In-Memory Computing SUMMIT NORTH AMERICA 2018

Pushing Enterprise Software to the Next Level

Self-contained Web Applications on In-Memory Platforms

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Starcounter AB

Who am I?

- Michał Nosek
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  Twitter: @mmnosek

On Today's Agenda

01

Setting the Stage
- RAM Memory
- Modern WEB
- SCS Architecture

02

In-Memory Application Platform
- Architecture
- Single App
- Integration
- Demo
- Future

Enterprise Software of Today

Monolith

- Bad maintainability
- Long builds
- Technology lock-in
- Long TTM
- Poor scalability

Micro-Services

- Orchestration
- Eventual consistency
- Communication problems
- Complexity

Wirth’s law

“What Intel giveth, Microsoft taketh away.”

“What Andy giveth, Bill taketh away”

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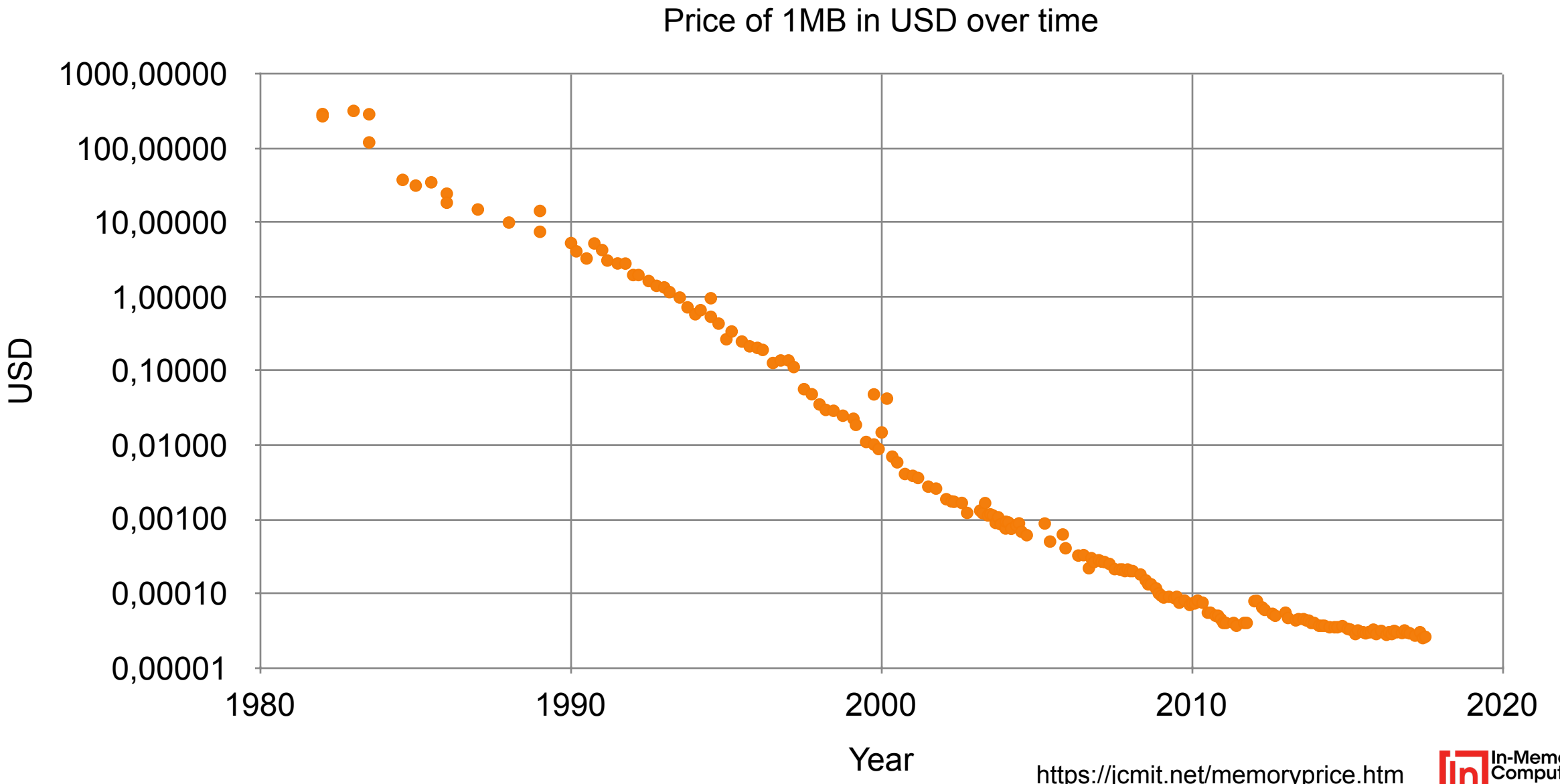
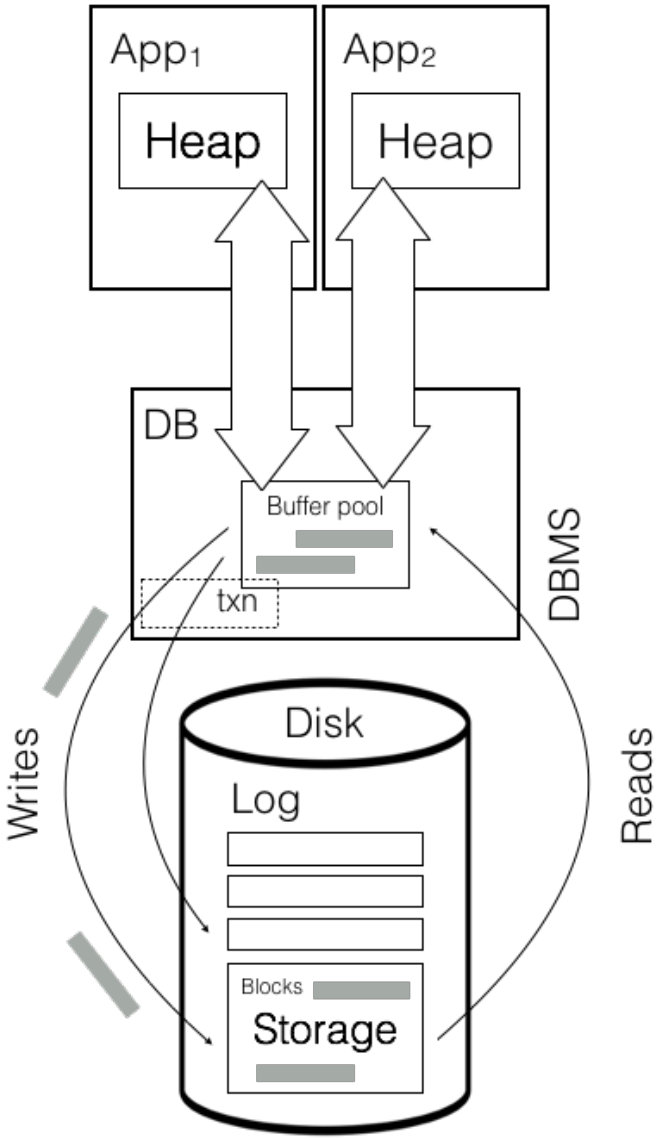
RAM Prices

