



**.NET**  
**DEVELOPER**  
**DAYS**



By Dennis van der Stelt



## WHY VERTICAL SLICES

---

Complex software systems stay maintainable with highly cohesive and low coupled slices

## FINDING CONSISTENCY BOUNDARIES

---

Use a well-known business process and find consistency boundaries and data ownership

## CODING VERTICAL SLICES

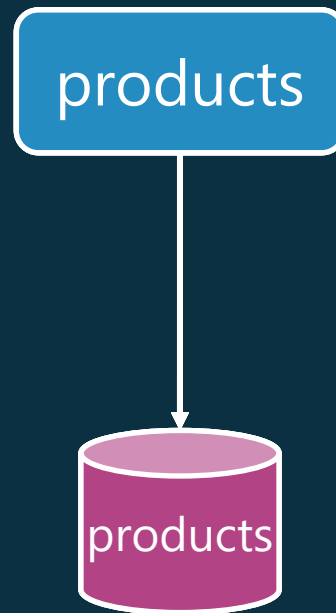
---

Use data composition, service-oriented architecture, event-driven architecture, and more architectural styles

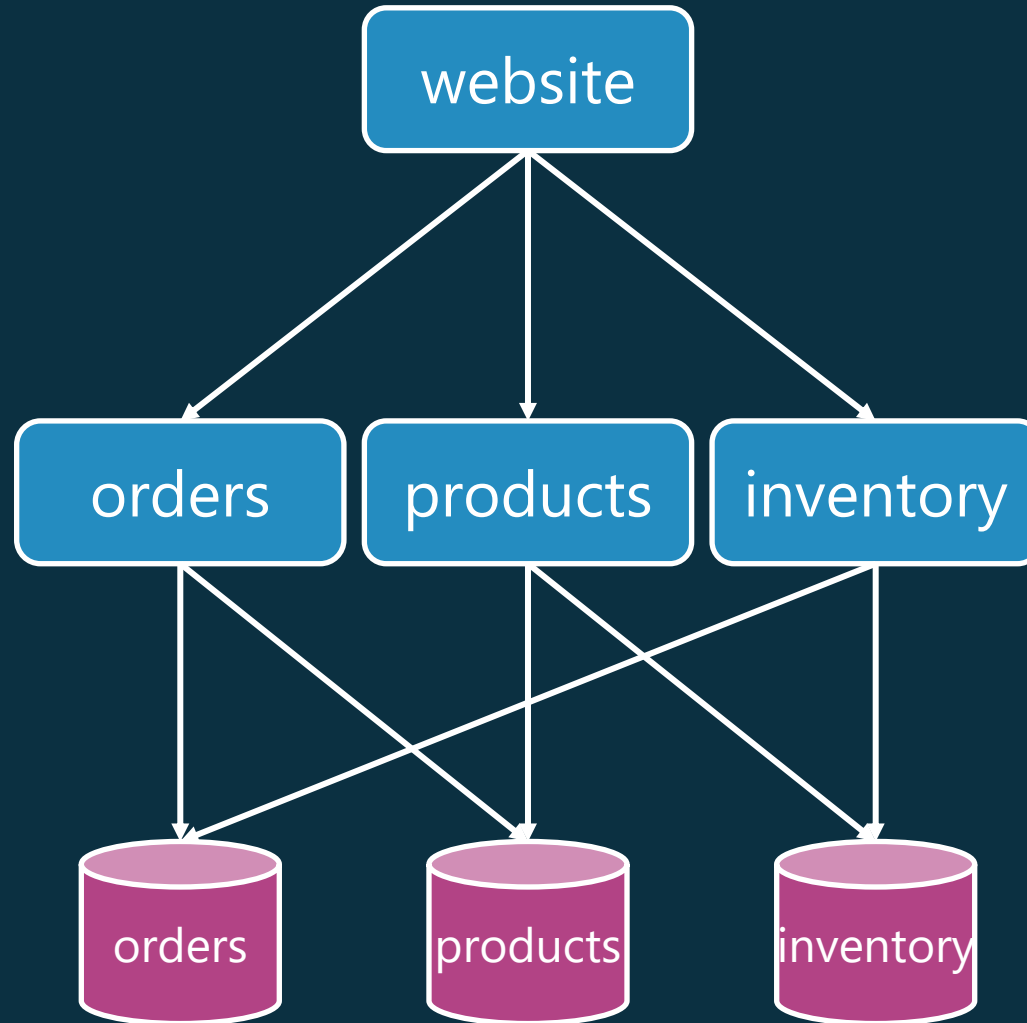


**VERTICAL SLICES**

# *Coupling* where does it start



# *Coupling* where does it start

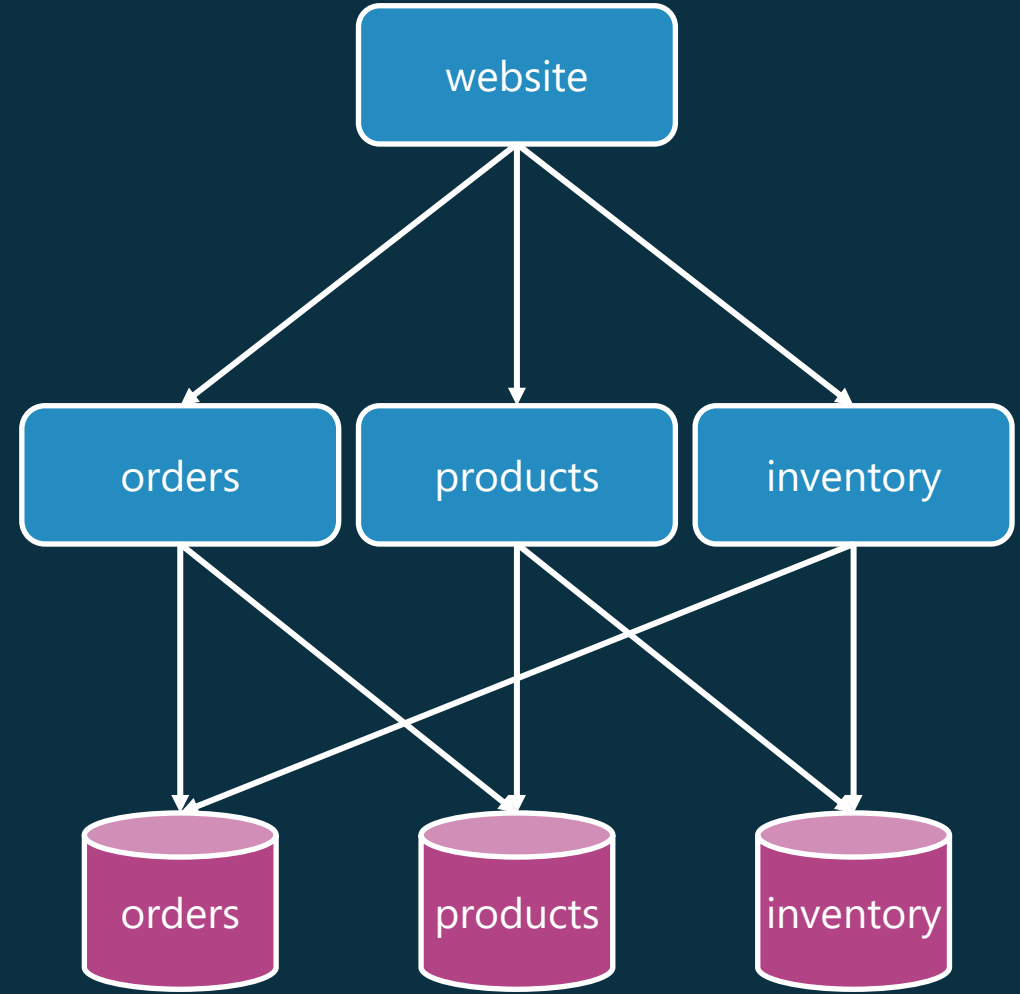
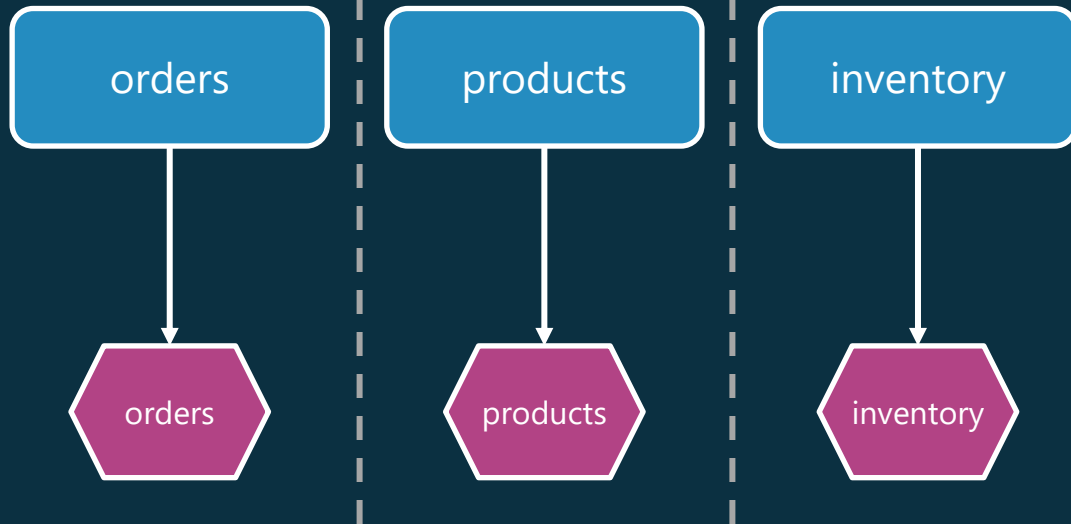


