

Step	Algorithm:
1a	
4	where
2	
3	while do
2,3	$\wedge$
5a	where
6	
8	
5b	
7	
2	
	endwhile
2,3	$\wedge \neg( \quad )$
1b	

Step	<b>Algorithm:</b> $[C] := \text{SYMM\_LU\_BLK\_VAR1}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \rightarrow \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right), B \rightarrow \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right), C \rightarrow \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right)$ <b>where</b> $A_{TL}$ is $0 \times 0$ , $B_T$ has 0 rows, $C_T$ has 0 rows
2	$\left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) = \left( \begin{array}{c} A_{TL}B_T + A_{TR}B_B + \widehat{C}_T \\ \hline A_{TR}^T B_T + \widehat{C}_B \end{array} \right)$
3	<b>while</b> $m(A_{TL}) < m(A)$ <b>do</b>
2,3	$\left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) = \left( \begin{array}{c} A_{TL}B_T + A_{TR}B_B + \widehat{C}_T \\ \hline A_{TR}^T B_T + \widehat{C}_B \end{array} \right) \wedge m(A_{TL}) < m(A)$
5a	<b>Determine block size <math>b</math></b> $\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c c c} A_{00} & A_{01} & A_{02} \\ \hline 0 & A_{11} & A_{12} \\ \hline 0 & 0 & A_{22} \end{array} \right), \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left( \begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right), \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$ <b>where</b> $A_{11}$ is $b \times b$ , $B_1$ has $b$ rows, $C_1$ has $b$ rows
6	$\left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right) = \left( \begin{array}{c} A_{00}B_0 + A_{01}B_1^T + A_{02}B_2 + \widehat{C}_0 \\ \hline A_{01}^T + \widehat{C}_1 \\ \hline A_{02}^T B_0 + \widehat{C}_2 \end{array} \right)$
8	$C_1 := A_{11}B_1 + A_{12}B_2 + C_1$ $C_2 := A_{12}B_1 + C_2$
5b	$\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c c c} A_{00} & A_{01} & A_{02} \\ \hline 0 & A_{11} & A_{12} \\ \hline 0 & 0 & A_{22} \end{array} \right), \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left( \begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right), \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$
7	$\left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right) = \left( \begin{array}{c} A_{00}B_0 + A_{01}B_1 + A_{02}B_2 + \widehat{C}_0 \\ \hline A_{01}B_0 + A_{11}B_1 + A_{12}B_2 + \widehat{C}_1 \\ \hline A_{02}B_0 + A_{12}B_1 + \widehat{C}_2 \end{array} \right)$
2	$\left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) = \left( \begin{array}{c} A_{TL}B_T + A_{TR}B_B + \widehat{C}_T \\ \hline A_{TR}^T B_T + \widehat{C}_B \end{array} \right)$
	<b>endwhile</b>
2,3	$\left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) = \left( \begin{array}{c} A_{TL}B_T + A_{TR}B_B + \widehat{C}_T \\ \hline A_{TR}^T B_T + \widehat{C}_B \end{array} \right) \wedge \neg(m(A_{TL}) < m(A))$
1b	$[C] = \text{symm\_lu}(A, B, \widehat{C})$

**Algorithm:**  $[C] := \text{SYMM\_LU\_BLK\_VAR1}(A, B, C)$

$$A \rightarrow \left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right), B \rightarrow \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right), C \rightarrow \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right)$$

**where**  $A_{TL}$  is  $0 \times 0$ ,  $B_T$  has 0 rows,  $C_T$  has 0 rows

**while**  $m(A_{TL}) < m(A)$  **do**

**Determine block size**  $b$

$$\left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline 0 & A_{11} & A_{12} \\ \hline 0 & 0 & A_{22} \end{array} \right), \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left( \begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right), \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$$

**where**  $A_{11}$  is  $b \times b$ ,  $B_1$  has  $b$  rows,  $C_1$  has  $b$  rows

$$C_1 := A_{11}B_1 + A_{12}B_2 + C_1$$

$$C_2 := A_{12}B_1 + C_2$$

$$\left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline 0 & A_{11} & A_{12} \\ \hline 0 & 0 & A_{22} \end{array} \right), \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left( \begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right), \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$$

