Final Project

Taipei travel planning helper

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Agenda

1. Situation
2. Source Code
3. Demonstration Video
4. Sample Output
5. Conclusion

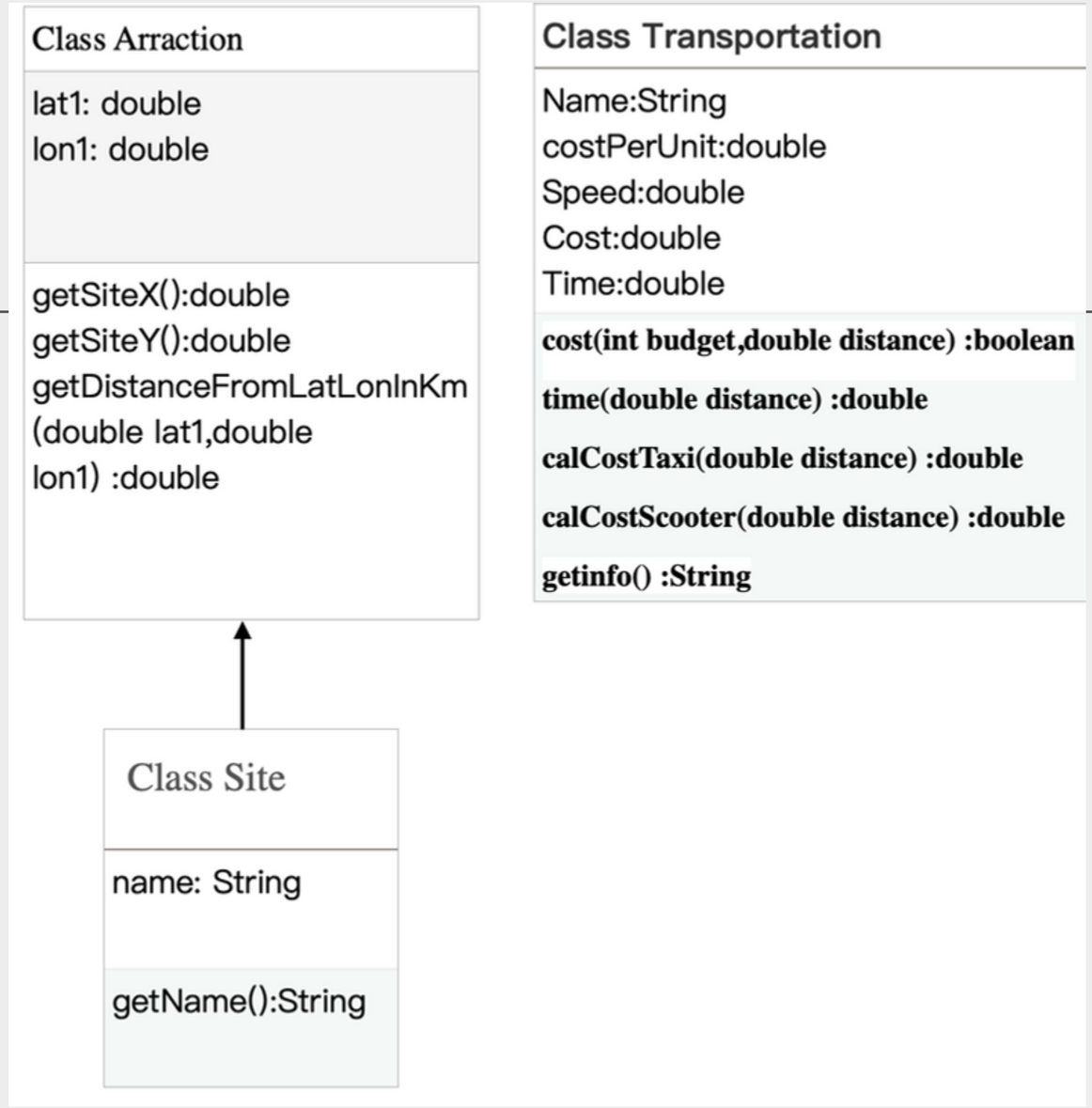
Situation

- Assume ourselves as a travel agency, and help the travelers plan their trip to Taipei.
- Let users choose four tourist attractions from six places we previously set: Taipei 101, Taipei Nangang Exhibition Center, Taipei Children's Amusement Park, Chiang Kai-shek Memorial Hall, Shilin Night Market.
- The sequence they input is also the sequence they visit these places.

Situation

- Users can input their budget. Help you calculate the money and time you would spend on by different transportation.
- Help you analyze if the money you would spend is over or within the budget.
- Finally, the best transportation for you can be determined!!