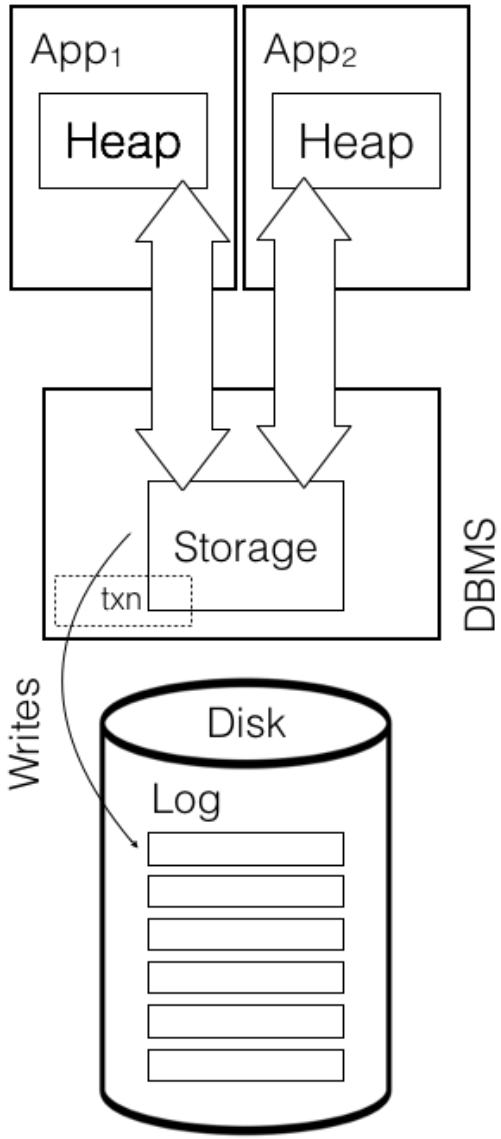


https://jcmit.net/memoryprice.htm

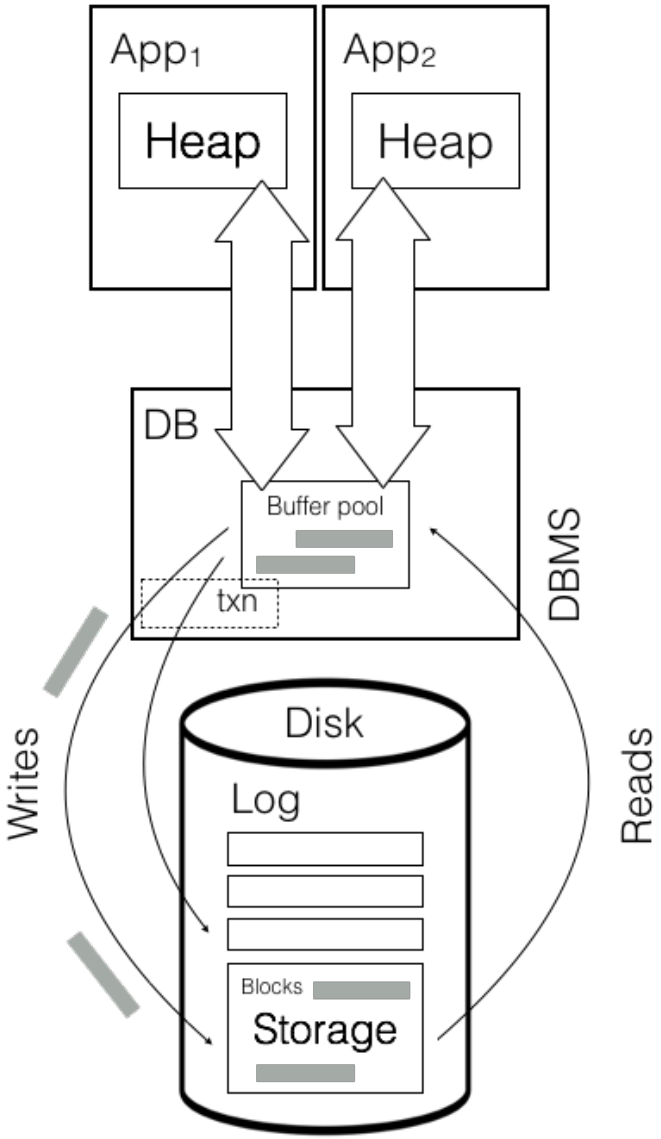
Conventional



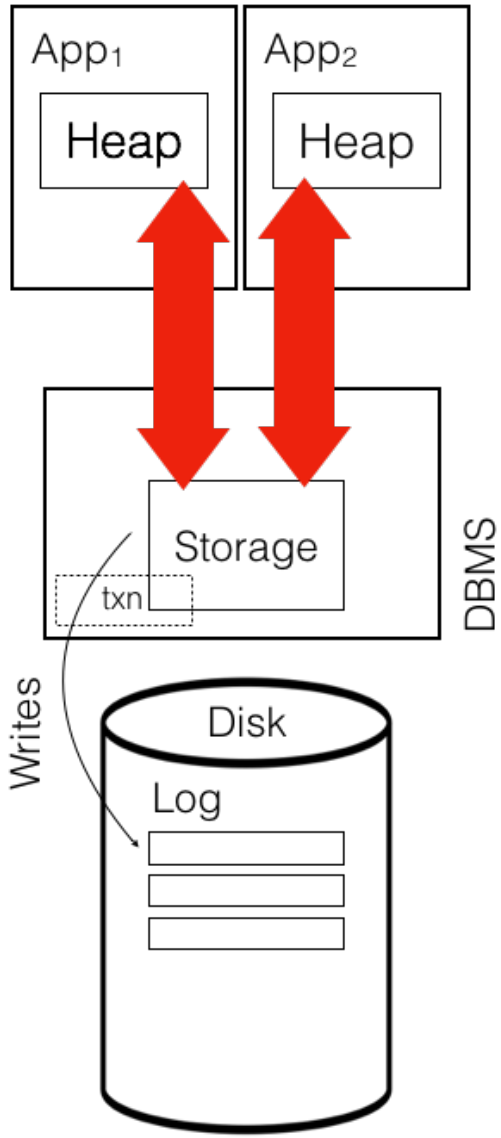
In-Memory



Conventional



In-Memory



Pros and Cons

Pros

- Getting faster
- Better utilised by modern CPUs

Cons

- Communication isn't faster
- It's not durable
- Not getting cheaper anymore?

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Pros and Cons

Pros

- Ubiquitous (no native, separate process)
- Semantics (content) vs Presentation
- Modularity as priority (reusability)

Cons

- Still not implemented everywhere
- Global scope (one app can break something in another)
- Online requirement

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source: scs-architecture.org

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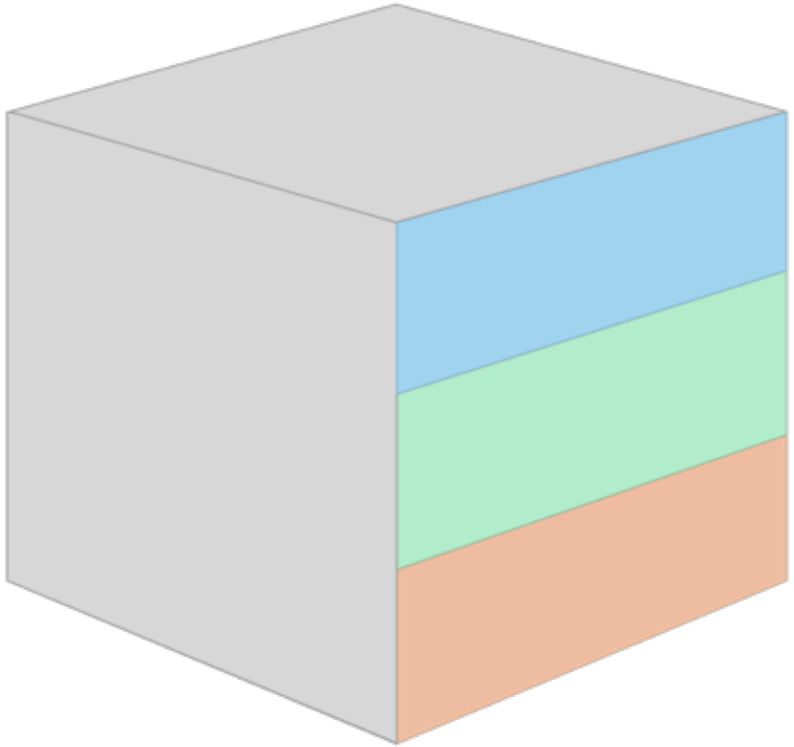
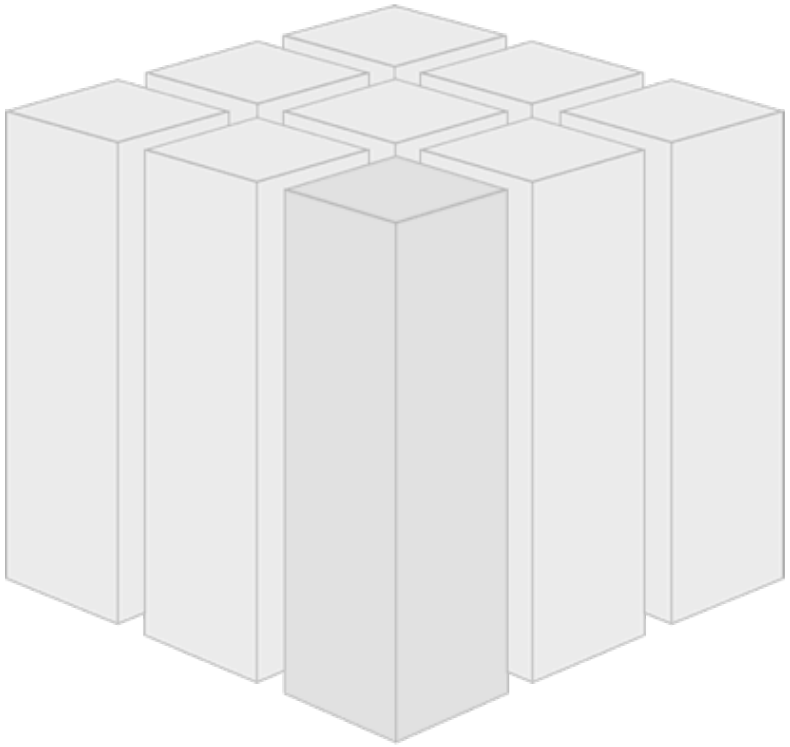
SCS Architecture



