PRESENTATION TO THE MASTER'S THESIS: "PRINCIPLES OF SYSTEM ORGANIZATION AND PRACTICAL USE CASES OF NANOSERVICE ARCHITECTURE"

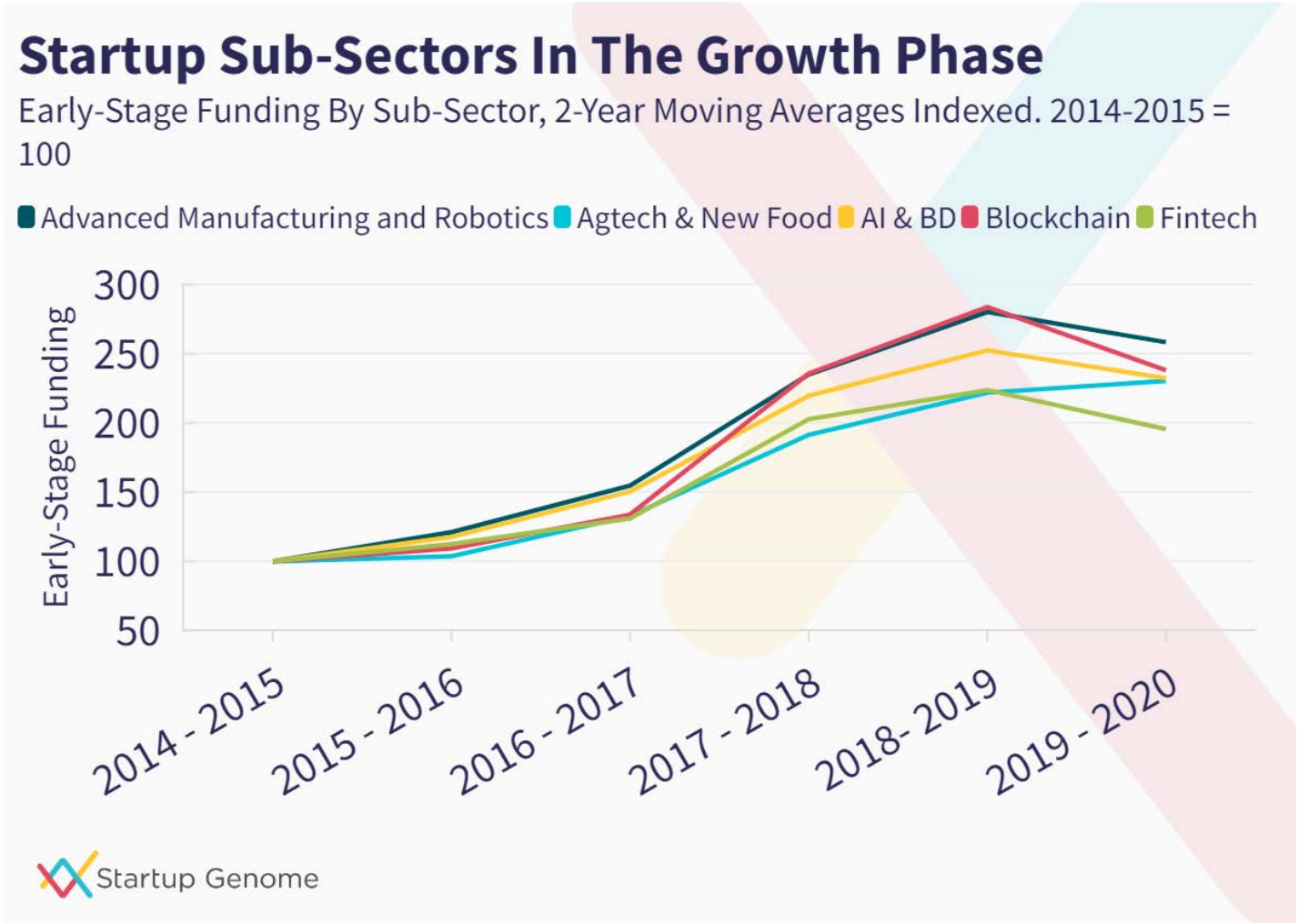
AGENDA

- Purpose and Objectives
- Definition of the nanoservice architecture
- Benefits and issues of the nanoservice architecture
- Communication Patterns
- Nanoservices use cases
- Implemented system
- Conclusions

