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PYTHON ASSIGNMENT

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Introduction and Assumptions

Due to large number of customers demanding ease to use and fast rental service of cars, SUPER CAR RENTAL SERVICES (SCRS) quoted us to develop python program for online car rental system to enhance effectiveness and efficiency of customers ordering and booking cars for rent.

Our program has 3 types of users as requested by SCRS, which are **admin**, **all customer,** and **registered customers**. We assume that **"all customers"** must use username and password as per global standardization to create an account as **"registered customer"**. We also assume that registered customers' personal details are username and password, they can modify their personal details which are username and password. We also assume that **"registered customer"** can view detail of cars to be rented out, which are car rental price and car name (brand & model) while **"all customer**" can only view cars available for rent.

Next, for the **admins**, we assume that they can modify the details of each cars (brand, name, description, hourly price, daily price, and remaining count). They can also return a specific car that is rented by a customer. Admins can also look at records of a specific customer, for example, their rental and booking history.

Lastly, we assume that the "**select and book a car for a specific duration**" section is our **"shopping cart"**. Customers can perform payment to confirm booking that is being included in the **"shopping cart"** and we let customers confirm their payment via a binary question (yes/no).

Pseudocode

Utility Functions

```
FUNCTION join_util(join_list, join_str)
BEGIN
  IF join_list[0] != "" THEN
    RETURN JOIN join_list with join_str
  ELSE
    RETURN join_list[1]
  ENDIF
END
```

Pseudo 1: join_util

Console Input Utility Functions

```
FUNCTION get_user_int(prompt_msg)
BEGIN
  usr_input = ""
  DOWHILE NOT usr_input IS DIGIT
    DISPLAY prompt_msg
    READ usr_input
    IF NOT usr_input IS DIGIT THEN
      DISPLAY "Input is not an integer\nPlease try again\n"
    ENDIF
  ENDWHILE
  RETURN usr_input AS INTEGER
END
```

Pseudo 2: get_user_int

```
FUNCTION get_user_float(prompt_msg)
BEGIN
  usr_input = ""
  DOWHILE NOT (REPLACE FIRST "." WITH "" IN usr_input) IS DIGIT
    DISPLAY prompt_msg
    READ usr_input
    IF NOT REPLACE FIRST "." WITH "" IN usr_input IS DIGIT THEN
      DISPLAY "Input is not a number\nPlease try again\n"
    ENDIF
  ENDWHILE
  RETURN usr_input AS FLOAT
END
```

Pseudo 3: get_user_float

```
FUNCTION get_user_not_empty(prompt_msg, error_msg="Input cannot be empty\n")
BEGIN
  usr_input = ""
  DOWHILE usr_input == ""
    DISPLAY prompt_msg
    READ usr_input
    IF usr_input == "" THEN
      DISPLAY error_msg
    ENDIF
  ENDWHILE
  RETURN usr_input
END
```

Pseudo 4: get_user_not_empty

```
FUNCTION get_user_selection(prompt_msg, selections,
  error_msg="Input is not within selections given\n")
BEGIN
  usr_input = ""
  DOWHILE usr_input NOT IN selections
    DISPLAY prompt_msg
    READ usr_input
    IF usr_input NOT IN selections THEN
      DISPLAY error_msg
    ENDIF
  ENDWHILE
  RETURN usr_input
END
```

Pseudo 5: get_user_selection

```
FUNCTION get_user_int_range(prompt_msg, range_min, range_max,
  exceed_range_error_msg="Input has exceed the range given!\n")
BEGIN
  usr_int = range_min - 1
  DOWHILE usr_int < range_min OR usr_int > range_max
    usr_int = get_user_int(prompt_msg)
    DISPLAY prompt_msg
    READ usr_int
    IF usr_int < range_min OR usr_int > range_max THEN
      DISPLAY exceed_range_error_msg
    ENDIF
  ENDWHILE
  RETURN usr_int
END
```

Pseudo 6: get_user_int_range

I/O Utility Functions

```
FUNCTION get_file_info(filename)
BEGIN
  READ file_content FROM filename
  lines = SPLIT file_content BY "\n"

  content1 = []
  content2 = []

  LOOP line_idx FROM 0 TO len(lines) - 1
    IF line_idx % 2 == 0 THEN
      APPEND lines[line_idx] INTO content1
    ELSE
      APPEND lines[line_idx] INTO content2
    ENDIF
  ENDLOOP
  RETURN content1, content2
END
```

Pseudo 7: get_file_info

```
FUNCTION modify_file_info(filename, location, is_content1, info)
BEGIN
  content1, content2 = get_file_info(filename)

  IF is_content1 THEN content1[location] = info
  ELSE content2[location] = info
  ENDIF

  final_string = ""
  LOOP content_idx FROM 0 TO len(content1)
    final_string += content1[content_idx] + "\n"
    final_string += content2[content_idx] + "\n"
  ENDLOOP

  WRITE final_string INTO filename
END
```

Pseudo 8: modify_file_info

```
FUNCTION delete_file_info(filename, location)
BEGIN
  content1, content2 = get_file_info(filename)

  final_string = ""

  LOOP content_idx FROM 0 TO len(content1)
    IF (content_idx != location) THEN
      final_string += content1[content_idx] + "\n"
      final_string += content2[content_idx] + "\n"
    ENDIF
  ENDLOOP

  WRITE final_string INTO filename
END
```

Pseudo 9: delete_file_info

```
FUNCTION add_file_info(filename, new_content1, new_content2)
BEGIN
  APPEND new_content1 INTO filename
  APPEND new_content2 INTO filename
END
```

Pseudo 10: add_file_info

Login System

```
FUNCTION register_new_user(filename, usernames)
BEGIN
  username = ""
  password = ""

  DOWHILE username == "" OR username IN usernames
    username = get_user_not_empty("Enter username: ")
    IF username == "" THEN
      DISPLAY "Username cannot be empty!\n"
    ELSE IF username IN usernames THEN
      DISPLAY "Username has been taken!\nPlease enter another username.\n"
    ENDIF
  ENDWHILE

  DOWHILE password == ""
    password = get_user_not_empty("Enter password: ")
    IF password == "" THEN
      DISPLAY "Password cannot be empty!\n"
    ENDIF
  ENDWHILE

  DISPLAY "Your username and password is " + username + "," + password

  APPEND (username + "\n" + password + "\n") INTO filename
END
```

Pseudo 11: register_new_user

```
FUNCTION login(usernames, passwords)
BEGIN
  DISPLAY "Please log in.\n"

  username = ""
  username_idx = 0

  DOWHILE username NOT IN usernames
    username = get_user_not_empty("Username: ")
    IF username NOT IN usernames THEN
      DISPLAY "Username not found\nPlease try again\n"
    ELSE
      username_idx = INDEX username FROM usernames
    ENDIF
  ENDWHILE

  password = ""

  DOWHILE password != passwords[username_idx]
    password = get_user_not_empty("Password: ")
    IF password != passwords[username_idx] THEN
      DISPLAY "Password incorrect\nPlease try again\n"
    ENDIF
  ENDWHILE

  DISPLAY "Logged in!\n"
  DISPLAY "Press enter to continue..."
  READ
  os.system("cls")
  RETURN username_idx
END
```

Pseudo 12: login

Admin

```
FUNCTION add_new_car()
BEGIN
  car_details, _ = get_file_info(CARS_FILE)

  used_car_names = []
  LOOP i FROM 0 to len(car_details)
    car_details[i] = car_details[i].split("|")
    used_car_names[i] = LOWERCASE car_details[i][0] + LOWERCASE car_details[i][1]
  ENDLOOP

  car_detail = ""
  car_name = ""

  brand = ""
  model = ""
  description = ""

  DOWHILE car_detail == "" OR car_name IN used_car_names

    brand = get_user_not_empty("Enter brand: ", "Brand cannot be empty!\n")
    model = get_user_not_empty("Enter model: ", "Model cannot be empty!\n")
    description = get_user_not_empty("Enter description:  ", "Description cannot be empty!\n")
    amount = get_user_int("Enter amount of cars to add: ")

    car_detail = brand + "|" + model + "|" + description + "|" + amount + "\n"
    car_name = LOWERCASE brand + LOWERCASE model

    IF car_name IN used_car_names THEN
      DISPLAY "The car name has been taken!\nPlease create a unique one.\n"
    ENDIF
  ENDWHILE

  hourly_price = get_user_float("Enter hourly price: ")
  daily_price = get_user_float("Enter daily price: ")
  price_detail = hourly_price + "|" + daily_price + "\n"

  DISPLAY "Your car name is: ", brand, model
  DISPLAY "Your car description is: ", description
  DISPLAY "The hourly price is: ", hourly_price + "\n" + "The daily price is: ", daily_price

  add_file_info(CARS_FILE, car_detail, price_detail)
END
```

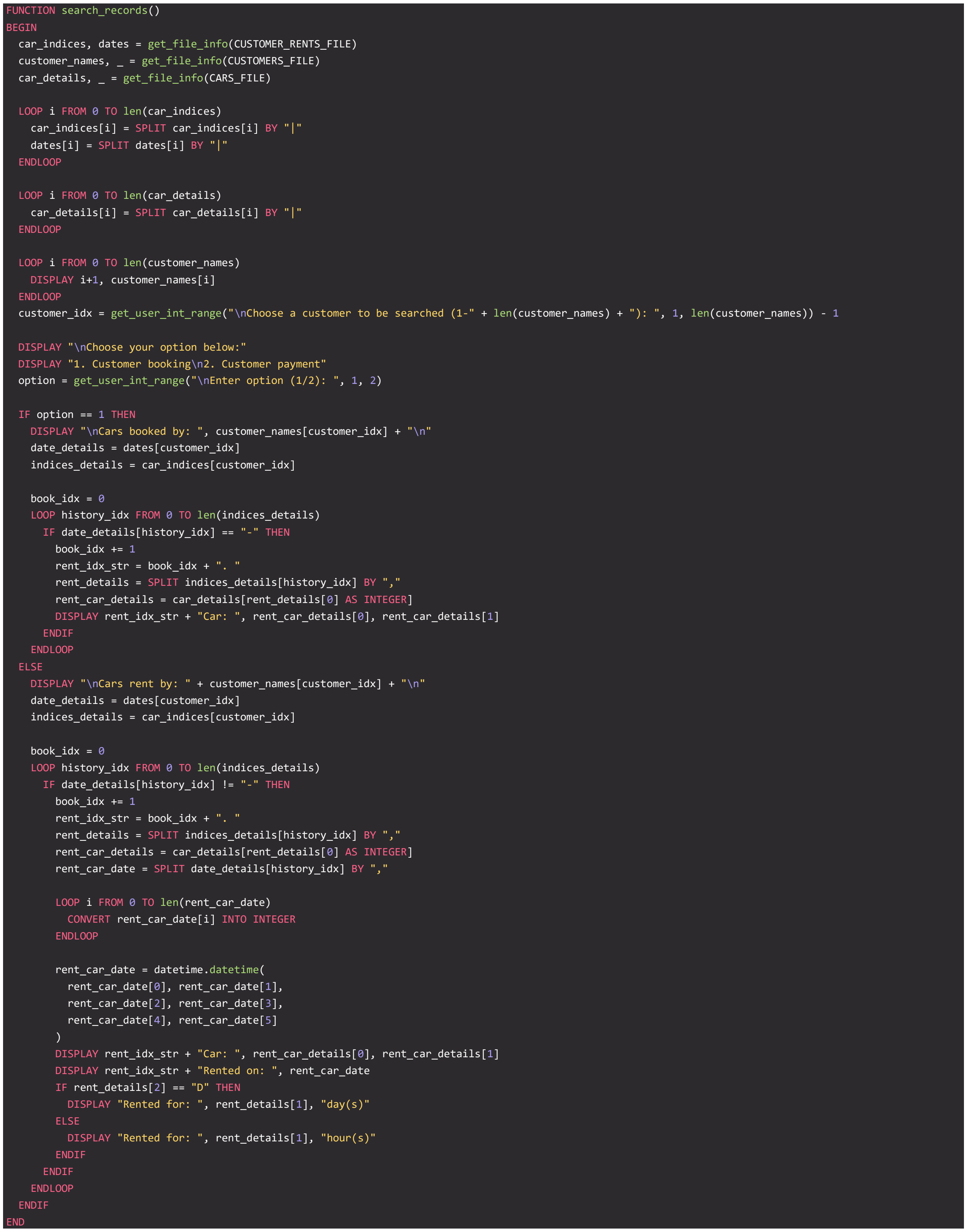
Pseudo 13: add_new_car

```
FUNCTION modify_car_details()
BEGIN
  cars, prices = get_file_info(CARS_FILE)

  car_details = []
  price_details = []

  LOOP i FROM 0 TO len(cars)
    APPEND (SPLIT cars[i] BY "|") INTO car_details
    APPEND (SPLIT prices[i] BY "|") INTO price_details
  ENDLOOP

  view_cars(False, False)
  car_idx = get_user_int_range("Choose a car index to edit: ", 1, len(car_details)) - 1

  DISPLAY "\nWhich car detail you want to modify?"
  DISPLAY("\n1. Car Detail\n2. Price Detail")
  choose_detail = get_user_int_range("\nEnter (1/2): ", 1, 2)

  IF choose_detail == 1 THEN

    DISPLAY "\nChoose car detail to be modified:"
    DISPLAY"\n1. Brand\n2. Model\n3. Description\n4. Cars Remaining"
    detail_idx = get_user_int_range("\nChoose car detail (1-4): ", 1, 4) - 1

    IF detail_idx != 3 THEN
      new_info = get_user_not_empty("\nEnter new car detail: ", "Nothing is entered. Please try again!\n")
    ELSE
      new_info = get_user_int("\nEnter new car remaining: ")
    ENDIF

    car_details[car_idx][detail_idx] = new_info AS STRING
    modification = car_details[car_idx]
    modification = join_util(modification, "|")

    modify_file_info(CARS_FILE, car_idx, True, modification)

  ELSE
    DISPLAY "\nWhich price detail you want to modify?"
    DISPLAY "\n1. Hourly Price\n2. Daily Price"
    detail_idx = get_user_int_range("\nChoose price detail(1/2): ", 1, 2) - 1
    new_info = get_user_float("\nEnter new car rent price: ")

    price_details[car_idx][detail_idx] = new_info AS STRING
    modification = price_details[car_idx]
    modification = join_util(modification, "|")

    modify_file_info(CARS_FILE, car_idx, False, modification)
  ENDIF
END
```

Pseudo 14: modify_car_details

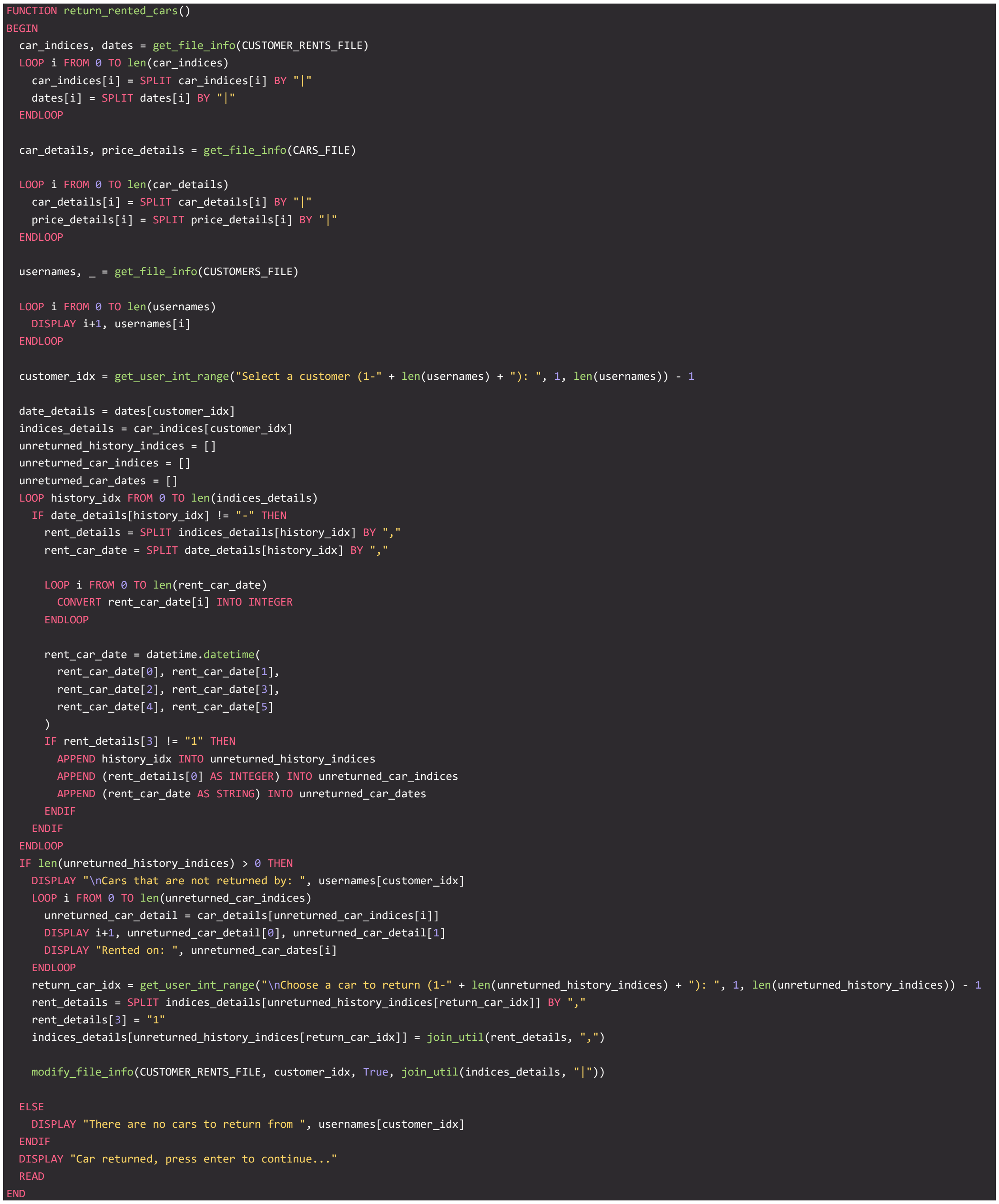
```
FUNCTION display_records()
BEGIN
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)

  LOOP i FROM 0 TO len(car_indices)
    car_indices[i] = SPLIT car_indices[i] BY "|"
    dates[i] = SPLIT dates[i] BY "|"
  ENDLOOP

  car_details, price_details = get_file_info(CARS_FILE)

  LOOP i FROM 0 TO len(car_details)
    car_details[i] = SPLIT car_details[i] BY "|"
    price_details[i] = SPLIT price_details[i] BY "|"
  ENDLOOP

  usernames, _ = get_file_info(CUSTOMERS_FILE)

  DISPLAY "\nRented cars:"

  LOOP customer_idx FROM 0 TO len(car_indices)
    date_details = dates[customer_idx]
    indices_details = car_indices[customer_idx]
    IF len(indices_details) <= 0 THEN CONTINUE
    ENDIF

    DISPLAY "\nCars rented by: ", usernames[customer_idx] + "\n"
    rent_idx = 0

    LOOP history_idx FROM 0 TO len(indices_details)
      IF date_details[history_idx] != "-" THEN
        rent_idx += 1
        rent_idx_str = rent_idx + "."
        rent_details = SPLIT indices_details[history_idx] BY ","
        rent_car_date = SPLIT date_details[history_idx] BY ","

        LOOP i FROM 0 TO len(rent_car_date)
          CONVERT rent_car_date[i] INTO INTEGER
        ENDLOOP

        rent_car_date = datetime.datetime(

          rent_car_date[0], rent_car_date[1],
          rent_car_date[2], rent_car_date[3],
          rent_car_date[4], rent_car_date[5]
        )
        rent_car_details = car_details[rent_details[0] AS INTEGER]
        DISPLAY rent_idx_str + "Car:" , rent_car_details[0], rent_car_details[1]
        DISPLAY "Rented on:", rent_car_date
        IF rent_details[2] == "D" then
          DISPLAY "Rented for: ", rent_details[1], "day(s)"
        ELSE
          DISPLAY "Rented for: ", rent_details[1], "hour(s)"
        ENDIF

        IF rent_details[3] AS INTEGER == 1 THEN
          DISPLAY "Status: Returned"
        ELSE
          DISPLAY "Status: Not returned"
        ENDIF
      ENDIF
    ENDLOOP
  ENDLOOP

  DISPLAY "Booked cars:"
  LOOP customer_idx FROM 0 TO len(car_indices)
    date_details = dates[customer_idx]
    indices_details = car_indices[customer_idx]

    DISPLAY "\nCars booked by: ", usernames[customer_idx] + "\n"
    rent_idx = 0
    LOOP history_idx FROM 0 TO len(indices_details)
      IF date_details[history_idx] == "-" THEN
        rent_idx += 1
        rent_idx_str = rent_idx + ". "
        rent_details = SPLIT indices_details[history_idx] BY ","
        rent_car_details = car_details[rent_details[0] AS INTEGER]
        DISPLAY rent_idx_str + "Car: ", rent_car_details[0], rent_car_details[1]
      ENDIF
    ENDLOOP
  ENDLOOP
  DISPLAY "Cars available for rent:\n"
  view_cars(True, True)
END
```

Pseudo 15: display_records



```
FUNCTION search_records()
BEGIN
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
  customer_names, _ = get_file_info(CUSTOMERS_FILE)
  car_details, _ = get_file_info(CARS_FILE)

  LOOP i FROM 0 TO len(car_indices)
    car_indices[i] = SPLIT car_indices[i] BY "|"
    dates[i] = SPLIT dates[i] BY "|"
  ENDLOOP

  LOOP i FROM 0 TO len(car_details)
    car_details[i] = SPLIT car_details[i] BY "|"
  ENDLOOP

  LOOP i FROM 0 TO len(customer_names)
    DISPLAY i+1, customer_names[i]
  ENDLOOP
  customer_idx = get_user_int_range("\nChoose a customer to be searched (1-" + len(customer_names) + "): ", 1, len(customer_names)) - 1

  DISPLAY "\nChoose your option below:"
  DISPLAY "1. Customer booking\n2. Customer payment"
  option = get_user_int_range("\nEnter option (1/2): ", 1, 2)

  IF option == 1 THEN
    DISPLAY "\nCars booked by: ", customer_names[customer_idx] + "\n"
    date_details = dates[customer_idx]
    indices_details = car_indices[customer_idx]

    book_idx = 0
    LOOP history_idx FROM 0 TO len(indices_details)
      IF date_details[history_idx] == "-" THEN
        book_idx += 1
        rent_idx_str = book_idx + ". "
        rent_details = SPLIT indices_details[history_idx] BY ","
        rent_car_details = car_details[rent_details[0] AS INTEGER]
        DISPLAY rent_idx_str + "Car: ", rent_car_details[0], rent_car_details[1]
      ENDIF
    ENDLOOP
  ELSE
    DISPLAY "\nCars rent by: " + customer_names[customer_idx] + "\n"
    date_details = dates[customer_idx]
    indices_details = car_indices[customer_idx]

    book_idx = 0
    LOOP history_idx FROM 0 TO len(indices_details)
      IF date_details[history_idx] != "-" THEN
        book_idx += 1
        rent_idx_str = book_idx + ". "
        rent_details = SPLIT indices_details[history_idx] BY ","
        rent_car_details = car_details[rent_details[0] AS INTEGER]
        rent_car_date = SPLIT date_details[history_idx] BY ","

        LOOP i FROM 0 TO len(rent_car_date)
          CONVERT rent_car_date[i] INTO INTEGER
        ENDLOOP

        rent_car_date = datetime.datetime(
          rent_car_date[0], rent_car_date[1],
          rent_car_date[2], rent_car_date[3],
          rent_car_date[4], rent_car_date[5]
        )
        DISPLAY rent_idx_str + "Car: ", rent_car_details[0], rent_car_details[1]
        DISPLAY rent_idx_str + "Rented on: ", rent_car_date
        IF rent_details[2] == "D" THEN
          DISPLAY "Rented for: ", rent_details[1], "day(s)"
        ELSE
          DISPLAY "Rented for: ", rent_details[1], "hour(s)"
        ENDIF
      ENDIF
    ENDLOOP
  ENDIF
END
```

Pseudo 16: search_records



```
FUNCTION return_rented_cars()
BEGIN
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
  LOOP i FROM 0 TO len(car_indices)
    car_indices[i] = SPLIT car_indices[i] BY "|"
    dates[i] = SPLIT dates[i] BY "|"
  ENDLOOP

  car_details, price_details = get_file_info(CARS_FILE)

  LOOP i FROM 0 TO len(car_details)
    car_details[i] = SPLIT car_details[i] BY "|"
    price_details[i] = SPLIT price_details[i] BY "|"
  ENDLOOP

  usernames, _ = get_file_info(CUSTOMERS_FILE)

  LOOP i FROM 0 TO len(usernames)
    DISPLAY i+1, usernames[i]
  ENDLOOP

  customer_idx = get_user_int_range("Select a customer (1-" + len(usernames) + "): ", 1, len(usernames)) - 1

  date_details = dates[customer_idx]
  indices_details = car_indices[customer_idx]
  unreturned_history_indices = []
  unreturned_car_indices = []
  unreturned_car_dates = []
  LOOP history_idx FROM 0 TO len(indices_details)
    IF date_details[history_idx] != "-" THEN
      rent_details = SPLIT indices_details[history_idx] BY ","
      rent_car_date = SPLIT date_details[history_idx] BY ","

      LOOP i FROM 0 TO len(rent_car_date)
        CONVERT rent_car_date[i] INTO INTEGER
      ENDLOOP

      rent_car_date = datetime.datetime(
        rent_car_date[0], rent_car_date[1],
        rent_car_date[2], rent_car_date[3],
        rent_car_date[4], rent_car_date[5]
      )
      IF rent_details[3] != "1" THEN
        APPEND history_idx INTO unreturned_history_indices
        APPEND (rent_details[0] AS INTEGER) INTO unreturned_car_indices
        APPEND (rent_car_date AS STRING) INTO unreturned_car_dates
      ENDIF
    ENDIF
  ENDLOOP
  IF len(unreturned_history_indices) > 0 THEN
    DISPLAY "\nCars that are not returned by: ", usernames[customer_idx]
    LOOP i FROM 0 TO len(unreturned_car_indices)
      unreturned_car_detail = car_details[unreturned_car_indices[i]]
      DISPLAY i+1, unreturned_car_detail[0], unreturned_car_detail[1]
      DISPLAY "Rented on: ", unreturned_car_dates[i]
    ENDLOOP
    return_car_idx = get_user_int_range("\nChoose a car to return (1-" + len(unreturned_history_indices) + "): ", 1, len(unreturned_history_indices)) - 1
    rent_details = SPLIT indices_details[unreturned_history_indices[return_car_idx]] BY ","
    rent_details[3] = "1"
    indices_details[unreturned_history_indices[return_car_idx]] = join_util(rent_details, ",")

    modify_file_info(CUSTOMER_RENTS_FILE, customer_idx, True, join_util(indices_details, "|"))

  ELSE
    DISPLAY "There are no cars to return from ", usernames[customer_idx]
  ENDIF
  DISPLAY "Car returned, press enter to continue..."
  READ
END
```

Pseudo 17: return_rented_cars

```
FUNCTION admin()
BEGIN
  os.system("cls")
  admin_list = [
    "ADMIN",
    "\n1. Add a new car.",
    "2. Modify car details.",
    "3. Display records",
    "4. Search specific records",
    "5. Return a rented car.",
    "6. Return to main menu.\n"
  ]
  admin_func = [add_new_car, modify_car_details, display_records, search_records, return_rented_cars]

  usernames, passwords = get_file_info(ADMINS_FILE)
  login(usernames, passwords)
  DOWHILE True
    os.system("cls")
    LOOP i FROM 0 TO len(admin_list)
      DISPLAY admin_list[i]
    no = get_user_int_range("Choose option (1-6): ", 1, 6)
    IF no == 6 THEN RETURN
    ENDIF
    admin_func[no-1]()
  ENDWHILE
END
```

Pseudo 18: admin

All Customers

```
FUNCTION create_acc()
BEGIN
  usernames, _ = get_file_info(CUSTOMERS_FILE)
  register_new_user(CUSTOMERS_FILE, usernames)
  add_file_info(CUSTOMER_RENTS_FILE, "\n", "\n")
END
```

Pseudo 19: create_acc

```
FUNCTION view_cars(view_available=True, wait=True)
BEGIN
  cars, price = get_file_info(CARS_FILE)
  available_car_indices = []
  LOOP i FROM 0 TO len(cars)
    car_detail = cars[i] SPLIT("|")
    price_detail = price[i] SPLIT("|")
    IF view_available AND car_detail[3] AS INTEGER <= 0 THEN CONTINUE
    ENDIF
    APPEND (i) INTO available_car_indices
    DISPLAY "Car Index: ", i+1
    DISPLAY "Car: ", car_detail[0], car_detail[1]
    DISPLAY "Description: ", car_detail[2]
    DISPLAY "Cars Remaining: ", car_detail[3]
    DISPLAY "Hourly Price: ", price_detail[0]
    DISPLAY "Daily Price: ", price_detail[1] + "\n"
  ENDLOOP

  IF wait THEN
    DISPLAY "Press enter to continue..."
    READ
  ENDIF
  RETURN available_car_indices
END
```

Pseudo 20: view_cars

```
FUNCTION all_customer()
BEGIN
  os.system("cls")
  customer_list = [
    "ALL CUSTOMER",
    "\n1. View all cars available for rent.",
    "2. Create new account.",
    "3. Exit to main menu\n"
  ]
  customer_func = [view_cars, create_acc]

  DOWHILE True
    os.system("cls")
    LOOP i FROM 0 TO len(customer_list)
      DISPLAY customer_list[i]
    ENDLOOP
    no = get_user_int_range("Choose option (1-3): ", 1, 3)
    IF no == 3 THEN RETURN
    ENDIF
    customer_func[no-1]()
  ENDWHILE
END
```

Pseudo 21: all_customer

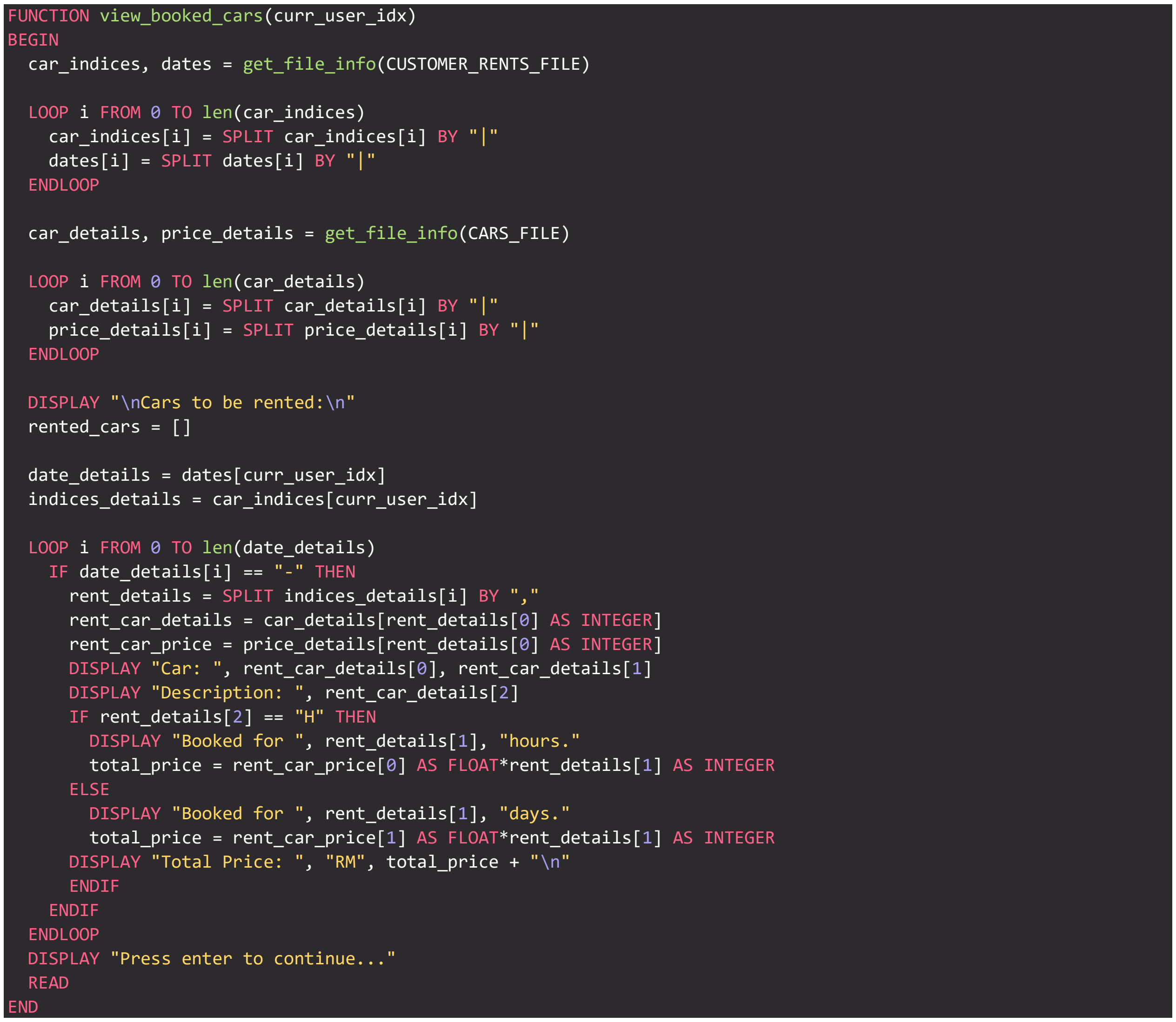
Registered Customers

```
FUNCTION modify_personal_details(curr_user_idx)
BEGIN
  DISPLAY "\n1. Username\n2. Password\n3. Cancel"
  selection = get_user_int_range("Choose option (1-3): ", 1, 3, "Select 1 or 2 only!\n")
  IF selection == 3 THEN RETURN
  ENDIF

  IF selection == 1 THEN
    new_username = get_user_not_empty("New username: ")
    modify_file_info(CUSTOMERS_FILE, curr_user_idx, True, new_username)
  ELSE
    new_password = get_user_not_empty("New password: ")
    modify_file_info(CUSTOMERS_FILE, curr_user_idx, False, new_password)
  ENDIF
END
```