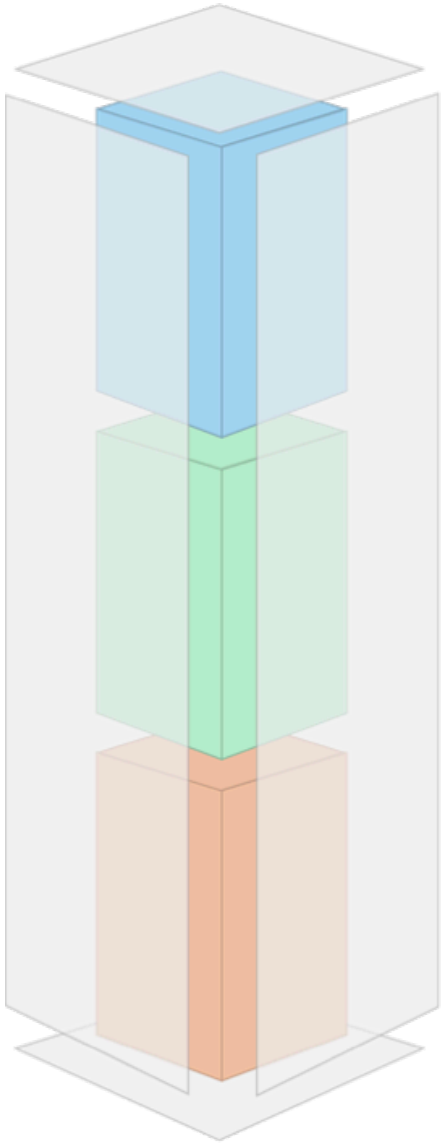
User interface
Business logic
Persistence

SCS Architecture



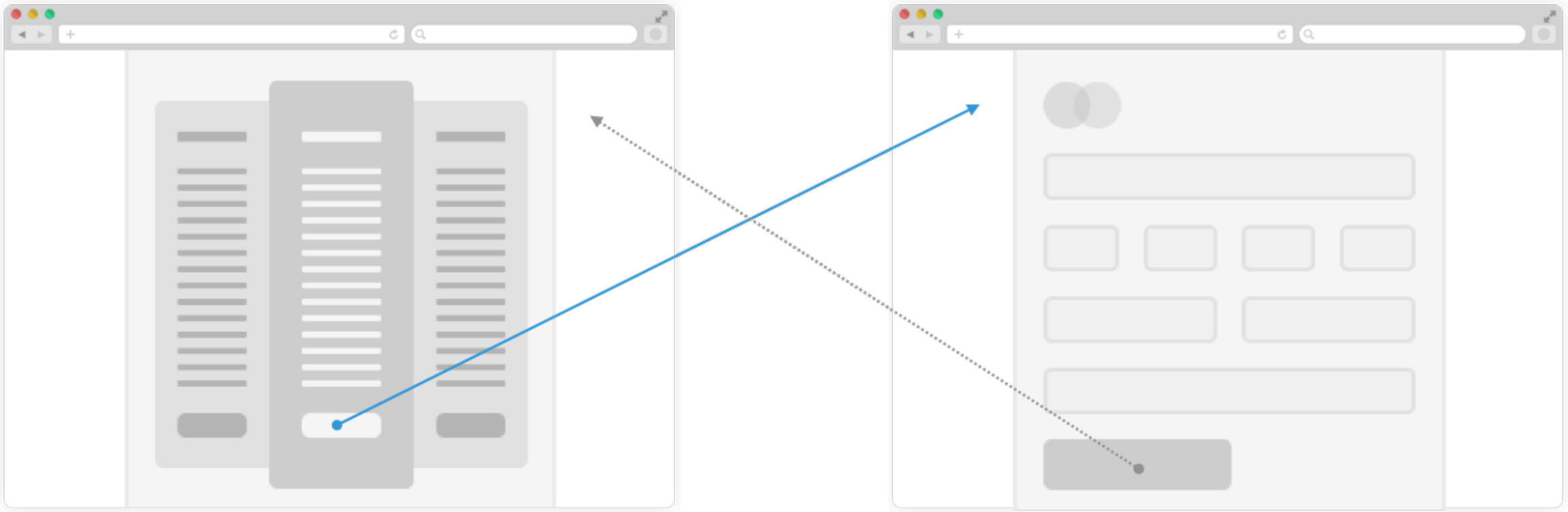
If you cut and wrap every domain in a separate web application

SCS Architecture



An SCS contains its own user interface, specific business logic and separate data storage

SCS Architecture



System 1

System 2

Pros and Cons

Pros

- Modularisation
- Maintainability
- Loose coupling

Cons

- Integration
- Common look and feel
- Inconsistency

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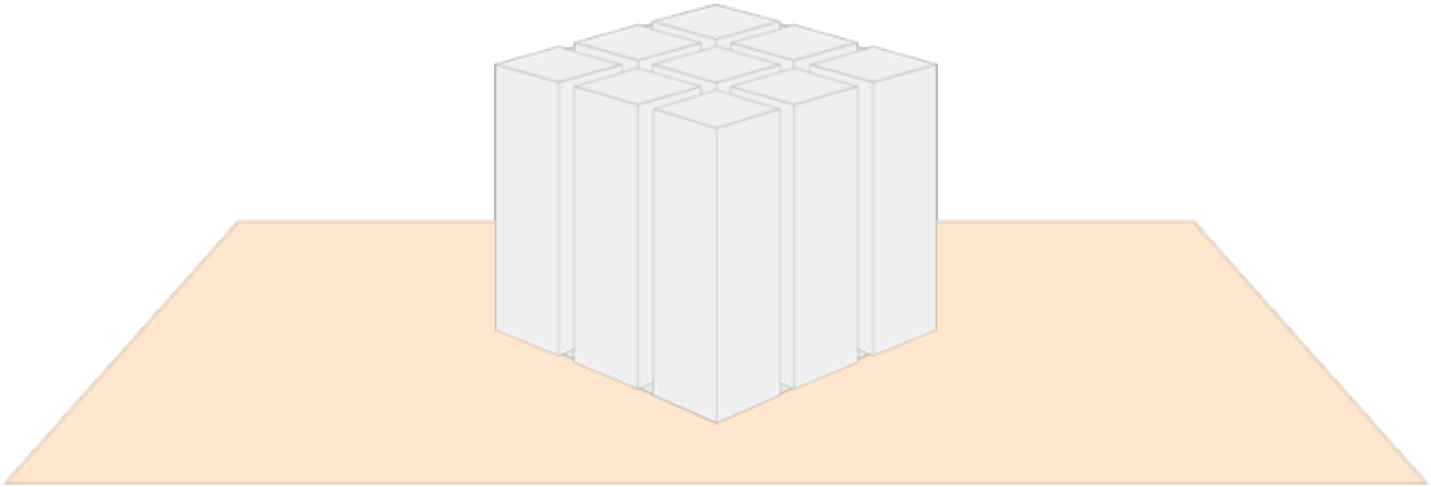
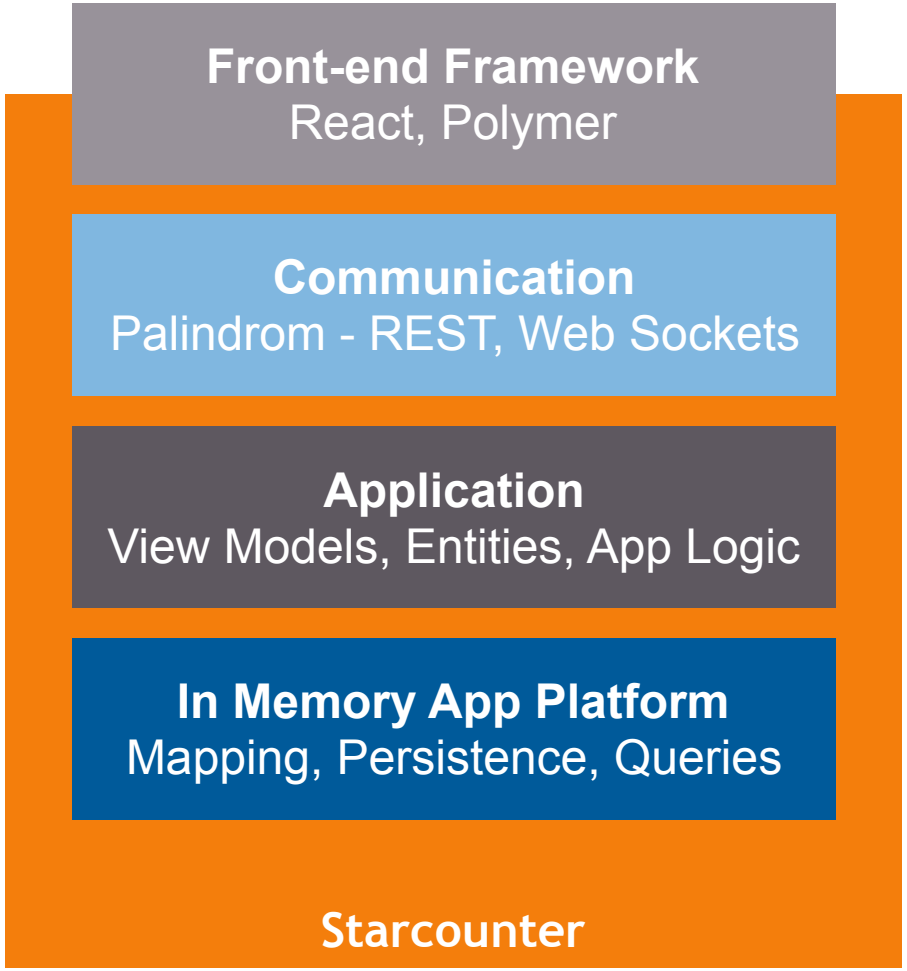
In-Memory Application Platform

