mechanics need databases too

Prepared by Group 14: Heather Fillerup- Software Developer, Chris Nelson- Software Developer
CS 340-400: Spr 2020
Project- Step 2 Final
April 25, 2020

Feedback by the peer reviewers

- Does the overview describe what problem is to be solved by a website with DB back end?
  - Vinh Tran: Yes, the overview describes a problem with pen and paper that needs to be solved by a website with DB back end.
  - Kelley Neubauer: Yes, the overview describes an auto shop problem that can be solved by a DB back end. Great story and background!
  - Benjamin Mayinger: Yes, the idea is very practical and shows a real world problem that could be organized using a database backend. Furthermore, the overview is detailed and well written.
  - Sibai Lou: Yes
- Does the overview list specific facts?
  - Vinh Tran: Yes. Some of them are creating a repair order, associating a car and a customer to the repair order.
  - Kelley Neubauer: The overview has some specifics, but it could be more detailed. How many mechanics will be accessing the system? How long does a car spend under repair? Is there only one location?
  - Benjamin Mayinger: The overview explains the relationships between the entities and the attributes of given entities in a concise way.
  - Sibai Lou: Yes
- Are at least four entities described and does each one represent a single idea to be stored a s a list?
  - Vinh Tran Yes, 4 of them are customers, cars, repairs, and statuses. Each of them represent a single idea.
  - Kelley Neubauer: Yes, there are at least four entities described. customers, cars, repairs, statuses, and mechanics all represent unique ideas that could be stored as a list.
  - Benjamin Mayinger: The draft outlines five entities: customers, cars, repairs, statuses, and mechanics.
  - Sibai Lou: Yes

- Does the outline of entity details describe the purpose of each, list attribute datatypes and constraints and describe relationships between entities? Does the outline clearly indicate which entities (tables) will be implemented and which team member is primarily assigned to the associated page(s)?
    - Vinh Tran: Yes, the outline of entity details describes the purpose of each, list attribute datatypes and constraints and describe relationships between entities. The outline clearly indicates which entities (tables) will be implemented and which team member is primarily assigned to the associated page(s)
    - Kelley Neubauer: Yes, the outline describes the purpose of each entity and lists datatypes and constraints. The relationships between entities are described.
    - Benjamin Mayinger: Each entity is well explained and so are the relationships between them. The ERD and Schema diagrams do a good job of showing this. The overview also shows which team members will be implementing which entities.
    - Sibai Lou: Yes
- Are 1:M relationships correctly formulated? Is there at least one M:M relationship?
    - Vinh Tran: Yes, 1:M relationships are correctly formulated and there is at least one M:M relationship.
    - Kelley Neubauer: Yes, the 1:M relationships are correctly formulated. Yes, there is at least one M:M relationship.
    - Benjamin Mayinger: All the relationships seem to be in order.
    - Sibai Lou: Yes
- Is there consistency in a) naming between overview and entity/attributes b) entities plural, attributes singular c) use of capitalization for naming?
    - Vinh Tran: Yes, there is consistency in areas as listed above.
    - Kelley Neubauer: Yes, there is consistency in naming conventions. I'd recommend that you make use of the convention to capitalize entity names.
    - Benjamin Mayinger: The document is actually really well formatted and holds its consistency throughout it.
    - Sibai Lou: Yes
- Additional notes:
    - Kelley Neubauer: I am a little confused about why the mechanic works on statuses and not repairs. How does a mechanic work on "customer paid" or "customer picked up?" It would seem more natural to me for the relationship to be between mechanics and repairs. Maybe the statuses entity should have a different name? As is, it's a little confusing and could be clarified.

- Kelley Neubauer: One little thing, check that the arrow for the repiairs_statuses FK, status_id, points to the correct attribute.
- Benjamin Mayinger: Everything looks good to me! Well done!
- Sibai Lou: It is a good project, and I think in statuses, the start and end date can be changed to how many days needed to repair the car. When I go to a auto shop, I perfer they show me how many days they took to repair my car.

