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# **JFORTES Documentation**

***Release 1***

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## INTRODUCTION TO JFORTES

Nowadays, software applications need to be developed quickly and meet a high-level of quality. Formal verification plays an important role to ensure predictability and dependability in the design of critical applications. Consequently, the application of verification and testing are indispensable techniques to the development of high-quality software. However, there is usually a high cost involved in the preparation, execution and management of tests. One way to deal with such problems is to integrate formal verification techniques with test environments <sup>1</sup>.

JFORTES (Java FORMAL unit TEST generation) is a method that aims to extract the safety properties generated by ESC/JAVA <sup>2</sup> to generate automatically test cases using the rich set of assertions provided by Unit Test frameworks, such as: TestNG <sup>3</sup> and JCUTE <sup>4</sup>. The integration of these two environments aims to ensure software quality by exploiting formal verification and tests. JFORTES is an extension of FORTES <sup>5</sup> to Java programs. *Figure 1: JFORTES Flow* shows a flow structure of the JFORTES method. We advocate that exploiting the integration between a testing framework and formal verification allows us to go deeper into the Java program verification.

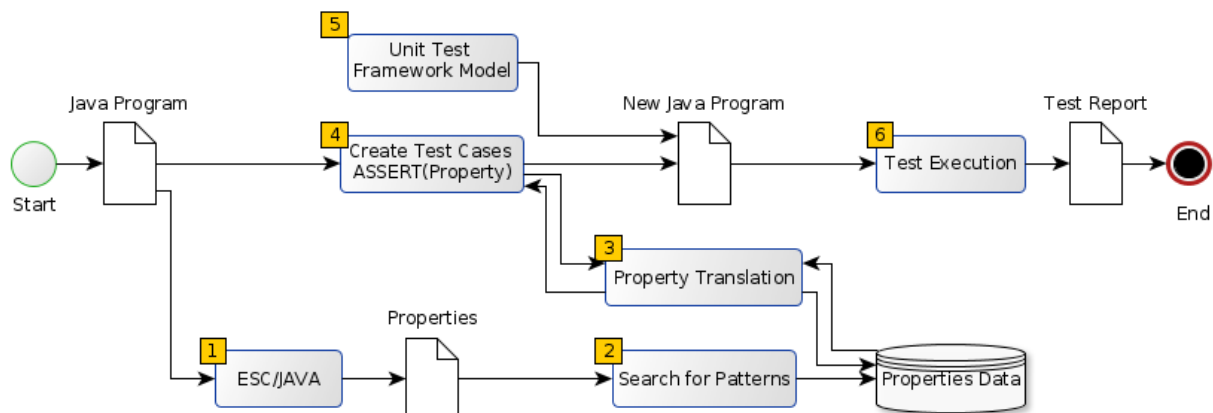


Figure 1.1: Figure 1: JFORTES Flow

### References

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- <sup>1</sup> Herbert Rocha, Lucas Cordeiro, Raimundo Barreto and José Netto. Exploiting Safety Properties in Bounded Model Checking for Test Cases Generation of C Programs. In SAST. SBC. 2010.
- <sup>2</sup> Available at <http://kindsoftware.com/products/opensource/ESCJava2/>
- <sup>3</sup> Available at <http://testng.org/doc/index.html>
- <sup>4</sup> Available at <http://osl.cs.illinois.edu/software/jcute/>
- <sup>5</sup> Available at <https://sites.google.com/site/fortesmethod/>





## JFORTES'S TUTORIAL

JFORTES aims to extract the safety properties generated by ESC/JAVA <sup>1</sup> to generate automatically test cases using the rich set of assertions provided by Unit Test frameworks.

### 2.1 Requirements for using the tool

To use this tool is necessary that the system contains the following software already installed properly:

- Python
- ESC/JAVA <sup>1</sup>
- Java 1.5 <sup>2</sup>
- Ctags <sup>3</sup>

WARNING: ESC/Java2 is written with Java 1.4 and only runs in a Java 1.4 or 1.5 virtual machine. While ESC/Java2 should work in any Java 1.4 or 1.5 virtual machine.

### 2.2 How to install JFortes?

In order to install JFortes on your PC, you should download and save the JFORTES\_vx.zip file on your disk. After that, you should type the following command:

#### 2.2.1 STEP 1:

```
$ tar -xzf JFORTES_vx.zip
```

or from GITHUB

```
$ git clone https://github.com/hbgit/jfortes.git
```

#### 2.2.2 STEP 2:

Open the directory where the JFortes tool was extracted and then you should locate the configure.py script. After that, you should run the configure.py script, it is worth to say that you should run the configure.py script from inside the directory where JFortes was extracted.

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<sup>1</sup> Available at <http://kindsoftware.com/products/opensource/ESCJava2/>

<sup>2</sup> Available at <http://www.oracle.com/technetwork/java/javasebusiness/downloads/java-archive-downloads-javase5-419410.html>

<sup>3</sup> Available at <http://ctags.sourceforge.net/>

```
$ cd JFortes_vx
$ ls
$ ./configure.py
```

Now it is advisable that you should set the environment variable `PATH` in your `.bashrc` for:

- Java 5

```
# --- Java 5
$ JAVA_HOME="/usr/lib/java/jdk1.5.0_22/"
$ export JAVA_HOME
$ export PATH=$JAVA_HOME/bin:$PATH
```

- ESC/JAVA

```
export PATH=$PATH:/home/hrocha/Downloads/ESCJava-2.0.5-04-11-08-binary/
```

### 2.2.3 STEP 3:

It is advisable that you should set the environment variable `PATH` in your `.bashrc` file as follows:

```
$ export PATH=$PATH:/home/user/JFortes_vx/
```

### 2.2.4 STEP 4:

Testing Map2Check-Fortes

```
$ jfortes.py test_cases/primary_tests/Bag.java
```

## References

## **JFORTES'S LIMITATIONS**

DOING...



## INDICES AND TABLES

- *genindex*
- *modindex*
- *search*