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Design Patterns for Distributed Systems

Alberto Acerbis

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You

What is a Distributed System?

- A distributed system is a network of independent computers that work together as a single system to solve a problem or execute a task
- In a distributed system, each computer, also known as a node, has its own memory and processing capabilities and communicates with other nodes through a network.
- These systems are designed to distribute the workload among multiple nodes, which can lead to increased performance, fault tolerance, and scalability compared to centralized systems.

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Promise (and Perils) of Distributed Systems

- Limits of a Single Server
- Separate Business Logic and DataLayers
- Partitioning Data
- Failure Management

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Architecture Evolution

Cloud

New Patterns

Components

Service Oriented

Distributed Systems

Microservizi

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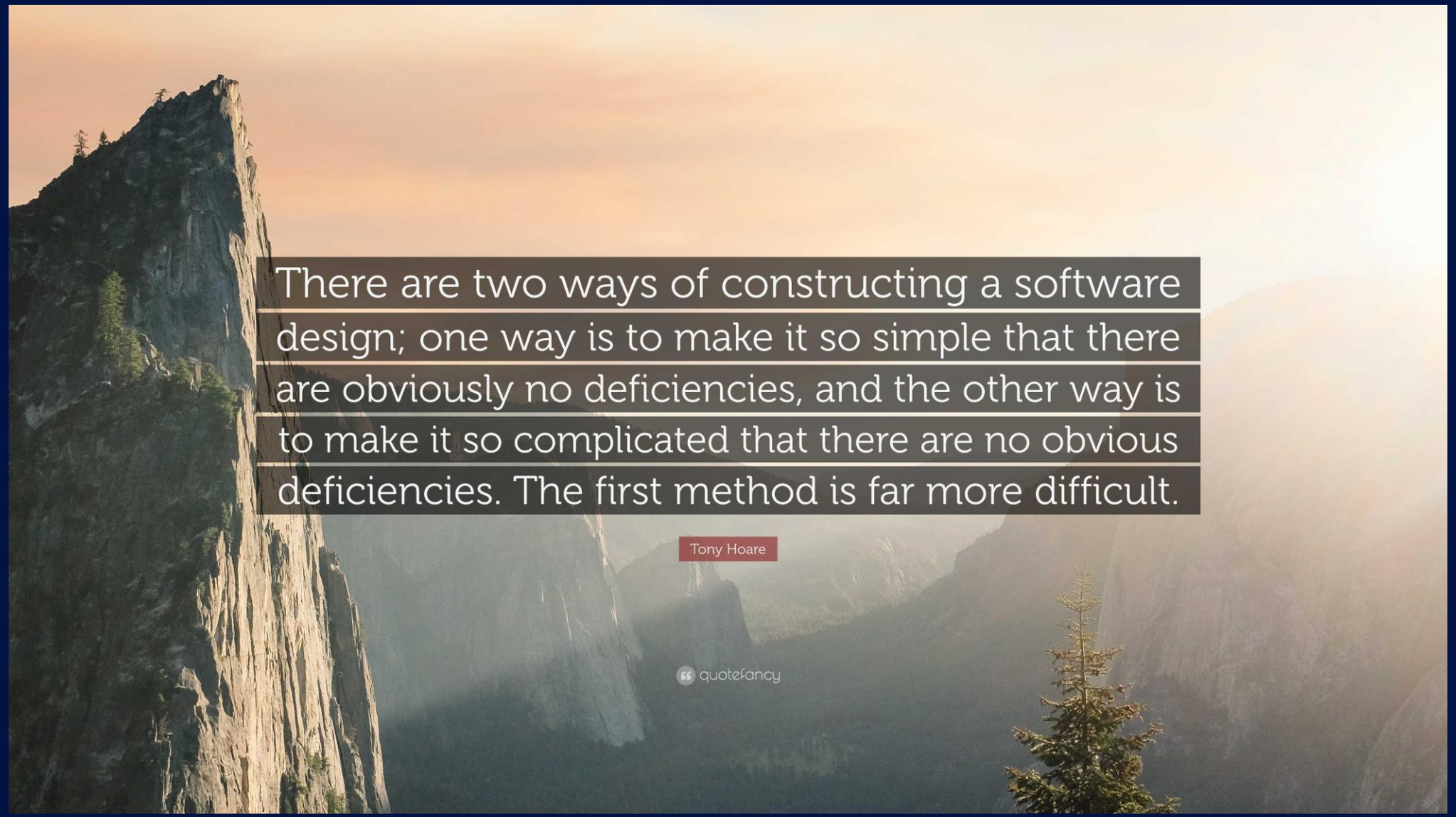