Actions based on the feedback

- Added more details to the project overview and better defined what the website will do and what the tracking display will look like.
- We are keeping our tables/entities lowercased, this makes it easier to code and view, especially in keeping with the format that the SQL keywords will be uppercase, having lowercase tables and columns makes it easier to read. Also we won't have to remember what is uppercase and what isn't.
- Kelley was confused by what we were trying to accomplish. A car comes into the shop for a repair, however a repair goes through various stages\tasks which are assigned to different mechanics and can take varying amounts of time to complete. A repair can have multiple mechanics working on it, e.g. one assigned to diagnose, a different one assigned to get customer approval, etc. This helped us realize that we needed to update our repairs table to repair_orders, which is the main tracking mechanism for the overall reason the car is in the shop, then we can add work orders (tracked in the composite table work_orders) that records the various tasks being done to the cars, the mechanic assigned to each task and start and end dates of the task.
- Fixed FK arrow pointing to wrong PK in schema
- Sibai mentioned tracking days needed to repair the car, we could calculate this based on the time between the repair_orders' start date and end date attributes. However, this would not provide meaningful data because we are not tracking the exact specific type of repair, we are only tracking the mechanic general tasks workflow. E.g. brake repair job is two hours, transmission replacement could be two weeks, 169 hours would be the average.

Upgrades to the Draft version

- Removed Parts table since we only have to implement one M:M relationship
- Removed cost, hours and rate attributes to focus on the tasks and mechanics for the repair order
- Changed the name of the status table to work_tasks for better clarification
- Changed the name of the repairs table to repair_orders for better clarification
- Changed repairs_statuses relationship table to work_orders and added it as a composite table for better clarification

- Made work_orders a composite table with attributes moved from work_tasks (mechanic_id, start_date and end_date). This was to satisfy the requirement that when we delete our M:M task and repair orders relationship record, we cannot delete any record from the repair_orders or work_tasks tables.
- Updated the customers participation with cars, a customer can have 0 or more cars, this will allow a customer to be added to the database without requiring a car_id
- Updated the cars participation with repair orders, a car can have 0 or more repairs, this will allow a car to be added to the database without requiring a repair order
- Changed mechanics relationship with work_tasks (statuses). Mechanics has a M:M relationship with both repair_orders and work_tasks.
- Added parts_neeeded attribute to repair_order, this will allow us to use logic to only add an Order Parts work_order to a repair_order when true
- Added pair programming to programming assignments because we want to work on everything together if possible.
- Changed year attribute to model_year and model to model_name, since year is an SQL keyword

Project Outline

Mahinui auto shop, a single location, has seen record business in the last decade, repairing 50 or more cars on any given day. With more customers coming in by the day, keeping track of records has become a nightmare. The owner, Brad, has finally decided to upgrade his repair order workflow from pen and paper being passed between his 10 mechanics to a website database. Brad is looking to create a system for his mechanics to track the tasks involved with a car's repair, from diagnosis to customer pick up, and be able to view a display of the progress on the homepage. The website will allow users to:

1. Search for car
    a. If car is not found
        i. Search for customer to add to car
            1. If customer is not found
                a. Add customer
        ii. Add car
2. Add repair order to a car
3. Add work orders to repair orders
    a. First work order automatically added is the diagnosis task
        i. Followed by customer approval, order parts, repair, test drive and finally contact customer
    b. Add Mechanic to work order
4. Complete current work order and move on to next work order if needed
    a. Order parts task is only added if the repair order needs parts
    b. Provides an option to delete repair order's current work order or delete the entire repair order
5. View on the website homepage the following display of all of the cars currently being repaired at the shop and the current task being performed

EXAMPLE DISPLAY						
Repair Order	Customer Name	Car Description	Current Task	Task Start Date	Mechanic	Details
1	Jason Bateman	2015 Honda Accord	Diagnosis	03/1/2020	Johnny	
2	Charlize Theron	2014 Toyota Civic	Customer Approval	3/2/2020	Ben	
3	Ryan Reynolds	2011 Honda Ridgeline	Order Parts	3/3/2020	Cameron	Delivery expected in two weeks
4	Scarlet Johansen	2009 Toyota Front Runner	Repair	3/4/2020	Peter	Waiting for open bay
5	Jeff Bridges	2014 Fiat 500	Test Drive	3/5/2020	Frank	
6	Tyler Perry	2017 Kia Soul	Contact Customer	3/6/2020	Brian	Left message, waiting for call back
7	Brandon Fraser	2019 Chevrolet Corvette	Diagnosis	3/6/2020	Ben	

Programming Implementation and Assignments

For this project we will be implementing pair programming when possible. The goal is for the code in this project to be done together and we will switch back and forth between who is actively programming and who is giving feedback and checking for errors. This will allow us to learn from each other and help ensure that the code is of good quality.