Pseudo 22: modify_personal_details

```
FUNCTION view_history(curr_user_idx)
BEGIN
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)

  LOOP i FROM 0 TO len(car_indices)
    car_indices[i] = SPLIT car_indices[i] BY "|"
    dates[i] = SPLIT dates[i] BY "|"
  ENDLOOP

  car_details, price_details = get_file_info(CARS_FILE)

  LOOP i FROM 0 TO len(car_details)
    car_details[i] = SPLIT car_details[i] BY "|"
    price_details[i] = SPLIT price_details[i] BY "|"
  ENDLOOP

  DISPLAY "\nRented cars:\n"
  rented_cars = []

  date_details = dates[curr_user_idx]
  indices_details = car_indices[curr_user_idx]

  rent_idx = 0
  LOOP i FROM 0 TO len(date_details)
    IF date_details[i] != "-" THEN
      rent_idx += 1
      rent_idx_str = rent_idx + ". "
      rent_details = SPLIT indices_details[i] BY ","
      rent_car_date = SPLIT date_details[i] BY ","

      LOOP i FROM 0 TO len(rent_car_date)
        CONVERT rent_car_date[i] INTO INTEGER
      ENDLOOP

      rent_car_date = datetime.datetime(
        rent_car_date[0], rent_car_date[1],
        rent_car_date[2], rent_car_date[3],
        rent_car_date[4], rent_car_date[5]
      )
      rent_car_details = car_details[rent_details[0] AS INTEGER]
      DISPLAY rent_idx_str + "Car: ", rent_car_details[0] + ",", rent_car_details[1]
      DISPLAY "Rented on: ", rent_car_date
      IF rent_details[3] AS INTEGER == 1 THEN
        DISPLAY "Status: Returned"
      ELSE
        DISPLAY "Status: Not returned"
      ENDIF
    ENDIF
  ENDLOOP
  DISPLAY "Press enter to continue..."
  READ
END
```

Pseudo 23: view_history



```
FUNCTION view_booked_cars(curr_user_idx)
BEGIN
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)

  LOOP i FROM 0 TO len(car_indices)
    car_indices[i] = SPLIT car_indices[i] BY "|"
    dates[i] = SPLIT dates[i] BY "|"
  ENDLOOP

  car_details, price_details = get_file_info(CARS_FILE)

  LOOP i FROM 0 TO len(car_details)
    car_details[i] = SPLIT car_details[i] BY "|"
    price_details[i] = SPLIT price_details[i] BY "|"
  ENDLOOP

  DISPLAY "\nCars to be rented:\n"
  rented_cars = []

  date_details = dates[curr_user_idx]
  indices_details = car_indices[curr_user_idx]

  LOOP i FROM 0 TO len(date_details)
    IF date_details[i] == "-" THEN
      rent_details = SPLIT indices_details[i] BY ","
      rent_car_details = car_details[rent_details[0] AS INTEGER]
      rent_car_price = price_details[rent_details[0] AS INTEGER]
      DISPLAY "Car: ", rent_car_details[0], rent_car_details[1]
      DISPLAY "Description: ", rent_car_details[2]
      IF rent_details[2] == "H" THEN
        DISPLAY "Booked for ", rent_details[1], "hours."
        total_price = rent_car_price[0] AS FLOAT*rent_details[1] AS INTEGER
      ELSE
        DISPLAY "Booked for ", rent_details[1], "days."
        total_price = rent_car_price[1] AS FLOAT*rent_details[1] AS INTEGER
      DISPLAY "Total Price: ", "RM", total_price + "\n"
      ENDIF
    ENDIF
  ENDLOOP
  DISPLAY "Press enter to continue..."
  READ
END
```

Pseudo 24: view_booked_cars

```
FUNCTION book_cars(curr_user_idx)
BEGIN
  car_details, price_details = get_file_info(CARS_FILE)

  LOOP i FROM 0 TO len(car_details)
    car_details[i] = SPLIT car_details[i] BY "|"
    price_details[i] = SPLIT price_details[i] BY "|"
  ENDLOOP

  available_car_indices = view_cars(True, False)

  LOOP i FROM 0 TO len(available_car_indices)
    available_car_indices[i] += 1
    CONVERT available_car_indices[i] INTO STRING
  ENDLOOP

  car_idx = get_user_selection("\nSelect car index: ", available_car_indices, "Car index is not available for rent!\n")
  car_idx = car_idx AS INTEGER - 1

  car_details[car_idx][3] = ((car_details[car_idx][3]) - 1 AS INTEGER) AS STRING
  modify_file_info(CARS_FILE, car_idx, True, join_util(car_details[car_idx], "|"))

  DISPLAY "\nDo you want to rent the car IN days or hours? Select '1' for days and '2' for hours"
  selection = get_user_int_range("\nChoose option (1/2): ", 1, 2)
  booking_result = ""
  IF selection == 1 THEN
    duration = get_user_int("How many days do you want to rent the car: ")
    booking_result = car_idx + "," + duration + ",D,0"
  ELSE
    duration = get_user_int("How many hours do you want to rent the car: ")
    booking_result = car_idx + "," + duration + ",H,0"
  ENDIF

  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)

  LOOP i FROM 0 TO len(car_indices)
    car_indices[i] = SPLIT car_indices[i] BY "|"
    dates[i] = SPLIT dates[i] BY "|"
  ENDLOOP

  APPEND booking_result INTO car_indices[curr_user_idx]
  APPEND "-" INTO dates[curr_user_idx]

  new_car_indices = join_util(car_indices[curr_user_idx], "|")
  new_dates = join_util(dates[curr_user_idx], "|")

  modify_file_info(CUSTOMER_RENTS_FILE, curr_user_idx, True, new_car_indices)
  modify_file_info(CUSTOMER_RENTS_FILE, curr_user_idx, False, new_dates)
END
```

Pseudo 25: book_cars

```
FUNCTION payment(curr_user_idx)
BEGIN
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)

  LOOP i FROM 0 TO len(car_indices)
    car_indices[i] = SPLIT car_indices[i] BY "|"
    dates[i] = SPLIT dates[i] BY "|"
  ENDLOOP

  unpaid_car_indices = []
  LOOP i FROM 0 TO len(car_indices[curr_user_idx])
    IF dates[curr_user_idx][i] == "-" THEN
      APPEND i INTO unpaid_car_indices
    ENDIF
  ENDLOOP
  car_details, price_details = get_file_info(CARS_FILE)

  LOOP i FROM 0 TO len(car_details)
    car_details[i] = SPLIT car_details[i] BY "|"
    price_details[i] = SPLIT price_details[i] BY "|"
  ENDLOOP

  total_price = 0
  DISPLAY "\nCars booked:\n"
  LOOP idx FROM 0 TO len(unpaid_car_indices)
    rent_details = SPLIT car_indices[curr_user_idx][idx] BY ","
    rent_car_details = car_details[rent_details[0] AS INTEGER]
    rent_car_price = price_details[rent_details[0] AS INTEGER]
    IF rent_details[2] == "H" THEN
      rent_price = rent_car_price[0] AS FLOAT*rent_details[1] AS INTEGER
      DISPLAY rent_car_details[0], rent_car_details[1]
      DISPLAY rent_details[1], "hours", "RM", rent_price
      total_price += rent_price
    ELSE
      rent_price = rent_car_price[1] AS FLOAT*rent_details[1] AS INTEGER
      DISPLAY rent_car_details[0], rent_car_details[1]
      DISPLAY rent_details[1], "days", "RM", rent_price
      total_price += rent_price
    ENDIF
  ENDLOOP
  DISPLAY "The total price is: ", "RM", total_price + "\n"

  DISPLAY "Type '1' to pay, '2' to cancel payment."
  pay = get_user_int_range("Choose option (1/2): ", 1, 2)
  IF pay == 1 THEN
    current_time = datetime.datetime.now().strftime("%Y,%m,%d,%H,%M,%S")
    LOOP idx FROM 0 TO len(unpaid_car_indices)
      dates[curr_user_idx][idx] = current_time
    ENDLOOP
    modify_file_info(CUSTOMER_RENTS_FILE, curr_user_idx, False, join_util(dates[curr_user_idx], "|"))
  ENDIF
END
```

Pseudo 26: payment

```
FUNCTION delete_account(curr_user_idx)
BEGIN
  decision = ""
  decision = get_user_selection("Are you sure? y/n: ", ["y", "n"])

  IF decision == "y" THEN
    delete_file_info(CUSTOMERS_FILE, curr_user_idx)
    delete_file_info(CUSTOMER_RENTS_FILE, curr_user_idx)
    RETURN True
  ENDIF
  RETURN False
END
```

Pseudo 27: delete_account

```
FUNCTION registered_customer()
BEGIN
  os.system("cls")
  registered_customer_list = [
    "REGISTERED CUSTOMER",
    "\n1. Modify personal details.",
    "2. View personal rental history.",
    "3. View details of cars to be rented out.",
    "4. Select and book a car for a specific duration.",
    "5. Do payment to confirm Booking.",
    "6. Delete account.",
    "7. Exit to main menu\n"
  ]
  registered_customer_func = [modify_personal_details, view_history, view_booked_cars, book_cars, payment, delete
_account]

  usernames, passwords = get_file_info(CUSTOMERS_FILE)
  curr_user_idx = login(usernames, passwords)
  in_loop = True
  DOWHILE in_loop
    os.system("cls")
    LOOP i FROM 0 TO len(registered_customer_list)
      DISPLAY registered_customer_list[i]
    ENDLOOP
    no = get_user_int("Choose option (1-7): ")
    IF no == 7 THEN RETURN
    ENDIF
    in_loop = NOT registered_customer_func[no-1](curr_user_idx)
  ENDWHILE
END
```

Pseudo 28: registered_customer

Main Program

```
FUNCTION exit_program()
BEGIN
  DISPLAY "\nDo you want to continue? To exit to the Main Menu type '1', To Terminate Program type '2': "
  no = get_user_int_range("Choose option (1/2): ", 1, 2)
  IF no == 2: exit()
  ENDIF
END
```

Pseudo 29: exit_program

```
FUNCTION main()
BEGIN
  user_func = [admin, all_customer, registered_customer]

  user_type_list = [
    "MAIN MENU",
    "1. Admin",
    "2. All Customers (Registered / Not-Registered)",
    "3. Registered Customer",
    "4. Exit Program\n"
  ]

  DOWHILE True
    os.system("cls")
    DISPLAY "Welcome to SUPER CAR RENTAL SERVICES!!!\n"
    LOOP i FROM 0 TO len(user_type_list)
      DISPLAY user_type_list[i]
    ENDLOOP

    no = get_user_int_range("Choose user(1-4): ", 1, 4)
    IF no == 4 THEN exit_program()
    ELSE user_func[no-1]()
    ENDIF
  ENDWHILE
END
```

Pseudo 30: main

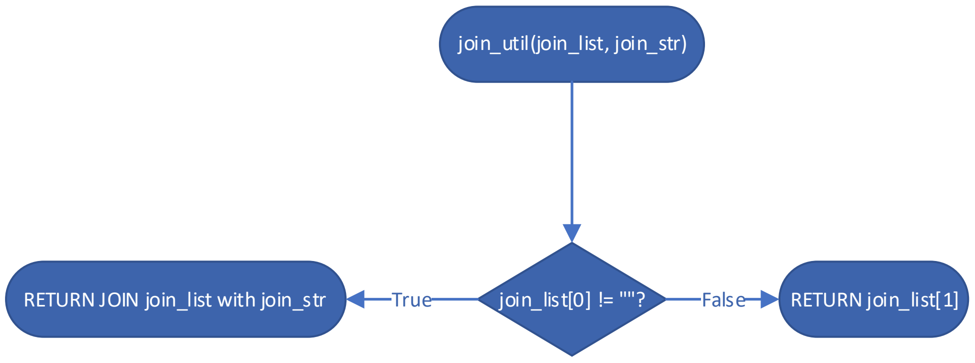
```
IMPORT datetime
IMPORT os

CUSTOMERS_FILE = "./customers.txt"
CUSTOMER_RENTS_FILE = "./customer_rents.txt"
CARS_FILE = "./cars.txt"
ADMINS_FILE = "./admins.txt"

main()
```

Pseudo 31: running the program

Flowchart

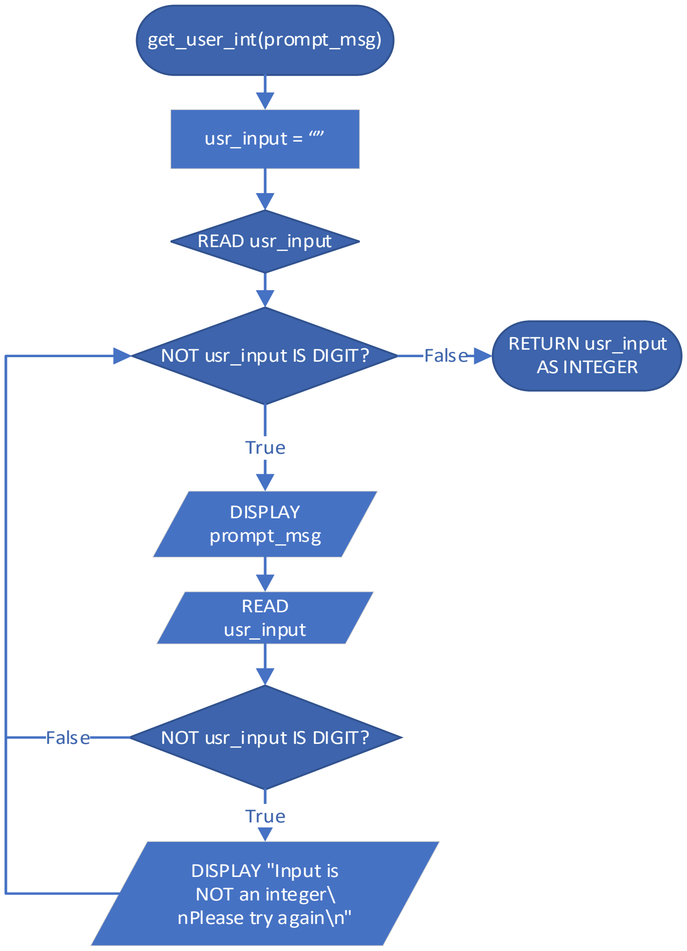
Disclaimer: Some flow charts are too large to fit in, therefore it may not be in its actual size, please feel free to zoom in if needed, the resolution will not be reduced as it is in vector space.

Utility Functions

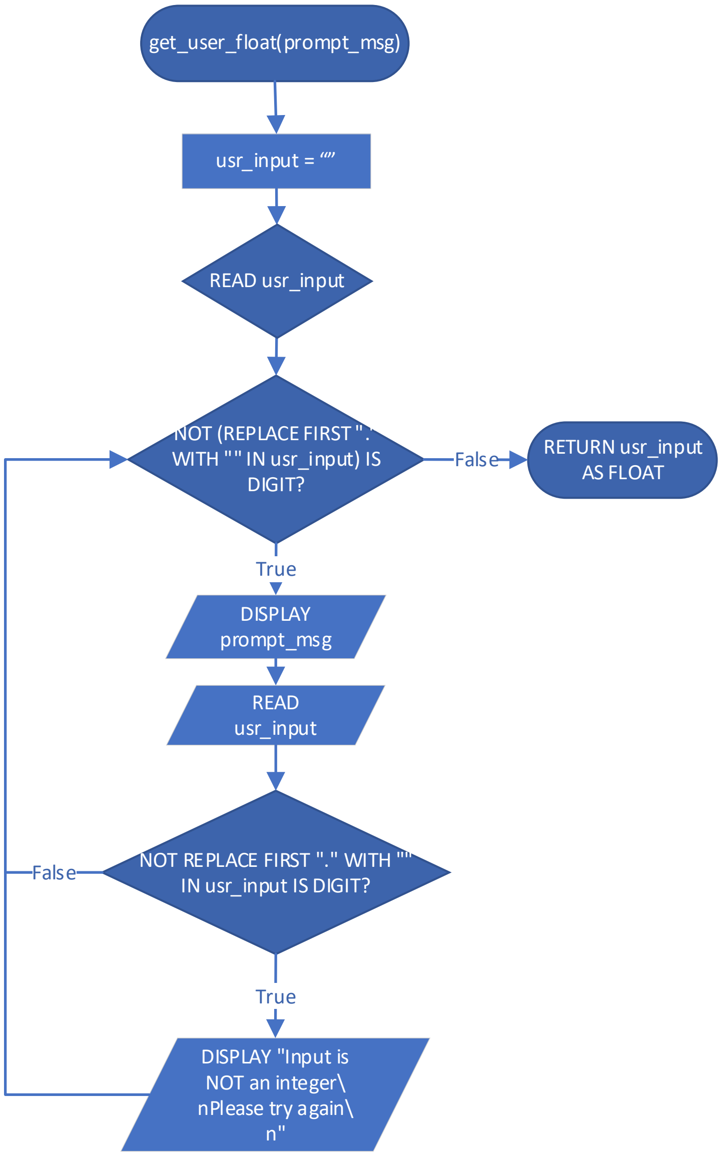

join_util(join_list, join_str)
join_list[0] != ""?
True
RETURN JOIN join_list with join_str
False
RETURN join_list[1]

Flowchart 1: join_util

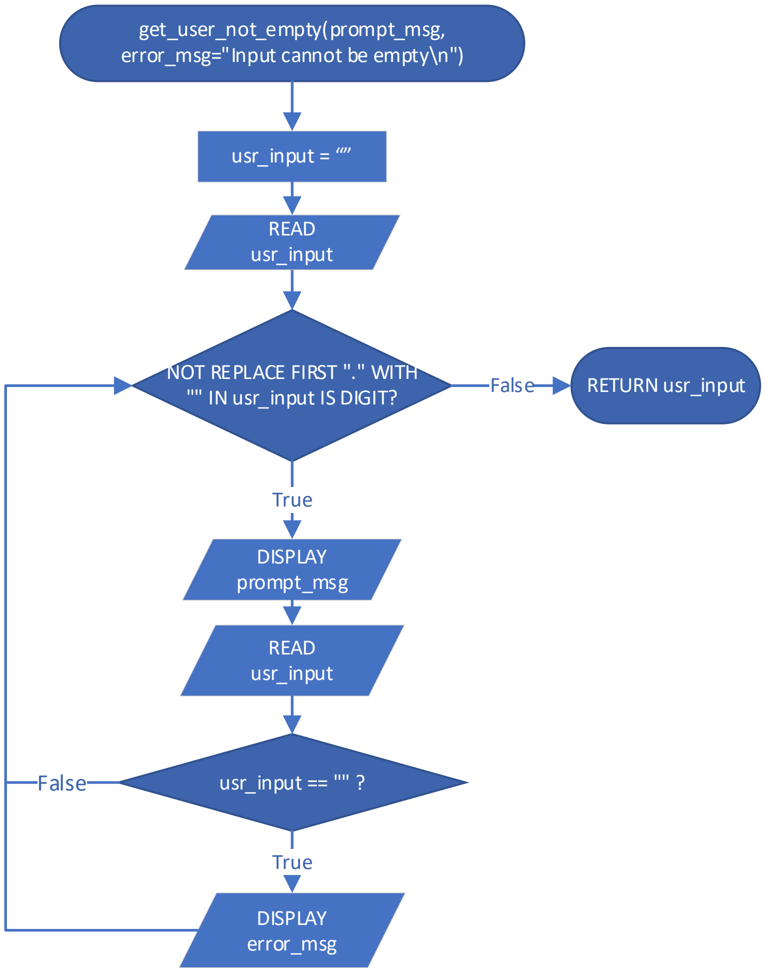
Console Input Utility Functions



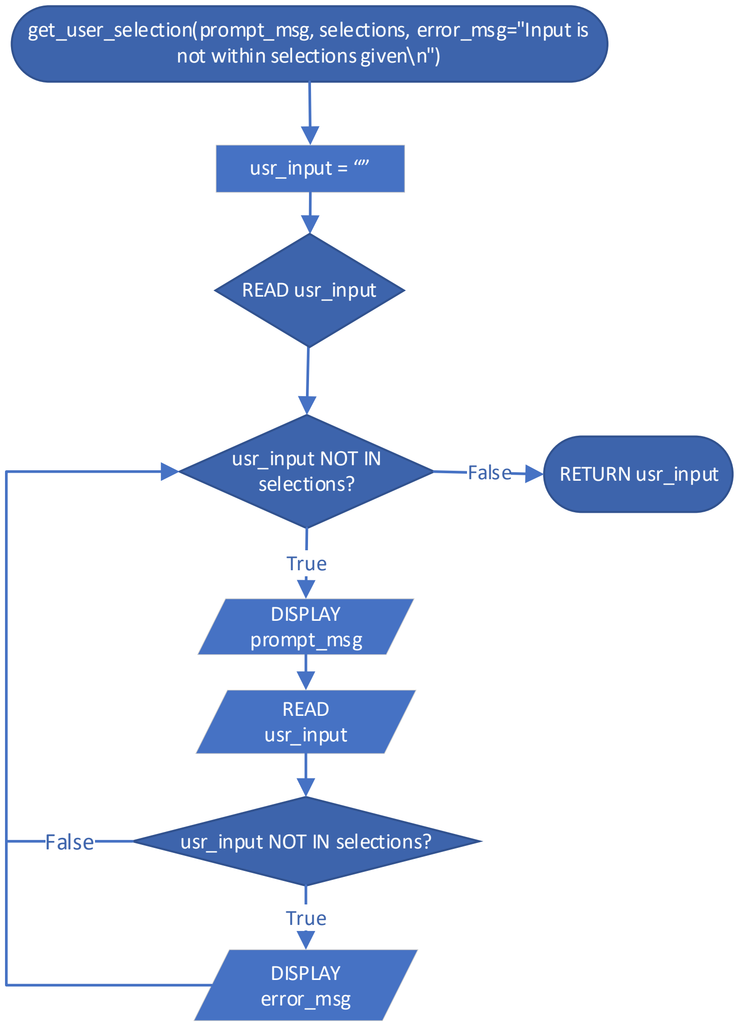
Flowchart 2: get_user_int


get_user_float(prompt_msg)
usr_input = “”
READ usr_input
NOT (REPLACE FIRST "." WITH "" IN usr_input) IS DIGIT?
False
RETURN usr_input AS FLOAT
True
DISPLAY prompt_msg
READ usr_input
NOT REPLACE FIRST "." WITH "" IN usr_input IS DIGIT?
False
True
DISPLAY "Input is NOT an integer\nPlease try again\n"

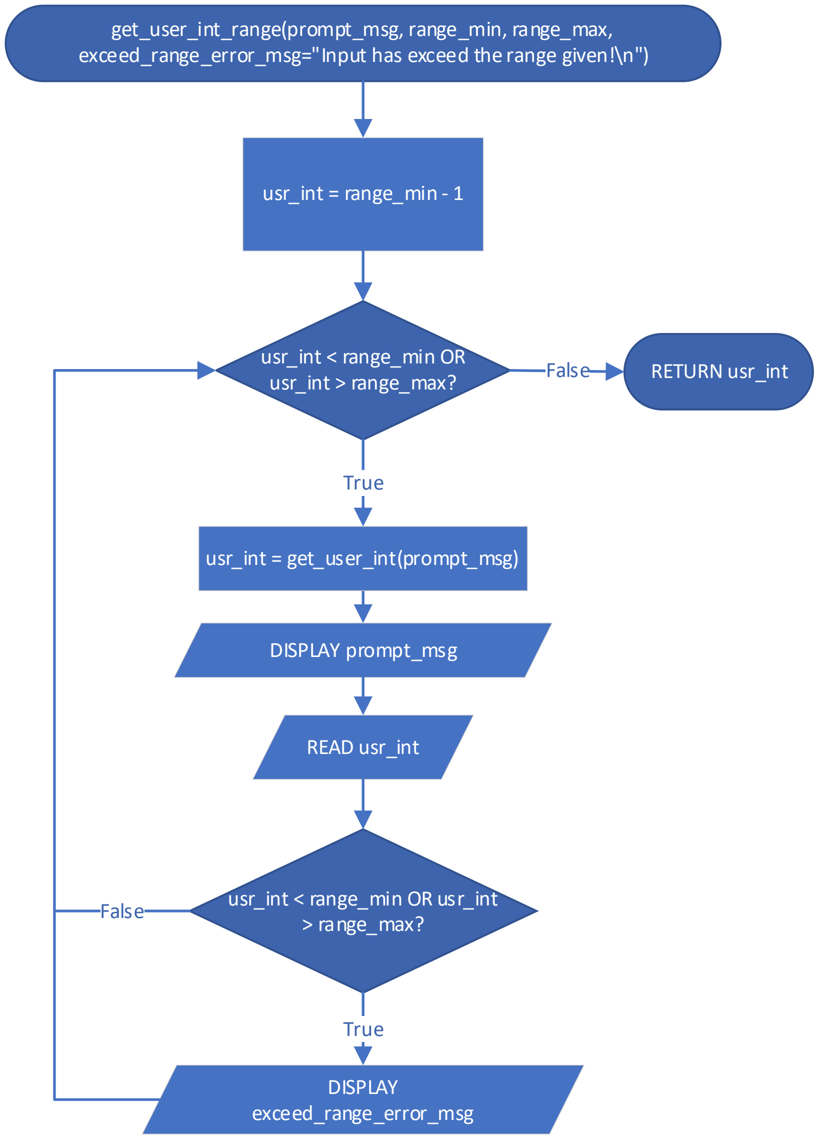
Flowchart 3: get_user_float



Flowchart 4: get_user_not_empty

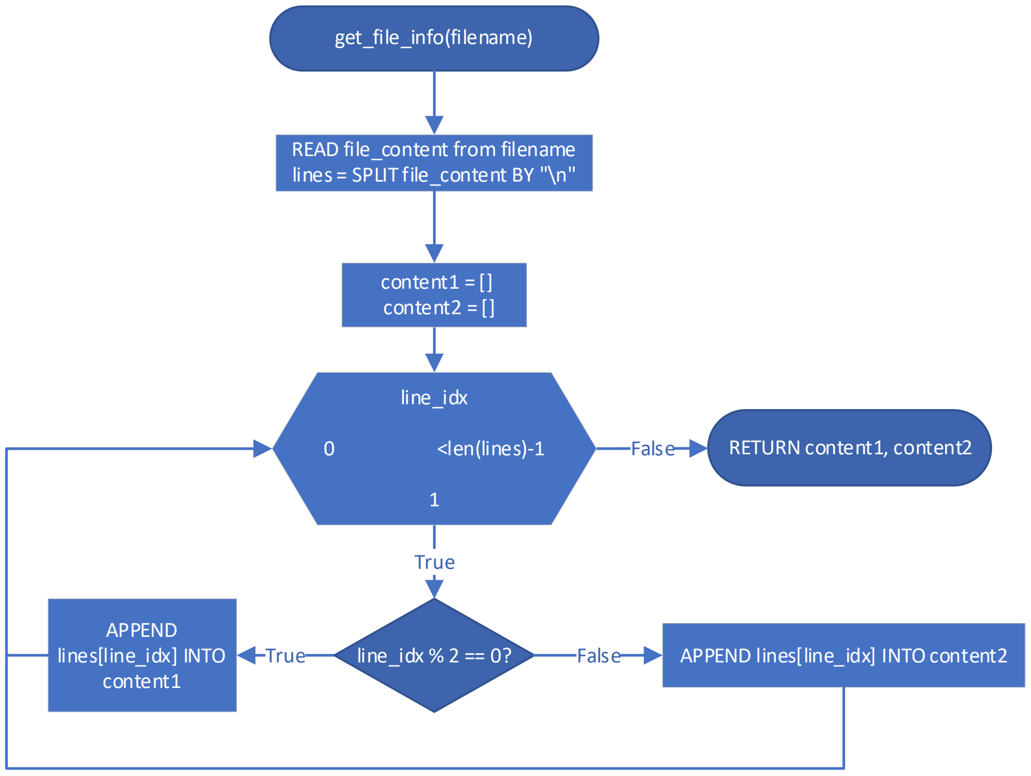

get_user_selection(prompt_msg, selections, error_msg="Input is not within selections given\n")
usr_input = “”
READ usr_input
usr_input NOT IN selections?
False
RETURN usr_input
True
DISPLAY prompt_msg
READ usr_input
usr_input NOT IN selections?
False
True
DISPLAY error_msg

Flowchart 5: get_user_selection

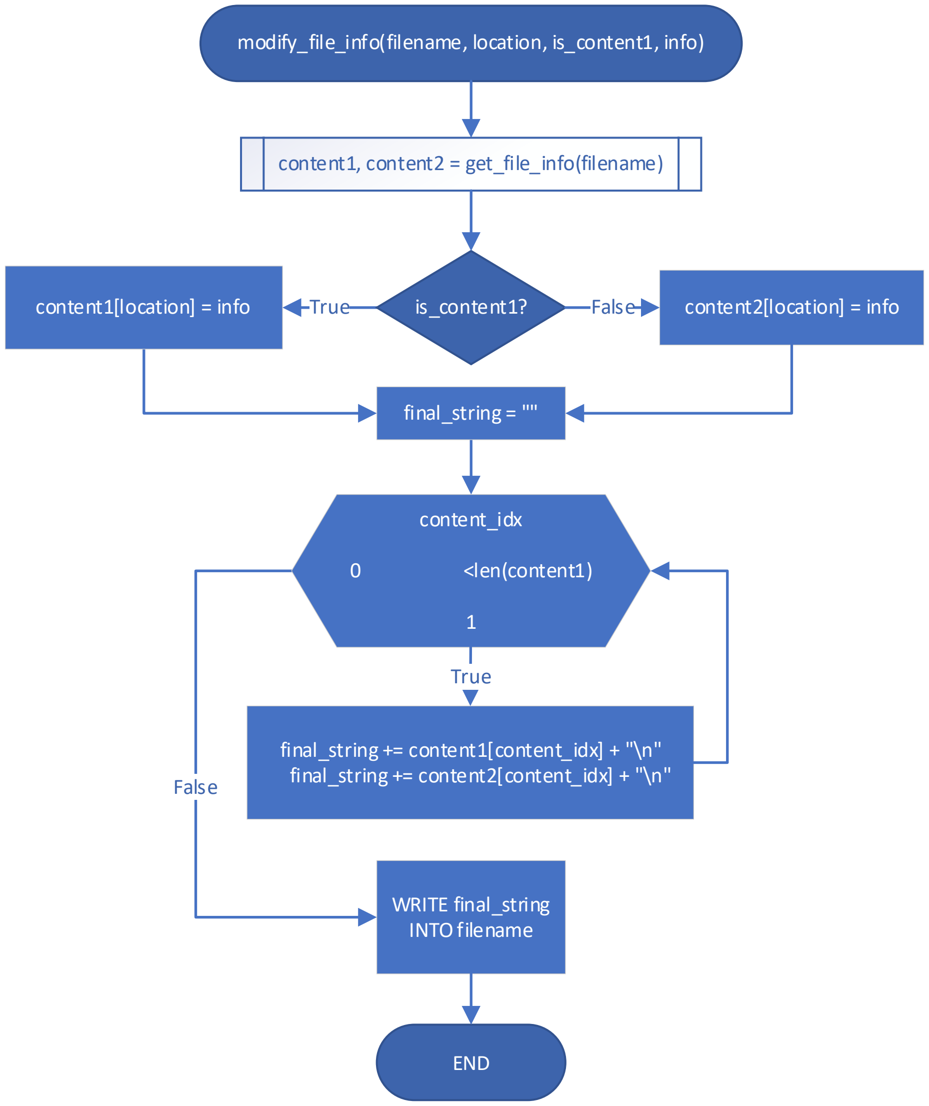

get_user_int_range(prompt_msg, range_min, range_max, exceed_range_error_msg="Input has exceed the range given!\n")
usr_int = range_min - 1
usr_int < range_min OR usr_int > range_max?
False
RETURN usr_int
True
usr_int = get_user_int(prompt_msg)
DISPLAY prompt_msg
READ usr_int
usr_int < range_min OR usr_int > range_max?
False
True
DISPLAY exceed_range_error_msg

Flowchart 6: get_user_int_range

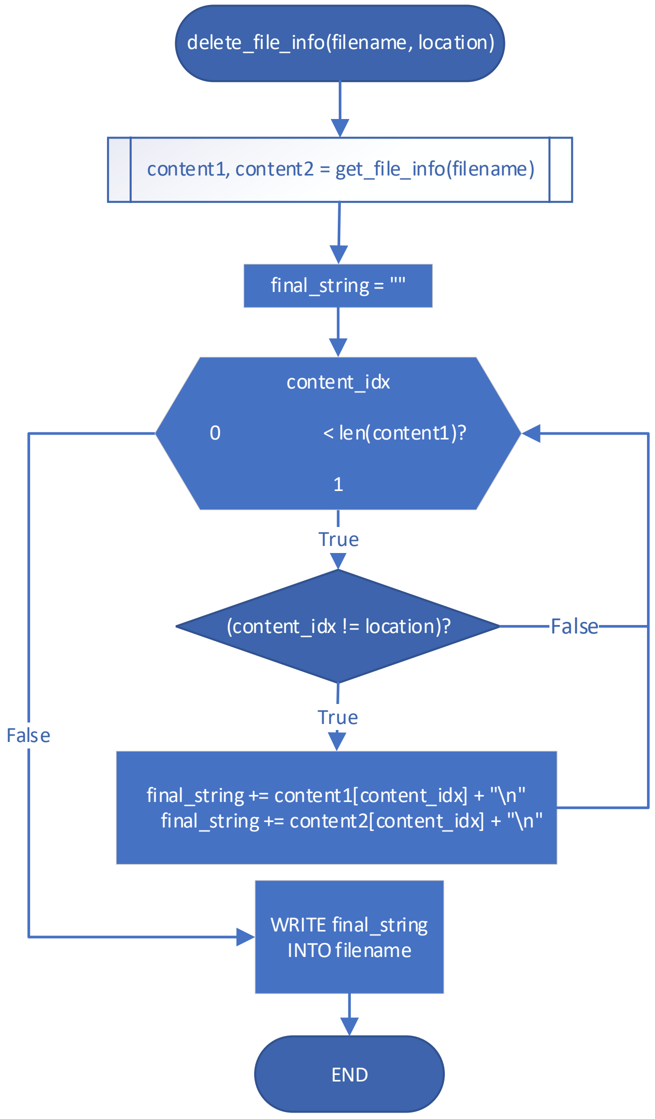
I/O Utility Functions


get_file_info(filename)
READ file_content from filename
lines = SPLIT file_content BY "\n"
content1 = []
content2 = []
line_idx
0
<len(lines)-1
1
False
RETURN content1, content2
True
line_idx % 2 == 0?
True
APPEND lines[line_idx] INTO content1
False
APPEND lines[line_idx] INTO content2

