Towards a flexible Pharo Compiler

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Three Problems

- Architecture is not reusable
- Compiler can not be parametrized
- The mapping between source code and bytecode is overly complex.

Reusability

- AST is special for the Compiler
  - Tools use own AST (RB)
- AST is destroyed when compiling
- No reusable backend/parser...

No Parametrization

- No pluggable archicture
  - Parser, code generator fixed
- No infrastructure for compiler options

Mapping bc2source

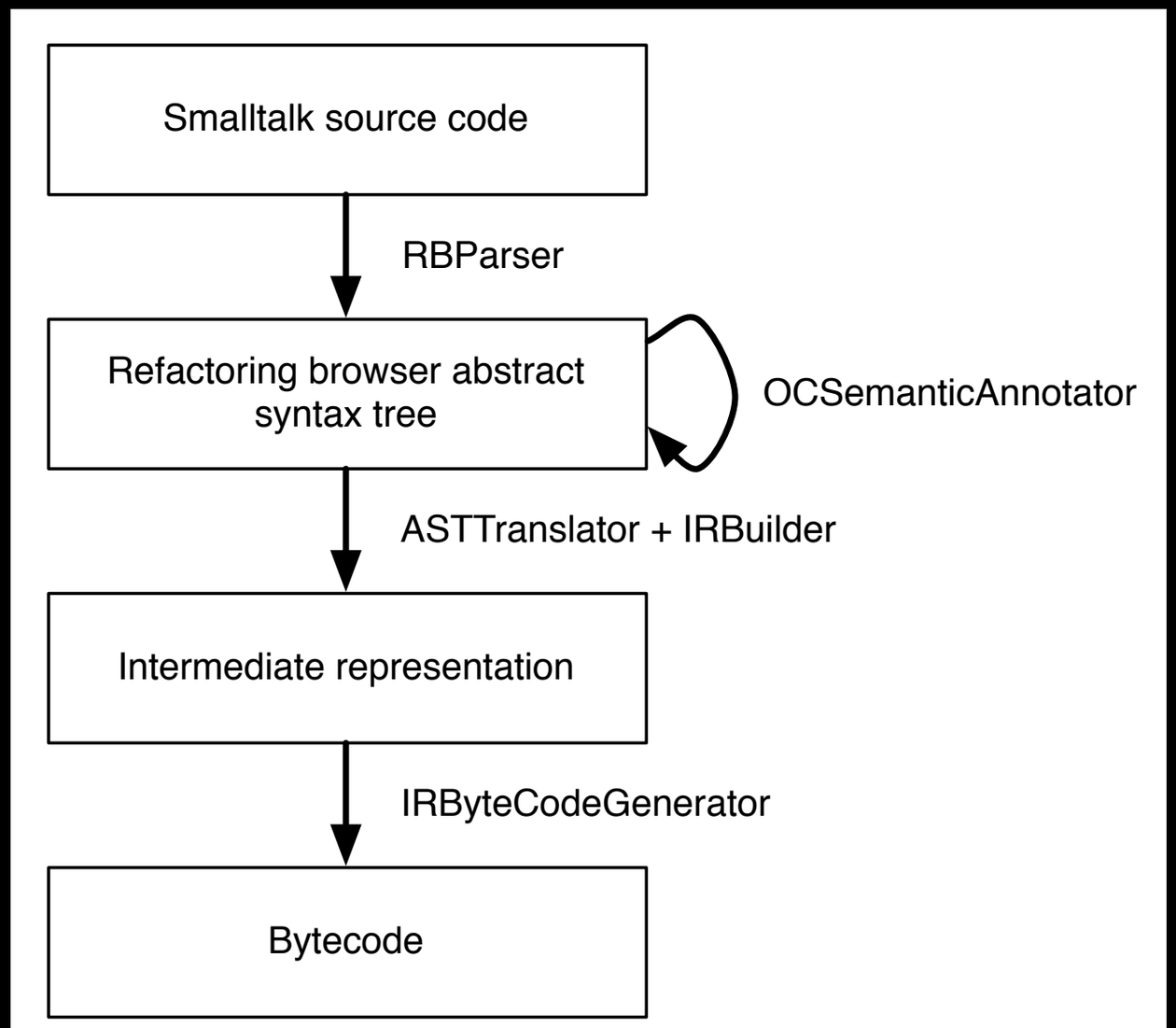
- For the Debugger, we need to map bytecode to source offsets
- With closures, we need to map temp offsets to real temps.

Old Compiler: Encoder builds complex table structure

Solution: OPAL

- New compiler framework for Pharo
- Default compiler in Pharo3
  - Old Compiler will be a loadable package

Design



- RB AST
- Visitors
- Bytecode level IR

Reusability

- AST is unchanged
- Backend independent

AST Interpreter

Oz/Hazelnut

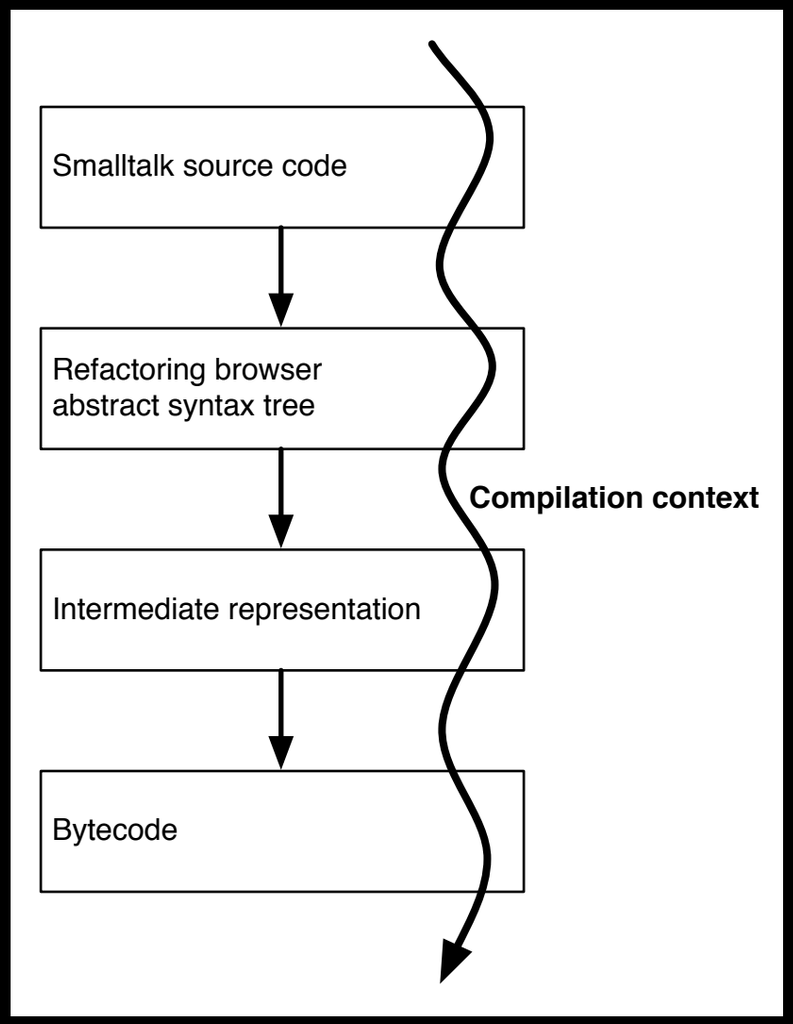
Node navigation

Smart suggestions

Reflectivity
Metalinks

Class Builder

Parametrization



- Explicit compiler context
- All visitors are pluggable

