

# From Spoon to Repairnator: hands on!

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Goal: present Spoon and discuss with its potential usage on your own works. It's meant to be interactive!

- Overview of Spoon (10-15 min max)
- Spoon demo (10 min)
- Hands on! (35-40 min)

Disclaimer: title is cool, but we won't really have time to really talk about Spoon usage on repair tools ;)

## How Spoon is used in the team?

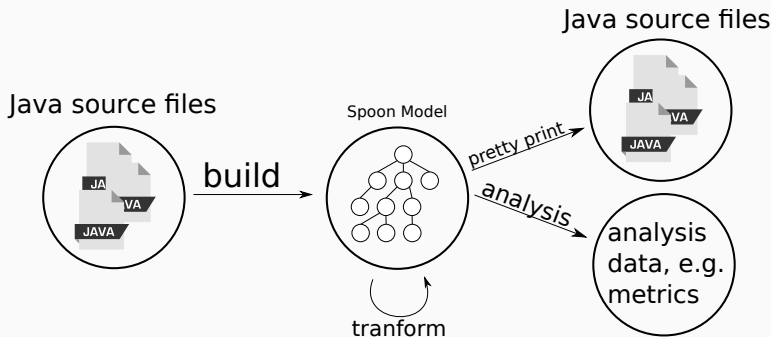
- Mixin creations and component architecture optimization: Lionel
- Software repair tools: Thomas, Benjamin [Nopol, NPEFix, AssertFixer, Astor, ...]
- Test amplification: Benjamin [DSpot]
- Bad smells detection: Sarra [Paprika]
- JavaScript documentation generation from Android API: Romain, Lakhdar [APISense]
- (WIP: Dynamic Software Product Line: Clément)
- (Create state diagrams for java programs: Simon B.)

## Spoon 101

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# Spoon in a nutshell

A library to write your own analysis and transformation in java.



## Usage examples:

- test improvement
- transpilation, e.g. Java to Javascript
- detection of bad smells
- automatic refactoring

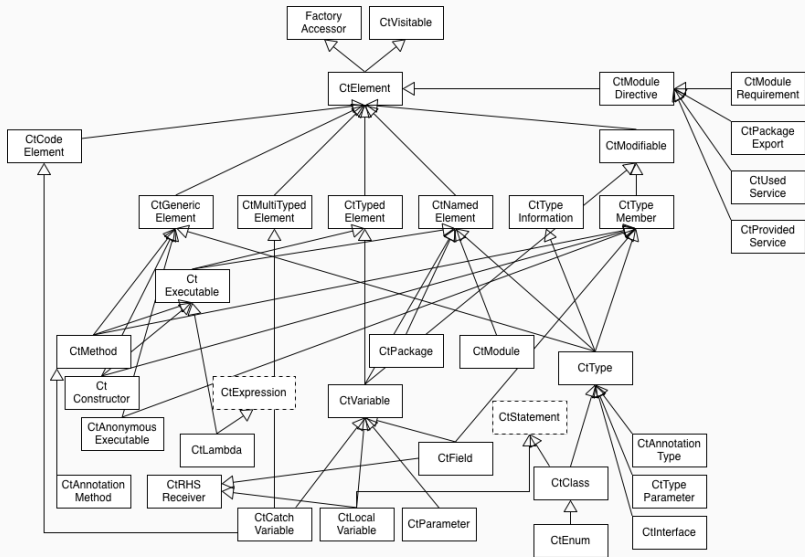
## Spoon standard process

1. Build a model of your project
2. Query and analyze interesting parts
3. Transform what needs to be transformed
4. Output a transformed source code

Three categories:

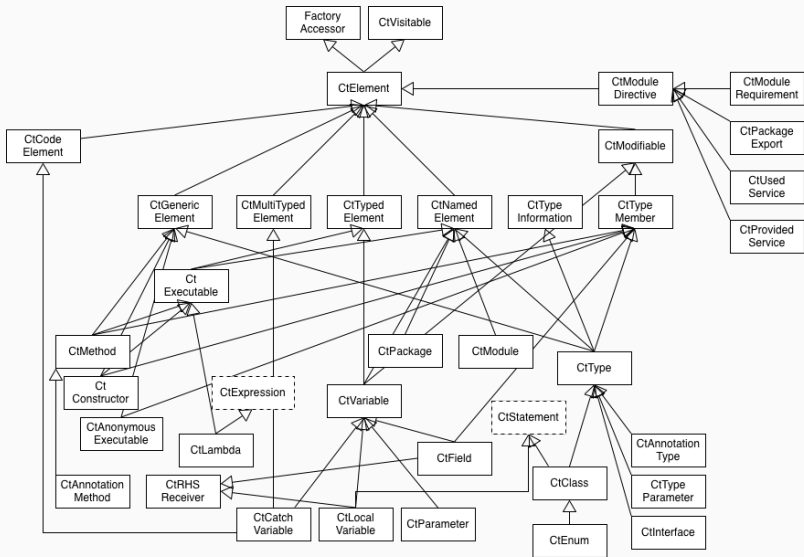
- structural elements: class, package, ...
- code elements: if, for, while, ...
- **references elements**: when something already declared is used (types, methods, fields, ...)

# Spoon AST Metamodel (structural elements)

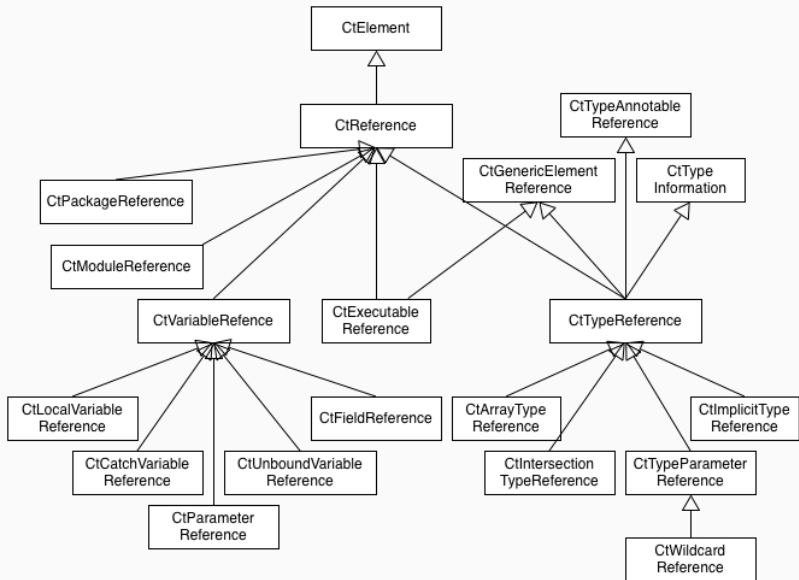




# Spoon AST Metamodel (code elements)



# Spoon AST Metamodel (references elements)



Some hints about Spoon Model:

- it's an Abstract Syntax **Tree**: you have access to parents and children at each node
- only references might appear multiple times in the model
- everything's not necessarily named
- the tree is processed in depth first when using processors

Transforming model involve performing basic CRUD operations on the nodes of the model.

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- Create a node

```
Factory factory = launcher.getFactory();  
CtClass aClass = factory.createClass(qualifiedName: "my.org.MyClass");
```

Transforming model involve performing basic CRUD operations on the nodes of the model.

- Create a node
- Retrieve a node or a property

```
namedElement.getSimpleName();  
List<CtMethod> elements = ctClass.getElements(new TypeFilter<>(CtMethod.class));
```

# CRUD on the model

Transforming model involve performing basic CRUD operations on the nodes of the model.

- Create a node
- Retrieve a node or a property
- Update a node or a property

```
aClass.setSimpleName("myNewName");  
CtMethod myMethod = factory.createMethod();  
aClass.addMethod(myMethod);
```

## CRUD on the model

Transforming model involve performing basic CRUD operations on the nodes of the model.

- Create a node
- Retrieve a node or a property
- Update a node or a property
- Delete a node

```
aClass.removeMethod(myMethod);
```



# Demo

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- Present the project
- present Spoon model of the project (GUI)

**Hands on!**

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# What you have to do?

- Rename `BadNameCounter` using `RenameLinearCountingProcessor`
- Create a processor to detect types of `privateapi` package that are available through `publicapi` package
- (if you still have time...) Create a processor to transform setters of `Store` to a builder pattern