Karlsruhe Institute of Technology

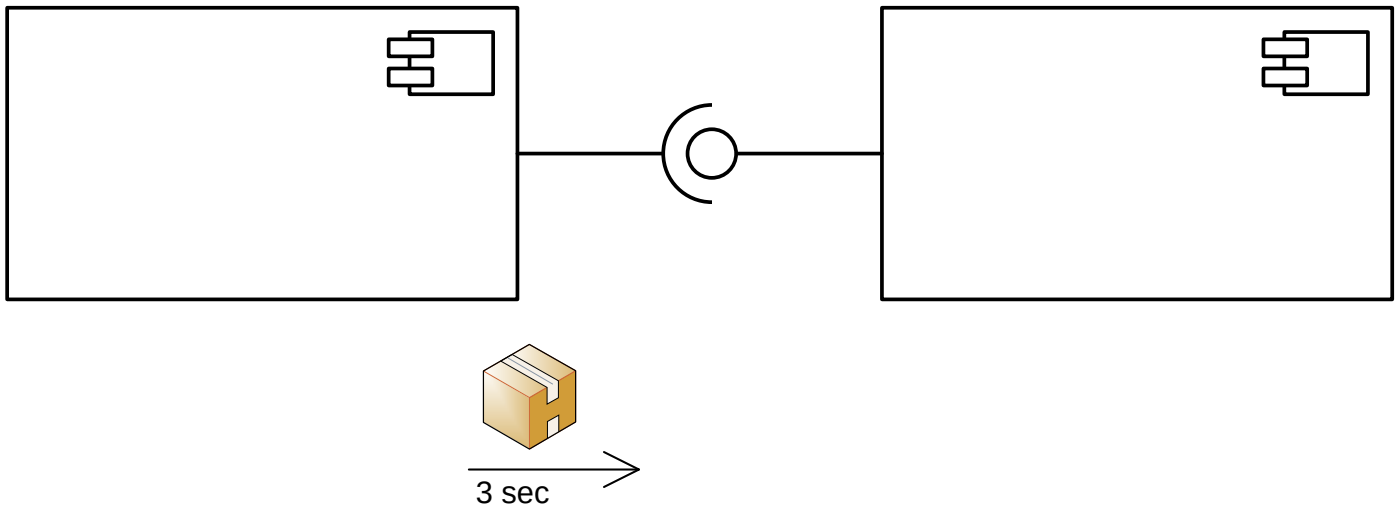
Performance Abstractions of Communication Patterns for Connectors

Study Thesis Final Presentation

Misha Strittmatter | December 8, 2014

Chair for Software Design and Quality

Motivation: Illustration



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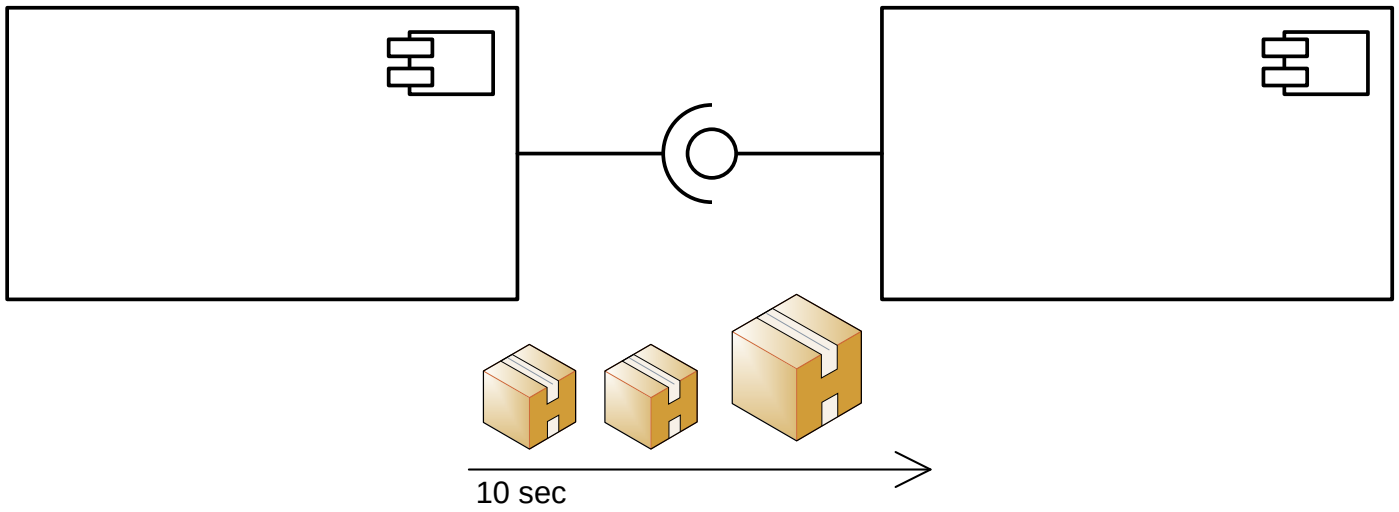

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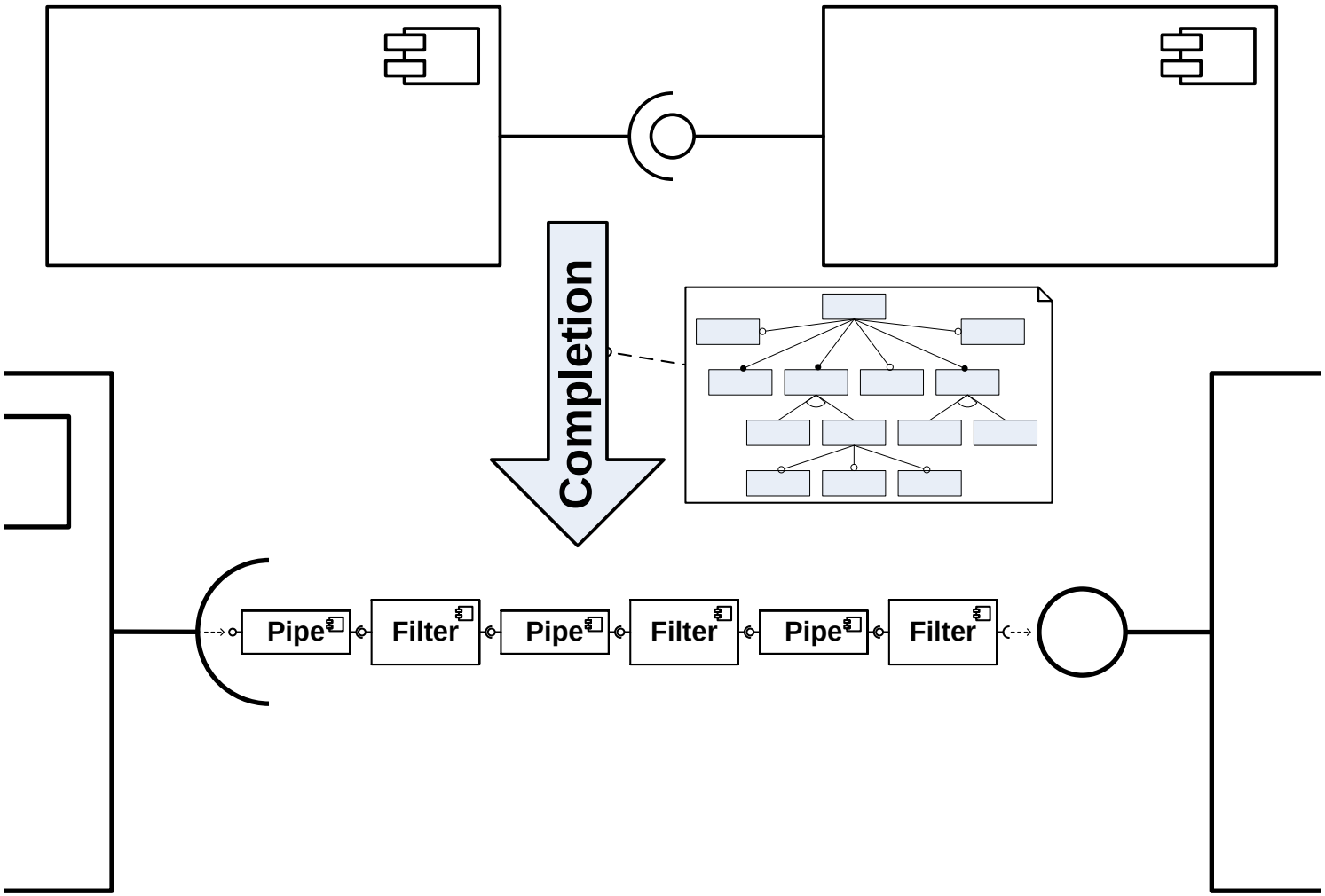

