

# Decision Table Testing

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# Example: Open Credit Card Discount

- If you want to open a credit card account then there are three conditions
  1. If you are a new customer, you will get a 15% discount on all your purchases today
  2. If you are an existing customer and you hold a loyalty card, you get a 10% discount
  3. If you have a coupon, you can get 20% off today (but it can not be used with the new customer discount).
- Discount amounts are added, if applicable.

➔ Different input combinations?

➔ Need how many Test Cases?

# Decision Table Testing

- A software testing technique based on Decision Table, a tabular representation of inputs versus rules/cases/test conditions.
- Helps to test different combinations of conditions and provide better test coverage for complex business logic
- Disadvantage: when the number of input increases the table will become more complex

|                 |        | Combinations |   |   |   |   |   |   |   |
|-----------------|--------|--------------|---|---|---|---|---|---|---|
| Causes          | Values | 1            | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <i>Cause 1</i>  | Y, N   | Y            | Y | Y | Y | N | N | N | N |
| <i>Cause 2</i>  | Y, N   | Y            | Y | N | N | Y | Y | N | N |
| <i>Cause 3</i>  | Y, N   | Y            | N | Y | N | Y | N | Y | N |
| Effects         |        |              |   |   |   |   |   |   |   |
| <i>Effect 1</i> |        | X            |   |   | X |   |   |   | X |
| <i>Effect 2</i> |        |              | X |   |   |   | X |   | X |

# Decision Table Testing

## □ 4 steps

1. Identify Causes and Effects
2. Create Decision Table
3. Reduce Decision Table
4. Transform each column in Decision table into a Test Case

# 1. Identify Causes & Effects

## ☐ Causes

- ☐ C1: you are a new customer
- ☐ C2: you are an existing customer and you hold a loyalty card
- ☐ C3: you have a coupon

## ☐ Effects

- ☐ E1: 15% discount
- ☐ E2: 10% discount
- ☐ E3: 20% discount

## 2. Create Decision Table

| Cause           | 1 | 2 | 3   | 4   | 5   | 6   | 7   | 8  |
|-----------------|---|---|-----|-----|-----|-----|-----|----|
| C1 (new)        | T | T | T   | T   | F   | F   | F   | F  |
| C2 (loyalty)    | T | T | F   | F   | T   | T   | F   | F  |
| C3 (coupon)     | T | F | T   | F   | T   | F   | T   | F  |
| Effect          |   |   |     |     |     |     |     |    |
| E1 (15%)        |   |   | X   | X   |     |     |     |    |
| E2 (10%)        |   |   |     |     | X   | X   |     |    |
| E3 (20%)        |   |   |     |     | X   |     | X   |    |
| E4 (impossible) | X | X |     |     |     |     |     |    |
| Discount        | - | - | 15% | 15% | 30% | 10% | 20% | 0% |

# 3. Reduced Decision Table

| Cause         | 3   | 5   | 6   | 7   | 8  |
|---------------|-----|-----|-----|-----|----|
| C1 (new)      | T   | F   | F   | F   | F  |
| C2 (VIP)      | F   | T   | T   | F   | F  |
| C3 (coupon)   | —   | T   | F   | T   | F  |
| <b>Effect</b> |     |     |     |     |    |
| E1 (15%)      | X   |     |     |     |    |
| E2 (10%)      |     | X   | X   |     |    |
| E3 (20%)      |     | X   |     | X   |    |
| Chiết khấu    | 15% | 30% | 10% | 20% | 0% |

**Each column in Decision Table is a Test Case**

## 4. Generate Test Cases

| #TC | Input |     |        | Expected Output |
|-----|-------|-----|--------|-----------------|
|     | New   | VIP | Coupon | Chiết khấu      |
| TC1 | Y     | N   | Y      | 15%             |
| TC2 | N     | Y   | Y      | 30%             |
| TC3 | N     | Y   | N      | 10%             |
| TC4 | N     | N   | Y      | 20%             |
| TC5 | N     | N   | N      | 0%              |

**Each column in Decision Table is a Test Case**



# Triangle Problem

- ☐ Input: 3 sides of a triangle ( $a$ ,  $b$ ,  $c$ )
- ☐ Output:
  - ☐ Not triangle
  - ☐ Scalene
  - ☐ Isosceles
  - ☐ Equilateral

# Identify Causes & Effects

## ☐ Causes:

- ☐ C1:  $a < b + c$
- ☐ C2:  $b < a + c$
- ☐ C3:  $c < a + b$
- ☐ C4:  $a = b$
- ☐ C5:  $a = c$
- ☐ C6:  $b = c$

## ☐ Effects:

- ☐ E1: Not triangle
- ☐ E2: Scalene
- ☐ E3: Isosceles
- ☐ E4: Equilateral

## Recuded Decision Table

Pick input  $\langle a, b, c \rangle$  for each of the columns

Assume a, b and c are all between 1 and 200

1.  $a < b + c$
2.  $b < a + c$
3.  $c < a + b$
4.  $a = b$
5.  $a = c$
6.  $b = c$

