**Fall 2019**

**CSE-5321-002 - Software Testing**

**Homework Assignment 2**

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Please find the worksheet I used for calculations (HW\_2\_answers.xlsx), attached to the zip file I submitted.

**Problem 1**

1. **Test case Table**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test Case Number** | **Current State** | **Inputs** | | | | | | **Internal** | | | | | **Expected Outputs** | | | | | **Next State** |
| **N** | **V** | **E** | **C** | **U** | **L** | **D1** | **D2** | **D3** | **D4** | **D1D2D3D4==code** | **B** | **R** | **Y** | **G** | **X** |
| 1 | Start | - | - | - | - | - | - | null | null | null | null | - | F | F | F | F | T | S0 |
| 2 | S0 | F | - | T | F | F | F | null | null | null | null | - | F | F | F | F | T | S0 |
| 3 | S0 | F | - | F | T | F | F | null | null | null | null | - | F | F | F | F | T | S0 |
| 4 | S0 | F | - | F | F | T | F | null | null | null | null | - | F | F | F | F | T | S0 |
| 5 | S0 | F | - | F | F | F | T | null | null | null | null | - | F | F | F | F | T | S0 |
| 6 | S0 | T | V | F | F | F | F | V | null | null | null | - | T | F | F | F | T | S1 |
| 7 | S1 | F | - | T | F | F | F | V | null | null | null | - | T | F | F | F | T | S1 |
| 8 | S1 | F | - | F | F | T | F | V | null | null | null | - | T | F | F | F | T | S1 |
| 9 | S1 | F | - | F | F | F | T | V | null | null | null | - | T | F | F | F | T | S1 |
| 10 | S1 |  | - |  | T |  |  | null | null | null | null | - |  |  |  |  | T | S0 |
| 11 | S1 | T | V | F | F | F | F | V | V | null | null | - | F | T | F | F | T | S2 |
| 12 | S2 | F | - | T | F | F | F | V | V | null | null | - | F | T | F | F | T | S2 |
| 13 | S2 | F | - | F | F | T | F | V | V | null | null | - | F | T | F | F | T | S2 |
| 14 | S2 | F | - | F | F | F | T | V | V | null | null | - | F | T | F | F | T | S2 |
| 15 | S2 |  | - |  | T |  |  | V | null | null | null | - | T |  |  |  | T | S1 |
| 16 | S2 | T | V | F | F | F | F | V | V | V | null | - | F | F | T | F | T | S3 |
| 17 | S3 | F | - | T | F | F | F | V | V | V | null | - | F | F | T | F | T | S3 |
| 18 | S3 | F | - | F | F | T | F | V | V | V | null | - | F | F | T | F | T | S3 |
| 19 | S3 | F | - | F | F | F | T | V | V | V | null | - | F | F | T | F | T | S3 |
| 20 | S3 |  | - |  | T |  |  | V | V | null | null | - |  | T |  |  | T | S2 |
| 21 | S3 | T | V | F | F | F | F | V | V | V | V | - | F | F | F | T | T | S4 |
| 22 | S4 | T | V | F | F |  |  | V | V | V | V | - | F | F | F | T | T | S4 |
| 23 | S4 | F | F | F | F | T |  | V | V | V | V | - | F | F | F | T | T | S4 |
| 24 | S4 | F | F | F | F |  | T | V | V | V | V | - | F | F | F | T | T | S4 |
| 25 | S4 |  | - |  | T |  |  | V | V | V | null | - |  |  | T |  | T | S3 |
| 26 | S4 | F | - | T | F | F | F | V | V | V | V | - | F | F | F | F | T | S5 |
| 27 | S5 | T | V | F | F | F | F | V | V | V | V | - | F | F | F | F | T | S5 |
| 28 | S5 | F | F | T | F | F | F | V | V | V | V | - | F | F | F | F | T | S5 |
| 29 | S5 | F | F | F | T | F | F | V | V | V | V | - | F | F | F | F | T | S5 |
| 30 | S5 | F | F | F | F | F | T | V | V | V | V | - | F | F | F | F | T | S5 |
| 31 | S5 | F | - | F | F | T | F | null | null | null | null | - | F | F | F | F | T | S6 |
| 32 | S6 |  | - |  |  |  |  | null | null | null | null | F |  |  |  |  | T | S0 |
| 33 | S6 | F | - | F | F | F | F | null | null | null | null | T | T | T | T | T | F | S7 |
| 34 | S7 | T | V | F | F | F | F | null | null | null | null | - | T | T | T | T | F | S7 |
| 35 | S7 | F | F | T | F | F | F | null | null | null | null | - | T | T | T | T | F | S7 |
| 36 | S7 | F | F | F | T | F | F | null | null | null | null | - | T | T | T | T | F | S7 |
| 37 | S7 | F | F | F | F | T | F | null | null | null | null | - | T | T | T | T | F | S7 |
| 38 | S7 | F | - | F | F | F | T | null | null | null | null | - | F | F | F | F | T | S0 |

1. **Sequence enumeration**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Length** | **Sequence** | **Response** | **Equivalence** | **Carry to next level** |
| 0 | Idle | B=R=Y=G=F,D1=D2=D3=D4=null,X=T | - |  |
| 1 | N | B=T,R=Y=G=F,D1=V,D2=D3=D4=null,X=T | - | Yes |
| 1 | E | B=R=Y=G=F,D1=D2=D3=D4=null,X=T | Idle |  |
| 1 | C | B=R=Y=G=F,D1=D2=D3=D4=null,X=T | Idle |  |
| 1 | U | B=R=Y=G=F,D1=D2=D3=D4=null,X=T | Idle |  |
| 1 | L | B=R=Y=G=F,D1=D2=D3=D4=null,X=T | Idle |  |
| 2 | NN | R=T,B=Y=G=F,D1=V,D2=V,D3=D4=null,X=T | - | Yes |
| 2 | NE | B=T,R=Y=G=F,D1=V,D2=D3=D4=null,X=T | N |  |
| 2 | NC | B=R=Y=G=F,D1=D2=D3=D4=null,X=T | Idle |  |
| 2 | NU | B=T,R=Y=G=F,D1=V,D2=D3=D4=null,X=T | N |  |
| 2 | NL | B=T,R=Y=G=F,D1=V,D2=D3=D4=null,X=T | N |  |
| 3 | NNN | Y=T,B=R=G=F,D1=V,D2=V,D3=V,D4=null,X=T | - | Yes |
| 3 | NNE | R=T,B=Y=G=F,D1=V,D2=V,D3=D4=null,X=T | NN |  |
| 3 | NNC | B=T,R=Y=G=F,D1=V,D2=D3=D4=null,X=T | N |  |
| 3 | NNU | R=T,B=Y=G=F,D1=V,D2=V,D3=D4=null,X=T | NN |  |
| 3 | NNL | R=T,B=Y=G=F,D1=V,D2=V,D3=D4=null,X=T | NN |  |
| 4 | NNNN | G=T,B=R=Y=F,D1=V,D2=V,D3=V,D4=V,X=T | - | Yes |
| 4 | NNNE | Y=T,B=R=G=F,D1=V,D2=V,D3=V,D4=null,X=T | NNN |  |
| 4 | NNNC | R=T,B=Y=G=F,D1=V,D2=V,D3=D4=null,X=T | NN |  |
| 4 | NNNU | Y=T,B=R=G=F,D1=V,D2=V,D3=V,D4=null,X=T | NNN |  |
| 4 | NNNL | Y=T,B=R=G=F,D1=V,D2=V,D3=V,D4=null,X=T | NNN |  |
| 5 | NNNNN | G=T,B=R=Y=F,D1=V,D2=V,D3=V,D4=V,X=T | NNNN |  |
| 5 | NNNNE | B=R=Y=G=F,D1=V,D2=V,D3=V,D4=V,X=T | - | Yes |
| 5 | NNNNC | Y=T,B=R=G=F,D1=V,D2=V,D3=V,D4=null,X=T | NNN |  |
| 5 | NNNNU | G=T,B=R=Y=F,D1=V,D2=V,D3=V,D4=V,X=T | NNNN |  |
| 5 | NNNNL | G=T,B=R=Y=F,D1=V,D2=V,D3=V,D4=V,X=T | NNNN |  |
| 6 | NNNNEN | B=R=Y=G=F,D1=V,D2=V,D3=V,D4=V,X=T | NNNNE |  |
| 6 | NNNNEE | B=R=Y=G=F,D1=V,D2=V,D3=V,D4=V,X=T | NNNNE |  |
| 6 | NNNNEC | B=R=Y=G=F,D1=V,D2=V,D3=V,D4=V,X=T | NNNNE |  |
| 6 | NNNNEU | B=R=Y=G=F,D1=D2=D3=D4=null,X=T | - | Yes |
| 6 | NNNNEL | B=R=Y=G=F,D1=V,D2=V,D3=V,D4=V,X=T | NNNNE |  |
| 6a | NNNNEU and D1D2D3D4!=code | B=R=Y=G=F,D1=D2=D3=D4=null,X=T | - |  |
| 6a | NNNNEU and D1D2D3D4==code | B=R=Y=G=T,D1=D2=D3=D4=null,X=F | - | Yes |
| 7 | NNNNEUN | B=R=Y=G=T,D1=D2=D3=D4=null,X=F | NNNNEU |  |
| 7 | NNNNEUE | B=R=Y=G=T,D1=D2=D3=D4=null,X=F | NNNNEU |  |
| 7 | NNNNEUC | B=R=Y=G=T,D1=D2=D3=D4=null,X=F | NNNNEU |  |
| 7 | NNNNEUU | B=R=Y=G=T,D1=D2=D3=D4=null,X=F | NNNNEU |  |
| 7 | NNNNEUL | B=R=Y=G=F,D1=D2=D3=D4=null,X=T | Idle |  |

