Semper

Translating Chalice into SIL

Bachelor's Thesis

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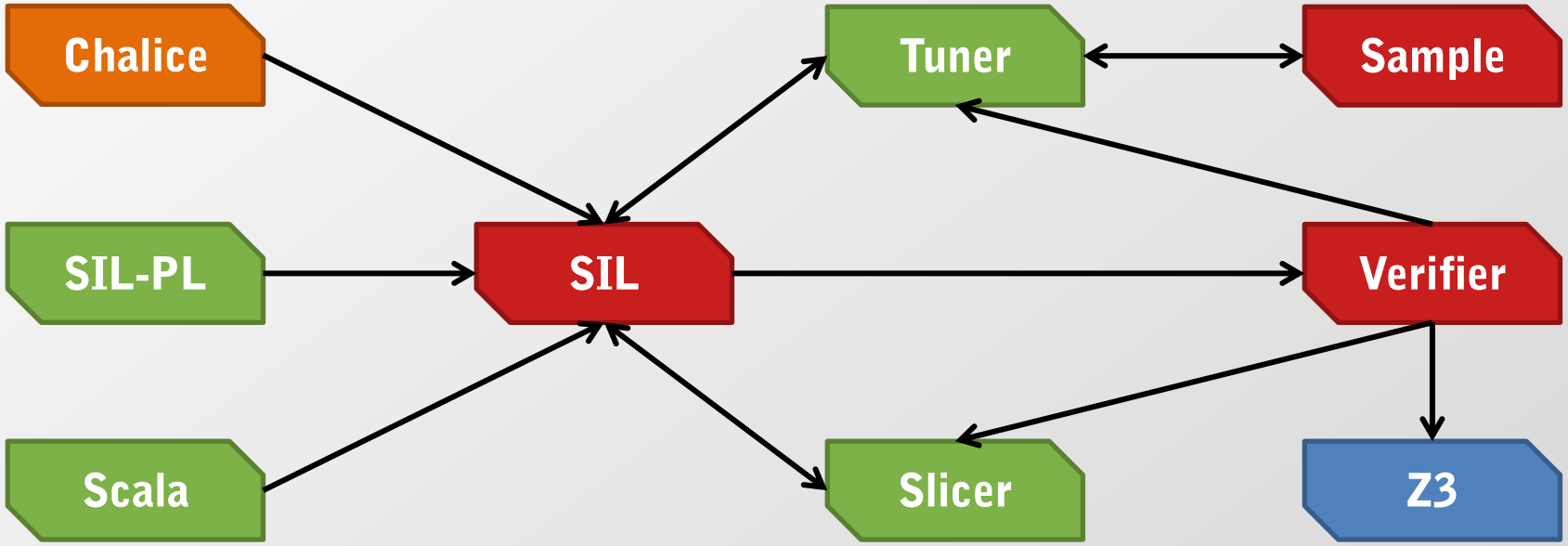
The Semper Project

- Long term project
- Automatic program verifier for **Scala**
  - verify concurrent programs
  - reduce annotation overhead
  - deal with functional features (e.g., closures)

Semper Architecture Design



Chalice

- Annotated Methods

```
class Cell {
    var v: int;

    method inc(d: int)
        requires 0 < d;
        requires acc(v);
        ensures v == old(v) + d;
    {   v := v + d; }
}
```

Chalice

- Annotated Methods
- Monitors

```
class Cell {
  var v: int;
  invariant acc(v) && 0 <= c;
}
class Program {
  method main() {
    var c:Cell := new Cell;
    c.v := 3;
    share c;

    acquire c; call c.inc(2); release c;
  }
}
```

Chalice

- Annotated Methods
- Monitors
- Predicates/Functions

```
class Cell {
  var v: int;

  predicate valid
  { acc(this.v) && 0 <= this.v }

  function add(d:int) requires valid;
  { unfolding valid in this.v + d; }

  …
}
```

Chalice

- Annotated Methods
- Monitors
- Predicates/Functions
- Fork-Join

```
class Cell { … }
class Program {
  method main()  {
    var c1:Cell := new Cell;
    var c2:Cell := new Cell;
    c1.v := 0; c2.v := 5;
    fork tk1 = c1.inc(3);
    fork tk2 = c2.inc(1);
    join f1 := tk1;
    join f2 := tk2;
  }
}
```

Chalice2SIL

- First front-end for SIL
- Help establish and test the tool chain
- Ideally no changes to Chalice
- If enough time is left
  - Predicates and functions
  - Deadlock avoidance
  - Channels (Actor model)

Thank you

QUESTIONS?