# ReShift

By

Alex Romero

Christian Mata

Sheldon Trotman

Project 3 Phase 3

Group Design Document

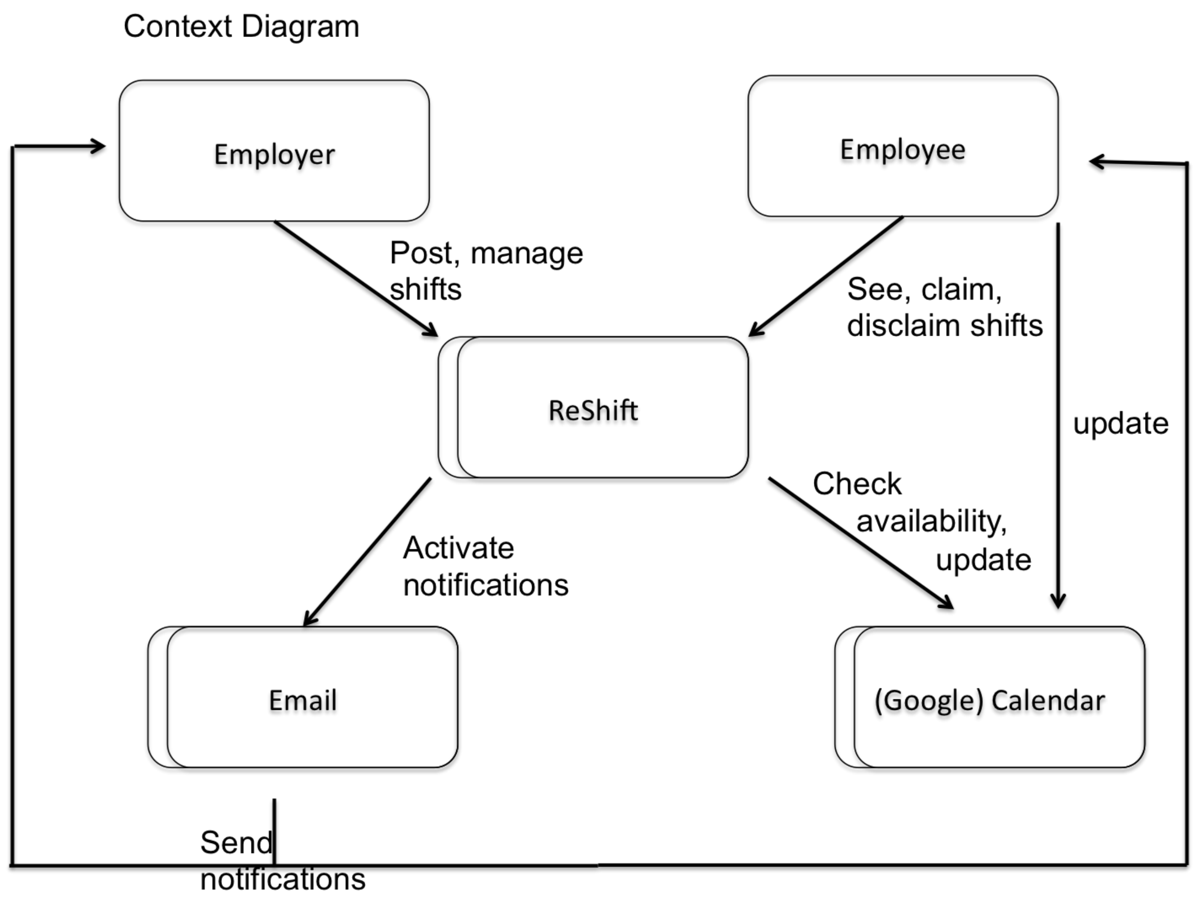
## I. Motivation:

ReShift is a web app that allows various campus jobs to efficiently handle changes in shift availability. The app creates a workplace that have employees and managers. Each employee has his/her usual shift, but if the employee cannot make his/her shift because of a meeting or class, they can offer the shift up for fellow employees to pick up and work. The web app makes it more efficient to offer and pick up hours. It supports creation of workplaces, offering and picking up of shifts, notifications of available shifts and calendar integration.

