**Example 1 – Decision Coverage**

Given the following code snippet. Apply Decision Coverages to solve it.

If ( ( EBC or Minority ) and State = MH ) Then

50% Fee Concession

Else

No Concession

End if

**How many Decisions ?**

Answer : one decision i.e. ( ( EBC or Minority ) and State = MH )

**How many Conditions ?**

Answer : three conditions

Conditions :

A : EBC=yes

B : Minority=yes

C : State=MH

Therefore, it is represented as **(A or B) and C**

We get the following TRUTH TABLE :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | A or B | (A or B) and C |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 |

Apply CC :

To ensure **Condition coverage** criteria for this example, A, B and C should be evaluated at least one time "true" and one time "false" during tests, which would be the case with **2 tests**:

Answer 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | A or B | (A or B) and C |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 |

TC 1: A=0; B=0; C=0

TC 2: A=1; B=1; C=1

(or) Answer 2 :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | A or B | (A or B) and C |
| 0 | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 |

TC 1: A=0; B=0; C=1

TC 2: A=1; B=1; C=0

(or) you can think of more combinations.

**Ans: Two test cases are enough sufficing the rule of Condition Coverage.**

Apply DC :

To ensure **Decision coverage** criteria, (A or B) and C should be evaluated at least one time "true" and one time "false" during tests, which would be the case with **2 tests**:

Answer 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | A or B | (A or B) and C |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 |

TC 1: (A or B) and C =0

TC 2: (A or B) and C =1

(or) Answer 2 :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | A or B | (A or B) and C |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 1 | 1 |

TC 1: (A or B) and C =0

TC 2: (A or B) and C =1

(or) you can think of more combinations.

**Ans: Two test cases are enough sufficing the rule of Decision Coverage.**

Apply Condition Decision Coverage :

To ensure **Condition Decision coverage** criteria, A, B, C conditions and the decision outcome should be evaluated at least one time "true" and one time "false" and this with effecting the decision’s outcome, which would be the case with **2 tests**:

Answer 1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | A or B | (A or B) and C |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 |

TC 1: A=0; B=0; C=0 (A or B) and C =0

TC 2: A=1; B=1; C=1 (A or B) and C =1

(or) Answer 2 :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | A or B | (A or B) and C |
| 0 | 1 | 0 | 1 | 0 |
| 1 | 0 | 1 | 1 | 1 |

TC 1: A=0; B=1; C=0 (A or B) and C =0

TC 2: A=1; B=0; C=1 (A or B) and C =1

(or) you can think of more combinations.

**Ans: Two test cases are enough sufficing the rule of Condition Decision Coverage.**

Apply Multiple coverage :

To ensure **Multiple coverage** criteria for this example, A, B and C should be evaluated for **all possible combinations** of results, so the full coverage decision table is generated which would be the case with 2^3 = **8 tests**:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | A or B | (A or B) and C |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 |

Apply MCDC :

Q. Identify is the missing cell ?

|  |  |  |
| --- | --- | --- |
| (A or B) and C | 1 | 0 |
| A | 1 0 1 | 0 0 1 |
| B | . . . | ~~0 0 1~~ |
| C | ? ? 1 | ? ? 0 |

Answer : 0 1 1

|  |  |  |
| --- | --- | --- |
| (A or B) and C | 1 | 0 |
| A | 1 0 1 | 0 0 1 |
| B | 0 1 1 | ~~0 0 1~~ |
| C | ~~0 1 1~~  ~~1 0 1~~  1 1 1 | 0 1 0  1 0 0  1 1 0 |

**Note :** Neutral value of AND is ‘1’, so choose A and B that causes the result of (A or B) = 1

* 3 possibilities
  + 1 0
  + 0 1
  + 1 1

Underlined values are determinant values & non-underlined are noted as per the neutral values to satisfy the TRUE & FALSE column.