

Class Diagram of the problem in simple form

Readme:

The program is developed under windows 10 with below configuration.

Visual studio 2017 is used as generator and IDE for this project.

The compiler used is MinGW (dated 2017-09-06)

About program:

At first, this program can be done in different ways. Some points:

1. I have provided two project. Car_Simulation_Revised as clean and without extras rough work where the project Car_simulation has rough work and different ways of implementation too.
2. The program is structured mainly into three files. Car_Sim_Eval.cpp , Car_Sim_Eval.h and Car_Simulation.cpp
Car_Simulation.cpp – main function for the purpose of execution
Car_Sim_Eval.h – header files to includes class declaration
Car_Sim_Eval.cpp- implementation of classes' attributes and method here, which was declared in header, files.

Vehicle as base class

```
double fuel_consume - total fuel consumed
double distance - total distance covered by vehicle
double roll_resistance - roll resistance on vehicle
double wind_resistance -wind resistance on vehicle
double vehicle_weight - vehicle weight
double vehicle_height - vehicle height
constexpr static double c_rollresistance { 0.75 }; //roll resistance as constant value
constexpr static double c_windresistance { 0.2 }; //wind resistance as constant value
constexpr static double c_trailerresistance { 0.05 }; //trailer resistance as constant value
fuel_consumption() // for calculating the total fuel consumed for the given distance and
vehicle type
```

Convertible_Car, Van and Truck are child class of Vehicle class

Convertible_Car and Van are self-explanatory

Truck Child class

```
double empty_trailer_weight; //empty weight of trailer
double full_trailer_weight;    // full weight of trailer
//bool isTrailer;
fuel_consumption_with_trailer() //for calculating the total fuel consumed for the given
distance and vehicle type including trailer. Here an input needs to be given if there is empty
or full weight trailer.
```

3. You might see two more files pch.cpp and pch.h (are precompiled header) which are from Visual studio. For the purpose of integrity to run in Visual studio, I have included these files in

CMakeLists.txt. The project can also run without these files. Once can just comment these file names in the program and remove from cmake lists file and then the program will run fine without that. I have tested that as well. You can check the Car_Simulation project where I have not included these two files in the program.

4. I have used inheritance concept to inherit attributes and methods
5. pure virtual function concept is used which is implemented in child classes. (There was no need for this. Even a normal virtual method inside the Base class Vehicle would have been enough and there was no need to override this method in child class. Because all these child classes would inherit these functions, so save performance time but for the bigger project, it's better to override the method.)
6. I did not use the fuel consumption of the truck trailer method inside the vehicle class which would have been used as virtual. I wanted to show another way to call just fuel consumption for truck without the trailer and then compute for trailer with/without weight.
7. I have used constexpr in Vehicle class for declaring some resistance variables. I could have used a normal const or #define. I just want to show the use of this.
8. No exception handling done
9. Not tested on Linux. (But I am sure, It should run successfully with cmake file)

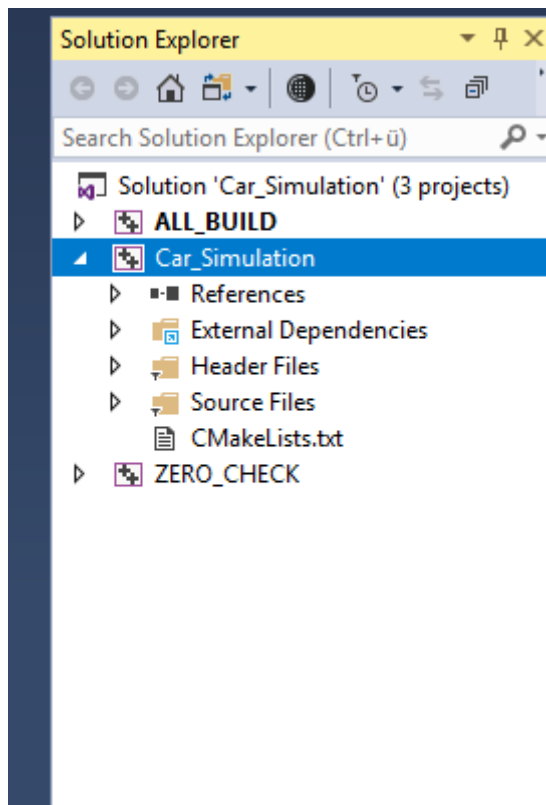
For program:

Car_Simulation_Revised

With Visual studio, just open the folder Car_Simulation_Revised and run the program Car_Simulation.sln

[Note: After it opens in Visual studio, right click on Car_Simulation.sln, click on **set as startup project**, and then again right click on Car_Simulation.sln and click on **rebuild** this and then run the program.

