

eCar

Assignment 5

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Submitted for the course SEG2105*[Z] Intro To Software Engineering 20205

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Github URL

<https://github.com/italobravo/Assignment5/tree/v1>

Basic Requirements

These appears in the Readme.md page at the top level of my repo

For this assignment I will build an emulator for the basic console/interface for a simple electric car. The car will have two doors, each one of them with a corresponding window. The underlying concept is to implement some key activities the driver of this electric car will need to execute in order to make the car work such as turn on the engine, turn off the engine, accelerate, brake, set cruise control, open and close windows, open and close doors, etc .

User Stories

Engine On/Off

The driver should be able to turn the car's engine on or off using a "key" in the emulator. When the engine starts, the car will default to "idle" status. Three beeps will be sounded when the engine is started. All car's functions will shut down when the car is powered off.

Power Mode

Only when the car is on, the driver should be able to set the power consumption to either "Eco", which is the ecological feature with low power consumption or "Performance", the setting for speed and performance.

Door Opening

A command will allow opening either one of the two doors of the car. A security feature will disable door opening when the car is moving. An error message will be displayed indicating the feature is not available in that status.

Vehicle Movement

Pressing a foot pedal accelerates the car forward. Pressing the brake foot pedal causes the car to start to decelerate if the car is in motion. Setting up cruise control will maintain the car at the current speed, pressing cruise control again will deactivate this function

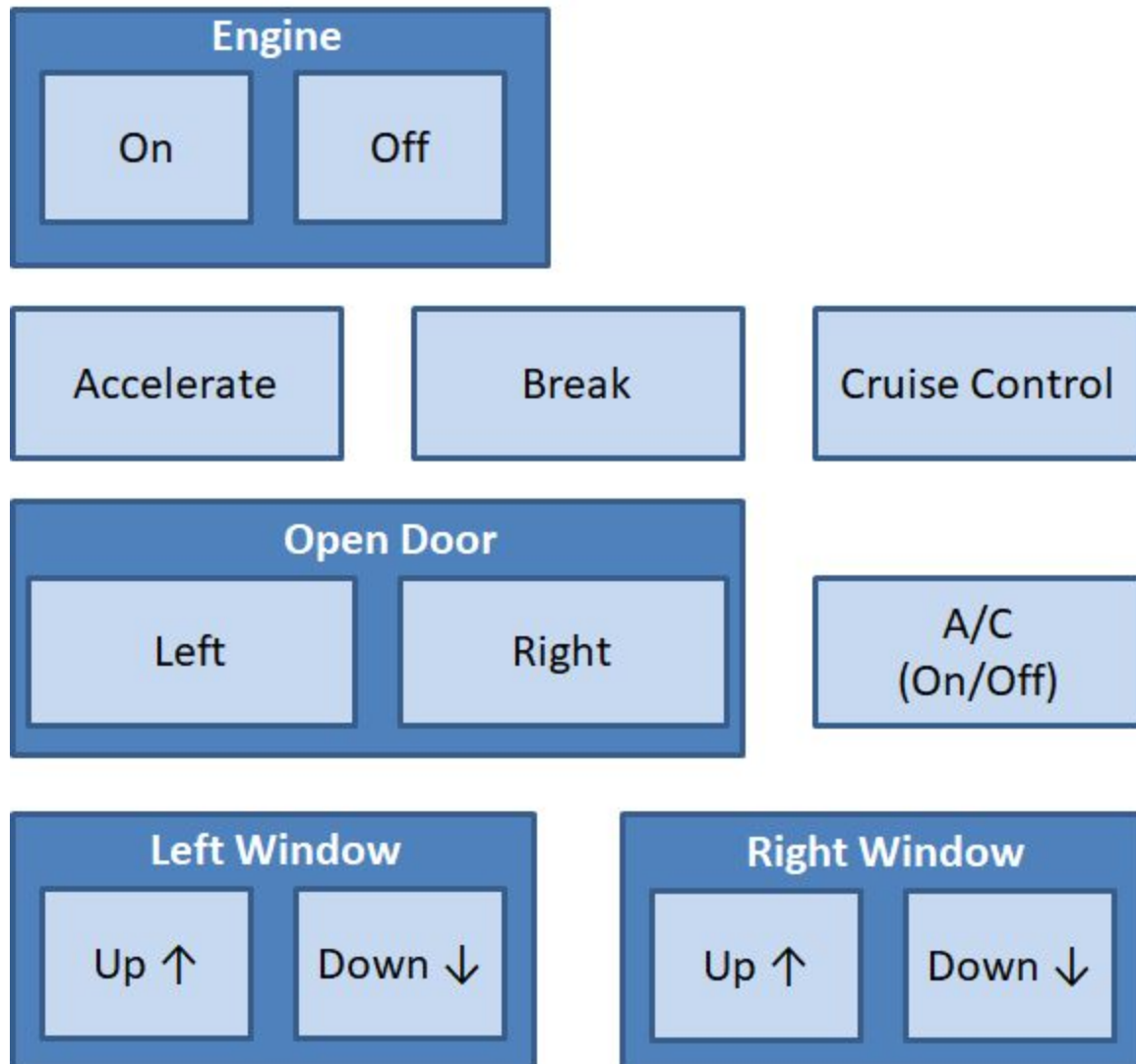
Other Functions

Pressing a button on the dashboard will turn on/off the air conditioner.

Pressing their corresponding buttons on the dashboard will open/close either one of the side windows.

Basic UI

The following graphic represents a basic instance of the User Interface on the car, it is not intended to present the actual images in the car console but the functions that will be available through such console.



