Pushing Enterprise Software to the Next Level

Self-contained Web Applications on In-Memory Platforms

MICHAŁ NOSEK

Who am I?

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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

- Maintainability
- Long builds
- Technology lock-in
- Long TTM

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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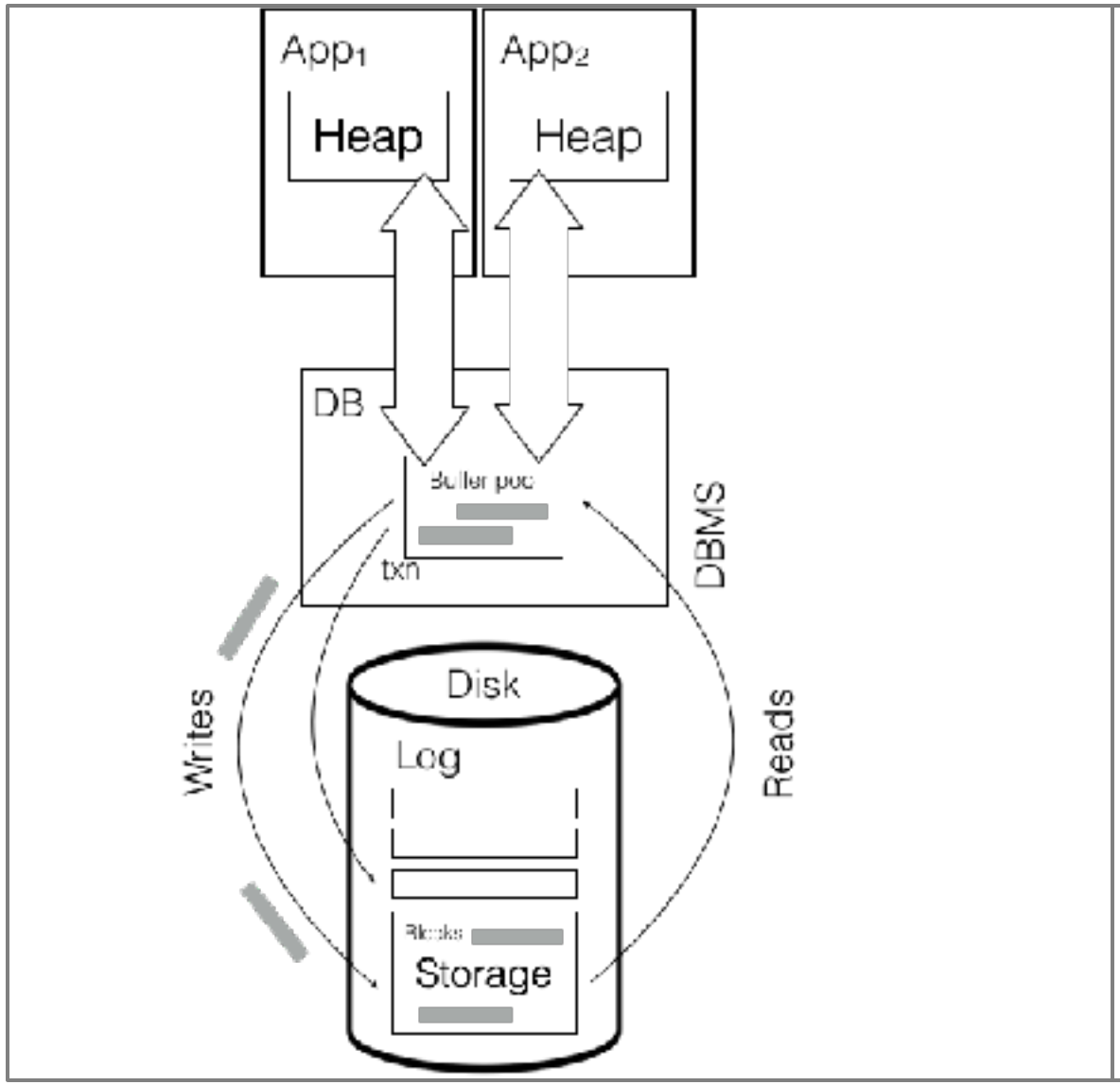
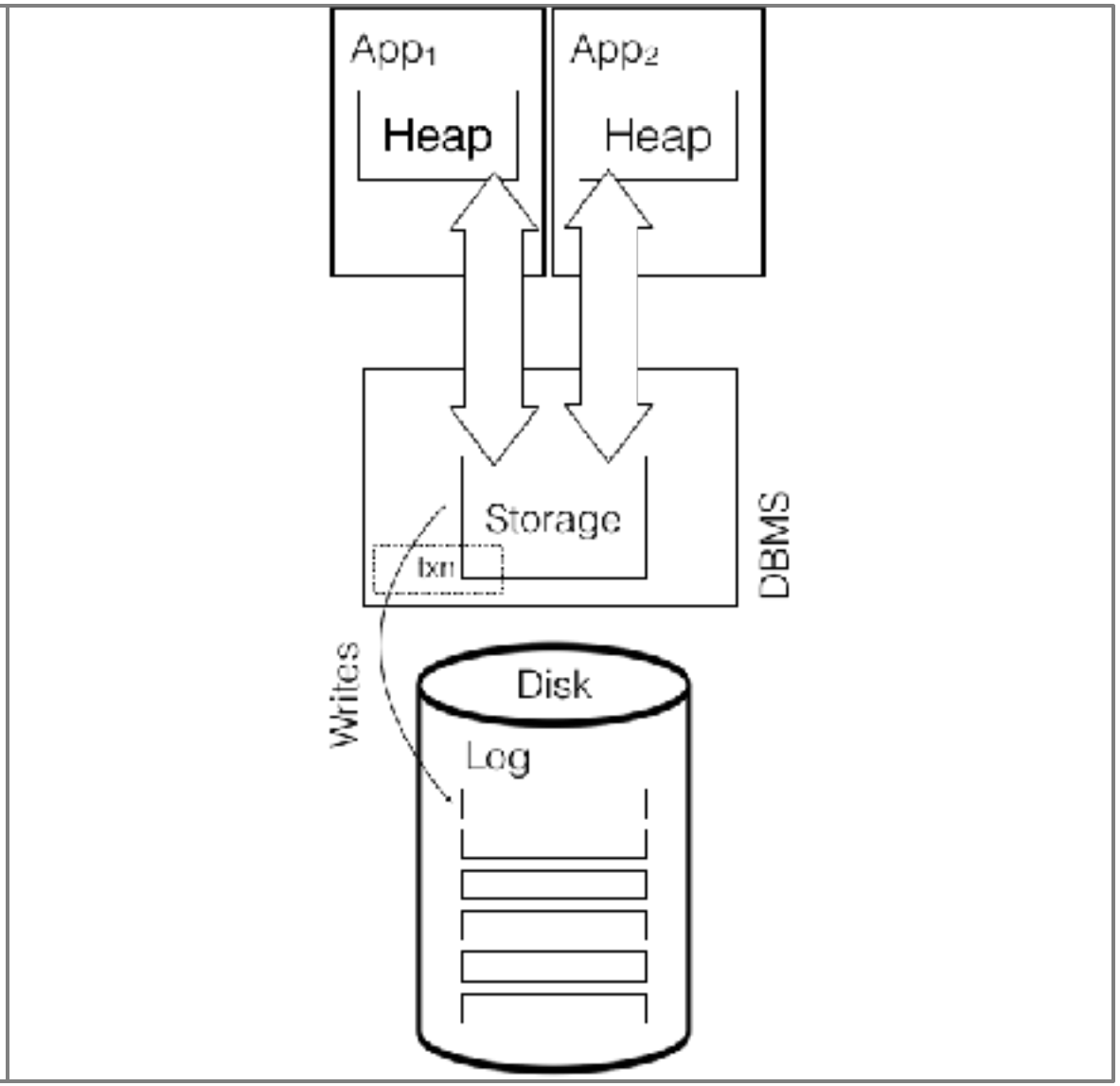
Price of 1MB in USD over time
1000,00000
100,00000
10,00000
1,00000
0,10000
0,01000
0,00100
0,00010
0,00001
USD
1980
1990
2000
2010
2020
Year

