CPP Problem Design Example

Subject: Matrix Multiplication

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Main testing concept: Basic Function and Dynamic Array

Basics	Functions
■ C++ BASICS	□ SEPARATE COMPILATION AND NAMESPACES
■ FLOW OF CONTROL	□ STREAMS AND FILE I/O
■ FUNCTION BASICS	□ RECURSION
□ PARAMETERS AND OVERLOADING	□ INHERITANCE
□ ARRAYS	□ POLYMORPHISM AND VIRTUAL FUNCTIONS
□ STRUCTURES AND CLASSES	□ TEMPLATES
□ CONSTRUCTORS AND OTHER TOOLS	□ LINKED DATA STRUCTURES
□ OPERATOR OVERLOADING, FRIENDS,AND REFERENCES	□ EXCEPTION HANDLING
□ STRINGS	□ STANDARD TEMPLATE LIBRARY
■ POINTERS AND DYNAMIC ARRAYS	□ PATTERNS AND UML

Description:

Please write a program to calculate matrix multiplication.
The multiplication rule of the matrix is as follows, given two matrices A and B：

$$\mathbf{A} = \begin{bmatrix} a_{1,1} & a_{1,2} & \cdots \\ a_{2,1} & a_{2,2} & \cdots \\ \vdots & \vdots & \ddots \end{bmatrix} \mathbf{B} = \begin{bmatrix} b_{1,1} & b_{1,2} & \cdots \\ b_{2,1} & b_{2,2} & \cdots \\ \vdots & \vdots & \ddots \end{bmatrix}$$

$$\mathbf{AB} = \begin{bmatrix} a_{1,1}[b_{1,1} & b_{1,2} & \ldots] + a_{1,2}[b_{2,1} & b_{2,2} & \ldots] + \cdots \\ a_{2,1}[b_{1,1} & b_{1,2} & \ldots] + a_{2,2}[b_{2,1} & b_{2,2} & \ldots] + \cdots \\ & & \vdots & & \end{bmatrix}$$

The number of columns of the A matrix must equal to the number of rows of the B matrix.

Input:

1. The first line is the size of A and B(row major).
2. The second line is the numbers of matrix A.
3. The third line is the numbers of matrix B.

Output:

Output the matrix obtained by multiplying A and B.
If A and B can not be multiplied, please print " Matrix multiplication failed.".

Sample Input / Output：

Sample Input	Sample Output
3 2 2 3 1 2 3 4 5 6 6 5 4 3 2 1	12 9 6 30 23 16 48 37 26

■ **Easy,Only basic programming syntax and structure are required.**
□ **Medium,Multiple programming grammars and structures are required.**
□ **Hard,Need to use multiple program structures or complex data types.**

Expected solving time:

20 minutes
Other notes: