

Generative Programming from a DSL Viewpoint

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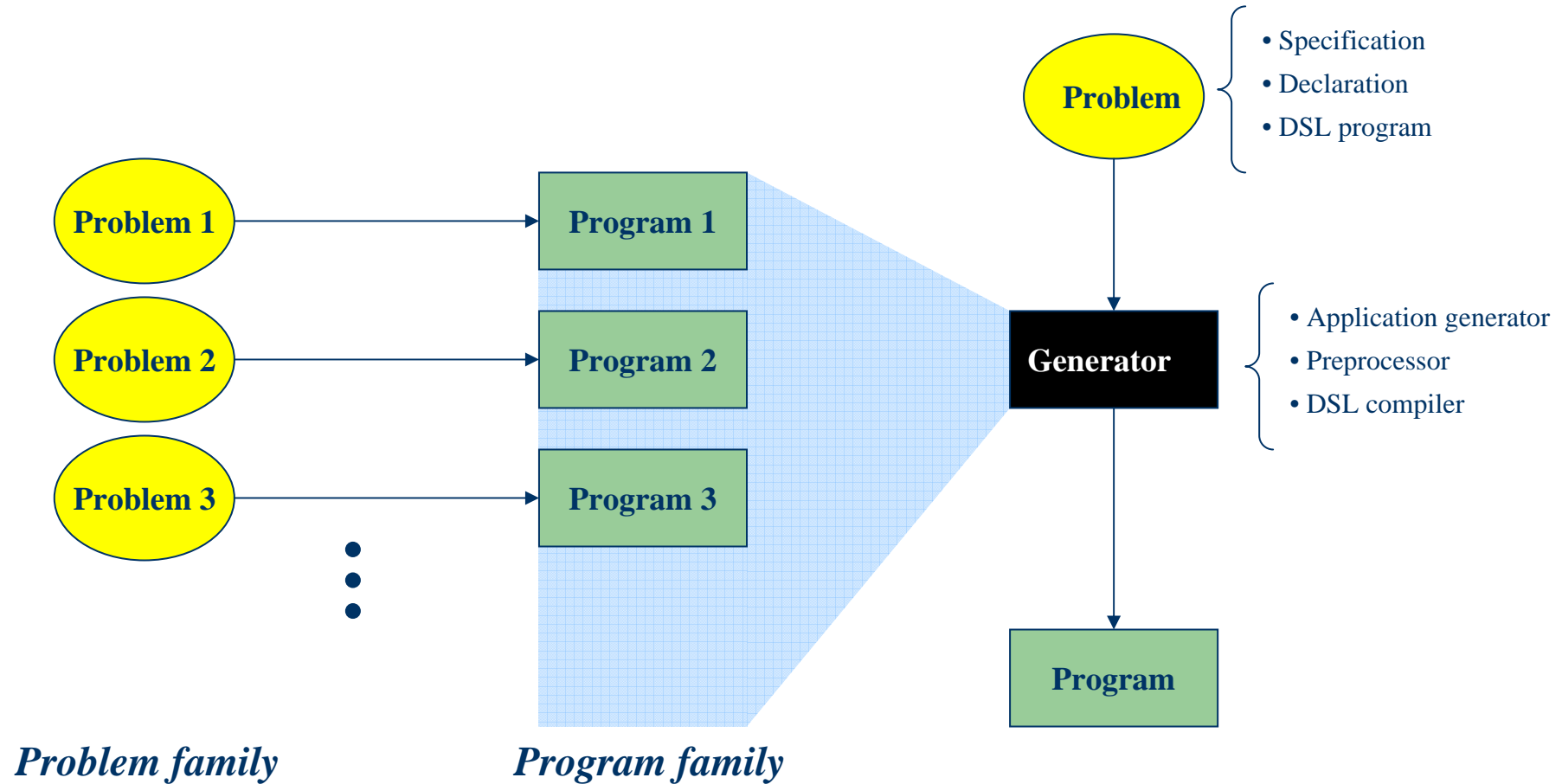
(Joint work with C. Consel)

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<http://phoenix.labri.fr/>

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Domain-Specific Languages: What



Domain-Specific Languages (1)

- ◆ Domain-specific notations and abstractions
 - Types (return value, SIP addresses)
 - Exceptions (timers, resources...)
- ◆ Domain-specific verifications
 - No call loss
 - Valid state transition
- ◆ Domain-specific optimizations
 - Server state management
- ◆ Domain-specific code generation
 - Exception handling (multiple platforms)
- ◆ Domain-specific development tools
 - Textual tools
 - Graphical tools

Domain-Specific Languages (2)

