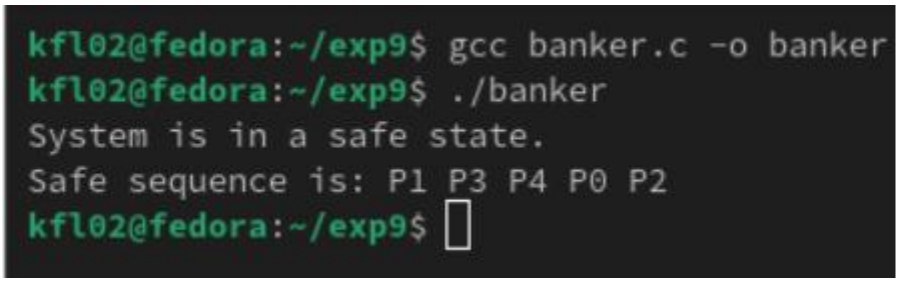
Expr 9: Banker’s Algorithm

Banker’s Algorithm code:

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

#define P 5  // Number of processes
#define R 3  // Number of resources

int main() {
    int need[P][R], allocation[P][R], max[P][R], available[R];
    int finish[P] = {0}, safeSequence[P];
    int i, j, k;

    // Example data (can be modified)
    int alloc[P][R] = {
        {0, 1, 0},
        {2, 0, 0},
        {3, 0, 2},
        {2, 1, 1},
        {0, 0, 2}
    };

    int maximum[P][R] = {
        {7, 5, 3},
        {3, 2, 2},
        {9, 0, 2},
        {2, 2, 2},
        {4, 3, 3}
    };

    int avail[R] = {3, 3, 2};

    for (i = 0; i < P; i++) {
        for (j = 0; j < R; j++) {
            allocation[i][j] = alloc[i][j];
            max[i][j] = maximum[i][j];
            need[i][j] = max[i][j] - allocation[i][j];
        }
    }

    for (i = 0; i < R; i++) {
        available[i] = avail[i];
    }

    int count = 0;
    while (count < P) {
        bool found = false;
        for (i = 0; i < P; i++) {
            if (!finish[i]) {
                bool canAllocate = true;
                for (j = 0; j < R; j++) {
                    if (need[i][j] > available[j]) {
                        canAllocate = false;
                        break;
                    }
                }

                if (canAllocate) {
                    for (k = 0; k < R; k++)
                        available[k] += allocation[i][k];

                    safeSequence[count++] = i;
                    finish[i] = 1;
                    found = true;
                }
            }
        }

        if (!found) {
            printf("System is not in a safe state (deadlock possible).\n");
            return 1;
        }
    }

    printf("System is in a safe state.\nSafe sequence is: ");
    for (i = 0; i < P; i++)
        printf("P%d ", safeSequence[i]);
    printf("\n");

    return 0;
}
```

Output:



```
kfl02@fedora:~/exp9$ gcc banker.c -o banker
kfl02@fedora:~/exp9$ ./banker
System is in a safe state.
Safe sequence is: P1 P3 P4 P0 P2
kfl02@fedora:~/exp9$ 
```

Result:

Thus the Banker Code is implemented in fedora using the C language