<table>
<tr><th>Step</th><th>Annotated Algorithm: $C := AB + C$ where A is symmetric and stored in the lower triangle</th></tr>
<tr><td>1a</td><td>$\left\{ C = \widehat{C} \right\}$</td></tr>
<tr><td>4</td><td>Partition $A \rightarrow \left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$, $B \rightarrow \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right)$, $C \rightarrow \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right)$
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<tr><td>2</td><td>$\left\{ \left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array} \right) \right\}$</td></tr>
<tr><td>3</td><td>while $m(A_{TL}) < m(A)$ do</td></tr>
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<tr><td>5a</td><td>Repartition
$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array} \right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$
where A_{11} is $b \times b$, B_1 has b rows, C_1 has b rows</td></tr>
<tr><td>6</td><td>$\left\{ \left(\begin{array}{c} A_{00}B_0 + C_0 = \widehat{C}_0 \\ \hline C_1 = \widehat{C}_1 \\ \hline C_2 = \widehat{C}_2 \end{array} \right) \right\}$</td></tr>
<tr><td>8</td><td>$C_1 = \widehat{C}_1 + A_{10}B_0 + A_{11}B_1$
$C_0 = \widehat{C}_0 + A_{10}B_1$</td></tr>
<tr><td>5b</td><td>Continue with
$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array} \right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$</td></tr>
<tr><td>7</td><td>$\left\{ \left(\begin{array}{c} A_{00}B_0 + A_{10}B_1 + C_0 = \widehat{C}_0 \\ \hline A_{10} + B_0 + A_{11}B_1 + C_1 = \widehat{C}_1 \\ \hline C_2 = \widehat{C}_2 \end{array} \right) \right\}$</td></tr>
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<tr><td></td><td>endwhile</td></tr>
<tr><td>2,3</td><td>$\left\{ \left(\left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array} \right) \right) \wedge \neg (m(A_{TL}) < m(A)) \right\}$</td></tr>
<tr><td>1b</td><td>$\left\{ C = AB + \widehat{C} \right\}$</td></tr>
</table>

Algorithm: $C := AB + C$ where A is symmetric and stored in the lower triangle

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

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

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

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$$

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

$C_1 = \widehat{C}_1 + A_{10}B_0 + A_{11}B_1$

$C_0 = \widehat{C}_0 + A_{10}B_1$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$$

endwhile

Step	**Annotated Algorithm:** $C := AB + C$ where A is symmetric and stored in the lower triangle
1a	$\left\{ C = \widehat{C} \right\}$
4	**Partition** $A \rightarrow \left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right)$, $B \rightarrow \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right)$, $C \rightarrow \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right)$ **where** A_{TL} is 0×0, B_T has 0 rows, C_T has 0 rows
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** $\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c\|c\|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$ **where** A_{11} is $b \times b$, B_1 has b rows, C_1 has b rows
6	$\left\{ \left(\begin{array}{c} A_{00}B_0 + A_{10}B_1 + C_0 = \widehat{C}_0 \\ \hline C_1 = \widehat{C}_1 \\ \hline C_2 = \widehat{C}_2 \end{array}\right) \right\}$
8	$C_1 = \widehat{C}_1 + A_{10}B_0 + A_{11}B_1 + A_{21}^T B2$
5b	**Continue with** $\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c\|c\|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$
7	$\left\{ \left(\begin{array}{c} A_{00}B_0 + A_{10}B_1 + C_0 = \widehat{C}_0 \\ \hline A_{10} + B_0 + A_{11}B_1 + C_1 = \widehat{C}_1 \\ \hline C_2 = \widehat{C}_2 \end{array}\right) \right\}$
2	$\left\{ \left(\begin{array}{c} A_{TL}B_T + A_{BL}^T B_B + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array}\right) \right\}$
	endwhile
2,3	$\left\{ \left(\left(\begin{array}{c} A_{TL}B_T + A_{BL}^T B_B + C_T = \widehat{C}_T \\ \hline C_B = \widehat{C}_B \end{array}\right) \right) \wedge \neg (m(A_{TL}) < m(A)) \right\}$
1b	$\left\{ C = AB + \widehat{C} \right\}$

