

Step	Algorithm: $C = AB^T + BA^T + C$
1a	$\{C = \hat{C}$
4	$A \rightarrow \left(\begin{array}{c} A_T \\ \hline A_B \end{array} \right), B \rightarrow \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right), C \rightarrow \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right)$ <p>where A_T has 0 rows, B_T has 0 rows, C_{TL} is 0×0</p>
2	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \hat{C}_{TL} & * \\ \hline A_B B_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \right\}$
3	while $m(C_{TL}) < m(C)$ do
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \hat{C}_{TL} & * \\ \hline A_B B_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \wedge m(C_{TL}) < m(C) \right\}$
5a	<p>Determine block size b</p> $\left(\begin{array}{c} A_T \\ \hline A_B \end{array} \right) \rightarrow \left(\begin{array}{c} A_0 \\ \hline A_1^T \\ \hline A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline B_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c cc} C_{00} & * & * \\ \hline C_{10}^T & C_{11} & * \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$ <p>where A_1 has b rows, B_1 has b rows, C_{11} is $b \times b$</p>
6	$\left\{ \left(\begin{array}{ccc} C_{00} & * & * \\ C_{10}^T & C_{11} & * \\ C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{ccc} A_0 B_0^T + B_0 A_0^T + \hat{C}_{00} & * & * \\ A_1^T B_0^T + \hat{C}_{10}^T & \hat{C}_{11} & * \\ A_2 B_0^T + \hat{C}_{20} & \hat{C}_{21} & \hat{C}_{22} \end{array} \right) \right\}$
8	$C_{11} = A_1^T (B_1^T)^T + B_1^T (A_1^T)^T + C_{11}$ $C_{10}^T = B_1^T A_0^T + C_{10}^T$ $C_{20} = A_2 (B_1^T)^T + C_{20}^T$ $C_{21} = A_2 B_0^T + A_1^T B_0^T + C_{20}^T$
7	$\left\{ \left(\begin{array}{ccc} C_{00} & * & * \\ C_{10}^T & C_{11} & * \\ C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{ccc} A_0 B_0^T + B_0 A_0^T + \hat{C}_{00} & * & * \\ A_1 B_0^T + B_1^T A_0^T + \hat{C}_{10}^T & A_1^T (b_1^T)^T + B_1^T (A_1^T)^T + \hat{C}_{11} & * \\ A_2 (b_1^T)^T + A_2 B_0^T + \hat{C}_{20} & A_2 B_0^T + A_1^T B_0^T + \hat{C}_{21} & \hat{C}_{22} \end{array} \right) \right\}$
5b	$\left(\begin{array}{c} A_T \\ \hline A_B \end{array} \right) \leftarrow \left(\begin{array}{c} A_0 \\ \hline A_1^T \\ \hline A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c cc} C_{00} & * & * \\ \hline C_{10}^T & C_{11} & * \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$
2	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \hat{C}_{TL} & * \\ \hline A_B B_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \hat{C}_{TL} & * \\ \hline A_B B_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \wedge \neg(m(C_{TL}) < m(C)) \right\}$
1b	$\{C = AB^T + BA^T + \hat{C}$

Step	Algorithm: $C = AB^T + BA^T + C$
1a	{
4	
	where
2	{
3	while do
2,3	{
	\wedge
5a	Determine block size b
	where
6	{
8	
7	{
5b	
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	endwhile
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	$\wedge \neg($
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2	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_TB_T^T + B_TA_T^T + \hat{C}_{TL} & * \\ \hline A_BB_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \right\}$
3	while do
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	endwhile
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2	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \hat{C}_{TL} & * \\ \hline A_B B_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \right\}$
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	endwhile
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \hat{C}_{TL} & * \\ \hline A_B B_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \wedge \neg(m(C_{TL}) < m(C)) \right\}$
1b	$\{C = AB^T + BA^T + \hat{C}$