Class diagram



class Attraction

Attraction	
Modifier and type	**Method (or Variable) and description**
Instance variable	
double	lat1 The latitude of site.
double	lon1 The lontiude of site.
Constructor	
Attraction(double lat1, double lon1) Enable to instantiate a Attraction object with a given lat1 and lon1.	
Instance Methods	
-	2 getter for 2 attributes (getSiteX(),getSiteY()).
double	getDistanceFromLatLonInKm (double lat2, double lon2)

class Attraction

```java
public class Attraction {
    private double lat1,lon1;

    public Attraction(double lat1,double lon1) {
        this.lat1 = lat1;
        this.lon1 = lon1;
    }

    public double getDistanceFromLatLonInKm(double lat2,double lon2) {
        int R = 6371; // Radius of the earth in k
        double dLat = Math.toRadians(lat2-lat1);  // deg2rad below
        double dLon = Math.toRadians(lon2-lon1);
        double a =
          Math.sin(dLat/2) * Math.sin(dLat/2) +
          Math.cos(Math.toRadians(lat1)) * Math.cos(Math.toRadians(lat2)) *
          Math.sin(dLon/2) * Math.sin(dLon/2)
          ;
        double c = 2 * Math.atan2(Math.sqrt(a), Math.sqrt(1-a));
        double d = R * c; // Distance in km
        return d;
      }

    public double getSiteX() {
        return lat1;
    }

    public double getSiteY() {
        return lon1;
    }
}
```

class Site

Site	
Modifier and type	**Method (or Variable) and description**
Instance variable	
String	name The name of the site.
Constructor	
Site(String name, double sitex, double sitey) Enable to instantiate a Site object with a given name, sitex and sitey.	
Instance Methods	
-	1 getter for 1 attributes (getName()).

class Site

- Extends Attraction Class
- Set the name and the coordinate of each site

```
public class Site extends Attraction{
    private String name;

    public Site(String name,double sitex,double sitey) {
        super(sitex,sitey);
        this.name = name;
    }

    public String getName() {
        return name;
    }
}
```

class Transportation

Transportation	
Modifier and type	**Method (or Variable) and description**
Instance variable	
String	name The name of the transportation.
double	costPerUnit The cost per kilometer of the transportation.
double	speed The speed of the transportation.
double	cost The total cost of the transportation.
double	time The time cost of the transportation.
Constructor	
Transportation(String name,double costPerUnit,double speed) Enable to instantiate a Taxi object with a given name, costPerUnit and speed.	

class Transportation

Instance Methods	
boolean	**cost(int budget,double distance)** If the budget is higher or equal please return true, otherwise return false.
double	**time(double distance)** Calculate the time of the transportation cost.
double	**calCostTaxi(double distance)** Calculate the cost of the taxi. If the distance is over 1.25, calculate it by: cost = (distance - 1.25)*costPerUnit + 70; If the distance is lower than 1.25, the cost is 70.
double	**calCostScooter(double distance)** Calculate the cost of the scooter. If “time(distance)*60 - 6 > 0”, calculate it by: cost = 15 + (time(distance) * 60 - 6) * costPerUnit; If it is not, the cost is 15.
String	**getinfo()** Return the information of the transportation’s name, the cost, the time it cost.

class Transportation

- Set the name, cost per unit and the speed of each transportation tool
- calculate the total cost and total time

```java
public class Transportation {
    private String name;
    private double speed,cost,time,costPerUnit;

    public Transportation(String name,double costPerUnit,double speed) {
        this.name = name;
        this.speed = speed;
        this.costPerUnit = costPerUnit;
    }

    public boolean cost(int budget,double distance) {
        if(budget>=cost) {
            return true;
        }
        else {
            return false;
        }
    }

    public double time(double distance) {
        time = distance/speed;
        return time;
    }
```

```java
    public double calCostTaxi(double distance) {
        if(distance -1.25>0) {
            cost = (distance - 1.25)*costPerUnit + 70;
        }
        else {
            cost = 70;
        }
        return cost;
    }

    public double calCostScooter(double distance) {
        if(time(distance)/60 - 6 > 0) {
            cost = 15 + (time(distance)/60 -6 ) * costPerUnit;
        }
        else {
            cost = 15;
        }
        return cost;
    }

    public String getInfo() {
        return String.format("by all %s → cost: %.0f NTD/time: "
                + "%.1f hours",name,cost,time);
    }
}
```

class Test

Create **Test** class

a. Create six Site objects by the information below.

oneZeroOne:("101",25.034015253745892,121.56467565652719)

exhibition:("南港展覽館", 25.05674767102679,121.61807298218889);

amusementPark:("兒童新樂園",121.61807298218889,121.51503695215715)

CKSmemorialHall:("中正紀念堂",25.034655934625235,121.5215010282203)

Zoo:("木柵動物園",24.99877740610815,121.5811251723995)

nightMarket:("士林夜市",25.088249233297443,121.52428822822138)

b. Create an arraylist to store these sites.

c. Print out the site question. (You can check it at the sample output.)

d. Make the users input the sites and make sure their input is correct.

e. Print out the budget question. (You can check it at the sample output.)

f. Make the users input the budget and make sure their input is a positive number.

g. Create three transportaion objects by the information below.

taxi:("Taxi",5,70)

goShare:("goShare",2.5,50)

car:("car",2,80)

h. Start to calculate the best schedule and the cost must be lower than the budget.

i. Print out the result. (You can check it at the sample output.)