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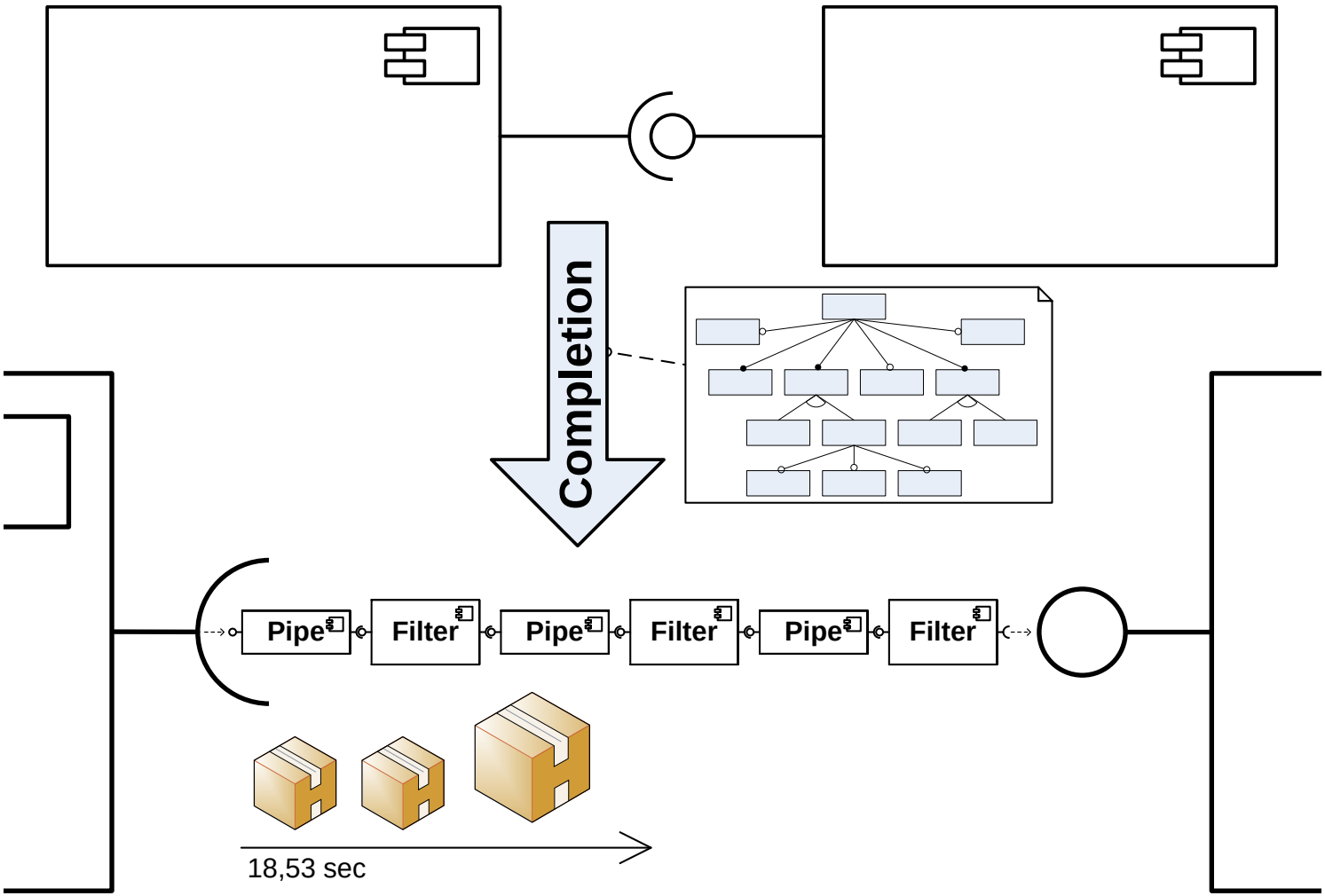
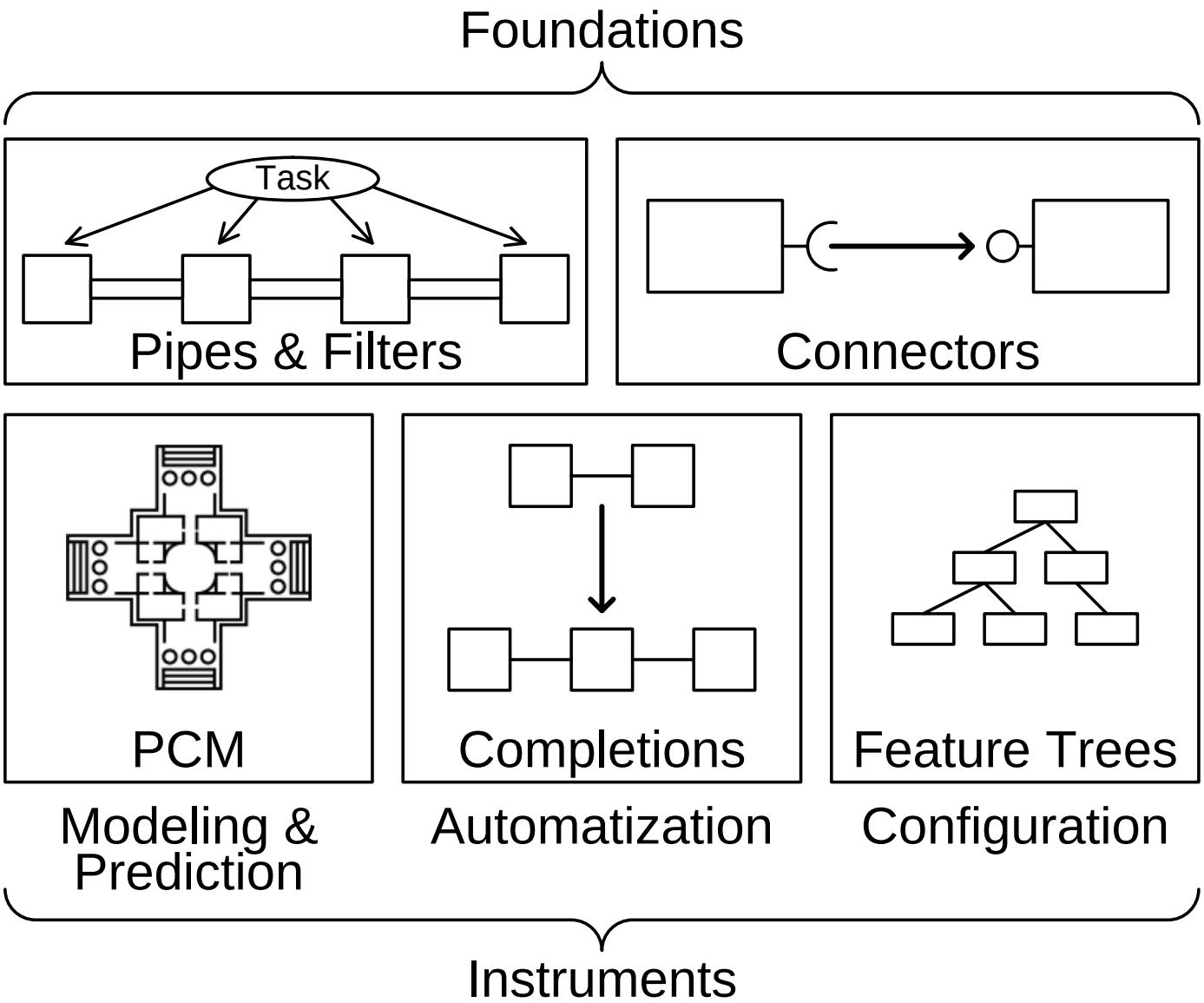


Motivation: PIBA

- Problem: Prediction and analysis considering non-functional properties of connectors
- Idea: Connector abstraction can be inserted by transformation
- Benefit:
  - Original model kept abstract
  - Simulations on intermediate model enriched with implementation details
  - (Coordination of other communication oriented completions)
- Action:
  - Research
  - Assert feasibility
  - Design basic constructs
  - Model arch and FMs
  - Map features to arch
  - Evaluate



[Bus07, BKR07, CE00]

Research: Related Work

Connectors

- Connector taxonomy [MMP00]
- **Composing connectors of elements [BP03]**

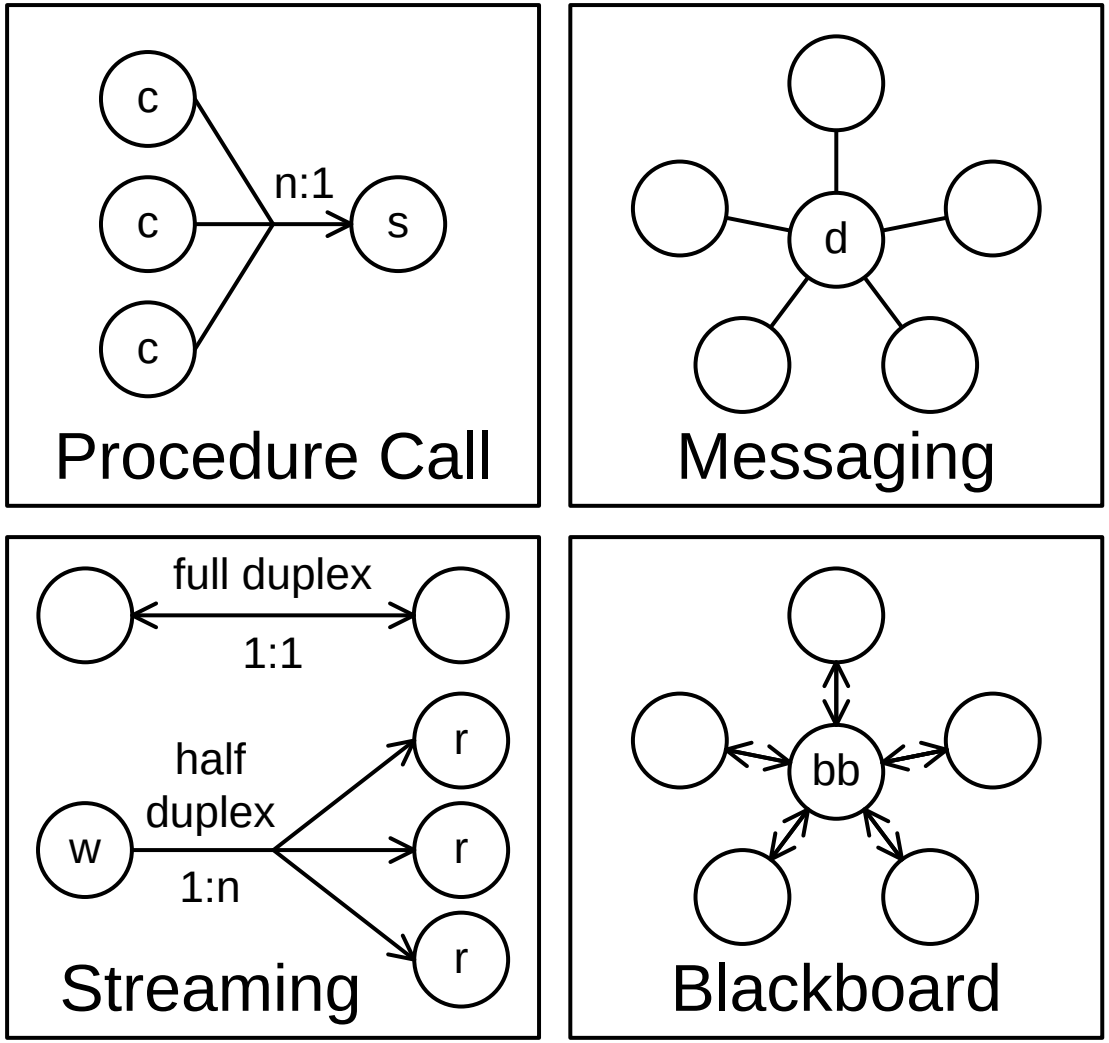
Completions

- Completion generation [KHB10], conflict resolution [KG09]
- Replication [Har10]
- Middleware completion [HFBR08]
- Encryption, Compression, Marshalling [Bec08]

