



all our  
aggregates  
are wrong

Mauro Servienti  
@mauroservienti



All I wanna do  
when I wake up in  
the morning is...

*Rosanna, Toto. Toto IV*

# Buy a "Banana Protector"



BENRAN

Benran Outdoor Travel Cute Banana  
Protector Storage Box (Pink, Green,  
Yellow, Pack of 3)

★★★★★☆ ▾ 26 customer reviews

Price: \$10.00 & FREE Shipping

*i* Get \$50.00 off instantly: Pay \$0.00 upon approval for the Amazon Rewards Visa Card. [Learn more](#)

Only 9 left in stock.

This item does not ship to Garlasco, Italy. Please check other sellers who may ship internationally.

Ships from and sold by Ziyue.

# Buy a "Banana Protector"

Shopping Cart		Price	Quantity
	<b>Benran Outdoor Travel Cute Banana Protector Storage Box (Pink, Green, Yellow, Pack of 3)</b> <small>Only 11 left in stock - order soon.</small> <small>Gift options not available. <a href="#">Learn more</a></small> <a href="#">Delete</a>   <a href="#">Save for later</a>	\$9.99	<input type="button" value="1"/> <input type="button" value="▼"/>
<b>Subtotal (1 item): \$9.99</b>			

# Sounds like a nice looking aggregate



# It even has behaviors

Shopping Cart

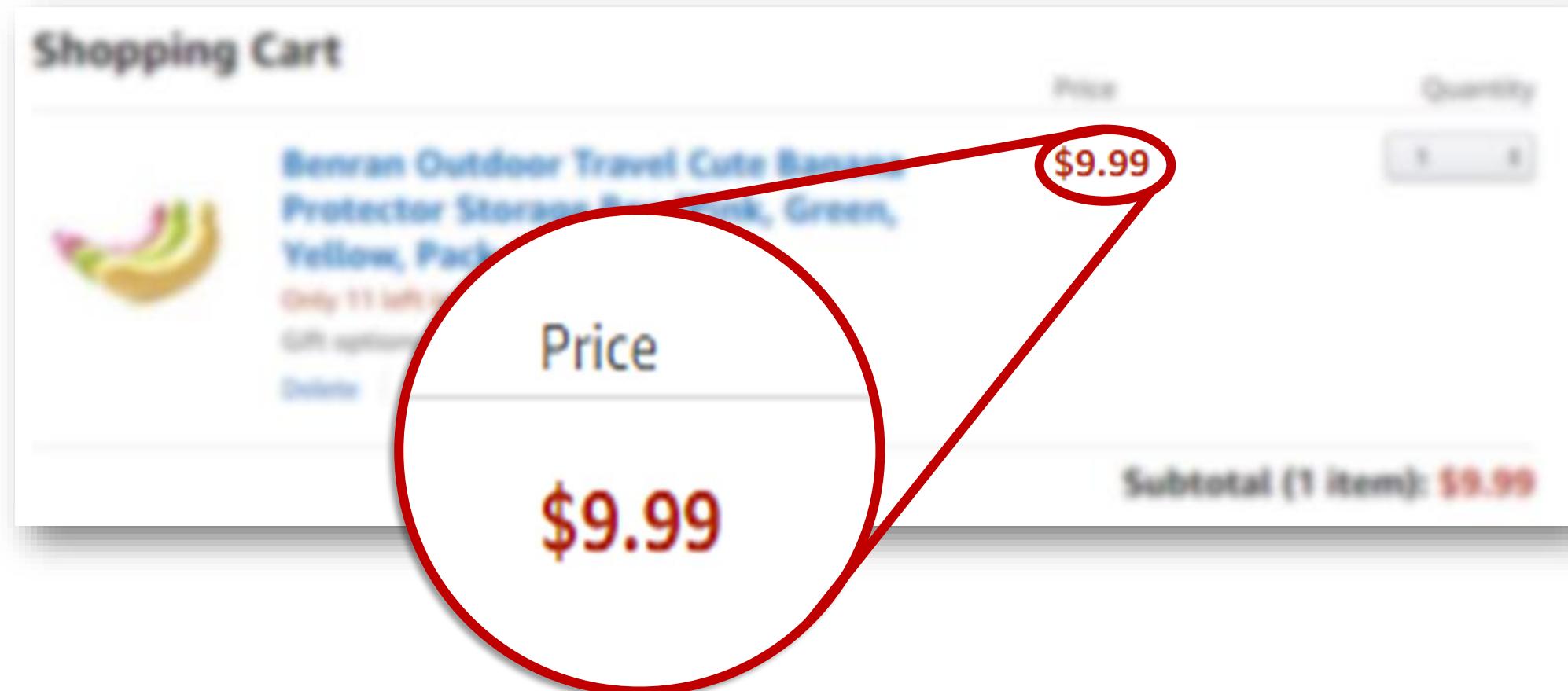
	Price	Quantity
 Benran Outdoor Travel Cute Banana Protector Storage Box (Pink, Green, Yellow, Pack of 3) Only 11 left in stock - order soon. Gift options not available. Learn more <a href="#">Delete</a>   <a href="#">Save for later</a>	\$9.99	<input type="button" value="1"/> <input type="button" value="▼"/>

Subtotal (1 item): \$9.99



please, welcome the  
**business**

# Business requirements (#1)



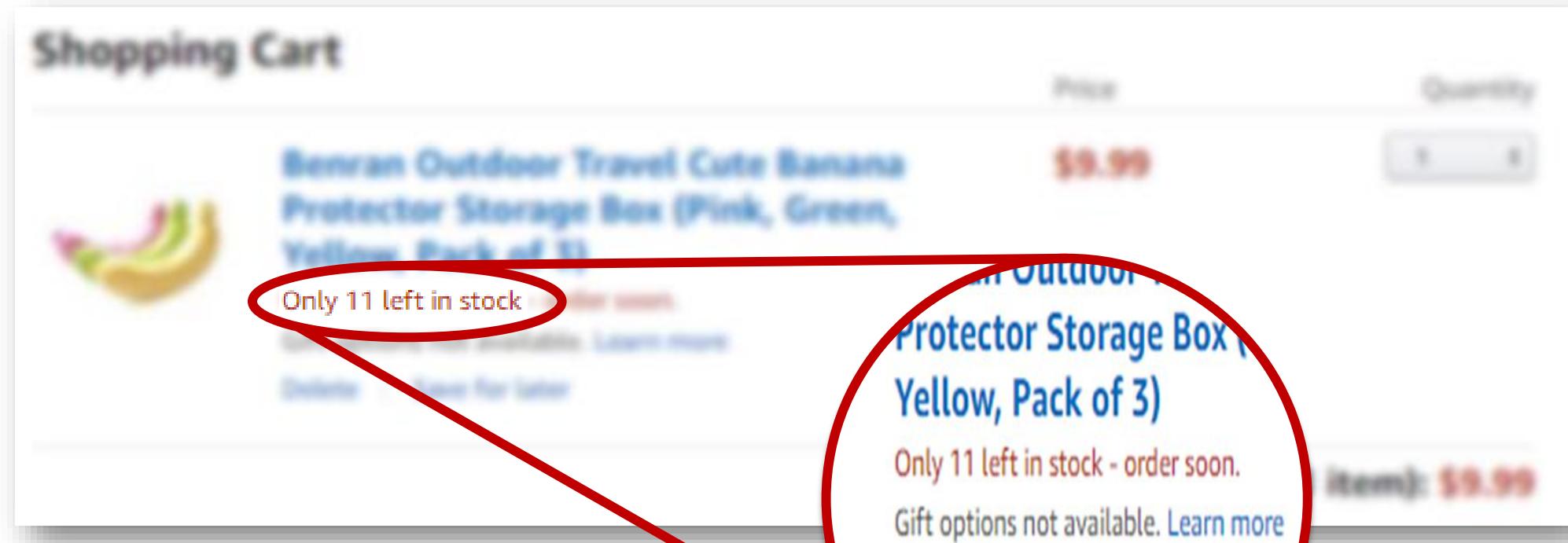
# Straightforward, isn't it?



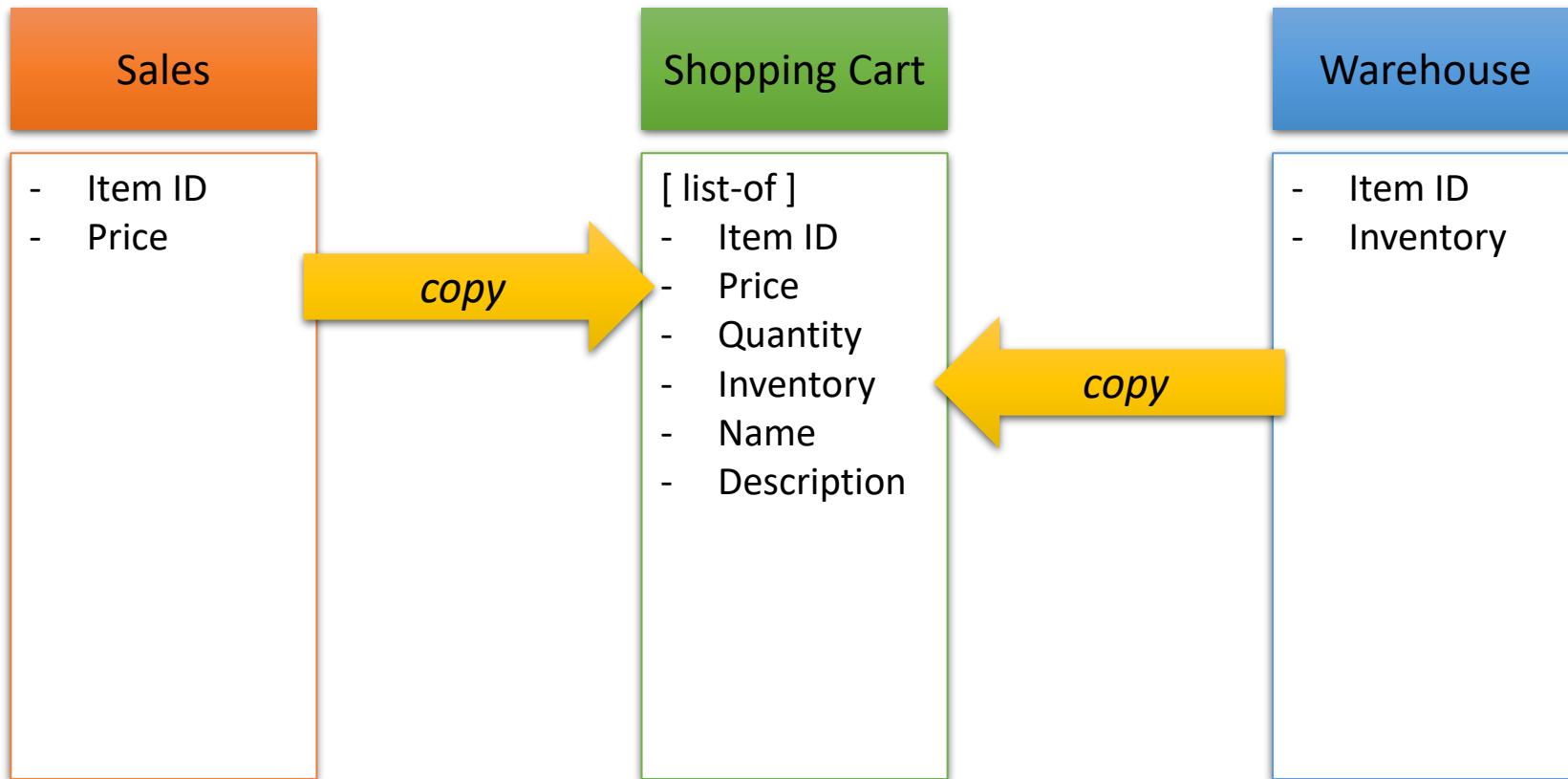
# Straightforward, isn't it?



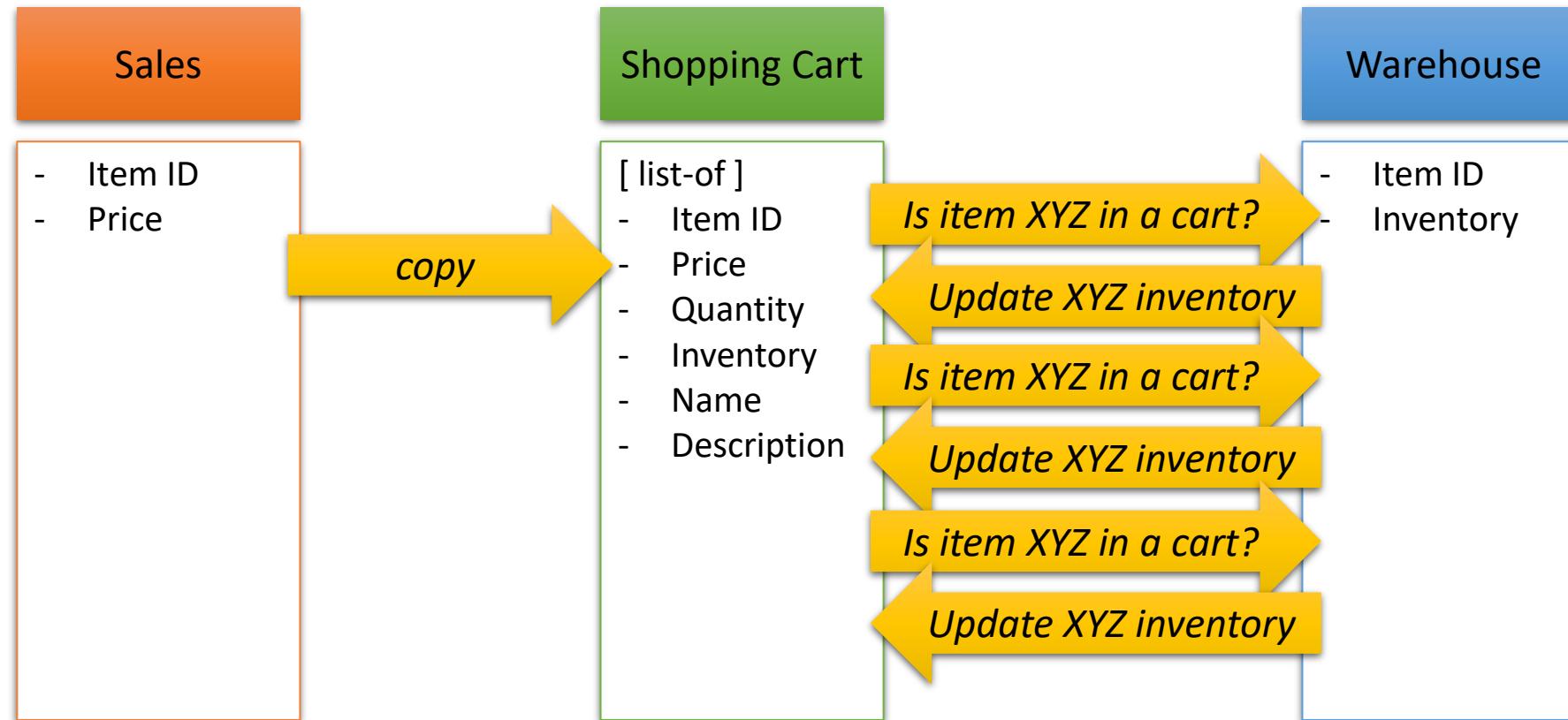
# Business requirements (#2)



