

# Safe Evolution Templates for Software Product Lines - Catalogue

Software Productivity Group

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## 1 Templates for Compositional Product Lines

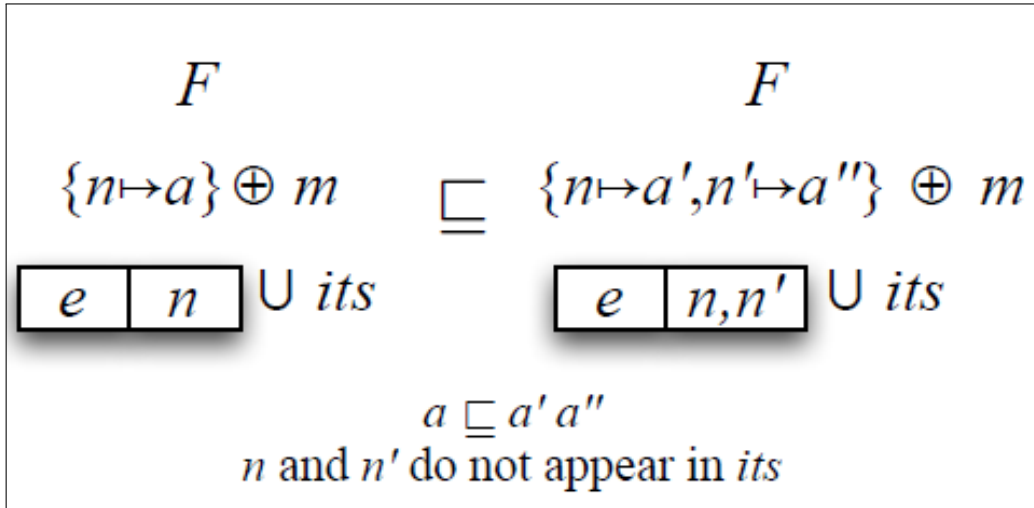


Figure 1: Split Asset (Taken from [1])

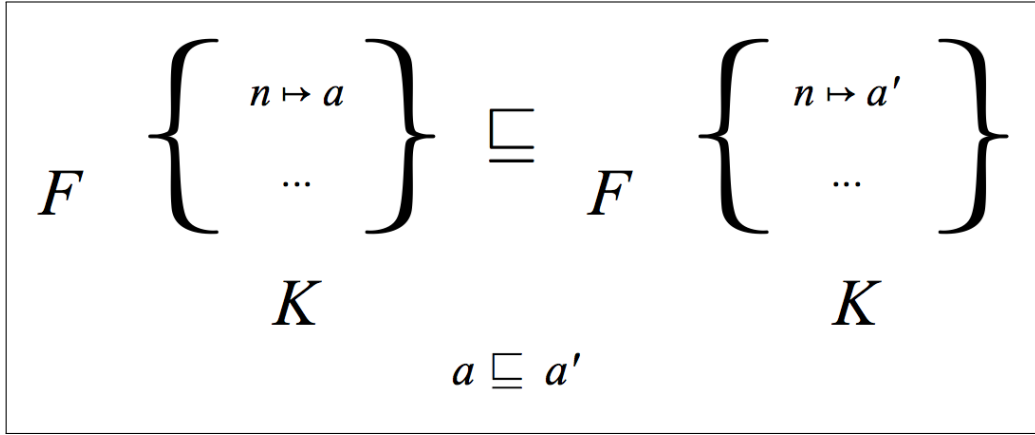


Figure 2: Refine Asset (Taken from [1])

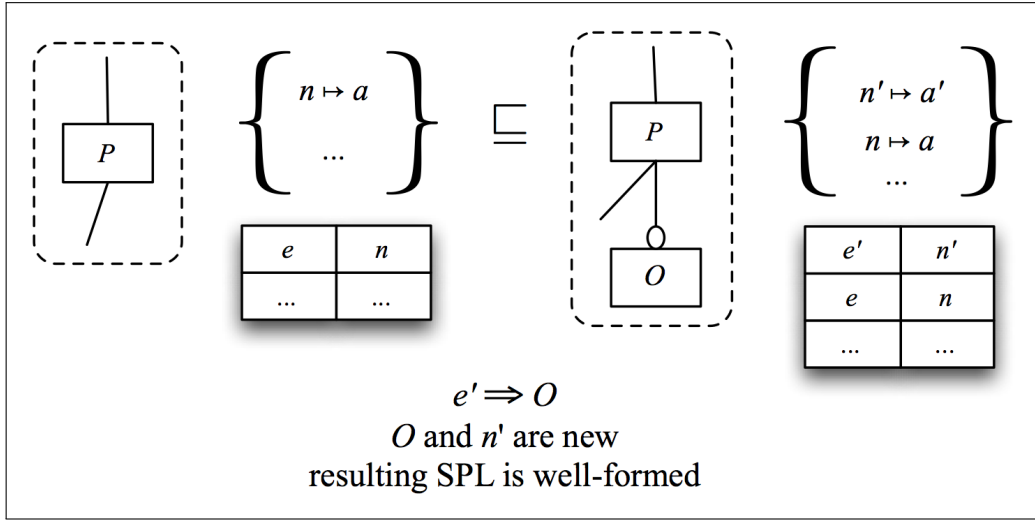


Figure 3: Add New Optional Feature (Taken from [2])

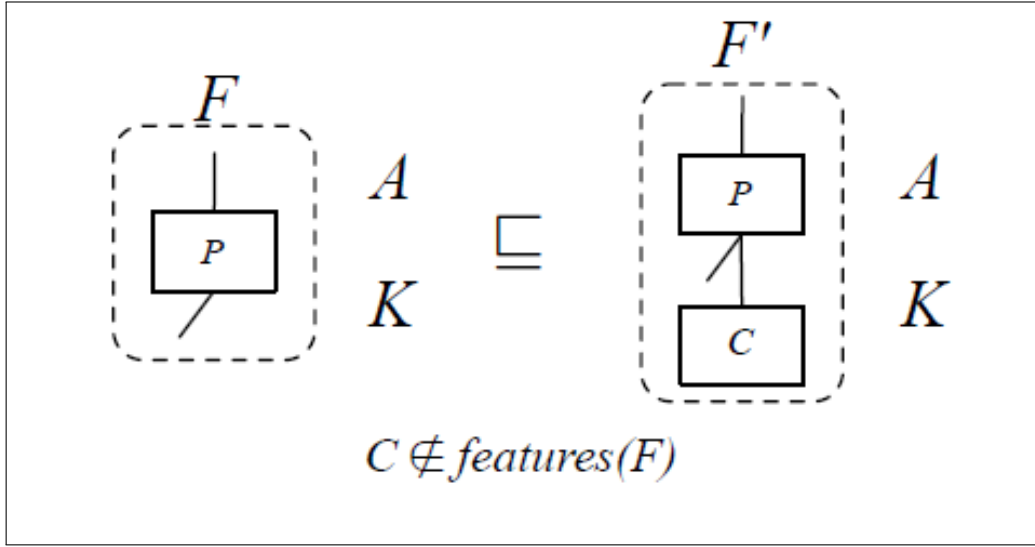


Figure 4: Add any feature without changing the AM and CK (Taken from [1])

