

**Ex. No.: 9**

**Date:16.04.2024**

### **DEADLOCK AVOIDANCE**

**Aim:**

To find out a safe sequence using Banker's algorithm for deadlock avoidance.

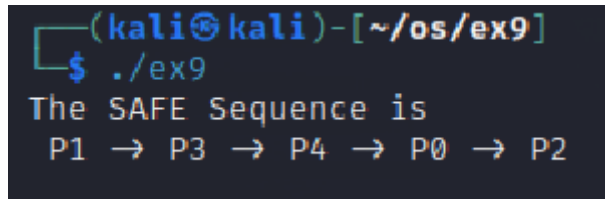
**Program Code:**

```
#include <stdio.h>
```

```
int main() {
    int n, m, i, j, k;
    n = 5;
    m = 3;
    int alloc[5][3] = {{0, 1, 0},
                       {2, 0, 0},
                       {3, 0, 2},
                       {2, 1, 1},
                       {0, 0, 2}};
    int max[5][3] = {{7, 5, 3},
                     {3, 2, 2},
                     {9, 0, 2},
                     {2, 2, 2},
                     {4, 3, 3}};
    int avail[3] = {3, 3, 2};
    int f[n], ans[n], ind = 0;
    for (k = 0; k < n; k++) {
        f[k] = 0;
    }
    int need[n][m];
    for (i = 0; i < n; i++) {
        for (j = 0; j < m; j++)
            need[i][j] = max[i][j] - alloc[i][j];
    }
    int y = 0;
    for (k = 0; k < 5; k++) {
        for (i = 0; i < n; i++) {
            if (f[i] == 0) {
                int flag = 0;
                for (j = 0; j < m; j++) {
                    if (need[i][j] > avail[j]) {
                        flag = 1;
                        break;
                    }
                }
                if (flag == 0) {
                    ans[ind++] = i;
                    for (y = 0; y < m; y++)
                        avail[y] += alloc[i][y];
                    f[i] = 1;
                }
            }
        }
    }
}
```

```
}  
printf("The SAFE Sequence is \n");  
for (i = 0; i < n - 1; i++)  
    printf(" P%d ->", ans[i]);  
printf(" P%d", ans[n - 1]);  
return (0);  
}
```

**Output:**



```
(kali@kali)-[~/os/ex9]  
$ ./ex9  
The SAFE Sequence is  
P1 -> P3 -> P4 -> P0 -> P2
```

**Result:**

The above program executed successfully and output got verified.