

# Architecting System Performance; Resource Management

by *Gerrit Muller* TNO-ESI, University College of South East Norway

e-mail: `gaudisite@gmail.com`

`www.gaudisite.nl`

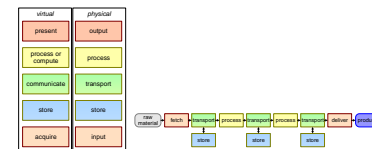
## Abstract

The management of the resources largely determines system performance. This document discusses concepts related to resource management, such as caching, concurrency, and scheduling.

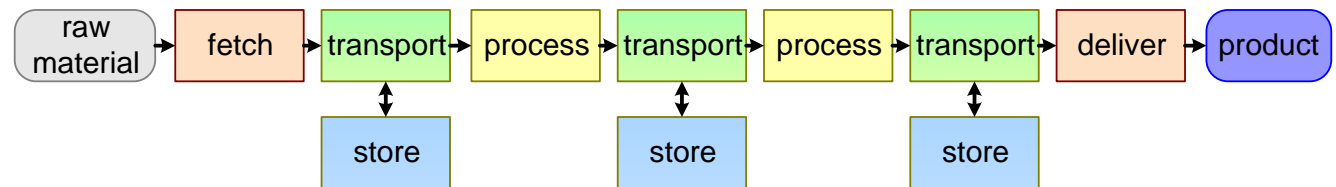
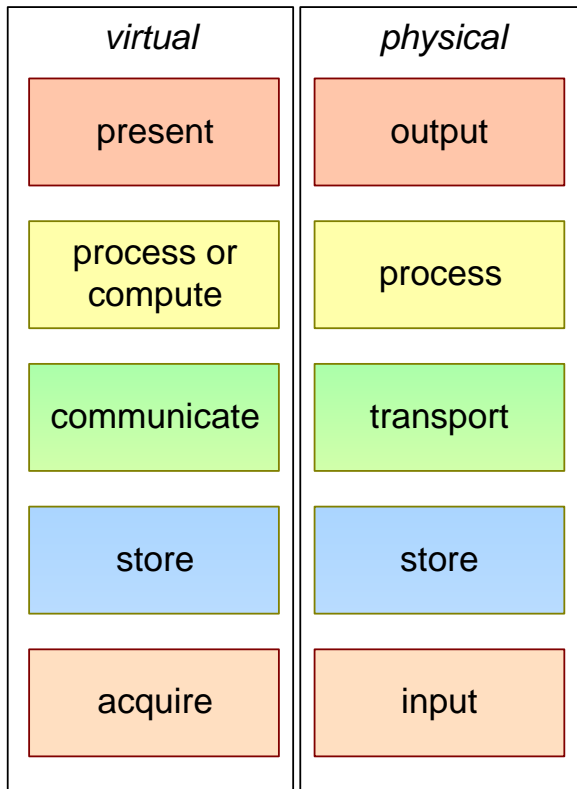
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# Generic Resource Model



# Design Considerations for Resource Management

Performance depends on resource utilization and management.

The design of the logistics, how does EMI<sup>1</sup> flow through the resources, is critical.

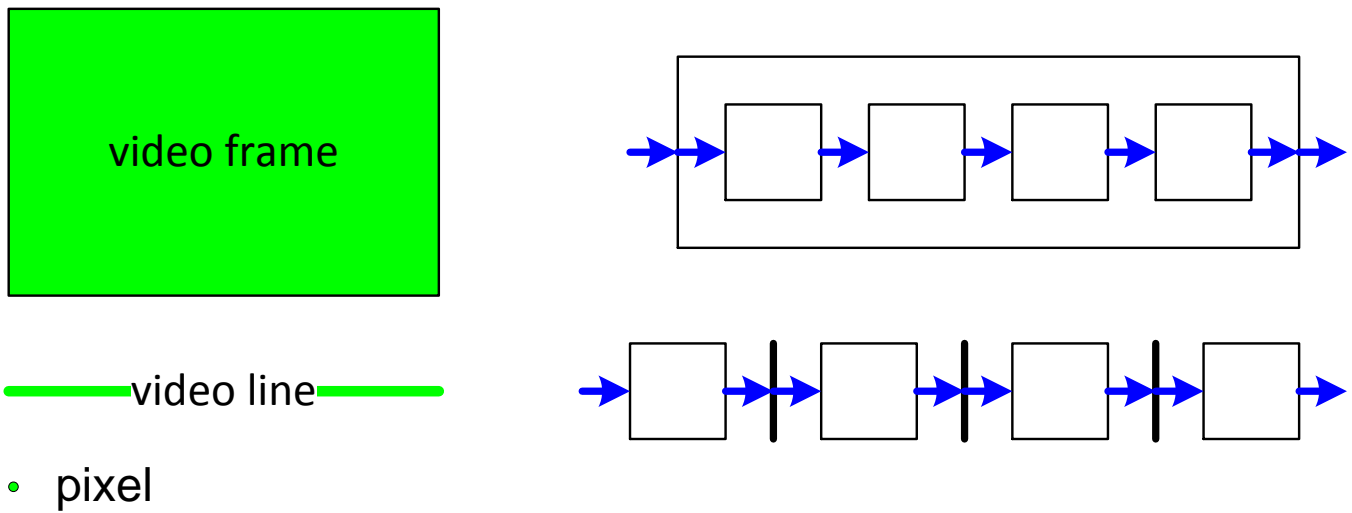
Critical design aspects are:

- concurrency (parallelism, pipelining)
- granularity of EMI
- scheduling (allocation of resources)

<sup>1</sup>Energy Material Information

# Granularity as Key Design Choice

*unit of buffering* == *unit of synchronization* == *unit of processing* == *unit of I/O*  
 or or or  
 <> <> <>



*fine grain:*  
 flexible  
 high overhead

*coarse grain:*  
 rigid  
 low overhead

# Size versus Performance Trade off

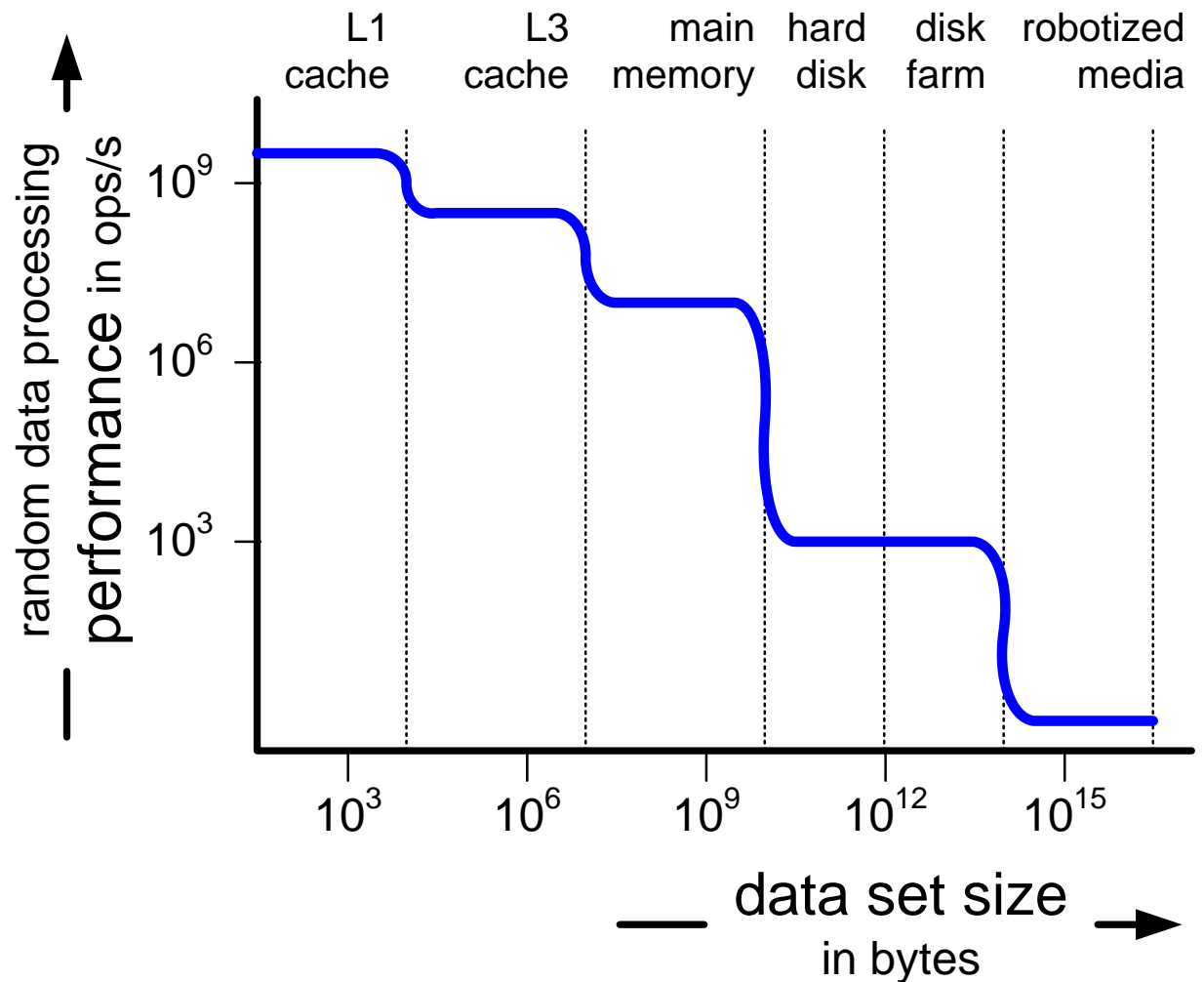
*small capacity*

fast technology  
small  
expensive

*large capacity*

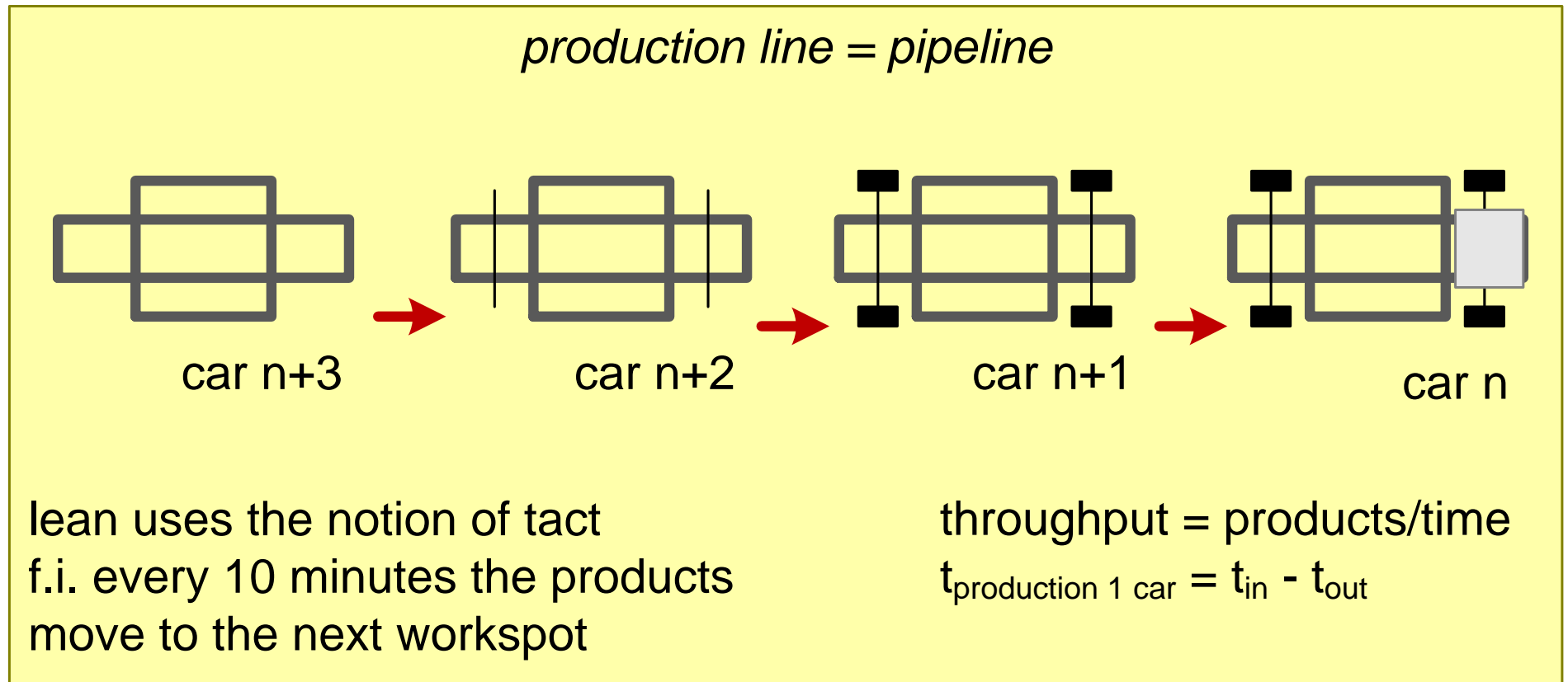
slow technology  
large  
low cost

*staircase effect:*  
performance and  
size are non-linear  
with thresholds

