

# System and Testing Validation (STV08)

A template based method for automatic unit  
test case generation of web applications

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# Introduction

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- Web applications are more and more popular
- Web Application Framework simplifies development
  - Java EE, Spring Framework
- Agile WAF
  - Ruby on Rails, Grails, Trails, Roma
- Software testing: important but complex and costly
  - Automatic testing could save time and effort
- Problem: **automatic testing** for applications based on **agile WAF**

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- ATP4Romulus
- Conclusions & Future Work

# Background - WAF

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- Java
  - Java EE
  - Spring Framework
- Agile development:
  - Ruby on Rails
  - Grails
  - Trails
  - Roma/Romulus

# Background – Auto Testing

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- Specification based: SDL
- Model based: UML
- Path oriented: control flow
- Random generation: random test distribution
- Goal oriented: agents
- Intelligent test case generation: computation
- Template based: flexible

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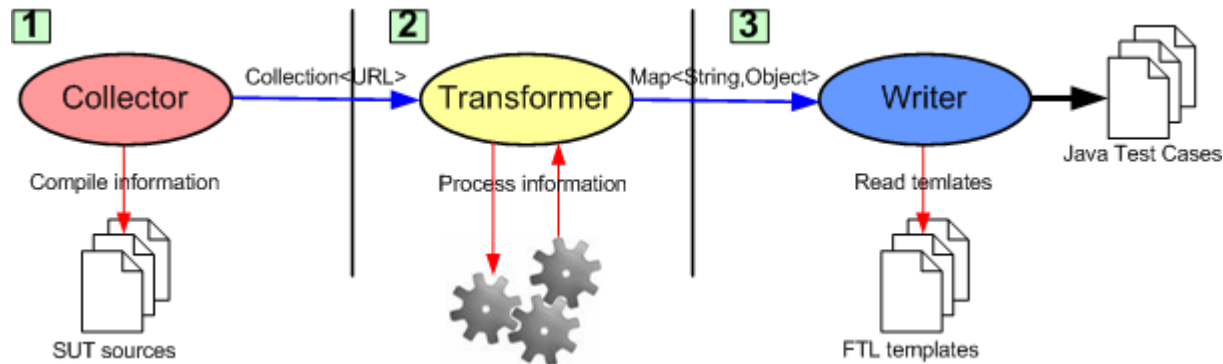
# Automatic Testing Platform (I)

- Template based: FreeMarker
- ATP4Java:
  - Generators: Entities in charge of the **automatic** test case generation
  - CSV: Input file for **semi-automatic** test case generation

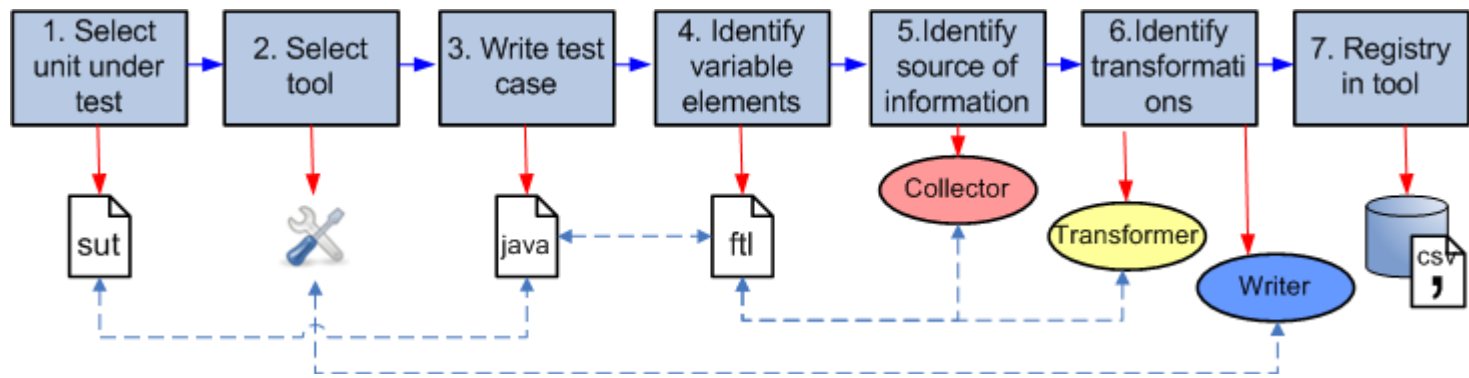


# Automatic Testing Platform (II)

- Generators



- Extending ATP4Java





# Automatic Testing Platform (III)

- Semi-automatic generation: CSV

```
new,Store,1000  
new,Box,3,2,2  
run,$1,fits,$2  
assert,$3
```

```
new,java.lang.Integer,1000  
new,Store,$1  
new,Box,3,2,2  
run,$2,insert,$3  
run,$2,getCapacity  
assert,$5,!=,$1
```

```
run,StaticStore,getCapacity  
assert,$1,<,1000
```



```
@Test  
public void testCSV_1() throws Exception {  
    Store store1 = new Store(1000);  
    Box box2 = new Box(3,2,2);  
    boolean boolean3 = store1.fits(box2);  
    Assert.assertTrue(boolean3);  
}
```

```
@Test  
public void testCSV_2() throws Exception {  
    Integer integer1 = new Integer(1000);  
    Store store2 = new Store(integer1);  
    Box box3 = new Box(3,2,2);  
    store2.insert(box3);  
    Integer integer5 = store2.getCapacity();  
    Assert.assertTrue(!EqualsBuilder.  
        reflectionEquals(integer5, integer1));  
}
```

```
@Test  
public void testCSV_3() throws Exception {  
    int int1 = StaticStore.getCapacity();  
    Assert.assertTrue(int1 < 1000);  
}
```

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# ATP4Romulus (I)

- Extension of ATP4Java for Romulus framework
- Set of specific generators
- Functional and structural test case generation
  - Domain tests (DDD approach)
  - Functional test (CRUD, I18N, View, ...)
- <http://www.ict-romulus.eu/web/atp4romulus>



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# Conclusions & Future Work

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- Open source testing suite released for automatic unit test case generation: **ATP**
  - Focused on agile web development
  - Flexible (template-based)
  - Scalable (by Generators)
- To come: extending ATP to integration and system testing levels (mocks, web testing)

# Thank you

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