PURPOSE AND OBJECTIVES

- Why nanoservices matter
- Addressing scalability and flexibility in software systems
- Suitability for cloud environments and IoT applications
- **Purpose**: Define the nanoservice architecture, its fundamentals of communication, and relevant use cases
- **Objectives:** differentiate nanoservice architecture from other architectural styles, analyze relevant communication patterns, design a real-world nanoservice-based architecture, implement the system

PURPOSE AND OBJECTIVES



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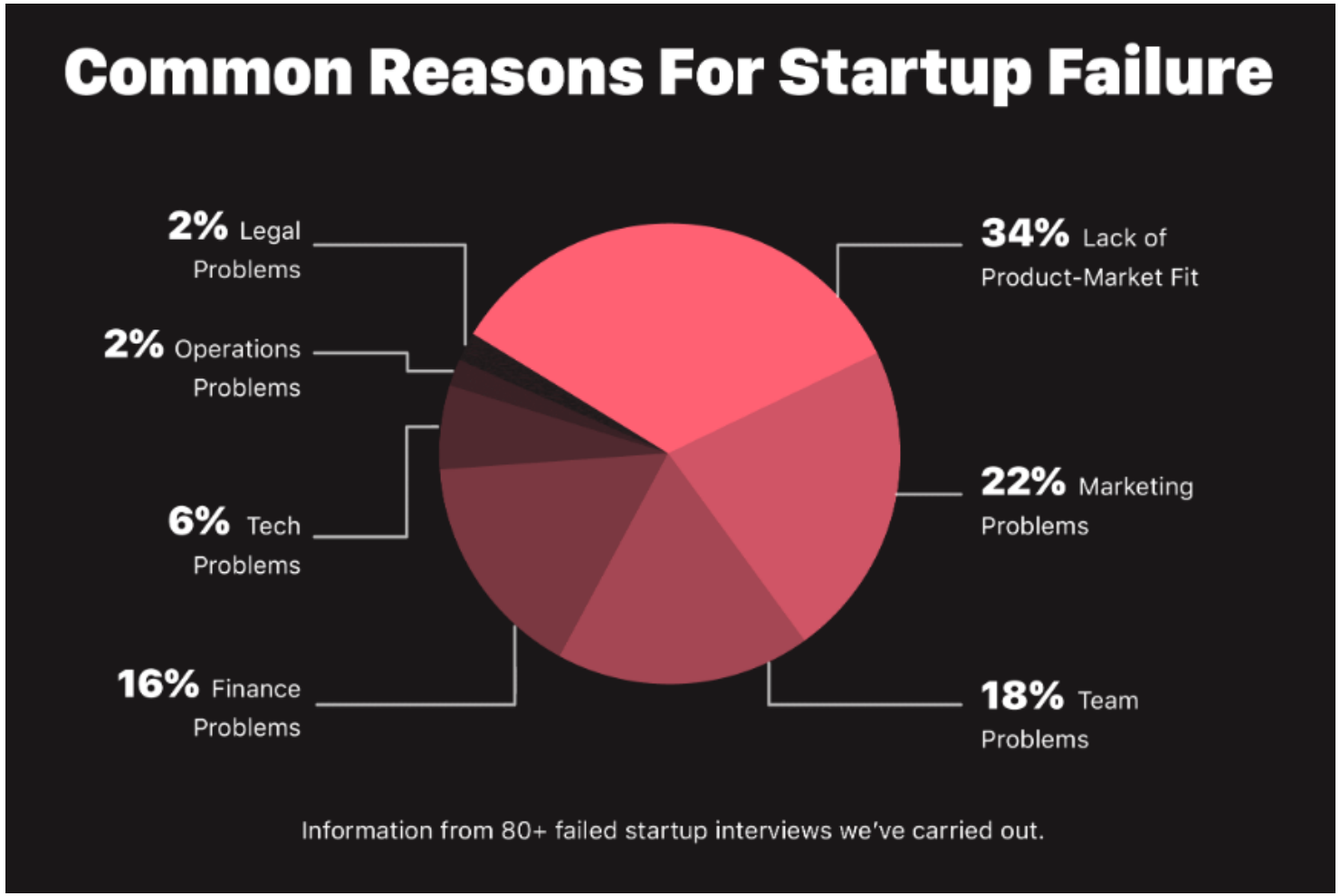
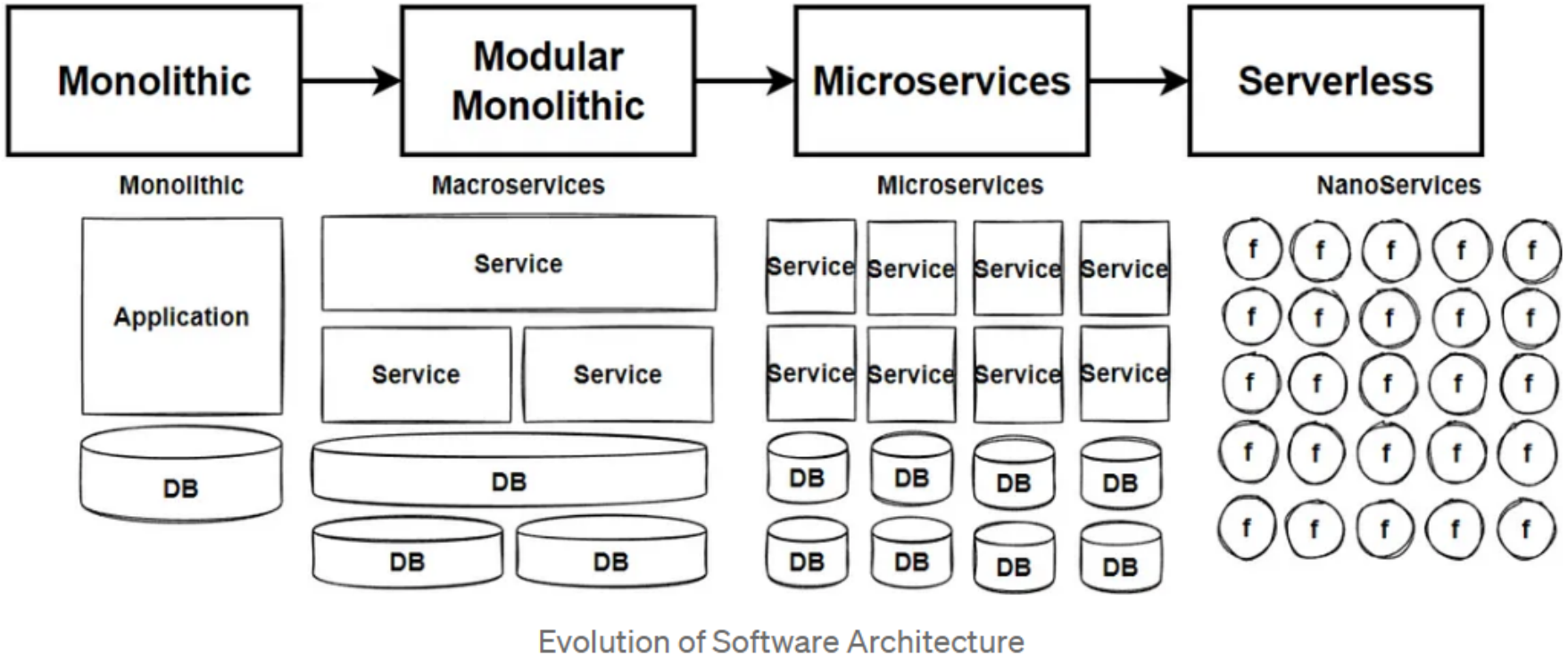


