EXPERIMENT 5

Aim :

(a) Write a Program in C/C++ to compute previous date, given the present date as input and perform data flow testing.

1. Algorithm
2. Define/Use Table
3. Du Path Table
4. All uses-definition clear
5. Test case table of all uses
6. Test case table of all definition

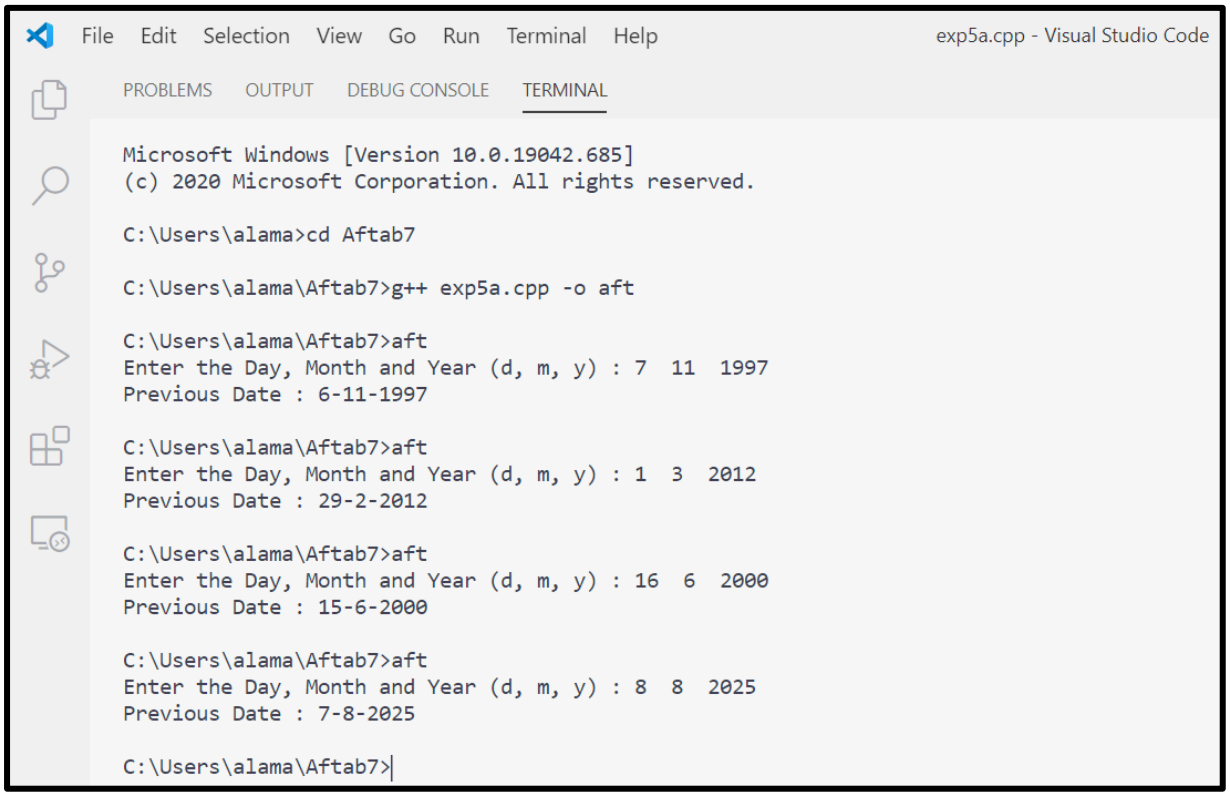
Algorithm :

- Take 3 inputs from the user for Day, Month and Year.
- Check whether they lie in the given intervals.
- If the condition is false, stop the program and exit.
- If the condition is true, calculate the date according to the given values.
- Subtract 1 day from it to get the Previous Date.

Code :

```
#include <iostream>
using namespace std;
int main()
{   int d, m, y;
    cout << "Enter the Day, Month and Year (d, m, y) : ";
    cin >> d >> m >> y;
    if (d != 1)
    {   if ((m == 2 || m == 4 || m == 6 || m == 9 || m == 11) & (d == 31))
            cout << "Invalid Date";
        else if ((m == 2) & (d == 30))
            cout << "Invalid Date";
        else if ((m == 2) & (d == 29) & (y % 4 != 0))
            cout << "Invalid Date";
        else
        cout << "Previous Date : " << d - 1 << "-" << m << "-" << y; }
    else
    {
        if (m == 3)
        {
            if (y % 4 == 0)
                d = 29;
            else
                d = 28;
        }
        cout << "Previous Date : " << d << "-" << m - 1 << "-" << y;
    }
    return 0;
}
```