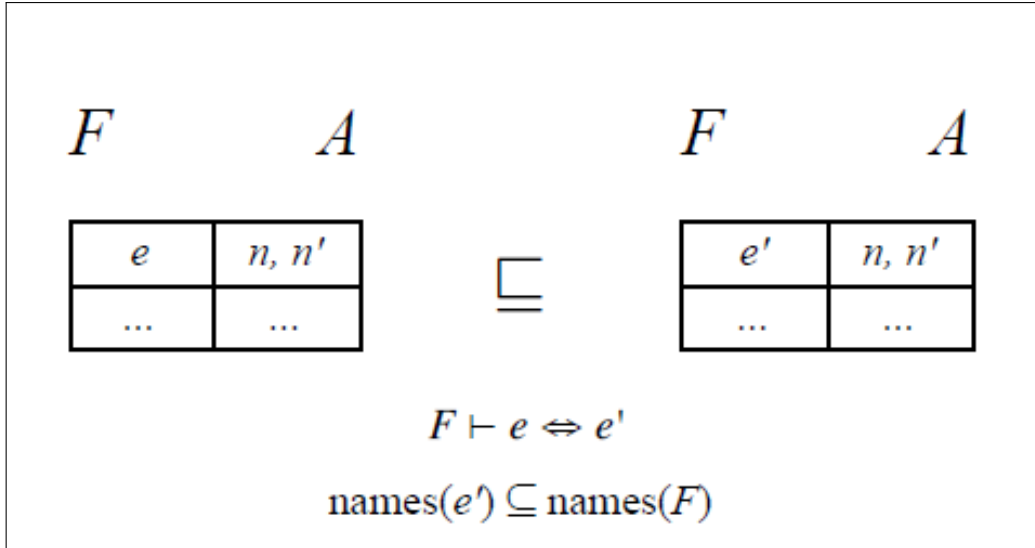


Figure 5: Replace Feature Expression (Taken from [1])

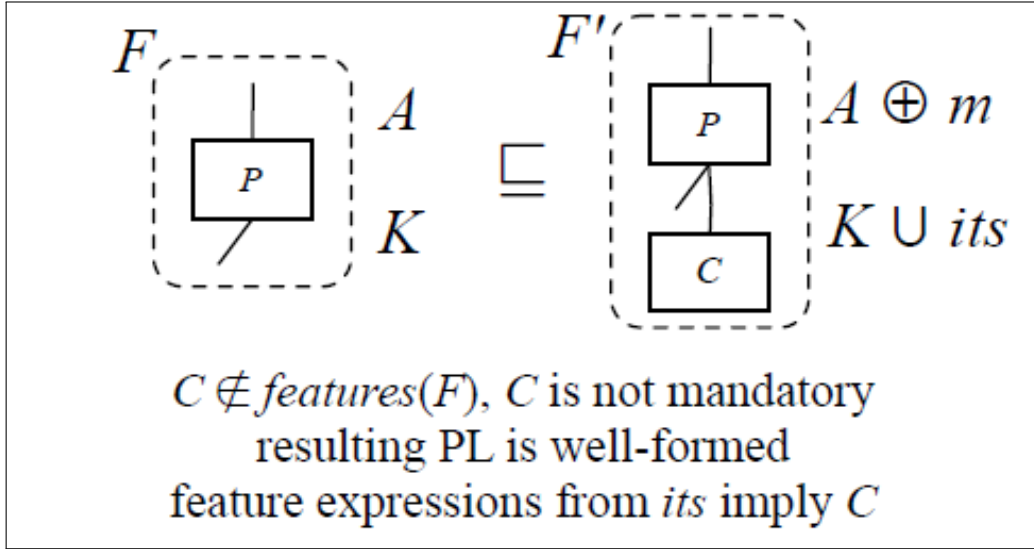


Figure 6: Add variable feature with implementation (Taken from [1])

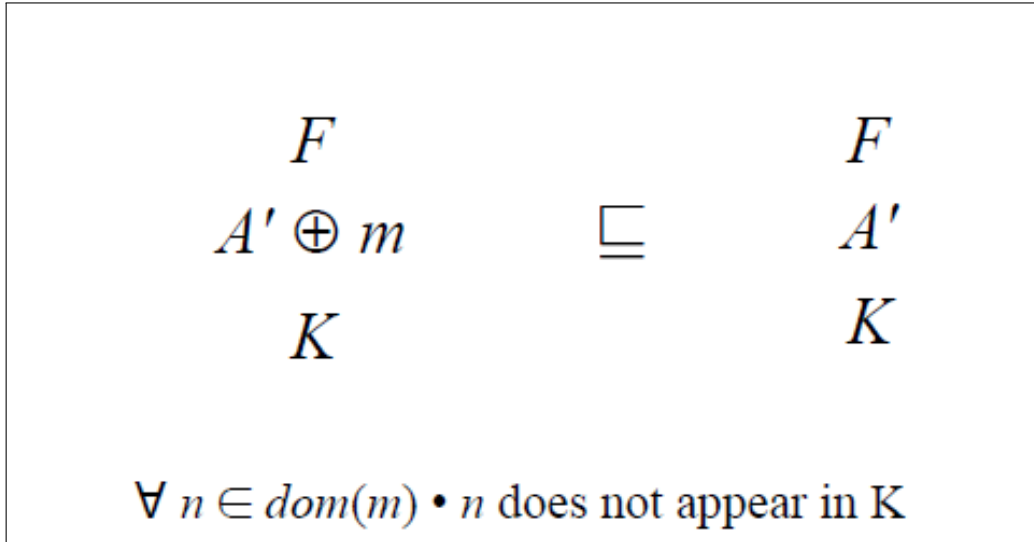


Figure 7: Remove Unused Assets (Taken from [1])

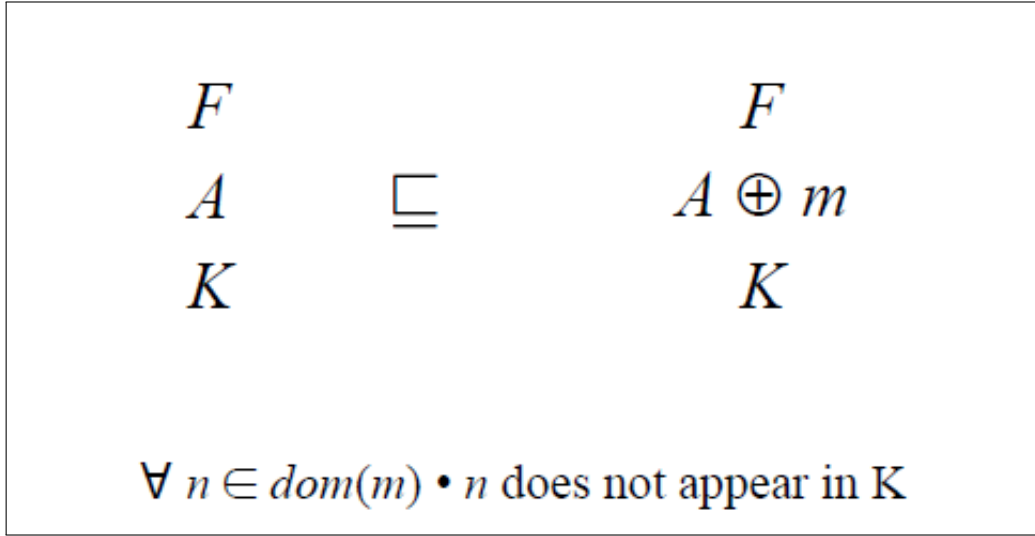


Figure 8: Add Unused Assets (Taken from [1])