DEFINITION OF THE NANOSERVICE ARCHITECTURE

- What is a software architecture
- What is a nanoservice and nanoservice architecture?
- Differences between the nanoservice architecture and serverless approach

DEFINITION OF THE NANOSERVICE ARCHITECTURE



Evolution of Software Architecture

BENEFITS AND ISSUES OF THE NANOSERVICE ARCHITECTURE

Benefits:

- Cloud computing
- Cost efficiency
- Easy scaling
- Independent development
- Easy deployment
- Technology Diversity

Issues:

- increased complexity
- communication overhead
- operational overhead
- possible increased infrastructure costs
- increased latency in processing requests
- development overhead
- testing challenges

COMMUNICATION PATTERNS

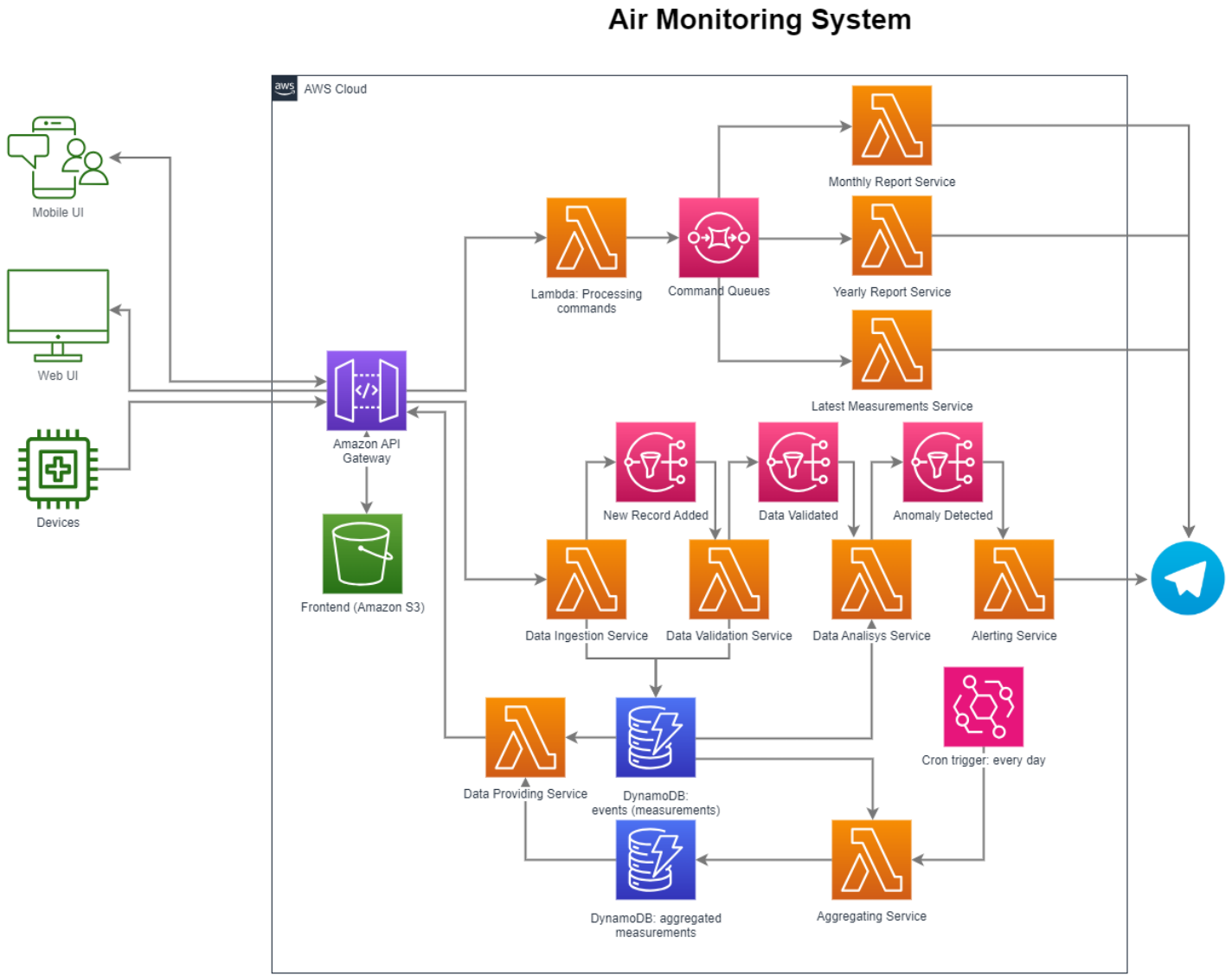
- Request/response
- Publish/subscribe (Event-Driven Communication)
- Request-Reply Pattern
- Direct-Call Pattern
- Command Pattern
- Priority Queue Pattern
- Pattern “Saga”
- Pattern “Two-Phase Commit”

