The “Domain Model” Supporting Architecture

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Implementing the Domain Layer

Classic Approach

Object-oriented Model

Domain Services

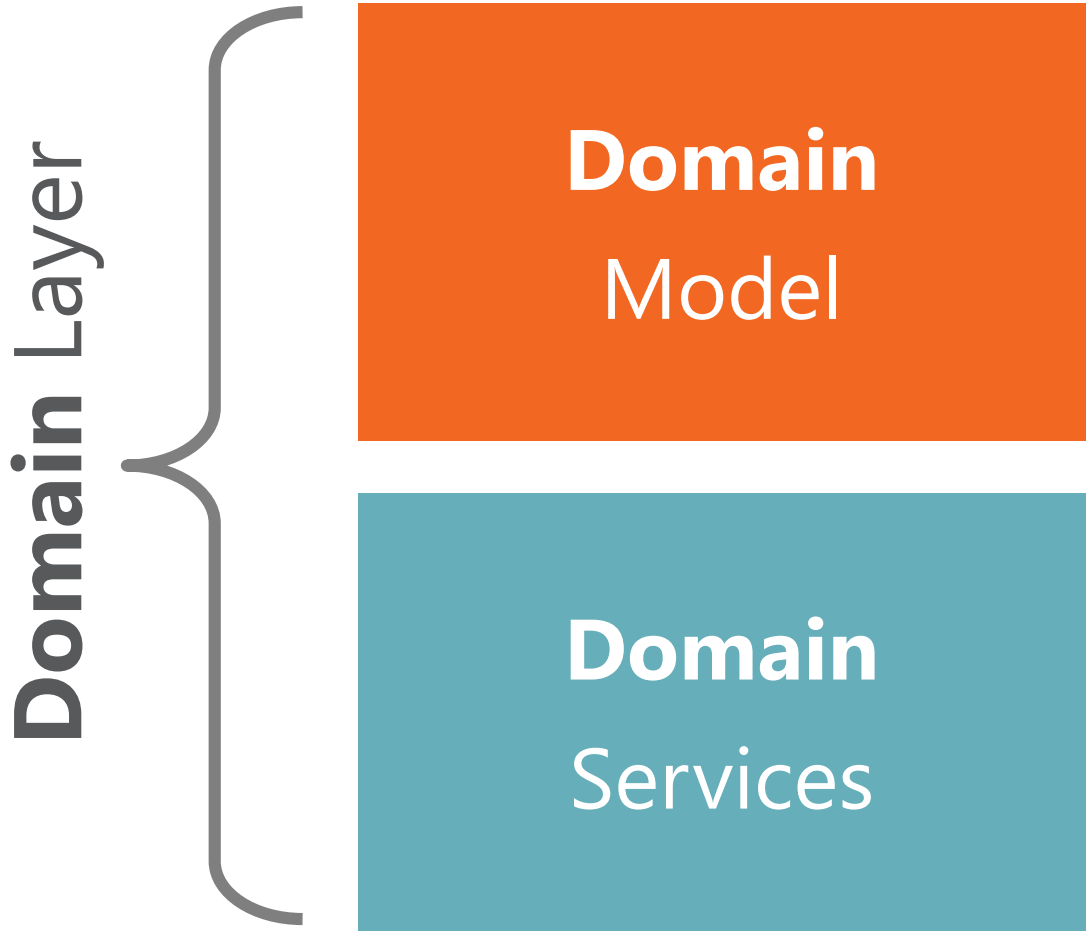
Key Points

Object-oriented Model for Domain

Domain Services

Events, Processes and More ...

Domain Model Supporting Architecture



- Aggregates
- Entities
- Value types
- Factories

- Cross-aggregate behavior
- Repositories
- External services

Key **DDD** Misconceptions

- Perceived simply as having an **object model** with some special characteristics
- **Database** is merely part of the infrastructure and can be neglected
- Ubiquitous Language is a guide to naming classes in the object model

Clearing Misconceptions

Just an object model

- Context mapping is paramount
- Modeling the domain through objects is just one of the possible options

Database agnostic

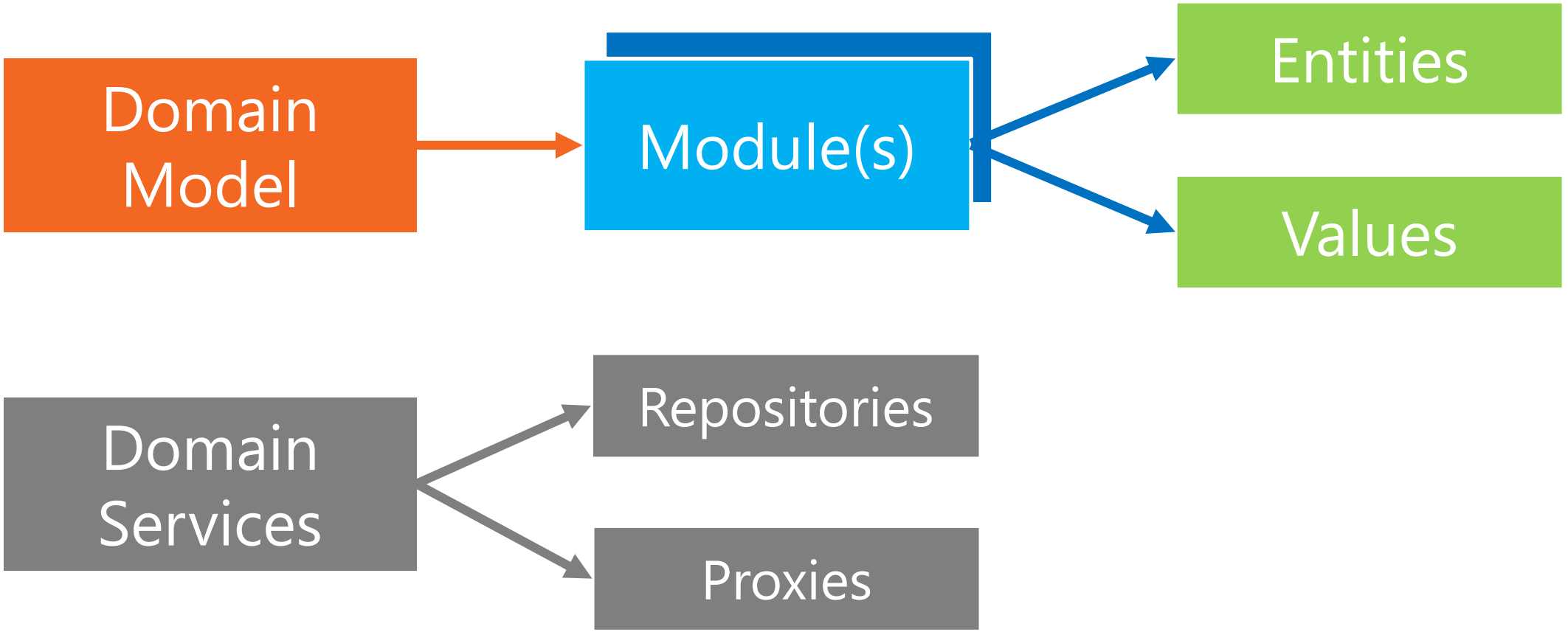
- The object model must be easy to persist
- Persistence, though, should not be the primary concern
- Primary concern is making sense of the business domain