Logical View

# Coupling

## where does it start

Physical View

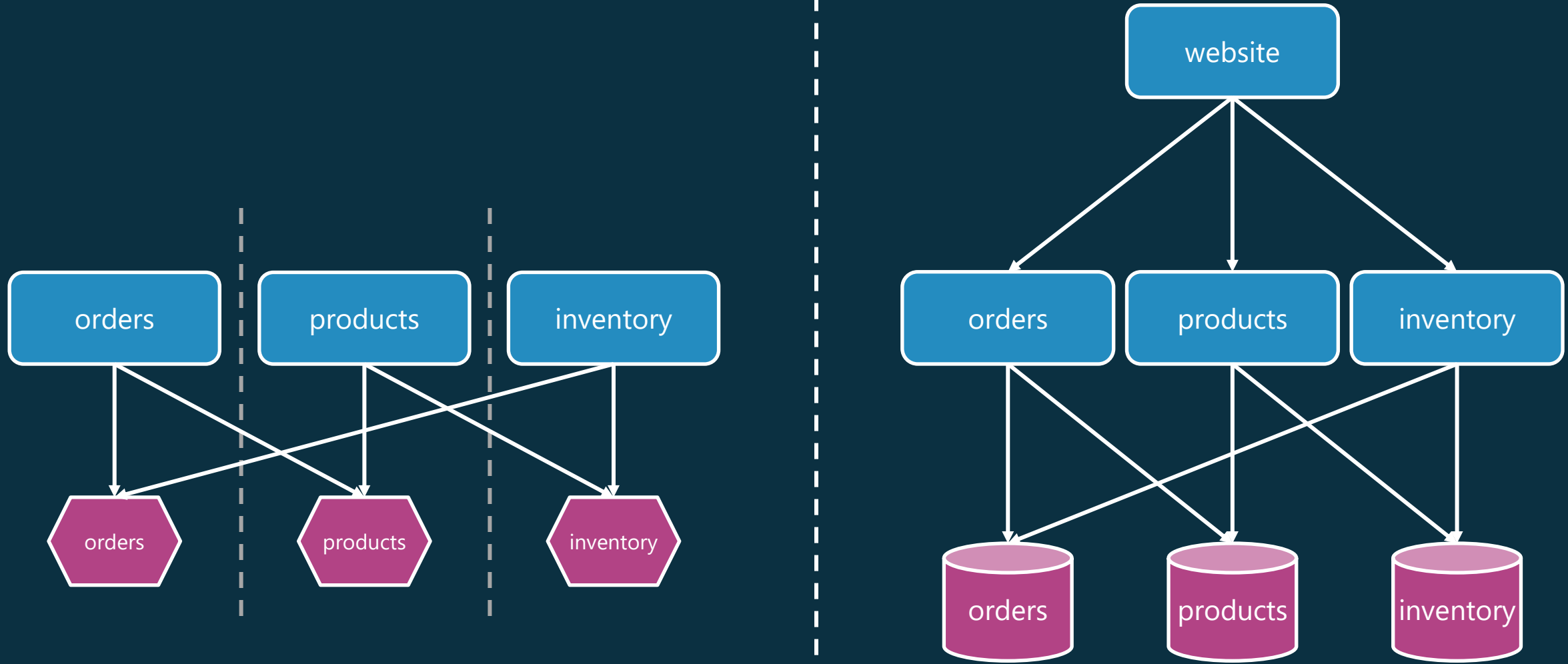


# Coupling

## where does it start

Logical View

Physical View

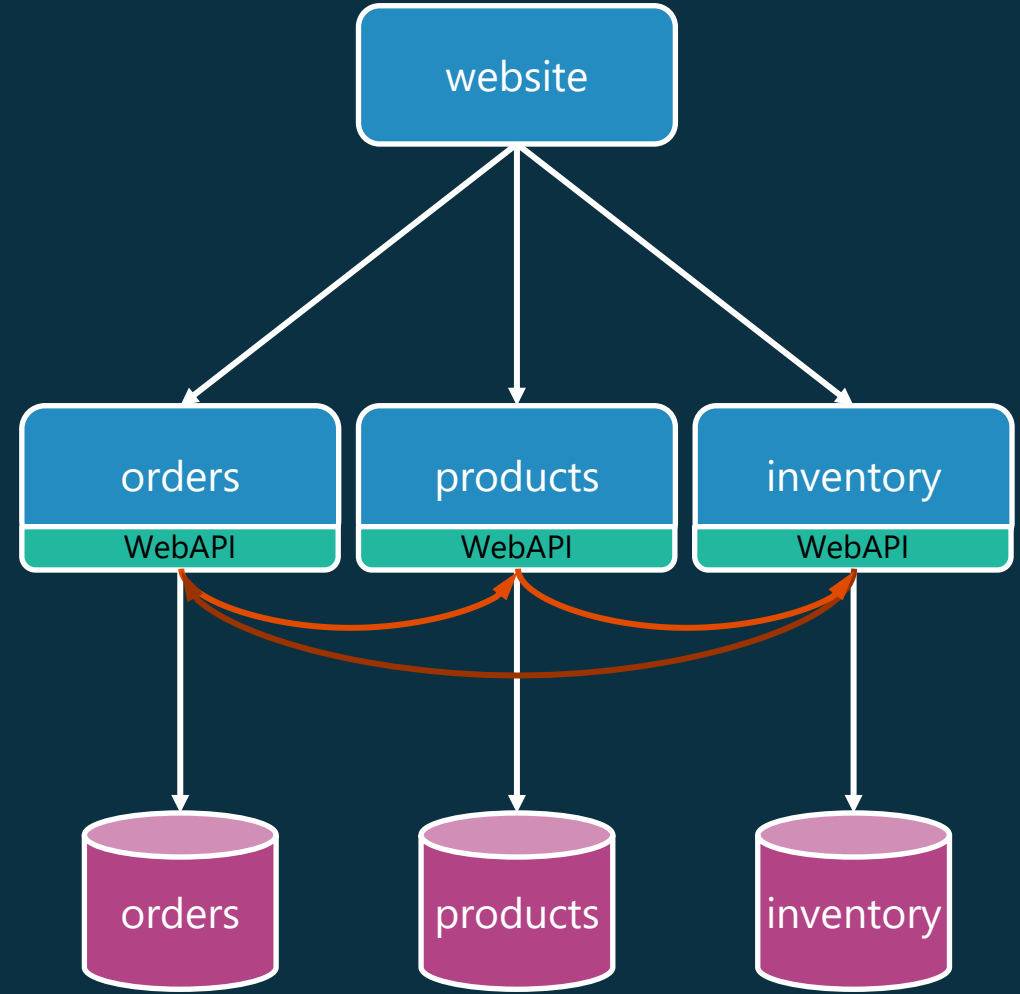
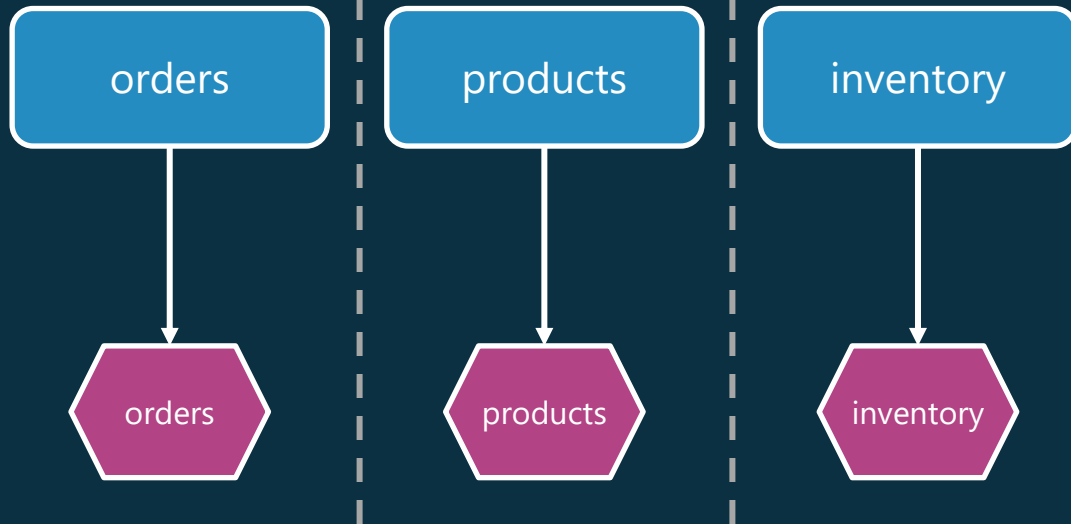


