Proiectarea si Arhitectura Sistemelor Software Complexe

Design and Architecture of Complex Software Systems

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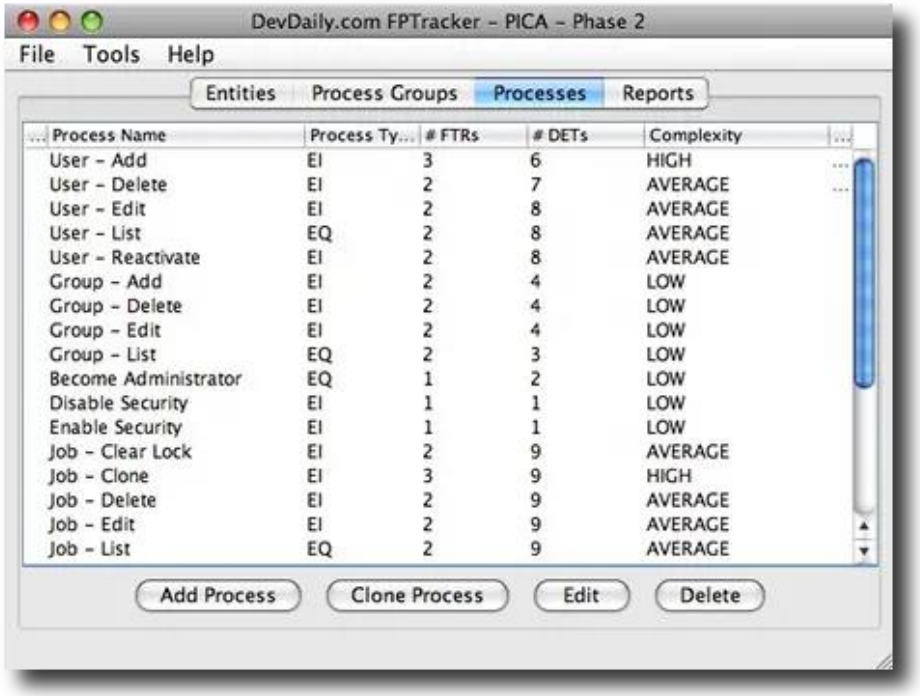
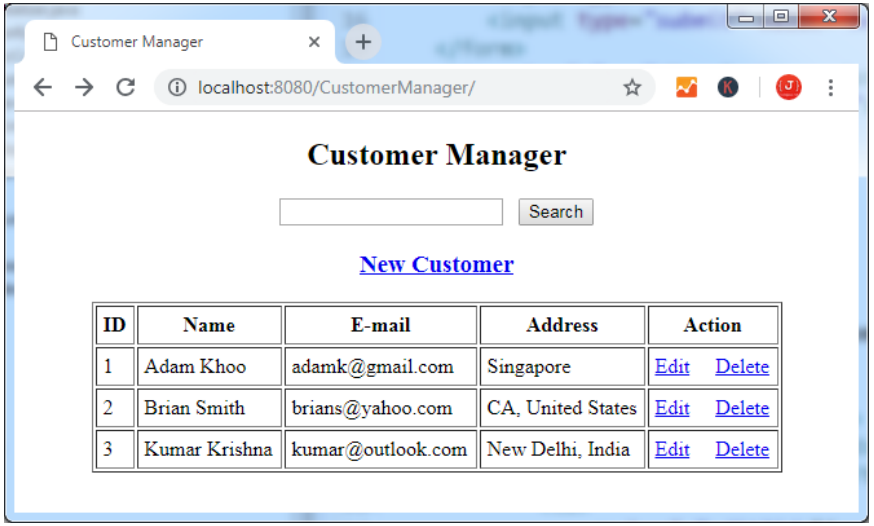
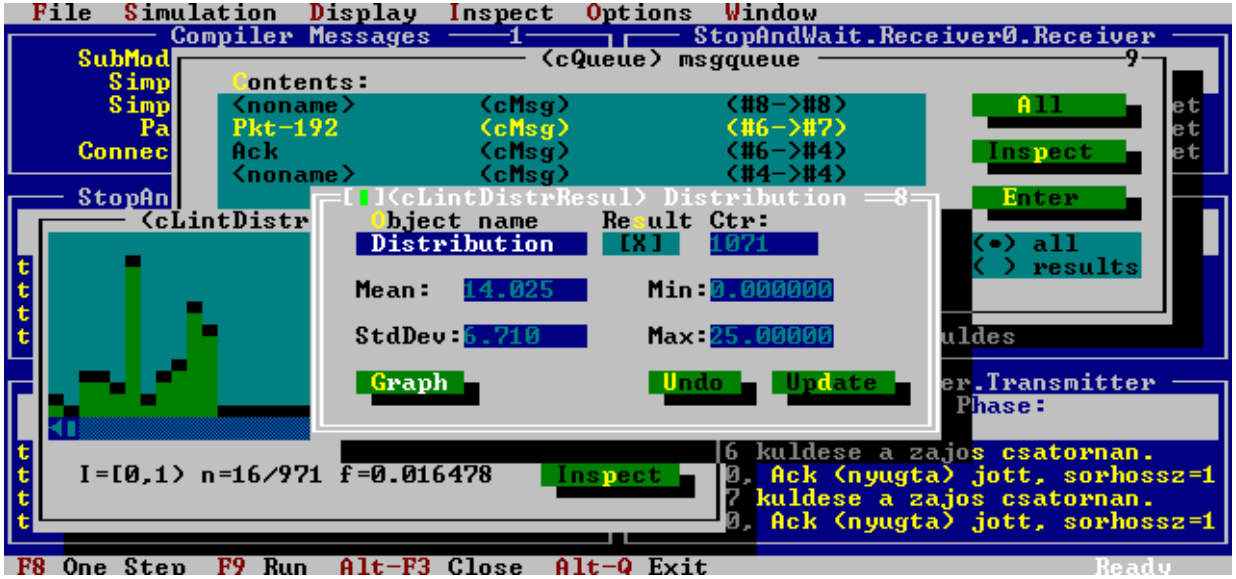
Quizz