Ubiquitous Language

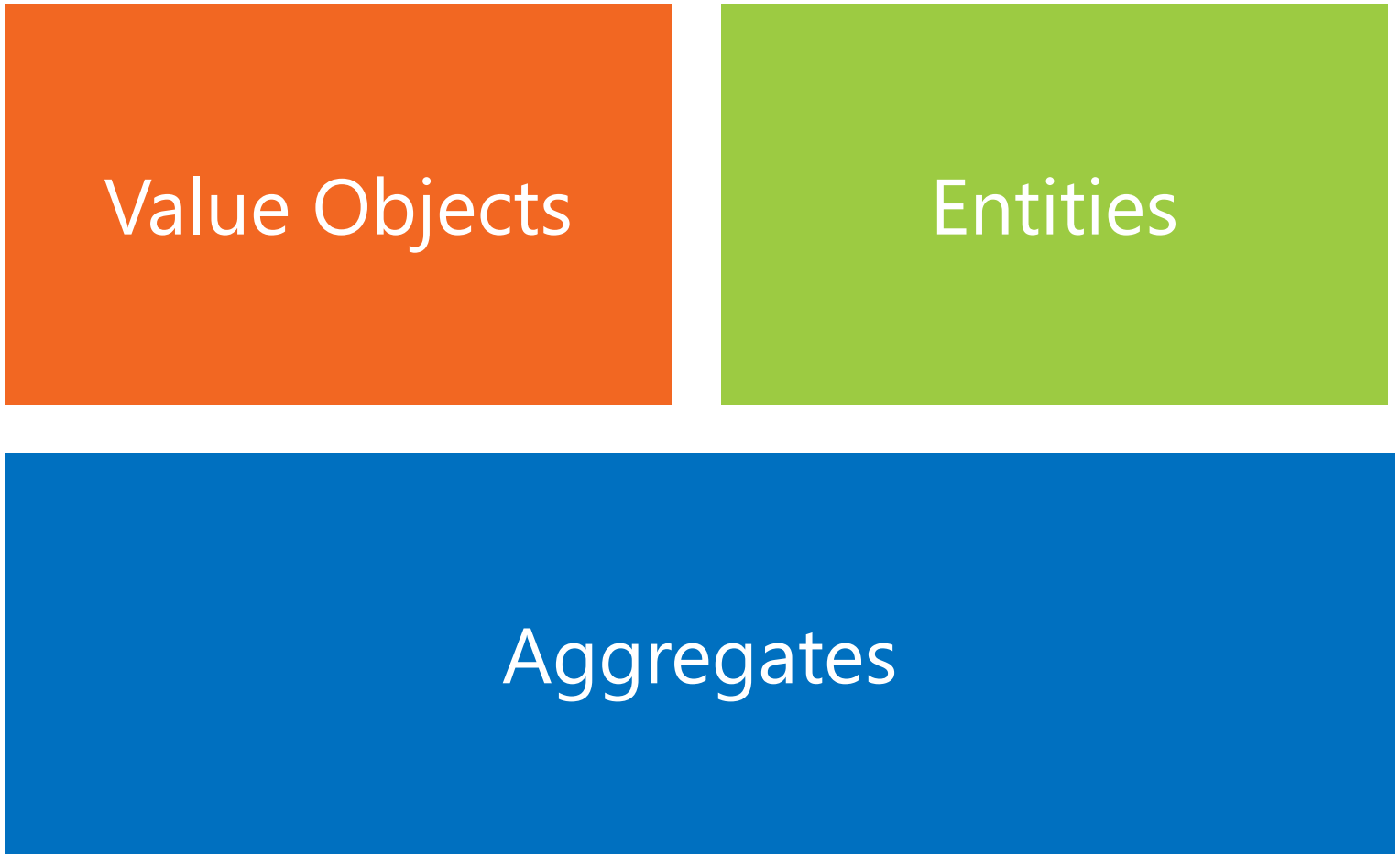
- Understand the language to understand the business
- Keep language of business in sync with code

It's all about behavior.