Logical View

# Coupling

## where does it start

Physical View



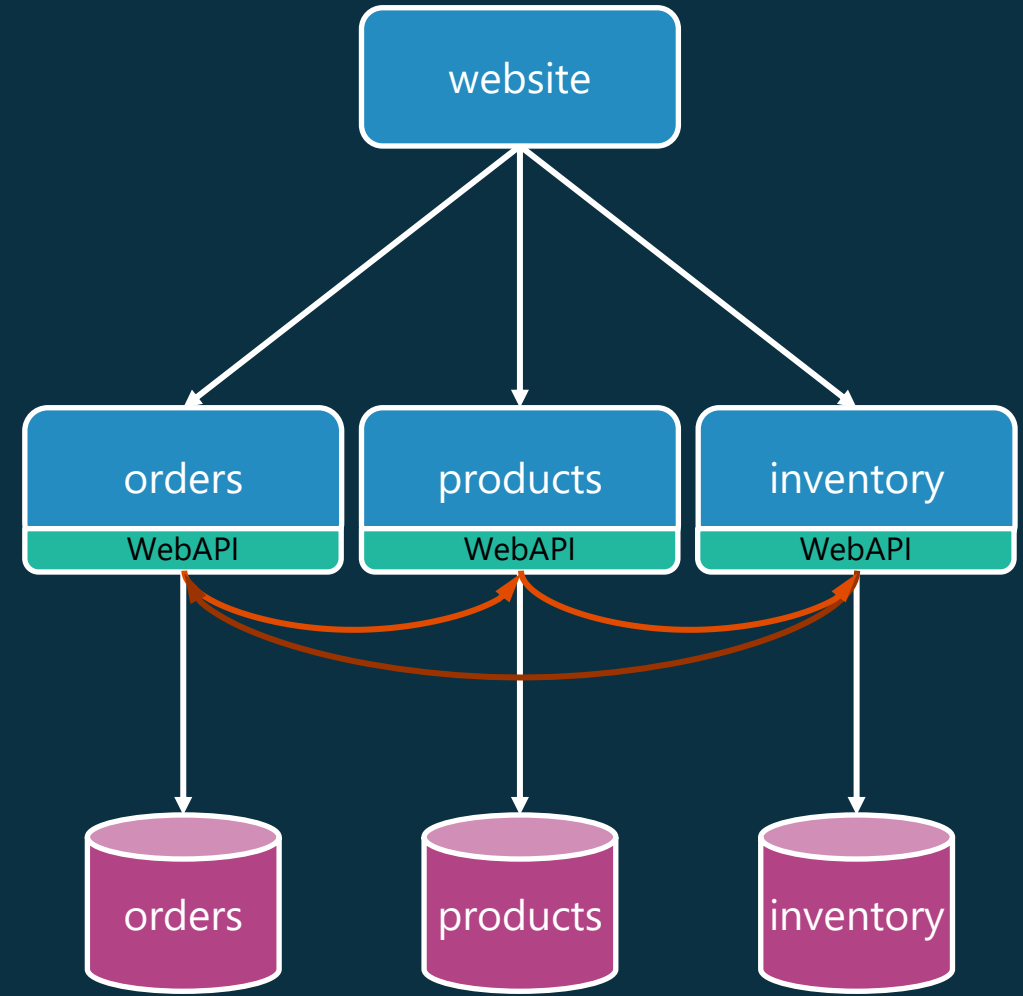
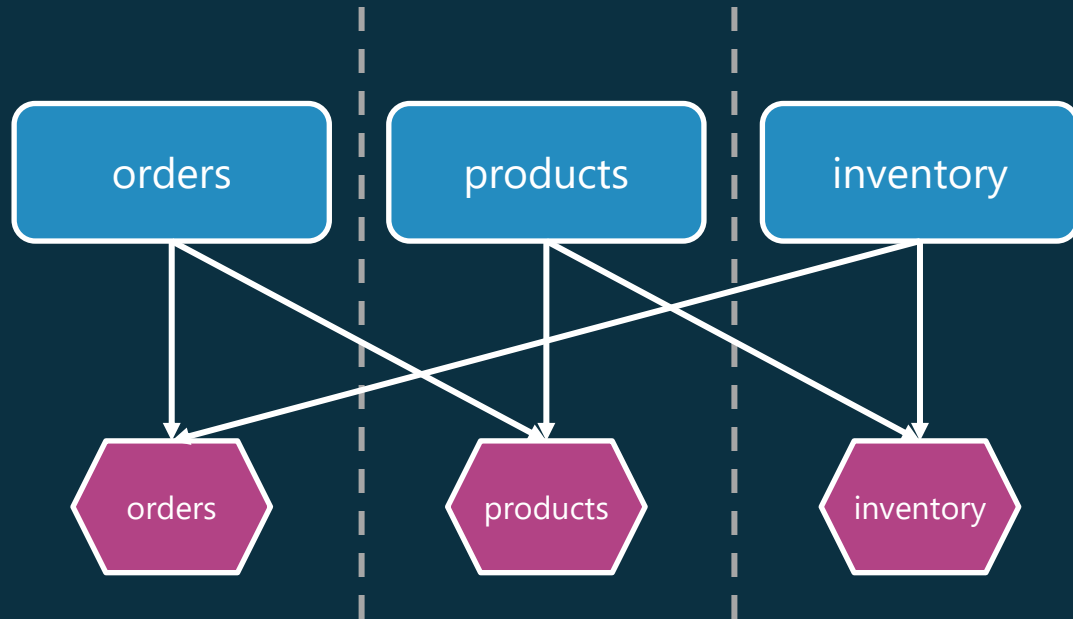


# Coupling

## where does it start

Logical View

Physical View





# To do:

VISIT SESSIONS AND  
TRY TO UNDERSTAND  
WHY SHARING DATA  
VIA THE SQL API  
IS BAD, BUT SHARING  
DATA VIA WEB API  
SEEMS TO BE OKAY.



SITES TO VISIT:  
[HTTP://BLOGGINGABOUT.NET](http://BLOGGINGABOUT.NET)