Database Outline

customers: records details about the customers who own the cars being repaired (Heather)

- id: INT, AUTO_INCREMENT, UNIQUE, NOT NULL, PK
- f_name: VARCHAR, NOT NULL
- l_name: VARCHAR, NOT NULL
- contact_no: VARCHAR, NOT NULL
- email_address: VARCHAR, NOT NULL
- street_address: VARCHAR, NOT NULL
- city: VARCHAR, NOT NULL
- state: VARCHAR, NOT NULL
- zip_code: INT, NOT NULL
- relationship: a 1:M relationship between customers and cars is implemented with customer_id as a FK inside of cars, where a customer can have 0 to many cars, and a car can only have one customer.

cars: records details about the car being repaired (Chris)

- id: INT, AUTO_INCREMENT, UNIQUE, NOT NULL, PK
- customer_id: INT, NOT NULL FK
- license_plate: VARCHAR, NOT NULL
- make: VARCHAR, NOT NULL
- model_name: VARCHAR, NOT NULL
- model_year: YEAR, NOT NULL
- description: VARCHAR
- relationship: a 1:M relationship between cars and repair_orders is implemented with car_id as a FK inside of repair_orders, were a car can have 0 or more repair orders and a repair order can have only one car ; a 1:M relationship between customers and cars is implemented with customer_id as a FK inside of cars, where a car requires one and only one customer and a customer can have 0 or more cars

repair_orders: records details about the repair order being done on a car (Heather and Chris)

- id: INT, AUTO_INCREMENT, UNIQUE, NOT NULL, PK
- car_id: INT, NOT NULL, FK
- date_received: DATE
- date_completed: DATE
- parts_needed: BOOLEAN, NOT NULL, DEFAULT 0
- current_status: INT, NOT NULL, DEFAULT 1
- relationship: a M:M relationship between repair_orders and work_tasks and a M:M relationship between repair_orders and mechanics are both implemented with a composite table work_orders; a 1:M relationship between cars and repair_orders is implemented with car_id as a FK inside of repair_orders, where a repair order can have only 1 car, but a car can have 0 or more repairs

work_tasks: records the types of tasks that can be added to repair orders, these tasks are associated to repair orders through work orders (Heather)

- id: INT, AUTO_INCREMENT, UNIQUE, NOT NULL, PK
- category: VARCHAR, NOT NULL (diagnosis, approval, parts, repair, test, contact)
- relationship: a M:M relationship between repair_orders and work_tasks and a M:M relationship between mechanics and work_tasks are both implemented with a composite table work_orders

work_orders: composite table that records the tasks that have been added to the repair_orders and also tracks the mechanic responsible for the work order (Heather and Chris)

