SE 471 Software Architecture

Lab 1

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90

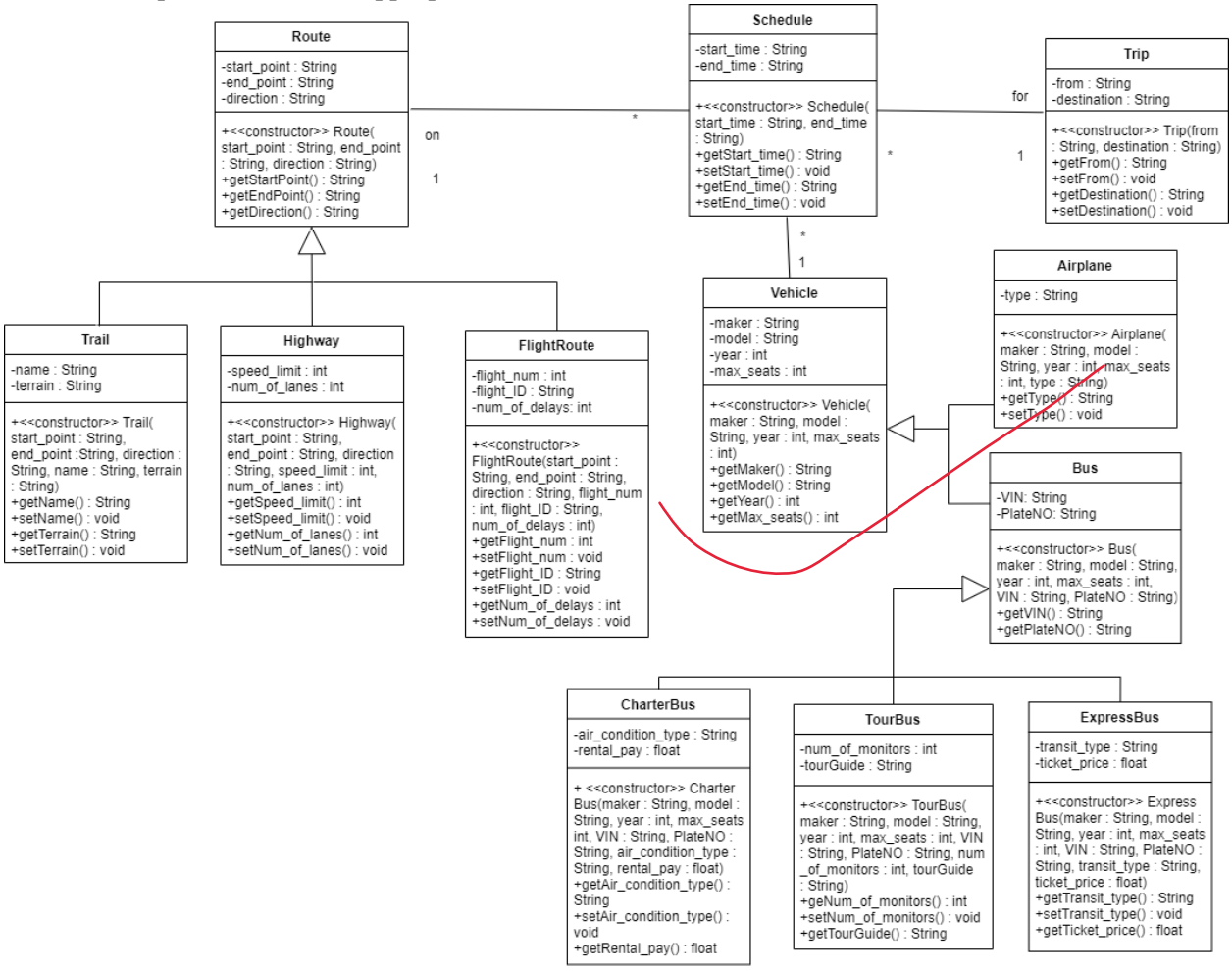
Grading Rubrics (for instructor only):

Criteria	1. Beginning	2. Developing	3. Proficient	4. Exemplary
Mapping from design to Java code	0-9	10-14	15-19	30
Program: quality -> ***Readability***	0-2	3-5	6-9	10
Program: quality -> ***Modularity***	0-2	3-5	6-9	10
Program: quality -> ***Simplicity***	0-2	3-5	6-9	10
Updated design: ***correctness***	0-9	10-14	15-19	20
Updated design: ***Consistency with code***	0-9	10-14	15-19	20
Total Grade (100)				

SE 471 Software Architecture

Problems:

a. In the following design in UML class diagram, some classes are incomplete (lack of attributes and/or operations). You should update the class diagram by adding important attributes and/operations that are appropriate.



b. Translate your complete design into Java implementation. For this assignment, your code may not be executable. Remember, the goal is to make sure the implementation is consistent with the design.

