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

<table>
<tr><th>Step</th><th>Algorithm: $[C] := \textsc{Syr2k\_lt\_blk\_var1}(A, B, C)$</th></tr>
<tr><td>1a</td><td>$C = \widehat{C}$</td></tr>
<tr><td>4</td><td>$A \rightarrow \left(\begin{array}{c|c} A_L & A_R \end{array}\right)$, $B \rightarrow \left(\begin{array}{c|c} B_L & B_R \end{array}\right)$, $C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right)$
where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0</td></tr>
<tr><td>2</td><td>$\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right)$</td></tr>
<tr><td>3</td><td>while $n(A_L) < n(A)$ do</td></tr>
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<tr><td>5a</td><td>Determine block size b
$\left(\begin{array}{c|c} A_L & A_R \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} A_0 & A_1 & A_2 \end{array}\right)$, $\left(\begin{array}{c|c} B_L & B_R \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} B_0 & B_1 & B_2 \end{array}\right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$
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<tr><td>8</td><td>$C_{10} := A_1^T B_0 + B_1^T A_0 + \widehat{C}_{10}$
$C_{11} := A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11}$</td></tr>
<tr><td>5b</td><td>$\left(\begin{array}{c|c} A_L & A_R \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} A_0 & A_1 & A_2 \end{array}\right)$, $\left(\begin{array}{c|c} B_L & B_R \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} B_0 & B_1 & B_2 \end{array}\right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$</td></tr>
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<tr><td>1b</td><td>$[C] = \mathrm{Syr2k\_lt}(A, B, \widehat{C})$</td></tr>
</table>

Algorithm: $[C] := \text{SYR2K\_LT\_BLK\_VAR1}(A, B, C)$

$A \rightarrow \left(A_L \,\middle|\, A_R\right)$, $B \rightarrow \left(B_L \,\middle|\, B_R\right)$, $C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right)$

where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0

while $n(A_L) < n(A)$ **do**

Determine block size b

$$\left(A_L \,\middle|\, A_R\right) \rightarrow \left(A_0 \,\middle|\, A_1 \,\middle|\, A_2\right), \left(B_L \,\middle|\, B_R\right) \rightarrow \left(B_0 \,\middle|\, B_1 \,\middle|\, B_2\right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$$

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

$C_{10} := A_1^T B_0 + B_1^T A_0 + \widehat{C}_{10}$

$C_{11} := A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11}$

$$\left(A_L \,\middle|\, A_R\right) \leftarrow \left(A_0 \,\middle|\, A_1 \,\middle|\, A_2\right), \left(B_L \,\middle|\, B_R\right) \leftarrow \left(B_0 \,\middle|\, B_1 \,\middle|\, B_2\right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c|c|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$$

endwhile

Step	Algorithm: $[C] := \text{Syr2k\_lt\_blk\_var1}(A, B, C)$
1a	$C = \widehat{C}$
4	where
2	
3	while do
2,3	$\wedge$
5a	**Determine block size** where
6	
8	
5b	
7	
2	
	endwhile
2,3	$\wedge \neg($ $)$
1b	$[C] = \text{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \textsc{Syr2k\_lt\_blk\_var1}(A, B, C)$
1a	$C = \widehat{C}$
4	where
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right)$
3	while do
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge$
5a	**Determine block size** where
6	
8	
5b	
7	
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right)$
	endwhile
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge \neg(\qquad)$
1b	$[C] = \mathrm{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \textsc{Syr2k\_lt\_blk\_var1}(A, B, C)$
1a	$C = \widehat{C}$
4	where
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right)$
3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge n(A_L) < n(A)$
5a	**Determine block size** where
6	
8	
5b	
7	
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right)$
	endwhile
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \mathrm{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \textsc{Syr2k\_lt\_blk\_var1}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \rightarrow \left(A_L \,\middle\|\, A_R \right)$, $B \rightarrow \left(B_L \,\middle\|\, B_R \right)$, $C \rightarrow \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A)$
5a	**Determine block size** where
6	
8	
5b	
7	
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \mathrm{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \textsc{Syr2k\_lt\_blk\_var1}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \rightarrow \left(A_L \mid A_R \right)$, $B \rightarrow \left(B_L \mid B_R \right)$, $C \rightarrow \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
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3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge n(A_L) < n(A)$
5a	**Determine block size b** $\left(A_L \mid A_R \right) \rightarrow \left(A_0 \mid A_1 \mid A_2 \right)$, $\left(B_L \mid B_R \right) \rightarrow \left(B_0 \mid B_1 \mid B_2 \right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c\|c\|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$ where A_1 has b columns, B_1 has b columns, C_{11} is $b \times b$
6	
8	
5b	$\left(A_L \mid A_R \right) \leftarrow \left(A_0 \mid A_1 \mid A_2 \right)$, $\left(B_L \mid B_R \right) \leftarrow \left(B_0 \mid B_1 \mid B_2 \right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c\|c\|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$
7	
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right)$
	endwhile
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array} \right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \mathrm{Syr2k\_lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \textsc{Syr2k\_lt\_blk\_var1}(A, B, C)$
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3	while $n(A_L) < n(A)$ do
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge n(A_L) < n(A)$
5a	**Determine block size** b $\left(A_L \,\|\, A_R\right) \rightarrow \left(A_0 \,\|\, A_1 \,\|\, A_2\right)$, $\left(B_L \,\|\, B_R\right) \rightarrow \left(B_0 \,\|\, B_1 \,\|\, B_2\right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c\|c\|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$ where A_1 has b columns, B_1 has b columns, C_{11} is $b \times b$
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5b	$\left(A_L \,\|\, A_R\right) \leftarrow \left(A_0 \,\|\, A_1 \,\|\, A_2\right)$, $\left(B_L \,\|\, B_R\right) \leftarrow \left(B_0 \,\|\, B_1 \,\|\, B_2\right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c\|c\|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$
7	
2	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right)$
	endwhile
2,3	$\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) = \left(\begin{array}{c\|c} A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} & \widehat{C}_{TR} \\ \hline \widehat{C}_{BL} & \widehat{C}_{BR} \end{array}\right) \wedge \neg(n(A_L) < n(A))$
1b	$[C] = \mathrm{Syr2k\_lt}(A, B, \widehat{C})$

