

```

1 // dynamic_allocation_of_memory_malloc.cpp
2 //
3 #ifdef _WIN32
4     #include <tchar.h>
5     #include <conio.h>
6 #elif (defined __linux__) || (defined _AIX) || (defined __APPLE__)
7     typedef char _TCHAR;
8     #define _tmain main
9 #endif
10
11 #include <stdio.h>
12 #include <stdlib.h>
13 #include <iostream>
14 using namespace std;
15
16 void my_getch();
17 void VynasobMatice(const unsigned, const unsigned, const unsigned, long double**,
18     long double**, long double**);
19 void VypisMaticu(const unsigned, const unsigned, long double**);
20
21 int _tmain(int argc, _TCHAR* argv[])
22 {
23     //Deklarujeme A ako pointer na pointre na premenne typu long double
24     long double** A, ** B, ** C;
25     unsigned m, n, r, s, i, j;
26
27     cout << "\n Z klavesnice nacistajte matice A a B a vypiste ich na obrazovku"
28         << " spolu\ns maticou A*B.\n\n";
29     cout << " Zadajte rad matice A!\n";
30     cout << " Pocet riadkov je ";
31     cin >> m;
32     cout << " Pocet stlpcov je ";
33     cin >> n;
34
35     //Alokujeme dynamicke pole pre m pointrov na riadky matice (m = pocet riadkov)
36     if ((A = (long double**)malloc(m * sizeof(long double*))) == NULL) {
37         cout << "Nie je volna pamat!";
38         exit(1);
39     }
40
41     cout << "\n Zadajte prvky matice A!\n";
42     for (i = 0; i < m; i++) {
43         //Alokujeme dynamicke pole pre n prvkov m-teho riadu matice A
44         //(n = pocet stlpcov)
45         if ((A[i] = (long double*)malloc(n * sizeof(long double*))) == NULL) {
46             cout << "Nie je volna pamat!";
47             exit(1);
48         }
49
50         for (j = 0; j < n; j++) {
51             cout << " ";
52             cout << "A[" << i << "][" << j << "]=";
53             cin >> A[i][j];
54         }
55     }
56
57     cout << endl << " Zadajte rad matice B!\n";
58     r = n;
59     //r je pocet riadkov
60     cout << " Pocet stlpcov je ";
61     cin >> s;
62     if ((B = (long double**)malloc(r * sizeof(long double*))) == NULL) {
63         cout << "Nie je volna pamat!";
64         exit(1);
65     }
66
67     cout << "\n Zadajte prvky matice B!\n";
68     for (i = 0; i < r; i++) {
69         if ((B[i] = (long double*)malloc(s * sizeof(long double*))) == NULL) {
70             cout << "Nie je volna pamat!";
71             exit(1);
72         }
73

```

```

74     for (j = 0; j < s; j++) {
75         cout << "    ";
76         cout << "B[" << i << "]"[" << j << "]=";
77         cin >> *((B + i) + j);
78     }
79 }
80
81 if ((C = (long double**)malloc(m * sizeof(long double*))) == NULL) {
82     cout << "Nie je volna pamat!";
83     exit(1);
84 }
85
86 for (i = 0; i < m; i++)
87     if ((C[i] = (long double*)malloc(s * sizeof(long double))) == NULL) {
88         cout << "Nie je volna pamat!";
89         exit(1);
90     }
91
92 VynasobMatice(m, n, s, A, B, C);
93
94 cout << "\n Zadali ste nasledujuce matice:\n\n";
95 VypisMaticu(m, n, A);
96 VypisMaticu(r, s, B);
97 cout << "    Ich sucin je:\n\n";
98 VypisMaticu(m, s, C);
99
100 //Uvolnujeme pamat od vsetkych dynamickych premennych
101 for (i = 0; i < m; i++) {
102     free(A[i]);
103     free(C[i]);
104 }
105 for (i = 0; i < r; i++)
106     free(B[i]);
107 free(A);
108 free(B);
109 free(C);
110
111 my_getch();
112 return 0;
113 }
114
115 void my_getch()
116 {
117     #ifdef _WIN32
118         _getch();
119     #else
120         // cout << endl;
121     #endif
122 }
123
124 //Vystupnu dynamicky alokovanu premennu Z volate sposobom "by dereference"
125 void VynasobMatice(const unsigned m, const unsigned n, const unsigned s,
126     long double** X, long double** Y, long double** Z)
127 {
128     long double Suma;
129
130     for (unsigned i = 0; i < m; i++)
131         for (unsigned j = 0; j < s; j++) {
132             Suma = 0;
133             for (unsigned k = 0; k < n; k++)
134                 Suma += X[i][k] * Y[k][j];
135             Z[i][j] = Suma;
136         }
137 }
138
139 void VypisMaticu(const unsigned m, const unsigned n, long double** X)
140 {
141     for (unsigned i = 0; i < m; i++) {
142         for (unsigned j = 0; j < n; j++)
143             printf("%12.6Lf", X[i][j]);
144         cout << "\n";
145     }
146     cout << "\n";

```

