DATA STRUCTURES AND ALGORITHMS

PRACTICE No.11

Exercises

Exercise No.1

Multiply two matrices according to calculus rules
(row x column) and using high performance way (row x row):

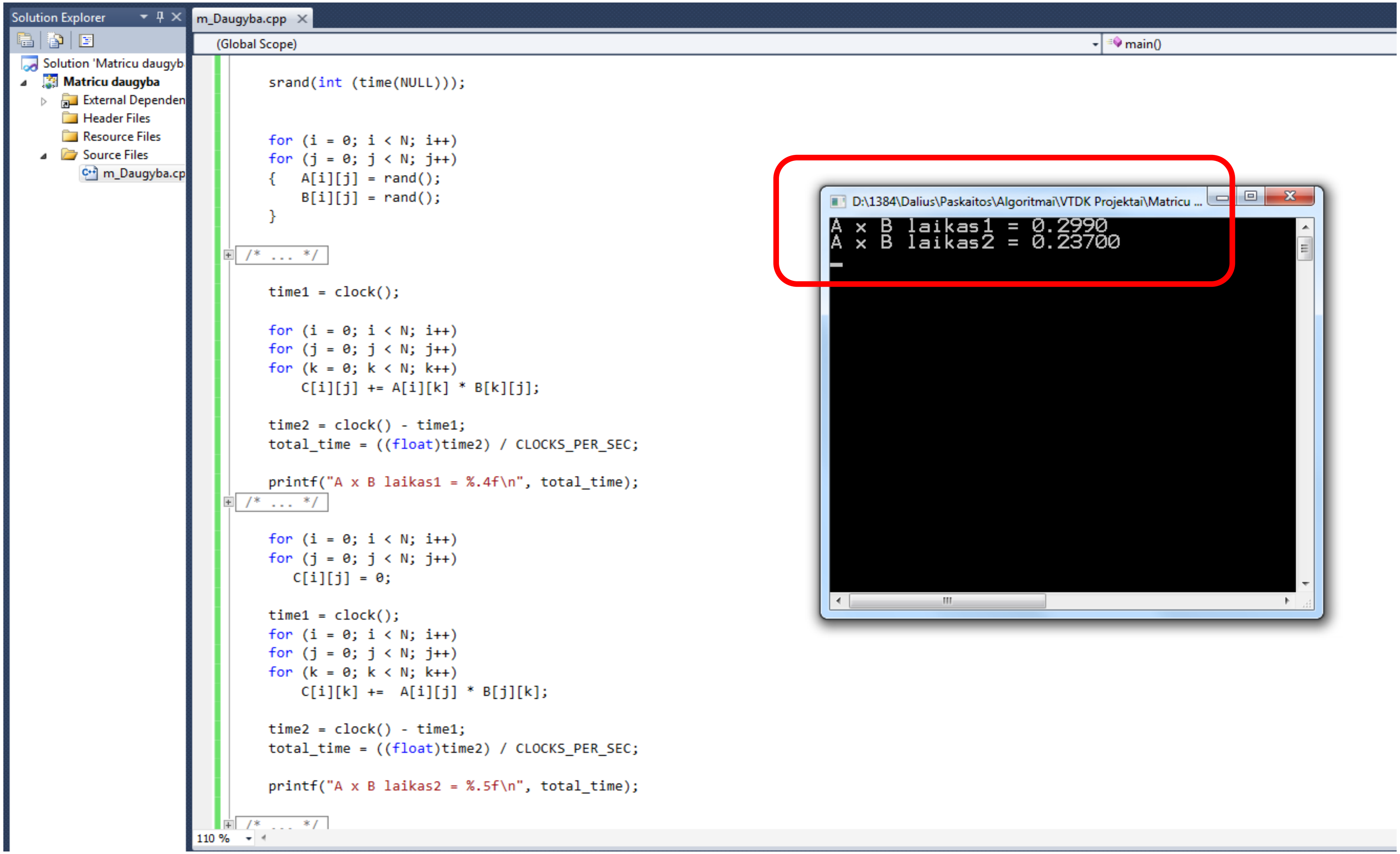
$$[C] = [A] \times [B]$$

Compare running time of these two algorithms.

Note:

Matrices are stored row by row in the primary memory.

Results



```
srand(int (time(NULL)));


for (i = 0; i < N; i++)
for (j = 0; j < N; j++)
{   A[i][j] = rand();
    B[i][j] = rand();
}

/* ... */

time1 = clock();

for (i = 0; i < N; i++)
for (j = 0; j < N; j++)
for (k = 0; k < N; k++)
    C[i][j] += A[i][k] * B[k][j];

time2 = clock() - time1;
total_time = ((float)time2) / CLOCKS_PER_SEC;

printf("A x B laikas1 = %.4f\n", total_time);
/* ... */

for (i = 0; i < N; i++)
for (j = 0; j < N; j++)
   C[i][j] = 0;

time1 = clock();
for (i = 0; i < N; i++)
for (j = 0; j < N; j++)
for (k = 0; k < N; k++)
    C[i][k] +=  A[i][j] * B[j][k];

time2 = clock() - time1;
total_time = ((float)time2) / CLOCKS_PER_SEC;

printf("A x B laikas2 = %.5f\n", total_time);

/* ... */
```

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```
A x B laikas1 = 0.2990
A x B laikas2 = 0.23700
```

Exercises

Exercise No.2

Data set consists of 100 random numbers. Select unique numbers from data set. Implement two different algorithms for problem solving and compare running time of these algorithms.

Exercise No.3

Compare running time of the Quick sort algorithm, when pivot is:

- the leftmost element
- the rightmost element
- random element of the array
- middle element of the array

Homework

Arithmetic of Long numbers

No.1

Real number has one digit in whole part and 30 decimal digits. All numbers are random.

Round decimal digits numbers till the position that are given interactively.

No.2

Multiply long number (30 digits) by the constant number.