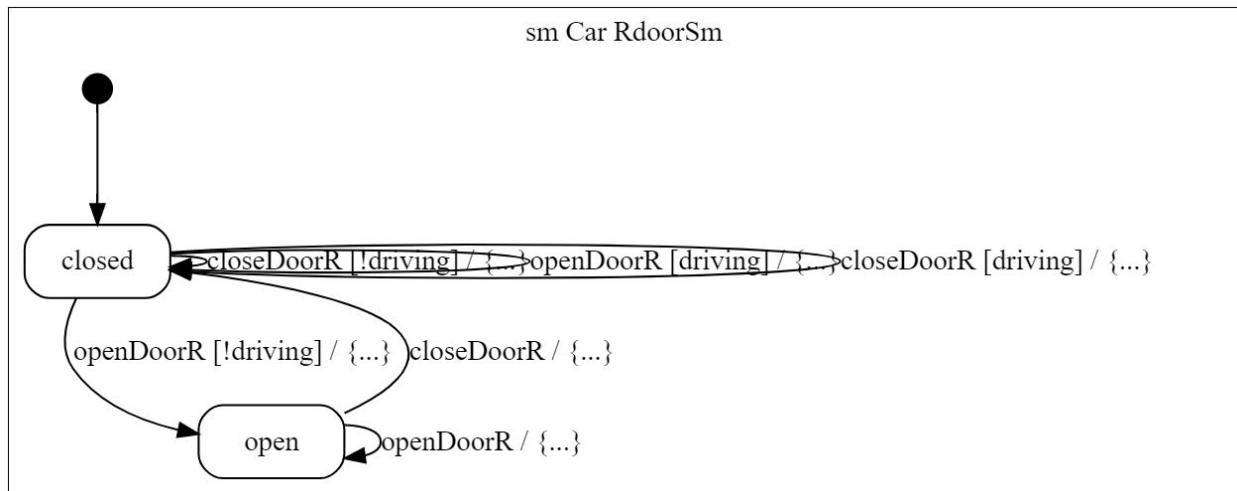
Feedback and Exits

Program has been created with documentation online (in the source code) and in the user interface including the command 'q' for orderly exit.

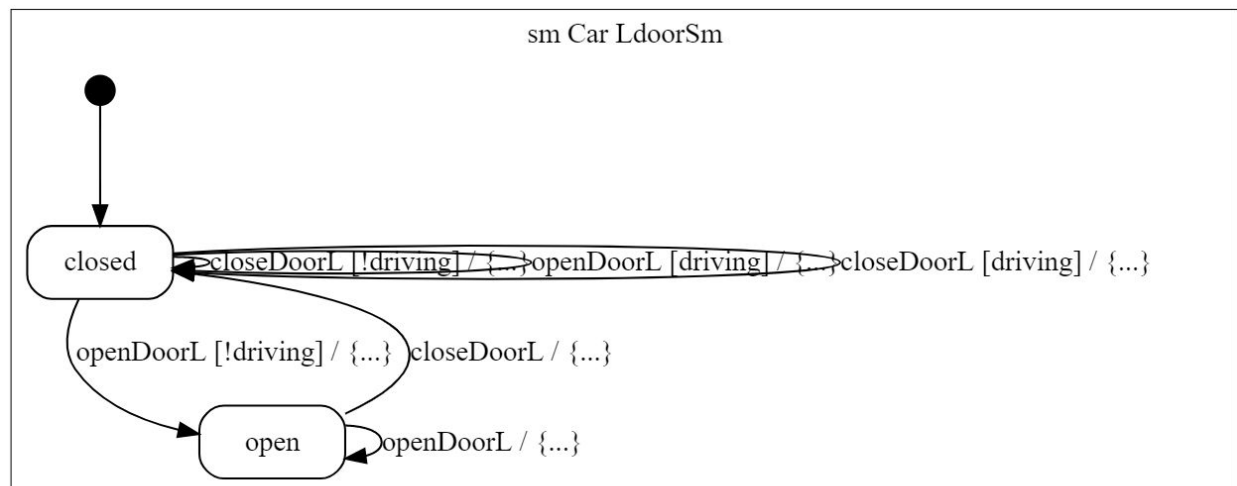
Architecture Description

The program has been modeled using umple, multiple State Machines running in separate threads were implemented to keep track of the states of the different components of the system and the events that apply to these components, transitioning their states.

