Travel System Solution Description

I. Explain the solution

1. Assumption
   - Any record with touch OFF status without touch ON before will be an unprocessable record
   - Any record that has data cell value null/empty will be unprocessable
   - A row of data of touch will be called a “touch record”
   - TouchOn and TouchOff in a trip will be same companyId and busId
   - Bus fee mean a trip cost
2. Pre-condition
   a. Cost mapping, to fast lookup cost of TripX_To_TripY

      Ex:

      "StopA_TO_StopB": 4.50

      "StopB_TO_StopC": 6.25

      "StopA_TO_StopC": 8.45

      "StopB_TO_StopA": 4.50

      "StopC_TO_StopB": 6.25

      "StopC_TO_StopA": 8.45

   b. A group of touching of each PAN (sorted by ‘DateTimeUTC’)
      Ex:
      Input:

```
ID, DateTimeUTC, TouchType, StopID, CompanyID, BusID, PAN
1,08-01-2023 09:15:00, ON, StopA, Company1, Bus10, 1111
2,08-01-2023 09:15:01, ON, StopA, Company1, Bus10, 2222
3,08-01-2023 09:15:01, ON, StopA, Company1, Bus10, 3333
4,08-01-2023 09:30:00, OFF, StopB, Company1, Bus10, 1111
5,08-01-2023 09:35:05, OFF, StopC, Company1, Bus10, 2222
6,08-01-2023 09:35:10, OFF, StopC, Company1, Bus10, 3333
```

      Grouping input and Sort by ‘DateTimeUTC’

```
ID, DateTimeUTC, TouchType, StopID, CompanyID, BusID, PAN
1,08-01-2023 09:15:00, ON, StopA, Company1, Bus10, 1111
4,08-01-2023 09:30:00, OFF, StopB, Company1, Bus10, 1111
2,08-01-2023 09:15:01, ON, StopA, Company1, Bus10, 2222
5,08-01-2023 09:35:05, OFF, StopC, Company1, Bus10, 2222
3,08-01-2023 09:15:01, ON, StopA, Company1, Bus10, 3333
6,08-01-2023 09:35:10, OFF, StopC, Company1, Bus10, 3333
```

      After that order, we can assume that the “touch ON” record is always before the “touch OFF” record, and two “touch ON” – “touch OFF” records in a PAN group are adjoining together in a trip.

3. Bus fee calculation rule

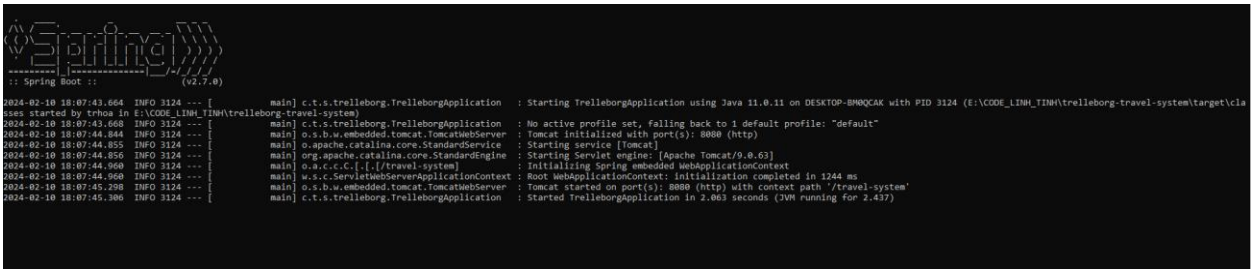
   - Prepare 3 lists to store information of “trips”, “unprocessableTouchData”, “summary”

   - Touch record has any null/empty fields value will be add to “unprocessableTouchData”

   - Calculate the bus fee for each PAN based on the list records touch ON/OFF
   Rule are:
   1. If A touchOnRecord has touchOffRecord (next to touchOnRecord)
      1.1 Build key to look up on “cost mapping” via pattern *<touchOnRecord.stopID_TO_ touchOffRecord.stopID>*
      Ex: “StopA_TO_StopB” = 4.50
      1.2 Build trip data base on touchOnRecord and touchOffRecord information.
      1.3 Add trip information to the “trips” list (COMPLETE status)
   2. If next to touchOnRecord is not touchOffRecord.
      2.1 Lookup in “cost mapping” any key containt “touchOnRecord.stopID”, then find max cost of those map item.
      2.2 Build trip data base on touchOnRecord and maximum cost of “touchOnRecord.stopID”
      2.3 Add trip information to the “trips” list (INCOMPLETE status)
   3. If touchOnRecord has the TouchType = OFF
      3.1 This touchOffRecord without touchOnRecord, shoule be an unprocessable trip, build a trip data base on touchOffRecord and set trip status “NO TOUCH ON DATA”
      3.2 Add this trip into “unprocessableTouchData” list
   4. Base on “trips”, calculate that data to “summary”
   5. Generate results of “trips”, “unprocessableTouchData”, “summary”

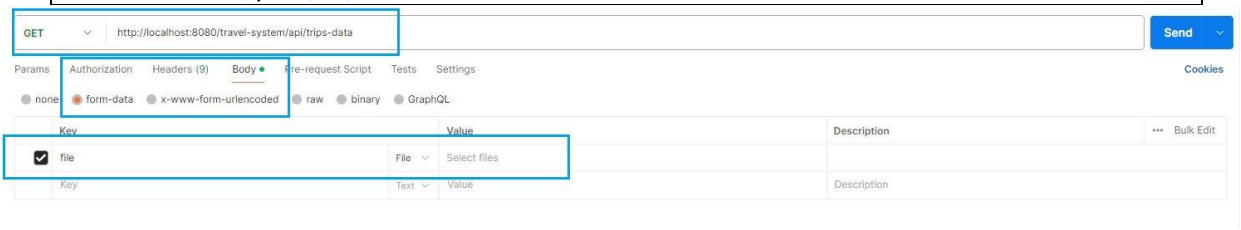
II. Run and testing

1. Test cases resource stored in “trelleborg-travel-system\src\main\resources\csv_test_data”
   - *case 1: "happycase_enought_data_on_off_samebus.csv"*
     Happy cases with 6 valid touch pairs (3 touch on/ 3 touch off)
   - *case 2: "one_incompleted_and_one_unprocessable.csv"*
     8 touch record with 6 valid touch on/off (complete), 1 touch on without touch off (incompleted), 1 touch off without touch on (unprocessable)
   - *case 3: "complext_cases.csv"*
     10 touch record with:
     3 empty/null fields, 1 no touch on (4 unprocessable)
     3 completed, 2 incomplete, 1 canceled (6 trips)
   - *case 4: "10_valid_touch_3_days.csv"*
     18 valid touch records in 3 days (9 complete)
2. Run application:
   Go to: /trelleborg-travel-system
   run: mvn clean package
   run: mvn spring-boot:run

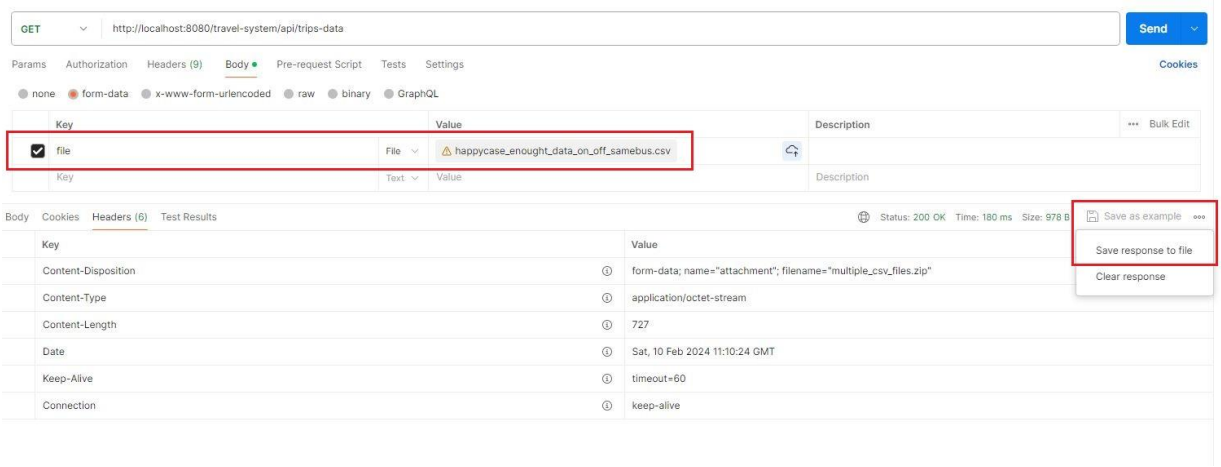


3. Import postman Curl:

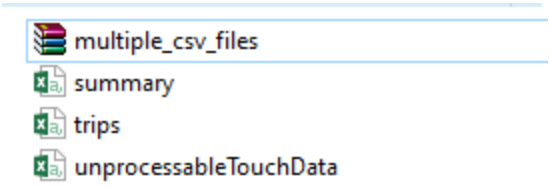
```
curl --location --request GET 'http://localhost:8080/travel-system/api/trips-data' \
--form 'file=@"/path/to/file"'
```



4. Select an input file then run



Select “Save response to file”, we will get the zip named “multiple_csv_files”, extract and see 3 expected output files “trips.csv”, “unprocessableTouchData.csv”,”summary.csv”



Note:

Enhancements:

- Build a mapping for each Stop station with maximum cost, to improve performance process.
- Unit testing controller and services.

Thanks for your time to read that solution document!