Output Screenshots :



Define/Use Table :

S. No.	Variable	Defined at Node	Used at Node
1	D	3,16,20,22,25,29,32,36	5,10,13,36,38
2	M	3,17,23,26,30,33	7,10.15,17,18,23,24,28,30,33,38
3	Y	3,27	9,10,19,27,38

Du Path Table :

S. No.	Variable	Du Path (Begin, End)		
1	D	3,5 3,10 3,13 3,36 3,38 22,5 22,10 22,13 22,36 22,38 32,5 32,10 32,13	16,5 16,10 16,13 16,36 16,38 25,5 25,10 25,13 25,36 25,38 32,36 32,38 36,5	20,5 20,10 20,13 20,36 20,38 29,5 29,10 29,13 29,36 29,38 36,10 36,13 36,36 36,38
2	M	3, 7 3,10 3,15 3,17 3,18 3,23 3,24 3,28 3,30 3,33 3,38 26, 7 26,10 26,15 26,17 26,18 26,23 26,24 26,28 26,30 26,33 26,38	17, 7 17,10 17,15 17,17 17,18 17,23 17,24 17,28 17,30 17,33 17,38 30, 7 30,10 30,15 30,17 30,18 30,23 30,24 30,28 30,30 30,33 30,38	23, 7 23,10 23,15 23,17 23,18 23,23 23,24 23,28 23,30 23,33 23,38 33, 7 33,10 33,15 33,17 33,18 33,23 33,24 33,28 33,30 33,33 33,38
3	Y	3,9 3,10 3,19	3,27 3,38 27,9	27,10 27,19 27,27 27,38

All uses-definition clear :

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S. No.	Variable	Du Path (Begin, End)	Definition clear?
1	D	3,5	Yes
2	D	3,10	Yes
3	D	3,10,13	Yes
4	D	3,10,13,36	No
5	D	3,10,13,36,38	No
6	D	(16,5), (16,10), (16,13), (16,36)	Not Possible
7	D	16,17,38	Yes
8	D	(20,5), (20,10), (20,13), (20,36)	Not Possible
9	D	20,23,38	Yes
10	D	(22,5), (22,10), (22,13), (22,36)	Not Possible
11	D	22,23,38	Yes
12	D	(25,5), (25,10), (25,13), (25,36)	Not Possible
13	D	25,26,27,38	Yes
14	D	(29,5), (29,10), (29,13), (29,36)	Not Possible
15	D	29,30,38	Yes
16	D	(32,5), (32,10), (32,13), (32,36)	Not Possible
17	D	32,33,38	Yes
18	D	(36,5), (36,10), (36,13)	Not Possible
19	D	36,36	No
20	D	36,37,38	Yes
21	M	3,7	Yes
22	M	3,7,10	Yes
23	M	3,10,13,15	Yes
24	M	3,10,13,15,17	No
25	M	3,10,13,15,18	Yes
26	M	3,10,15,18,19,22,23	No
27	M	3,10,15,18,24	Yes
28	M	3,10,15,18,24,28	Yes
29	M	3,10,15,18,24,28,29,30	No
30	M	3,10,15,18,24,28,32,33	No
31	M	3,10,15,18,24,28,32,33,38	No
32	M	(17,7),(17,10),(17,15),(17,18),(17,23),(17,24),(17,28),(17,30),(17,3)	Not Possible
33	M	17,17	No
34	M	17,38	Yes
35	M	(23,7),(23,10),(23,15),(23,17),(23,18),(23,23),(23,24),(23,28),(23,30),(23,33)	Not Possible
36	M	23,38	Yes
37	M	(26,7),(26,10),(26,15),(26,17),(26,18),(26,23),(26,24),(26,28),(26,30),(26,33)	Not Possible
38	M	26,27,38	Yes
39	M	(30,7),(30,10),(30,15),(30,17),(30,18),(30,23),(30,24),(30,28),(30,33)	Not Possible
40	M	30,30	No
41	M	30,38	Yes
42	M	(33,7),(33,10),(33,15),(33,17),(33,18),(33,23),(33,24),(33,28)	Not Possible
43	M	33,33	No
44	M	33,38	Yes
45	Y	3,9	Yes
46	Y	3,9,10	Yes
47	Y	3,10,13,15,18,19	Yes
48	Y	3,10,13,15,18,24,27	No
49	Y	3,10,13, 15,18,24,27,38	No
50	Y	(27,9),(27,10),(27,19)	Not Possible
51	Y	27,27	No
52	Y	27,38	Yes