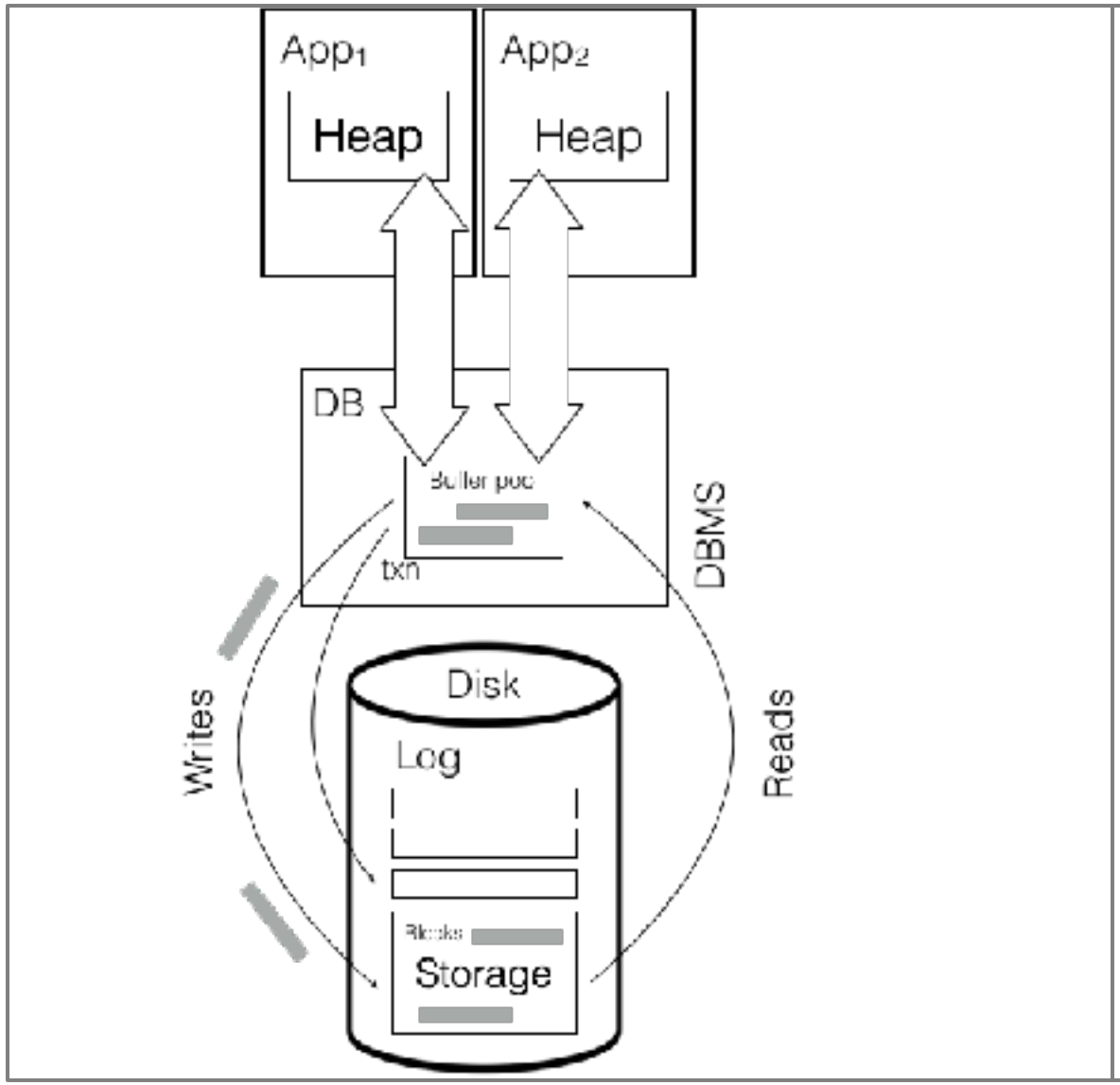
Conventional



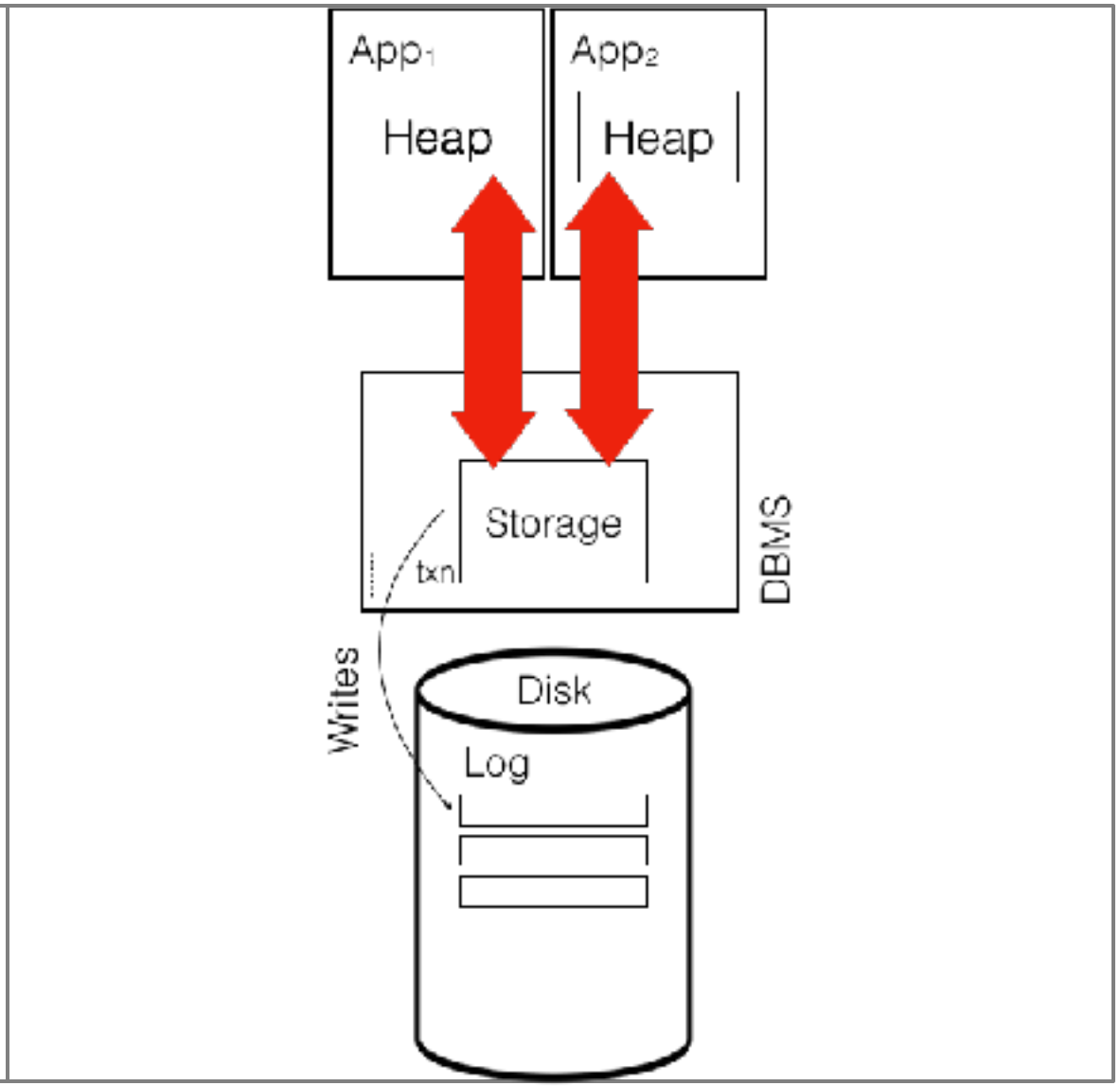
In-Memory



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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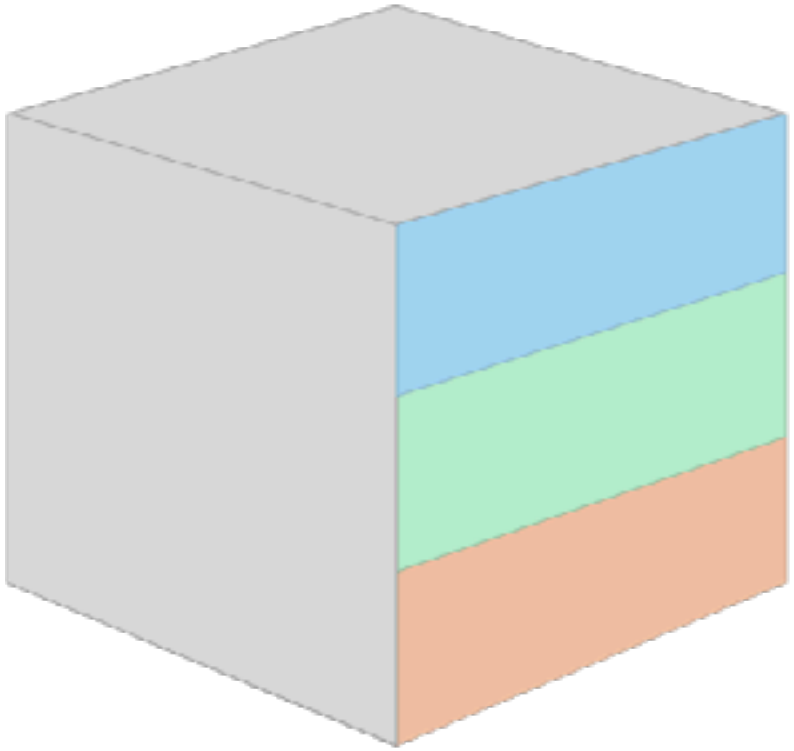
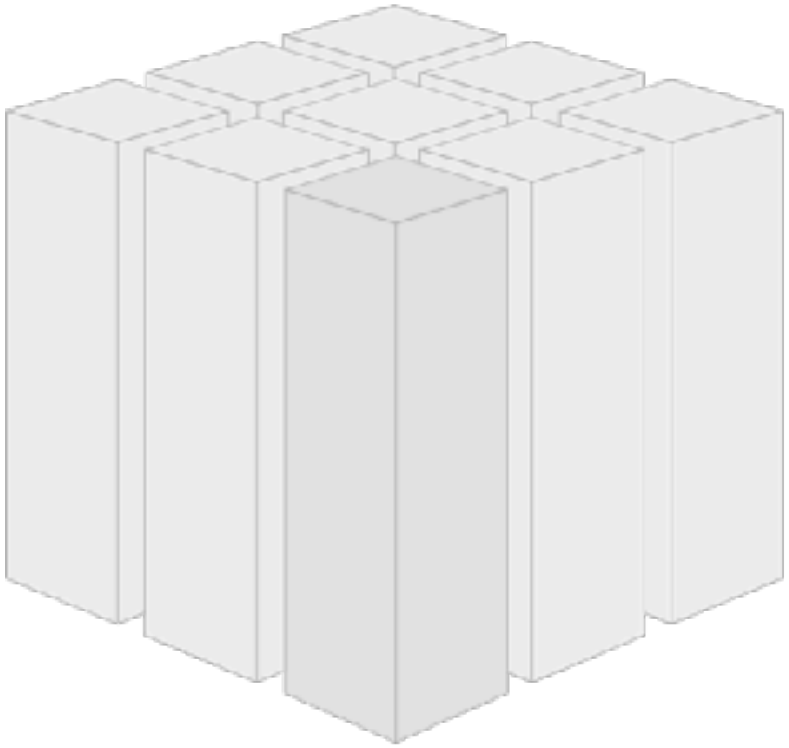
SCS Architecture



