


Coupling Two Constraint-Based Systems Into an On-line Façade-layout Configurator

A. F. BARCO⁽¹⁾ J.-G. FAGES⁽²⁾
É. VAREILLES⁽¹⁾ M. ALDANONDO⁽¹⁾
P. GABORIT⁽¹⁾

⁽¹⁾ Université de Toulouse, Mines d'Albi-Carmaux, Albi, France

⁽²⁾ COSLING S.A.S., Nantes, France

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- 1 Configuration Problem : facade layout synthesis
 - 2 CSP-based Decision Support system
 - 3 Conclusions and Future work

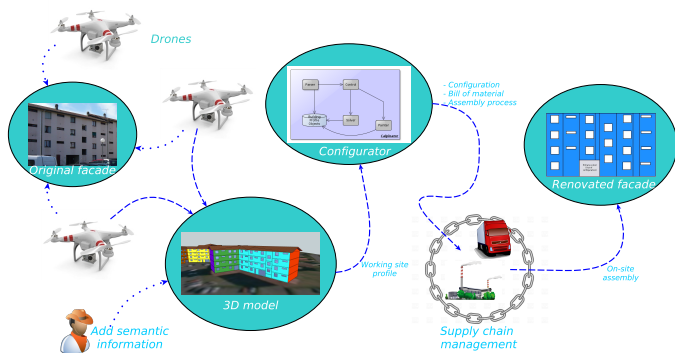
Energy consumption

Observations :

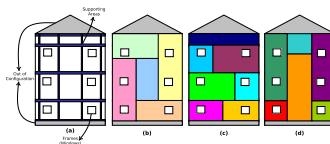
- Energy consumption of residential and commercial buildings 44% in France, 37% in Europe, 36% in North America, 31% in Japan...
- One of the strategies to achieve a significant reduction lies on (thermal) building renovation.




Industrial process



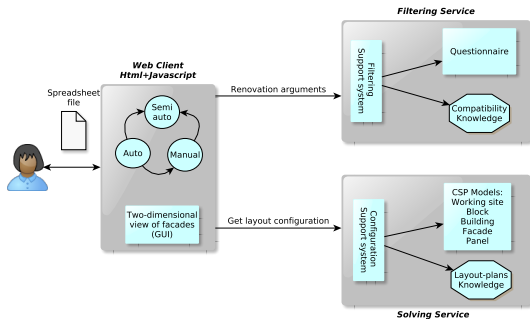
Configuration problem



- 1 Number and size of panels not known *a priori*.
- 2 Frames completely overlapped by exactly one panel.
- 3 Panels attached in specific places.

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Architecture



Using CoFiADE and Choco Solver

Questionnaire

Configuration allows to

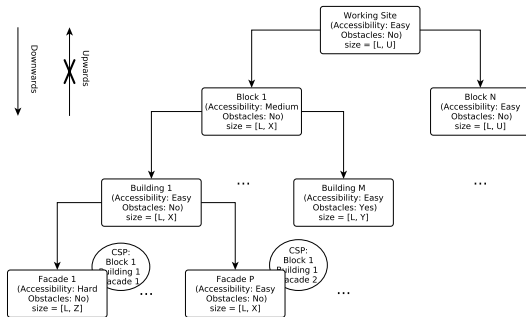
- Set limits for panels size (width and height)
- Set limits for panels weight (maximum weight)

Note : Limits are for each facade independently.

Different CSP instances because each facade

- has its own geometrical and structural properties (e.g., size...)
- counts with its own environmental properties (e.g., access...)
- counts with its own panel size and panel weight

Downwards consistency



Drawing of layout

Manual Mode

- Given the limits defined by Setp1 for panels size and weight,
- Draw of consistent panels by the user

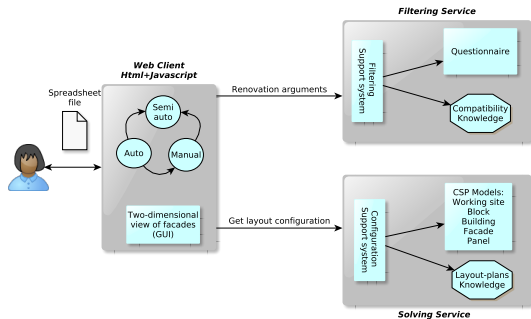
Automatic Mode

- Given the limits defined by Setp1 for panels size and weight,
- Solve the CSP and provide several solutions.

Manual and Automatic Mode

- Adapt automatic solutions,
- Finish manual solutions.


Demo



Using CoFiADE and Choco Solver

Divide and conquer

- Modularity
- Maintenance
- Performance (exploit systems strengths) :
 - Applying compatibility table $\mathcal{O}(1)$
 - Finding solutions depends on model and underlying engine (expensive)

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Remarks

- 1 Formalize each service behavior
- 2 Presented the compatibility tables on the CoFiADefiltering service.
- 3 Presented the first order formulas on the Chocosolving service.
- 4 Show how to solve the configuration tasks by coupling the two constraint-based systems.
- 5 Consistency and integrity of solutions are easily modeled under monotonic properties of CSP.
- 6 The configuration and underlying systems are transparent for the user.

Future work

- Increase details of models
- One model checker and one set of constraints
- API for services
- Benchmarks

That's all

Gracias/Thank you/Merci.