

Step	Annotated Algorithm: $C := AB + C$ where A is symmetric and stored in lower triangle
1a	$\{C = \widehat{C}\}$
4	Partition $A \rightarrow \left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right), B \rightarrow \left(\begin{array}{c} B_T \\ B_B \end{array} \right), C \rightarrow \left(\begin{array}{c} C_T \\ C_B \end{array} \right)$ where A_{TL} is 0×0 , B_T has 0 rows, C_T has 0 rows
2	$\left\{ \left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array} \right) \right\}$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left\{ \left(\left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array} \right) \right) \wedge (m(A_{TL}) < m(A)) \right\}$
5a	Repartition $\left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ b_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ c_1^T \\ C_2 \end{array} \right)$ where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row
6	$\left\{ \left(\begin{array}{c} A_{00}B_0 + C_0 = \widehat{C}_0 \\ \hline c_1^T = \widehat{c}_1^T \\ \hline C_2 = \widehat{C}_2 \end{array} \right) \right\}$
8	$c_1^T = \widehat{c}_1^T + a_{10}^T B_0 + \alpha_{11} b_1^T$ $C_0 = \widehat{C}_0 + a_{10} b_1^T$
5b	Continue with $\left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ b_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ c_1^T \\ C_2 \end{array} \right)$
7	$\left\{ \left(\begin{array}{c} A_{00}B_0 + a_{10}b_1^T + C_0 = \widehat{C}_0 \\ \hline a_{10}^T B_0 + \alpha_{11} b_1^T + c_1^T = \widehat{c}_1^T \\ \hline C_2 = \widehat{C}_2 \end{array} \right) \right\}$
2	$\left\{ \left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array} \right) \right) \wedge \neg (m(A_{TL}) < m(A)) \right\}$
1b	$\{C = AB + \widehat{C}\}$

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

where A_{TL} is 0×0 , B_T has 0 rows, C_T has 0 rows

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

Repartition

$$\left(\begin{array}{c|c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$$

where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row

$$c_1^T = \hat{c}_1^T + a_{10}^T B_0 + \alpha_{11} b_1^T$$

$$C_0 = \hat{C}_0 + a_{10} b_1^T$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$$

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2	$\left\{ \left(\begin{array}{c} A_{TL}B_T + A_{BL}^T B_B + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array} \right) \right\}$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left\{ \left(\left(\begin{array}{c} A_{TL}B_T + A_{BL}^T B_B + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array} \right) \right) \wedge (m(A_{TL}) < m(A)) \right\}$
5a	Repartition $\left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ b_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ c_1^T \\ C_2 \end{array} \right)$ where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row
6	$\left\{ \left(\begin{array}{c} A_{00}B_0 + a_{10}b_1^T + C_0 = \widehat{C}_0 \\ \hline c_1^T = \widehat{c}_1^T \\ \hline C_2 = \widehat{C}_2 \end{array} \right) \right\}$
8	$c_1^T = \widehat{c}_1^T + a_{10}^T B_0 + \alpha_{11} b_1^T$ $C_0 = \widehat{C}_0 + A_{20}^T B_2$
5b	Continue with $\left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ b_1^T \\ B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ c_1^T \\ C_2 \end{array} \right)$
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	endwhile
2,3	$\left\{ \left(\left(\begin{array}{c} A_{TL}B_T + A_{BL}^T B_B + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array} \right) \right) \wedge \neg(m(A_{TL}) < m(A)) \right\}$
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$$c_1^T = \hat{c}_1^T + a_{10}^T B_0 + \alpha_{11} b_1^T$$

