1 lb. cooked shrimp or crab flakes", "cocktail sauce"]
|
| ["Mix all ingredients, except parsley, shrimp (or crab) and cocktail sauce.", "Spread on glass plate.", "Top with cocktail sauce and shrimp (or crab); sprinkle with parsley.", "Serve with chips or crackers."]
Crispy Baked Onion Rings,["2 large sweet onions", "1 (7 oz.) pkg. corn flakes", "1 tsp. seasoned salt", "2 tsp. sugar", "1 tsp. paprika", "1 c. egg substitute"]

| Crabmeat Au Gratin | ["1 can cream of shrimp soup", "1/2 can milk (use soup can)", "1 lb. faux crabmeat", "4 c. celery, chopped", "1/2 c. green pepper, chopped", "2 pimentos, chopped", "2 tbsp. onions, chopped", "1/3 c. slivered almonds", "4 hard-cooked eggs, chopped", "1 c. shredded sharp cheddar cheese", "buttered bread crumbs"]
|
| ["Mix everything together, except cheese and crumbs, in casserole.", "Top with cheese, then with bread crumbs.", "Bake at 350\u00b0 for 35 minutes."]
Hobo Stew,["2 lb. ground beef", "1/4 c. catsup", "1/4 c. mustard", "1/4 c. barbecue sauce", "2 (16 oz.) cans sliced potatoes, drained", "2 (16 oz.) cans pork and beans", "1 (16 oz.) can whole kernel corn, drained", "2 tbsp. minced onion flakes"]
```

```
|
| Egg Rolls | ["1/2 head cabbage", "2 large carrots", "1 onion", "2 c. meat (hamburger, shredded pork, chicken, shrimp)", "2 tbsp. soy sauce", "egg roll skins"]
|
| ["Shred cabbage.", "Dice carrots and onion.", "Cook meat and drain grease.", "Add vegetables to skillet and stir-fry until crisp-tender.", "Mix in soy sauce.", "Place a heaping tablespoonful of filling in center of each egg roll skin.", "Fold in sides, then fold over long sides, sealing shut with cornstarch and water paste. Deep fry until golden brown.", "Serve with sweet and sour sauce. Any other combination of vegetables may be used."]
Round Steaks Smothered in Onions,["2 1/2 to 3 lb. round steak", "1 large onion, sliced", "salt and pepper to taste", "1 1/2 c. flour", "3 tbsp. oil"]

| Layered Tuna Salad | ["1 1/2 c. miracle whip salad dressing", "1/4 c. green onion, sliced", "2 tsp. dijon mustard", "2 (6 1/2 oz.) cans tuna, drained and flaked", "1 tsp. dill weed (optional)", "4 c. shredded lettuce", "1 1/2 c. (4 oz.) medium shell macaroni, cooked and drained", "2 c. chopped tomatoes", "2 c. chopped cucumber", "1 (10 oz.) pkg. frozen peas, thawed and drained", "6 bacon slices, crisply cooked and crumbled", "1 c. (4 oz.) shredded cheddar cheese"]
|
| ["Combine dressing, green onions and mustard; set aside.", "Toss tuna with dill.", "In a 3-quart serving bowl, layer lettuce, shells, cucumber, tomatoes, tuna, peas and bacon.", "Spread dressing mixture over bacon, sealing to edge of bowl.", "Sprinkle with cheese; cover. Chill several hours or overnight.", "Toss to serve.", "Makes 8 servings.", "Prep. Time: 25 minutes plus chilling."]
Chicken Divan Pot Pie,["2 pet-ritz regular pie crusts", "3 tbsp. oleo", "3 tbsp. flour", "1/4 tsp. pepper", "1/2 c. chicken broth", "1/4 c. milk", "4 oz. (1 c.) shredded american cheese", "2 c. cooked and diced chicken", "1 (10 oz.) pkg. chopped broccoli, thawed and drained"]

| Lobster Sauce | ["3 tbsp. butter or oleo", "3 tbsp. flour", "1 tsp. salt", "1/4 tsp. pepper", "1 c. milk", "1/2 c. cream or half and half", "1 to 1 1/2 c. cooked lobster meat"]
|
| ["Melt butter.", "Add flour and seasonings.", "Stir until smooth. Add milk and cream slowly; cook over low heat until thickened. Heat slowly.", "Do not let boil."]
Dandy Candies,["1/3 c. honey", "1/2 c. crunchy peanut butter", "1/2
```

