Comp-304 : Visitor (cont.)
Lecture 30

Alexandre Denault
Original notes by Marc Provost
and Hans Vangheluwe
Computer Science
McGill University
Fall 2007

7 / 23 = 30.4%

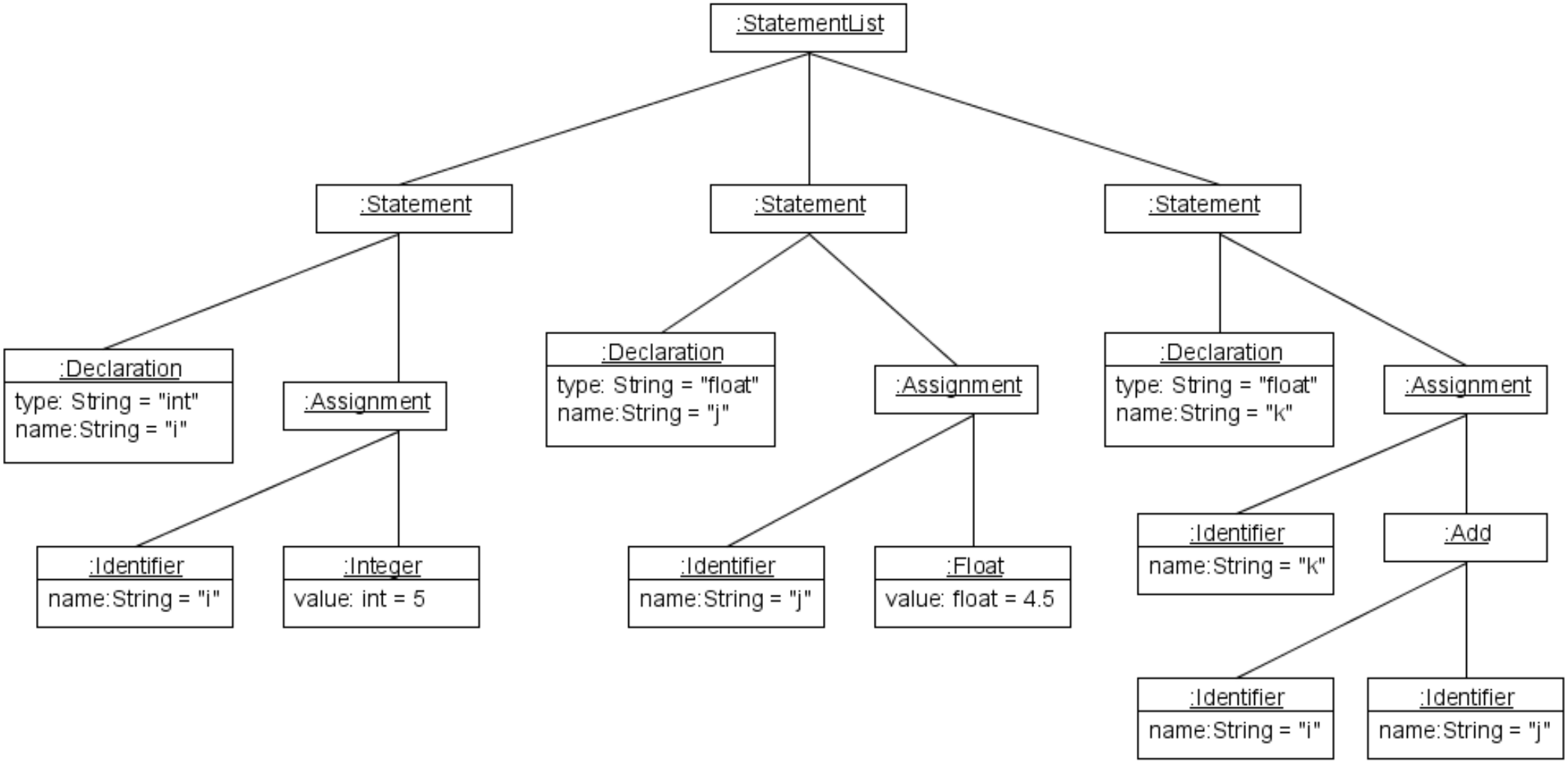
Tutorial

Thursday April 12th
Friday April 13th
Saturday April 14th
Sunday April 15th
Monday April 16th

The Code

```
int i = 5;
float j = 4.5;
float k = i + j;
```

Example


:StatementList
:Statement
:Statement
:Statement
:Declaration
type: String = "int"
name:String = "i"
:Assignment
:Declaration
type: String = "float"
name:String = "j"
:Assignment
:Declaration
type: String = "float"
name:String = "k"
:Assignment
:Identifier
name:String = "i"
:Integer
value: int = 5
:Identifier
name:String = "j"
:Float
value: float = 4.5
:Identifier
name:String = "k"
:Add
:Identifier
name:String = "i"
:Identifier
name:String = "j"

