



CONTROLLING DATA FLOWS IN DISTRIBUTED SYNCHRONOUS LOGICAL EXECUTION TIME: THE CONTROL DEPTH READING APPROACH

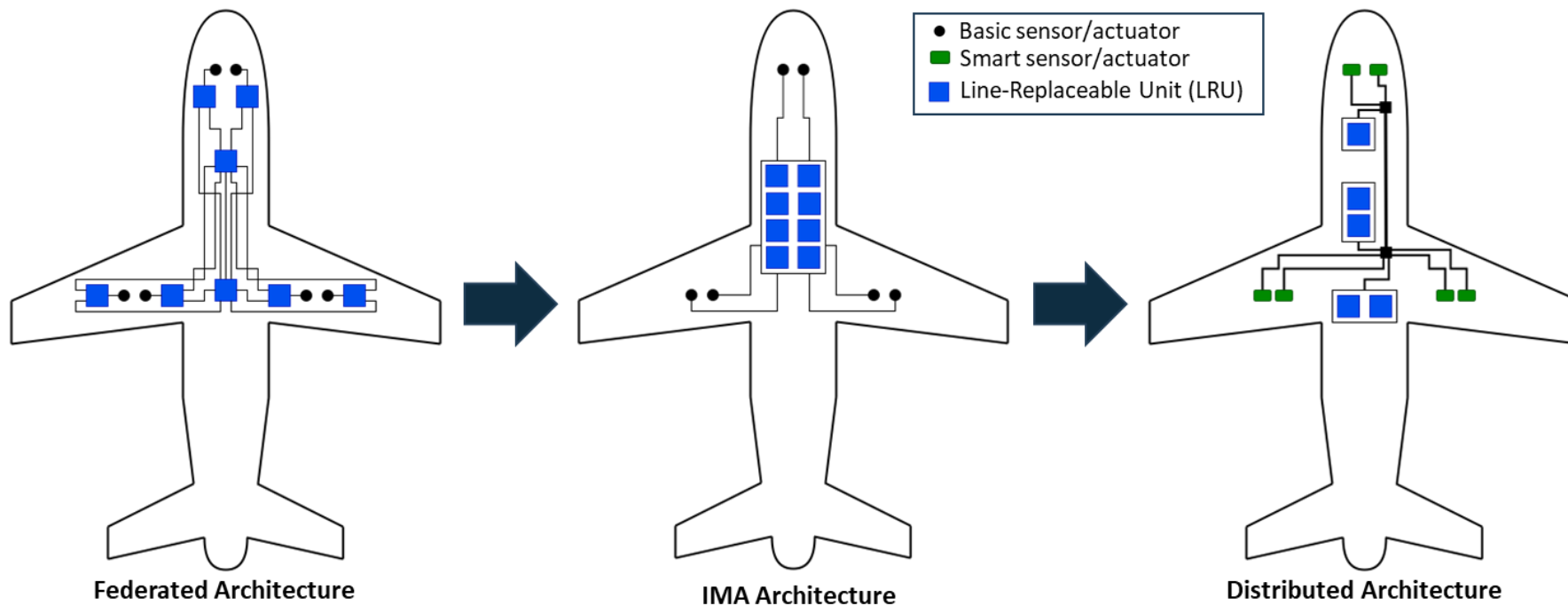
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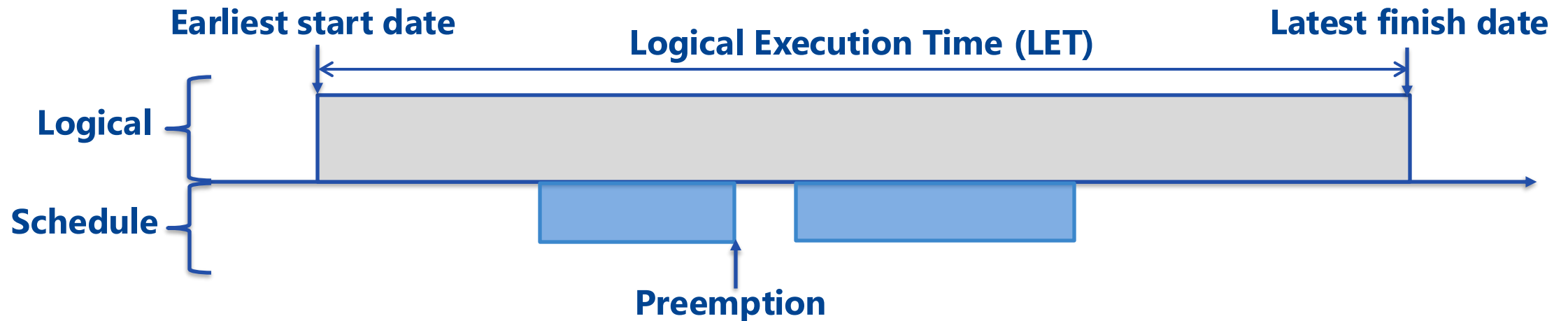
Distributed communication based on LET

