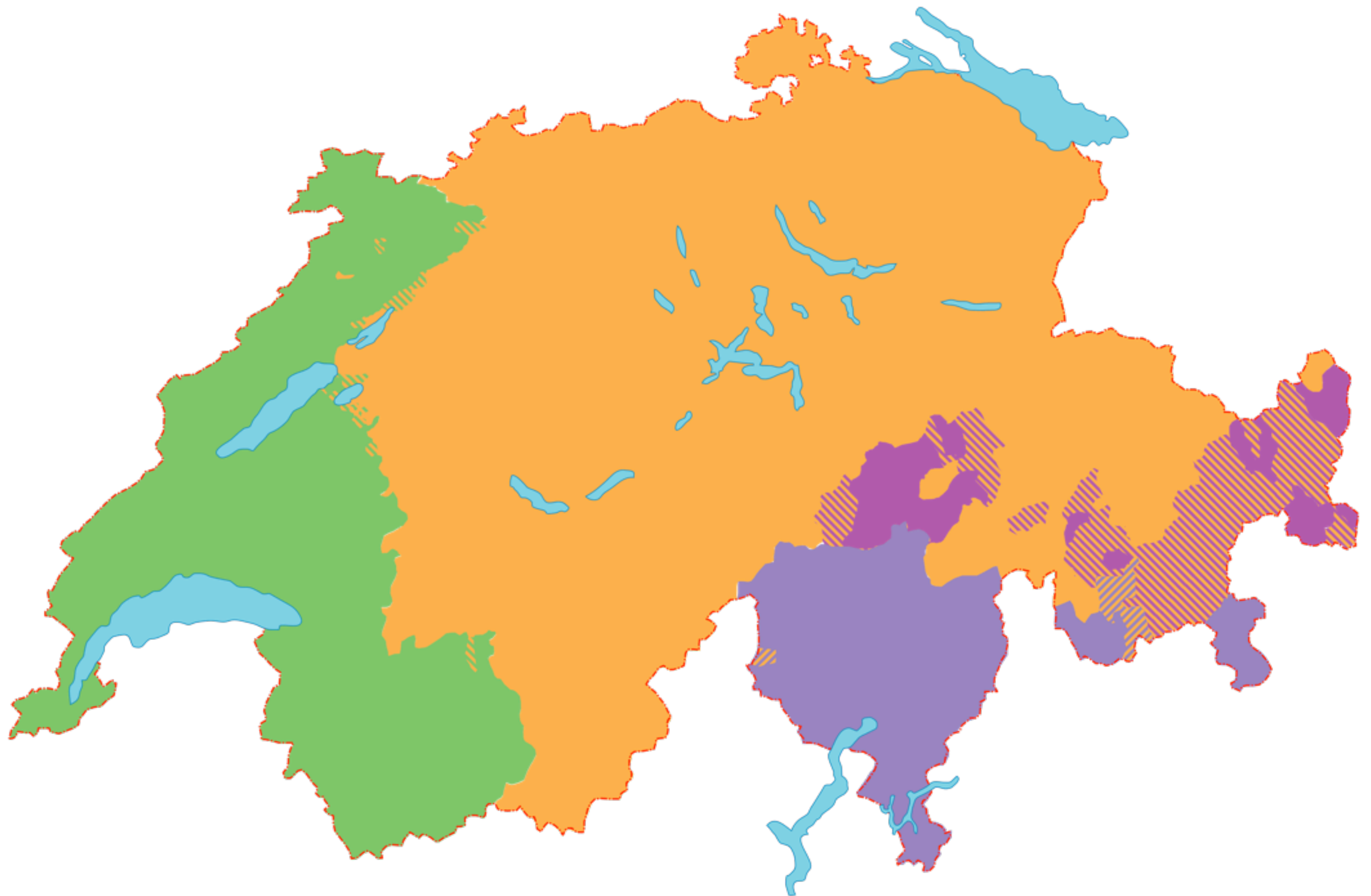


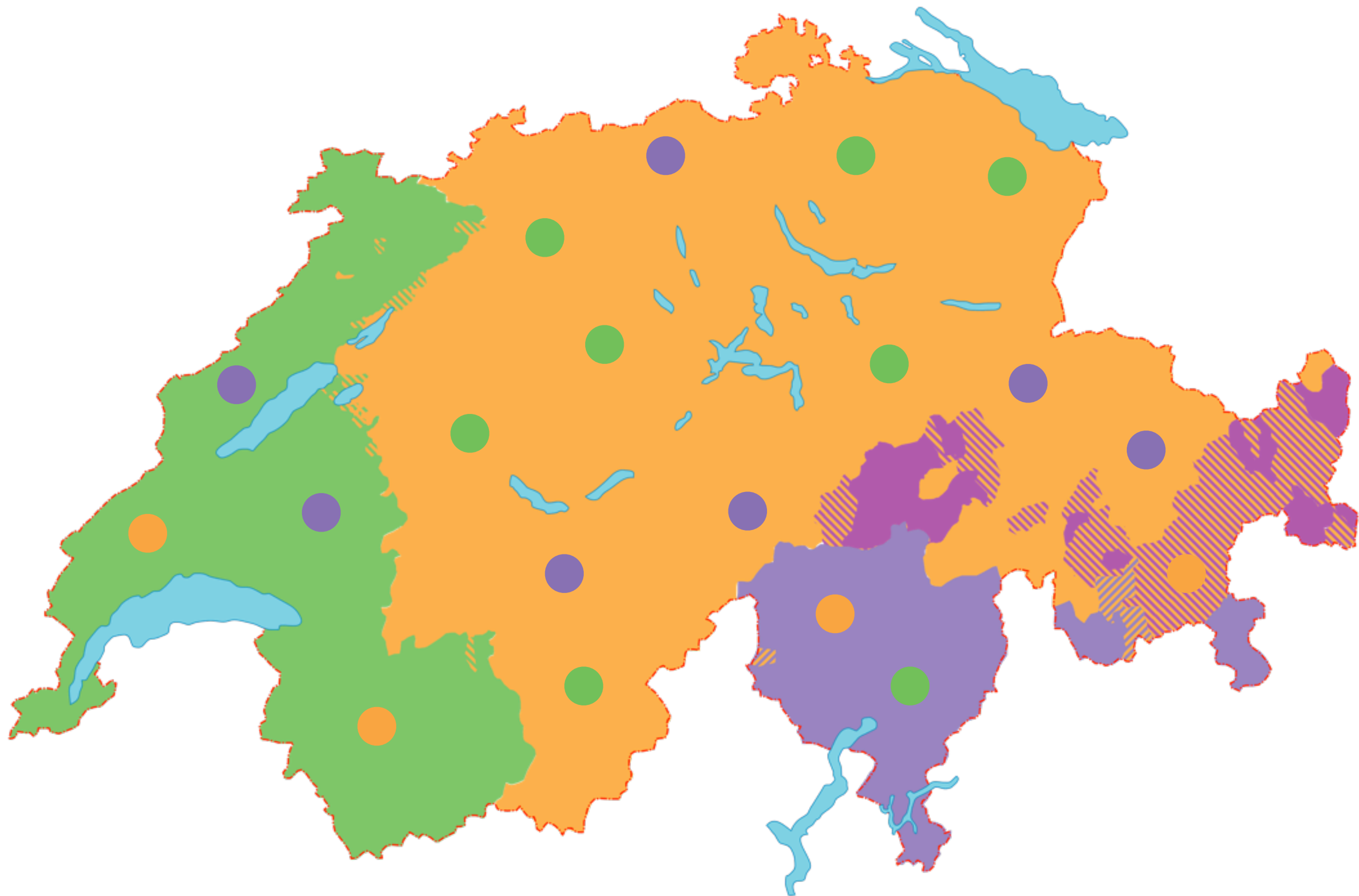
Language Boxes

Bending the Host Language
with Modular Language Changes

Lukas Renggli, Marcus Denker, Oscar Nierstrasz

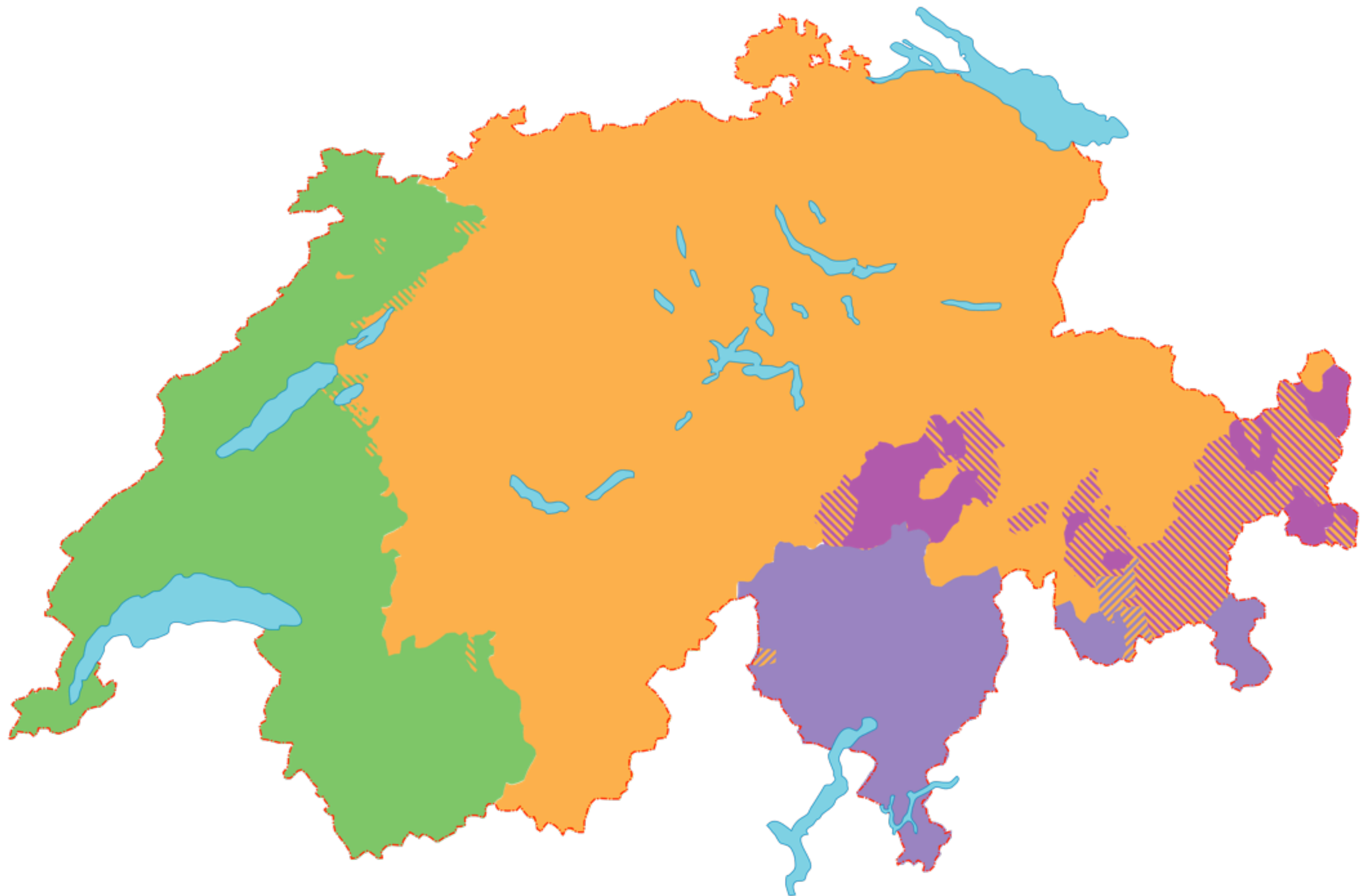


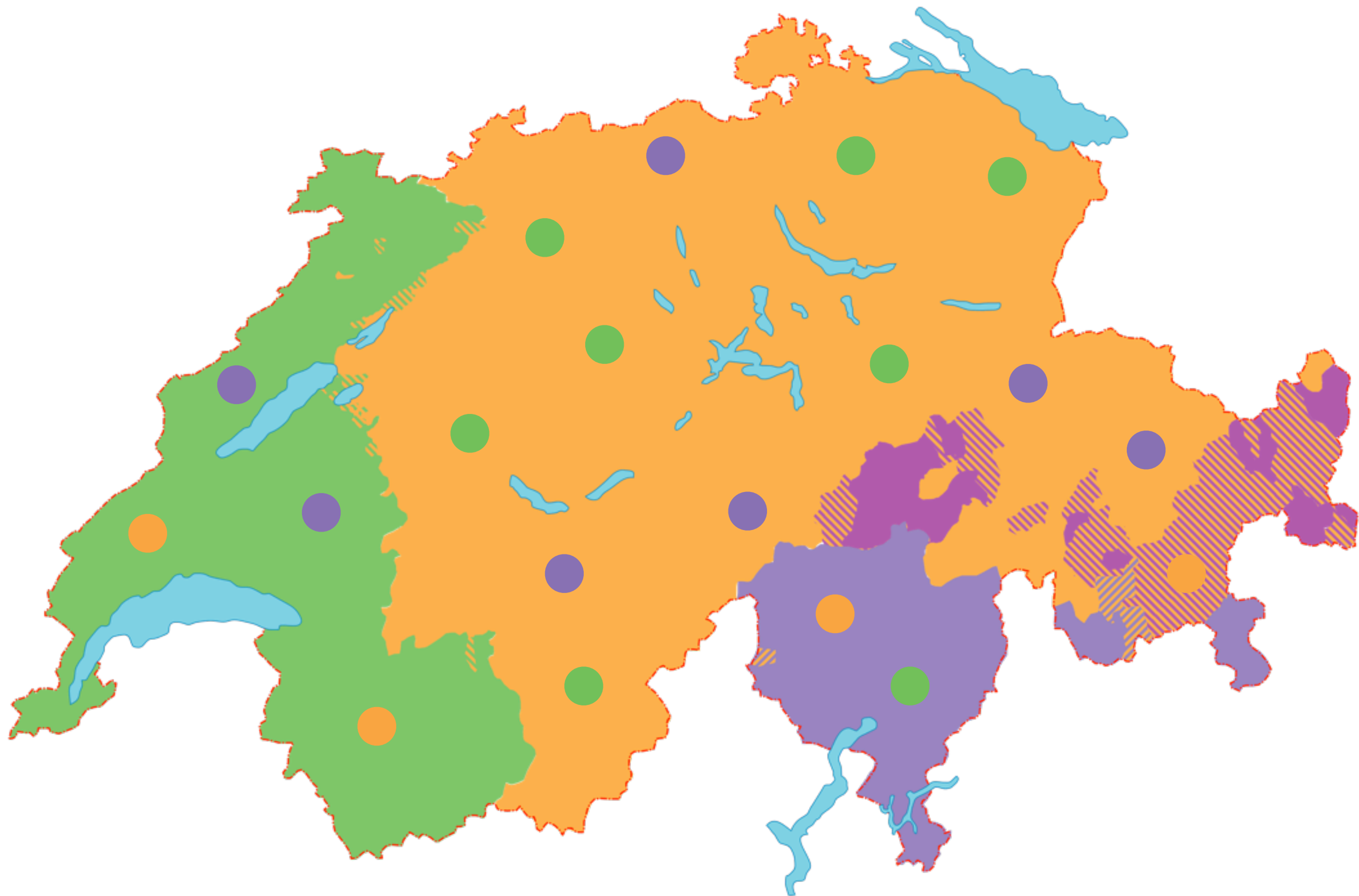














