



# Designing a UI for Microservices

Mauro Servienti | @mauroservienti

100% remote





bike rider



bananas |  
my favorite snack





What could  
possibly go  
wrong...

# Let me buy a “banana holder”




**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](#).

# Mauro Servienti

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[//milestone.topics.it](#)





# Does a page like that exist?

Or put it in another way: does a “Product” class or aggregate exist?



*“There is no spoon”*

The image shows an Amazon product page for the Benran Outdoor Travel Cute Banana Protector Storage Box. The product is a pack of three banana-shaped storage boxes in pink, green, and yellow. The page includes a product title, a price of \$10.00 with free shipping, and a note that only 9 items are left in stock. Several annotations are overlaid on the page:

- Marketing**: A yellow box highlights the product title and the number of customer reviews (26).
- Sales**: A blue box highlights the price (\$10.00) and the free shipping offer.
- Shipping**: A green box highlights the free shipping offer.
- Warehouse**: A red box highlights the low stock warning ("Only 9 left in stock").

Benran  
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26 customer reviews  
Price: \$10.00 FREE Shipping  
Get \$50.00 off instantly: For the Amazon Rewards Visa Card. [Learn more](#)  
Only 9 left in stock  
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# Domain Model Decomposition

**services owning  
their own piece of  
information.**

Single Responsibility Principle

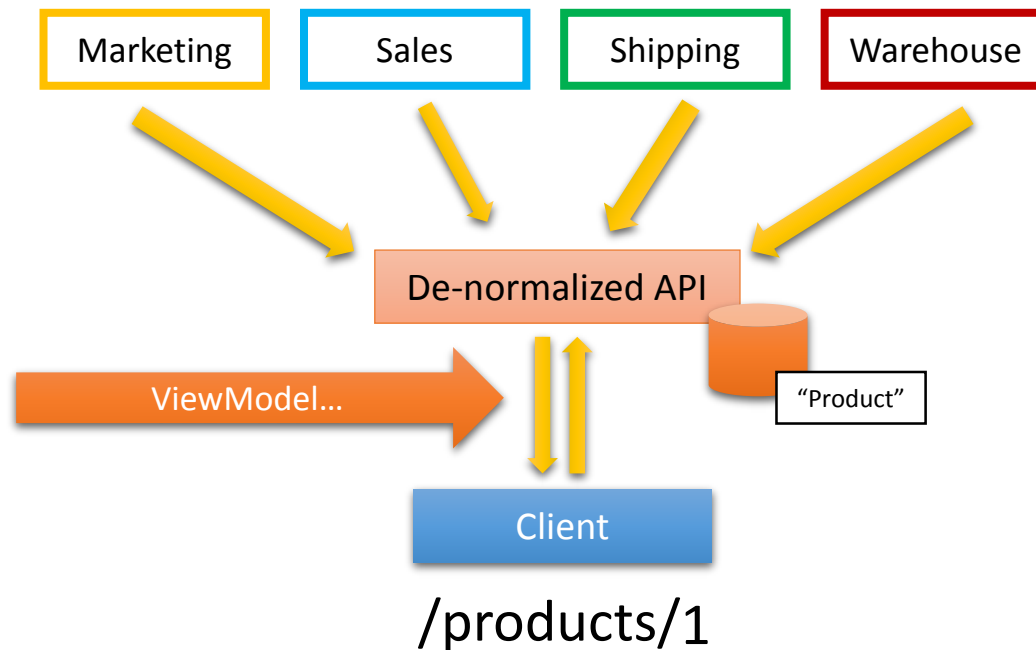
```

749 $sort_order = array();
750
751 foreach ($quotes as $key => $value) {
752     $sort_order[$key] = $value['sort_order'];
753 }
754
755 array_multisort($sort_order, SORT_ASC, $quotes);
756
757 $this->session->data['lpa']['shipping_methods'] = $quotes;
758 $this->session->data['lpa']['address'] = $address;
759
760 if (empty($quotes)) {
761     $json['error'] = $this->language->get('
762         error_no_shipping_methods');
763 } else {
764     $json['quotes'] = $quotes;
765 }
766
767 if (isset($this->session->data['lpa']['shipping_method']) && !
768     empty($this->session->data['lpa']['shipping_method']) &&
769     isset($this->session->data['lpa']['shipping_method']['code']
770 )) {
771     $json['selected'] = $this->session->data['lpa']['
772         shipping_method']['code'];
773 } else {
774     $json['selected'] = '';
775 }
776
777 } else {
778     $json['error'] = $this->language->get('error_shipping_methods');
779 }
780
388
389 this.interval = clearInterval(this.interval)
390
391 return this
392 }
393
394 Carousel.prototype.next = function () {
395     if (this.sliding) return
396     return this.slide('next')
397 }
398
399 Carousel.prototype.prev = function () {
400     if (this.sliding) return
401     return this.slide('prev')
402 }
403
404 Carousel.prototype.slide = function (type, next) {
405     var $active = this.$element.find('.item.active')
406     var $next = next || this.getItemForDirection(type, $active)
407     var isCycling = this.interval
408     var direction = type == 'next' ? 'left' : 'right'
409     var fallback = type == 'next' ? 'first' : 'last'
410     var that = this
411
412     if (!$next.length) {
413         if (!this.options.wrap) return
414         $next = this.$element.find('.item')[fallback]()
415     }
416
417     if ($next.hasClass('active')) return (this.sliding = false)
418
419     var relatedTarget = $next[0]
420     var slideEvent = $.Event('slide.bs.carousel', {
421         relatedTarget: relatedTarget,
422         direction: direction
423     })