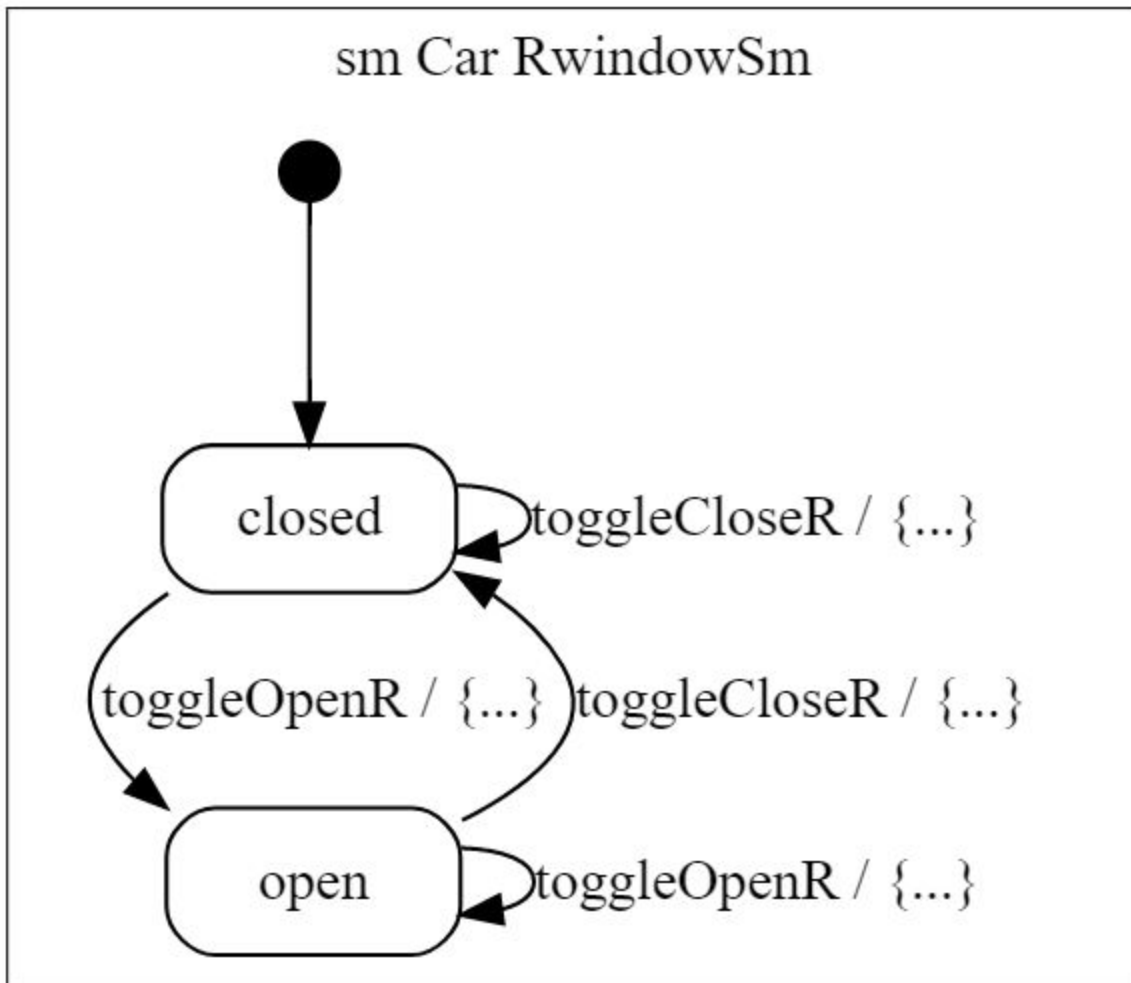
RdoorSm



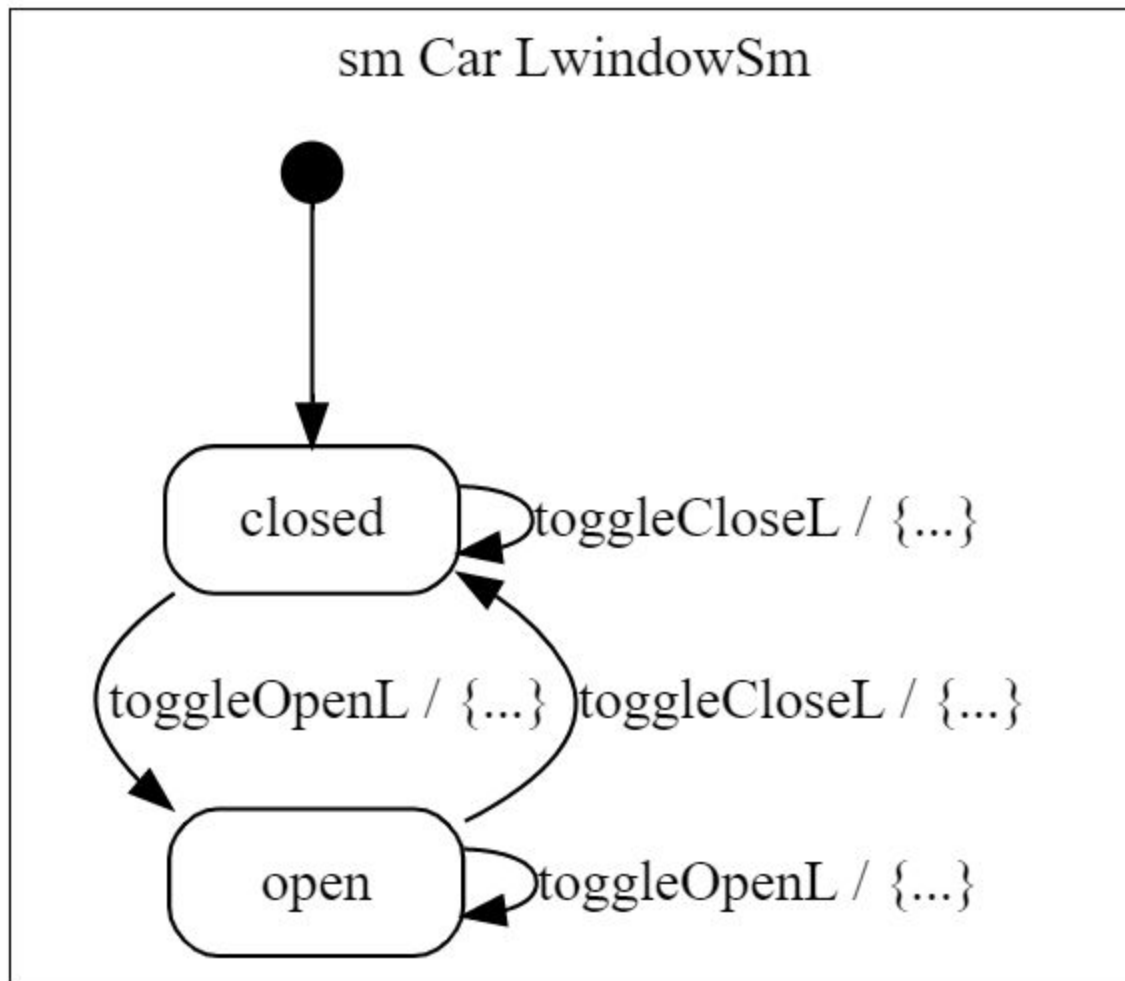
LdoorSm



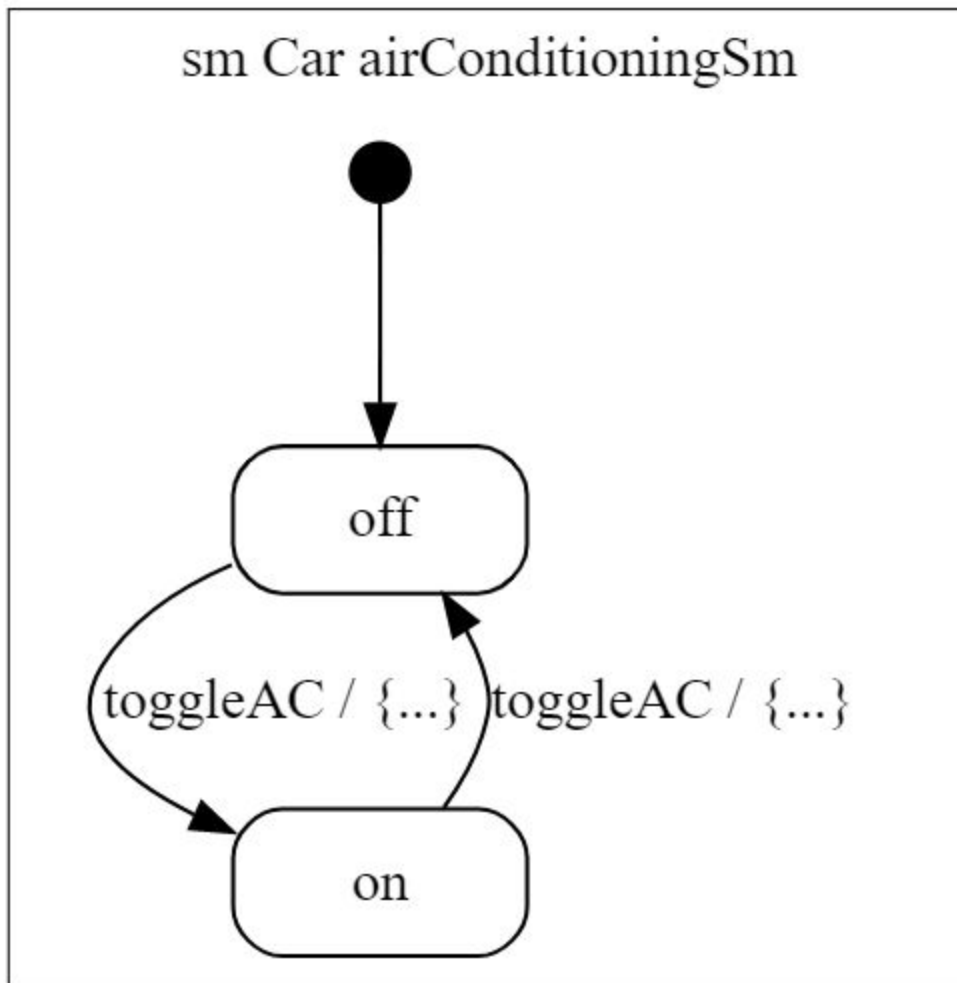
RwindowSm