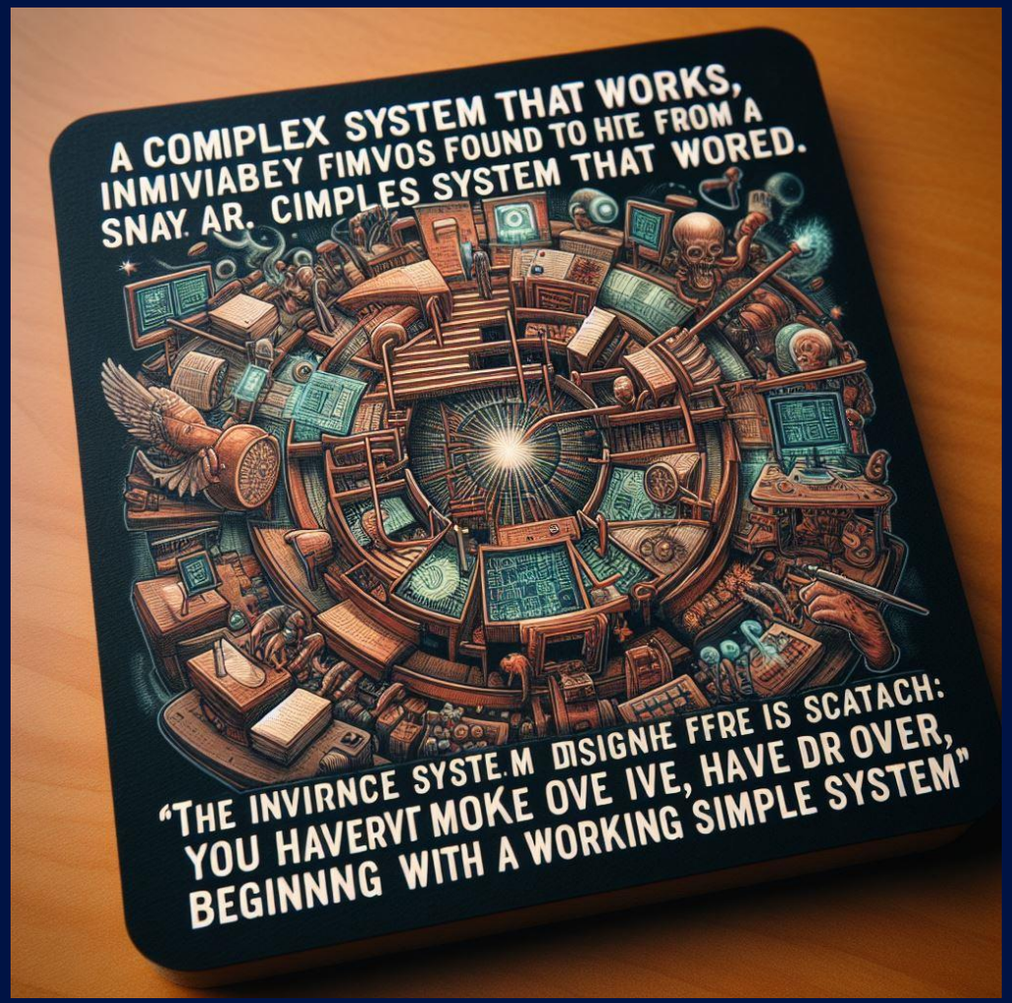

- A complex system that works is invariably found to have evolved from a simple system that worked.
- The inverse proposition also appears to be true: A complex system designed from scratch never works and cannot be made work.
- You have to start over, beginning with a working simple system.

Gall's Law

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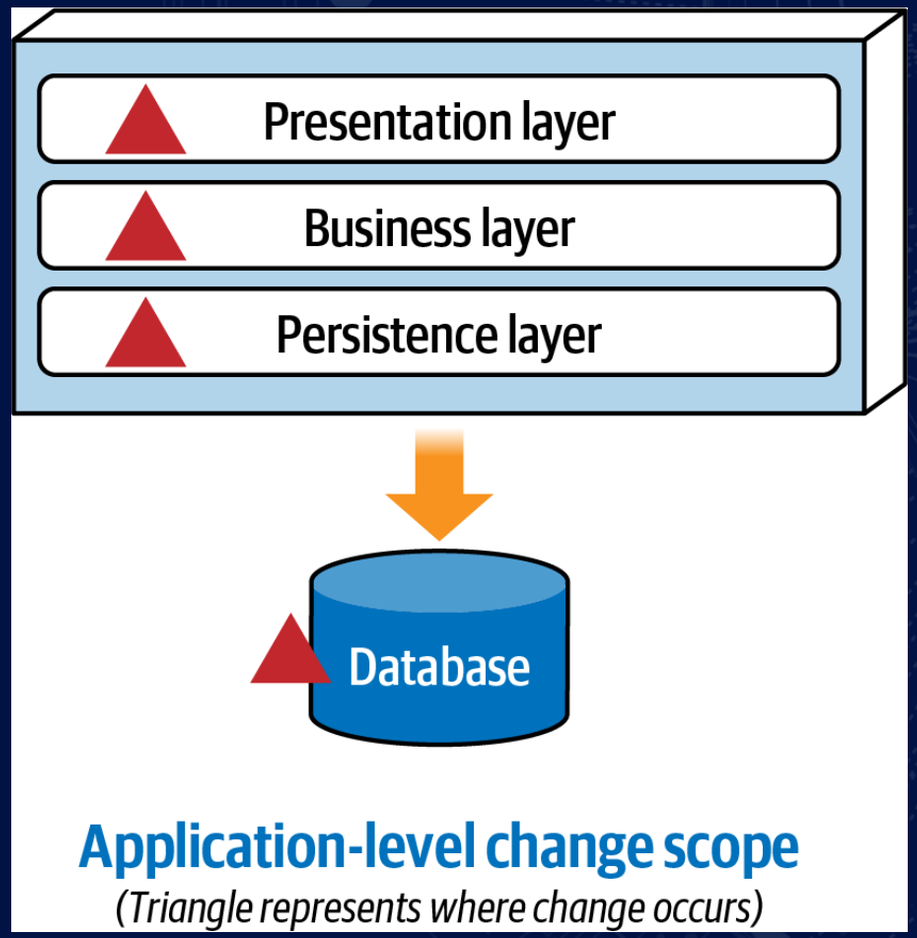
Separate Business Logic and Data Layer



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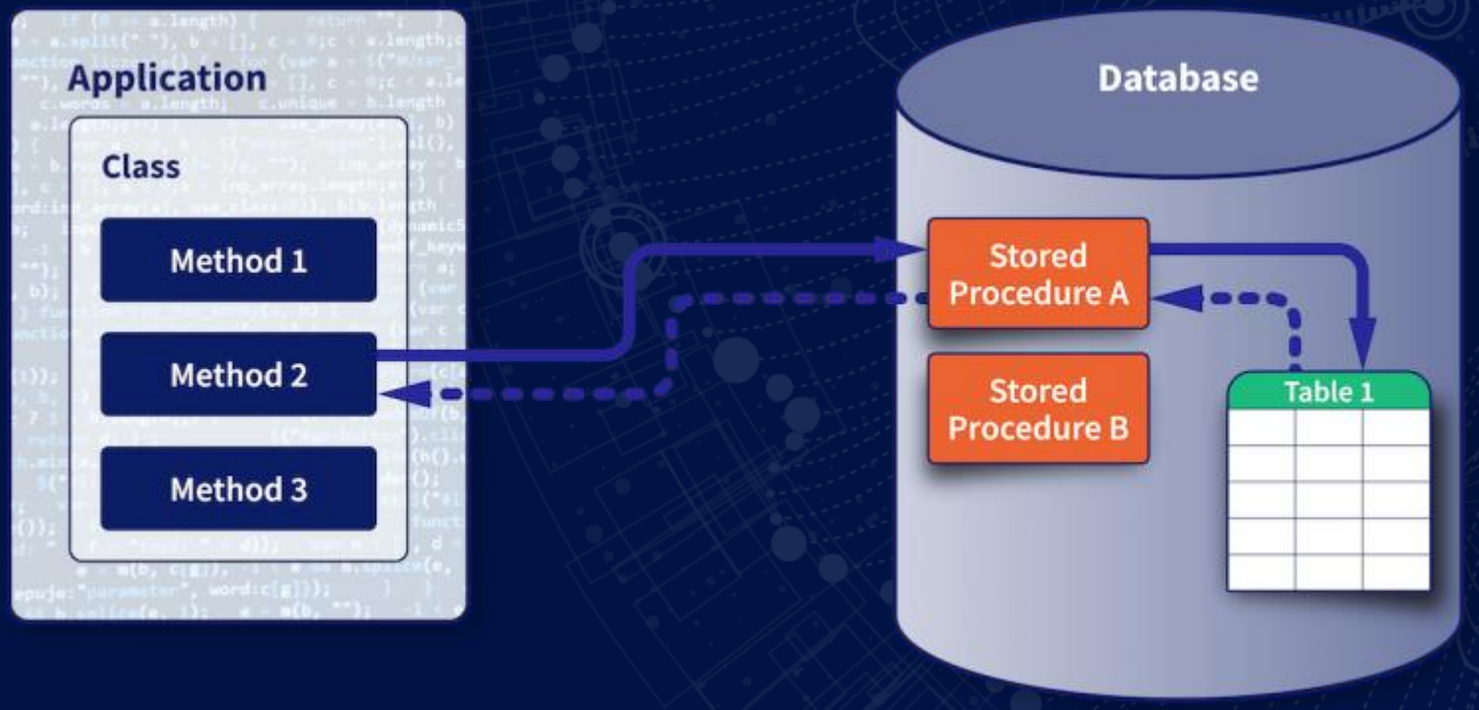
Separate Business Logic and Data Layer