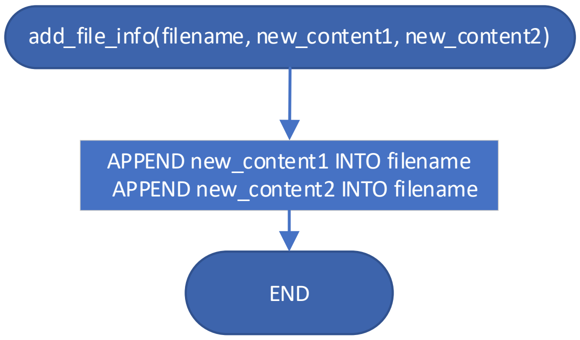
Flowchart 7: get_file_info


modify_file_info(filename, location, is_content1, info)
content1, content2 = get_file_info(filename)
is_content1?
True
False
content1[location] = info
content2[location] = info
final_string = ""
content_idx
0
<len(content1)
1
True
False
final_string += content1[content_idx] + "\n"
final_string += content2[content_idx] + "\n"
WRITE final_string
INTO filename
END

Flowchart8: modify_file_info

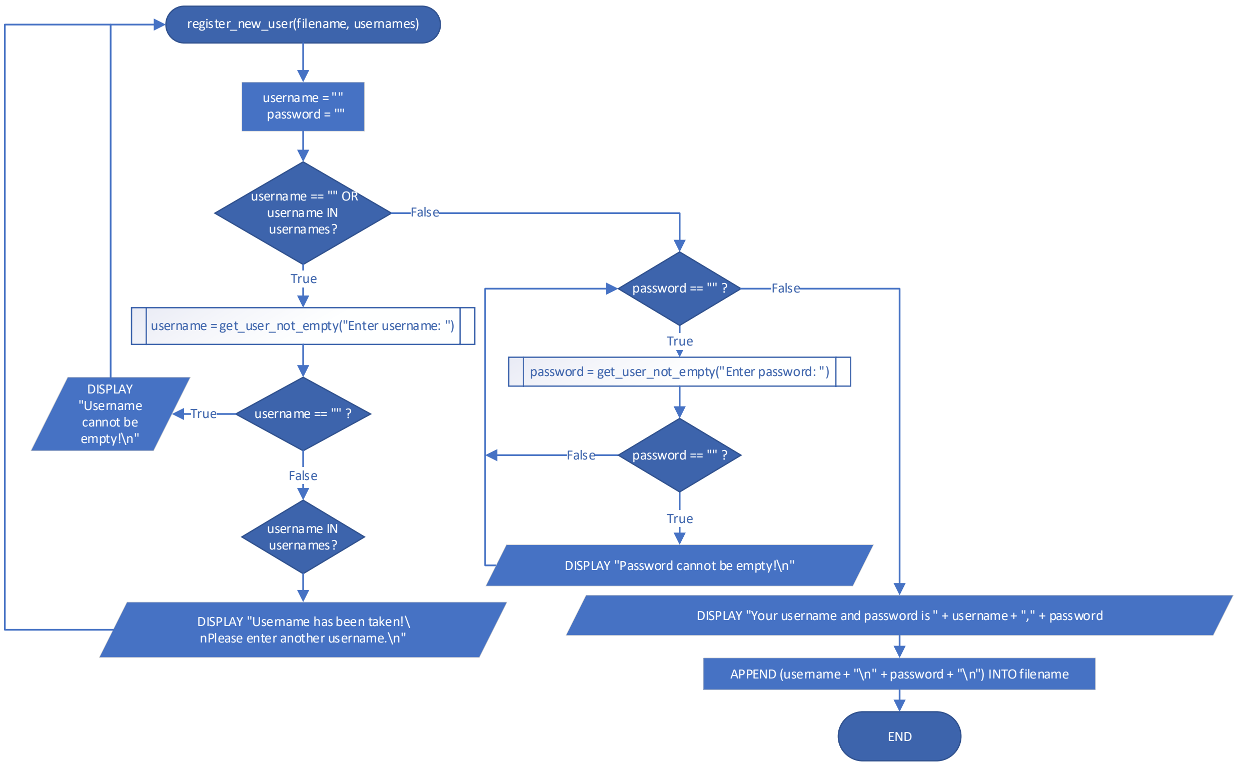

delete_file_info(filename, location)
content1, content2 = get_file_info(filename)
final_string = ""
content_idx
0
< len(content1)?
1
True
(content_idx != location)?
False
True
False
final_string += content1[content_idx] + "\n"
final_string += content2[content_idx] + "\n"
WRITE final_string INTO filename
END

Flowchart 9: delete_file_info

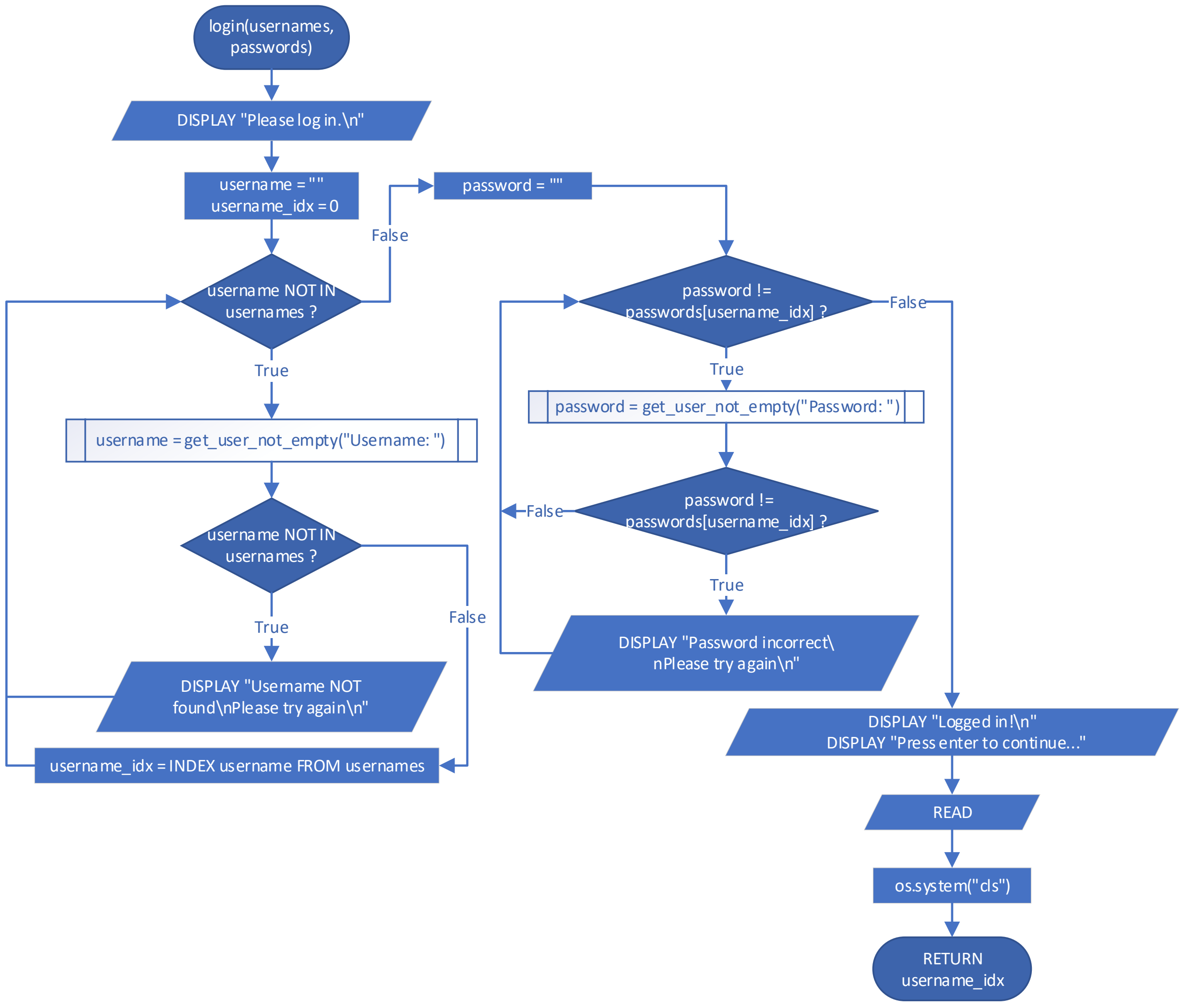

add_file_info(filename, new_content1, new_content2)
APPEND new_content1 INTO filename
APPEND new_content2 INTO filename
END

Flowchart 10: add_file_info

Login System

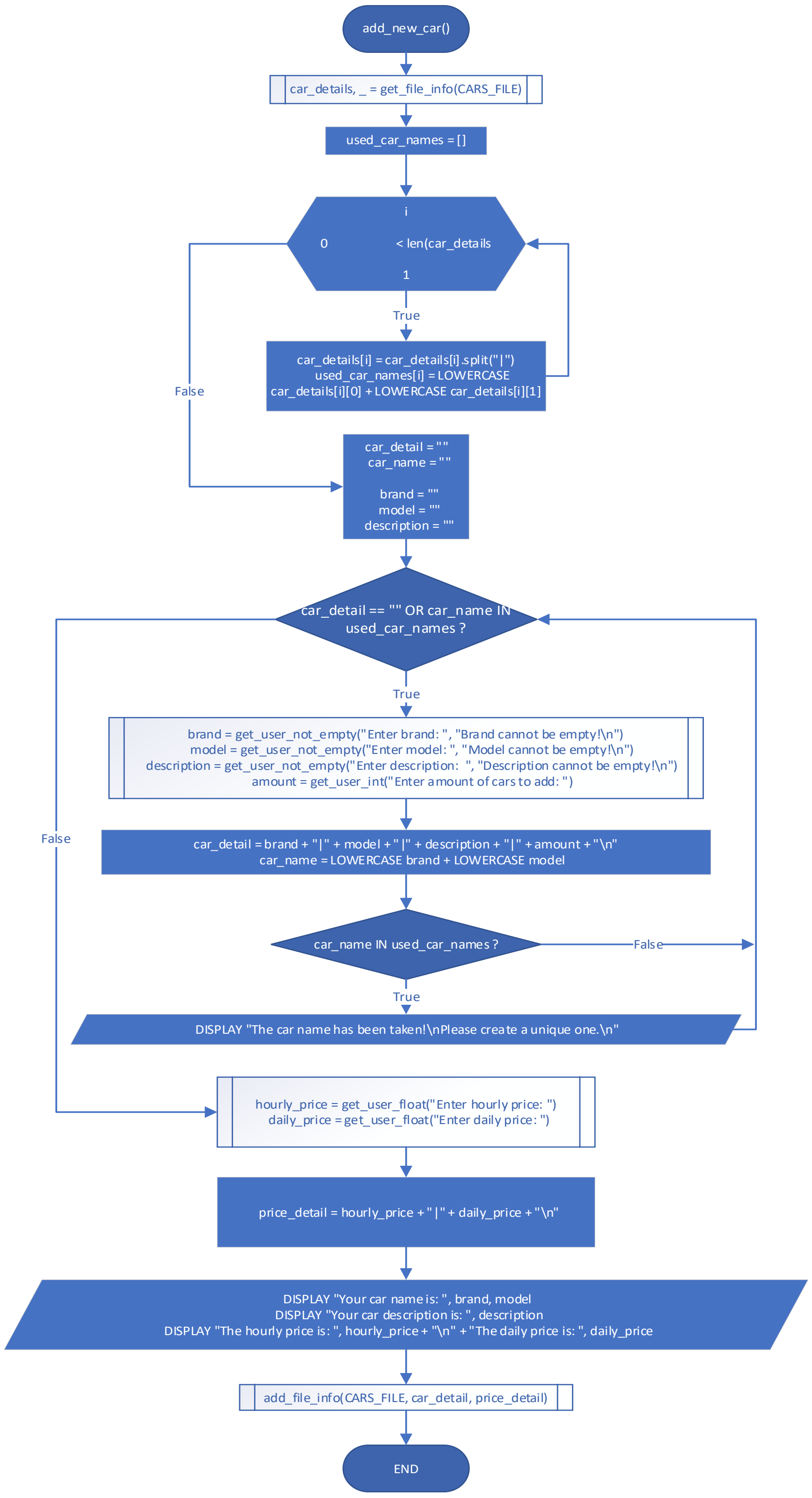

register_new_user(filename, usernames)
username = ""
password = ""
username == "" OR username IN usernames?
False
True
username = get_user_not_empty("Enter username: ")
username == "" ?
True
DISPLAY "Username cannot be empty!\n"
False
username IN usernames?
DISPLAY "Username has been taken!\nPlease enter another username.\n"
password == "" ?
False
True
password = get_user_not_empty("Enter password: ")
password == "" ?
False
True
DISPLAY "Password cannot be empty!\n"
DISPLAY "Your username and password is " + username + "," + password
APPEND (username + "\n" + password + "\n") INTO filename
END

Flowchart 11: register_new_user

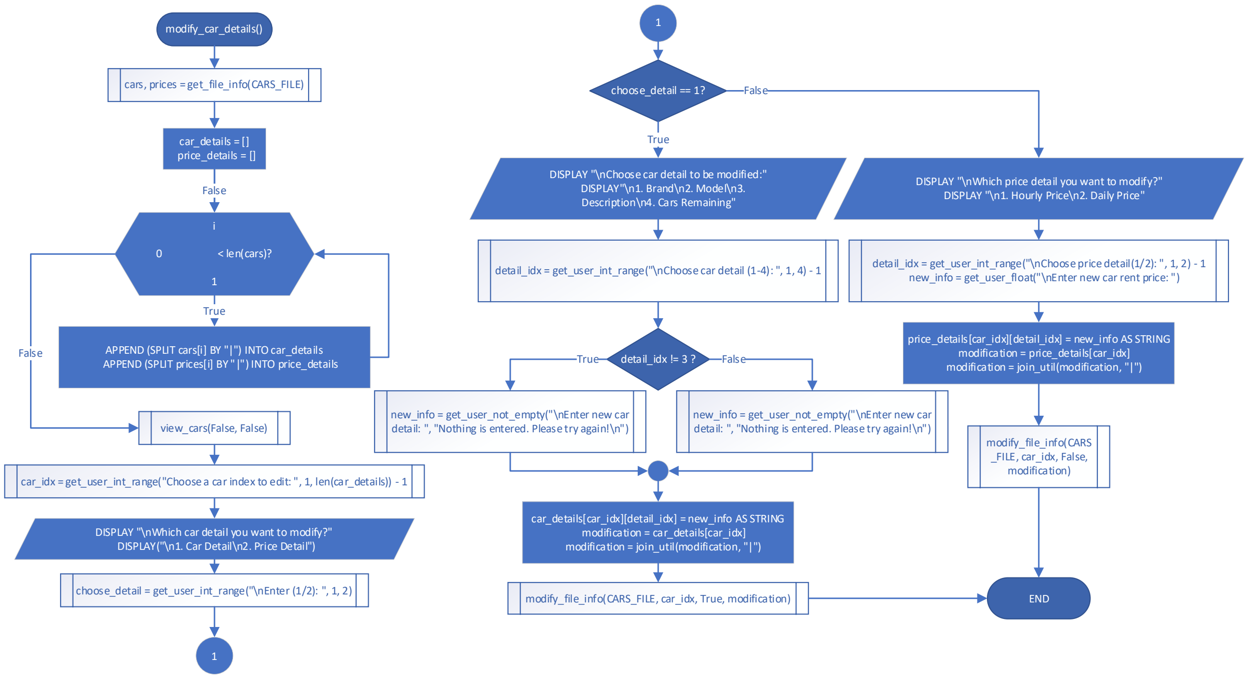

login(usernames, passwords)
DISPLAY "Please log in.\n"
username = ""
username_idx = 0
username NOT IN usernames ?
True
False
username = get_user_not_empty("Username: ")
username NOT IN usernames ?
True
False
DISPLAY "Username NOT found\nPlease try again\n"
username_idx = INDEX username FROM usernames
password = ""
password != passwords[username_idx] ?
True
False
password = get_user_not_empty("Password: ")
password != passwords[username_idx] ?
True
False
DISPLAY "Password incorrect\nPlease try again\n"
DISPLAY "Logged in!\n"
DISPLAY "Press enter to continue..."
READ
os.system("cls")
RETURN username_idx

Flowchart 12: login

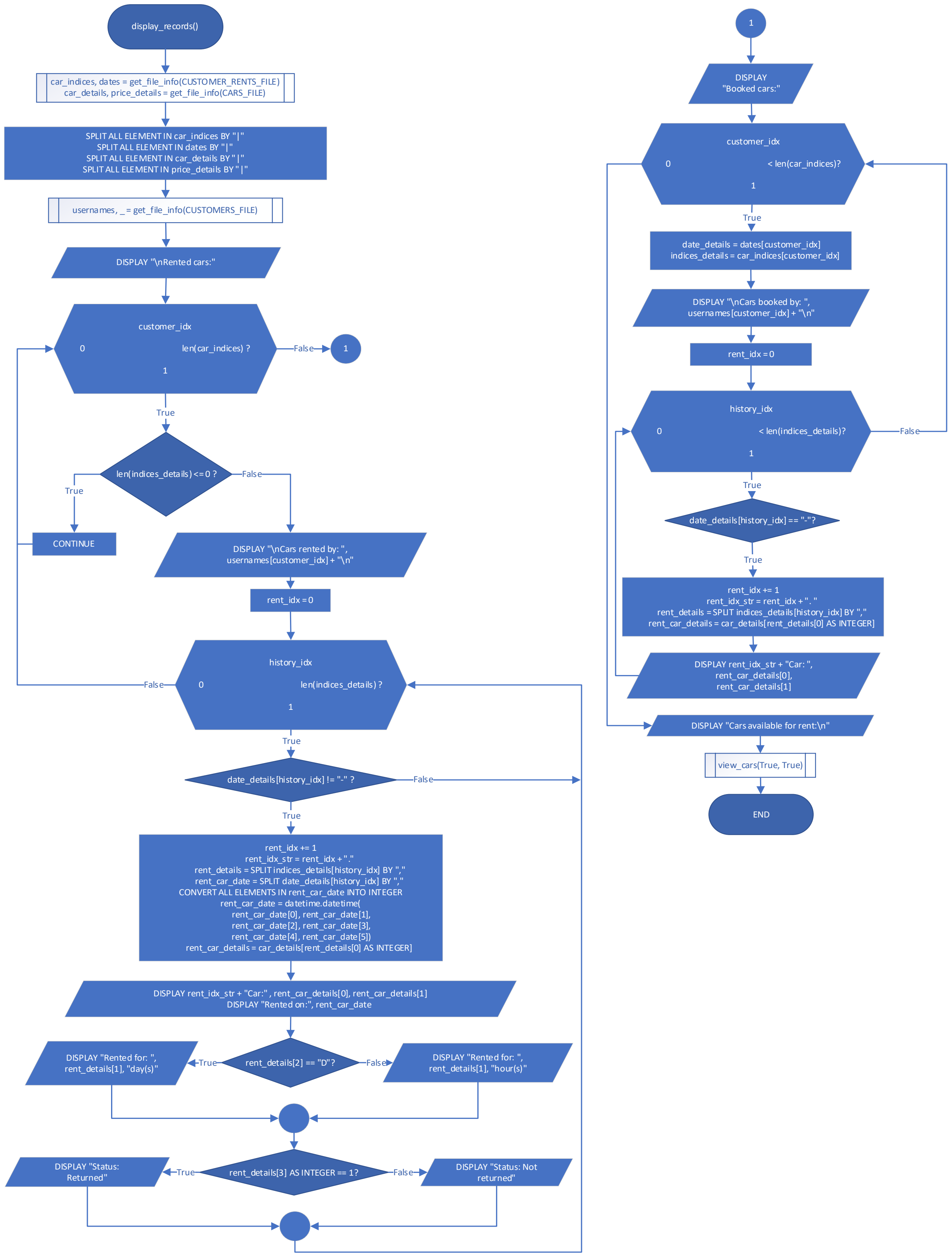
Admin


add_new_car()
car_details, _ = get_file_info(CARS_FILE)
used_car_names = []
i
0
< len(car_details
1
True
False
car_details[i] = car_details[i].split("|")
used_car_names[i] = LOWERCASE car_details[i][0] + LOWERCASE car_details[i][1]
car_detail = ""
car_name = ""
brand = ""
model = ""
description = ""
car_detail == "" OR car_name IN used_car_names ?
True
False
brand = get_user_not_empty("Enter brand: ", "Brand cannot be empty!\n")
model = get_user_not_empty("Enter model: ", "Model cannot be empty!\n")
description = get_user_not_empty("Enter description: ", "Description cannot be empty!\n")
amount = get_user_int("Enter amount of cars to add: ")
car_detail = brand + "|" + model + "|" + description + "|" + amount + "\n"
car_name = LOWERCASE brand + LOWERCASE model
car_name IN used_car_names ?
False
True
DISPLAY "The car name has been taken!\nPlease create a unique one.\n"
hourly_price = get_user_float("Enter hourly price: ")
daily_price = get_user_float("Enter daily price: ")
price_detail = hourly_price + "|" + daily_price + "\n"
DISPLAY "Your car name is: ", brand, model
DISPLAY "Your car description is: ", description
DISPLAY "The hourly price is: ", hourly_price + "\n" + "The daily price is: ", daily_price
add_file_info(CARS_FILE, car_detail, price_detail)
END

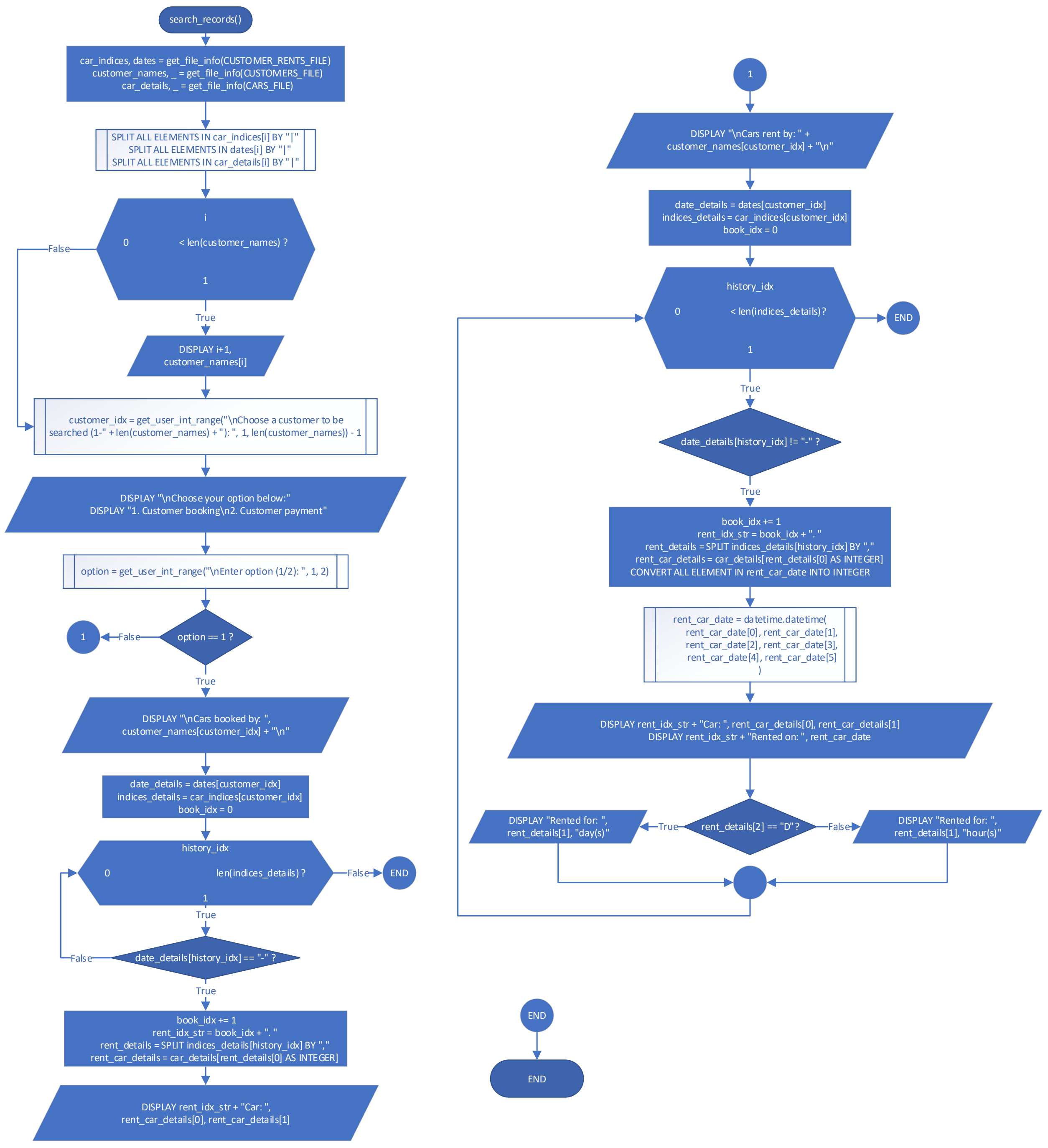
Flowchart 13: add_new_car


modify_car_details()
cars, prices = get_file_info(CARS_FILE)
car_details = []
price_details = []
False
i
0
< len(cars)?
1
True
APPEND (SPLIT cars[i] BY "|") INTO car_details
APPEND (SPLIT prices[i] BY "|") INTO price_details
False
view_cars(False, False)
car_idx = get_user_int_range("Choose a car index to edit: ", 1, len(car_details)) - 1
DISPLAY "\nWhich car detail you want to modify?"
DISPLAY("\n1. Car Detail\n2. Price Detail")
choose_detail = get_user_int_range("\nEnter (1/2): ", 1, 2)
1
1
choose_detail == 1?
False
True
DISPLAY "\nChoose car detail to be modified:"
DISPLAY "\n1. Brand\n2. Model\n3. Description\n4. Cars Remaining"
detail_idx = get_user_int_range("\nChoose car detail (1-4): ", 1, 4) - 1
detail_idx != 3 ?
True
False
new_info = get_user_not_empty("\nEnter new car detail: ", "Nothing is entered. Please try again!\n")
new_info = get_user_not_empty("\nEnter new car detail: ", "Nothing is entered. Please try again!\n")
car_details[car_idx][detail_idx] = new_info AS STRING
modification = car_details[car_idx]
modification = join_util(modification, "|")
modify_file_info(CARS_FILE, car_idx, True, modification)
DISPLAY "\nWhich price detail you want to modify?"
DISPLAY "\n1. Hourly Price\n2. Daily Price"
detail_idx = get_user_int_range("\nChoose price detail(1/2): ", 1, 2) - 1
new_info = get_user_float("\nEnter new car rent price: ")
price_details[car_idx][detail_idx] = new_info AS STRING
modification = price_details[car_idx]
modification = join_util(modification, "|")
modify_file_info(CARS_FILE, car_idx, False, modification)
END

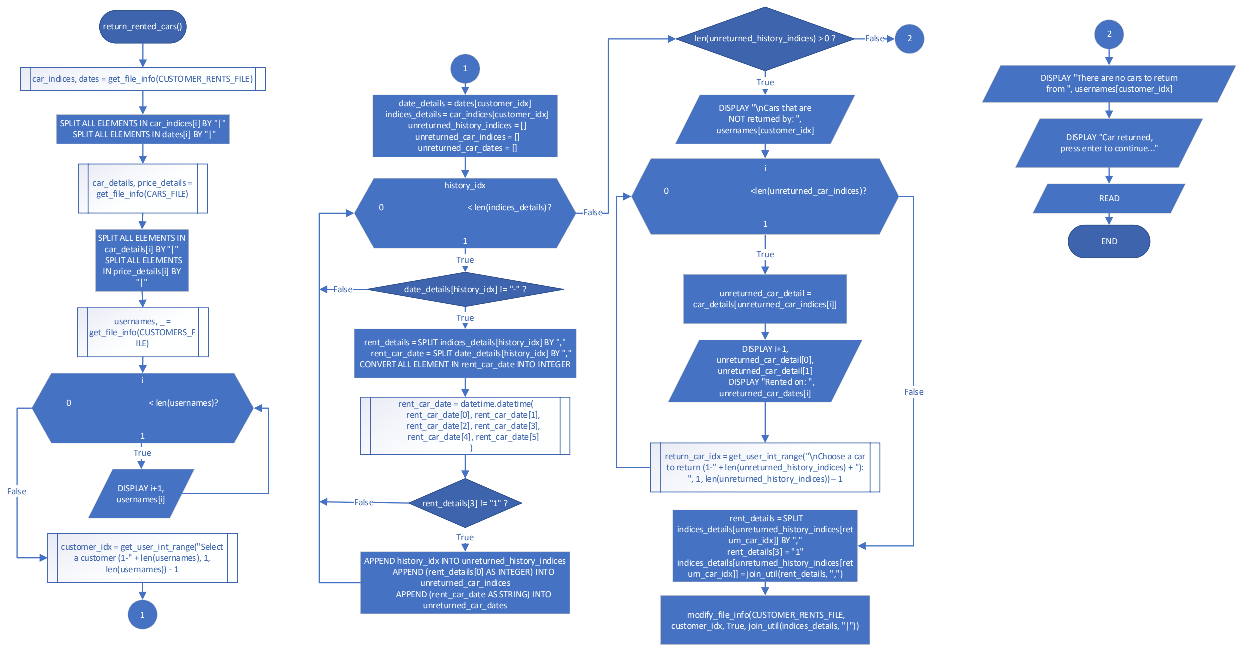
Flowchart 14: modify_car_details


display_records()
car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
car_details, price_details = get_file_info(CARS_FILE)
SPLIT ALL ELEMENT IN car_indices BY "|"
SPLIT ALL ELEMENT IN dates BY "|"
SPLIT ALL ELEMENT IN car_details BY "|"
SPLIT ALL ELEMENT IN price_details BY "|"
usernames, _ = get_file_info(CUSTOMERS_FILE)
DISPLAY "\nRented cars:"
customer_idx
0
len(car_indices) ?
1
False
1
True
len(indices_details) <= 0 ?
True
False
CONTINUE
DISPLAY "\nCars rented by: ",
usernames[customer_idx] + "\n"
rent_idx = 0
history_idx
0
len(indices_details) ?
1
False
True
date_details[history_idx] != "-" ?
False
True
rent_idx += 1
rent_idx_str = rent_idx + "."
rent_details = SPLIT indices_details[history_idx] BY ","
rent_car_date = SPLIT date_details[history_idx] BY ","
CONVERT ALL ELEMENTS IN rent_car_date INTO INTEGER
rent_car_date = datetime.datetime(
rent_car_date[0], rent_car_date[1],
rent_car_date[2], rent_car_date[3],
rent_car_date[4], rent_car_date[5])
rent_car_details = car_details[rent_details[0] AS INTEGER]
DISPLAY rent_idx_str + "Car:" , rent_car_details[0], rent_car_details[1]
DISPLAY "Rented on:", rent_car_date
DISPLAY "Rented for: ",
rent_details[1], "day(s)"
True
rent_details[2] == "D"?
False
DISPLAY "Rented for: ",
rent_details[1], "hour(s)"
DISPLAY "Status:
Returned"
True
rent_details[3] AS INTEGER == 1?
False
DISPLAY "Status: Not
returned"
1
DISPLAY
"Booked cars:"
customer_idx
0
< len(car_indices)?
1
True
date_details = dates[customer_idx]
indices_details = car_indices[customer_idx]
DISPLAY "\nCars booked by: ",
usernames[customer_idx] + "\n"
rent_idx = 0
history_idx
0
< len(indices_details)?
1
False
True
date_details[history_idx] == "-"?
True
rent_idx += 1
rent_idx_str = rent_idx + ". "
rent_details = SPLIT indices_details[history_idx] BY ","
rent_car_details = car_details[rent_details[0] AS INTEGER]
DISPLAY rent_idx_str + "Car: ",
rent_car_details[0],
rent_car_details[1]
DISPLAY "Cars available for rent:\n"
view_cars(True, True)
END