- Towards Distributed Architectures
- Platform Abstraction And Deployment Automation
- New operational efficiency in the development of distributed critical real-time systems



Logical Execution Time (LET) paradigm

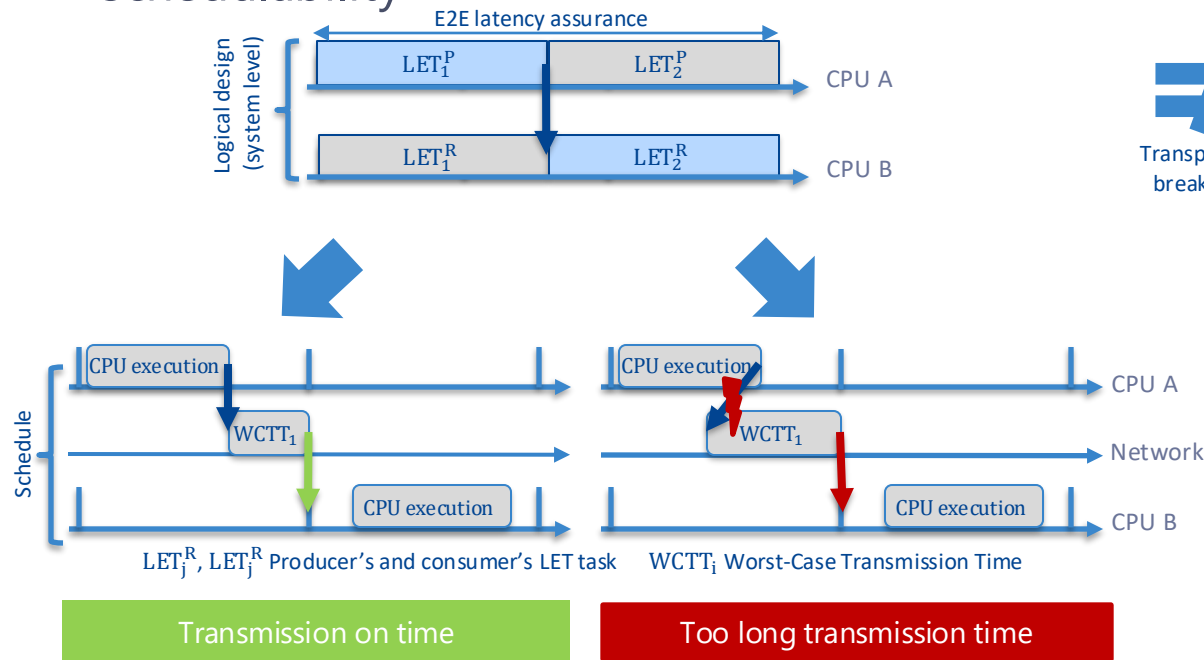
- Abstracts the exact schedule in user defined windows
- Communication variables are updated at the window boundaries
- Periodic behavior
- Platform Independent = single core, multicore or multi-computer (distributed)