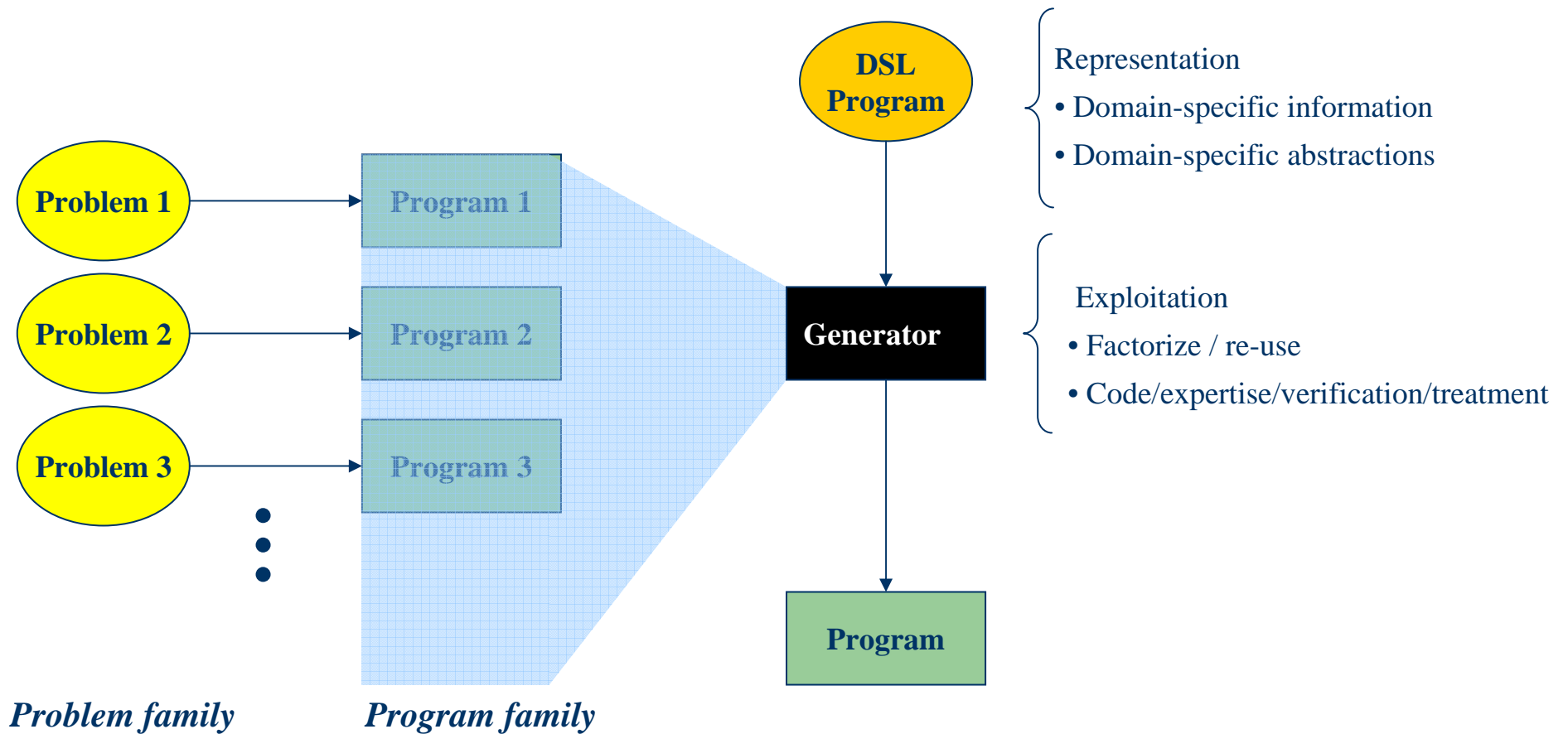
◆ Examples of DSLs

- Scripting languages
 - » Shell, AWK... (~)
- Layer-oriented DSL
 - » XDR [SUN], Devil
- Component-oriented DSL
 - » Plan-P, Bossa [Muller & Lawall], SPL