Step	Algorithm: $C = AB^T + BA^T + C$
1a	$\{C = \hat{C}$
4	$A \rightarrow \left(\begin{array}{c} A_T \\ A_B \end{array} \right), B \rightarrow \left(\begin{array}{c} B_T \\ B_B \end{array} \right), C \rightarrow \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_T has 0 rows, B_T has 0 rows, C_{TL} is 0×0
2	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \hat{C}_{TL} & * \\ \hline A_B B_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \right\}$
3	while $m(C_{TL}) < m(C)$ do
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \hat{C}_{TL} & * \\ \hline A_B B_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \wedge m(C_{TL}) < m(C) \right\}$
5a	Determine block size b $\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \rightarrow \left(\begin{array}{c} A_0 \\ A_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ B_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c cc} C_{00} & * & * \\ \hline C_{10}^T & C_{11} & * \\ C_{20} & C_{21} & C_{22} \end{array} \right)$ where A_1 has b rows, B_1 has b rows, C_{11} is $b \times b$
6	$\left\{ \left(\begin{array}{ccc} C_{00} & * & * \\ C_{10}^T & C_{11} & * \\ C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{ccc} A_0 B_0^T + B_0 A_0^T + \hat{C}_{00} & * & * \\ A_1^T B_0^T + \hat{C}_{10}^T & \hat{C}_{11} & * \\ A_2 B_0^T + \hat{C}_{20} & \hat{C}_{21} & \hat{C}_{22} \end{array} \right) \right\}$
8	$C_{11} = A_1^T (B_1^T)^T + B_1^T (A_1^T)^T + C_{11}$ $C_{10}^T = B_1^T A_0^T + C_{10}^T$ $C_{20} = A_2 (B_1^T)^T + C_{20}^T$ $C_{21} = A_2 B_0^T + A_1^T B_0^T + C_{20}^T$
7	$\left\{ \left(\begin{array}{ccc} C_{00} & * & * \\ C_{10}^T & C_{11} & * \\ C_{20} & C_{21} & C_{22} \end{array} \right) = \left(\begin{array}{ccc} A_0 B_0^T + B_0 A_0^T + \hat{C}_{00} & * & * \\ A_1 B_0^T + B_1^T A_0^T + \hat{C}_{10}^T & A_1^T (b_1^T)^T + B_1^T (A_1^T)^T + \hat{C}_{11} & * \\ A_2 (b_1^T)^T + A_2 B_0^T + \hat{C}_{20} & A_2 B_0^T + A_1^T B_0^T + \hat{C}_{21} & \hat{C}_{22} \end{array} \right) \right\}$
5b	$\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \leftarrow \left(\begin{array}{c} A_0 \\ A_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ B_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c cc} C_{00} & * & * \\ \hline C_{10}^T & C_{11} & * \\ C_{20} & C_{21} & C_{22} \end{array} \right)$
2	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \hat{C}_{TL} & * \\ \hline A_B B_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \hat{C}_{TL} & * \\ \hline A_B B_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \wedge \neg(m(C_{TL}) < m(C)) \right\}$
1b	$\{C = AB^T + BA^T + \hat{C}$

	Algorithm: $C = AB^T + BA^T + C$
	$A \rightarrow \left(\begin{array}{c} A_T \\ A_B \end{array} \right), B \rightarrow \left(\begin{array}{c} B_T \\ B_B \end{array} \right), C \rightarrow \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right)$ <p>where A_T has 0 rows, B_T has 0 rows, C_{TL} is 0×0</p>
	while $m(C_{TL}) < m(C)$ do
	<p>Determine block size b</p> $\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \rightarrow \left(\begin{array}{c} A_0 \\ A_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ B_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c cc} C_{00} & * & * \\ \hline C_{10}^T & C_{11} & * \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$ <p>where A_1 has b rows, B_1 has b rows, C_{11} is $b \times b$</p>
	$C_{11} = A_1^T (B_1^T)^T + B_1^T (A_1^T)^T + C_{11}$ $C_{10}^T = B_1^T A_0^T + C_{10}^T$ $C_{20} = A_2 (B_1^T)^T + C_{20}^T$ $C_{21} = A_2 B_0^T + A_1^T B_0^T + C_{20}^T$
	$\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \leftarrow \left(\begin{array}{c} A_0 \\ A_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ B_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c cc} C_{00} & * & * \\ \hline C_{10}^T & C_{11} & * \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$
	endwhile

Algorithm: $C = AB^T + BA^T + C$

$$A \rightarrow \left(\begin{array}{c} A_T \\ A_B \end{array} \right), B \rightarrow \left(\begin{array}{c} B_T \\ B_B \end{array} \right), C \rightarrow \left(\begin{array}{c|c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right)$$

where A_T has 0 rows, B_T has 0 rows, C_{TL} is 0×0

while $m(C_{TL}) < m(C)$ **do**

Determine block size b

$$\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \rightarrow \left(\begin{array}{c} A_0 \\ A_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ B_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c|c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|cc} C_{00} & * & * \\ \hline C_{10}^T & C_{11} & * \\ C_{20} & C_{21} & C_{22} \end{array} \right)$$

where A_1 has b rows, B_1 has b rows, C_{11} is $b \times b$

$$C_{11} = A_1^T (B_1^T)^T + B_1^T (A_1^T)^T + C_{11}$$

$$C_{10}^T = B_1^T A_0^T + C_{10}^T$$

$$C_{20} = A_2 (B_1^T)^T + C_{20}^T$$

$$C_{21} = A_2 B_0^T + A_1^T B_0^T + C_{20}^T$$

$$\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \leftarrow \left(\begin{array}{c} A_0 \\ A_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ B_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c|c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|cc} C_{00} & * & * \\ \hline C_{10}^T & C_{11} & * \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$$

endwhile