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# 2021 07 09

CRITERIA

Sex

Heigth

Weight

PREDICATES

Sex 1,2, !=1,2

Height >0,<0

Weight >0,<0

BMI weight/(height \* height)

BOUNDARIES

Sex 0,3,minint,maxint

Heigth minint,0

Weight minint,0

EQUIVALENCE CLASSES

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sex | Height | Weight | BMI | Valid | Test Case |
| [minint,0] | \* | \* | \* | I | T1(-8,…,…)->0  TB(0,…,…)->0 |
| [3,maxint] | \* | \* | \* | I | T2(5,…,…)->0  TB(3,…,…)->0 |
| \* | [minint,0] | \* | \* | I | T3(…,-5,…)->0  TB(…,0,…)->0 |
| \* | \* | [minint,0] | \* | I | T4(…,…,-5)->0  TB(…,…,0)->0 |
| 1 | 170 | 60 | 20.76 Normal | V | T5(1,170,60) ->1 |
| 1 | 170 | 50 | 17.3 Below | V | T6(1,170,50)->2 |
| 1 | 170 | 80 | 27.68 Above | V | T7(1,170,80)->3 |
| 2 | 170 | 50 | 17.3 Normal | V | T8(2,170,50)->1 |
| 2 | 180 | 50 | 15.43 Below | V | T9(2,180,50)->2 |
| 2 | 140 | 50 | 25.5 Above | V | T10(2,140,50)->3 |

# 2020 07 23

CRITERIA  
charge

Movingmode

Distance

PREDICATES

Charge <,>0,<101

movingMode =0,=1,!=0,1

distance <,>0

formula1: Distance/unit of charge needed unit of charge needed =1 slow mode =2 fast mode

BOUNDARIES

Charge minint,-1,0,100,maxint

MovingMode minint,-1,2,maxint

Distance minint,-1,0,1,maxint

EQUIVALENCE CLASSES

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Charge | Moving Mode | Distance | Formula1 | Valid | Test Case |
| [minint,-1] | \* | \* | \* | I | T1(-8,…,…) ->Error  TB(-1,…,…) ->Error |
| [101,maxint] | \* | \* | \* | I | T2(111,…,…) ->Error  TB(101,…,…) ->Error |
| \* | [minint,-1] | \* | \* | I | T3(…,-8,…) ->Error  TB(…,-1,…) ->Error |
| \* | [2,maxint] | \* | \* | I | T4(…,25,…) ->Error  TB(…,2,…) ->Error |
| \* | \* | [minint,-1] | \* | I | T5(…,…,-5) ->Error  TB(…,…,-1) ->Error |
| 90 | 0 | [101,maxint] | 90<101 | V | T6(90,0,101) ->false  TB(90,0,101) ->false |
| 60 | 0 | 50 | 60>=50 | V | T7(60,0,50) ->true  TB(100,0,50) -> true |
| 60 | 1 | 25 | (60/2)>=25 | V | T8(60,1,25) -> true  TB(100,1,25) -> true |
| 40 | 0 | 50 | 40<50 | V | T9(40,0,50) -> false  TB(100,0,150) -> false |
| 40 | 1 | 23 | (40/2)<23 | V | T10(40,1,23) -> false  TB(100,1,51) -> false |

# 2022 06 29

Security Only authenticated user can monitor/switch the system off

Efficiency Alarm response time < 0.5 ms

Availability System should not be unavailable for more then 5 minutes

CRITERIA

Totalincome

Deductible

Taxdeductible

PREDICATES

Totalincome Sign <0,>0

Deductible Sign <0,>0 <4000

taxDeductible Sign <0,>0 <2000

formula 1 🡺 0.3 \* (totalincome – deductible-10000) – 0.2 \* taxdeductible >= 0

BOUNDARIES

Totalincome minint,-1,0,9999,10000,10001,maxint

[minint,-1] [0,10000] [10001,maxint]

Deductible sign minint,-1,0,1,3999,4000,4001,maxint

[minint,-1] [0,4000] [4001,maxint]

taxDeductible minint,-1,0,1,1999,2000,2001,maxint

[minint,-1] [0,2000] [2001,maxint]

Formula1>=0

T F

EQUIVALENCE CLASSES

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| totalIncome | Deductible | taxDeductible | Formula1>=0 | Valid | Test Cases |
| [minint,-1] | \* | \* | \* | I | T1(-8,…,…) ->Error  TB(-1,…,…)-> Error |
| \* | [minint,-1] | \* | \* | I | T2(…,-8,…) ->Error  TB(…,-1,…) ->Error |
| \* | \* | [minint,-1] | \* | I | T3(…,…,-8)-> Error  TB(…,…,-1)-> Error |
| [0,10000] | [0,4000] | [0,2000] | T | V | T4(10000,0,0)-> 0  TB(10000,0,0)->0 |
| [0,10000] | [0,4000] | [0,2000] | F | V | T5(9000,2000,1000) ->0  TB(0,4000,2000)->0 |
| [0,10000] | [0,4000] | [2001,maxint] | F (cannot be T) | V | T6(9000,2000,4000) ->0  TB(0,4000,2001)->0 |
| [0,10000] | [4001,maxint] | [0,2000] | F (cannot be T) | V | T7(9000,4500,1000) ->0  TB(0,4001,2000)->0 |
| [0,10000] | [4001,maxint] | [2001,maxint] | F (cannot be T) | V | T8(9000,4500,2500) ->0  TB(0,4001,2001)->0 |
| [10001,maxint] | [0,4000] | [0,2000] | T | V | T9(15000,4000,1000) ->100  TB(20000,4000,2000)->1400 |
| [10001,maxint] | [0,4000] | [0,2000] | F | V | T10(10010,1000,500)->0  TB(10001,4000,2000)->0 |
| [10001,maxint] | [0,4000] | [2001,maxint] | T | V | T11(20000,4000,3000)->1200  TB(20000,4000,2001)->1400 |
| [10001,maxint] | [0,4000] | [2001,maxint] | F | V | T12(10100,2000,3000) ->0  TB(10001,4000,2001)->0 |
| [10001,maxint] | [4001,maxint] | [0,2000] | T | V | T13(20000,5000,1500)->1500  TB(15335,4001,2000) ->0 |
| [10001,maxint] | [4001,maxint] | [0,2000] | F | V | T14(10001,5000,1000) ->0  TB(15334,4001,2000) ->0 |
| [10001,maxint] | [4001,maxint] | [2001,maxint] | T | V | T15(20000,5000,3000) ->1100  TB(15335,4001,2001) ->0 |
| [10001,maxint] | [4001,maxint] | [2001,maxint] | F | V | T16(10010,5000,3000) ->0  TB(15335,4001,2001)->0 |