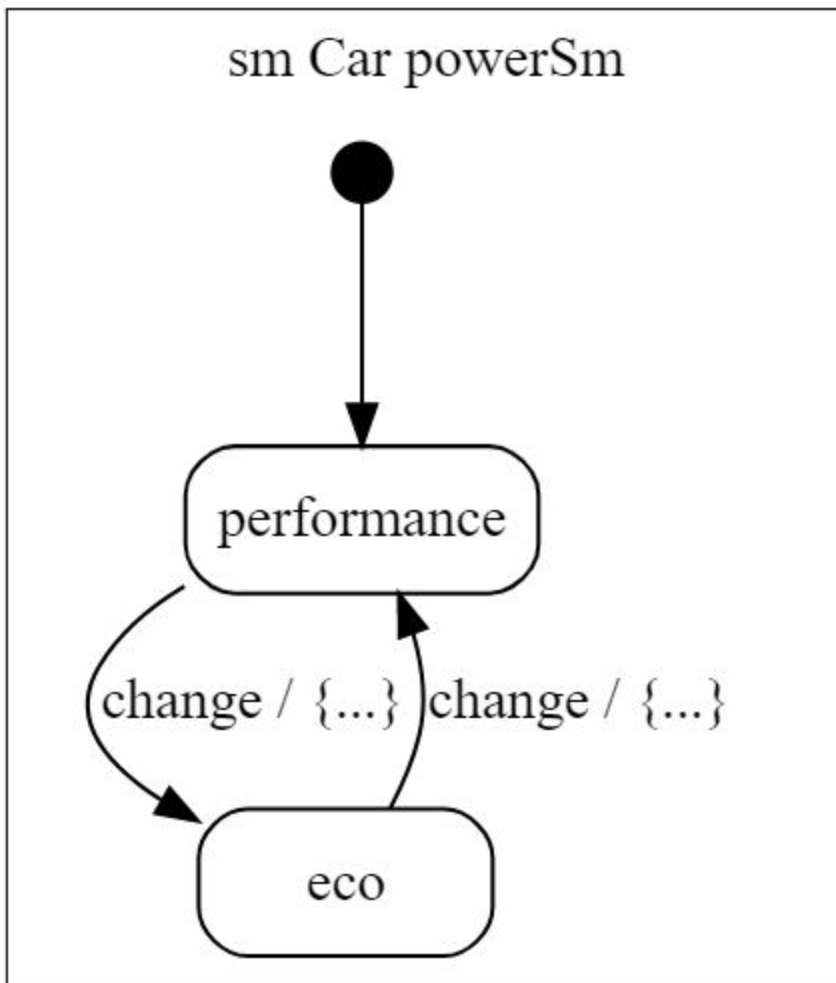
LwindowSm



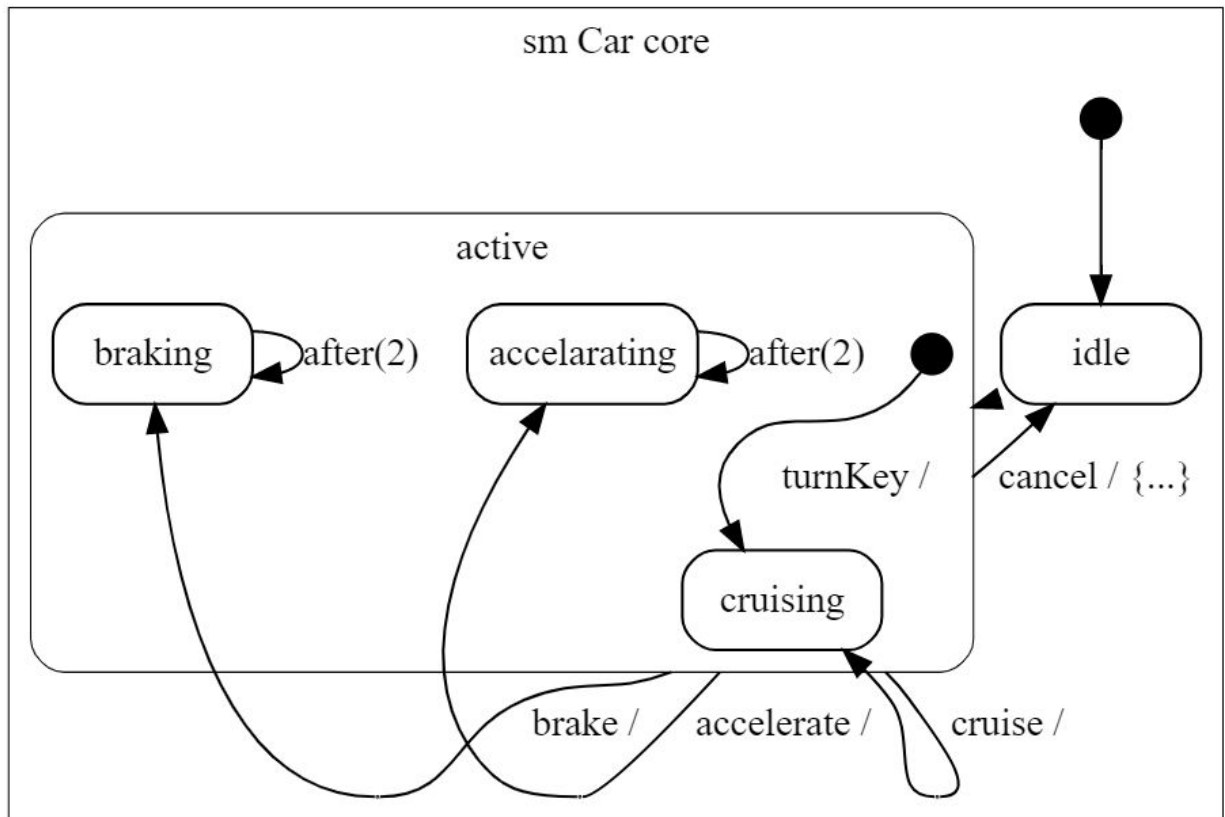
airConditioningSm



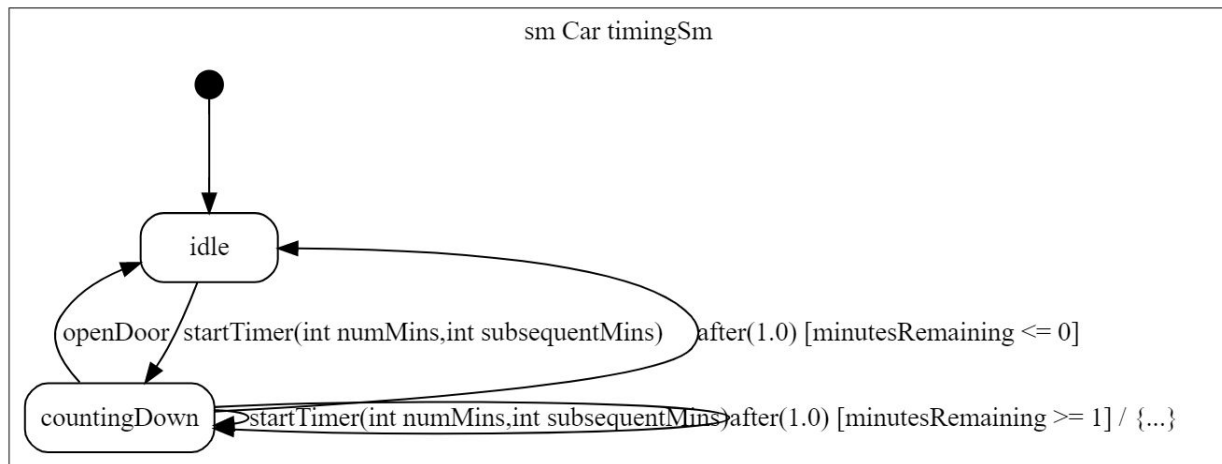
powerSm



CoreSm



timingSm