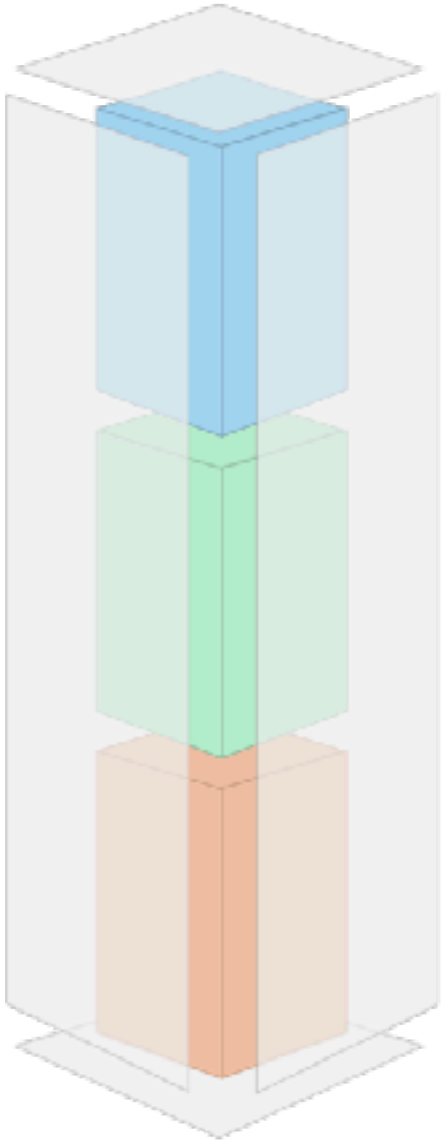
User interface
Business logic
Persistence

SCS Architecture



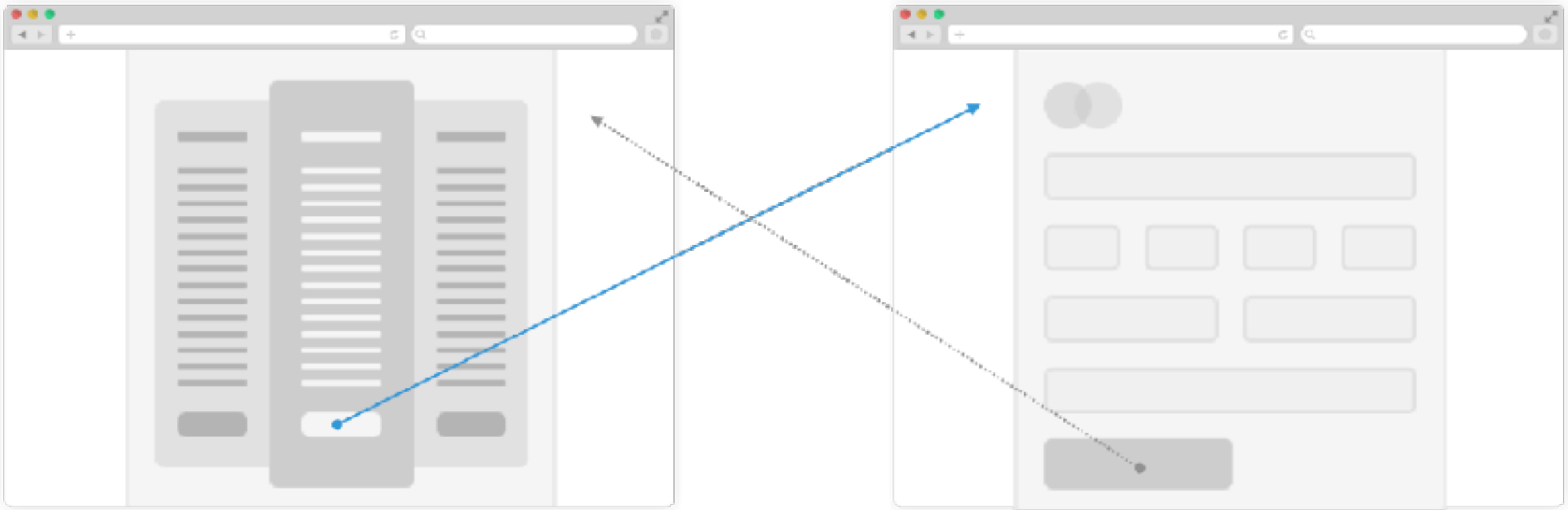
If you cut and wrap every domain in a separate web application

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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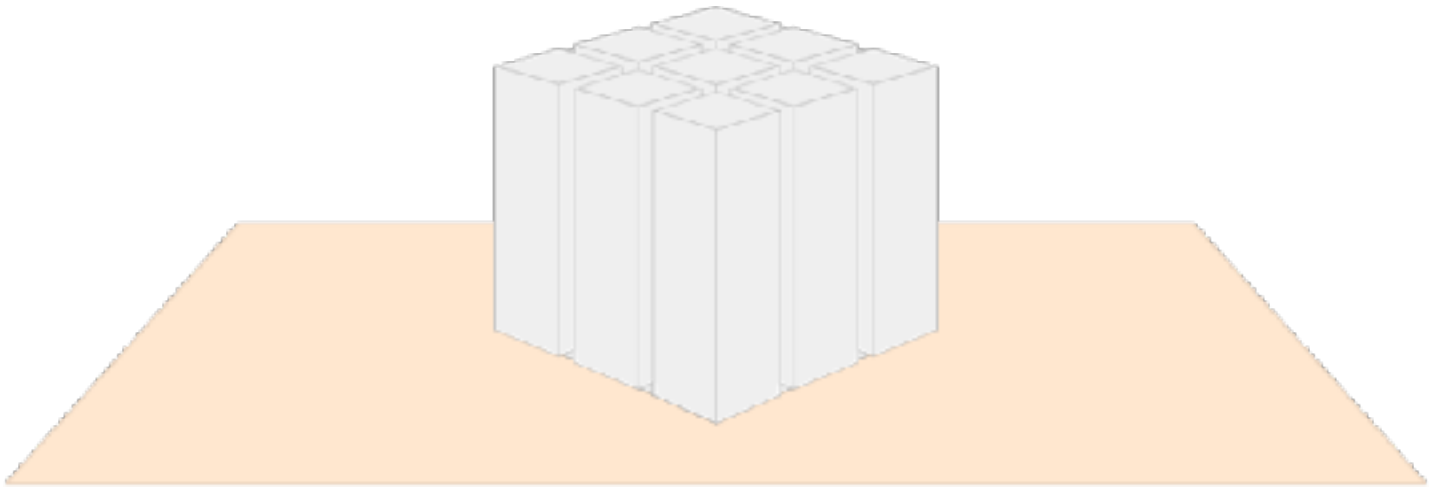
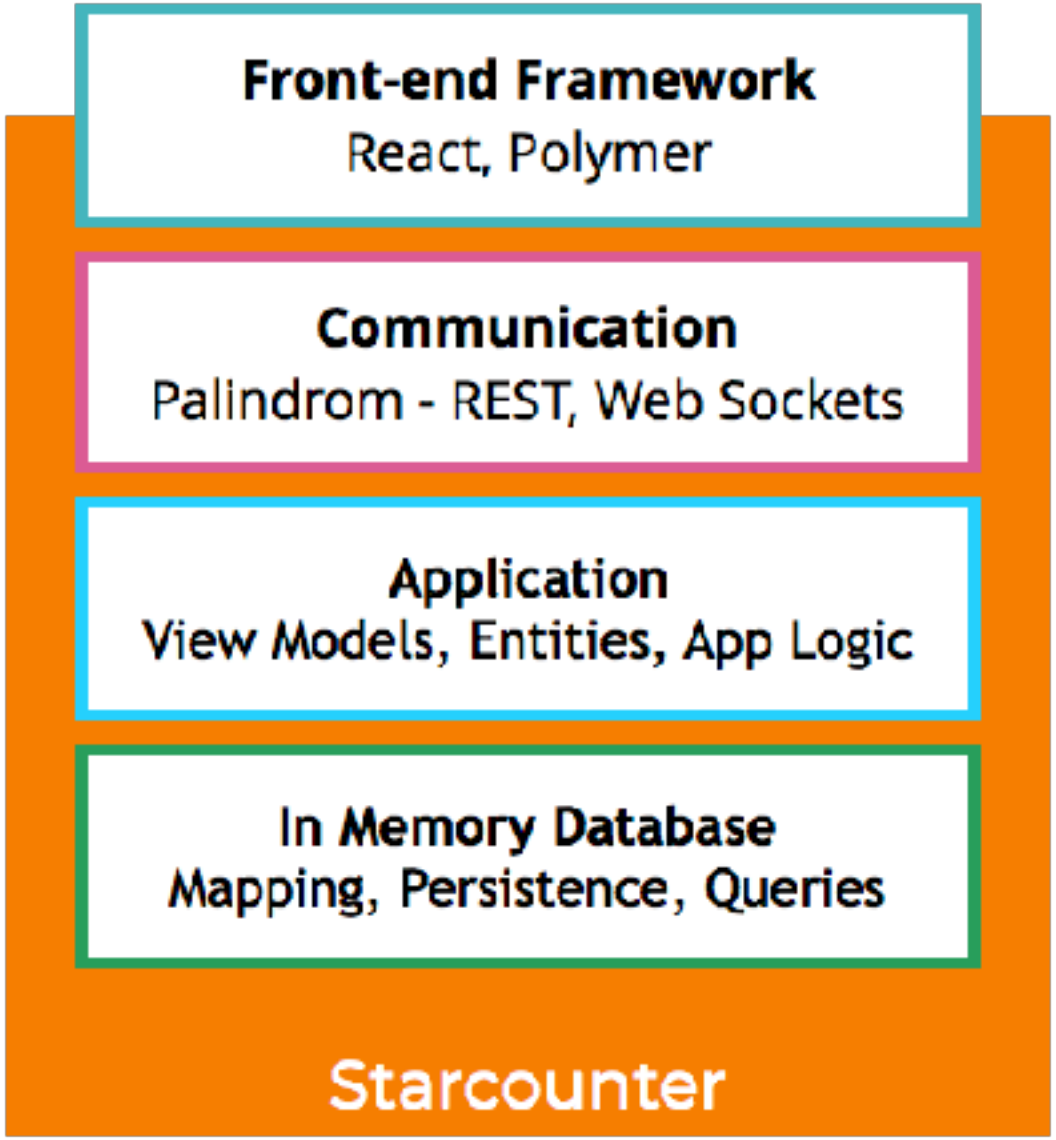
In-Memory Application Platform