# Still not a big deal...



# However, availability changes over time



# Business requirements (#3)

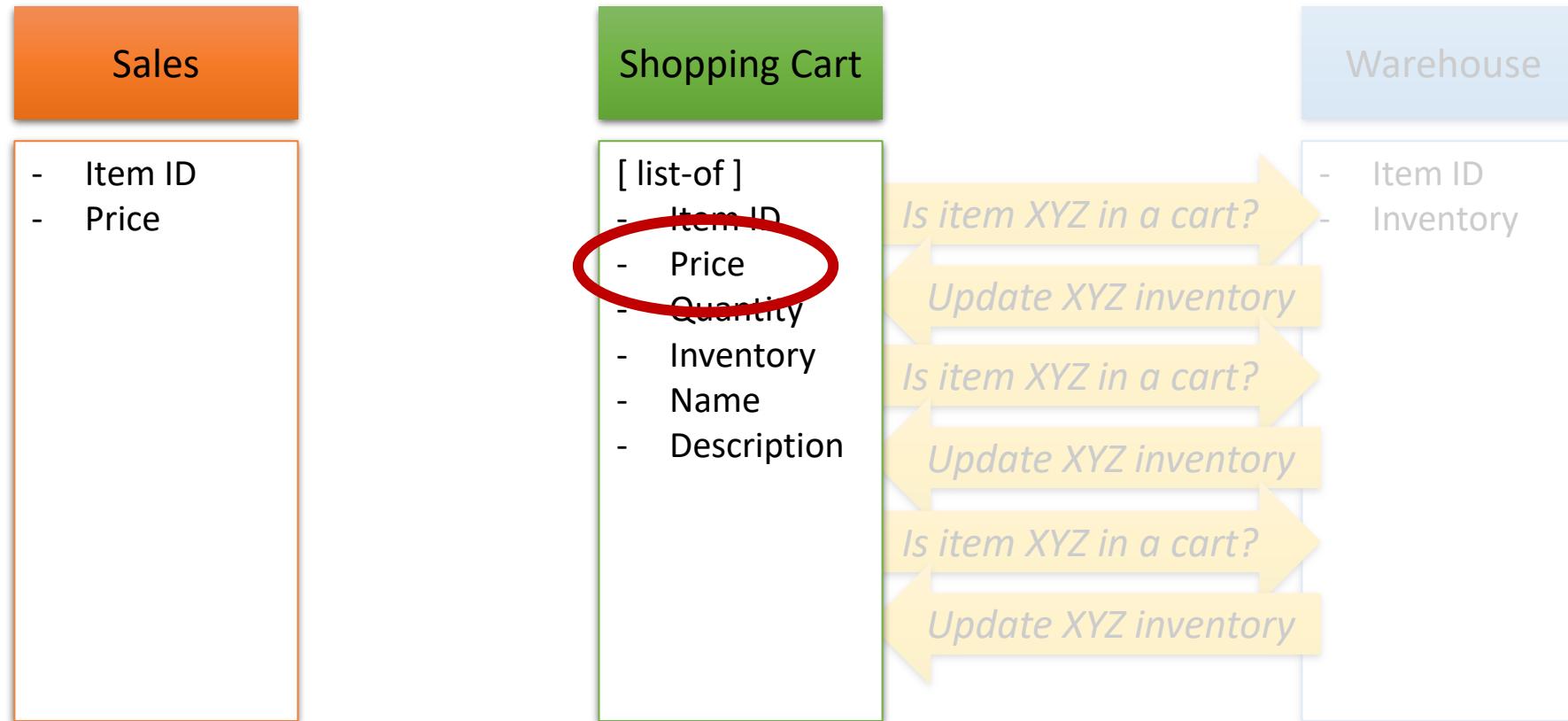
 **Important messages about items in your Cart:**

**3 items in your Cart have changed price.**  
Items in your Shopping Cart will always reflect the most recent price displayed on their product detail pages.

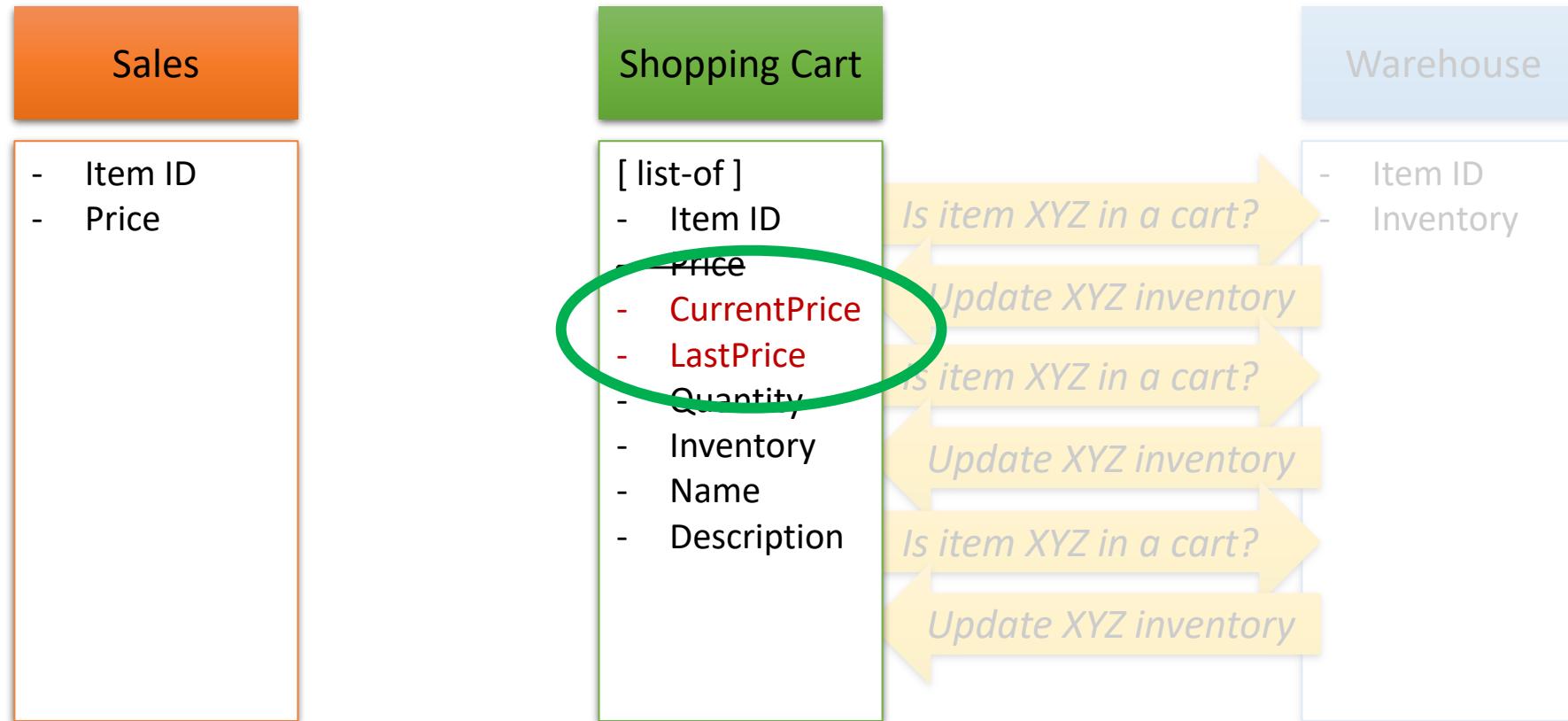
- A Dog's Purpose: A Novel for Humans ▾ has increased from \$9.10 to \$9.36
- A Dog's Purpose: A Novel for Humans ▾ has decreased from \$8.92 to \$8.46
- Samsung Internal SSD (MZ-75E1T0B/AM) ▾ has increased from \$324.99 to \$349.99

The most recent price displayed  
increased from \$9.10 to \$9.36  
decreased from \$8.92 to \$8.46  
Samsung Internal SSD (MZ-75E1T0B/AM) ▾

...uhm...



...uhm...



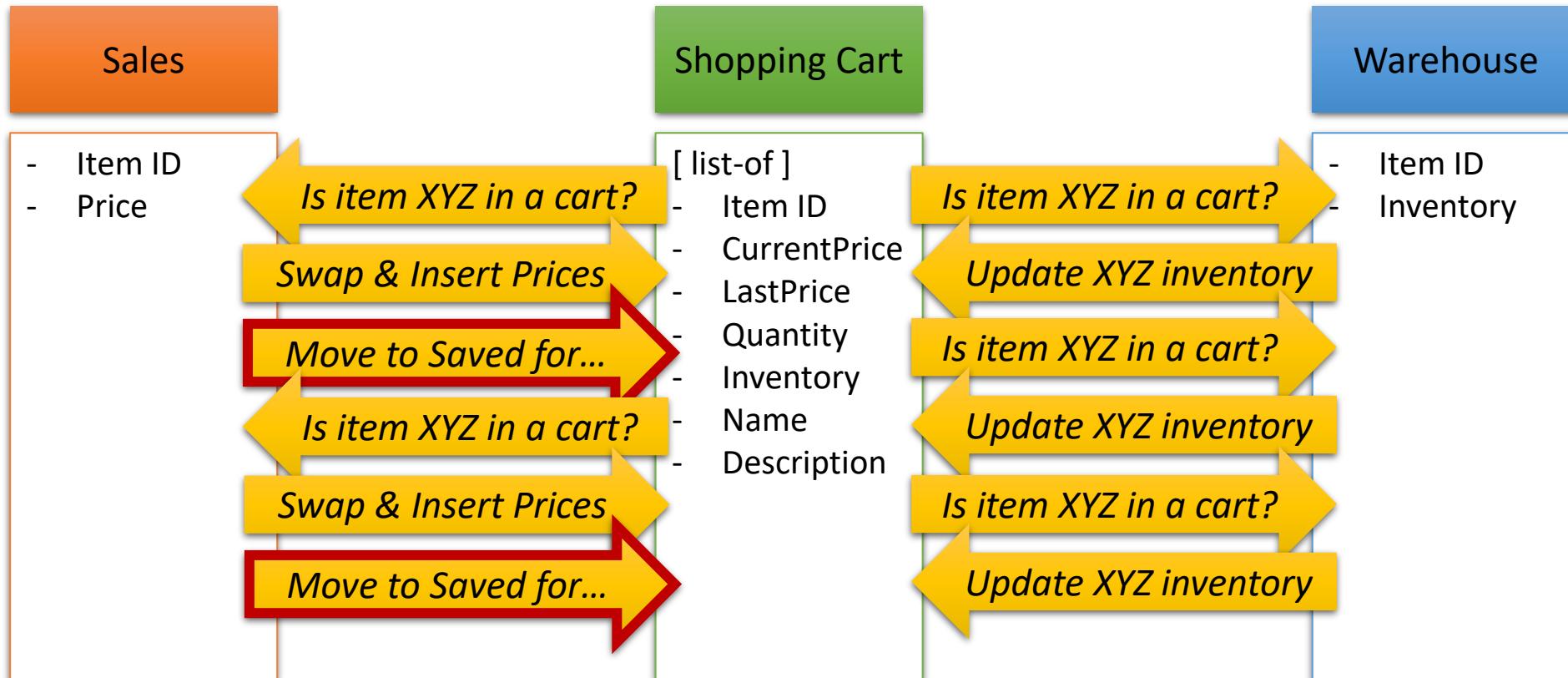
...uhm...



...uhm...



# It's becoming messy, isn't it?



# The big picture is even messier!



# ...and messier!





autonomy?  
poof, it's gone

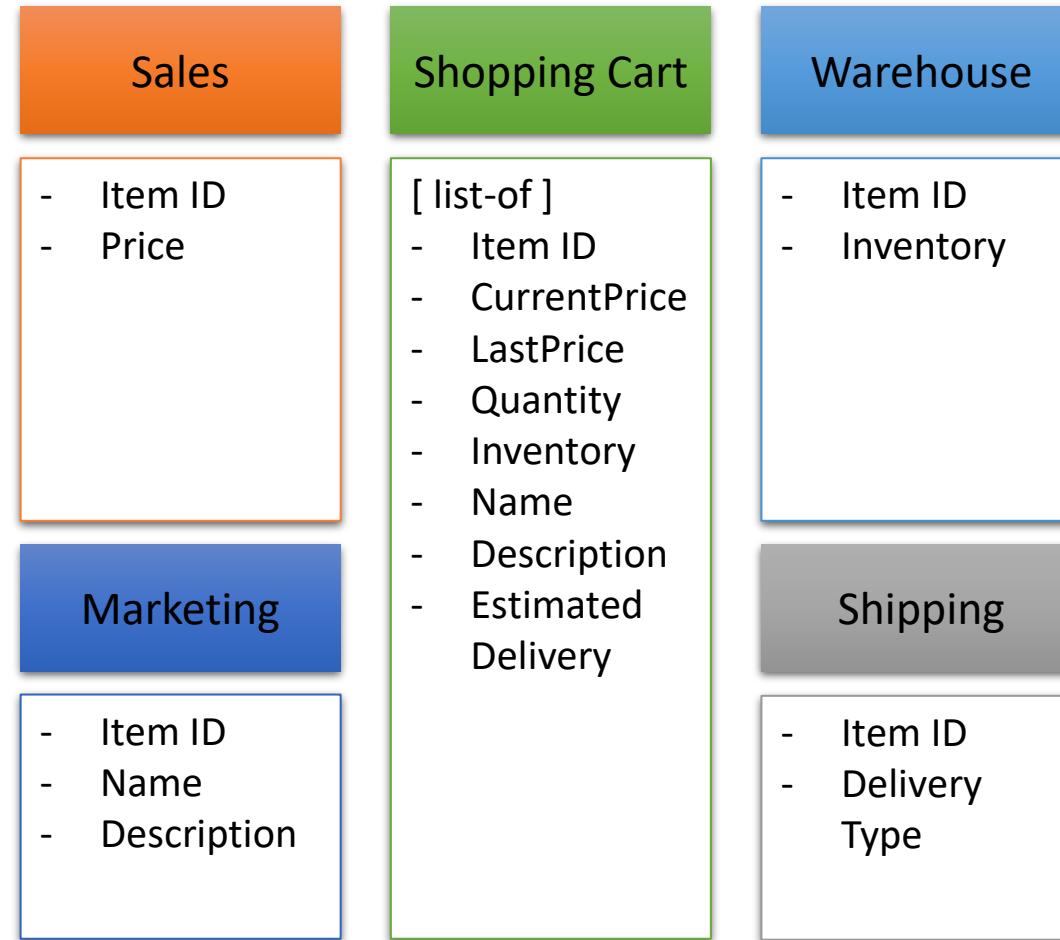
# Can we get rid of all this *coupling*?



