

Software-Architektur im Zeitalter von generativer KI

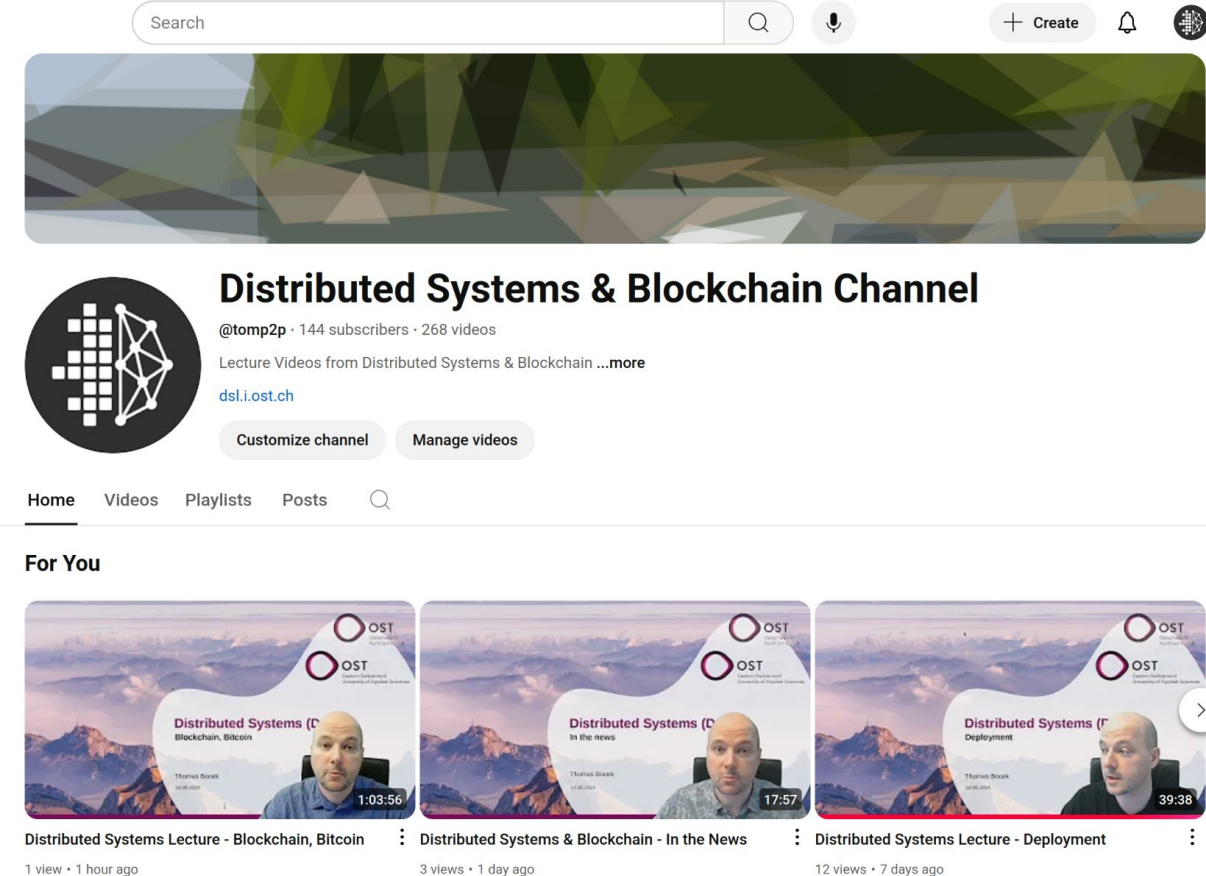
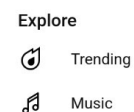
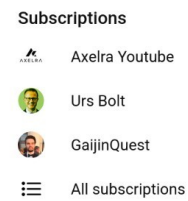
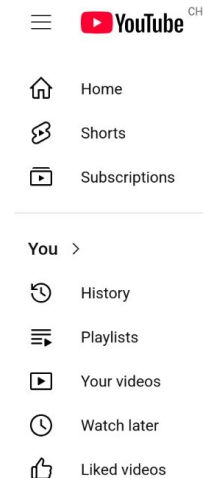
Kompetenzen und Rollen im Wandel?

Thomas Bocek

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About Me / Introduction

- OST, Lecturer
 - Distributed systems and blockchains
 - Hands on!
- Also on YouTube, since Corona
 - Like and subscribe 😊



GenAI

- Productivity gains (own experience)
 - Coding
 - I need a skip list in the language X - ✓
 - I need a component in Svelte 5 that does X - ✗
 - Transcribing
 - “In the news” – generate subtitles - ✓
 - Mandate (data room for startups)
 - Categorize documents according to this list - ✓
 - Red flag report - ?
 - Research / lecture preparation
 - Ask stupid questions - ✓
 - Find answers (perplexity, kagi) faster - ✓

```
const maxLevel = 32 // Enough for 2^32 elements 5usages
const nodesPerLevel = 4 // Every 4 nodes we add a level up

// skipList implements a thread-safe deterministic skip list
// Implement interface
type skipList[K comparable, V any] struct { 22 usages 2 Thomas
    items map[K]*shmPair[K, V]
    head *shmPair[K, V]
    level int
    size int // Number of elements
    mu sync.RWMutex
    less func(a K, b K) bool
    // ...
```

T Can PNG be lossy?