Purposes

- Ease the administration's job for posting and managing shifts
- Enable reminders for shifts that a user has signed up for as well as notifications of upcoming non-claimed shifts
- Facilitate organization and updates of a pool of employees for a first come-first serve, shifts-based job
- Ease individual's time administration and payroll processes when working at a shift-based job

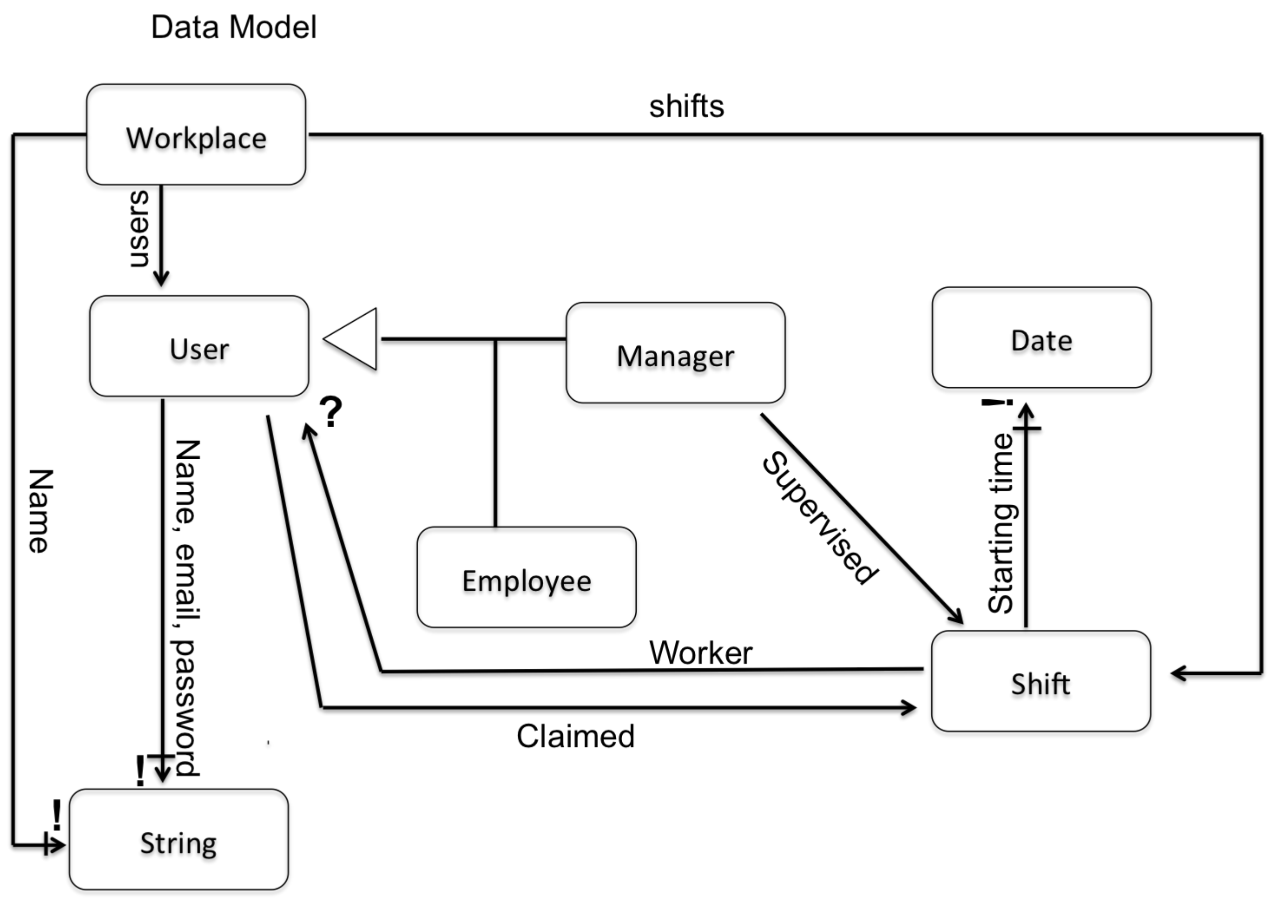
## II. Context Diagram:



## III. Concepts:

- **Manager and Employee** – organization of both the people posting the available shifts and people claiming them; tracking of individual worked hours
- **Email notifications** – reminders for employees and notification of non-claimed shifts
- **Workplace** – Forum with a set of users and shifts to be claimed with real time updates
- **Calendar** – individual's time administration
- **Shift** – This is the set start time and duration for a slot of time an employee can work.
- **Posting** – Users that cannot work the specified shift that they are supposed to have the option to "post" the shift. This notifies all other employees that the shift is now available to be covered by someone else.