DENNIS INVITED  
ME FOR A CALL



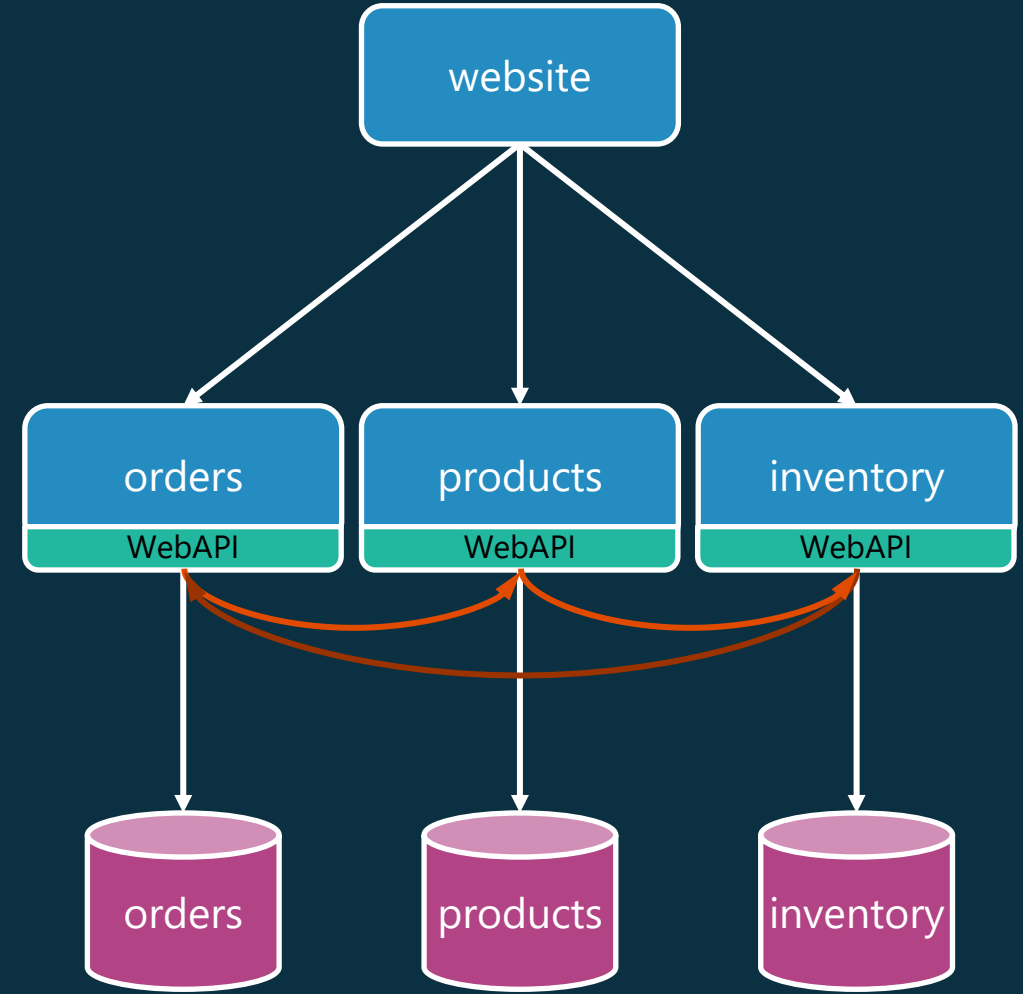
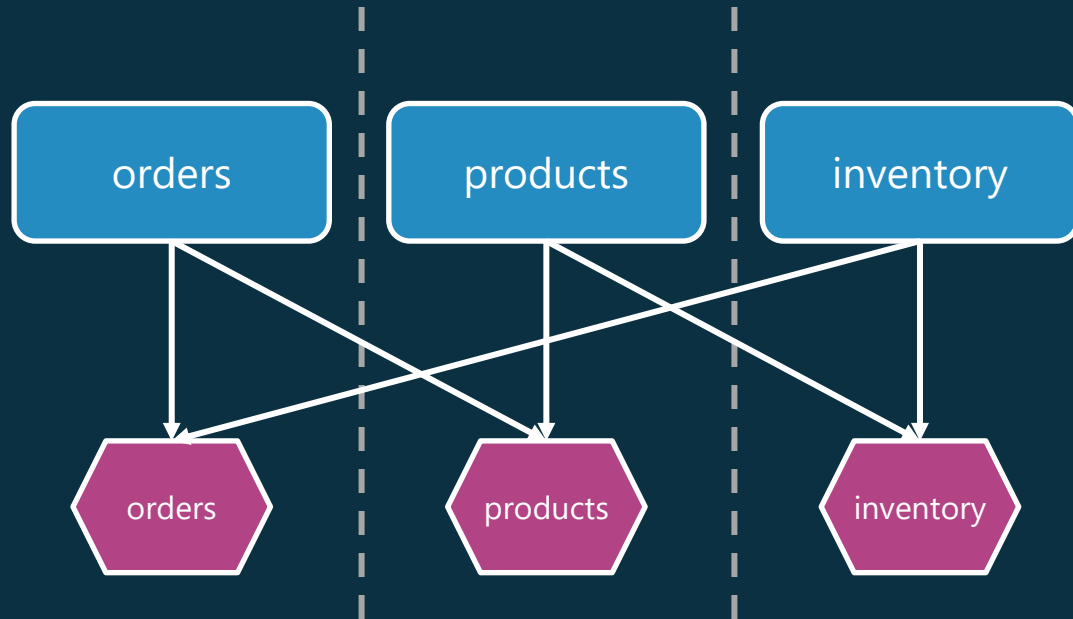
[CALENDLY.COM/DVDSTELT](https://calendly.com/dvdstelt)



Logical View

# *Coupling* where does it end

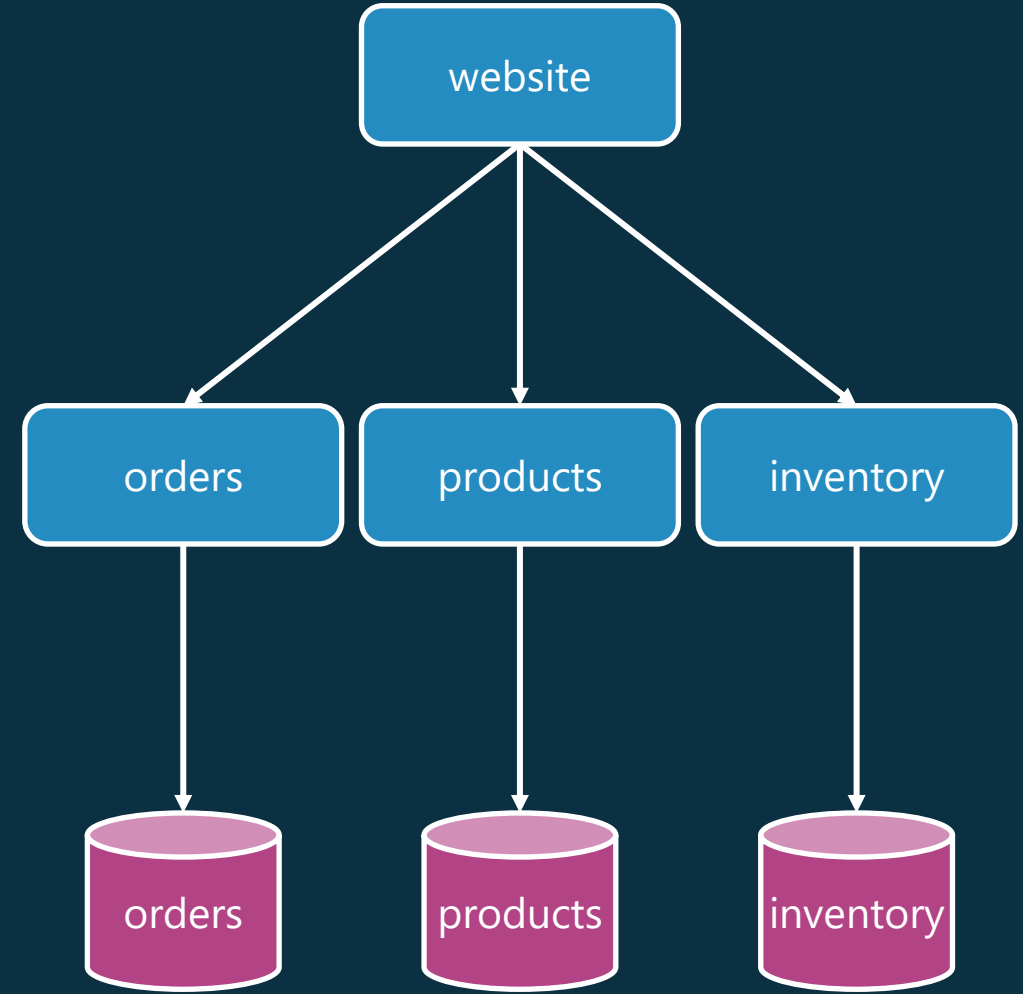
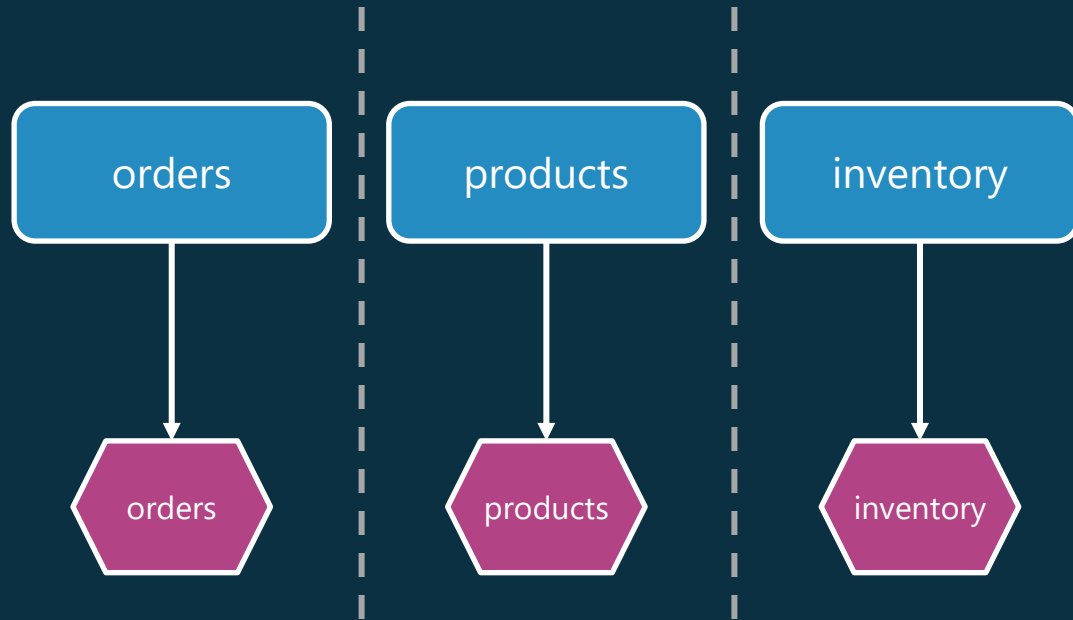
Physical View