Domain Layer



Aspects of a Domain Model **Module**



DDD **Value Types**

- Collection of individual values
- Fully defined by its collection of attributes
- Immutable
- More precise and accurate than primitive types

Value Type

```
public int OutsideTemperature { get; set; }
```

```
public Temperature OutsideTemperature { get; set; }
```

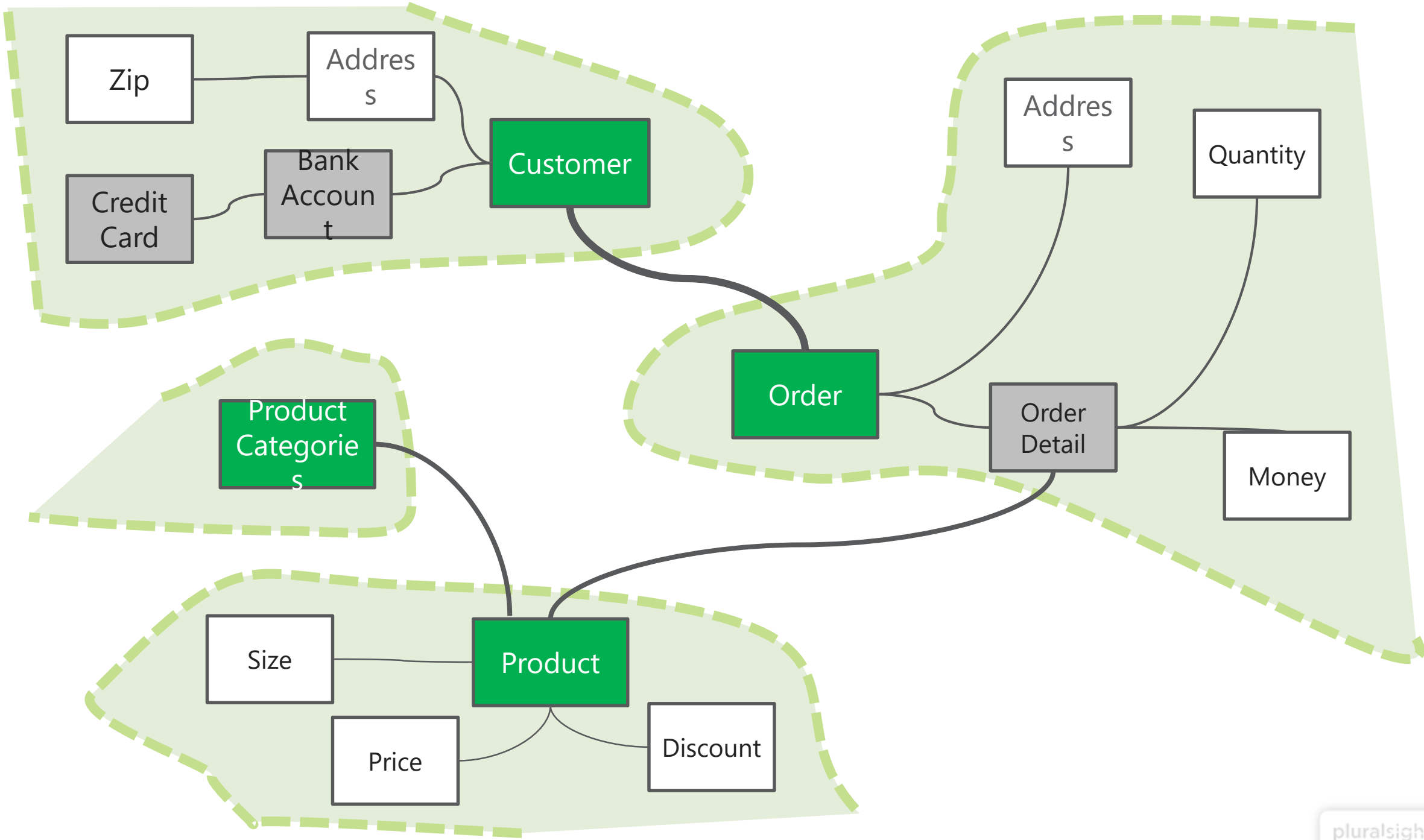
- Constructor(s)
- Min and Max constants
- Ad hoc setters with built-in validation and compensation logic
- Ad hoc getters
- Ad hoc comparison
- Additional properties

DDD **Entities**

- Need an identity
- Uniqueness is important to the specific object
- Typically made of data and behavior
- Contain domain logic, but not persistence logic

DDD **Aggregates**

- A few individual entities constantly used and referenced together
- Cluster of associated objects treated as one for data changes
- Aggregate roots
- Preserve transactional integrity



Persistence vs. Domain Model

Persistence Model

- Object-oriented model 1:1 with underlying relational data
- Reliable and familiar to most developers
- Doesn't include business logic (except perhaps validation)

Domain Model

- Object-oriented model for business logic
- Persistable model
- No persistence logic inside

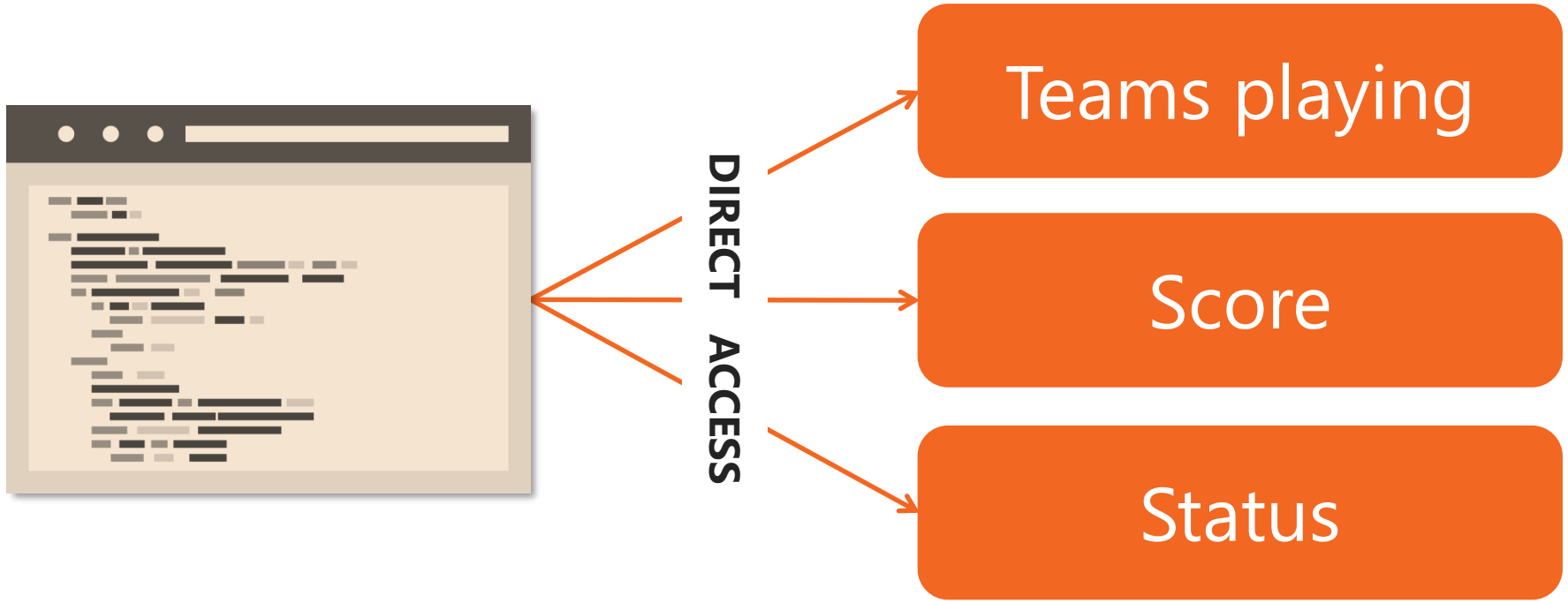
Resistance to Change

DEMO

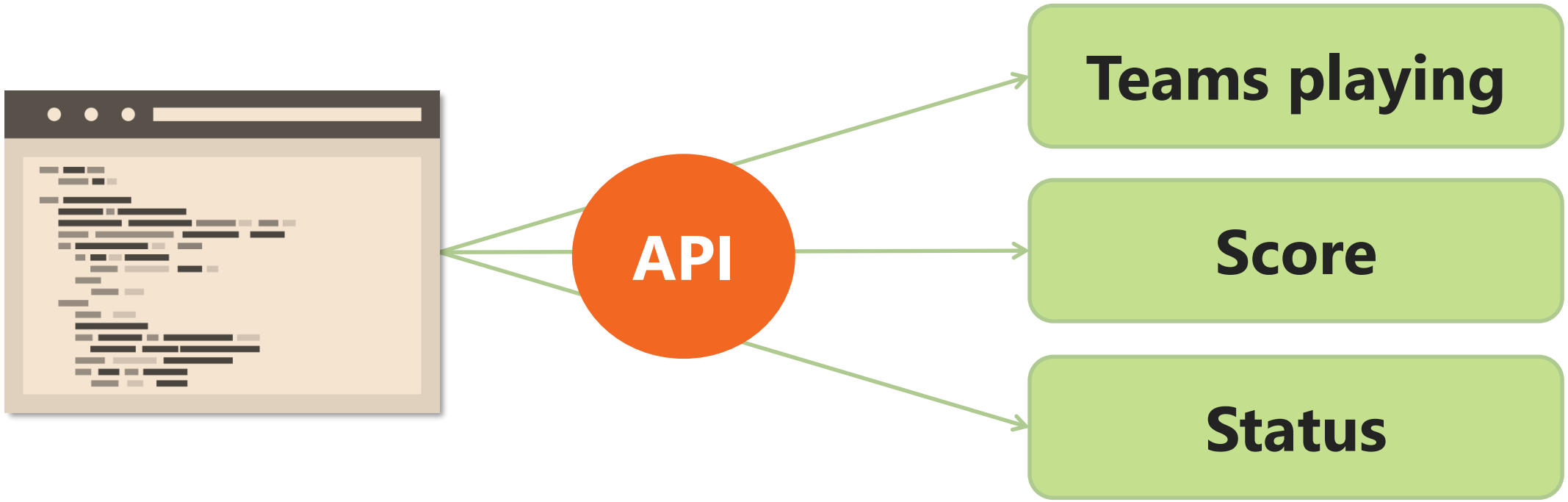
What's Behavior?

The way in which one acts or conducts oneself, especially towards others

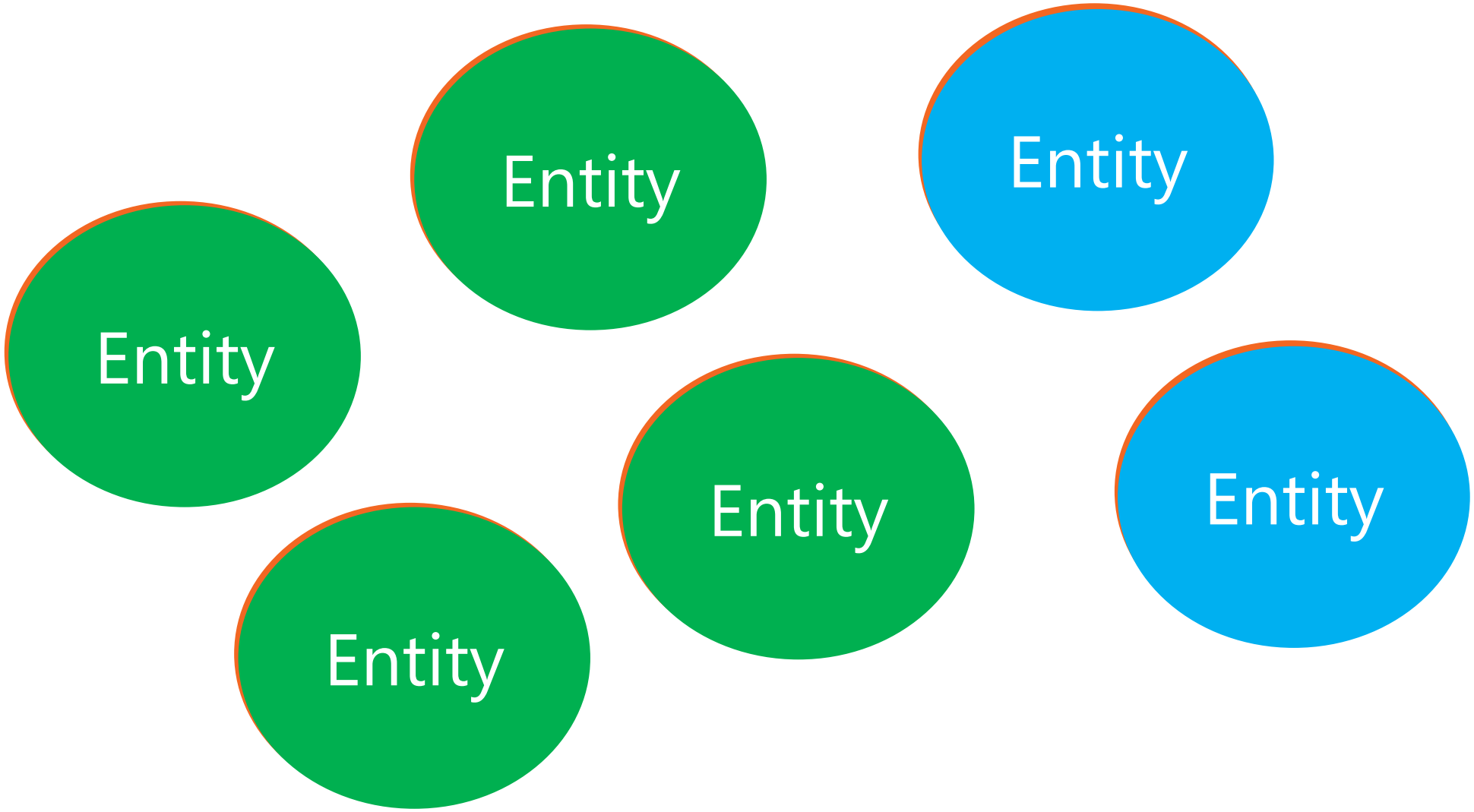
Sport Game

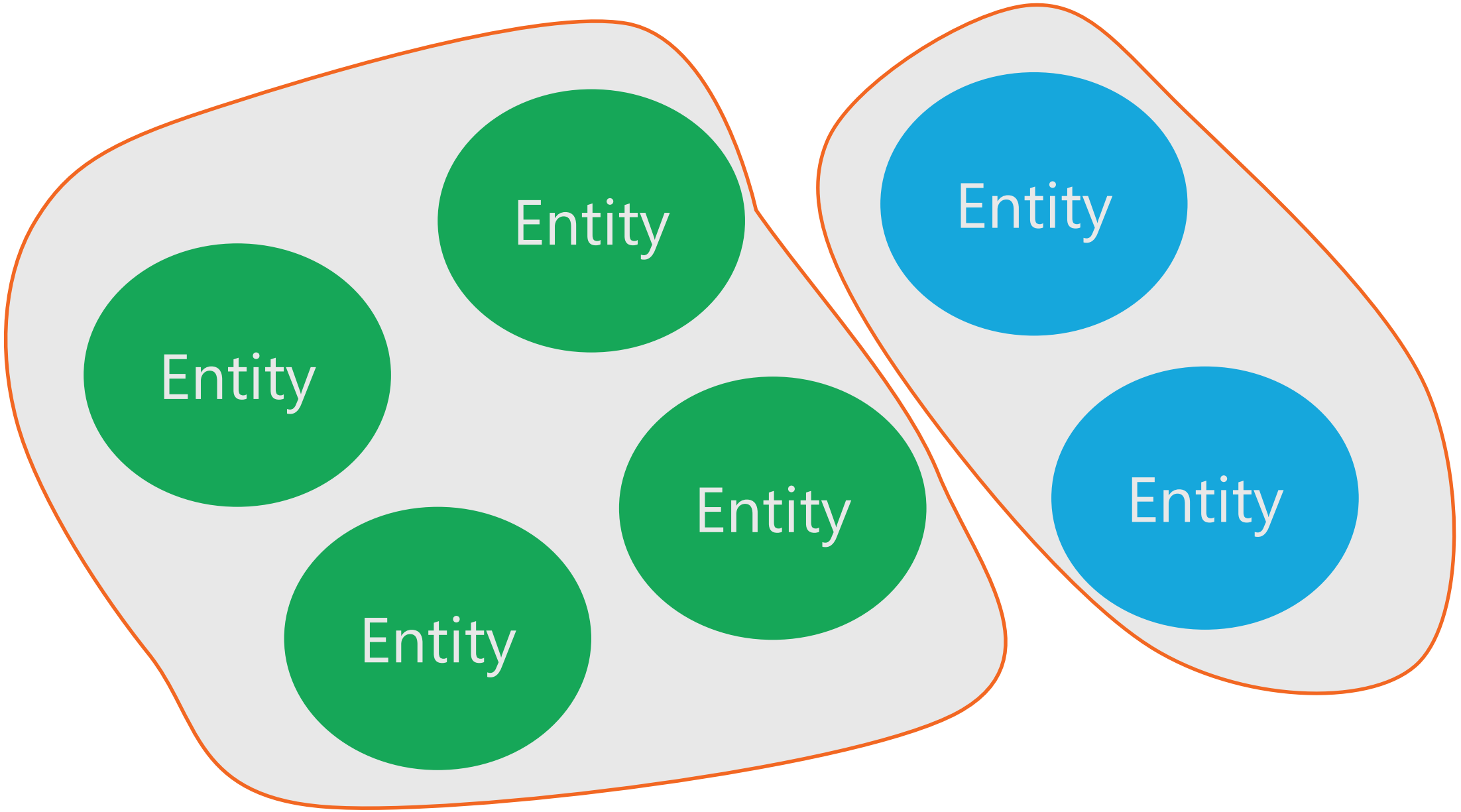


Sport Game



DEMO

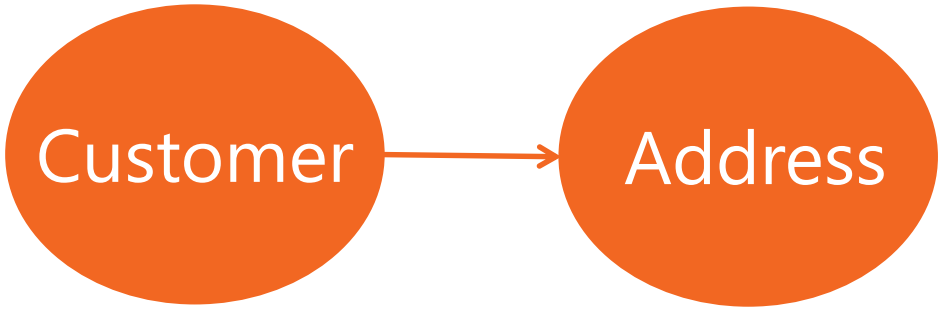




Facts of an Aggregate

Work with fewer objects and coarse grained and with fewer relationships

- Protect as much as possible the graph of entities from outsider access
- Ensure the state of child entities is always consistent
- Actual boundaries of aggregates are determined by business rules



Distinct aggregates

Aggregate

Common Responsibilities
Associated with an Aggregate Root

- Ensure encapsulated objects are always in a consistent state
- Take care of persistence for all encapsulated objects
- Cascade updates and deletions through the encapsulated objects
- Access to encapsulated objects must always happen by navigation

One repository per aggregate

In terms of code, what does it **mean** to be an aggregate root?

DEMO

Domain Services

Implement the domain logic that doesn't belong to a particular aggregate and most likely span over multiple entities.