## IV. Data Model:



Additional constraints:

- Shift will have a starting time & a duration integer value

** This has changed please refer to the data design.

## V. Design Challenges:

Testing:

**What is the preferred testing method?** As required for 3.2, we needed to automate some queries to our API with tests.

Potential Solutions:

— Use QUnit, jQuery & asserts to automate the testing and handle the test running. This is the recommended method shown in the example API documentation.

— Create a script that simply used AJAX calls and compare the expected to the results. Instead of including QUnit and having to go through the headache of CORS issues, we could host the script and execute it when a view is shown. Essentially, we would have to make our own testrunner.

Solution: We chose to go with QUnit. Although it had considerable headaches and pains including it into our code, the asyncTest functionality allowed us to work with AJAX calls that return asynchronously.

Employee, User, Manager:

**How to relate User, Manager and Employees?** While implementing the API, we ran into issues of what would be the optimal way to organize the User, Manager and Employee models.

— User as superclass of Manager and Employee with Mongoose Extends. Here we would let each model inherit from the User and take all its fields, which include the email and password.

— Create a pointer from the Manager & Employee model instance to the User. Rather than exending, we'd create a field in each of the Manager and Employee schemas that would have an ObjectID for the User that it was referring to.

Solution: We chose to use the pointer/reference idea. This is because it created a degree of separation between the email and password and Employee instances. We figured it would be more secure to only have Employee fields passed around. The extends functionality simply did not do enough to keep the two seperated.

**How to store shift durations?** In the Shift object, the object needs to keep track of the amount of time that must be worked. In this, the Shift object has a few different options that can be used.

- *Starting and ending time stamps* -- Consistent data type. Native data type operations are implemented so computing difference in time should be trivial.
- *Starting time and duration as a number* -- This would use a time string as the starting time and then have a variable duration value. The variable duration value would allow the user to work for portions of hours (e.g. 15 minutes) and be able to save the point values quickly. Also this would lend itself well to computing the total hours worked and amount earned if desired.
- *Creating a new object "Time slot" with a fixed unit of time* -- The idea here would be to create new objects that would store a fixed unit of time. This would allowed the Time Slot object to be given to each shift as a field and then stored and accessed later.

**Are managers allowed to be workers?** For situations, the manager may be considered a manager or a manager may have to work a shift.

Potential Solutions:

- *Allow managers to have fields of workers* -- Build the data model to include the worker fields and easily allow the manager to claim shifts if desired.
- *Force manager to create a worker account* -- Simplifies the logic for the manager model.