1. Not triangle
2. Scalene
3. Isosceles
4. Equilateral
5. *impossible*

Note the  
Impossible cases

# Test Cases

| #TC | Input |   |   | Expected Output |
|-----|-------|---|---|-----------------|
|     | a     | b | c |                 |
| TC1 | 4     | 1 | 2 | Not triangle    |
| TC2 | 1     | 4 | 2 | Not triangle    |
| TC3 | 1     | 2 | 4 | Not triangle    |
| TC4 | 5     | 5 | 5 | Equilateral     |
| TC5 | 2     | 2 | 3 | Isosceles       |
| TC6 | 2     | 3 | 2 | Isosceles       |
| TC7 | 3     | 2 | 2 | Isosceles       |
| TC8 | 3     | 4 | 5 | Scalene         |

# Next Date Problem

- ☐ M1= {month | month has 30 days}
- ☐ M2= {month | month has 31 days}
- ☐ M3= {month | month is December}
- ☐ M4= {month | month is February}
- ☐ D1= {day |  $1 \leq \text{day} \leq 27$ }
- ☐ D2= {day | day = 28}
- ☐ D3= {day | day = 29}
- ☐ D4= {day | day = 30}
- ☐ D5= {day | day=31}
- ☐ Y1= {year | year is a leap year}
- ☐ Y2= {year | year is a common year}

# Decision Table

| Cause               | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
|---------------------|----|----|----|----|----|----|----|----|----|----|
| C1: month in        | M1 | M1 | M1 | M1 | M1 | M2 | M2 | M2 | M2 | M2 |
| C2: day in          | D1 | D2 | D3 | D4 | D5 | D1 | D2 | D3 | D4 | D5 |
| C3: year in         | -  | -  | -  | -  | -  | -  | -  | -  | -  | -  |
| Effect              |    |    |    |    |    |    |    |    |    |    |
| E1: Impossible      |    |    |    |    | X  |    |    |    |    |    |
| E2: Increment day   | X  | X  | X  |    |    | X  | X  | X  | X  |    |
| E3: Reset day       |    |    |    | X  |    |    |    |    |    | X  |
| E4: Increment month |    |    |    | X  |    |    |    |    |    | X  |
| E5: reset month     |    |    |    |    |    |    |    |    |    |    |
| E6: Increment year  |    |    |    |    |    |    |    |    |    |    |

# Decision Table (tt)

| Cause               | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---------------------|----|----|----|----|----|----|----|----|----|----|----|----|
| C1: month in        | M3 | M3 | M3 | M3 | M3 | M4 | M4 | M4 | M4 | M4 | M4 | M4 |
| C2: day in          | D1 | D2 | D3 | D4 | D5 | D1 | D2 | D2 | D3 | D3 | D4 | D5 |
| C3: year in         | -  | -  | -  | -  | -  | -  | Y1 | Y2 | Y1 | Y2 | -  | -  |
| Effect              |    |    |    |    |    |    |    |    |    |    |    |    |
| E1: Impossible      |    |    |    |    |    |    |    |    |    | X  | X  | X  |
| E2: Increment day   | X  | X  | X  | X  |    | X  | X  |    |    |    |    |    |
| E3: Reset day       |    |    |    |    | X  |    |    | X  | X  |    |    |    |
| E4: Increment month |    |    |    |    |    |    |    | X  | X  |    |    |    |
| E5: reset month     |    |    |    |    | X  |    |    |    |    |    |    |    |
| E6: Increment year  |    |    |    |    | X  |    |    |    |    |    |    |    |

# Test Cases

| #TC | Input |       |      | Expected Output |
|-----|-------|-------|------|-----------------|
|     | Day   | Month | Year | Next Date       |
| TC1 | 2     | 4     | 2013 | 4/3/2013        |
| TC2 | 28    | 4     | 2013 | 4/29/2013       |
| TC3 | 29    | 4     | 2013 | 4/30/213        |
| TC4 | 30    | 4     | 2013 | 5/1/2013        |
| TC5 | 31    | 2     | 2013 | Error           |
| TC6 | 2     | 5     | 2013 | 5/3/2013        |
| TC7 | 28    | 5     | 2013 | 5/29/2013       |
| TC8 | 29    | 5     | 2013 | 5/30/2013       |



# Test Cases (tt)

| #TC  | Input |       |      | Expected Output |
|------|-------|-------|------|-----------------|
|      | Day   | Month | Year | Next Date       |
| TC9  | 30    | 5     | 2013 | 5/31/2013       |
| TC10 | 31    | 5     | 2013 | 6/1/2013        |
| TC11 | 2     | 12    | 2013 | 12/3/2013       |
| TC12 | 28    | 12    | 2013 | 12/29/2013      |
| TC13 | 29    | 12    | 2013 | 12/30/213       |
| TC14 | 30    | 12    | 2013 | 12/31/2013      |
| TC15 | 31    | 12    | 2013 | 1/1/2014        |

# Test Cases (tt)

| #TC  | Input |       |      | Expected Output |
|------|-------|-------|------|-----------------|
|      | Day   | Month | Year | Next Date       |
| TC16 | 2     | 2     | 2013 | 2/3/2013        |
| TC17 | 28    | 2     | 2000 | 2/29/2000       |
| TC18 | 28    | 2     | 2013 | 3/1/2013        |
| TC19 | 29    | 2     | 2000 | 3/1/2000        |
| TC20 | 29    | 2     | 2013 | Error           |
| TC21 | 30    | 2     | 2013 | Error           |
| TC22 | 31    | 2     | 2013 | Error           |