```
|
| New England Clam Chowder(Serves 6) | ["1 pt. clams (bay quahaugs)", "1/4 c. salt pork or bacon, chopped", "1/4 c. chopped onion", "1/2 tsp. salt", "dash of pepper", "1 c. clam liquor (add water to make 1 c.)", "1 c. diced potatoes", "2 c. milk", "parsley for garnish"]

| ["Drain clams; save liquor and chop.", "Fry salt pork or bacon until lightly brown.", "Add onion and cook until tender.", "Add liquor, potatoes and seasonings.", "Cook 15 minutes until potatoes are tender.", "Add milk and heat thoroughly.", "Stir in chopped clams and warm gently 2 to 5 minutes.", "Garnish with parsley."]"
Cheesecake,["1 large pkg. lemon jello", "2 1/4 c. graham cracker crumbs", "1 cream cheese, softened", "1 can pet milk, chilled", "1 c. sugar"]

|
| Quick One Dish Meal | ["1 box kraft macaroni and cheese", "1 green pepper, chopped", "1 (6 oz.) can tuna", "1 small onion, chopped"]

| ["Prepare macaroni and cheese as directed; add green pepper, onion and tuna.", "Mix well and let set for 5 or 10 minutes with the lid on."]"
Instant Spiced Russian Tea,["1 c. tang", "1/4 c. sugar", "1/2 c. presweetened lemon flavored instant tea", "1/2 tsp. cinnamon", "1/2 tsp. ground cloves"]

|
| Salmon Ball | ["2 c. (1 lb. can) drained, canned salmon", "1 (8 oz.) pkg. soft cream cheese", "1 tbsp. minced onion", "1/4 tsp. salt", "1 tbsp. lemon juice", "1 tsp. prepared horseradish", "chopped parsley"]

| ["In bowl, combine all ingredients, except parsley.", "Mix well. Refrigerate about 4 hours or until firm enough to shape into a ball.", "Shape in ball; roll in parsley (and chopped nuts, if desired).", "Refrigerate at least 1 hour before serving.", "Serve with crackers or small slices of rye bread.", "Makes 5-inch ball."]"
Veal Parmesan,["veal patties or beef patties", "mozzarella cheese", "regular cheese", "cottage cheese", "garlic", "any seasoning to match your taste", "ragu sau
```

```
|
| Salmon Casserole Baked In Sour Cream | ["1 (1 lb.) can salmon, drained and juice reserved", "1 tbsp. lemon juice", "1/2 tsp. salt", "pepper to taste", "1 c. sour cream", "1/2 tsp. dry dill weed", "1 medium onion, thinly sliced", "1 tbsp. chopped parsley"]

| ["Place salmon liquid in mixing bowl, add lemon juice, salt, pepper, sour cream and dill weed.", "Mix to smooth sauce.", "Break salmon in large chunks; place in greased 1-quart casserole.", "Pour sour cream sauce over salmon.", "Spread with onion; sprinkle with parsley.", "Cover and bake at 350\u00b0 for 30 minutes.", "Yields 4 servings."]"
Carrie'S Cabbage Soup,["6 c. shredded green cabbage", "1 c. chopped onion", "2 c. diced celery", "1/2 c. diced green pepper", "1/2 tsp. thyme", "1/4 tsp. marjoram", "1 tbsp. anisette", "6 peeled ripe red tomatoes", "2 pkg. dry onion soup mix", "2 cans beef bouillon", "water", "1/4 tsp. tarragon", "2 tbsp. granulated sugar", "8 oz. tomato sauce", "1 lb. ground beef, browned (optional)", "1 lb. sausage (link, polish, italian, kielbasi or ground, browned or precooked)"]
| Salmon Croquettes | ["1 (14 3/4 oz.) can pink salmon, drained", "1 1/2 c. mashed potatoes", "1 small onion, grated", "1 large egg", "1/2 tsp. pepper", "1/4 c. packaged bread crumbs", "3 tbsp. vegetable oil"]

| ["Mix salmon, potatoes, onion, egg and pepper until blended. Form into 8 patties, each about 3/4-inch thick.", "Spread crumbs on waxed paper.", "Gently press patties in crumbs to coat.", "Heat oil in a large nonstick skillet.", "Add patties and cook over medium heat about 4 minutes per side until heated through, golden and crisp. Serves 4."]"
"Croquettes(Chicken, Fish Or Meat)
```