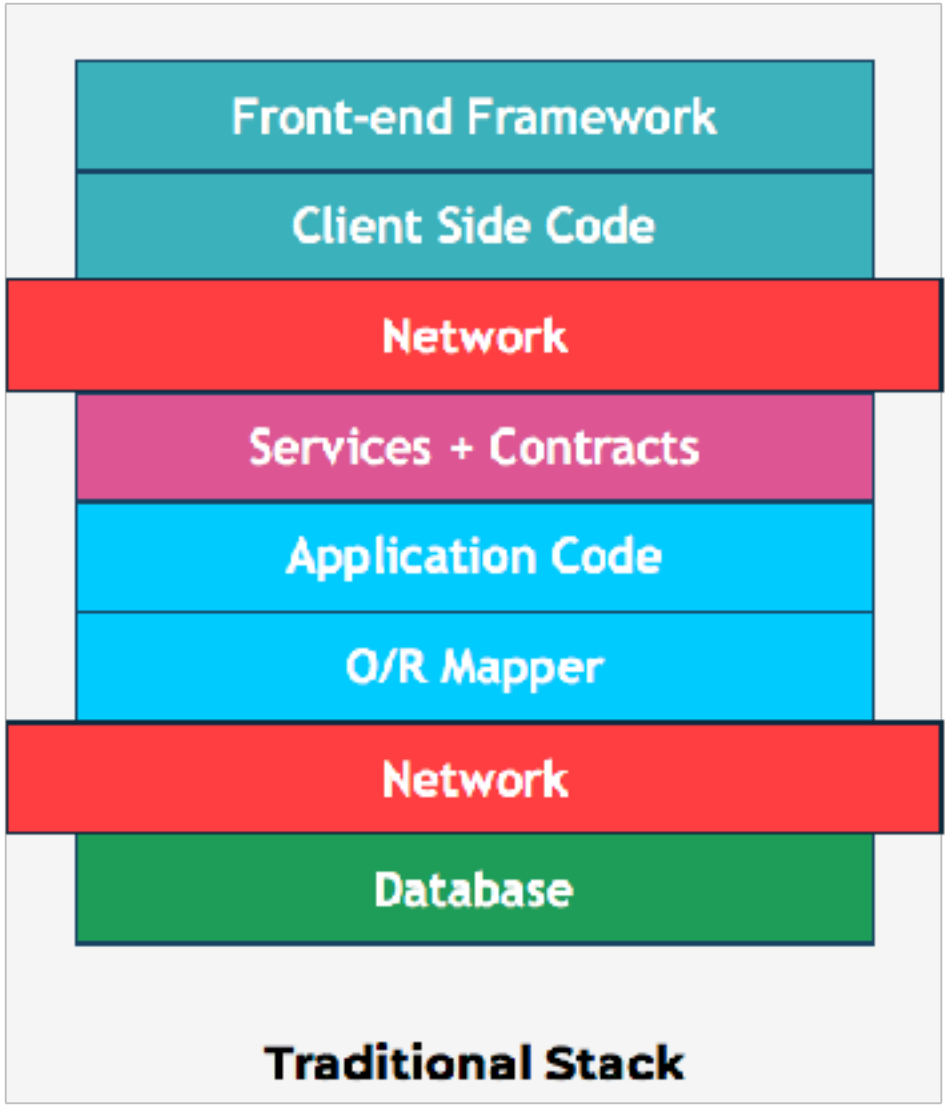
For Building Self-Contained Systems

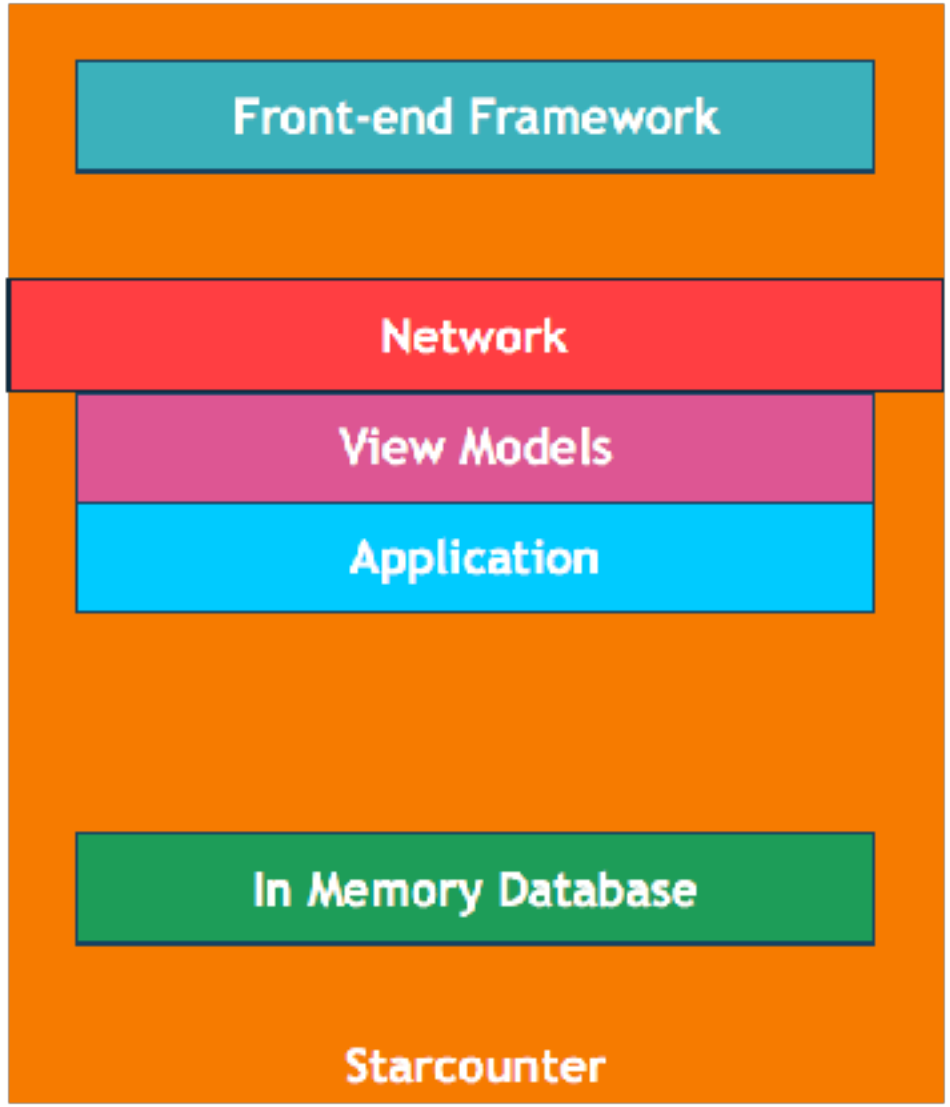


General Platform Architecture



Traditional Stack vs Starcounter Stack



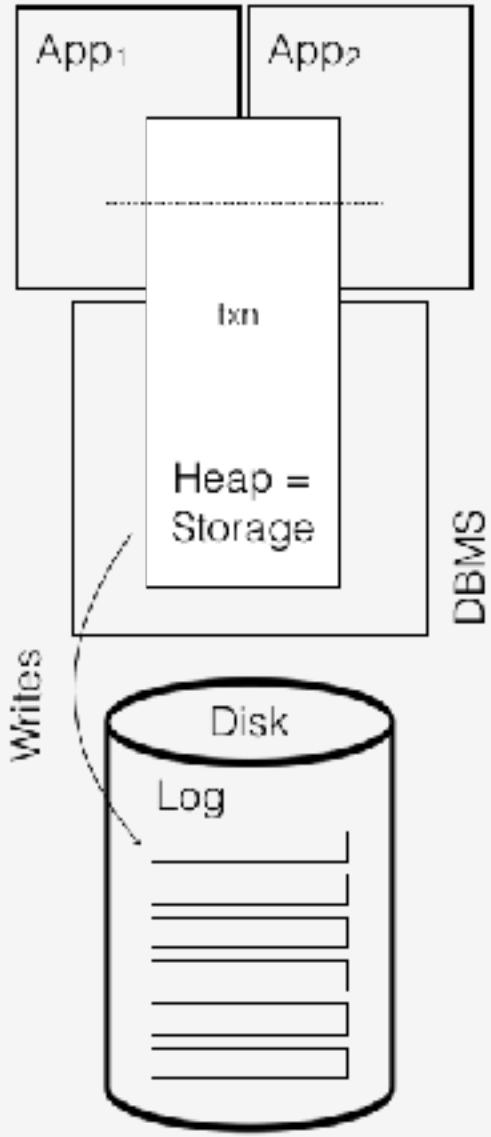


Data Storage

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

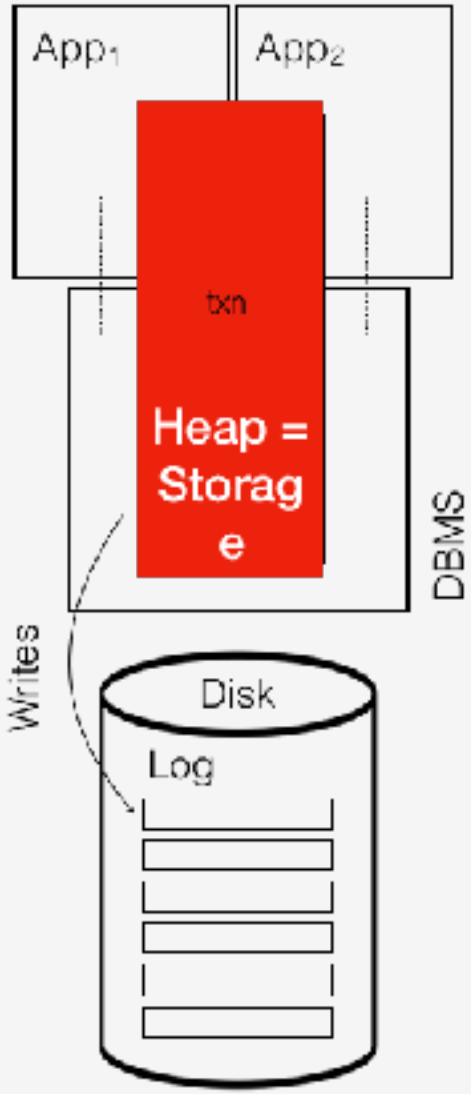
VMDBMS

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



