Domain-Driven Design & Bounded Contexts

In this lesson, we'll discuss what domain-driven design is and how bounded contexts fit into that definition.

We'll cover the following

- Bounded context and strategic design
  - An example for a domain architecture
- Domain-driven design: definition
- Bounded context: definition
  - Multiple bounded contexts
- Domain events between bounded contexts
  - Example
- Bounded contexts and microservices
- Evolution

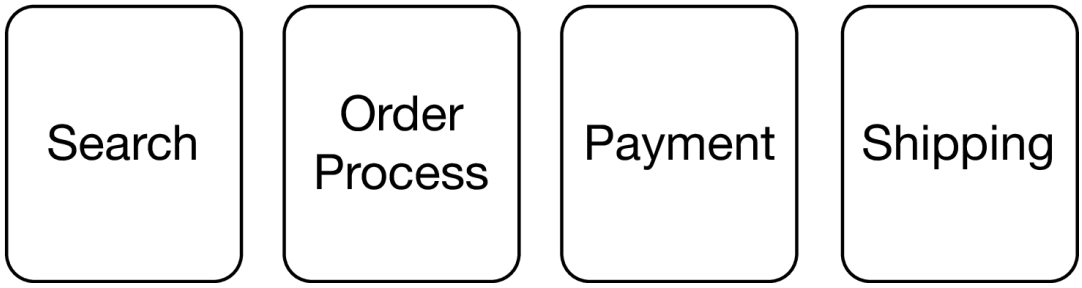
Bounded context and strategic design

Regarding to the domain architecture, the concept of micro and macro architecture has long been a common practice. A macro architecture divides the domains into coarse-grained modules. These modules are further divided as part of the micro architecture.

For example, an e-commerce system can be divided into modules and sub-modules as follows:

- **Customer registration**
- **Order process**
  - Data validation
  - Freight charge calculation
- **Payment**
- **Shipping**

The internal architecture of the **order process** module is, however, hidden from the outside and can be altered without affecting other modules. This **flexibility to change one module without influencing the other** modules is one of the main advantages of modular software development.



Example for a split into multiple domain modules

An example for a domain architecture

The drawing above shows an example of the division of a system into multiple domain modules. In this division, each module has its own domain model. Let’s discuss each.

- To **search** successfully, data, such as descriptions, images or prices, must be stored for the products. Important customer data can include, for example, the recommendations that can be determined based on past orders.

- To process orders in the **order process** module, the contents of the shopping cart have to be tracked. For products, only basic information is required such as name and price. Similarly, not too much data concerning the customer is necessary. The most important component of the domain model of this module is the shopping cart. It is then turned into an order that has to be handed over and processed by the other bounded contexts.

- For **payment**, the payment-associated information like credit card numbers has to be kept for each customer.

- For **shipping**, the delivery address is required information about the customer while the size and the weight are necessary information about the product.

This list reflects that **the modules require different domain models**. Not only does the data concerning customer and product differ but so does the entire model and the logic.

Domain-driven design: definition

Domain-driven design (DDD) offers a collection of **patterns** for the domain model of a system. For microservices, the patterns in the area of strategic design are the most interesting. They describe how a domain can be subdivided.

Here are some books you could look into if you are interested in Domain-Driven Design:

- Domain-driven design offers many more patterns that, for example, facilitate the model of individual modules. The original DDD book (https://www.amazon.com/Domain-Driven-Design-Tackling-Complexity-Software/dp/0321125215) provides a lot more information. It introduces the term “domain-driven design” and comprehensively describes DDD.
- The more compact book *Domain-driven Design Distilled* (https://www.amazon.com/Domain-Driven-Design-Distilled-Vaughn-Vernon/dp/0134434420) focuses on design, bounded context, and domain events.
- The *Domain-Driven Design Reference* (https://domainlanguage.com/ddd/reference/) is also by the author of the original DDD book. It contains all DDD patterns but without any additional explanation or examples.

Bounded context: definition

Domain-driven design speaks of a **bounded context**. Each domain model is valid only in a bounded context.