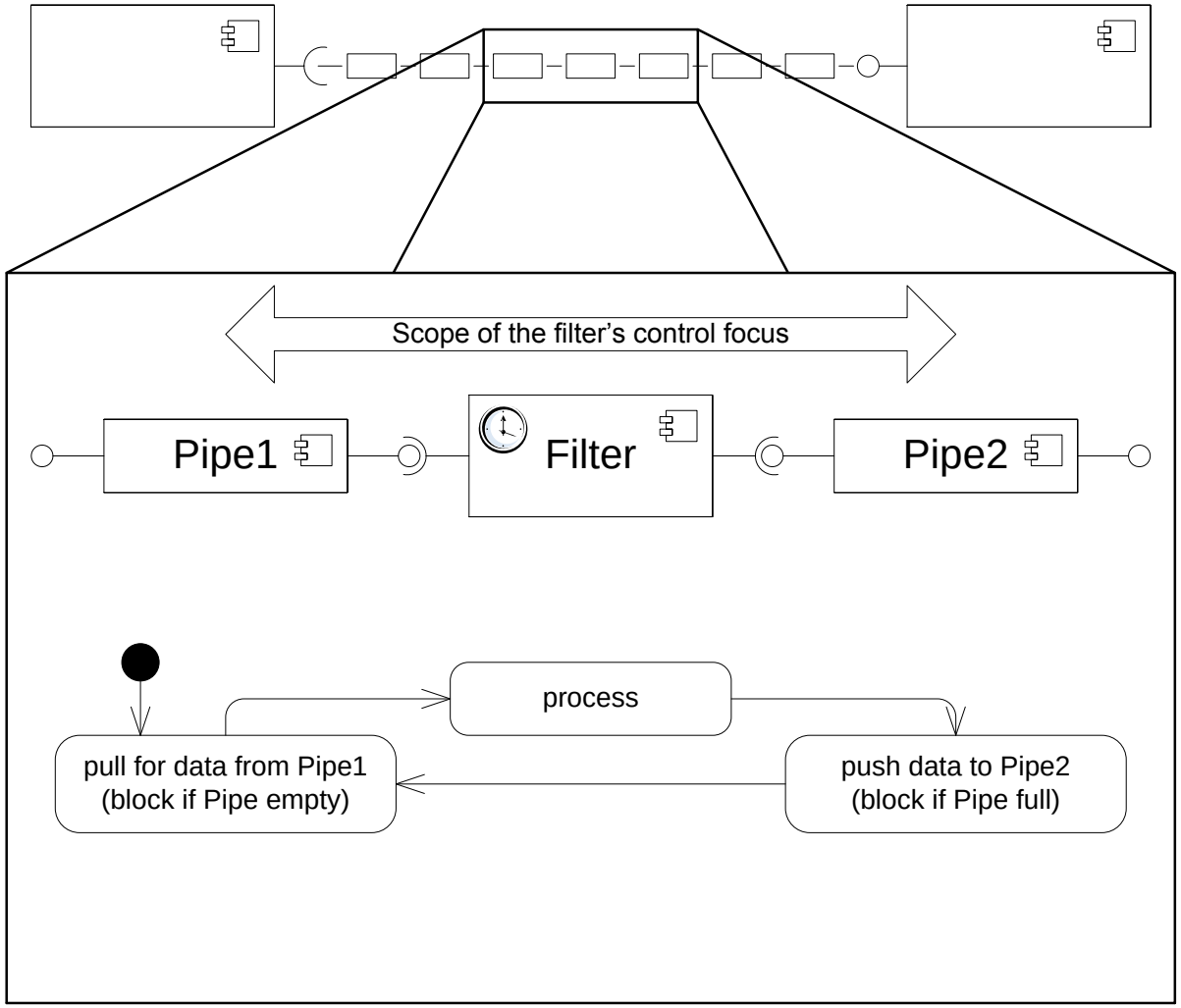
Component Systems

- Surveys [Koz10, LW05, KZM+10, Bur06]
- ROBOCOP [BMdW+04, Rob], OLAN [BBB+98], SOFA [PBJ98]

Research: Connector Topology



Contribution: Basic Design



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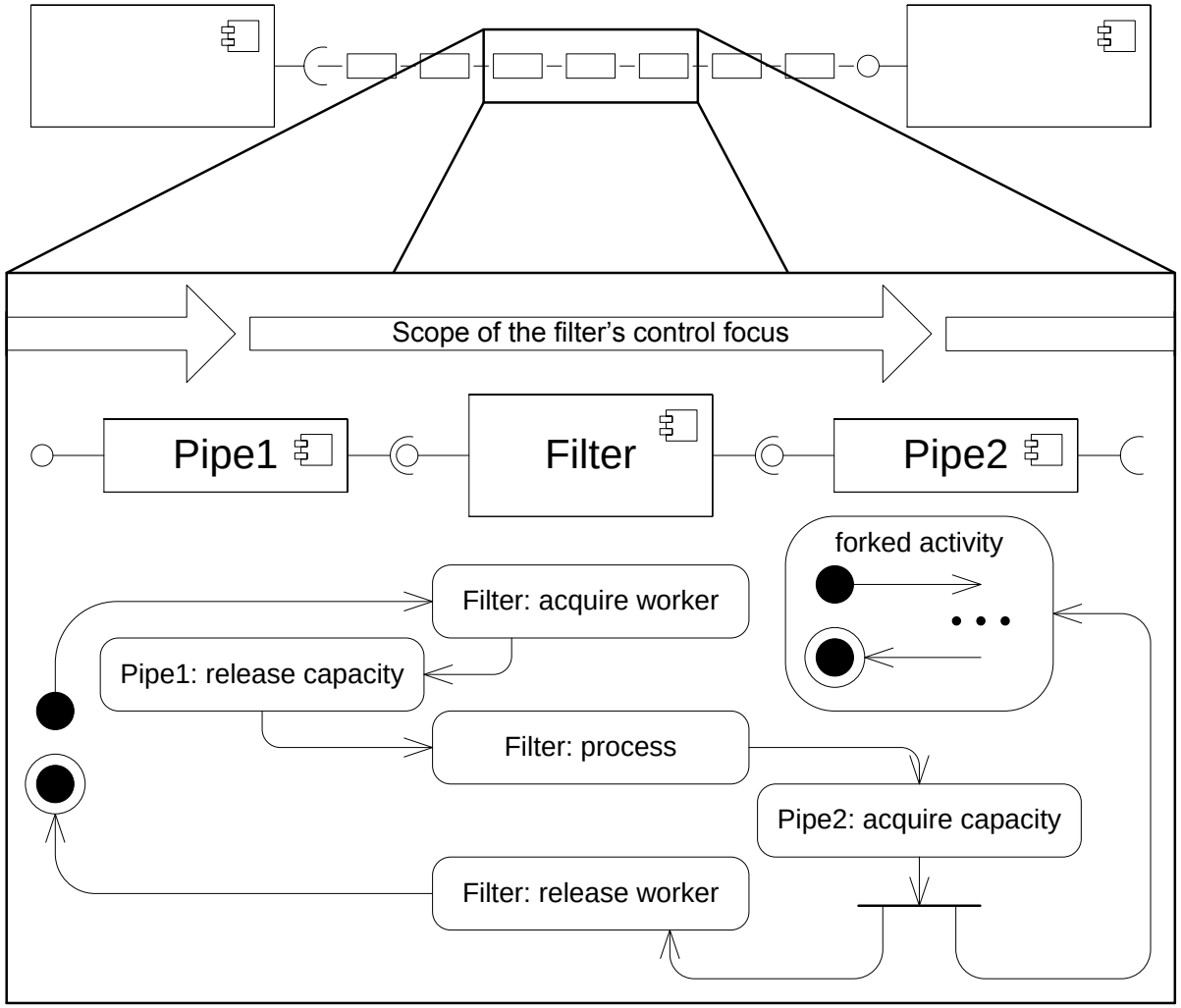

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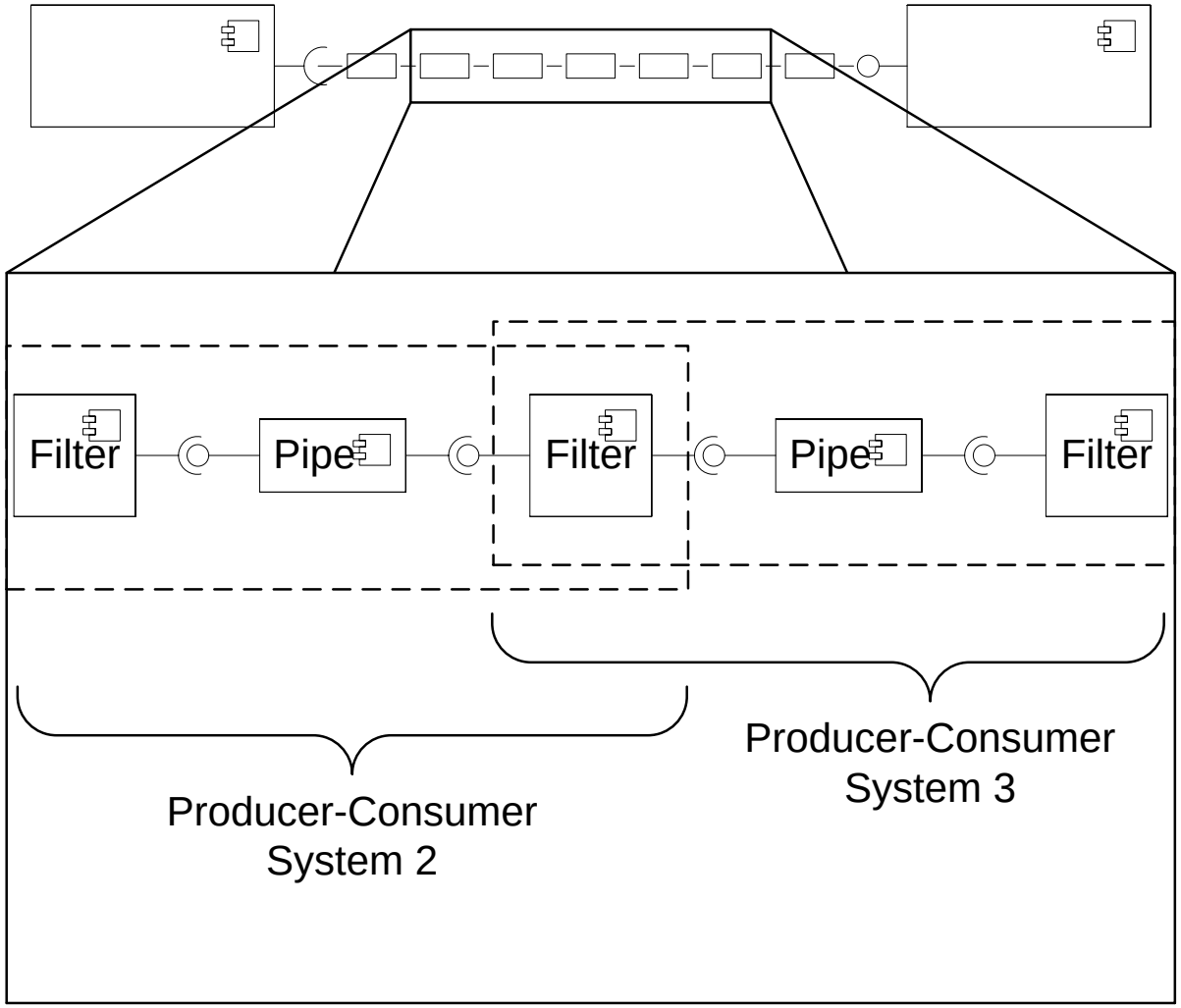
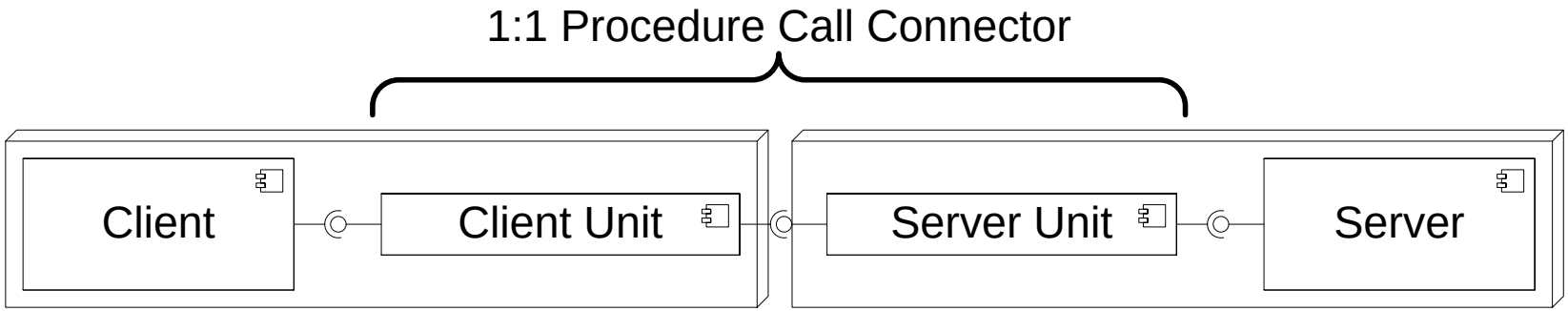