```
ar", "8 oz. tomato sauce", "1 lb. ground beef, browned (optional)", "1 lb. sausage (link, polish, italian, kielbasi or ground, browned or precooked)"]
| Salmon Croquettes | ["1 (14 3/4 oz.) can pink salmon, drained", "1 1/2 c. mashed potatoes", "1 small onion, grated", "1 large egg", "1/2 tsp. pepper", "1/4 c. packaged bread crumbs", "3 tbsp. vegetable oil"]

| ["Mix salmon, potatoes, onion, egg and pepper until blended. Form into 8 patties, each about 3/4-inch thick.", "Spread crumbs on waxed paper.", "Gently press patties in crumbs to coat.", "Heat oil in a large nonstick skillet.", "Add patties and cook over medium heat about 4 minutes per side until heated through, golden and crisp. Serves 4."]"
"Croquettes(Chicken, Fish Or Meat)
```

```
15 rows in set (0.38 sec)

mysql>
mysql>
mysql> COMMIT;
Query OK, 0 rows affected (0.01 sec)

mysql>
```


Stored Procedure: Functional, with at least two advanced queries, cursors (optional), control structures, and application utility.

This Procedure outputs all the recipes that are in the user-provided category1 and category2 that contain ingredients food1 and food2 respectively. This stored procedure also calculates the average Protein of the first category inputted by the user.

```
DELIMITER //
CREATE PROCEDURE complexFoods(
    IN cat VARCHAR(250),
    IN cat2 VARCHAR(250),
    IN food1 VARCHAR(250),
    IN food2 VARCHAR(250),
    OUT total FLOAT)

BEGIN

(
SELECT r.RecipeTitle, r.Ingredients, r.Directions
FROM Recipe r
JOIN Food f ON r.Ingredients LIKE CONCAT('%', food1, '%')
WHERE f.Category = cat
)
INTERSECT
(
SELECT r.RecipeTitle, r.Ingredients, r.Directions
FROM Recipe r
JOIN Food f ON r.Ingredients LIKE CONCAT('%', food2, '%')
WHERE f.Category = cat2
);

SELECT AVG(f.Protein) INTO total
FROM Recipe r
JOIN Food f ON r.Ingredients LIKE CONCAT('%', f.food1, '%')
GROUP BY Category
HAVING f.Category = cat;

END //
DELIMITER ;
```


For example, if we call the procedure by doing:

```
mysql> CALL complexFoods("American", "Dairy Products", "apple", "milk", @total);
```

The output are recipes in the “American” category that contain apples and all recipes in the “Dairy Products” category that contain milk, as well as the average protein of all “American” recipes:

```
-----
| Raw Apple Bread | ["1/2 c. butter or margarine", "1 c. sugar", "2 eggs", "2 c. flour", "1/2 tsp. salt", "1/2 tsp. baking soda", "1 tsp. double-acting
baking powder", "2 tbsp. buttermilk or sour milk", "1 c. coarsely chopped unpeeled apples", "1/2 c. coarsely chopped walnuts or pecans", "1 tsp. vanilla"]
| | ["Cream butter and sugar, then beat until light and lemon colored.", "Beat in eggs.", "Sift together dry ingre
dients.", "Add alternately to the creamed mixture with milk.", "Stir in apples, nuts and vanilla.", "Pour into greased 9 x 5 x 3-inch loaf pan. Bake at 350\u00B0 for 50 to 60 minute
s until knife inserted comes out clean.", "Cool in the pan for 5 minutes, then loosen from pan and turn out onto a rack to cool completely before slicing.", "Serves 10 to 12."|]
| Cabbage Soup,["1/2 large cabbage, cut up", "2 potatoes, chopped", "3 carrots, sliced in large pieces", "1 turnip, chopped", "1 sweet onion, in large pieces", "1 large can corn", "2
large cans whole tomatoes", "3 cubes beef bouillon", "1 can rutabaga", "1/2 c. baby limas", "1 can healthy choice tomato soup", "2 pods jalapeno peppers", "1/2 tsp. oregano", "salt
and pepper to taste", "1/2 tsp. basil"] | |
| Plnk Stuff(Frozen Dessert) | ["1 can pie filling (cherry or strawberry)", "1 can crushed pineapple, drained", "1 can sweetened condensed milk", "1 (8 oz.) conta
iner thawed whipped topping", "2 tbsp. lemon juice"] | ["Mix all ingredients together.", "Pour into a 9 x 13-inch pan. Freeze until firm.", "Allow to set out approxi
mately 15 minutes before serving."|]
| Fresh Strawberry Pie,["1 baked pie shell", "1 qt. cleaned strawberries", "1 1/2 c. water", "4 tbsp. cornstarch", "1 c. sugar", "1/8 tsp. salt", "4 tbsp. strawberry jello"]