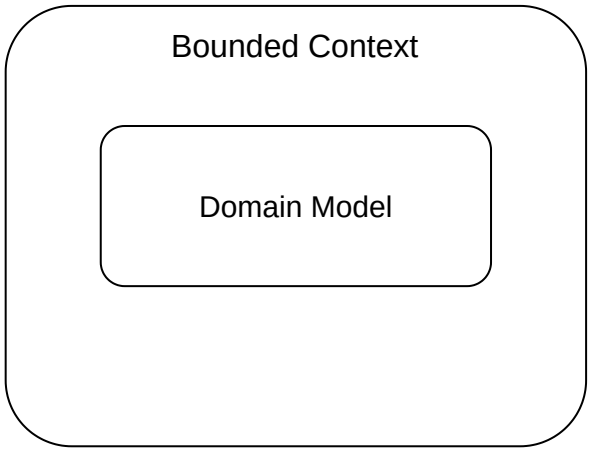
Consequently, *search*, *order process*, *payment*, and *shipping* **are such bounded contexts** because they each have their own domain model.

Multiple bounded contexts

It would be conceivable to implement a domain model that comprises **multiple bounded contexts**. However, such a model would not be the easiest solution.

For example, a price change affects *search*; however, it must not result in a price change for orders that have already been processed in *payment*. It is easier to store only the current price of a product in the bounded context *search*, and to store the price of the product of each order in *payment*, which can also comprise rebates and other complex logic.

Therefore, the simplest design consists of **multiple specialized domain models that are valid only in a certain context**. Each domain model has its own model for business objects such as customers or products.



Each domain model is valid only in a bounded context

Domain events between bounded contexts

For the communication between bounded contexts, we can use **domain events**.

Events can be useful for integrating bounded contexts. Domain events are a part of the domain model as they represent something that happened in the domain. That means they should also be relevant to domain experts.

Example

- Ordering a shopping cart can be modeled as such an event.
- This event is triggered by the bounded context *order process* and is received by the bounded contexts *shipping* and *payment* to initiate shipping and invoicing of the order.

Bounded contexts and microservices

Bounded contexts divide a system by domains. They **do not have to be microservices**. They can also be implemented as modules in a deployment monolith.

If the bounded contexts are implemented as microservices, this results in modules that are independent at the domain and technical level. Therefore, it is sensible to combine the concepts of microservices and bounded contexts.

The dependencies of the bounded contexts as part of strategic designs, as we'll learn in the next lesson, limit this independence. However, since the microservices are part of a larger system, **dependencies between the modules cannot be completely avoided**.

Evolution

There are a number of reasons why new bounded context, and therefore new microservices, might be created:

1. Over time, **new functionalities** might justify **new bounded contexts**.

2. It might become apparent that one bounded context should really be split into two. That might be the case because new logic is added to the bounded context, or the team understands the bounded context better.

3. **New microservices** might be created by dividing a current one due to a **technical reason** (recall division by technicality (https://www.educative.io/collection/page/10370001/6518081205567488/4532272759832576#two-levels-of-microservices-domain-and-technical)!).

    - One reason may be to make scalability easier. A microservice may be split in two since the resulting microservices will be smaller and therefore easier to scale. Such reasons might also lead to a larger number of microservices.

QUIZ

1 Suppose you're given the following e-commerce system:

- **Customer registration**
- **Order process**
    - Data validation
    - Freight charge calculation
- **Payment**
- **Shipping**

What will happen to the rest of the modules if the internal architecture of **order process** is changed as follows:

- **Customer registration**
- **Order process**
  - Data validation
  - *Input sanitation*
  - Freight charge calculation
- **Payment**
- **Shipping**

A) The rest of the modules will have to adopt more security principles too. Otherwise, the entire app can be compromised.

B) Nothing - the rest of the modules will not have to change anything.

C) The entire app will have to be deployed from scratch.

Submit Answer

Question 1 of 3
0 attempted

Reset Quiz

In the next lesson, we'll discuss some strategic design and its key patterns.

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