Domain Services

Coordinate the activity of aggregates and repositories with the purpose of implementing a business action.

Domain Services

May consume services from the infrastructure, such as when sending an email or a text message is necessary.

Actions in domain services come from **requirements** and are approved by **domain experts**.

Names used in domain services are strictly part of the ubiquitous language.

Domain Service **Example**

Determine whether a given customer reached the status of "gold" customer

A customer earns the status of "**gold**" after she exceeds a given threshold of orders on a selected range of products.

Need to query **Orders** and **Products** to determine

Strictly **business-oriented**

Not the **right** job for an aggregate (data access!)

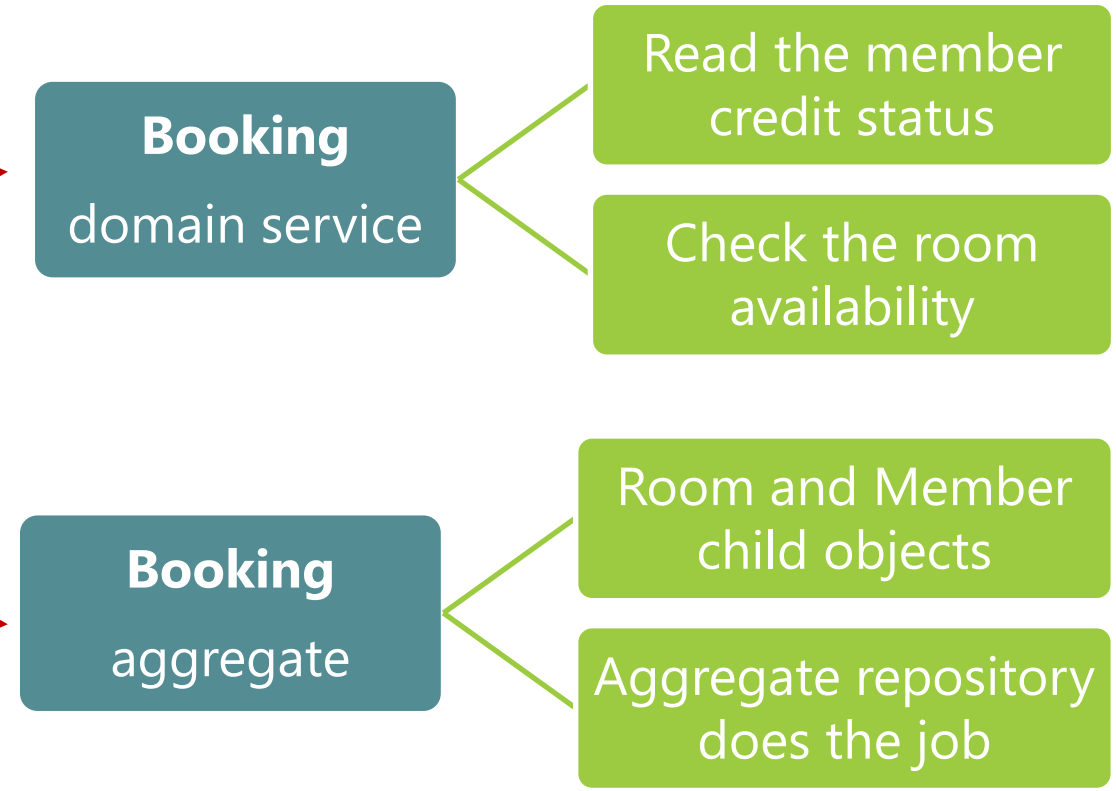
Cross-aggregate **domain** logic

Value set on any newly created instance of **Customer**

Domain Service **Example**

Booking a meeting room

Booking requires **verifying** availability of the room and **processing** payment.