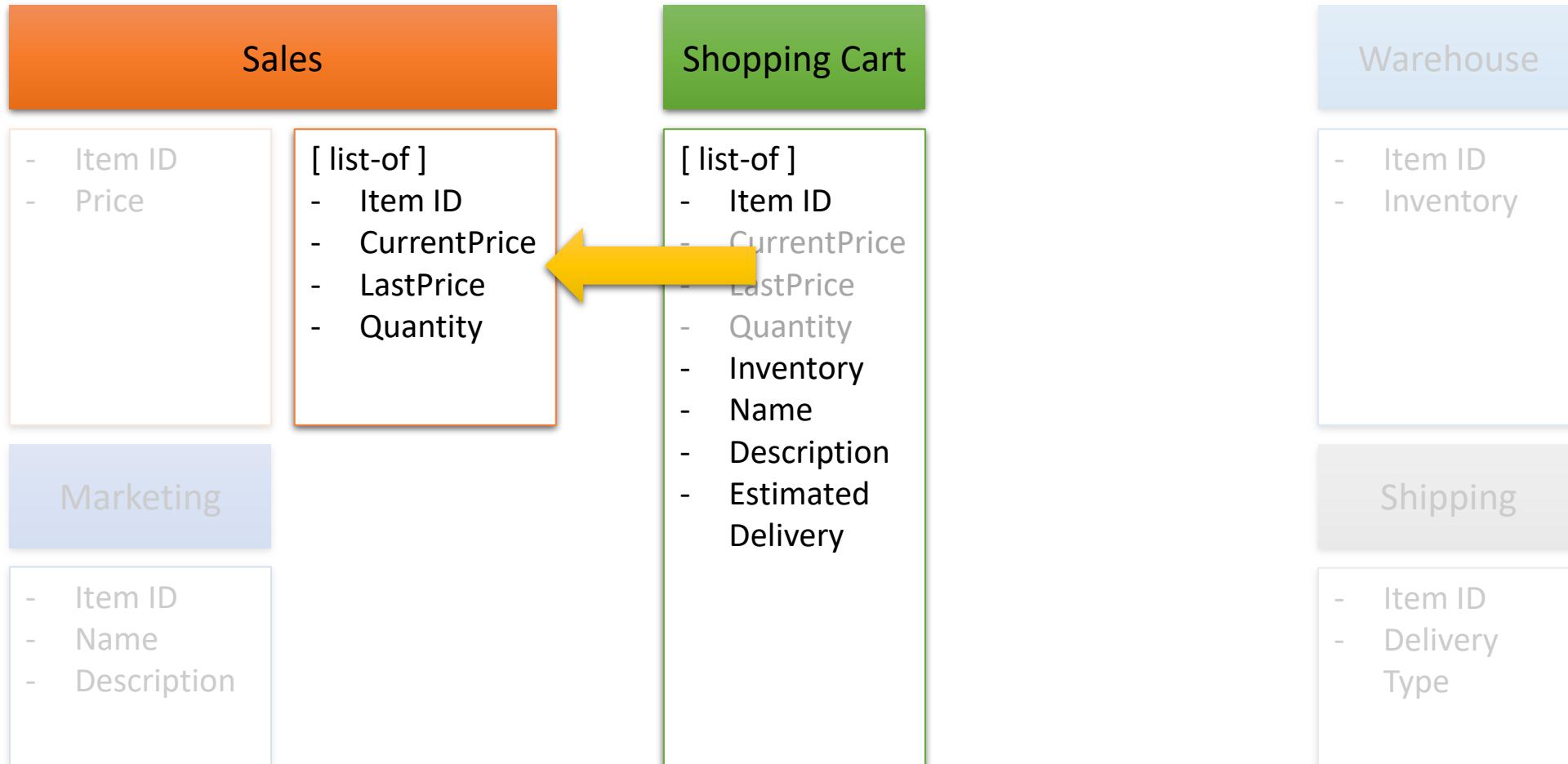


shopping cart  
doesn't exist

# Let's decompose the Shopping Cart



# *Sales* shopping cart



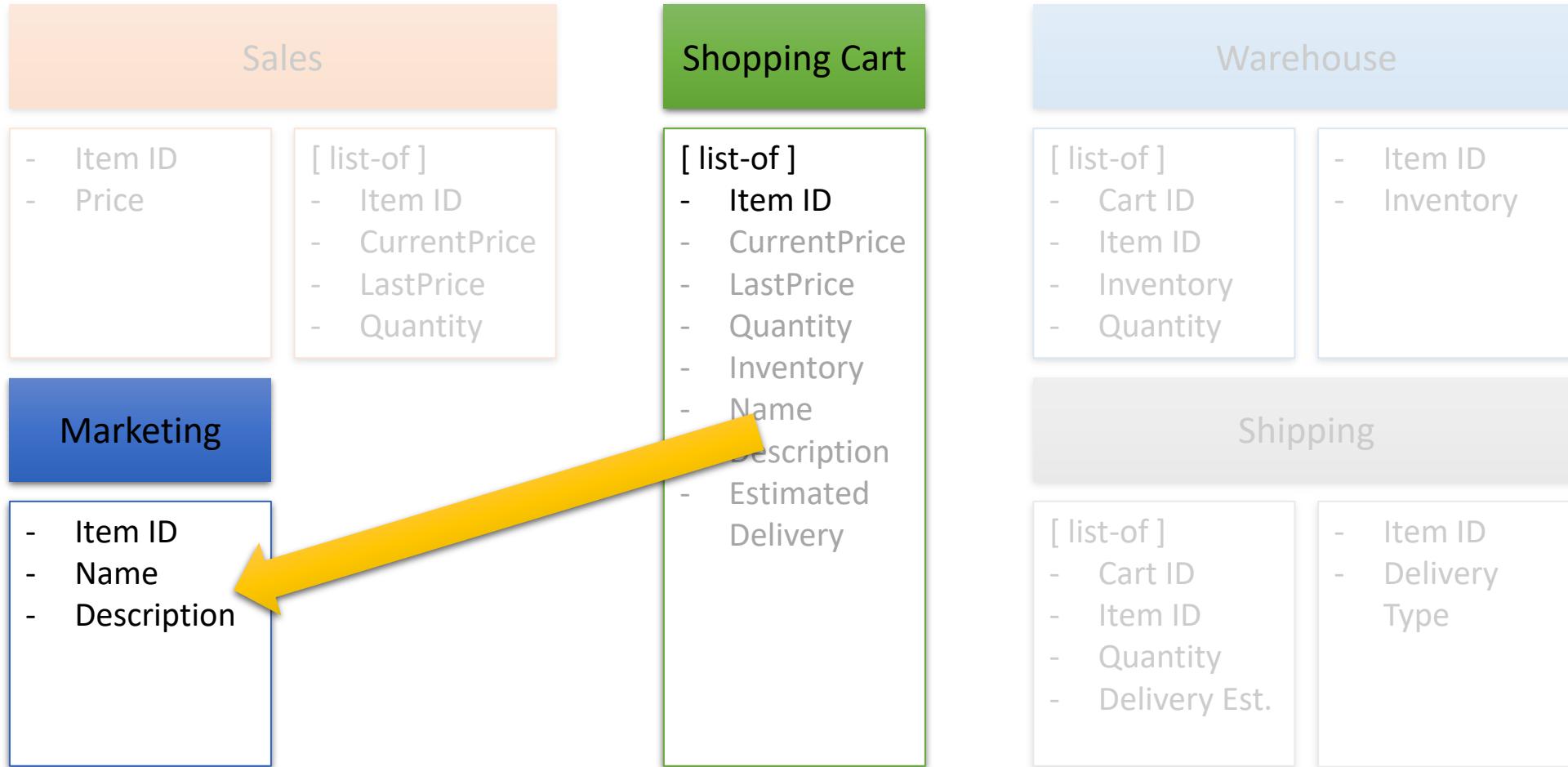
# *Warehouse* shopping cart



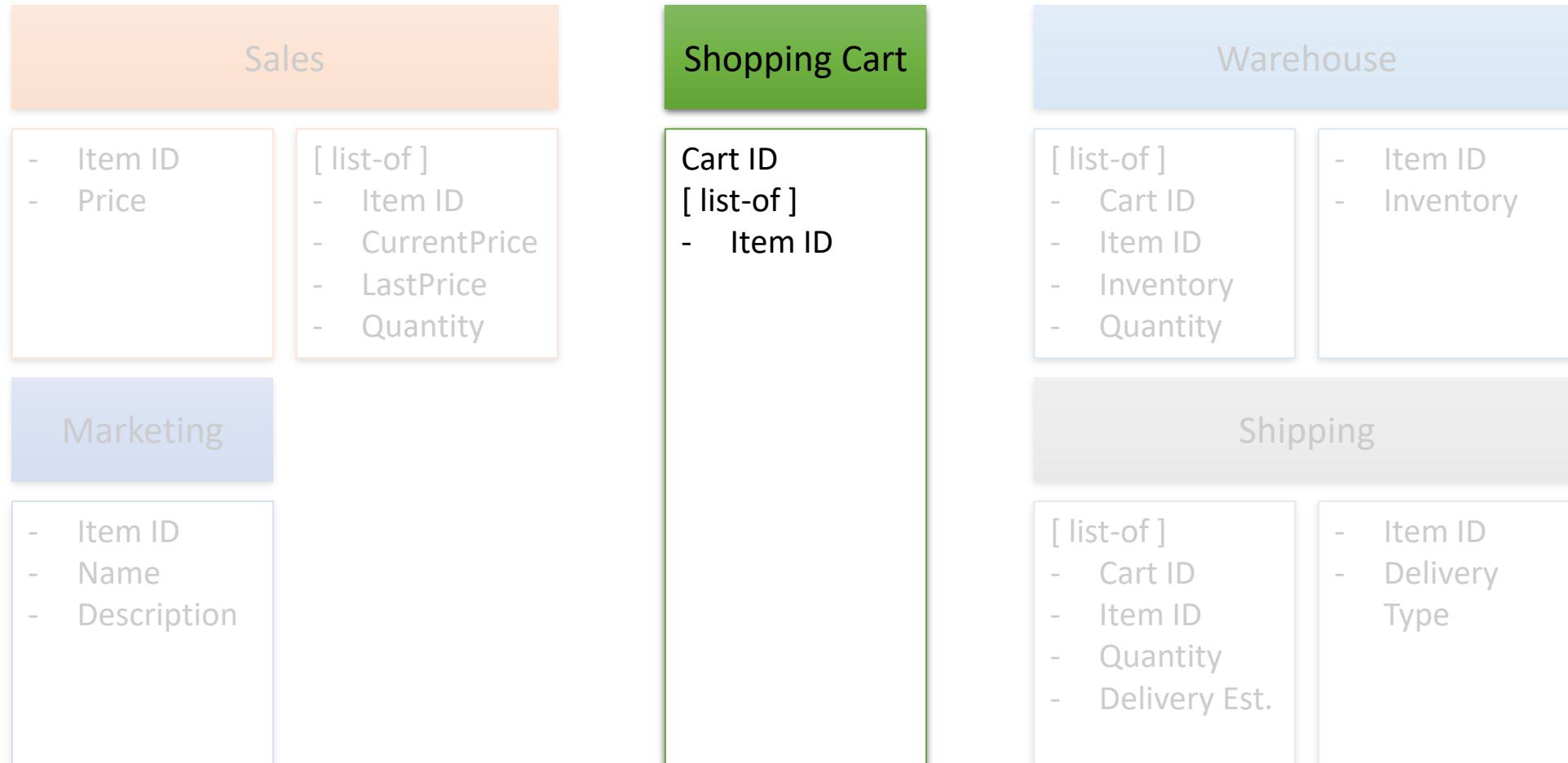
# *Shipping* shopping cart



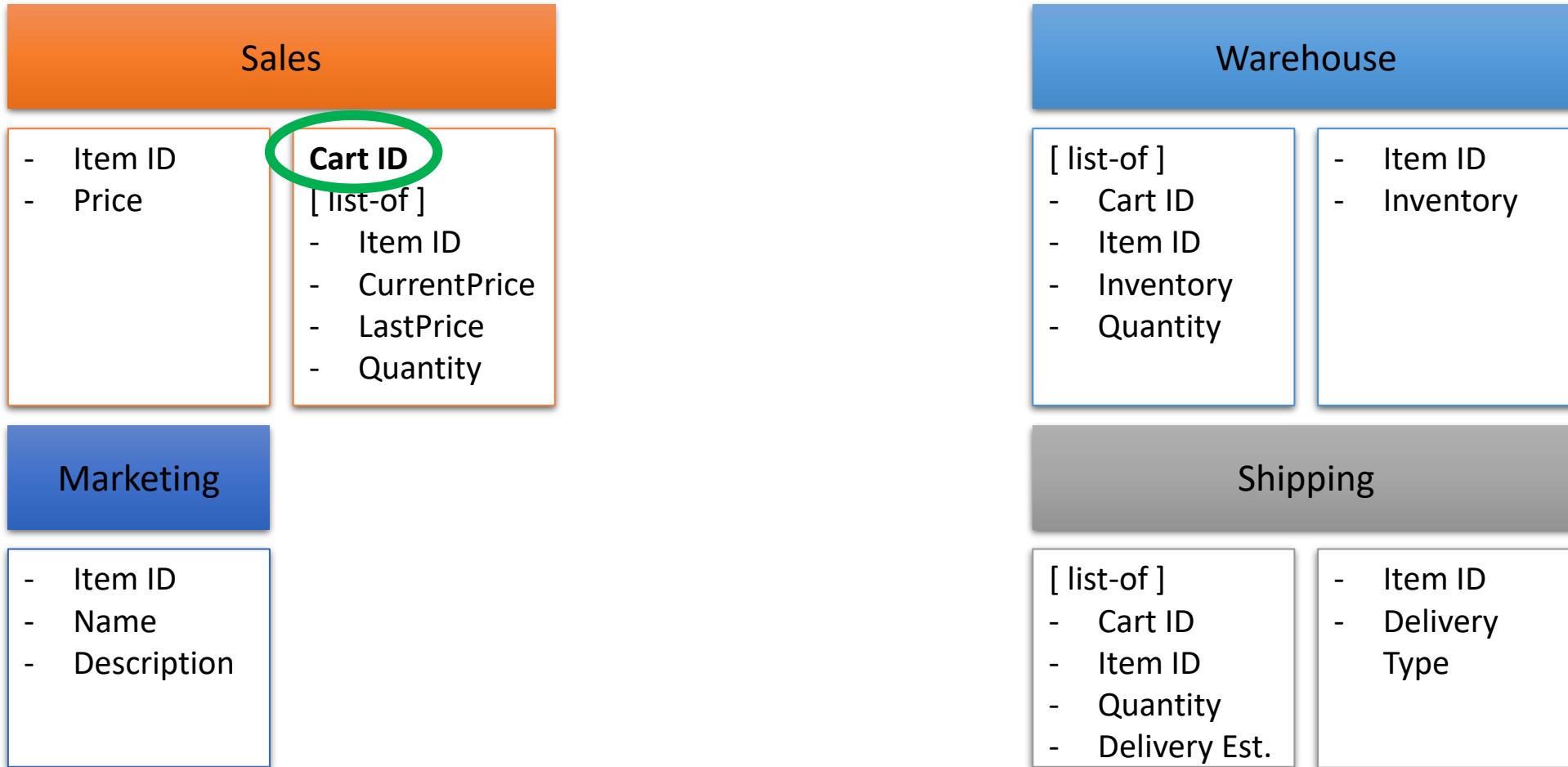
# *Marketing* tends to be stable



# Do we need the *Shopping Cart* at all?



# Can *Sales* be responsible for that concept?



# We followed the coupling



# Vertical Slices

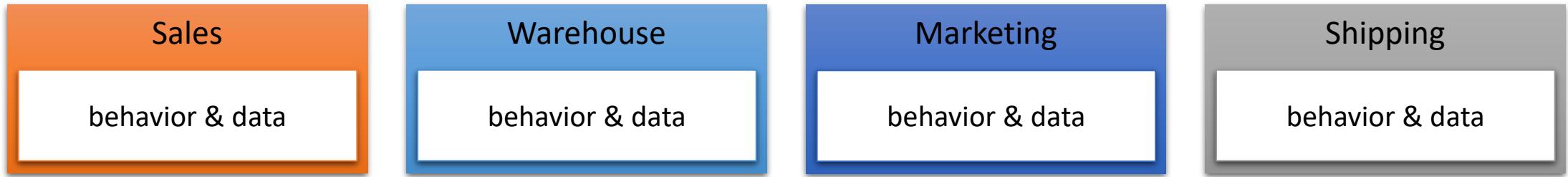
Sales

Warehouse