Contribution: Architecture Excerpt



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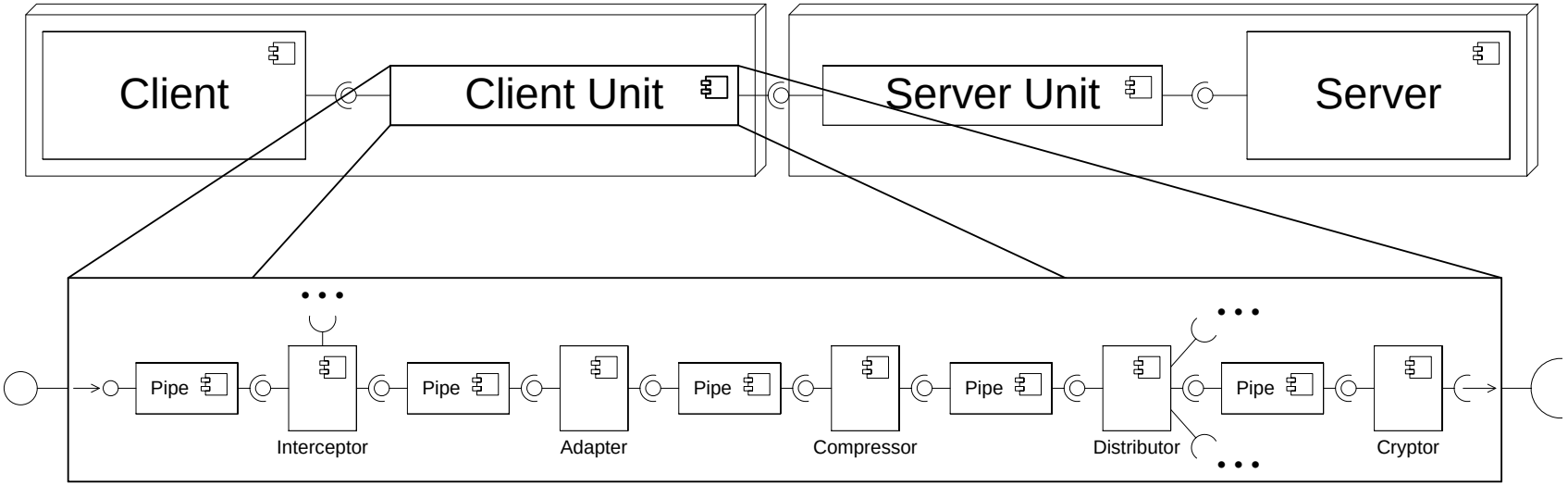
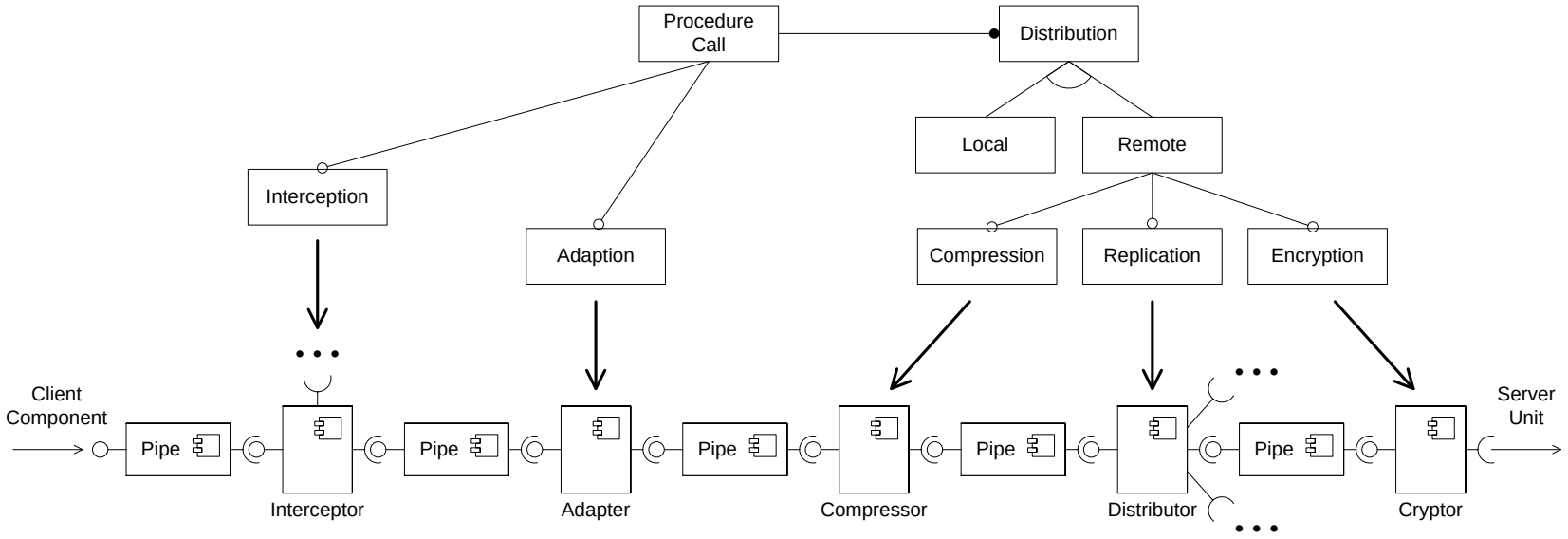
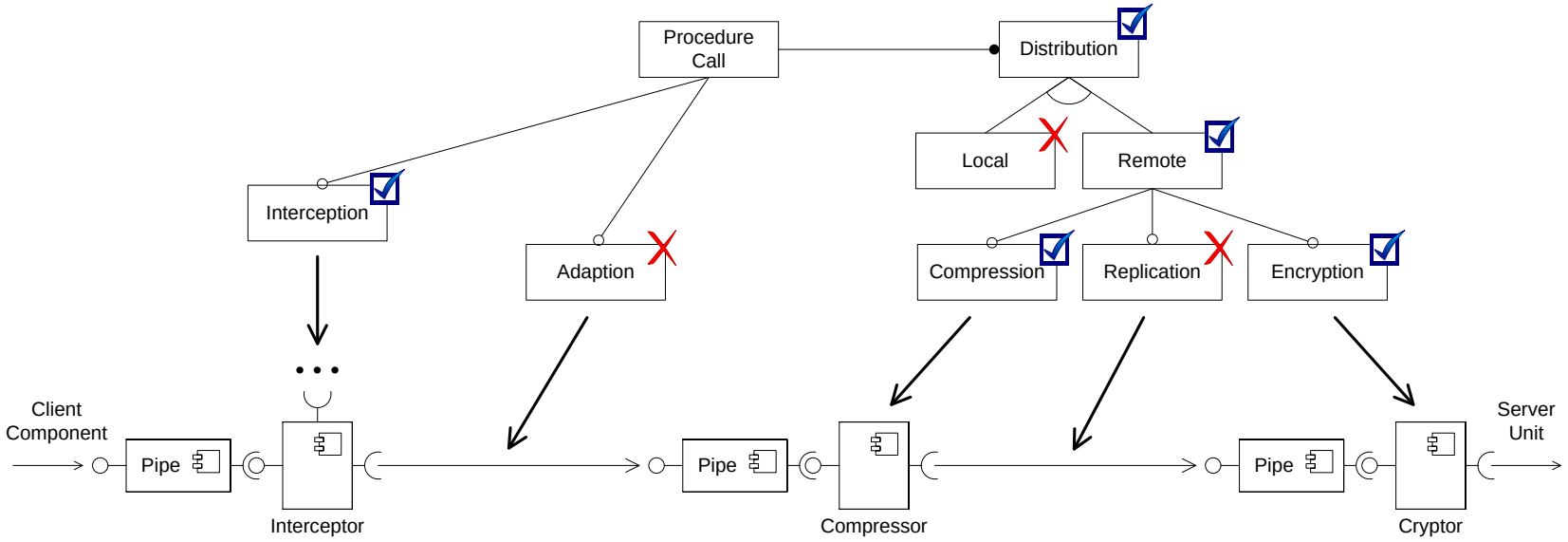