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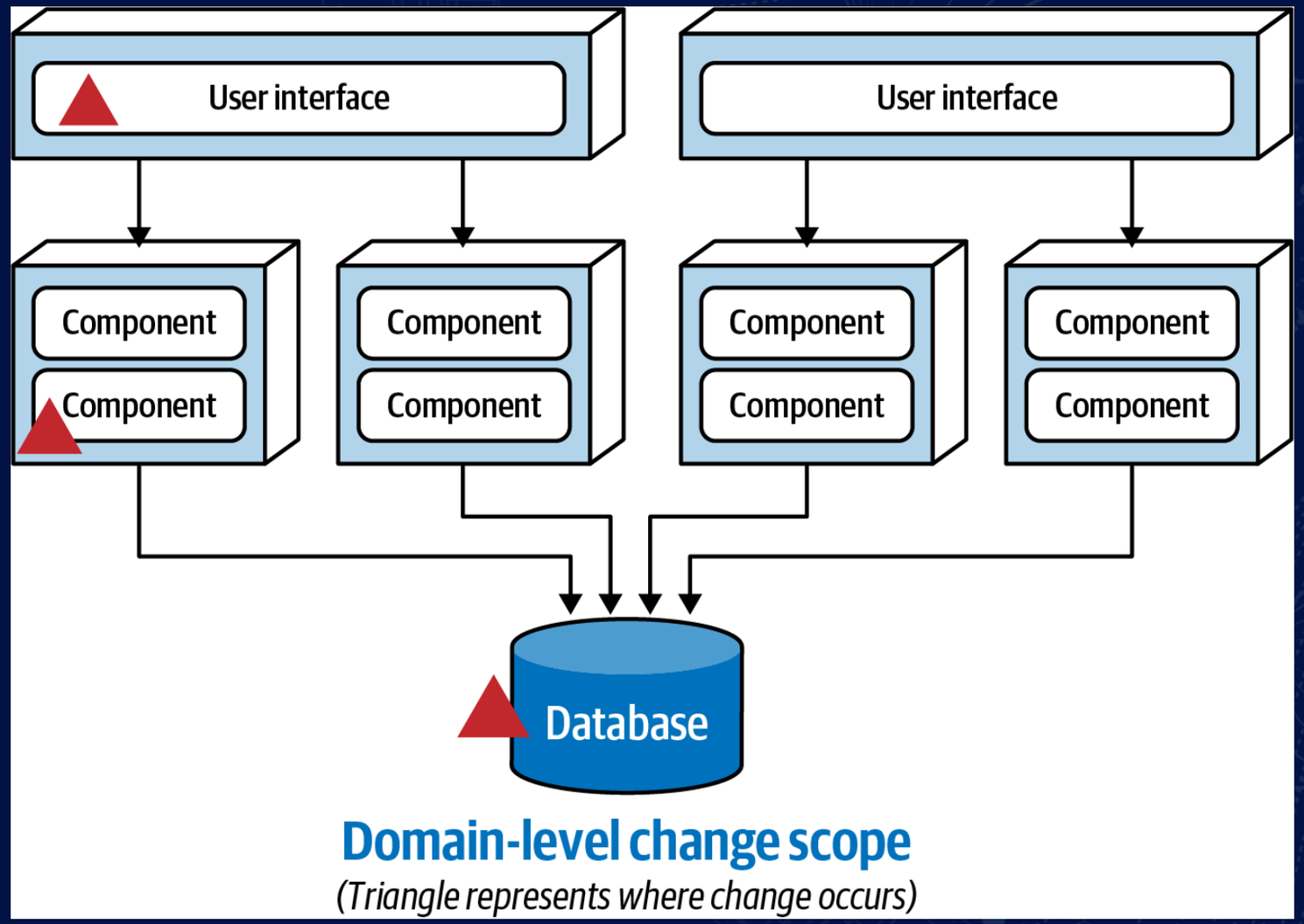
Separate Business Logic and Data Layer



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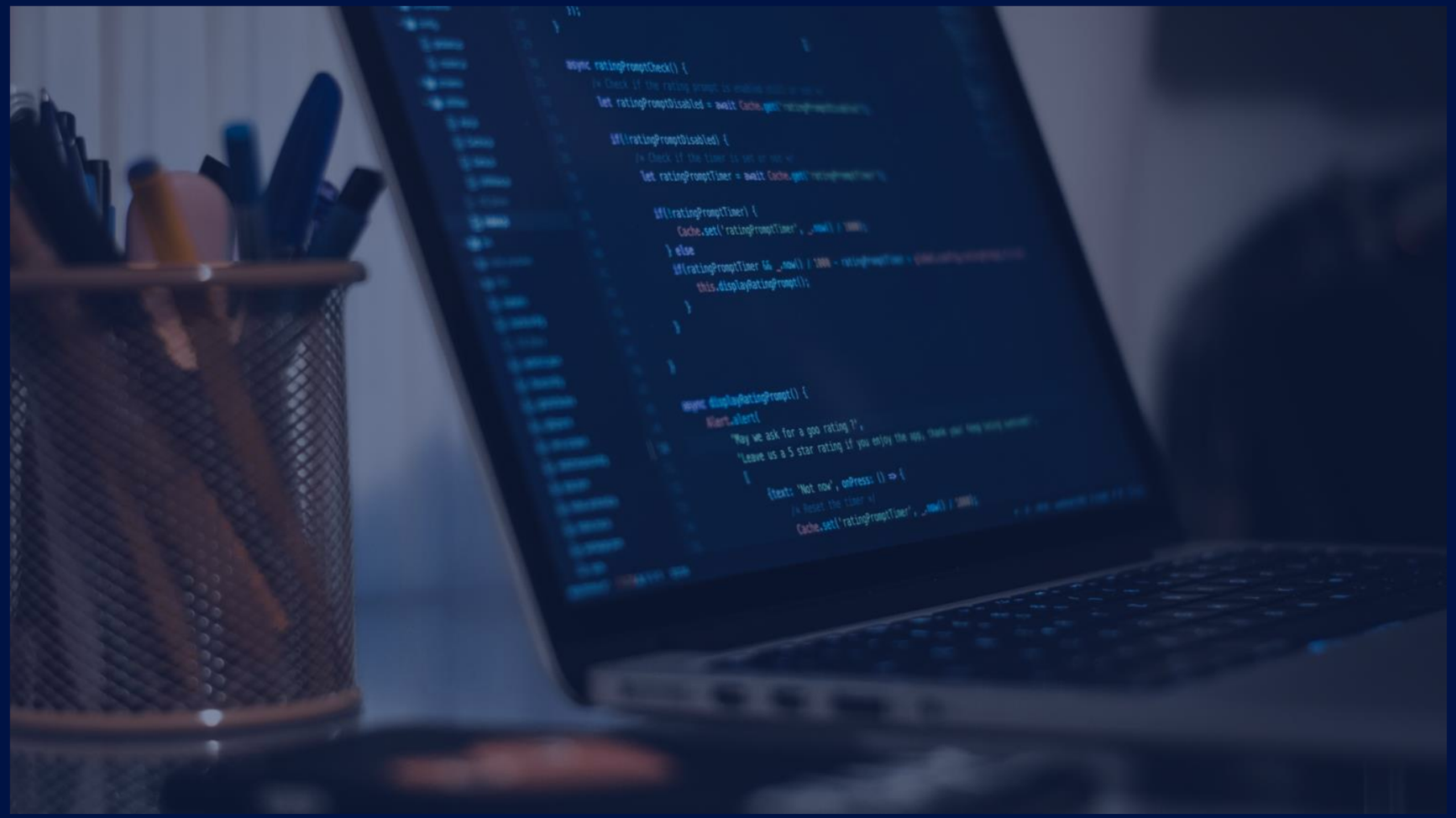

