Step	Annotated Algorithm: $C := AB + C$ where A is symmetric and stored in lower triangle
1a	$\left\{ C=\widehat{C} ight\}$
4	Partition $A  o \left( \begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right)$ , $B  o \left( \begin{array}{c c} B_T \\ \hline B_B \end{array} \right)$ , $C  o \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right)$
	where $A_{TL}$ is $0 \times 0$ , $B_T$ has 0 rows, $C_T$ has 0 rows
2	$\left\{ \left( \frac{A_{TL}B_T + C_T = \widehat{C}_T}{C_B = \widehat{C}_B} \right) \right\}$
3	while $m(A_{TL}) < m(A)$ do
2,3	$\left\{ \left( \left( \frac{A_{TL}B_T + C_T = \widehat{C}_T}{C_B = \widehat{C}_B} \right) \right) \land (m(A_{TL}) < m(A)) \right\}$
5a	Repartition
	$ \left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c c} 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 \\ B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ C_B \end{array}\right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ C_2 \end{array}\right) $
	where $\alpha_{11}$ is $1 \times 1$ , $b_1$ has 1 row, $c_1$ has 1 row
6	$ \left\{ \left( \frac{A_{00}B_0 + C_0 = \widehat{C}_0}{c_1^T = \widehat{c}_1^T} \right) \right\} $ $ C_2 = \widehat{C}_2 $
8	$c_1^T = \hat{c}_1^T + a_{10}^T B_0 + \alpha_{11} b_1^T$ $C_0 = \hat{C}_0 + a_{10} b_1^T$
5b	Continue with
	$\left(\begin{array}{c c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right), \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline C_1^T \\ \hline C_2 \end{array}\right)$
7	$ \left\{ \left( \frac{A_{00}B_0 + a_{10}b_1^T + C_0 = \hat{C}_0}{a_{10}^T B_0 + \alpha_{11}b_1^T + c_1^T = \hat{c}_1^T} \right) \right\} $ $ C_2 = \hat{C}_2 $
2	$\left\{ \left( \frac{A_{TL}B_T + C_T = \widehat{C}_T}{C_B = \widehat{C}_B} \right) \right\}$
	endwhile
2,3	$\left\{ \left( \left( \frac{A_{TL}B_T + C_T = \widehat{C}_T}{C_B = \widehat{C}_B} \right) \right) \land \neg \left( m(A_{TL}) < m(A) \right) \right\}$
1b	$\left\{ C = AB + \widehat{C} \right\}$

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

where  $A_{TL}$  is  $0 \times 0$ ,  $B_T$  has 0 rows,  $C_T$  has 0 rows while  $m(A_{TL}) < m(A)$  do

Repartition

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

where  $\alpha_{11}$  is  $1 \times 1$ ,  $b_1$  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

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

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

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

where  $A_{TL}$  is  $0 \times 0$ ,  $B_T$  has 0 rows,  $C_T$  has 0 rows while  $m(A_{TL}) < m(A)$  do

Repartition

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

where  $\alpha_{11}$  is  $1 \times 1$ ,  $b_1$  has 1 row,  $c_1$  has 1 row

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

### Continue with

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

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

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

where  $A_{TL}$  is  $0 \times 0$ ,  $B_T$  has 0 rows,  $C_T$  has 0 rows while  $m(A_{TL}) < m(A)$  do

# Repartition

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

where  $\alpha_{11}$  is  $1 \times 1$ ,  $b_1$  has 1 row,  $c_1$  has 1 row

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

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

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

### Continue with

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

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

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

where  $A_{TL}$  is  $0 \times 0$ ,  $B_T$  has 0 rows,  $C_T$  has 0 rows while  $m(A_{TL}) < m(A)$  do

Repartition

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

where  $\alpha_{11}$  is  $1 \times 1$ ,  $b_1$  has 1 row,  $c_1$  has 1 row

$$c_1^T = \hat{c}_1^T + \alpha_{11}b_1^T + a_{21}^T B_2$$
$$C_2 = \hat{C}_2 + a_{21}b_1^T$$