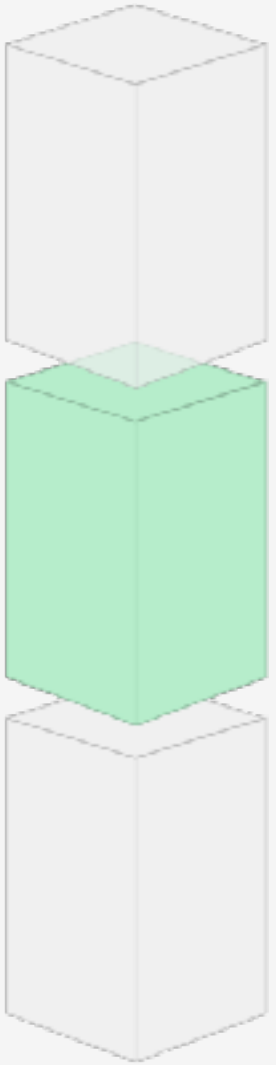
VMDBMS

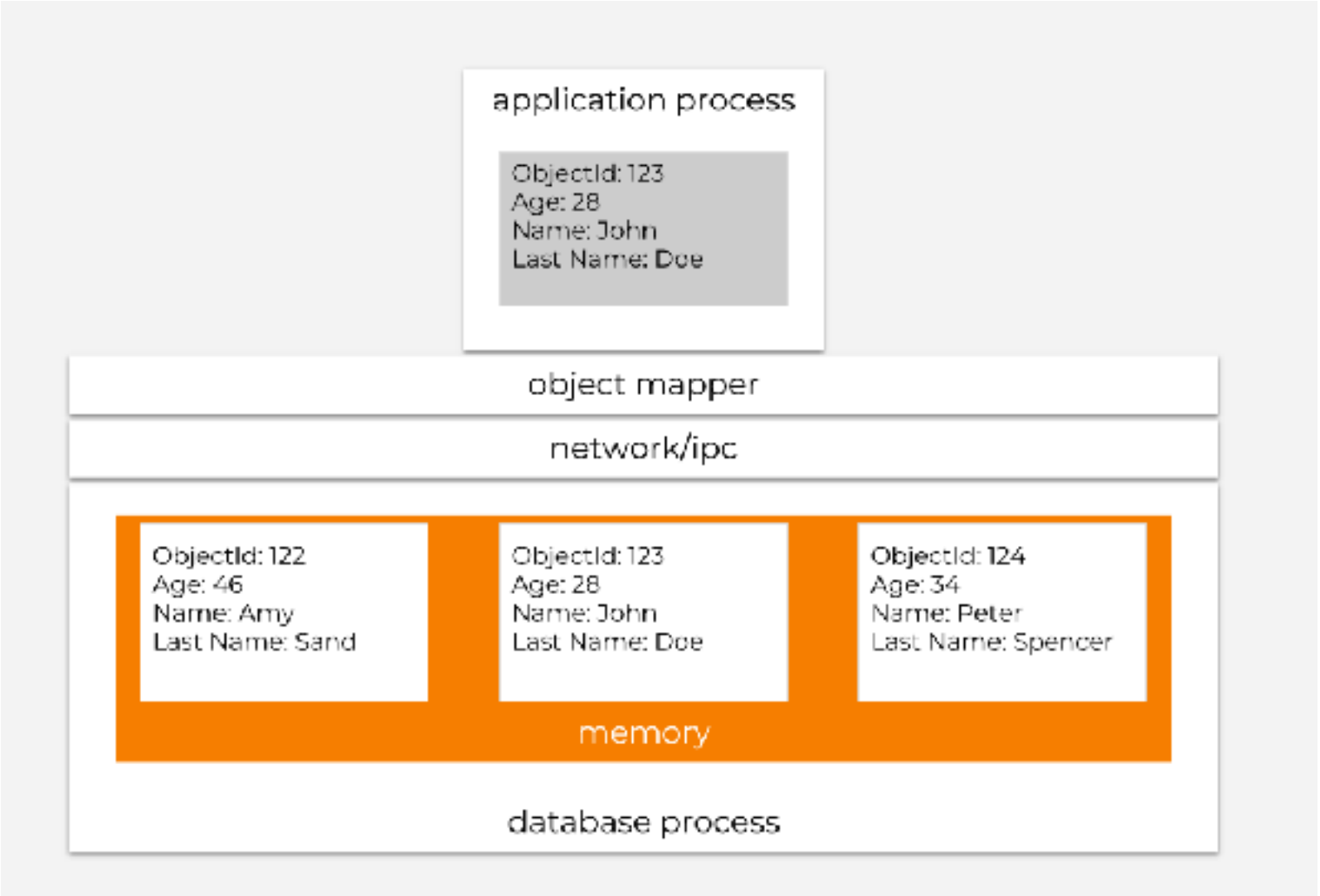
U.S. Patent No. 8,266,125

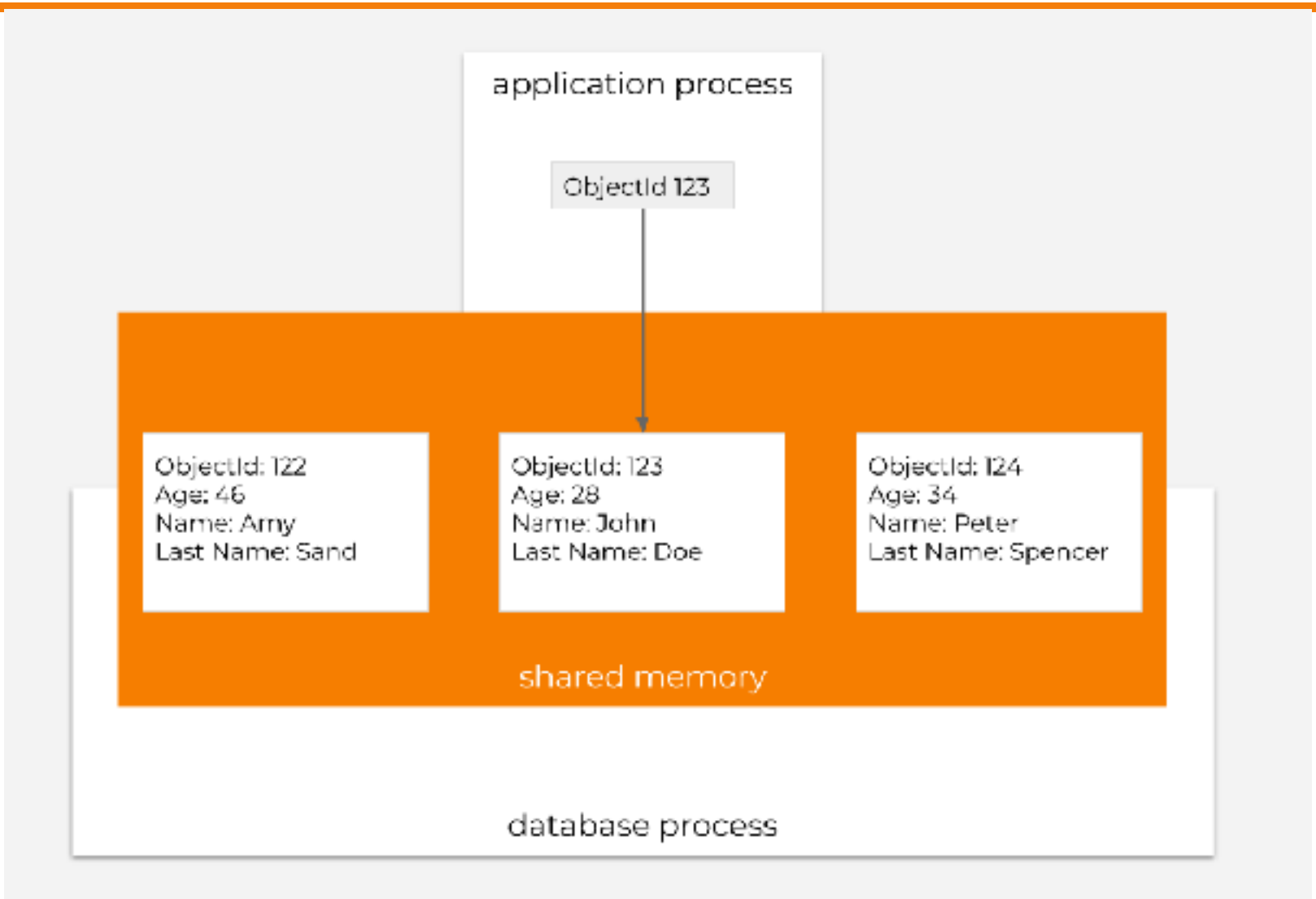


Business Logic

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

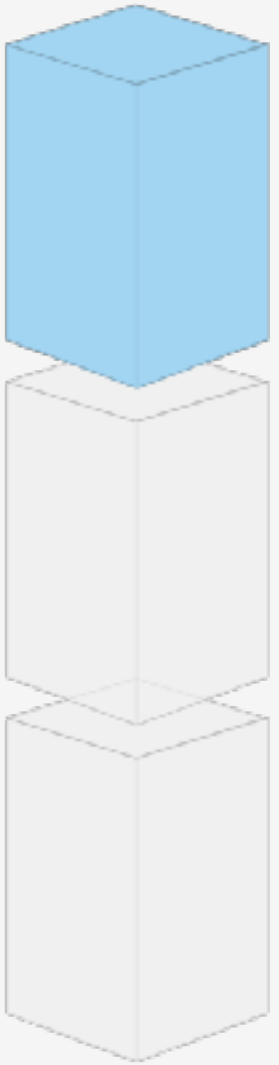



application process
ObjectId: 123
Age: 28
Name: John
Last Name: Doe
object mapper
network/ipc