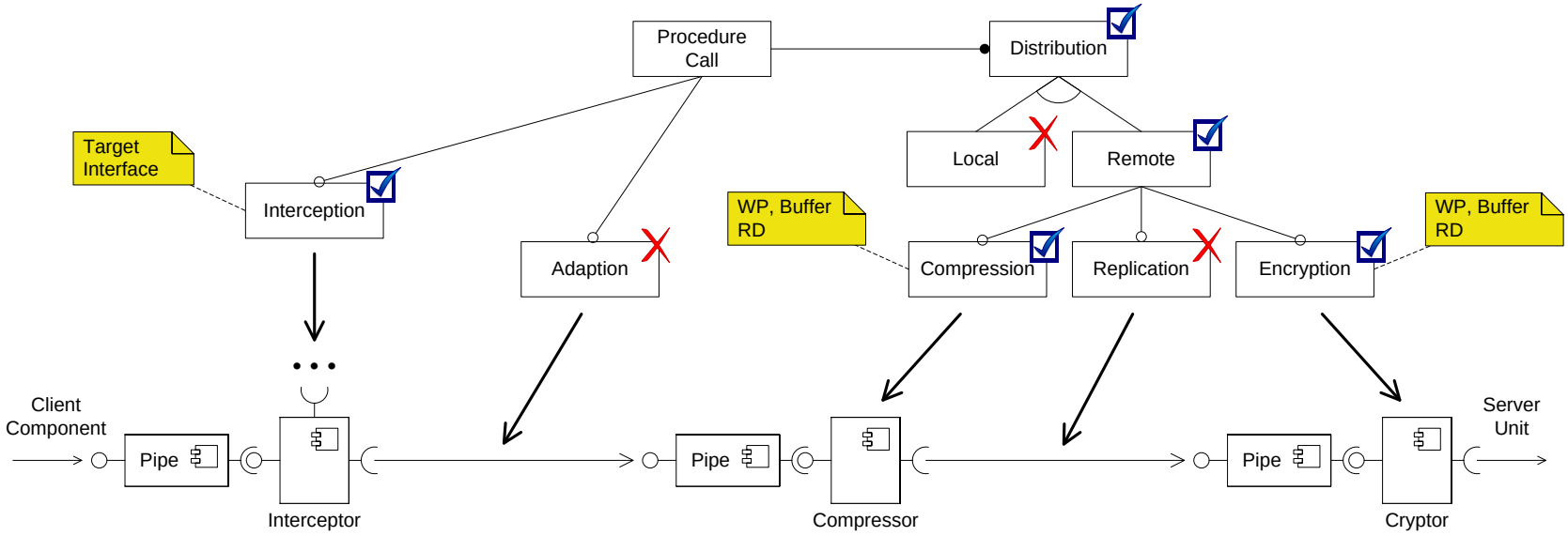
Contribution: Feature Arch Mapping



Contribution: Feature Selection



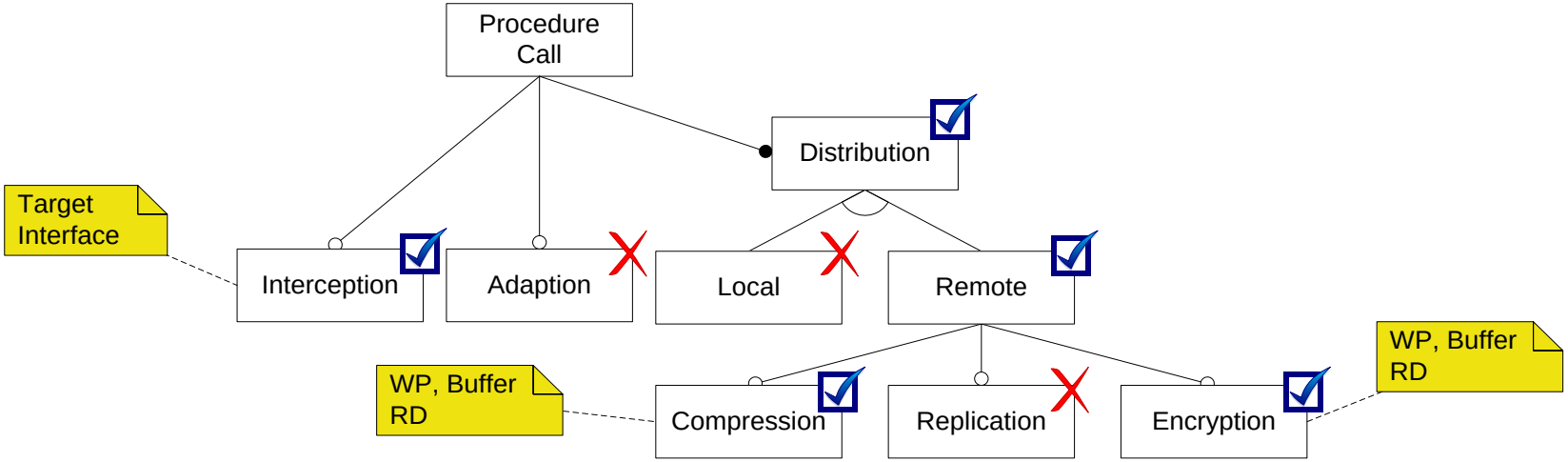
Contribution: Feature Annotation



Evaluation

We identified following effects:

- **Feature configuration**
- Limitation of concurrency
- Piling chain effect
- Use of asynchronous calls



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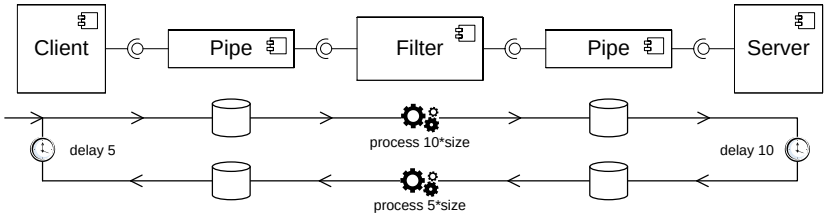

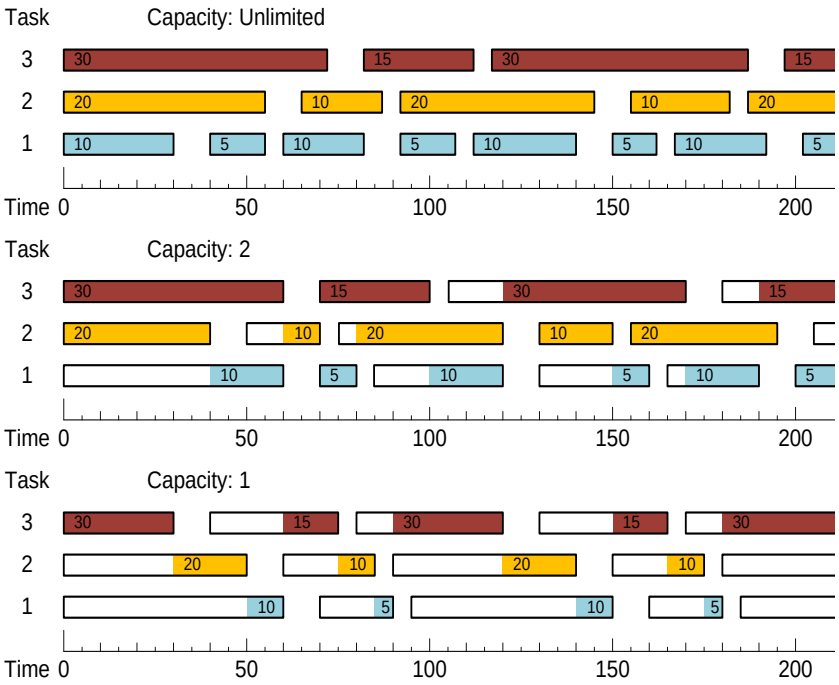

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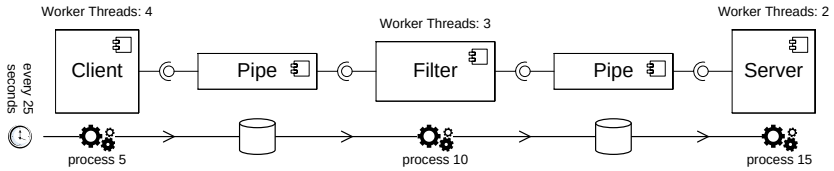

