Contribution ID: **62**

Type: **not specified**

Graceful Under Pressure: Prioritizing Shutdown to Protect Your Data in Embedded Systems (Even When the Power Flickers)

Thursday, 19 September 2024 15:00 (45 minutes)

Power fluctuations are a common challenge in embedded systems, where components like SD cards, eMMCs, and raw NAND flash are widely used for storage. These storage components are vulnerable to data corruption or even permanent damage when power unexpectedly drops. While larger systems, such as servers, often employ solutions like uninterruptible power supplies (UPS) to mitigate this risk, the size and cost constraints of embedded devices often preclude such measures. Although some modern embedded systems can detect power issues early, a unified, upstream solution for gracefully shutting down critical components is still lacking.

In fact, software-based solutions for prioritized shutdown already exist in some Linux-based embedded systems. However, these solutions are not integrated into the mainline kernel. This fragmentation makes it difficult for the broader community to benefit from these advancements.
This talk aims to bridge this gap by advocating for the inclusion of prioritized shutdown mechanisms in the Linux kernel. We will discuss the unique challenges faced by embedded systems, where size and cost constraints often limit hardware-based protections like UPS systems. By leveraging existing software solutions and collaborating with the community, we can develop a standardized approach to power loss protection that benefits all embedded Linux users.

Join us as we explore the technical and community aspects of this issue, with the goal of making graceful shutdowns a standard feature in all Linux-based embedded systems. Let's work together to protect our data, even when the power flickers.

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Session Classification: Kernel Summit

Track Classification: Kernel Summit Track