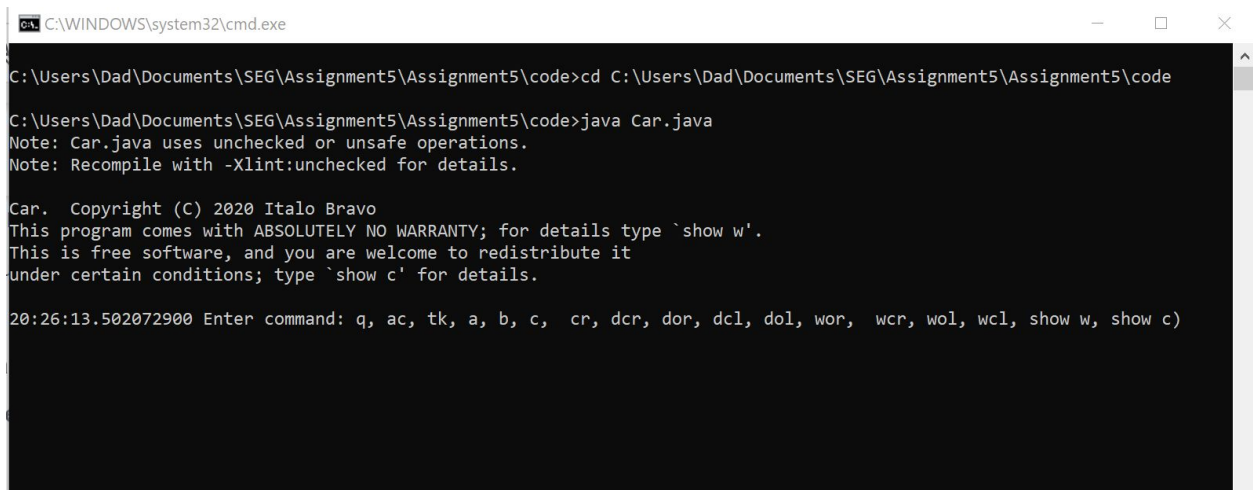
Test Cases

Test 01: Start and Copyright

Steps

- Start the application
- Copyright disclaimer is showed and user is asked to enter command