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2	$\left\{ \left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline A_{BL}B_T + C_B = \widehat{C}_B \end{array} \right) \right\}$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left\{ \left(\left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline A_{BL}B_T + C_B = \widehat{C}_B \end{array} \right) \right) \wedge (m(A_{TL}) < m(A)) \right\}$
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6	$\left\{ \left(\begin{array}{c} A_{00}B_0 + C_0 = \widehat{C}_0 \\ \hline a_{10}^TB_0 + c_1^T = \widehat{c}_1^T \\ \hline A_{20}B_0 + C_2 = \widehat{C}_2 \end{array} \right) \right\}$
8	$C_0 = \widehat{C}_0 + a_{10}b_1^T$ $c_1^T = \widehat{c}_1^T + \alpha_{11}b_1^T$ $C_2 = \widehat{C}_2 + a_{21}b_1^T$
5b	Continue with $\left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$
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2	$\left\{ \left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline A_{BL}B_T + C_B = \widehat{C}_B \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline A_{BL}B_T + C_B = \widehat{C}_B \end{array} \right) \right) \wedge \neg (m(A_{TL}) < m(A)) \right\}$
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$$C_0 = \hat{C}_0 + a_{10}b_1^T$$

$$c_1^T = \hat{c}_1^T + \alpha_{11}b_1^T$$

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Continue with

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2	$\left\{ \left(\begin{array}{c} A_{TL}B_T + A_{BL}^T B_B + C_T = \widehat{C}_T \\ \hline A_{BL}B_T + C_B = \widehat{C}_B \end{array} \right) \right\}$
3	while $m(A_{TL}) < m(A)$ do
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2	$\left\{ \left(\begin{array}{c} A_{TL}B_T + A_{BL}^T B_B + C_T = \widehat{C}_T \\ \hline A_{BL}B_T + C_B = \widehat{C}_B \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\left(\begin{array}{c} A_{TL}B_T + A_{BL}^T B_B + C_T = \widehat{C}_T \\ \hline A_{BL}B_T + C_B = \widehat{C}_B \end{array} \right) \right) \wedge \neg(m(A_{TL}) < m(A)) \right\}$
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2	$\left\{ \left(\begin{array}{c} C_T \\ \hline A_{BR}B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right\}$
3	while $m(A_{TR}) < m(A)$ do
2,3	$\left\{ \left(\left(\begin{array}{c} C_T \\ \hline A_{BR}B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right) \wedge (m(A_{TR}) < m(A)) \right\}$
5a	Repartition $\left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$ where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row
6	$\left\{ \left(\begin{array}{c} C_0 = \widehat{C}_0 \\ \hline c_1^T = \widehat{c}_1^T \\ \hline A_{22}B_2 + C_2 = \widehat{C}_2 \end{array} \right) \right\}$
8	$C_2 = \widehat{C}_2 + a_{21}b_1^T$ $c_1^T = \widehat{c}_1^T + \alpha_{11}b_1^T + a_{21}^T B_2$
5b	Continue with $\left(\begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$
7	$\left\{ \left(\begin{array}{c} C_0 = \widehat{C}_0 \\ \hline \alpha_{11}b_1^T + a_{21}^T B_2 + c_1^T = \widehat{c}_1^T \\ \hline a_{21}b_1^T + A_{22}B_2 + C_2 = \widehat{C}_2 \end{array} \right) \right\}$
2	$\left\{ \left(\begin{array}{c} C_T \\ \hline A_{BR}B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\left(\begin{array}{c} C_T \\ \hline A_{BR}B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right) \wedge \neg(m(A_{TR}) < m(A)) \right\}$
1b	$\{C := AB + \widehat{C}\}$

Algorithm: $C := A B + C$ where A is symmetric stored in lower triange

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

where A_{TR} is 0×0 , B_B has 0 rows, C_B has 0 rows

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

Repartition

$$\left(\begin{array}{c|c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$$

where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row

$$C_2 = \hat{C}_2 + a_{21} b_1^T$$

$$c_1^T = \hat{c}_1^T + \alpha_{11} b_1^T + a_{21}^T B_2$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$$