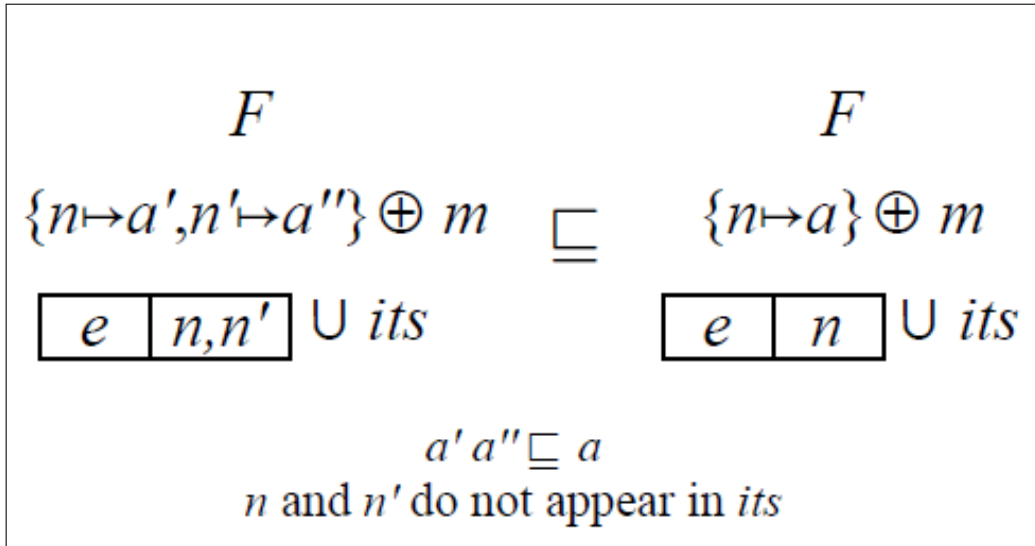


Figure 9: Merge Assets (Taken from [1])

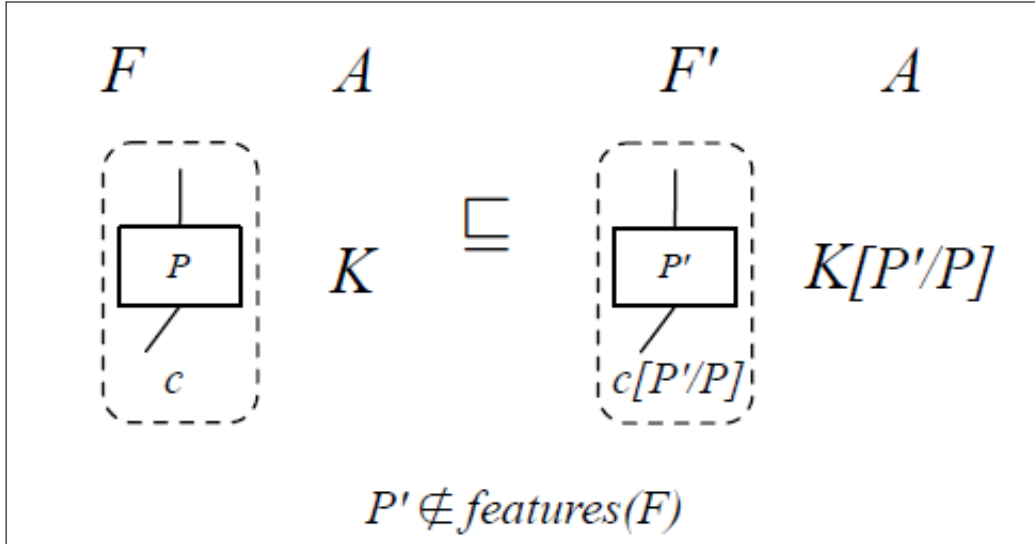


Figure 10: Feature Renaming (Taken from [1])

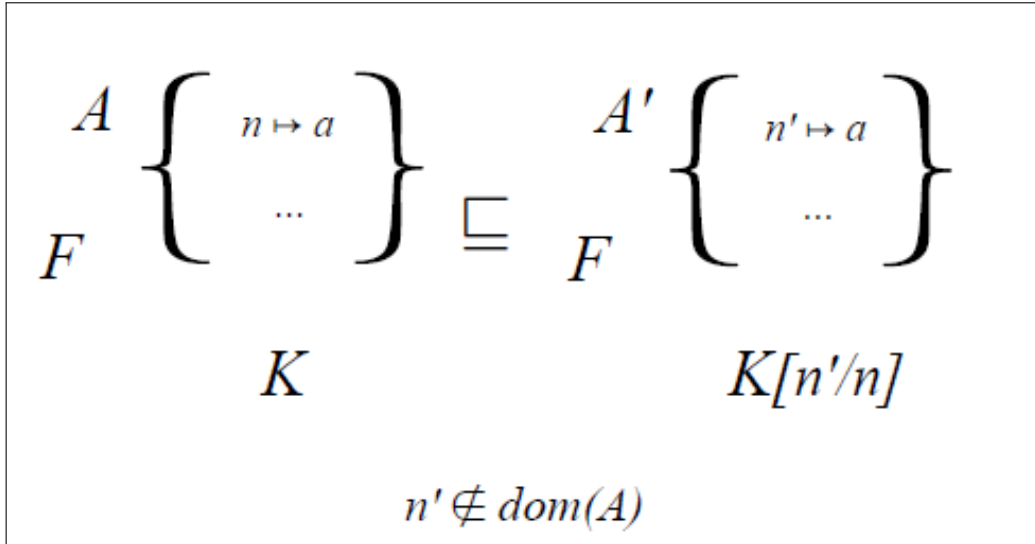


Figure 11: Asset Name Renaming (Taken from [1])

