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Operating system security updates and network boot support for Libera instruments

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The Libera instruments are widely used in particle accelerators for applications like beam position monitoring, beam loss monitoring and control of radio frequency fields. The instruments rely on embedded Linux operating systems to ensure stable and precise operation. Maintaining security and operational reliability across a fleet of such instruments presents a significant challenge, especially in facilities with limited physical access. This paper presents a robust and automated solution for managing operating system security updates and network-based booting for Libera instruments. We detail an approach that integrates secure, version-controlled Linux OS updates with a centralized network boot infrastructure, enabling consistent and traceable deployments across all instruments. The network boot process further simplifies device provisioning and recovery, reducing downtime and minimizing maintenance overhead. This combined strategy improves system security posture, ensures reproducibility and supports scaling. Implementation experiences from production accelerator environments are also discussed.

Footnotes

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