Test case table of all users :

S. No.	Variables			Expected Output	Du Path
	D	M	Y		
1	15	1	1962	14/1/1962	3,5
2	15	1	1962	14/1/1962	3,10
3	1	6	1964	31/5/1964	3,10,13
4	1	6	1964	31/5/1964	16,17,38
5	1	3	1964	29/2/1964	20,23,38
6	1	3	1964	28/2/1962	22,23,38
7	1	1	1960	31/12/1959	25,26,27,38
8	1	2	1962	31/1/1962	29,30,38
9	1	5	1960	30/4/1960	32,33,38
10	12	4	1960	11/4/1960	36,37,38
11	15	1	1962	14/1/1962	3,7
12	15	1	1962	14/1/1962	3,7,10
13	1	6	2000	31/5/2000	3,10,13,15
14	1	3	2000	29/2/2000	3,10,13,15,18
15	1	1	2000	31/12/1999	3,10,13,15,18,24
16	1	2	2000	31/1/2000	3,10,13,15,18,24,28
17	1	6	2000	31/5/2000	17,38
18	1	3	2000	29/2/2000	23,38
19	1	1	2000	31/12/1999	26,27,38
20	1	2	2000	31/1/2000	30,38
21	1	7	2001	30/6/2001	33,38
22	15	1	1962	14/1/1962	3,9
23	15	1	1962	14/1/1962	3,9,10
24	1	3	2015	28/2/2015	3,10,13,15,18,19
25	1	1	2015	31/12/2014	27,38

Test case table of all definition :

S. No.	Variables			Expected Output	Du Path
	D	M	Y		
1	15	6	1972	14/6/1972	3,10,13,36
2	15	6	1972	14/6/1972	3,10,13,36,38
3	15	6	1972	14/6/1972	36,36
4	1	4	2012	31/3/2012	3,10,13,15,17
5	1	3	2011	28/2/2011	3,10,15,18,19,22,23
6	1	2	2012	31/1/2012	3,10,15,18,24,28,29,30
7	1	5	2012	30/4/2012	3,10,15,18,24,28,32,33
8	1	5	2012	30/4/2012	3,10,15,18,24,28,32,33,38
9	1	4	2012	31/3/2012	17,17
10	1	2	2012	31/1/2012	30,30
11	1	5	2012	30/4/2012	33,33
12	1	1	2013	31/12/2012	3,10,13,15,18,24,27
13	1	1	2013	31/12/2012	3,10,13, 15,18,24,27,38
14	1	1	2013	31/12/2012	27,27

Aim : (b) Write a Program in C/C++ to compute $\mathbf{a^b}$ and perform data flow testing.

1. Algorithm
2. Define/Use Table
3. Du Path Table
4. All uses-definition clear
5. Test case table of all uses
6. Test case table of all definition

Algorithm :

- Take two inputs from the user for a and b.
- Calculate $\mathbf{a^b}$ using the pow() function.
- Store the result in another variable result.
- Print the result on the screen.

Code :

```
#include <iostream>
#include <math.h>
using namespace std;
int main()
{
    float a, b, result;
    cout << "Enter First Variable (a) : ";
    cin >> a;
    cout << "Enter Second Variable (b) : ";
    cin >> b;
    result = pow(a, b);
    cout << "Result (a^b) = " << result;
    return 0;
}
```

Output Screenshot :

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Define/Use Table :

S. No.	Variable	Defined at Node	Used at Node
1	a	3	5,8
2	b	3	7,8
3	result	3,8	9

Du Path Table :

S. No.	Variable	Du Path (Begin, End)
1	a	3,5 3,8
2	b	3,7 3,8
3	result	3,9 8,9

All uses definition clear :

S. No.	Variable	Du Path (Begin, End)	Definition clear?
1	a	3,5	Yes
2	a	3,5,8	Yes
3	b	3,7	Yes
4	b	3,7,8	Yes
5	result	3,8,9	No
6	result	8,9	Yes

There is a total of 6 du-paths out of which 1 path is not defined clearly.

Test case table of all users :

S. No.	Variables			Expected Output	Du Path
	a	b	result		
1	2.5	4	39.0625	39.0625	3,5
2	2.5	4	39.0625	39.0625	3,5,8
3	4.3	5	1470.08	1470.08	3,7
4	4.3	5	1470.08	1470.08	3,7,8
5	5	2.2	34.4932	34.4932	8,9

Test case table of all definition :

S. No.	Variables			Expected Output	Du Path
	a	b	result		
1	5	2.2	34.4932	34.4932	3,8,9