| |
| Pineapple Souffle | ["1/4 c. butter", "1 1/2 c. sugar", "1 large can pineapple, drained", "3 slices bread, cubed", "3 eggs, beaten", "1/4 c. milk", "ci
nnamon", "1 tbsp. sugar", "roasted pecans"] | ["Melt butter in pan (9 x 9-inch).", "Mix together the next 5 ingredients and pour into baking dish with melte
d butter. Sprinkle with cinnamon, 1 tablespoon sugar and roasted pecans. Bake at 300\u00B0 for 40 minutes."|]
| Real Whipped Cream That Keeps,["1/2 tsp. unflavored gelatin", "4 tsp. cold water", "1 c. heavy cream", "pinch of salt", "1/2 tsp. real vanilla", "1 tsp. sugar"]

| |
| Pineapple Nut Pie | ["1 (8 oz.) pkg. cream cheese", "1 can sweetened condensed milk", "1/2 c. crushed pineapple", "1/3 c. chopped nuts", "1/3 c. lemon
juice"] | ["Cream the cream cheese; add the milk and beat smooth.", "Add lemon juice, pineapple and nuts.", "Beat well."
, "Pour into graham cracker crust and chill.", "Slice in small servings (very rich) and top with dollop of Cool Whip."|]
| Annie'S Diabetic Candy,["1 (8 oz.) jell-o sugar-free vanilla or french vanilla pudding (put in dry)", "1 (8 oz.) philadelphia light cream cheese", "2 tbsp. butter", "2 tbsp. peanut
butter or more if you would like"]

| |
| Pineapple Crush Cake | ["1 box pineapple cake mix", "1 pkg. instant vanilla pudding mix (4 serving size)", "2 c. cold milk", "8 oz. cream cheese", "8 oz.
crushed pineapple, drained", "2 c. cool whip"] | ["Bake cake mix as directed in 3 pans. Combine pudding mix, milk and cream cheese.", "Spread 1/3 of the pineap
ple on each cake layer, making sure layers are completely cool. Spread pudding mixture on top of pineapple on each layer.", "Stack layers and cover with whipped topping.", "A small
amount of pudding mixture may be added to whipped topping to flavor."|]
| Dump Cake,["1 can cherries", "1 can crushed pineapple", "1 c. chopped pecans", "1 yellow cake mix"]

| |
| Cherry Chiffon Dessert | ["1 can cherry pie filling", "1 can sweetened condensed milk or 1 c. nonfat plain yogurt", "1 (8 oz.) container whipped topping", "
1 (15 oz.) can crushed or chunk pineapple, drained", "1 c. miniature marshmallows"] | ["Combine ingredients in large bowl, folding together until blended.", "Spoon into decorative bowl.", "Chill."
, "Makes 12 to 14 servings.", "Chill 30 minutes before serving."|]
| Old Fashioned Chocolate Pie,["2 c. sugar", "4 heaping tbsp. flour", "3 tbsp. cocoa", "pinch of salt", "2 c. milk", "4 tbsp. butter", "4 eggs, separated", "4 tbsp. sugar", "1/4 tsp.
cream of tartar", "1 baked pie crust"]

| |
| Blueberry Heaven Supreme | ["1 (21 oz.) can blueberry pie filling", "1 (8 1/4 oz.) can crushed pineapple, drained", "1/2 c. lemon juice", "1 (14 oz.) can eagl
e brand milk", "1 (8 oz.) container cool whip", "2 graham cracker crusts", "miniature marshmallows"] | ["Mix Eagle Brand milk and lemon juice until thickened.", "Fold in pie filling and drained pineapple.", "Fold
in Cool Whip.", "Pour into pie shells.", "Garnish with graham cracker crumbs and/or miniature marshmallows.", "Put in refrigerator and chill 3 or 4 hours or overnight."|]
| Kraut Salad,["1 (no. 2 1/2) can kraut", "1 c. chopped celery", "1 c. chopped onion", "1 c. chopped green pepper", "1 (4 oz.) jar chopped pimento", "1 c. sugar", "1 c. salad oil", "
1/2 c. white vinegar"]