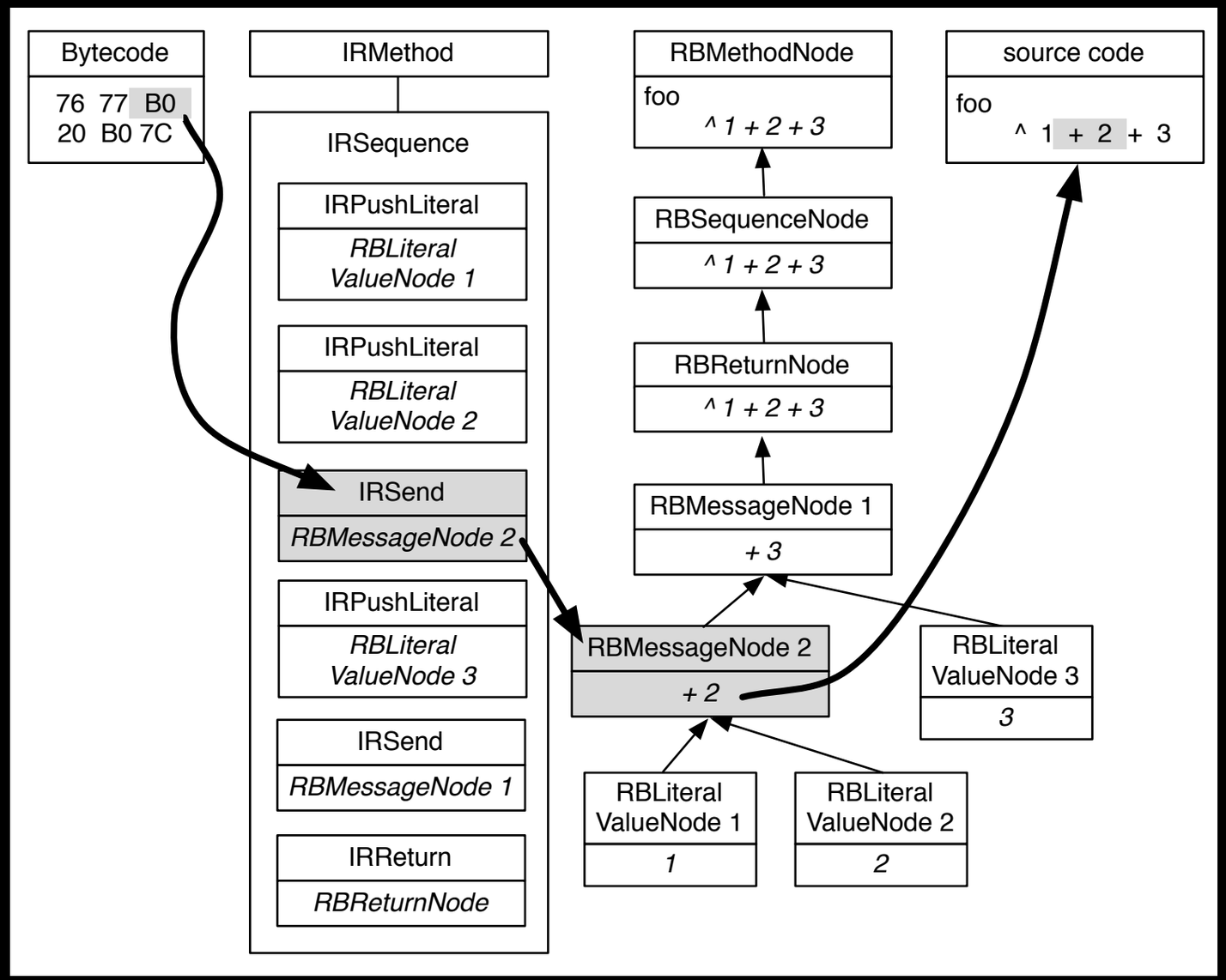
Compiler Options

- Turn off inlining of ifTrue: and friends

```
MyClass>>foo
<compilerOptions: - optionInlineIf>

^ #myNonBooleanObject
    ifTrue:  [ 1 ]
    ifFalse: [ 0 ]
```

Mapping



- Mapping uses AST directly

Performance

- Visitors and IR do cost a bit of speed
- But not much

Recompile	Opal Compiler	Old Compiler
Object class (ms)	296.66 ± 0.98	222.9 ± 2.4
Whole image (ms)	72120 ± 189	49908 ± 240

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Questions?