This step may or may not be required. However, if the program does not run , just perform this.]



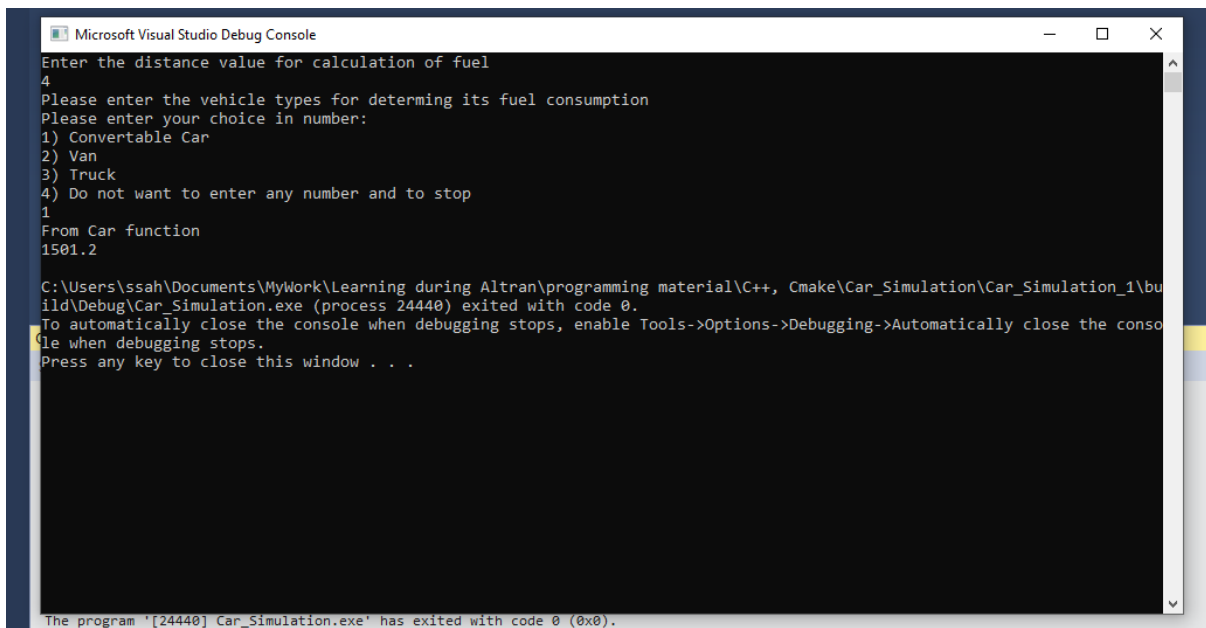
Output:

1. For Convertible car:

For input value: 42195 km distance

```
Microsoft Visual Studio Debug Console
Enter the distance value for calculation of fuel
42195
Please enter the vehicle types for determing its fuel consumption
Please enter your choice in number:
1) Convertable Car
2) Van
3) Truck
4) Do not want to enter any number and to stop
1
From Car function
1.58358e+07
C:\Users\ssah\Documents\MyWork\Learning during Altran\programming material\C++, Cmake\Car_Simulation\Car_Simulation_1\bu
ild\Debug\Car_Simulation.exe (process 35744) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

For input value of 4 km distance



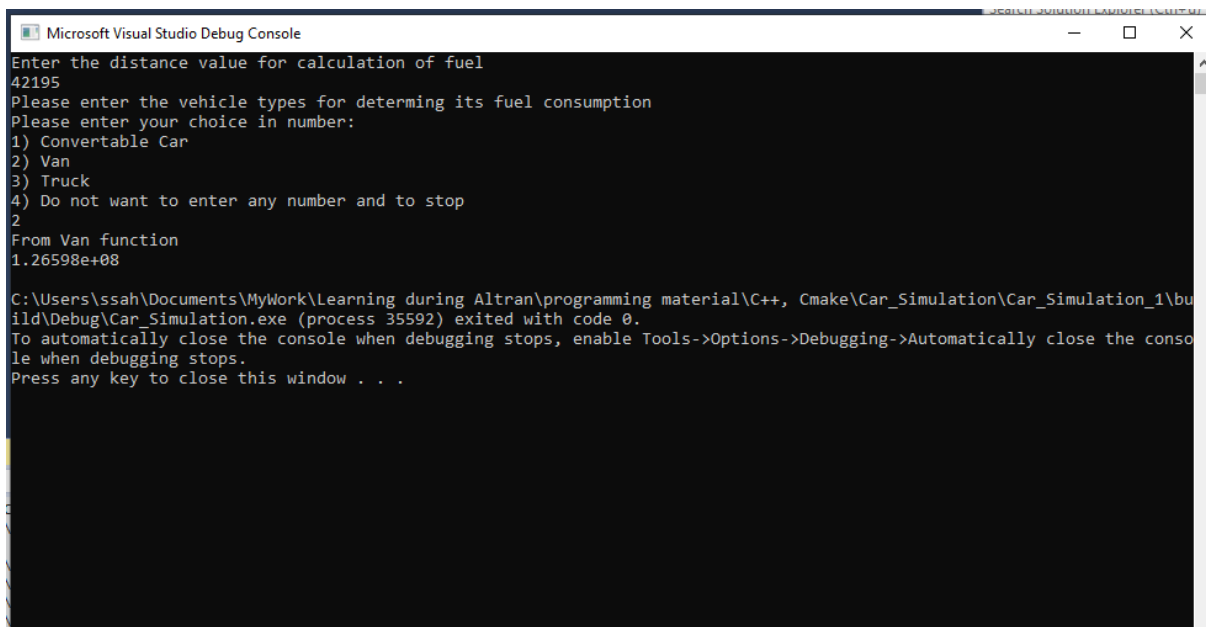
```