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Partitioning Data

Given a distributed system has to update many components, it can't simultaneously change everything at once, quickly, without failure.

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Partitioning Data

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Partition Tolerance

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Partitioning Data

Given a distributed system has to update many components, it can't simultaneously **change everything at once**, quickly, without failure.

Consistency

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Partitioning Data

Given a distributed system has to update many components, it can't simultaneously change everything at once, quickly, **without failure**.

Availability

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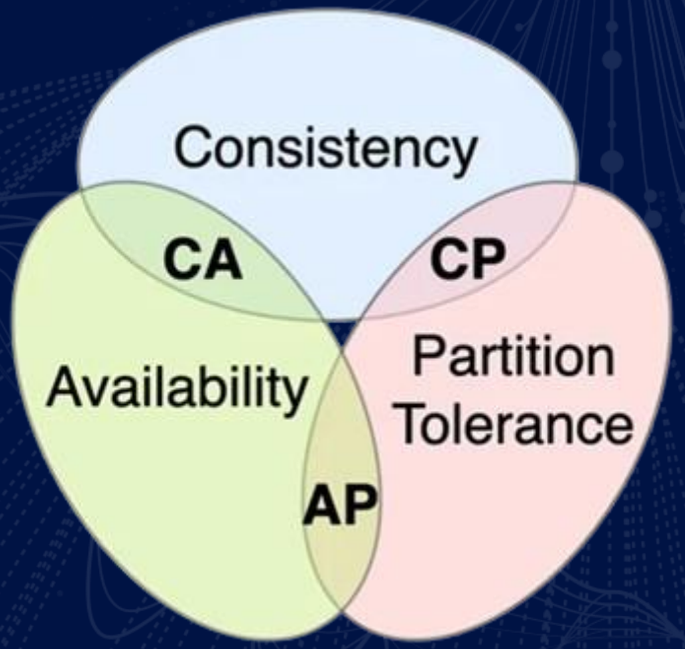
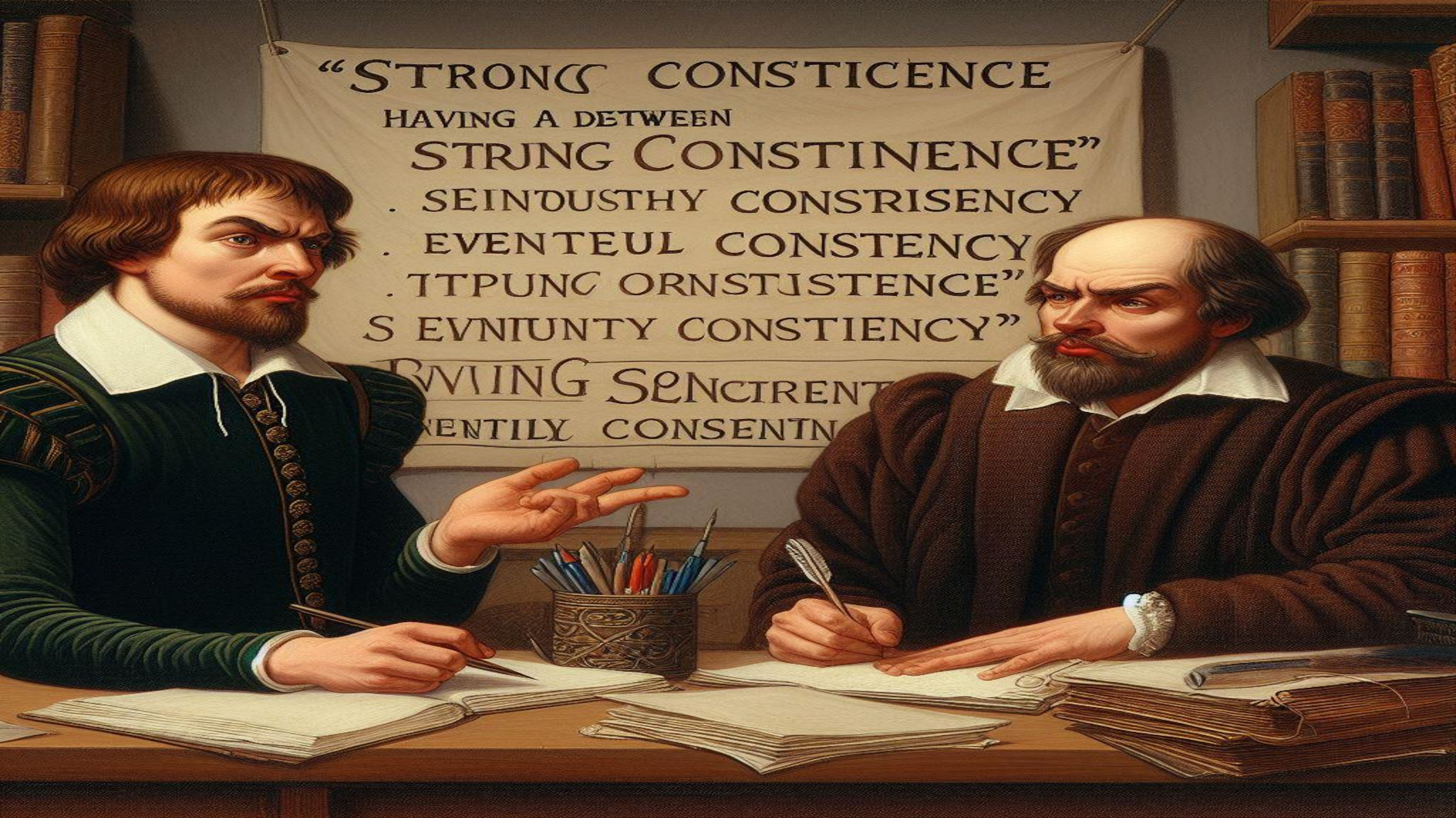
CAP Theorem

Any partition tolerant system can only have consistency or availability. Not both!