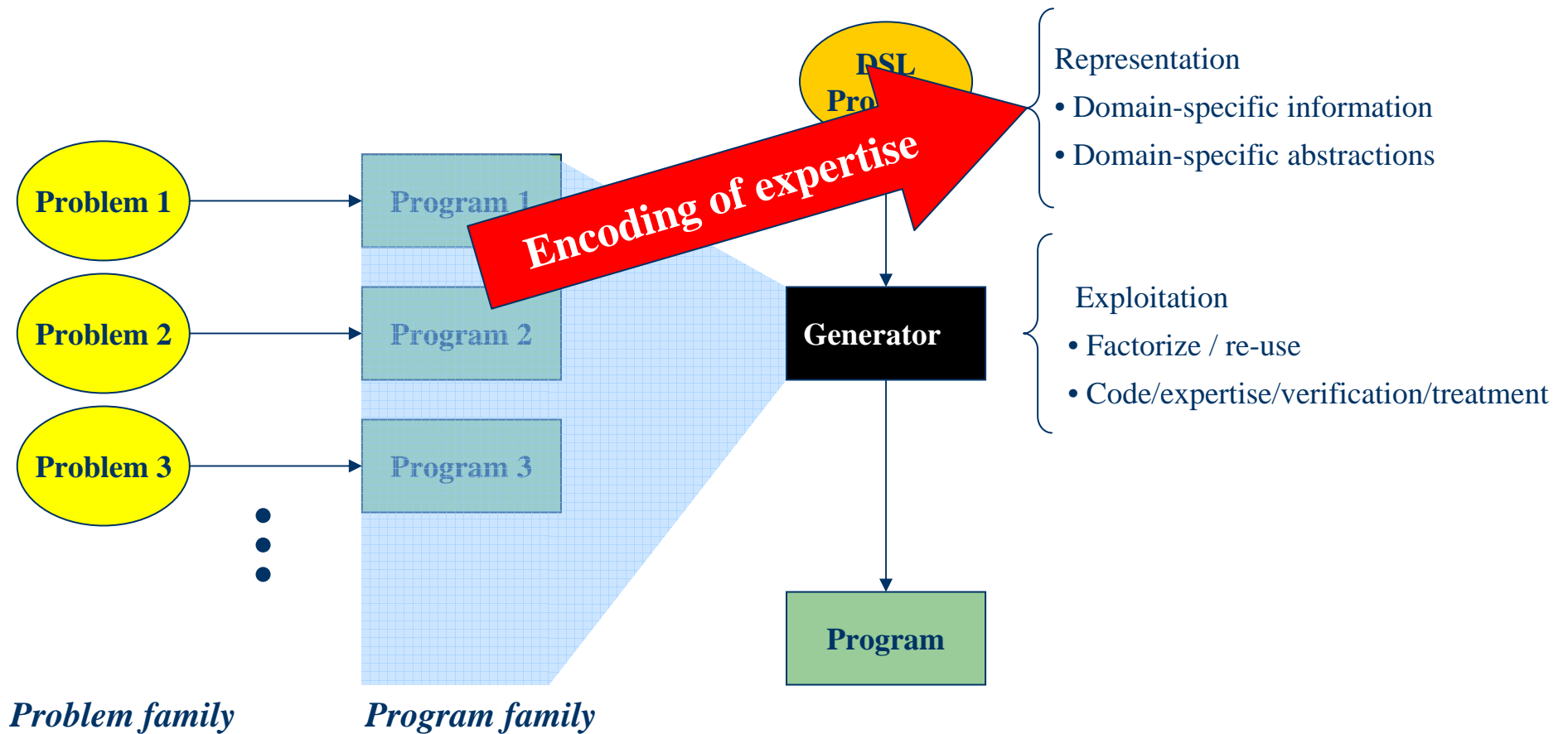
◆ Benefits

- Efficiency
- Verification
- Conciseness
- Re-use
- Productivity

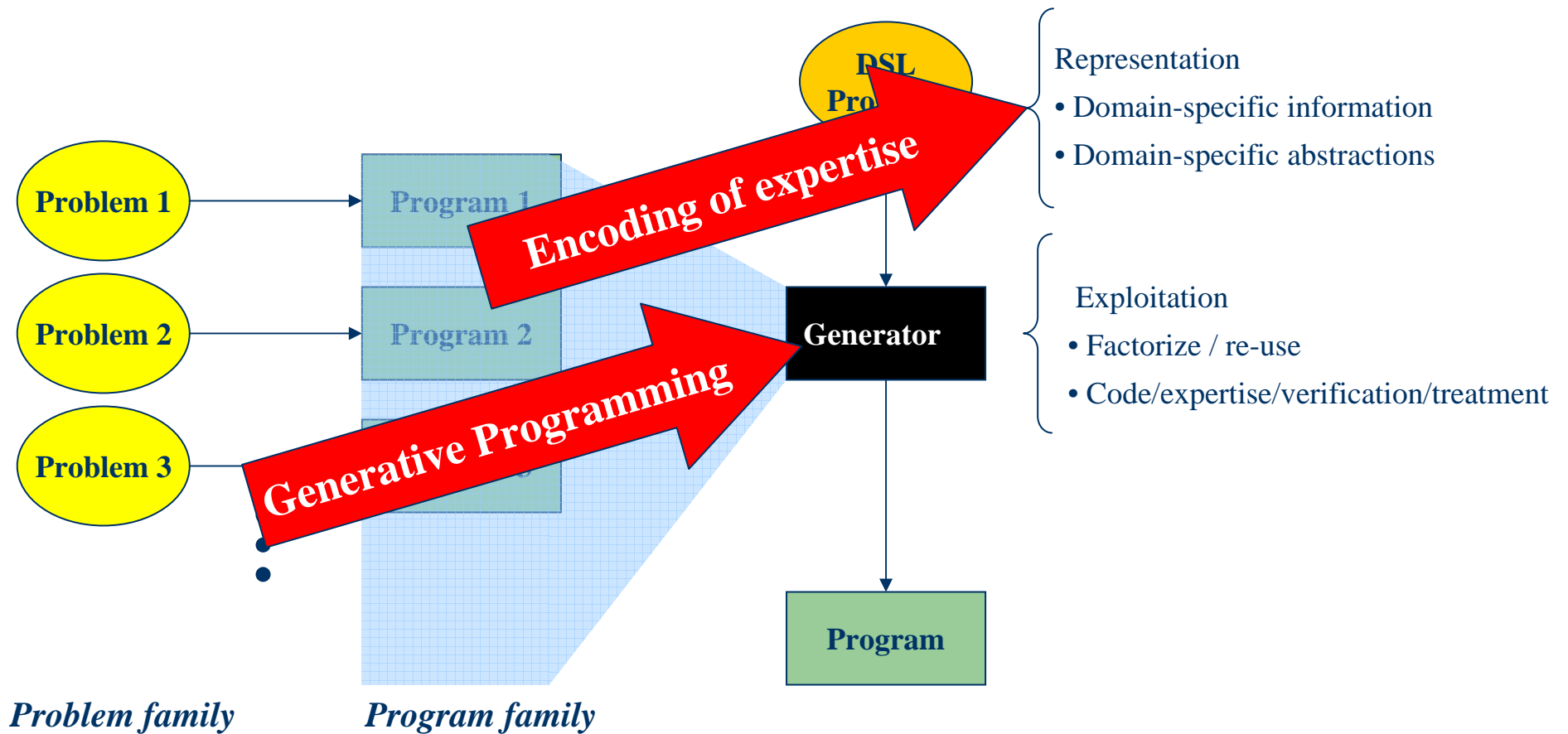
