**QUESTION**

The $N^2$-matrix multiplication is one of the most mathematical operations, being used for many applications in our society, such as Fourier transform (image processing, analyzing sound data, and etc.). The $N^2$-matrix multiplication is defined as visualized below:

$$
\begin{align*}
\text{Matrix } A &= \begin{pmatrix}
    a_{11} & a_{12} & a_{13} \\
    a_{21} & a_{22} & a_{23} \\
    a_{31} & a_{32} & a_{33}
\end{pmatrix} \\
\text{Matrix } B &= \begin{pmatrix}
    b_{11} & b_{12} & b_{13} \\
    b_{21} & b_{22} & b_{23} \\
    b_{31} & b_{32} & b_{33}
\end{pmatrix} \\
\text{Matrix } C &= \begin{pmatrix}
    c_{11} & c_{12} & c_{13} \\
    c_{21} & c_{22} & c_{23} \\
    c_{31} & c_{32} & c_{33}
\end{pmatrix}
\end{align*}
$$

$$
C_{11} = (a_{11} \times b_{11}) + (a_{21} \times b_{21}) + (a_{31} \times b_{31}) \\
C_{21} = (a_{21} \times b_{11}) + (a_{22} \times b_{21}) + (a_{23} \times b_{31}) \\
C_{31} = (a_{31} \times b_{11}) + (a_{32} \times b_{21}) + (a_{33} \times b_{31}) \\
C_{12} = (a_{11} \times b_{12}) + (a_{12} \times b_{22}) + (a_{13} \times b_{32}) \\
C_{22} = (a_{21} \times b_{12}) + (a_{22} \times b_{22}) + (a_{23} \times b_{32}) \\
C_{32} = (a_{31} \times b_{12}) + (a_{32} \times b_{22}) + (a_{33} \times b_{32})
$$

$N^2$-matrix multiplication can be executed by a SIMD parallel computer. Regarding executions of $N^2$-matrix multiplications, answer the following questions:

1. Algorithm complexity using a SISD computer:

2. Algorithm complexity using a SIMD computer:

3. The number of parallel processing units (PUs) to achieve the algorithm complexity for (2) above: