CS307 Assignment1 Database Design

Background

As we know, the China's rail network is complex, more than 5000 station distribute in 657 citys and connected by 140000km railway. There are so many passengers take the train each day and processing these informations is a real challeng. You, a SUSTech student who want to improve the experience of 12306 and refactor their database.

BEFORE START

Although there are standards, database designing is still a highly subjective intellectual activity. As graders, we will set some rules for grading, but as long as your design can satisfy our requirements, you should be able to get the points.
Since table name and field name is case-insensitive, it is recommended to use underline "_" to separate words, instead of using camel naming.(e.g. `Use my_great_table` , `some_informative_field` instead of `MyGreateTable` or `SomeInformativeField` .)

Example fields are only for reference. You may create new fields and combine/separate these fields to simplify your design, but the information needs to be remained at least.

DETAILS ABOUT THE RELATIONSHIPS

Store data about rail lines and rail station in an organized and easy-to-maintain manner (see the keywords below).

- City and Station
  - A city have multiple rail stations
  - A city can have no stations
  - A station must be in a city.
- Train and Seat
  - Different trains have different seat count and different seat type.
  - Price of different seat type in the same train is different and the number of remaining tickets should be calculated dynamically.
- Ticket
  - A concrete train in concrete date. For example, "G74" in Feb. 28th or Feb. 29th.
  - Needs arrive station and depart station, and their datetime.
  - Need seat type... or other you think is necessary
- User
  - The user must record it's ID card, the ID card number may have a 'x' in its last digit.
  - Needs phone number
- Order

    - The Order should record user, create date, order status, train num, the depart city, arrive city and price, etc.
- Other General Requirement:
    - The passengers can get on or get off the train in each station where the train will stop.
    - The ticket should be allocated to the city not the train, for example, there is a train from Shenzhen to Guangzhou, which will stop 10 min at Dongguan, the left tickets from Dongguan to Guangzhou should be larger than the left tickets from Shenzhen to Guangzhou.
    - In each train, such as "G74", we can find all passing stations in it, and for one station in this train, we can find its former and next station from your design. For example, the former station of "WU HAN" in "G74" is "YUE YAND DONG".
    - From your design, we can easily get all information as the graph below

RULES

- Design a database allowing to manage all information mentioned above in this document, and contains all fields in the table below.
- Your design needs to follow the requirements of the three normal forms
- Use primary key and foreign keys to indicate important attributes and relationships about your data
- Every row in each table should to be uniquely identified by its primary key.(You may use simple or composite primary key).
- Every table should be involved in a link. No isolate tables included.

  (每个表要有外键，或者有其他表的外键指向)
- Your design should contain no circular links

  （对于表之间的外键方向，不能有环）
- Each table should always have at least one mandatory (“Not Null”) column(including the primary key but not the id column)
- Table with only one column is not allowed(Not include the id column).

  （不能存在只有一列的表，不包含主键id）
- Tables with no other unique columns than possibly a system-generated ID is not allowed.

  （除了主键自增的id之外，需要有其他unique约束的列）
- Use appropriate types for different fields of data

- You need to use relative regular name format so that we can understand it easily. For instance, you need to use the field names mentioned in the table below unless you decide to split or merge them. The names of relationship tables need to reflect the related entities, etc
- Arrange your model diagram in a way that helps understanding your design.

Fields must contain

Field	Explanation	Example
city_name	Name of city	Shenzhen, Beijing
station_name	Name of rail station	Shenzhen North station
depart_time	Time to leave the station(For each station)	2020.02.29-18:00:21
arrive_time	Time that will arrive the station(For each station)	2020.02.29-18:00:21
depart_station	The start station of the train	Shenzhen North station
arrive_station	The destination station of the train	Shenzhen North station
ticket_entrance	The ticket entrance is where to check your ticket	2A, 3B, 16A
seat_type	The type of the seat	Hard seat, Soft sleeper
rest_ticket	The rest of the ticket	32
ticket_price	The Price of the ticket	1145.14
create_date	The date that create the order	2020.02.29-18:00:21
order_status	The status of the order	0, 1, 2(correspond to multiple states)
order_price	The price of the order	1145.14
username	Name of the user	Shiyi Chen, Xin Yao
phone_number	phone number of user	13899998888
ID_card_num	The ID card number of user	11111120000229111x

Submission

Please submit the following files, with prefix of your student ID:

- .mwb file: The default MySQL Workbench model file
- .pdf file: Export a PDF file of your modeling to prevent compatibility issues.