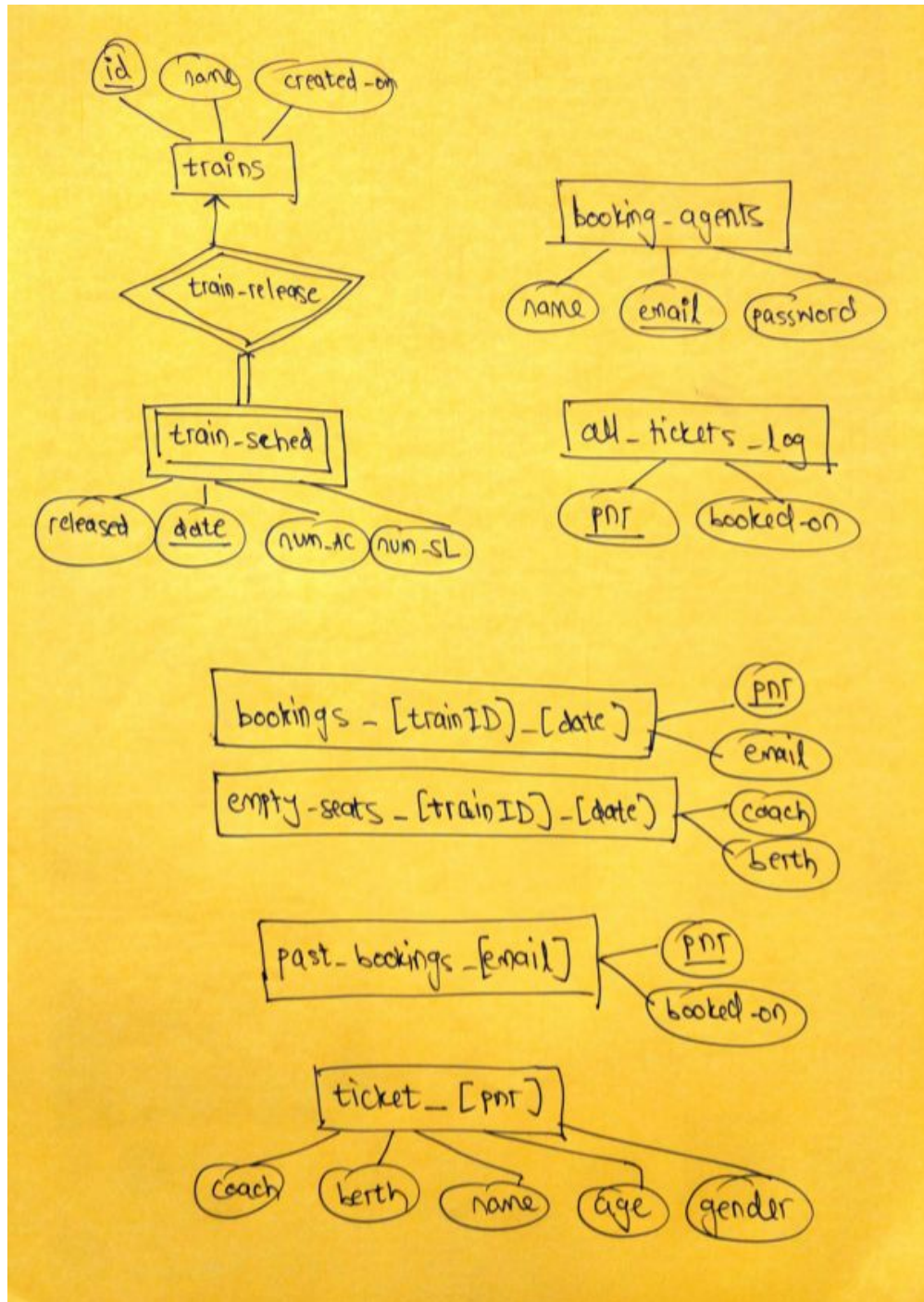


CS301 Project Documentation
Submitted by:
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ER diagram:



Tables:

- trains(train_id serial primary key, name varchar(256) not null, created_on timestamp)
- train_sched(train_id integer, date date, num_AC integer not null, num_SL integer not null, released_on timestamp, primary key(train_id, date), foreign key(train_id) references trains(train_id))
- coach(coach_type char(2), berth integer, berth_type char(2), primary key(coach_type, berth))
- booking_agents(name varchar(256), email varchar(256) primary key, password varchar(256))
- all_tickets_log(booking_agent varchar(256), pnr bigint primary key, created_on timestamp)
- bookings_[train_id]_[date](pnr bigint primary key, booking_agent varchar(256))
- empty_seats_[train_id]_[date](coach char(5), berth integer, primary key(coach, berth))
- ticket_[pnr](name varchar(256), age integer, gender char(1), coach char(5), berth integer)
- past_bookings_[email](pnr bigint primary key, created_on timestamp)

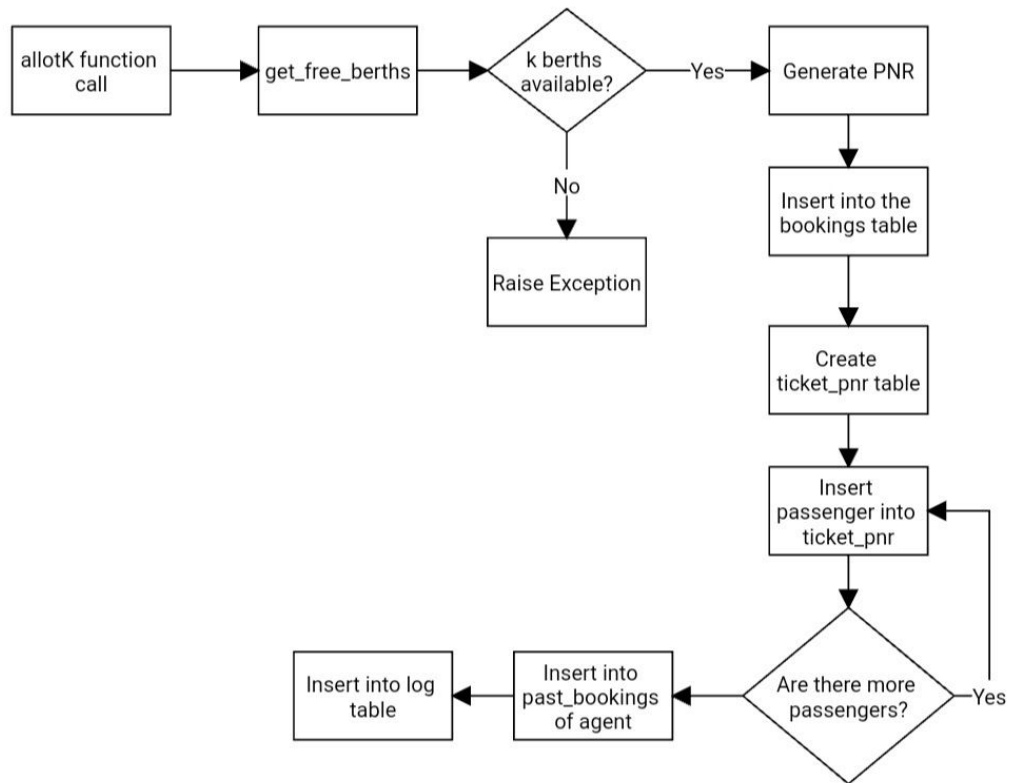
Triggers:

- pre_insert_schedule: Checks if release date is atleast a week from current date and if number of coaches is not zero
- on_insert_schedule: Creates the bookings and empty_seats table for this particular (train_id, date), and initialises the empty_seats table with all the available seats
- on_insert_agent: Creates the past_bookings table for this particular booking agent

Functions and stored procedures:

- _pre_insert_schedule(), _on_insert_schedule(), _on_insert_agent(): functions activated for their respective triggers
- get_booked_berths(train_id integer, date date): function to return a table of all the booked berths for a train on some date
- get_free_berths (coach_type char(2), num_seats int, train_id int, date date): function to return a table of all the unbooked berths for a train on some date
- getPNR(trainID integer, day date, coach char(5), berth integer): function to return bigint pnr (a pseudorandom unique number) for a particular ticket
- power(x bigint, y bigint): function to calculate the mod value of x to the power y in $O(\log(y))$ time
- decrypt(x bigint): function to decrypt the pnr number to trainid, date, coach, berth
- getTicket(pnr bigint): return a table of passengers in a ticket
- allotK(trainID integer, day date, k integer, ct char(2), booking_agent varchar(256), names varchar(256)[], ages integer[], genders char(1)[]): function to book k berths in a class of a train on some date, returns the pnr number
- total_seats(trainID integer, day date): returns the total number of berths in the train
- empty_seats(train_id integer, day date): returns the empty berths in a train
- getTrainDetails(pnr bigint): returns a table of train_id, date from pnr
- getTrainID(pnr bigint): returns the train_id from pnr
- getTrainDate(pnr bigint): returns the date from pnr

