5th Int'l Workshop on Automated Specification and Verification of Web Systems (WWV09)

Automatic Functional and Structural Test Case Generation for Web Applications based on Agile Frameworks

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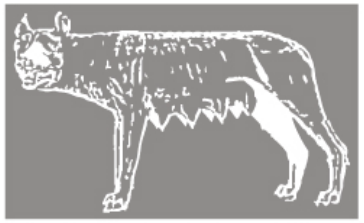

Introduction

- 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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Background - WAF

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

Background – Auto Testing

- 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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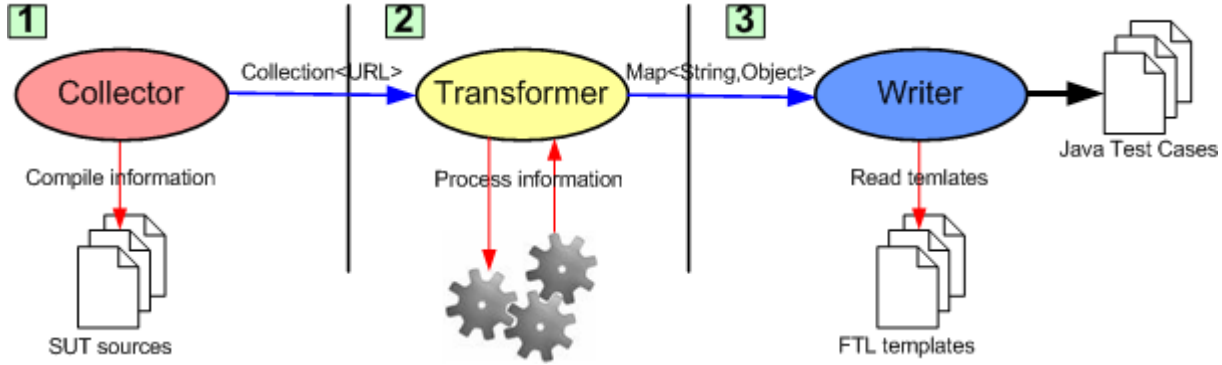
Automatic Testing Platform (I)

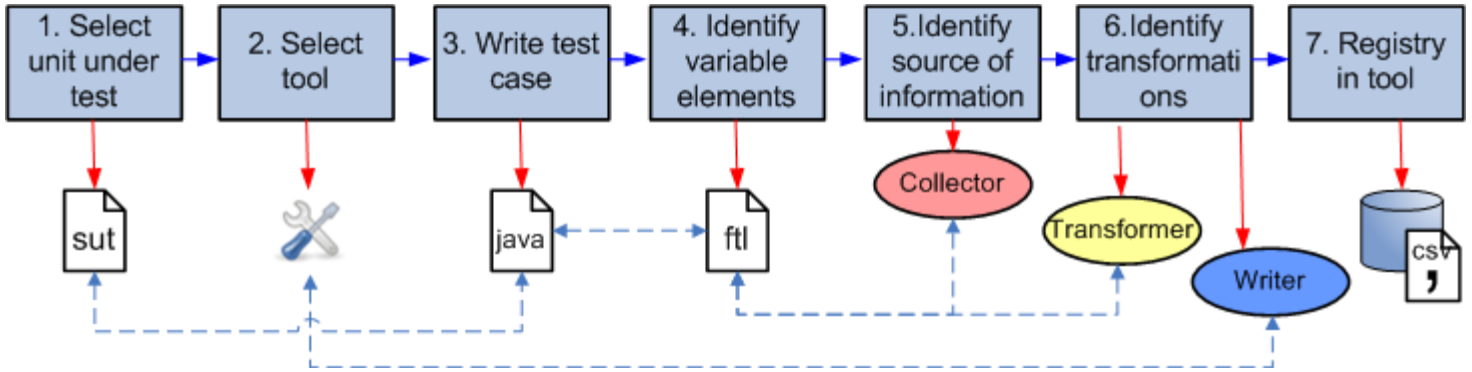
- Template based: FreeMarker
- ATP concepts:
  - Generators: Entities in charge of the **automatic** test case generation
  - CSV: Input file for **semi-automatic** test case generation

Automatic Testing Platform (II)

- Generators



- Extending ATP



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 ATP 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

ATP4Romulus (II)

- Demo

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Conclusions & Future Work

- Open source testing suite released for automatic unit test case generation: **ATP**
  - Focused on agile web development
  - Flexible (template-based)
  - Scalable (by Generators)
- Work in progress: extending ATP towards integration and system testing levels (web and performance)

Thank you

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ROMULUS