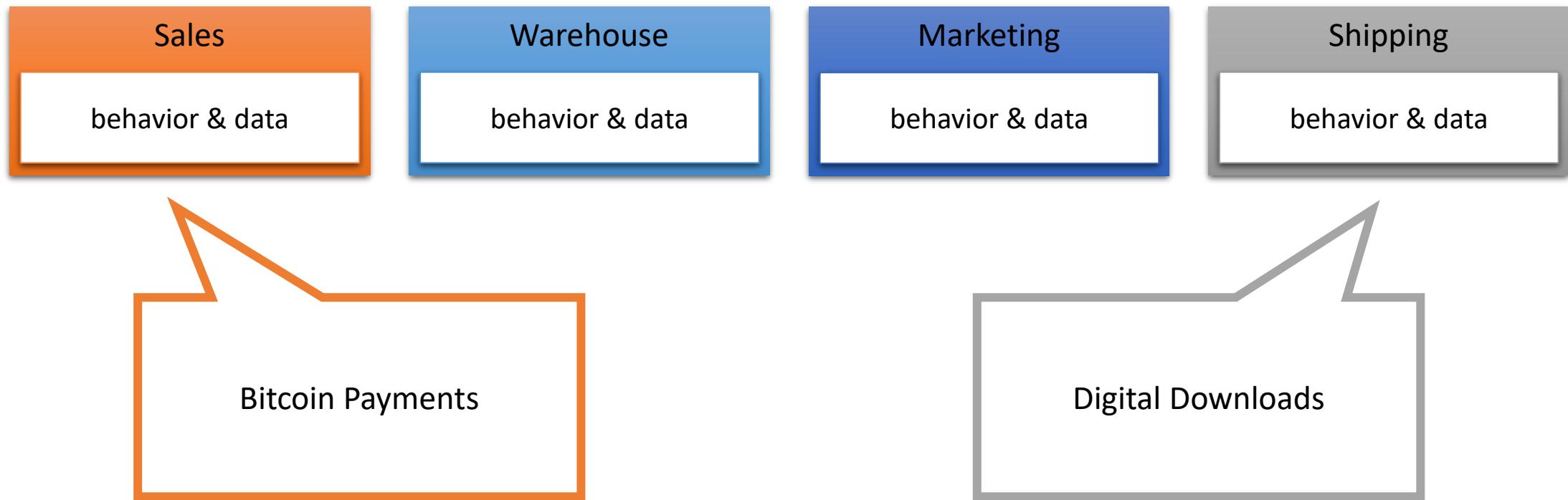
Marketing

Shipping

# Vertical Slices



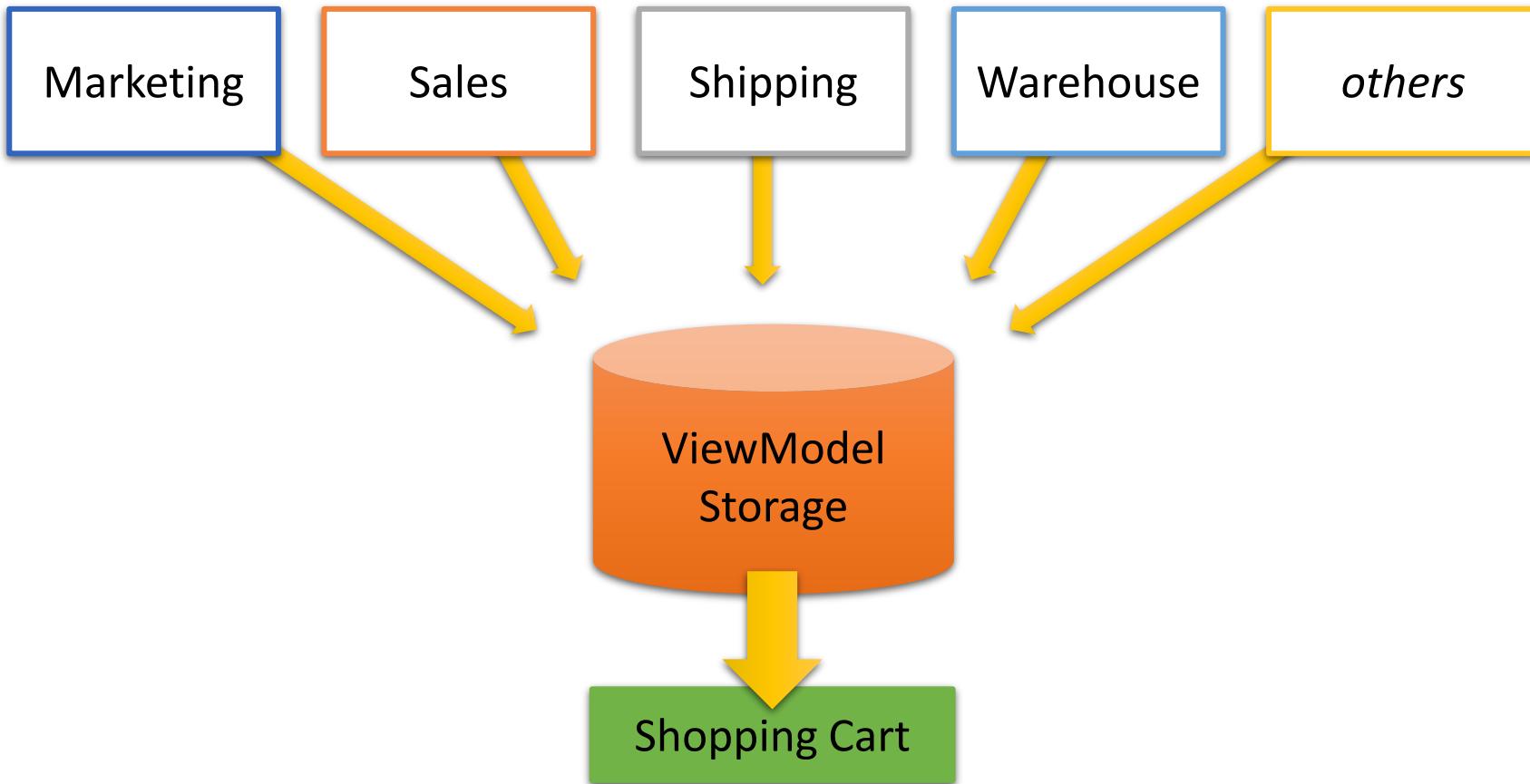
# Vertical Slices: autonomy





information structure  
doesn't fit users

# Can Read Models be a solution?





that's a  
cache

# We cannot cache everything



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Ships from and sold by Ziyue.

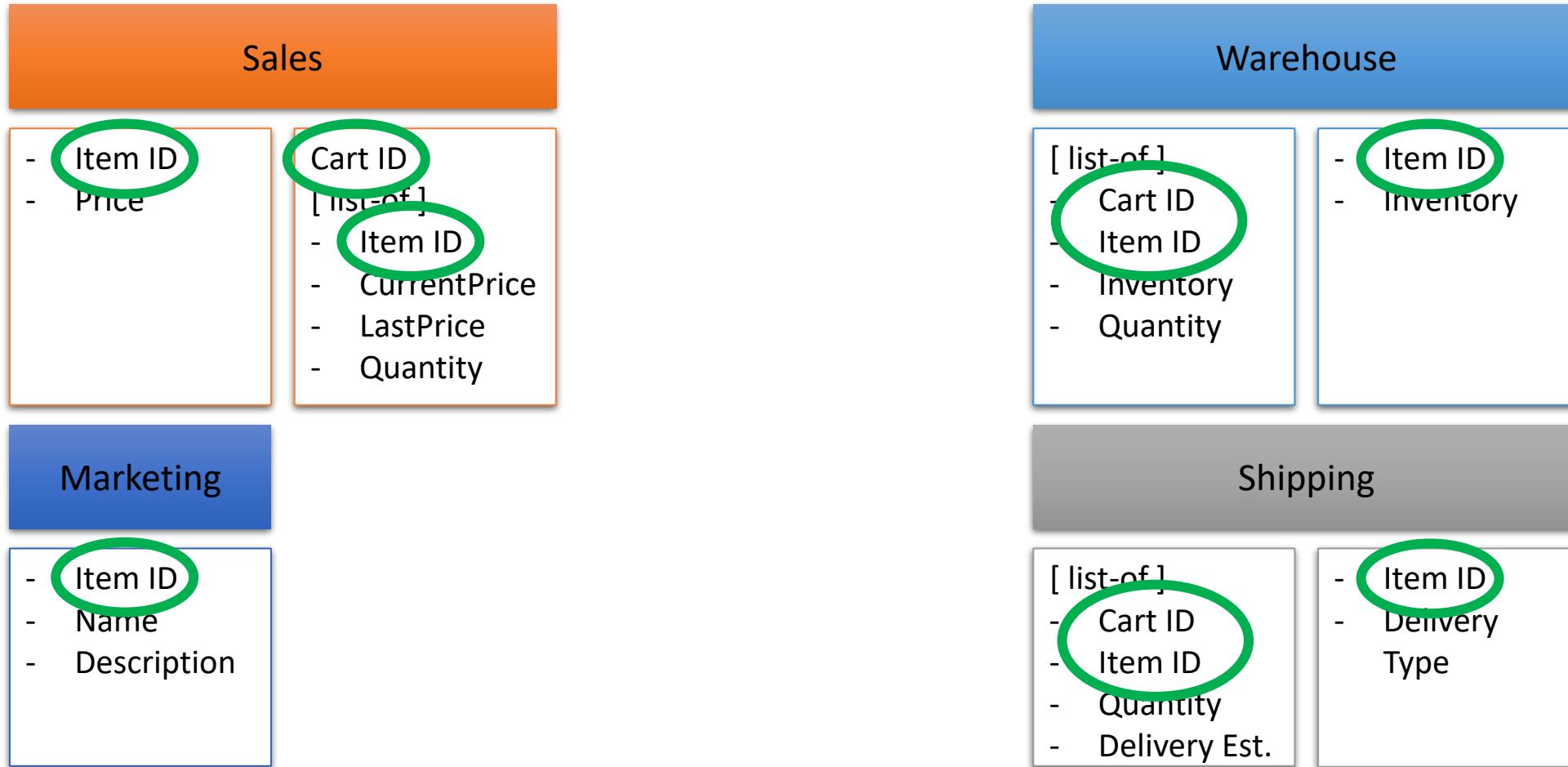
Only 9 left in stock.

This item does not ship to Garlasco, Italy. Please check other  
sellers who may ship internationally.  
Ships from and sold by Ziyue.

