

Task 1: software design and development

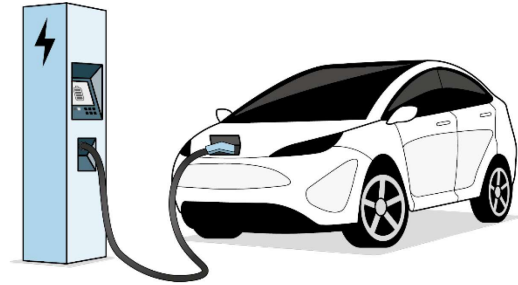
EVcharge is a company that runs an electric vehicle charging network. It requires a program to provide users with a summary of their journey, and to calculate the cost for using the charging network.

Program analysis

At the end of the journey, details are submitted to EVcharge to calculate the final cost.

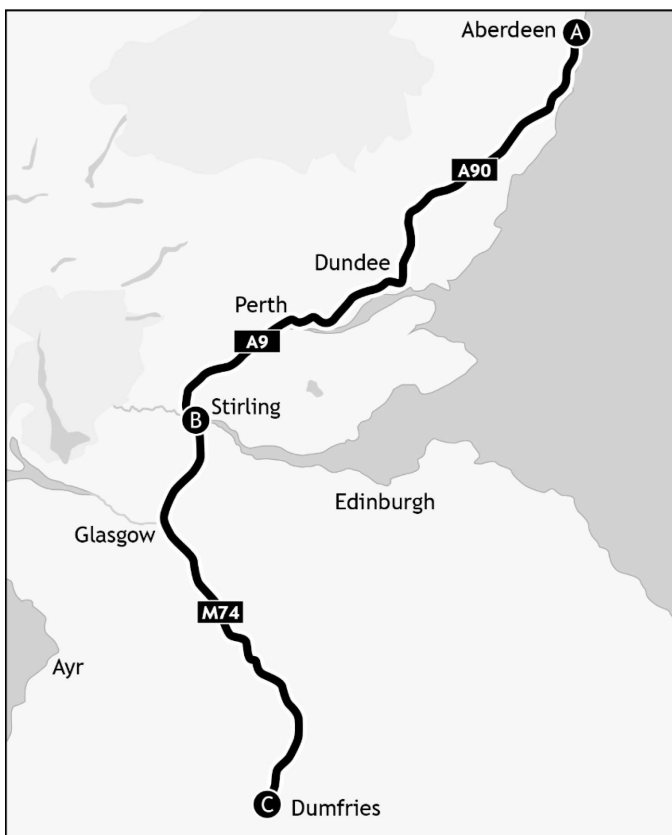
Inputs

- ◆ The vehicle mileage at the start of the journey.
- ◆ The number of charging stations visited.
- ◆ A valid kilowatt (kW) rating for each charging station (7kW, 22kW or 50kW).
- ◆ The vehicle mileage at each charging station.



For example, if making the journey from Aberdeen to Dumfries via Stirling (shown in the diagram below), the user would enter:

- ◆ the vehicle mileage at the start of the journey (A)
- ◆ that two charging stations were visited (B and C)
- ◆ the kW rating of each of the two charging stations
- ◆ the vehicle mileage at each of the two charging stations (B and C)



Process

- ◆ Calculate the number of miles travelled in each stage of the journey.
- ◆ Calculate the cost of each stage of the journey using the number of miles travelled and the cost per mile, based on the kW rating of the charging station as shown below:
 - 7kW = £0 per mile
 - 22kW = £0.005 per mile
 - 50kW = £0.01 per mile
- ◆ Calculate the total number of miles travelled from the start to the end of the journey.
- ◆ Calculate the total cost for the journey.

Outputs

- ◆ The total number of miles travelled.
- ◆ The cost (£) of each stage of the journey.
- ◆ The total cost (£) rounded to two decimal places.