Microsoft Visual Studio Debug Console
Enter the distance value for calculation of fuel
4
Please enter the vehicle types for determining its fuel consumption
Please enter your choice in number:
1) Convertable Car
2) Van
3) Truck
4) Do not want to enter any number and to stop
1
From Car function
1501.2

C:\Users\ssah\Documents\MyWork\Learning during Altran\programming material\C++, Cmake\Car_Simulation\Car_Simulation_1\bu
ild\Debug\Car_Simulation.exe (process 24440) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .

The program '[24440] Car_Simulation.exe' has exited with code 0 (0x0).
```

2. For Van:

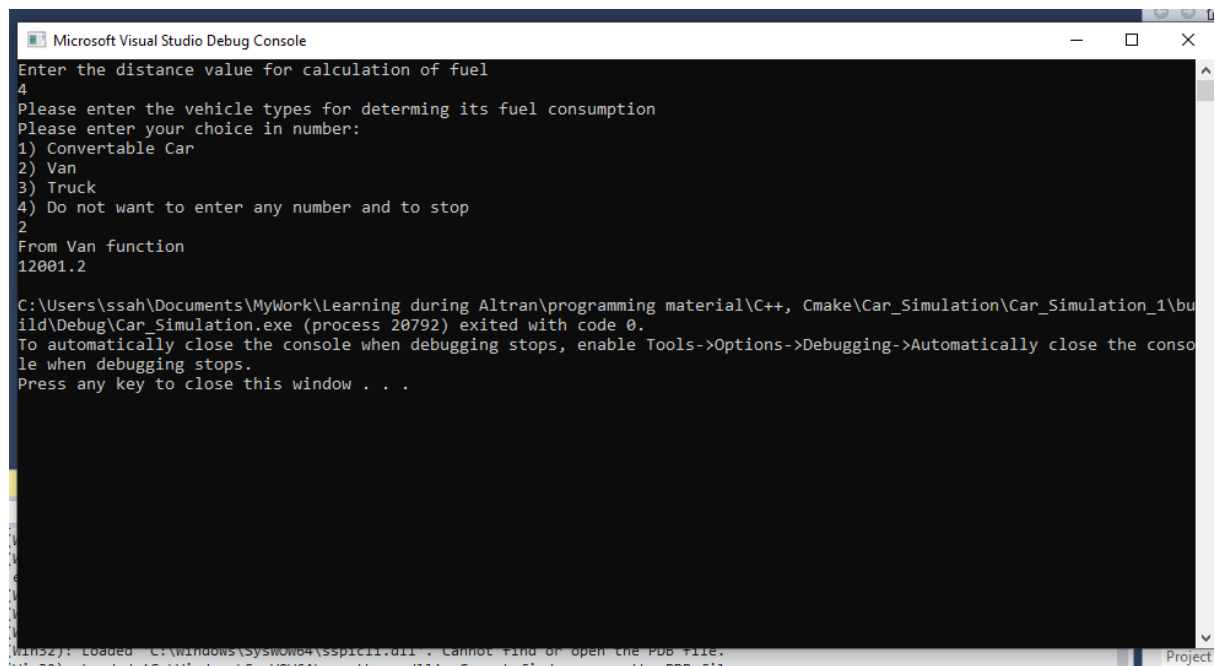
For input value: 42195 km distance