Logical View

# *Coupling* where does it end

Physical View



Logical View

# *Coupling* where does it end

Physical View

orders

products

inventory

orders

products

inventory

website

orders

products

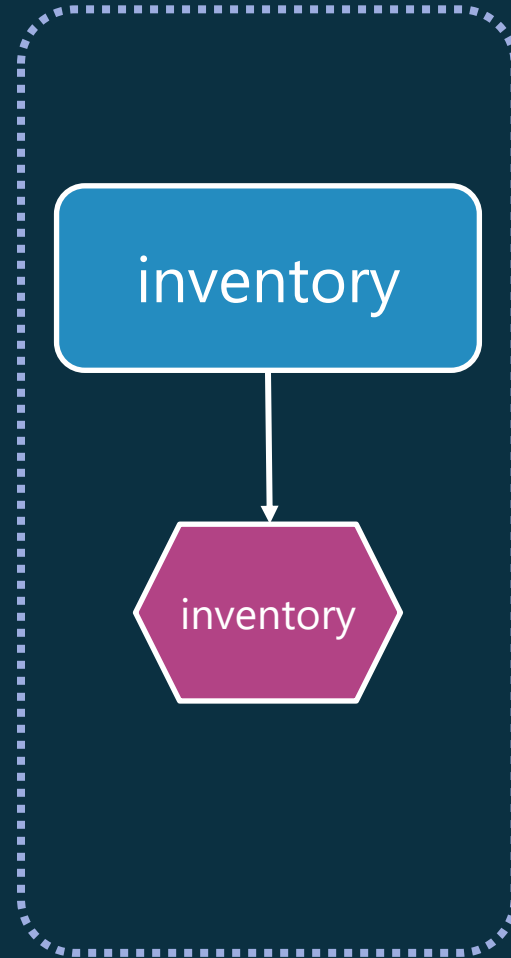
inventory

orders

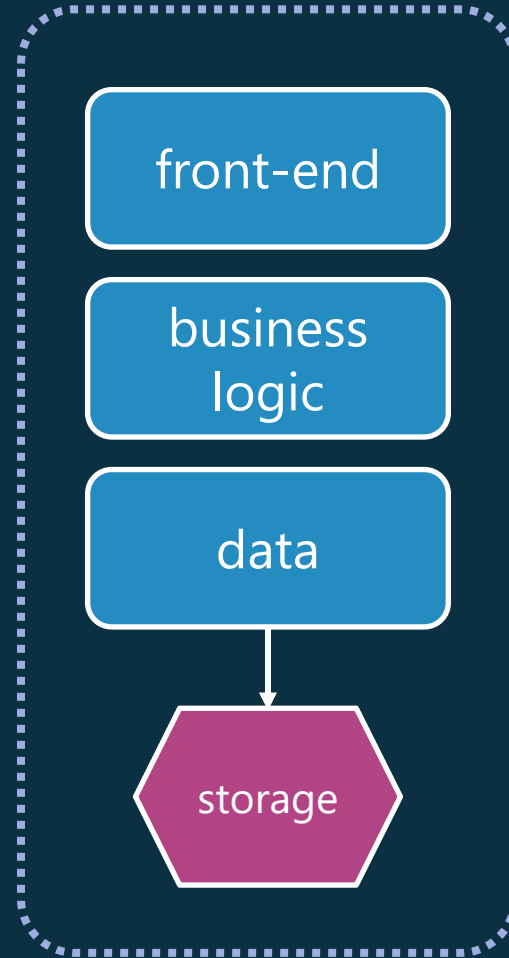
products

inventory

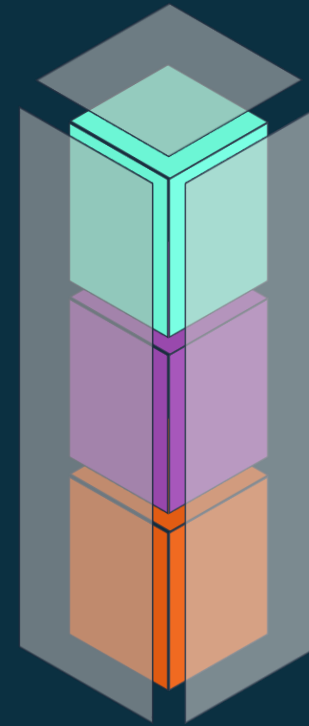
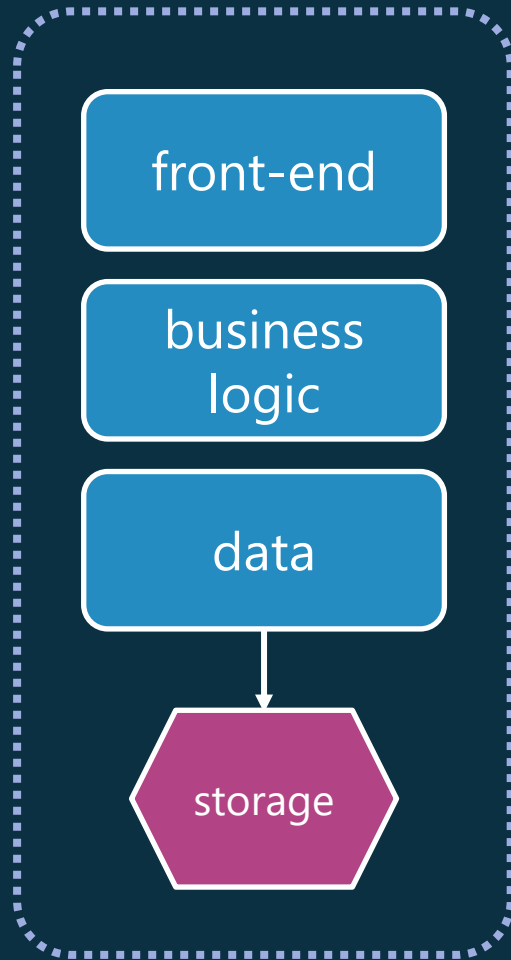
# *Coupling* where does it end



