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# 2021 08 30

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage Type | Number of test cases needed to obtain 100% coverage | Coverage obtained with test cases defined (%) | Test cases defined |
| Node Coverage | 1 | 100% | T1 |
| Edge Coverage | 1 | 100% | T1 |
| No Multiple Condition Here, so 100 % coverage | 1 | 100% | T1 |
| Loop Coverage | Loop iteration not input controlled, not feasible | 33%, only multiple iteration | T1 |
| Path Coverage | 4^6 | Not so much combination, coverage is feasible |  |

T1(1,2,3,4,5,6)

# 2022 06 29

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage type | Number of test cases to obtain 100 % coverage | Coverage obtained with the test cases defined | Test Cases Defined |
| Node | 2 | 100% | T1-T2 |
| Edge | 2 | 100% | T1-T2 |
| Multiple Decision | 4 | 100% | T1 FT  T2 FF  T3 TF  T4 TT |
| Loop Coverage line 4 | 3 | 100% (Try no enter, enter one, enter many) | T2 try no enter  T5 enter one  T6 enter many |
| Loop Coverage line 5 | 1 | 33% (only enter many, ,since depends on outer loop) | T5 enter many |
| Path Coverage | 2^(i\*(i-2)), depend on I so in the order of maxint\*maxint | Close to zero with test cases above  Not feasible |  |

T1(1,-1) T2(1,1) T3(-1,1) T4(-1,-1) T5(2,1) T6(4,1)

# 2022 07 11

FUNCTIONAL REQUIREMENTS

|  |  |
| --- | --- |
| **AUTHORIZE AUTHENTICATE** |  |
| REGISTER |  |
| LOGIN |  |
| LOGOUT |  |
| **APP** |  |
| SUBSCRIBE |  |
| **START USING THE SCOUTER** |  |
| UNLOCK THE SCOUTER |  |
| START COURSE TIMING |  |
| **FINISH USING THE SCOUTER** |  |
| LOCK THE SCOUTER |  |
| FINISH COURSE TIMING |  |
| PAY FOR THE SERVICE |  |
| **MAP** |  |
| SHOW MAP |  |
| SHOW AVAILABLE SCOUTERS WITH A MARKER |  |
| SHOW BATTERY PERCENTAGE WITH A NUMBER 0-100 |  |
| **SCOUTER** |  |
| SEND POSITION TO SERVER |  |
| SEND BATTERY INFORMATION TO THE SERVER |  |
| **TOUCHSCREEN** |  |
| SHOW MAP |  |
| INSERT/ CHANGE DESTINATION |  |
| SHOW SPEED |  |
| SHOW THE AMOUNT TO PAY |  |
| **ADMIN** |  |
| ADD SCOUTER |  |
| DELETE SCOUTER |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage type | N of test to obtain 100% coverage | Coverage obtained with defined tests | Test Cases defined |
| Node | 2 | 100% | T1-T2 |
| Edge (decision) | 1 | 100% | T1 |
| Multiple Condition | 8 in theory, but not feasible (N.F.) since A[i] annot be digit comma and dot a the same time | 50% | TTT (N.F)  TTF (N.F.)  TFT (N.F)  TFF T4  FFF T1  FTF T3  FFT T2  FTT (N.F.) |
| Loop Coverage | 3 | 100% | Try no Enter T5  Enter 1 Time T1  Enter Many T6 |
| Path Coverage | 2^(n), not feasible if n is too large, potentially 2^(maxint) | Not feasible |  |

T1(“A”,1) T2(“.”,1) T3(“,”,1) T4(“2”,1) T5(“”,0) T6(“AER”,3)

Development 12\*3\*1 = 36 person months = 3 person years Maintenance: 12\*1.5\*7 = 126 person months = 10.5 person years Maintenance costs are (according to these estimates) the major cost source

# 2022 09 12

NF Requirements:  
Efficiency Response time <0.5s, since in 1 minute code will expire

Security Only authenticated users (student) can send code and only authenticated users (teacher) can generate it. Only teacher/office can analyse trendings.