# 2020 09 02

Security Only authenticated user can activate/disactivate HSS, configure view log receive notifications. WIFI and GIU cryptographed and protected.

CRITERIA

partPerMillion

batteryCharge

temperature

PREDICATES

partPerMillion <,>0 Sign

batteryCharge <0,>0 Sign

temperature <0,>0 Sign

formula1 partpermillion>=0 AND batteryCharged>=50 AND temperature[-20,40]

BOUNDARIES

partPerMillion minint,-1,0,1,maxint

[minint,-1] [0,maxint]

batteryCharge minint,-1,0,1,99,100,101,maxint

[minint,-1] [0,49] [50,100] [101,maxint]

temperature minint,-21,-20,-19,-1,0,1,39,40,41,maxint

[minint,-21] [-20,40] [41,maxint]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| partPerMillion | batteryCharge | Temperature | Formula1 | Valid | Test Cases |
| [minint,-1] | \* | \* | \* | I | T1(-8,…,…)->Error  TB(-1,…,…)->Error |
| \* | [minint,-1] | \* | \* | I | T2(…,-8,…)->Error  TB(…,-1,…)->Error |
| \* | \* | [minint,-1] | \* | I | T3(…,…,-8)->Error  TB(…,…,-1)->Error |
| [0,maxint] | [0,49] | [-20,40] | T (not possible) | V | \* |
| [0,maxint] | [0,49] | [-20,40] | F | V | T4(50,40,10)->false  TB(0,0,-20)->false |
| [0,maxint] | [0,49] | [41,maxint] | T(not possible) | V | \* |
| [0,maxint] | [0,49] | [41,maxint] | F | V | T5(50,30,55)->false  TB(0,0,41)->false |
| [0,maxint] | [50,100] | [-20,40] | T | V | T6(50,60,30)->true  TB(0,100,40)->true |
| [0,maxint] | [50,100] | [-20,40] | F (not possible) | V | \* |
| [0,maxint] | [50,100] | [41,maxint] | T (not possible) | V | \* |
| [0,maxint] | [50,100] | [41,maxint] | F | V | T7(20,60,45)->false  TB(0,50,41)->false |
| [0,maxint] | [101,maxint] | [-20,40] | T | V | T8(20,111,30)->error  TB(20,101,40)->error |
| [0,maxint] | [101,maxint] | [-20,40] | F (not possible) | V | \* |
| [0,maxint] | [101,maxint] | [41,maxint] | T (not possible) | V | \* |
| [0,maxint] | [101,maxint] | [41,maxint] | F | V | T9(20,440,50)->error  TB(20,101,41)->error |

# 2019 02 12

NF requirements

Security Payment must be secured

Privacy Only the proper Medic Certificate must be visible to authenticated users

Usability User must be able to use the system with no previous training

Precondition: Customer is registered and has a way to access the FITFIT center

PostCondition: Customer is inside the facility

1 Customer approach the turnstiles

2 customer Pick his method to access the facility (RFID card or NFC smartphone)

3 Customer put the RFID or NFC near the turnstiles

4 System checks that the payment and the certificate are not expired

5 turnstiles opens

6 Customer enter the facility

CRITERIA

Grade1

Grade2

Grade3

Grade4

Grade5

Grade6

PREDICATES

Sign of grade1,2,3,4,5,6 <0,>0

BOUNDARIES

For each grade: [minint,17] [18,30] [31,32] [33] [34,maxint]