# What do we have?



# Shared identifiers

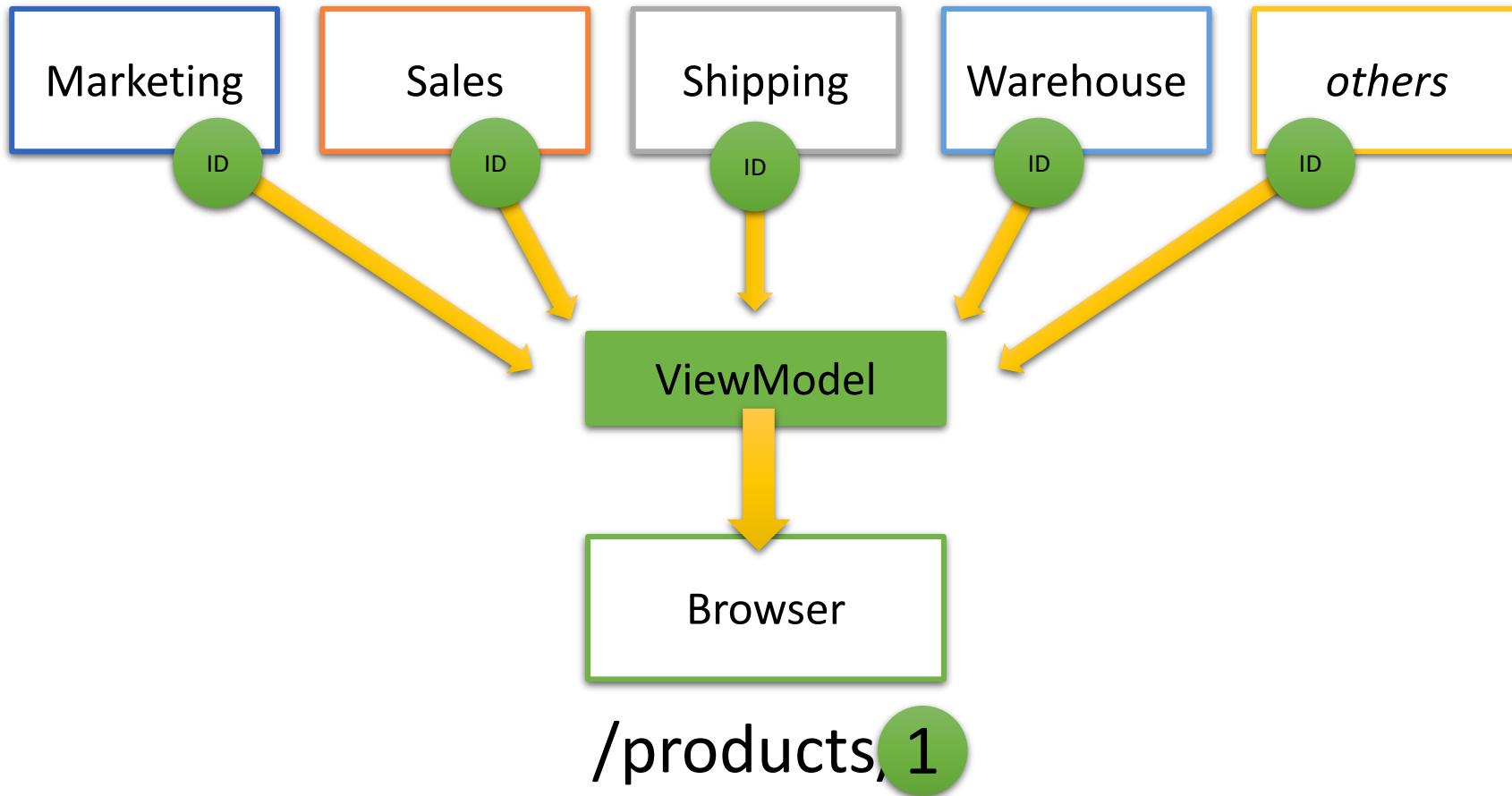


# ViewModel Composition

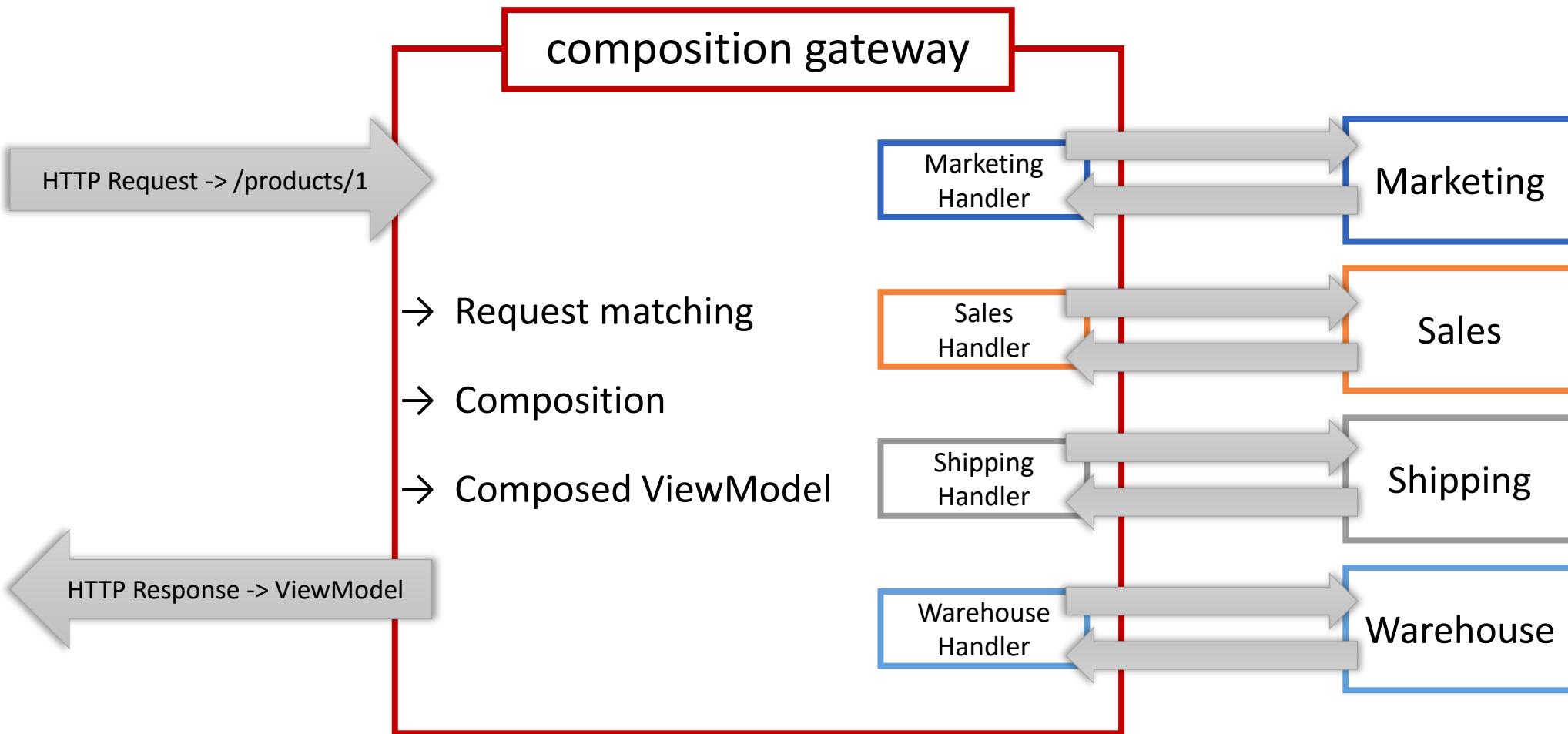
Browser

/products/1

# ViewModel Composition



# ViewModel Composition (flow)



# Let's focus on the price

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Protector Storage Box (Pink, Green,  
Yellow, Pack of 3)  
★★★★★ 26 customer reviews

Price: \$10.00 & FREE Shipping

i Get \$50.00 off instantly: Pay \$0.00 upon approval for the Amazon Rewards Visa Card. [Learn more](#)

Only 9 left in stock.

This item does not ship to Garlasco, Italy. Please check other sellers who may ship internationally.  
Ships from and sold by Ziyue.

# Sales Product Requests Handler

```
class ProductDetailsGetHandler : IHandleRequests
{
}

}
```

# Sales Request matching

```
class ProductDetailsGetHandler : IHandleRequests
{
    public bool Matches(RouteData routeData, string verb)
    {
        var controller = (string)routeData.Values["controller"];

        return HttpMethod.IsGet(verb)
            && controller.ToLowerInvariant() == "products"
            && routeData.Values.ContainsKey("id");
    }
}
```

# Sales Composition

```
class ProductDetailsGetHandler : IHandleRequests
{
    public bool Matches(RouteData routeData, string verb)
    {
    }

    public async Task Handle(string requestId, dynamic vm, RouteData routeData, HttpRequest request)
    {
        var id = (string)routeData.Values["id"];

        var url = $"http://localhost:5001/api/prices/product/{id}";
        var client = new HttpClient();
        var response = await client.GetAsync(url);

        dynamic productPrice = await response.Content.AsExpando();

        vm.ProductPrice = productPrice.Price;
    }
}
```

# Sales Composition

```
class ProductDetailsGetHandler : IHandleRequests
{
    public bool Matches(RouteData routeData, string verb)
    {

        public async Task Handle(string requestId, dynamic vm, RouteData routeData, HttpRequest request)
        {

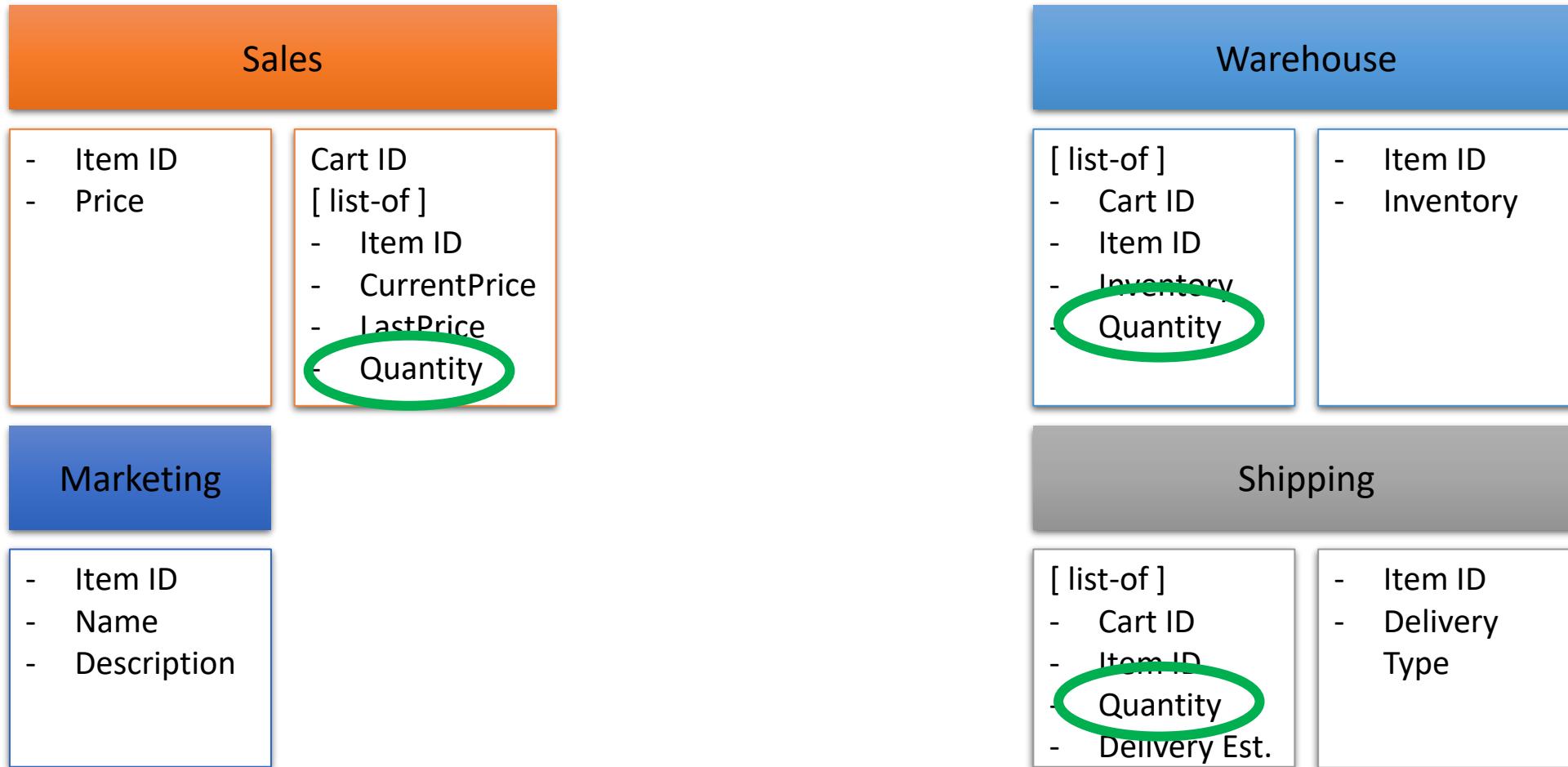
            retrieve data from your
            favorite source

        }
    }
}
```