```
Microsoft Visual Studio Debug Console
Enter the distance value for calculation of fuel
42195
Please enter the vehicle types for determining its fuel consumption
Please enter your choice in number:
1) Convertable Car
2) Van
3) Truck
4) Do not want to enter any number and to stop
2
From Van function
1.26598e+08

C:\Users\ssah\Documents\MyWork\Learning during Altran\programming material\C++, Cmake\Car_Simulation\Car_Simulation_1\bu
ild\Debug\Car_Simulation.exe (process 35592) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

For input value of 4 km distance

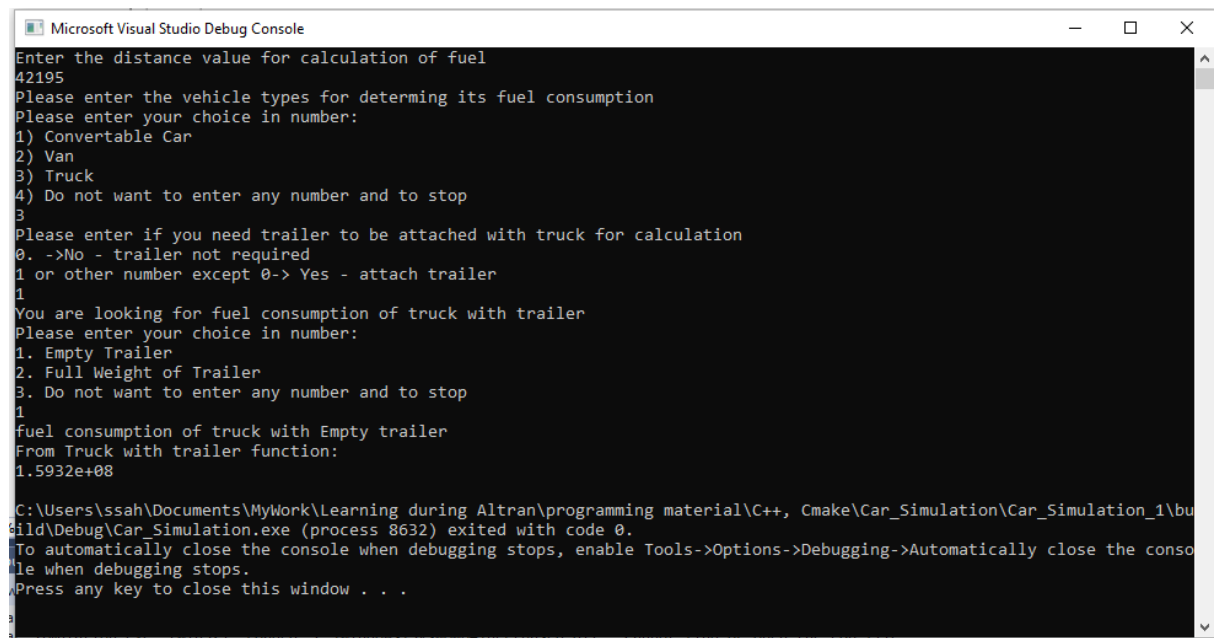


```
Microsoft Visual Studio Debug Console
Enter the distance value for calculation of fuel
4
Please enter the vehicle types for determining its fuel consumption
Please enter your choice in number:
1) Convertable Car
2) Van
3) Truck
4) Do not want to enter any number and to stop
2
From Van function
12001.2

C:\Users\ssah\Documents\MyWork\Learning during Altran\programming material\C++, Cmake\Car_Simulation\Car_Simulation_1\bu
ild\Debug\Car_Simulation.exe (process 20792) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

3. For truck with empty trailer:

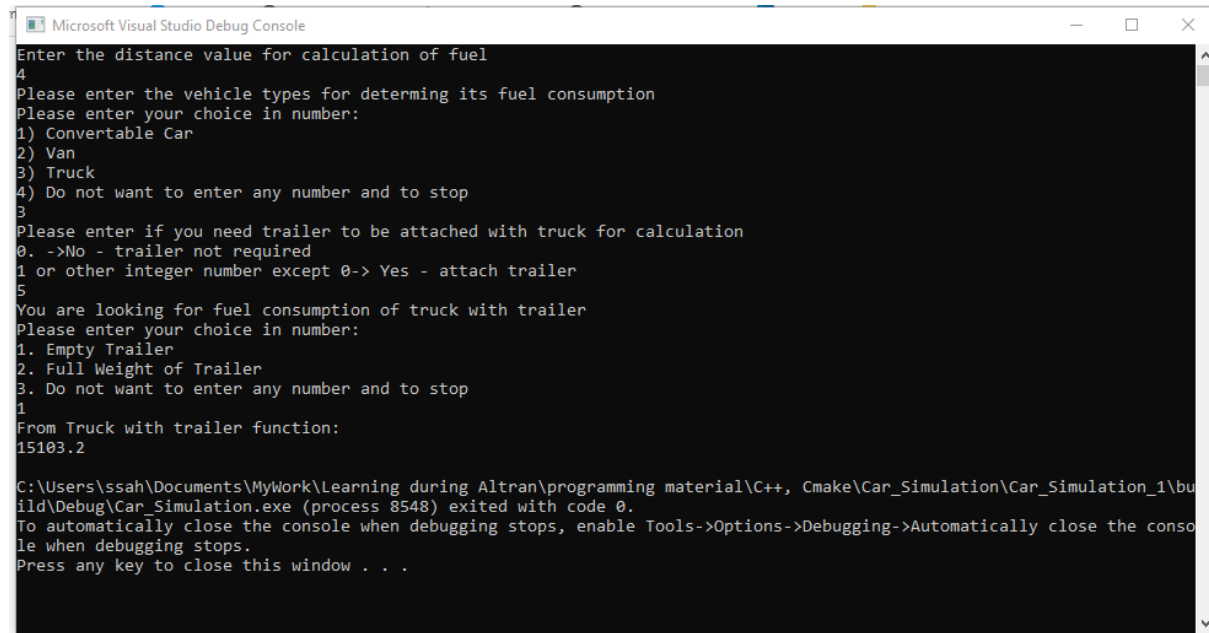
For input value: 42195 km distance