**endwhile**

Step	Algorithm: $[C] := \text{SYMM\_LU\_BLK\_VAR1}(A, B, C)$
1a	$C = \widehat{C}$
4	where
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2,3	$\wedge$
5a	Determine block size
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	endwhile
2,3	$\wedge \neg( \quad )$
1b	$[C] = \text{symm\_lu}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{SYMM\_LU\_BLK\_VAR1}(A, B, C)$
1a	$C = \widehat{C}$
4	where
2	$\left( \frac{C_T}{C_B} \right) = \left( \frac{A_{TL}B_T + A_{TR}B_B + \widehat{C}_T}{A_{TR}^T B_T + \widehat{C}_B} \right)$
3	while do
2,3	$\left( \frac{C_T}{C_B} \right) = \left( \frac{A_{TL}B_T + A_{TR}B_B + \widehat{C}_T}{A_{TR}^T B_T + \widehat{C}_B} \right) \wedge$
5a	Determine block size
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	endwhile
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3	<b>while</b> $m(A_{TL}) < m(A)$ <b>do</b>
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2	$\left( \begin{array}{c} C_T \\ C_B \end{array} \right) = \left( \begin{array}{c} A_{TL}B_T + A_{TR}B_B + \widehat{C}_T \\ A_{TR}^T B_T + \widehat{C}_B \end{array} \right)$
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2	$\left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) = \left( \begin{array}{c} A_{TL}B_T + A_{TR}B_B + \widehat{C}_T \\ \hline A_{TR}^T B_T + \widehat{C}_B \end{array} \right)$
3	<b>while</b> $m(A_{TL}) < m(A)$ <b>do</b>
2,3	$\left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) = \left( \begin{array}{c} A_{TL}B_T + A_{TR}B_B + \widehat{C}_T \\ \hline A_{TR}^T B_T + \widehat{C}_B \end{array} \right) \wedge m(A_{TL}) < m(A)$
5a	<b>Determine block size <math>b</math></b> $\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c c c} A_{00} & A_{01} & A_{02} \\ \hline 0 & A_{11} & A_{12} \\ \hline 0 & 0 & A_{22} \end{array} \right), \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left( \begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right), \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$ <b>where</b> $A_{11}$ is $b \times b$ , $B_1$ has $b$ rows, $C_1$ has $b$ rows
6	$\left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right) = \left( \begin{array}{c} A_{00}B_0 + A_{01}B_1^T + A_{02}B_2 + \widehat{C}_0 \\ \hline A_{01}^T + \widehat{C}_1 \\ \hline A_{02}^T B_0 + \widehat{C}_2 \end{array} \right)$
8	$C_1 := A_{11}B_1 + A_{12}B_2 + C_1$ $C_2 := A_{12}B_1 + C_2$
5b	$\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c c c} A_{00} & A_{01} & A_{02} \\ \hline 0 & A_{11} & A_{12} \\ \hline 0 & 0 & A_{22} \end{array} \right), \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left( \begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right), \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$
7	$\left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right) = \left( \begin{array}{c} A_{00}B_0 + A_{01}B_1 + A_{02}B_2 + \widehat{C}_0 \\ \hline A_{01}B_0 + A_{11}B_1 + A_{12}B_2 + \widehat{C}_1 \\ \hline A_{02}B_0 + A_{12}B_1 + \widehat{C}_2 \end{array} \right)$
2	$\left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) = \left( \begin{array}{c} A_{TL}B_T + A_{TR}B_B + \widehat{C}_T \\ \hline A_{TR}^T B_T + \widehat{C}_B \end{array} \right)$
	<b>endwhile</b>
2,3	$\left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) = \left( \begin{array}{c} A_{TL}B_T + A_{TR}B_B + \widehat{C}_T \\ \hline A_{TR}^T B_T + \widehat{C}_B \end{array} \right) \wedge \neg(m(A_{TL}) < m(A))$
1b	$[C] = \text{symm\_lu}(A, B, \widehat{C})$

Step	<b>Algorithm:</b> $[C] := \text{SYMM\_LU\_BLK\_VAR1}(A, B, C)$
	$A \rightarrow \left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right), B \rightarrow \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right), C \rightarrow \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right)$ <p>where <math>A_{TL}</math> is <math>0 \times 0</math>, <math>B_T</math> has 0 rows, <math>C_T</math> has 0 rows</p>
	<b>while</b> $m(A_{TL}) < m(A)$ <b>do</b>
	<p><b>Determine block size <math>b</math></b></p> $\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c c c} A_{00} & A_{01} & A_{02} \\ \hline 0 & A_{11} & A_{12} \\ \hline 0 & 0 & A_{22} \end{array} \right), \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left( \begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right), \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$ <p>where <math>A_{11}</math> is <math>b \times b</math>, <math>B_1</math> has <math>b</math> rows, <math>C_1</math> has <math>b</math> rows</p>
	$C_1 := A_{11}B_1 + A_{12}B_2 + C_1$ $C_2 := A_{12}B_1 + C_2$
	$\left( \begin{array}{c c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c c c} A_{00} & A_{01} & A_{02} \\ \hline 0 & A_{11} & A_{12} \\ \hline 0 & 0 & A_{22} \end{array} \right), \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left( \begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right), \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$
	<b>endwhile</b>

**Algorithm:**  $[C] := \text{SYMM\_LU\_BLK\_VAR1}(A, B, C)$

$$A \rightarrow \left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right), B \rightarrow \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right), C \rightarrow \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right)$$

**where**  $A_{TL}$  is  $0 \times 0$ ,  $B_T$  has 0 rows,  $C_T$  has 0 rows

**while**  $m(A_{TL}) < m(A)$  **do**

**Determine block size**  $b$

$$\left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline 0 & A_{11} & A_{12} \\ \hline 0 & 0 & A_{22} \end{array} \right), \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left( \begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right), \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$$

**where**  $A_{11}$  is  $b \times b$ ,  $B_1$  has  $b$  rows,  $C_1$  has  $b$  rows

$$C_1 := A_{11}B_1 + A_{12}B_2 + C_1$$

$$C_2 := A_{12}B_1 + C_2$$

$$\left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline 0 & A_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline 0 & A_{11} & A_{12} \\ \hline 0 & 0 & A_{22} \end{array} \right), \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left( \begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right), \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left( \begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$$

**endwhile**