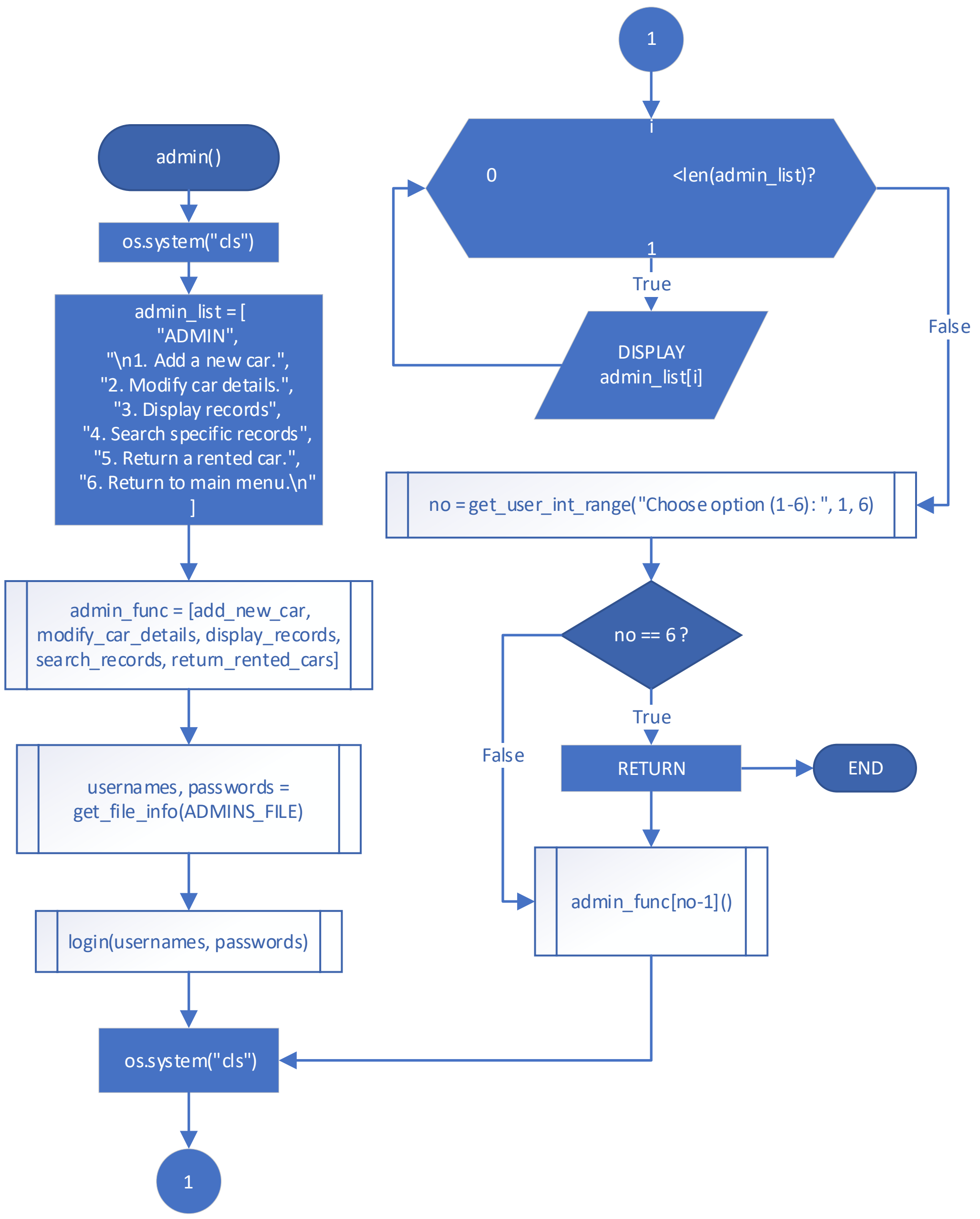
Flowchart 15: display_records


search_records()
car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
customer_names, _ = get_file_info(CUSTOMERS_FILE)
car_details, _ = get_file_info(CARS_FILE)
SPLIT ALL ELEMENTS IN car_indices[i] BY "|"
SPLIT ALL ELEMENTS IN dates[i] BY "|"
SPLIT ALL ELEMENTS IN car_details[i] BY "|"
i
0
< len(customer_names) ?
1
False
True
DISPLAY i+1, customer_names[i]
customer_idx = get_user_int_range("\nChoose a customer to be searched (1-" + len(customer_names) + "): ", 1, len(customer_names)) - 1
DISPLAY "\nChoose your option below:"
DISPLAY "1. Customer booking\n2. Customer payment"
option = get_user_int_range("\nEnter option (1/2): ", 1, 2)
option == 1 ?
False
1
True
DISPLAY "\nCars booked by: ", customer_names[customer_idx] + "\n"
date_details = dates[customer_idx]
indices_details = car_indices[customer_idx]
book_idx = 0
history_idx
0
len(indices_details) ?
1
False
END
True
date_details[history_idx] == "-" ?
False
True
book_idx += 1
rent_idx_str = book_idx + ". "
rent_details = SPLIT indices_details[history_idx] BY ","
rent_car_details = car_details[rent_details[0] AS INTEGER]
DISPLAY rent_idx_str + "Car: ", rent_car_details[0], rent_car_details[1]
1
DISPLAY "\nCars rent by: " + customer_names[customer_idx] + "\n"
date_details = dates[customer_idx]
indices_details = car_indices[customer_idx]
book_idx = 0
history_idx
0
< len(indices_details) ?
1
END
True
date_details[history_idx] != "-" ?
True
book_idx += 1
rent_idx_str = book_idx + ". "
rent_details = SPLIT indices_details[history_idx] BY ","
rent_car_details = car_details[rent_details[0] AS INTEGER]
CONVERT ALL ELEMENT IN rent_car_date INTO INTEGER
rent_car_date = datetime.datetime(
rent_car_date[0], rent_car_date[1],
rent_car_date[2], rent_car_date[3],
rent_car_date[4], rent_car_date[5]
)
DISPLAY rent_idx_str + "Car: ", rent_car_details[0], rent_car_details[1]
DISPLAY rent_idx_str + "Rented on: ", rent_car_date
rent_details[2] == "D"?
True
DISPLAY "Rented for: ", rent_details[1], "day(s)"
False
DISPLAY "Rented for: ", rent_details[1], "hour(s)"
END
END

Flowchart 16: search_records

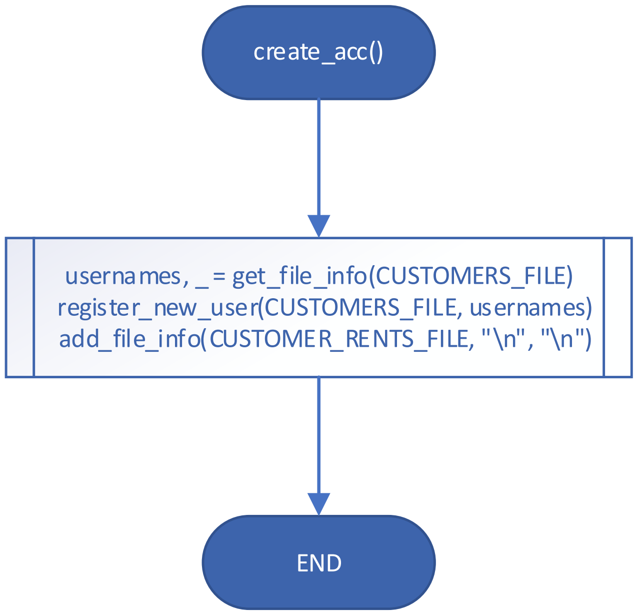

return_rented_cars()
car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
SPLIT ALL ELEMENTS IN car_indices[i] BY "|"
SPLIT ALL ELEMENTS IN dates[i] BY "|"
car_details, price_details = get_file_info(CARS_FILE)
SPLIT ALL ELEMENTS IN car_details[i] BY "|"
SPLIT ALL ELEMENTS IN price_details[i] BY "|"
usernames, _ = get_file_info(CUSTOMERS_FILE)
i
0
< len(usernames)?
1
True
DISPLAY i+1, usernames[i]
False
customer_idx = get_user_int_range("Select a customer (1-" + len(usernames), 1, len(usernames)) - 1
1
1
date_details = dates[customer_idx]
indices_details = car_indices[customer_idx]
unreturned_history_indices = []
unreturned_car_indices = []
unreturned_car_dates = []
history_idx
0
< len(indices_details)?
1
True
date_details[history_idx] != "-" ?
False
True
rent_details = SPLIT indices_details[history_idx] BY ","
rent_car_date = SPLIT date_details[history_idx] BY ","
CONVERT ALL ELEMENT IN rent_car_date INTO INTEGER
rent_car_date = datetime.datetime(
rent_car_date[0], rent_car_date[1],
rent_car_date[2], rent_car_date[3],
rent_car_date[4], rent_car_date[5]
)
rent_details[3] != "1" ?
False
True
APPEND history_idx INTO unreturned_history_indices
APPEND (rent_details[0] AS INTEGER) INTO unreturned_car_indices
APPEND (rent_car_date AS STRING) INTO unreturned_car_dates
False
len(unreturned_history_indices) > 0 ?
False
2
True
DISPLAY "\nCars that are NOT returned by: ", usernames[customer_idx]
i
0
<len(unreturned_car_indices)?
1
True
unreturned_car_detail = car_details[unreturned_car_indices[i]]
DISPLAY i+1,
unreturned_car_detail[0],
unreturned_car_detail[1]
DISPLAY "Rented on: ",
unreturned_car_dates[i]
False
return_car_idx = get_user_int_range("\nChoose a car to return (1-" + len(unreturned_history_indices) + "): ", 1, len(unreturned_history_indices)) – 1
rent_details = SPLIT indices_details[unreturned_history_indices[return_car_idx]] BY ","
rent_details[3] = "1"
indices_details[unreturned_history_indices[return_car_idx]] = join_util(rent_details, ",")
modify_file_info(CUSTOMER_RENTS_FILE, customer_idx, True, join_util(indices_details, "|"))
2
DISPLAY "There are no cars to return from ", usernames[customer_idx]
DISPLAY "Car returned, press enter to continue..."
READ
END

Flowchart 17: return_rented_cars

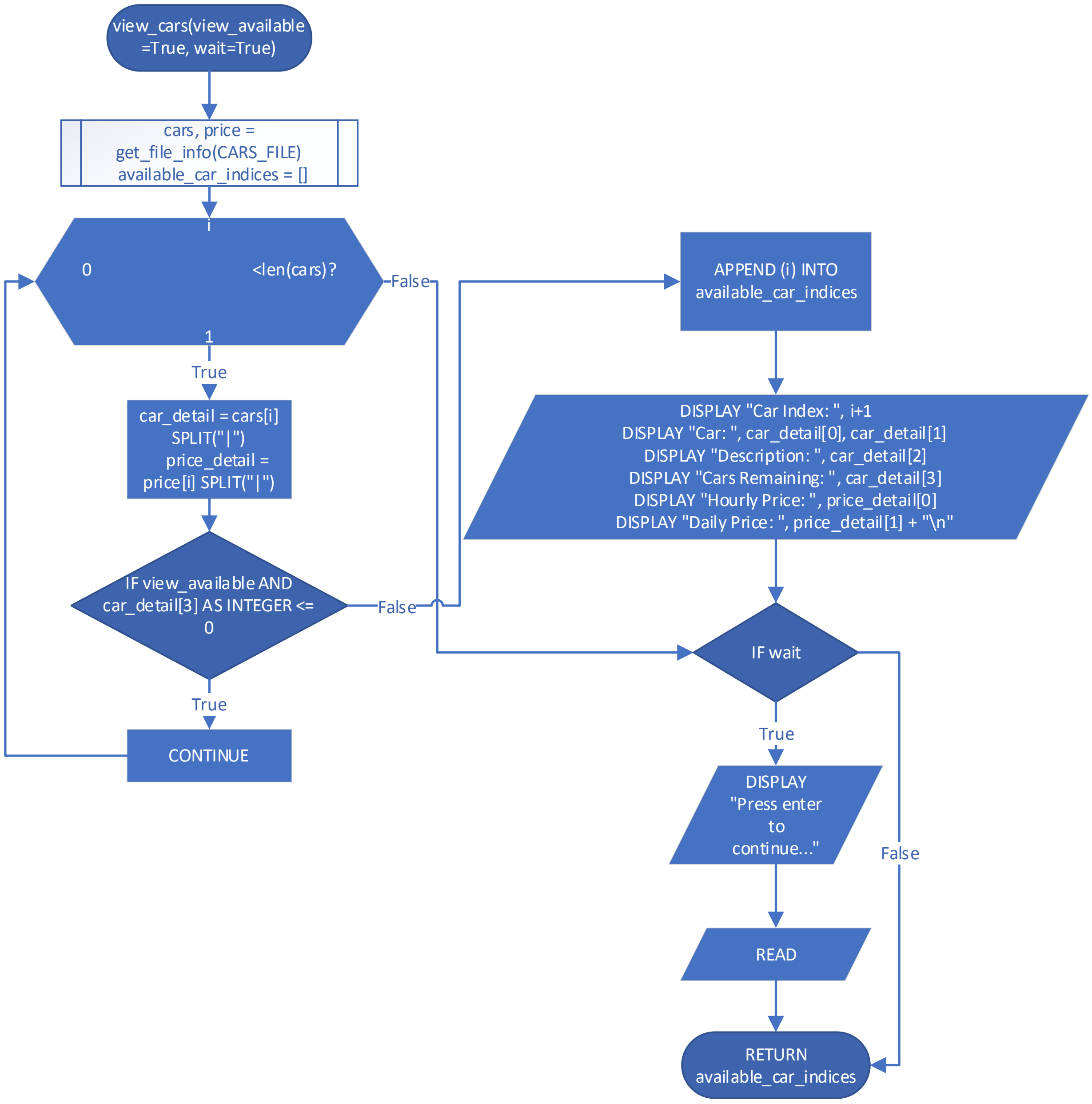

admin()
os.system("cls")
admin_list = [
"ADMIN",
"\n1. Add a new car.",
"2. Modify car details.",
"3. Display records",
"4. Search specific records",
"5. Return a rented car.",
"6. Return to main menu.\n"
]
admin_func = [add_new_car, modify_car_details, display_records, search_records, return_rented_cars]
usernames, passwords = get_file_info(ADMINS_FILE)
login(usernames, passwords)
os.system("cls")
1
1
i
0
<len(admin_list)?
1
True
DISPLAY admin_list[i]
False
no = get_user_int_range("Choose option (1-6): ", 1, 6)
no == 6 ?
True
False
RETURN
END
admin_func[no-1]()

Flowchart 18: admin

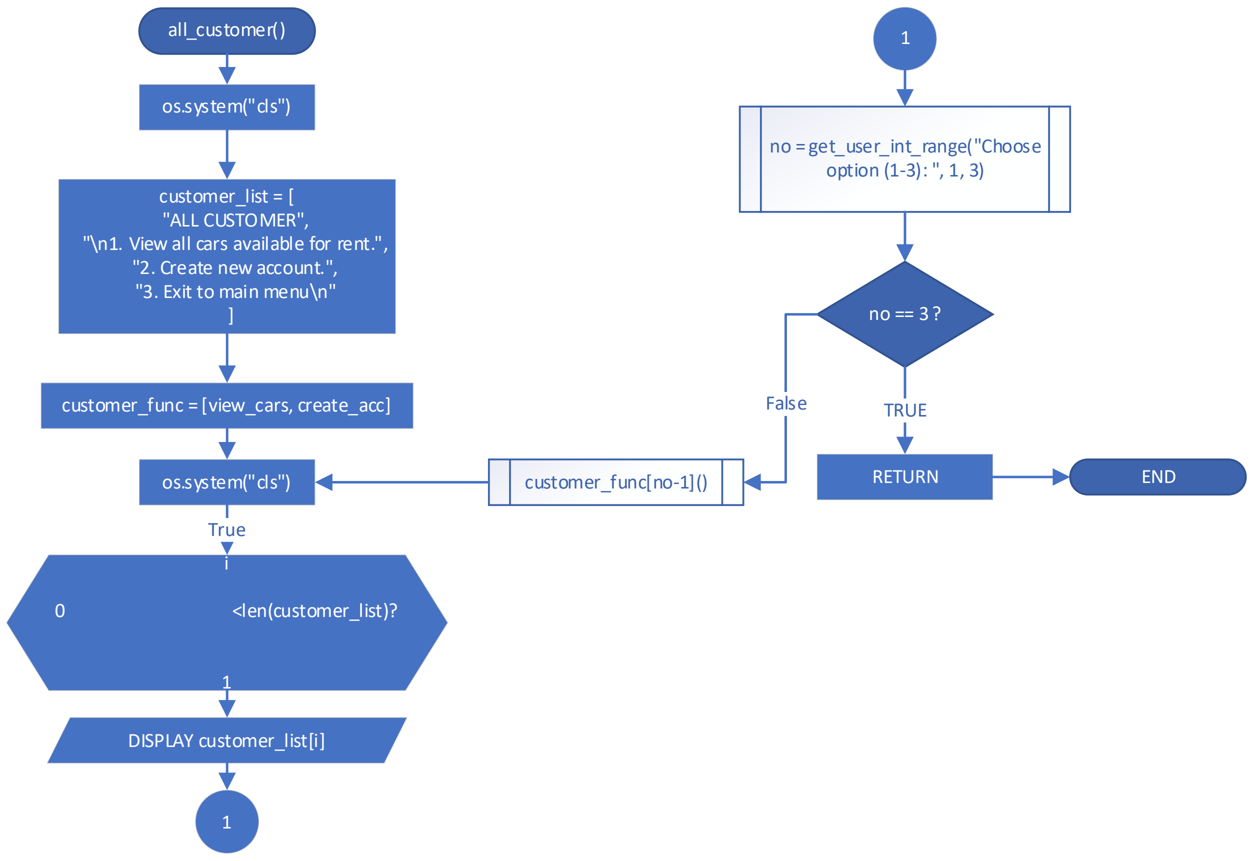
All Customers


create_acc()
usernames, _ = get_file_info(CUSTOMERS_FILE)
register_new_user(CUSTOMERS_FILE, usernames)
add_file_info(CUSTOMER_RENTS_FILE, "\n", "\n")
END

Flowchart 19: create_acc

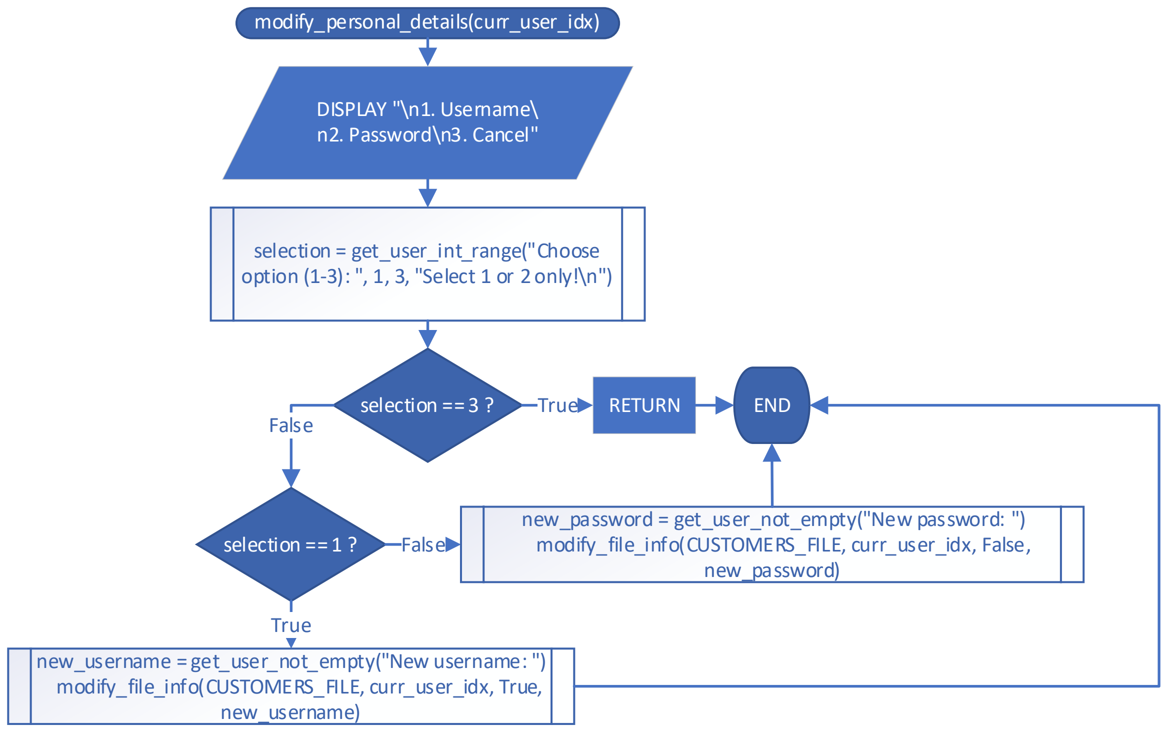

view_cars(view_available =True, wait=True)
cars, price = get_file_info(CARS_FILE) available_car_indices = []
i
0
<len(cars)?
1
False
True
car_detail = cars[i] SPLIT("|") price_detail = price[i] SPLIT("|")
IF view_available AND car_detail[3] AS INTEGER <= 0
False
True
CONTINUE
APPEND (i) INTO available_car_indices
DISPLAY "Car Index: ", i+1
DISPLAY "Car: ", car_detail[0], car_detail[1]
DISPLAY "Description: ", car_detail[2]
DISPLAY "Cars Remaining: ", car_detail[3]
DISPLAY "Hourly Price: ", price_detail[0]
DISPLAY "Daily Price: ", price_detail[1] + "\n"
IF wait
True
False
DISPLAY "Press enter to continue..."
READ
RETURN available_car_indices

Function 20: view_cars

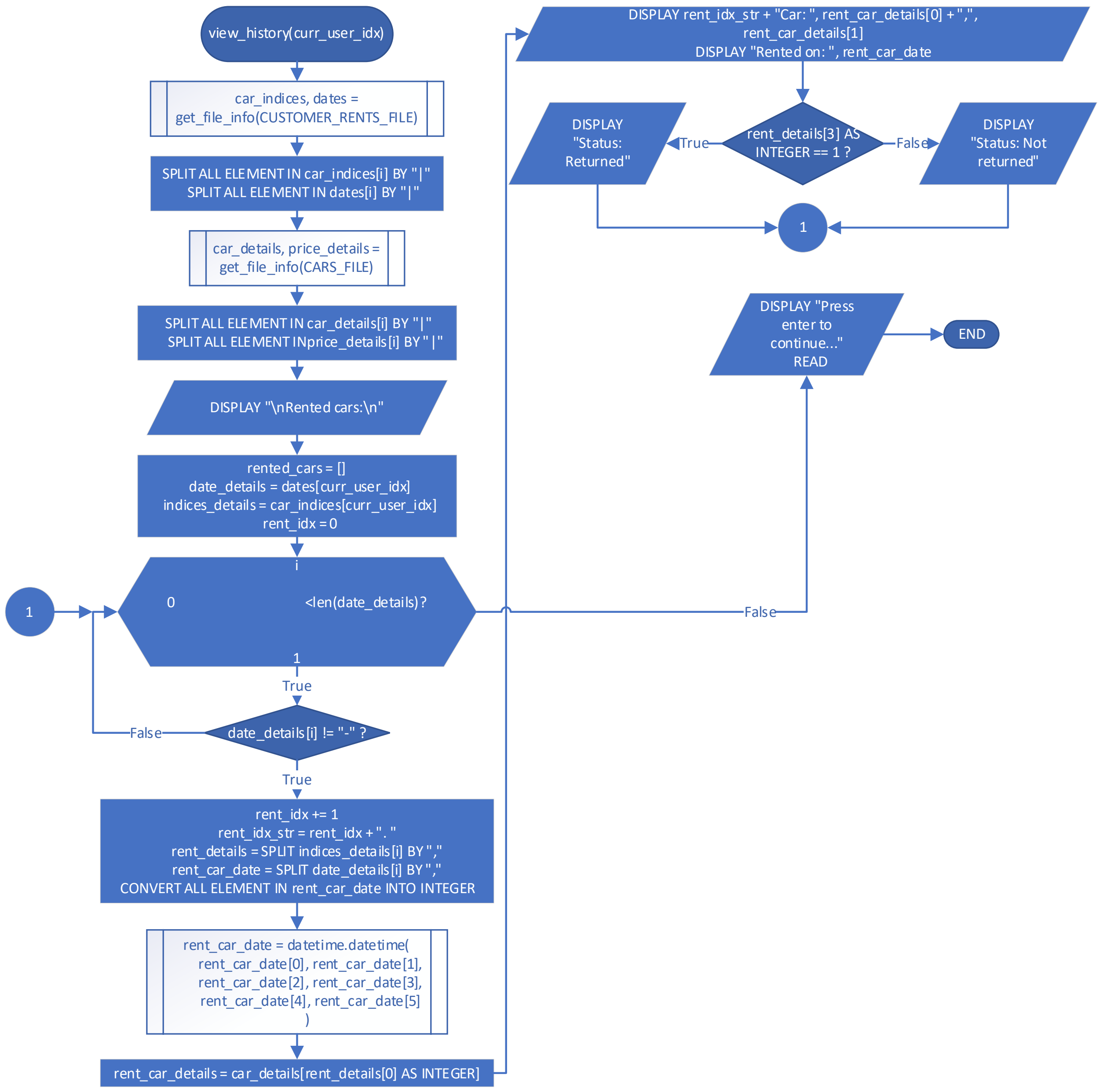


Flowchart 21: all_customer

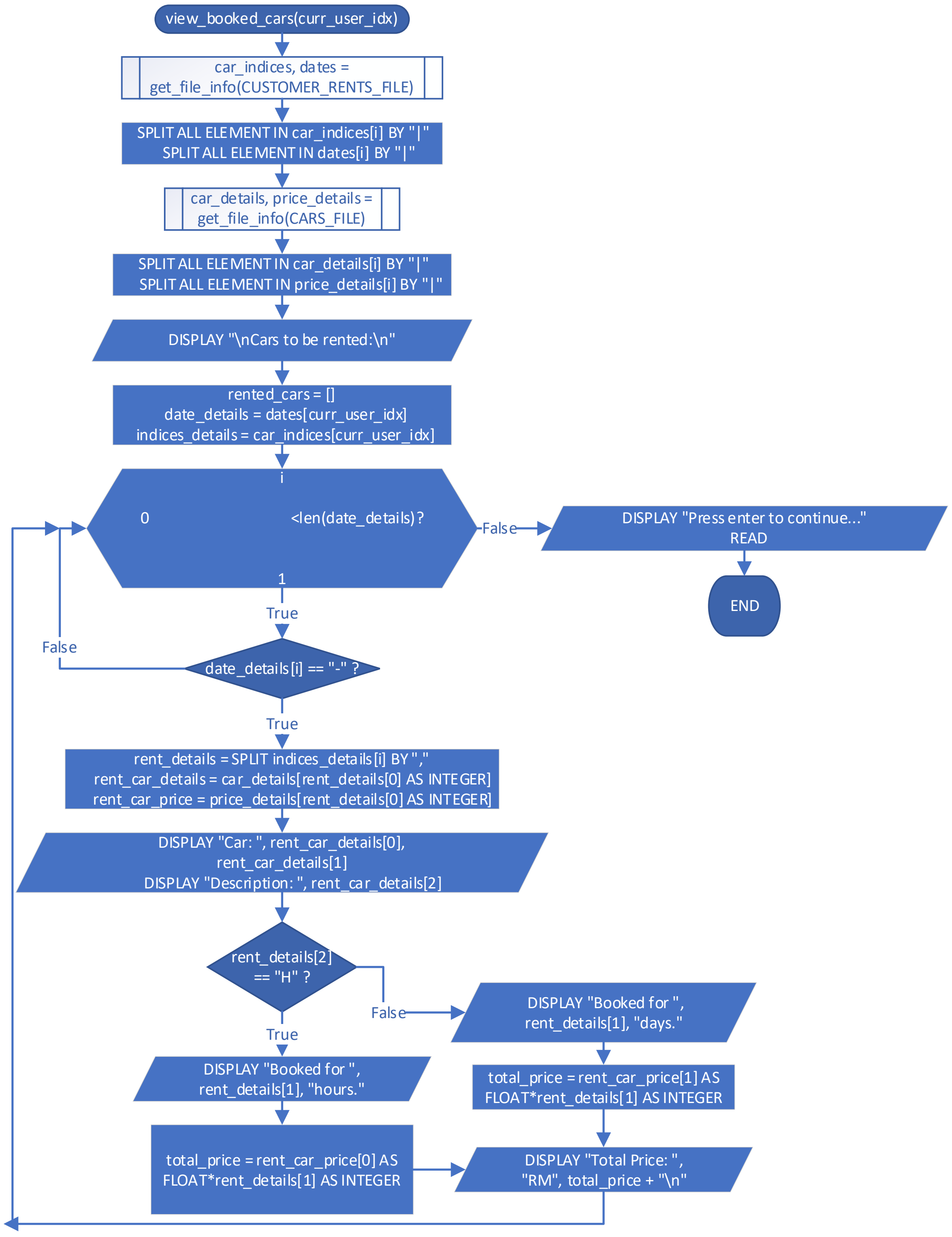
Registered Customers


modify_personal_details(curr_user_idx)
DISPLAY "\n1. Username\n2. Password\n3. Cancel"
selection = get_user_int_range("Choose option (1-3): ", 1, 3, "Select 1 or 2 only!\n")
selection == 3 ?
True
RETURN
END
False
selection == 1 ?
False
new_password = get_user_not_empty("New password: ") modify_file_info(CUSTOMERS_FILE, curr_user_idx, False, new_password)
True
new_username = get_user_not_empty("New username: ") modify_file_info(CUSTOMERS_FILE, curr_user_idx, True, new_username)

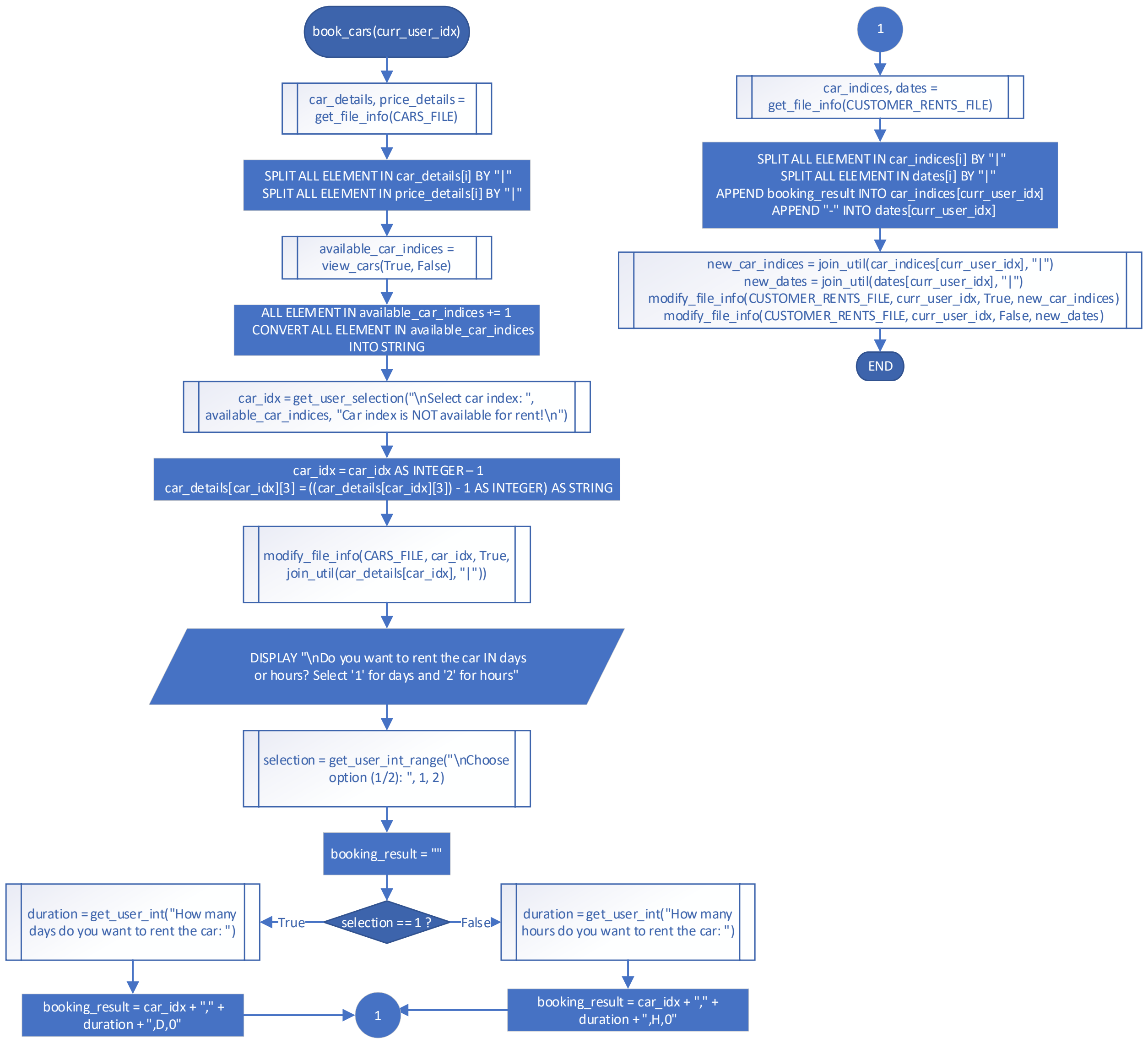
Flowchart 22: modify_personal_details


view_history(curr_user_idx)
car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
SPLIT ALL ELEMENT IN car_indices[i] BY "|"
SPLIT ALL ELEMENT IN dates[i] BY "|"
car_details, price_details = get_file_info(CARS_FILE)
SPLIT ALL ELEMENT IN car_details[i] BY "|"
SPLIT ALL ELEMENT INprice_details[i] BY "|"
DISPLAY "\nRented cars:\n"
rented_cars = []
date_details = dates[curr_user_idx]
indices_details = car_indices[curr_user_idx]
rent_idx = 0
i
0
<len(date_details)?
1
1
True
False
date_details[i] != "-" ?
True
rent_idx += 1
rent_idx_str = rent_idx + ". "
rent_details = SPLIT indices_details[i] BY ","
rent_car_date = SPLIT date_details[i] BY ","
CONVERT ALL ELEMENT IN rent_car_date INTO INTEGER
rent_car_date = datetime.datetime(
rent_car_date[0], rent_car_date[1],
rent_car_date[2], rent_car_date[3],
rent_car_date[4], rent_car_date[5]
)
rent_car_details = car_details[rent_details[0] AS INTEGER]
DISPLAY rent_idx_str + "Car: ", rent_car_details[0] + ",",
rent_car_details[1]
DISPLAY "Rented on: ", rent_car_date
rent_details[3] AS INTEGER == 1 ?
True
DISPLAY "Status: Returned"
False
DISPLAY "Status: Not returned"
1
False
DISPLAY "Press enter to continue..."
READ
END

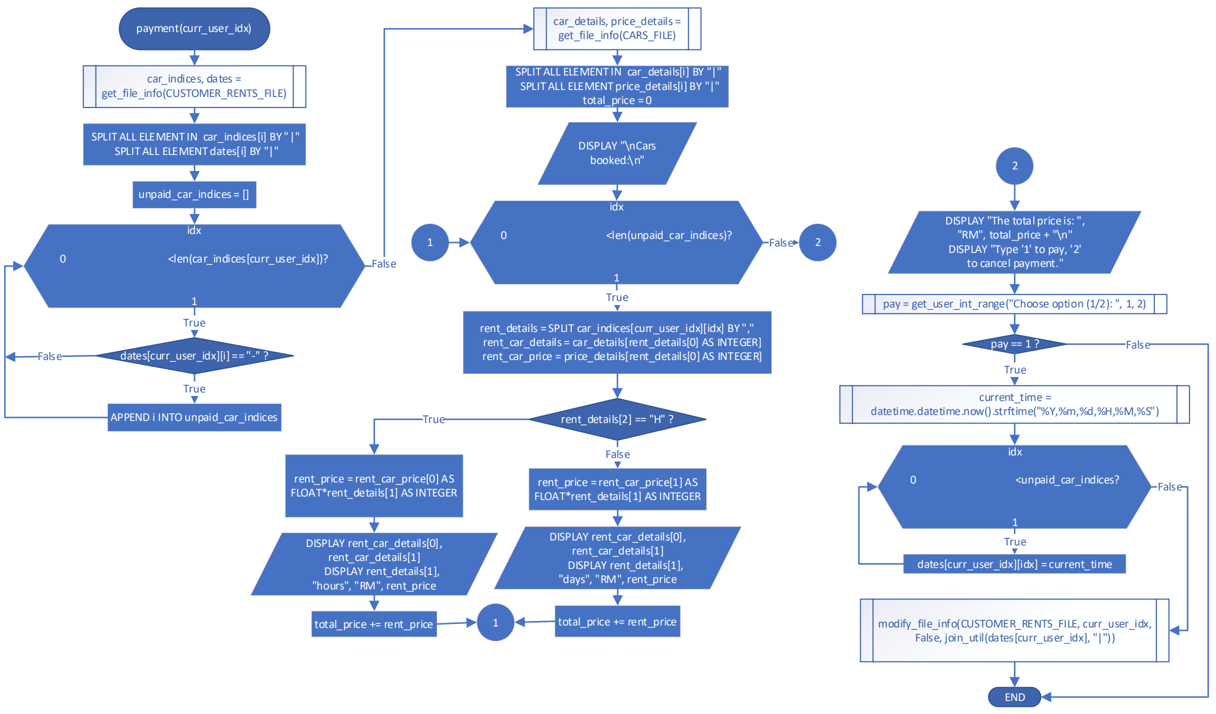
Flowchart 23: view_history


view_booked_cars(curr_user_idx)
car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
SPLIT ALL ELEMENT IN car_indices[i] BY "|"
SPLIT ALL ELEMENT IN dates[i] BY "|"
car_details, price_details = get_file_info(CARS_FILE)
SPLIT ALL ELEMENT IN car_details[i] BY "|"
SPLIT ALL ELEMENT IN price_details[i] BY "|"
DISPLAY "\nCars to be rented:\n"
rented_cars = []
date_details = dates[curr_user_idx]
indices_details = car_indices[curr_user_idx]
i
0
<len(date_details)?
1
False
DISPLAY "Press enter to continue..."
READ
END
True
date_details[i] == "-" ?
False
True
rent_details = SPLIT indices_details[i] BY ","
rent_car_details = car_details[rent_details[0] AS INTEGER]
rent_car_price = price_details[rent_details[0] AS INTEGER]
DISPLAY "Car: ", rent_car_details[0], rent_car_details[1]
DISPLAY "Description: ", rent_car_details[2]
rent_details[2] == "H" ?
False
DISPLAY "Booked for ", rent_details[1], "days."
total_price = rent_car_price[1] AS FLOAT*rent_details[1] AS INTEGER
True
DISPLAY "Booked for ", rent_details[1], "hours."
total_price = rent_car_price[0] AS FLOAT*rent_details[1] AS INTEGER
DISPLAY "Total Price: ", "RM", total_price + "\n"

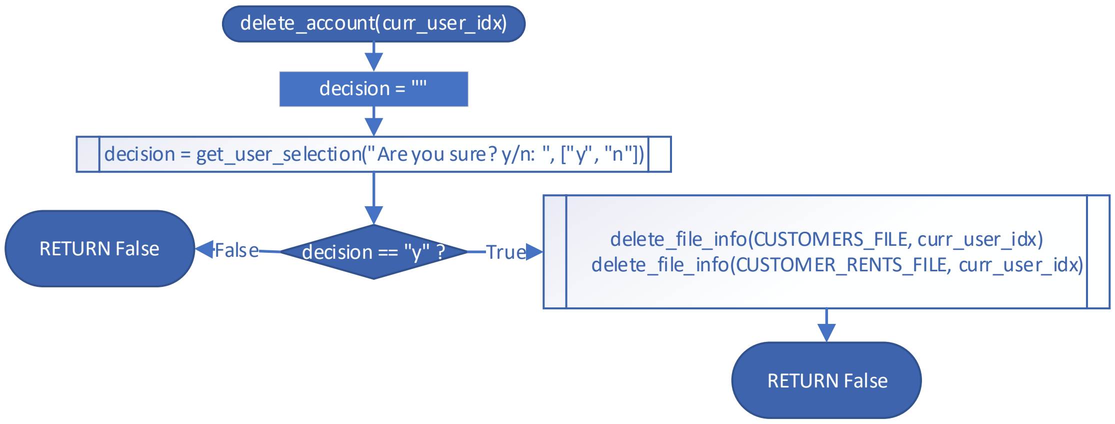
Flowchart 24: view_booked_cars


book_cars(curr_user_idx)
car_details, price_details = get_file_info(CARS_FILE)
SPLIT ALL ELEMENT IN car_details[i] BY "|"
SPLIT ALL ELEMENT IN price_details[i] BY "|"
available_car_indices = view_cars(True, False)
ALL ELEMENT IN available_car_indices += 1
CONVERT ALL ELEMENT IN available_car_indices INTO STRING
car_idx = get_user_selection("\nSelect car index: ", available_car_indices, "Car index is NOT available for rent!\n")
car_idx = car_idx AS INTEGER – 1
car_details[car_idx][3] = ((car_details[car_idx][3]) - 1 AS INTEGER) AS STRING
modify_file_info(CARS_FILE, car_idx, True, join_util(car_details[car_idx], "|"))
DISPLAY "\nDo you want to rent the car IN days or hours? Select '1' for days and '2' for hours"
selection = get_user_int_range("\nChoose option (1/2): ", 1, 2)
booking_result = ""
selection == 1 ?
True
False
duration = get_user_int("How many days do you want to rent the car: ")
duration = get_user_int("How many hours do you want to rent the car: ")
booking_result = car_idx + "," + duration + ",D,0"
booking_result = car_idx + "," + duration + ",H,0"
1
1
car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
SPLIT ALL ELEMENT IN car_indices[i] BY "|"
SPLIT ALL ELEMENT IN dates[i] BY "|"
APPEND booking_result INTO car_indices[curr_user_idx]
APPEND "-" INTO dates[curr_user_idx]
new_car_indices = join_util(car_indices[curr_user_idx], "|")
new_dates = join_util(dates[curr_user_idx], "|")
modify_file_info(CUSTOMER_RENTS_FILE, curr_user_idx, True, new_car_indices)
modify_file_info(CUSTOMER_RENTS_FILE, curr_user_idx, False, new_dates)
END

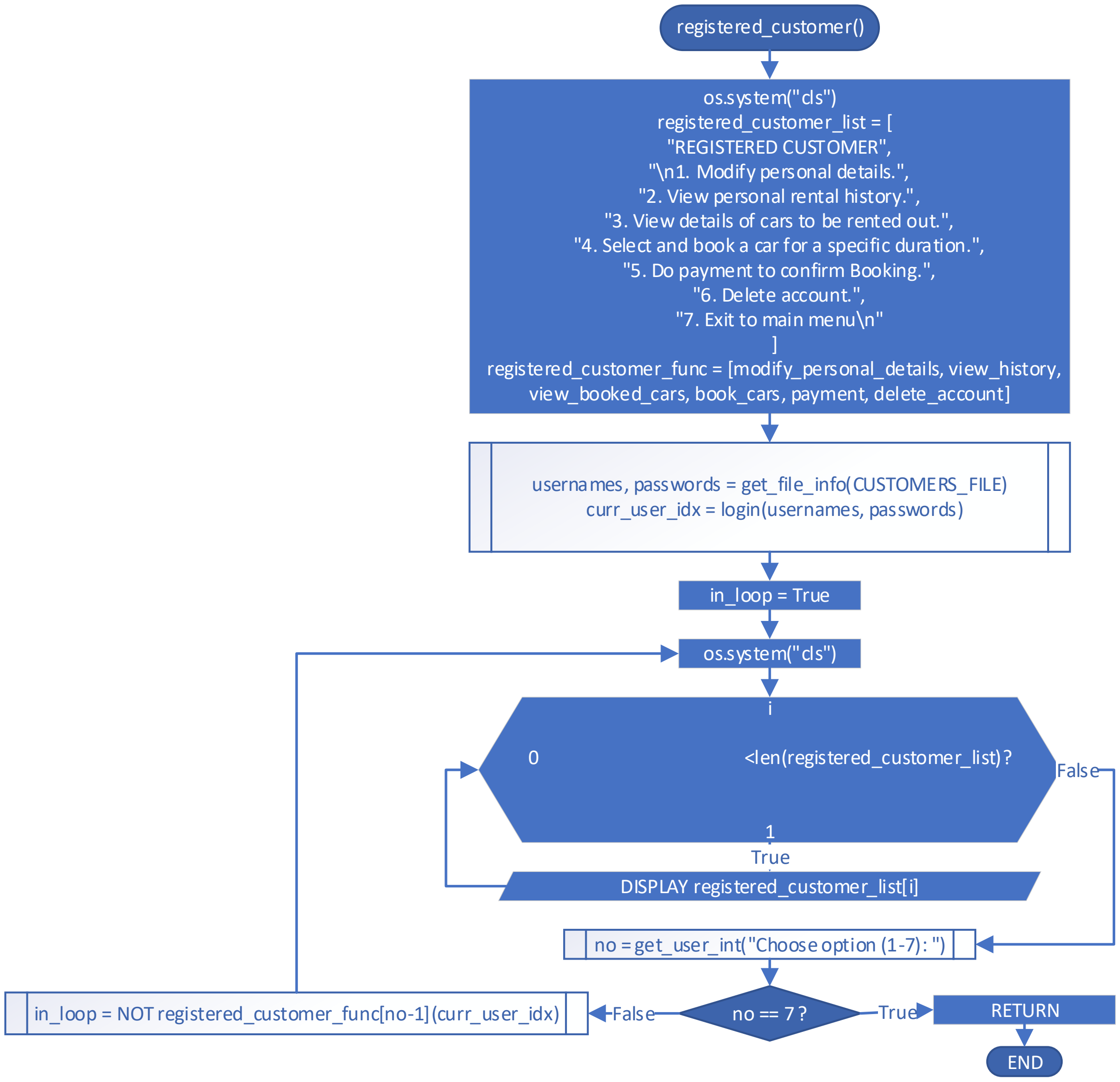
Flowchart 25: book_cars


payment(curr_user_idx)
car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
SPLIT ALL ELEMENT IN car_indices[i] BY "|"
SPLIT ALL ELEMENT dates[i] BY "|"
unpaid_car_indices = []
idx
0
<len(car_indices[curr_user_idx])?
1
True
False
dates[curr_user_idx][i] == "-" ?
False
True
APPEND i INTO unpaid_car_indices
car_details, price_details = get_file_info(CARS_FILE)
SPLIT ALL ELEMENT IN car_details[i] BY "|"
SPLIT ALL ELEMENT price_details[i] BY "|"
total_price = 0
DISPLAY "\nCars booked:\n"
1
idx
0
<len(unpaid_car_indices)?
1
False
2
True
rent_details = SPLIT car_indices[curr_user_idx][idx] BY ","
rent_car_details = car_details[rent_details[0] AS INTEGER]
rent_car_price = price_details[rent_details[0] AS INTEGER]
rent_details[2] == "H" ?
True
False
rent_price = rent_car_price[0] AS FLOAT*rent_details[1] AS INTEGER
DISPLAY rent_car_details[0], rent_car_details[1]
DISPLAY rent_details[1], "hours", "RM", rent_price
total_price += rent_price
1
rent_price = rent_car_price[1] AS FLOAT*rent_details[1] AS INTEGER
DISPLAY rent_car_details[0], rent_car_details[1]
DISPLAY rent_details[1], "days", "RM", rent_price
total_price += rent_price
2
DISPLAY "The total price is: ", "RM", total_price + "\n"
DISPLAY "Type '1' to pay, '2' to cancel payment."
pay = get_user_int_range("Choose option (1/2): ", 1, 2)
pay == 1 ?
False
True
current_time = datetime.datetime.now().strftime("%Y,%m,%d,%H,%M,%S")
idx
0
<unpaid_car_indices?
1
False
True
dates[curr_user_idx][idx] = current_time
modify_file_info(CUSTOMER_RENTS_FILE, curr_user_idx, False, join_util(dates[curr_user_idx], "|"))
END

Flowchart 26: payment


delete_account(curr_user_idx)
decision = ""
decision = get_user_selection("Are you sure? y/n: ", ["y", "n"])
RETURN False
False
decision == "y" ?
True
delete_file_info(CUSTOMERS_FILE, curr_user_idx)
delete_file_info(CUSTOMER_RENTS_FILE, curr_user_idx)
RETURN False

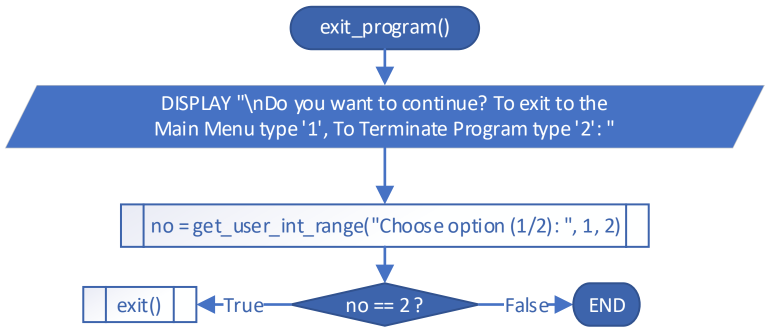
Flowchart 27: delete_account



registered_customer()
os.system("cls")
registered_customer_list = [
"REGISTERED CUSTOMER",
"\n1. Modify personal details.",
"2. View personal rental history.",
"3. View details of cars to be rented out.",
"4. Select and book a car for a specific duration.",
"5. Do payment to confirm Booking.",
"6. Delete account.",
"7. Exit to main menu\n"
]
registered_customer_func = [modify_personal_details, view_history, view_booked_cars, book_cars, payment, delete_account]
usernames, passwords = get_file_info(CUSTOMERS_FILE)
curr_user_idx = login(usernames, passwords)
in_loop = True
os.system("cls")
i
0
<len(registered_customer_list)?
1
False
True
DISPLAY registered_customer_list[i]
no = get_user_int("Choose option (1-7): ")
no == 7 ?
True
RETURN
END
False
in_loop = NOT registered_customer_func[no-1](curr_user_idx)

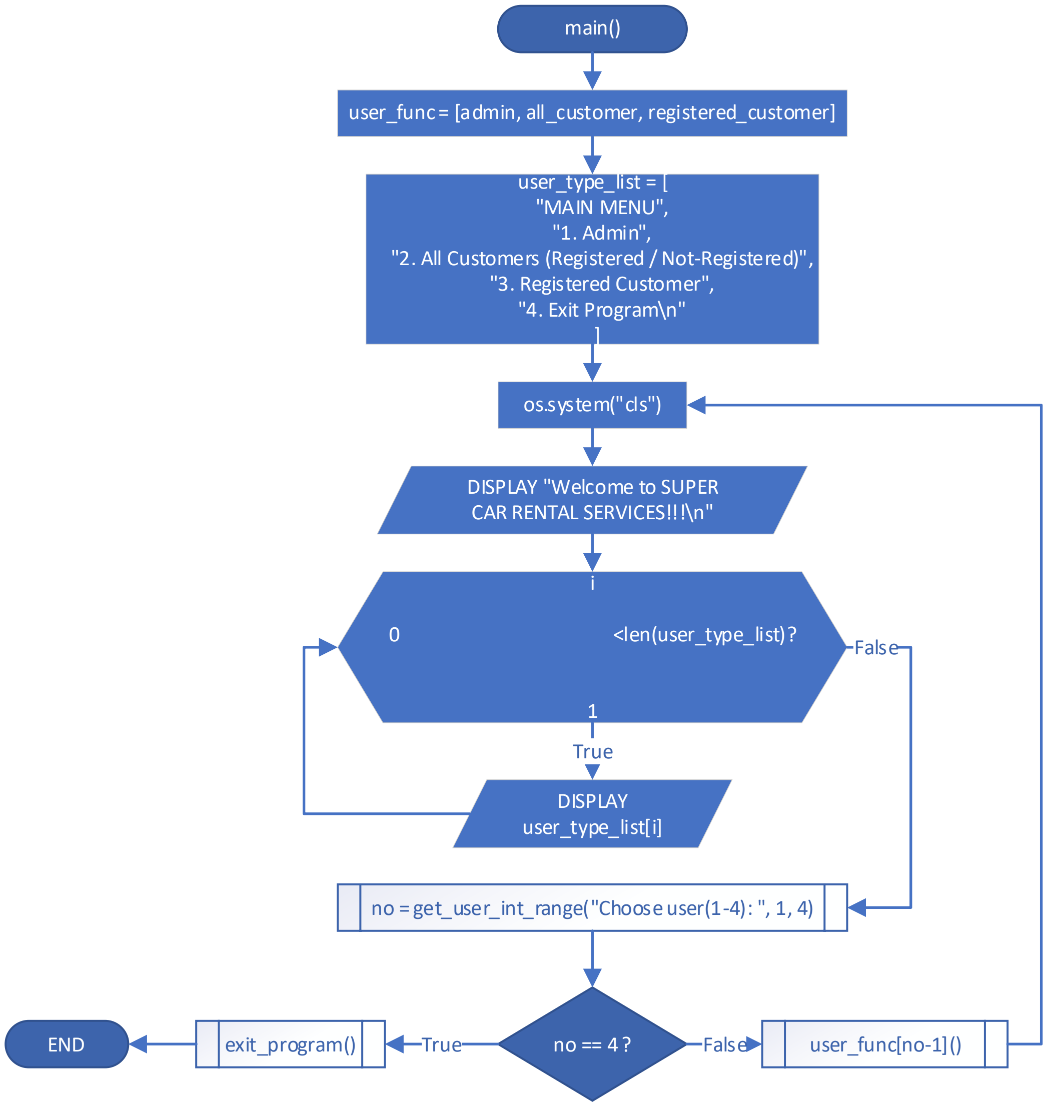
Flowchart 28: registed_customer

Main Program

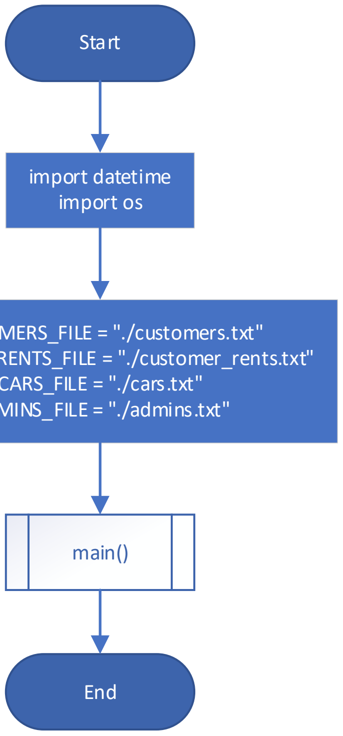


exit_program()
DISPLAY "\nDo you want to continue? To exit to the Main Menu type '1', To Terminate Program type '2': "
no = get_user_int_range("Choose option (1/2): ", 1, 2)
no == 2 ?
True
exit()
False
END

Flowchart 29: exit_program


main()
user_func = [admin, all_customer, registered_customer]
user_type_list = [
"MAIN MENU",
"1. Admin",
"2. All Customers (Registered / Not-Registered)",
"3. Registered Customer",
"4. Exit Program\n"
]
os.system("cls")
DISPLAY "Welcome to SUPER CAR RENTAL SERVICES!!!\n"
i
0
<len(user_type_list)?
1
False
True
DISPLAY user_type_list[i]
no = get_user_int_range("Choose user(1-4): ", 1, 4)
no == 4 ?
True
False
exit_program()
user_func[no-1]()
END

Flowchart 30: main


Start
import datetime
import os
CUSTOMERS_FILE = "./customers.txt"
CUSTOMER_RENTS_FILE = "./customer_rents.txt"
CARS_FILE = "./cars.txt"
ADMINS_FILE = "./admins.txt"
main()
End

Flowchart 31: running the program

Program Source Code

Annotations

Python annotations are used in the Python code, therefore, you will be able to see snippets like `:str` after a variable to indicate that the variable should be a string or signs like `-> int` which shows that the function returns an integer.

Naming Conventions

```
def function_name() -> int:
  pass

CONSTANT_VARIABLE = "./customers.txt"
variable_name = 10
```

Source 1: naming conventions

These are the naming conventions that we use throughout our python assignment to ensure readability and consistency.

1. All function names uses lowercase. Separate words are being separated by an underscore "_".
2. Constant variables uses uppercase on all letters. Separate words are also being separated by an underscore "_".
3. Variable names uses the same format as function names.

File Structure

```
0. 1,2,D,1|3,10,H,1|0,4,D,0
1. 2021,06,02,22,33,47|2021,06,02,22,45,37|-
2. 1,3,H,0|0,1,D,0
3. 2021,06,09,19,52,21|2021,06,09,19,52,21
```

Source 2: customer_rents.txt (example of file structure)

Our file structure is organized so that each data occupies 2 lines. The first line often represents the key and the second line often represents the value. When there are more than one item to store in a line, we use `"|"` as a separator. When each item has more than one attribute, we use `","` as a separator.

admins.txt, customers.txt

```
0.  Nixon
1.  321
2.  Andrew
3.  123
```

Source 3: admins.txt

In admins.txt and customers.txt, all even number lines are the usernames and odd number lines are the passwords.

cars.txt

```
0.  Nissan|Almera|City drives, running errands, road trips on a budget, and going meetings in town.|1
1.  5.9|59.0
2.  Renault|Captur|Interstate business trips, wooing your date, and stylish weekend getaways.|1
3.  11.9|119.0
4.  Nissan|Serena S-Hybrid|Long drives out of the city while reducing carbon footprint.|2
5.  26.9|269.0
```

Source 4: cars.txt

```
# format
Brand|Model|Description|Car Remaining
Hourly Price|Daily Price
```

Source 5: cars.txt format

As shown in the source above, the car details and prices are stored in the cars.txt file where even number lines stores the details and odd number lines store the prices. The details and prices are separated by the "|" separator.

customer_rents.txt

```
0.  1,2,D,1|3,10,H,1|0,4,D,0
1.  2021,06,02,22,33,47|2021,06,02,22,45,37|-
2.  1,3,H,0|0,1,D,0
3.  2021,06,09,19,52,21|2021,06,09,19,52,21
```

Source 6: customer_rents.txt

```
# format
Car Index,Rent Duration,Day/Hour,Return Status|(next record with same format)
Year,Month,Day,Hour,Minute,Second|(next record with same format)
```

Source 7: customer_rents.txt format

In customer_rents.txt, we store rent details on the even number lines and rent date on the odd number lines. Each record is being separated by "|" and each detail in the record is again separated by "," to differentiate the details in the record which can be referred from Source 7.

Utility Functions

```python
def join_util(join_list:list, join_str:str) -> str:
  if join_list[0] != "":
    return join_str.join(join_list)
  else: return join_list[1]
```

Source 8: join_util function

This is a simple utility function to join a list of strings together with a unique character to separate each element in the list. This function mainly prevents joining empty elements. We do this by checking if the first element of the list is an empty string or not. If it is, we simply just return the second element. If it is not, we can safely join all strings together.

Console Input Utility Functions

```python
# forcefully get integer input from user
def get_user_int(prompt_msg:str) -> int:
  usr_input = ""
  # check if usr_input is digit or not
  while not usr_input.isdigit():
    # get usr_input from user
    usr_input = input(prompt_msg)

    # check if usr_input is digit or not
    if not usr_input.isdigit():
      # print error message
      print("Input is not an integer\nPlease try again\n")

  return int(usr_input)
```

Source 9: get_user_int function

This function forcefully gets integer input from the user. We achieve it by using a `while` loop that goes on forever unless the user inputs an integer number. In order to check if the use input is a digit or not, we use the `str` object built in function `.isdigit()`. Whenever the user inputs a non-digit input, we will prompt an error message to indicate the user to try again. When a digit number is obtained, we convert the `usr_input` into `int` and return it out of this function.

```python
# forcefully get float input from user
def get_user_float(prompt_msg:str) -> float:
  usr_input = ""
  # check if usr_input is a float or not
  while not usr_input.replace(".", "", 1).isdigit():
    # get usr_input from user
    usr_input = input(prompt_msg)
    # if usr_input is not a float, print error msg
    if not usr_input.replace(".", "", 1).isdigit():
      print("Input is not a number\nPlease try again\n")

  return float(usr_input)
```

Source 10: get_user_float function

This function forcefully gets float input from the user. We store it in a function so that we can reuse it. Similar to Source 1, we also achieve this by using a `while` loop.

This time, we cannot check just by using `.isdigit()` because it will return false when there is a character inside the string, which in this case is the '.' decimal point in any float number.

Therefore, in order to check if given input is a `float`, we first remove the decimal point by using the `.replace(".", "", 1)` function to remove the first encountered decimal point. We remove only one decimal point to prevent users from providing a float number with 2 or more decimal point.

When all check is done, we convert the `usr_input` into a `float` and return it out of this function.

```python
# forcefully get a non-empty string from user
def get_user_not_empty(prompt_msg:str, error_msg:str) -> str:
  usr_input = ""
  while usr_input == "":
    usr_input = input(prompt_msg)
    if usr_input == "":
      print(error_msg + "\n")

  return usr_input
```

Source 11: get_user_not_empty function

Similar to Source 9 and Source 10, we also use a `while` loop to forcefully get a non-empty string input from the user. This function is fairly simple as it only checks if the `usr_input` is empty or not by doing a simple `usr_input == ""` comparison. When a non-empty input is obtained, we return the raw value out of this function.

```
# forcefully get a string input that is inside the given selection from user
def get_user_selection(prompt_msg:str, selections:list,
  error_msg:str="Input is not within selection given\n") -> str:
  usr_input = ""
  while usr_input not in selections:
    usr_input = input(prompt_msg)
    if usr_input not in selections:
      print(error_msg)

  return usr_input
```

Source 12: get_user_selection function

This function forcefully gets a string input from user within a selection list. We use the `not in` keyword to check if the input we get from the user is acceptable or not. We will only return the value when the user inputs an acceptable answer.

```
# forcefully get integer input within a range from user
def get_user_int_range(prompt_msg:str, range_min:int, range_max:int,
  exceed_range_error_msg:str="Input has exceed the range given!\n") -> int:
  """
  get user int and only accept a range of int, anything outside the range will be rejected

  ex: range_min: 0, range_max: 5 only accepts (0, 1, 2, 3, 4, 5)
  """
  usr_int = range_min - 1
  while usr_int < range_min or usr_int > range_max:
    usr_int = get_user_int(prompt_msg)
    if usr_int < range_min or usr_int > range_max:
      print(exceed_range_error_msg)

  return usr_int
```

Source 13: get_user_int_range function

This function forcefully gets an integer from the user within a given range. The range is define by the `range_min` and `range_max` parameter.

Console Input Utility Functions Summary

All functions gets a `prompt_msg` as an input argument. The `prompt_msg` is being displayed before the user input. This parameter makes sures that we can alter the prompt message for different use cases.

Some utility functions has a second argument called the `error_msg`. This argument allows us to display different error messages on different scenarios. For example, when we are getting user input for customer name, we could change the error message to `"Customer name cannot be empty"`. This makes the entire program significantly user friendly as the program understands the context of the current situation.

These utility functions are important as they will be used throughout the entire program so that we as the programmers do not need to retype these logic again and again.

I/O Utility Functions

```python
# get usernames and passwords from a text file
def get_file_info(filename:str) -> tuple:
  with open(filename, "r", encoding="utf-8") as file:
    file_content = file.read()
  lines = file_content.split("\n")

  content1 = []
  content2 = []

  # loop through the entire list lines in the text file and exclude the last line
  for line_idx in range(len(lines) - 1):
    # check if line_idx is an even or odd number
    if line_idx % 2 == 0:
      content1.append(lines[line_idx])
    else:
      content2.append(lines[line_idx])

  return content1, content2
```

Source 14: get_file_info function

This function reads the content of file based on the given `filename` using the `open` keyword and then splits it into 2 major contents (`content1` or `content2`). The contents in the file should be organized such that all `content1` is in the even number lines and all `content2` is in the odd number lines of the file (see File Structure section).

Using the `with` keyword, we are able to open the file and read its contents without explicitly closing it with the `file.close()` method. We then split the contents of the file by newline `file_content.split("\n")`. To check if a given `line_idx` is even or odd, we use the modulo `%`

operator to check if the number if divisible by 2 or not. Based on the outcome, we either append it into `content1` or `content2`. These 2 contents will then be returned as a *`tuple`*.

```python
# modify file lines from a text file
def modify_file_info(filename:str, location:int, is_content1:bool, info:str) -> None:
  content1, content2 = get_file_info(filename)
  # edit content1[location]/content2[location] based on is_content1
  if is_content1: content1[location] = info
  else: content2[location] = info

  final_string = ""
  for content_idx in range(len(content1)):
    # content_idx is an integer which will increase until the range ends
    final_string += content1[content_idx] + "\n"
    final_string += content2[content_idx] + "\n"

  with open(filename, "w") as file:
    file.write(final_string)
```

Source 15: modify_file_info function

This function overwrites a particular line in a file based on a given *`filename`* and *`location`*. A *`location`* consists of 2 lines, therefore, we also need to specify if it is `content1` or `content2` via the *`is_content1`* argument. This function also takes in an *`info`* argument that specifies what data are we going to replace that line to.

```python
# delete file lines from a text file
def delete_file_info(filename:str, location:int) -> None:
  content1, content2 = get_file_info(filename)

  final_string = ""
  for content_idx in range(len(content1)):
    if (content_idx != location):
      final_string += content1[content_idx] + "\n"
      final_string += content2[content_idx] + "\n"

  with open(filename, "w") as file:
    file.write(final_string)
```

Source 16: delete_file_info function

This function finds the *`location`* of the data in the file (based on its *`filename`*) and remove it from the file. As shown above, the method we use to remove the data is by excluding it from `content1` and `content2`.

```python
# add file lines to a text file
def add_file_info(filename:str, new_content1:str, new_content2:str) -> None:
  with open(filename, "a") as file:
    file.write(new_content1)
    file.write(new_content2)
```
Source 17: add_file_info function

As the function name suggests, this function adds a new content into the file (based on `filename`). Contents are based on arguments `new_content1` and `new_content2`.

I/O Utility Functions Summary

With these 4 functions built, we are now capable of manipulating any data in any file. These functions play a major role in storing data, retrieving data, changing data, and deleting data.

Login System

```python
# register new username and password
def register_new_user(filename:str, usernames:list) -> None:
  username = ""
  password = ""

  while username == "" or username in usernames:
    username = get_user_not_empty("Enter username: ")
    if username == "":
      print("Username cannot be empty!\n")
    elif username in usernames:
      print("Username has been taken!\nPlease enter another username.\n")

  while password == "":
    password = get_user_not_empty("Enter password: ")
    if password == "":
      print("Password cannot be empty!\n")

  print(f"Your username and password is: {username}, {password}")

  with open(filename, "a", encoding="utf-8") as customer_file:
    customer_file.write(f"{username}\n{password}\n")
```
Source 18: register_new_user function

This function lets unregistered customers to register new account. Because our user accounts are stored in a text file, we need to take in the target `filename` as an argument. To prevent users from creating a username that exists in the database itself, we also need to take in all `usernames` that has been created before.

With `usernames` in hand, we can simply check if then given `username` is taken or not via the `username in usernames` evaluation. This evaluation will return `True` as long as the given `username` is taken. Using a `while` loop, we can keep asking the user to retry as long as the given `username` is not unique.

```python
def login(usernames:list, passwords:list) -> int:
  """
  login a user and return the index of the user
  """
  print("Please log in.\n")
  username = ""
  username_idx = 0
  while username not in usernames:
    # get input from user
    username = get_user_not_empty("Username: ")
    if username not in usernames:
      print("Username not found\nPlease try again\n")
    else:
      username_idx = usernames.index(username)

  password = ""
  # check if password is correct corresponding to the username_idx
  while password != passwords[username_idx]:
    # get input from user
    password = get_user_not_empty("Password: ")
    if password != passwords[username_idx]:
      print("Password incorrect\nPlease try again\n")

  print("Logged in!\n")
  input("Press enter to continue...")
  os.system("cls")
  return username_idx
```

Source 19: login function

This function's goal is to let users to login based on a list of available `usernames` and their corresponding `passwords`. This function takes in `usernames` as the list of registered usernames and `passwords` as the list of passwords that corresponds to the `usernames` list.

Firstly, we get the `username` from the user and check if it exists inside the `usernames` list or not. This is to prevent from accepting `username` that is not yet registered. Once a valid `username` is obtained, we get the `username_idx` of the `username` from the `usernames` list. This `username_idx` is used to identify the actual password for this `username`. That way when we are getting the `password` from the user, we can easily check if the given `password` is correct or not by checking if the given `password` is equal to `passwords[username_idx]` or not. Lastly when a valid `password` is obtained, a `"Logged in!"` string is being printed to indicate that the user has successfully logged in and the function ends.