Availability Downtime Time <5s, since in 1 minute code will expire

Usability Time to learn by a new user < than 1 hour

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage type | N test to obtain 100% coverage | Coverage obtained with test case defined | Test case defined |
| Node | 3 | 100% | T1-T2-T3 |
| Edge | 3 | 100% | T1-T2-T3 |
| Multiple condition | 4 | 100% | TT T4  TF T1  FT T5  FF T2 |
| Loop Coverage | 3 (enter one not feasible) | 66% | T2 Try and no enter  T1 Enter many |
| Path Coverage | 2\*1\*2=4 feasible | 100% | T4-T6-T2-T3 |

T1(-1,-1,3) T2(3,0,3) T3(2,4,3) T4(2,2,2) T5(1,2,2) T6(3,-1,3)

# 2019 02 12

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage Type | N of test cases to obtain 100% COVERAGE | Coverage Obtained with test cases defined | Test Cases |
| Node | 3 | 100% | T1-T2-T3 |
| Edge | 3 | 100% | T1-T2-T3 |
| Multiple Condition | 0 (No Multiple Condition) | \* | \* |
| Loop | Not Feasible since it is not input controlled | 33%, only enter many | Any Input |
| Path | (2^3)\*2\*2\*2=64, so it is feasible | Almost 100% | T1-T2-T3 |

T1(7000) T2(19000) T3(37000)

# 2018 09 17

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage Type | N test case to obtain 100% | Coverage obtained with the test cases defined | Test cases defined |
| Node | 1 | 100% | T1 |
| Edge | 2 | 100% | T1-T2 |
| Multiple Condition | 4 | 100% | TT T1  TF T3  FT T4  FF T2 |
| Loop Line 8 | 3 | 100% | T5 Try no Enter  T2 Enter One  T1 Enter Many |
| Loop Line 17 | Not input Controlled, Not Feasible | 33%, only enter many | Any Test Case is Ok |
| Path | 2^(n\_penalties-1)\*2\*2^3 | 100% obtainable with automated test case generation mechanism | - |

T1([1,2,2],[1,1,1],6,[10,20,30,110,40,50]) T2([1,2,2],[1,1,1],1,[10])

T3([1,2,2],[1,1,1],3,[110,40,50]) T4([1,2,2],[1,1,1],6,[10,10,10,10,10,10])

T5([1,2,2],[1,1,1],0,[])

# 2018 07 13

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage Type | Number of test cases needed 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 | In theory: Line 8 (4 test),Line 10(4 test), but we can cover them with 1 test using different values in loop iteration | 100% | T2 |
| Loop | Not feasible, since iteration does not depend on input | 33%  Only multiple iterations | T1 or T2 |
| Path | 2\*3^(4\*5) | More than six million test cases to obtain full path coverage |  |

T1 ([1,1,1,1,1,…],[1,1,1,1,1,…]) 🡺 grade = 15

T2 ([1,1,0,1,1,…],[0,0,1,0,0,…]) 🡺 grade = -4 🡺 0 is returned

…

# 2018 06 28

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage Type | N test cases needed to obtain 100% coverage | Coverage obtained with the test cases defined | Test Cases Defined |
| Node | 3 | 100% | T1-T2-T3 |
| Edge | 3 | 100% | T1-T2-T3 |
| Multiple Decision line 11 | 4 in theory, only 3 possible (TT not feasible) | 75% | TF T1  FT T1  FF T2 or T3 |
| Loop line 10 | 3 | 100% | Try no Enter T5  Enter One T4  Enter Many T1 or T2 or T3 |
| Path | 2\*3^(n\_children)\*3 |  |  |

T1(50,0,2,[-8,150]) T2(100.10,1,2,[10,17]) T3(10000,1,2,[10,17])

T4(50,0,0,[]) T5(50,0,1,[15])