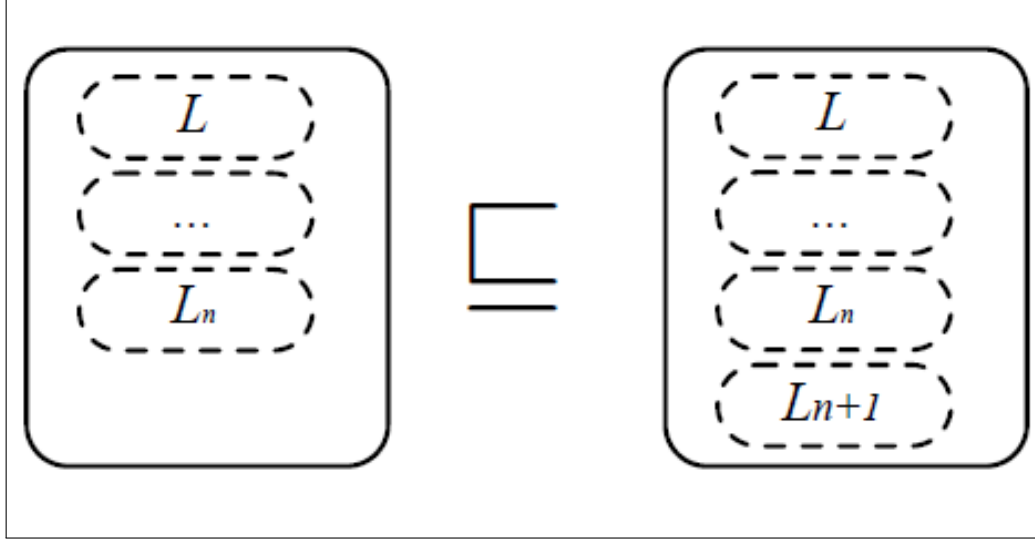


Figure 12: Add Product Line (Taken from [1])

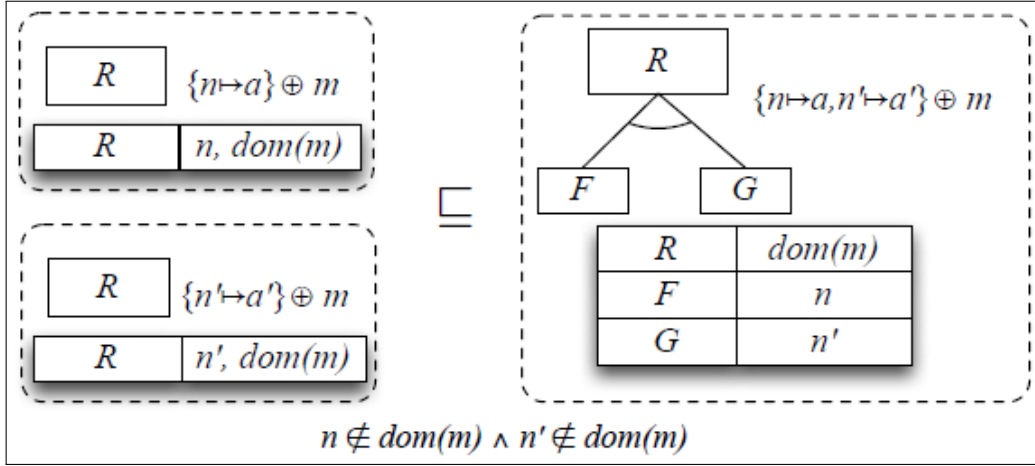


Figure 13: Merge Products Into a PL (Taken from [1])

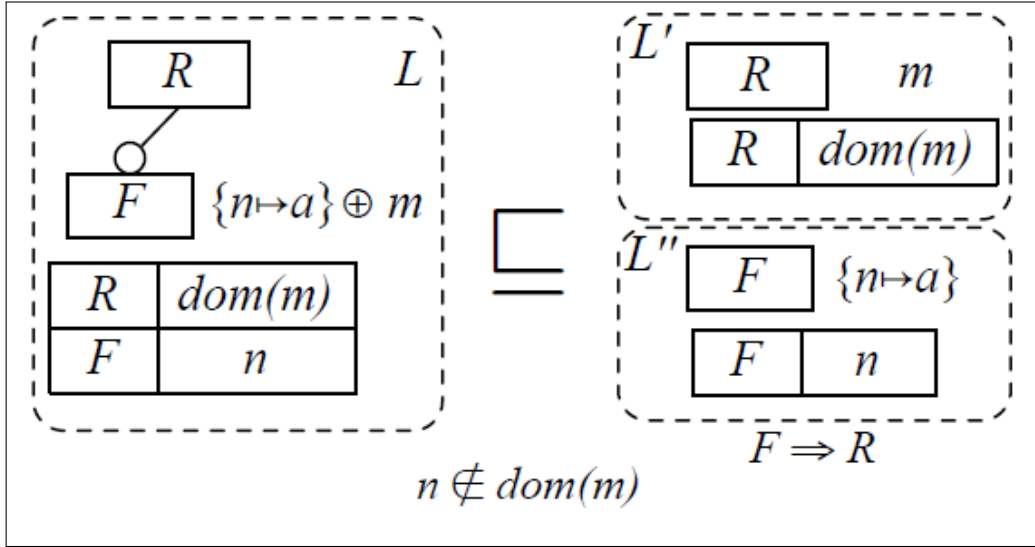


Figure 14: Derive Multi Product Line from a Product Line (Taken from [1])



## 2 Templates for Annotative Product Lines

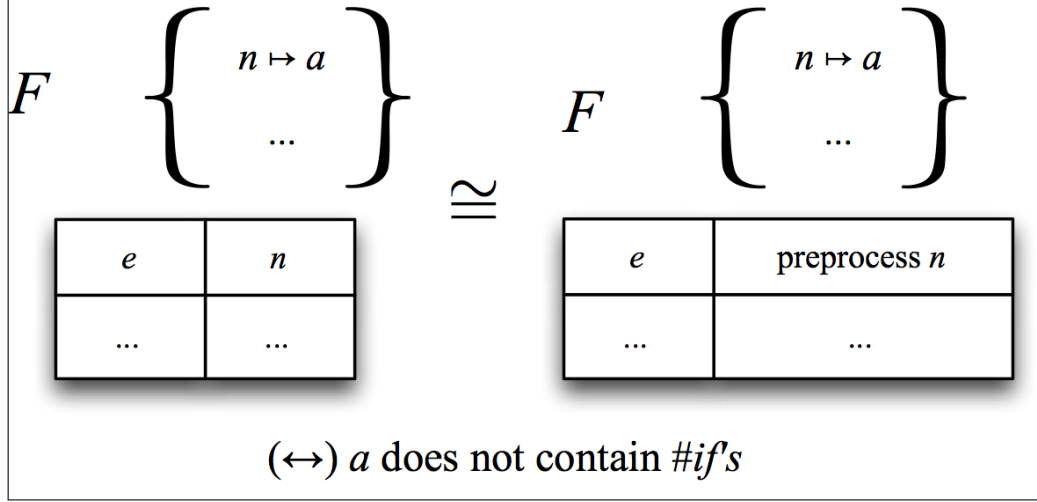


Figure 15: Preprocess Asset Without Preprocessor Directive (Taken from [2])