Consistency vs Availability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What is Communication?

Communication is the process of passing information (sending) and understanding (receiving) the same from one service to another.

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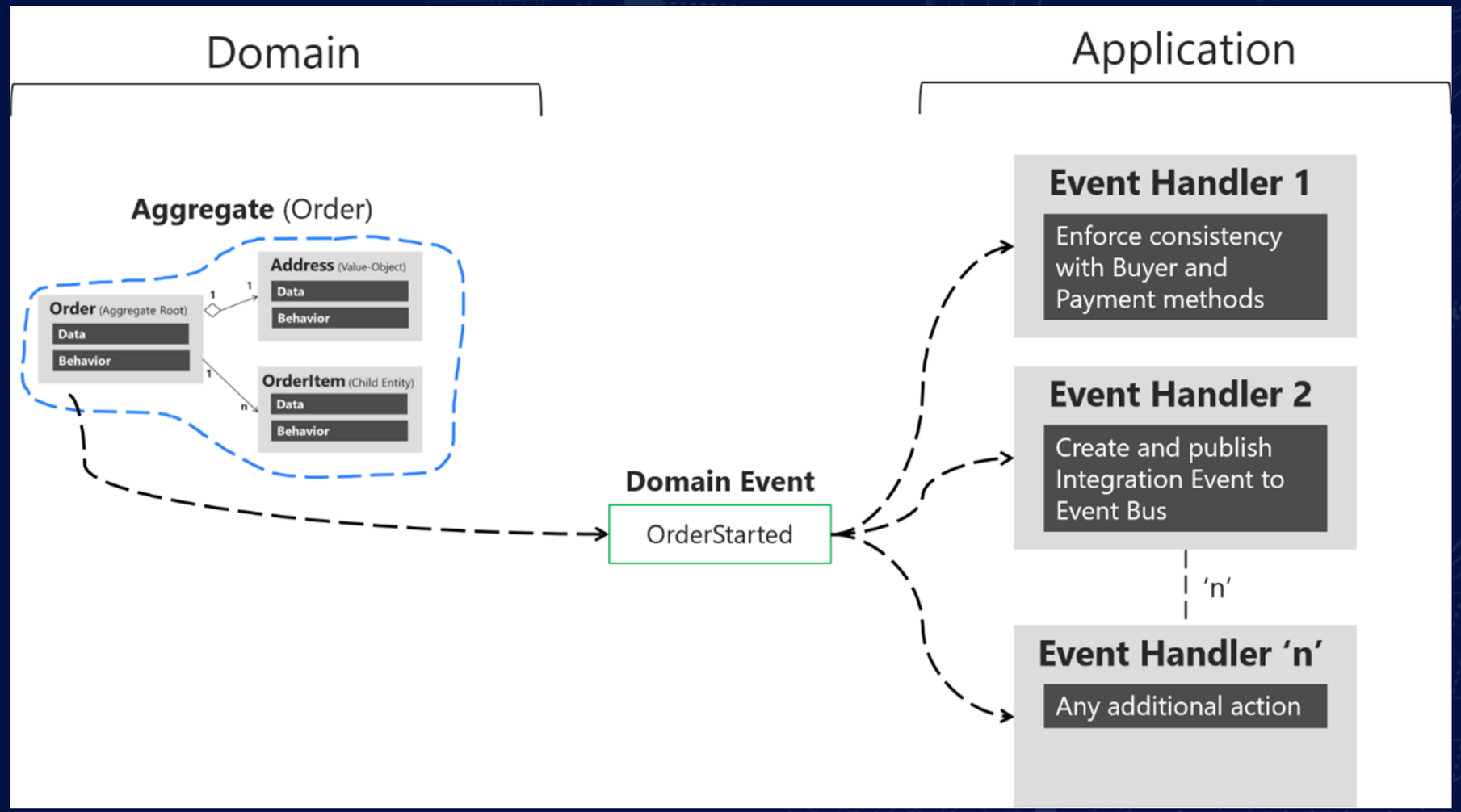
Domain Event



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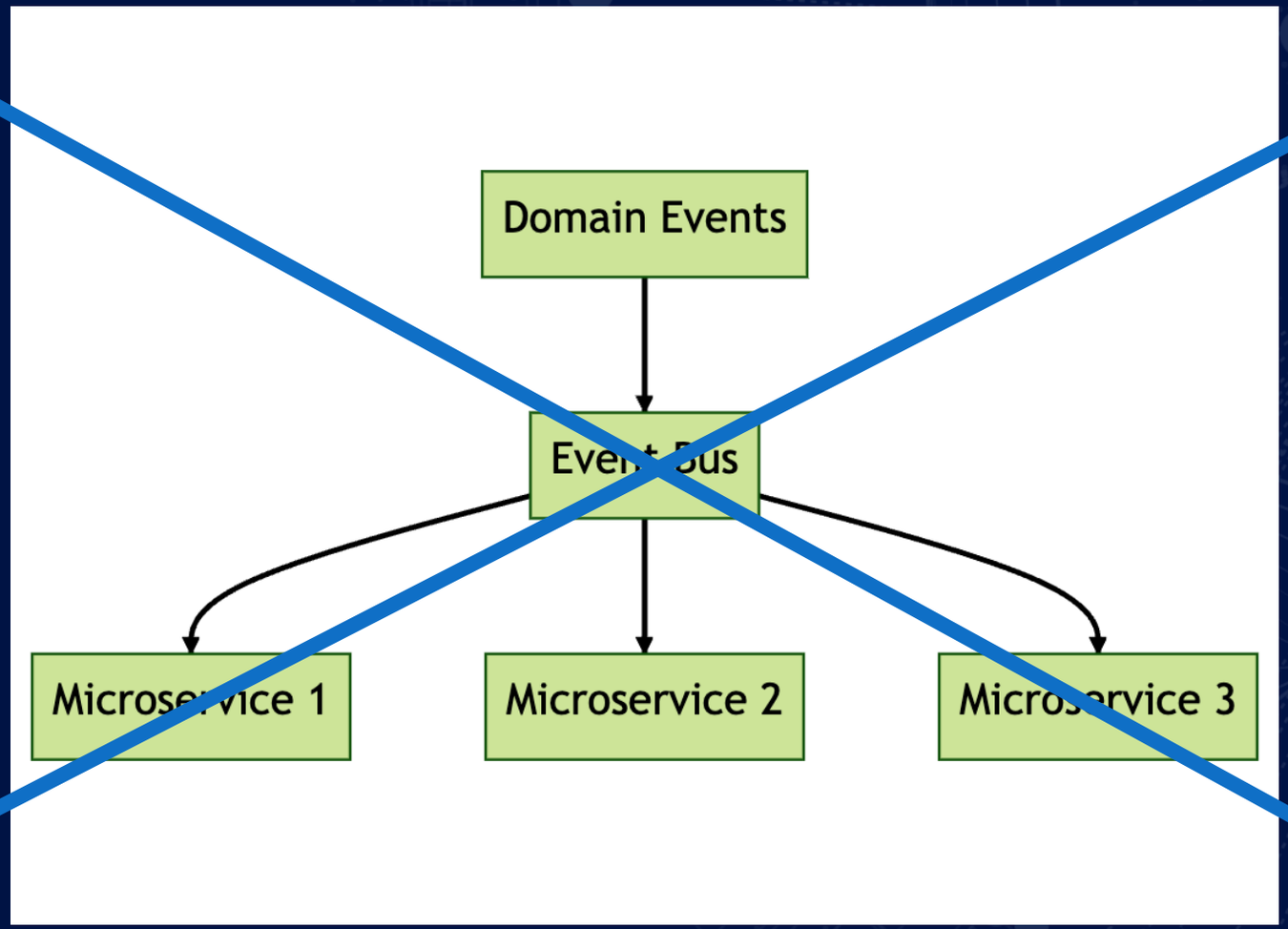
Don’t Try It at Home!