Airplane.java:

```
package Code;

public class Airplane extends Vehicle {
   /*
    * Variables declared in Airplane class
    * from UML diagram
    */
   private String type;

   /*
    * Constructor
    * @param maker
    * @param model
    * @param year
    * @param max_seats
    * @param type
    */
   Airplane(String maker, String model, int year, int max_seats, String type){
       //this.maker = maker;
       //this.model = model;
       //this.year = year;
       //this.max_seats = max_seats;
       super(maker, model, year, max_seats); //needed since a constructor was made in
the vehicle class
       this.type = type;
   }

   /*
    * get function for initialization
    */
   public String getType() {
       return type;
   }
    /*
     * set function for variables in
     * Vehicle class
     */
   public void setType(String type) {
       this.type = type;
   }
}
```

Bus.java

```
package Code;

public class Bus extends Vehicle{
   /*
    * Variables declared in Bus class
    * from UML diagram
    */
   String VIN;
   String PlateNO;
   /*
    * Constructor
    * @param maker
    * @param model
    * @param year
    * @param max_seats
    * @param VIN
    * @param PlateNO
    */
   Bus(String maker, String model, int year, int max_seats, String VIN, String
PlateNO){
       /*
       this.maker = maker;
       this.model = model;
       this.year = year;
       this.max_seats = max_seats;
        */
       super(maker, model, year, max_seats); //needed since constructor was made for
Vehicle
       this.VIN = VIN;
       this.PlateNO = PlateNO;
   }

   /*
    * get functions for initialization
    */
   public String getVIN() {
       return VIN;
   }
   public String getPlateNO() {
       return PlateNO;
   }
}
```

CharterBus.java

```
package Code;

public class CharterBus extends Bus{

   /*

    * Variables declared in CharterBus class

    * from the UML diagram

    */

   private String air_condition_type;

   private float rental_pay;

     /*

    * Constructor

    * @param maker

    * @param model

    * @param year

    * @param max_seats

    * @param VIN

    * @param PlateNO

    * @param air_condition_type

    * @param rental_pay

    */

   CharterBus(String maker, String model, int year, int max_seats, String VIN, String
PlateNO, String air_condition_type, float rental_pay){

       /*

       this.maker = maker;

       this.model = model;

       this.year = year;

       this.max_seats = max_seats;

       this.VIN = VIN;

       this.PlateNO = plateNO;

        */
```

```
        super(maker, model, year, max_seats, VIN, PlateNO); //needed since it includes
both Bus and Vehicle classes

        this.air_condition_type = air_condition_type;

        this.rental_pay = rental_pay;

    }

    /*

     * get functions for initialization

     */

    public String getAir_condition_type() {

        return air_condition_type;

    }

    public float getRental_pay() {

        return rental_pay;

    }

     /*

      * set function for variables in

      * CharterBus class

      */

    public void setAir_condition_type(String air_condition_type) {

        this.air_condition_type = air_condition_type;

    }

}
```

ExpressBus.java

```
package Code;

public class ExpressBus extends Bus{

   /*

    * Variables declared in the ExpressBus

    * class from UML diagram

    */

   private String transit_type;

   private float ticket_price;

   /*

    * Constructor

    * @param maker

    * @param model

    * @param year

    * @param max_seats

    * @param VIN

    * @param PlateNO

    * @param transit_type

    * @param ticket_price

    */

   ExpressBus(String maker, String model, int year, int max_seats, String VIN, String
PlateNO, String transit_type, float ticket_price){

       /*

       this.maker = maker;

       this.model = model;

       this.year = year;

       this.max_seats = max_seats;

       this.VIN = VIN;

       this.PlateNO = plateNO;

        */
```

```
        super(maker, model, year, max_seats, VIN, PlateNO); //needed since both Bus and
ExpressBus constructors were created

        this.transit_type = transit_type;

        this.ticket_price = ticket_price;

    }

    /*

     * get functions for initialization

     */

    public String getTransit_type() {

        return transit_type;

    }

    public float getTicket_price() {

        return ticket_price;

    }

    /*

     * set function for variables in

     * ExpressBus class

     */

    public void setTransit_type(String transit_type) {

        this.transit_type = transit_type;

    }

}
```