# *Coupling* where does it end

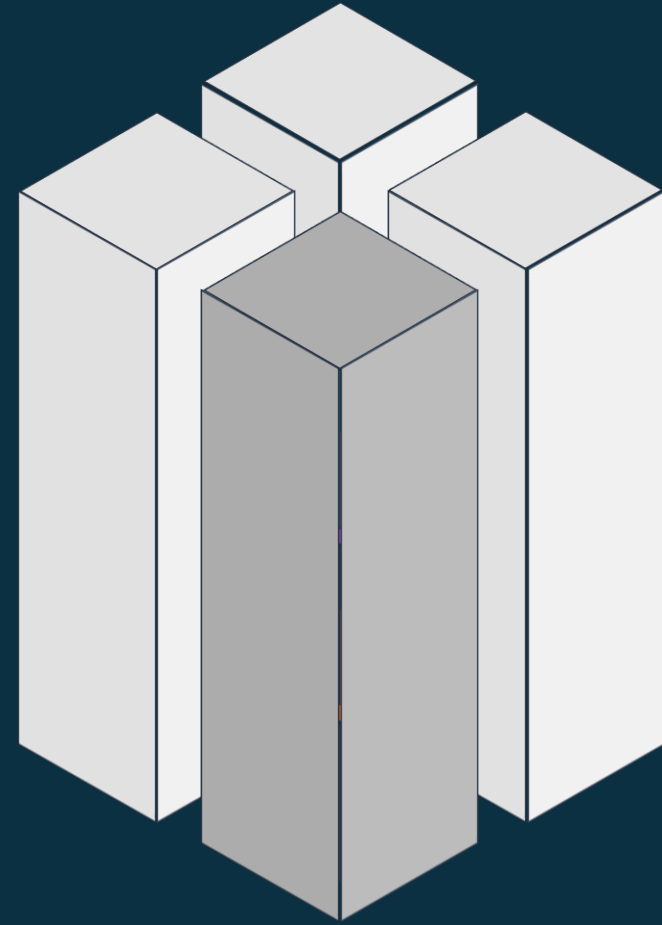


# *Coupling* where does it end

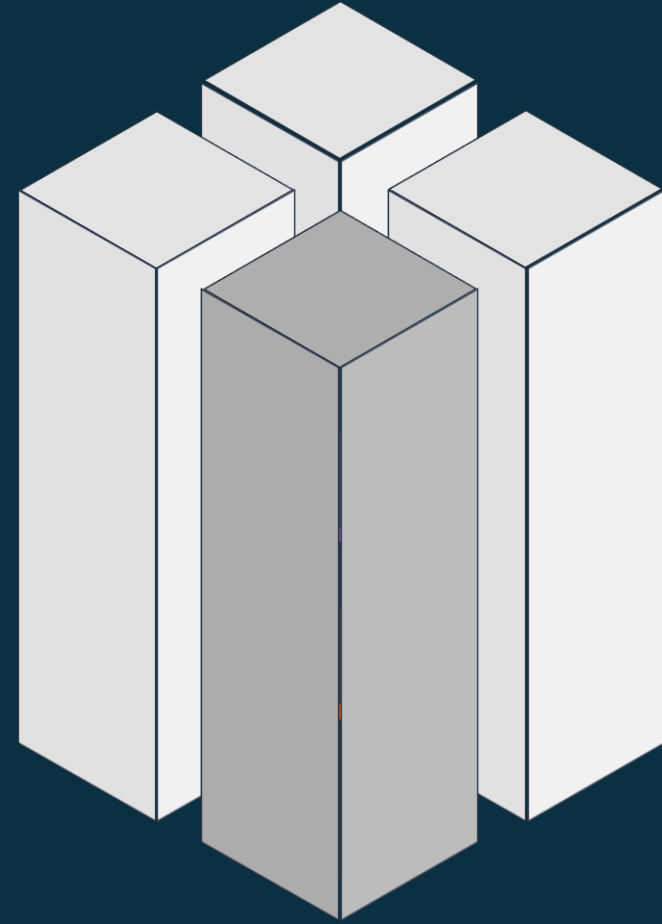




# *Coupling* where does it end



# *Coupling* where does it end

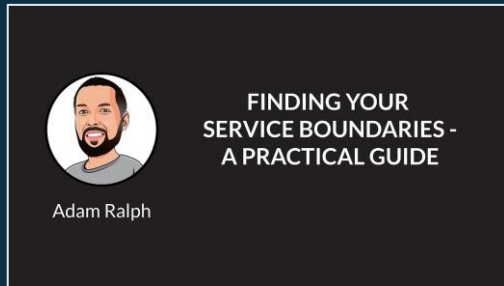




## Autonomous microservices don't share data. Period.

Dennis van der Stelt

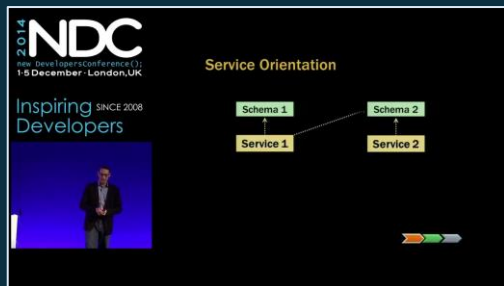
[https://youtu.be/\\_UN50hNZlx4](https://youtu.be/_UN50hNZlx4)



## Finding your service boundaries – a practical guide

Adam Ralph

<https://youtu.be/jdliXz70NtM>



## Finding Service Boundaries – illustrated in healthcare

Udi Dahan

<https://youtu.be/RhfyP8pEEc4>





**CONSISTENCY BOUNDARIES**



ZER  
Lager

BISCUS  
BLANC

GARS  
DU DEP

LE MARCHAND  
BONHEUR

NORHTHERN  
SUMMIT

27  
RNHAM

35  
RNHAM

42  
RNHAM

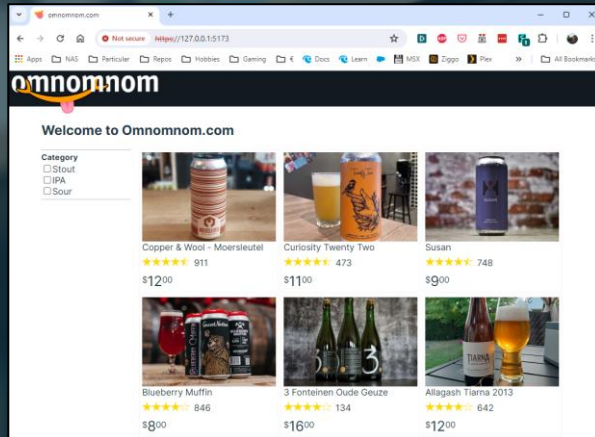
48  
RNHAM

54  
RNHAM

55  
RNHAM

# OmNomNom

Because beer is good,  
but beers are better.



https://www.omnomnom.dev/abraxas/

# 1

## start checkout



Shopping Cart

Item	Price	Quantity
 Abraxas by Perennial Artisan Ales	\$42.00	1

https://www.omnomnom.dev/buy/shippingaddress/

### Where should we deliver your order?

Enter a shipping address

Name:

Address Line 1:

City:

Country:

https://www.omnomnom.dev/buy/delivery/

### When do you need it?

Shipping from Amazon.com

Abraxas by Perennial Artisan Ales

Quantity: 1

Choose a delivery option:

- Amazon Prime: \$49.98 - Available
- Amazon: \$20.98 - Available
- Amazon: \$7.98 - Available

https://www.omnomnom.dev/buy/payment/

### Select a payment option

Your credit and debit cards

MasterCard ending in 2164 Dennis van der S... 09/2018

Please tell us the currency of your card

- My card is in US Dollar
- My card is in a different currency:

More payment options

Amazon accepts all major credit and debit cards

VISA, MasterCard, American Express, Discover

> Add a card

https://www.omnomnom.dev/buy/payment/


### Review your order

Shipping address: [change](#)  
Dennis van der Stelt  
Van Zandvlietplein 1  
Rotterdam, The Netherlands

Payment method: [change](#)  
MasterCard ending in 2164

Billing Address: Same as shipping address


Estimated delivery: Aug 17, 2018 - Aug 21, 2018

 Abraxas by Perennial Artisan Ales \$42.00 - Quantity: 1 [change](#)

https://www.omnomnom.dev/abraxas/

# omnomnom

## Shopping Cart

Item	Price	Quantity
 Abraxas by Perennial Artisan Ales	\$42.00	1

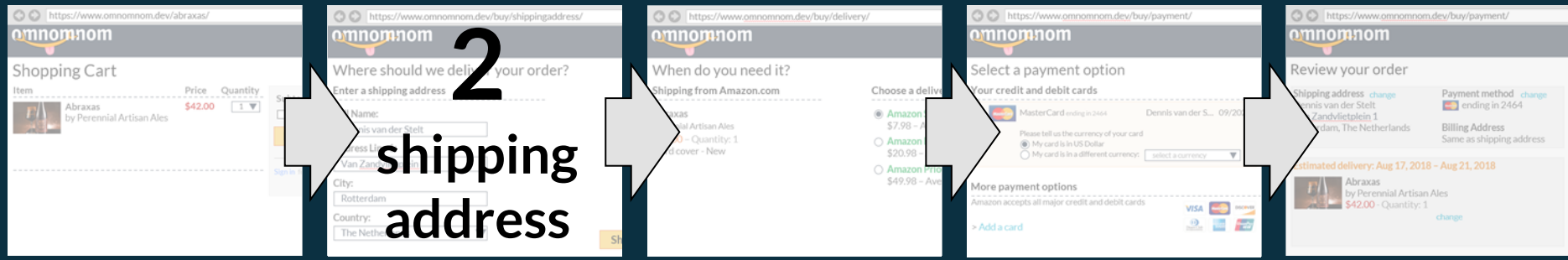
Subtotal: **\$42.00**

This list contains a gift.

**Proceed to checkout**

or

[Sign in](#) for 1 click ordering.



https://www.omnomnom.dev/buy/shippingaddress/

**omnomnom**

### Where should we deliver your order?

Enter a shipping address

Full Name:

Address Line 1:

City:

Country:

[Ship to this Address](#)