NANOSERVICES USE CASES

- backend compute (Cloud Guru, Comcast, Coinbase, Fender, Nordstrom, and Netflix backends)
- Internet of Things
- data processing and manipulation
- real-time analytics
- legacy API proxy
- scheduled services
- bots
- hybrids

IMPLEMENTED SYSTEM

- AWS infrastructure
- Serverless Framework
- Event-Driven Communication
- Command Pattern
- Scheduled aggregation
- Queues and topics



IMPLEMENTED SYSTEM

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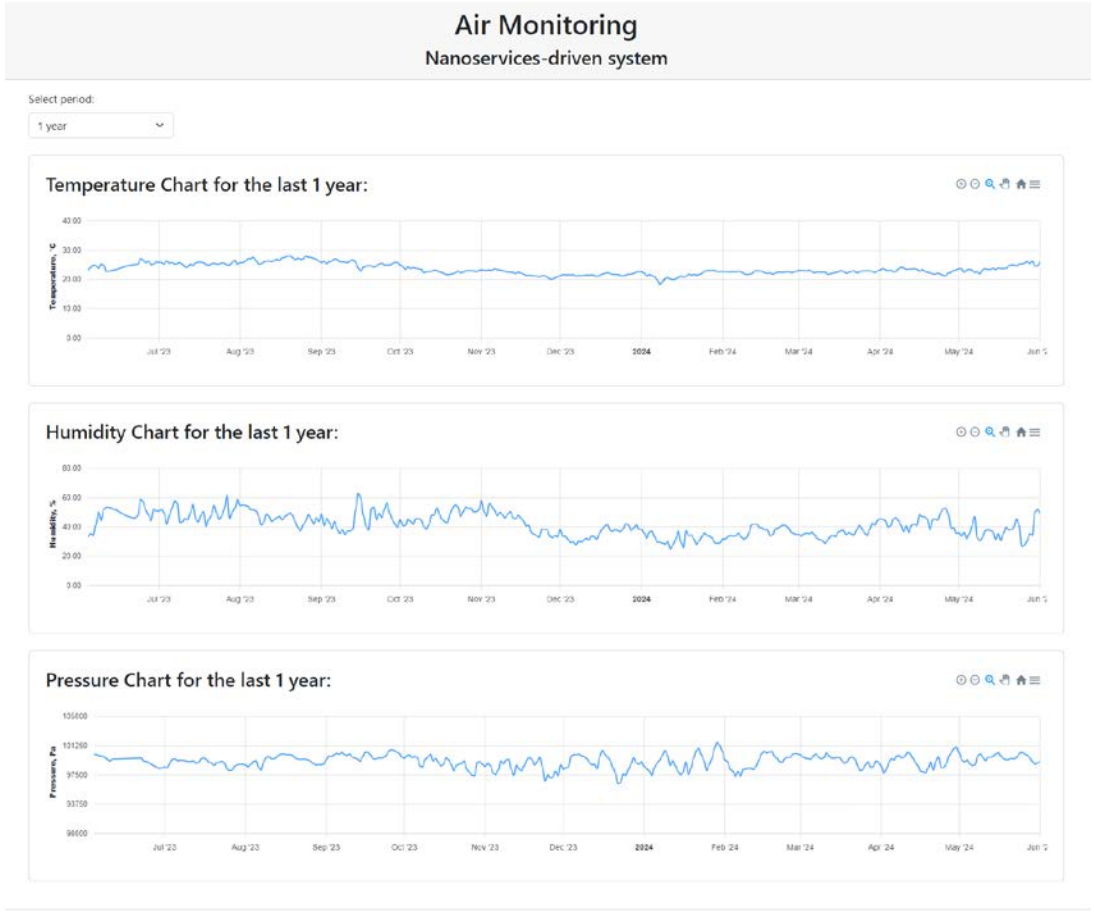
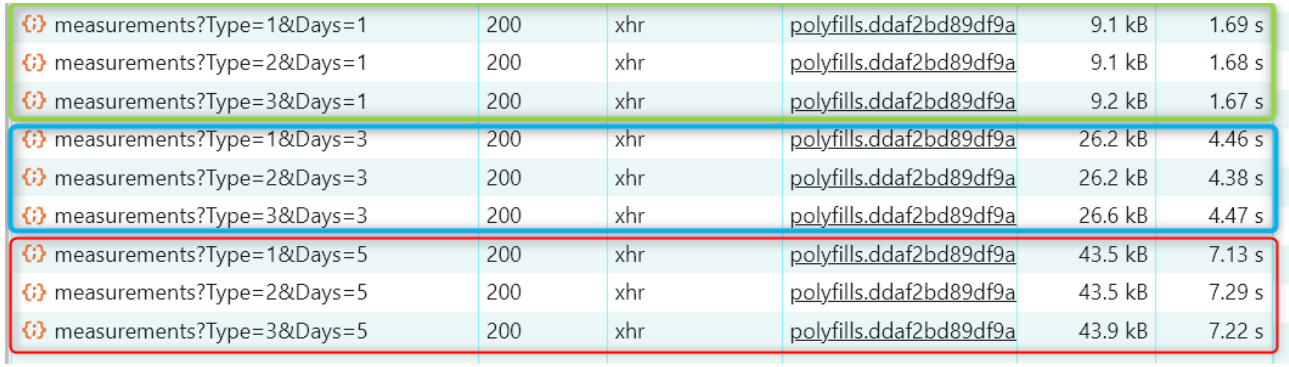


IMPLEMENTED SYSTEM

Performance overview

Without data aggregation (1-5 days):



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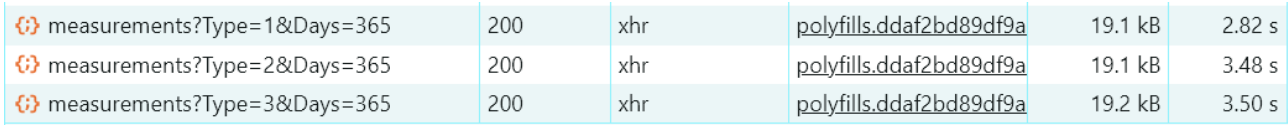
With data aggregation (1 year):



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CONCLUSIONS

Key Findings:

- Emphasis on asynchronous communication and event-driven architecture
- Effective patterns: Event-Driven Communication, Command Pattern, Request-Reply Pattern
- Benefits: independent service operation, autoscaling, unexpected peak loads

Ideal Use Cases:

- IoT applications, real-time data analytics, backend compute, scheduled services

Recommendations:

- Optimize communication patterns to minimize latency and resource overhead
- Investigate advanced orchestration and choreography techniques
- Explore integration with emerging technologies (edge computing, AI-driven automation)
- Assess long-term cost implications in various cloud environments

QUESTIONS & ANSWERS

Thanks for attention!