Domain-Specific Languages: How



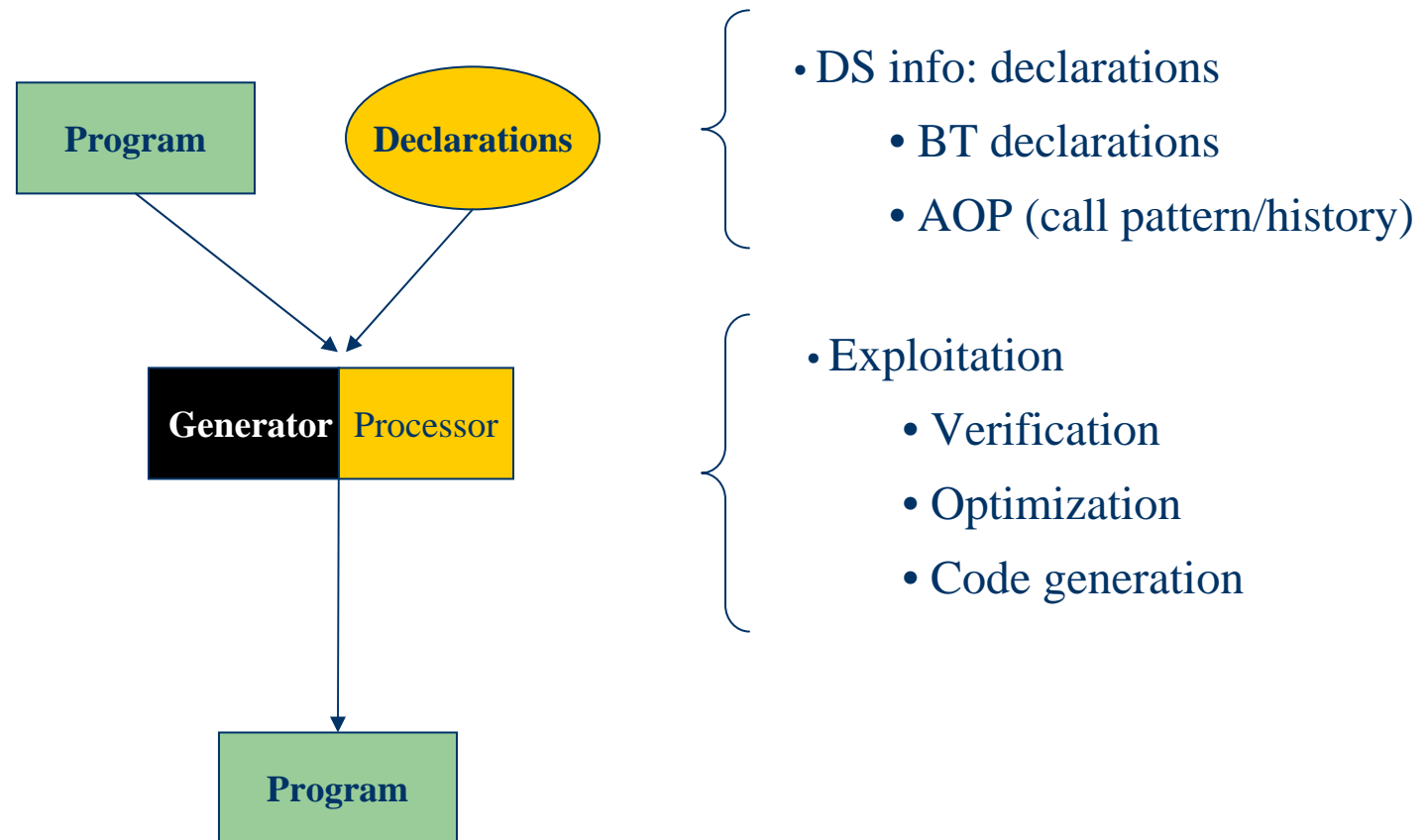
Domain-Specific Languages: How



Domain-Specific Languages: How

