

Step	Algorithm: $C = AB^T + BA^T + C$
1a	$\{C = \hat{C}$
4	$A \rightarrow \left(\begin{array}{c} A_T \\ \hline A_B \end{array} \right), B \rightarrow \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right), C \rightarrow \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right)$ 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	$\left(\begin{array}{c} A_T \\ \hline A_B \end{array} \right) \rightarrow \left(\begin{array}{c} A_0 \\ \hline a_1^T \\ \hline A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c c c} C_{00} & * & * \\ \hline c_{10}^T & \gamma_{11} & * \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$ where a_1 has 1 row, b_1 has 1 row, γ_{11} is 1×1
6	$\left\{ \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0 B_0^T + B_0 A_0^T + \hat{C}_{00} & * & * \\ a_1^T B_0^T + \hat{c}_{10}^T & \hat{\gamma}_{11} & * \\ A_2 B_0^T + \hat{C}_{20} & \hat{c}_{21} & \hat{C}_{22} \end{pmatrix} \right\}$
8	$\gamma_{11} := a_1^T (b_1^T)^T + b_1^T (a_1^T)^T + \gamma_{11}$ $c_{10}^T := b_1^T A_0^T + c_{10}^T$ $c_{21} := A_2 (b_1^T)^T + c_{21}$
7	$\left\{ \begin{pmatrix} C_{00} & c_{01} & C_{02} \\ c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0 B_0^T + B_0 A_0^T + \hat{C}_{00} & * & * \\ a_1 B_0^T + b_1^T A_0^T + \hat{c}_{10}^T & a_1^T (b_1^T)^T + b_1^T (a_1^T)^T + \hat{\gamma}_{11} & * \\ A_2 B_0^T + \hat{C}_{20} & A_2 (b_1^T)^T + \hat{c}_{21} & \hat{C}_{22} \end{pmatrix} \right\}$
5b	$\left(\begin{array}{c} A_T \\ \hline A_B \end{array} \right) \leftarrow \left(\begin{array}{c} A_0 \\ \hline a_1^T \\ \hline A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c c c} C_{00} & * & * \\ \hline c_{10}^T & \gamma_{11} & * \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$
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	
	where
6	{
8	
7	{
5b	
2	{
	endwhile
2,3	{
	$\wedge \neg($
1b	{

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1a	{ $C = \hat{C}$ }
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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
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_TB_T^T + B_TA_T^T + \hat{C}_{TL} & * \\ \hline A_BB_T^T + \hat{C}_{BL} & \hat{C}_{BR} \end{array} \right) \wedge \right\}$
5a	
	where
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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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Step	Algorithm: $C = AB^T + BA^T + C$
1a	$\{C = \widehat{C}$
4	$A \rightarrow \left(\begin{array}{c} A_T \\ A_B \end{array} \right), B \rightarrow \left(\begin{array}{c} B_T \\ B_B \end{array} \right), C \rightarrow \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right)$ <p>where A_T has 0 rows, B_T has 0 rows, C_{TL} is 0×0</p>
2	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \widehat{C}_{TL} & * \\ \hline A_B B_T^T + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$
3	while $m(C_{TL}) < m(C)$ do
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \widehat{C}_{TL} & * \\ \hline A_B B_T^T + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge m(C_{TL}) < m(C) \right\}$
5a	$\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \rightarrow \left(\begin{array}{c} A_0 \\ a_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ b_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c cc} C_{00} & * & * \\ \hline c_{10}^T & \gamma_{11} & * \\ C_{20} & c_{21} & C_{22} \end{array} \right)$ <p>where a_1 has 1 row, b_1 has 1 row, γ_{11} is 1×1</p>
6	$\left\{ \left(\begin{array}{ccc} C_{00} & c_{01} & C_{02} \\ c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array} \right) = \left(\begin{array}{ccc} A_0 B_0^T + B_0 A_0^T + \widehat{C}_{00} & * & * \\ a_1^T B_0^T + \widehat{c}_{10}^T & \widehat{\gamma}_{11} & * \\ A_2 B_0^T + \widehat{C}_{20} & \widehat{c}_{21} & \widehat{C}_{22} \end{array} \right) \right\}$
8	$\gamma_{11} := a_1^T (b_1^T)^T + b_1^T (a_1^T)^T + \gamma_{11}$ $c_{10}^T := b_1^T A_0^T + c_{10}^T$ $c_{21} := A_2 (b_1^T)^T + c_{21}$
7	$\left\{ \left(\begin{array}{ccc} C_{00} & c_{01} & C_{02} \\ c_{10}^T & \gamma_{11} & c_{12}^T \\ C_{20} & c_{21} & C_{22} \end{array} \right) = \left(\begin{array}{ccc} A_0 B_0^T + B_0 A_0^T + \widehat{C}_{00} & * & * \\ a_1 B_0^T + b_1^T A_0^T + \widehat{c}_{10}^T & a_1^T (b_1^T)^T + b_1^T (a_1^T)^T + \widehat{\gamma}_{11} & * \\ A_2 B_0^T + \widehat{C}_{20} & A_2 (b_1^T)^T + \widehat{c}_{21} & \widehat{C}_{22} \end{array} \right) \right\}$
5b	$\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \leftarrow \left(\begin{array}{c} A_0 \\ a_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ b_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c cc} C_{00} & * & * \\ \hline c_{10}^T & \gamma_{11} & * \\ C_{20} & c_{21} & C_{22} \end{array} \right)$
2	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \widehat{C}_{TL} & * \\ \hline A_B B_T^T + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\begin{array}{c c} C_{TL} & * \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c c} A_T B_T^T + B_T A_T^T + \widehat{C}_{TL} & * \\ \hline A_B B_T^T + \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(m(C_{TL}) < m(C)) \right\}$
1b	$\{C = AB^T + BA^T + \widehat{C}$

	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
	$\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \rightarrow \left(\begin{array}{c} A_0 \\ a_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ b_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c c c} C_{00} & * & * \\ \hline c_{10}^T & \gamma_{11} & * \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$ <p>where a_1 has 1 row, b_1 has 1 row, γ_{11} is 1×1</p>
	$\gamma_{11} := a_1^T (b_1^T)^T + b_1^T (a_1^T)^T + \gamma_{11}$ $c_{10}^T := b_1^T A_0^T + c_{10}^T$ $c_{21} := A_2 (b_1^T)^T + c_{21}$
	$\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \leftarrow \left(\begin{array}{c} A_0 \\ a_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ b_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c c c} C_{00} & * & * \\ \hline c_{10}^T & \gamma_{11} & * \\ \hline C_{20} & c_{21} & C_{22} \end{array} \right)$
	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**

$$\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \rightarrow \left(\begin{array}{c} A_0 \\ a_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ b_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|cc} C_{00} & * & * \\ \hline c_{10}^T & \gamma_{11} & * \\ C_{20} & c_{21} & C_{22} \end{array} \right)$$

where a_1 has 1 row, b_1 has 1 row, γ_{11} is 1×1

$$\gamma_{11} := a_1^T (b_1^T)^T + b_1^T (a_1^T)^T + \gamma_{11}$$

$$c_{10}^T := b_1^T A_0^T + c_{10}^T$$

$$c_{21} := A_2 (b_1^T)^T + c_{21}$$

$$\left(\begin{array}{c} A_T \\ A_B \end{array} \right) \leftarrow \left(\begin{array}{c} A_0 \\ a_1^T \\ A_2 \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ b_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|cc} C_{00} & * & * \\ \hline c_{10}^T & \gamma_{11} & * \\ C_{20} & c_{21} & C_{22} \end{array} \right)$$

endwhile