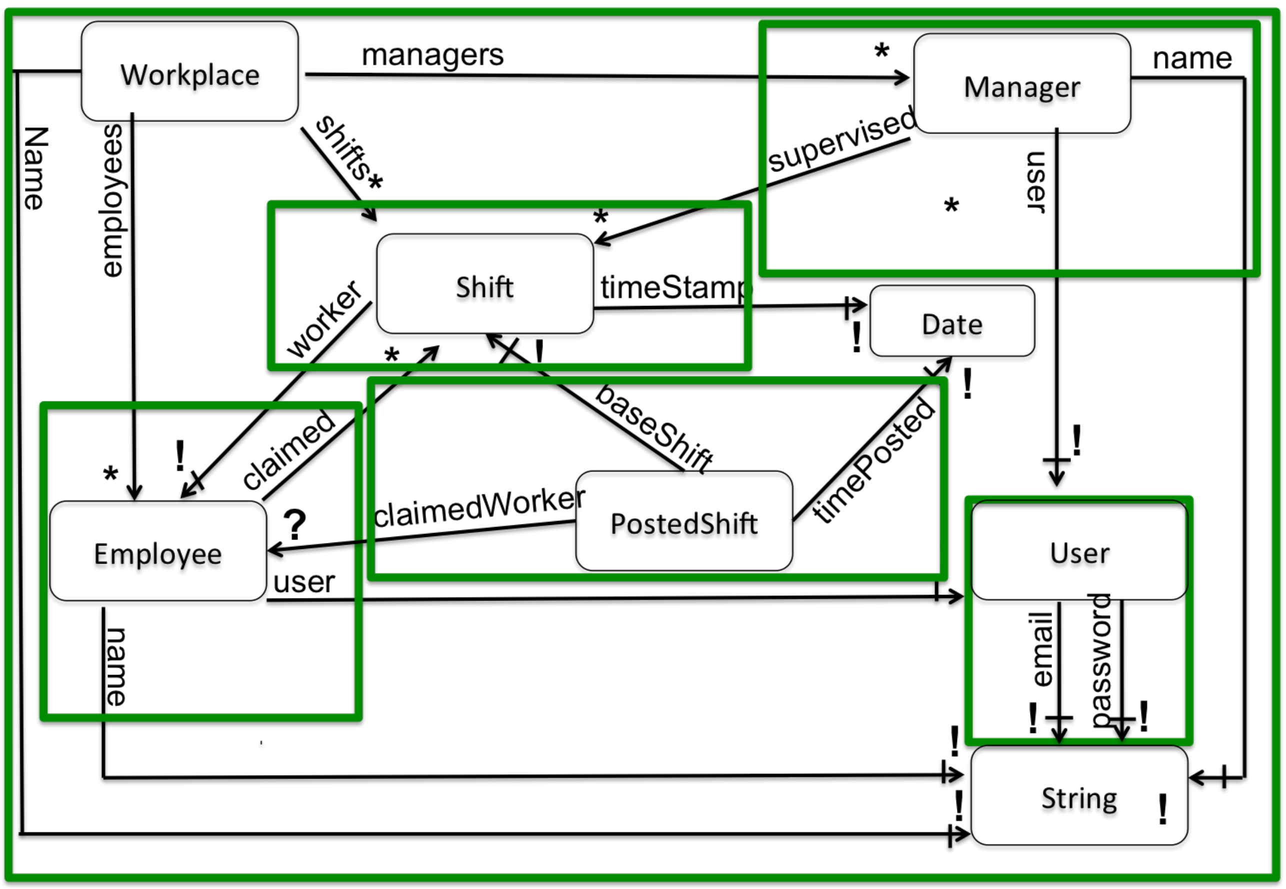
**Are workers allowed to post a shift that they said they'd cover?** This is the situation that a worker said that they would cover a shift for another worker, but later determined that they would not be able to cover it.

Potential Solutions:

- *Treat the shift as before* -- Simply allow the shift to be able to go to posts as before. This would allow the app to have flexibility in handling shifts until someone can pick up the hours.
- *Force the shift coverer to keep it* -- This would be a way to maintain the integrity of covering. Rather than being able to post a shift you said you'd cover, the app would enforce it and whatever punishment would go to the coverer.

## VI. Data Model:

Data Model



From our previous data model our main changes are the following (plus justification):

**Note: Most justifications of changes in design are included in design challenges

- Workplace has two lists: employees and managers

    - Ease of access to each kind of user
    - Separates types of users for authorization
- Employee and Manager are now independent objects, not sublcasses, that refer to a user.
    - Avoided passing around the password of each user
    - Separated properly the actions for each one
- Employee has a list of claimed shifts
    - Keep track of the amount of hours worked
- Shifts have a fixed worker
    - Shifts are meant to be assigned to a specific worker for a long duration of time. This does not change. The user however, is allowed to post it in case it cannot do his regular shift in a given week.
- Posted Shift is a new class that points to its original shift
    - Enables claiming and disclaiming of shifts without changing the original owner of the shift
    - Mutable type that points to an immutable type
    - Allows us to keep track of when the shift was posted and who claimed it so that it can return to its default worker