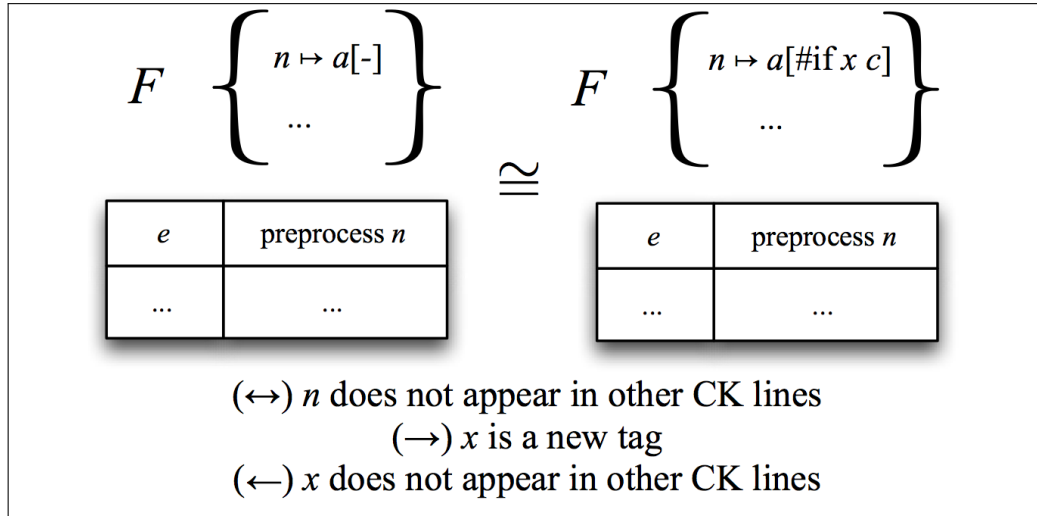


Figure 16: Add Dead Preprocessed Code (Taken from [2])

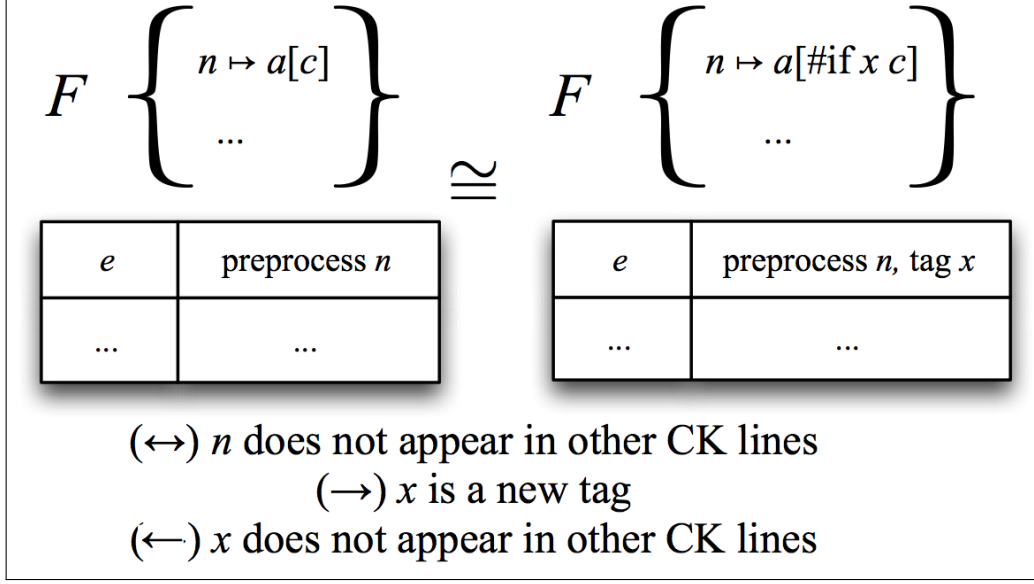


Figure 17: Add Harmless Preprocessing Directive (Taken from [2])

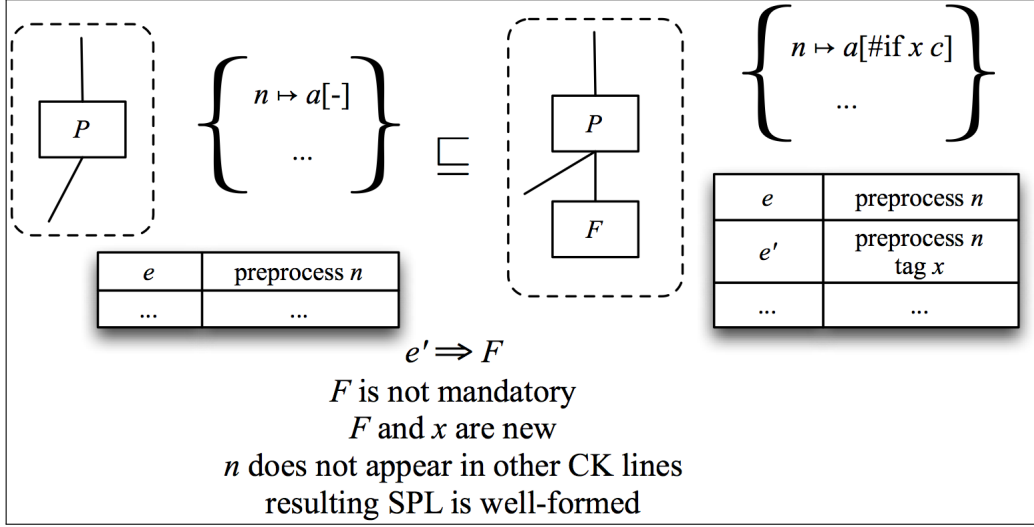


Figure 18: Add New Preprocessed Feature (Taken from [2])

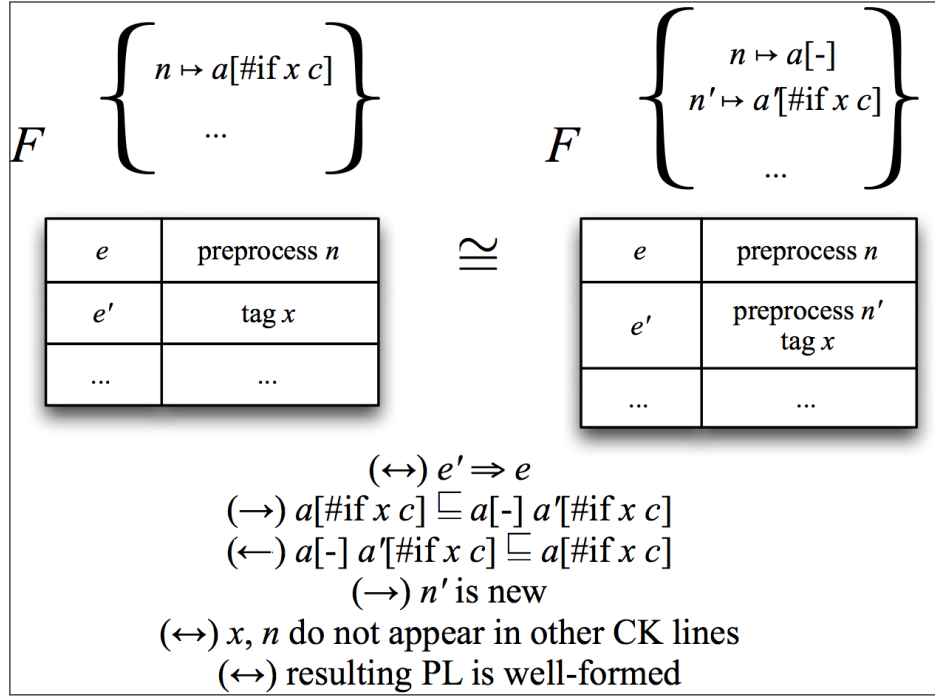


Figure 19: Extract Preprocessed Code (Taken from [2])