Repository

In DDD, a repository is just the class that handles **persistence** on behalf of entities and ideally aggregate roots.

Repositories

Most popular type of domain service

Take care of persisting aggregates

One repository per aggregate root

Assembly with repositories has a direct dependency on data stores.

A repository is where you deal with connection strings and use SQL commands.

There's Nearly No Wrong Way to Write a Repository Class

```
public interface IRepository<T> where T:IAggregateRoot
{
    // You can keep the interface a plain marker or
    // you can have a few common methods here.

    T Find (object id);
    bool Save (T item);
    bool Delete (T item);
}
```

Why Should You Consider Events
in a Domain Layer?

Not strictly necessary.

Just a more effective and resilient way to express the intricacy of some real-world business domains.

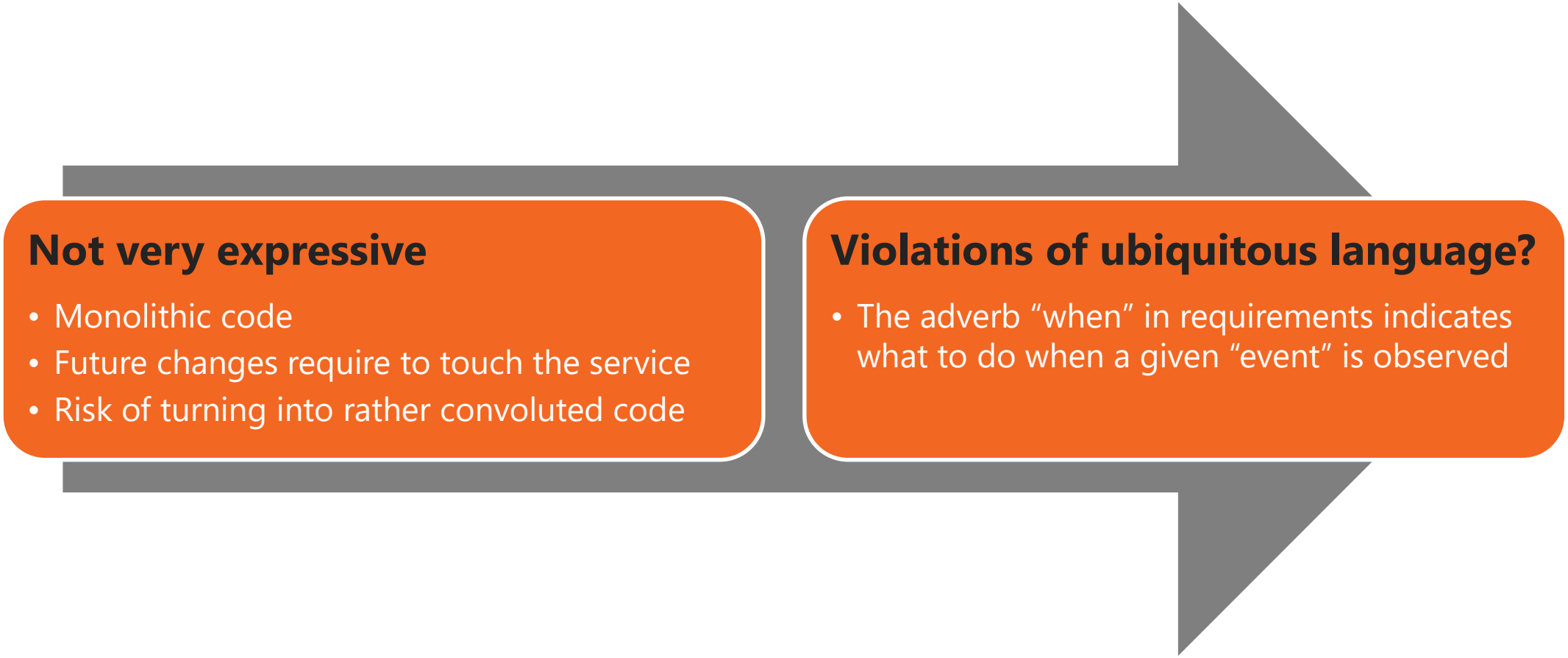
Some task(s) to perform upon creation of the order

Where would you implement such task(s)?