https://www.omnomnom.dev/buy/delivery/

# omnomnom

## When do you need it?

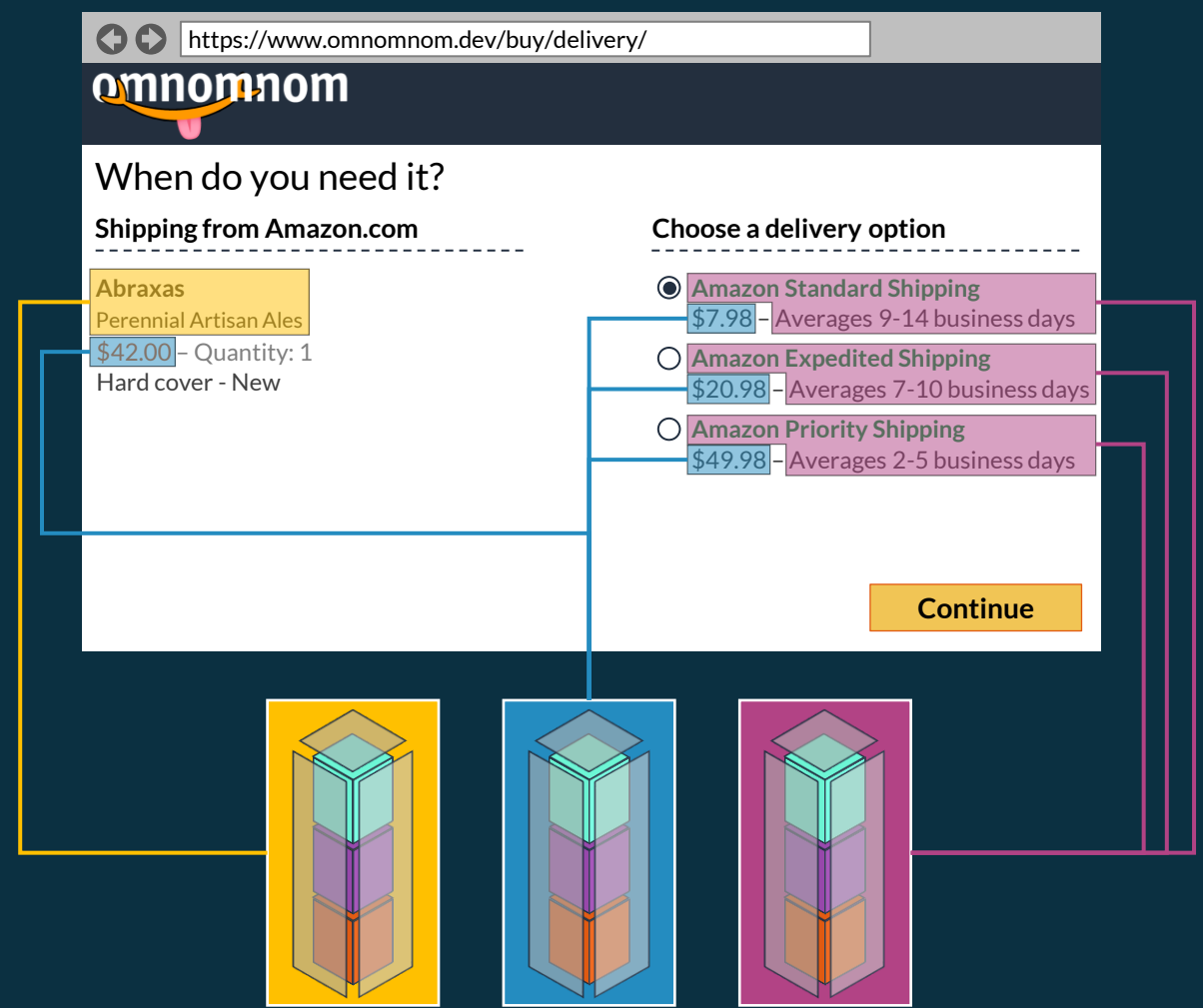
### Shipping from Amazon.com

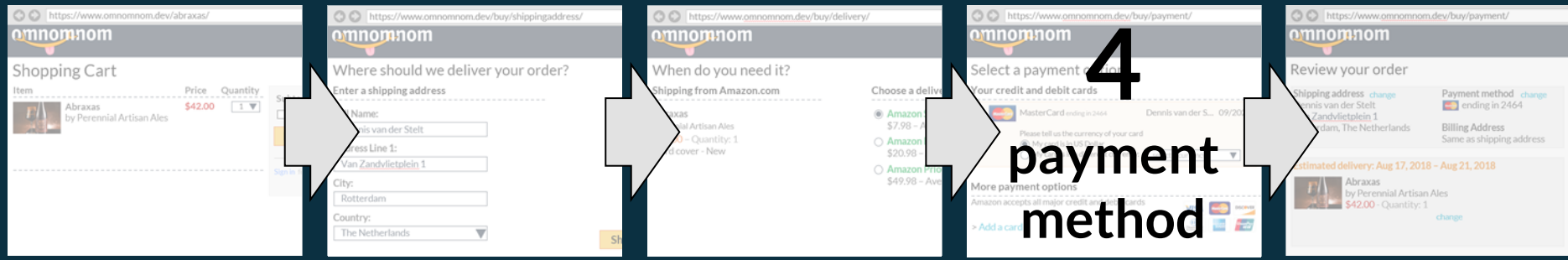
**Abraxas**  
Perennial Artisan Ales  
\$42.00 - Quantity: 1  
Hard cover - New

### Choose a delivery option

- Amazon Standard Shipping**  
\$7.98 - Averages 9-14 business days
- Amazon Expedited Shipping**  
\$20.98 - Averages 7-10 business days
- Amazon Priority Shipping**  
\$49.98 - Averages 2-5 business days

[Continue](#)






https://www.omnomnom.dev/buy/payment/

# omnomnom

## Select a payment option

### Your credit and debit cards

 MasterCard ending in 2464 Dennis van der S... 09/2026




Please tell us the currency of your card




My card is in US Dollar

My card is in a different currency:

### More payment options

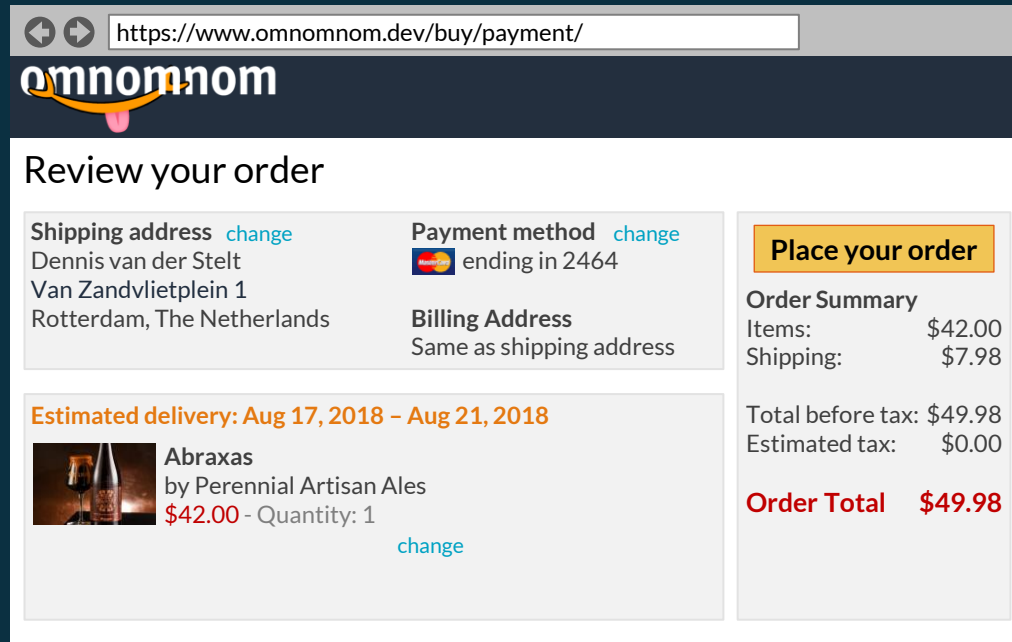
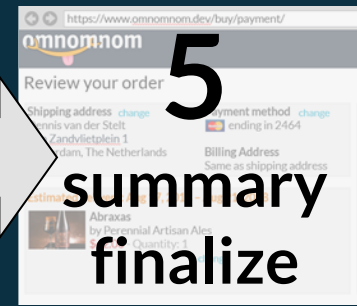
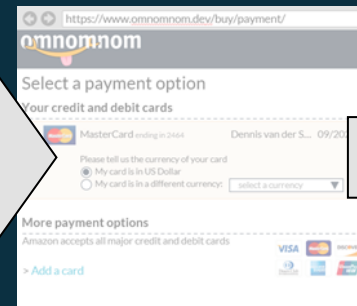
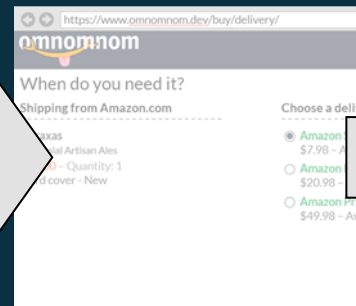
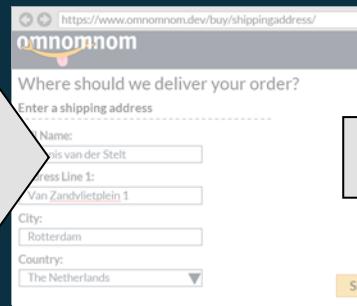
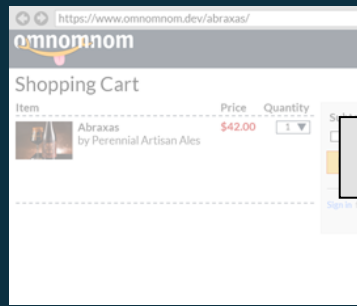
Amazon accepts all major credit and debit cards

> [Add a card](#)

[Continue](#)



1

2

3

4

5

*Finding*  
**CONSISTENCY  
BOUNDARIES**

# 01

## Service C

ProductId  
Price  
Discount

## Service A

ProductId  
Name  
Description  
Image  
Category

1

# Finding CONSISTENCY BOUNDARIES

2

3

4

5

The screenshot shows a web browser window with the URL <https://www.omnomnom.dev/abraxas/>. The page title is "omnomnom" and the main heading is "Shopping Cart". The cart contains one item: "Abraxas by Perennial Artisan Ales" with a price of \$42.00 and a quantity of 1. The subtotal is \$42.00. There is a checkbox for "This list contains a gift." and a prominent "Proceed to checkout" button. A "Sign In" link is also visible at the bottom of the cart area.

