



# A reliability analyzer for NVIDIA Kepler GPUs

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## What is this thesis about?

Recent years have witnessed an increase of computational power demand in several application domains. General Purpose computing on Graphics Processing Units (GPGPU) has gained a primary role in the delivery of high computational power leveraging the inherent high parallel architecture of GPUs to accelerate complex tasks. In this scenario, GPUs are no longer employed just for graphics. They have increasingly found application in areas where reliability is a primary concern (i.e., advanced driver assistance systems, aviation, medicine, super computing, etc.). This trend is however threatened by the technology shrinking, which has a detrimental effect on the susceptibility to faults for new devices. Characterization of the reliability of GPGPU systems is therefore becoming a mandatory task.

One of the main open challenges in evaluating the reliability of GPGPU systems is the development of fast and accurate reliability assessment tools able to properly trade-off simulation time and accuracy and providing information able to guide the system designers in the choice of proper architectural parameters and error protection mechanisms to achieve the target reliability and performance requirements.

This thesis is devoted to the development of a reliability analyzer for NVIDIA Kepler GPU architecture.

## What will I do?

You will develop a reliability framework for NVIDIA Kepler GPU architecture. The framework will:

- be built on top a micro-architecture simulator
- implement some of the state-of-the-art techniques for reliability evaluation
- allow to analyze performance, power consumption and reliability for different settings of micro-architecture parameters

Once the framework will be ready, some experimental results will be generated in order to compare the obtained results with real hardware (we have a Tesla K20 GPU!) an other GPU architectures such as AMD Southern Islands.

## What skills, experience do I need?

You require:

- strong skills in programming languages (C/C++, Python, Bash)
- basic knowledge of computer architecture and/or GPU architecture
- experience with Linux environment

## Contacts

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