Visitor

```
class PrettyPrinterVisitor implements Visitor {

    public visitStatementList(StatementList elem) {
        //Nothing to do
    }

    public visitStatement(Statement elem) {
        print(" ;");
    }

    public visitDeclaration(Declaration elem) {
        print(elem.getType() + " ");
    }

    public visiAssignment(Assignment elem) {
        print(" = ");
    }
```

Visitor

```
    public visitMultiply(Multiply elem) {
       print(" * ");
    }

    public visitFloat(Float elem) {
       print(elem.getValue());
    }

    public visitInt(Int elem) {
       print(elem.getValue());
    }

    public visitIdentifier(Identifier elem) {
       print(elem.getName());
    }
}
```

Composite Concerns

- When dealing with composites, who should take care of the traversal?

Composite Concerns

- When dealing with composites, who should take care of the traversal?
  - Composite
  - Visitor
  - External class (somebody else)

Traversal : Composite

- Using the composite to take care of the traversal is the simplest solution.
- We saw something similar to this with the car example.

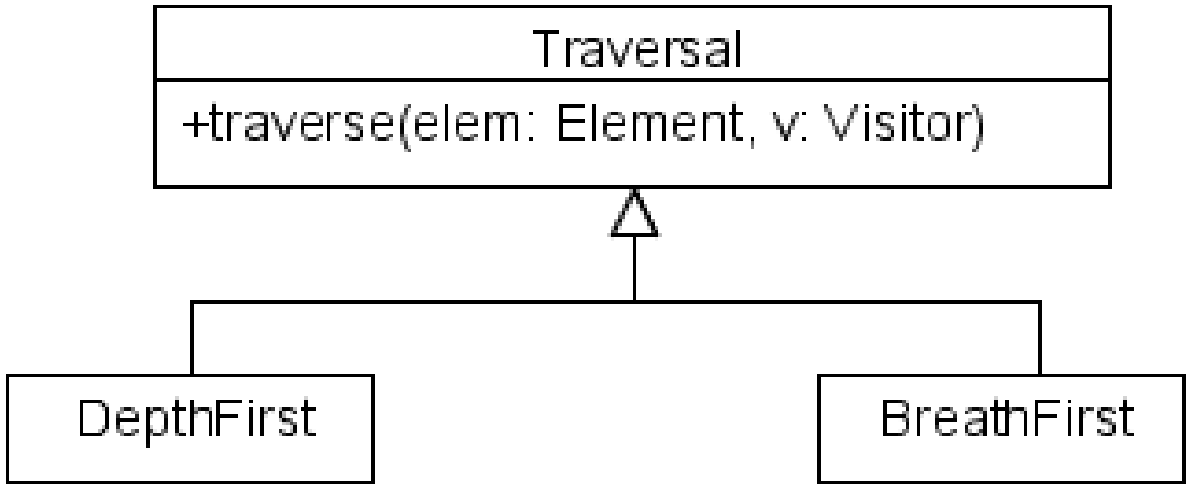
```
public void accept(Visitor visitor) {
    visitor.visitCar(this);
    engine.accept(visitor);
    body.accept(visitor);
    for(int i = 0; i < wheels.length; ++i) {
        wheels[i].accept(visitor);
    }
}
```

- Unfortunately, this only works if all the visitors need to visit the elements in the same order.
- Using the Composite to control the traversal leaves us with very little flexibility.

External Class

- Use an external class to define the traversal.
- That class would require internal knowledge of the data structure, but at least the visitor would remain generic.
- This traversal object could even be considered an iterator.

External Class for Traversal



Traversal - Visitor

- To allow different traversal orders, the traversal could be in the visitors.
- This would allow each visitor to use a special traversal.
  - This is the only solution for very complex traversal.
- What's bad about this?

Visitor

```
class PrettyPrinterVisitor implements Visitor {
    ...
    public visitStatement(Statement elem) {
        elem.def.accept(this)
        elem.assign.accept(this)
        print(" ;");
    }

    public visiAssignment(Assignment elem) {
        elem.id.accept(this)
        print(" = ");
        elem.exp.accept(this)
    }
    ...
```

The Problem

- The visitor needs to know and understand the data structure.
  - Breaks the abstraction, creates coupling
- Each visitor must include information on how to traverse the data structure.
  - Can represent lots of duplicate code.