```
Microsoft Visual Studio Debug Console
Enter the distance value for calculation of fuel
42195
Please enter the vehicle types for determining its fuel consumption
Please enter your choice in number:
1) Convertable Car
2) Van
3) Truck
4) Do not want to enter any number and to stop
3
Please enter if you need trailer to be attached with truck for calculation
0. ->No - trailer not required
1 or other number except 0-> Yes - attach trailer
1
You are looking for fuel consumption of truck with trailer
Please enter your choice in number:
1. Empty Trailer
2. Full Weight of Trailer
3. Do not want to enter any number and to stop
1
fuel consumption of truck with Empty trailer
From Truck with trailer function:
1.5932e+08

C:\Users\ssah\Documents\MyWork\Learning during Altran\programming material\C++, Cmake\Car_Simulation\Car_Simulation_1\bu
ild\Debug\Car_Simulation.exe (process 8632) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

For input value of 4 km distance

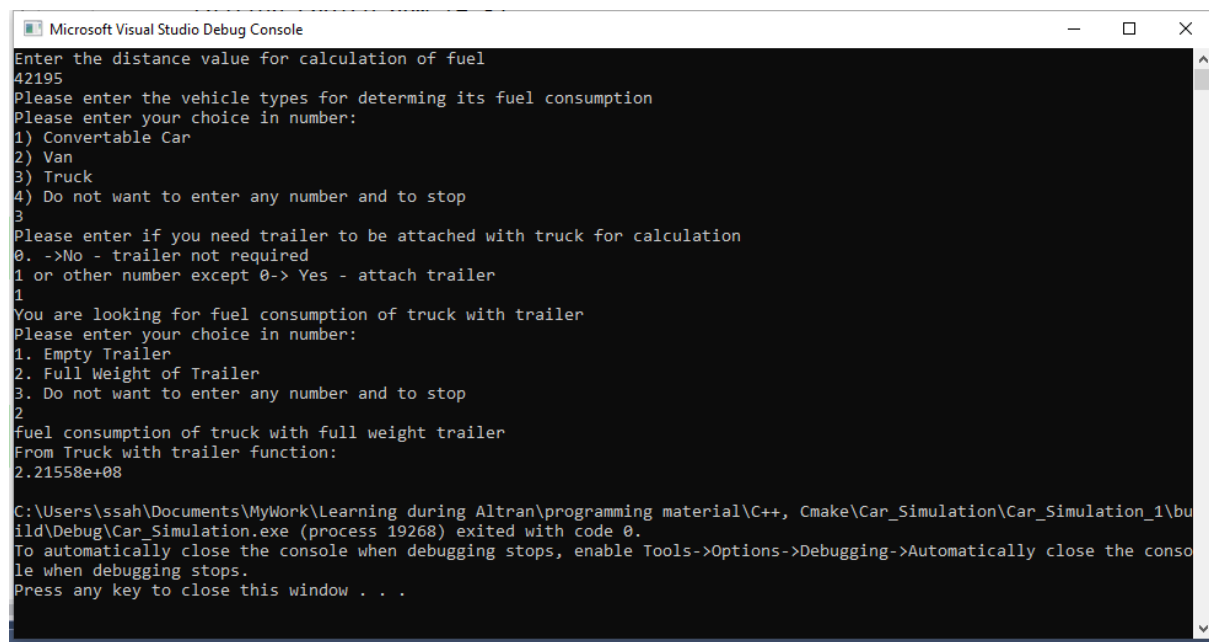


```
Microsoft Visual Studio Debug Console
Enter the distance value for calculation of fuel
4
Please enter the vehicle types for determining its fuel consumption
Please enter your choice in number:
1) Convertable Car
2) Van
3) Truck
4) Do not want to enter any number and to stop
3
Please enter if you need trailer to be attached with truck for calculation
0. ->No - trailer not required
1 or other integer number except 0-> Yes - attach trailer
5
You are looking for fuel consumption of truck with trailer
Please enter your choice in number:
1. Empty Trailer
2. Full Weight of Trailer
3. Do not want to enter any number and to stop
1
From Truck with trailer function:
15103.2

C:\Users\ssah\Documents\MyWork\Learning during Altran\programming material\C++, Cmake\Car_Simulation\Car_Simulation_1\bu
ild\Debug\Car_Simulation.exe (process 8548) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

4. For truck with full weight trailer:

For input value: 42195 km distance



```
Microsoft Visual Studio Debug Console
Enter the distance value for calculation of fuel
42195
Please enter the vehicle types for determining its fuel consumption
Please enter your choice in number:
1) Convertable Car
2) Van
3) Truck
4) Do not want to enter any number and to stop
3
Please enter if you need trailer to be attached with truck for calculation
0. ->No - trailer not required
1 or other number except 0-> Yes - attach trailer
1
You are looking for fuel consumption of truck with trailer
Please enter your choice in number:
1. Empty Trailer
2. Full Weight of Trailer
3. Do not want to enter any number and to stop
2
fuel consumption of truck with full weight trailer
From Truck with trailer function:
2.21558e+08

C:\Users\ssah\Documents\MyWork\Learning during Altran\programming material\C++, Cmake\Car_Simulation\Car_Simulation_1\bu
ild\Debug\Car_Simulation.exe (process 19268) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```

For input value of 4 km distance

```
Microsoft Visual Studio Debug Console
Enter the distance value for calculation of fuel
4
Please enter the vehicle types for determining its fuel consumption
Please enter your choice in number:
1) Convertible Car
2) Van
3) Truck
4) Do not want to enter any number and to stop
3
Please enter if you need trailer to be attached with truck for calculation
0. ->No - trailer not required
1 or other integer number except 0-> Yes - attach trailer
2
You are looking for fuel consumption of truck with trailer
Please enter your choice in number:
1. Empty Trailer
2. Full Weight of Trailer
3. Do not want to enter any number and to stop
2
From Truck with trailer function:
21003.2

C:\Users\ssah\Documents\MyWork\Learning during Altran\programming material\C++, Cmake\Car_Simulation\Car_Simulation_1\bu
ild\Debug\Car_Simulation.exe (process 9392) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the conso
le when debugging stops.
Press any key to close this window . . .
```