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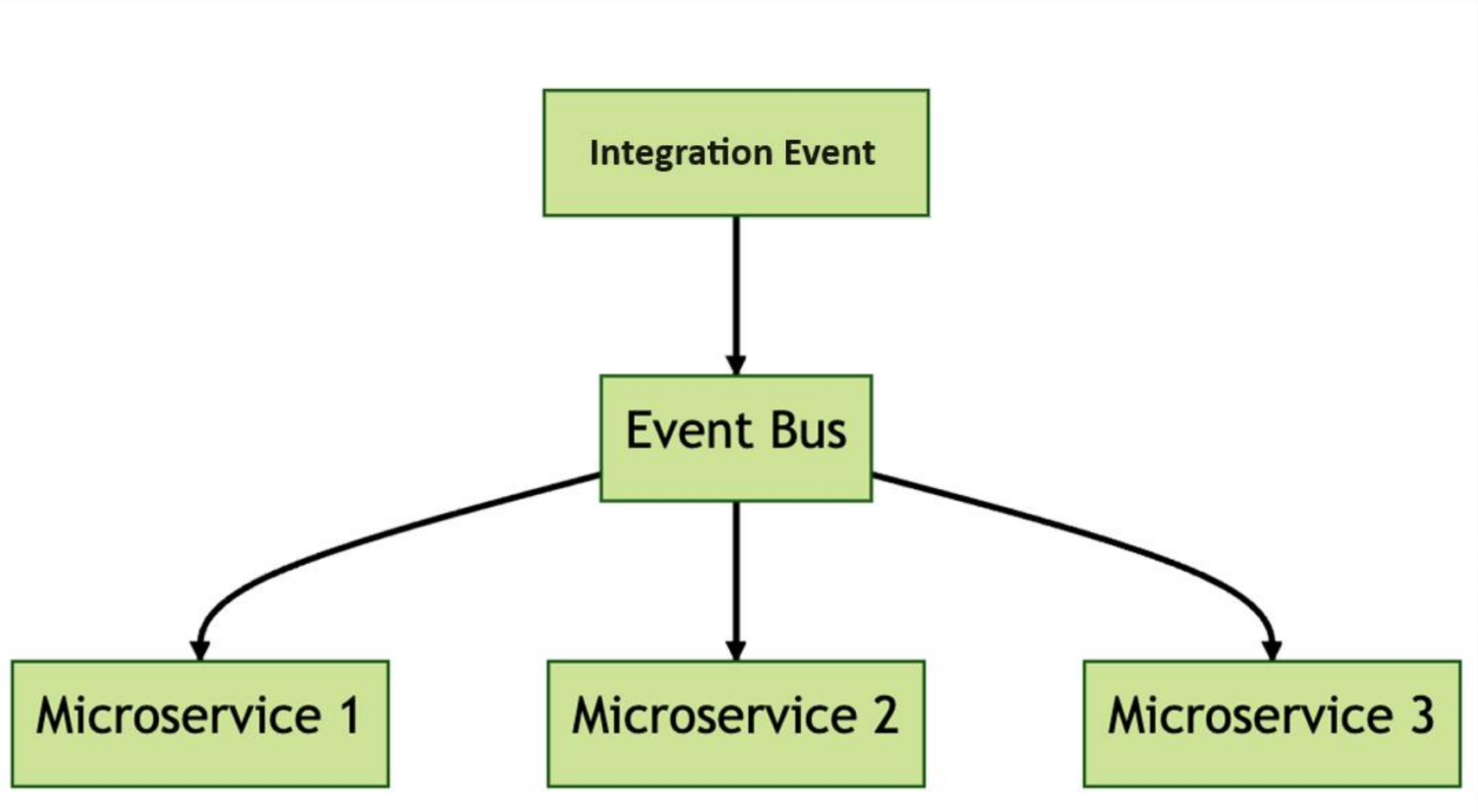
Integration Event