ObjectId: 122
Age: 46
Name: Amy
Last Name: Sand
ObjectId: 123
Age: 28
Name: John
Last Name: Doe
ObjectId: 124
Age: 34
Name: Peter
Last Name: Spencer
memory
database process


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

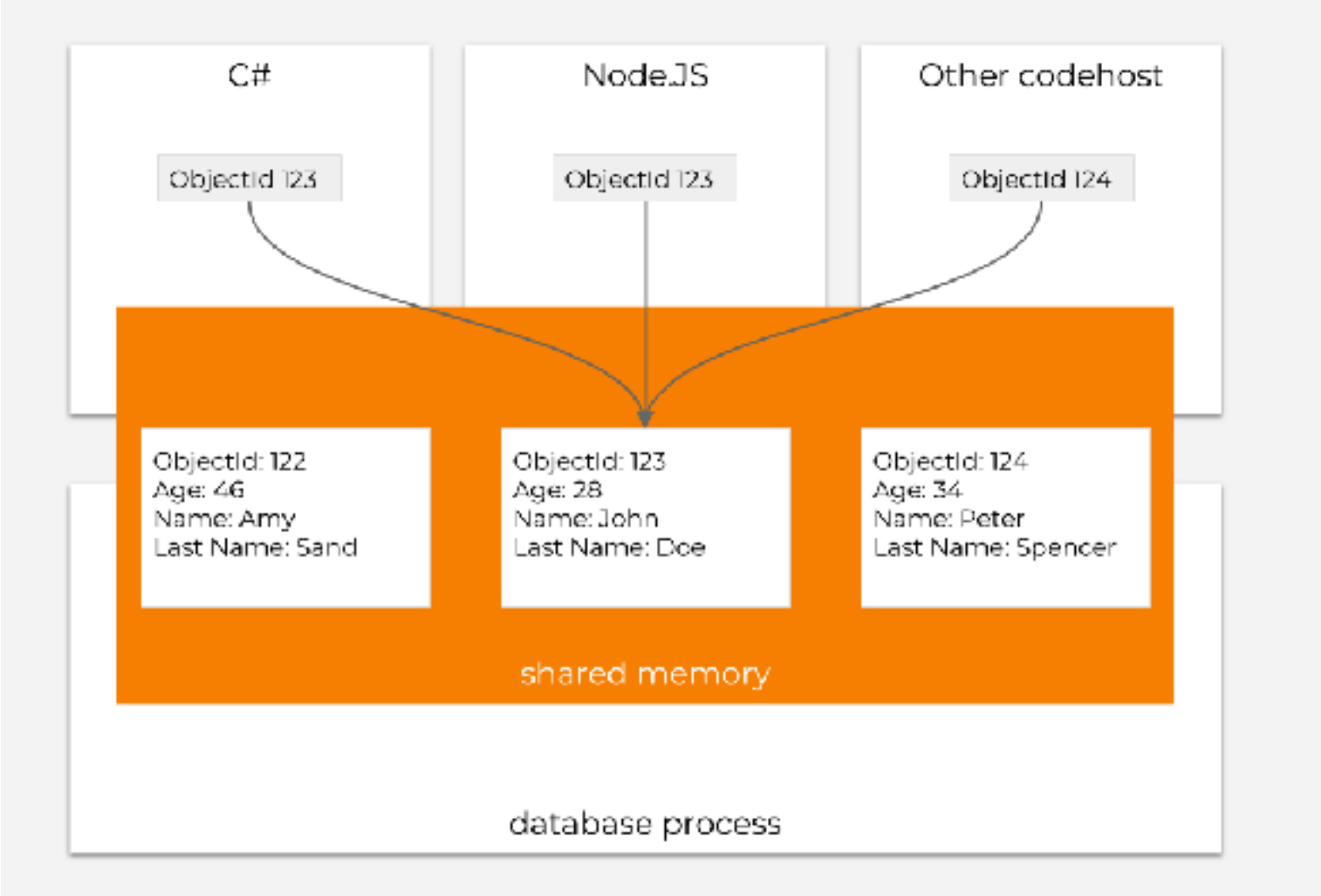
User Interface

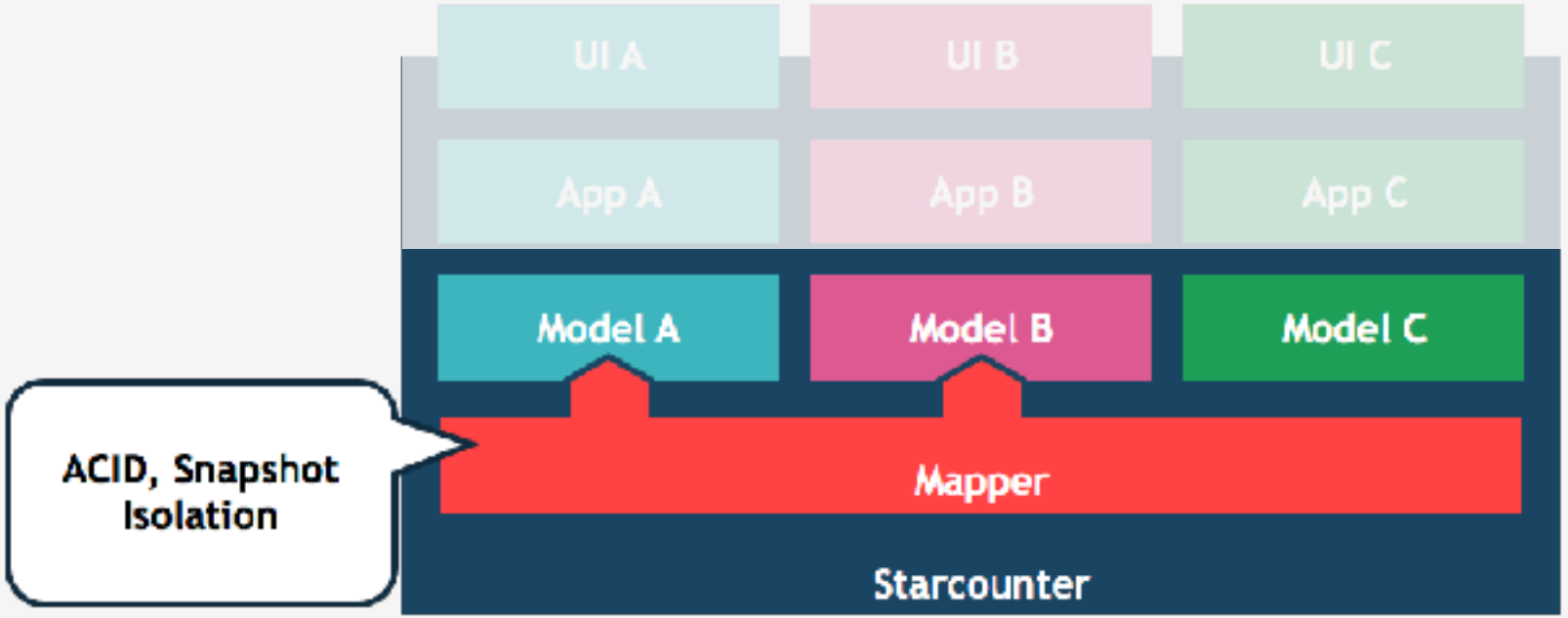
- Web native
- Web socket communication
- Design agnostic
- Thin