Host Environment

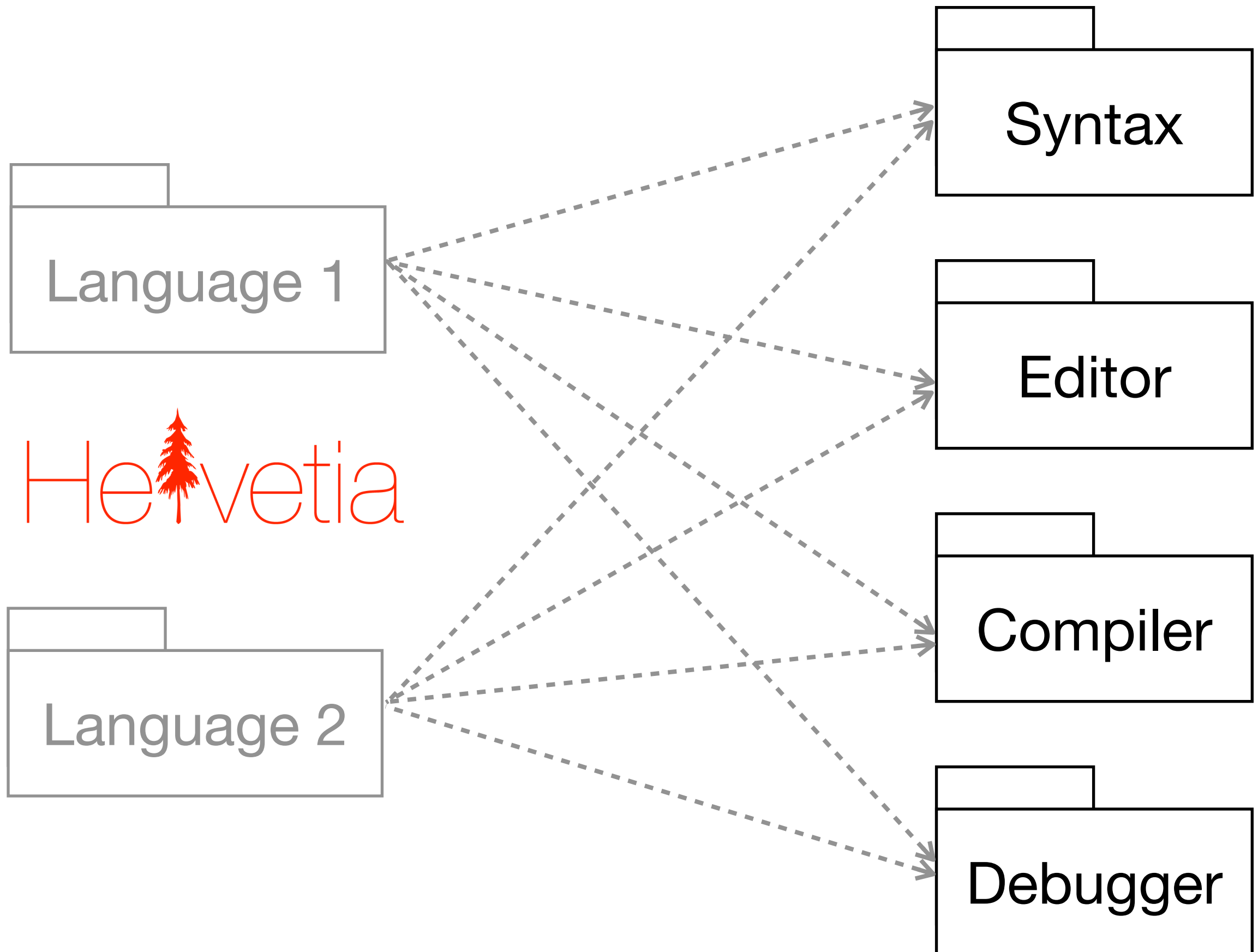


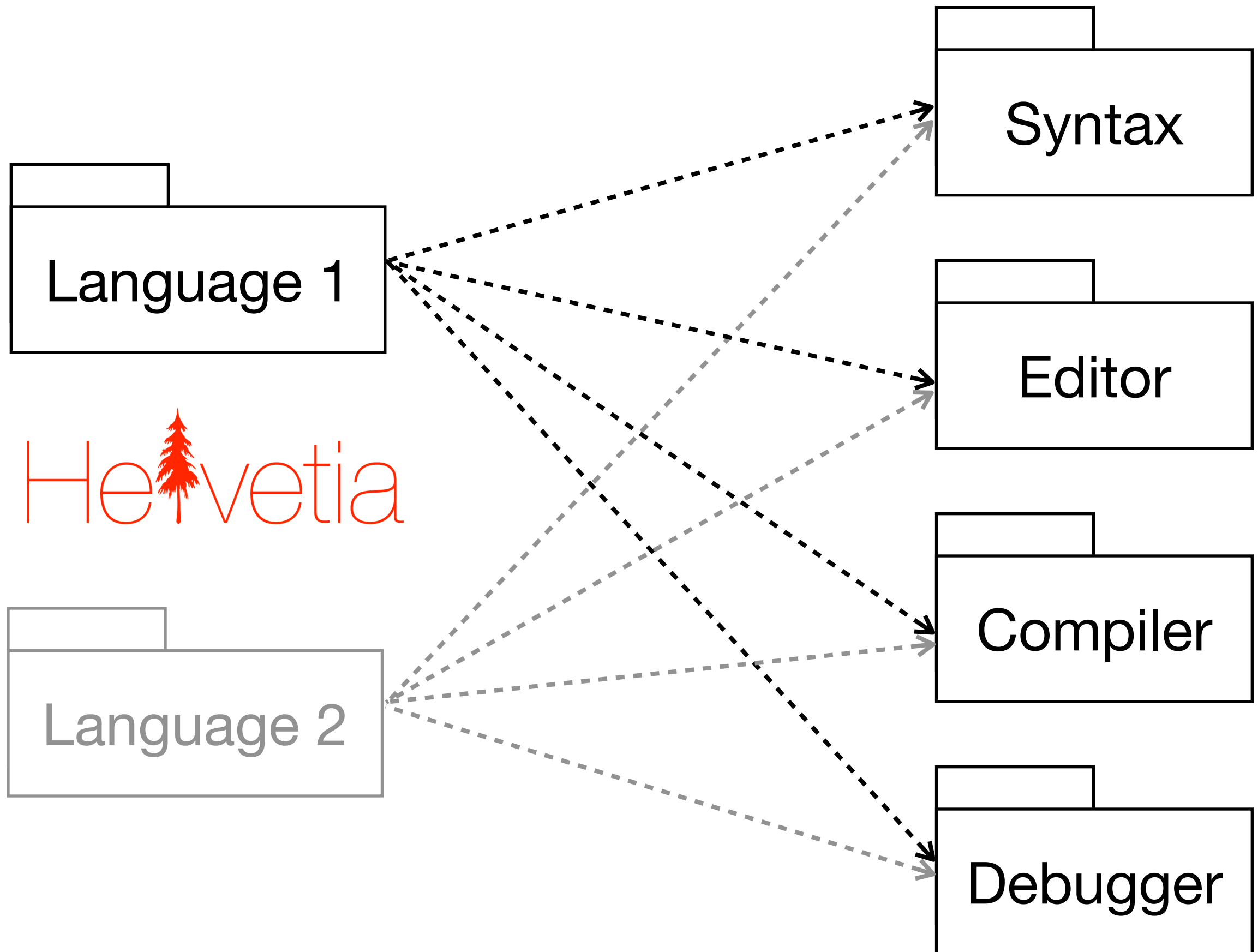
Tool Infrastructure

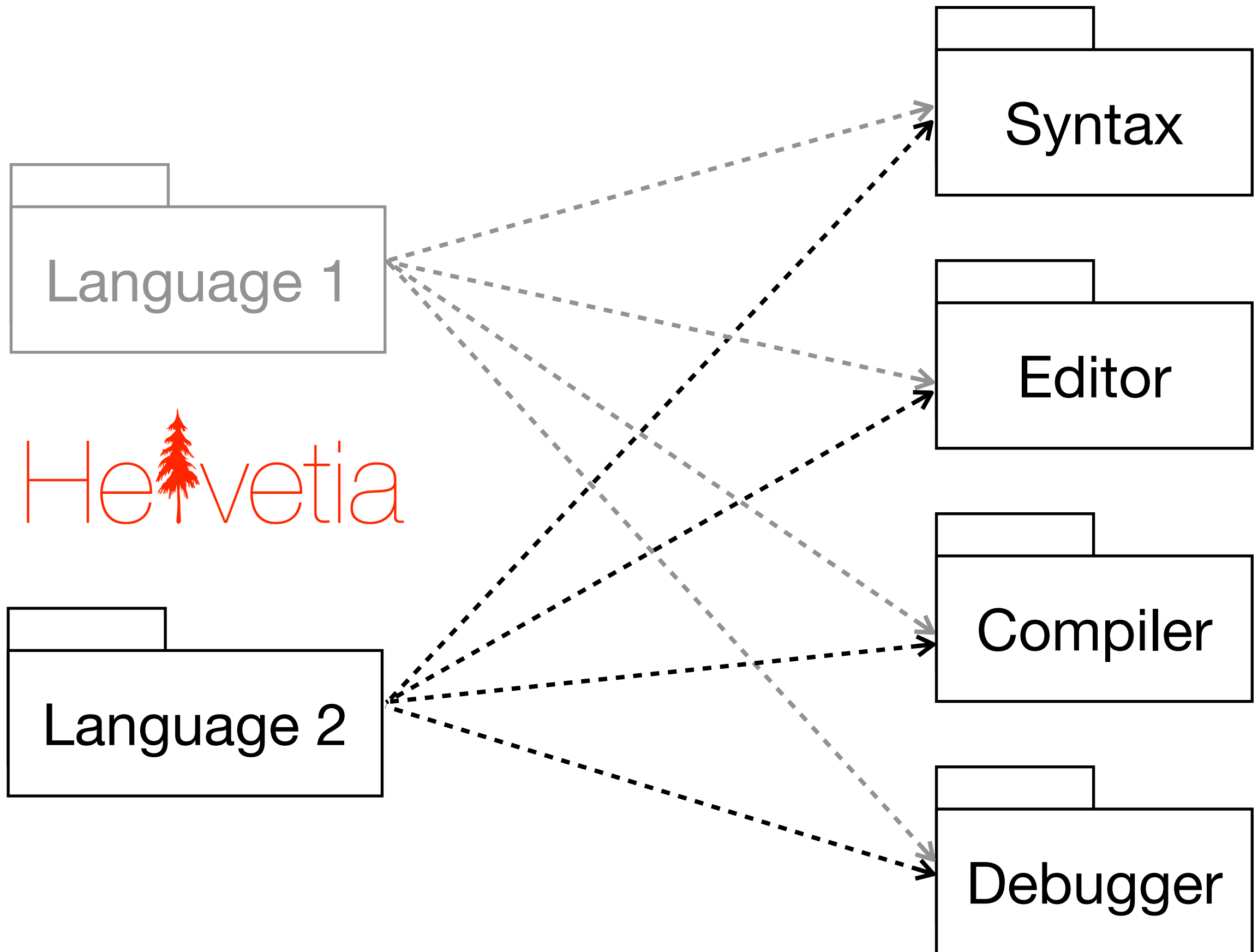


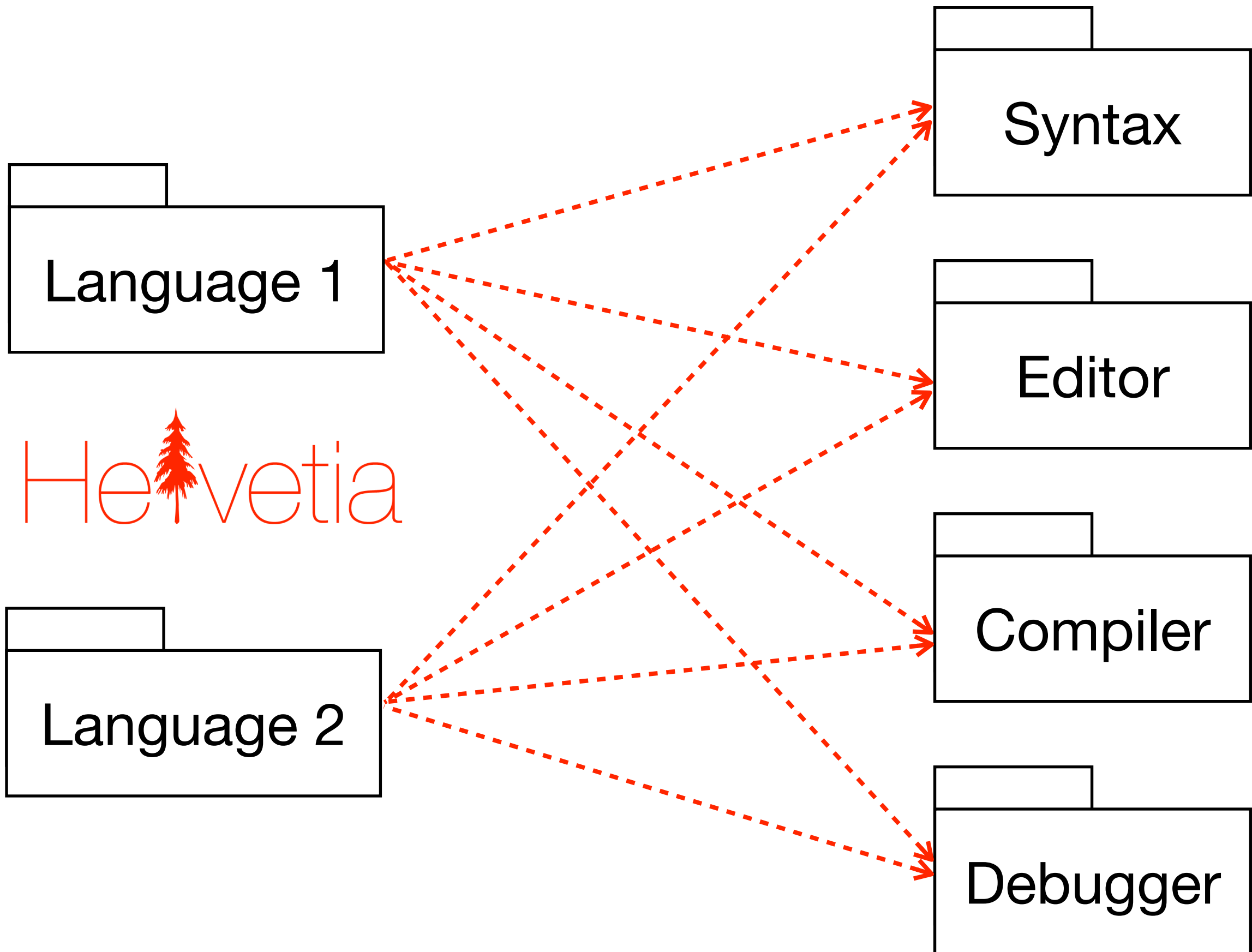
Host Environment

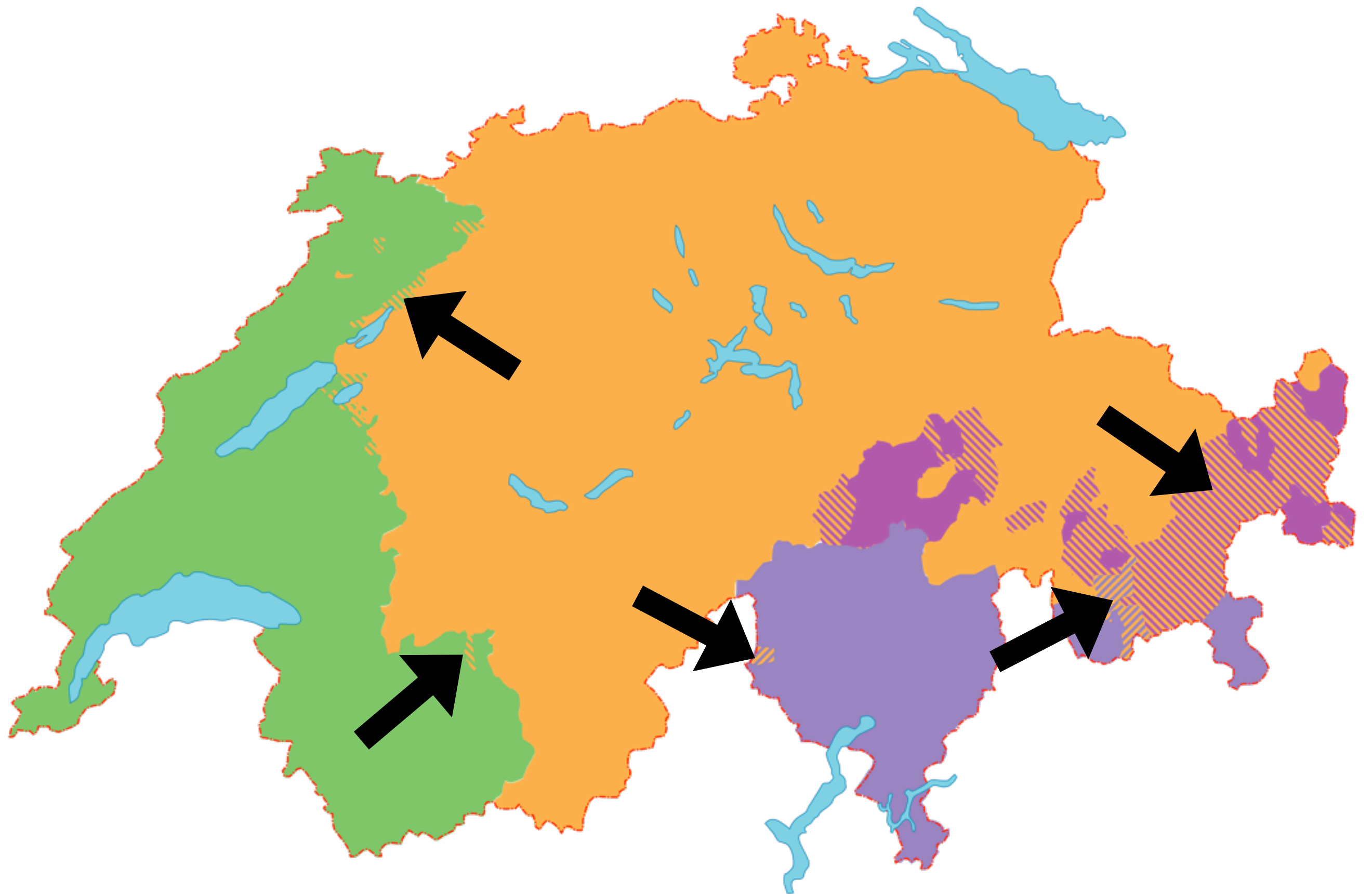












