

# Architecting System Performance; Resource Management

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## 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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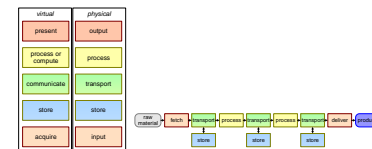
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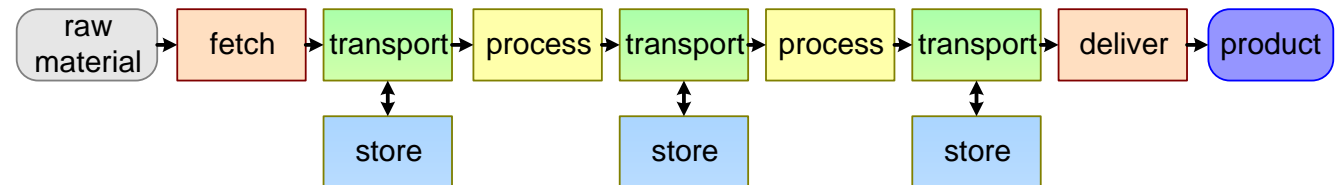
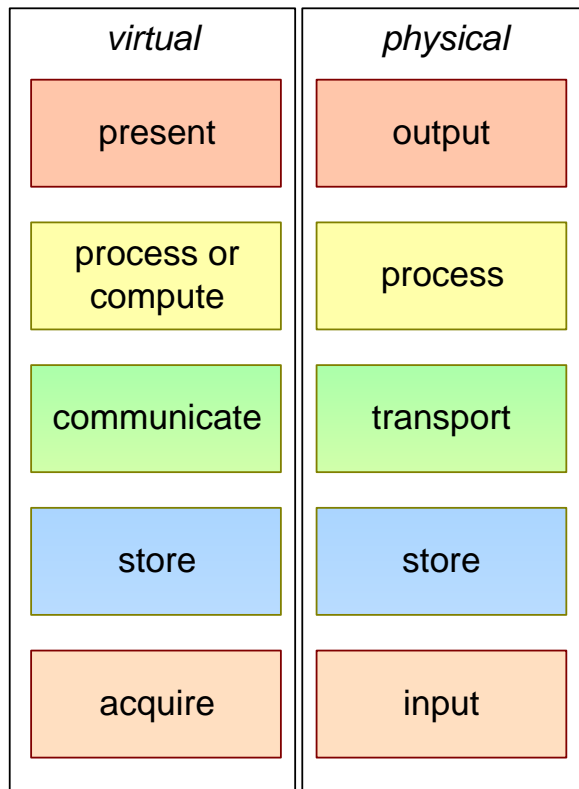
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# Generic Resource Model



# 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.

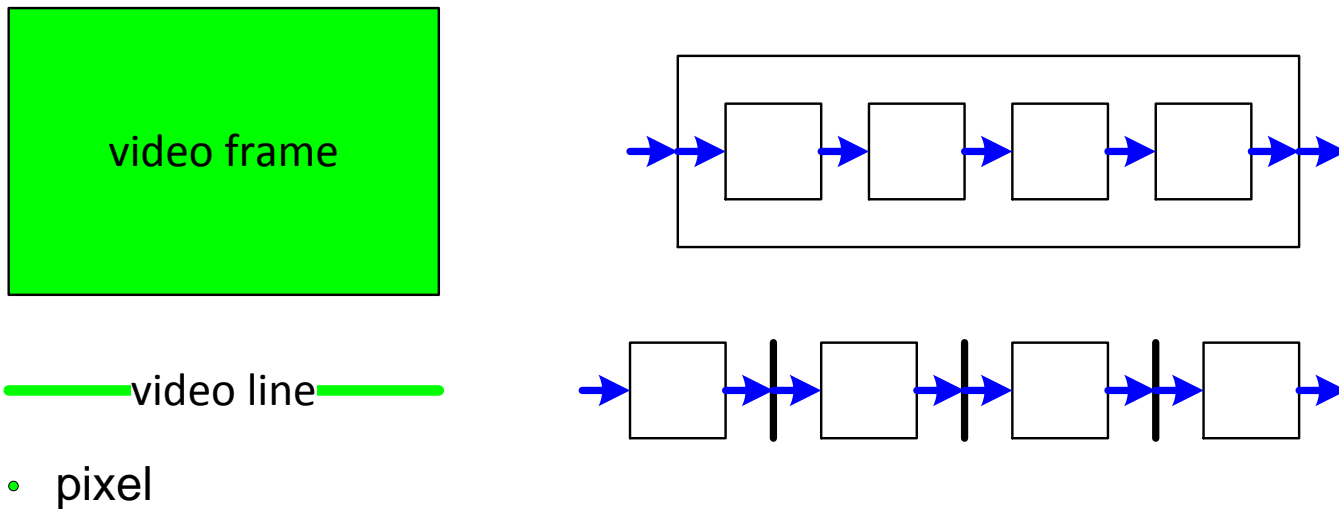
Critical design aspects are:

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

<sup>1</sup>Energy Material Information

# Granularity as Key Design Choice

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



*fine grain:*  
flexible  
high overhead

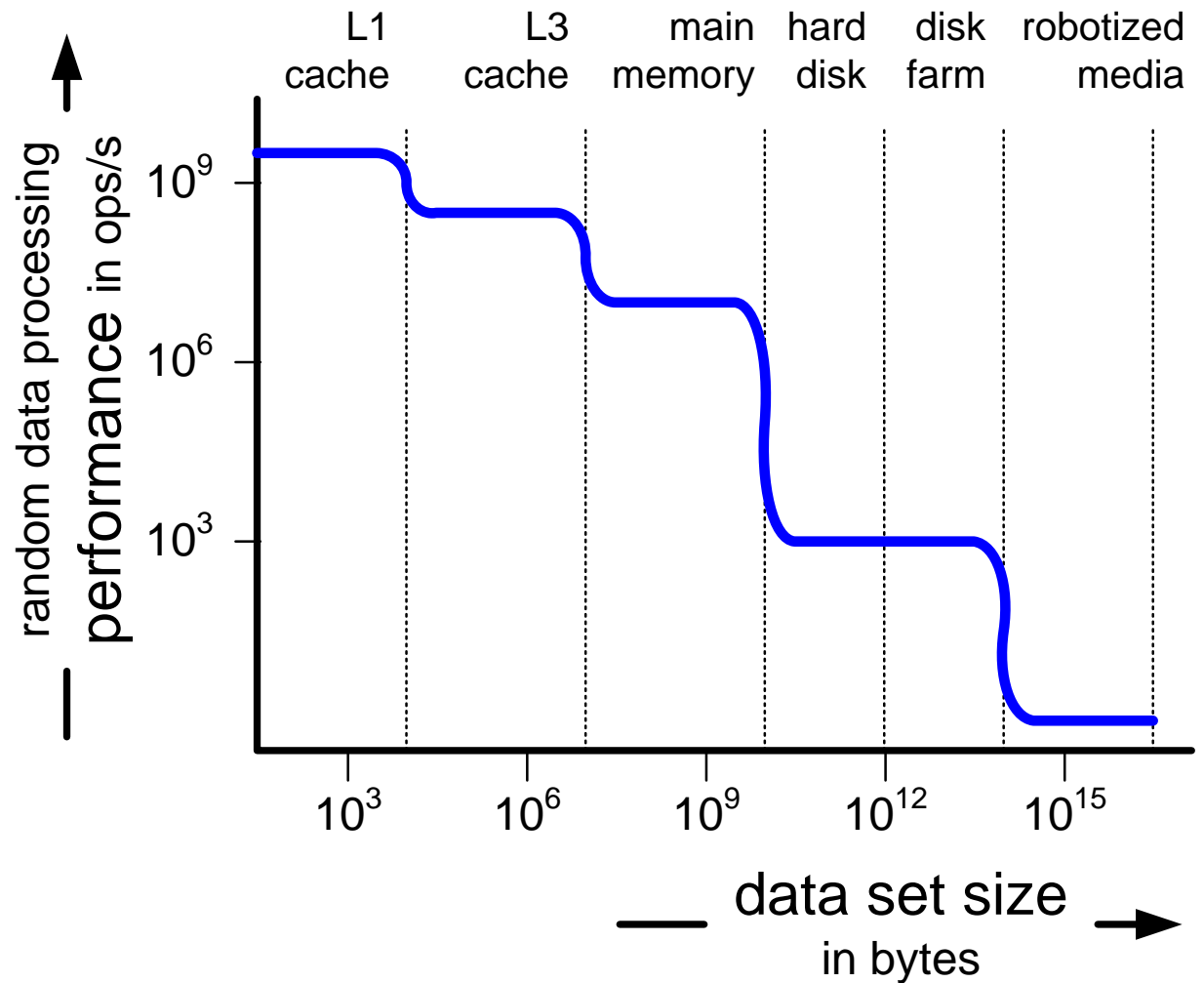
*coarse grain:*  
rigid  
low overhead

# Size versus Performance Trade off

*small capacity*  
fast technology  
small  
expensive

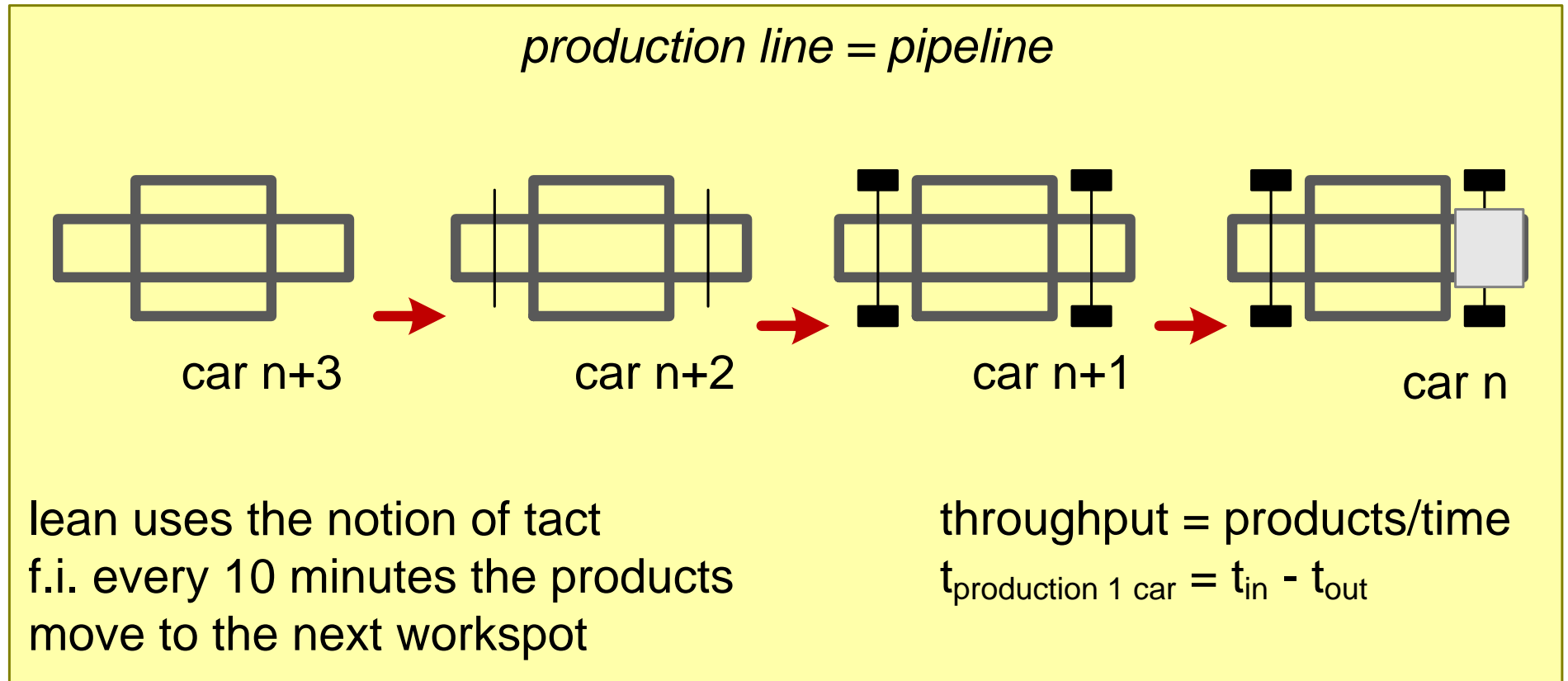
*large capacity*  
slow technology  
large  
low cost