# what about writes?



# ViewModel Decomposition



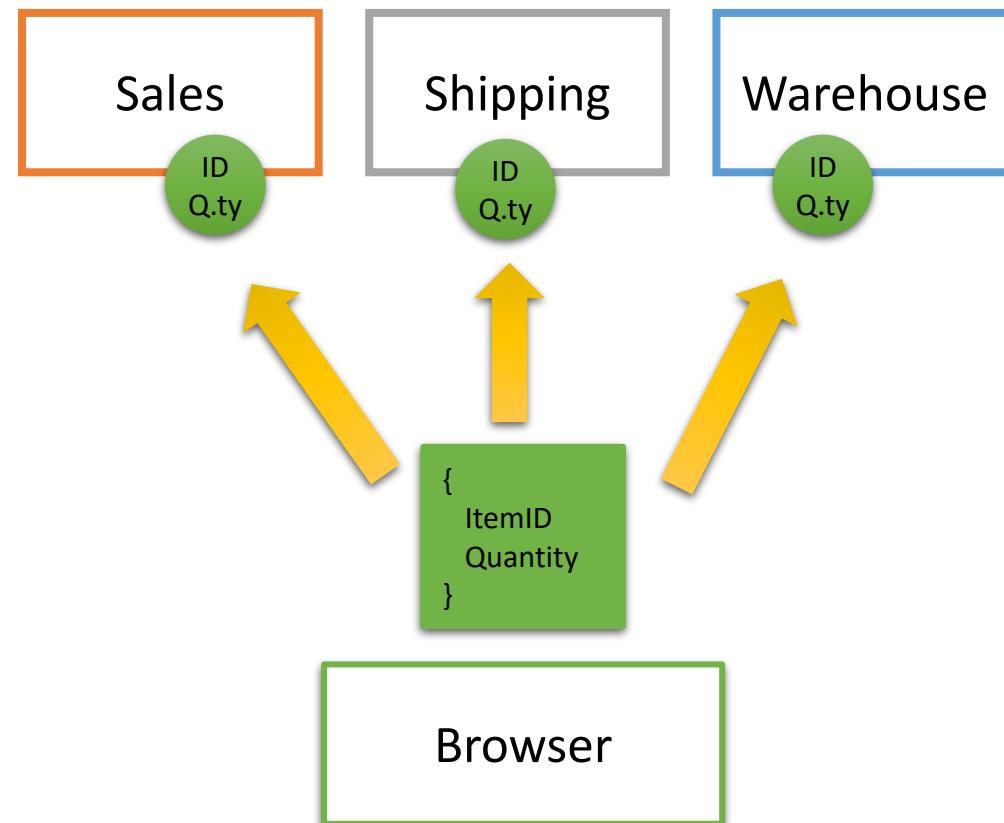
# ViewModel Decomposition

Browser

POST -> /shopping-cart/

```
{  
  ItemID  
  Quantity  
}
```

# ViewModel Decomposition

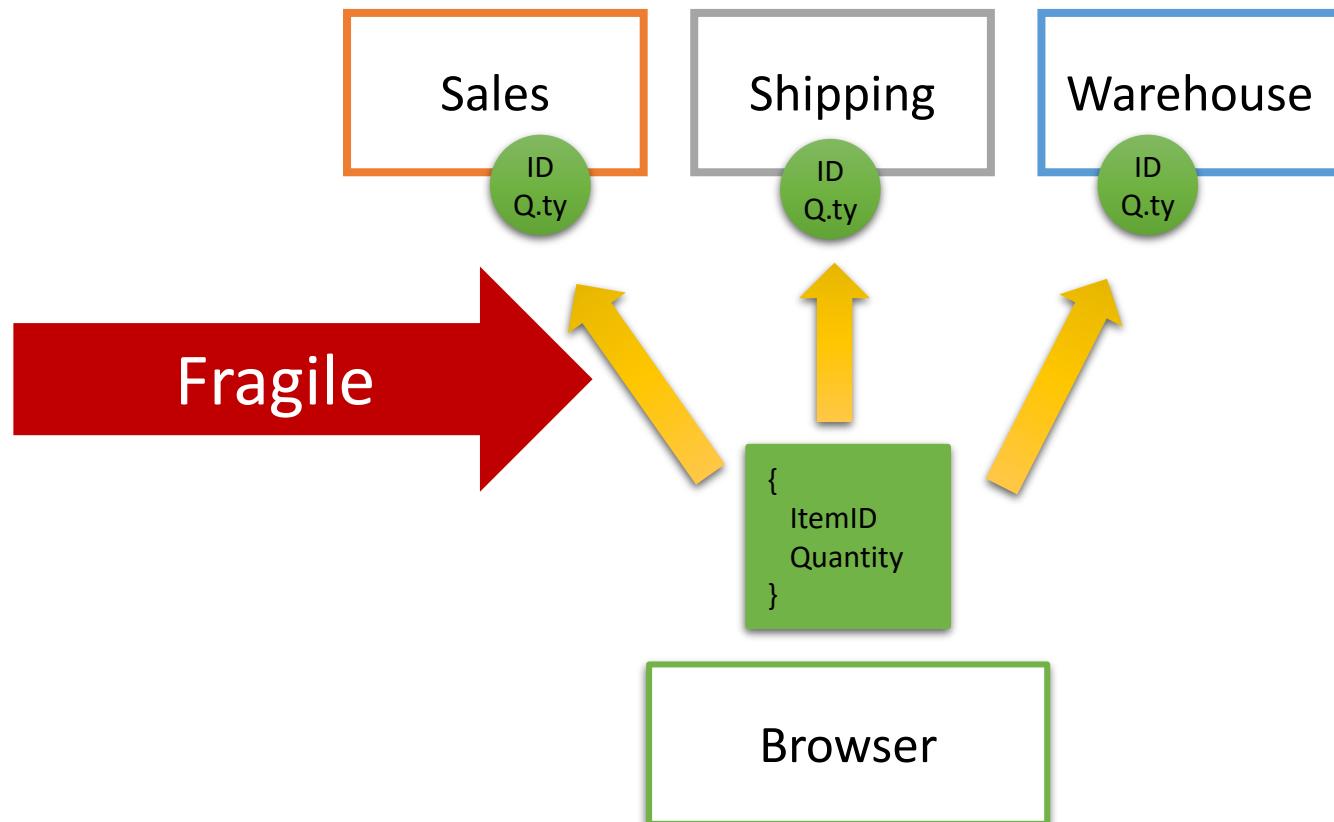


POST -> /shopping-cart/



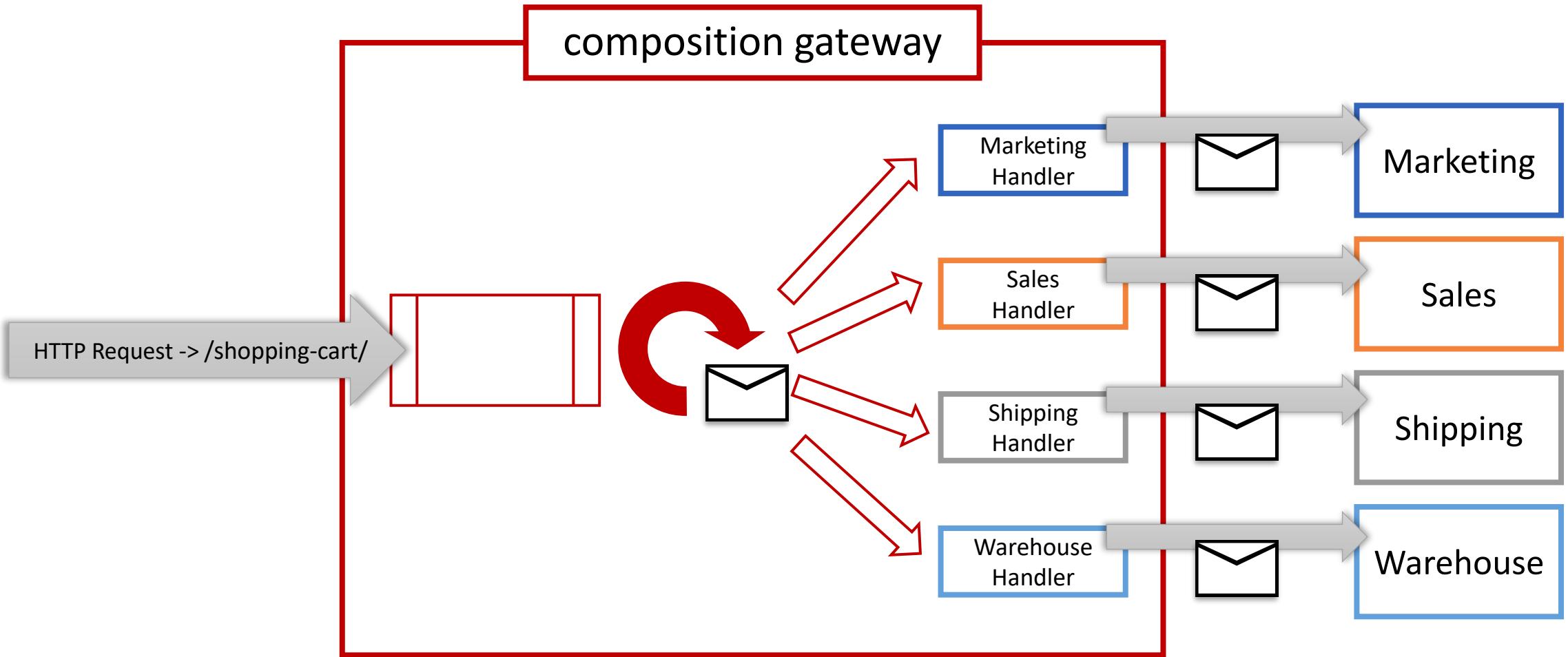
things might  
go wrong

# ViewModel Decomposition

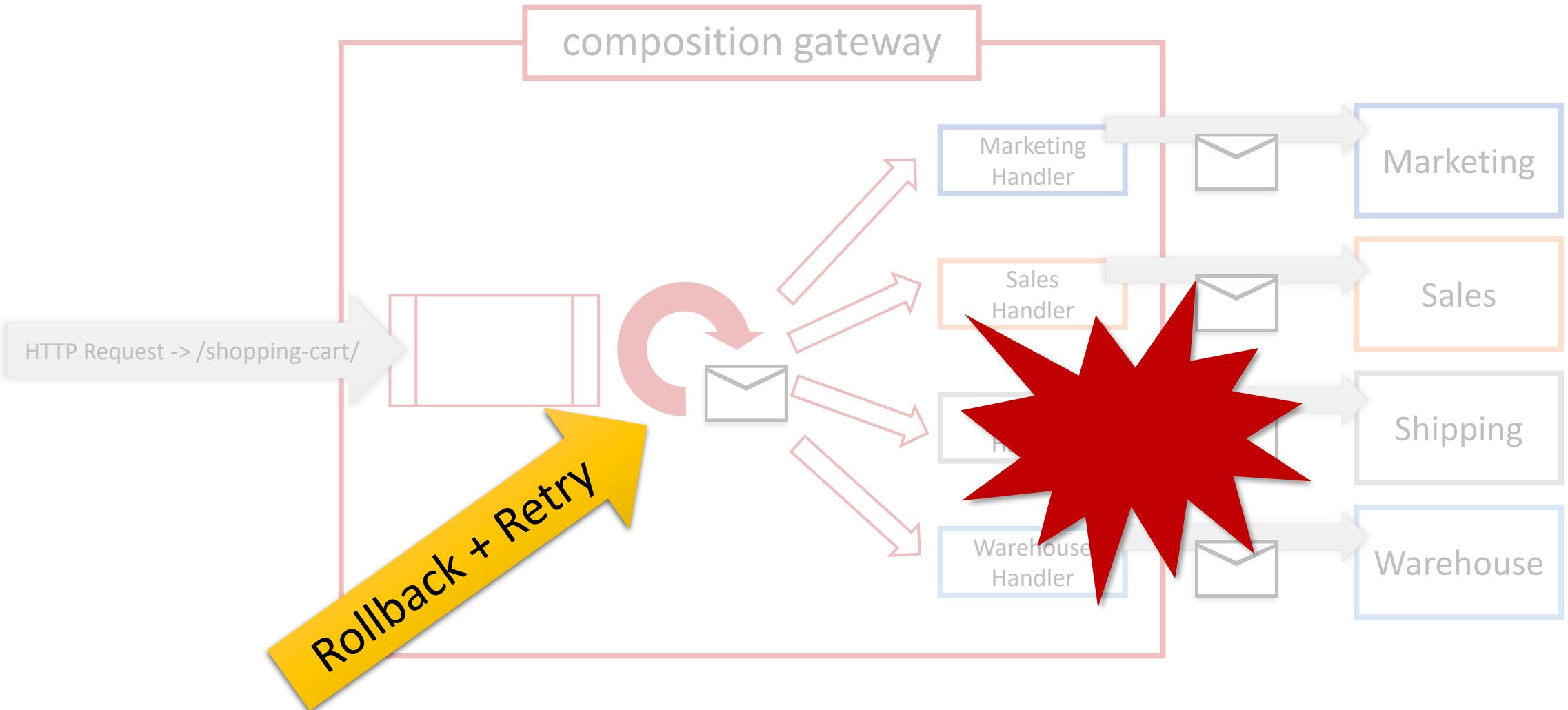


POST -> /shopping-cart/

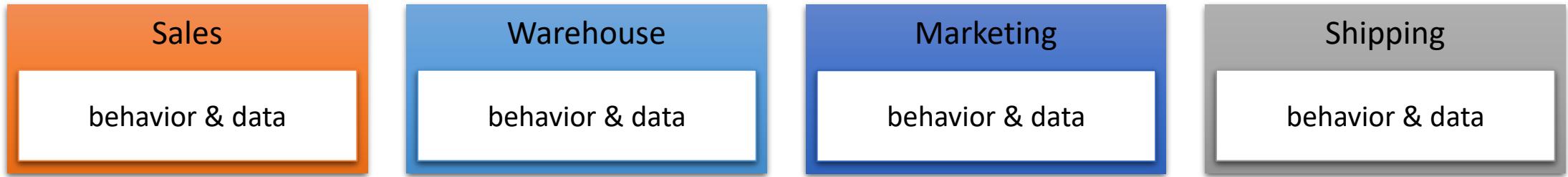
# ViewModel Decomposition (flow)



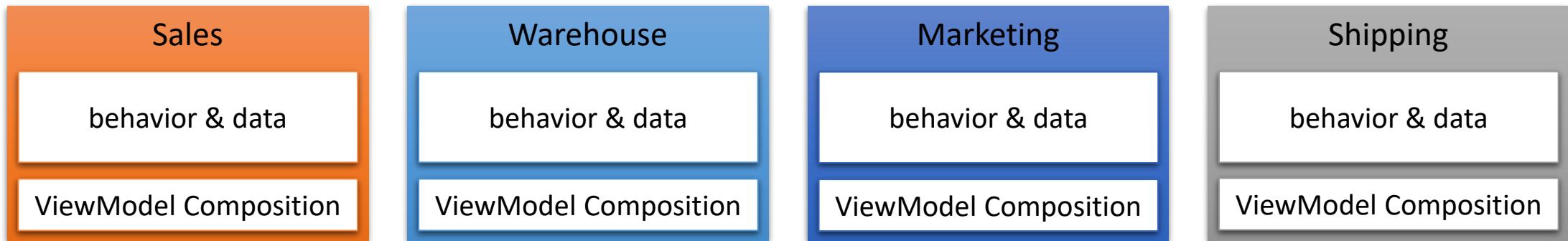
# ViewModel Decomposition (flow)



# Vertical Slices



# Vertical Slices



services need to  
communicate

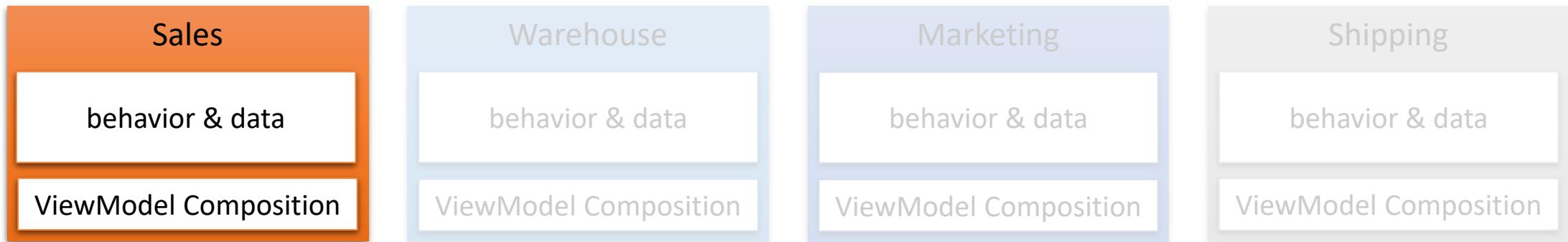


# Business requirements

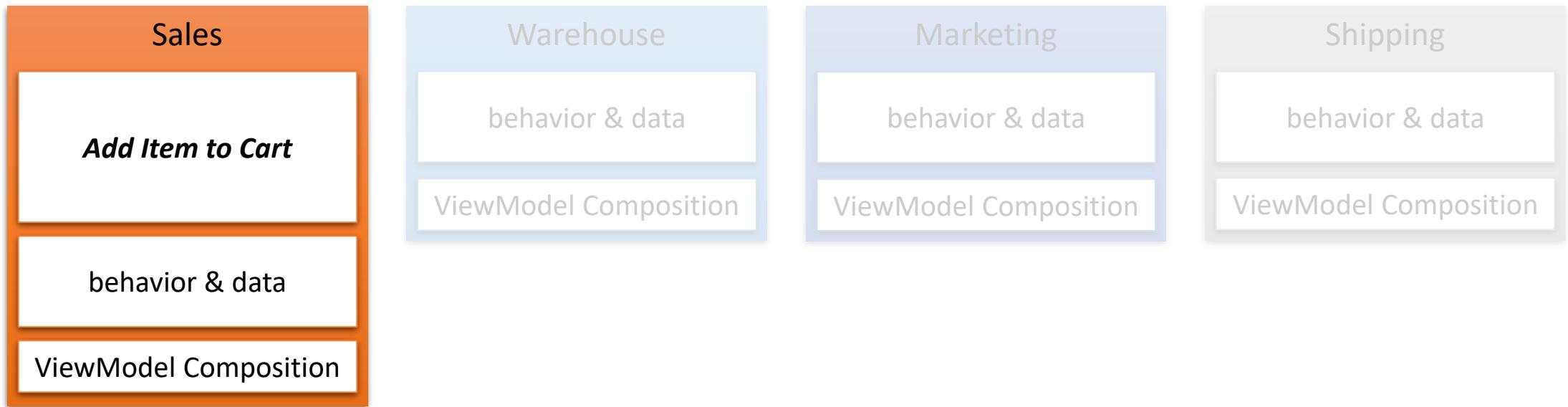
- Notify users of 1 week stale carts
- Wipe 1 month stale carts