No, PNG (Portable Network Graphics) is a **lossless** compression format. This means that when you save an image as PNG, no image data is lost during compression - you get exactly the same image back when you decompress it.

However, there are a few nuances to consider:

When PNG might appear "lossy":

- If you convert from a higher bit-depth format (like 16-bit) to 8-bit PNG, you lose color information in the conversion process (but the PNG itself is still lossless)

Anthropic / OpenAI / xAI / Meta / Mistral Announcements

- 28.05.2025: Behind the Curtain: A white-collar bloodbath [\[link\]](#)
 - Anthropic CEO warns: massive job displacement
 - “AI could eliminate 40-50% of entry-level white-collar jobs within 1-5 years”
- Marketing
 - Sales! - major AI companies are currently operating at significant losses
 - Make your model seem superior
 - FOMO: known from the blockchain world
 - Anthropic CEO Timing: Shortly after announcing new model
- More than 2 years since GPT4
 - GPT4 – here I saw productivity gains
 - Mass layoffs due to GenAI?
- My prediction: GenAI will generate more work than it eliminates, but the work will be different



My Prediction: GenAI Will Generate More Work

- Complexity increases, more code is generated
- New tools = new problems
- Integration and maintenance become more complex
- Quality assurance becomes more critical
- Challenge task since 2018
 - I actively encourage students to use GenAI
 - Students generate better results, more features, I need to check more code

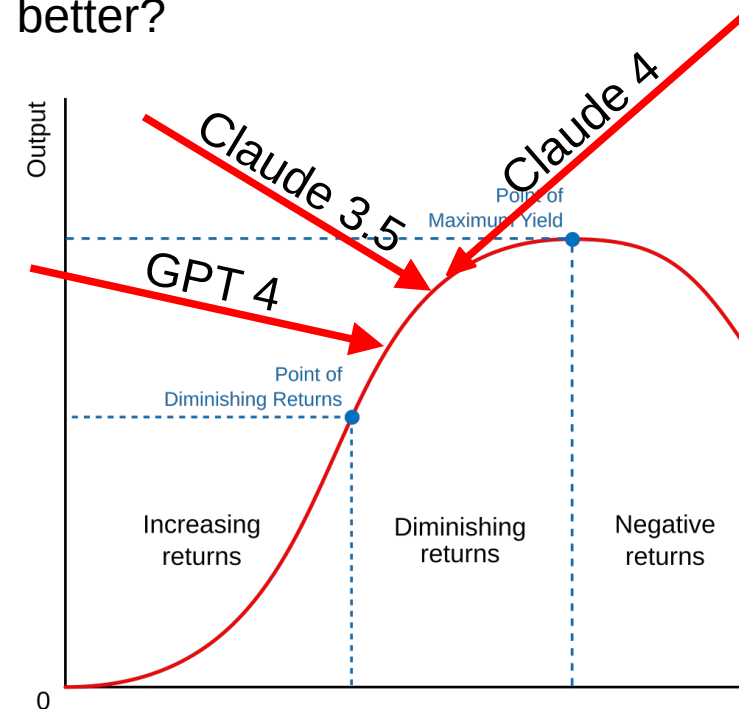


Vibe Coding

- What is it?
 - Generate code that “feels” right
 - Less structure, more iterations
 - It somehow works
- Future of engineering?
 - Problem: vibe coders do not understand the code
- Problem: GenAI introduced silly mistakes

“I have 10k lines of code, and fixing bugs is impossible, as each iteration introduces new bugs”

- Do we need software architecture when GenAI writes the code?
 - More than ever!
 - But in 1-5 years GenAI gets significantly better?



Source: https://en.wikipedia.org/wiki/Diminishing_returns

Why Do We Need Software Architecture?

- Managing Complexity
 - Breaking down complex systems into understandable parts → creating mental models to reason about
 - Prevent unmaintainable "big ball of mud"
 - Communication
 - Architecture provides a shared language for stakeholders
- Managing Complexity
 - Can GenAI manage complexity and create mental models to reason about?
 - No! But it can help
 - Communication
 - Can GenAI provide a shared language?
 - Yes/no, but in a different way! GenAI can translate, you can ask questions

Software Architecture is Changing?

- Change is the only constant, also in software architecture
 - My University era (~2000): Object-Oriented Programming (OOP) was the gold standard
 - Today: E.g., Rust / Go alternative approaches and philosophies (composition over inheritance)
 - Monolithic vs. microservices
 - Microservices skepticism growing
 - Well-structured monoliths with clear module boundaries → valid architecture choice
- Software architecture brings structure
 - **Becomes more important, not less important**
 - AI-generated systems risk becoming incomprehensible, unmaintainable artifacts that work until they don't - and then no one knows why
- How to use GenAI in software architecture?
 - 17.03.2025: The application of GenAI in software architecture is still in its infancy [\[link\]](#)

Future Software Architects

- Today...
 - Design patterns
 - UML-diagrams
 - Tech-stack decisions
 - System design
- Maybe new roles...
 - Prompt architect for reusable prompt patterns
 - AI integration specialist
 - Code auditor: understands and validates GenAI code
- ...Tomorrow
 - Prompt engineering
 - GenAI-output validation
 - AI-assisted design exploration
 - GenAI-based documentation and communication
- Role transformations...
 - **Developer** → **Developer (with new tools)**
 - **QA engineer** → **QA engineer (with new tools)**
 - **Software architect** → **Software architect (with new tools)**

Questions?



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