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Fault Tolerance Engine User Guide

Activity 4: Basic Service Operation

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Dissemination Level

PU	Public	X
PP	Restricted to other programme participants (including the Commission)	
RE	Restricted to a group specified by the consortium (including the Commission)	
CO	Confidential, only for members of the consortium (including the Commission)	



Version History

Version	Date	Comments, Changes, Status	Authors, contributors, reviewers
1.0	2012-04-10	Final version ready for submission	J. Oriol Fitó (BSC)
2.0	2013-04-01	Final version ready for submission	Mario Macías (BSC)



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1 Introduction

This document includes the user guide for the software component Fault Tolerance Engine.

Section 2 details the component's release information, its functionality and provided API. It also details its limitations, as well as its code information and directory structure. Its usage and testing procedures are also provided.

1.1 Glossary of Acronyms

Table 1 - Acronyms table

Acronym	Definition
API	Application Programming Interface
BLO	Business Level Objective
EMOTIVE	Elastic Management Of Tasks In Virtualized Environments
IP	Infrastructure Provider
JAR	Java ARchive
OCCI	Open Cloud Computing Interface
OVF	Open Virtualization Format
REST	Representational State Transfer
VM	Virtual Machine



2 Fault Tolerance Engine User Guide

2.1 Release information

Table 2 - Release information

Component Name	Release Number	Release Date
FaultToleranceEngine	1.0-SNAPSHOT	2013-04-1

2.2 Introduction

The Fault Tolerance Engine is part of the OPTIMIS toolkit for Infrastructure Providers (IPs).

This component is responsible for monitoring and alerting of parts of self-healing infrastructure operation. As such, it explicitly asks or implicitly receives periodic updates to/from the monitoring system about the state of physical hardware hosts and virtual-IT infrastructure (i.e. virtual machines, VMs). Later on, this engine decides whether any corrective action is required, such as restarting a recently failed VM.

Note that this component only deals with failures at the infrastructure level. It is idempotent and tolerant to multiple failures, i.e. physical hosts failures and VMs crashes.

2.3 Functionalities

The new functionalities included in this release are the following:

- Detection of failures of physical resources
- Improved detection of virtual resources failures
- Risk-based proactive fault tolerance
- Behaviour configurable through policies and rules

2.3.1 Detection of failures of physical and virtual resources

There is no interface provided by the component related to these functionalities.

2.3.2 Risk-based proactive fault tolerance

This new functionality offers a way to be proactive to faults of resources. To that end, thresholds for the probability of failure of resources are configured into the risk tool by the Cloud Optimizer, according to required services availability. Then, the risk tool is the responsible for pulling values greater than those thresholds to the fault tolerance engine in order to proactively react to faults.

Operation	Input	Output	Description
putVMRiskPoF	Parameter 1: resource identifier Parameter 2:	-	This method is used by the Risk tool in order to pull values of probability of failure regarding a particular



	probability of failure		physical or virtual resources
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2.3.3 Behaviour configurable through policies and rules

Operation	Input	Output	Description
changeSchedulingPolicy	Parameter 1: BLO	-	This method is used by the Cloud Optimizer in order to set the management Business Level Objective and its constraints, to be used by the engine.

2.4 Known limitations

N/A

2.5 Getting Started

2.5.1 Using the Software

There is a client to interact with this component, which is packaged as a JAR file and can be used by any user. The only thing that one needs to do is importing such file.

2.5.2 Testing the Software

In a Maven environment, the test cases provided can be invoked by means of the following command: `mvn test`.

2.5.3 Configuration

N/A

2.6 FAQ

N/A

2.7 Other information

2.7.1 Source Code Information

This component has been developed in Java. Its main classes are the following:

- `FaultToleranceEngineRESTClient`: Java interfaces that act as a client of the RESTful interfaces provided

- FaultToleranceEngineREST: contains the RESTful interfaces
- FTAssessor: encapsulates core functionalities and establishes communications with the Cloud Optimizer in order to react to resources failures
- Monitor: it is a Java thread in charge of monitoring services' VMs and physical hosts

2.7.2 Directory Structure

This OPTIMIS engine is divided in three directories:

- FaultToleranceEngineRESTClient: this software part should be used by clients of this component. It is composed by several Java interfaces that act as clients of REST methods offered by a server.
- FTService: this core part of the component comprises the main functionality of this engine, and is intended to be offered by an application server.

2.7.3 Contributors

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