Continue with

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

Step	<b>Annotated Algorithm:</b> $C := A B + C$ where A is symmetric stored in lower triange
1a	$\left\{ C=\widehat{C} ight\}$
4	Partition $A  o \left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array}\right)$ , $B  o \left(\begin{array}{c} B_T \\ \hline B_B \end{array}\right)$ , $C  o \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right)$
	where $A_{TR}$ is $0 \times 0$ , $B_B$ has 0 rows, $C_B$ has 0 rows
2	$\left\{ \left( \frac{C_T}{A_{BR}B_B + C_B} \right) = \left( \frac{\widehat{C}_T}{\widehat{C}_B} \right) \right\}$
3	while $m(A_{TR}) < m(A)$ do
2,3	$\left\{ \left( \left( \frac{C_T}{A_{BR}B_B + C_B} \right) = \left( \frac{\widehat{C}_T}{\widehat{C}_B} \right) \right) \wedge \left( m(A_{TR}) < m(A) \right) \right\}$
5a	Repartition
	$ \left(\begin{array}{c c} A_{TL} & * \\ A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{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 \\ \hline 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 \\ \hline c_1^T \\ C_2 \end{array}\right) $ where $\alpha_{11}$ is $1 \times 1$ , $b_1$ has 1 row, $c_1$ has 1 row
6	$ \left\{ \left( \frac{C_0 = \widehat{C}_0}{c_1^T = \widehat{c}_1^T} \right) \right\} $ $ \left\{ A_{22}B_2 + C_2 = \widehat{C}_2 \right) $
8	$C_2 = \widehat{C}_2 + a_{21}b_1^T \ c_1^T = \widehat{c}_1^T + \alpha_{11}b_1^T + a_{21}^TB_2$
5b	Continue with
	$\left(\begin{array}{c c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{c c} A_{00} & * & * \\ \hline a_{10}^T & \alpha_{11} & * \\ \hline A_{20} & a_{21} & A_{22} \end{array}\right), \\ \left(\begin{array}{c c} B_T \\ \hline B_B \end{array}\right) \leftarrow \left(\begin{array}{c} B_0 \\ \hline b_1^T \\ \hline B_2 \end{array}\right), \\ \left(\begin{array}{c} C_T \\ \hline C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ \hline C_2 \end{array}\right)$
7	$ \left\{ \left( \frac{C_0 = \hat{C}_0}{\alpha_{11}b_1^T + a_{21}^T B_2 + c_1^T = \hat{c}_1^T} \right) \right\} $ $ \left( \left( \frac{C_0}{a_{21}b_1^T + A_{22}B_2 + C_2 = \hat{C}_2} \right) \right\} $
2	$\left\{ \left( rac{C_T}{A_{BR}B_B + C_B}  ight) = \left( rac{\widehat{C}_T}{\widehat{C}_B}  ight)  ight\}$
	endwhile
2,3	$\left\{ \left( \left( \frac{C_T}{A_{BR}B_B + C_B} \right) = \left( \frac{\widehat{C}_T}{\widehat{C}_B} \right) \right) \land \neg \left( m(A_{TR}) < m(A) \right) \right\}$
1b	$\left\{ \; C := AB + \widehat{C}  ight\}$

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

where  $A_{TR}$  is  $0 \times 0$ ,  $B_B$  has 0 rows,  $C_B$  has 0 rows while  $m(A_{TR}) < m(A)$  do

Repartition

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

where  $\alpha_{11}$  is  $1 \times 1$ ,  $b_1$  has 1 row,  $c_1$  has 1 row

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

$$c_1^T = \hat{c}_1^T + \alpha_{11}b_1^T + a_{21}^TB_2$$

Continue with

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

Step	Annotated Algorithm: $C := A B + C$ where A is symmetric stored in lower triange
1a	$\left\{ C=\widehat{C} ight\}$
4	Partition $A  o \left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array}\right)$ , $B  o \left(\begin{array}{c c} B_T \\ \hline B_B \end{array}\right)$ , $C  o \left(\begin{array}{c c} C_T \\ \hline C_B \end{array}\right)$
	where $A_{TR}$ is $0 \times 0$ , $B_B$ has 0 rows, $C_B$ has 0 rows
2	$\left\{ \left( \frac{C_T}{A_{BL}B_T + A_{BR}B_B + C_B} \right) = \left( \frac{\widehat{C}_T}{\widehat{C}_B} \right) \right\}$
3	while $m(A_{TR}) < m(A)$ do
2,3	$\left\{ \left( \left( \frac{C_T}{A_{BL}B_T + A_{BR}B_B + C_B} \right) = \left( \frac{\widehat{C}_T}{\widehat{C}_B} \right) \right) \land (m(A_{TR}) < m(A)) \right\}$
5a	Repartition
	$ \left(\begin{array}{c c} A_{TL} & * \\ A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{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 \\ \hline 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 \\ \hline c_1^T \\ C_2 \end{array}\right) $ where $\alpha_{11}$ is $1 \times 1$ , $b_1$ has 1 row, $c_1$ has 1 row
6	$\left\{ \left( \frac{C_0 = \widehat{C}_0}{c_1^T = \widehat{c}_1^T} \right) \right\}$ $A_{20}B_0 + a_{21}b_1^T + A_{22}B_2 + C_2 = \widehat{C}_2$
8	$c_1^T = \hat{c}_1^T + a_{10}^T B_0 + \alpha_{11} b_1^T + a_{21}^T B_2$
5b	Continue with
	$ \left(\begin{array}{c c c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array}\right) \leftarrow \left(\begin{array}{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 \\ B_2 \end{array}\right), \left(\begin{array}{c} C_T \\ C_B \end{array}\right) \leftarrow \left(\begin{array}{c} C_0 \\ \hline c_1^T \\ C_2 \end{array}\right) $
7	$ \left\{ \left( \frac{C_0 = \widehat{C}_0}{\frac{a_{10}^T B_0 + \alpha_{11} b_1^T + a_{21}^T B_2 + c_1^T = \widehat{c}_1^T}{A_2 0 B_0 + a_{21} b_1^T + A_{22} B_2 + C_2 = \widehat{C}_2} \right) \right\} $
2	$\left\{ \left( \frac{C_T}{A_{BL}B_T + A_{BR}B_B + C_B} \right) = \left( \frac{\widehat{C}_T}{\widehat{C}_B} \right) \right\}$
	endwhile
2,3	$\left\{ \left( \left( \frac{C_T}{A_{BL}B_T + A_{BR}B_B + C_B} \right) = \left( \frac{\widehat{C}_T}{\widehat{C}_B} \right) \right) \land \neg \left( m(A_{TR}) < m(A) \right) \right\}$
1b	$\left\{ \ C := AB + \widehat{C} \right\}$