Algorithm: $C := AB + C$ where A is symmetric and stored in the lower triangle

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

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

Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$$

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

$C_1 = \widehat{C}_1 + A_{10}B_0 + A_{11}B_1 + A_{21}^T B2$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$$

endwhile

Step	**Annotated Algorithm:** $C := AB + C$ where A is symmetric and stored in the lower triangle
1a	$\left\{ C = \widehat{C} \right\}$
4	**Partition** $A \rightarrow \left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right)$, $B \rightarrow \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right)$, $C \rightarrow \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right)$ **where** A_{TL} is 0×0, B_T has 0 rows, C_T has 0 rows
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3	**while** $m(A_{TL}) < m(A)$ **do**
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8	$C_0 = \widehat{C}_0 + A10^T B_1$ $C_1 = \widehat{C}_1 + A_{11}B_1$ $C_2 = \widehat{C}_2 + A_{21}B_1$
5b	**Continue with** $\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c\|c\|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$
7	$\left\{ \left(\begin{array}{c} A_{00}B_0 + A_{10}B_1 + C_0 = \widehat{C}_0 \\ \hline A_{10} + B_0 + A_{11}B_1 + C_1 = \widehat{C}_1 \\ \hline C_2 = \widehat{C}_2 \end{array}\right) \right\}$
2	$\left\{ \left(\begin{array}{c} A_{TL}B_T + C_T = \widehat{C}_T \\ \hline A_{BL}B_T + C_B = \widehat{C}_B \end{array}\right) \right\}$
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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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Repartition

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$C_1 = \widehat{C}_1 + A_{11} B_1$

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Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$$

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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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Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$$

endwhile

Step	**Annotated Algorithm:** $C := AB + C$ where A is symmetric and stored in the lower triangle
1a	$\left\{ C = \widehat{C} \right\}$
4	**Partition** $A \rightarrow \left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$, $B \rightarrow \left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right)$, $C \rightarrow \left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right)$ **where** A_{TL} is 0×0, B_T has 0 rows, C_T has 0 rows
2	$\left\{ \left(\begin{array}{c} C_T = \widehat{C}_T \\ \hline A_{BR}B_B + C_B = \widehat{C}_B \end{array} \right) \right\}$
3	**while** $m(A_{TL}) < m(A)$ **do**
2,3	$\left\{ \left(\left(\begin{array}{c} C_T = \widehat{C}_T \\ \hline A_{BR}B_B + C_B = \widehat{C}_B \end{array} \right) \right) \wedge (m(A_{TL}) < m(A)) \right\}$
5a	**Repartition** $\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c\|c\|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array} \right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$ **where** A_{11} is $b \times b$, B_1 has b rows, C_1 has b rows
6	$\left\{ \left(\begin{array}{c} C_0 = \widehat{C}_0 \\ \hline C_1 = \widehat{C}_1 \\ \hline A_{22}B_2 + C_2 = \widehat{C}_2 \end{array} \right) \right\}$
8	$C_2 = \widehat{C}_2 + A21B_1$ $C_1 = \widehat{C}_1 + A_{11}B_1 + A_{21}^T B_2$
5b	**Continue with** $\left(\begin{array}{c\|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c\|c\|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array} \right)$, $\left(\begin{array}{c} B_T \\ \hline B_B \end{array} \right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array} \right)$, $\left(\begin{array}{c} C_T \\ \hline C_B \end{array} \right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array} \right)$
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2	$\left\{ \left(\begin{array}{c} C_T = \widehat{C}_T \\ \hline A_{BR}B_B + C_B = \widehat{C}_B \end{array} \right) \right\}$
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1b	$\left\{ C = AB + \widehat{C} \right\}$

Algorithm: $C := AB + C$ where A is symmetric and stored in the lower triangle

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

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Repartition

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \rightarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$$

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$C_2 = \widehat{C}_2 + A21B_1$

$C_1 = \widehat{C}_1 + A_{11}B_1 + A_{21}^T B_2$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$$

endwhile

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Algorithm: $C := AB + C$ where A is symmetric and stored in the lower triangle

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

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Repartition

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$C_0 = \widehat{C}_0 + A_{10}^T B_1$

$C_1 = \widehat{C}_1 + A_{10} B_0 + A_{11} B_1$

Continue with

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} A_{00} & A_{01} & A_{02} \\ \hline A_{10} & A_{11} & A_{12} \\ \hline A_{20} & A_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline B_1 \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1 \\ \hline C_2 \end{array}\right)$$

endwhile