endwhile

Step	Annotated Algorithm: $C := A B + C$ where A is symmetric stored in lower triange
1a	$\{C = \widehat{C}\}$
4	Partition $A \rightarrow \left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right), B \rightarrow \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right), C \rightarrow \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right)$ where A_{TR} is 0×0 , B_B has 0 rows, C_B has 0 rows
2	$\left\{ \left(\begin{array}{c} C_T \\ \hline A_{BL}B_T + A_{BR}B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right\}$
3	while $m(A_{TR}) < m(A)$ do
2,3	$\left\{ \left(\left(\begin{array}{c} C_T \\ \hline A_{BL}B_T + A_{BR}B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right) \wedge (m(A_{TR}) < m(A)) \right\}$
5a	Repartition $\left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$ where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row
6	$\left\{ \left(\begin{array}{c} C_0 = \widehat{C}_0 \\ \hline c_1^T = \widehat{c}_1^T \\ \hline A_{20}B_0 + a_{21}b_1^T + A_{22}B_2 + C_2 = \widehat{C}_2 \end{array} \right) \right\}$
8	$c_1^T = \widehat{c}_1^T + a_{10}^T B_0 + \alpha_{11} b_1^T + a_{21}^T B_2$
5b	Continue with $\left(\begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$
7	$\left\{ \left(\begin{array}{c} C_0 = \widehat{C}_0 \\ \hline a_{10}^T B_0 + \alpha_{11} b_1^T + a_{21}^T B_2 + c_1^T = \widehat{c}_1^T \\ \hline A_{20}B_0 + a_{21}b_1^T + A_{22}B_2 + C_2 = \widehat{C}_2 \end{array} \right) \right\}$
2	$\left\{ \left(\begin{array}{c} C_T \\ \hline A_{BL}B_T + A_{BR}B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\left(\begin{array}{c} C_T \\ \hline A_{BL}B_T + A_{BR}B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right) \wedge \neg (m(A_{TR}) < m(A)) \right\}$
1b	$\{C := AB + \widehat{C}\}$

Algorithm: $C := A B + C$ where A is symmetric stored in lower triange

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

where A_{TR} is 0×0 , B_B has 0 rows, C_B has 0 rows

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

Repartition

$$\left(\begin{array}{c|c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$$

where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row

$$c_1^T = \tilde{c}_1^T + a_{10}^T B_0 + \alpha_{11} b_1^T + a_{21}^T B_2$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$$

endwhile

Step	Annotated Algorithm: $C := A B + C$ where A is symmetric stored in lower triange
1a	$\{C = \widehat{C}\}$
4	Partition $A \rightarrow \left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right)$, $B \rightarrow \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right)$, $C \rightarrow \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right)$ where A_{TR} is 0×0 , B_B has 0 rows, C_B has 0 rows
2	$\left\{ \left(\begin{array}{c} A_{BL}^T B_B + C_T \\ \hline A_{BR} B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right\}$
3	while $m(A_{TR}) < m(A)$ do
2,3	$\left\{ \left(\left(\begin{array}{c} A_{BL}^T B_B + C_T \\ \hline A_{BR} B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right) \wedge (m(A_{TR}) < m(A)) \right\}$
5a	Repartition $\left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$ where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row
6	$\left\{ \left(\begin{array}{c} A_{20}^T B_2 + C_0 = \widehat{C}_0 \\ \hline a_{21}^T B_2 + c_1^T = \widehat{c}_1^T \\ \hline A_{22} B_2 + C_2 = \widehat{C}_2 \end{array} \right) \right\}$
8	$C_0 = \widehat{C}_0 + a_{10}^T B_0$ $c_1^T = \widehat{c}_1^T + \alpha_{11} b_1^T$ $C_2 = \widehat{C}_2 + a_{21}^T B_2$
5b	Continue with $\left(\begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$
7	$\left\{ \left(\begin{array}{c} a_{10} b_1^T + A_{20}^T B_2 + C_0 = \widehat{C}_0 \\ \hline \alpha_{11} b_1^T + a_{21}^T B_2 + c_1^T = \widehat{c}_1^T \\ \hline a_{21} b_1^T + A_{22} B_2 + C_2 = \widehat{C}_2 \end{array} \right) \right\}$
2	$\left\{ \left(\begin{array}{c} A_{BL}^T B_B + C_T \\ \hline A_{BR} B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\left(\begin{array}{c} A_{BL}^T B_B + C_T \\ \hline A_{BR} B_B + C_B \end{array} \right) = \left(\begin{array}{c} \widehat{C}_T \\ \hline \widehat{C}_B \end{array} \right) \right) \wedge \neg (m(A_{TR}) < m(A)) \right\}$
1b	$\{C := AB + \widehat{C}\}$