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Grade1 | Grade2 | Grade3 | Grade4 | Grade5 | Grade6 | Valid | Test Cases |
| [minint,17] | \* | \* | \* | \* | \* | I | T1(-10,…)->error  TB(17,…)->error |
| \* | [minint,17] | \* | \* | \* | \* | I | T2(..,-10,)->error  TB(…,17)->error |
| \* | \* | [minint,17] | \* | \* | \* | I | T3(..,-10,)->error  TB(…,17)->error |
| \* | \* | \* | [minint,17] | \* | \* | I | T4(..,-10,)->error  TB(…,17)->error |
| \* | \* | \* | \* | [minint,17] | \* | I | T5(..,-10,)->error  TB(…,17)->error |
| \* | \* | \* | \* | \* | [minint,17] | I | T6(..,-10,)->error  TB(…,17)->error |
| [34,maxint] | \* | \* | \* | \* | \* | I | T7(50,…)->error  TB(34,…)->error |
|  | [34,maxint] | \* | \* | \* | \* | I | T8(…,50)->error  TB(…,34)->error |
| \* | \* | [34,maxint] | \* | \* | \* | I | T9(…,50)->error  TB(…,34)->error |
| \* | \* | \* | [34,maxint] | \* | \* | I | T10(…,50)->error  TB(…,34)->error |
| \* | \* | \* | \* | [34,maxint] | \* | I | T11(…,50)->error  TB(…,34)->error |
| \* | \* | \* | \* | \* | [34,maxint] | I | T12(…,50)->error  TB(…,34)->error |
| [31,32] | \* | \* | \* | \* | \* | I | T13(32,…)->error  TB(31,…)->error |
|  | [31,32] | \* | \* | \* | \* | I | T14(…,32)->error  TB(…,31)->error |
| \* | \* | [31,32] | \* | \* | \* | I | T15(…,32)->error  TB(…,31)->error |
| \* | \* | \* | [31,32] | \* | \* | I | T16(…,32)->error  TB(…,31)->error |
| \* | \* | \* | \* | [31,32] | \* | I | T17(…,32)->error  TB(…,31)->error |
| \* | \* | \* | \* | \* | [31,32] | I | T18(…,32)->error  TB(…,31)->error |
| [18,30] | [18,30] | [18,30] | [18,30] | [18,30] | [18,30] | V | T19(30,18,26,28,27,25)->26.5 (30/18 excl) |
| [18,30] | [18,30] | [33] | [18,30] | [18,30] | [18,30] | V | T20(30,18,33,28,27,25)->27.5 (18/33 excl) |
| [18,30] | [18,30] | [18,30] | [18,30] | [18,30] | [18,30] | V | T21(30,18,18,28,27,25)->26.67 (30/18/18 excl) |
| [18,30] | [18,30] | [18,30] | [18,30] | [18,30] | [18,30] | V | T22(30,18,26,30,27,25)->26 (30/30/18 excl) |
| [18,30] | [18,30] | [33] | [33] | [18,30] | [18,30] | V | T23(30,18,33,33,27,25)->27.33 (33/33/18 excl) |
| [18,30] | [18,30] | [18,30] | [18,30] | [18,30] | [18,30] | V | T24(27,18,28,28,27,25)->26.33 (28/28/18 excl) |
| [18,30] | [18,30] | [33] | [33] | [18,30] | [18,30] | V | T25(30,20,33,33,27,25)->27.33 (33/33/20 excl) |
| [18,30] | [18,30] | [18,30] | [18,30] | [18,30] | [18,30] | V | T25(20,20,20,20,20,20)->0 (all excl.) |

# 2018 09 17

NF requirements

Security Only authenticated user can subscribe unsubscribe to a race, add penalty and disqualify, produce a ranking. Rankings are publicly visible.

Domain Time is measured in seconds, Length in meters.

Usability App and PC GUI should be simple to use without any training

Precondition: Employee is authenticated

Postcondition: Start Time is inserted

1. Employee open APP/PC GUI
2. Employee open athlete profile and select the interested stage
3. Employee insert the start time
4. System check the correctness
5. Time is inserted

CRITERIA

Winner time

Average Speed

Category of the track

PREDICATES

Winner Time > 0, < 0 (sign of winner time)

Average Speed >0,<0 (sign of average speed)

Category of the track =A,=B,=C, !=A,B,C (value of category)

BOUNDARIES

Winner Time 🡺 mindouble,-1,0,1,maxdouble

Average Speed 🡺 mindouble,-1,0,1,maxdouble

* Category bounds 🡺 29,30,31,34,35,36

Category of the Track 🡺 =A,=B,=C, !=A,B,C

Examples:

computeMaxTime(50, 27, 'A') -> 50 + 50\*0.05 = 52.5

computeMaxTime(60, 33, 'B') -> 60 + 60\*0.25 = 75

computeMaxTime(80, 40, 'C') -> 80 + 80\*0.5 = 120

EQUIVALENCE CLASSES AND TEST

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Winner Time | Average Speed | Value of Category | Valid/Invalid | Test Case |
| ]0,maxdouble] | ]0,30] | A | V | T1(50,27,A) -> 50 + 50\*0.05 = 52.5 |
| ]0,maxdouble] | ]30,35] | A | V | T2(50,33,A) -> 50 +50\*0.1 = 55 |
| ]0,maxdouble] | ]35,maxdouble] | A | V | T3(50,40,A) -> 50+50\*0.15=57.5 |
| ]0,maxdouble] | ]0,30] | B | V | T4(50,27,B) -> 50 + 50\*0.2 = 60 |
| ]0,maxdouble] | ]30,35] | B | V | T5(50,33,B) -> 50 +50\*0.25 = 62.5 |
| ]0,maxdouble] | ]35,maxdouble] | B | V | T6(50,40,B) -> 50+50\*0.3=65 |
| ]0,maxdouble] | ]0,30] | C | V | T7(50,27,B) -> 50 + 50\*0.5 = 75 |
| ]0,maxdouble] | ]30,35] | C | V | T8(50,33,B) -> 50 +50\*0.5 = 75 |
| ]0,maxdouble] | ]35,maxdouble] | C | V | T9(50,40,B) -> 50+50\*0.5=75 |
| \* | \* | =! A,B,C | I | T10(…,…,D) -> 0(error) |
| [0,maxdouble] | [mindouble,0] | n/a | I | T11(12,-1,…) -> 0(error) |
| [mindouble,0] | [0,maxdouble] | n/a | I | T12(-1,12,…) -> 0(error) |
| [mindouble,0] | [mindouble,0] | n/a | I | T13(-2,-5,…) -> 0(error) |

# 2018 07 13

CRITERIA

Exercise1

Exercise 2

lab

PREDICATES

Exercise 1 <0,>0 (sign of exercise1)

Exercise 2 <0,>0 (sign of exercise2)

Lab =0,=1

Formula 1 🡺 Exercise 1 + Exercise 2 >=18

BOUNDARIES

Exercise 1 🡺 minint,0,15,7,maxint

Exercise 2 🡺 minint,0,15,7,maxint

Lab 🡺 0,1, !=0,1

Formula 1 no boundaries (depends on the input)