FlightRoute.java

```
package Code;

public class FlightRoute extends Route{

   /*

    * Variables that will be in the FlightRoute

    * class from UML diagram

    */

   private int flight_num;

   private String flight_ID;

   private int num_of_delays;

   /*

    * Constructor

    * @param start_point

    * @param end_point

    * @param direction

    * @param flight_num

    * @param flight_ID

    * @param num_of_delays

    */

   FlightRoute(String start_point, String end_point, String direction, int flight_num,
String flight_ID, int num_of_delays){

       //this.start_point = start_point;

       //this.end_point = end_point;

       //this.direction = direction;
```

```
        super(start_point, end_point, direction); //needed since a constructor was made
in Route class

        this.flight_num = flight_num;

        this.flight_ID = flight_ID;

        this.num_of_delays = num_of_delays;

    }

    /*

     * get functions for initialization

     */

    public int getFlight_num() {

        return flight_num;

    }

    public String getFlight_ID() {

        return flight_ID;

    }

    public int getNum_of_delays() {

        return num_of_delays;

    }

    /*

     * set functions for variables in

     * FlightRoute class

     */

    public void setFlight_num(int flight_num) {

        this.flight_num = flight_num;
```

```
    }

    public void setFlight_ID(String flight_ID) {

        this.flight_ID = flight_ID;

    }

    public void setNum_of_delays(int num_of_delays) {

        this.num_of_delays = num_of_delays;

    }

}
```

Highway.java

```
package Code;

public class Highway extends Route{
    /*
     * Declare variables that are in the
     * Highway class from UML diagram
     */
    private int speed_limit;
    private int num_of_lanes;
    /*
     * Constructor
     * @param start_point
     * @param end_point
     * @param direction
     * @param speed_limit
     * @param num_of_lanes
     */
     Highway(String start_point, String end_point, String direction, int speed_limit,
int num_of_lanes){
        //this.start_point = start_point;
        //this.end_point = end_point;
        //this.direction = direction;
          super(start_point, end_point, direction); // needed for making constructor in
Route class
        this.speed_limit = speed_limit;
        this.num_of_lanes = num_of_lanes;
    }

    /*
```

```
    * Get functions for initialization
    */
   public int getSpeed_limit() {
       return speed_limit;
   }
   public int getNum_of_lanes() {
       return num_of_lanes;
   }

   /*
    * Set functions for the variables
    * in Highway class
    */
   public void setSpeed_limit(int speed_limit) {
       this.speed_limit = speed_limit;
   }
   public void setNum_of_lanes(int num_of_lanes) {
       this.num_of_lanes = num_of_lanes;
   }
}
```

Route.java

```
package Code;

public class Route {
   /*
    * Declare attributes of Route in the
    * UML diagram
    */
   private String start_point; //start from initial point
   private String end_point; //stop from initial point to new point
   private String direction; //check if it is NORTH/EAST/WEST/SOUTH

   /*
    * Constructor
    * @param start_point
    * @param end_point
    * @param direction
    */
   Route(String start_point, String end_point, String direction){
       this.start_point = start_point;
       this.end_point = start_point;
       this.direction = direction;
   }


   /*
```

```
    * Create get functions to indicate
    * the following variables in Route class
    */
   public String getStart_point() {
       return start_point;
   }
   public String getEnd_point() {
       return end_point;
   }
   public String getDirection() {
       return direction;
   }
}
```

Schedule.java

```
package Code;

public class Schedule {
   /*
    * Declare the attributes of UML diagram
    * for Schedule class
    */
   private String start_time; //set a time with format hours:minutes:seconds
   private String end_time; //same as prior variable

   /*
    * Constructor
    * @param start_time
    * @param end_time
    */
   Schedule(String start_time, String end_time){
       this.start_time = start_time;
       this.end_time = end_time;
   }

   /*
    * Have get functions that is
    * from the methods location
    */
   public String getStart_time() {
       return start_time;
   }
   public String getEnd_time() {
       return end_time;
   }

   /*
    * Have set functions to assign the
    * string types
    */
   public void setStart_time(String start_time) {
       this.start_time = start_time;
   }
```

```
   public void setEnd_time(String end_time) {
       this.end_time = end_time;
   }
}
```