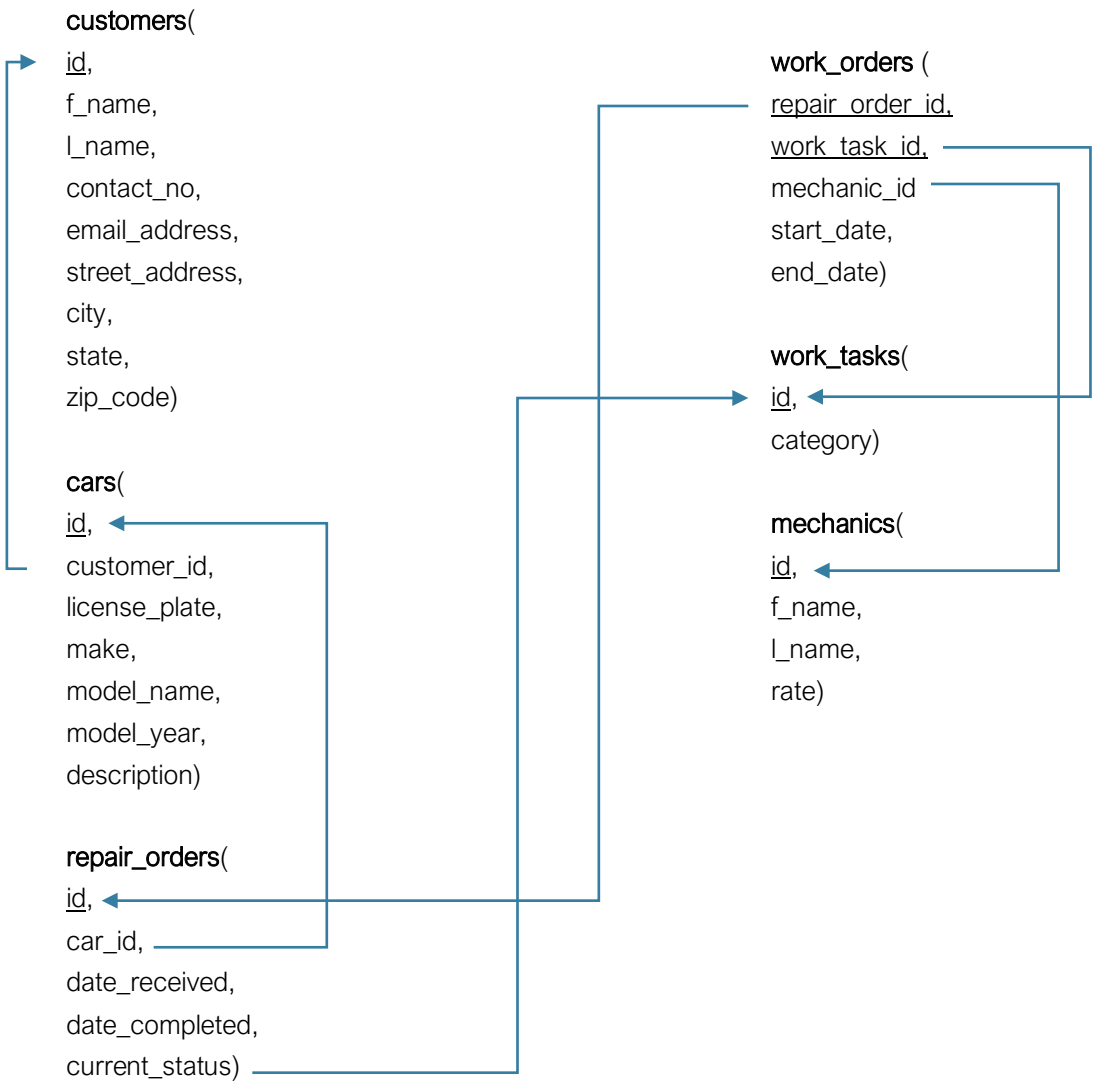
- repair_order_id, NOT NULL PK
- order_task_id, NOT NULL PK

- mechanic_id: INT, FK
- start_date: date
- end_date: date

mechanics: records details of the mechanic responsible for the work orders (Chris)

- id: INT, AUTO_INCREMENT, UNIQUE, NOT NULL, PK
- f_name: VARCHAR, NOT NULL
- l_name: VARCHAR, NOT NULL
- relationship: a 1:M relationship between mechanics and work order is implemented with mechanic_id as a FK inside of work_orders, where a mechanic can have 0 or more work_orders but a work order can only have one mechanic; a M:M relationship between repair_orders and mechanics and a M:M relationship between mechanics and work_tasks are both implemented with a composite table work_orders;