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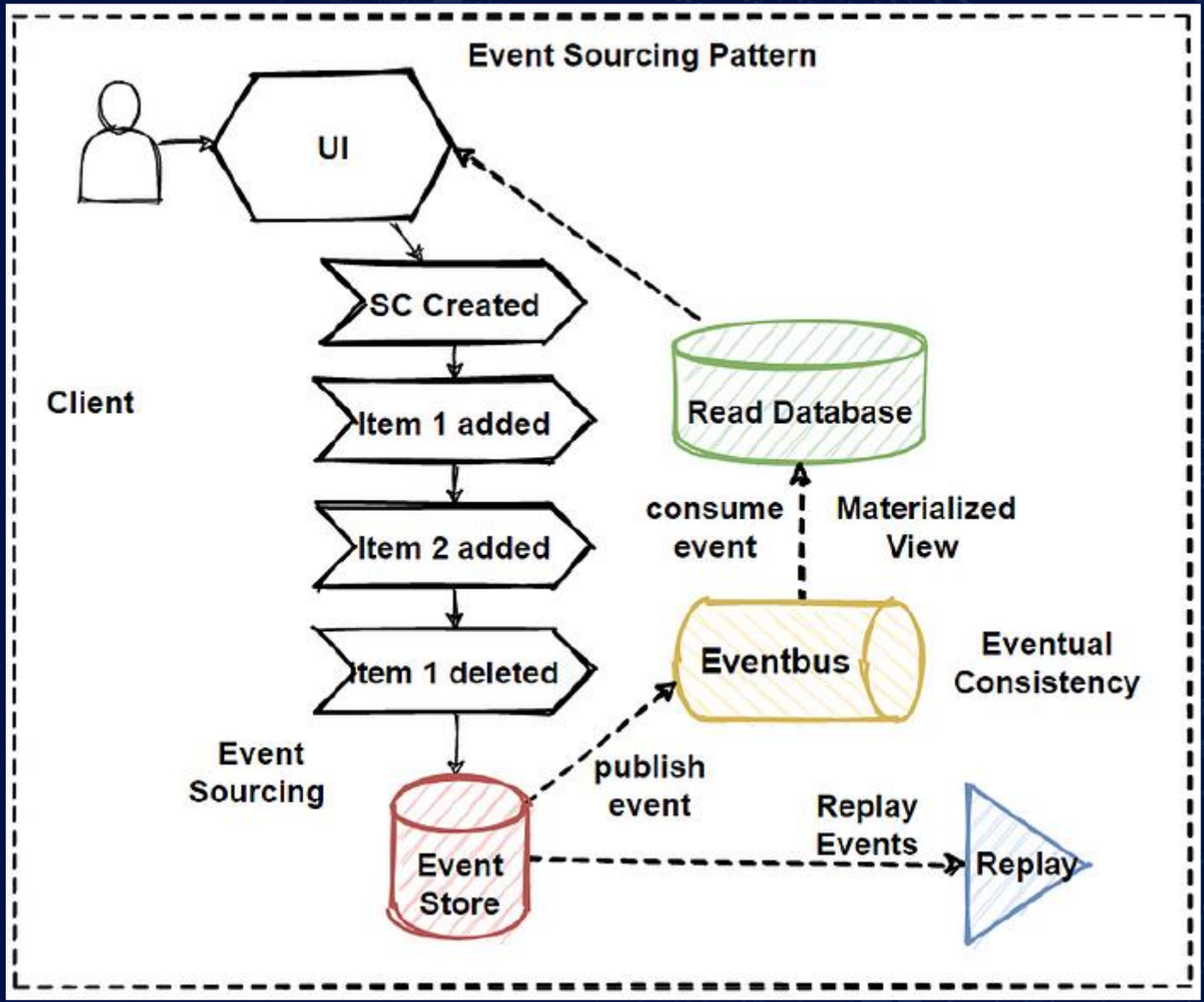

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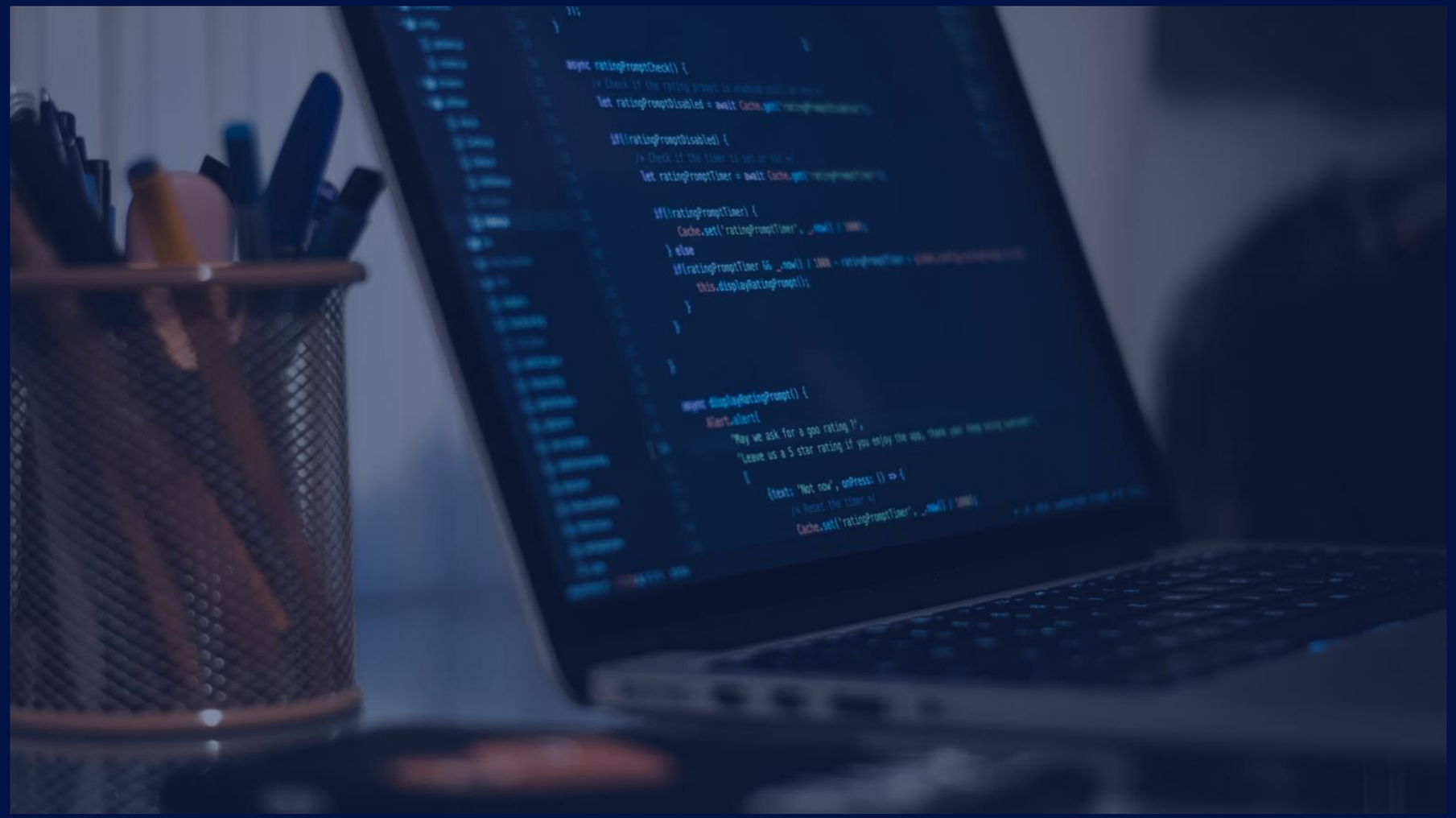