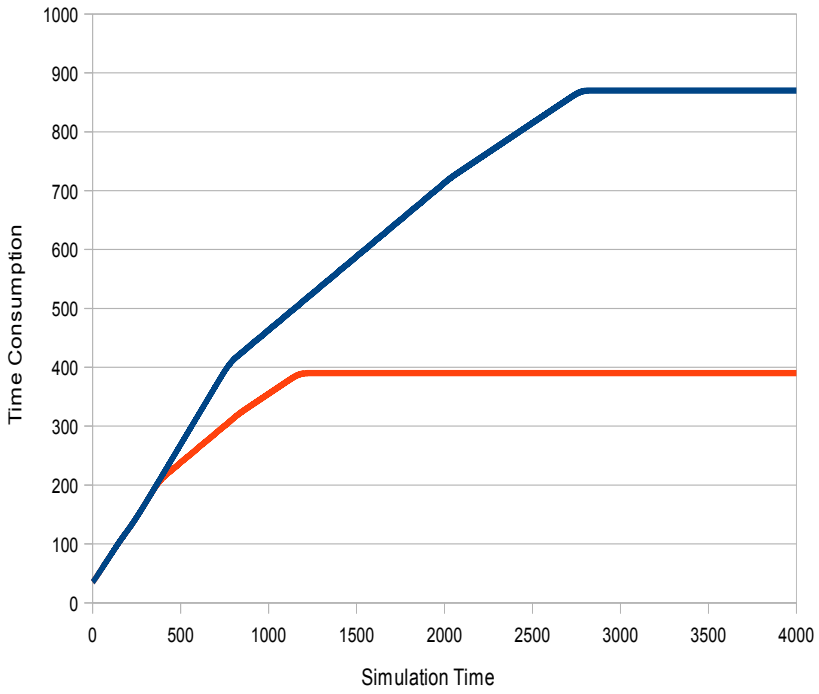

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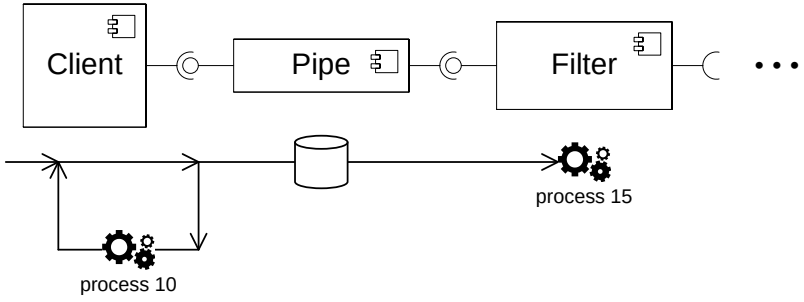
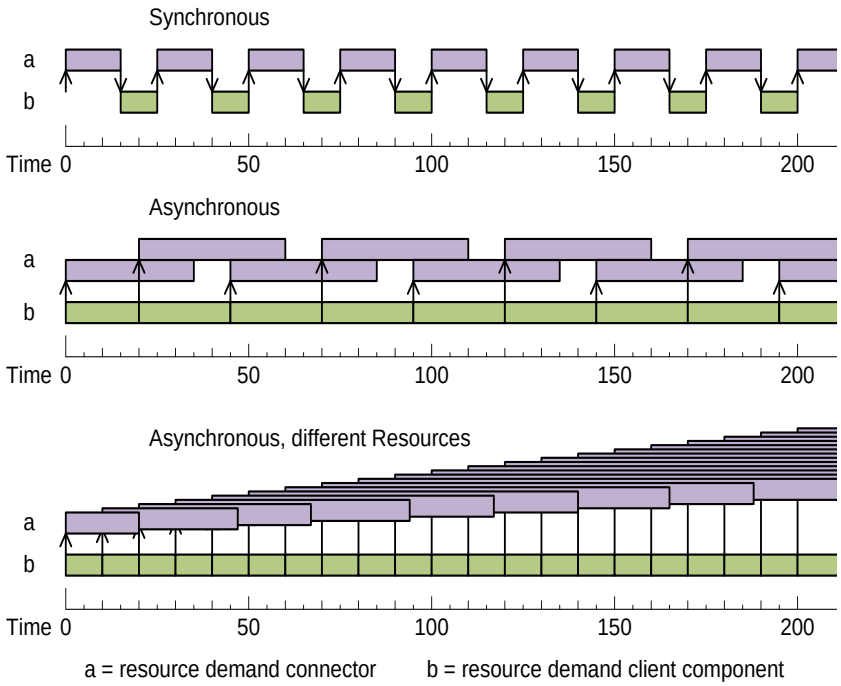
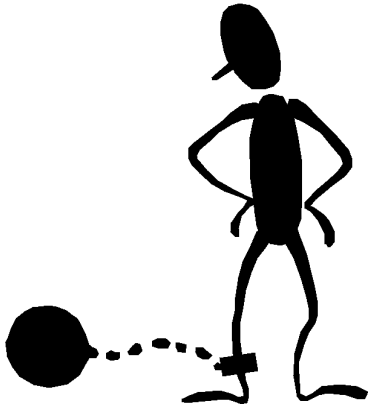




Restrictions



- Connector-use restricted to its communication method. Cannot be deployed in arbitrary context.
- Restricted to PCM $\rightarrow$ obvious and intended
- Remaining restrictions $\rightarrow$ future work (see next slide)

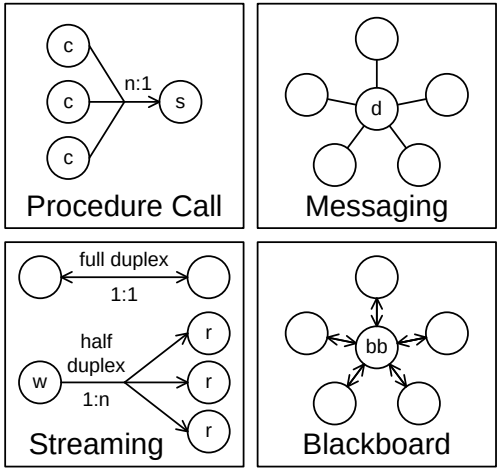
Conclusion

Feasibility assured:
active pulling, buffering, asynch, connectors

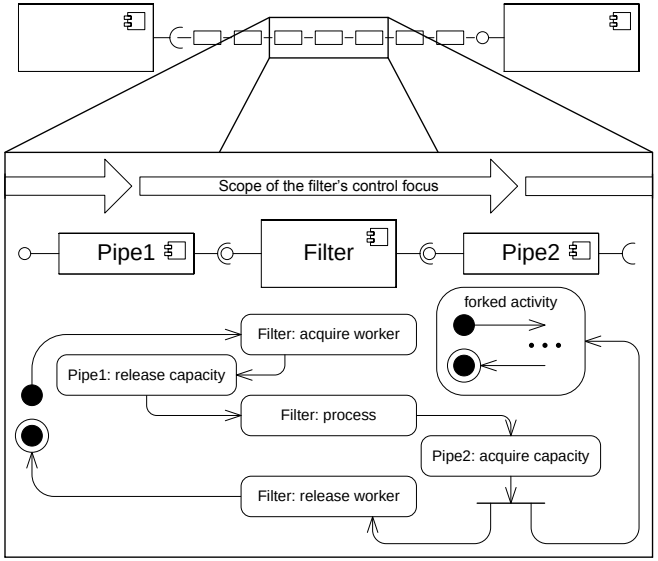
Future Work

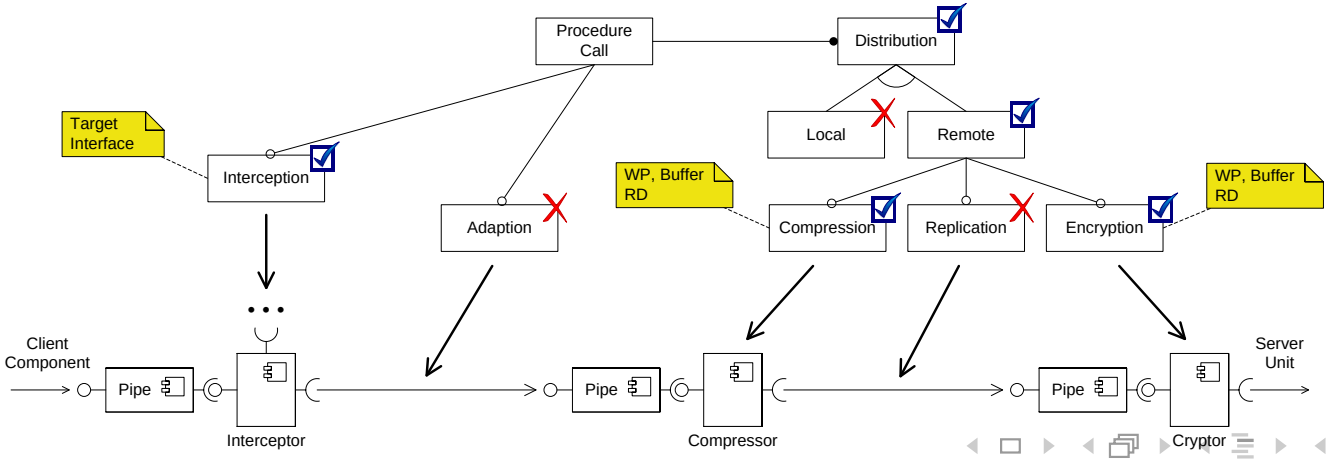
- Implementation (done: static prototype [Vog10], open: configurable completion)
- Needs data and incorporation of other completions
- Case study (evaluate concept)
- Find and validate connector configurations
- Refinement and expansion (architecture and feature model)
- Identify and implement new connectors
- Integration into a completion library or the PCM IDE

The End



Thanks for your attention!
Any questions?





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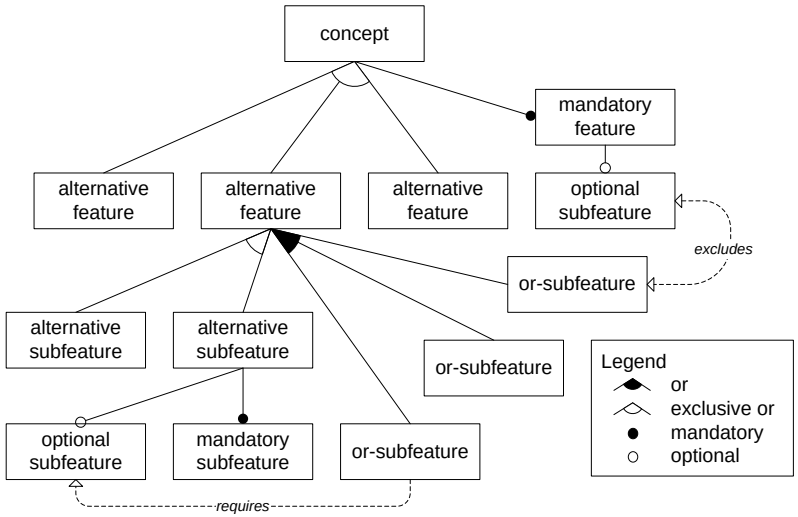
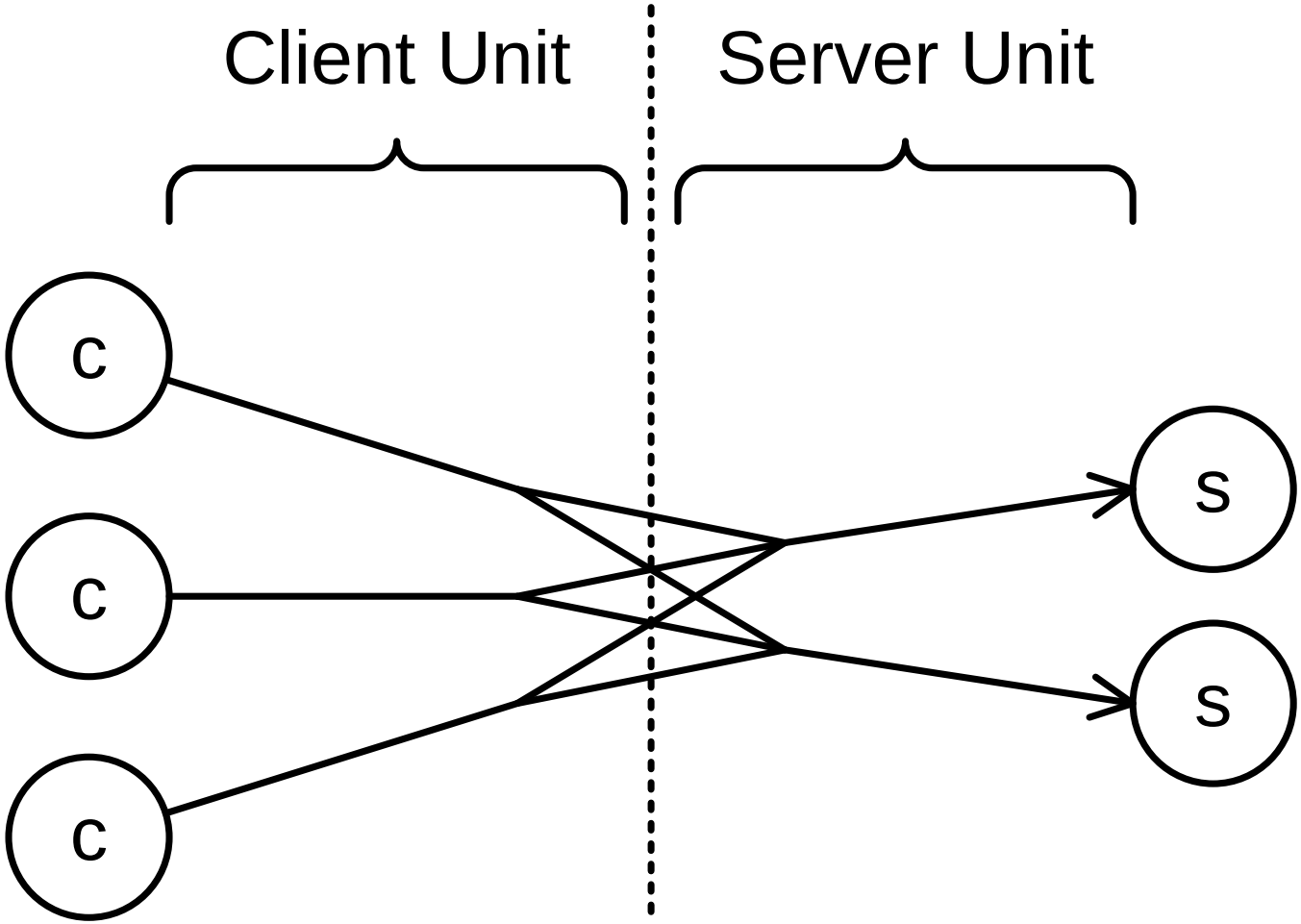
Appendix: Feature Diagram