Schema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l_name,
contact_no,
email_address,
street_address,
city,
state,
zip_code)
cars(
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customer_id,
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model_name,
model_year,
description)
repair_orders(
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car_id,
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date_completed,
current_status)
work_orders (
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work_task_id,
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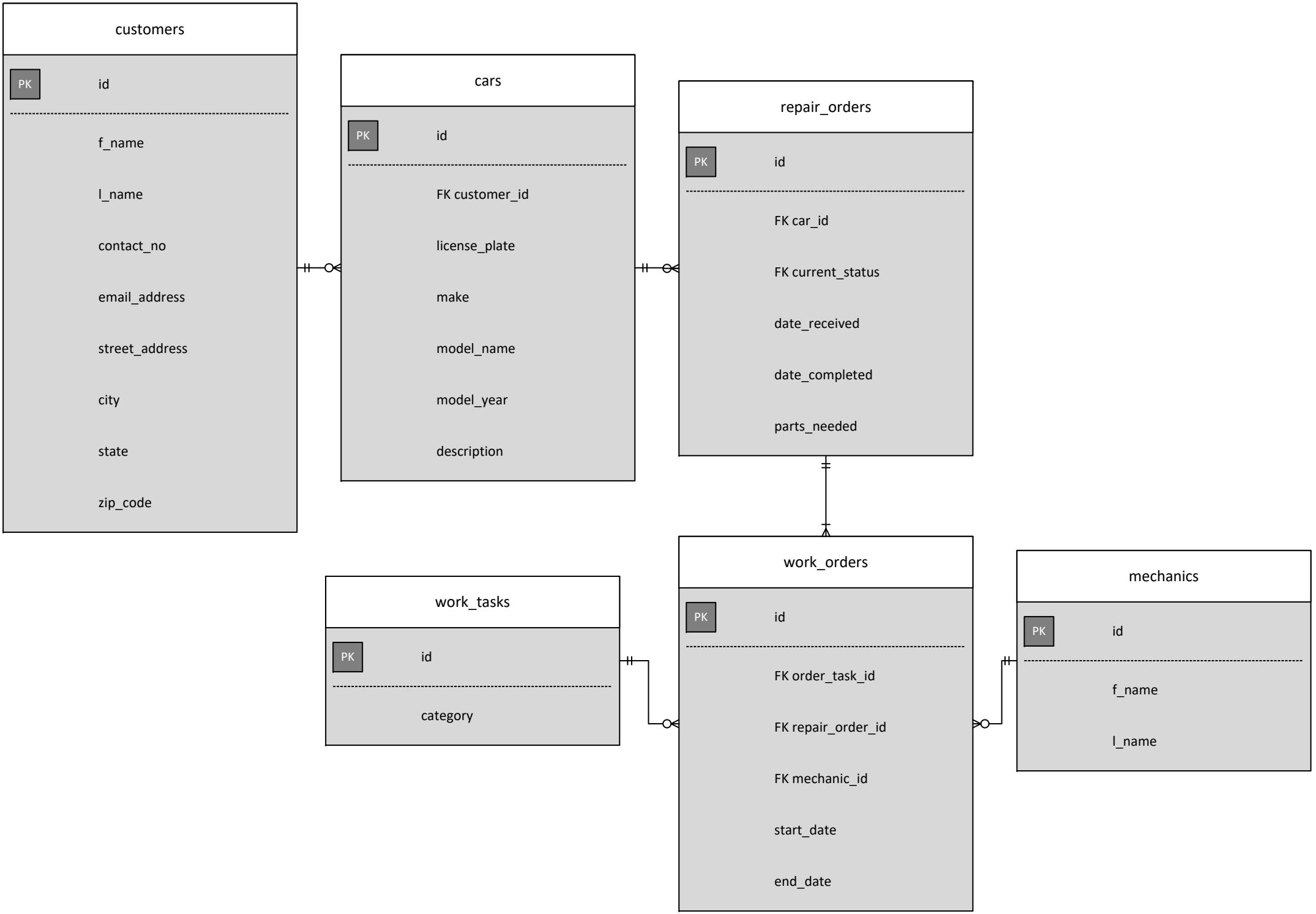
end_date)
work_tasks(
id,
category)
mechanics(
id,
f_name,
l_name,
rate)


customers
PK
id
f_name
l_name
contact_no
email_address
street_address
city
state
zip_code
cars
PK
id
FK customer_id
license_plate
make
model_name
model_year
description
repair_orders
PK
id
FK car_id
FK current_status
date_received
date_completed
parts_needed
work_tasks
PK
id
category
work_orders
PK
id
FK order_task_id
FK repair_order_id
FK mechanic_id
start_date
end_date
mechanics
PK
id
f_name
l_name

CS 340 TEAM EVALUATION FORM

APRIL 25, 2020

RATE YOUR TEAMS PERFORMANCE USING THE SCALE BELOW.

1 = Strongly Disagree 2 = Disagree 3 = Agree 4 = Strongly Agree

GROUP NUMBER	14	
NAME OF GROUP TEAM MEMBERS:	Heather Fillerup, Chris Nelson	
SCALE AND COMMENTS	RATING	ADDITIONAL COMMENTS
HOW PREPARED WAS YOUR TEAM? Research, reading, and assignment complete	4	We both kept up with the modules
HOW RESPONSIVE & COMMUNICATIVE WERE YOU BOTH AS A TEAM? Responded to requests and assignment modifications needed. Initiated and responded appropriately via email, Slack etc.	4	We both responded within a reasonable timeframe
DID BOTH GROUP MEMBERS PARTICIPATE EQUALLY Contributed best academic ability	4	We both contributed to the best of our academic ability and current knowledge regarding how to create a database
DID YOU BOTH FOLLOW THE INITIAL TEAM CONTRACT? Were both team members both positive and productive?	4	We were both supportive, positive, productive and respectful of any other time commitments

Are there any suggestions for improvement for your team and what are your goals moving forward?

(Better communication, follow the contract better, modify the initial team contract, more contribution, etc?)?

Phone slack calls with screen sharing have been very helpful, we will continue to do them in the future. Especially since we plan on implementing pair programming.