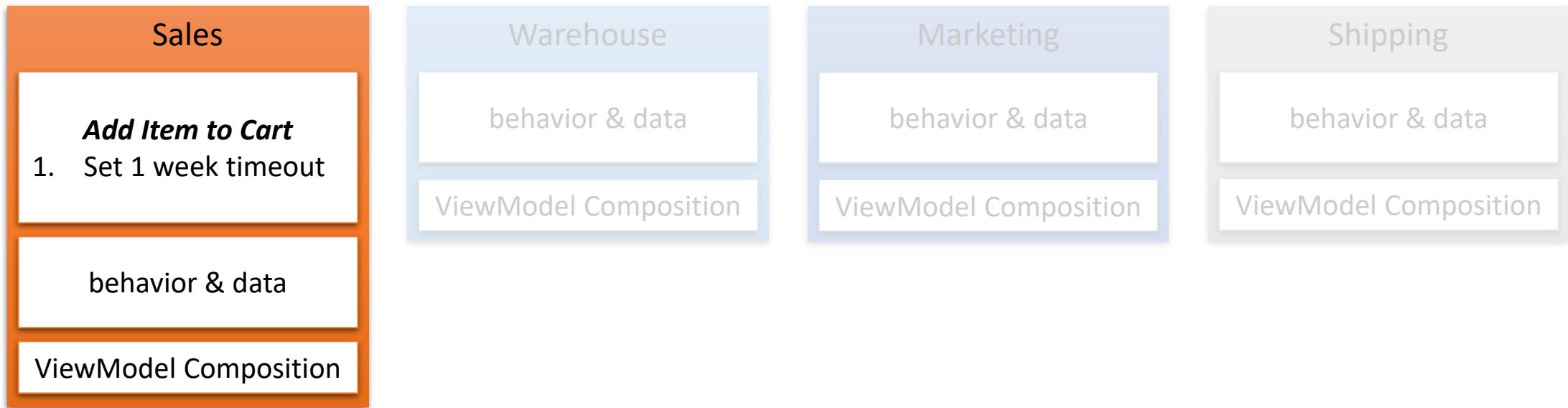
# Services communication channel



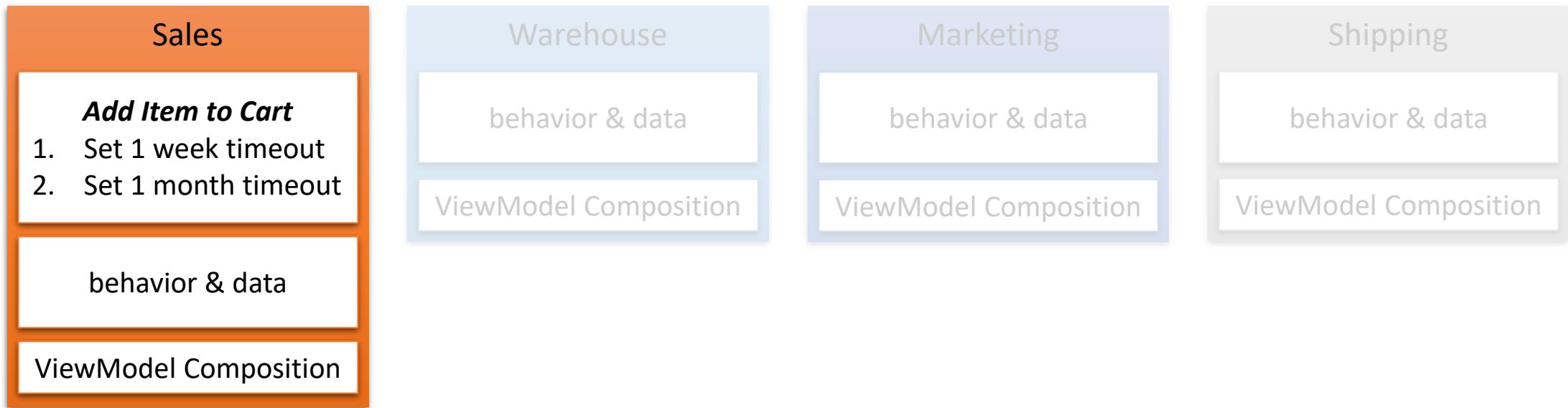
# Services communication channel



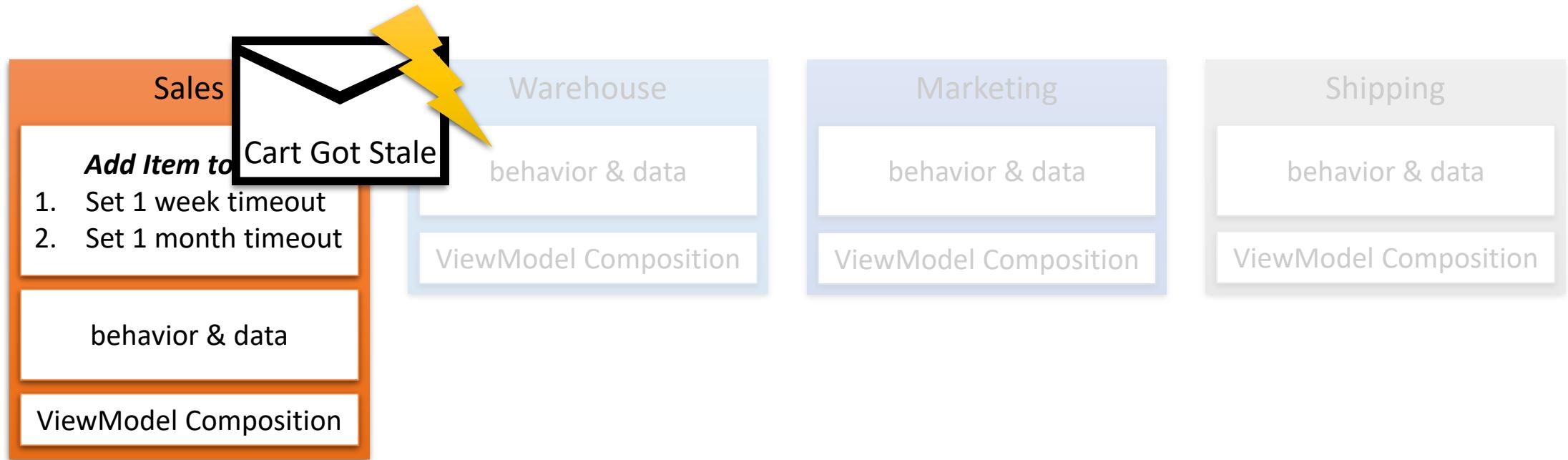
# Services communication channel



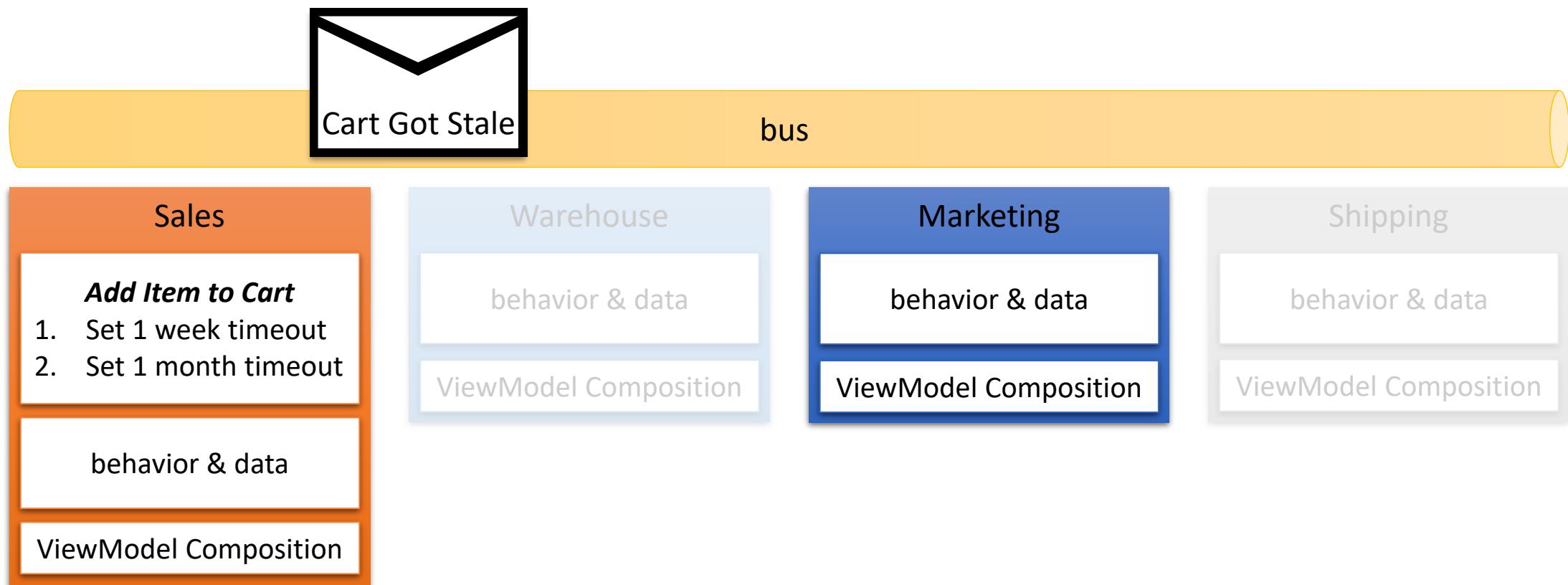
# Services communication channel



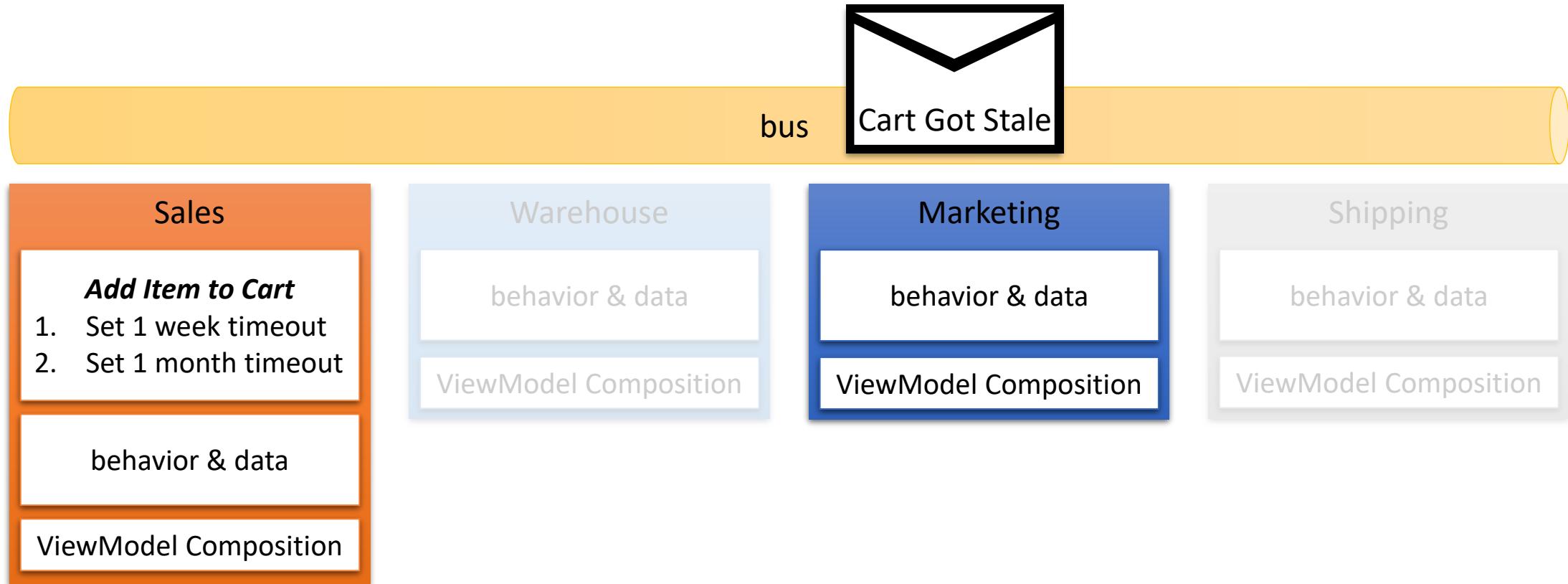
# 1 week later



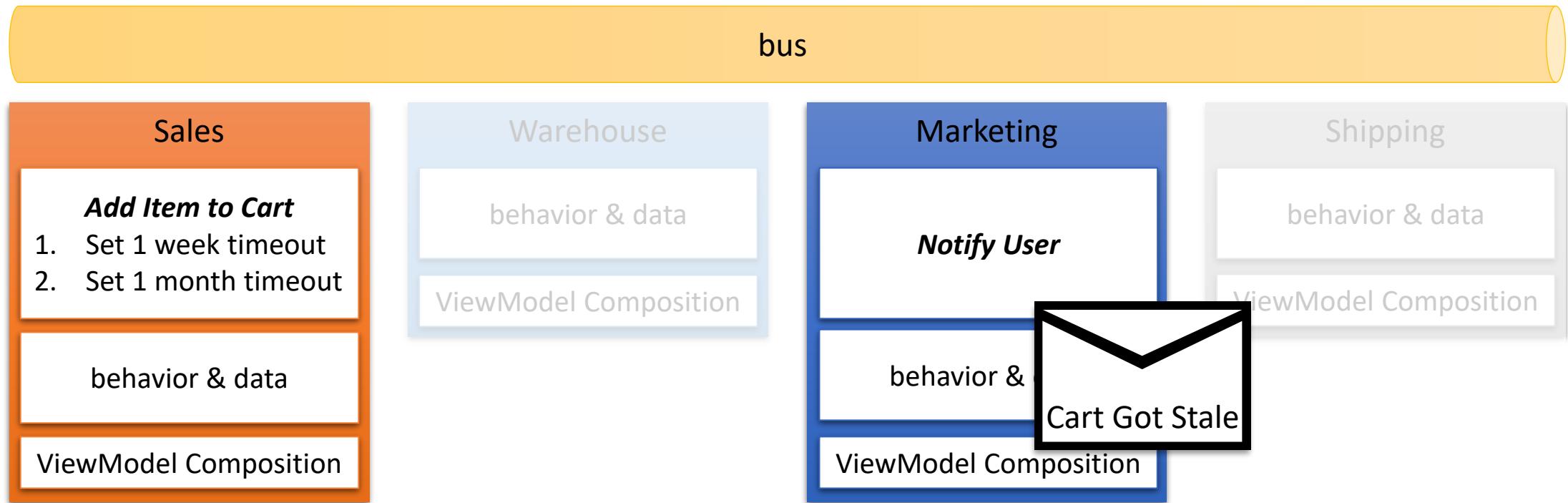
# 1 week later



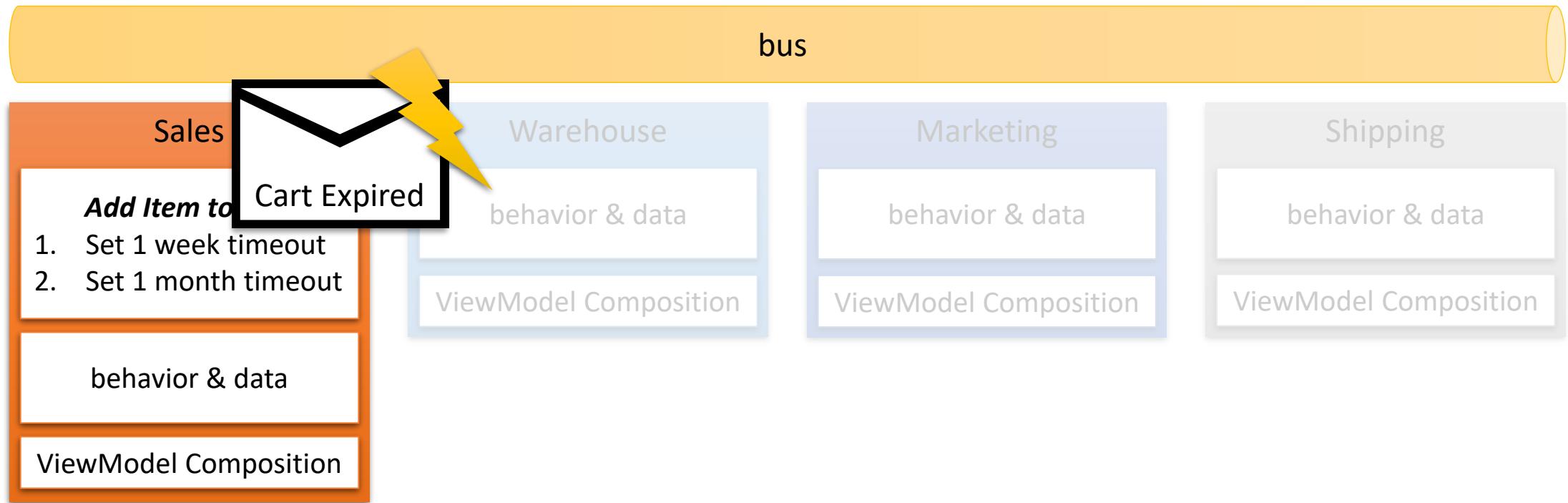
# 1 week later



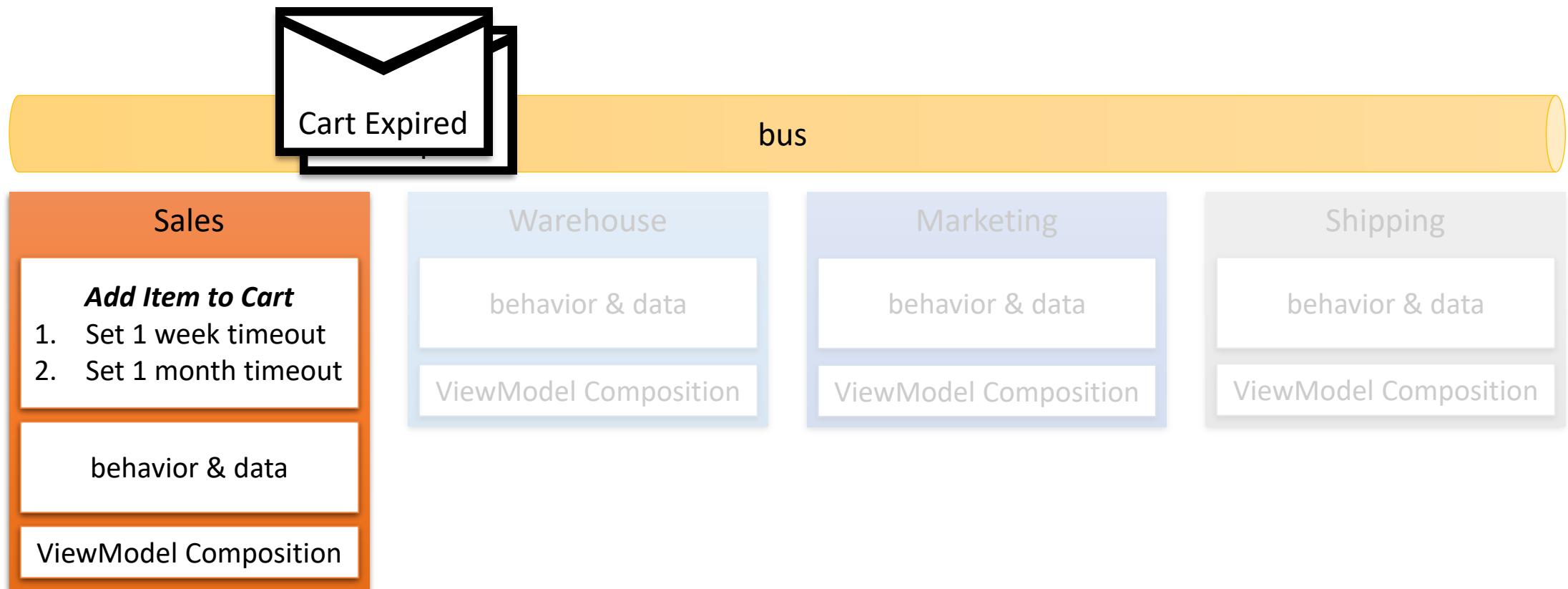
# 1 week later



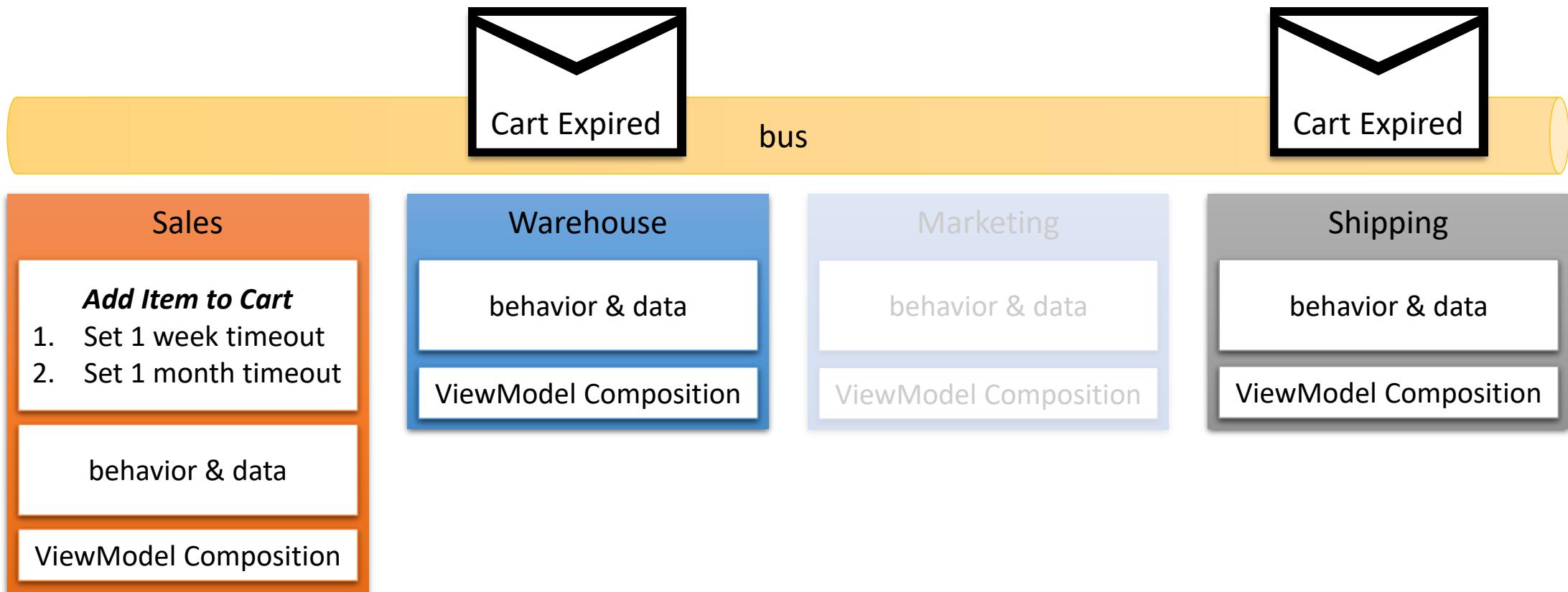
# 1 month later



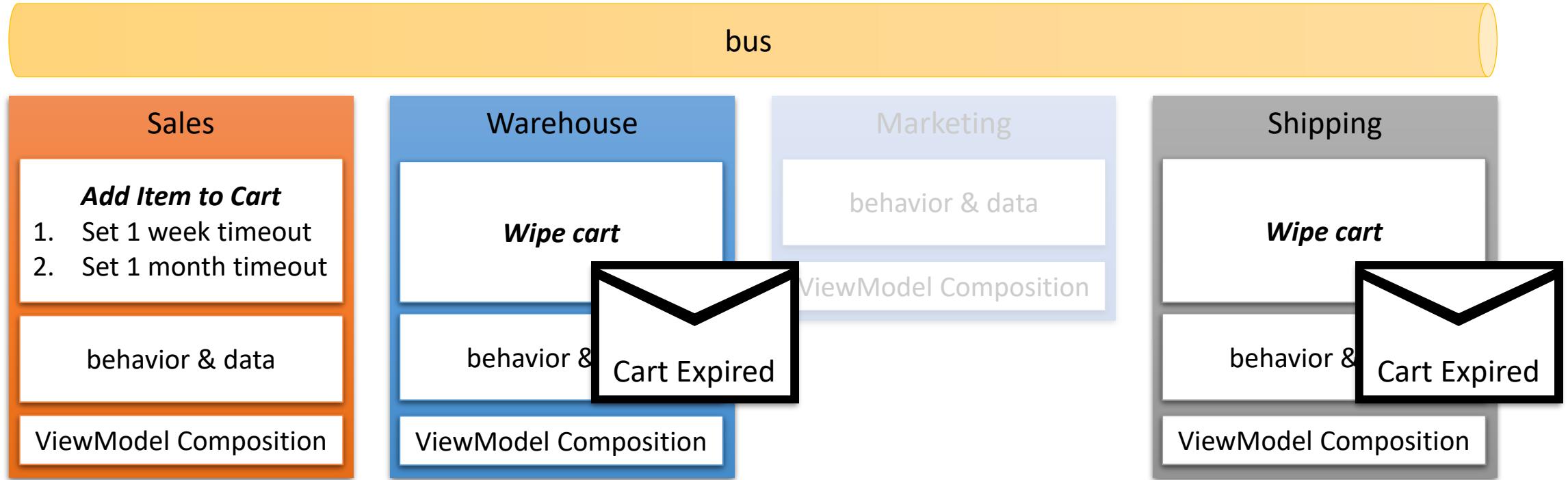
# 1 month later



# 1 month later

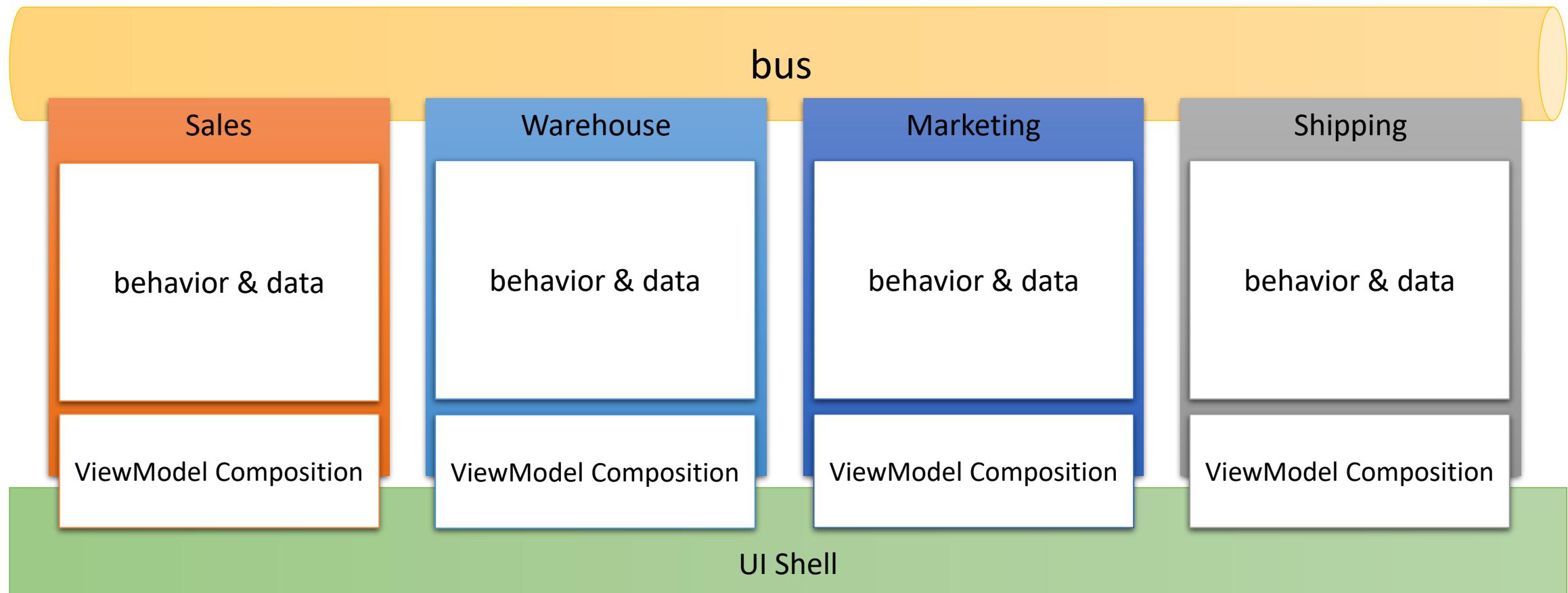


# 1 month later



**cross-services events**  
can be as thin as  
**event name and identifiers**

# The final big picture





# time tyranny

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Demos: [bit.ly/dnd-2020-aggregates-demos](https://bit.ly/dnd-2020-aggregates-demos)

Slides: [bit.ly/dnd-2020-aggregates-slides](https://bit.ly/dnd-2020-aggregates-slides)

*Udi Dahan on Service Boundaries*

Videos: [go.particular.net/dnd-2020-aggregates](https://go.particular.net/dnd-2020-aggregates)



# Takeaways



# Takeaways

- Boundaries are key to success
  - Do not bring in more technology to solve non-technical problems



# Takeaways

- Boundaries are key to success
- Mental model can badly influence design
  - Users/Business analysts tend to think in term of data presentation



## Takeaways

- Boundaries are key to success
- Mental model can badly influence design
- Do not name things prematurely
  - Premature names stick and drive data aggregation



# Takeaways

- Boundaries are key to success
- Mental model can badly influence design
- Do not name things prematurely
- Behaviors define how to aggregate data
  - Group data that change together and that influence each other
  - Use anti-requirements techniques to validate data grouping
  - Follow the coupling



# Takeaways

- Boundaries are key to success
- Mental model can badly influence design
- Do not name things prematurely
- Behaviors define how to aggregate data
- Use Composition techniques to present data
  - No need for complex projections and centralized read models



there is no  
such thing as  
orchestration

# Mauro Servienti

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//milestone.topics.it





# Thank you!

Demos: [bit.ly/dnd-2020-aggregates-demos](https://bit.ly/dnd-2020-aggregates-demos)

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