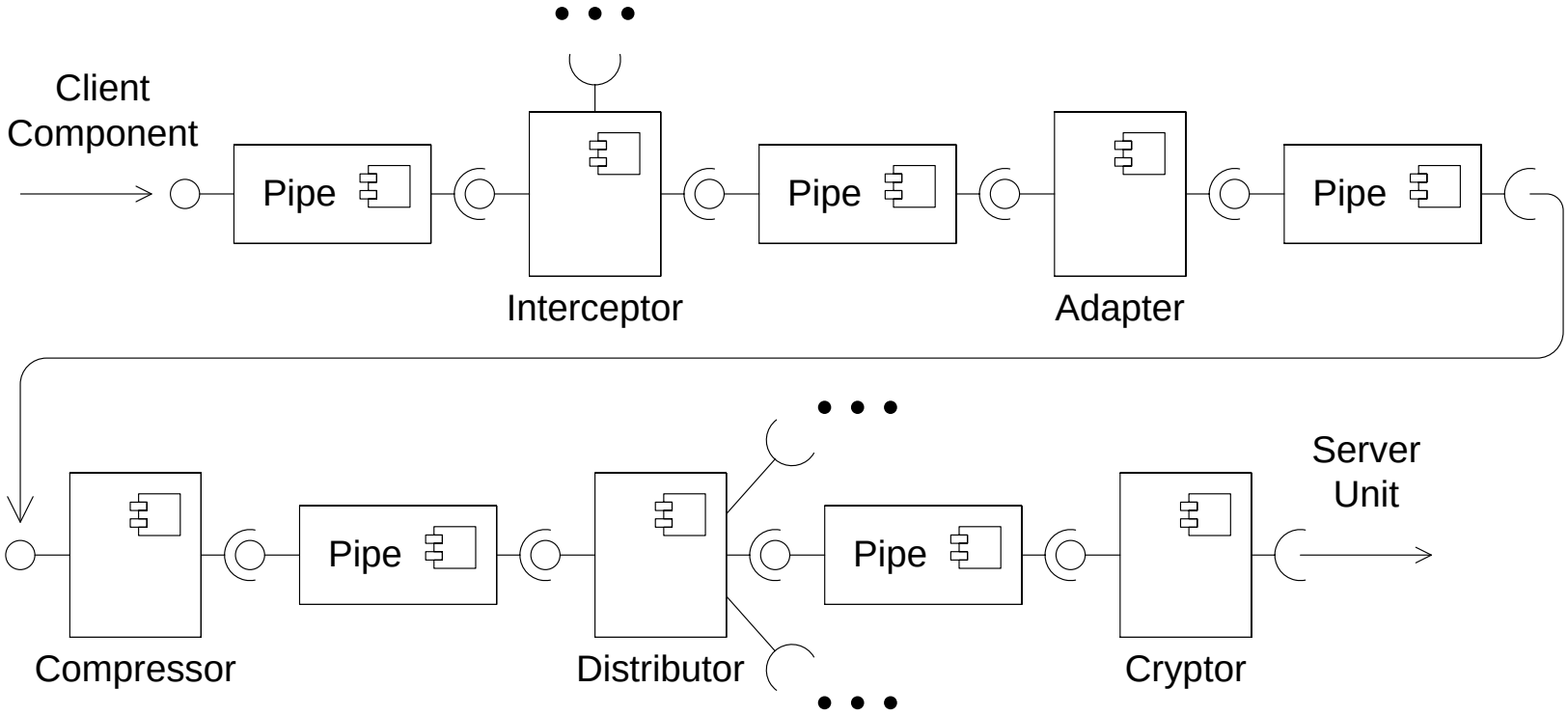
An instance of a feature diagram is a subset of nodes, selected after the following restrictions:

- The root is always included.
- Mandatory features have to be included, if their parent is included.
- Optional features can be included, if their parent is included.
- One or more features of an or-feature set have to be included, if their parent is included.
- Exactly one feature of an exclusive-or-feature set has to be included, if its parent is included.
- All requires- and excludes-constraints of a feature are satisfied.

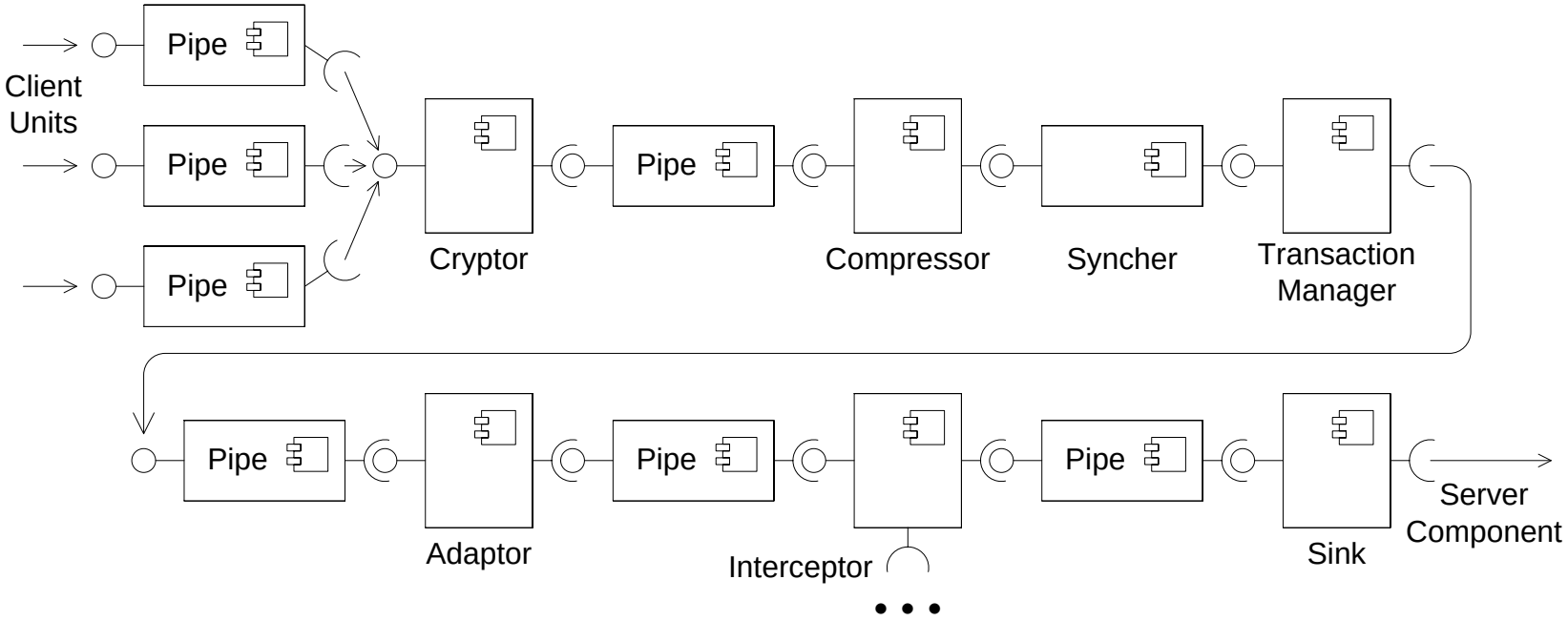
Appendix: Full Procedure Call Connector Topology



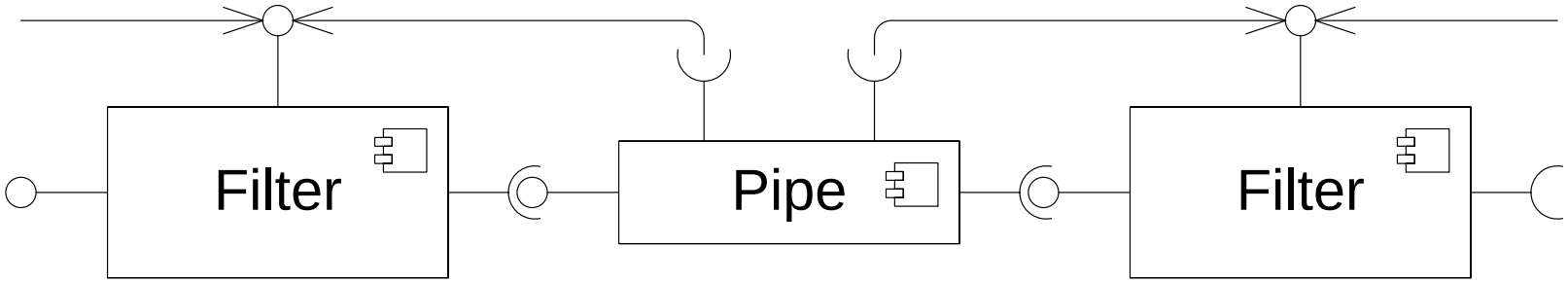
Appendix: Procedure Call Connector Client Unit Architecture