Examples:

has\_passed\_exam(8, 8, 0); 0

has\_passed\_exam(10, 10, 0): 1

has\_passed\_exam(14, 4, 0): 0

has\_passed\_exam(0, 5, 1): 0

has\_passed\_exam(0, 10, 1): 1

EQUIVALENCE CLASSES AND TEST

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Exercise 1 | Exercise 2 | Lab | Formula 1 | Valid/Invalid | Test Case |
| [minint,-1] | n/a | n/a | n/a | I | T1(-5,…,…) ->Error  TB(-1,…,…) ->Error |
| n/a | [minint,-1] | n/a | n/a | I | T2(…,-5,…) ->Error  TB(…,-1,…) ->Error |
| [16,maxint] | n/a | n/a | n/a | I | T3(25,…,…) ->Error  TB(16,…,…) ->Error |
| n/a | [16,maxint] | n/a | n/a | I | T4(…,25,…) ->Error  TB(…,16,…) ->Error |
| n/a | n/a | [minint,-1] | n/a | I | T5(…,…,-5) ->Error  TB(…,…,-1) -> Error |
| n/a | n/a | [2,maxint] | n/a | I | T6(…,…,8) -> Error  TB(…,…,2) -> Error |
| [7,15] | [7,15] | 0 | T | V | T7(10,10,0) ->1  TBex(15,15,0) ->1  TBf(10,8,0)->1 |
| [7,15] | [0,6] | 0 | T | V | T8(15,3,0)->0  TBex(12,6,0) ->0  Tbf=Tbex |
| [0,6] | [7,15] | 0 | T | V | T9(3,15,0)->0  TBex(6,12,0) ->0  Tbf=Tbex |
| [7,15] | [7,15] | 0 | F | V | T10(8,8,0)->0  TBex(7,7,0) ->0  TBf=(9,8,0) ->0 |
| [7,15] | [0,6] | 0 | F | V | T11(10,5,0) ->0  TBex(10,6,0)->0  TBf(13,4,0)->0 |
| [0,6] | [7,15] | 0 | F | V | T12(5,10,0) ->0  TBex(6,10,0) ->0  TBf(5,12,0)->0 |
| [0,6] | [0,6] | 0 | F | V | T13(5,5,0)->0  Tbex(6,6,0)->0  Tbf not possible |
| [7,15] | [7,15] | 1 | T | V | T14(10,10,1) ->1  TBex(15,15,1) ->1  TBf(10,8,1)->1 |
| [7,15] | [0,6] | 1 | T | V | T15(15,3,1)->0  TBex(12,6,1) ->0  Tbf=Tbex |
| [0,6] | [7,15] | 1 | T | V | T16(3,15,1)->1  TBex(6,12,1) ->1  Tbf=Tbex |
| [7,15] | [7,15] | 1 | F | V | T17(8,8,1)->1  TBex(7,7,1) ->1  TBf=(9,8,1) ->1 |
| [7,15] | [0,6] | 1 | F | V | T18(10,5,1) ->0  TBex(10,6,1)->0  TBf(13,4,1)->0 |
| [0,6] | [7,15] | 1 | F | V | T12(5,10,1) ->1  TBex(6,10,1) ->1  TBf(5,12,1)->1 |
| [0,6] | [0,6] | 1 | F | V | T13(5,5,1)->0  Tbex(6,6,1)->0  Tbf not possible |

# 2018 06 28

NF Requirements

Security Only authenticated users can perform the operations. Only citizen authenticated can access/download… Only General practisioner can browse citizen,…

Privacy Health document visible only by citizen and authorize the practisioner to see it.

Usability System should be usable with no effort and training

Efficiency Response Time <0.5 s

Precondition: Citizen is logged in and want to select a practisioner

PostCondition: Citizen has selected the practisioner

1. Citizen open and browse the list of available practisioner
2. Citizen select the desired practisioner
3. System checks that it is possible to select it
4. System confirm the selection, citizen has a practisioner

CRITERIA

Age

Family income

isEmployed

PREDICATES

Age sign <0,>0

Family income sign <0,>0

Is Employed sign <0,>0,!=0,1  
BOUNDARY

Age

[minint,-1] [0,5] [6,64] [65,maxint]

Family Income

[mindouble,-0.0001] [0,8263.56] [8263.57,36151.97] [36151.98,maxdouble]

isEmployed

[minint,-1] [0] [1] [2,maxint]

EQUIVALENCE CLASSES AND TESTS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Age | Family Income | isEmployed | Valid | Test Cases |
| [minint,-1] | \* | \* | I | T1(-8,…,…)->Error  TB(-1,…,…)->Error |
| \* | [mindouble,-0.0001] | \* | I | T2(…,-4.2,…)->Error  TB(…,-0.0001,…)->Error |
| \* | \* | [minint,-1] | I | T3(…,…,-8)->Error  TB(…,…,-1)->Error |
| \* | \* | [2,maxint] | I | T4(…,…,5)->Error  TB(…,…,2)->Error |
| [0,5] | [0,8263.56] | 0 | V | T5(3,5000,0)->1  TB(0,8263.56,0)->1 |
| [0,5] | [0,8263.56] | 1 | V | T6(3,5000,1)->1  TB(0,8263.56,1)->1 |
| [0,5] | [8263.57,36151.97] | 0 | V | T7(3,9000,0)->1  TB(0,8263.57,0)->1 |
| [0,5] | [8263.57,36151.97] | 1 | V | T8(3,9000,1)->1  TB(0,8263.57,1)->1 |
| [0,5] | [36151.98,maxdouble] | 0 | V | T9(3,39000,0)->0  TB(0,36151.98,0)->0 |
| [0,5] | [36151.98,maxdouble] | 1 | V | T10(3,39000,1)->0  TB(0, 36151.98,1)->0 |
| [6,64] | [0,8263.56] | 0 | V | T11(60,5000,0)->1  TB(6,8263.56,0)->1 |
| [6,64] | [0,8263.56] | 1 | V | T12(60,5000,1)->1  TB(6,8263.56,1)->1 |
| [6,64] | [8263.57,36151.97] | 0 | V | T13(60,9000,0)->0  TB(6,8263.57,0)->0 |
| [6,64] | [8263.57,36151.97] | 1 | V | T14(60,9000,1)->0  TB(6,8263.57,1)->0 |
| [6,64] | [36151.98,maxdouble] | 0 | V | T15(60,39000,0)->0  TB(6,36151.98,0)->0 |
| [6,64] | [36151.98,maxdouble] | 1 | V | T16(60,39000,1)->0  TB(6, 36151.98,1)->0 |
| [65,maxint] | [0,8263.56] | 0 | V | T17(70,5000,0)->1  TB(65,8263.56,0)->1 |
| [65,maxint] | [0,8263.56] | 1 | V | T18(70,5000,1)->1  TB(65,8263.56,1)->1 |
| [65,maxint] | [8263.57,36151.97] | 0 | V | T17(70,10000,0)->1  TB(65,8263.57,0)->1 |
| [65,maxint] | [8263.57,36151.97] | 1 | V | T18(70,10000,1)->1  TB(65,8263.57,1)->1 |
| [65,maxint] | [36151.98,maxdouble] | 0 | V | T19(70,40000,0)->1  TB(65,36151.98,0)->1 |
| [65,maxint] | [36151.98,maxdouble] | 1 | V | T20(70,40000,1)->1  TB(65,36151.98,1)->1 |

# 2018 02 06

NF requirement

Privacy Only allowed parent can view and approve grades of their childer.

Security Only principal can do his role and so teacher and so parents.

Usability System should be easily usable with no training

Domain Grades go from 0 to 10

Efficiency Response time <0.5 s

Precondition: Teacher authenticated

Postcondition: Teacher have assigned a grade to a certain student

1 Teacher select student Z of class X and subject Y

2 Teacher add the grade

3 System check the correctness of the grade

4 System confirm the add of the grade.

CRITERIA

Grade1

Grade2

Grade3

PREDICATES

Grade 1,2,3 sign <0,>0

Average > 5.9

BOUNDARIES

Grade1

[minint,-1] [0] [1,4] [5,10] [11,maxint]

Grade2

[minint,-1] [0] [1,4] [5,10] [11,maxint]

Grade3

[minint,-1] [0] [1,4] [5,10] [11,maxint]

Average > 5.9 [T] [F]

54 correct combination, do the main ones:

* No grades
* Only 1 grade (<5 and in range)
* 2 grades and pass
* 2 grade and fail
* 3 grades and fail
* 3 grades and pass

EQUIVALENCE CLASSES AND TEST

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Grade1 | Grade2 | Grade3 | Average>5.9 | Valid | Test Cases |
| [minint,-1] | \* | \* | \* | I | T1(-8,…,…)->Error  TB(-1,…,…)->Error |
| \* | [minint,-1] | \* | \* | I | T2(…,-8,…)->Error  TB(…,-1,…)->Error |
| \* | \* | [minint,-1] | \* | I | T3(…,…,-8)->Error  TB(…,…,-1)->Error |
| [11,maxint] | \* | \* | \* | I | T4(18,…,…)->Error  TB(11,…,…)->Error |
| \* | [11,maxint] | \* | \* | I | T5(…,18,…)->Error  TB(…,11,…)->Error |
| \* | \* | [11,maxint] | \* | I | T6(…,…,18)->Error  TB(…,…,11)->Error |
| [0] | [0] | [0] | F | V | T7(0,0,0)->false |
| [0] | [0] | [1,4] | F | V | T8(0,0,2)->false  TB(0,0,1)->false |
| [0] | [0] | [5,10] | F | V | T9(0,0,8)->false  TB(0,0,5)->false |
| [0] | [5,10] | [5,10] | T | V | T10(0,8,8)->true  TB(0,6,6)->true |
| [0] | [1,4] | [1,4] | F | V | T11(0,2,2)->false  TB(0,4,4)->false |
| [0] | [5,10] | [5,10] | F | V | T12(0,5,5)->false |
| [5,10] | [5,10] | [5,10] | T | V | T13(8,8,8)->true  TB(6,6,6)->true |
| [5,10] | [5,10] | [5,10] | F | V | T14(5,5,5)->true |
| [1,4] | [1,4] | [1,4] | F | V | T15(2,2,2)->false  TB(4,4,4)->false |

# 2017 10 02

NF requirements

Privacy Workshop must not know that it is all organized

Usability System should be usable with no training

Efficiency Response time < 0,5 s

Precondition: Valunteer has signed the contract and took the car to repair

Postcondition: Volunteer car has been verified and report sent

1. Volunteer exit the X workshop with the repaired car
2. Volunteer take the car to Specialized Company Y, who check the car.
3. Y produce a report that send to automotive company Z.

CRITERIA

basePrice

n\_passsengers

n\_over18

n\_under15

PREDICATES

basePrice sign <0,>0

n\_passegners sign <0,>0

n\_over18 sign <0,>0

n\_under15 sign <0,>0

BOUNDARIES

basePrice

[mindouble,- 0.0001] [0.001,maxdouble]

N\_passengers

[minint,-1] [0,5] [6,maxint]

N\_over18

[minint,-1] [0] [1,5] [6,maxint]

N\_under15

[minint,-1] [0] [1,5] [6,maxint]

EQUIVALENCE CLASSES AND TEST CASES

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| basePrice | N\_passengers | N\_over18 | N\_under15 | Valid | Test Cases |
| [mindouble,-0.0001] | \* | \* | \* | I | T1(-8,…,…,…)->Error  TB(-0.001,…,…,…)->Error |
| \* | [minint,-1] | \* | \* | I | T2(…,-8,…,…)->Error  TB(…,-1,…,…)->Error |
| \* | \* | [minint,-1] | \* | I | T3(…,…,-8,…)->Error  TB(…,…,-1,…)->Error |
| \* | \* | \* | [minint,-1] | I | T4(…,…,…,-8)->Error  TB(…,…,…,-1)->Error |
| \* | [6,maxint] | \* | \* | I | T5(…,8,…,…)->Error  TB(…,6,…,…)->Error |
| \* | \* | [6,maxint] | \* | I | T6(…,…,8,…)->Error  TB(…,…,6,…)->Error |
| \* | \* | \* | [6,maxint] | I | T7(…,…,…,8)->Error  TB(…,…,…,6)->Error |
| [0.001,maxdouble] | [0,5] | [0] | [0] | V | T8(20.0,0,0,0)->0  TB(0.001,0,0,0)->0 |
| [0.001,maxdouble] | [0,5] | [0] | [1,5] | V | T9(20.0,4,0,2)->80.0  TB(20.0,0,0,0)->0 |
| [0.001,maxdouble] | [0,5] | [1,5] | [0] | V | T10(20.0,4,4,0)->80.0  TB(20.0,1,1,0)->20.0 |
| [0.001,maxdouble] | [0,5] | [1,5] | [1,5] | V | T11(20.0,5,1,4)->20.0  TB(20.0,3,1,1)->40.0 |

# 2017 07 03

NF requirements

Privacy Show only the position with GPS but not other sensible information of the user such as name,address

Usability System should be usable with user with 1 year phone experience with no previous training

Efficiency Response Time <0,5 seconds

CRITERIA

Driving\_time

Stop\_time

Reservation\_time  
PREDICATES

Driving\_time sign <0,>0

Stop\_time sign <0,>0

Reservation\_time <0,>0  
BOUNDARIES

Driving\_time

[minint,-1] [0,maxint]

Stop\_time

[minint,-1] [0,maxint]

Reservation\_time

[minint,-1] [0,15] [16,maxint]  
EQUIVALENCE CLASSES AND TEST

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Driving\_time | Stop\_time | Reservation\_time | Valid | Test Cases |
| [minint,-1] | \* | \* | I | T1(-8,…,…)->Error  TB(-1,…,…)->Error |
| \* | [minint,-1] | \* | I | T2(…,-8,…)->Error  TB(…,-1,…)->Error |
| \* | \* | [minint,-1] | I | T3(…,…,-8)->Error  TB(…,…,-1)->Error |
| [0,maxint] | [0,maxint] | [0,15] | V | T4(10,10,10)->3.5  TB(0,0,0)->0  TB(10,10,15)->3.5 |
| [0,maxint] | [0,maxint] | [16,maxint] | V | T5(10,10,25)->4.5  TB(0,0,16)->0.1  TB(10,10,16)->3.6 |

# 2016 09 22

F and NF requirements

|  |  |
| --- | --- |
| Define regular maintenance jobs | By inserting the relevant properties |
| Record a set of interventions (Regular or not) | Also cost, and effort spent for each intervention |
| Remind Owner about scheduled maintenance |  |
| Browse/Analyze jobs for a motorcycle |  |

NF

Efficiency Response time < 0,5 seconds

Usability System should be usable by user with 1 year experience with no training

Domain Effort measured in person hour, Cost in Euro

Precondition: User owns a vehicle X

Postcondition: Job Y has been done on vehicle X

1. Owner take the vehicle in the maintenance shop for do the job
2. 2 the maintenance shop does the job
3. Maintenance shop Sign the intervention

CRITERIA

amountAsString

amountAsNumber

PREDICATES

amountAsString != ‘’

amountAsNumber <0,>0,<=10000

BOUNDARY

amountAsString

[‘’] [!=’’]

amountAsNumber

[mindouble,-0.00001] [0,10000] [10000.00001,maxdouble]

EQUIVALENCE CLASSES AND TEST

|  |  |  |  |
| --- | --- | --- | --- |
| amountAsString | amountAsNumber | Valid | Test Cases |
| [‘’] | \* | I | T1(‘’,…)->Error |
| \* | [mindouble,-0.00001] | I | T2(…,-85)->Error  TB(…,-0.00001)->Error |
| \* | [10000.00001,maxdouble] | I | T3(…,15000)->Error  TB(…,10000.00001)->Error |
| “ferffe/10” | [0,10000] | V | T4(“ferffe/10”,100.10)->false |
| “hundred/10” | [0,10000] | V | T5(“hundred/10”,100.10)->true  TB(“hundred/10”,100.09)->false |
| “hundred/00” | [0,10000] | V | T6(“hundred/00”,100)->true  TB(“hundred/00”,100.01)->false |
| “ferffe euro/10” | [0,10000] | V | T4(“ferffe euro/10”,100.10)->false |
| “hundred euro/10” | [0,10000] | V | T5(“hundred euro/10”,100.10)->true  TB(“hundred euro/10”,100.09)->false |
| “hundred euro/00” | [0,10000] | V | T6(“hundred euro/00”,100)->true  TB(“hundred euro/00”,100.01)->false |
| “ten thousand/00” | [0,10000] | V | T7(“ten thousand/00”,10000)->true  TB(“zero/00”,0)->true |
| “ten thousand/00” | [0,10000] | V | T8(“ten thousand/00”,9999.99)->false  TB(“zero/00”,0.0001)->false |
| “ten thousand euro/00” | [0,10000] | V | T9(“ten thousand euro/00”,9999.99)->false  TB(“zero euro/00”,0.0001)->false |

# 2014 09 01

Requirements

Functional

|  |  |
| --- | --- |
| Authorize/Authenticate |  |
|  | Register |
|  | Login |
|  | Logout |
| Request a Ride |  |
| Share Car for a Ride |  |
| Match Requested Ride with Shared Ones |  |
| Put Passenger/Driver in Contact |  |
|  | Establish a price |
|  | Negotiate Final details |
| Track Ride |  |
|  | Start Point |
|  | Start Time |
|  | Path Followed |
|  | End Point |
|  | End Time |
| Payment |  |
|  | Exchange Amount between user/driver accounts |
|  | Give Percentage to the Company |
| Evaluations |  |
|  | Evaluation by Passenger |
|  | Evaluation by Driver |

Non Functional

Efficiency Response time < 0,5 s

Usability System should be usable by an user with 1 year experience with no previous training

Domain Time is measured in seconds, Point saved with coordinates (lat lng), Review goes from 0 to 5

Precondition: User is logged in, needs a ride

Postcondition: User is Picked up by the driver

1 User request a ride

2 System found a match and contact the driver

3 the driver accepts and is put in contact with the user

4 user and drive negotiate the final details and negotiation succeeds.