LET drawbacks / limitations for distributed architectures

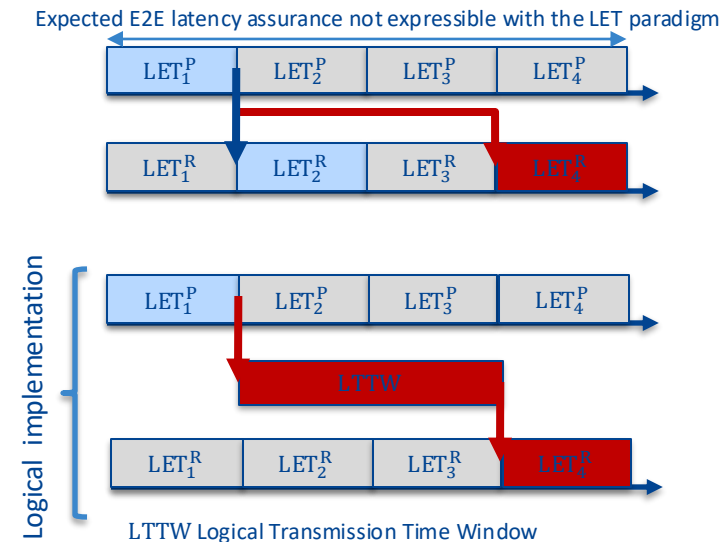
▪ Producer Encapsulated Transmission Time (PETT)

- Transmission encapsulated within producer's LET window
- Transmission time impacts directly tasks schedulability



▪ System Level-LET (SL-LET)¹

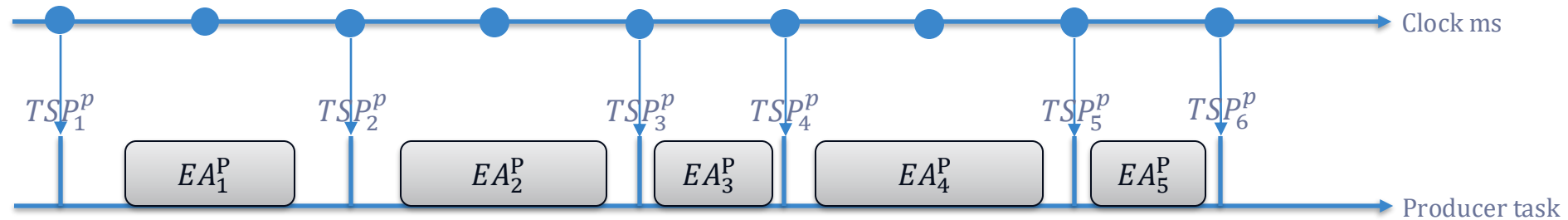
- Introduction of a Logical Transmission Time Window
- Breakdown between logical system design and distributed implementation



[1] KÖHLER, LEONIE ; HERTHA, PHIL ; BECKERT, MATTHIAS ; BENDRICK, ALEX ; ERNST, ROLF: ROBUST CAUSE-EFFECT CHAINS WITH BOUNDED EXECUTION TIME AND SYSTEM-LEVEL LOGICAL EXECUTION TIME. IN: ACM TRANSACTIONS ON EMBEDDED COMPUTING SYSTEMS Bd. 22 (2023), NR. 3, S. 1–28

Synchronous Logical Execution Time (sLET) scheduling

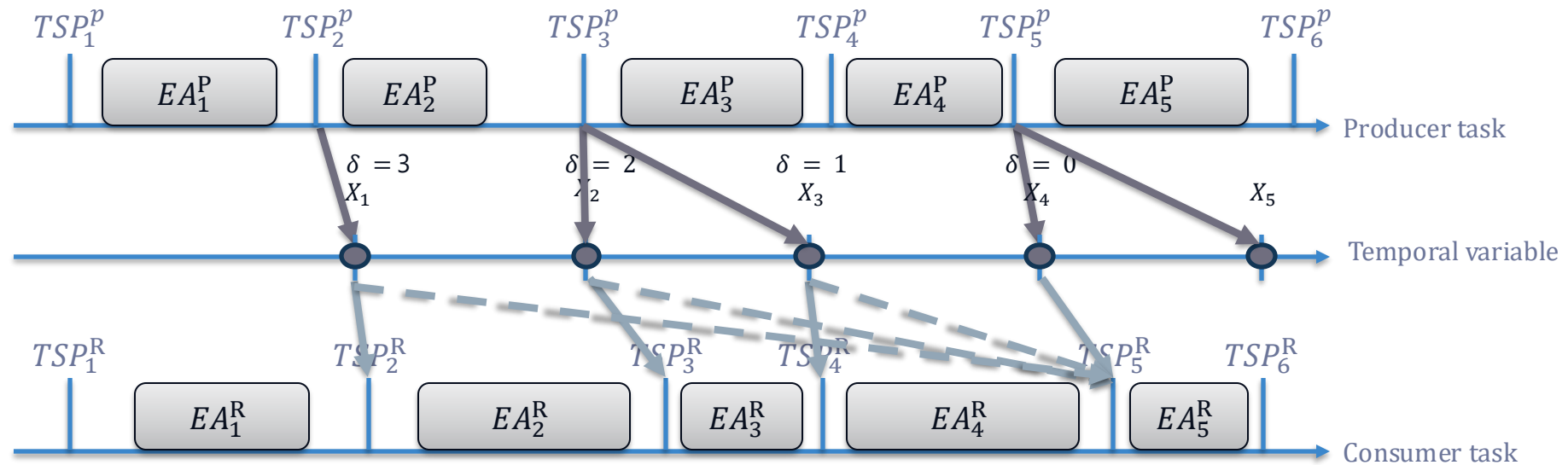
- Inherits from LET paradigm
- LET intervals are triggered by a synchronous logical clock
 - Time Synchronization Point (TSP)²
- Tasks are not always periodic



