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Kernel Dependability & Assurance

Linux is now being used in applications that are going to require a high degree of trust that the kernel is going to behave as expected. Some of the key areas we're seeing Linux now start to be used are in medical devices, civil infrastructure, caregiving robots, automotives, etc.

The kernel development is producing high-quality kernels, release by release, with an increasing speed of change and arguably also increasing software quality. The process of kernel development has been adapting to handle the increasing number of contributors over the years and ensure a sufficient software quality.

The kernel processes have evolved over time to produce a high quality kernel that is able to react to security and bug fixes in an effective manner.

However there are a few areas to explore as it pertains to safety critical space:

- What sort of uptime can we count on?
- Can we leverage uptime and Mean time between failures (MTBF) metric?
- How does the rate of change impact the analysis of the applications and products?
- Can we minimize the impact of kernel changes on a pre-existing safety claim?
- Are the system requirements that Linux is included in being satisfied?
- Is there tooling and processes to help us answer these questions efficiently?

In short, we would like this mini-conf to bring the safety critical user community and the kernel community together to start dialogue and collaboration on making sure that the kernel is fit to be used in safety-critical systems and that questions from the safety community wrt. software quality can be answered adequately.

Since the last LPC in 2020, the ELISA team has made contributions to the Documentation and tools. The team has deployed a CI server that runs static analysis tools and syzkaller on the Linux kernel repos. Results of last 10 days of linux-next are made available to the community:

- https://elisa-builder-00.iol.unh.edu/
- https://elisa-builder-00.iol.unh.edu/syzkaller/

We would like to continue our dialogue with the community at this LPC. We are requesting discussion topics in the following topics:

Topics:

- Identify missing features that will provide assurance in safety critical systems.
- Which test coverage infrastructures are most effective to provide evidence for kernel quality assurance? How should it be measured?
- Explore ways to improve testing framework and tests in the kernel with a specific goal to increase traceability and code coverage.
- Regression Testing for safety: Prioritize configurations and tests critical and important for quality and dependability

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I agree to abide by the anti-harassment policy

I agree

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