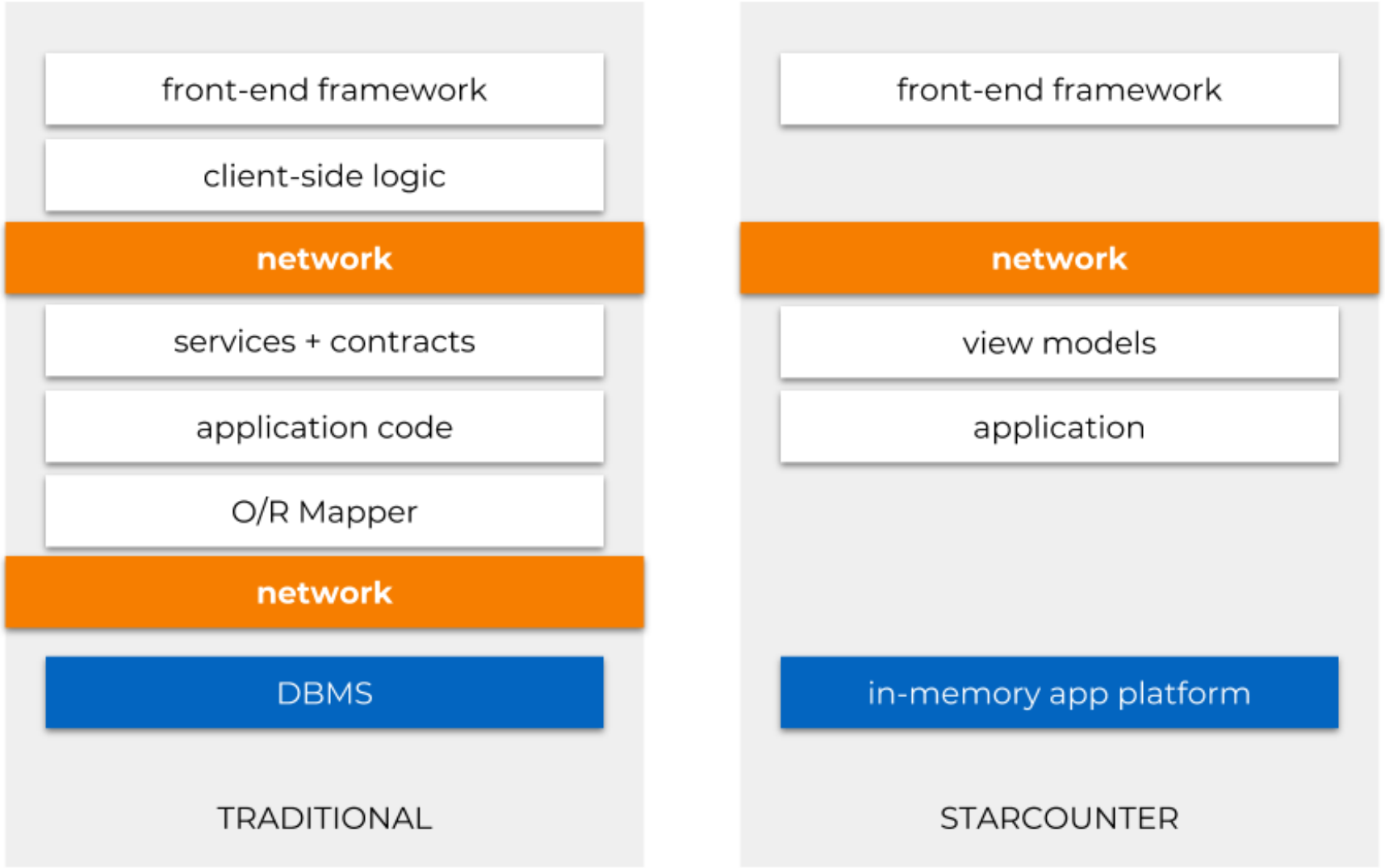
For Building
Self-Contained Systems



General Platform Architecture

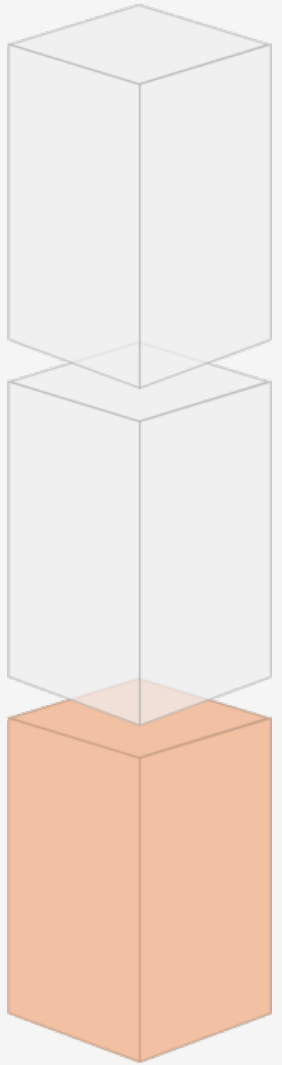


Traditional Stack vs Starcounter Stack



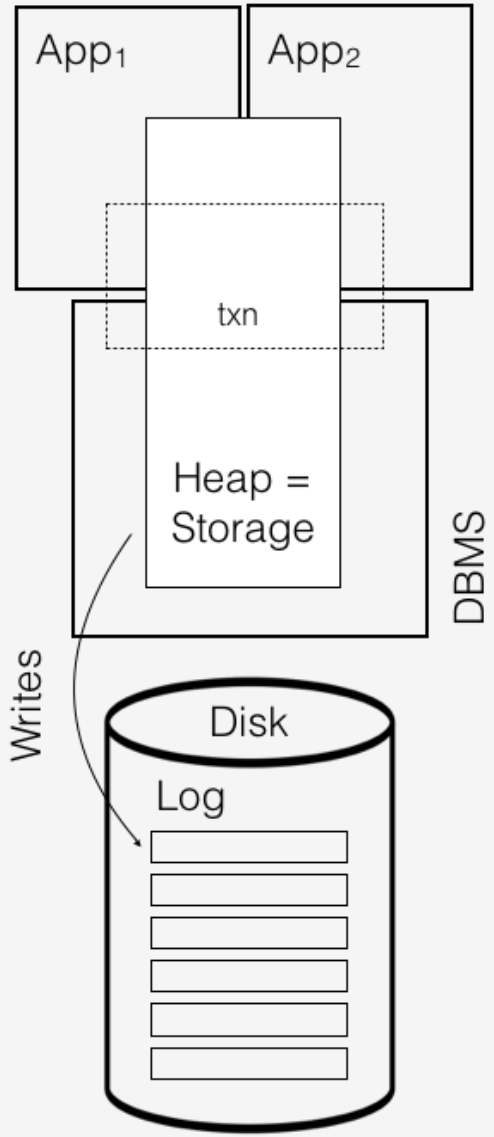
Data Storage

- In-Memory database
- ACID compliant
- Snapshot isolation
- Flexible



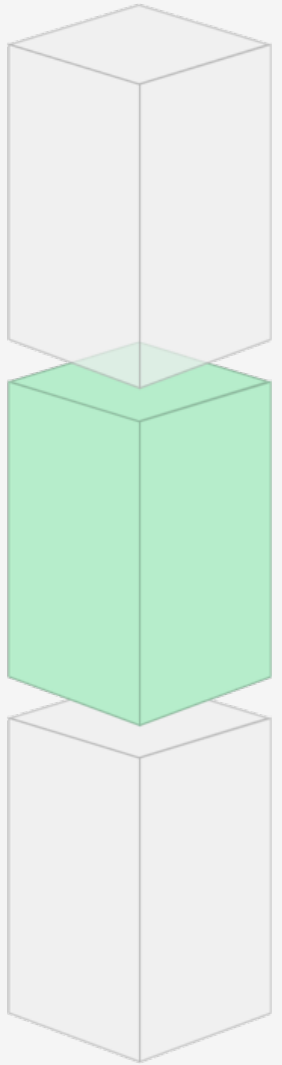
VMDBMS

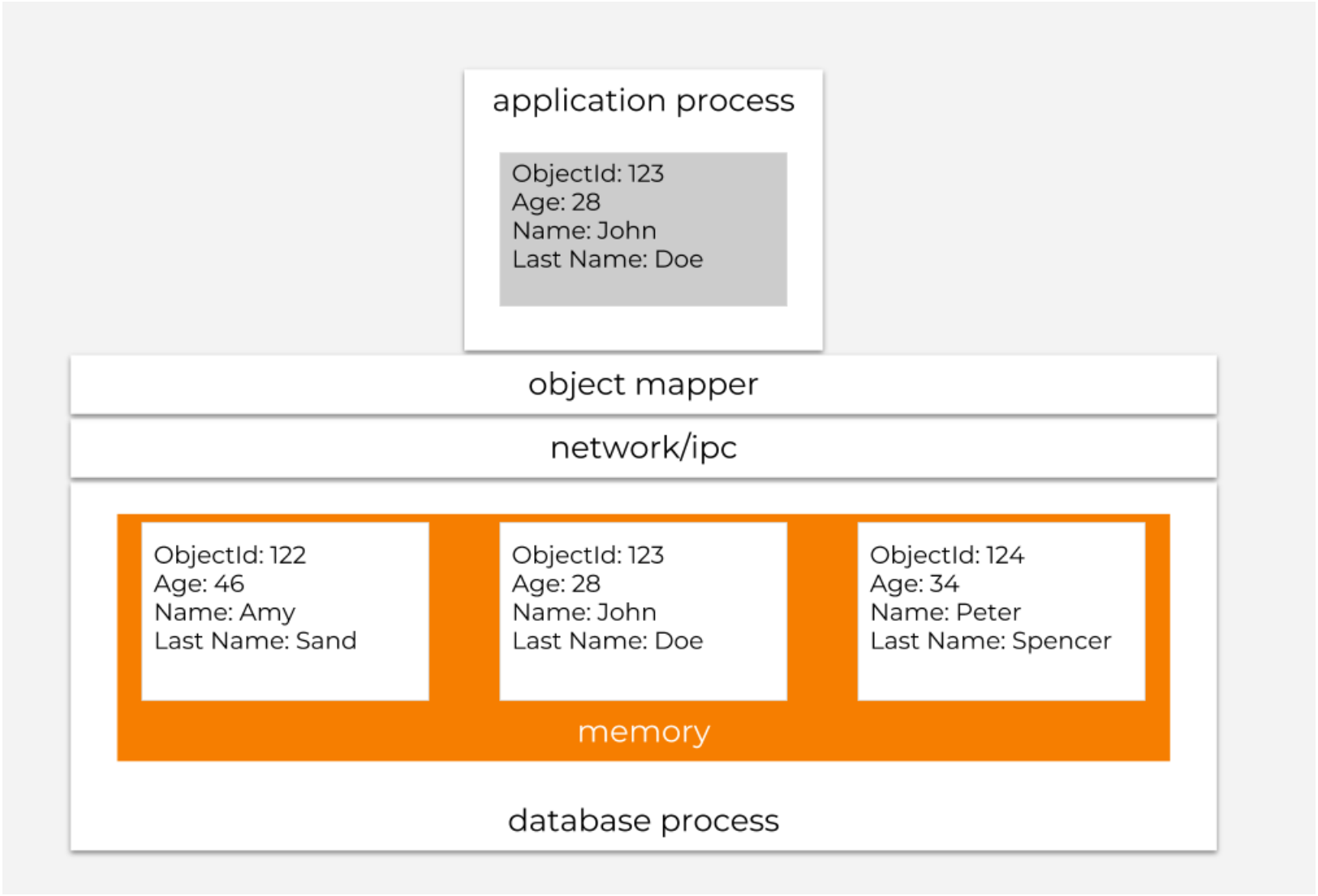
U.S. Patent No. 8,266,125

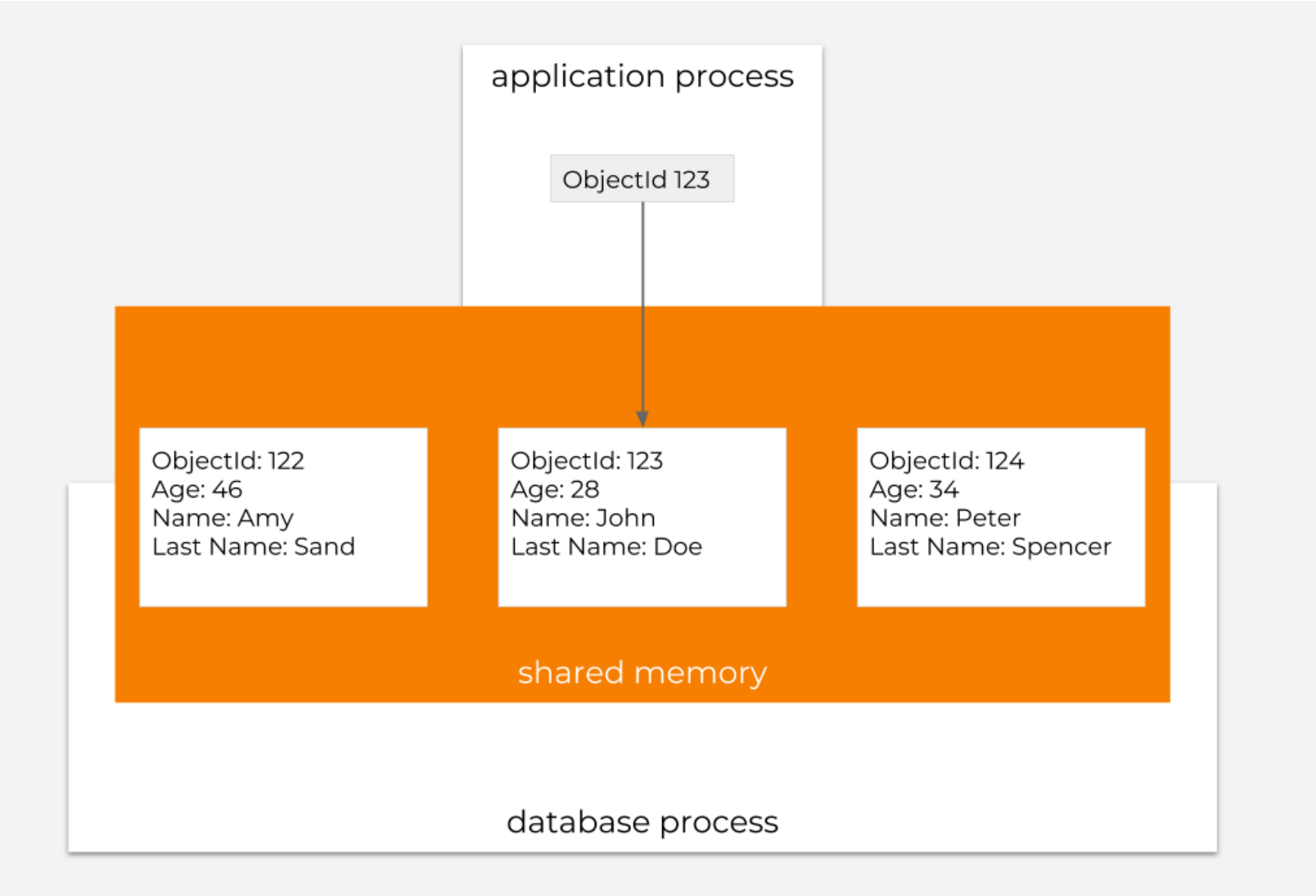


Business Logic

- Polyglot
- Simplified
- Platform-agnostic