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CHAOS MONKEY

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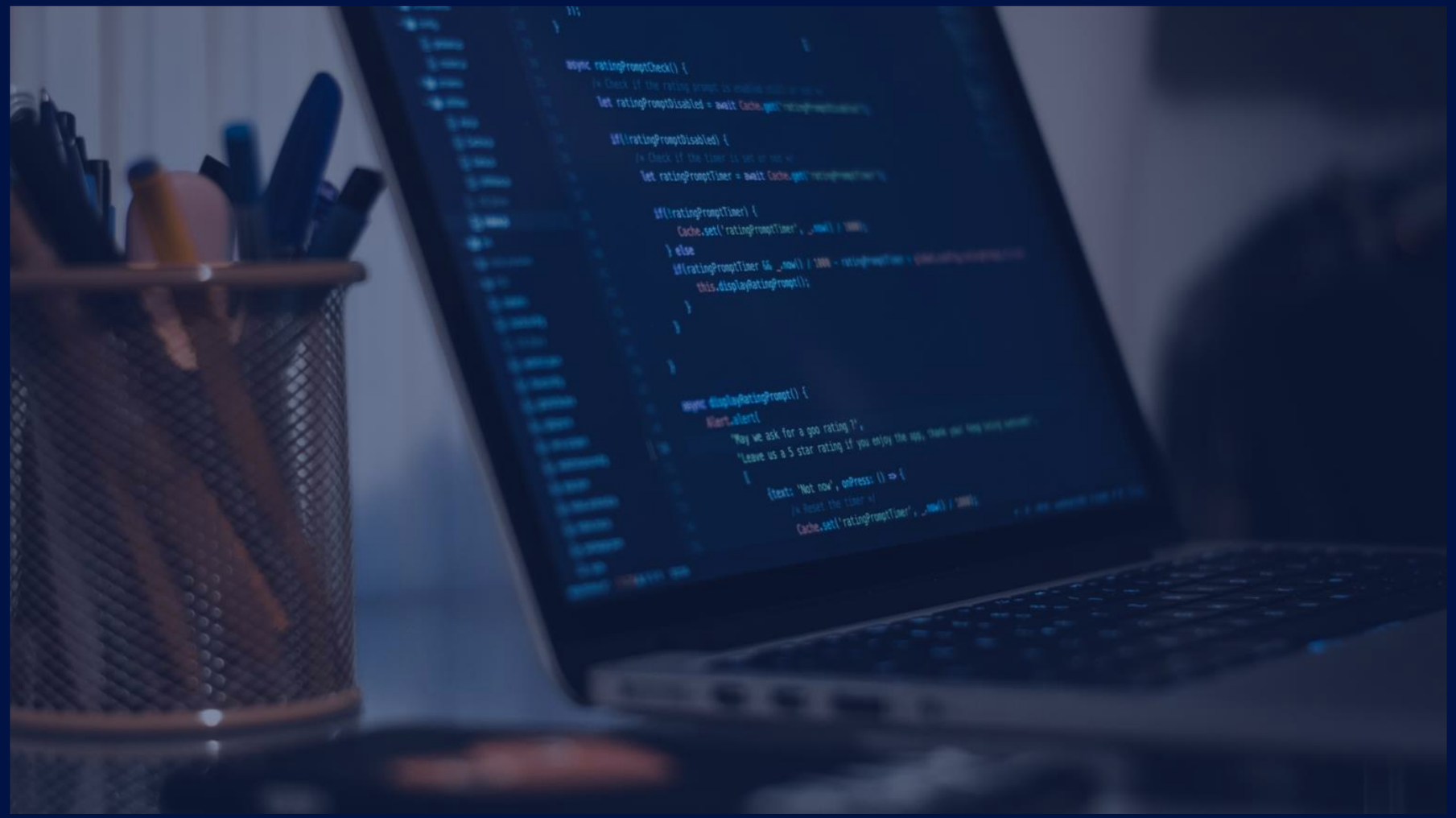

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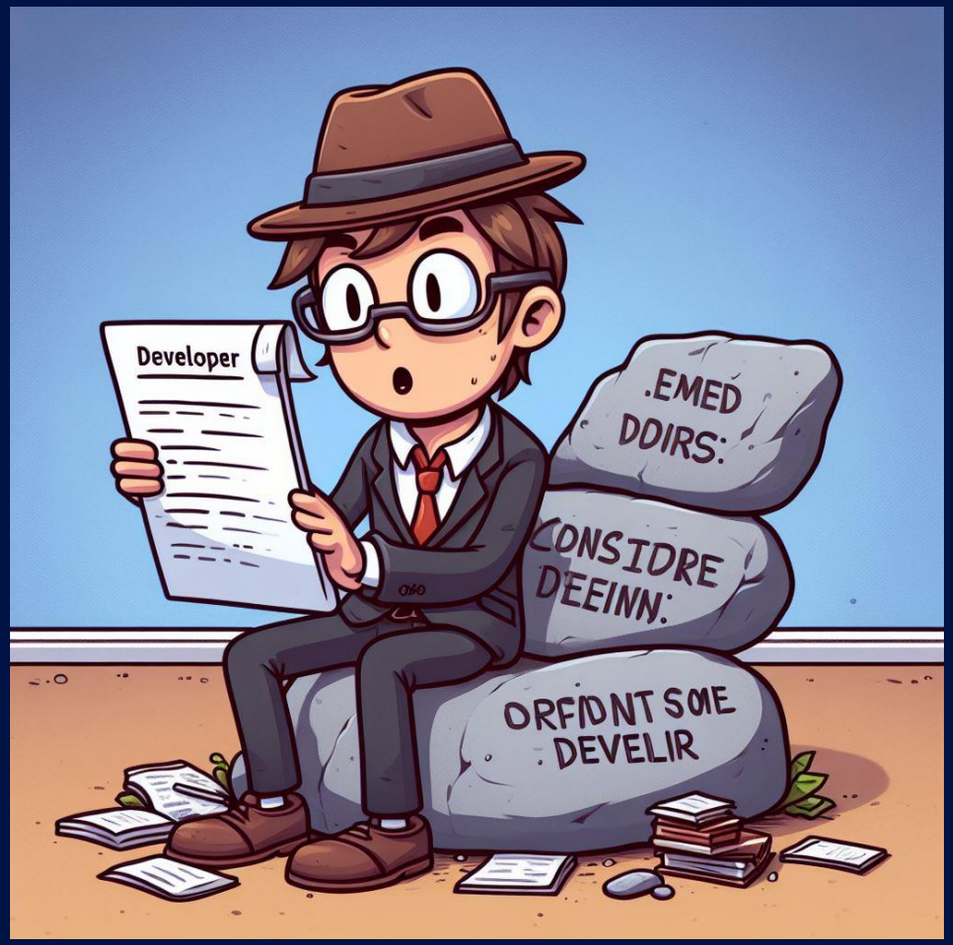
	Before	After
Unexpected Outcome	1	1
Latency	0	1
General Fault	0	1
	1	3
Resilience Index	0.5	

Thank You



alberto.acerbis@intre.it

https://github.com/Ace68/PatternsOfDistributedSystems

https://github.com/ace68

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