Algorithm: $C := A B + C$ where A is symmetric stored in lower triange

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

where A_{TR} is 0×0 , B_B has 0 rows, C_B has 0 rows

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

Repartition

$$\left(\begin{array}{c|c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$$

where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row

$$C_0 = \hat{C}_0 + a_{10}^T B_0$$

$$c_1^T = \hat{c}_1^T + \alpha_{11} b_1^T$$

$$C_2 = \hat{C}_2 + a_{21}^T B_2$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$$

endwhile

Step	Annotated Algorithm: $C := A B + C$ where A is symmetric stored in lower triangle
1a	$\{C = \widehat{C}\}$
4	Partition $A \rightarrow \left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right)$, $B \rightarrow \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right)$, $C \rightarrow \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right)$ where A_{TR} is 0×0 , B_B has 0 rows, C_B has 0 rows
2	$\left\{ \left(\frac{A_{BL}^T B_B + C_T}{A_{BL} B_T + A_{BR} B_B + C_B} \right) = \left(\frac{\widehat{C}_T}{\widehat{C}_B} \right) \right\}$
3	while $m(A_{TR}) < m(A)$ do
2,3	$\left\{ \left(\left(\frac{A_{BL}^T B_B + C_T}{A_{BL} B_T + A_{BR} B_B + C_B} \right) = \left(\frac{\widehat{C}_T}{\widehat{C}_B} \right) \right) \wedge (m(A_{TR}) < m(A)) \right\}$
5a	Repartition $\left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$ where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row
6	$\left\{ \left(\begin{array}{c} A_{20}^T B_2 + C_0 = \widehat{C}_0 \\ \hline a_{21}^T B_2 + c_1^T = \widehat{c}_1^T \\ \hline A_{20} B_0 + a_{21} B_1^T + A_{22} B_2 + C_2 = \widehat{C}_2 \end{array} \right) \right\}$
8	$C_0 = \widehat{C}_0 + a_{10} b_1^T$ $c_1^T = \widehat{c}_1^T + a_{10}^T B_0 + \alpha_{11} b_1^T$
5b	Continue with $\left(\begin{array}{c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$
7	$\left\{ \left(\begin{array}{c} a_{10} b_1^T + A_{20}^T B_2 + C_0 = \widehat{C}_0 \\ \hline a_{10} B_0 + \alpha_{11} b_1^T + a_{21}^T B_2 + c_1^T = \widehat{c}_1^T \\ \hline A_{20} B_0 + a_{21} b_1^T + A_{22} B_2 + C_2 = \widehat{C}_2 \end{array} \right) \right\}$
2	$\left\{ \left(\frac{A_{BL}^T B_B + C_T}{A_{BL} B_T + A_{BR} B_B + C_B} \right) = \left(\frac{\widehat{C}_T}{\widehat{C}_B} \right) \right\}$
	endwhile
2,3	$\left\{ \left(\left(\frac{A_{BL}^T B_B + C_T}{A_{BL} B_T + A_{BR} B_B + C_B} \right) = \left(\frac{\widehat{C}_T}{\widehat{C}_B} \right) \right) \wedge \neg (m(A_{TR}) < m(A)) \right\}$
1b	$\{C := AB + \widehat{C}\}$

Algorithm: $C := A B + C$ where A is symmetric stored in lower triange

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

where A_{TR} is 0×0 , B_B has 0 rows, C_B has 0 rows

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

Repartition

$$\left(\begin{array}{c|c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$$

where α_{11} is 1×1 , b_1 has 1 row, c_1 has 1 row

$$C_0 = \hat{C}_0 + a_{10} b_1^T$$

$$c_1^T = \hat{c}_1^T + a_{10}^T B_0 + \alpha_{11} b_1^T$$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array} \right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array} \right)$$

endwhile