

Back to the future: How a 2004 book helps us design cloud native software

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Domain Driven Design

Introduction

¥ Speaker of the day: Konrad Renner

¥ Day to day job: Software Architect at ARZ Allgemeines Rechenzentrum GmbH

¥ Some personal things: Linux / Java / DDD / Open Source / OpenHab / Star Wars / BBQ enthusiast

¥ Direct link to digital life: [GitHub - konradrenner](#)

Agenda

- ¥ What is it about?
- ¥ How can this time travel help us?
- ¥ Are there other crazy ideas Doc?
- ¥ Sounds pretty heavy. How does this all come together?
- ¥ Let me know what you think about all this

What is it about?

¥ Ubiquitous Language

¥ Distillation and Context

¥ Refactoring toward deeper insight

NOTE

¥ Ubiquitous Language most important part

! Ubiquitous: appearing everywhere " users, architects, product owner, developer and of course in code too

! The meanings of words are "context sensitive"

¥ Distillation and Context

! You can think about Problem space and Solution Space

! Example: Problem Space - How to build a time machine; Solution Space - How a time machine is actually built

! *Distillation*: Distill the core domain out of your business domain

! Put most of your effort in your core domain

! Example Distillation: Doc Browns DeLorean DMC-12

Core Domain is the timetravel functionality

Subdomain is, that the DeLorean is possible to drive

! *Context*: The area in which a word or some kind of "structure" has the same meaning everywhere

! Example Context: Doc Browns DeLorean DMC-12

When Doc Brown talks about a timemachine, he means his DMC-12

When a mechanic gets his fingers on the DMC-12, he is repairing a car

¥ Refactoring toward deeper insight

! Design and implementation is an ongoing process

! Agile and DDD are a perfect match

! Think of products, not projects

Strategic and Tactical Design

NOTE

¥ Strategic Design

- ! "Big Picture"

- ! Communication paths between contexts

¥ Tactical Design

- ! Model within a Bounded Context

- ! Aggregates not just encapsulate, they are also important for consistency

¥ *Examples for technical communication possibilities will come in the next slides!*

How can this time travel help us?

NOTE

- ¥ There is a tragedy that not only concerns Marty McFly and Doc Brown, but also a galaxy far, far away
- ¥ First part of the tragedy could be a misunderstanding of the domain because:
"It's developer's understanding, not expert knowledge that gets released into production" - Alberto Brandolini
- ¥ The second part of the tragedy could be, that the cut of Microservices was based on an inappropriate approach
- ¥ Inappropriate approaches would be:
 - ! Pure technical
 - ! Based on organizational circumstances
- ¥ Why can this second part also end in a tragedy?
 - ! Because inappropriate cut Microservices can lead to unnecessary or even dangerous remote communication
 - ! In the worst case you transform a "local" monolithic app (local from a transactional view), to a distributed monolithic app (distributed transactions)
 - # Sooner or later this will lead to a real resilience tragedy (e.g. Deadlocks)
 - # Beware: Local monoliths do not necessarily have to be bad, but distributed monoliths are problematic most of the time!
- ¥ Service Mesh and similar solutions are often only symptom treatments, but do not solve the problems at the cause
- ¥ So this "time travel" to the 2004 book, can help us find more effective approach

- ! As the book subtitle states: Tackling complexity in the heart of software
- ! In the next couple of slides I will show you some of the concepts, to minimize the propability that such tragedies will occur

DDD for "cloud native software architecture"

