

SScAC: Towards a framework for small-scale arch. comparison

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Purpose and contribution

- Formalize design comparison
- Validate pattern suitability
- Reasoned recommendation

- Educational purposes
- Framework should force a student to think about design decisions
- Generally: small-scale projects

Framework limitations

- We want to compare, not to evaluate
- Isolated results (one time use)
- Maintaining the same functionality
- Only design level
- Comparison of goals only resulting from architectural features

Building blocks

- Goals have different significance
- Goal is reached through a combination of *properties*
- A property can have different weights in context of different goals

Framework usage

- Create architecture *designs* (not implementations)
- Choose your design goals (= qualities you want to attain) and give them relative weights
- Rate their respective properties (0 - 4)
- Calculate valuation of each goal
 $\sum \textit{propertyWeight} \cdot \textit{propertyGrade}$
- Calculate valuation of each design
 $\sum \textit{weight} \cdot \textit{goal}$

Case study: Keyword in Context

- Finding occurrences of words in their context
- Index = $\text{map}(\textit{keyword}, (\textit{pos}_1, \textit{pos}_2, \dots))$
- Five basic actions mapped to the design components
 - line reading
 - splitting lines into tokens
 - indexing and storing tokens
 - creating contexts using index and stored tokens
 - outputting contexts
- Logical design components stay the same, we only change how they interact

Compared KWIC designs

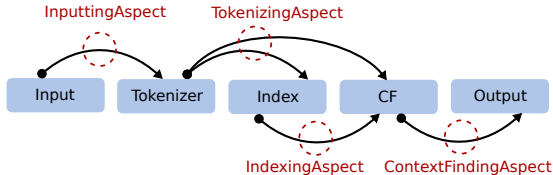


Pipe and Filter

Compared KWIC designs



Pipe and Filter

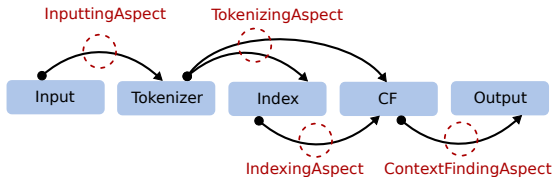


Aspect Oriented

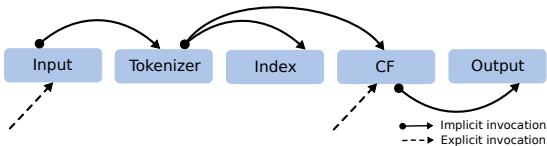
Compared KWIC designs



Pipe and Filter



Aspect Oriented



Event Oriented

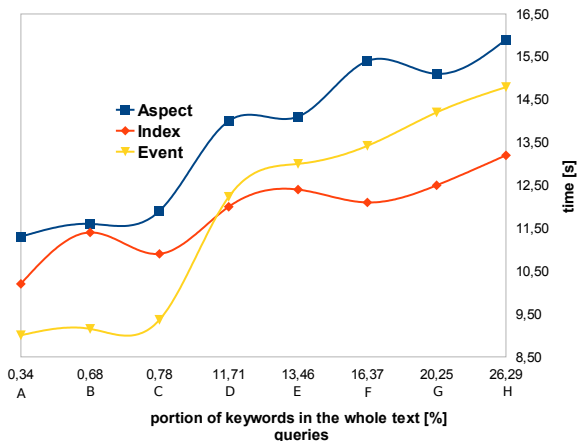
Example of goal evaluation: Performance

Goal-Subgoal/Property	Weight	P&F	Aspect	Event
Parallelization	0.25	3	3	1
No bottlenecks	0.25	4	4	4
Synchronization	0.2	2	2	4
No robustness penalty	0.2	4	2	3
Stable data format	0.1	1	4	4

- Parallelization - P&F, Aspect - threads
- No bottlenecks - None
- Synchronization - P&F, Aspect - synchronized queues
- No robustness penalty - Aspect - weaving, pointcut binding
- Stable data format - P&F - each filter parses again
(lowest common denominator is string)

Results

Prediction: Goal P&F Aspect Event
Performance 3.05 2.95 3.05



Thank you