TourBus.java

```
package Code;

public class TourBus extends Bus{
   /*
    * Variables declared in the TourBus
    * class in UML diagram
    */
   private int num_of_monitors;
   private String tourGuide;

   /*
    * Constructor
    * @param maker
    * @param model
    * @param year
    * @param max_seats
    * @param VIN
    * @param PlateNO
    * @param num_of_monitors
    * @param tourGuide
    */

    TourBus(String maker, String model, int year, int max_seats, String VIN, String
PlateNO, int num_of_monitors, String tourGuide){
       /*
       this.maker = maker;
       this.model = model;
       this.year = year;
       this.max_seats = max_seats;
       this.VIN = VIN;
       this.PlateNO = plateNO;
        */
       super(maker, model, year, max_seats, VIN, PlateNO); //needed since constructors
have been made for Bus and TourBus
       this.num_of_monitors = num_of_monitors;
       this.tourGuide = tourGuide;
   }

   /*
    * get functions for initialization
    */
   public int getNum_of_monitors() {
       return num_of_monitors;
   }
   public String getTourGuide() {
       return tourGuide;
   }
```

```
    /*
     * set function for variables in
     * TourBus class
     */
    public void setNum_of_monitors(int num_of_monitors) {
        this.num_of_monitors = num_of_monitors;
    }
}
```

Trail.java

```
package Code;

public class Trail extends Route {
    /*
     * Declare attributes from the Trail and
     * Route class from UML diagram
     */
    private String name; //name of the trail
    private String terrain; //biome or region of the area

    /*
     * Constructor
     * @param start_point (Route class)
     * @param end_point (Route class)
     * @param direction (Route class)
     * @param name (Trail class)
     * @param terrain (Trail class)
     */
     Trail(String start_point, String end_point, String direction, String name, String
terrain){
        //this.start_point = start_point;
        //this.end_point = end_point;
        //this.direction = direction;
          super(start_point,end_point,direction); //used when having a constructor for
Route class
        this.name = name;
        this.terrain = terrain;
    }
    /*
    * Get functions for initialization
    */
    public String getName() {
        return name;
    }
    public String getTerrain() {
        return terrain;
    }
    /*
    * Set functions for the variables
    * in Trail class
```

```
    */
    public void setName(String name) {
        this.name = name;
    }
    public void setTerrain(String terrain) {
        this.terrain = terrain;
    }
}
```

Trip.java

```
package Code;

public class Trip {
    /*
     * Declare attributes from the Trip
     * class in UML diagram
     */
    private String from; //original area (or start area)
    private String destination; //desired area to go

    /*
     * Get functions for initalization
     */
    public String getFrom() {
        return from;
    }
    public String getDestination() {
        return destination;
    }

    /*
     * Set functions for the variables
     * in Trip class
     */
    public void setFrom(String from) {
        this.from = from;
    }
    public void setDestination(String destination) {
        this.destination = destination;
    }
}
```

Vehicle.java

```java
package Code;

public class Vehicle {
    /*
     * Variables to be declared in the
     * Vehicle class
     */
    private String maker;
    private String model;
    private int year;
    private int max_seats;

    /*
     * Constructor
     * @param maker
     * @param model
     * @param year
     * @param max_seats
     */
    Vehicle(String maker, String model, int year, int max_seats){
        this.maker = maker;
        this.model = model;
        this.year = year;
        this.max_seats = max_seats;
    }

    /*
     * get functions for initialization
     */
    public String getMaker() {
        return maker;
    }
    public String getModel() {
        return model;
    }
    public int getYear() {
        return year;
    }
    public int getMax_seats() {
        return max_seats;
    }
}
```

Solution:

- First, remember to zip the src folder of your project and submit the zip file to the ungraded assignment named "Lab1CodeSubmission". One submission from each team.
- Paste all your source code here.
- Paste your updated UML class diagram below.
- Save this report in PDF, then **each student** needs to submit the pdf report to the graded assignment named "Lab1ReportSubmission".