Results



```
C:\WINDOWS\system32\cmd.exe
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>cd C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>java Car.java
Note: Car.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

Car. Copyright (C) 2020 Italo Bravo
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

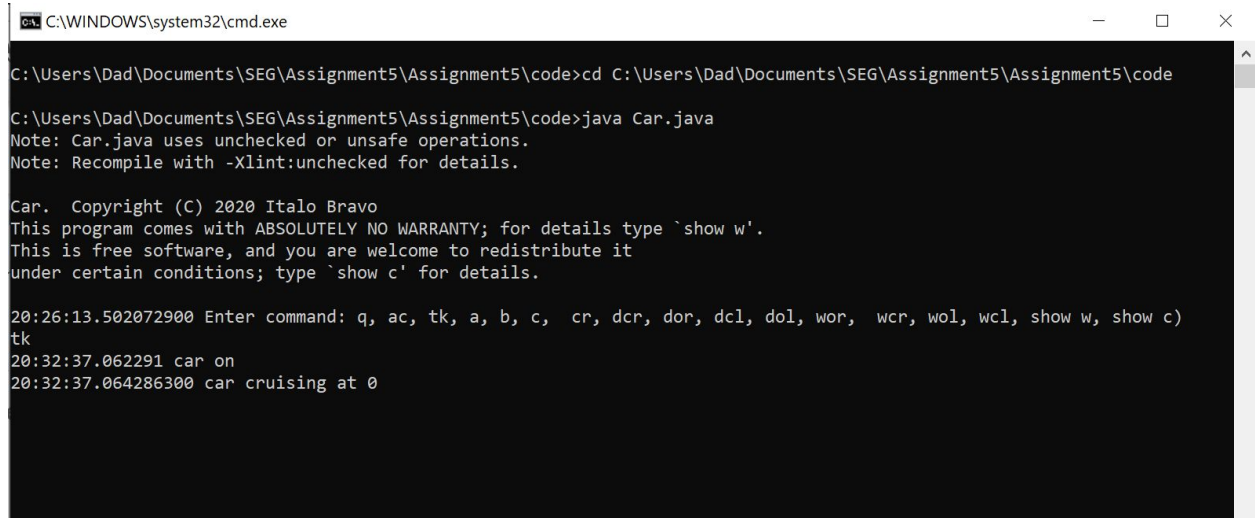
20:26:13.502072900 Enter command: q, ac, tk, a, b, c, cr, dcr, dor, dcl, dol, wor, wcr, wol, wcl, show w, show c)
```

Test 02: Start Engine

Steps

- Start the application
- Copyright disclaimer is showed and user is asked to add command
- User enter tk for engine on
- Engine is started, displays current speed (expected 0 at this point)

Results



```
C:\WINDOWS\system32\cmd.exe
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>cd C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>java Car.java
Note: Car.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

Car. Copyright (C) 2020 Italo Bravo
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

20:26:13.502072900 Enter command: q, ac, tk, a, b, c, cr, dcr, dor, dcl, dol, wor, wcr, wol, wcl, show w, show c)
tk
20:32:37.062291 car on
20:32:37.064286300 car cruising at 0
```

Test 03: Acceleration and Cruise Control

Steps

- Start the application
- Copyright disclaimer is showed and user is asked to add command
- User enter tk for engine on
- Engine is started, displays current speed (expected 0 at this point)
- User enters a for acceleration, program runs for some time and shows increase in speed
- User enters cr (for cruise control on), car continue driving at set speed

Results

```
C:\WINDOWS\system32\cmd.exe

C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>cd C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code

C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>java Car.java
Note: Car.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

Car. Copyright (C) 2020 Italo Bravo
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

20:35:48.719187800 Enter command: q, ac, tk, a, b, c, cr, dcr, dor, dcl, dol, wor, wcr, wol, wcl, show w, show c)
tk
20:35:51.122447200 car on
20:35:51.123453100 car cruising at 0
a
20:35:59.378148200 car accelerating: 0 -> 1
20:36:01.382166400 car accelerating: 1 -> 2
20:36:03.383885400 car accelerating: 2 -> 3
20:36:05.388019100 car accelerating: 3 -> 4
20:36:07.398034300 car accelerating: 4 -> 5
20:36:09.423851600 car accelerating: 5 -> 6
20:36:11.438536100 car accelerating: 6 -> 7
20:36:13.440820100 car accelerating: 7 -> 8
20:36:15.459514500 car accelerating: 8 -> 9
20:36:17.462288 car accelerating: 9 -> 10
20:36:19.609470700 car accelerating: 10 -> 11
20:36:21.611591300 car accelerating: 11 -> 12
cr
20:36:22.683801400 car cruising at 12
```

Test 04: Leaving Cruise Control and Start Breaking

Steps

- Start the application
- Copyright disclaimer is showed and user is asked to add command
- User enter tk for engine on
- Engine is started, displays current speed (expected 0 at this point)
- User enters a for acceleration, program runs for some time and shows increase in speed
- User enters cr (for cruise control on), car continue driving at set speed
- User enters b (for break), car decreases speed for some time
- User enters cr (for cruise control on), car continue driving at set speed

Results

```
C:\WINDOWS\system32\cmd.exe

C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>cd C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code

C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>java Car.java
Note: Car.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

Car. Copyright (C) 2020 Italo Bravo
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

20:35:48.719187800 Enter command: q, ac, tk, a, b, c, cr, dcr, dor, dcl, dol, wor, wcr, wol, wcl, show w, show c)
tk
20:35:51.122447200 car on
20:35:51.123453100 car cruising at 0
a
20:35:59.378148200 car accelerating: 0 -> 1
20:36:01.382166400 car accelerating: 1 -> 2
20:36:03.383885400 car accelerating: 2 -> 3
20:36:05.388019100 car accelerating: 3 -> 4
20:36:07.398034300 car accelerating: 4 -> 5
20:36:09.423851600 car accelerating: 5 -> 6
20:36:11.438536100 car accelerating: 6 -> 7
20:36:13.440820100 car accelerating: 7 -> 8
20:36:15.459514500 car accelerating: 8 -> 9
20:36:17.462288 car accelerating: 9 -> 10
20:36:19.609470700 car accelerating: 10 -> 11
20:36:21.611591300 car accelerating: 11 -> 12
cr
20:36:22.683801400 car cruising at 12
b
20:40:09.124353500 car braking: 12 -> 11
20:40:11.125733 car braking: 11 -> 10
20:40:13.130282300 car braking: 10 -> 9
20:40:15.130844700 car braking: 9 -> 8
20:40:17.131341100 car braking: 8 -> 7
20:40:19.139439100 car braking: 7 -> 6
20:40:21.154705 car braking: 6 -> 5
cr
20:40:22.916169600 car cruising at 5
```