¥ Focus on your core domain, not technical aspects

¥ Establish a common understanding of strategic AND tactical design

! Merge the people, split the software

¥ Build Microservices or Self-Contained-Systems based on Bounded Context

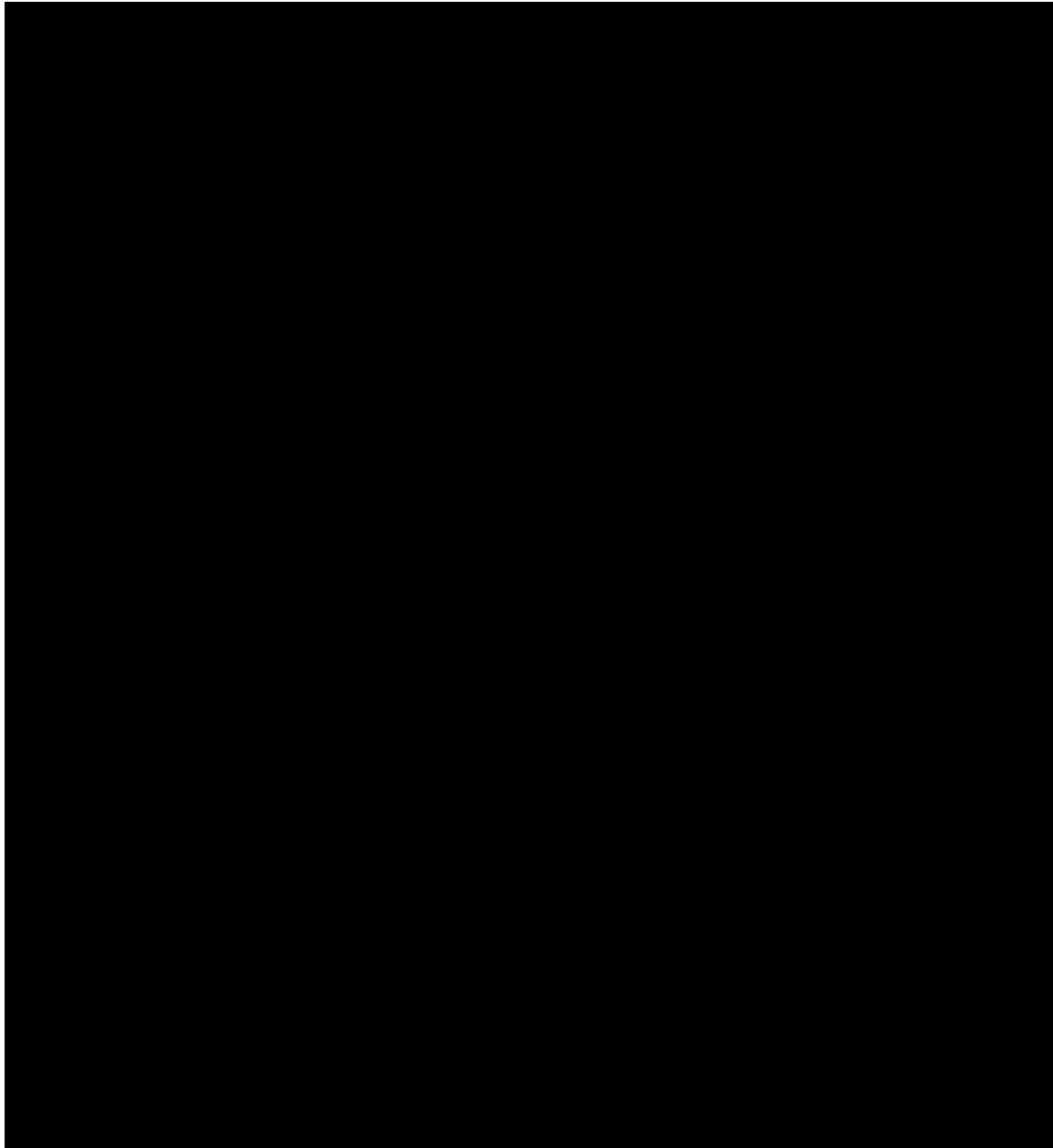
! Maybe a Bounded Context can also help by defining K8s Namespaces ;-)

NOTE

¥ One of the most common questions in my day to day work is, how to size Microservices or siblings (e.g. SCS)

! Just use the Bounded Contexts

Strategic Design



NOTE

¥ The Context Map helps to understand how communication flows through the system

! The relationship types helps in discussions about the technical communication

Confirmist

Upstream has no motivation to provide for the downstream team's need

Maybe a lib, which is developed without regard to the downstream (maybe because it was create for another downstream in form of a customer-supplier relationship)

Open Host Service

Access to a system is provided by clearly defined services, using a

clearly defined protocol

Maybe RESTful services with OpenAPI powered Published Language

Are there other crazy ideas Doc?

