

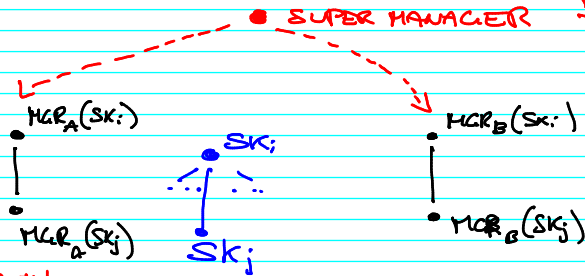
DISTRIBUTED SOLUTION  
(NO BOTTLENECKS)

NO EXTRA COMMS

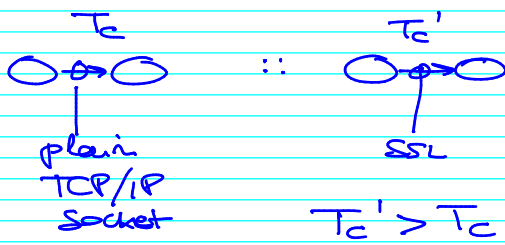
NO SPECIFIC ROLE  
OF THE HIERARCHY

BUT HAVING "CORRESPONDING  
MANAGERS" IN COMMUNICATION

BOTTLENECK  
GLOBAL VIEW  
~ PROBABLY  
BETTER  
DECISIONS

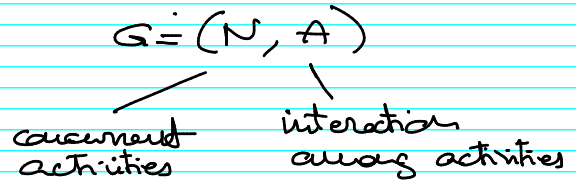


COMMON "GROUND"  
FOR COOPERATION



$$\max\{L_1, L_2\} > T_c'$$

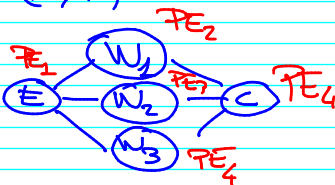
COMPUTATION GRAPH



+ metadata

describing properties/facts related to either  $N$  or  $A$

$$G = (N, A)$$



metadata

- $on(E, PE_1)$
- $on(W_2, PE_2)$
- $on(PE_2, PE_2)$

$$N = \{E, C, W_1, \dots, W_3\} \quad A = \{\langle E, W_1 \rangle, \dots, \langle E, W_3 \rangle, \langle W_1, C \rangle, \dots, \langle W_3, C \rangle\}$$

MANA tree & MANB tree

where

$G = (N, A)$  and  $\{\text{metadata}\} \equiv \text{collection}$   
 $\uparrow$  defined in terms of PEs  $\text{factor}(\dots \text{params})$

$G \leftarrow$

secure link (PE<sub>i</sub>, PE<sub>j</sub>)

cluster Node (PE<sub>i</sub>)

power hungry (PE<sub>j</sub>)

power cheap (PE<sub>j</sub>)

# COORDINATION of MANAGERS

2 phase protocol

1) decision steps

MGR<sub>A</sub> decides action A  
↳ "improve" A property

2) answer for consensus

in terms of modifications of G

IS IT OK ( $G \rightarrow G'$ )

↑  
result  
of action A  
on graph G

3) get consensus  
answers step

↳ OK, NOK, PROVIDED (property)

4) commit step

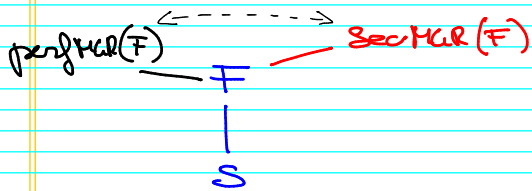
$\forall$  OK  $\rightarrow$  COMMIT(A)  
 $G \rightarrow G'$

$\exists$  NOK  $\rightarrow$  ABORT  
+ corrects  
PROPERTY  
IN RULES

4) commit step

$\nexists$  NOK  $\exists$  PROVIDED(P)  
COMMIT A' (A ensuring P)

F A = performance  
 | B = security  
 S



PerfMGR(F) → INCREASE MW  
 ↳ PLAN: recruit(PE<sub>x</sub>), deploy(RTS, PE<sub>x</sub>),  
 start(PE<sub>x</sub>, RTS), link(PE<sub>x</sub>)

G = (N, A)

N = {PE<sub>1</sub>, PE<sub>2</sub>, PE<sub>3</sub>}

A = {<PE<sub>1</sub>, PE<sub>2</sub>>, <PE<sub>2</sub>, PE<sub>3</sub>>}

G' = (N', A')

N' = N ∪ {PE<sub>4</sub>}

A' = A ∪ {<PE<sub>2</sub>, PE<sub>4</sub>>, <PE<sub>4</sub>, PE<sub>3</sub>>}

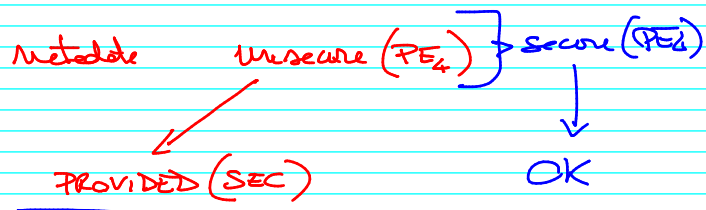
METADATA U = workerNode(PE<sub>4</sub>)

DATA  
 DATA  
 DATA  
 DATA

- workerNode (PE<sub>2</sub>)
- emitterNode (PE<sub>1</sub>)
- collectorNode (PE<sub>3</sub>)

↳ is sent to  
 (ASK CONSENSUS) SecMGR(F)

SecTKR(F)



PerTKR(F) gets

A' = deploy(secure FIS), rules(), link()

commit(A')