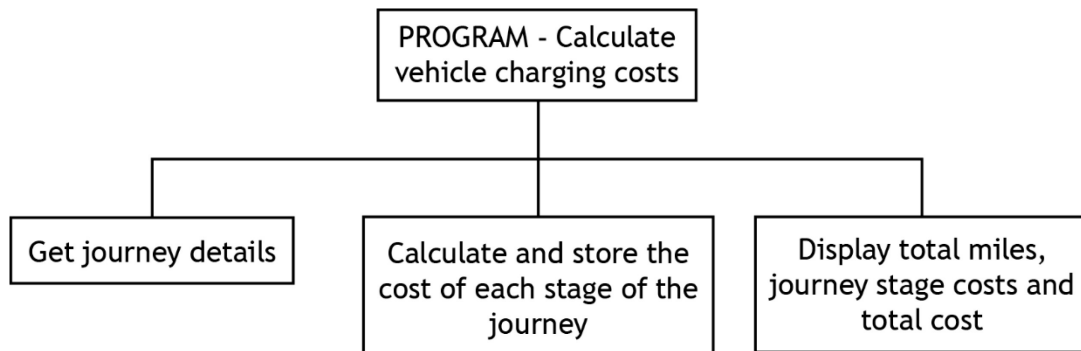
Assumption(s)

- ◆ The user will complete the journey using no more than 10 charging stations.

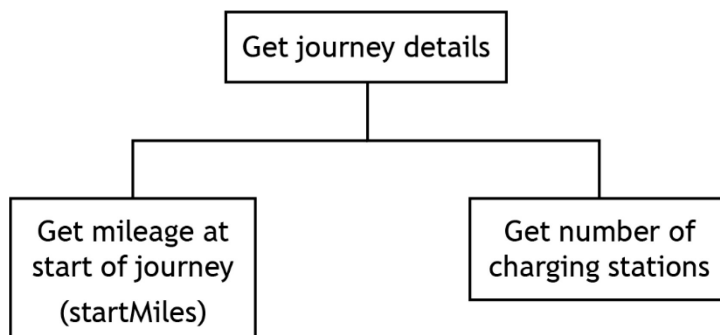
Task 1: software design and development (part B)

Program design (structure diagram)