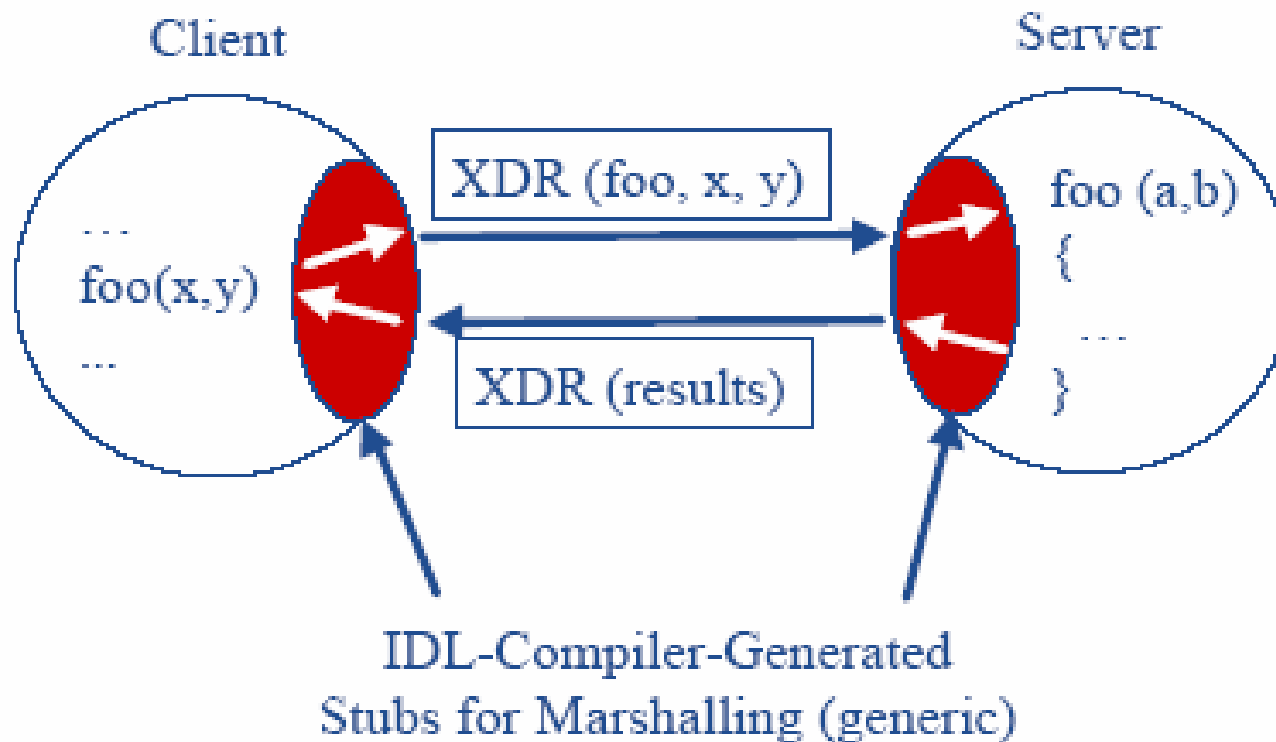


From Program Family to Generative Programming: Declarations / AOP