class Test

```java
import java.util.ArrayList;
public class test {

    public static void main(String[] args) {
        // TODO Auto-generated method stub
        Site oneZeroOne = new Site("101",25.034015253745892,121.56467565652719);
        Site exhibition = new Site("南港展覽館", 25.05674767102679,121.61807298218889);
        Site amusementPark = new Site("兒童新樂園",25.097294233523936,121.51503695215715
        Site CKSmemorialHall = new Site("中正紀念堂",25.034655934625235,121.521501028220
        Site zoo = new Site("木柵動物園",24.99877740610815,121.5811251723995);
        Site nightMarket = new Site("士林夜市",25.088249233297443,121.52428822822138);


        ArrayList<Site>sites = new ArrayList<Site>();
        Scanner sc = new Scanner(System.in);

        sites.add(oneZeroOne);
        sites.add(exhibition);
        sites.add(amusementPark);
        sites.add(CKSmemorialHall);
        sites.add(zoo);
        sites.add(nightMarket);

        System.out.println("Please choose four sites from these sites below, "
                + "your schedule will be the same as your input order:");
        String site = "";
        for(Site s:sites) {
            if(sites.indexOf(s)==0) {
                site += (sites.indexOf(s)+1)+")"+s.getName();
            }
```

```java
System.out.println(site);
System.out.print("Your choice (input the number of the site):");
int start = sc.nextInt();
int op1 = sc.nextInt();
int op2 = sc.nextInt();
int op3 = sc.nextInt();
System.out.print("Please input your transpotation budget(must be a positive number):");
int budget = sc.nextInt();

while(budget<=0) {
    System.out.print("Please input a positive number:");
    budget = sc.nextInt();
}

Transportation taxi = new Transportation("Taxi",5,70);
Transportation goShare = new Transportation("goShare",2.5,50);
Transportation car = new Transportation("car",2,80);

ArrayList<Site>picked = new ArrayList<Site>();
picked.add(sites.get(start-1));
picked.add(sites.get(op1-1));
picked.add(sites.get(op2-1));
picked.add(sites.get(op3-1));

double totalDistance = 0;
for(Site dis:picked) {
    if(picked.indexOf(dis)<3) {
        totalDistance += dis.getDistanceFromLatLonInKm(picked.get(picked.indexOf(dis)+1).getSiteX()
                ,picked.get(picked.indexOf(dis)+1).getSiteY());
    }
}

taxi.calCostTaxi(totalDistance);
taxi.time(totalDistance);
goShare.calCostScooter(totalDistance);
goShare.time(totalDistance);
car.calCostTaxi(totalDistance);
car.time(totalDistance);
```

class Test

```
System.out.print(taxi.getInfo());
if(taxi.cost(budget, totalDistance)) {
    System.out.println("  在預算內");
}

else {
    System.out.println("  超出預算");
}
System.out.print(goShare.getInfo());
if(goShare.cost(budget, totalDistance)) {
    System.out.println("  在預算內");
}

else {
    System.out.println("  超出預算");
}

System.out.print(car.getInfo());
if(car.cost(budget, totalDistance)) {
    System.out.println("  在預算內");
}

else {
    System.out.println("  超出預算");
}

for(Site p:picked) {
    if(picked.indexOf(p)==0) {
        System.out.print("Your schedule: "+p.getName());
    }
    else {
        System.out.print(" "+p.getName());
    }
}
sc.close();
```

- Sample Output

```
Please choose four sites from these sites below, your schedule will be the same as your input order:
1)101 2)南港展覽館 3)兒童新樂園 4)中正紀念堂 5)木柵動物園 6)士林夜市
Your choice (input the number of the site):1 3 4 6
Please input your transpotation budget(must be a positive number):-300
Please input a positive number:300
by all Taxi     → cost: 172 NTD/time: 0.3 hours  在預算內
by all goShare  → cost: 65 NTD/time: 0.4 hours  在預算內
by all car      → cost: 111 NTD/time: 0.3 hours  在預算內
Your schedule: 101 兒童新樂園 中正紀念堂 士林夜市
```

```
Please choose four sites from these sites below, your schedule will be the same as your input order:
1)101 2)南港展覽館 3)兒童新樂園 4)中正紀念堂 5)木柵動物園 6)士林夜市
Your choice (input the number of the site):1 2 3 4
Please input your transpotation budget(must be a positive number):100
by all Taxi     → cost: 185 NTD/time: 0.3 hours  超出預算
by all goShare  → cost: 73 NTD/time: 0.5 hours  在預算內
by all car      → cost: 116 NTD/time: 0.3 hours  超出預算
Your schedule: 101 南港展覽館 兒童新樂園 中正紀念堂
```

```
Please choose four sites from these sites below, your schedule will be the same as your input order:
1)101 2)南港展覽館 3)兒童新樂園 4)中正紀念堂 5)木柵動物園 6)士林夜市
Your choice (input the number of the site):1 5 2 6
Please input your transpotation budget(must be a positive number):20
by all Taxi     → cost: 173 NTD/time: 0.3 hours  超出預算
by all goShare  → cost: 65 NTD/time: 0.4 hours  超出預算
by all car      → cost: 111 NTD/time: 0.3 hours  超出預算
Your schedule: 101 木柵動物園 南港展覽館 士林夜市
```

THANK YOU