5 The driver picks up the user

CRITERIA

nPieces

weight

PREDICATES

nPieces sign <0,>0

weight sign <0,>0

BOUNDARIES

nPieces

[minint,-1] [0,2] [3,maxint]

Weight

[mindouble,-0.0001] [0,22] [22.001,64] [64.001,maxdouble]

EQUIVALENCE CLASSES AND TESTS

|  |  |  |  |
| --- | --- | --- | --- |
| nPieces | Weight | Valid | Test Cases |
| [minint,-1] | \* | I | T1(-8,…)->Error  TB(-1,…)->Error |
| \* | [mindouble,-0.0001] | I | T2(…,-8)->Error  TB(…,-1)->Error |
| [3,maxint] | \* | V | T3(5,…)->-1  TB(3,…)->-1 |
| \* | [64.001,maxdouble] | V | T4(…,100)->-1  TB(…,64.001)->-1 |
| [0,2] | [0,22] | V | T6(0,20)->0  TB(0,22)->0 |
| [0,2] | [0,22] | V | T7(1,20)->0  TB(1,22)->0 |
| [0,2] | [0,22] | V | T8(2,20)->0  TB(2,22)->0 |
| [0,2] | [22.001,64] | V | T9(0,28)->0  TB(0,22.001)->0  TB(0,64)->0 |
| [0,2] | [22.001,64] | V | T10(1,28)->60  TB(1,22.001)->10  TB(1,64)->420 |
| [0,2] | [22.001,64] | V | T11(2,28)->60  TB(2,22.001)->10  TB(2,64)->420 |

# 2015 07 01

F requirements

|  |  |
| --- | --- |
| Authorize and Authenticate |  |
|  | Login |
|  | Register |
|  | Logout |
| Manage Account |  |
|  | Check History |
|  | Check Num of Points |
|  | Check List of Gifts |
| Manage Gift Delivery |  |
|  | Order a Gift |
|  | Track the gift |
| Enroll Fidelity Program |  |
|  | Receive Card |
|  | Receive Credentails |
| Payment |  |
|  | Insert Credit Card Credentials |
|  | Pay by Credit Card |

NF requirements

Domain Currency is Euro

Usability System should be usable with no previous training by user with 1 year experience

Efficiency Response time <0,5 s

Privacy User can see only his own data

Security Payment system must be cryptographed

CRITERIA

Starttime

Endtime

zone

PREDICATES

Starttime sign <0,>0

Endtime sign <0,>0

Zone =1,2,3,!=1,2,3

Formula 1 : Endtime - Starttime <300 >=300

BOUNDARIES

Starttime

[minint,-1] [0,86400] [86401,maxint]

Endtime

[minint,-1] [0,86400] [86401,maxint]

Zone

[minint,0] [1,3] [4,maxint]

Formula1

T F

EQUIVALENCE CLASSES AND TESTS

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Start Time | End Time | Zone | End-Start>=0 | Endtime – Starttime>=300 | Valid | Test Cases |
| [minint,-1] | \* | \* | \* | \* | I | T1(-8,…,…)->error  TB(-1,…,…)->error |
| \* | [minint,-1] | \* | \* | \* | I | T2(…,-8,…)->error  TB(…,-1,…)->error |
| [86401,maxint] | \* | \* | \* | \* | I | T3(89000,…,…)->error  TB(86401,…,…)->error |
| \* | [86401,maxint] | \* | \* | \* | I | T4(…,89000,…)->error  TB(…,86401,…)->error |
| \* | \* | [minint,0] | \* | \* | I | T5(…,…,-8)->error  TB(…,…,0)->error |
| \* | \* | [4,maxint] | \* | \* | I | T6(…,…,8)->error  TB(…,…,4)->error |
| [0,86400] | [0,86400] | 1 | T | T | V | T7(0,500,1)->450  TB(0,0,1)->0  TB(86400,86400,1)->0 |
| [0,86400] | [0,86400] | 1 | F | \* | V | T8(200,100,1)->error  TB(1,0,1)->error  TB(86400,86399,1)->error |
| [0,86400] | [0,86400] | 2 | T | T | V | T9(0,500,2)->900  TB(0,0,2)->0  TB(86400,86400,2)->0 |
| [0,86400] | [0,86400] | 2 | F | \* | V | T10(200,100,2)->error  TB(1,0,2)->error  TB(86400,86399,2)->error |
| [0,86400] | [0,86400] | 3 | T | T | V | T11(0,500,3)->1350  TB(0,0,3)->0  TB(86400,86400,3)->0 |
| [0,86400] | [0,86400] | 3 | F | \* | V | T12(200,100,3)->error  TB(1,0,3)->error  TB(86400,86399,3)->error |
| [0,86400] | [0,86400] | 1 | T | F | V | T13(0,200,1)->200  TB(0,299,1)->299 |
| [0,86400] | [0,86400] | 1 | F | \* | V | T14(200,100,1)->error  TB(1,0,1)->error  TB(86400,86399,1)->error |
| [0,86400] | [0,86400] | 2 | T | F | V | T15(0,200,2)->400  TB(0,299,2)->598 |
| [0,86400] | [0,86400] | 2 | F | \* | V | T16(200,100,2)->error  TB(1,0,2)->error  TB(86400,86399,2)->error |
| [0,86400] | [0,86400] | 3 | T | F | V | T17(0,200,3)->600  TB(0,299,3)->897 |
| [0,86400] | [0,86400] | 3 | F | \* | V | T18(200,100,3)->error  TB(1,0,3)->error  TB(86400,86399,3)->error |