- Real-time

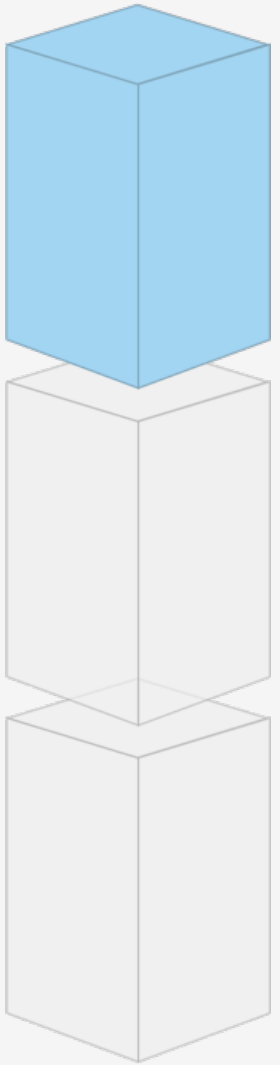



application process
ObjectId: 123
Age: 28
Name: John
Last Name: Doe
object mapper
network/ipc
ObjectId: 122
Age: 46
Name: Amy
Last Name: Sand
ObjectId: 123
Age: 28
Name: John
Last Name: Doe
ObjectId: 124
Age: 34
Name: Peter
Last Name: Spencer
memory
database process


application process
ObjectId 123
ObjectId: 122
Age: 46
Name: Amy
Last Name: Sand
ObjectId: 123
Age: 28
Name: John
Last Name: Doe
ObjectId: 124
Age: 34
Name: Peter
Last Name: Spencer
shared memory
database process