|  |  |
| --- | --- |
|  | Cannonical states |
|  | Jumps to previous state |

1. **Canonical states**

Canonical states are N,NN,NNN,NNNN,NNNNE,NNNNEU

**Problem 2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Test Case Number** | **Input** | | | |  | **Expected output** |
| **Number of Drinks** | **Discount Type** | **Drink Type** | **Size** | **Payment Type** | **Return** |
| 1 | 1 | None | Coffee | Small | Cash | 1.66954 |
| 2 | 1 | Student | Tea | Regular | CreditCard | 1.142459 |
| 3 | 1 | Teacher | Soda | Large | DebitCard | 1.790915 |
| 4 | 4 | None | Tea | Large | Cash | 5.613434 |
| 5 | 4 | Student | Coffee | Grande | DebitCard | 11.46303 |
| 6 | 4 | Teacher | Slushy | Small | CreditCard | 5.041917 |
| 7 | 7 | None | Soda | Regular | CreditCard | 11.57846 |
| 8 | 7 | Student | Slushy | Large | Cash | 10.62725 |
| 9 | 7 | Teacher | Coffee | Regular | Cash | 12.76781 |
| 10 | 7 | Military | Tea | Small | DebitCard | 6.376466 |
| 11 | 12 | None | Slushy | Grande | DebitCard | 28.59749 |
| 12 | 12 | Military | Coffee | Large | CreditCard | 24.4116 |
| 13 | 12 | Frequent | Soda | Small | Cash | 13.00351 |
| 14 | 17 | Military | Cappuccino | Regular | Cash | 45.19237 |
| 15 | 17 | Frequent | Tea | Grande | CreditCard | 27.77224 |
| 16 | 17 | Coupon | Soda | Grande | Cash | 38.34004 |
| 17 | 17 | Employee | Slushy | Regular | DebitCard | 18.88787 |
| 18 | 20 | Frequent | Cappuccino | Large | DebitCard | 60.55938 |
| 19 | 20 | Coupon | Cappuccino | Small | CreditCard | 51.98013 |
| 20 | 20 | Employee | Coffee | Grande | Cash | 46.32973 |
| 21 | 31 | Coupon | Coffee | Regular | DebitCard | 55.2239 |
| 22 | 31 | Employee | Cappuccino | Small | CreditCard | 67.14101 |
| 23 | 31 | Student | Soda | Small | Cash | 37.79145 |
| 24 | 50 | Teacher | Cappuccino | Grande | Cash | 238.9818 |
| 25 | 50 | Military | Soda | Large | CreditCard | 82.52348 |
| 26 | 50 | Frequent | Coffee | Regular | DebitCard | 79.17405 |
| 27 | 1 | Military | Slushy | Grande | CreditCard | 2.086425 |
| 28 | 4 | Coupon | Tea | Regular | Cash | 4.303632 |
| 29 | 7 | Coupon | Slushy | Large | CreditCard | 11.28461 |
| 30 | 7 | Employee | Tea | Grande | DebitCard | 10.40864 |
| 31 | 12 | Employee | Soda | Regular | CreditCard | 14.88659 |
| 32 | 17 | None | Coffee | Small | CreditCard | 30.13777 |
| 33 | 20 | None | Soda | Regular | DebitCard | 32.11778 |
| 34 | 31 | Teacher | Tea | Large | DebitCard | 42.60712 |
| 35 | 31 | Frequent | Slushy | Grande | Cash | 57.32842 |
| 36 | 50 | Student | Cappuccino | Small | DebitCard | 126.1654 |
| 37 | 1 | Employee | Cappuccino | Large | Cash | 2.753559 |
| 38 | 4 | Military | Soda | Grande | DebitCard | 8.783513 |
| 39 | 4 | Frequent | Cappuccino | Regular | CreditCard | 10.62705 |
| 40 | 12 | Student | Tea | Small | Cash | 11.22687 |
| 41 | 12 | Teacher | Cappuccino | Grande | CreditCard | 60.90339 |
| 42 | 17 | Student | Coffee | Large | CreditCard | 36.6174 |
| 43 | 20 | Military | Slushy | Small | Cash | 21.24201 |
| 44 | 20 | None | Tea | Large | CreditCard | 29.80328 |
| 45 | 50 | None | Slushy | Regular | Cash | 71.84796 |
| 46 | 50 | Coupon | Tea | Small | DebitCard | 48.22538 |
| 47 | 7 | None | Cappuccino | Grande | DebitCard | 36.30759 |
| 48 | 1 | Frequent | Slushy | Small | DebitCard | 1.03054 |
| 49 | 12 | Coupon | Coffee | Large | DebitCard | 25.09473 |
| 50 | 17 | Teacher | Tea | Small | DebitCard | 17.30755 |
| 51 | 31 | Military | Coffee | Regular | CreditCard | 53.72058 |
| 52 | 50 | Employee | Coffee | Large | CreditCard | 89.74852 |
| 53 | 1 | Coupon | Soda | Grande | CreditCard | 2.394799 |
| 54 | 4 | Employee | Soda | Small | Cash | 4.063597 |
| 55 | 7 | Frequent | Coffee | Small | Cash | 9.349423 |
| 56 | 20 | Student | Soda | Regular | DebitCard | 28.906 |
| 57 | 20 | Teacher | Slushy | Regular | CreditCard | 28.99102 |
| 58 | 31 | None | Cappuccino | Large | Cash | 113.8138 |