Admin

```python
def add_new_car() -> None:
  car_details, _ = get_file_info(CARS_FILE)
  car_details = [c.split("|") for c in car_details]
  # lower down all cases to perform name checking
  used_car_names = [c[0].lower()+c[1].lower() for c in car_details]

  car_detail = ""
  car_name = ""

  brand = ""
  model = ""
  description = ""

  while car_detail == "" or car_name in used_car_names:
    brand = get_user_not_empty("Enter brand: ", "Brand cannot be empty!\n")
    model = get_user_not_empty("Enter model: ", "Model cannot be empty!\n")
    description = get_user_not_empty("Enter description:  ", "Description cannot be empty!\n")
    amount = get_user_int("Enter amount of cars to add: ")

    car_detail = f"{brand}|{model}|{description}|{amount}\n"
    car_name = brand.lower() + model.lower()

    if car_name in used_car_names:
      print("The car name has been taken!\nPlease create a unique one.\n")

  hourly_price = get_user_float("Enter hourly price: ")
  daily_price = get_user_float("Enter daily price: ")
  price_detail = f"{hourly_price}|{daily_price}\n"

  print(f"Your car name is: {brand}, {model}")
  print(f"Your car description is: {description}")
  print(f"The hourly price is: {hourly_price}\nThe daily price is: {daily_price}")

  add_file_info(CARS_FILE, car_detail, price_detail)
```

Source 20: add_new_car function

This function's goal is to add a new car into the car list. A car contains a few details:

1. Brand
2. Model
3. Description
4. Amount
5. Hourly price
6. Daily price

In this function, we also prevent users from creating a car that has been created before. We achieve this by combining all the `brand` and `model` of existing cars in lower case and store it in a list called `used_car_names`. When user creates a new car, we also combine the `brand` and `model` of the new car in lower case and store it in a variable called `car_name`. Using a simple `car_name in used_car_names` evaluation, we are able to check if the new car has been created before or not.

Once all the details are retrieved, we simply add it into the `CARS_FILE`.

```python
def modify_car_details():
  cars, prices = get_file_info(CARS_FILE)
  car_details = []
  price_details = []
  for i in range(len(cars)):
    # split makes strings into list in list
    car_details.append(cars[i].split("|"))
    price_details.append(prices[i].split("|"))

  view_cars(False, False)
  car_idx = get_user_int_range("Choose a car index to edit: ", 1, len(car_details)) - 1

  print("\nWhich car detail you want to modify?")
  print("\n1. Car Detail\n2. Price Detail")
  choose_detail = get_user_int_range("\nEnter (1/2): ", 1, 2)

  if choose_detail == 1:
    print("\nChoose car detail to be modified:")
    print("\n1. Brand\n2. Model\n3. Description\n4. Cars Remaining")
    detail_idx = get_user_int_range("\nChoose car detail (1-4): ", 1, 4) - 1
    if detail_idx != 3:
      new_info = get_user_not_empty("\nEnter new car detail: ", "Nothing is entered. Please try again!\n")
    else:
      new_info = get_user_int("\nEnter new car remaining: ")

    car_details[car_idx][detail_idx] = str(new_info)
    modification = car_details[car_idx]
    modification = join_util(modification, "|")

    modify_file_info(CARS_FILE, car_idx, True, modification)
  else:
    print("\nWhich price detail you want to modify?")
    print("\n1. Hourly Price\n2. Daily Price")
    detail_idx = get_user_int_range("\nChoose price detail(1/2): ", 1, 2) - 1
    new_info = get_user_float("\nEnter new car rent price: ")

    price_details[car_idx][detail_idx] = str(new_info)
    modification = price_details[car_idx]
    modification = join_util(modification, "|")

    modify_file_info(CARS_FILE, car_idx, False, modification)
```

Source 21: modify_car_details function

This function's goal is to modify the detail of a specific car. We allow admins to choose a car by getting the index of a car. The admins will be able to obtain the index of the car from the `view_cars` function that we will be defined later in the program below (see All Customers section). Once we know which car we are going to modify, we ask the admin whether he/she wants to edit the car details or the car price. Once a detail type is selected (car detail / car price), we ask which `detail_idx` the admin wants to change. We then get the user input and modify it based on the selected `detail_idx`.

```python
def display_records():
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
  car_indices = [idx.split("|") for idx in car_indices]
  dates = [date.split("|") for date in dates]

  car_details, price_details = get_file_info(CARS_FILE)
  car_details = [detail.split("|") for detail in car_details]
  price_details = [detail.split("|") for detail in price_details]

  usernames, _ = get_file_info(CUSTOMERS_FILE)

  # show rented cars START
  print("\nRented cars:")
  for customer_idx in range(len(car_indices)):
    date_details = dates[customer_idx]
    indices_details = car_indices[customer_idx]
    if len(indices_details) <= 0: continue

    print(f"\nCars rented by: {usernames[customer_idx]}\n")
    rent_idx = 0
    for history_idx in range(len(indices_details)):
      if date_details[history_idx] != "-":
        rent_idx += 1
        rent_idx_str = f"{rent_idx}. "
        rent_details = indices_details[history_idx].split(",")
        rent_car_date = date_details[history_idx].split(",")
        # convert all string elements from string to integer
        rent_car_date = [int(d) for d in rent_car_date]
        # create readable datetime format
        rent_car_date = datetime.datetime(
          rent_car_date[0], rent_car_date[1],
          rent_car_date[2], rent_car_date[3],
          rent_car_date[4], rent_car_date[5]
        )
        rent_car_details = car_details[int(rent_details[0])]
        print(f"{rent_idx_str}Car: {rent_car_details[0]}, {rent_car_details[1]}")
        print(" "*len(rent_idx_str) + f"Rented on: {rent_car_date}")
        if rent_details[2] == "D":
          print(" "*len(rent_idx_str) + f"Rented for: {rent_details[1]} day(s)")
        else:
          print(" "*len(rent_idx_str) + f"Rented for: {rent_details[1]} hour(s)")
        print(" "*len(rent_idx_str) + f"Status: {'Returned' if int(rent_details[3]) else 'Not returned'}")
  # show rented cars END

  # show cars that are booked START
  print("\n" + "="*50)
  print("Booked cars:")
  for customer_idx in range(len(car_indices)):
    date_details = dates[customer_idx]
```

```
 indices_details = car_indices[customer_idx]

 print(f"\nCars booked by: {usernames[customer_idx]}\n")
 rent_idx = 0
 for history_idx in range(len(indices_details)):
  if date_details[history_idx] == "-":
   rent_idx += 1
   rent_idx_str = f"{rent_idx}. "
   rent_details = indices_details[history_idx].split(",")
   rent_car_details = car_details[int(rent_details[0])]
   print(f"{rent_idx_str}Car: {rent_car_details[0]}, {rent_car_details[1]}")
# show cars that are booked END

# show cars available for rent START
print("\n" + "="*50)
print("Cars available for rent:\n")
view_cars(True, True)
# show cars available for rent END
```

Source 22: display_records function

This function's main goal is to just display all the records for the admin. Things that are being displayed include:

1. Cars rented out
2. Customer bookings
3. Customer payment for a specific time duration
4. Cars available for rent

Cars rented out, Customer bookings

This is done by looping through the rent history of each customers. The rent history can be obtained from the `CUSTOMER_RENTS_FILE` which looks like this:

```
0. 1,2,D,1|3,10,H,1|0,4,D,0 # rent detail
1. 2021,06,02,22,33,47|2021,06,02,22,45,37|- # rent date
```

We determine a history as rented when there is a date at that record. If there is only a `"-"`, then we say that it is only booked.

Customer payment for a specific time duration

In the `CUSTOMER_RENTS_FILE`, we are able to obtain the duration of the rent by looking the second and third element of the rent detail record. The second element being the duration and third element being a specification of either it is day or hour. (ex: `1,2,D,1` in this case, it is 2 days)

Cars available for rent

We use the `view_cars` function to accomplish this (see All Customers section).

```
def search_records():
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
  customer_names, _ = get_file_info(CUSTOMERS_FILE)
  car_details, _ = get_file_info(CARS_FILE)

  car_indices = [c.split("|") for c in car_indices]
  dates = [d.split("|") for d in dates]
  car_details = [c.split("|") for c in car_details]

  print("")
  for i in range(len(customer_names)):
    print(f"{i+1}. {customer_names[i]}")
  customer_idx = get_user_int_range(f"\nChoose a customer to be searched (1-
{len(customer_names)}): ", 1, len(customer_names)) - 1

  print("\nChoose your option below:")
  print("1. Customer booking\n2. Customer payment")
  option = get_user_int_range("\nEnter option (1/2): ", 1, 2)

  if option == 1:
    # do customer booking
    print(f"\nCars booked by: {customer_names[customer_idx]}\n")
    # all date history in that line
    date_details = dates[customer_idx]
    # all index history in that line
    indices_details = car_indices[customer_idx]

    book_idx = 0
    for history_idx in range(len(indices_details)):
      if date_details[history_idx] == "-":
        book_idx += 1
        rent_idx_str = f"{book_idx}. "
        rent_details = indices_details[history_idx].split(",")
        rent_car_details = car_details[int(rent_details[0])]
        print(f"{rent_idx_str}Car: {rent_car_details[0]}, {rent_car_details[1]}")

  else:
    # do customer payment
    # name in customer_names[i] == car_info[i]
    print(f"\nCars rent by: {customer_names[customer_idx]}\n")
    date_details = dates[customer_idx]
    indices_details = car_indices[customer_idx]

    book_idx = 0
    for history_idx in range(len(indices_details)):
      if date_details[history_idx] != "-":
        book_idx += 1
        rent_idx_str = f"{book_idx}. "
        rent_details = indices_details[history_idx].split(",")
        rent_car_details = car_details[int(rent_details[0])]
        rent_car_date = date_details[history_idx].split(",")
        # convert all string elements from string to integer
        rent_car_date = [int(d) for d in rent_car_date]
        # create readable datetime format
        rent_car_date = datetime.datetime(
          rent_car_date[0], rent_car_date[1],
          rent_car_date[2], rent_car_date[3],
          rent_car_date[4], rent_car_date[5]
        )
        print(f"{rent_idx_str}Car: {rent_car_details[0]}, {rent_car_details[1]}")
        print(" "*len(rent_idx_str) + f"Rented on: {rent_car_date}")
        if rent_details[2] == "D":
          print(" "*len(rent_idx_str) + f"Rented for: {rent_details[1]} day(s)")
        else:
          print(" "*len(rent_idx_str) + f"Rented for: {rent_details[1]} hour(s)")

  input("Press enter to continue...")
```
Source 23: search_records function

This function allows admins to search a specific history on a specific customer. To achieve this, we prompt the admin to enter a customer index according to the customer menu that we printed out. We also ask which detail that the admin wants to search for (bookings or payment/rent). Based on these 2 results, we are able to obtain the related records.

Obtaining the result

To obtain the result requested by the admin, we first locate the history via the `customer_idx` variable obtained from the admin user. Then, based on the option that the admin choose, we gather different information.

Customer bookings

Customer bookings is determined by the format of the date details. As mentioned above, we gather all information where the date shows only a dash (`"-"`) and then display it.

Customer payment

Customer payment is also determined by the format of the details. We gather all information where the date is being updated to an actual date (is not a dash) and then display it.

```
def return_rented_cars():
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
  car_indices = [idx.split("|") for idx in car_indices]
  dates = [date.split("|") for date in dates]

  car_details, price_details = get_file_info(CARS_FILE)
  car_details = [detail.split("|") for detail in car_details]
  price_details = [detail.split("|") for detail in price_details]

  usernames, _ = get_file_info(CUSTOMERS_FILE)

  print("")
  for i in range(len(usernames)):
    print(f"{i+1}. {usernames[i]}")

  customer_idx = get_user_int_range(f"Select a customer (1-{len(usernames)}): ", 1, len(usernames)) - 1

  # show unreturned cars START
  date_details = dates[customer_idx]
  indices_details = car_indices[customer_idx]
  unreturned_history_indices = []
  unreturned_car_indices = []
  unreturned_car_dates = []
  for history_idx in range(len(indices_details)):
    if date_details[history_idx] != "-":
      rent_details = indices_details[history_idx].split(",")
      rent_car_date = date_details[history_idx].split(",")
      # convert all string elements from string to integer
      rent_car_date = [int(d) for d in rent_car_date]
      # create readable datetime format
      rent_car_date = datetime.datetime(
        rent_car_date[0], rent_car_date[1],
        rent_car_date[2], rent_car_date[3],
        rent_car_date[4], rent_car_date[5]
      )
      if rent_details[3] != "1":
        # store history index, car index and rent date
        unreturned_history_indices.append(history_idx)
        unreturned_car_indices.append(int(rent_details[0]))
        unreturned_car_dates.append(str(rent_car_date))

  if len(unreturned_history_indices) > 0:
    print(f"\nCars that are not returned by: {usernames[customer_idx]}")
    for i in range(len(unreturned_car_indices)):
      unreturned_car_detail = car_details[unreturned_car_indices[i]]
      print(f"{i+1}. {unreturned_car_detail[0]}, {unreturned_car_detail[1]}")
      print(" "*len(f"{i+1}. ") + f"Rented on: {unreturned_car_dates[i]}")

    return_car_idx = get_user_int_range(f"\nChoose a car to return (1-
{len(unreturned_history_indices)}): ", 1, len(unreturned_history_indices)) - 1
    # return the car by setting the last value in rent_details to "1"
    rent_details = indices_details[unreturned_history_indices[return_car_idx]].split(",")
    rent_details[3] = "1"
    indices_details[unreturned_history_indices[return_car_idx]] = join_util(rent_details, ",")

    modify_file_info(CUSTOMER_RENTS_FILE, customer_idx, True, join_util(indices_details, "|"))

  else:
    print(f"There are no cars to return from {usernames[customer_idx]}.")

  input("Car returned, press enter to continue...")
```

Source 24: return_rented_cars function

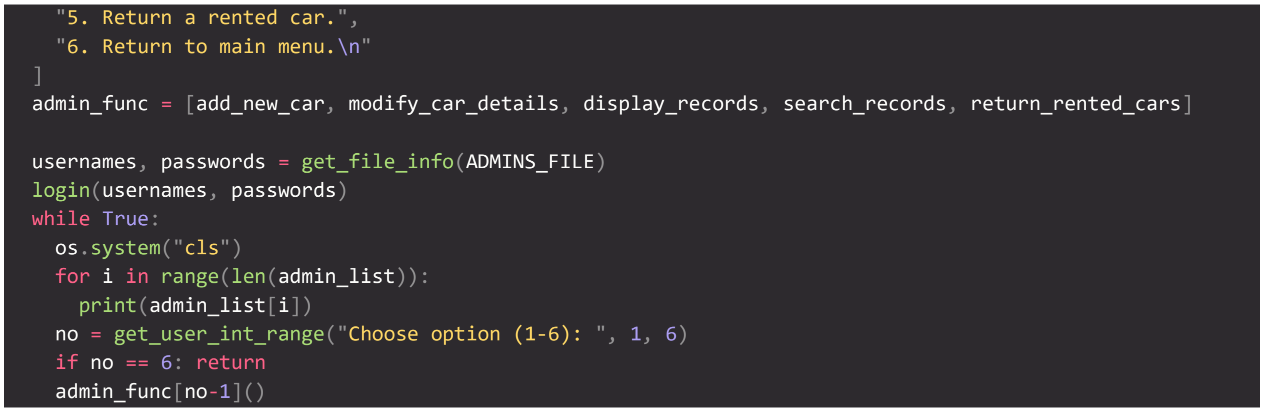
This function allows admins to return a car that is rented from the customer and restore the car into the available car list. For example, if Vios, Toyota only has 1 remaining car available and customer 1 rented 1 of it, the admin is able to go to customer 1's rent history and return the car to restore the remaining number of Vios, Toyota from 1 to 2.

We first obtain the `customer_idx` from the admin (similar to `search_records` function). Then we display all the rented but not returned cars related to this `customer_idx`. The admin can then choose which car to return.

```
0. 1,2,D,1|3,10,H,1|0,4,D,0 # rent detail
1. 2021,06,02,22,33,47|2021,06,02,22,45,37|- # rent date
```

In this example, `1,2,D,1` means that it has been returned while `0,4,D,0` means that it has not yet been returned. We also avoid displaying cars that has not been rented. In this example, `0,4,D,0` will not be displayed as the rent date is still not being updated to mark it as rented.

```
def admin():
  os.system("cls")
  admin_list = [
    "ADMIN",
    "\n1. Add a new car.",
    "2. Modify car details.",
    "3. Display records",
    "4. Search specific records",
```



```
  "5. Return a rented car.",
  "6. Return to main menu.\n"
]
admin_func = [add_new_car, modify_car_details, display_records, search_records, return_rented_cars]

usernames, passwords = get_file_info(ADMINS_FILE)
login(usernames, passwords)
while True:
  os.system("cls")
  for i in range(len(admin_list)):
    print(admin_list[i])
  no = get_user_int_range("Choose option (1-6): ", 1, 6)
  if no == 6: return
  admin_func[no-1]()
```

Source 25: admin function

This is the main function for our admin menu. It displays all the features that the admins can use. The admin can then select an option to do different task. Once a task is done, it will automatically return to this menu until the admin decides to leave, which can be done by choosing option 6.

There is something unique in this function, which is the `admin_func` list. This is not an ordinary list as it stores functions instead of data. This way, we can prevent ourselves from using multiple if else statement to check the option that the admin chooses. It both enhance the performance of the code and also ensure that the code is always clean.

It is also robust as programmers can easily add new functionalities by extending the list (adding a new function into the list) and adding a new selection to the `admin_list`.

All Customers

```python
def create_acc():
  usernames, _ = get_file_info(CUSTOMERS_FILE)
  register_new_user(CUSTOMERS_FILE, usernames)
  add_file_info(CUSTOMER_RENTS_FILE, "\n", "\n")
```

Source 26: create_acc function

We allow new customers to create a new account so that they can be a registered customer, allowing them to book and rent cars. This function is quite simple as we have already predefined all the abstraction of the needed functionality, which is the `register_new_user` function. After creating a new customer username and password, we also create a new entry at the `CUSTOMER_RENTS_FILE` to reserve a spot for that customer's bookings and rentals.

```python
def view_cars(view_available:bool=True, wait=True) -> list:
  cars, price = get_file_info(CARS_FILE)
  available_car_indices = []
  for i in range(len(cars)):
    car_detail = cars[i].split("|")
    price_detail = price[i].split("|")
    if view_available and int(car_detail[3]) <= 0: continue
    available_car_indices.append(i)
    print(f"Car Index: {i+1}")
    print(f"Car: {car_detail[0]}, {car_detail[1]}")
    print(f"Description: {car_detail[2]}")
    print(f"Cars Remaining: {car_detail[3]}")
    print(f"Hourly Price: {price_detail[0]}")
    print(f"Daily Price: {price_detail[1]}\n")

  if wait: input("Press enter to continue...")
  return available_car_indices
```

Source 27: view_cars function

We also allow all customers (registered/not registered) to view all the cars that are available to be rented. If `view_available` is set to `True`, this function simply loops through all the cars inside the `CARS_FILE` and print out all the cars that has a remaining number that is greater than 0. If `view_available` is set to `False`, all cars will be printed out along with its details regardless of how much remaining it has. Once all cars is being printed out, we prompt the user to press enter to continue if `wait` is set to `True` and vice versa. We also return out indices of cars that has a remaining that is greater than 0. Note that this remaining indices will only be correct if `view_available` is set to True. This view_cars function as you have noticed has also been used by many other functions above (and below).

```
def all_customer():
  os.system("cls")
  customer_list = [
    "ALL CUSTOMER",
    "\n1. View all cars available for rent.",
    "2. Create new account.",
    "3. Exit to main menu\n"
  ]
  customer_func = [view_cars, create_acc]

  while True:
    os.system("cls")
    for i in range(len(customer_list)):
      print(customer_list[i])
    no = get_user_int_range("Choose option (1-3): ", 1, 3)
    if no == 3: return
    customer_func[no-1]()
```

Source 28: all_customer function

And that's it, we have completed all our features for All Customers. This function encapsulates everything just like how the admin function does, with option 3 to exit to main menu.

Registered Customers

```python
def modify_personal_details(curr_user_idx:int) -> None:
  print("\n1. Username\n2. Password\n3. Cancel")
  selection = get_user_int_range("Choose option (1-3): ", 1, 3, "Select 1 or 2 only!\n")
  if selection == 3: return

  if selection == 1:
    new_username = get_user_not_empty("New username: ")
    modify_file_info(CUSTOMERS_FILE, curr_user_idx, True, new_username)
  else:
    new_password = get_user_not_empty("New password: ")
    modify_file_info(CUSTOMERS_FILE, curr_user_idx, False, new_password)
```

Source 29: modify_personal_details function

This function allows registered customers to modify their username and password. We first ask them which detail the customer wants to change, based on that, we prompt them to enter the new detail and then store it back into the `CUSTOMERS_FILE`. It is also important to note that a *`curr_user_idx`* is taken in as an argument so that we know which username and password to overwrite.

```python
def view_history(curr_user_idx:int) -> None:
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
  car_indices = [idx.split("|") for idx in car_indices]
  dates = [date.split("|") for date in dates]

  car_details, price_details = get_file_info(CARS_FILE)
  car_details = [detail.split("|") for detail in car_details]
  price_details = [detail.split("|") for detail in price_details]

  print("\nRented cars:\n")
  rented_cars = []

  date_details = dates[curr_user_idx]
  indices_details = car_indices[curr_user_idx]

  rent_idx = 0
  for i in range(len(date_details)):
    if date_details[i] != "-":
      rent_idx += 1
      rent_idx_str = f"{rent_idx}. "
      rent_details = indices_details[i].split(",")
      rent_car_date = date_details[i].split(",")
      # convert all string elements from string to integer
      rent_car_date = [int(d) for d in rent_car_date]
      # create readable datetime format
      rent_car_date = datetime.datetime(
        rent_car_date[0], rent_car_date[1],
        rent_car_date[2], rent_car_date[3],
        rent_car_date[4], rent_car_date[5]
      )
      rent_car_details = car_details[int(rent_details[0])]
      print(f"{rent_idx_str}Car: {rent_car_details[0]}, {rent_car_details[1]}")
      print(" "*len(rent_idx_str) + f"Rented on: {rent_car_date}")
      print(" "*len(rent_idx_str) + f"Status: {'Returned' if int(rent_details[3]) else 'Not returned'}")

  input("Press enter to continue...")
```

Source 30: view_history function

This function allows a registered customers to view their rental history only. We do this by looping over all the details in the `CUSTOMER_RENTS_FILE` using a `for` loop. We obtain the detail of the car that the customer rent by referencing it from the `CARS_FILE`. Similar to `modify_personal_details`, we also takes in the `curr_user_idx` as an argument so that we know which customer's rent history to look at. Again, as mentioned above, we determine a car is rented when the date is updated to actual date instead of a `"-"`.

```python
def view_booked_cars(curr_user_idx:int) -> None:
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
  car_indices = [idx.split("|") for idx in car_indices]
  dates = [date.split("|") for date in dates]

  car_details, price_details = get_file_info(CARS_FILE)
  car_details = [detail.split("|") for detail in car_details]
  price_details = [detail.split("|") for detail in price_details]

  print("\nCars to be rented:\n")
  rented_cars = []

  date_details = dates[curr_user_idx]
  indices_details = car_indices[curr_user_idx]

  for i in range(len(date_details)):
    if date_details[i] == "-":
      rent_details = indices_details[i].split(",")
      rent_car_details = car_details[int(rent_details[0])]
      rent_car_price = price_details[int(rent_details[0])]
      print(f"Car: {rent_car_details[0]}, {rent_car_details[1]}")
      print(f"Description: {rent_car_details[2]}")
      if rent_details[2] == "H":
        print(f"Booked for {rent_details[1]} hours.")
        total_price = float(rent_car_price[0])*int(rent_details[1])
      else:
        print(f"Booked for {rent_details[1]} days.")
        total_price = float(rent_car_price[1])*int(rent_details[1])
      print(f"Total Price: RM {total_price}\n")

  input("Press enter to continue...")
```

Source 31: view_booked_cars function

This function allows user to view their booking history. It works just like the `view_history` function but just in reverse. Instead of avoiding `"-"`, we print out all cars with dates are not updated yet.

```python
def book_cars(curr_user_idx:int) -> None:
  # decrease cars remaning by 1 START
  car_details, price_details = get_file_info(CARS_FILE)
  car_details = [detail.split("|") for detail in car_details]
  price_details = [detail.split("|") for detail in price_details]

  available_car_indices = view_cars(True, False)
  available_car_indices = [str(idx+1) for idx in available_car_indices]
  car_idx = get_user_selection("\nSelect car index: ", available_car_indices, "Car index is not available for rent!\n")
  car_idx = int(car_idx) - 1

  car_details[car_idx][3] = str(int(car_details[car_idx][3]) - 1)
  modify_file_info(CARS_FILE, car_idx, True, join_util(car_details[car_idx], "|"))
  # decrease car remaining by 1 END

  # car_indices: car_idx,duration,D/H|car_idx,duration,D/H|car_idx,duration,D/H
  # dates      : date|date|date

  # ask how long does the customer wants to rent the car START
  print("\nDo you want to rent the car in days or hours? Select '1' for days and '2' for hours")
  selection = get_user_int_range("\nChoose option (1/2): ", 1, 2)
  booking_result = ""
  if selection == 1:
    duration = get_user_int("How many days do you want to rent the car: ")
    booking_result = f"{car_idx},{duration},D,0"
  else:
    duration = get_user_int("How many hours do you want to rent the car: ")
    booking_result = f"{car_idx},{duration},H,0"
  # ask how long does the customer wants to rent the car END

  # append new car index and allocate a new date in customer_rents.txt START
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
  car_indices = [idx.split("|") for idx in car_indices]
  dates = [date.split("|") for date in dates]

  car_indices[curr_user_idx].append(booking_result)
  dates[curr_user_idx].append("-")

  new_car_indices = join_util(car_indices[curr_user_idx], "|")
  new_dates = join_util(dates[curr_user_idx], "|")

  modify_file_info(CUSTOMER_RENTS_FILE, curr_user_idx, True, new_car_indices)
  modify_file_info(CUSTOMER_RENTS_FILE, curr_user_idx, False, new_dates)
  # append new car index and allocate a new date in customer_rents.txt END
```

Source 32: book_cars function

This function allows customers to book a specific cars that has a remaining that is greater than 0. This prevents the remaining number to go negative. We use the `view_cars` function that we defined above (see All Customers section) to show all cars that are available to be booked. Noticed that we pass in `True` for the *`view_available`* argument to prevent showing cars that has no remaining and `False` for the wait argument to prevent the menu to pause. From the `view_cars` function, we obtain all available indices and then ask for the `car_idx` that the customer wants to book. Once a car is selected, we ask for the duration (Day/Hour). We then save it back into the `CUSTOMER_RENTS_FILE` based on the customer's answer. We take *`curr_user_idx`* as an argument so that we know which part of the file to modify.

```
def payment(curr_user_idx:int) -> None:
  # check which booked cars are not payed yet START
  car_indices, dates = get_file_info(CUSTOMER_RENTS_FILE)
  car_indices = [idx.split("|") for idx in car_indices]
```

```python
  dates = [date.split("|") for date in dates]

  unpaid_car_indices = []
  for i in range(len(car_indices[curr_user_idx])):
    if dates[curr_user_idx][i] == "-":
      unpaid_car_indices.append(i)
  # check which booked cars are not payed yet END

  car_details, price_details = get_file_info(CARS_FILE)
  car_details = [detail.split("|") for detail in car_details]
  price_details = [detail.split("|") for detail in price_details]

  # print out details and show cars that the customer booked START
  total_price = 0
  print("\nCars booked:\n")
  for idx in unpaid_car_indices:
    rent_details = car_indices[curr_user_idx][idx].split(",")
    rent_car_details = car_details[int(rent_details[0])]
    rent_car_price = price_details[int(rent_details[0])]
    if rent_details[2] == "H":
      rent_price= float(rent_car_price[0])*int(rent_details[1])
      print(rent_car_details[0], rent_car_details[1], end=" ")
      print(f"* {rent_details[1]} hours (RM {rent_price})")
      total_price += rent_price
    else:
      rent_price = float(rent_car_price[1])*int(rent_details[1])
      print(rent_car_details[0], rent_car_details[1], end=" ")
      print(f"* {rent_details[1]} days (RM {rent_price})")
      total_price += rent_price

  print(f"The total price is: RM {total_price}\n")
  # print out details and show cars that the customer booked END

  print("Type '1' to pay, '2' to cancel payment.")
  pay = get_user_int_range("Choose option (1/2): ", 1, 2)
  if pay == 1:
    # replace "-" in dates with actual dates to mark it as paid START
    # get current time
    current_time = datetime.datetime.now().strftime("%Y,%m,%d,%H,%M,%S")
    for idx in unpaid_car_indices:
      dates[curr_user_idx][idx] = current_time
    # replace "-" in dates with actual dates to mark it as paid END

    # write car_indices and dates back into the file START
    modify_file_info(CUSTOMER_RENTS_FILE, curr_user_idx, False, join_util(dates[curr_user_idx], "|"))
    # write car_indices and dates back into the file END
```

Source 33: payment function

This function allows customer to pay for their bookings and then mark them as rent. As explained in the above sections, we mark the car as rented by updating the date to the date of payment. Therefore, in this function, we will ask the customer to confirm if he/she wants to pay for the booked cars. If the customer agrees, we replace all the `"-"` with the exact date that the car is being paid. Before asking for payment, we also calculate the price by multiplying the duration with the hourly/monthly cost (depending on what the user choose when booking). We take `curr_user_idx` as an argument so that we know which part of the `CUSTOMER_RENTS_FILE` to modify.

```python
def delete_account(curr_user_idx:int) -> bool:
  decision = ""
  decision = get_user_selection("Are you sure? y/n: ", ["y", "n"])

  if decision == "y":
    delete_file_info(CUSTOMERS_FILE, curr_user_idx)
    delete_file_info(CUSTOMER_RENTS_FILE, curr_user_idx)
    return True

  return False
```

Source 34: delete_account function

Last but not least, we have our newly added feature. This function allows a registered customer to delete their account and therefore become an unregistered customer. It is a simple function that asks a yes or no question before deleting the account. If the customer confirms to delete their account, we return a `True` and vice versa. This is to signal our main menu system to exit out of registered customer menu when the customer's account is being deleted.

```python
def registered_customer() -> None:
  os.system("cls")
  registered_customer_list = [
    "REGISTERED CUSTOMER",
    "\n1. Modify personal details.",
    "2. View personal rental history.",
    "3. View details of cars to be rented out.",
    "4. Select and book a car for a specific duration.",
    "5. Do payment to confirm Booking.",
    "6. Delete account.",
    "7. Exit to main menu\n"
  ]
  registered_customer_func = [modify_personal_details, view_history, view_booked_cars, book_cars, payment, delete_account]

  usernames, passwords = get_file_info(CUSTOMERS_FILE)
  curr_user_idx = login(usernames, passwords)
  in_loop = True
  while in_loop:
    os.system("cls")
    for i in range(len(registered_customer_list)):
      print(registered_customer_list[i])
    no = get_user_int("Choose option (1-7): ")
    if no == 7: return
    in_loop = not registered_customer_func[no-1](curr_user_idx)
```

Source 35: registered_customer function

This function is similar to the `admin` and `all_customer` function, however, this time we also expect an output from our sub functions. This is because we have a `delete_account` function that returns a `True` when an account is delete. When we get this signal, we immediately terminates this function and return to the main menu.

Main Program

```python
def exit_program() -> None:
  print("\nDo you want to continue? To exit to the Main Menu type '1', To Terminate Program type '2': ")
  no = get_user_int_range("Choose option (1/2): ", 1, 2)
  if no == 2: exit()
```

Source 36: exit_program function

This function simply asks the user to confirm if he/she wants to exit the program. If so, we exit the entire python program via the `exit` keyword.

```python
def main() -> None:
  user_func = [admin, all_customer, registered_customer]

  user_type_list = [
    "MAIN MENU",
    "1. Admin",
    "2. All Customers (Registered / Not-Registered)",
    "3. Registered Customer",
    "4. Exit Program\n"
  ]

  while True:
    os.system("cls")
    print("Welcome to SUPER CAR RENTAL SERVICES!!!\n")
    for i in range(len(user_type_list)):
      print(user_type_list[i])

    no = get_user_int_range("Choose user(1-4): ", 1, 4)
    if no == 4: exit_program()
    else: user_func[no-1]()
```

Source 37: main function

And there we have it! Our main function that encapsulates every features in the program. This is essentially the main menu of the entire program. We let users select the type of users and bring them to their respective menu.

```python
import datetime
import os

CUSTOMERS_FILE = "./customers.txt"
CUSTOMER_RENTS_FILE = "./customer_rents.txt"
CARS_FILE = "./cars.txt"
ADMINS_FILE = "./admins.txt"


main()
```

Source 38: running the program

This is how our actual program outside those functions looks like (excluding all those functions of course). We first import the only 2 libraries that we can use which is the `datetime` and `os` library. We then define 4 constants, assigning them as the name of the files that we store our data at. Last but not least, we call our `main` function!

Additional Features

These are the additional features that we add because we think they are necessary to the car rental system:

1. Return to main menu and stay at a menu as long as user decides not to return to main menu.
2. Delete customer account.
3. Available car remainder counter.
4. Splitting renting price into hourly and daily.

Return to main menu

```python
def all_customer():
  os.system("cls")
  customer_list = [
    "ALL CUSTOMER",
    "\n1. View all cars available for rent.",
    "2. Create new account.",
    "3. Exit to main menu\n"
  ]
  customer_func = [view_cars, create_acc]

  while True:
    os.system("cls")
    for i in range(len(customer_list)):
      print(customer_list[i])
    no = get_user_int_range("Choose option (1-3): ", 1, 3)
    if no == 3: return
    customer_func[no-1]()
```

Source 39: return to main menu demonstration

This feature can be found in all of the main function of each user. This prevents customers and admins to re-login every time they complete an action.