[2] SIRON, FABIEN ; POTOP-BUTUCARU, DUMITRU ; DE SIMONE, ROBERT ; CHABROL, DAMIEN ; METHNI, AMIRA: The synchronous logical execution time paradigm. In: *ERTS 2022-Embedded real time systems*, 2022

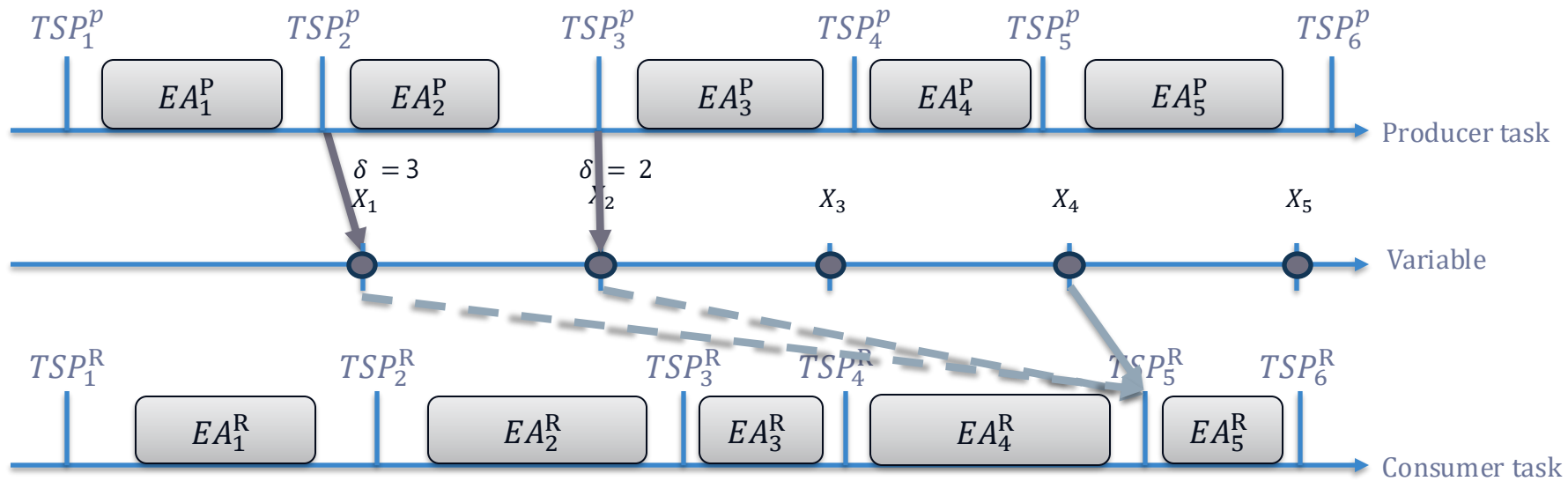
Synchronous Logical Execution Time (sLET) communications

- Communications (Producer – Reader) through periodic updated variables
- The ability to access a bounded history of past values of variables



Control Depth Reading principle (CDR)

- A mechanism to specify data freshness
 - User defined $[\delta^{\text{Min}}, \delta^{\text{Max}}]$
- Logical Transmission Time windows (LTTW) are automatically derived
- Relieves the user from explicitly defining all LTTWs



Mais ton poster ici ?

Thanks!
And if you want to
discuss how to use CDR
let's meet around the
poster...



**POWERED
BY TRUST**

