SpotSDC: An Information Visualization System To Analyze Silent Data Corruption

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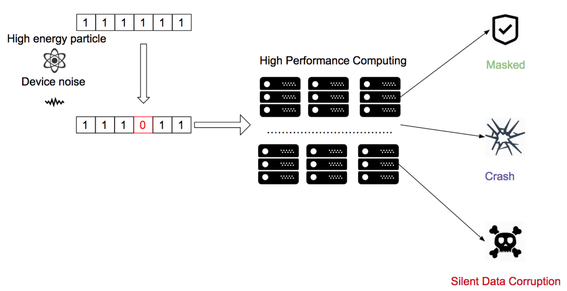
ABSTRACT

The aggressive scaling trend in high-performance computation increase the probability of silent data corruption and make the computation result's unreliability. How to improve applications' resiliency become a concern in computation community. In this study, we cooperate with two high-performance computation researchers design a visualization system to understand a program's resilient property to silent data corruption.

BACKGROUND

Transient error, such as a random bit flip, caused by high energy particle or device noise may silently corrupt the computation outcome.

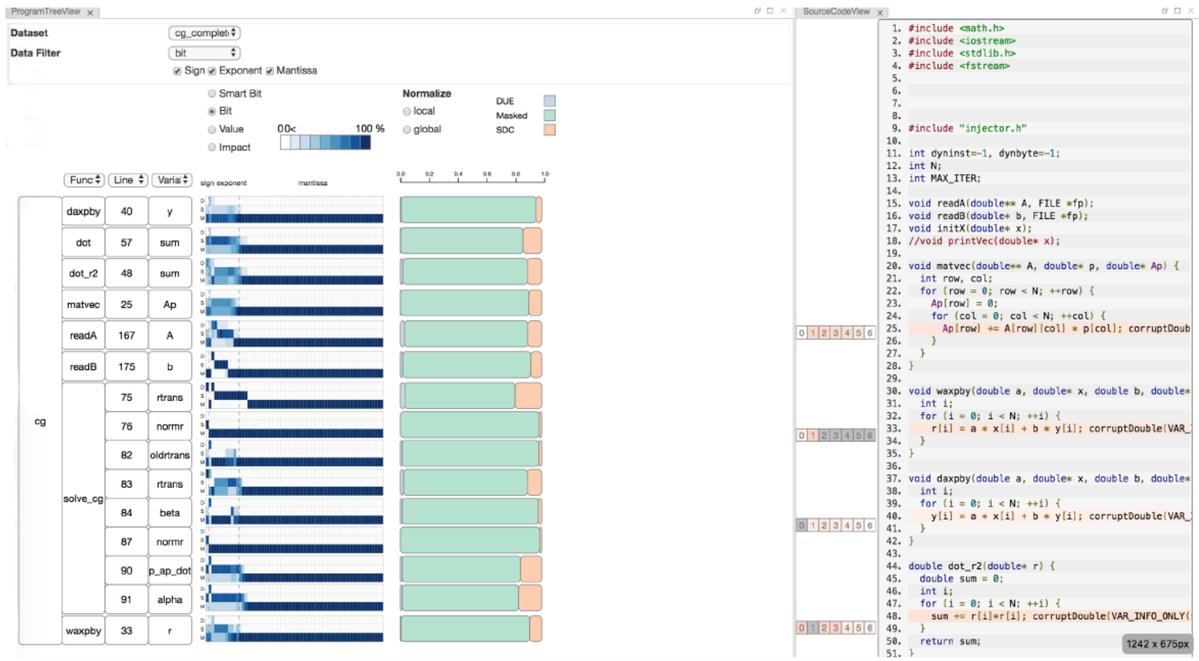
- SDC: Error corrupt the computation output silently.
- Masked: Error vanish, and computation outcome is under the threshold.
- Crash: Error crash the program



OBJECTIVES

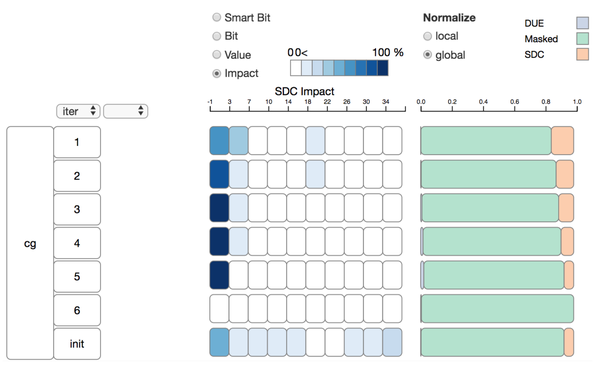
- Understand how the silent data corruption's impact on a program.
- Understand how a transient error propagates through a program.

THE SYSTEM



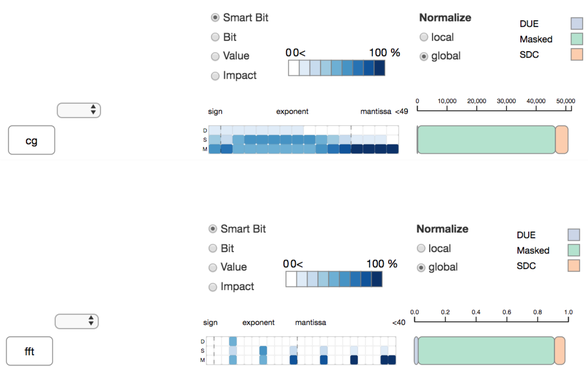
RESULT 1

What's transient errors' impact on different iteration?



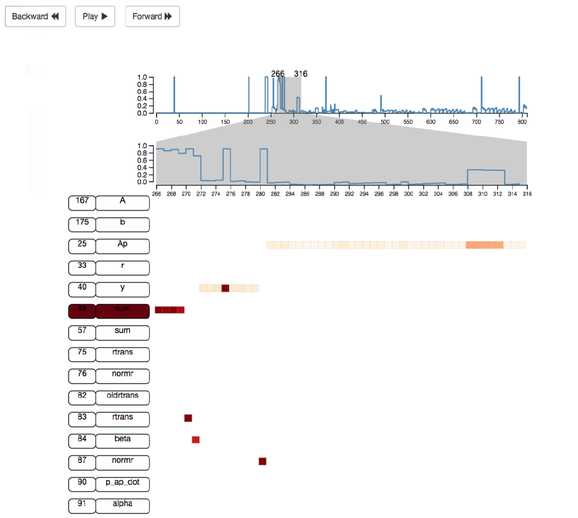
RESULT 2

How each bit impact the program outcome?



FUTURE WORK

How will the error propagation through the program?



CONCLUSION

- SpotSDC is a visualization system designed to study the silent data corruption's impact on a programs.
- SpotSDC helps HPC researchers build better intuition about program's resiliency property and motivate them to design more robust programs.

REFERENCE

Menon, Harshitha, and Kathryn Mohror. "DisCVar: discovering critical variables using algorithmic differentiation for transient faults." *Proceedings of the 23rd ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*. ACM, 2018.

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