# 2018 02 06

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage Type | Number of test to obtain 100% coverage | Coverage Obtained with test cases defined | Test Cases |
| Node | 2 | 100% | T1-T2 |
| Edge | 2 | 100% | T1-T2 |
| Multiple Condition Line 13 | 4 | 100% | TT T3  TF T4  FT T1  FF T2 |
| Loop Line 8 | 3 in theory, but not input controlled so not feasible | 33%, only enters many | Any test case |
| Path | 2^3\*2 | Not all feasible condition linked | T2-T3 |

T1(0,2,2) T2(8,8,8) T3(0,0,1) T4(0,0,8)

A test with (0,0,0) causes a division by 0, so an exception

# 2017 10 02

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage type | N test case to obtain 100% coverage | Coverage obtained with test cases defined | Test cases defined |
| Node | 1 | 100% | T1 |
| Edge | 2 | 100% | T1-T2 |
| Multiple Condition line 6 | 4 in theory, but covered with iteration of the loop. FF is not feasible | 75% | TT T1  TF T2  FT T1 |
| Loop line 5 | 3 in theory but not feasible, since no input controlled | 33%, only enter many | Any test |
| Path | 3 path (2 iteration and 1 for exiting) | 100% | T1-T2-T3 |

T1(7) T2(16) T3(30)

# 2017 07 24

NF requirements

Security Payment must be performed in a secure way.

Privacy Only authenticated users can access their area.

Usability System easioly usable with no training

Efficiency Response time <0.5 second

Precondition: User authenticated and with credit card informations added, with a car

Postcondition: Fee has been paid and registered

1. User select pay fee, tipology one-ff
2. User perform payment with already registered credit card information
3. System check the balance.
4. Fee has been paid and registered

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage type | Number of test to obtain 100% coverage | Coverage obtained with test cases defined | Test Cases |
| Node | 3 | 100% | T1-T2-T3 |
| Edge | 3 | 100% | T1-T2-T3 |
| Multiple Condition line 10 | 4 in theory, but TT not feasible. Also one test case with loop iteration cover the remaining 3 | 75% | TF T1 FT T1  FF T1 |
| Multiple Condition line 16 | 4 | 100% | TT T1  TF T5  FT T4  FF T3 |
| Loop line 5 | 3 in theory, but not input controlled, so not feasible | 33%, only enter many | Any test case |
| Path | 8^5+1+1+1 | Not feasible |  |

T1(20,10,16,-5,105) T2(20,20,10,10,10) T3(16,16,16,16,16)

T4(10,10,10,10,10) T5(20,20,20,20,20)

# 2017 07 03

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage type | Number of test cases to obtain 100% coverage | Coverage obtained with test cases defined | Test Cases Defined |
| Node | 1 | 100% | T1 |
| Edge | 1 | 100% | T1 |
| Multiple Condition line 3 | 4 | 100% | TT T1  TF T2  FT T3  FF T1 |
| Loop line 3 | 3 | 100% | Try no enter T3  Enter one T4  Enter many T1 |
| Loop line 5 | 3 in theory, but try no enter not feasible since has the same behaviour of the outer loop | 66% | Try no enter not feasible  Enter one T4  Enter many T1 |
| Path | 2^((n-1)^2) 🡪 O(n^2) | Not feasible |  |

T1([3,2,5],3) T2([1,2,3],3) T3([1],1) T4([1,2],2)

# 2016 09 22

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage type | Number of test cases to obtain 100% coverage | Coverage obtained with test cases defined | Test Cases Defined |
| Node | 1 | 100% | T1 |
| Edge | 1 | 100% | T1 |
| Multiple Condition line 4 | 4 in theory but TF not feasible if i<array.lenth-1 will be also <MAXINT | 100% | TT T1 TF T5  FT T1  FF T4 |
| Loop line 4 | 3 | 100% | Try no enter T3  Enter one T2  Enter many T1 |
| Path | 2^(array.length-1) | Since length of array can be very high coverage is close to zero |  |