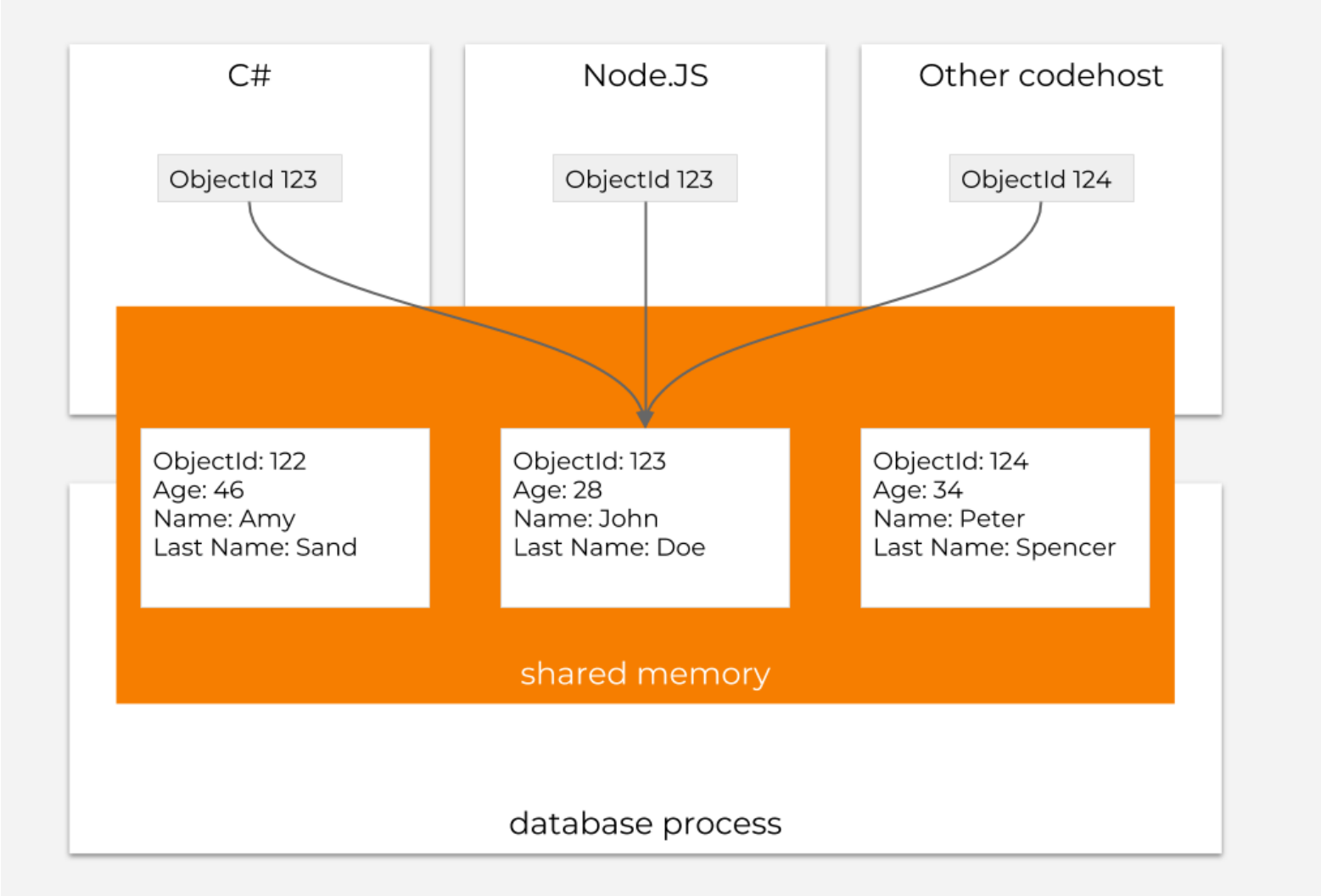
User Interface

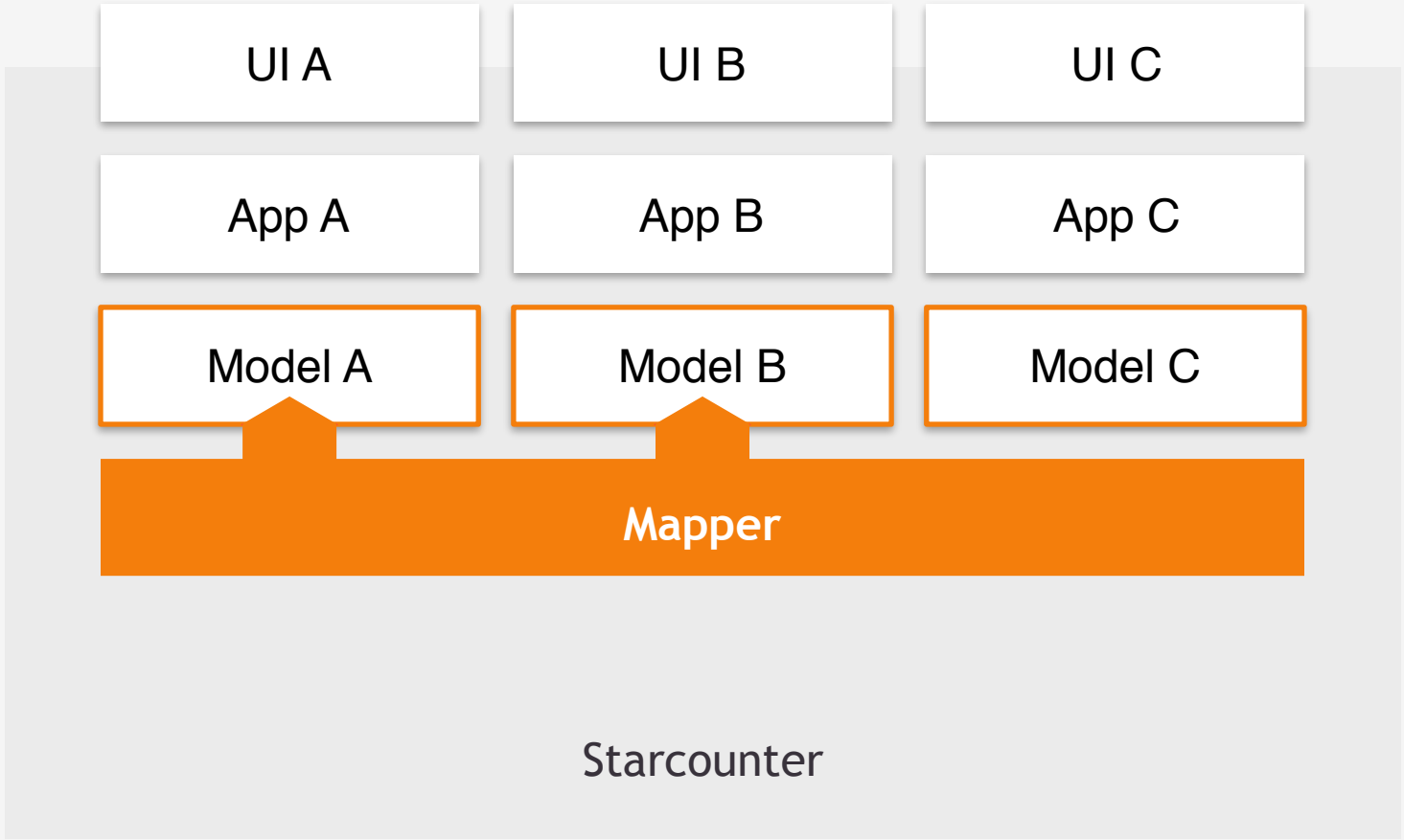
- Web native
- Web socket communication
- Design agnostic
- Thin



