

CPU multicore

### Fattorizzazione di cholesky a blocchi

$$\begin{array}{c|c} A_{11} & A_{21}^T \\ \hline A_{21} & A_{22} \end{array} = \begin{array}{c|c} L_{11} & 0 \\ \hline L_{21} & L_{22} \end{array} \begin{array}{c|c} L_{11}^T & L_{21}^T \\ \hline 0 & L_{22}^T \end{array}$$

$$A_{11} = L_{11} L_{11}^T$$

$$A_{21}^T = L_{11} L_{21}^T$$

$$A_{21} = L_{21} L_{11}^T$$

$$A_{22} = L_{21} L_{21}^T + L_{22} L_{22}^T$$

### Fattorizzazione di cholesky a blocchi

$$A_{11} = L_{11} L_{11}^T \longrightarrow L_{11} = \text{Chol}(A_{11})$$

$$A_{21}^T = L_{11} L_{21}^T$$

$$A_{21} = L_{21} L_{11}^T$$

$$A_{22} = L_{21} L_{21}^T + L_{22} L_{22}^T$$

$$L_{21} = A_{21} L_{11}^{-T}$$

$$L_{22} L_{22}^T = A_{22} - L_{21} L_{21}^T$$

### Fattorizzazione di cholesky a blocchi

$$\begin{array}{c|c} A_{22} & A_{32}^T \\ \hline A_{32} & A_{33} \end{array} = \begin{array}{c|c} L_{22} & 0 \\ \hline L_{32} & L_{33} \end{array} \begin{array}{c|c} L_{22}^T & L_{32}^T \\ \hline 0 & L_{33}^T \end{array}$$

$$A_{22} = L_{22} L_{22}^T$$

$$A_{32}^T = L_{22} L_{32}^T$$

$$A_{32} = L_{32} L_{22}^T$$

$$A_{33} = L_{32} L_{32}^T + L_{33} L_{33}^T$$

## Fattorizzazione di cholesky a blocchi

$$\begin{aligned}
 A_{22} &= L_{22} L_{22}^T && \longrightarrow && L_{22} = \text{Chol}(A_{22}) \\
 A_{32}^T &= L_{22} L_{32}^T && \longrightarrow && \\
 A_{32} &= L_{32} L_{22}^T && \longrightarrow && L_{32} = A_{32} L_{22}^{-T} \\
 A_{33} &= L_{32} L_{32}^T + L_{33} L_{33}^T && \longrightarrow && L_{33} L_{33}^T = A_{33} - L_{32} L_{32}^T
 \end{aligned}$$

## Fattorizzazione di cholesky a blocchi

$$A = L L^T$$

$$A_{33} = L_{33} L_{33}^T \longrightarrow L_{33} = \text{Chol}(A_{33})$$

## Fattorizzazione $LL^T$ a blocchi

```

for K = 1, NB
  L(K,K) = Chol( A(K,K) )
  for I = K+1, NB
    L(I,K) = A(I,K) L(K,K)^-T
  endfor

  for I = K+1, NB
    for J = K+1, ...
      A(I,J) = A(I,J) - L(I,K) L(J,K)^T
    endfor
  endfor
endfor

```

## Uso di BLAS/LAPACK

```

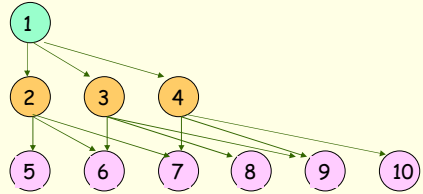
for K = 1, NB
  L(K,K) = Chol( A(K,K) )  $\longrightarrow$  DPOTF2
  for I = K+1, NB
    L(I,K) = A(I,K) L(K,K)^-T  $\longrightarrow$  DTRSM
  endfor

  for I = K+1, NB
    for J = K+1, ...
      A(I,J) = A(I,J) - L(I,K) L(J,K)^T  $\longrightarrow$  DGEMM
    endfor
  endfor
endfor

```

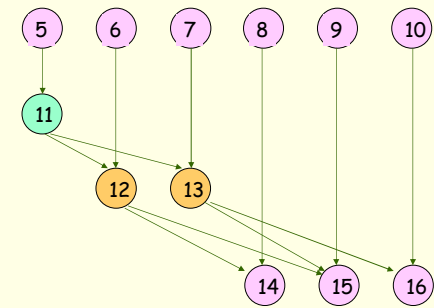
### Esempio NB=4

1			
2	5		
3	6	8	
4	7	9	10



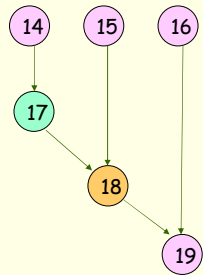
### Esempio NB=4

	11		
	12	14	
	13	15	16



### Esempio NB=4

		17	
	18	19	



### Esempio NB=4

			20