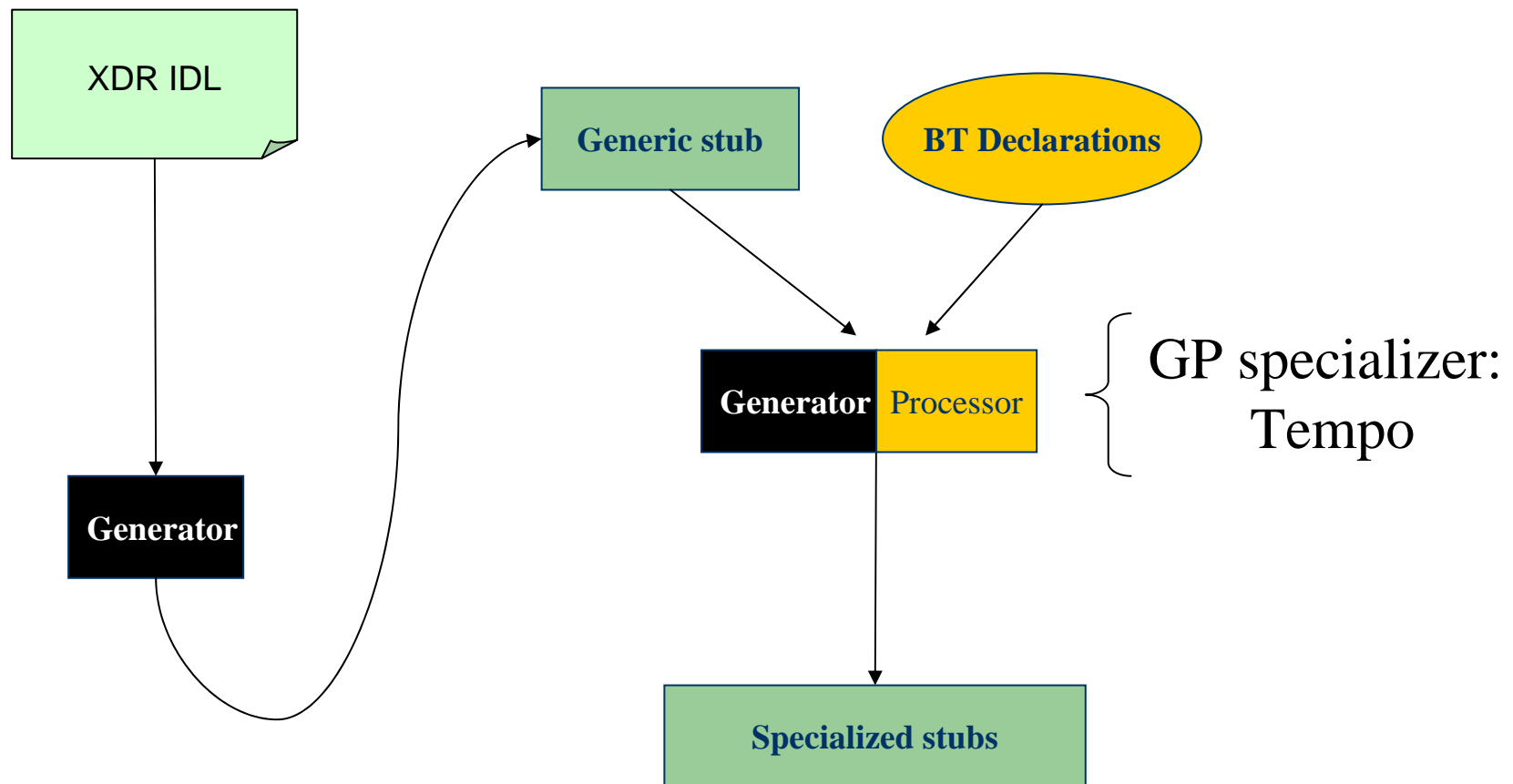


Example : RPC

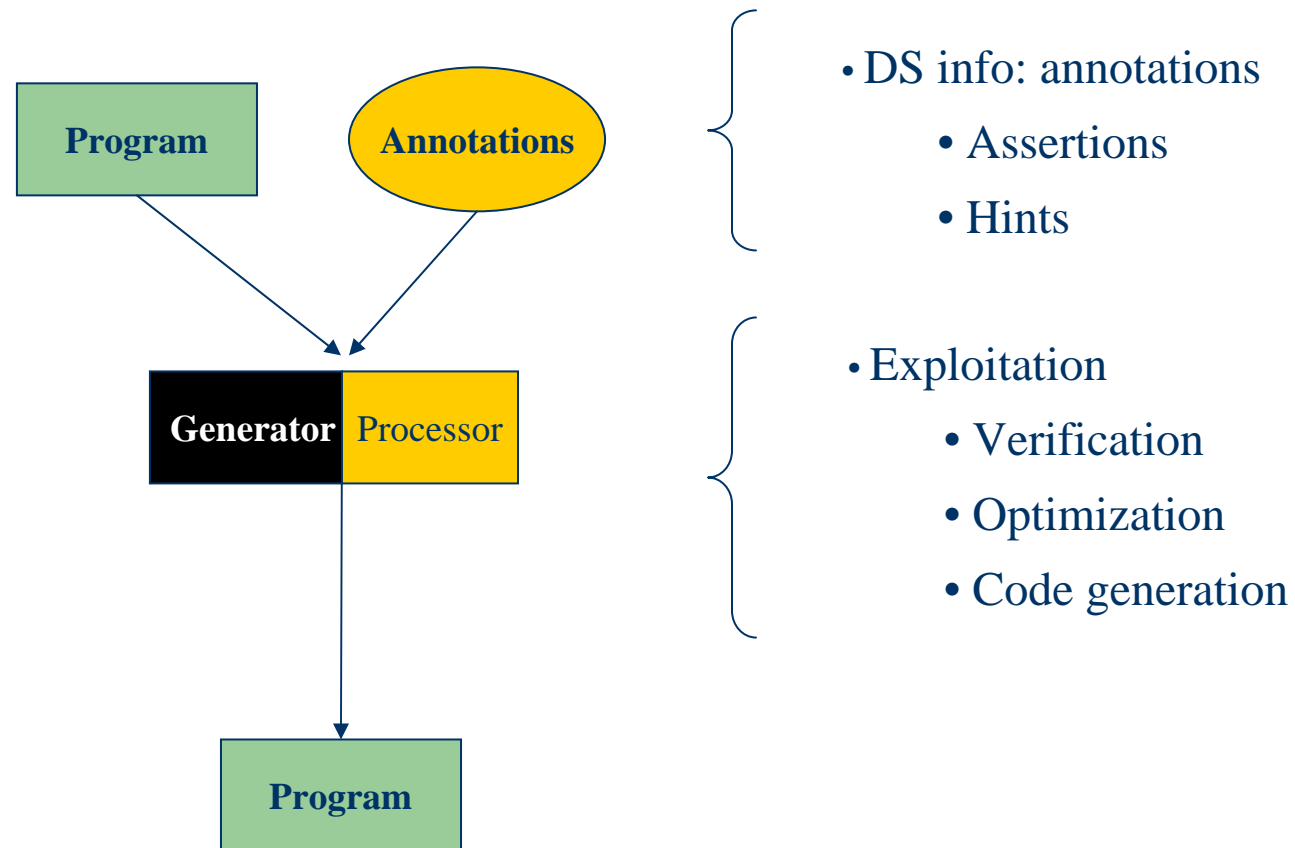
- ◆ RPC: Remote Procedure Call



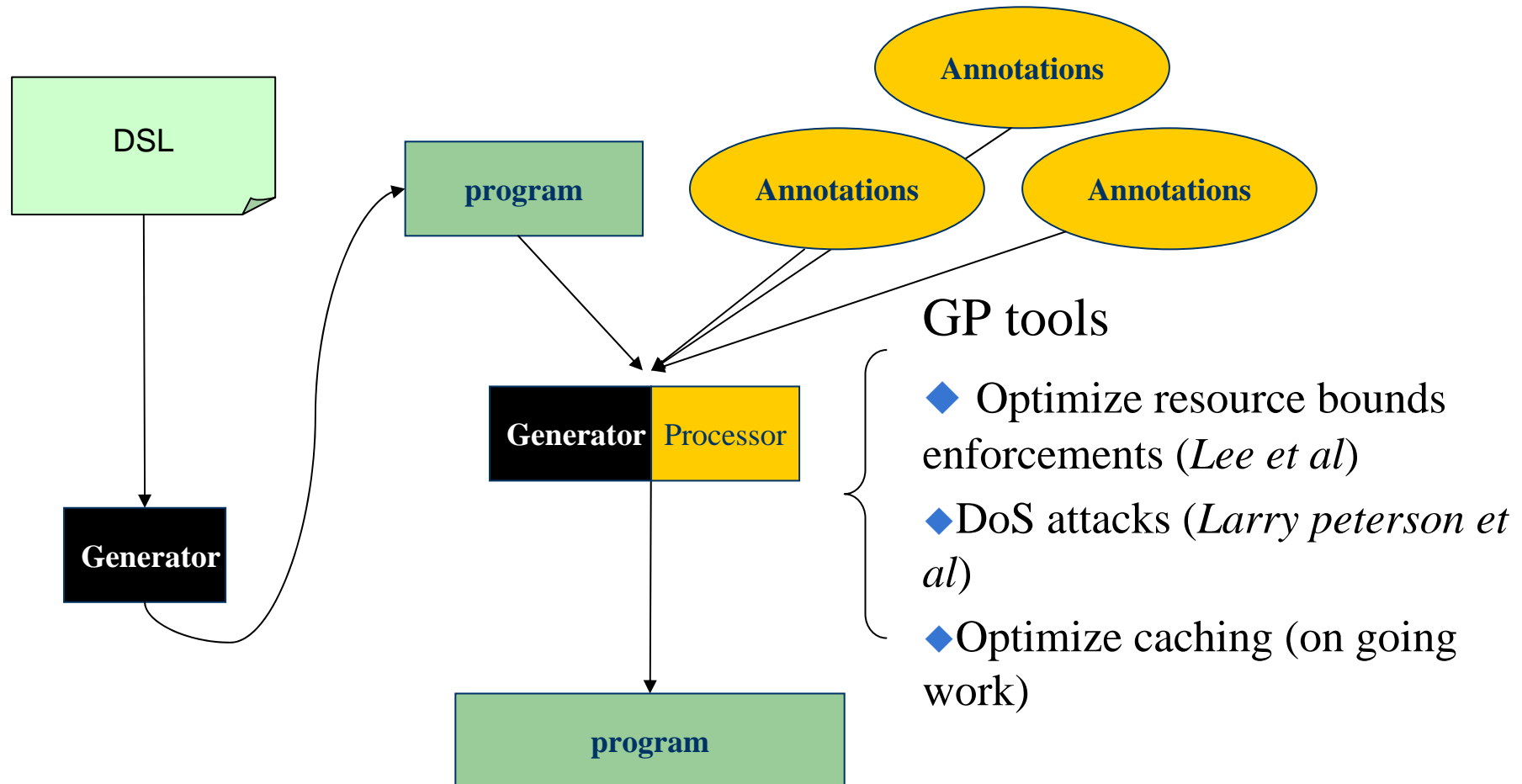