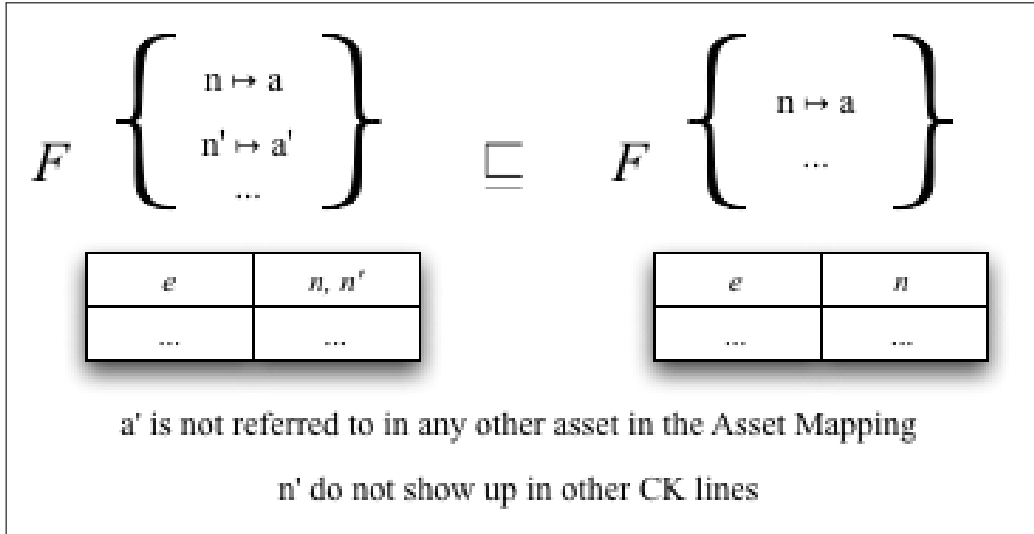


Figure 20: Delete Asset (Taken from [2])

### 3 Templates for CK Refactoring

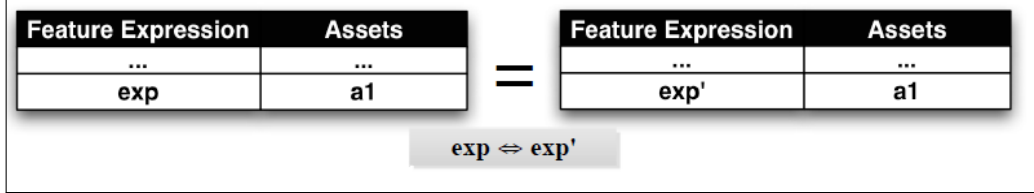


Figure 21: Simplify Feature Expression using Propositional Reasoning (Taken from [3])

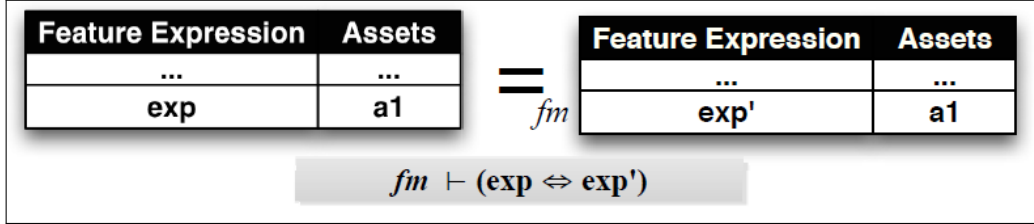


Figure 22: Simplify Feature Expression using the FM (Taken from [3])

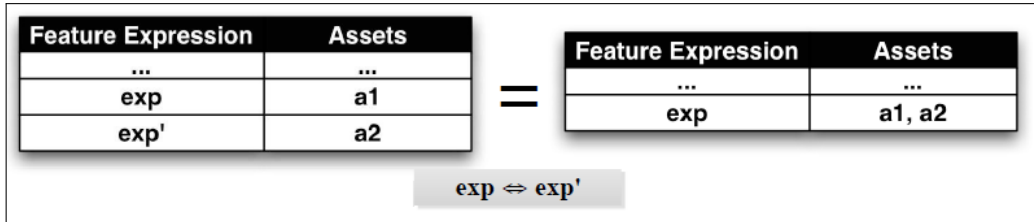


Figure 23: Merge items with propositionally equivalent feature expressions (Taken from [3])

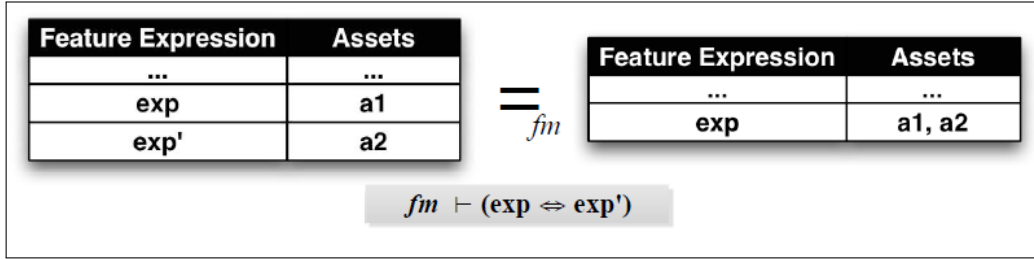


Figure 24: Merge items with equivalent feature expressions by the FM (Taken from [3])



Figure 25: Duplicated Assets (Taken from [3])

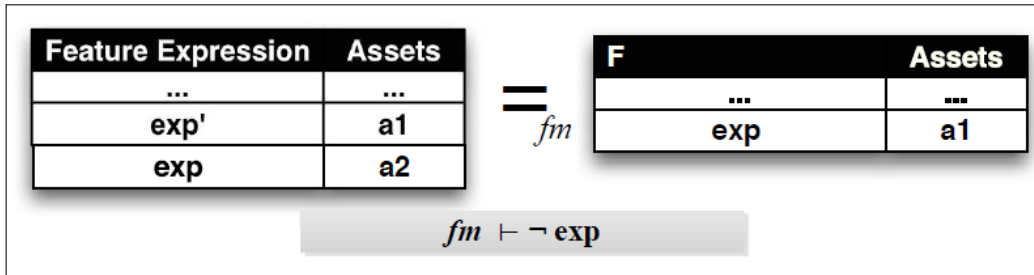


Figure 26: Dead Feature Expression (Taken from [3])

