ALIVE

Clereco
Cross-Layer Early Reliability Evaluation for the Computing cOntinuum

FP7-CLERECO
Grant Agreement FP7-611404
SEVENTH FRAMEWORK PROGRAMME

A LLVM-based Lifetime Variable Analysis

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Product Overview

ALIVE evaluates the effect of faults in all variables of a generic software, by analyzing the variable lifetime and its propagation to the output of the program.

*"Before asking if a single fault will **impact** on your system, ask if it will be **seen at all**"*

- LIRMM (CRNS)

Supported Architectures

The tool supports **all** programming languages included in the **LLVM** set of compilers.

Extensions & Tools

- Very fast evaluation: only **one** run is required to provide effective results,
- Time accurate,
- Accounts for all possibile making effects,
- Support Software Error Protection strategies,

Target Components

- Single variables
- Basic Structures (i.e., vectors and matrix)
- Advanced structures (i.e., unions, multi-type containers)

Supported Fault Models

CLERECO developed Software Fault Models (SFM):

- ✓ **Wrong Data**
- ✓ **Instruction Replacement**

Measurements

- **Masking probability**
- **Fault Silent Violation (FSV)**
- **Crashed**
- **Detected Faults**

Key Concepts

Variable **Lifetime analysis**:

- A variable is **alive** from the first write to the last read (before next write)
  - A fault in an alive variable can have influence on the program execution
  - A fault in a dead variable is masked (will be either re-written or never used again)

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LIRMM

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