From a DSL to Declarations



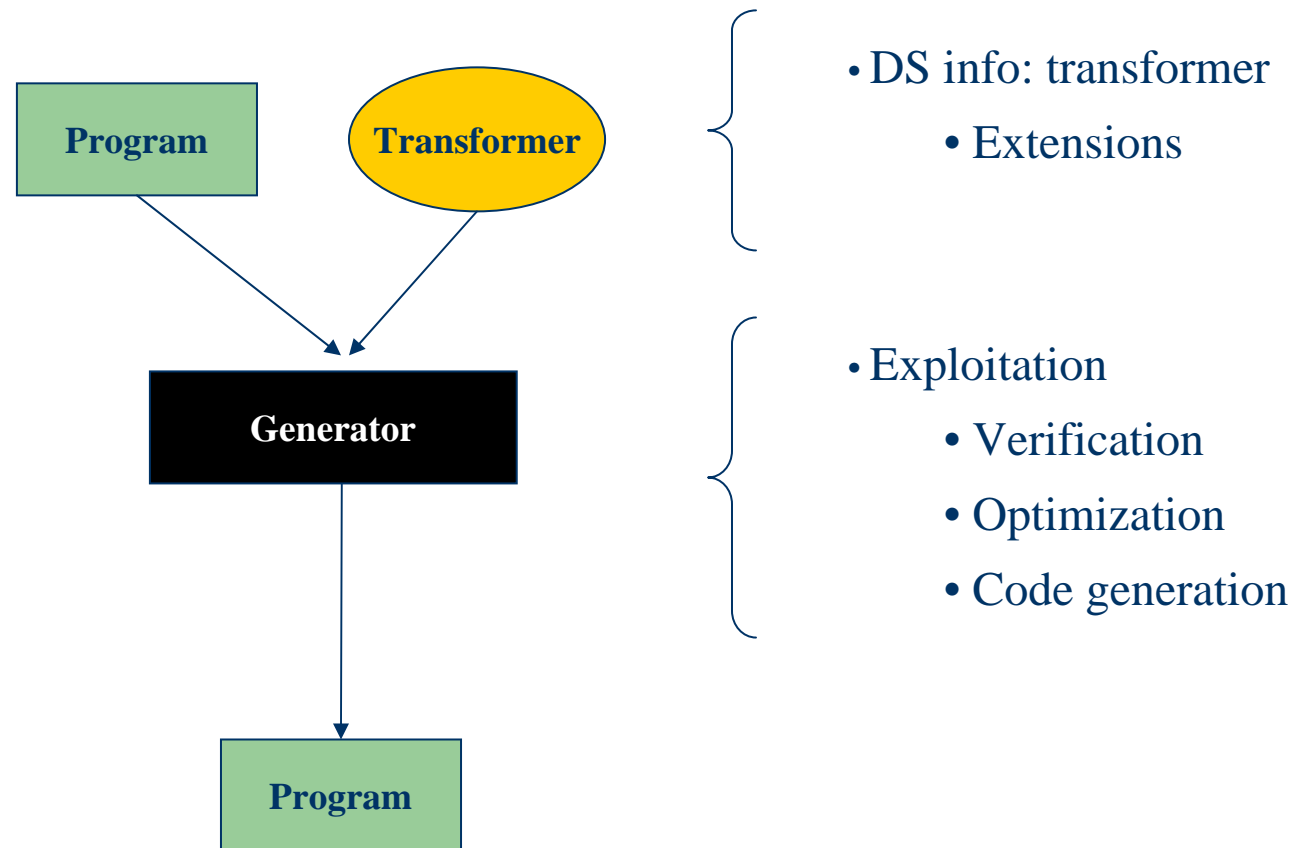
From Program Family to Generative Programming: Annotations