| |
| Apricot Salad | ["2 (3 oz.) pkg. apricot jello", "1 (15 oz.) can crushed pineapple", "1 (12 oz.) pkg. cool whip", "2 c. buttermilk"] | ["Combine jello and pineapple and microwave in bowl until jello melts.", "Let cool.", "Add Cool Whip to butter
milk; stir well.", "Add jello mix when cooled.", "Stir well and refrigerate."|]
| Church Windows,["12 oz. chocolate chips", "1/2 c. butter (margarine)", "12 oz. miniature colored marshmallows", "1 c. chopped nuts", "vanilla"]

| |
| Apple Pizza | ["1 3/4 c. flour", "1/2 c. shortening", "1 tsp. salt", "6 apples", "1 c. cornflakes, crushed", "3/4 c. sugar", "1/2 tsp. cinnamon",
"butter", "1 egg", "1/2 c. milk", "1/2 tsp. vanilla", "2 tbsp. sugar"] | ["Mix first 3 ingredients together and roll out to fit a cookie sheet.", "Peel and slice apples; crush cornfla
kes and sprinkle on pastry.", "Place apples in row until sheet is filled, then make a mixture of 3/4 cup sugar and 1/2 teaspoon cinnamon and sprinkle on apples.", "Dot with butter."
, "Bake at 400\u00B0 for approximately 15 minutes.", "Beat egg, milk, vanilla and 2 tablespoons sugar; pour over apples.", "Bake again until custard sets, approximately 5 minutes."|]
| Egg Custard Pie,["5 eggs", "3 c. scalded milk", "1 c. sugar", "1 1/2 tsp. vanilla"]

| |
| Apple Cobbler | ["1/2 c. (1 stick) margarine", "2 c. sugar", "2 c. water", "1 1/2 c. flour (self-rising)", "1/2 c. shortening", "1/3 c. milk", "2 c
. chopped apples", "1 tsp. cinnamon", "1/2 c. chopped walnuts"] | ["Heat oven to 350\u00B0 and melt margarine in a 13 x 9 x 2-inch pan. In a saucepan, heat sugar and water until
sugar melts.", "Cut shortening into flour until particles are fine crumbs.", "Add milk and stir.", "Turn onto floured board and knead until smooth.", "Roll dough into large rectan
gle; spread apples and sprinkle with cinnamon.", "Roll up and slice into 1 1/2-inches and lay apple, side up carefully in pan.", "Pour sugar syrup carefully around rolls. Bake 55 to
60 minutes."|]
| Goop - Cornstarch,["cornstarch", "water", "food coloring"]
```

Query OK, 1 row affected (0.67 sec)

```
mysql> SELECT @total;
+-----+
| @total |
+-----+
| 17.21875 |
+-----+
1 row in set (0.00 sec)
```

This resulting "Total" variable shows that the average protein in American recipes is 17.21875.

Trigger: Functioning triggers, involving an event, condition (IF statement), and action (Update, Insert, Delete), enhancing the application.

This code was ran on the SQL backend cloud platform, which only allows new passwords to be NOT NULL, and doesn't allow any NULL passwords.

```
`CREATE TRIGGER UserName
  // BEFORE INSERT ON User
  // FOR EACH ROW
  // BEGIN
  //   IF NEW.Password IS NOT NULL THEN
  //     UPDATE SET NEW.Password = old.Password
  //     WHERE UserID = ?;
  //   END IF;
  // END;`
```

DONE – Constraints: This requirement can be simply satisfied by defining the appropriate primary keys, and foreign keys. But we strongly encourage the team to use other types of constraints, such as attribute-level, tuple-level, and assertions.

```
CREATE TABLE MyRecipes (
  RecipeTitle VARCHAR(255),
  Ingredients TEXT,
  Directions TEXT,
  UserID VARCHAR(255),
  PRIMARY KEY (RecipeTitle),
  FOREIGN KEY (UserID) REFERENCES User(UserID)
);
```

This is just an example of one of our database tables DDL commands, which was done in Stage 2 and 3. We have already defined primary and foreign keys in the MyRecipe and User tables.

```
CREATE TABLE User (
  UserID VARCHAR(255),
  UserName VARCHAR(100),
  Password VARCHAR(20) CHECK (LENGTH>Password) > 5),
  PRIMARY KEY (UserID),
```

);

Implement features in SQL (not with Object Relational Mapping, ORM. More details in the next section), ensuring relevance to the application.