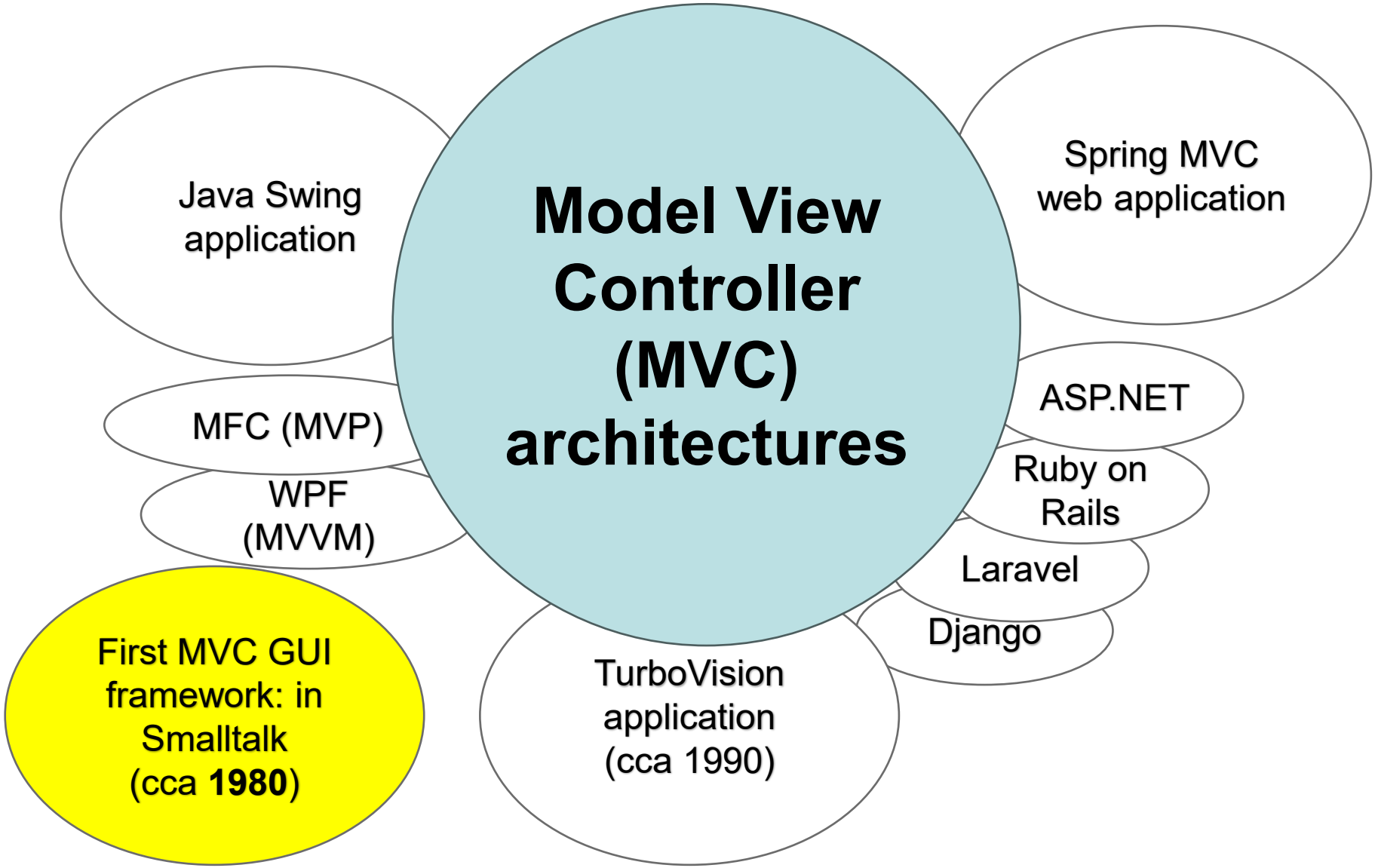
What do the following software systems have in common?