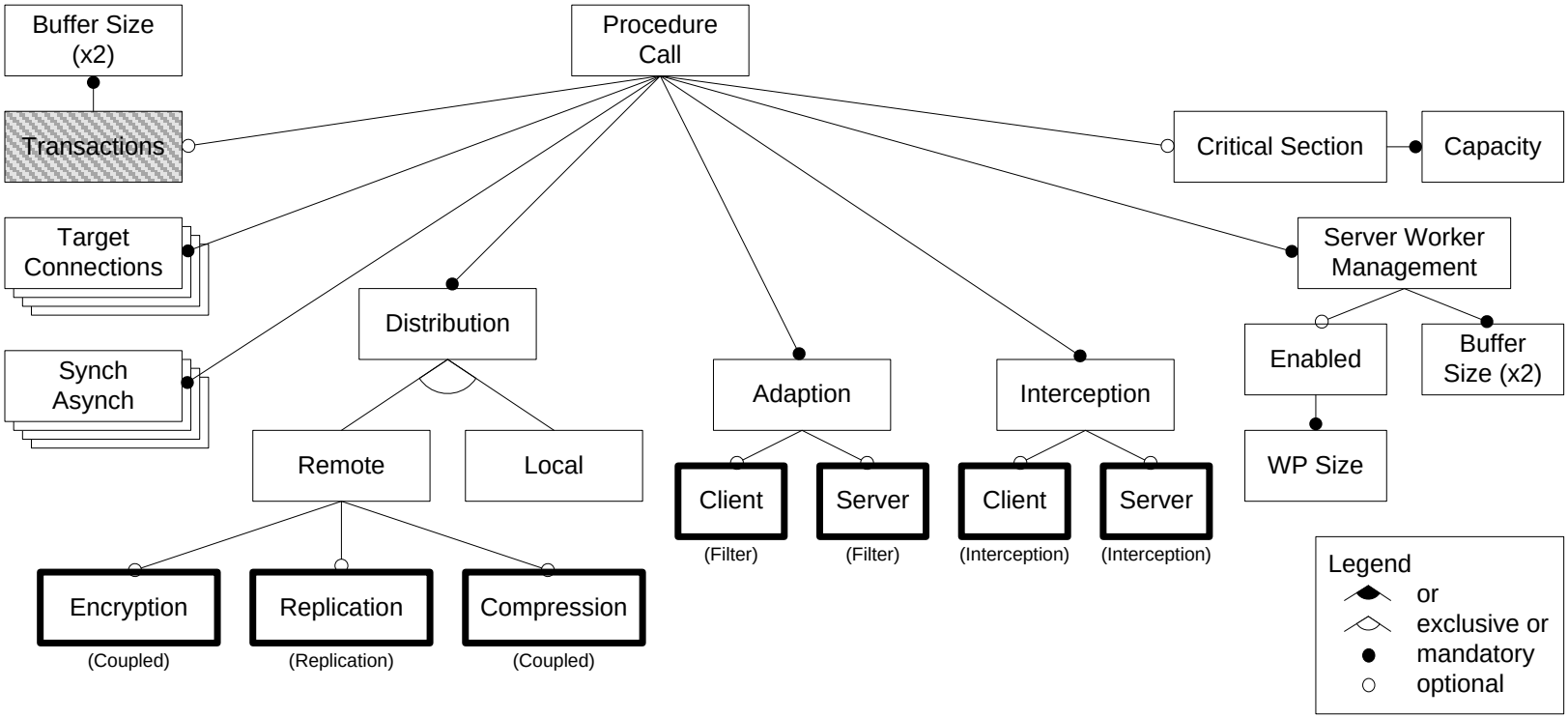
Appendix: Procedure Call Connector Server Unit Architecture



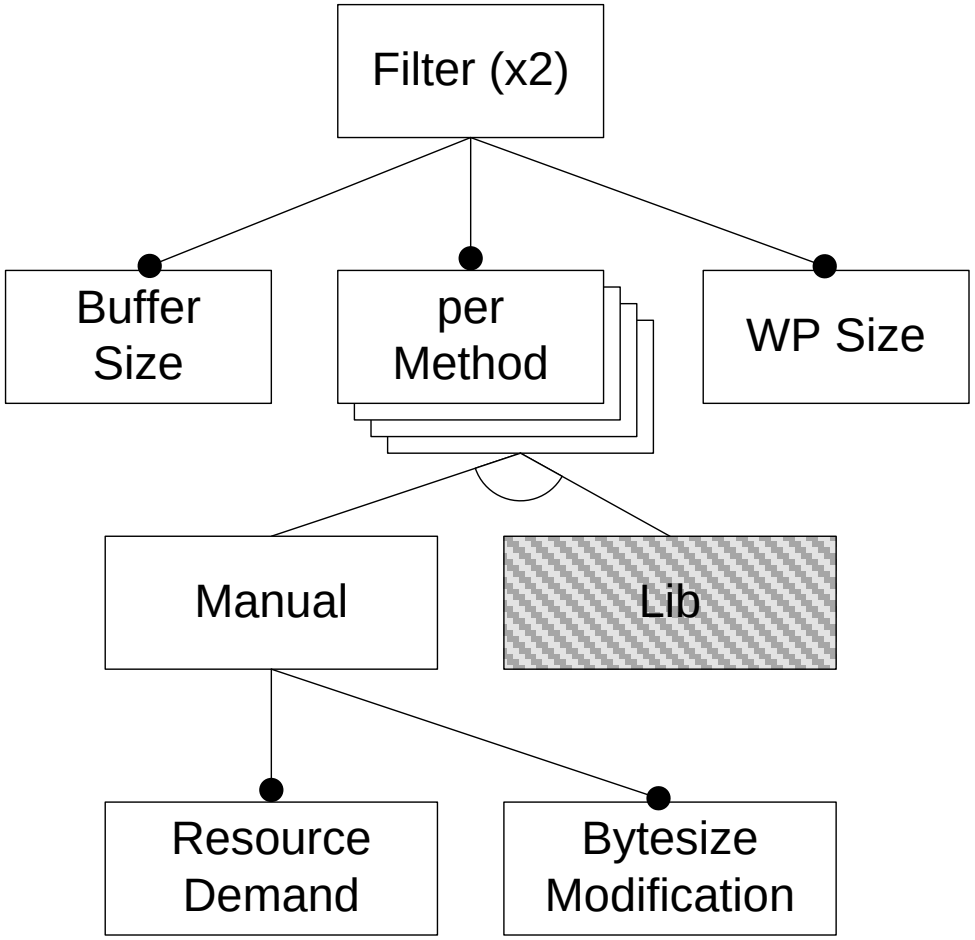
Appendix: Worker Management



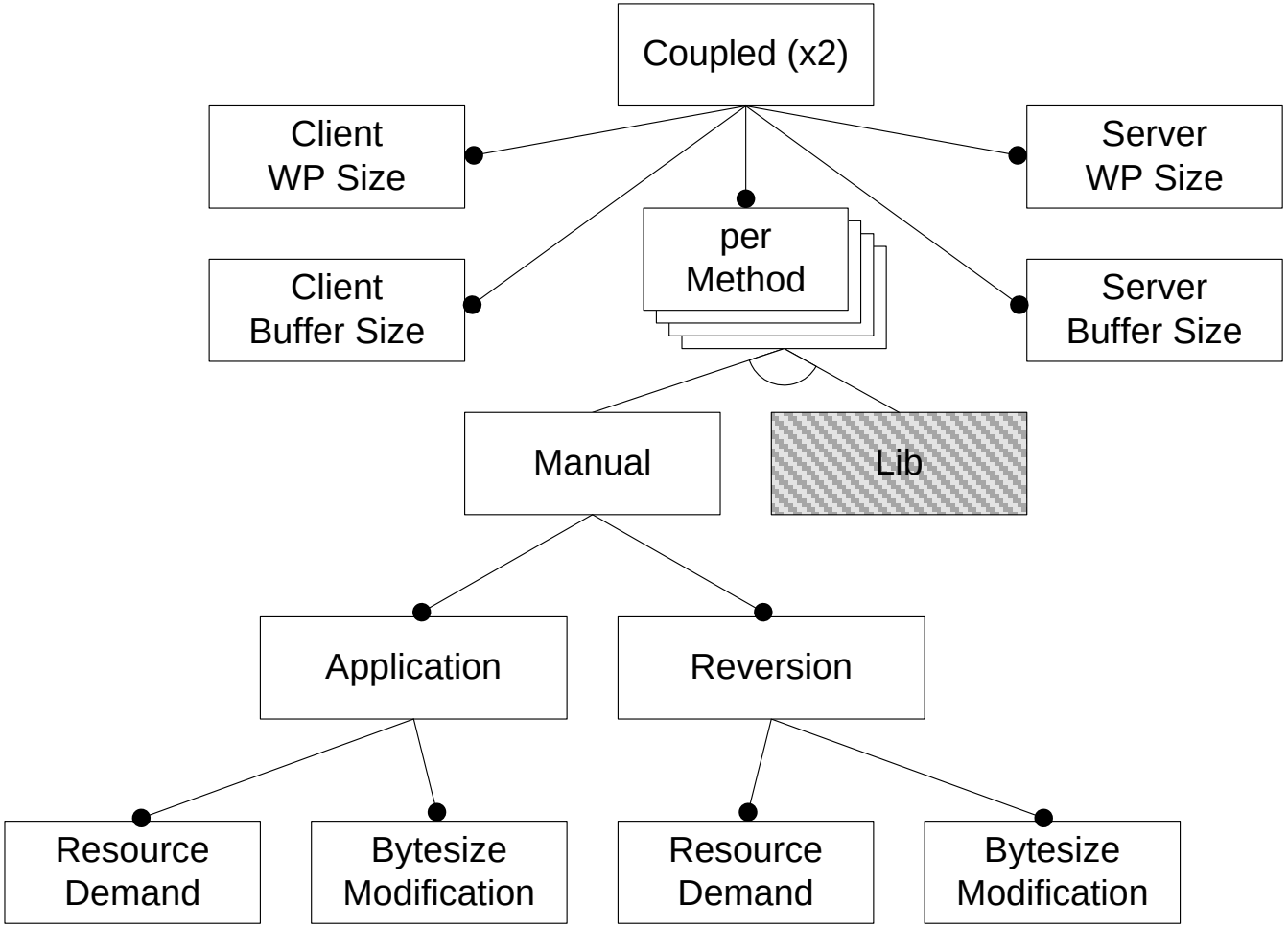
Appendix: Procedure Call Connector Feature Tree



Appendix: Filter Feature Tree



Appendix: Coupled Activity Feature Tree



Appendix: Interception & Replication Feature Tree