abc : Extending Java to AspectJ

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What is AspectJ?

- An extension of Java designed to support *cross-cutting concerns*
- “Static” features
  - *Intertype declarations* (Open classes)
  - *declare parents* (Hierarchy changes)
- “Dynamic” features
  - Aspect code observes a base program
  - Advice runs at certain *join points* as specified by a *pointcut*

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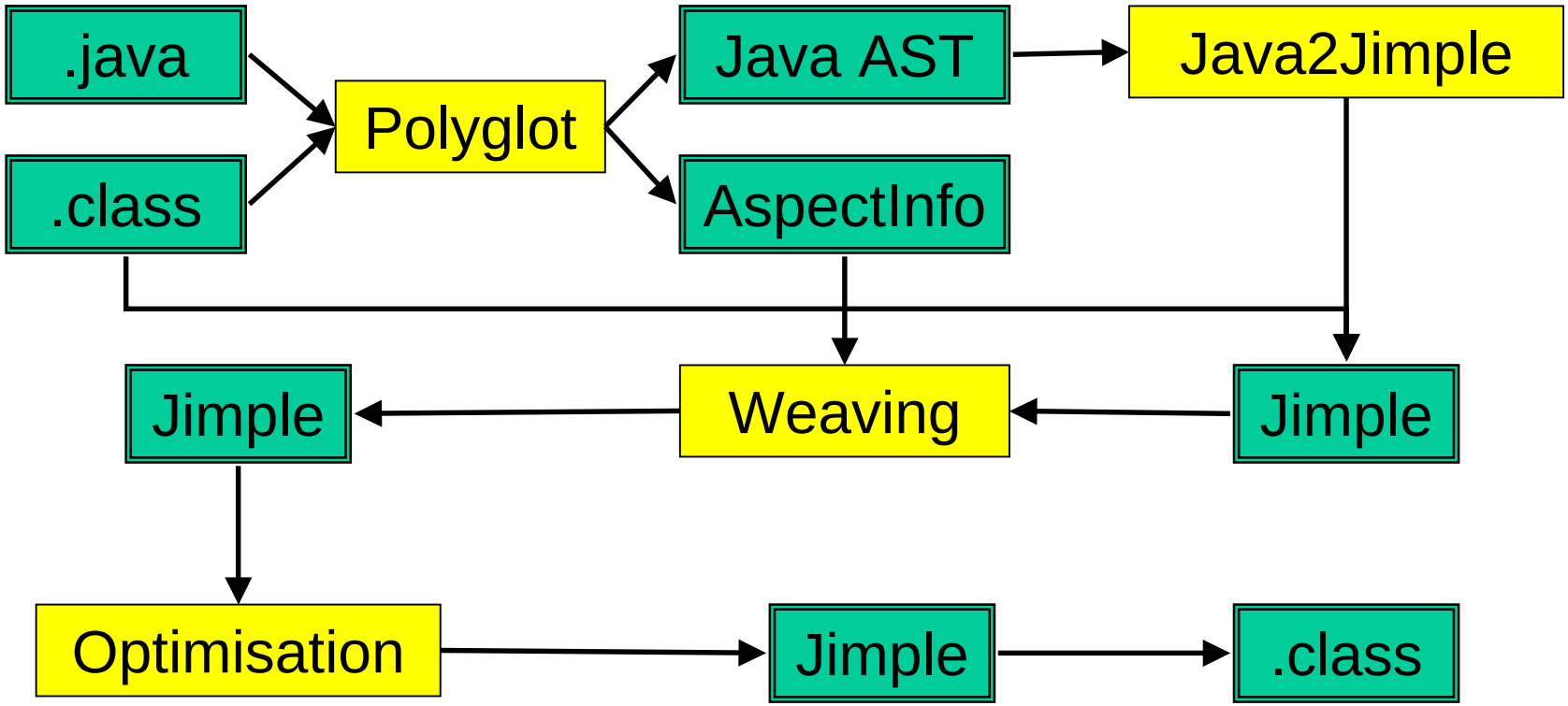
- A new compiler for AspectJ
- Full, robust implementation
- Research-oriented
  - Extensible
  - Optimising
- Frontend based on *Polyglot*
- Backend based on *Soot*

Architecture



Jimple IR

- Three address code
- Originally designed for analysis and optimisations of bytecode
- Framework for propagating information through the process with “tags”
- Great for a compiler backend too

Code generation

```
checkType = t instanceof Foo;
if checkType == 0 goto label1;
```

```
Local io=localgen.generateLocal(BooleanType.v(),"checkType");
Stmt instancetest=Jimple.v().newAssignStmt(io,
                Jimple.v().newInstanceOfExpr(v,type));
Expr test=Jimple.v().newEqExpr(io,IntConstant.v(0));
Stmt abort=Jimple.v().newIfStmt(test,fail);
units.insertAfter(instancetest,begin);
units.insertAfter(abort,instancetest);
```

Conclusions

- Soot has performed well as a code generation system

- But needs:
  - Quoting features
  - Code validation