DevDaily.com FPTracker - PICA - Phase 2
File Tools Help
Entities Process Groups Processes Reports
Process Name | Process Ty... | # FTRs | # DETs | Complexity
User - Add | EI | 3 | 6 | HIGH
User - Delete | EI | 2 | 7 | AVERAGE
User - Edit | EI | 2 | 8 | AVERAGE
User - List | EQ | 2 | 8 | AVERAGE
User - Reactivate | EI | 2 | 8 | AVERAGE
Group - Add | EI | 2 | 4 | LOW
Group - Delete | EI | 2 | 4 | LOW
Group - Edit | EI | 2 | 4 | LOW
Group - List | EQ | 2 | 3 | LOW
Become Administrator | EQ | 1 | 2 | LOW
Disable Security | EI | 1 | 1 | LOW
Enable Security | EI | 1 | 1 | LOW
Job - Clear Lock | EI | 2 | 9 | AVERAGE
Job - Clone | EI | 3 | 9 | HIGH
Job - Delete | EI | 2 | 9 | AVERAGE
Job - Edit | EI | 2 | 9 | AVERAGE
Job - List | EQ | 2 | 9 | AVERAGE
Add Process
Clone Process
Edit
Delete

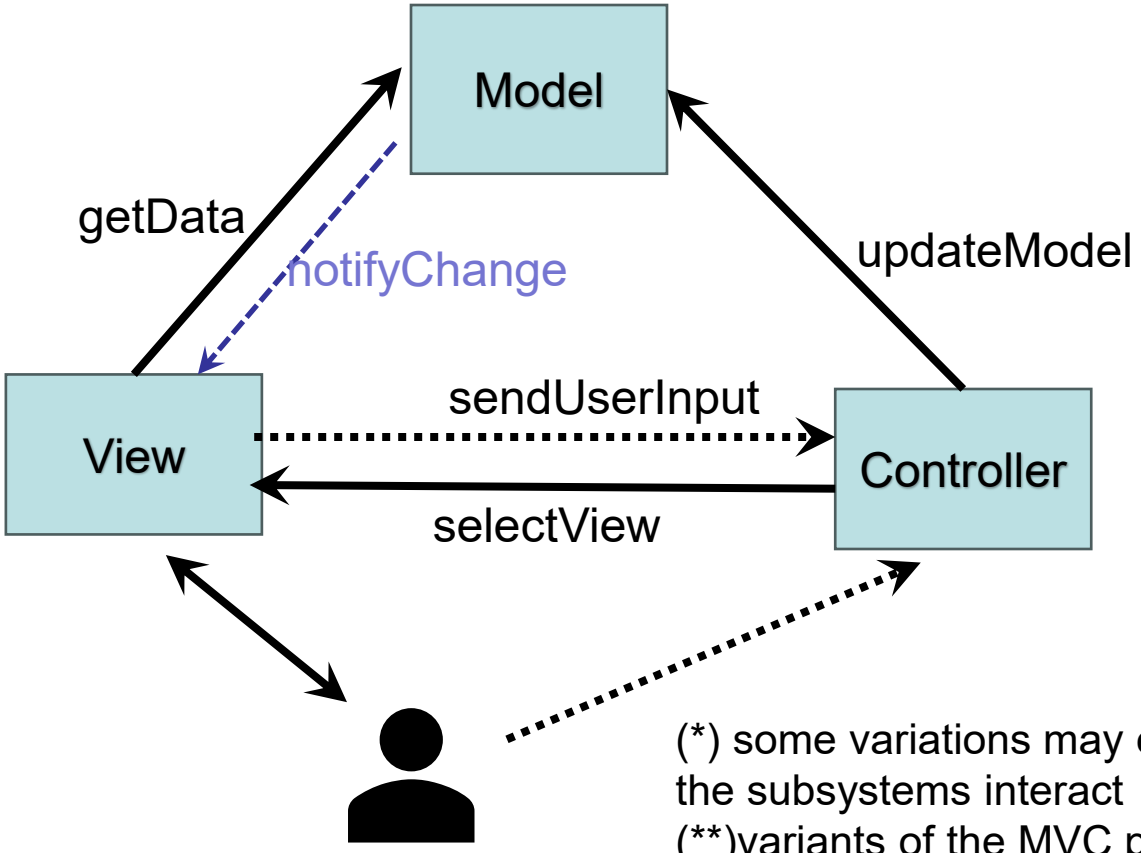

Customer Manager
localhost:8080/CustomerManager/
Customer Manager
Search
New Customer
ID | Name | E-mail | Address | Action
1 | Adam Khoo | adamk@gmail.com | Singapore | Edit Delete
2 | Brian Smith | brians@yahoo.com | CA, United States | Edit Delete
3 | Kumar Krishna | kumar@outlook.com | New Delhi, India | Edit Delete


File Simulation Display Inspect Options Window
Compiler Messages
StopAndWait.Receiver0.Receiver
(cQueue) msgqueue
Contents:
<noname> (cMsg) (#8->#8)
Pkt-192 (cMsg) (#6->#7)
Ack (cMsg) (#6->#4)
<noname> (cMsg) (#4->#4)
All
Inspect
Enter
(•) all
( ) results
(cLintDistrResul) Distribution
Object name Result Ctr:
Distribution [X] 1071
Mean: 14.025
Min: 0.000000
StdDev: 6.710
Max: 25.00000
Graph
Undo
Update
I=[0,1) n=16/971 f=0.016478
Inspect
6 kuldese a zajos csatornan.
0, Ack (nyugta) jott, sorhossz=1
7 kuldese a zajos csatornan.
0, Ack (nyugta) jott, sorhossz=1