Ticket booking procedure:

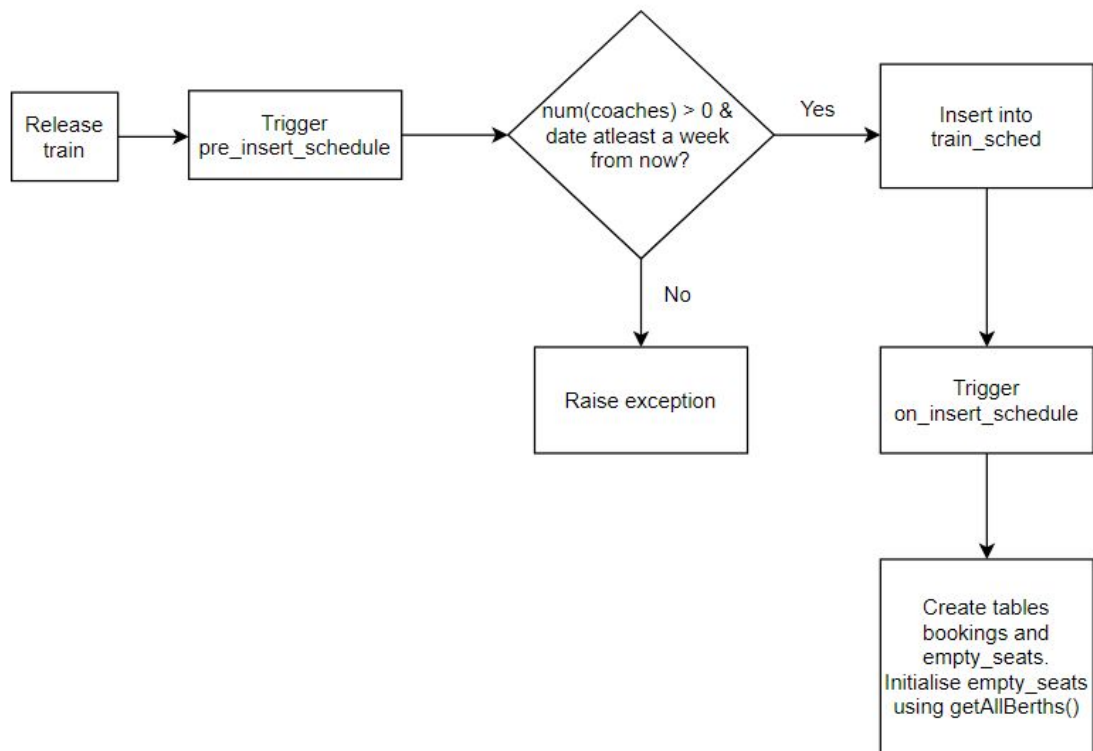


To book a ticket, the user calls the allotK function with arguments, train_id, date, number of berths, coach type, booking agent, names array, ages array, genders array.

The steps taken in the allotK function are:

- Call get_free_berths to get k free berths. If k berths are not available, raise Exception
- Generate pnr from the first free berth found
- Insert this pnr in the bookings table
- Create ticket_pnr table
- Insert each of the k free berths along with the corresponding names, ages and genders into the ticket_pnr table
- Insert this pnr into the log table and the past_bookings of the agent

Train release procedure:



- When a train is released by the administrator, the trigger `pre_insert_schedule` is called.
- The trigger checks if the total number of coaches is positive and release date is atleast a week from the current date. If not, an exception is raised.
- The `(train_id, date)` is then inserted into the `train_sched` table.
- The `on_insert_schedule` trigger is then called. This trigger creates the `bookings` and `empty_seats` table. It makes two calls to `getAllBerths()`, one to initialise the `empty_seats` table with all the AC coaches and then for all the SL coaches.