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Towards asynchronous control systems, an asyncio implementation of OPC UA using TANGO green modes

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The ALBA Synchrotron (Barcelona, Spain) has been operating as a 3 GeV facility for over 10 years and is now preparing its transition to ALBA II, a fourth-generation light source. As part of this planned upgrade, we are evaluating state-of-the-art technologies that could shape the future of our Tango Control System. In particular, we investigate how asynchronous programming can enhance system responsiveness while reducing latency and resource usage. This study focuses on applying asynchronous communication paradigms at all levels between our Taurus SCADA UIs, Tango Control System and PLC-based systems —used for Equipment (EPS) and Personnel (PSS) Protection as well as automation. In this context, we explore the adoption of OPC Unified Architecture (OPC UA), a self-descriptive industrial standard for secure, platform-independent communication, alongside asyncio, the Python standard library for coroutine-based asynchronous programming, as supported by the FreeOpcUa library and "green" modes of PyTango, the Python binding for Tango Controls. Our goal is to demonstrate a modern, flexible, vendor-independent and high-performance control strategy for ALBA II Control System. We provide a comprehensive comparison and benchmark between the proposed solution and existing PyPLC Tango Device Servers.

Footnotes

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