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

where  $A_{TR}$  is  $0 \times 0$ ,  $B_B$  has 0 rows,  $C_B$  has 0 rows while  $m(A_{TR}) < m(A)$  do

Repartition

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

where  $\alpha_{11}$  is  $1 \times 1$ ,  $b_1$  has 1 row,  $c_1$  has 1 row

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

### Continue with

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

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

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

where  $A_{TR}$  is  $0 \times 0$ ,  $B_B$  has 0 rows,  $C_B$  has 0 rows while  $m(A_{TR}) < m(A)$  do

## Repartition

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

where  $\alpha_{11}$  is  $1 \times 1$ ,  $b_1$  has 1 row,  $c_1$  has 1 row

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

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

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

### Continue with

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

Ston	Annotated Algorithm: $C := A B + C$ where A is symmetric stored in lower triange
Step	
1a	$\left\{C=\widehat{C}\right\}$
4	$\mathbf{Partition} \ \ A \to \left( \begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array} \right)  ,  B \to \left( \begin{array}{c} B_T \\ \hline B_B \end{array} \right)  ,  C \to \left( \begin{array}{c} C_T \\ \hline C_B \end{array} \right)$
	where $A_{TR}$ is $0 \times 0$ , $B_B$ 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	$\left\{ \left( \left( \frac{A_{BL}^T B_B + C_T}{A_{BL} B_T + A_{BR} B_B + C_B} \right) = \left( \frac{\widehat{C}_T}{\widehat{C}_B} \right) \right) \wedge \left( m(A_{TR}) < m(A) \right) \right\}$
5a	Repartition
	$ \left(\begin{array}{c c} A_{TL} & * \\ \hline A_{BL} & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{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 \\ C_B \end{array}\right) \rightarrow \left(\begin{array}{c} C_0 \\ \hline C_1^T \\ \hline C_2 \end{array}\right) $
	where $\alpha_{11}$ is $1 \times 1$ , $b_1$ has 1 row, $c_1$ has 1 row
6	$ \left\{ \left( \frac{A_{20}^T B_2 + C_0 = \widehat{C}_0}{a_{21}^T B_2 + c_1^T = \widehat{c}_1^T} \right) \right\} $ $ \left\{ A_{20}^T B_0 + a_{21} B_1^T + A_{22} B_2 + C_2 = \widehat{C}_2 \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} 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 \\ 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( \frac{a_{10}b_1^T + A_{20}^T B_2 + C_0 = \widehat{C}_0}{a_{10}B_0 + \alpha_{11}b_1^T + a_{21}^T B_2 + c_1^T = \widehat{c}_1^T}{A_{20}B_0 + a_{21}b_1^T + A_{22}B_2 + C_2 = \widehat{C}_2} \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	$\left\{ \left( \left( \frac{A_{BL}^T B_B + C_T}{A_{BL} B_T + A_{BR} B_B + C_B} \right) = \left( \frac{\widehat{C}_T}{\widehat{C}_B} \right) \right) \land \neg \left( m(A_{TR}) < m(A) \right) \right\}$
1b	$\left\{ \ C := AB + \widehat{C} \right\}$
	J

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

where  $A_{TR}$  is  $0 \times 0$ ,  $B_B$  has 0 rows,  $C_B$  has 0 rows while  $m(A_{TR}) < m(A)$  do

Repartition

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

where  $\alpha_{11}$  is  $1 \times 1$ ,  $b_1$  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

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