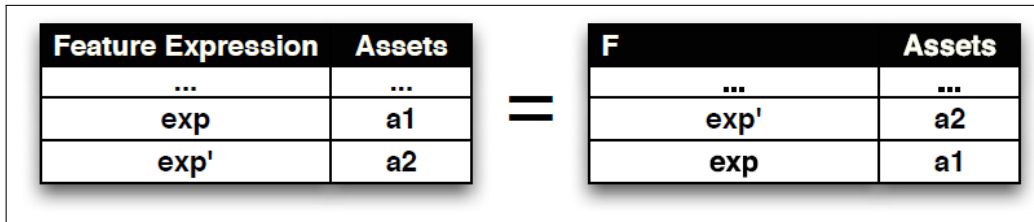


Figure 27: Change Order (Taken from [3])

## 4 Templates for FM Refactoring

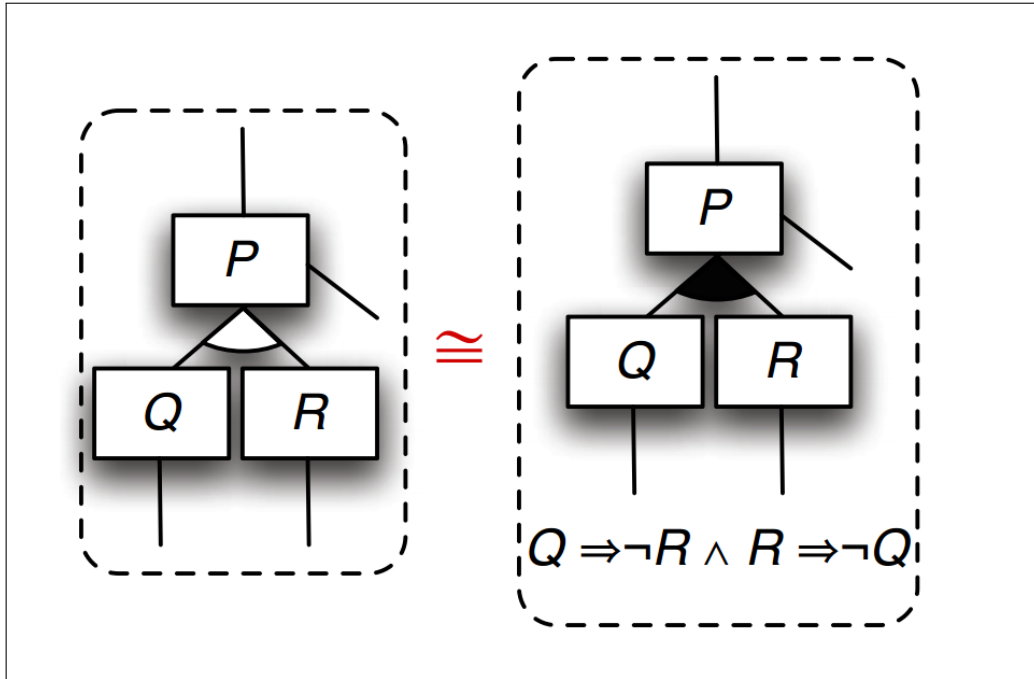


Figure 28: Replace Alternative Equivalence Template (Taken from [4])

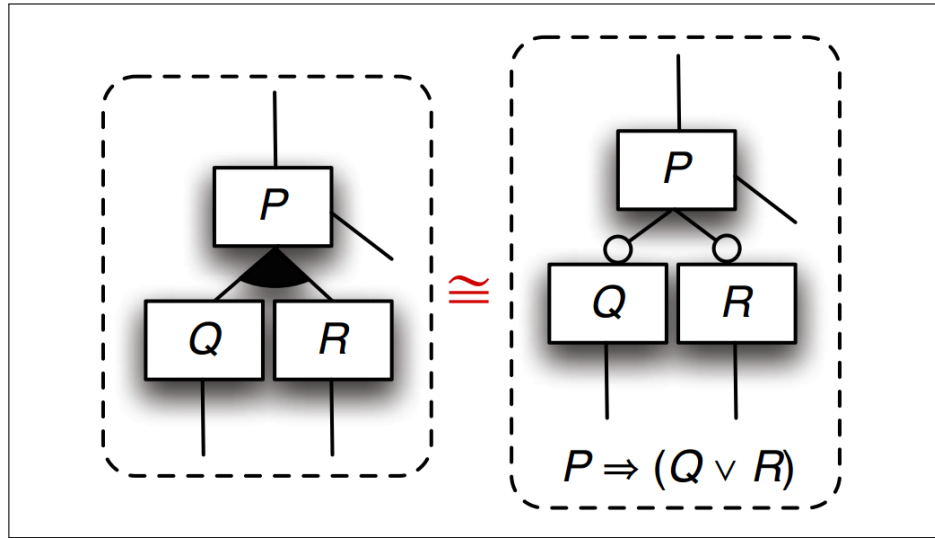


Figure 29: Replace Or Equivalence Template (Taken from [4])

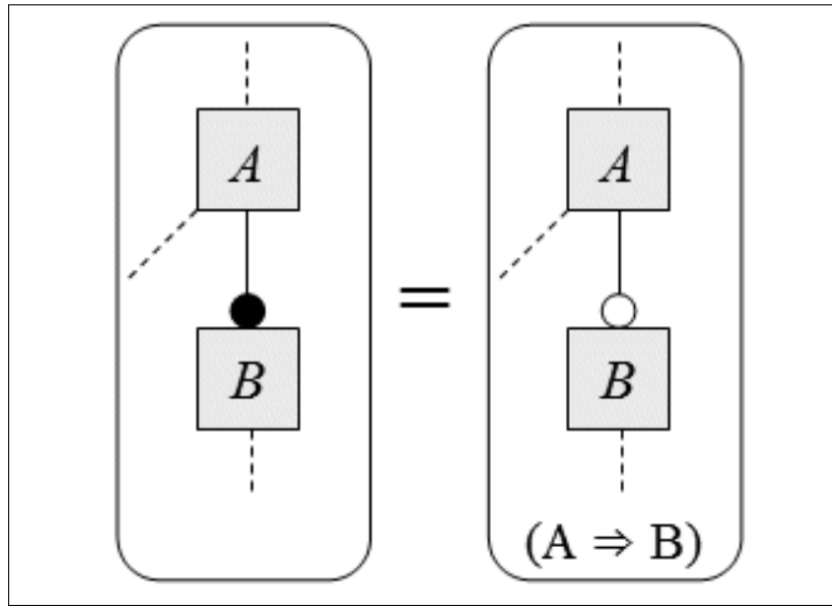


Figure 30: Replace Mandatory (Taken from [5])

