# Layered Programming

A Language Independent
Variability Management Approach

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## Outline

## Motivation

- Software Product Line Engineering (SPLE)
- High up-front investment[1]
- Proactive, reactive and extractive SPLE[2]

[1] Pfofe et al., "Synchronizing software variants with VariantSync".

[2] Clements and Krueger, "Being Proactive Pays Off/Eliminating the Adoption Barrier. Point-Counterpoint article in".

[3] Birk et al., "Product line engineering, the state of the practice"

## Motivation

- Software Product Line Engineering (SPLE)
- High up-front investment[1]
- Proactive, reactive and extractive SPLE[2]

Need for

- Tool support[3]
- Techniques for domain implementation

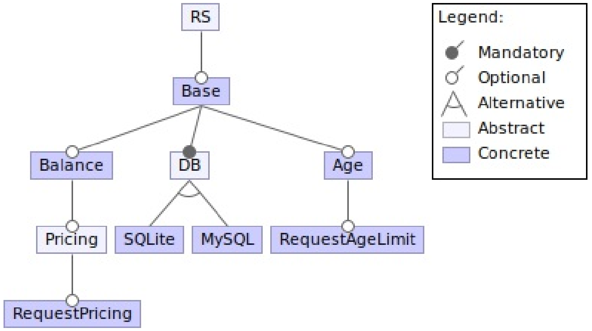
[1] Pfofe et al., "Synchronizing software variants with VariantSync".

[2] Clements and Krueger, "Being Proactive Pays Off/Eliminating the Adoption Barrier. Point-Counterpoint article in".

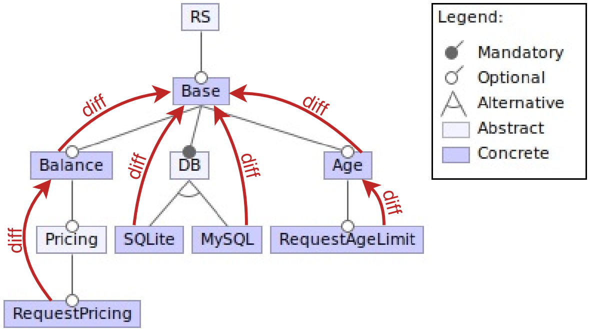
[3] Birk et al., "Product line engineering, the state of the practice"

## Outline

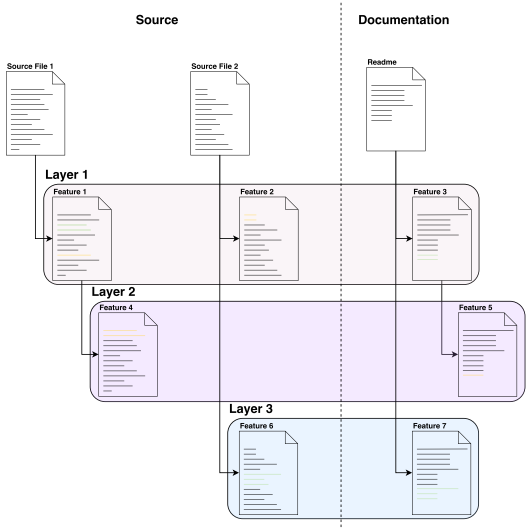
## Layered Programming



## Layered Programming



# Layered Programming



## Layered Programming Benefits

- System has multiple representations $\rightarrow$ keep them consistent
- Language independent
- Easy to use
  - No new language or complex structure
  - Semantically clear (WYSIWYG)
  - Features added where they are used
- Proactive / Reactive / (Extractive) SPLE

## Outline

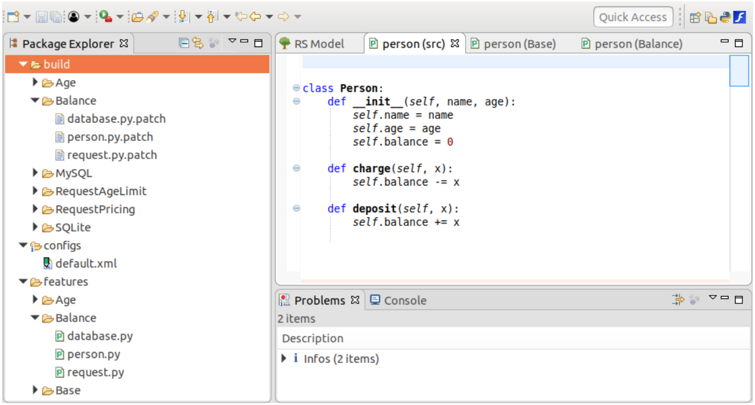
## Core Tool

- Two modes: Diff & Patch
- Word based diff[4,5]
- No FM or config

[4] Myers, "An O (ND) difference algorithm and its variations".

[5] Fraser, *google-diff-match-patch-Diff, Match and Patch libraries for Plain Text*.

# FeatureIDE Integration

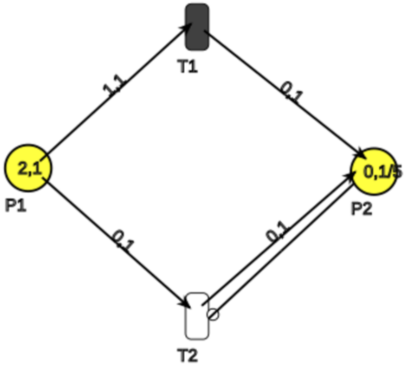


```
class Person:
    def __init__(self, name, age):
        self.name = name
        self.age = age
        self.balance = 0

    def charge(self, x):
        self.balance -= x

    def deposit(self, x):
        self.balance += x
```

## Outline

# Application: Models

- Petri Net
  - Colored
  - Capacity
  - Inhibitor
  - Stochastic



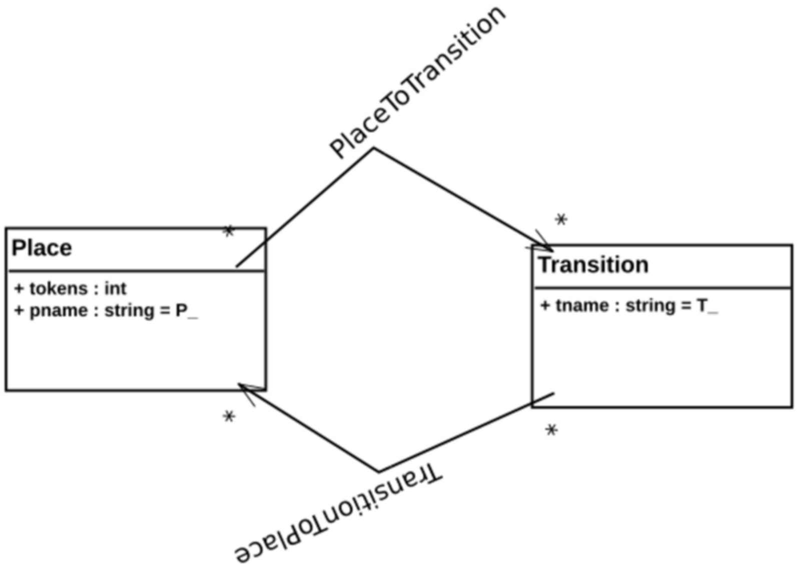
## Outline

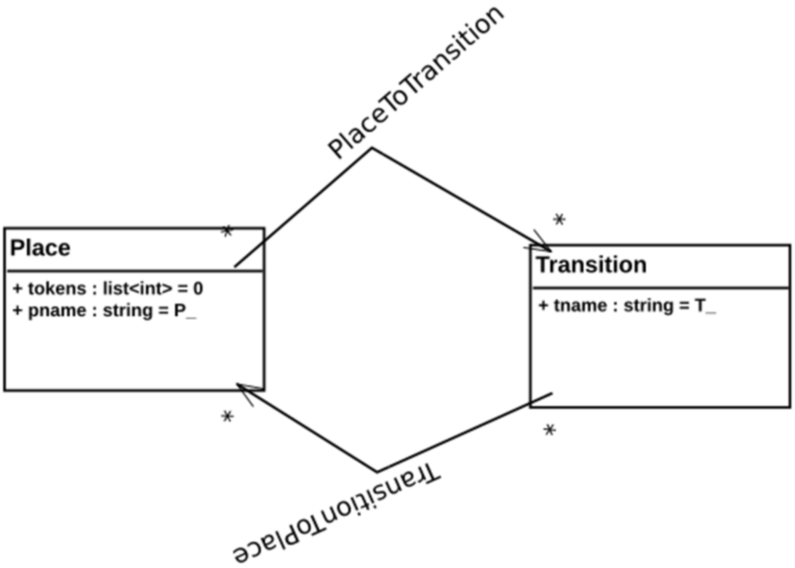
## Conclusion

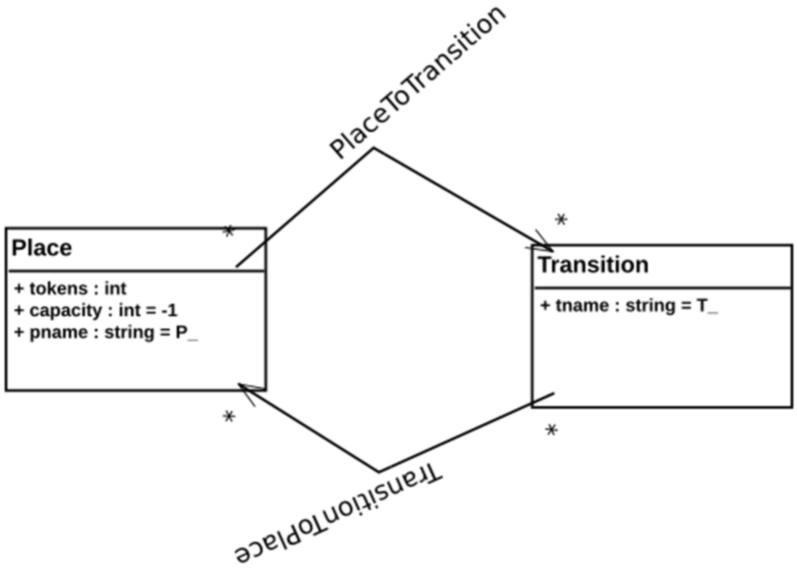
- $+$ Potential
- $-$ Unstable
- $-$ Unpredictable

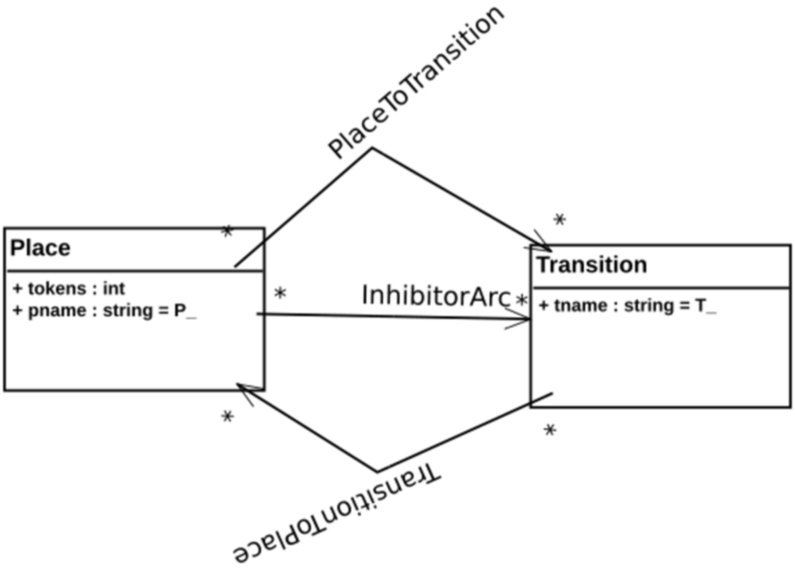
## Summary

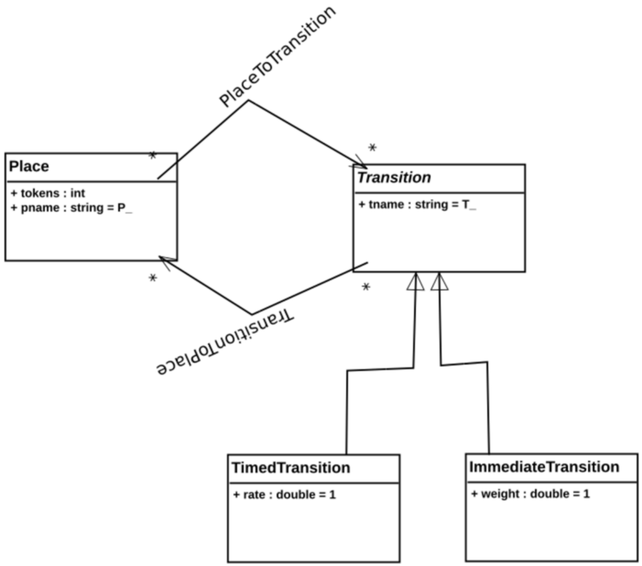
## Appendix


PlaceToTransition
Place
+ tokens : int
+ pname : string = P_
Transition
+ tname : string = T_
*
*
*
*
TransitionToPlace


PlaceToTransition
Place
+ tokens : list<int> = 0
+ pname : string = P_
Transition
+ tname : string = T_
TransitionToPlace
*
*
*
*


Place
+ tokens : int
+ capacity : int = -1
+ pname : string = P_
Transition
+ tname : string = T_
PlaceToTransition
TransitionToPlace
*
*
*
*


PlaceToTransition
Place
+ tokens : int
+ pname : string = P_
InhibitorArc
Transition
+ tname : string = T_
*
*
*
*
*
*
TransitionToPlace


PlaceToTransition
Place
+ tokens : int
+ pname : string = P_
*
*
Transition
+ tname : string = T_
*
*
TransitionToPlace
TimedTransition
+ rate : double = 1
ImmediateTransition
+ weight : double = 1