Test 05: Leaving Cruise Control and Start Breaking until car is stopped

Steps

- Start the application
- Copyright disclaimer is showed and user is asked to add command
- User enter tk for engine on
- Engine is started, displays current speed (expected 0 at this point)
- User enters a for acceleration, program runs for some time and shows increase in speed
- User enters cr (for cruise control on), car continue driving at set speed
- User enters b (for break), car decreases speed for some time
- User enters cr (for cruise control on), car continue driving at set speed

- User enters b (for break), car decreases speed for some time until speed is 0

Results

```
C:\WINDOWS\system32\cmd.exe

C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>cd C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>java Car.java
Note: Car.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

Car. Copyright (C) 2020 Italo Bravo
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

20:35:48.719187800 Enter command: q, ac, tk, a, b, c, cr, dcr, dor, dcl, dol, wor, wcr, wol, wcl, show w, show c)
tk
20:35:51.122447200 car on
20:35:51.123453100 car cruising at 0
a
20:35:59.378148200 car accelerating: 0 -> 1
20:36:01.382166400 car accelerating: 1 -> 2
20:36:03.383885400 car accelerating: 2 -> 3
20:36:05.388019100 car accelerating: 3 -> 4
20:36:07.398034300 car accelerating: 4 -> 5
20:36:09.423851600 car accelerating: 5 -> 6
20:36:11.438536100 car accelerating: 6 -> 7
20:36:13.440820100 car accelerating: 7 -> 8
20:36:15.459514500 car accelerating: 8 -> 9
20:36:17.462288 car accelerating: 9 -> 10
20:36:19.609470700 car accelerating: 10 -> 11
20:36:21.611591300 car accelerating: 11 -> 12
cr
20:36:22.683801400 car cruising at 12
b
20:40:09.124353500 car braking: 12 -> 11
20:40:11.125733 car braking: 11 -> 10
20:40:13.130282300 car braking: 10 -> 9
20:40:15.130844700 car braking: 9 -> 8
20:40:17.131341100 car braking: 8 -> 7
20:40:19.139439100 car braking: 7 -> 6
20:40:21.154705 car braking: 6 -> 5
cr
20:40:22.916169600 car cruising at 5
b
20:41:30.605265500 car braking: 5 -> 4
20:41:32.678096800 car braking: 4 -> 3
20:41:34.683526700 car braking: 3 -> 2
20:41:36.689892100 car braking: 2 -> 1
20:41:38.693976700 car braking: 1 -> 0
20:41:38.695971 car cruising at 0
-
```

Test 06: Setting Air Conditioning On with Car Stopped

Steps

- Start the application
- Copyright disclaimer is showed and user is asked to add command
- User enter tk for engine on
- Engine is started, displays current speed (expected 0 at this point)
- User enters ac for air conditioned

- Message is displayed showing AC is on
- User enters ac for air conditioned
- Message is displayed showing AC is off

Results

```

C:\WINDOWS\system32\cmd.exe
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>cd C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>java Car.java
Note: Car.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

Car. Copyright (C) 2020 Italo Bravo
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

20:43:05.021485600 Enter command: q, ac, tk, a, b, c, cr, dcr, dor, dcl, dol, wor, wcr, wol, wcl, show w, show c)
tk
20:43:07.375460800 car on
20:43:07.376457200 car cruising at 0
ac
20:43:25.315571500 ac disengaged
ac
20:43:47.408436900 ac engaged

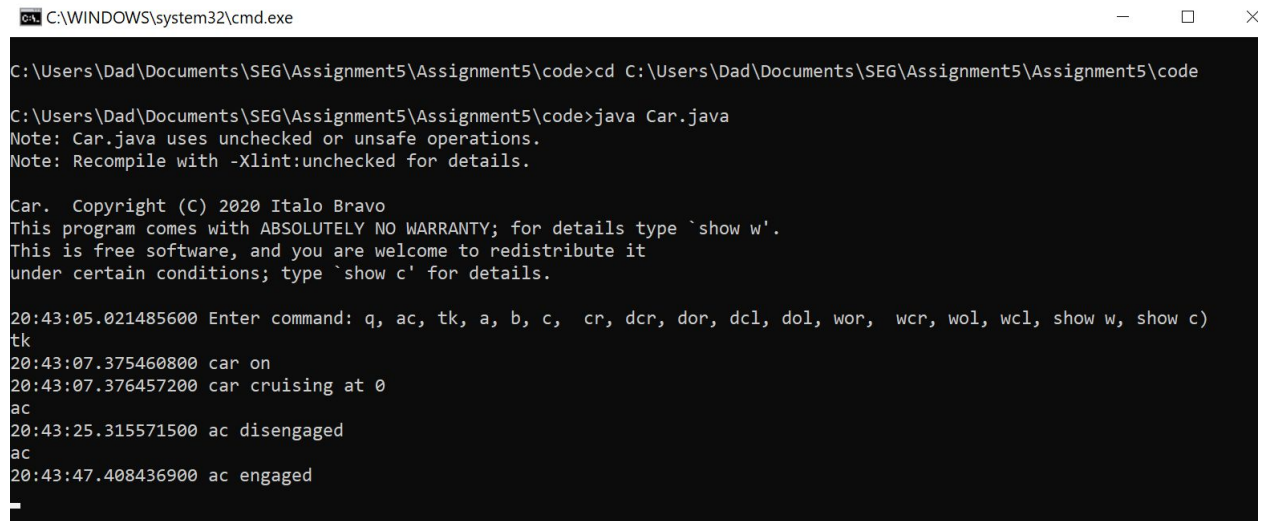
```