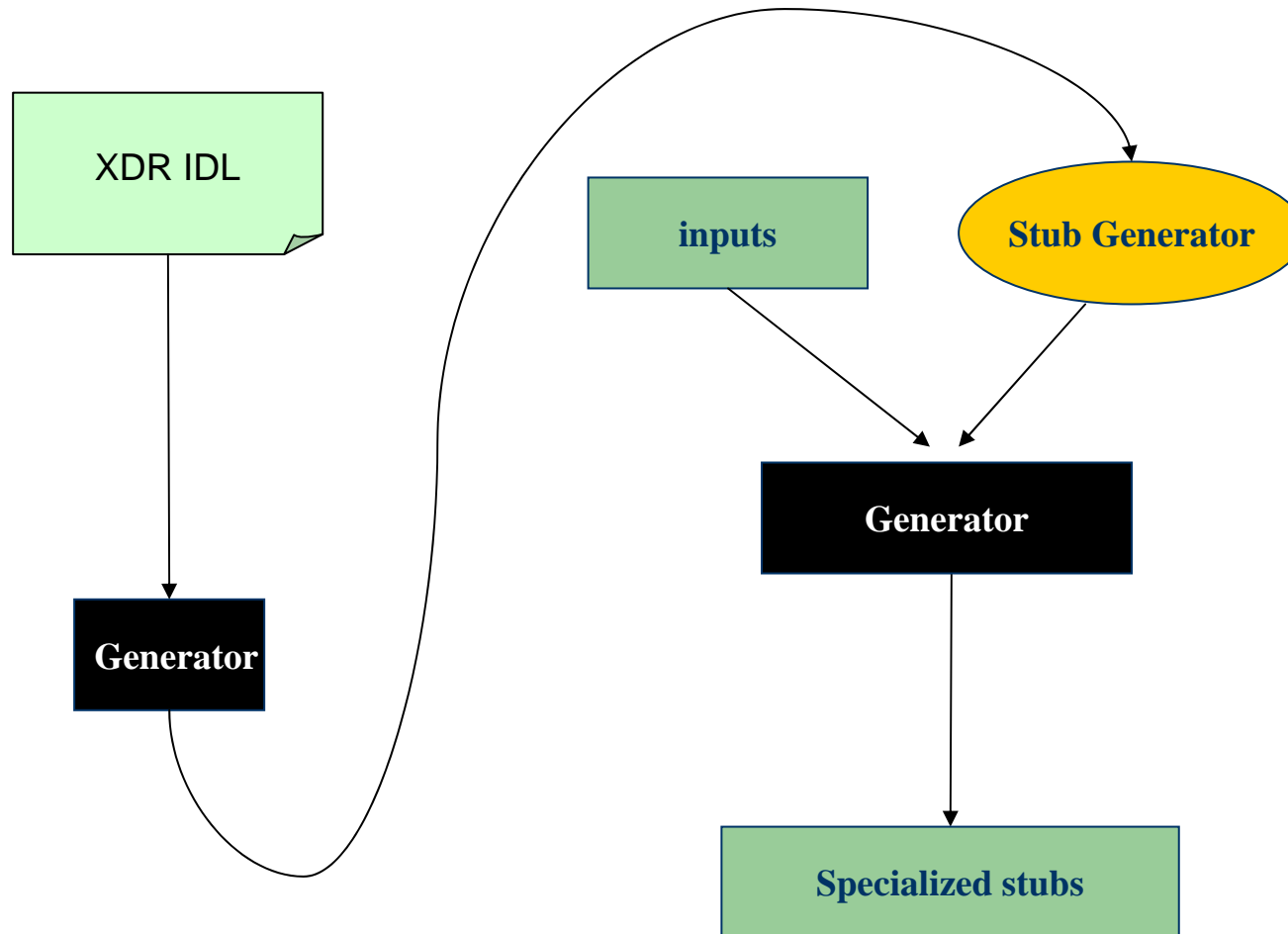
Example: a DSL for Network Servers



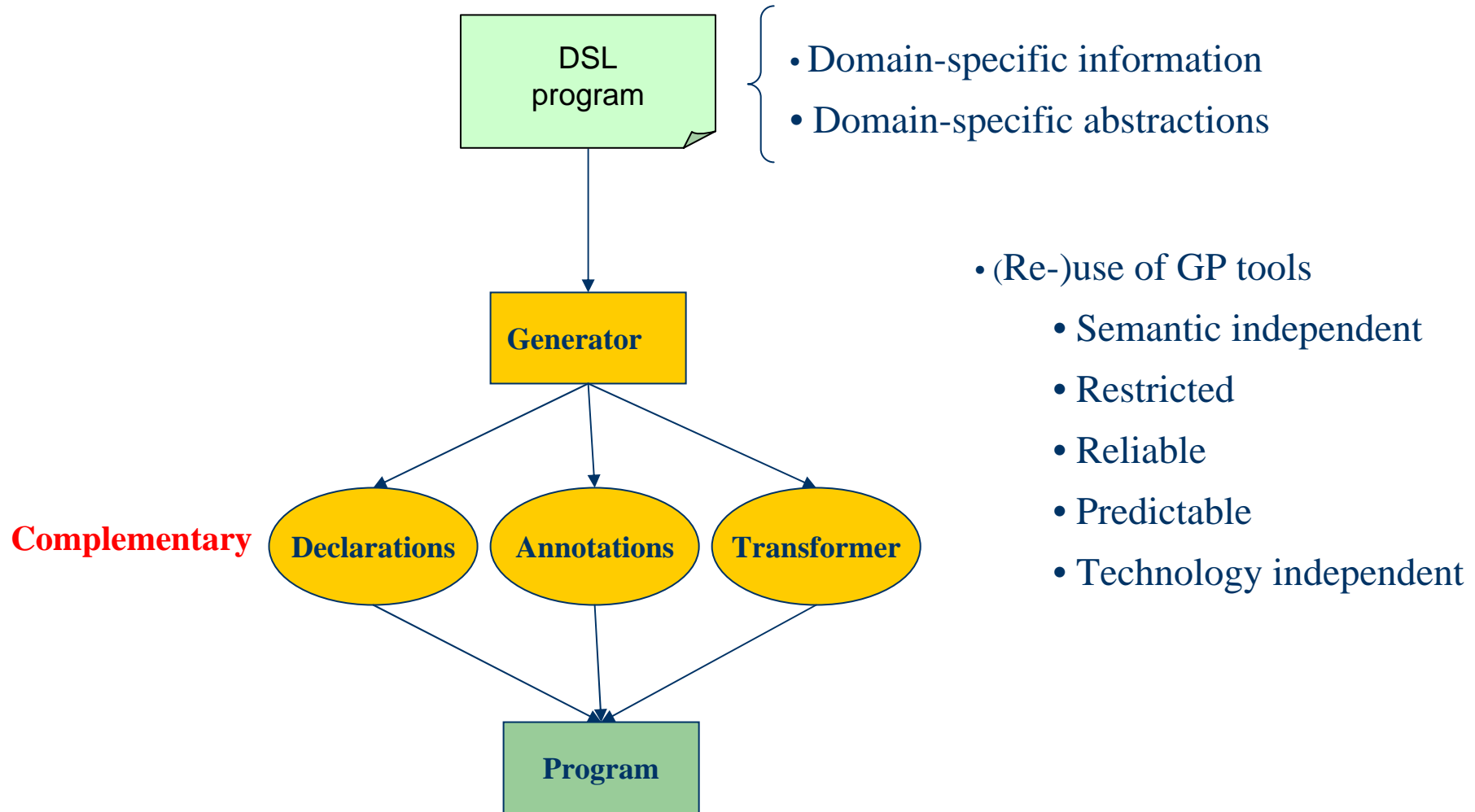
From Program Family to Generative Programming: Meta-Programming



From a DSL to Meta-Programming



From Program Family to Generative Programming



Disclaimers

- ◆ Not the panacea
 - need for a program family
- ◆ Not fixed
 - need to evolve with the program family
- ◆ Not GPL expressivity
 - Not embedded language: embedding rich run-time environment

Developing an IDE for DSLs

- ◆ Cost must be “acceptable”
 - Reuse of existing techniques
 - Beyond traditional compilation
- ◆ Staging the implementation of the DSL
 - GPL + Domain Specific information expressed as
 - » declarations,
 - » aspects,
 - » annotations,
 - » meta-programming
 - » ...