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

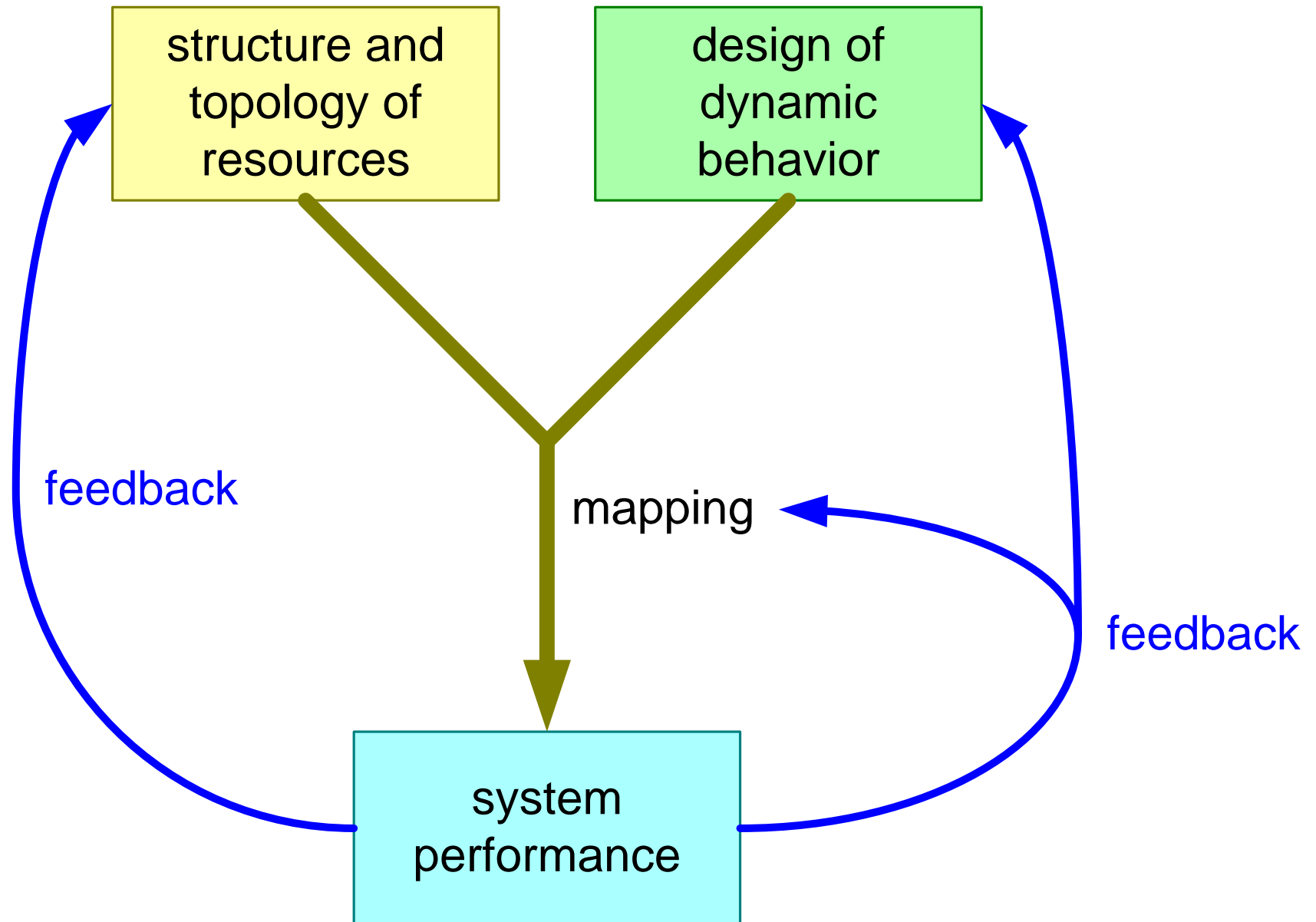


example data storage technology

# Pipeline pattern



# Y-chart Pattern



Overhead (control, handling)

Starvation (underrun)

Saturation/stagnation (overrun)

Variation (duration, quality)

Serialization

Interference with other work

Unnecessary conversions or adaptations