Delete Customer Account

```python
def delete_account(curr_user_idx:int) -> bool:
  decision = ""
  decision = get_user_selection("Are you sure? y/n: ", ["y", "n"])

  if decision == "y":
    delete_file_info(CUSTOMERS_FILE, curr_user_idx)
    delete_file_info(CUSTOMER_RENTS_FILE, curr_user_idx)
    return True

  return False
```

Source 40: delete customer account demonstration

This function allows customers to be unregistered. All renting and booking history will be removed alongside with it when the account is being removed.

Available Car Remaining Counter

```
0.  Nissan|Almera|City drives, running errands, road trips on a budget, and going meetings in town.|1
1.  5.9|59.0
```

This is a piece of information from the cars.txt. Notice that there is a number at then end of line 0. This is the counter for how many remaining cars there are. With this, we can prevent duplicate data as we don't need to store a new entry when we add a new similar car. In Source 21, (`modify_car_details` function), we also allow admins to edit the remaining counter of a car.

Hourly and Daily Renting Price

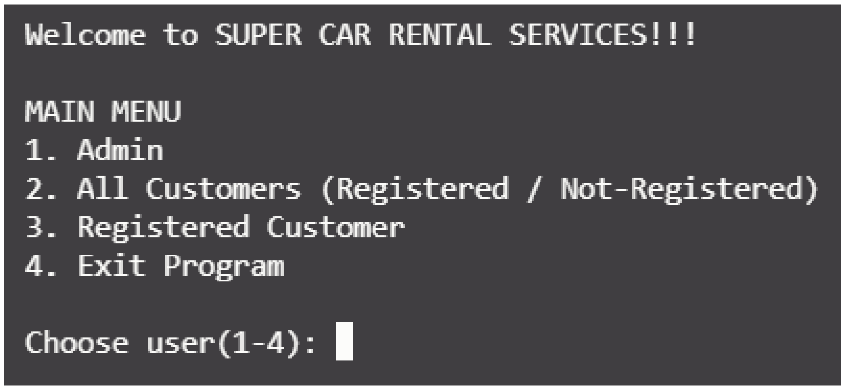
```
0.  Nissan|Almera|City drives, running errands, road trips on a budget, and going meetings in town.|1
1.  5.9|59.0
```

In line 1, there are 2 items, the first one being the hourly price and the second being the daily price. This encourages customers to rent daily as it is far cheaper compared to renting hourly. Splitting it to daily and hourly also prevents customers from calculating so much. This is because, normally a customer would need to give a number that is a multiple of 24 when he/she decides to rent in a daily basis. However, due to our newly added daily price, customers do not need to do any additional calculations.

Sample Input and Output

Main Menu

Welcome Page



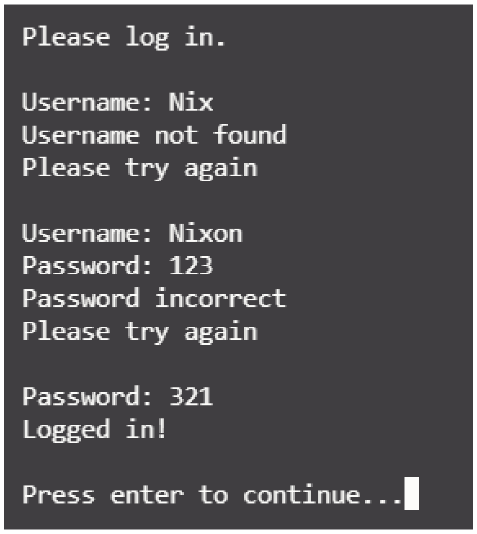
```
Welcome to SUPER CAR RENTAL SERVICES!!!

MAIN MENU
1. Admin
2. All Customers (Registered / Not-Registered)
3. Registered Customer
4. Exit Program

Choose user(1-4): 
```

Figure 1: main menu

This is the main menu for our program. We display a welcome message and options available.

Admin

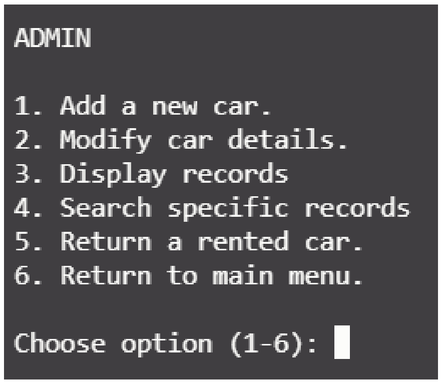
Admin Main Menu



```
Please log in.

Username: Nix
Username not found
Please try again

Username: Nixon
Password: 123
Password incorrect
Please try again

Password: 321
Logged in!

Press enter to continue...
```

Figure 2: admin login

When entering the admin menu, we need to login before accessing the admin features. During login, we also check if the entered username and password is correct or not. As you can see we prevent user from logging in if they type the wrong username or password.

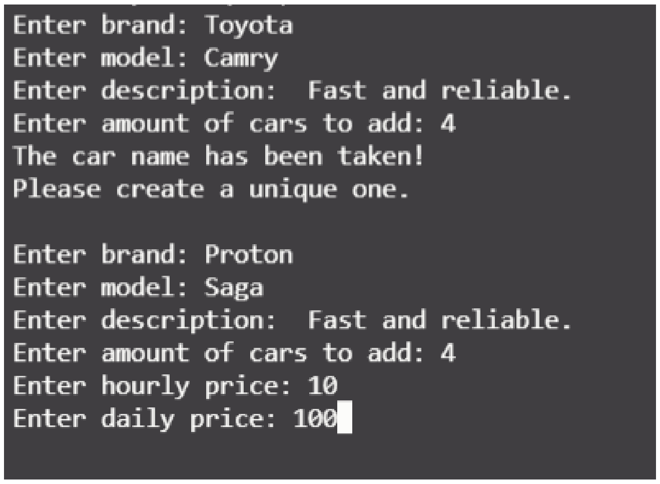


```
ADMIN

1. Add a new car.
2. Modify car details.
3. Display records
4. Search specific records
5. Return a rented car.
6. Return to main menu.

Choose option (1-6):
```

Figure 3: admin menu

We display all admin features in the admin menu.

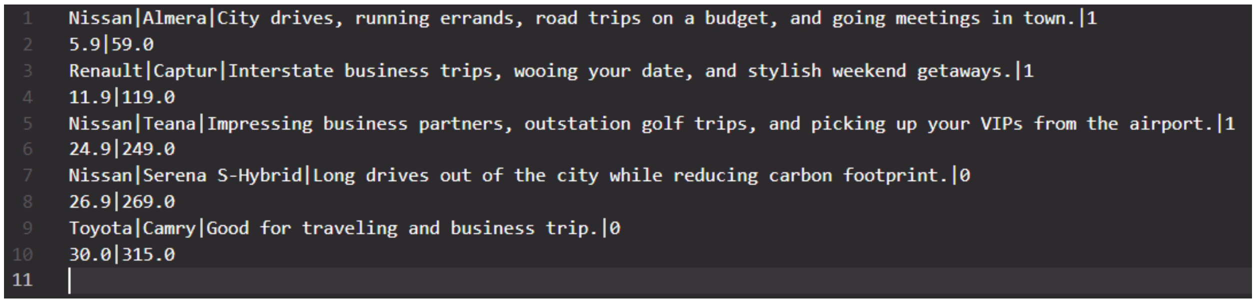
Add Car



```
Enter brand: Toyota
Enter model: Camry
Enter description:  Fast and reliable.
Enter amount of cars to add: 4
The car name has been taken!
Please create a unique one.

Enter brand: Proton
Enter model: Saga
Enter description:  Fast and reliable.
Enter amount of cars to add: 4
Enter hourly price: 10
Enter daily price: 100
```

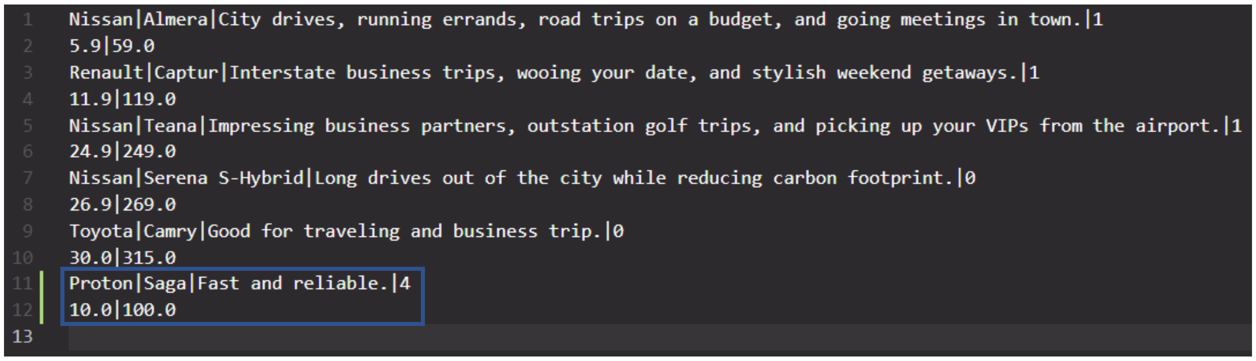
Figure 3: add car

When adding car we also checks if the car has been added or not. We only add it in if it is a unique new car.



```
Nissan|Almera|City drives, running errands, road trips on a budget, and going meetings in town.|1
5.9|59.0
Renault|Captur|Interstate business trips, wooing your date, and stylish weekend getaways.|1
11.9|119.0
Nissan|Teana|Impressing business partners, outstation golf trips, and picking up your VIPs from the airport.|1
24.9|249.0
Nissan|Serena S-Hybrid|Long drives out of the city while reducing carbon footprint.|0
26.9|269.0
Toyota|Camry|Good for traveling and business trip.|0
30.0|315.0

```

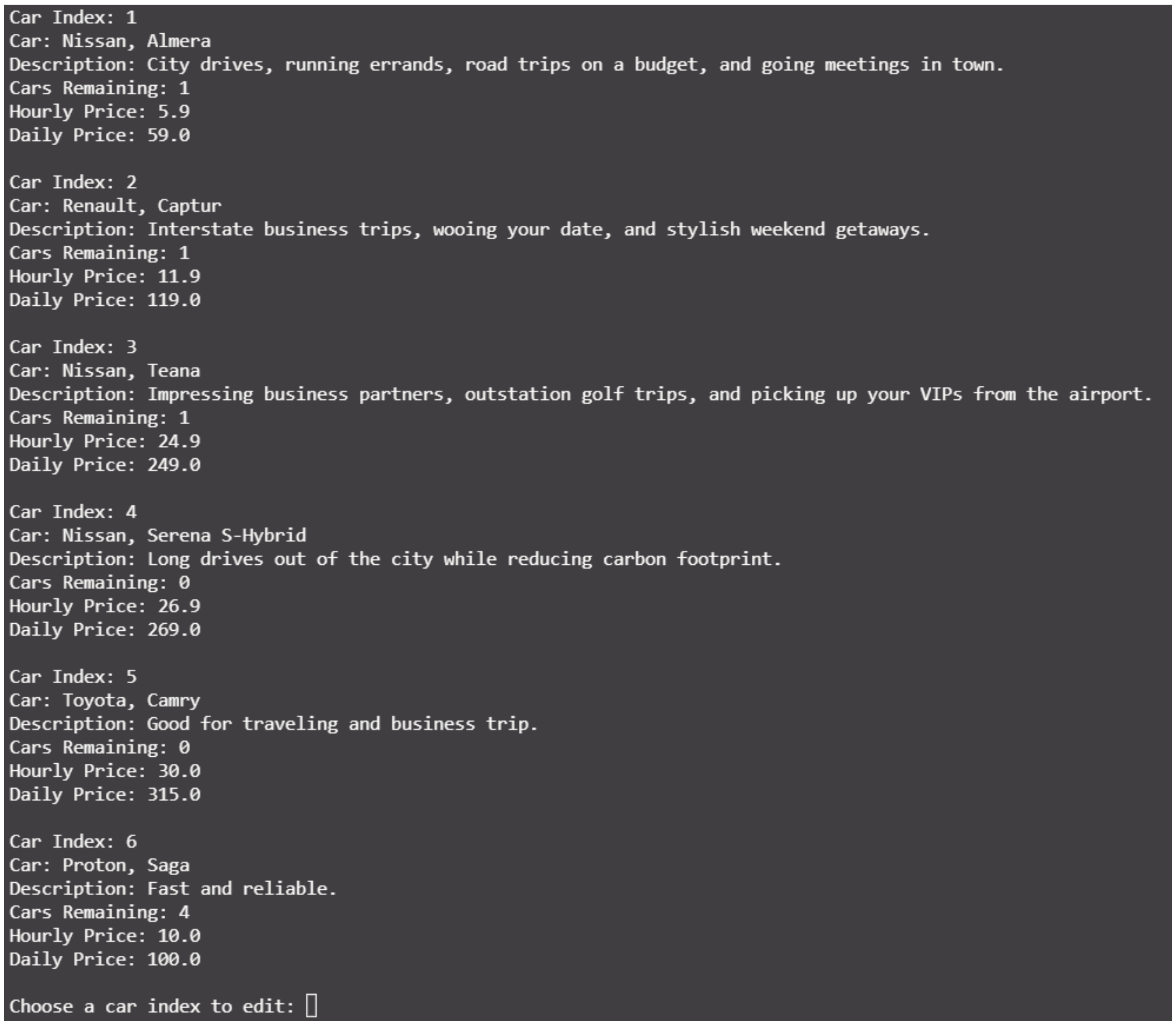
Figure 4: database before adding car



```
Nissan|Almera|City drives, running errands, road trips on a budget, and going meetings in town.|1
5.9|59.0
Renault|Captur|Interstate business trips, wooing your date, and stylish weekend getaways.|1
11.9|119.0
Nissan|Teana|Impressing business partners, outstation golf trips, and picking up your VIPs from the airport.|1
24.9|249.0
Nissan|Serena S-Hybrid|Long drives out of the city while reducing carbon footprint.|0
26.9|269.0
Toyota|Camry|Good for traveling and business trip.|0
30.0|315.0
Proton|Saga|Fast and reliable.|4
10.0|100.0

```

Figure 5: database after adding car

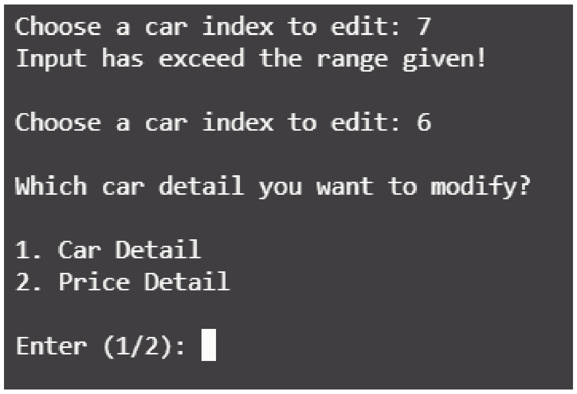
Modify Car Details



```
Car Index: 1
Car: Nissan, Almera
Description: City drives, running errands, road trips on a budget, and going meetings in town.
Cars Remaining: 1
Hourly Price: 5.9
Daily Price: 59.0

Car Index: 2
Car: Renault, Captur
Description: Interstate business trips, wooing your date, and stylish weekend getaways.
Cars Remaining: 1
Hourly Price: 11.9
Daily Price: 119.0

Car Index: 3
Car: Nissan, Teana
Description: Impressing business partners, outstation golf trips, and picking up your VIPs from the airport.
Cars Remaining: 1
Hourly Price: 24.9
Daily Price: 249.0

Car Index: 4
Car: Nissan, Serena S-Hybrid
Description: Long drives out of the city while reducing carbon footprint.
Cars Remaining: 0
Hourly Price: 26.9
Daily Price: 269.0

Car Index: 5
Car: Toyota, Camry
Description: Good for traveling and business trip.
Cars Remaining: 0
Hourly Price: 30.0
Daily Price: 315.0

Car Index: 6
Car: Proton, Saga
Description: Fast and reliable.
Cars Remaining: 4
Hourly Price: 10.0
Daily Price: 100.0

Choose a car index to edit:
```

Figure 6: modify car details (display)

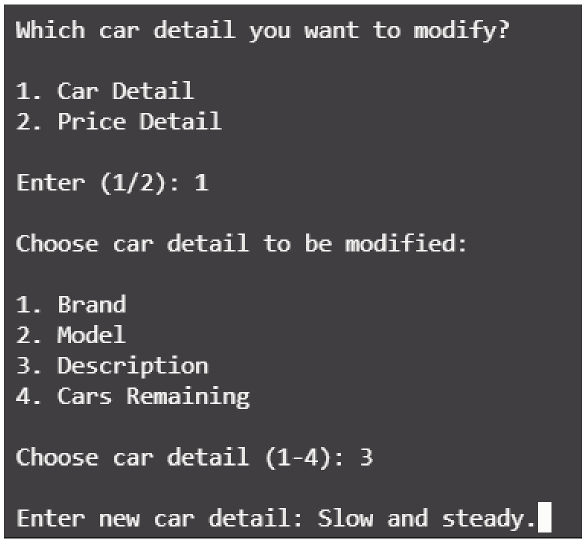
Display all car index and details to let admin choose which car to modify.



```
Choose a car index to edit: 7
Input has exceed the range given!

Choose a car index to edit: 6

Which car detail you want to modify?

1. Car Detail
2. Price Detail

Enter (1/2):
```

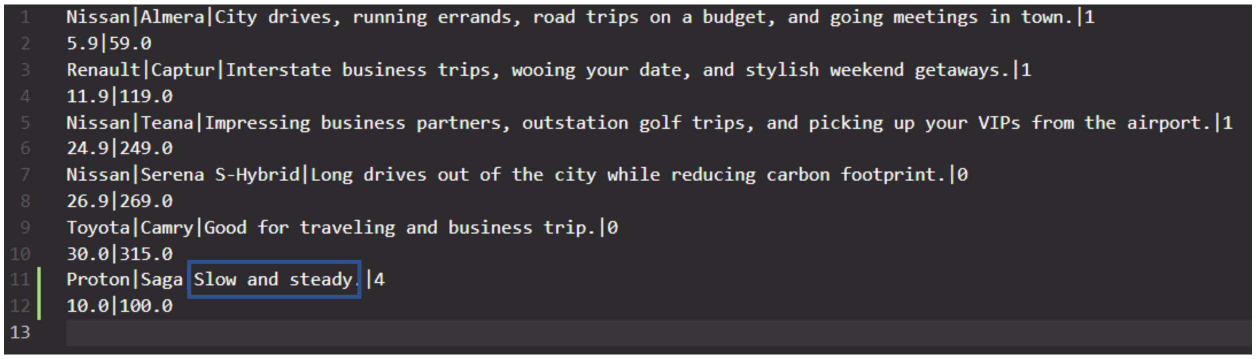
Figure 7: modify car details (choosing a car)

When choosing a car to edit we prevent admins from choosing a car index that is not available. Once a valid index is chosen, we let them choose the details that they want to edit.



```
Which car detail you want to modify?

1. Car Detail
2. Price Detail

Enter (1/2): 1

Choose car detail to be modified:

1. Brand
2. Model
3. Description
4. Cars Remaining

Choose car detail (1-4): 3

Enter new car detail: Slow and steady.
```

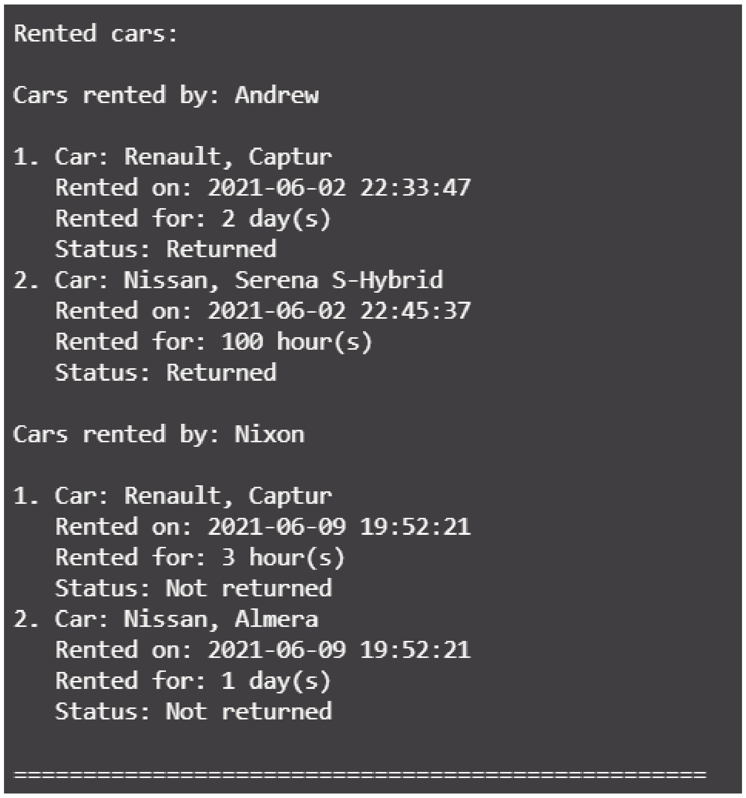
Figure 8: modify car description



```
Nissan|Almera|City drives, running errands, road trips on a budget, and going meetings in town.|1
5.9|59.0
Renault|Captur|Interstate business trips, wooing your date, and stylish weekend getaways.|1
11.9|119.0
Nissan|Teana|Impressing business partners, outstation golf trips, and picking up your VIPs from the airport.|1
24.9|249.0
Nissan|Serena S-Hybrid|Long drives out of the city while reducing carbon footprint.|0
26.9|269.0
Toyota|Camry|Good for traveling and business trip.|0
30.0|315.0
Proton|Saga|Slow and steady.|4
10.0|100.0
```

Figure 9: database after modifying car

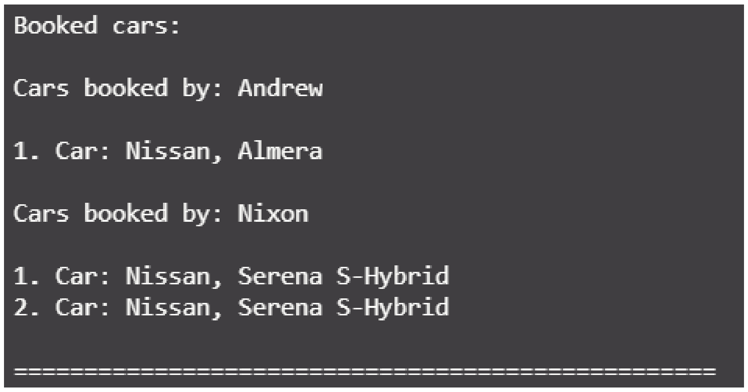
Display Records



```
Rented cars:

Cars rented by: Andrew

1. Car: Renault, Captur
   Rented on: 2021-06-02 22:33:47
   Rented for: 2 day(s)
   Status: Returned
2. Car: Nissan, Serena S-Hybrid
   Rented on: 2021-06-02 22:45:37
   Rented for: 100 hour(s)
   Status: Returned

Cars rented by: Nixon

1. Car: Renault, Captur
   Rented on: 2021-06-09 19:52:21
   Rented for: 3 hour(s)
   Status: Not returned
2. Car: Nissan, Almera
   Rented on: 2021-06-09 19:52:21
   Rented for: 1 day(s)
   Status: Not returned

==================================================
```

Figure 10: display records (rented cars)

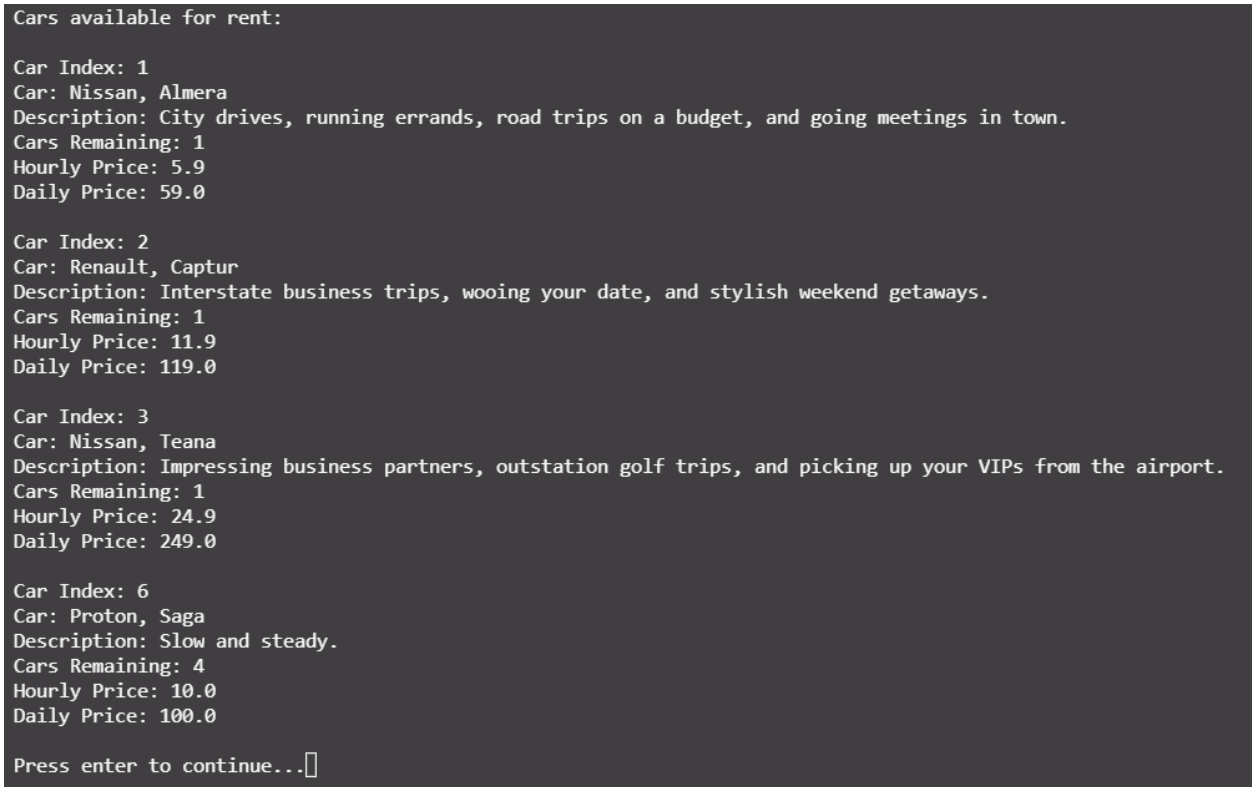
We display all the rented cars.



```
Booked cars:

Cars booked by: Andrew

1. Car: Nissan, Almera

Cars booked by: Nixon

1. Car: Nissan, Serena S-Hybrid
2. Car: Nissan, Serena S-Hybrid

==================================================
```

Figure 11: display records (booked cars)

We display all the booked cars and who booked it.

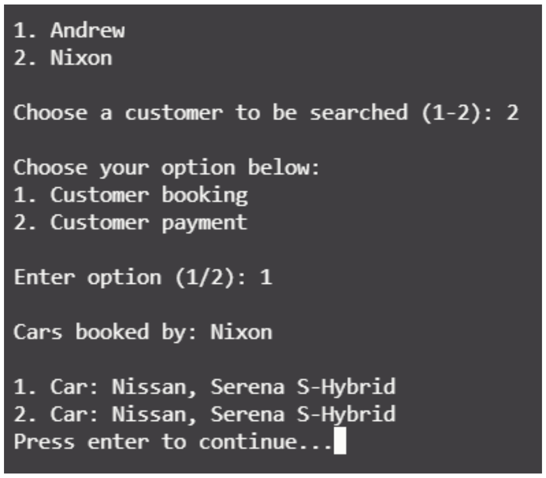


```
Cars available for rent:

Car Index: 1
Car: Nissan, Almera
Description: City drives, running errands, road trips on a budget, and going meetings in town.
Cars Remaining: 1
Hourly Price: 5.9
Daily Price: 59.0

Car Index: 2
Car: Renault, Captur
Description: Interstate business trips, wooing your date, and stylish weekend getaways.
Cars Remaining: 1
Hourly Price: 11.9
Daily Price: 119.0

Car Index: 3
Car: Nissan, Teana
Description: Impressing business partners, outstation golf trips, and picking up your VIPs from the airport.
Cars Remaining: 1
Hourly Price: 24.9
Daily Price: 249.0

Car Index: 6
Car: Proton, Saga
Description: Slow and steady.
Cars Remaining: 4
Hourly Price: 10.0
Daily Price: 100.0

Press enter to continue...
```

Figure 12: display records (cars available for rent)

We display all the cars that are available for rental and booking.

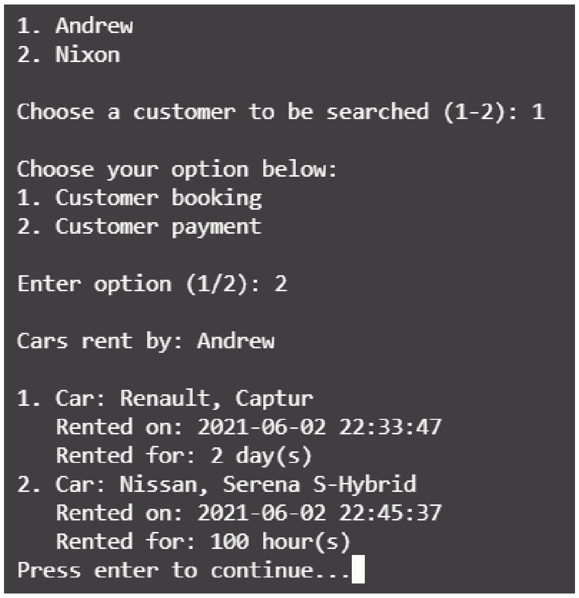
Search Records



```
1. Andrew
2. Nixon

Choose a customer to be searched (1-2): 2

Choose your option below:
1. Customer booking
2. Customer payment

Enter option (1/2): 1

Cars booked by: Nixon

1. Car: Nissan, Serena S-Hybrid
2. Car: Nissan, Serena S-Hybrid
Press enter to continue...
```

Figure 13: search records (customer bookings)

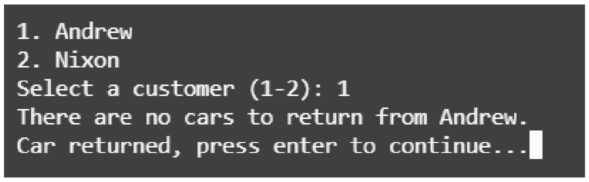
We allow admins to search a booking record for a specific customer.



```
1. Andrew
2. Nixon

Choose a customer to be searched (1-2): 1

Choose your option below:
1. Customer booking
2. Customer payment

Enter option (1/2): 2

Cars rent by: Andrew

1. Car: Renault, Captur
   Rented on: 2021-06-02 22:33:47
   Rented for: 2 day(s)
2. Car: Nissan, Serena S-Hybrid
   Rented on: 2021-06-02 22:45:37
   Rented for: 100 hour(s)
Press enter to continue...
```

Figure 14: search records (customer payments)

We allow admins to search a payment record for a specific customer.

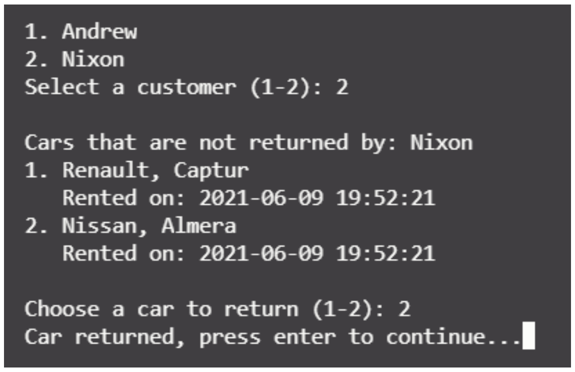


```
1. Andrew
2. Nixon
Select a customer (1-2): 1
There are no cars to return from Andrew.
Car returned, press enter to continue...
```

Figure 15: returning cars (no cars to return)

When there are no cars to be returned, we tell the admin.