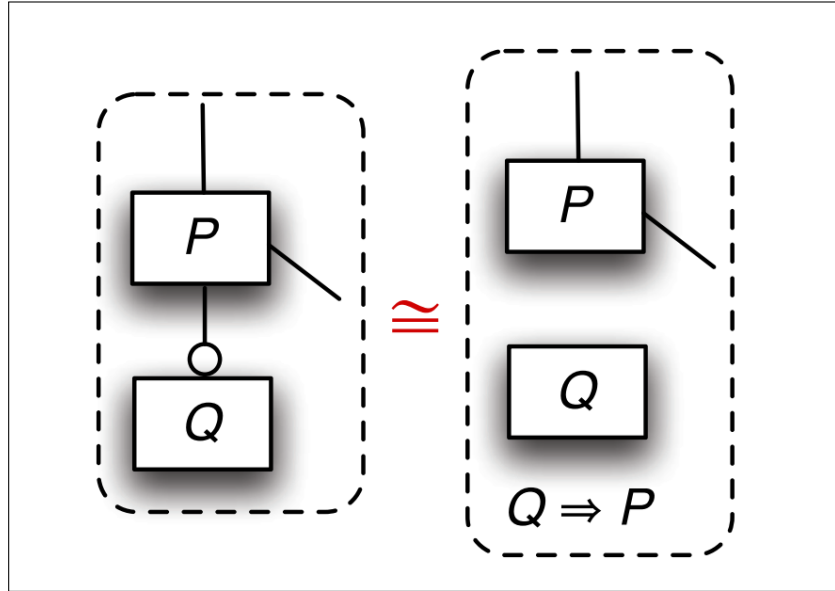


Figure 31: Remove Optional Equivalence Template (Taken from [4])

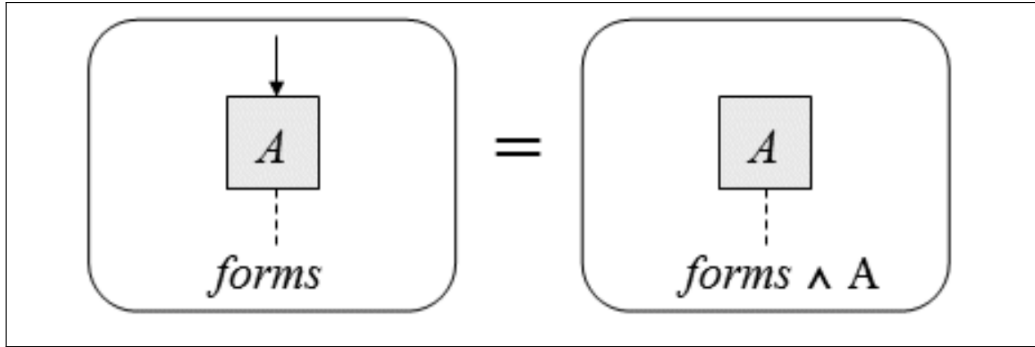


Figure 32: Remove Root (Taken from [5])



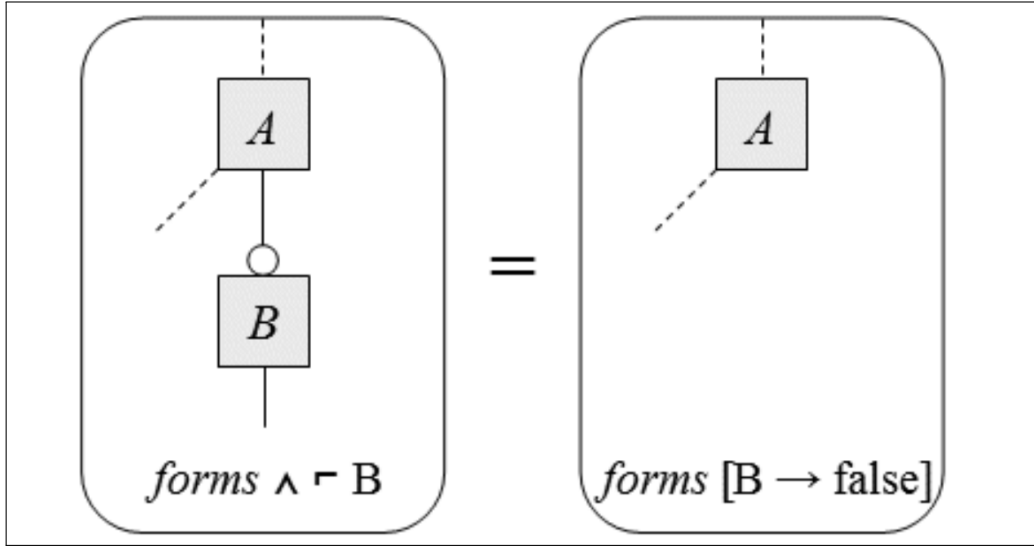


Figure 33: Remove Node (Taken from [5])

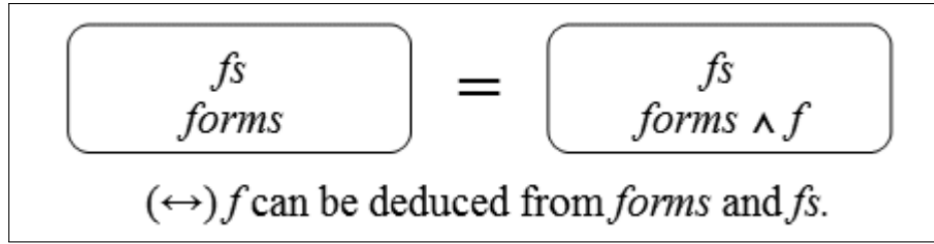


Figure 34: Add Formula (Taken from [5])

## References

- [1] Phd leopoldo. <http://twiki.cin.ufpe.br/twiki/pub/SPG/GenteAreaThesis/lmt-phd-thesis.pdf>. [Online; accessed 10-September-2015].
- [2] Twiki refactoring templates. <http://twiki.cin.ufpe.br/twiki/bin/view/SPG/SPLRefactoringTemplates>. [Online; accessed 10-September-2015].
- [3] Msc leopoldo. <http://twiki.cin.ufpe.br/twiki/pub/SPG/GenteAreaThesis/lmt-msc-thesis.pdf>. [Online; accessed 10-September-2015].
- [4] An introduction to software product line refactoring - gttse 2009, lncs 6491, pp. 1–26, 2011. [http://link.springer.com/chapter/10.1007%2F978-3-642-18023-1\\_1](http://link.springer.com/chapter/10.1007%2F978-3-642-18023-1_1). [Online; accessed 15-September-2015].
- [5] Algebraic laws for feature models - jucs vol. 14, no. 21 (2008). [http://www.jucs.org/jucs\\_14\\_21/algebraic\\_laws\\_for\\_feature/jucs\\_14\\_21\\_3573\\_3591\\_gheyi.pdf](http://www.jucs.org/jucs_14_21/algebraic_laws_for_feature/jucs_14_21_3573_3591_gheyi.pdf). [Online; accessed 14-September-2015].