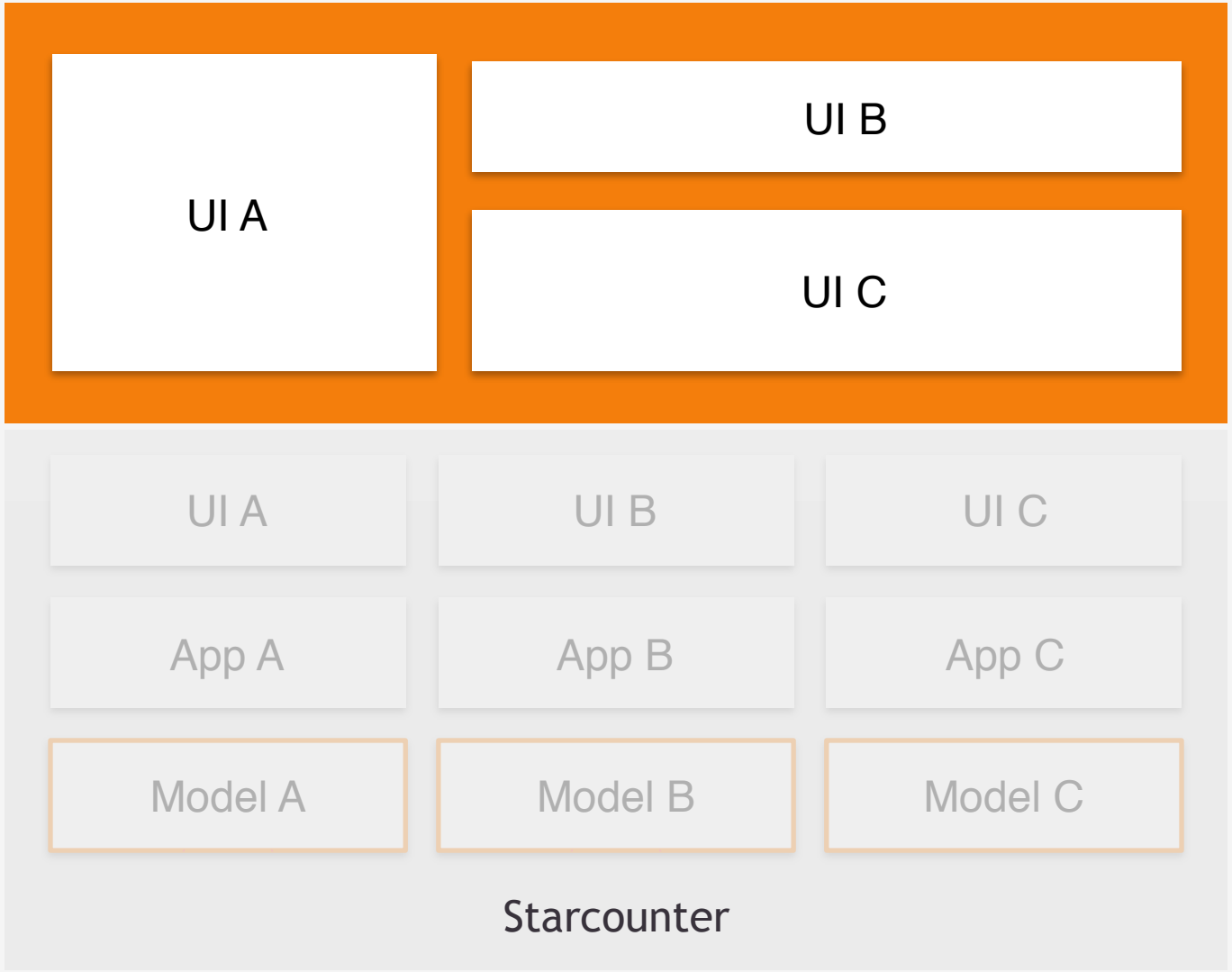
Demo:
Simple SCS app

Integration: Data Level


C#
Node.JS
Other codehost
ObjectId 123
ObjectId 123
ObjectId 124
ObjectId: 122
Age: 46
Name: Amy
Last Name: Sand
ObjectId: 123
Age: 28
Name: John
Last Name: Doe
ObjectId: 124
Age: 34
Name: Peter
Last Name: Spencer
shared memory
database process


UI A
UI B
UI C
App A
App B
App C
Model A
Model B
Model C
Mapper
Starcounter

Integration: UI Level


UI A
UI B
UI C
UI A
UI B
UI C
App A
App B
App C
Model A
Model B
Model C
Starcounter

Stephen Fry

Customer Id:

Save Back

Firstname: Stephen

Lastname: Fry

Primary

Stephen.Fry@Starcounter.com

ADD EMAIL ADDRESS

Primary

+46 71 234 56 78

ADD PHONE NUMBER

Shipping

Dammsugarvägen 53 | 123 45 | Punchrullistan | Country

ADD ADDRESS

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Shipping: Dammsugarvägen 53 | 123 45 | Punchrullistan | Country

ADD ADDRESS

SUBSCRIPTIONS

Product Name	Quantity	Start Date	Next Delivery	Discount (%)	Frequency (Days)	Price (SEK)	Active	Campaign
Flexovital	1	2018-02-21	2018-02-21	0	1	500.00	☑	None
Endurance	10	2018-02-21	2018-02-21	0	1	1500.00	☑	None
Endurance	5	2018-02-22	2018-02-22	0	1	750.00	☑	None
Flexovital	1	2018-02-27	2018-02-27	0	28	198.00	☑	None

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Endurance	5	2018-02-22	2018-02-22	0	1	750.00	☑	None
Flexovital	1	2018-02-27	2018-02-27	0	28	198.00	☑	None

FEB 27

17:29 TUESDAY 27 FEBRUARY
ORDER #10113 — 1 st — 198.00 SEK

17:28 TUESDAY 27 FEBRUARY
SUBSCRIPTION CREATED — Flexovital 198.00

14:13 TUESDAY 27 FEBRUARY
ORDER #10112 — 2 st — 396.00 SEK

10:34 TUESDAY 27 FEBRUARY
SUBSCRIPTION CREATED — Endurance 198.00

10:14 TUESDAY 27 FEBRUARY
SUBSCRIPTION CREATED — Flexovital 198.00

00:00 TUESDAY 27 FEBRUARY
ORDER #10111 — 1 st — 198.00 SEK

00:00 TUESDAY 27 FEBRUARY

Stephen Fry

Customer Id:

Save Back

Firstname: Stephen

Lastname: Fry

Primary

Stephen.Fry@Starcounter.com

ADD EMAIL ADDRESS

Primary

+46 71 234 56 78

ADD PHONE NUMBER

Shipping

Dammsugarvägen 53 | 123 45 | Punchrullistan | Country

ADD ADDRESS

SUBSCRIPTIONS

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ORDER #10111 — 1 st — 198.00 SEK

00:00 TUESDAY 27 FEBRUARY

Outcomes

Pros

- Modularisation
- Maintainability
- Loose coupling
- Full and easy integration
- Common look and feel
- Consistency

Cons

- ~~Integration~~
- ~~Different look and feel~~
- ~~Inconsistency~~
- Platform lock-in?

PALMA

Module System
Navigation

Merge
Actions

Admin Admin

- Market Input
- Engineering Input
- Module Concepts
- Product Configuration
- Profitability
- Supply Chain

SCS Supply Chain Structure
VP Volume Planner

- Navigator

Module Variant

MODULE VARIANTS

Modules / Variants	Description	Product Properties [ ]	Base Price USD	Brand -	Region -	Surface texture VDI	Size of inlet mm	Styling shape -	Air flow l/min	VCP
		S	S	S	S	S	S	S	S	
		C	B	V	V	B	V	E	E	
		#	1	5	3	1	2	2	6	
Shell module	Shell and container Styling							●		6
Shell, Extended	Extended, w "dust wheel"							Base style		
Shell, Short	Short, Compact							Exclusive...		
Shell, Long	Long, Standard							Base style		
Dust flap module	Dust flap One-way-valve								○	1
Dust flap, long life	Long Life, Silicone								120;1	
Dust flap, std	STD, Black rubber								80;90;	
Charger connect m...	Charge plugg and Charge so...									1
Dock module	Wall mounting, Docking Uni...							◒		2.25
PCB module	Printed circut board, electro...									1
Speciality Nozzle m...	Crevice nozzle (detachable)						◒		◒	4.5
Nozzle module	Nozzle (fixed)		●	◒		○	◒		○	7.5
Control module	On/Off switch, Container rel...					○				1.5
Container module	Container for dust collection...					○				3
Handle module	Handle, used for Styling					○				1.5
Charger module	Power Adopter (transformer...									54
Base module	Shell base									1
Filter module	Dust filter(Detachable)									3
Container styling m...						○		●		6

Chronicle

Full-Stack Benchmark

- 1.5 mln. accounts, 500 K remote clients transfer.
- Money between accounts (5%) and read totals (95%).
- Transfer and read operations are mixed randomly.
- Starcounter on .NET (1 x EC2 c3.8xlarge): 1 M OPS.
- MariaDB Galera Cluster 5 nodes with Node.js app server (5 x EC2 c3.2xlarge, EBS root volume and high network throughput, stored procedures): 55 K OPS.
- Ratio suffers for MariaDB doing more writes.

Storage Engine Benchmark

- YCSB load 5% writes, 95% reads.
- 1 x E5-2680v2, 1 machine (10/20 cores/ threads).
- 8 threads: 3.5 mln. Ops/sec.
- 16 threads: 5.4 mln. Ops/sec.