```

How can we design something like that?

# ~~Denormalization~~ *Temptations...*





# That's a cache!

<rant />

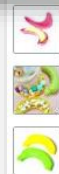


Oh...and by the way...

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.



el Cute Banana  
Protector Storage Box (Pink, Green,  
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a report  
not a cache

Whatchoo talkin'  
'bout, Willis?

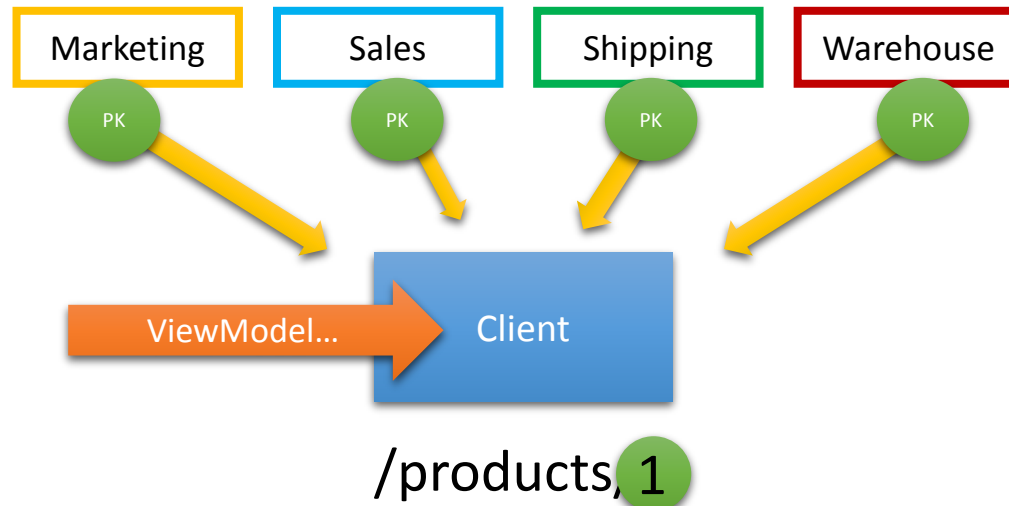
@mauroservienti | #apiconf2018

# A report

- We're crossing a “boundary”
  - Data flow out of each service to the user
- Users are already pulling things on demand
  - let's benefit of that



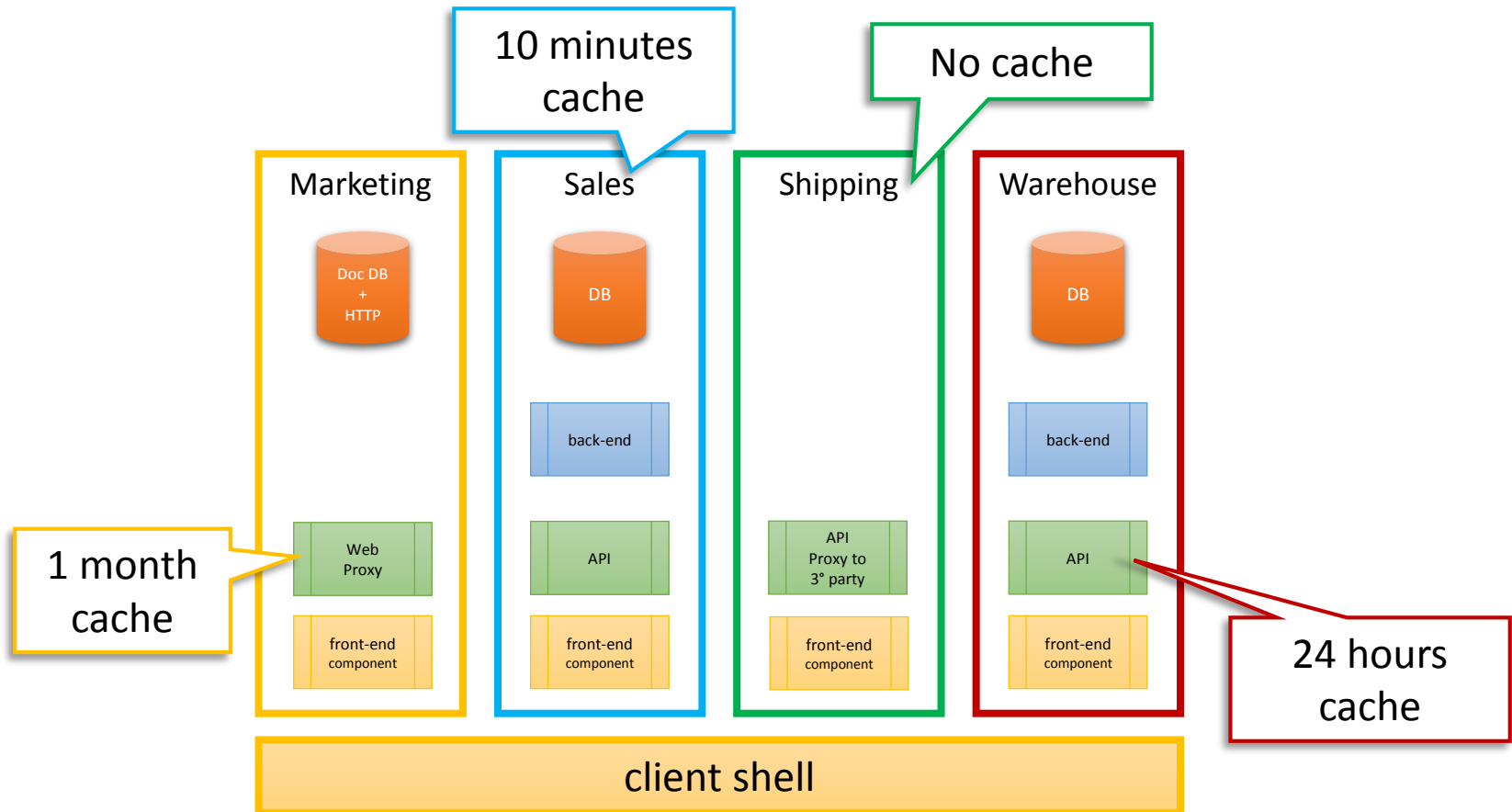
# ViewModel Composition



# Full vertical ownership



# Full vertical ownership



# View Model Appender

```
public class ProductDetailsViewModelAppender : IViewModelAppender
{

}
```



# Request matching

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

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

# Composition

```
public class ProductDetailsViewModelAppender : IViewModelAppender
{
    public bool Matches(RouteData routeData, string verb)
    {
    }

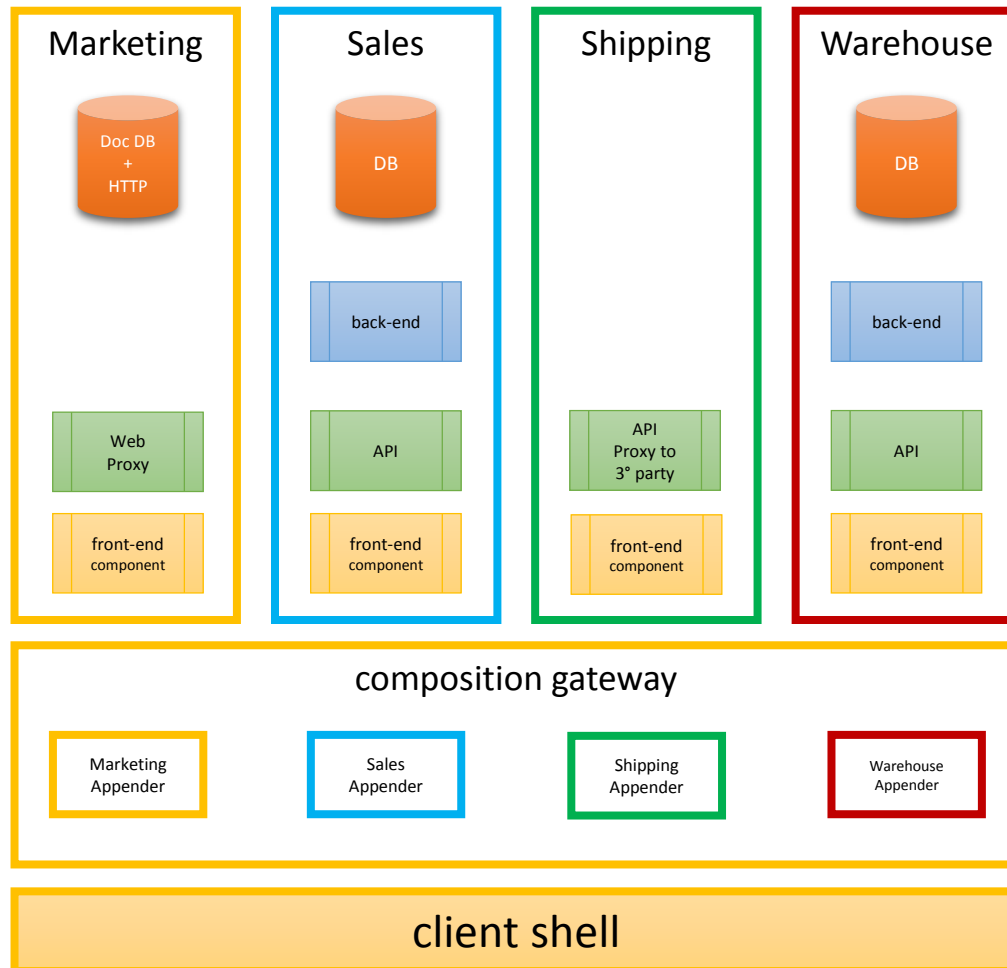
    public async Task Append(dynamic vm, RouteData routeData, IQueryCollection query)
    {
        var id = (string)routeData.Values["id"];

        var url = $"http://sales-backend.local/api/products/{id}";
        var client = new HttpClient();
        var response = await client.GetAsync(url);

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

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

# Full vertical ownership



# Composition Gateway

```
public class Startup
{
    public void ConfigureServices(IServiceCollection services)
    {
        services.AddRouting();
        services.AddViewModelComposition();
    }

    public void Configure(IApplicationBuilder app, ILoggerFactory loggerFactory)
    {
        app.RunCompositionGateway();
    }
}
```






is all that glitters gold?


# What about grids?

Customers who bought this item also bought


Page 1 of 12




PurelifeTropics Raw Organic Virgin coconut oil 16.9oz Non GMO for cooking, hair care, skin...  
★★★★★ 42  
\$15.95 Prime




Kaffe Maestro Barista Cafetiere French Press, 1000 ml/34 oz  
★★★★☆ 159  
Prime




Keeva Organics Anti-Aging Lavender Night Cream Moisturizer - Natural Formula Contains Deep...  
★★★★☆ 200  
\$24.99 Prime



6 Mistakes Most Senior Make When Approaching Pain, Aches & Stiff Leg Muscle - And How to...  
★★★★★ 15  
\$23.99 Prime



Wind Chimes Sounds Beautiful for Outdoor Balcony Porch Terrace Patio Garden and Indoor...  
★★★★☆ 50  
\$21.00 Prime

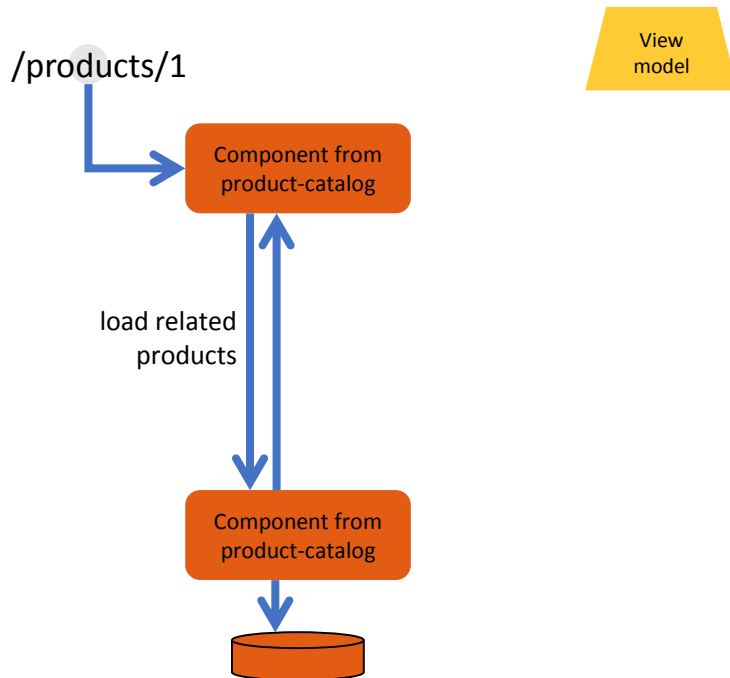


ProductA	ProductB	ProductC	ProductD
			
Supplier A	Supplier B	Supplier C	Supplier D
★★★★★	★★★★★	★★★★★	★★★★★
€ 20.00	€ 20.00	€ 20.00	€ 20.00

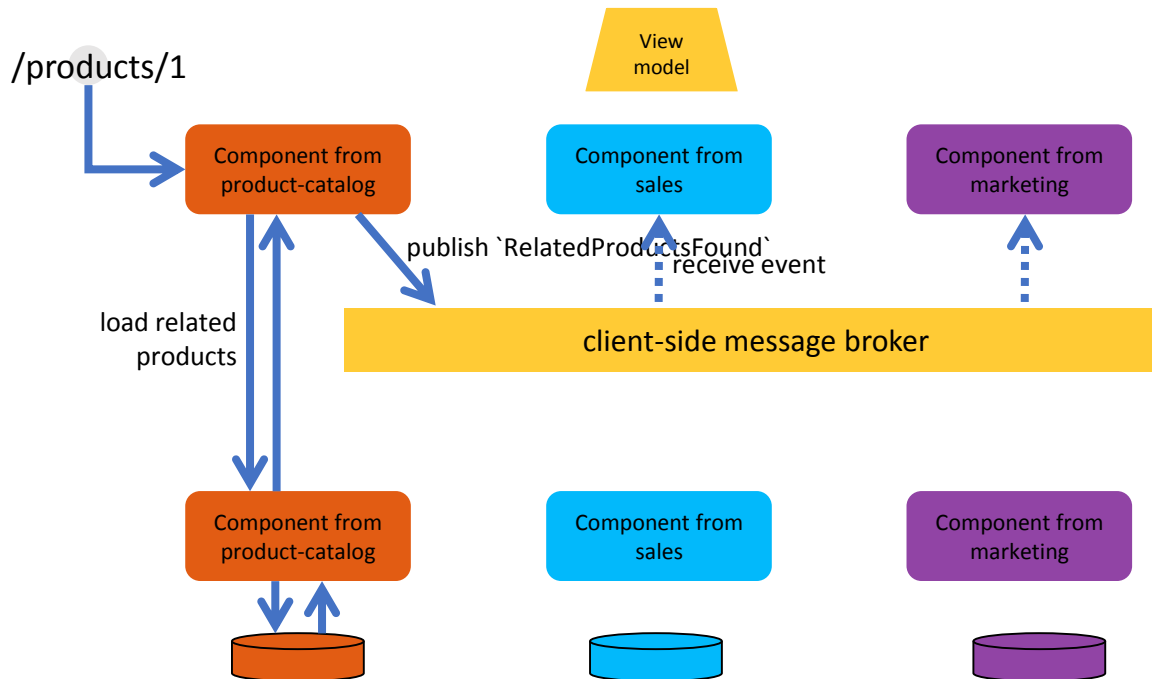
/products/1

View  
model

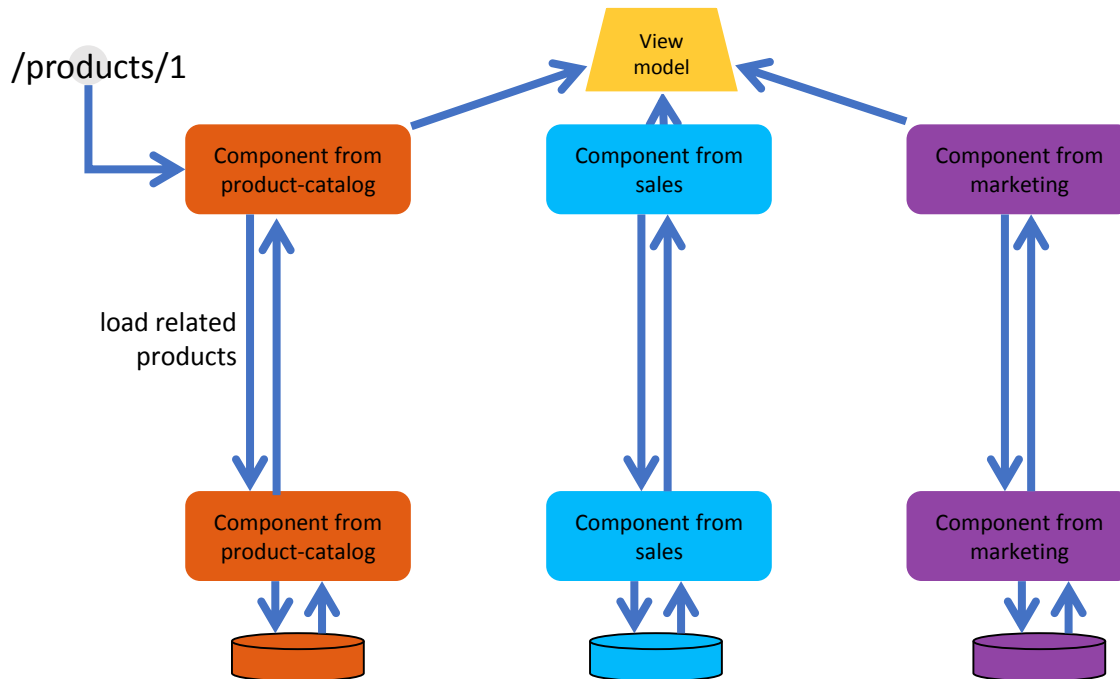
<div>ProductNameA</div> <div>  <div>Supplier A</div> <div>★★★★★</div> <div>€ 20.00</div> </div>	<div>ProductNameB</div> <div>  <div>Supplier B</div> <div>★★★★★</div> <div>€ 20.00</div> </div>	<div>ProductNameC</div> <div>  <div>Supplier C</div> <div>★★★★★</div> <div>€ 20.00</div> </div>	<div>ProductNameD</div> <div>  <div>Supplier D</div> <div>★★★★★</div> <div>€ 20.00</div> </div>
--	--	---	--



<div>ProductNameA</div> <div>  <div>Supplier A</div> <div>★★★★★</div> <div>€ 20.00</div> </div>	<div>ProductNameB</div> <div>  <div>Supplier B</div> <div>★★★★★</div> <div>€ 20.00</div> </div>	<div>ProductNameC</div> <div>  <div>Supplier C</div> <div>★★★★★</div> <div>€ 20.00</div> </div>	<div>ProductNameD</div> <div>  <div>Supplier D</div> <div>★★★★★</div> <div>€ 20.00</div> </div>
--	--	---	--



<div>ProductNameA</div> <div>  <div>Supplier A</div> <div>★★★★★</div> <div>€ 20.00</div> </div>	<div>ProductNameB</div> <div>  <div>Supplier B</div> <div>★★★★★</div> <div>€ 20.00</div> </div>	<div>ProductNameC</div> <div>  <div>Supplier C</div> <div>★★★★★</div> <div>€ 20.00</div> </div>	<div>ProductNameD</div> <div>  <div>Supplier D</div> <div>★★★★★</div> <div>€ 20.00</div> </div>
--	--	---	--



# Composition