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$\left(\begin{array}{c|c} A_L & A_R \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} A_0 & A_1 & A_2 \end{array}\right)$, $\left(\begin{array}{c|c} B_L & B_R \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} B_0 & B_1 & B_2 \end{array}\right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$
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<tr><td>4</td><td>$A \rightarrow \left(\begin{array}{c|c} A_L & A_R \end{array}\right)$, $B \rightarrow \left(\begin{array}{c|c} B_L & B_R \end{array}\right)$, $C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right)$
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<tr><td>5a</td><td>Determine block size b
$\left(\begin{array}{c|c} A_L & A_R \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} A_0 & A_1 & A_2 \end{array}\right)$, $\left(\begin{array}{c|c} B_L & B_R \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} B_0 & B_1 & B_2 \end{array}\right)$, $\left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$
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Step	Algorithm: $[C] := \textsc{Syr2k\_lt\_blk\_var1}(A, B, C)$
	$A \rightarrow \left(A_L \,\middle\|\, A_R\right)$, $B \rightarrow \left(B_L \,\middle\|\, B_R\right)$, $C \rightarrow \left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right)$ where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0
	while $n(A_L) < n(A)$ do
	Determine block size b $\left(A_L \,\middle\|\, A_R\right) \rightarrow \left(A_0 \,\middle\|\, A_1 \middle\| A_2\right)$, $\left(B_L \,\middle\|\, B_R\right) \rightarrow \left(B_0 \,\middle\|\, B_1 \middle\| B_2\right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c\|c\|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$ where A_1 has b columns, B_1 has b columns, C_{11} is $b \times b$
	$C_{10} := A_1^T B_0 + B_1^T A_0 + \widehat{C}_{10}$ $C_{11} := A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11}$
	$\left(A_L \,\middle\|\, A_R\right) \leftarrow \left(A_0 \middle\| A_1 \,\middle\|\, A_2\right)$, $\left(B_L \,\middle\|\, B_R\right) \leftarrow \left(B_0 \middle\| B_1 \,\middle\|\, B_2\right)$, $\left(\begin{array}{c\|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c\|c\|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array}\right)$
	endwhile

Algorithm: $[C] := \text{SYR2K\_LT\_BLK\_VAR1}(A, B, C)$

$A \rightarrow \left(A_L \,\Big|\, A_R \right)$, $B \rightarrow \left(B_L \,\Big|\, B_R \right)$, $C \rightarrow \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right)$

where A_L has 0 columns, B_L has 0 columns, C_{TL} is 0×0

while $n(A_L) < n(A)$ do

Determine block size b

$$\left(A_L \,\Big|\, A_R \right) \rightarrow \left(A_0 \,\Big|\, A_1 \,\big|\, A_2 \right), \left(B_L \,\Big|\, B_R \right) \rightarrow \left(B_0 \,\Big|\, B_1 \,\big|\, B_2 \right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \rightarrow \left(\begin{array}{c|c|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$$

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

$C_{10} := A_1^T B_0 + B_1^T A_0 + \widehat{C}_{10}$

$C_{11} := A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11}$

$$\left(A_L \,\Big|\, A_R \right) \leftarrow \left(A_0 \,\big|\, A_1 \,\Big|\, A_2 \right), \left(B_L \,\Big|\, B_R \right) \leftarrow \left(B_0 \,\big|\, B_1 \,\Big|\, B_2 \right), \left(\begin{array}{c|c} C_{TL} & C_{TR} \\ \hline C_{BL} & C_{BR} \end{array} \right) \leftarrow \left(\begin{array}{c|c|c} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{array} \right)$$

endwhile