- c3.8xlarge – 60 GiB RAM, 32 vCPUs
- c3.2xlarge – 15 GiB RAM, 8 vCPUs
- https://www.ec2instances.info/

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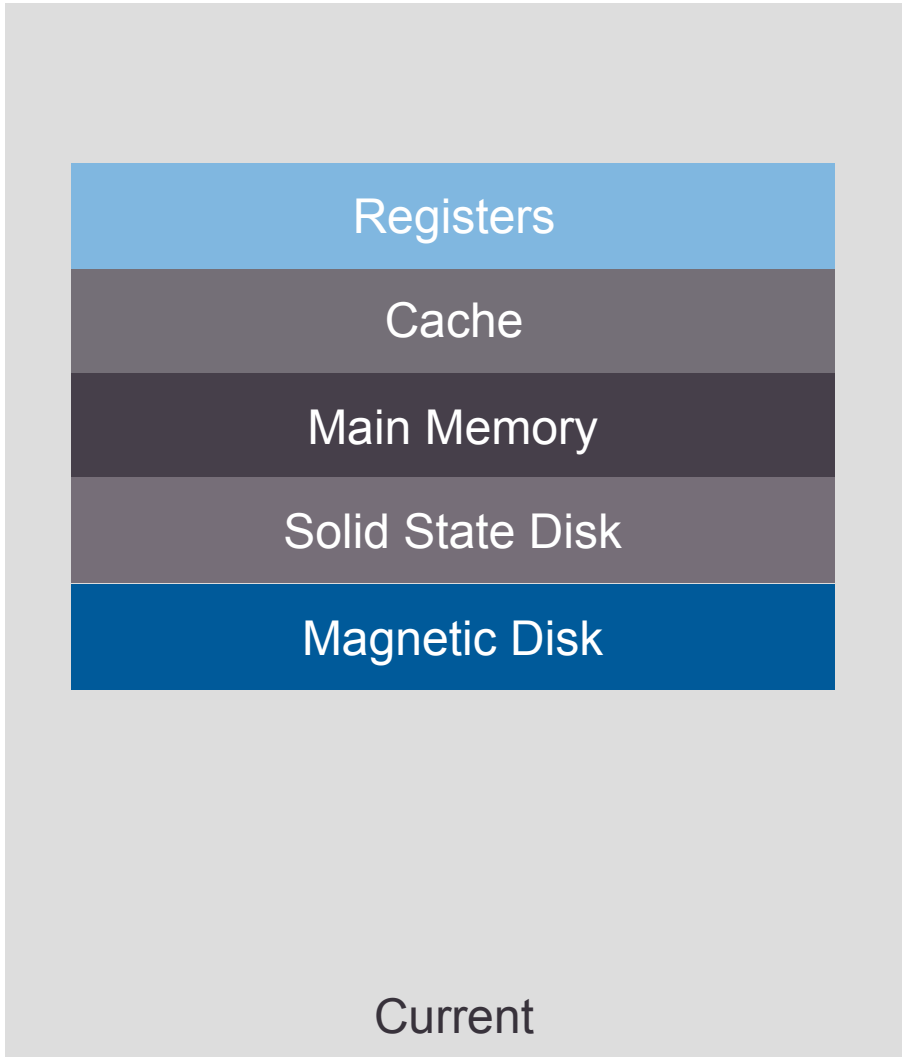
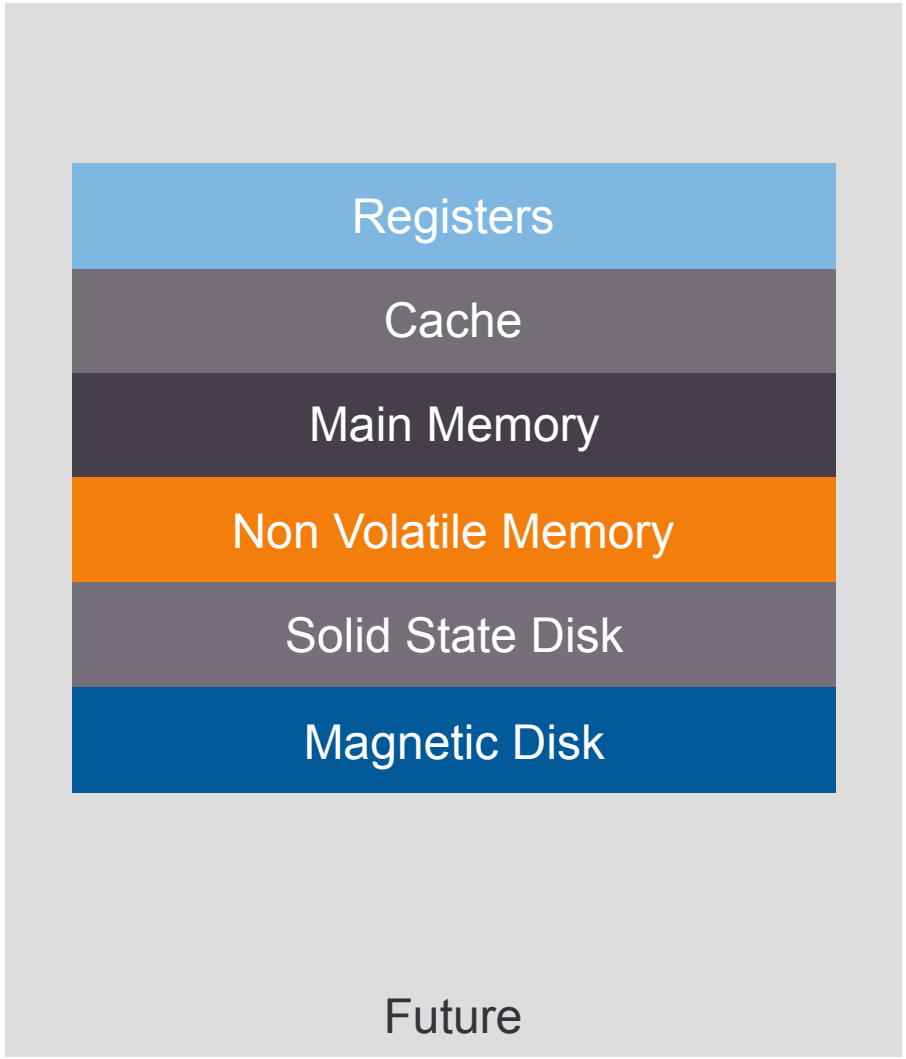
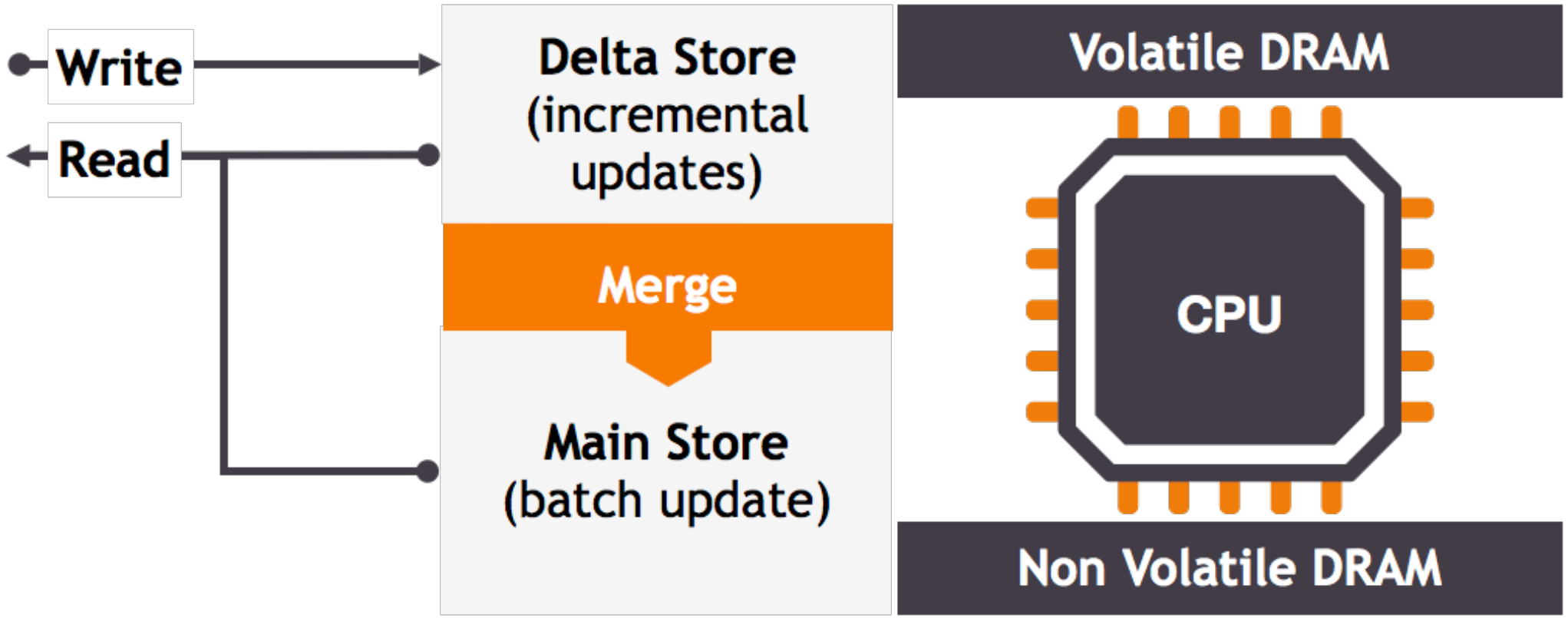
Currently vs Future





Starcounter in the Future



Enterprise Software of Tomorrow

- Simplified
- Near real-time
- Easy to maintain
- Reusable/modularised
- Fully web-based
- Fast data
- HTAP or HOAP

In-Memory Computing SUMMIT NORTH AMERICA 2018

THANK YOU!
Questions?