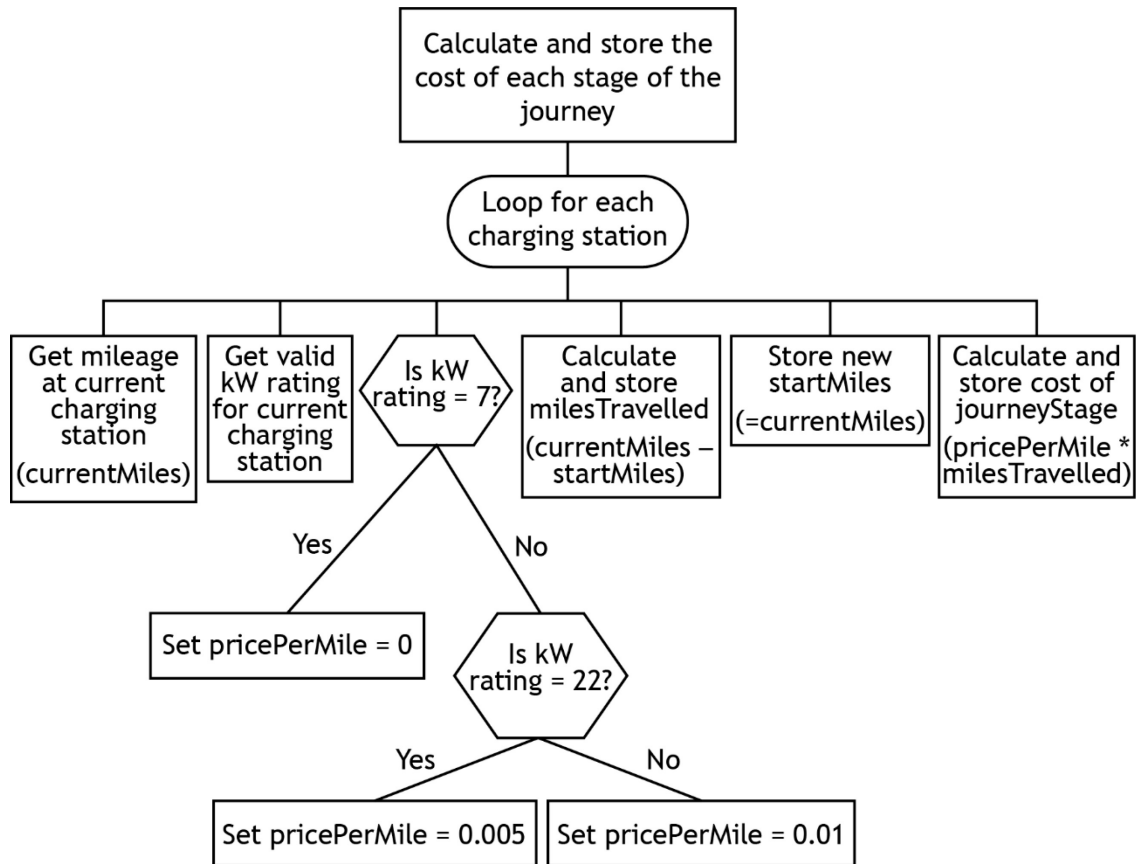
Main steps



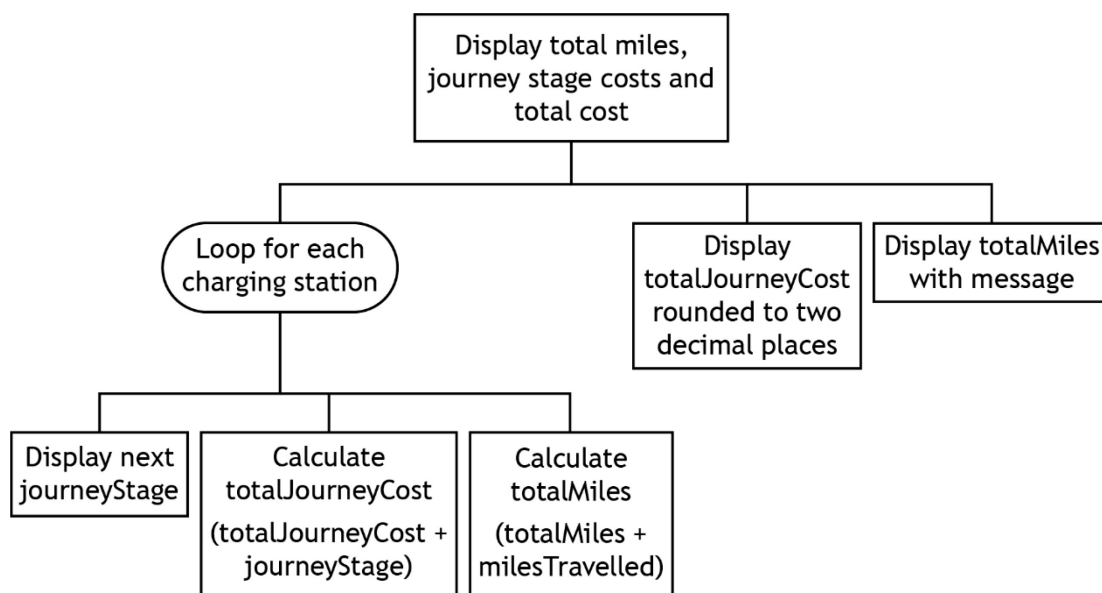
Refinement of 'Get journey details'



Refinement of 'Calculate and store the cost of each stage of the journey'



Refinement of 'Display total miles, journey stage costs and total cost'



- 1b Using the program analysis and the design, implement the program in a language of your choice.

Ensure the program matches the structure diagram given.

(15 marks)

Print evidence of your program code.

- 1c(i) Your program should be tested to ensure it produces the correct output.

Use the test data provided below to check that your program produces the correct output.

Type of test	User input	Expected output	Actual output
Normal	Miles at start 1200 2 charge stations visited Charge station 1 ♦ 1320 miles ♦ 22kW Charge station 2 ♦ 1411 miles ♦ 50kW	Journey stage 1 cost = 0.60 Journey stage 2 cost = 0.91 Total cost = 1.51 Total miles = 211	Attach printouts of inputs and outputs as evidence

Print evidence of the test showing inputs and outputs.

(1 mark)

- (ii) In the test data below, the mileage entered at Charge station 2 is not correct.

Complete the test table below – this will show that the program is not fit for purpose.

(2 marks)

Test data	Expected results
<p>Miles at start 18000</p> <p>2 charge stations visited</p> <p>Charge station 1</p> <ul style="list-style-type: none"> ◆ 18350 miles ◆ 7kW <p>Charge station 2</p> <ul style="list-style-type: none"> ◆ 17800 miles ◆ 50kW 	<p>Journey stage 1 cost = _____</p> <p>Journey stage 2 cost = _____</p> <p>Total cost = _____</p> <p>Total miles = _____</p>

- (iii) With reference to the test data above, describe how to make the program fit for purpose.

(1 mark)

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Candidate name_____ Candidate number_____

1d With reference to your code, evaluate your program by commenting on the following:

Efficiency of your program code	(1 mark)
Robustness of your completed program	(1 mark)
Readability of your code	(1 mark)

Candidate name_____ Candidate number_____