Option #1

```
/* Add any tasks to the method that processed the order */
void Checkout(ShoppingCart cart)
{
    // Proceed through the necessary steps
    ...
    if (success)
    {
        // Execute task(s)
        ...
    }
}
```

Option #1 – **Facts**



Option #2

Raise an event for domain-relevant facts

No need to have all handling code in one place

Raise of the event distinct from handling the event

Can handle the same event in multiple places

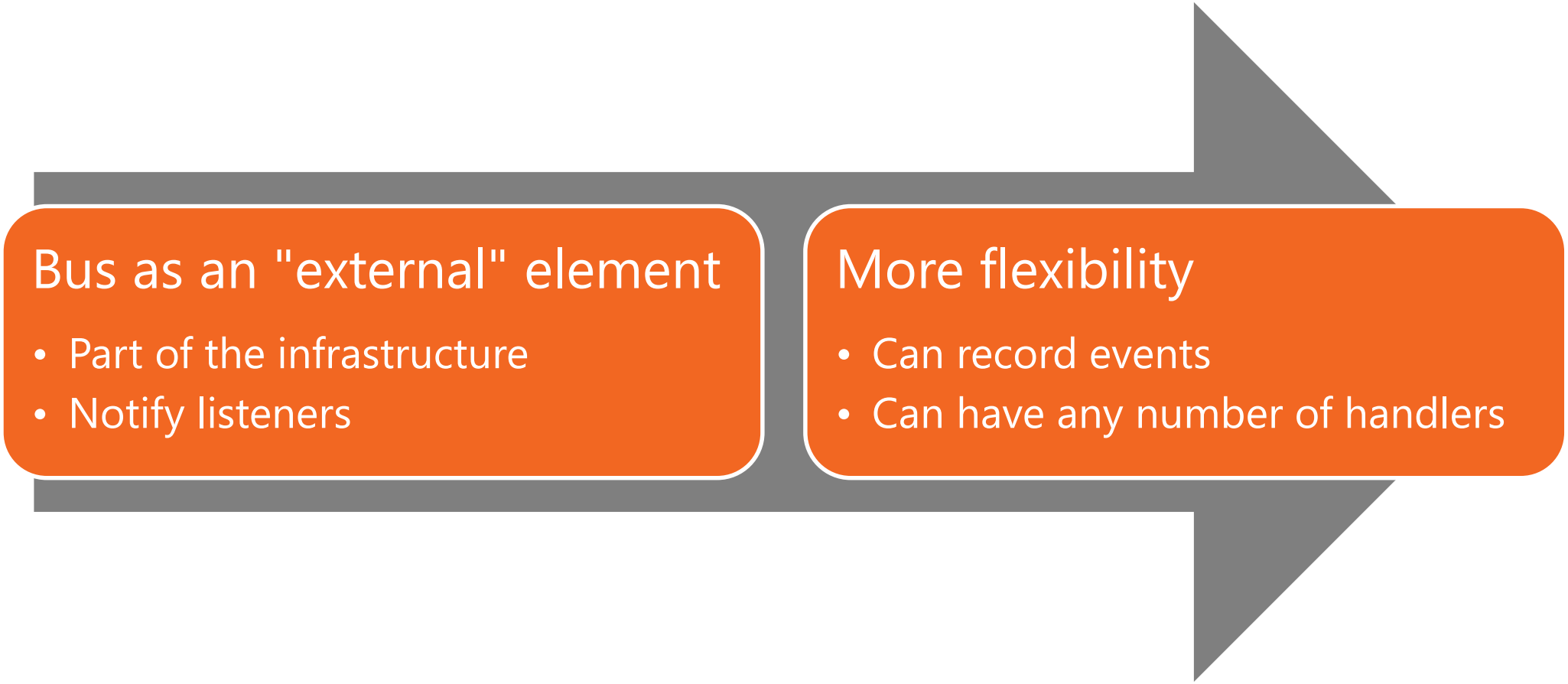
Option #2 – **event**

```
public class GoldMemberStatusReached : IDomainEvent
{
    public GoldMemberStatusReached(Customer customer)
    {
        Customer = customer;
    }

    public Customer Customer { get; set; }
}
```

Option #2 – **raise**

```
public void Checkout(ShoppingCart cart)
{
    // Proceed through the necessary steps
    ...

    if (success)
    {
        // Execute task(s)
        Bus.RaiseEvent(new GoldMemberStatusReached(customer));
    }
}
```

Option #2 – **Facts**



Events help significantly to coordinate actions within a workflow and to make use-case workflows a lot more resilient to changes.

Anemic Models

Anti-pattern because "**it takes behavior away from domain objects**"

- Entities only made of properties
- Required logic placed in service components
- Services orchestrate the application logic

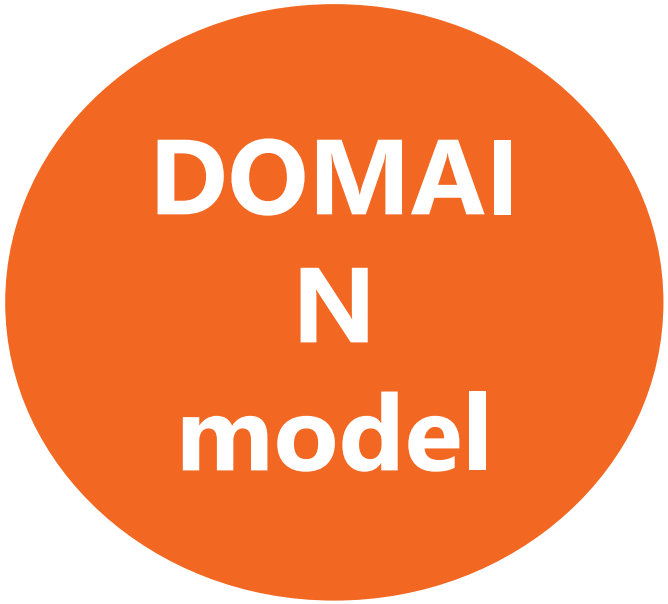
Is this **really** an anti-pattern today?

Entity Framework and Code First

- **Define a model of classes. Is it representing the domain model?**
  - No, it's mostly representing the persistence model.
- **Add behavior to a persistence model**
  - May or may not keep the resulting model fluent enough to express the ubiquitous language and be friendly enough to be persisted via EF
- **Database is infrastructure, but also a constraint**
  - Domain model
  - Persistence model
  - Adapters

The model you end up with when using **Code First** and **Entity Framework** is a lot more anemic than you may think.

If a developer **can** use an API the wrong way, **he will**.



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