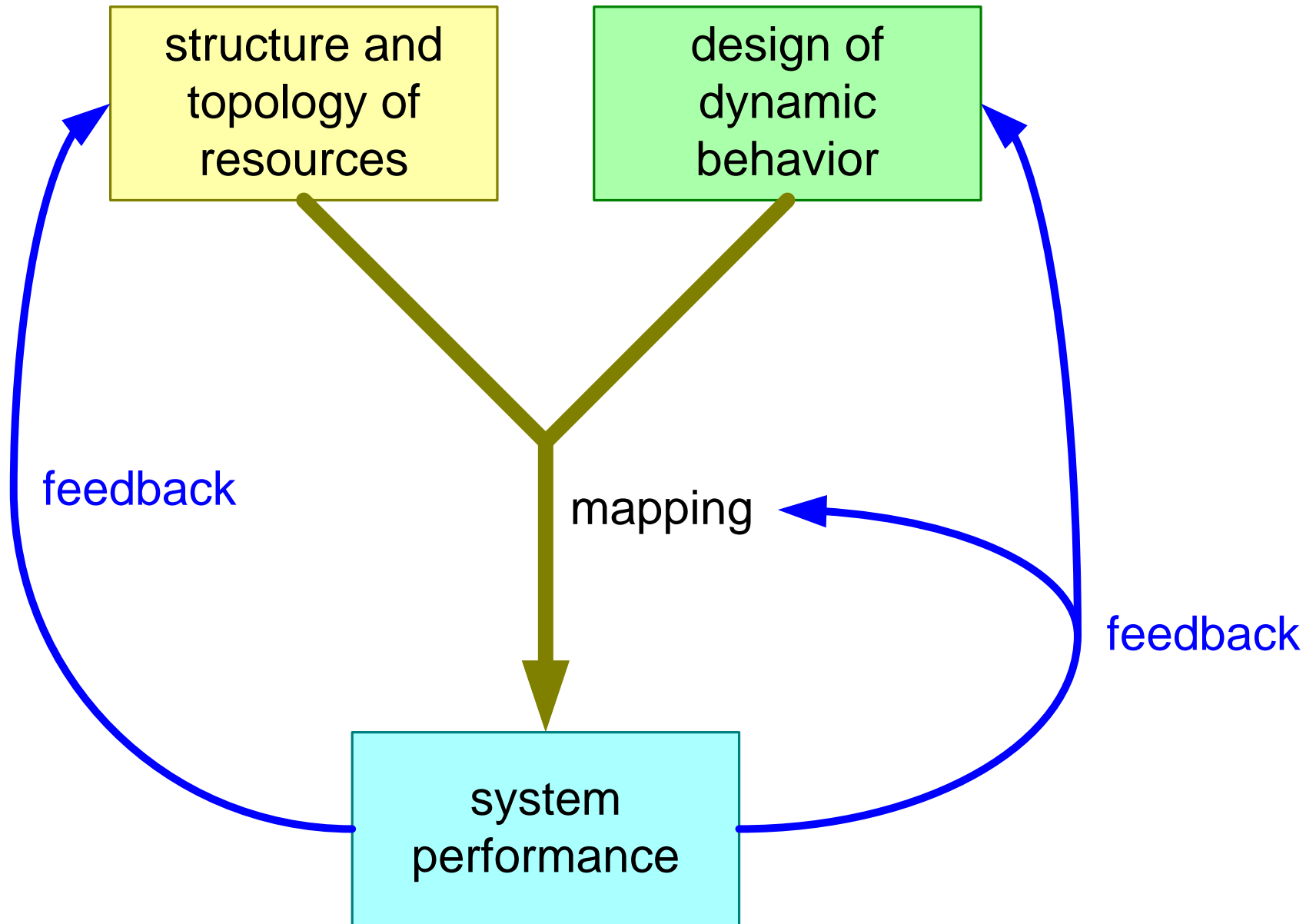


example data storage technology

# Pipeline pattern



# Y-chart Pattern



# Performance Pitfalls and Resource Management

Overhead (control, handling)

Starvation (underrun)

Saturation/stagnation (overrun)

Variation (duration, quality)

Serialization

Interference with other work

Unnecessary conversions or adaptations