Ex. No.: 9
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DEADLOCK AVOIDANCE

Aim:

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

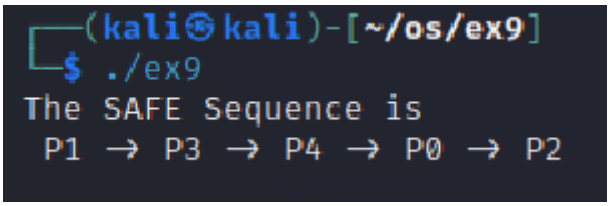
Program Code:

```
#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:



Result:

The above program executed successfully and output got verified.