## VII. API Specification:

**Models:**

- users
- managers
- workplaces
- shifts

**Schemas:**

- User
    - name : String
    - email : String
    - password : String

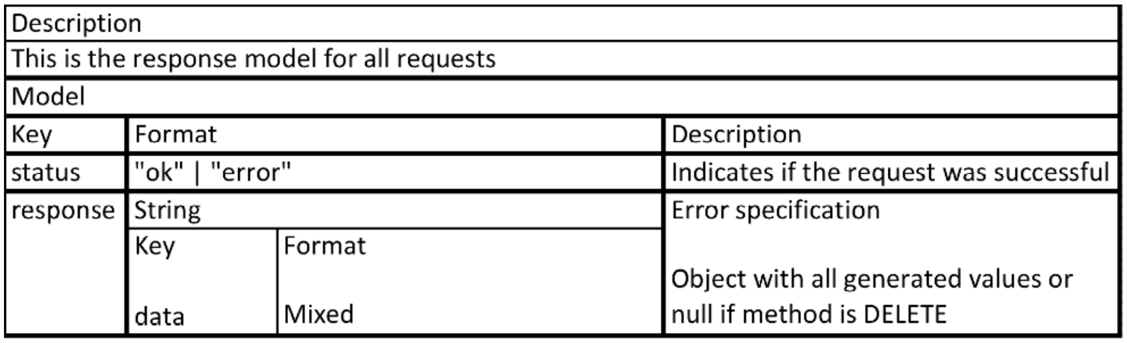
- Employee
    - user : {type: ObjectId, ref: users}]
    - name : String
    - claimed : Array[ {type : ObjectId, ref: shifts} ]

- Managers
    - user : {type: ObjectId, ref: users}
    - name : String
    - supervised :  Array[{type : ObjectId, ref: shifts}] **changed shifts -> workplace

- Workplaces
    - name : String
    - users : [{type : ObjectId, ref: users}]
    - shifts : [{type : ObjectId, ref: shifts}]

- Shifts
    - timestamp : Date
    - duration : Number
    - worker : {type : ObjectId, ref : users}
- PostedShifts
    - baseShift : {type : ObjectId, ref : shifts}
    - claimed :  {type : Boolean, default : false}
    - claimedWorker :  {type : ObjectId, ref : users}
    - timePosted : Date // date of the time the user wants to post

## Response Format:



| Description | | | |
|---|---|---|---|
| This is the response model for all requests | | | |
| Model | | | |
| Key | Format | | Description |
| status | "ok" \| "error" | | Indicates if the request was successful |
| response | String | | Error specification |
| | Key | Format | |
| | data | Mixed | Object with all generated values or null if method is DELETE |

## Workplaces

| Workplace Creation | | |
|---|---|---|
| Create a new Workplace | | |
| Method | | POST |
| Route | | /workplaces |
| Response Content Format | | Workplace object |
| Parameters | | |
| Key | Required | Description |
| name | TRUE | Username of this user |
| Errors | | |
| Code | Response content | |
| 500 | An unknown error ocurred | |

| Workplaces | |
|---|---|
| Get a list of all workplaces | |
| Method | GET |
| Route | /workplaces |
| Response Content Format | List of Workplace objects |
| Errors | |
| Code | Response content |
| 404 | Resource not found |

| Workplace | |
|---|---|
| Get a specific workplace | |
| Method | GET |
| Route | /workplaces/:id |
| Response Content Format | Workplace Object |
| Errors | |
| Code | Response content |
| 404 | Resource not found |

| Workplace Deletion | |
|---|---|
| Deletes a specific workplace | |
| Method | DELETE |
| Route | /workplaces/:id |
| Response Content Format | null |
| Errors | |
| Code | Response content |
| 500 | An unknown error ocurred |

| Workplace's Workers Update - Employee | |
|---|---|
| Adds an employee to this workplace's workers | |
| Method | PUT |
| Route | /workplaces/:id/employees/:eid |
| Response Content Format | Workplace Object |
| Errors | |
| Code | Response content |
| 404 | Resource not found |

| Workplace's Workers Update - Manager | |
|---|---|
| Adds an employee to this workplace's workers | |
| Method | PUT |
| Route | /workplaces/:id/managers/:mid |
| Response Content Format | Workplace Object |
| Errors | |
| Code | Response content |
| 404 | Resource not found |

| Workplace's Shifts Update | |
|---|---|
| Adds a shift to this workplace's shift | |
| Method | PUT |
| Route | /workplaces/:id/shifts/:sid |
| Response Content Format | Workplace Object |
| Errors | |
| Code | Response content |
| 404 | Resource not found |