F8 One Step F9 Run Alt-F3 Close Alt-Q Exit
Ready

What do they have in common?



MVC architectural pattern for interactive systems



(*) some variations may exist in the way the subsystems interact
(**)variants of the MVC pattern: MVP, MVVM, etc

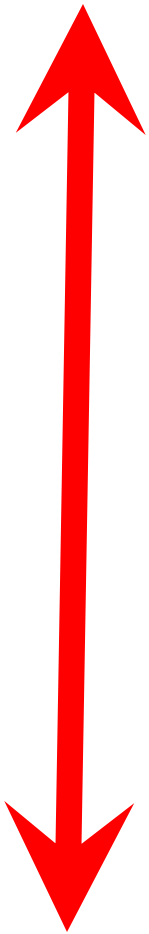
Technologies vs Patterns

Pattern

- In software:
- **Pattern = *general* solution to a *recurring* problem in a specific context**
- **Pattern =** a form of ***reuse***:
  - Reuse of ***wisdom***, ***experience*** (**no direct reuse of code!**)
  - Kind of partial ***reuse of design solutions***:
    - At different levels of abstraction
    - At different levels of detail
- **Pattern introduce a domain-specific *vocabulary* (a language of patterns)**

Pattern

Abstraction



Detail

"*An **architectural style** defines a **family** of software systems in terms of their **structural organization**. An architectural style expresses **components** and the **relationships** between them, with the **constraints** of their application, and the associated composition and design **rules** for their construction.*"

"*An **architectural pattern** expresses a **fundamental structural organization schema** for software systems. It provides a set of **predefined subsystems**, specifies their responsibilities, and includes **rules** and guidelines for organizing the **relationships** between them.*"

"*A **design pattern** provides a **scheme for refining the subsystems** of a software system, or the relationships between them. It describes a commonly-recurring structure of communicating components that solves a **general design problem** within a **particular context**.*"

Why is software architecture important?

