

# Extending the Coverage of Automated Testing in ITER's Control System Software Distribution\*

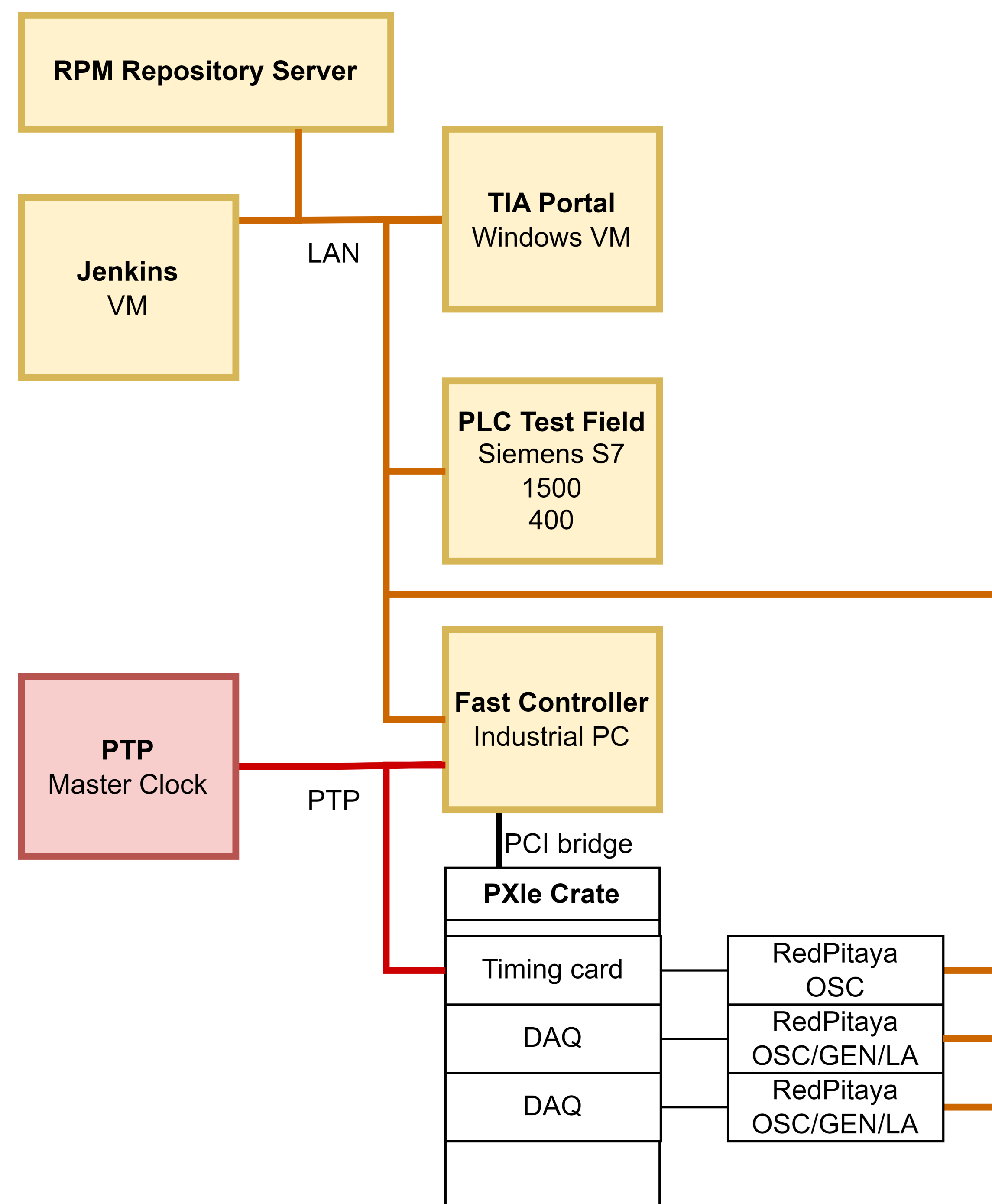
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## The Situation:

- >20 Software Test Plan documents
  - Manual test execution by contractors
  - Restricted manpower and budget
- ⇒ **Not sustainable.**

## The FIT Concept:

- Unified approach and architecture for integration testing
- All tests use solely RPMs, no compilation
- Mostly implemented in Python, using standard test environments
- Focus on functionality and integration
- Test stand allows end-to-end HIL tests using inexpensive instrumentation



FIT and HIL Test Stand Architecture.



Test Stand: Fast Controllers.



Test Stand: Instruments.

## Experiences:

- Five tests converted in two years
  - Shared parts to be moved into framework
  - Considerable reduction in testing time (PLC tests: 2 weeks → 2 hours)
- ⇒ **We will continue on this path.**

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Test Stand: Slow Controllers.



## Abstract

As part of the effort to standardize the control system environment of ITERs in-kind delivered >170 plant systems, the Controls Division publishes CODAC Core System (CCS), a complete Linux-based control system software distribution.

In the past, a large part of the integrated and end-to-end software testing for CCS was executed manually, using many long and complex test plan documents. As the project progress introduces increasing scope and higher quality requirements, that approach was not maintainable in the long term.

ITER CODAC and its partners have started a multi-year effort converting manual tests to automated tests, inside the so-called Framework for Integration Testing (FIT), which itself is being developed and gradually extended as part of the effort. This software framework is complemented by a dedicated hardware test stand setup, comprising specimens of the different controllers and I/O hardware supported by CCS. FIT and the test stand will allow to run fully scripted hardware-in-the-loop (HIL) tests and allow functional verification of specific software modules as well as different end-to-end use cases.



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