Tool Infrastructure



Host Environment



Language Boxes



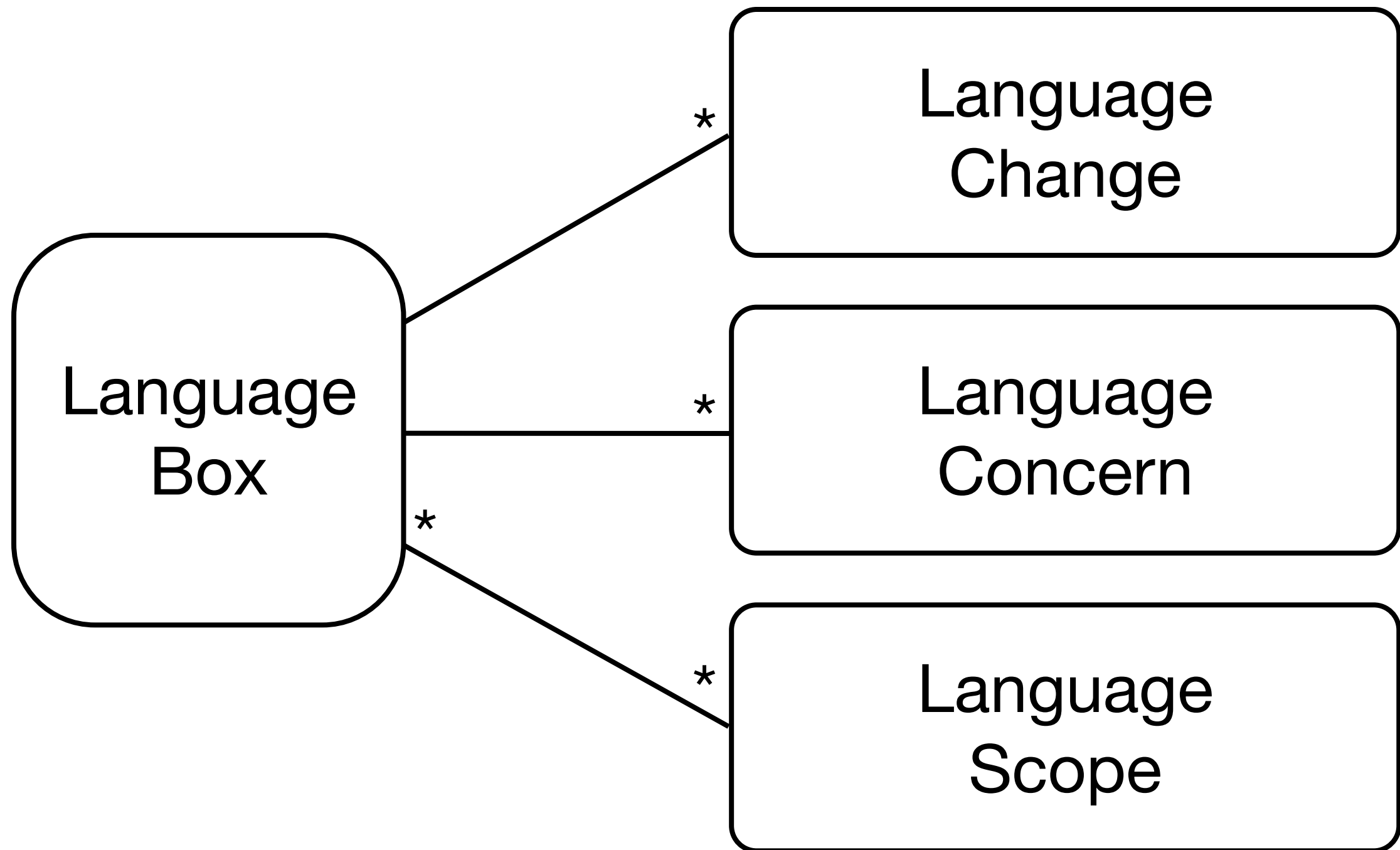
Tool Infrastructure



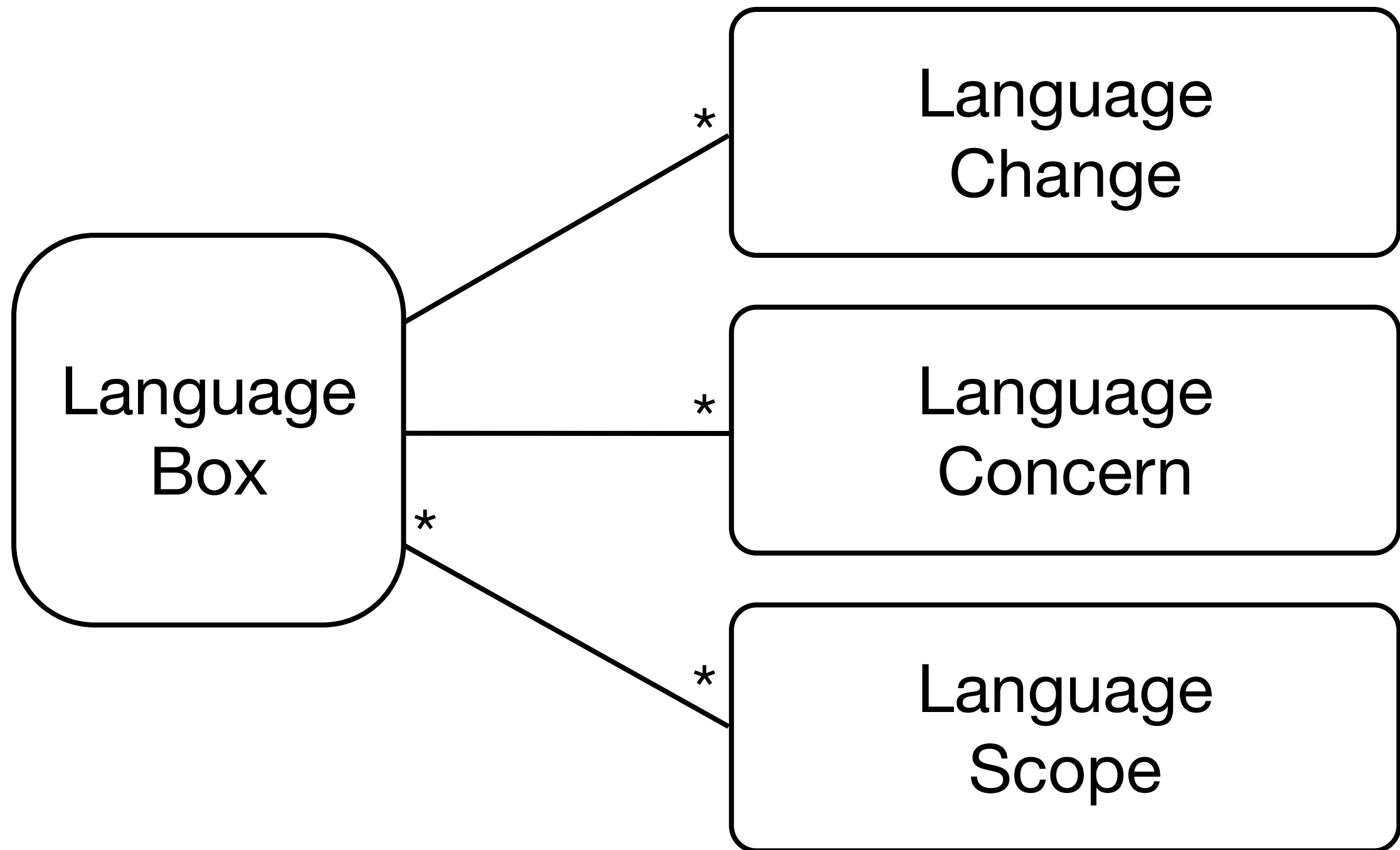
Host Environment

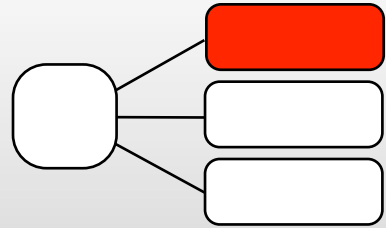


Language Box Model



$$\text{IV} + \text{VII} = \text{XI}$$



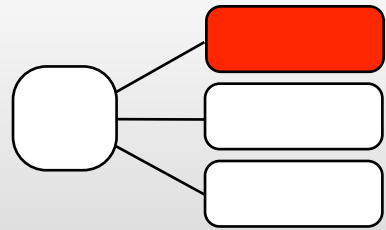


Language Change

Insert FRAGMENT

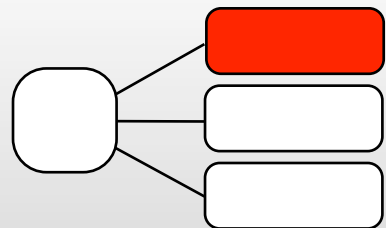
(before | after) PRODUCTION

as (choice | sequence | replacement)



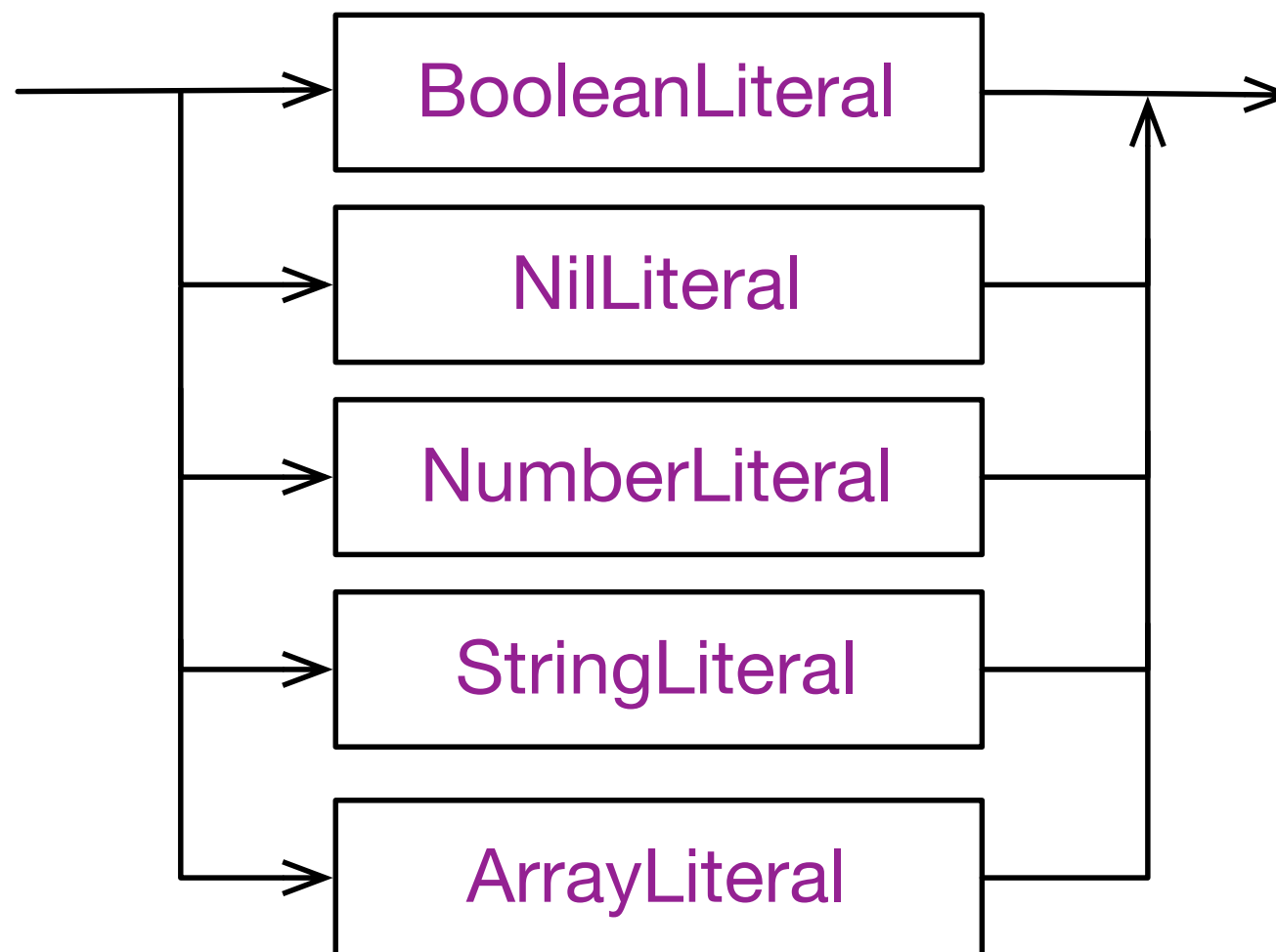
Language Change

Insert `RomanNumber`
before `NumberLiteral`
as a choice.

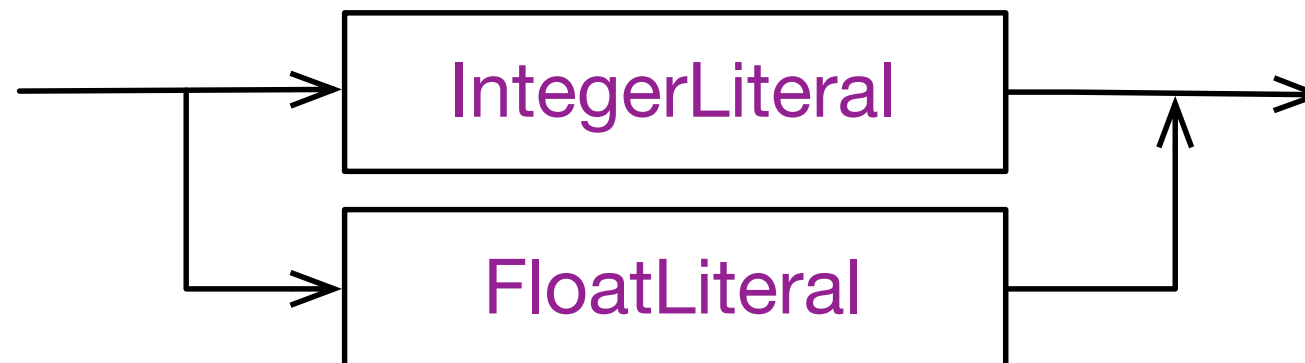


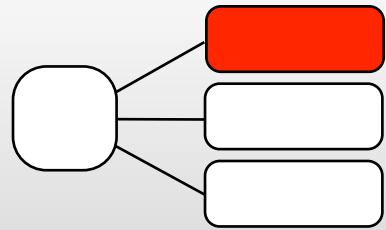
Language Change

Literal:



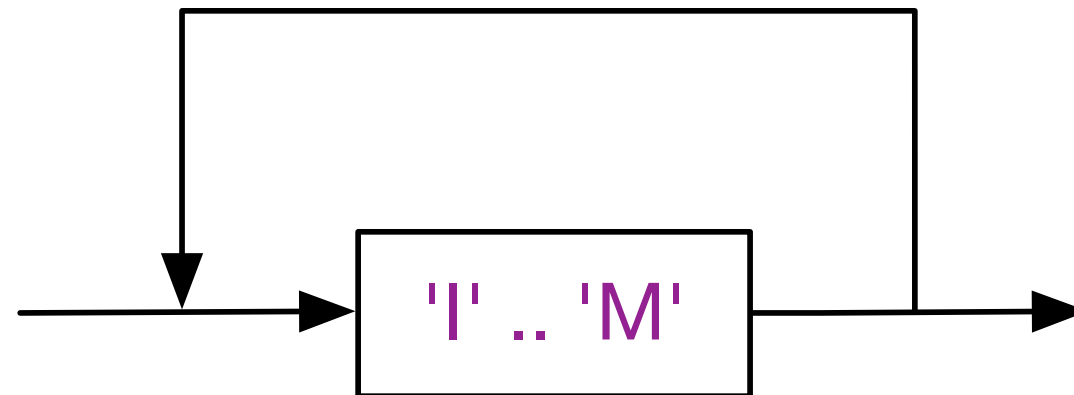
NumberLiteral:

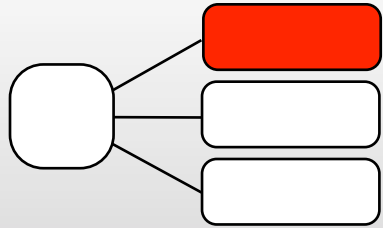




Language Change

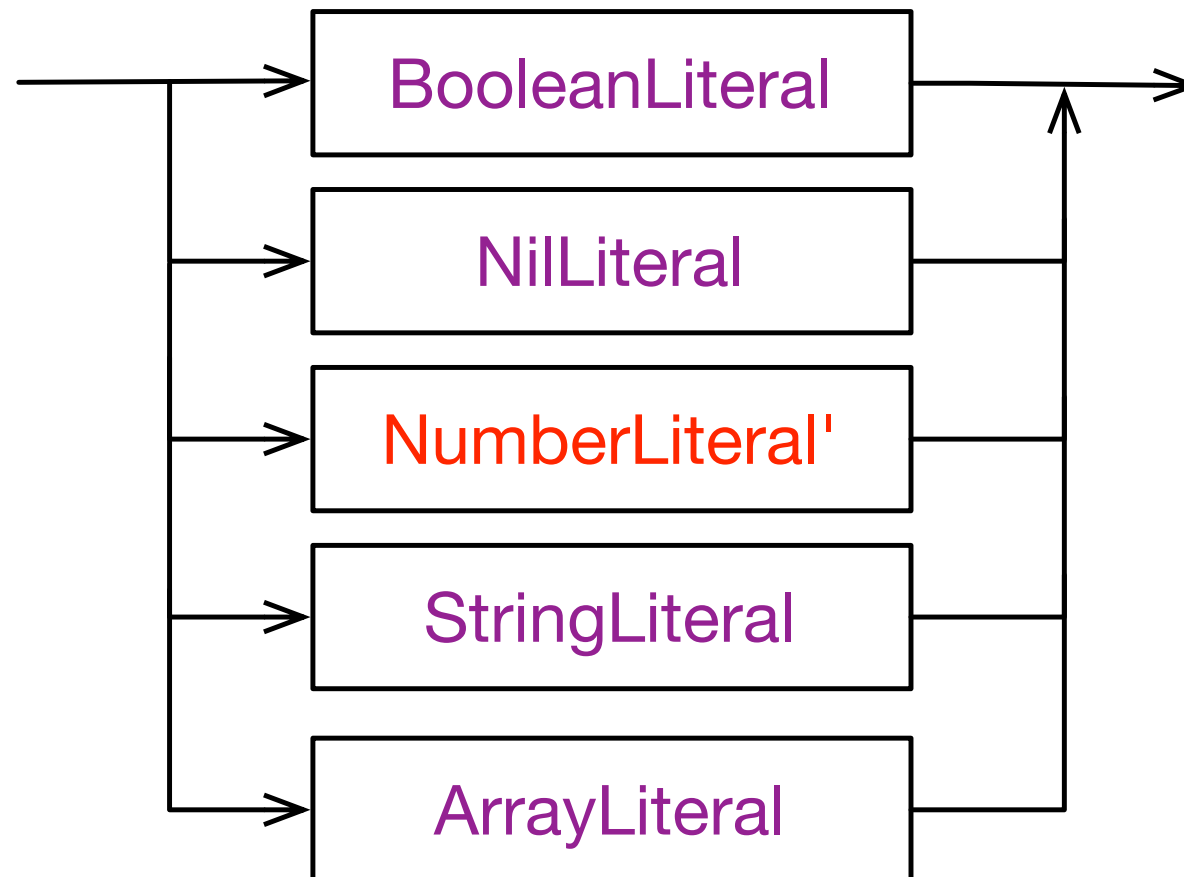
RomanNumber:



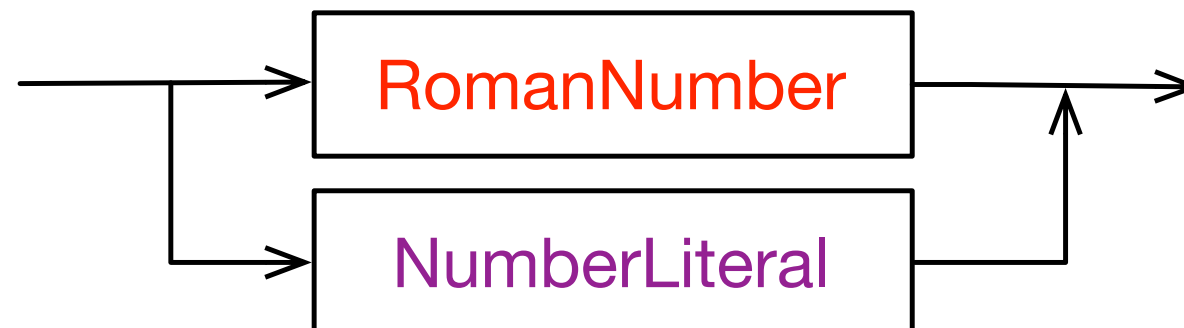


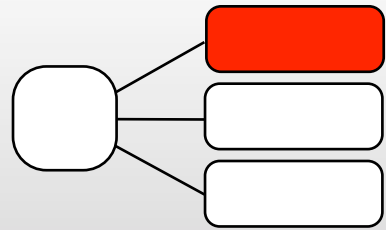
Language Change

Literal:



NumberLiteral':

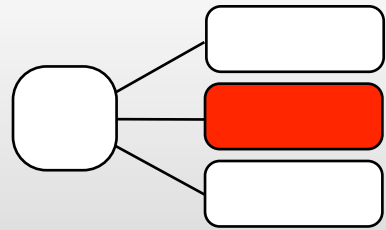




Language Change

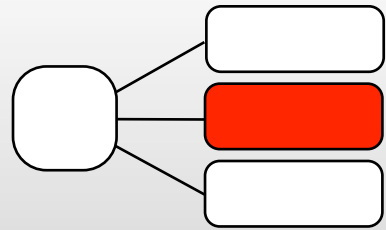
1st Class Grammar

Scannerless, Packrat



Language Concern

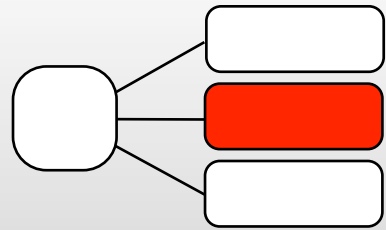
Production Action



Language Concern

Compiler

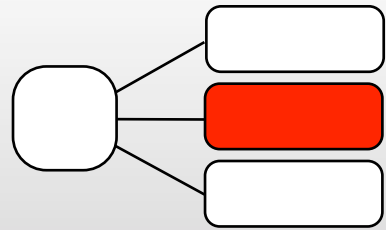
`aToken` value romanToArabic lift



Language Concern

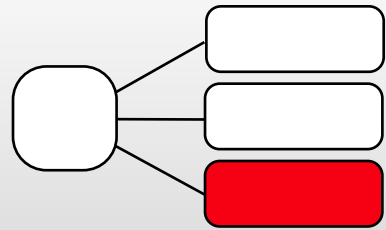
Highlighting

aToken -> Color gray



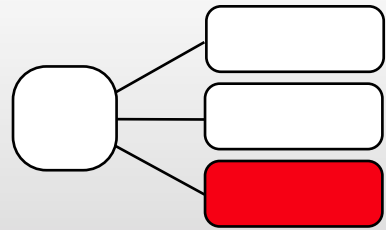
Language Concern

Custom Actions



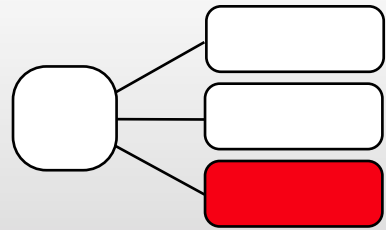
Language Scope

Active?



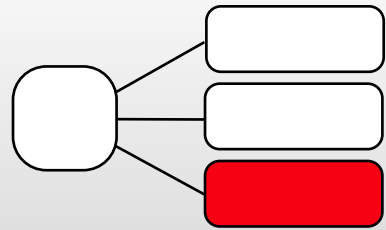
Language Scope

System



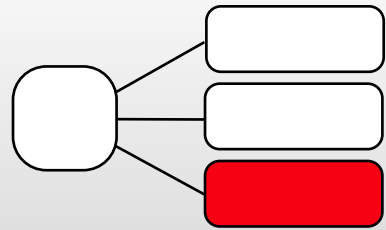
Language Scope

Packages



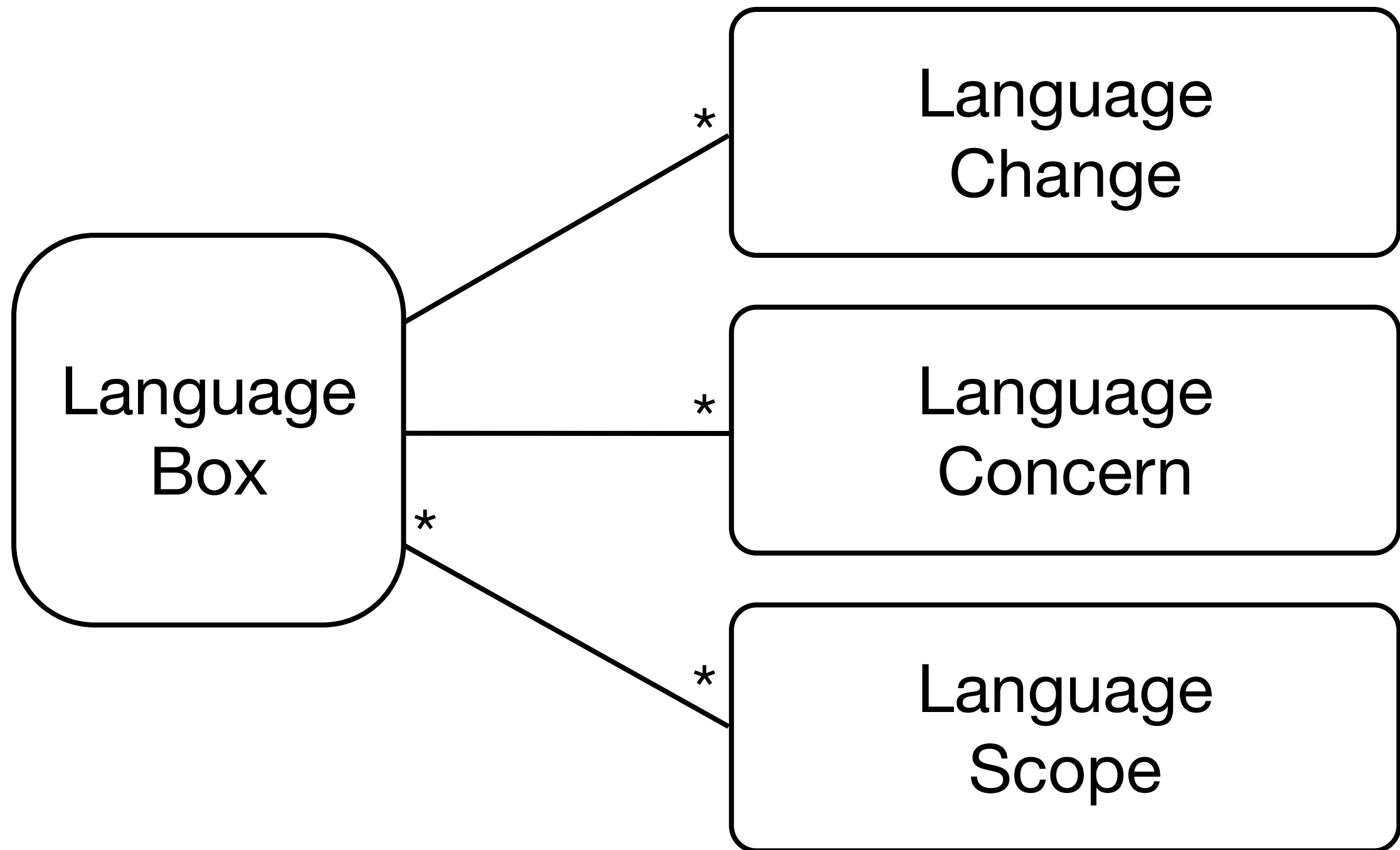
Language Scope

Classes

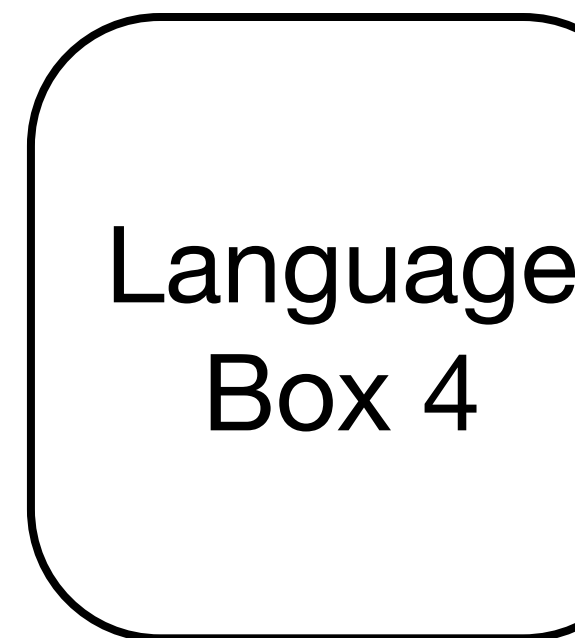
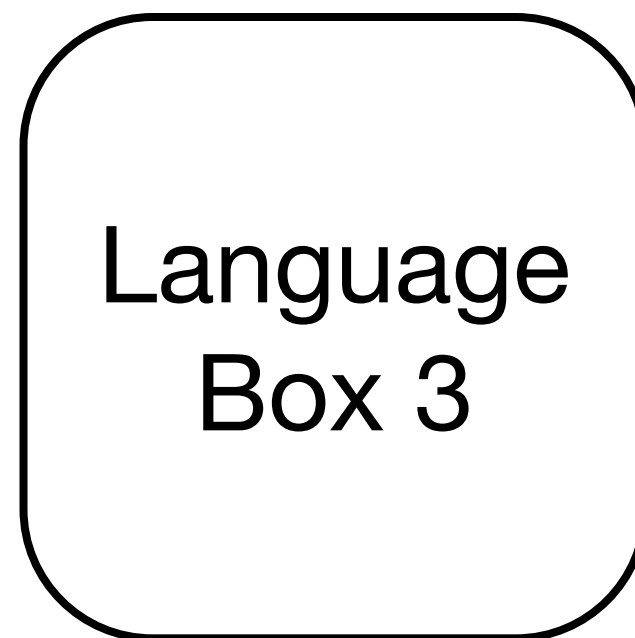
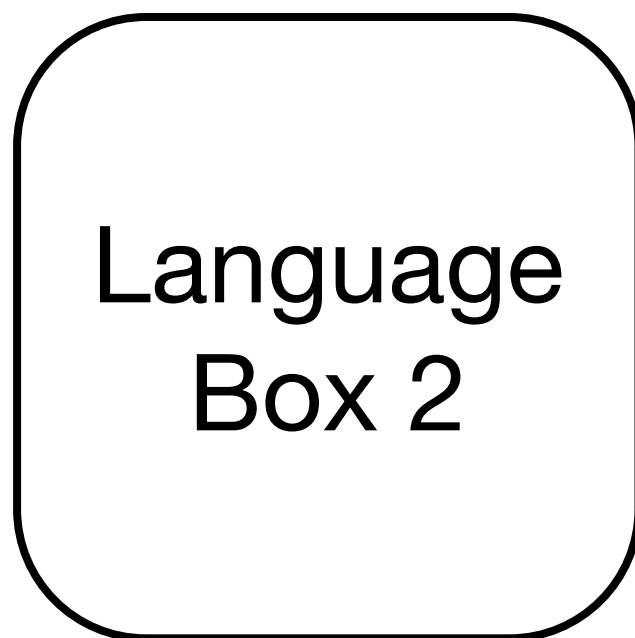
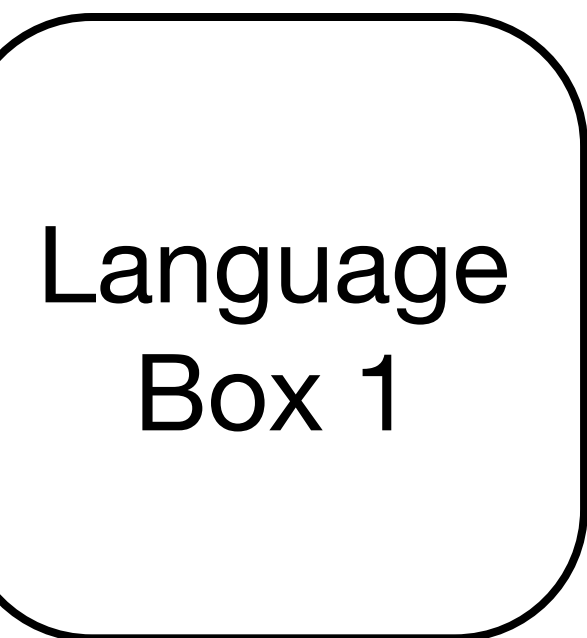


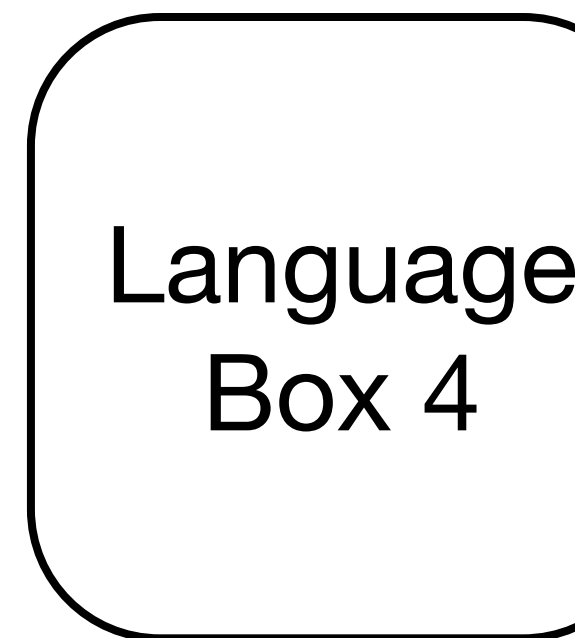
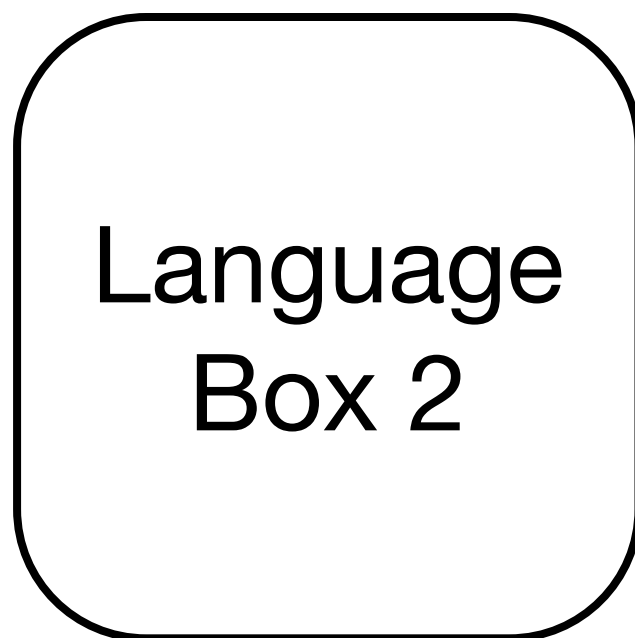
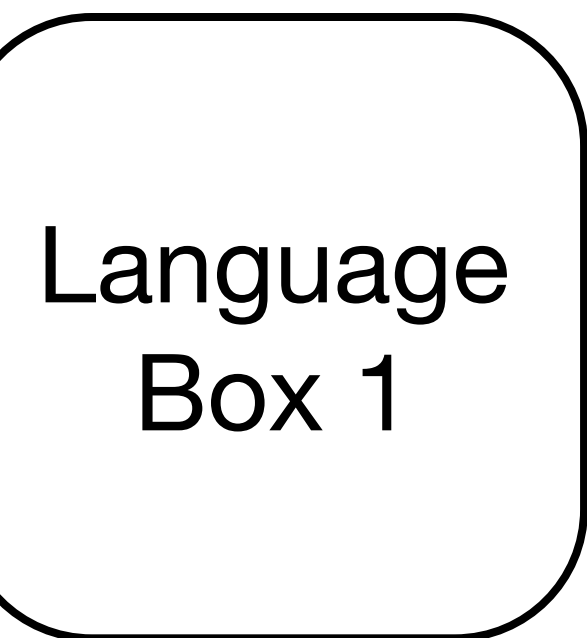
Language Scope

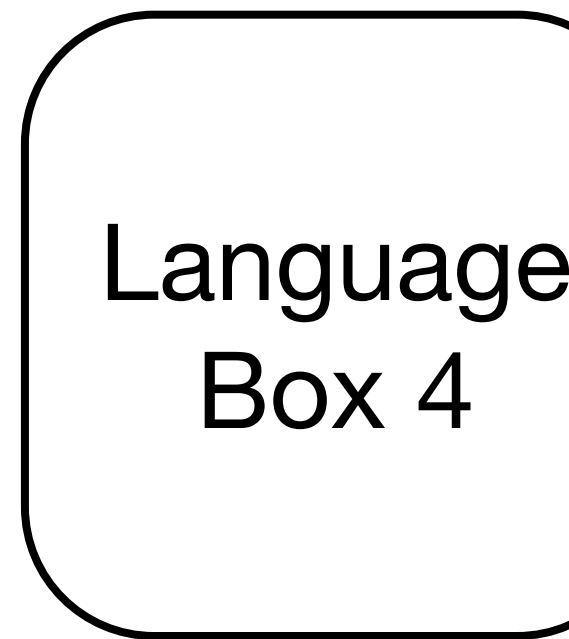
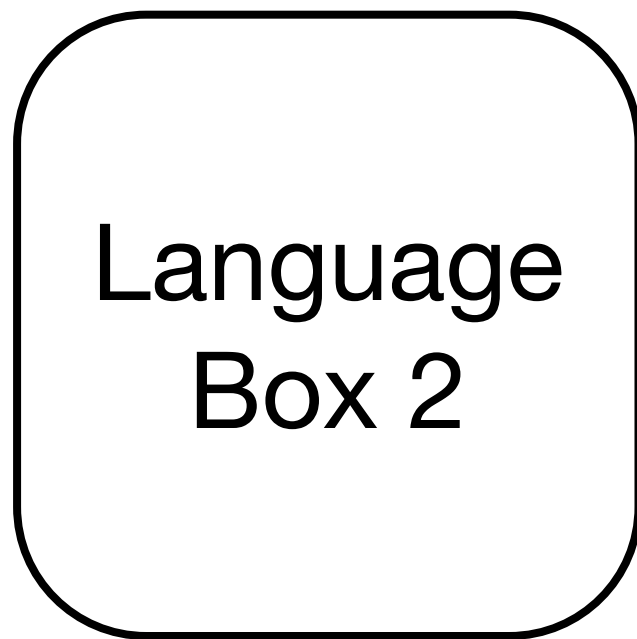
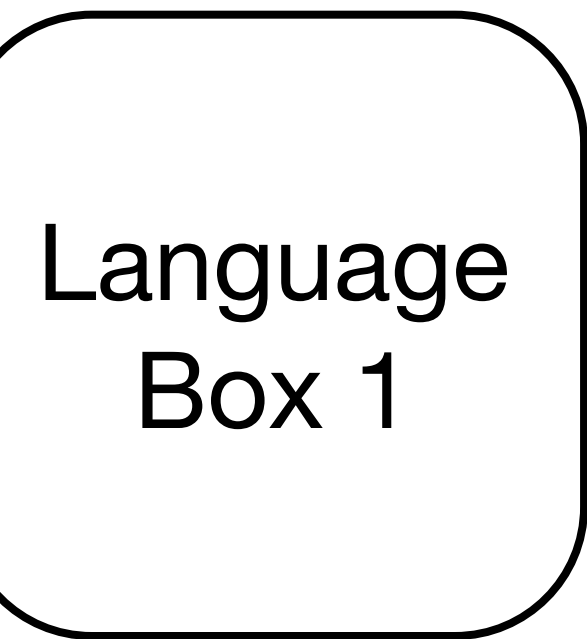
Methods

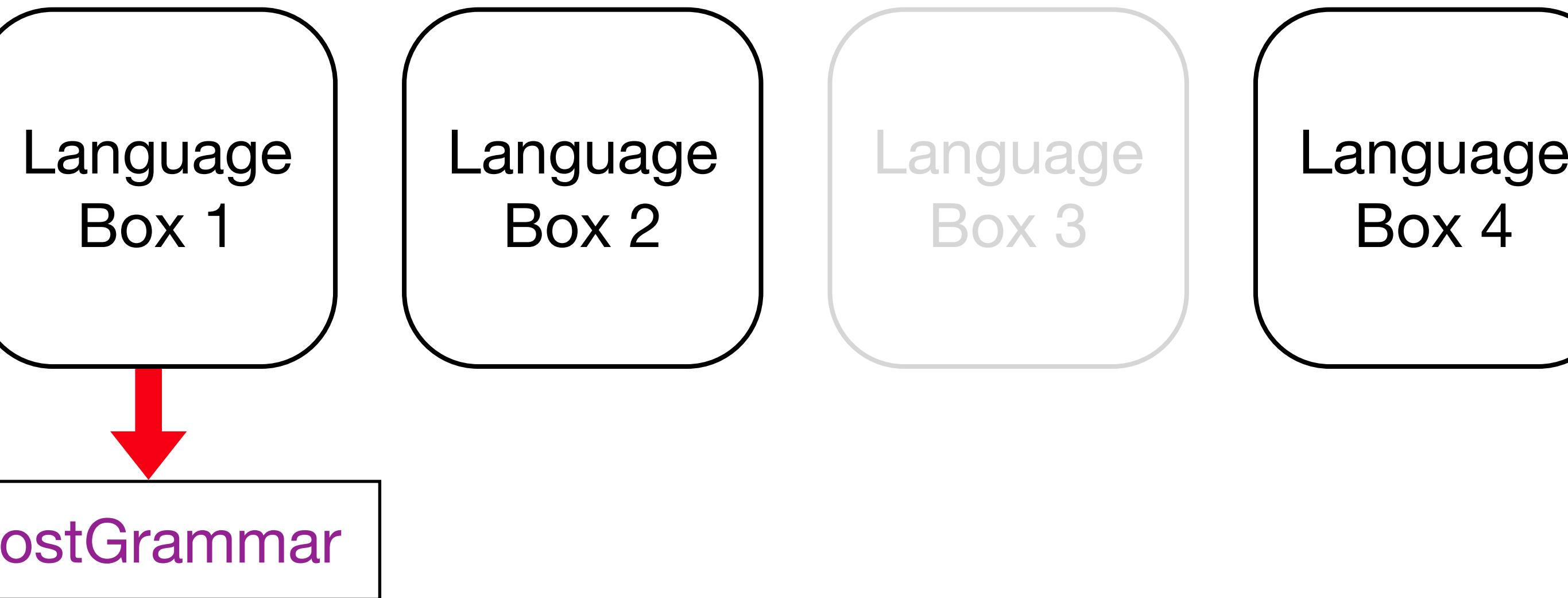


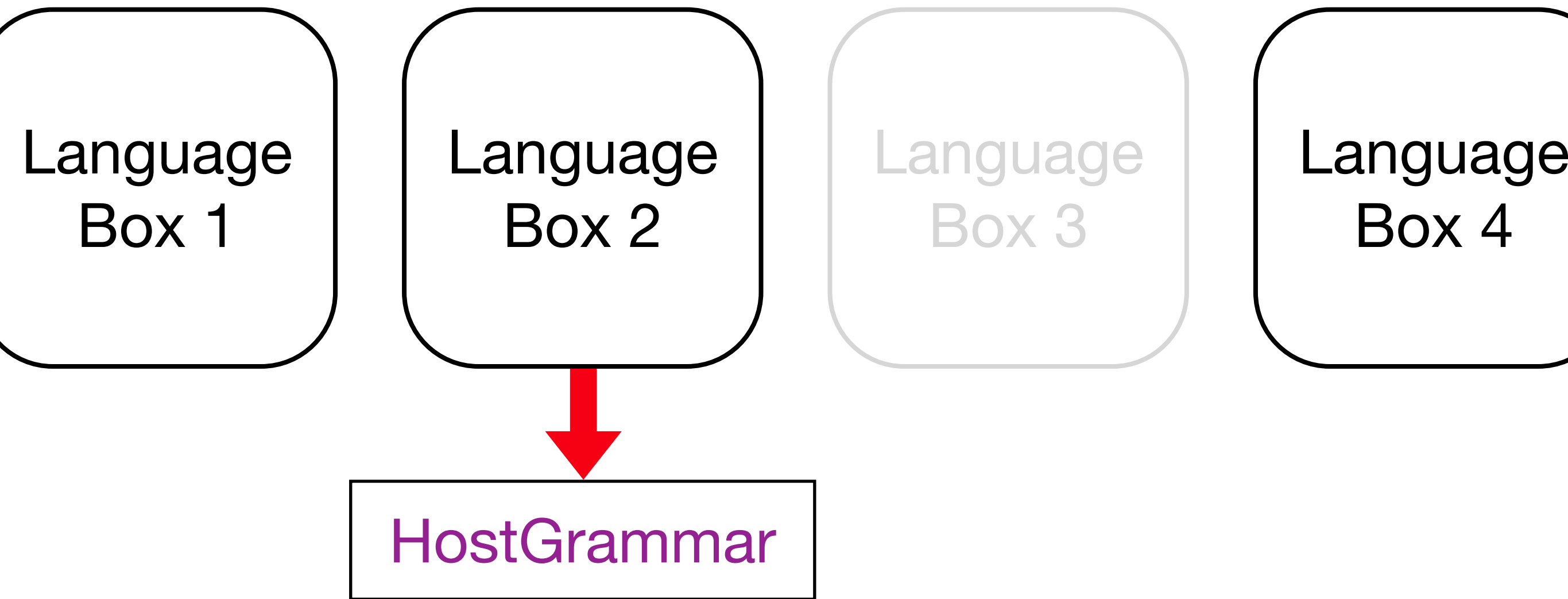
Conflicts

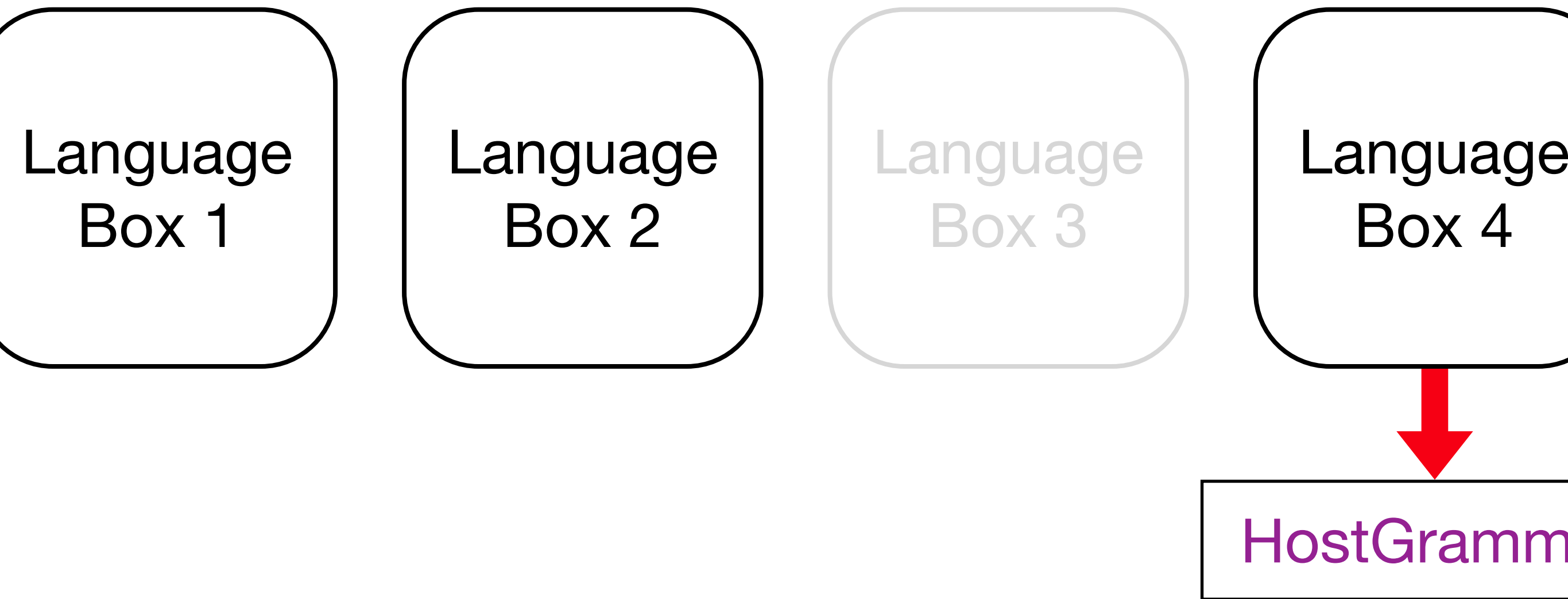












Language
Box 1

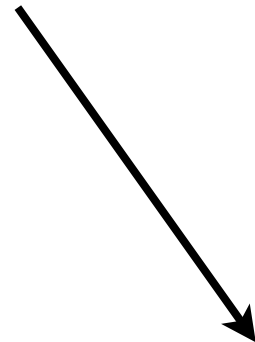
Language
Box 2

Language
Box 3

Language
Box 4

HostGrammar'

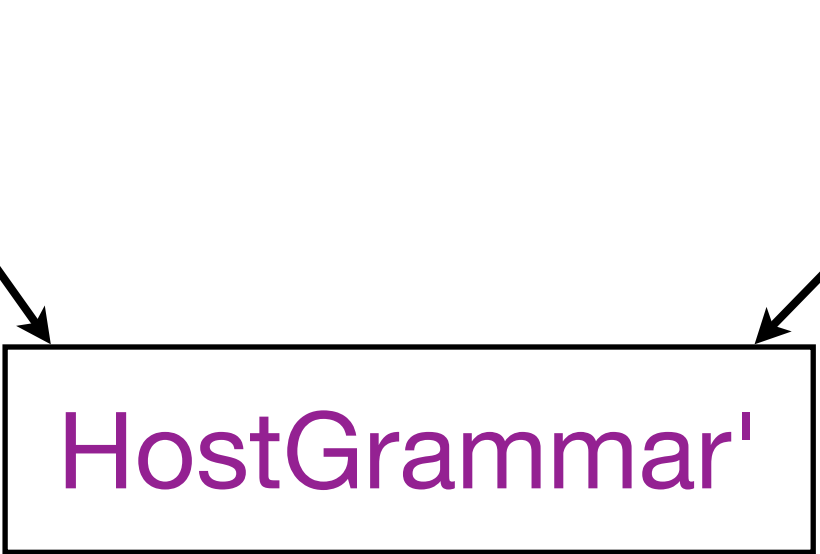
**might consist
of unused parts**



HostGrammar'

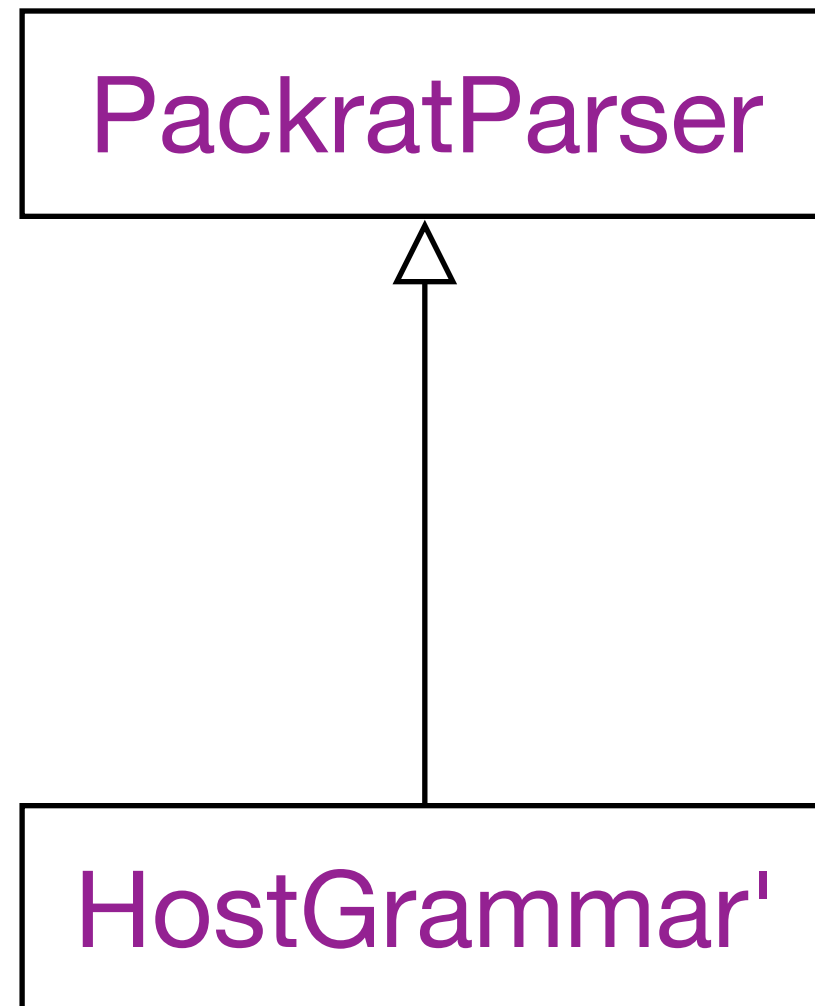
*might consist
of unused parts*

*might be
ambiguous*



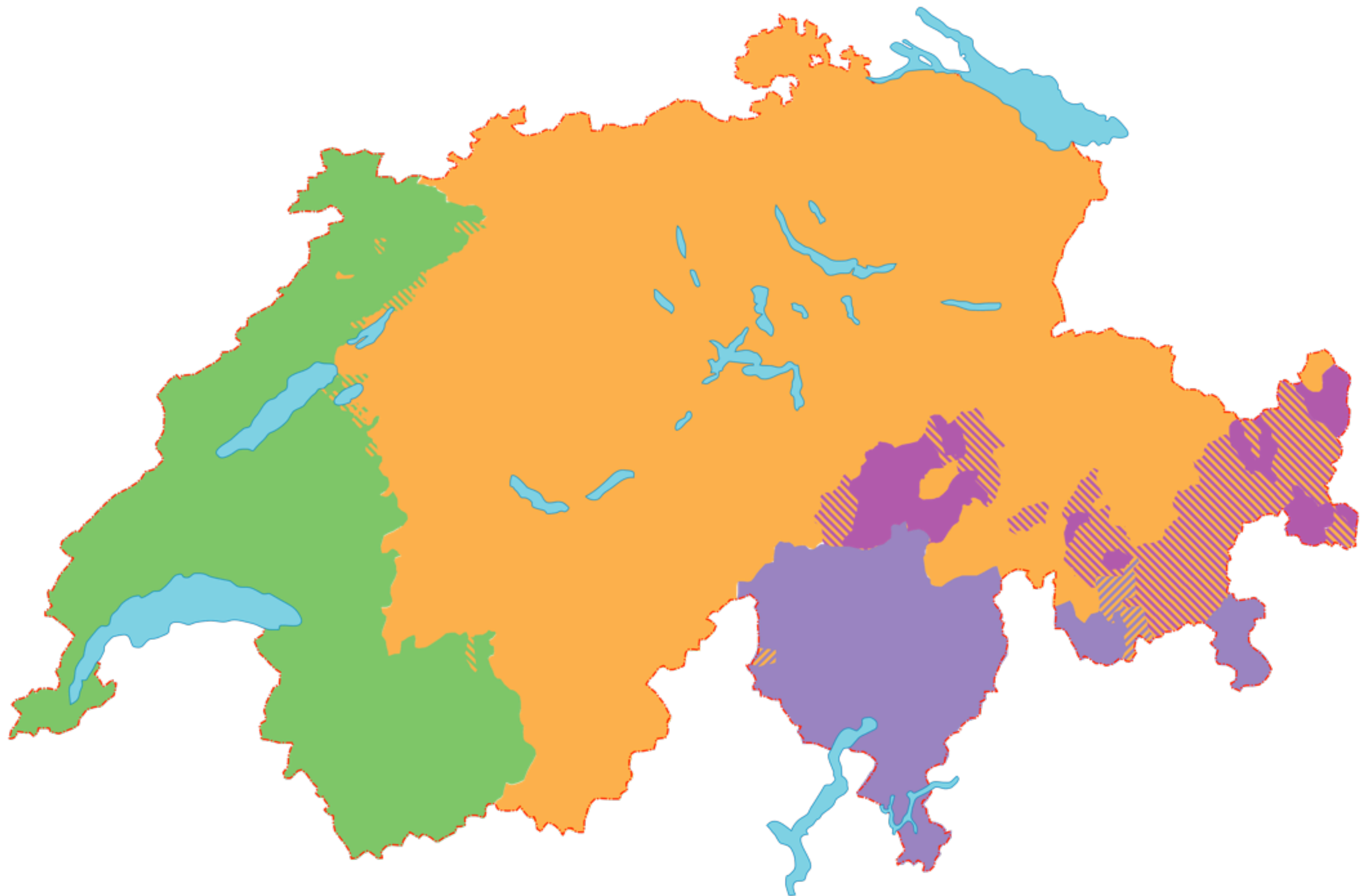
```
graph TD; A["might consist of unused parts"] --> C[HostGrammar']; B["might be ambiguous"] --> C;
```

HostGrammar'




```
SELECT * FROM users
```


<SQL: SELECT * FROM users>



Helvetia

scg.unibe.ch/research/helvetia