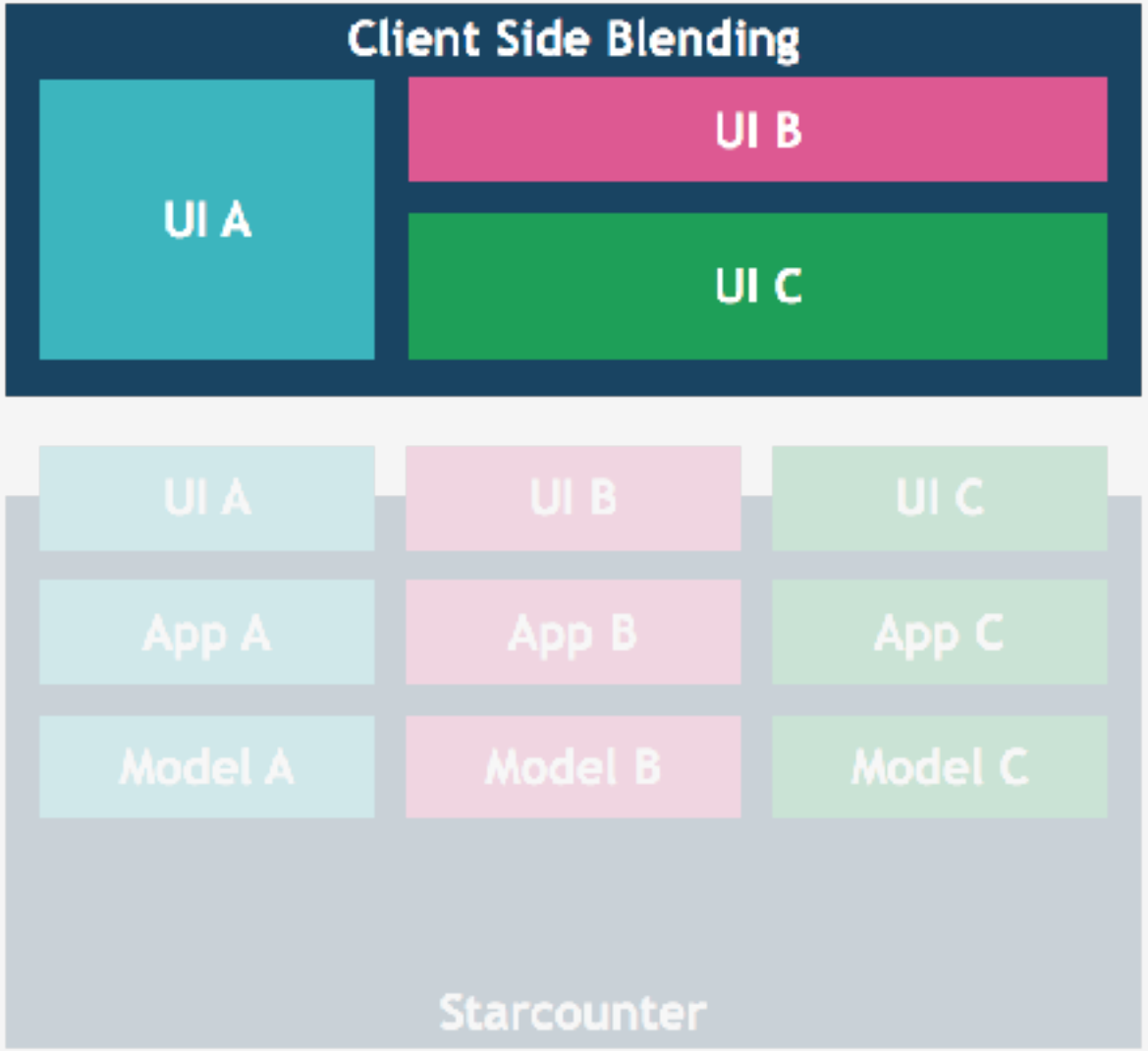
Demo:
Simple SCS app

Integration: Data Level


C#
NodeJS
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
ACID, Snapshot Isolation

Integration: UI Level


Client Side Blending
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

Torget Orders Customers Products Campaigns Reports Settings My Torget site Search... Bio Concept

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 50 123 45 Punchrullisten Country

ADD ADDRESS

Stephen Fry

Customer Id:

Save Back

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Lastname: Fry

Primary

Stephen.Fry@Starcounter.com

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Primary

+46 71 234 56 78

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Shipping

Dammsugarvägen 50 123 45 Punchrullisten Country

ADD ADDRESS

SUBSCRIPTIONS

Product Name	Quantity	Start Date	Next Delivery	Discount (%)	Frequency (Days)	Price (SEK)	Active	Campaign
Flexovital	1	2019-02-21	2019-02-21	0	1	500.00	☑	None
Endurance	10	2018-02-21	2018-02-21	0	1	1500.00	☑	None
Endurance	5	2019-02-22	2019-02-22	0	1	750.00	☑	None
Flexovital	1	2018-02-27	2018-02-27	0	20	198.00	☑	None

Stephen Fry

CustomerId

Save Back

Firstname: Stephen

Lastname: Fry

Primary

Stephen.Fry@Starcounter.com

ADD EMAIL ADDRESS

Primary

+46 71 284 56 78

ADD PHONE NUMBER

Shipping

Dammsugargatan 58 | 198 45 | Dunchrulistan | 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

TUE 27

17:20 TUESDAY 27 FEBRUARY

ORDER #10113 — 1 st — 198.00 SEK

17:28 TUESDAY 27 FEBRUARY

SUBSCRIPTION — Flexovital 198.00 — CREATED

[illegible] TUESDAY 27 FEBRUARY

ORDER #10112 — 2 st — 396.00 SEK

[illegible] TUESDAY 27 FEBRUARY

SUBSCRIPTION — Endurance 198.00 — CREATED

[illegible] TUESDAY 27 FEBRUARY

SUBSCRIPTION — Flexovital 198.00 — CREATED

00:00 TUESDAY 27 FEBRUARY

ORDER #10111 — 1 st — 198.00 SEK

00:00 TUESDAY 27 FEBRUARY

Torget Orders Customers Products Campaigns Reports Settings My Torget site Search...

Stephen Fry

Customer Id:

Save Back

Firstname: Stephen

Lastname: Fry

Primary

Stephen.Fry@Stancounter.com

ADD EMAIL ADDRESS

Primary

+46 71 234 56 78

ADD PHONE NUMBER

Shipping

Dammsugarvägen 53 | 123 45 | Huvudstaden | 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

FEB 27

12:28 TUESDAY 27 FEBRUARY

ORDER #10113 — 1 st — 198.00 SEK

12:28 TUESDAY 27 FEBRUARY

SUBSCRIPTION CREATED — Flexovital 198.00

14:18 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

08:30 TUESDAY 27 FEBRUARY

ORDER #10111 — 1 st — 198.00 SEK

08:30 TUESDAY 27 FEBRUARY

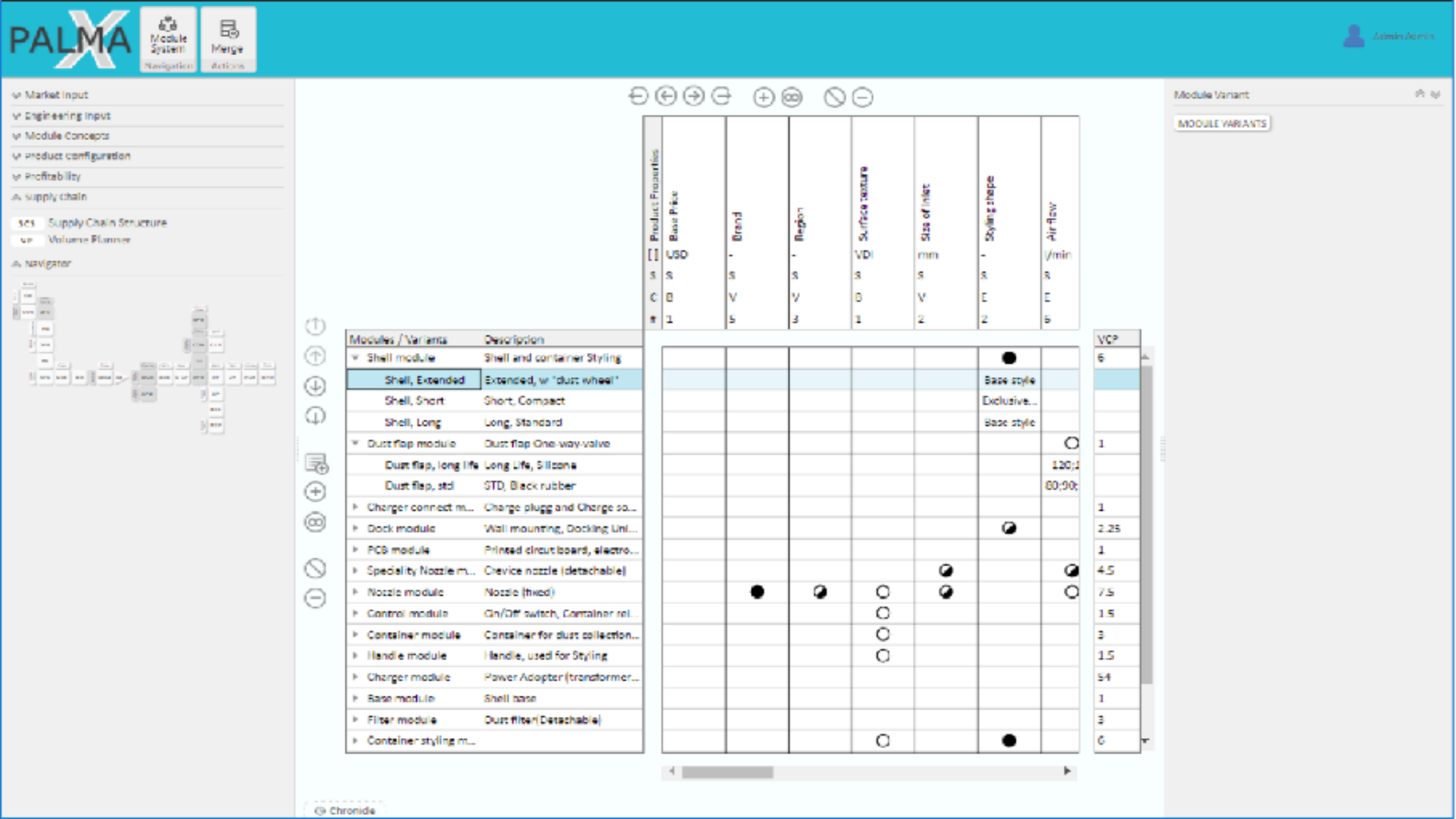
Outcomes

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
Product Properties
Base Price
Brand
Region
Surface texture
Size of inlet
Styling shape
Air flow
USD
VDI
mm
/min
Modules / Variants
Description
VCP
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
60;90;
Charger connect m...
Charge plugg and Charge so...
1
Dock module
Wall mounting, Docking Uni...
2.25
PCB module
Printed circuit 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 Adapter (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 (20 cores).
- 8 cores: 3.5 mln. Ops/sec.
- 16 cores: 5.4 mln. Ops/sec.