T1([3,2,1]) T2([1,2]) T3([1]) array of maxint length 🡺 T4([1,2,3,…,])

Array longer than maxint 🡺 T5([1,2,3,…])

# 2014 09 01

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage Type | Number of test cases to obtain 100% coverage | Coverage obtained with test cases defined | Test Cases Defined |
| Node | 1 | 100% | T1 |
| Edge | 1 | 100% | T1 |
| Multiple Condition | No Multiple Cond. | - | - |
| Loop line 3 | 3 | 100% | Try no Enter T2  Enter one T3  Enter many T1 |
| Loop line 4 | 3 | 66% | Try no Enter Not feasible  Enter one T1  Enter many T1 |
| Path | 2^((arr.length-1)^2) | Since arr.length can be very high, coverage is close to zero | - |

T1([2,1,3]) T2([]) T3([1,2])

# 2015 07 24

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage Type | Number of test Cases to obtain 100% coverage | Coverage obtained with test cases defined | Test Cases Defined |
| Node | 2 | 100% | T1-T2 |
| Edge | 3 | 100% | T1-T2-T3 |
| Multiple Condition line 7 | 4 | 100% | TT T2  TF T4  FT T5  FF T3 |
| Loop line 6 | 3 | 100% | Try no enter T6  Enter one T2  Enter many T3 |
| Loop line 9 | 3 in theory, but one test case is enough to cover since managed by outer loop | 100% | Try no Enter T4  Enter one T4  Enter many T4 |
| Path | 1+2^x | Since the value of x can be very high, coverage is close to zero | - |

T1(-1,5) T2(1,5) T3(40,30) T4(30,40) T5(10,5) T6(0,5)

# 2014 07 02

F requirements

|  |  |
| --- | --- |
| Authorize/Authenticate |  |
|  | Register |
|  | Login |
|  | Logout |
| Enter Food |  |
|  | Select it From a predefined List |
|  | Customize quantities/list |
| Show RDA list |  |
| Manage Eating Habits |  |
|  | Monitor Eating Habits by Calories |
|  | Monitor Eating Habits by Day |
|  | Monitor Eating Habits by Meal |
|  | Compare Habits with RDA list |
| Define Diet |  |

NF requirements

Domain Quantities are expressed in grams, Calories in kcal

Efficiency Response time <0,5 seconds

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

Privacy An user can see only his diet/information inserted

Precondition: User is logged in

Postcondition: User has inserted a meal

1. User opens the app and insert his meal (taking it from the predefined list or by inserting it manually)
2. System checks the insertion
3. System saves the meal, and updats the amount of calories and diet trend of the user.

CRITERIA

Weightproteins

Weightfats

Weightcarbohydrates

PREDICATES

Weightproteins, Weightfats and Weightcarbohydrates sign <0,>0

BOUNDARIES

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

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

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

EQUIVALENCE CLASSES AND TEST

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Weightproteins | Weightfats | Weightcarbohydrates | 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,maxint] | V | T4(1,2,3)->34  TB(0,0,0)->0 |
| [0,maxint] | [0,maxint] | [0,maxint] | V | T5(0,2,3)->30 |
| [0,maxint] | [0,maxint] | [0,maxint] | V | T6(1,0,3)->16 |
| [0,maxint] | [0,maxint] | [0,maxint] | V | T7(1,2,0)->22 |

# 2015 09 07

|  |  |  |  |
| --- | --- | --- | --- |
| Coverage Type | N of test cases to obtain 100% coverage | Coverage obtained with test cases defined | Test Cases Defined |
| Node | 3 | 100% | T1-T2-T3 |
| Edge | 4 | 100% | T1-T2-T3-T4 |
| Multiple Condition | No mult.cond | - | - |
| Loop line 7 | 3 in theory, but not easible, since not input controlled | 33% (only enters many) | Any test case |
| Path | 2^3\*2\*2\*2=64 | feasible |  |

T1(8000) T2(16000) T3(50000) T4(50)