```
public class ProductsListViewModelAppender : IViewModelAppender
{
}
```



# Composition

```
public class ProductsListViewModelAppender : IViewModelAppender
{
    public async Task Append(dynamic vm, RouteData routeData, IQueryCollection query)
    {
        var pageIndex = (string)query["pageIndex"] ?? "0";
        var pageSize = (string)query["pageSize"] ?? "10";

        var url = $"http://sales-backend.local/api/products?pageSize={pageSize}&pageIndex={pageIndex}";
        var client = new HttpClient();
        var response = await client.GetAsync(url);

        dynamic[] products = await response.Content.AsExpandableArrayAsync();

        var productsViewModel = MapToDictionary(products);

        await vm.RaiseEventAsync(new RelatedProductsLoaded()
        {
            ProductsViewModel = productsViewModel
        });

        vm.RelatedProducts = productsViewModel.Values.ToArray();
    }
}
```

# Composition

```
dynamic[] products = await response.Content.AsExpandoArrayAsync();

var productsViewModel = MapToDictionary(products);

await vm.RaiseEventAsync(new RelatedProductsLoaded()
{
    ProductsViewModel = productsViewModel
});

vm.RelatedProducts = productsViewModel.Values.ToArray();
```

# Recap

- Clearly defined ownership
- SRP is respected
- Different caching strategies
- Business is much more flexible
- *Select N+1* is not a concern
  - # of requests will be “# of services”





[//bit.ly/view-model-composition-demos](https://bit.ly/view-model-composition-demos)

THANK YOU