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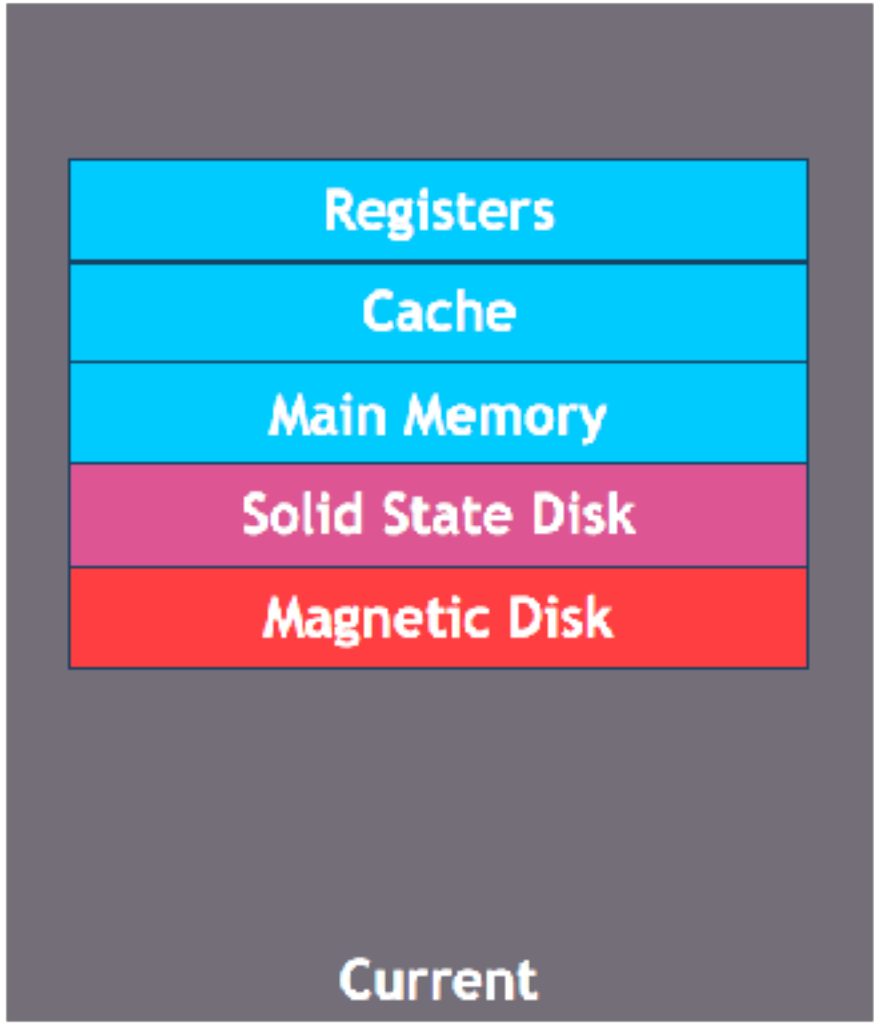
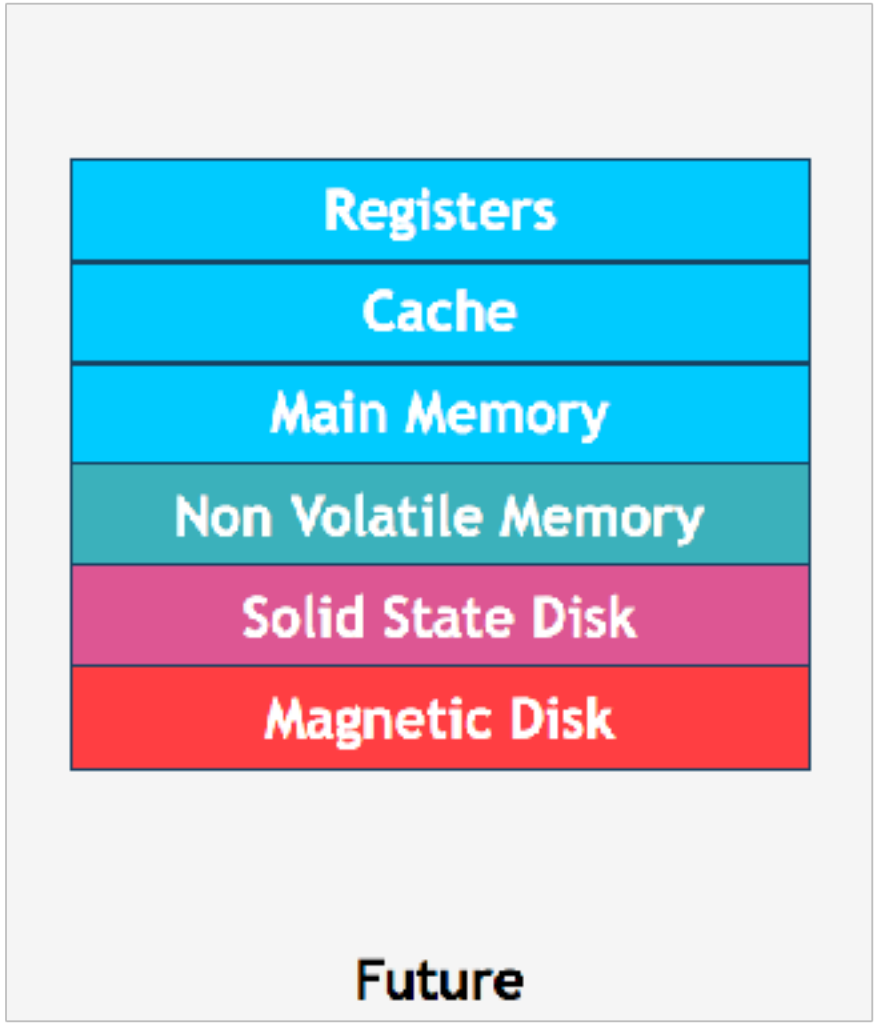
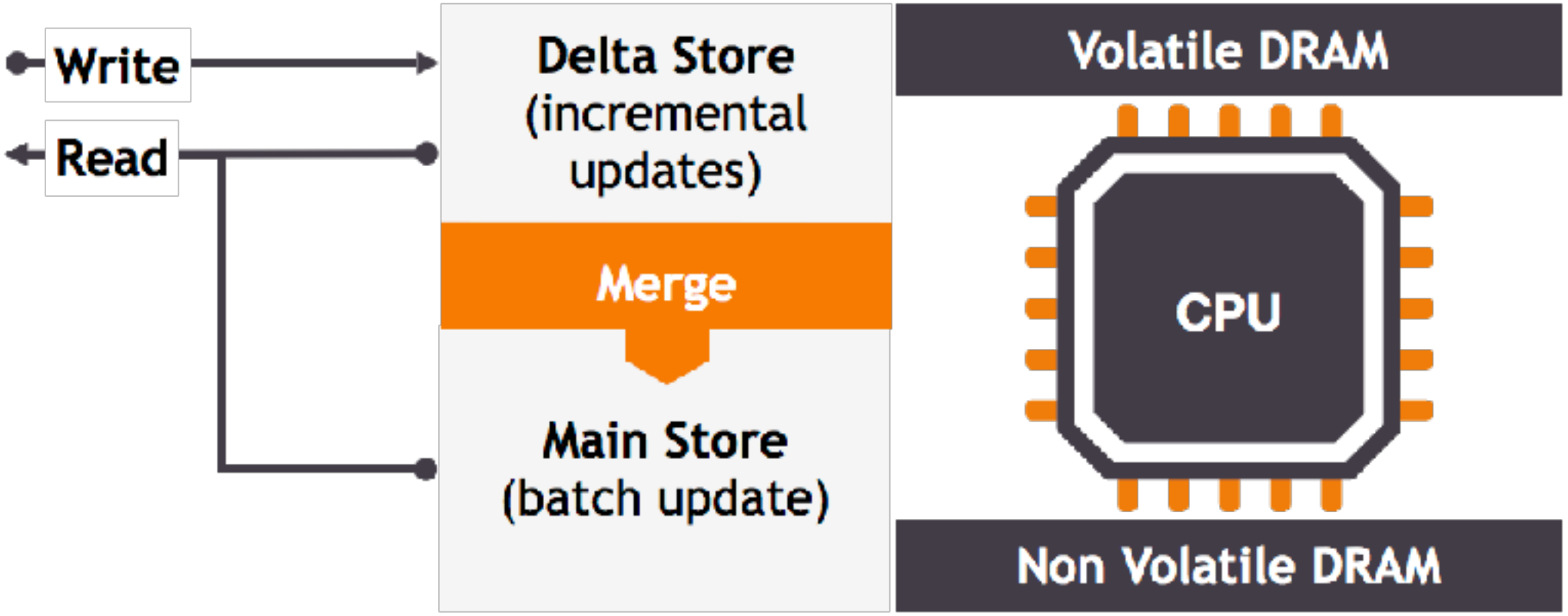
Currently vs Future





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

STARCOUNTER

Thank you!

Questions?