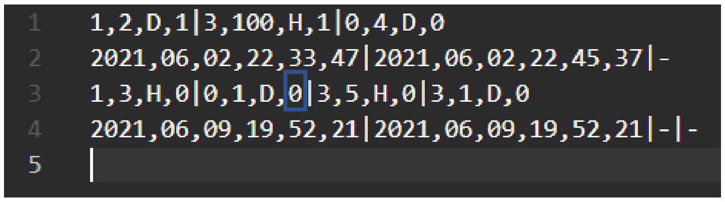
Return Rented Car



```
1. Andrew
2. Nixon
Select a customer (1-2): 2

Cars that are not returned by: Nixon
1. Renault, Captur
   Rented on: 2021-06-09 19:52:21
2. Nissan, Almera
   Rented on: 2021-06-09 19:52:21

Choose a car to return (1-2): 2
Car returned, press enter to continue...
```

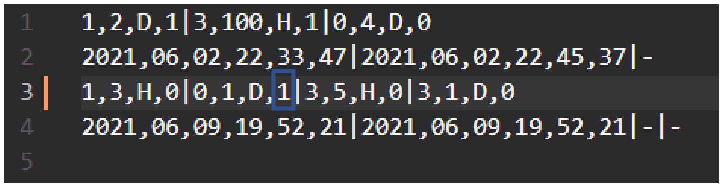
Figure 16: returning cars (existing cars to return)

When there is a car to be returned, we display them and let admin to choose a car to return.



```
1,2,D,1|3,100,H,1|0,4,D,0
2021,06,02,22,33,47|2021,06,02,22,45,37|-
1,3,H,0|0,1,D,0|3,5,H,0|3,1,D,0
2021,06,09,19,52,21|2021,06,09,19,52,21|-|-
```

Figure 17: database before return

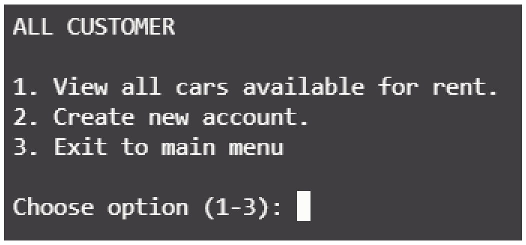


```
1,2,D,1|3,100,H,1|0,4,D,0
2021,06,02,22,33,47|2021,06,02,22,45,37|-
1,3,H,0|0,1,D,1|3,5,H,0|3,1,D,0
2021,06,09,19,52,21|2021,06,09,19,52,21|-|-
```

Figure 18: database after returning

All Customers

All Customers Main Menu

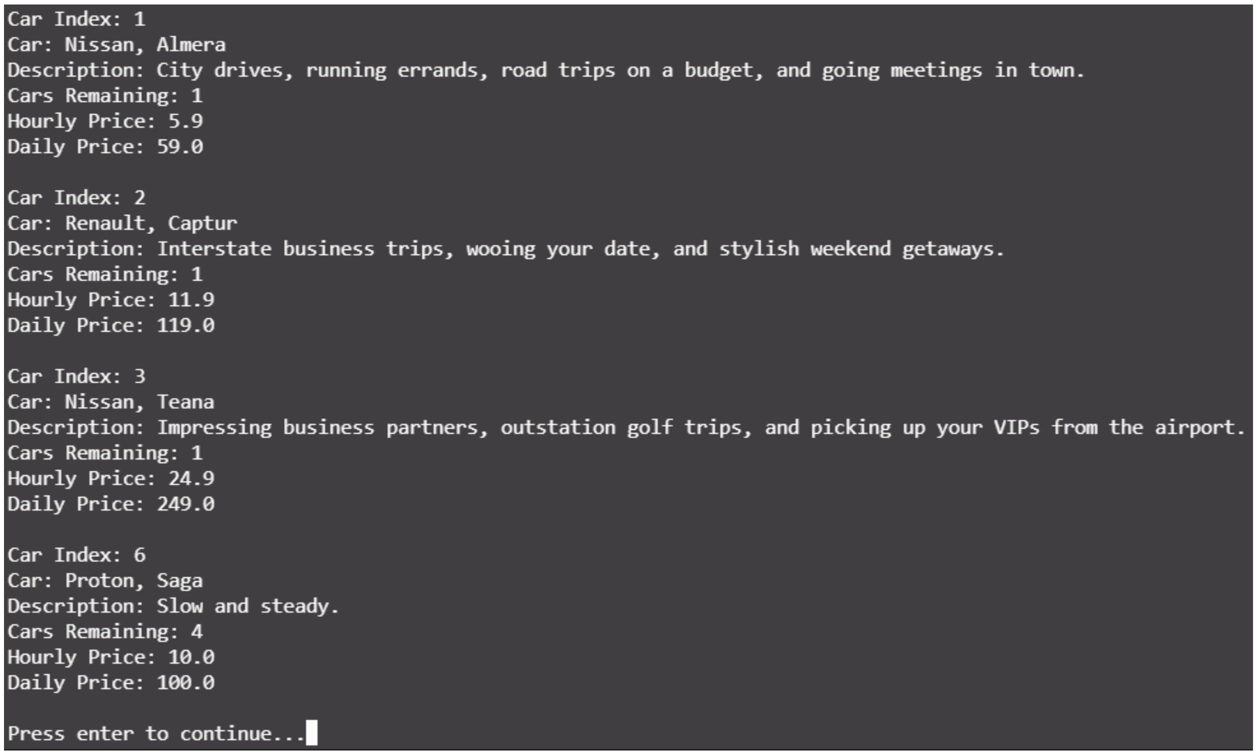


```
ALL CUSTOMER

1. View all cars available for rent.
2. Create new account.
3. Exit to main menu

Choose option (1-3):
```

Figure 19: all customer menu

We display all features available for all customers.

View All Cars Available For Rent

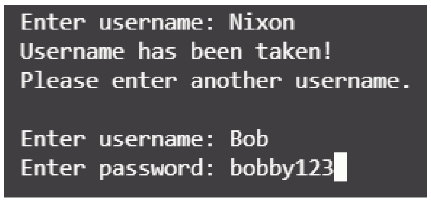


```
Car Index: 1
Car: Nissan, Almera
Description: City drives, running errands, road trips on a budget, and going meetings in town.
Cars Remaining: 1
Hourly Price: 5.9
Daily Price: 59.0

Car Index: 2
Car: Renault, Captur
Description: Interstate business trips, wooing your date, and stylish weekend getaways.
Cars Remaining: 1
Hourly Price: 11.9
Daily Price: 119.0

Car Index: 3
Car: Nissan, Teana
Description: Impressing business partners, outstation golf trips, and picking up your VIPs from the airport.
Cars Remaining: 1
Hourly Price: 24.9
Daily Price: 249.0

Car Index: 6
Car: Proton, Saga
Description: Slow and steady.
Cars Remaining: 4
Hourly Price: 10.0
Daily Price: 100.0

Press enter to continue...
```

Figure 20: view all cars available for rent

We display all cars that are available for rent.

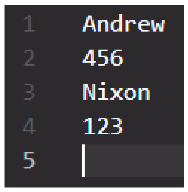
Create new account



```
Enter username: Nixon
Username has been taken!
Please enter another username.

Enter username: Bob
Enter password: bobby123
```

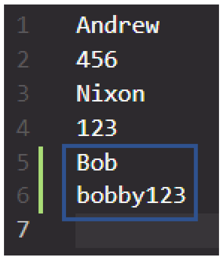
Figure 21: create new account

We let users create a new account be taking in username and password. We also make sure no duplicated account is created by checking the username.



```
Andrew
456
Nixon
123

```

Figure 22: database before creating new account

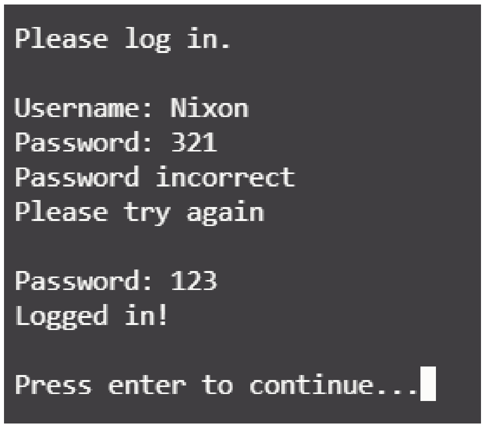


```
Andrew
456
Nixon
123
Bob
bobby123

```

Figure 23: database after creating new account

Registered Customers

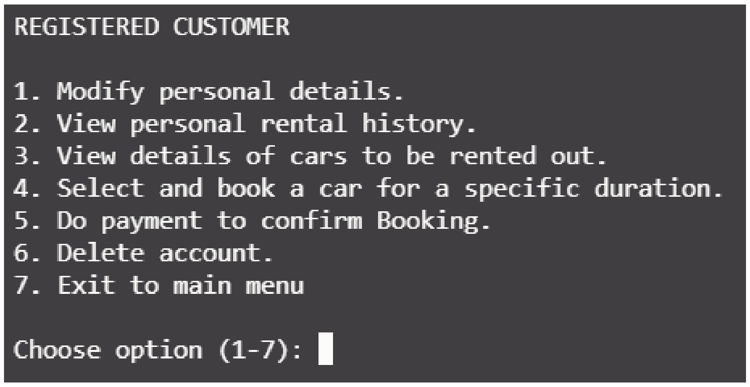
Registered Customer Main Menu



```
Please log in.

Username: Nixon
Password: 321
Password incorrect
Please try again

Password: 123
Logged in!

Press enter to continue...
```

Figure 24: logging in as registered customer

Similar to admin menu, we need to log in before entering the menu. We also make sure that the password and username is correct.

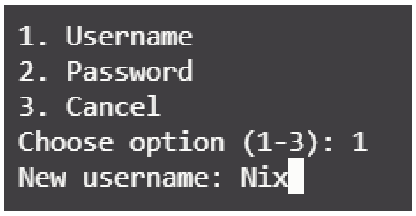


```
REGISTERED CUSTOMER

1. Modify personal details.
2. View personal rental history.
3. View details of cars to be rented out.
4. Select and book a car for a specific duration.
5. Do payment to confirm Booking.
6. Delete account.
7. Exit to main menu

Choose option (1-7):
```

Figure 25: registered customer menu

We display all the features included for the registered customer.

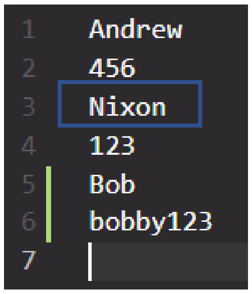
Modify Personal Details



```
1. Username
2. Password
3. Cancel
Choose option (1-3): 1
New username: Nix
```

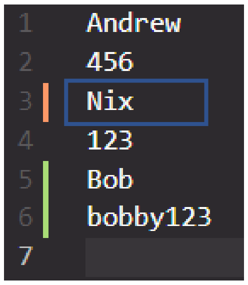
Figure 26: modify personal details (username)

We allow customers to change their username.



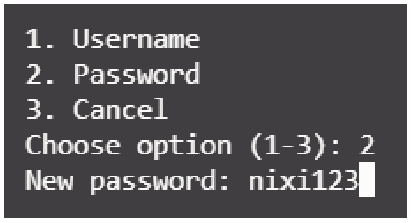
```
Andrew
456
Nixon
123
Bob
bobby123
```

Figure 27: database before modifying username



```
Andrew
456
Nix
123
Bob
bobby123
```

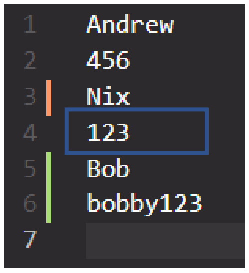
Figure 28: database after modifying username



```
1. Username
2. Password
3. Cancel
Choose option (1-3): 2
New password: nixi123
```

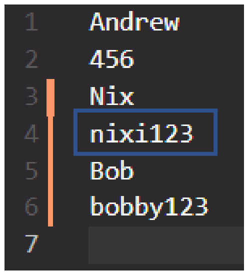
Figure 29: modify personal details (password)

We allow customers to change their password.



```
Andrew
456
Nix
123
Bob
bobby123
```

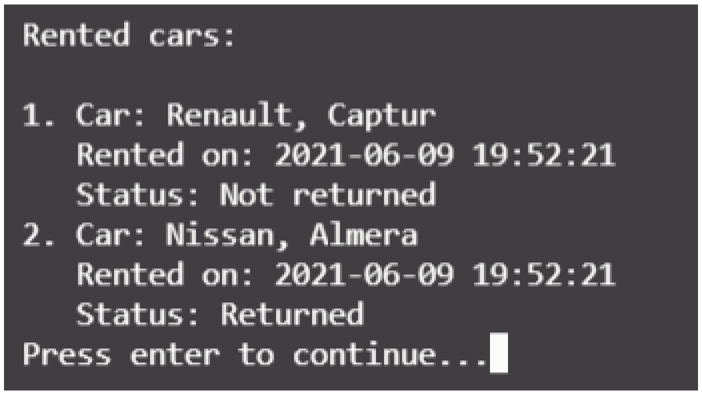
Figure 30: database before modifying password



```
Andrew
456
Nix
nixi123
Bob
bobby123
```

Figure 31: database after modifying password

View Rented Cars

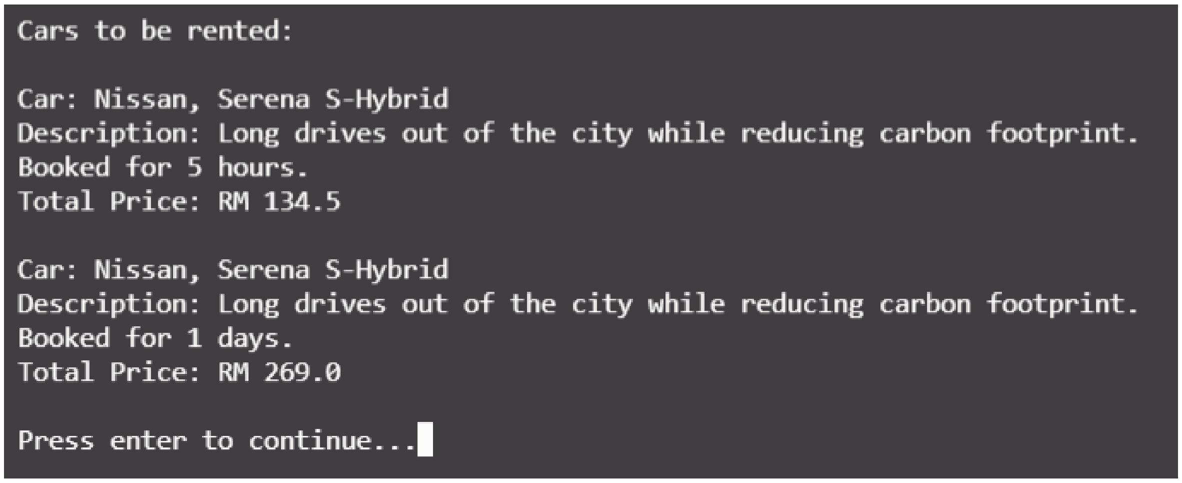


```
Rented cars:

1. Car: Renault, Captur
   Rented on: 2021-06-09 19:52:21
   Status: Not returned
2. Car: Nissan, Almera
   Rented on: 2021-06-09 19:52:21
   Status: Returned
Press enter to continue...
```

Figure 32: view rented cars

We display all cars that has been rented along with when it is rented and return status.

Cars To Be Rented

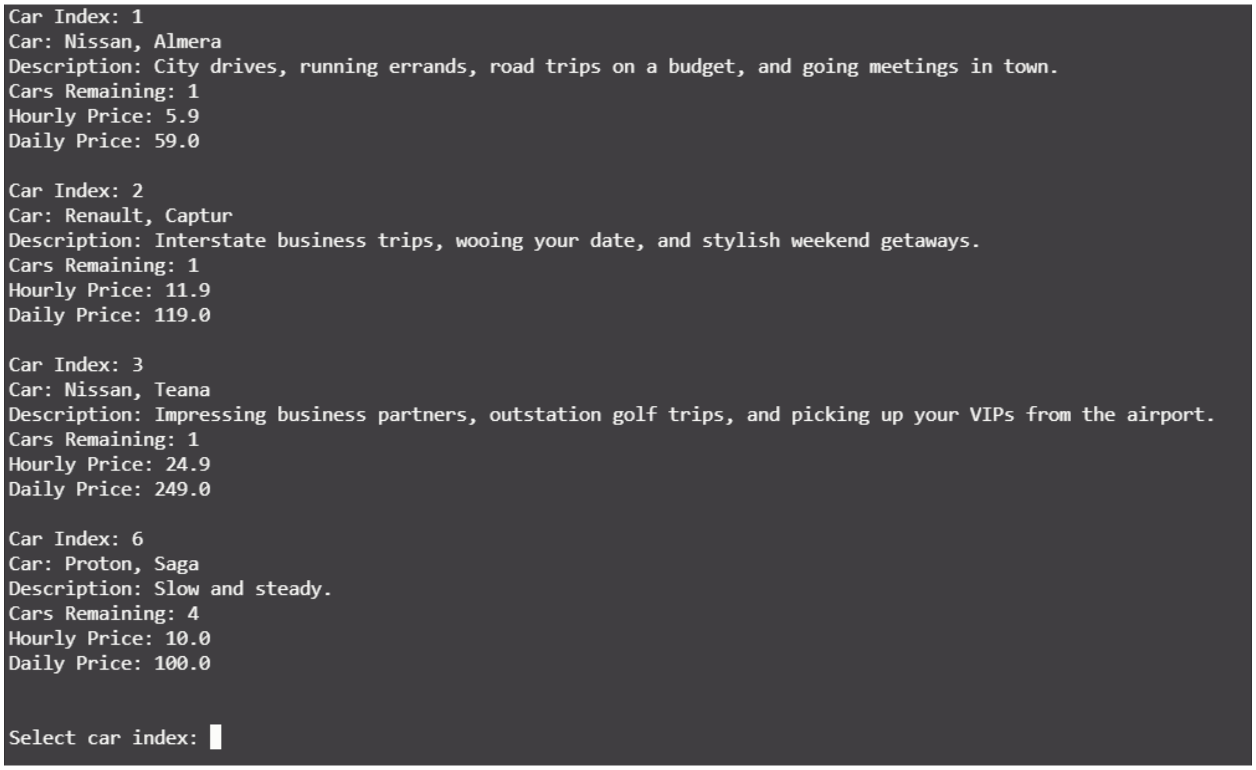


```
Cars to be rented:

Car: Nissan, Serena S-Hybrid
Description: Long drives out of the city while reducing carbon footprint.
Booked for 5 hours.
Total Price: RM 134.5

Car: Nissan, Serena S-Hybrid
Description: Long drives out of the city while reducing carbon footprint.
Booked for 1 days.
Total Price: RM 269.0

Press enter to continue...
```

Figure 33: cars to be rented

We display all cars that the customer has booked that is ready to be rented out.

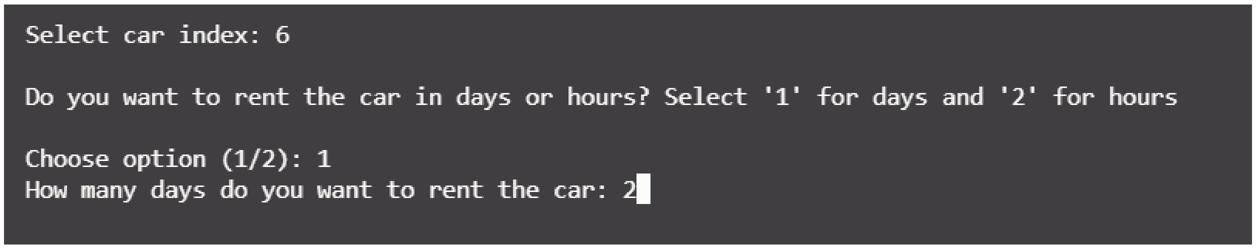
Select And Book A Car For A Specific Duration



```
Car Index: 1
Car: Nissan, Almera
Description: City drives, running errands, road trips on a budget, and going meetings in town.
Cars Remaining: 1
Hourly Price: 5.9
Daily Price: 59.0

Car Index: 2
Car: Renault, Captur
Description: Interstate business trips, wooing your date, and stylish weekend getaways.
Cars Remaining: 1
Hourly Price: 11.9
Daily Price: 119.0

Car Index: 3
Car: Nissan, Teana
Description: Impressing business partners, outstation golf trips, and picking up your VIPs from the airport.
Cars Remaining: 1
Hourly Price: 24.9
Daily Price: 249.0

Car Index: 6
Car: Proton, Saga
Description: Slow and steady.
Cars Remaining: 4
Hourly Price: 10.0
Daily Price: 100.0


Select car index:
```

Figure 34: selecting a car index

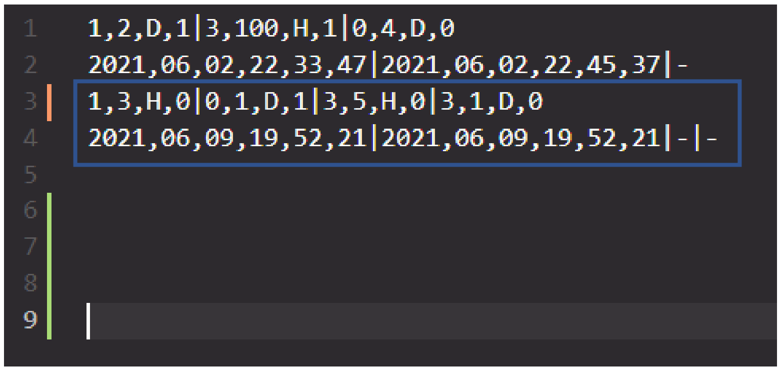
We let user select a car index from the menu which only shows cars that are available (remaining count that is greater than 0).



```
Select car index: 6

Do you want to rent the car in days or hours? Select '1' for days and '2' for hours

Choose option (1/2): 1
How many days do you want to rent the car: 2
```

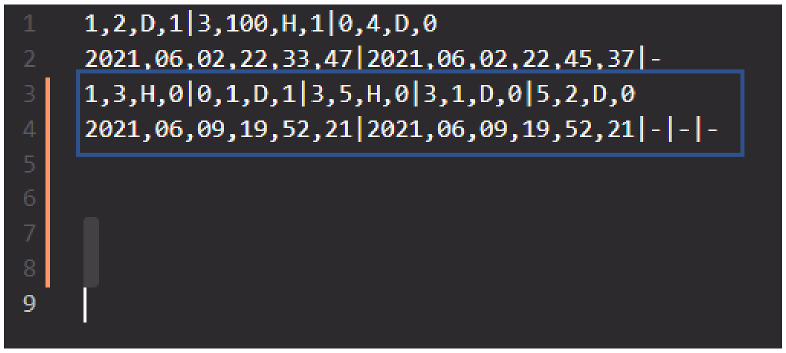
Figure 35: rent option

We let customers choose if they want to rent in days or hours.



```
1,2,D,1|3,100,H,1|0,4,D,0
2021,06,02,22,33,47|2021,06,02,22,45,37|-
1,3,H,0|0,1,D,1|3,5,H,0|3,1,D,0
2021,06,09,19,52,21|2021,06,09,19,52,21|-|-
```

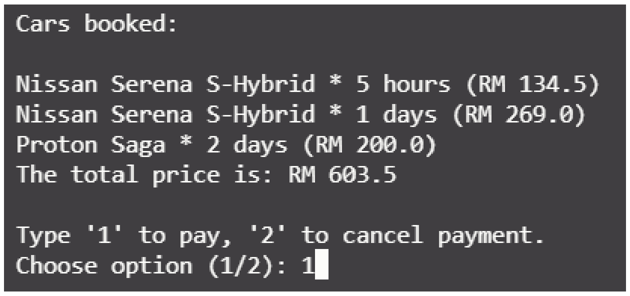
Figure 36: database before rent



```
1,2,D,1|3,100,H,1|0,4,D,0
2021,06,02,22,33,47|2021,06,02,22,45,37|-
1,3,H,0|0,1,D,1|3,5,H,0|3,1,D,0|5,2,D,0
2021,06,09,19,52,21|2021,06,09,19,52,21|-|-|-
```

Figure 37: database after rent

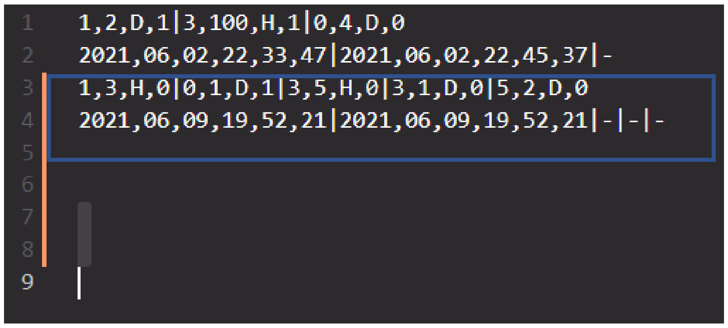
Do Payment To Confirm Booking



```
Cars booked:

Nissan Serena S-Hybrid * 5 hours (RM 134.5)
Nissan Serena S-Hybrid * 1 days (RM 269.0)
Proton Saga * 2 days (RM 200.0)
The total price is: RM 603.5

Type '1' to pay, '2' to cancel payment.
Choose option (1/2): 1
```

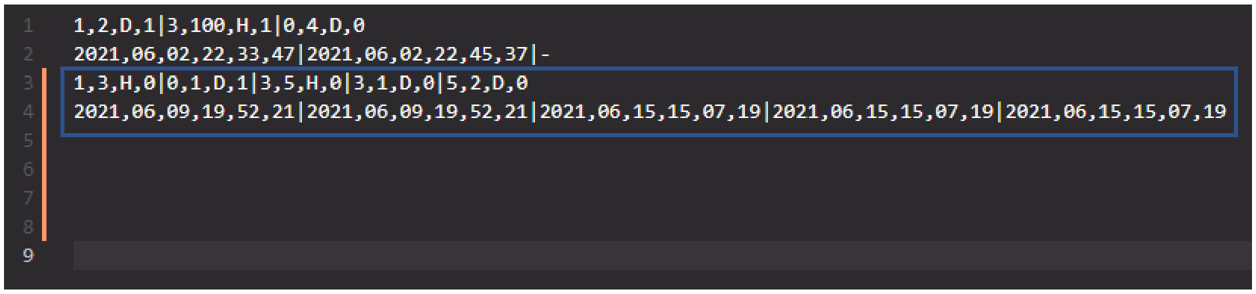
Figure 38: display cars booked

We display all the cars that has been booked and also the total price calculated. We also allow customers to cancel payment if they want to.



```
1,2,D,1|3,100,H,1|0,4,D,0
2021,06,02,22,33,47|2021,06,02,22,45,37|-
1,3,H,0|0,1,D,1|3,5,H,0|3,1,D,0|5,2,D,0
2021,06,09,19,52,21|2021,06,09,19,52,21|-|-|-
```

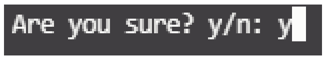
Figure 39: database before payment



```
1,2,D,1|3,100,H,1|0,4,D,0
2021,06,02,22,33,47|2021,06,02,22,45,37|-
1,3,H,0|0,1,D,1|3,5,H,0|3,1,D,0|5,2,D,0
2021,06,09,19,52,21|2021,06,09,19,52,21|2021,06,15,15,07,19|2021,06,15,15,07,19|2021,06,15,15,07,19
```

Figure 40: database after payment

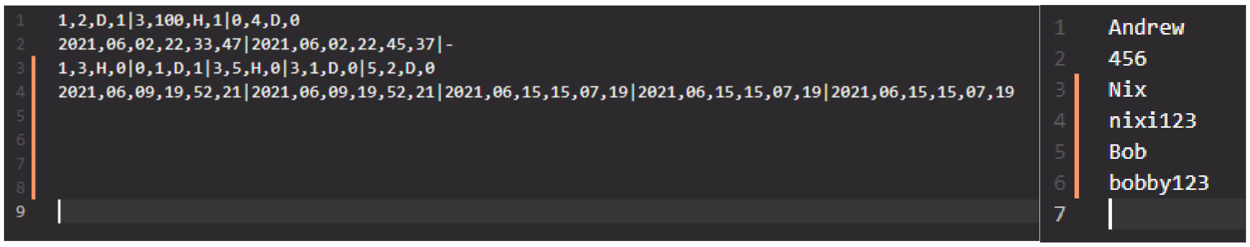
Delete Account



```
Are you sure? y/n: y
```

Figure 41: delete account confirmation

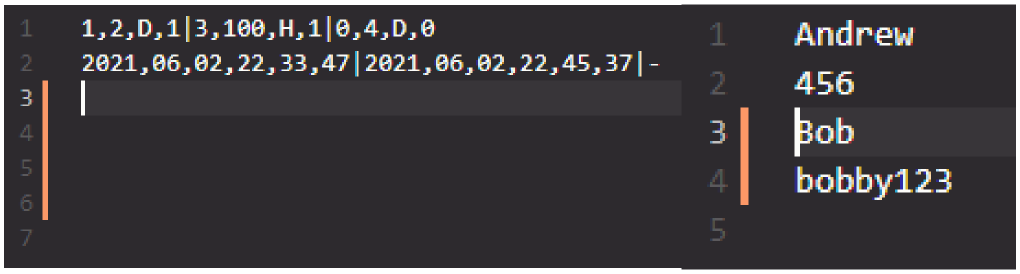
We also allow customers to delete their account if they choose not to be a registered customer anymore.



```
1,2,D,1|3,100,H,1|0,4,D,0
2021,06,02,22,33,47|2021,06,02,22,45,37|-
1,3,H,0|0,1,D,1|3,5,H,0|3,1,D,0|5,2,D,0
2021,06,09,19,52,21|2021,06,09,19,52,21|2021,06,15,15,07,19|2021,06,15,15,07,19|2021,06,15,15,07,19
```

```
Andrew
456
Nix
nixi123
Bob
bobby123
```

Figure 42: database before account deletion



```
1,2,D,1|3,100,H,1|0,4,D,0
2021,06,02,22,33,47|2021,06,02,22,45,37|-
```

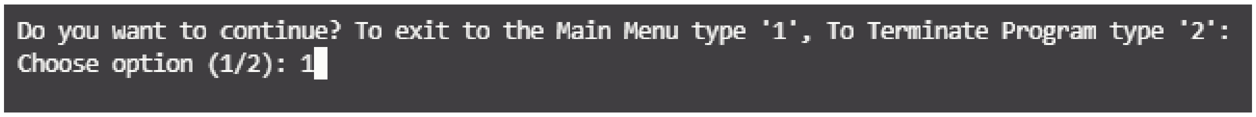
```
Andrew
456
Bob
bobby123
```

Figure 43: database after account deletion

We remove both the records and also the username and password.

Exit Program

Termination Confirmation



```
Do you want to continue? To exit to the Main Menu type '1', To Terminate Program type '2':
Choose option (1/2): 1
```

Figure 44: termination confirmation

We ask the user to confirm if he/she wants to exit the program or not.

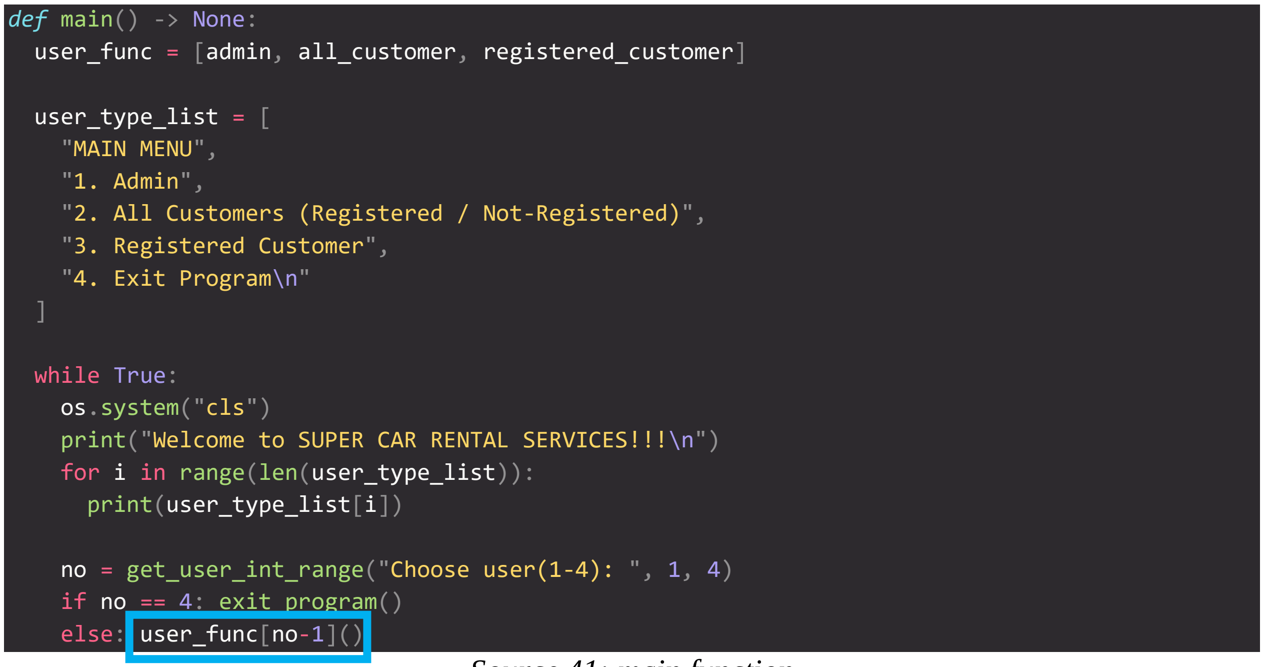
Conclusion

We have ensure that the program that we wrote is robust, consistent, readable, performant, and future proof. This can be shown with a few examples:

Abstraction

If you look back at Source 8 to Source 19 (all of our utility functions), you will notice that these functions are used again and again throughout the entire program. This functions are used to abstract away repetitive task so that we do not need to rewrite the same logic again and again.

Functions in a list



```python
def main() -> None:
  user_func = [admin, all_customer, registered_customer]

  user_type_list = [
    "MAIN MENU",
    "1. Admin",
    "2. All Customers (Registered / Not-Registered)",
    "3. Registered Customer",
    "4. Exit Program\n"
  ]

  while True:
    os.system("cls")
    print("Welcome to SUPER CAR RENTAL SERVICES!!!\n")
    for i in range(len(user_type_list)):
      print(user_type_list[i])

    no = get_user_int_range("Choose user(1-4): ", 1, 4)
    if no == 4: exit_program()
    else: user_func[no-1]()
```

Source 41: main function

Looking at our main function, what you will notice is that we do not use if else statement to check what numbers our user type. Instead, what we use is list indexing. We call the function that we store in a list earlier (`user_func`) based on the index that the user types. This prevent branching in our program.

Consistency and Readability

In the first section of our Source Code Explanation, we discuss about naming conventions and annotations. We have ensured that our code is consistent by following the naming conventions and insert appropriate annotations to explicitly tell other programmers what type of datatype that we expect in each functions.

Constant variables

To prevent our program from failing when the name of a certain database changes, we use constant variables to store the name of each database so that we can easily change the content of the variables when the name of our database changes. Note that these constant variables are not meant to be changed (although they can be changed technically) during the runtime of the entire program.

Workload Matrix

Subtask Workload

Note, different task contains different amount of work. So totaling up the workload is not equivalent to the person’s contribution.

Task	Cheng Yi Heng	Tan Chun Hung
Python Programming	80%	20%
Introduction	10%	90%
Pseudocode	0%	100%
Flowchart	15%	85%
Program Source Code Explanation	85%	15%
Additional Features	100%	0%
Sample Input and Output	100%	0%
Conclusion	100%	0%

References

Kinsley, H., 2018. Python Programming Tutorials. [online] Pythonprogramming.net. Available at: <https://pythonprogramming.net/introduction-learn-python-3-tutorials/> [Accessed 17 June 2021].