Test 07: Open and close windows

Steps

- Start the application
- Copyright disclaimer is showed and user is asked to add command
- User enter tk for engine on
- Engine is started, displays current speed (expected 0 at this point)
- User enters wor for open right window
- Message is displayed showing right window is open
- User enters wol for open left window
- Message is displayed showing left window is open
- User enters wcr for close right window
- Message is displayed showing right window is closed
- User enters wcl for close left window
- Message is displayed showing left window is closed

Results



```
C:\WINDOWS\system32\cmd.exe

C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>cd C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>java Car.java
Note: Car.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

Car. Copyright (C) 2020 Italo Bravo
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

20:43:05.021485600 Enter command: q, ac, tk, a, b, c, cr, dcr, dor, dcl, dol, wor, wcr, wol, wcl, show w, show c)
tk
20:43:07.375460800 car on
20:43:07.376457200 car cruising at 0
ac
20:43:25.315571500 ac disengaged
ac
20:43:47.408436900 ac engaged
```

Test 08: Opening the doors while Stationary

Steps

- Start the application
- Copyright disclaimer is showed and user is asked to add command
- User enter tk for engine on
- Engine is started, displays current speed (expected 0 at this point)
- User enters
- User enters dor for open right door
- Message is displayed showing right door is open
- User enters dcr for close right door
- Message is displayed showing right door is closed

Results

```
C:\WINDOWS\system32\cmd.exe

C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>cd C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>java Car.java
Note: Car.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

Car. Copyright (C) 2020 Italo Bravo
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

20:51:23.119253300 Enter command: q, ac, tk, a, b, c, cr, dcr, dor, dcl, dol, wor, wcr, wol, wcl, show w, show c)
tk
20:51:39.129006400 car on
20:51:39.130003500 car cruising at 0
dor
20:51:48.342795600 COMMAND COMPLETED:
20:51:48.343795300 The car's right door has been opened
dcr
20:51:59.681406400 :
20:51:59.681406400 Right door closed
```

Test 09: Opening/closing the doors while moving

Steps

- Start the application
- Copyright disclaimer is showed and user is asked to add command
- User enter tk for engine on
- Engine is started, displays current speed (expected 0 at this point)
- User enters a for acceleration, program runs for some time and shows increase in speed
- User enters dor for open right door
- Message is displayed warning command not allowed

Results

```
C:\WINDOWS\system32\cmd.exe

C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>cd C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>java Car.java
Note: Car.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

Car. Copyright (C) 2020 Italo Bravo
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

20:56:12.466914700 Enter command: q, ac, tk, a, b, c, cr, dcr, dor, dcl, dol, wor, wcr, wol, wcl, show w, show c)
tk
20:56:16.817242900 car on
20:56:16.819244800 car cruising at 0
a
20:56:18.577222800 car accelerating: 0 -> 1
20:56:20.581550700 car accelerating: 1 -> 2
20:56:22.581827300 car accelerating: 2 -> 3
20:56:24.586534400 car accelerating: 3 -> 4
20:56:26.609313300 car accelerating: 4 -> 5
dor
20:56:27.857264800 COMMAND NOT ALLOWED:
20:56:27.858261400 You cannot open the door while driving
20:56:28.630925100 car accelerating: 5 -> 6
20:56:30.632845900 car accelerating: 6 -> 7
cr
20:56:31.817631400 car cruising at 7
```

Test 10: Trying to move the car from stop with an open doorSteps

- Start the application
- Copyright disclaimer is showed and user is asked to add command
- User enter tk for engine on
- Engine is started, displays current speed (expected 0 at this point)
- User enters dor for open right door
- Message is displayed showing right door is open
- User enters a for acceleration
- Message is displayed warning command not allowed

Results

```
C:\WINDOWS\system32\cmd.exe

C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>cd C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code
C:\Users\Dad\Documents\SEG\Assignment5\Assignment5\code>java Car.java
Note: Car.java uses unchecked or unsafe operations.
Note: Recompile with -Xlint:unchecked for details.

Car. Copyright (C) 2020 Italo Bravo
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

21:01:52.408709600 Enter command: q, ac, tk, a, b, c, cr, dcr, dor, dcl, dol, wor, wcr, wol, wcl, show w, show c)
tk
21:01:55.771343900 car on
21:01:55.819216 car cruising at 0
dor
21:01:59.335813100 COMMAND COMPLETED:
21:01:59.335813100 The car's right door has been opened
a
Car cannot accelerate while the door is open
dcr
21:02:13.265017700 :
21:02:13.266013700 Right door closed
a
21:02:14.523946700 car accelerating: 0 -> 1
21:02:16.530684700 car accelerating: 1 -> 2
21:02:18.536498500 car accelerating: 2 -> 3
21:02:20.555767500 car accelerating: 3 -> 4
21:02:22.601845300 car accelerating: 4 -> 5
cr
21:02:23.491103400 car cruising at 5
```

Building/Compilation Instructions

Build/Compile

We have included a shell script for Windows, file is named "compile.bat", please ensure source code is deployed in the same directory specified inside the compile.bat file, and java and umple jar are available to the compiler.

Execute

We have included a shell script for Windows, file is named "run.bat", please ensure source code is deployed in the same directory specified inside the run.bat file, and java and umple jar are available to the compiler.

Copyright

```
// "eCar" is an emulator to illustrate the usage of state machines witten in Umple and Java.  
// Presented as assignment 5 of the course SEG2105*[Z] Intro To Software Engineering  
20205  
// Copyright (C) 2020 Italo Bravo
```

```
// This program is free software: you can redistribute it and/or modify  
// it under the terms of the GNU General Public License as published by  
// the Free Software Foundation, either version 3 of the License, or  
// any later version.
```

```
// This program is distributed in the hope that it will be useful,  
// but WITHOUT ANY WARRANTY; without even the implied warranty of  
// MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the  
// GNU General Public License for more details.
```

```
// You should have received a copy of the GNU General Public License  
// along with this program. If not, see <https://www.gnu.org/licenses/>.Copyright
```

Licensing information was also included in the License.md file and program UI