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Benefits of a Microkernel Architecture for Slow Control Systems Software in Research Activities: Case Studies from LHEP, JINR

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This paper presents an approach to software development for slow control systems. It reports the results of applying a microkernel architecture and justifies its choice based on Neal Ford's classification and an analysis of the most critical quality attributes. The work is devoted to **Maestro Software** and its application in projects for the **Synchronization System Segment for the Booster Injector** and the **Nuclotron-Collider Beam Transport Channel**. The application of *SOLID* principles and *GoF* design patterns is considered to facilitate the maintenance of slow control system software under conditions of constantly changing requirements. The developed software tools have been verified for both technical completeness and conceptual clarity. The paper describes the experience of involving undergraduate students from the Dubna State University in tackling actual software development tasks for physical setup equipment control as a part of the International Engineering School activity. The developed architectural rules and technical tools lower the entry barrier for young specialists and students participating in the development of slow control system software.

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