- Communication between stakeholders
- Early design decisions
- Transferable, reusable model

Terminology, vocabulary ?

Starting points ? Reuse?

Established terminology, good practices, standards, success stories ….
PATTERNS

Course goals. Course topics

- Fundamental architectural styles and patterns
  - Laters; Pipes&Filters; Repository
  - Event-Driven Architectures. Publish-Subscribe infrastructures. (greenrobot; RabbitMQ)
- Architectural patterns for some relevant application domains:
  - Adaptive systems: The Reflection pattern. Meta Layer Architectures. Reflective languages. Applications of reflective languages.
  - Remote Procedure Call. Remote Method Invocation: Patterns (Remote Proxy); Middleware technologies examples (gRPC; RMI)
  - Data access patterns:
    - Decoupling data access - DAO pattern. Technology example – Spring Data
    - Mapping OO program model on Data models (Data binding, ORM)

Practical assignments

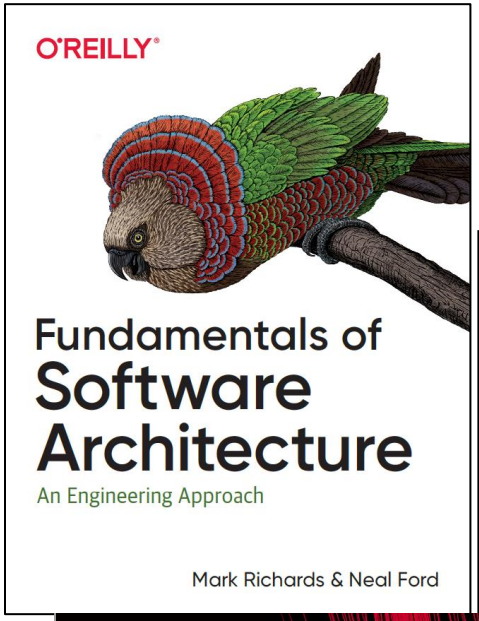
- Small projects where you have to apply/implement the patterns discussed in the lectures
- 4 main topics => 4 assignments. Each assignment 2-3 weeks
- Every assignment has multiple options, with various degrees of complexity, from easy to more difficult
- Can add bonus points for exam.
- By default, final grade = (lab + written exam +bonus points)/2
- Enough points (6 points) -> no more written exam at all
- Need *good* OO programming knowledge background. Can use implementation language of your choice, but examples in lectures are mostly Java-related
- PDSS (SSD): nice to have but not an absolute prerequisite

Course Webpage

- On Campus Virtual
- PASSC https://cv.upt.ro/course/view.php?id=1604
- DACSS https://cv.upt.ro/course/view.php?id=1661

- http://staff.cs.upt.ro/~ioana/arhit-engl/
  - Lectures slides and schedule
  - Lab assignments
  - Bibliographic pointers and additional resources