## Employees

| Employee Creation | | |
|---|---|---|
| Create a new Employee | | |
| Method | | POST |
| Route | | /employees |
| Response Content Format | | Employee object |
| Parameters | | |
| Key | Required | Description |
| email | TRUE | Unique email of this user |
| password | TRUE | Secret password of this user |
| name | TRUE | Username of this user |
| Errors | | |
| Code | Response content | |
| 500 | An unknown error ocurred | |

| Employees | |
|---|---|
| Get a list of all employees | |
| Method | GET |
| Route | /employees |
| Response Content Format | List of Employee objects |
| Errors | |
| Code | Response content |
| 404 | Resource not found |

| Employee | |
|---|---|
| Get a specific employee | |
| Method | GET |
| Route | /employees/:id |
| Response Content Format | Employee Object |
| Errors | |
| Code | Response content |
| 404 | Resource not found |

| Employee Deletion | |
|---|---|
| Deletes a specific employee | |
| Method | DELETE |
| Route | /employees/:id |
| Response Content Format | null |
| Errors | |
| Code | Response content |
| 500 | An unknown error ocurred |

| Employee's Claimed Shifts Update | |
|---|---|
| Deletes a specific employee | |
| Method | PUT |
| Route | /employees/:id/shifts/:id |
| Response Content Format | Employee Object |
| Errors | |
| Code | Response content |
| 404 | Resource not found |

## Managers

| Manager Creation | | |
|---|---|---|
| Create a new Manager | | |
| Method | | POST |
| Route | | /managers |
| Response Content Format | | Manager object |
| Parameters | | |
| Key | Required | Description |
| email | TRUE | Unique email of this user |
| password | TRUE | Secret password of this user |
| name | TRUE | Username of this user |
| Errors | | |
| Code | Response content | |
| 500 | An unknown error ocurred | |

| Managers | | |
|---|---|---|
| Get a list of all managers | | |
| Method | | GET |
| Route | | /managers |
| Response Content Format | | List of Manager objects |
| Errors | | |
| Code | Response content | |
| 404 | Resource not found | |

| Manager | | |
|---|---|---|
| Get a specific manager | | |
| Method | | GET |
| Route | | /managers/:id |
| Response Content Format | | Manager Object |
| Errors | | |
| Code | Response content | |
| 404 | Resource not found | |

| Manager Deletion | | |
|---|---|---|
| Deletes a specific manager | | |
| Method | | DELETE |
| Route | | /managers/:id |
| Response Content Format | | null |
| Errors | | |
| Code | Response content | |
| 500 | An unknown error ocurred | |

| Manager's Supervised Shifts Update | | |
|---|---|---|
| Adds a shift to this manager's supervised shifts | | |
| Method | | PUT |
| Route | | /managers/:id/shifts/:supervised |
| Response Content Format | | Manager Object |
| Errors | | |
| Code | Response content | |
| 404 | Resource not found | |

## Shifts / Posted Shifts

| | | |
|---|---|---|
| Shift Creation | | |
| Create a new Shift | | |
| Method | | POST |
| Route | | /shifts |
| Response Content Format | | Shift Object |
| Parameters | | |
| Key | Required | Description |
| timestamp | TRUE | Starting time of the shift |
| duration | TRUE | Duration in minutes of the shift |
| worker | TRUE | Employee that this shift belongs to |
| Errors | | |
| Code | Response content | |
| 500 | An unknown error ocurred | |

| | | |
|---|---|---|
| Shifts | | |
| Get a list of all shifts | | |
| Method | | GET |
| Route | | /shifts |
| Response Content Format | | List of Shift objects |
| Errors | | |
| Code | Response content | |
| 404 | Resource not found | |

| | | |
|---|---|---|
| Shift | | |
| Get a specific shift | | |
| Method | | GET |
| Route | | /shifts/:id |
| Response Content Format | | Shift Object |
| Errors | | |
| Code | Response content | |
| 404 | Resource not found | |

| | | |
|---|---|---|
| Shift Deletion | | |
| Deletes a specific shift | | |
| Method | | DELETE |
| Route | | /shifts/:id |
| Response Content Format | | null |
| Errors | | |
| Code | Response content | |
| 500 | An unknown error ocurred | |

| | | |
|---|---|---|
| Posted Shift Claimed Update | | |
| Changes the shift to being available for claiming | | |
| Method | | PUT |
| Route | | /shifts/posted/:id/disclaim |
| Response Content Format | | Posted Shift Object |
| Errors | | |
| Code | Response content | |
| 404 | Resource not found | |