# 02

## Service C

*ProductId*  
Price  
Discount

## Service A

*ProductId*  
Name  
Description  
Image  
Category

## Service B

*ProductId*  
InStock  
  
*OrderId*  
*ProductId*  
Quantity

1

2


# Finding CONSISTENCY BOUNDARIES

3

4

5

The screenshot shows a web browser window with the URL `https://www.omnomnom.dev/abraxas/`. The page displays the 'omnomnom' logo and a 'Shopping Cart' section. The cart contains one item: 'Abraxas by Perennial Artisan Ales' with a price of \$42.00 and a quantity of 1. The subtotal is \$42.00. There is a checkbox for 'This list contains a gift.' and a 'Proceed to checkout' button. A 'Sign In' link is also visible.

Item	Price	Quantity
 Abraxas by Perennial Artisan Ales	\$42.00	1

Subtotal: \$42.00

This list contains a gift.

[Proceed to checkout](#)

[Sign In](#) for 1 click ordering.

# 03

## Service D

*DeliveryOptionId*  
Type  
Description  
International  
  
*OrderId*  
*CustomerId*  
*DeliveryOptionId*  
ShippingAddress

## Service C

*ProductId*  
Price  
Discount  
  
*DeliveryOptionId*  
Price  
  
*OrderId*  
*ProductId*  
*PriceId*  
*DeliveryOptionId*  
Quantity  
BillingAddress

## Service A

*ProductId*  
Name  
Description  
Image  
Category

## Service B

*ProductId*  
InStock  
  
*OrderId*  
*ProductId*  
Quantity

1

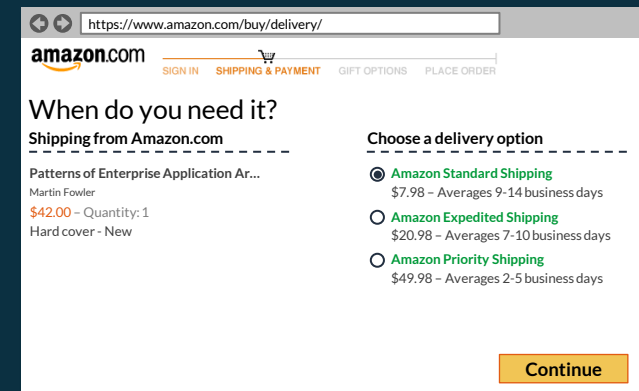
# Finding CONSISTENCY BOUNDARIES

2

3

4

5



The screenshot shows the Amazon.com shipping options page for a product. The URL is https://www.amazon.com/buy/delivery/. The page title is "When do you need it?". Under "Shipping from Amazon.com", the product is "Patterns of Enterprise Application Ar..." by Martin Fowler, priced at \$42.00 with a quantity of 1. Under "Choose a delivery option", three options are listed: Amazon Standard Shipping (\$7.98, 9-14 business days), Amazon Expedited Shipping (\$20.98, 7-10 business days), and Amazon Priority Shipping (\$49.98, 2-5 business days). A "Continue" button is at the bottom right.



# 04

## Service D

*DeliveryOptionId*  
Type  
Description  
International  
*OrderId*  
*CustomerId*  
*DeliveryOptionId*  
ShippingAddress

## Service C

*ProductId*  
Price  
Discount  
*DeliveryOptionId*  
Price  
*OrderId*  
*ProductId*  
*PriceId*  
*DeliveryOptionId*  
Quantity  
BillingAddress

## Service A

*ProductId*  
Name  
Description  
Image  
Category

## Service E

*CreditCardId*  
Cardholder  
LastDigits  
ExpiryDate  
Token

## Service B

*ProductId*  
InStock  
*OrderId*  
*ProductId*  
Quantity

1

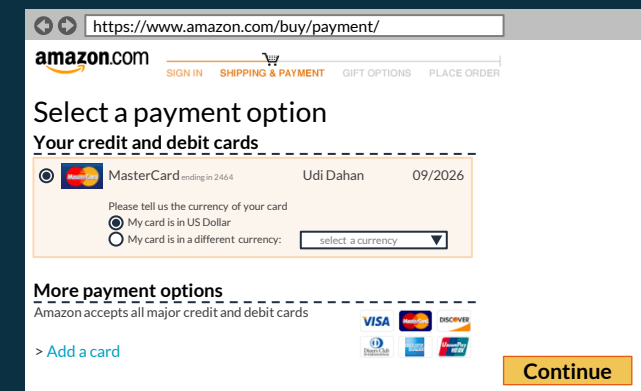
# Finding CONSISTENCY BOUNDARIES

2

3

4

5



# 05

## Shipping

*DeliveryOptionId*  
Type  
Description  
International  
*OrderId*  
*CustomerId*  
*DeliveryOptionId*  
ShippingAddress

## Finance

*ProductId*  
Price  
Discount  
*DeliveryOptionId*  
Price  
*OrderId*  
*ProductId*  
*PriceId*  
*DeliveryOptionId*  
Quantity  
BillingAddress

## Catalog

*ProductId*  
Name  
Description  
Image  
Category

## Marketing

*ProductId*  
Reviews  
Stars

## PaymentInfo

*CreditCardId*  
Cardholder  
LastDigits  
ExpiryDate  
Token

## Catalog

*ProductId*  
InStock  
*OrderId*  
*ProductId*  
Quantity

1

# Finding CONSISTENCY BOUNDARIES

2

3


4

5

The screenshot shows the Amazon checkout page at <https://www.amazon.com/buy/payment/>. The page title is "Review your order". It displays shipping and payment information, an order summary, and a "Place your order" button.

Shipping address	Payment method	Place your order
<a href="#">change</a> Udi Dahan 20 Uri Tzvi Greenberg Street Haifa, Israel	<a href="#">change</a> ending in 2464	<b>Place your order</b>
<b>Billing Address</b> Same as shipping address	<b>Order Summary</b>	
	Items: \$42.00	
	Shipping: \$7.98	
	Total before tax: \$49.98	
	Estimated tax: \$0.00	
	<b>Order Total \$49.98</b>	

**Estimated delivery: Aug 17, 2018 - Aug 21, 2018**

Product	Price	Quantity
 <b>Patterns of Enterprise Application Architecture</b> by Martin Fowler	\$42.00	Quantity: 1 <a href="#">change</a>

# FOODING

## VERTICAL SLICES



**Rider**

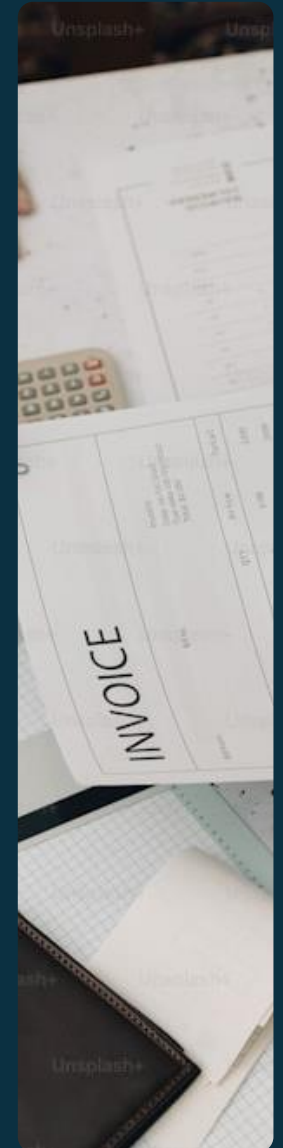


## COMPOSED UI

Instead of starting with coupling in the database, we removed coupling as much as possible and did not introduce it until in the user interface.

It's possible to take it up even higher and introduce microviews that are deployed to the website.

(I challenge you to a Pull Request in the GitHub repo)





## SERVICE BUS

Temporal coupling is removed by replacing RPC calls between services with messages using a service bus. Concepts like publish/subscribe, increased reliability and better performance

Events are published across vertical slices and contain only the least volatile data; identifiers.



## INVOICES

Invoices and emails are also user interfaces where data needs to be composed from the back end. These are still owned by the system.

Ask me how to integrate with third parties that don't know anything about any of the vertical slices





1 year subscription raffle



free 2-day video course on distributed systems and more..

<https://go.particular.net/warsaw24>

---





# Thanks for listening



free 2-day video course on distributed systems and more..

<https://go.particular.net/warsaw24>

---