¥ *Disclaimer:* The following tooling are just my personal favorites

¥ Start with [Event Storming](#)

¥ Document architecture with [arc42 template](#)

¥ Take out the pain of documentation with [Documentation As Code](#)

¥ Structure code on basis of [Clean Architecture](#)

Event Storming



¥ The key idea of EventStorming is

1. See the system as a whole
2. Find a problem worth solving (Distillation)
3. Gather the best immediately available information
4. Start implementing a solution from the best possible starting point (Context)

¥ You just need a room with a long enough wall, many coloured stickies, something to write, the "right" people (and no table in the middle)

¥ Invite all relevant stakeholder in the room

! They put their view in brain storming fashion on an "endless" wall, in form of events

! Events are always past tense

! They discuss the outcomes

NOTE

Consensus is not required, it could be a signal for different meanings of an event; mark heavy discussion with a hotspot sticky

¥ Start with a Big Picture workshop

! Helps crossing knowledge silo boundaries

! You get many hints about possible Bounded Contexts

¥ Then you can start modelling your processes in the contexts with the integration of commands, policies and read models

! Picture that explain (nearly) everything (see picture in next slide)

¥ And then you could dive even deeper into Software Design (for discovering/designing Aggregates)

! Aggregates are the "state machines" between commands and events

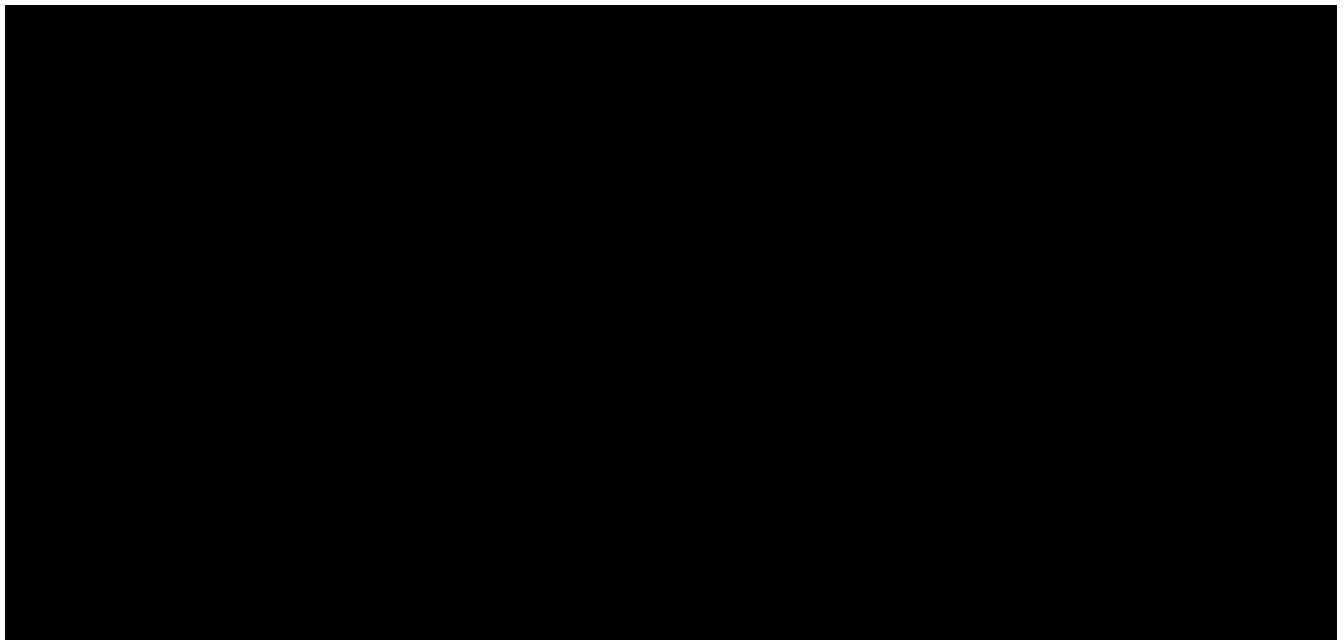
! It is not just Process Modelling with Aggregates because many processes can be connected with an Aggregate (think of a combination of processes with focus on Aggregates)

! Think of behavior, not data!

¥ But be aware, that every time you dive deeper, the required personŃs will change. And maybe you have to step back at some point of time

! Have a look at chapters "system scope and context" and "building block views" and "runtime views" of arc42, if you are interested in how to document outcomes

Event Storming



NOTE

- ¥ *Yellow*: People, Actor or Persona
- ¥ *Blue*: Command or Action (triggered from people, system or time based event)
- ¥ *Orange*: Event (consists at least of a noun and past tense verb)
- ¥ *Purple*: Policy or Business Rule, glue between event and thereafter command(Whenever [event(s)] the [command(s)])
- ¥ *Green*: Read Model (information/data that needs to be available to take a given decision)
- ¥ *Pink*: (External) System or part of a system
- ¥ *Red*: HotSpot (open question, noticed for later discussion)
- ¥ Precise Notation or explorations are not required and could harm creativity (e.g. it is not important if the yellow means people or Persona)