Resources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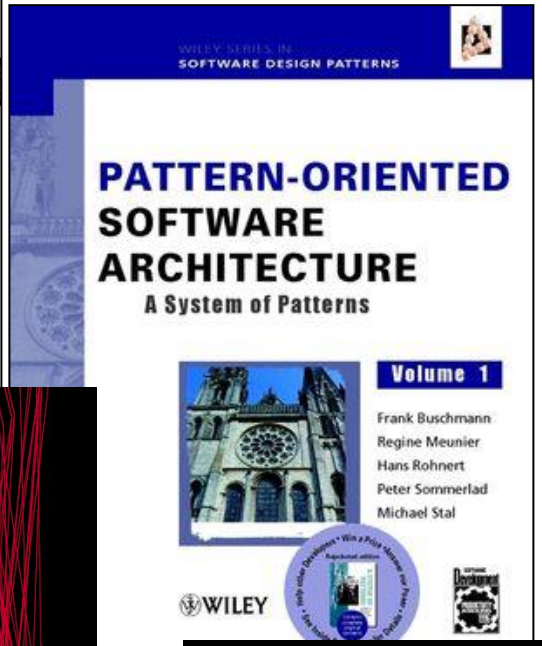
Mark Richards & Neal Ford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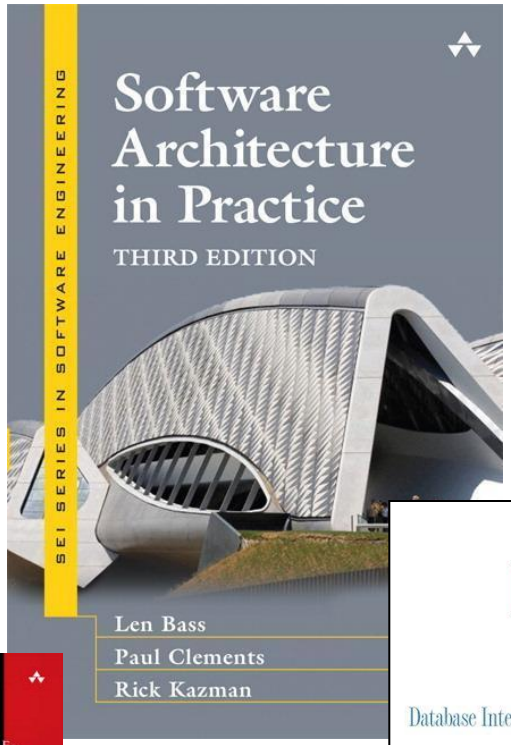
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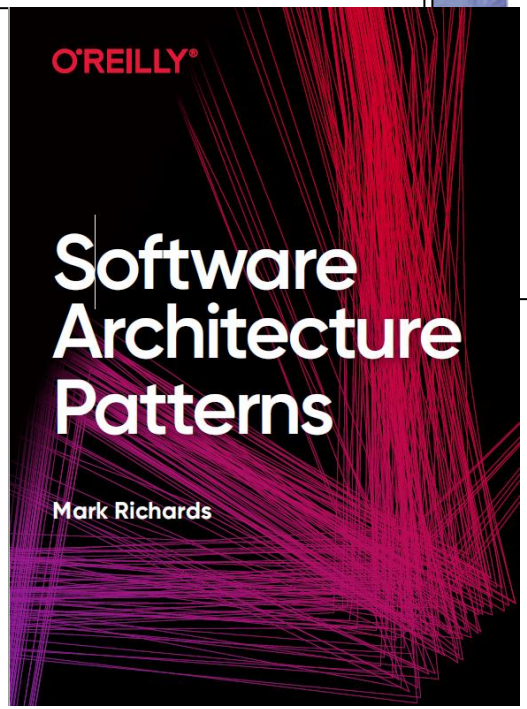
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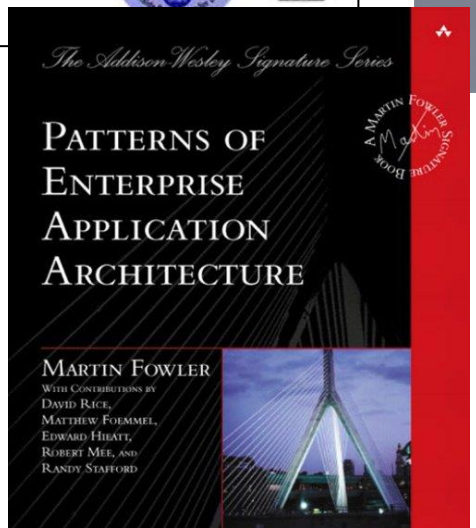
Mark Richards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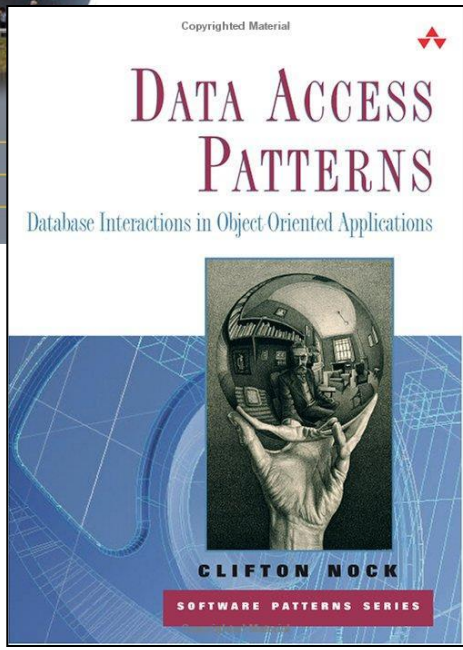
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