# 2015 07 24

F requirement

|  |  |
| --- | --- |
| Authorize and Authenticate |  |
|  | Register |
|  | Login |
|  | Logout |
| Manage Map/Localization |  |
|  | Show gas station on the map |
|  | Select an area |
|  | Filter by price |
|  | Filter by fuel |
| Manage Prices |  |
|  | Insert price for a certain gas station |
|  | Make a price unreliable if it became obsolete |
| Manage Users Trust |  |
|  | Report/Vote an User |
|  | Compute user trust |

NF requirements

Domain Currency is Euro

efficiency Response time <0,5 s

Usability System should be usable with no training by users with at least 1 year experience

Precondition: Driver is signed in

Postcondition: Driver has obtained the fuel price for the cheapest gas station

1. Driver selects an area
2. Driver filter by price in the selected area
3. Driver finds the best gas station and start the navigation towards it

CRITERIA

Start

Duration

Ntimes

PREDICATES

Start sign <0,>0

Duration sign <0,>0

Ntimes 1,2,3,!=1,2,3

BOUNDARIES

Start Sign: [minint,-1] [0,1440] [1441,maxint]

Duration: [minint,-1] [0,1440] [1441,maxint]

Ntimes: [minint,0] [1,3] [4,maxint]

Formula1: Duration\*nTimes + Start <=1440

EQUIVALENCE CLASSES AND TESTS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Start | Duration | nTimes | Start+Duration\*nTimes<=1440 | Valid | Test Cases |
| [minint,-1] | \* | \* | \* | I | T1(-8,..,..)->error  TB(-1,…,…)->error |
| \* | [minint,-1] | \* | \* | I | T2(…,-8,…)->error  TB(…,-1,…)->error |
| \* | \* | [minint,0] | \* | I | T3(…,…,-8)->error  TB(…,…,0)->error |
| [1441,maxint] | \* | \* | \* | I | T4(1500,…,…)->error  TB(1441,…,…)->error |
| \* | [1441,maxint] | \* | \* | I | T5(…,1500,…)->error  TB(…,1441,…)->error |
| \* | \* | [4,maxint] | \* | I | T6(…,..,8)->error  TB(…,…,4)->error |
| [0,1440] | [0,1440] | 1 | F | V | T7(1000,500,1)->error  TB(1440,1440,1)->error |
| [0,1440] | [0,1440] | 2 | F | V | T8(500,500,2)->error  TB(441,500,2)->error |
| [0,1440] | [0,1440] | 3 | F | V | T9(500,400,3)->error  TB(439,334,3)->error |
| [0,1440] | [0,1440] | 1 | T | V | T10(60,20,1)->[60,80,-1,-1,-1,-1]  TB(60,1380,1)->[60,1440,-1,-1,-1,-1] |
| [0,1440] | [0,1440] | 2 | T | V | T11(60,20,2)->[60,80,780,800,-1,-1]  TB(60,660,2)->[60,720,780,1440,-1,-1] |
| [0,1440] | [0,1440] | 3 | T | V | T12(60,20,3)->[60,80,540,560,1020,1040]  TB(60,420,3)->[60,480,540,960,1020,1440] |

# 2014 07 02

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage type | N° of test cases to obtain 100% coverage | Coverage obtained with test cases defined | Test Cases defined |
| Node | 2 | 100% | T1-T2 |
| Edge | 2 | 100% | T1-T2 |
| Multiple Condition | No mult.cond. | - | - |
| Loop line 4 | 3 | 100% | Try no enter T3  Enter one T4  Enter many T1 |
| Path | 1+4^ | - | - |

T1([1,2,3,4,5,6,7,8,9],9,3) T2([1,2,3,4,5,6,7,8,9],9,40) T3([],0,5) T4([1,2,3],3,2)

# 2015 09 07

F requirements

|  |  |
| --- | --- |
| Mange Zone |  |
|  | Open Valve |
|  | Close Valve |
|  | Use default watering program |
|  | Use Simple Watering Program |
|  | Use Custom Watering Program |
|  | Use Weekly Custom Watering Program |
| Manage Simple watering Program |  |
|  | Set Start time |
|  | Set Duration |
| Manage Custom water Program |  |
|  | Set how many watering period per day |
|  | Set how many hours |
|  | Set durations |
| Manage Weekly Custom Watering Program |  |
| Manage Day of The Week |  |
|  | Set how many watering period |
|  | Set how many hours |
|  | Set durations |
| Rain Sensor |  |
|  | Disable watering if rain detected |

NF requirements

Domain period is A.M. , duration in minutes

Efficiency Response time < 0,5s

Usability System should be easily usable with no training by user with at least 1 month experience

CRITERIA

Side1

Side2

Side3

PREDICATES

Side1 Side2 Side3 sign <0,>0

Side1>Side2+Side3 Side1<=Side2-Side3 Wrong conditions

BOUNDARIES

Side1,2,3 [minint,-1] [0,maxint]

EQUIVALENCE CLASSES AND TESTS

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Side1 | Side2 | Side3 | Not a triangle | Valid | Test Cases |
| [minint,-1] | \* | \* | \* | I | T1(-8,…,…)->-1  TB(-1,…,…)->-1 |
| \* | [minint,-1] | \* | \* | I | T2(…,-8,…)->-1  TB(…,-1,…)->-1 |
| \* | \* | [minint,-1] | \* | I | T3(…,…,-8)->-1  TB(…,…,-1)->-1 |
| [0,maxint] | [0,maxint] | [0,maxint] | F | V | T4(10,10,10)->1  TB(0,0,0)->-1 |
| [0,maxint] | [0,maxint] | [0,maxint] | F | V | T5(1,1,3)->2  TB(0,0,0)->-1 |
| [0,maxint] | [0,maxint] | [0,maxint] | F | V | T6(1,2,3)->3  TB(0,0,0)->-1 |
| [0,maxint] | [0,maxint] | [0,maxint] | T (TT) | V | T7(1,2,4)->-1 |
| [0,maxint] | [0,maxint] | [0,maxint] | T (TF) | V | T8(1,2,4) |
| [0,maxint] | [0,maxint] | [0,maxint] | T (FT) | V |  |
|  |  |  |  |  |  |