Clean Architecture

NOTE

- ¥ The most important part is flow of control
 - ! Never ever make inner circles depend on outer!
 - ! Technical aspects must never enter the domain logic
 - # If so: your code will e.g. not be unit testable (you cannot mock away technical aspects sufficient)
- ¥ This architecture perfectly fits with the "Layered Architecture" and Tactical design as described in the DDD book
 - ! Enterprise Business Rules: *Entities and Aggregates*
 - ! Application Business Rules: *Domain Services, Repository contracts* (e.g. Java Interface)
 - ! Interface Adapters: *Repository implementations*
- ¥ An example is just 2 slides away

Sounds pretty heavy. How does this all come together?

¥ [publishing-company example](#)

¥ Uses [Quarkus](#) as "*Kubernetes native Java stack*"

¥ [Boundary-Control-Entity](#) pattern for implementing "lightweight" Clean Architecture on top of DDD

¥ Architecture automatically checked with [ArchUnit](#)

NOTE

¥ Some think, Java is not the cool or hip enough nowadays

! They did not try Quarkus yet

! rock solid tooling, massive community, native performance and state of the art dev experience

¥ DDD and Clean Architecture are a perfect match

! Use BCE and you also get a standardized und clear structuring of your projects

Boundary: *Interface Adapters*

Control: *Application Business Rules*

Entity: *Enterprise Business Rules*

¥ Let the tooling do the "boring" work for you

! Automatic versioning and releasing

! Automatic publishing

! Automatic testing

¥ The (Git) Repo is the single source of truth for all aspects

! Architecture, Security, Code, Config

! Every change is tracked in your favorite VCS and absolutly traceable

! Maybe you use GitOps to further improve automation

Time for an example

NOTE

- ¥ Disclaimer: The [publishing-company example](#) has just little todo with back to the future :-) (one book entry)
- ¥ This example "lives", so it is in parts unfinished and will change from time to time
- ¥ It demonstrates all of the tools discussed, except context mapping
 - ! It just contains the "Author Aggregate" from the "Author Context" (1:1 mapping)
- ¥ It consists of a Web UI (JSF), REST API and a Cross Compiled Mobile/Desktop Companion App

ButÉ

¥ *Organizations which design systems [É] are constrained to produce designs which are copies of the communication structures of these organizations.* - Melvin E. Conway

¥ Have a look at [Team Topologies](#)

! Approach to modern software delivery with awareness of

Conway's Law, team cognitive load and responsive organization evolution

Team Topologies

NOTE

- ¥ Like DDD it "just" formalizes some good practices and ideas
- ¥ Stream aligned teams are the "heart" because they are aligned on value streams
 - ! These are based on top of the DevOps ideas
 - ! The other teams are "just" supporting them in which they take away cognitive load
 - ! So the other team types are just required, if the cognitive load will get too high for a stream aligned team
 - ! The other teams may consist "internally" also of stream aligned teams
- ¥ Complicated subsystem team:
 - ! Parts of the system which are not directly mapped to the value stream, but are a requirement "to function"
 - ! Think of the flux capacitor: one team just focuses on this complicated part, whereas the stream aligned teams will do improvements on the integration with the Delorean
- ¥ Enabling team:
 - ! Disclaimer: This is not Architecture Department, but a team of specialists
 - ! They help to spread knowledge about new things in the organization and tech world

! They also evaluate if "trends" are applicable and how

¥ Platform team:

! They are building and maintain e.g. the tools which are required, so that stream aligned teams can work effective AND efficient

! Think on the DeLorean: A Platform team would have built it and will repair things, whereas the stream aligned teams will focus on the time travel functionalities

¥ The interaction modes helps visualising and so understanding the dependencies between teams

! Collaboration: strong delivery dependencies (e.g. stream aligned and complicated subsystem team)

! X as a Service: Decoupling and standardization (mostly used when interaction with a platform team is needed)

! Facilitating: helping or being helped by another team (mostly the case when a stream aligned teams "gets knowledge" from an enabling team)

Let me know what you think about all this

NOTE

¥ Thank you for the possibilty to share my thoughts on this topic

¥ In closing, I have only two things to say

! Never stop refactoring, there is no "perfect" or "everlasting" solution

Software development is a learning process, working code is a nice side effect

! And: may the force be with you