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FAQAS Framework

SUM - Software User Manual

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Contents

Chapter 1

Scope and content

This document is the deliverable SUM of the ESA activity ITT-1-9873-ESA. It concerns the software user manual for the *FAQAS framework* to be delivered by ITT-1-9873-ESA. Following the structure described in the SoW *AO9873-ws00pe_SOW.pdf*, it provides instructions for the users of the FAQAS framework according to ECSS-E-ST-40C Annex B.

1.1 Applicable and reference documents

- D1 - Mutation testing survey
- D2 - Study of mutation testing applicability to space software

Chapter 2

Terms, definitions and abbreviated terms

- FAQAS: activity ITT-1-9873-ESA
- FAQAS-framework: software system to be released at the end of WP4 of FAQAS
- D2: Deliverable D2 of FAQAS, *Study of mutation testing applicability to space software*
- KLEE: Third party test generation tool, details are provided in D2.
- SUT: Software under test, i.e, the software that should be mutated by means of mutation testing.
- WP: Work package

Chapter 3

External View of the Software

The FAQAS-framework is delivered as an archive consisting of the source files and a installer. The following is a depiction of the directory structure:

- `FAQASFramework/`
  - `SRCMutation/`: contains the source files of the component that performs source mutations.
  - `llvm-build.sh`: build script that compiles the SRCMutation component
  - `PythonWrappers/`: contains Python script wrappers that facilitate source code mutations.
  - `MASS/`
    * `FAQAS-Setup`: contains the Bash scripts necessary to install the FAQAS-Framework.
    * `FAQAS-GenerateCodeCoverageMatrixes`: contains the Bash scripts providing procedures to collect code coverage from the SUT.
    * `FAQAS-GenerateMutants`: contains a Bash script that invokes the `SRCMutation` to generate mutants.
    * `FAQAS-CompileOptimizedMutants`: contains the Python and Bash scripts that provides the procedures to compile mutants and filter equivalent and redundant mutants based on trivial compiler optimizations.
    * `FAQAS-CompileAndExecuteMutants`
      · `FAQAS-GeneratePrioritizedTestSuite`: contains the Python and Bash scripts that provides the procedures to generate prioritized and reduced test suites from the SUT.
      · `FAQAS-CompileAndExecute`: contains the Python and Bash scripts that provides the procedures to compile and execute the mutants against the SUT test suite. It also provides the procedures to determine the mutation stopping criterion (i.e., mutant sampling).
      · `FAQAS-IdentifyEquivalentAndRedundantMutants`: contains the Python and Bash scripts that provides the procedures to identify equivalent mutants based on code coverage.
    * `FAQAS-MutationScore`: contains the Python and Bash scripts that provides the procedures to compute the mutation score and provide summarized information about the code-driven mutation testing process.

Chapter 4

Operations Manual

4.1 Set-up and Initialization

The first step to build the FAQAS-framework is to build the `SRCMutation` component. For this procedure, a Bash script and a Makefile are provided.

```
$ wget http://tex.stackexchange.com
```

4.2 Getting started

4.3 Mode selection and control

4.4 Normal Operations

4.5 Normal Termination

4.6 Error Conditions

4.7 Recover Runs

Chapter 5

Tutorial

5.1 Introduction

This tutorial presents how to

The examples use an

5.2 Example: Mathematical Library for Flight Software

5.2.1 Getting Started

5.3 Using the software on a typical task