| | | |
|---|---|---|
| Posted Shift Creation | | |
| Create a new Posted Shift | | |
| Method | | POST |
| Route | | /shifts/:id/disclaim |
| Response Content Format | | Posted Shift Object |
| Parameters | | |
| Key | Required | Description |
| baseShift | TRUE | Original shift that is being posted |
| claimedWorker | FALSE | Who the shift belongs to in the moment (defaults to whoever posted the shift) |
| timePosted | TRUE | Date when the shift was posted |
| claimed | FALSE | Indicates if the shift is available to be claimed (defaults to TRUE) |
| Errors | | |
| Code | Response content | |
| 500 | An unknown error ocurred | |

| | | |
|---|---|---|
| Posted Shifts | | |
| Get a list of all posted shifts | | |
| Method | | GET |
| Route | | /shifts/posted |
| Response Content Format | | List of Posetd Shift objects |
| Errors | | |
| Code | Response content | |
| 404 | Resource not found | |

| | | |
|---|---|---|
| Posted Shift | | |
| Get a specific posted shift | | |
| Method | | GET |
| Route | | /shifts/posted/:id |
| Response Content Format | | Posted Shift Object |
| Errors | | |
| Code | Response content | |
| 404 | Resource not found | |

| | | |
|---|---|---|
| Posted Shift Deletion | | |
| Deletes a specific shift | | |
| Method | | DELETE |
| Route | | /shifts/posted/:id |
| Response Content Format | | null |
| Errors | | |
| Code | Response content | |
| 500 | An unknown error ocurred | |

| | | |
|---|---|---|
| Posted Shift's Claimed Worker Update | | |
| Changes the claimed worker of this Posted Shift | | |
| Method | | PUT |
| Route | | /shifts/posted/:id/claim |
| Response Content Format | | Posted Shift Object |
| Parameters | | |
| Key | Required | Description |
| worker | TRUE | User that is claiming the shift |
| Errors | | |
| Code | Response content | |
| 404 | Resource not found | |

## VIII. Design Challenges:

**How should Users, Managers and Employees be set up?** Inspired by feedback from 3.2, we tried to determine how to correctly arrange the Managers and Employee with Respect to the Users.

- *Maintain as is* - As we defined the three models, we thought the Users would serve as a reference object that stored personal information that we thought should be kept away from. Leave this as a way to continue that distinction.
- *Make Managers and Employees as subclasses of Users* - As the feedback commented, the User should be a subclass of Managers and Employees. If we take this, we'd get rid of the layer of abstraction that we wanted. We also didn't understand that reasoning behind this given our thought process.
- *Remove Users and have Managers and Employees as the models* - This solution would remove the use of a User and save its fields into Managers and Employees instead. So now each of the managers and employees would have a password and an email.

Solution - *Remove Users and have Managers and Employees* - Since we wanted to simplify the design, we removed the Users model. Rather than being concerned about security, simplicity for us and the graders was taken. The API routes are more RESTful if we separate them by Managers and Employees rather than just by having Users. Allows us to have much more specific routes with appropriate middleware to authenticate the users.

**How to maintain Shifts and Posted Shifts?** Inspired by feedback from 3.2, the grader felt that Posted Shift should be subclasses for Shifts, but we felt otherwise.

- *Subclass Posted Shifts under Shifts* - Recommended by the grader, make the Posted Shifts belong to Shifts rather than having only a reference. We're not too certain what would be the benefit.
- *Continue the same implementation* - Current implementation allows the shifts to have the flexibility to always have one owner forever.

Solution - *Continue the same implementation* - The idea that we wanted to support is that the workplace will always have one worker who is assigned to a shift and he/she will always be required to work that time. ReShift is designed to allow users to create Posted Shift which are instances of Shifts that are given up for only one specific time slot. This allows us to maintain the original owner for the rest of time and have the reassigned shift instance for other users.

## IX. Lessons Learned:

For project 3, the overwhelming lesson that we all learned was how crucial design is to a project. Often seen as an obstacle that was required, our design ultimately became a huge help. As said in class having a good design keeps the team on the same page and keeps the project within scale. Rather than jumping straight into the implementation, designing the site gave us a roadmap of exactly what we wanted and kept the project from getting too out of hand. Furthermore, we also agreed that coordinating development was another lesson. Whereas the first two project allowed us to develop freely, project 3 required that we stay on track and stick to the specs, otherwise our individual pieces of code would not work together. Also, we learned that we had to be clear with responsibility because we had an issue where we were implementing code someone else had already made and was a waste of effort.