A Testbed-based Approach for the Assessment of Multi-Microgrids

Study Committee SC C6 – Preferential Subject PS3 – Question Q3.9

Different microgrid testing approaches, concepts, and corresponding tools (incl. hardware-in-the-loop and laboratory-based concepts) have been documented and reported in the last few years. Also, harmonized microgrid testing approaches and procedures exist today. However, there is still a lack of common benchmarking approaches, laboratory setups, and corresponding testing metrics. What kind of information and data need to be provided to further harmonize microgrid-based validation and testing approaches? In addition, what is necessary to test multi-microgrid approaches?

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Motivation

- Detailed assessment of multi-microgrid scheduling algorithms

- Overcome limited number of scenarios and failures

- Missing low-level controls and real-time fault mitigation techniques in long-term assessments

- Provide software design to enable scalable multi-microgrid assessments

- Efficient integration into engineering workflows

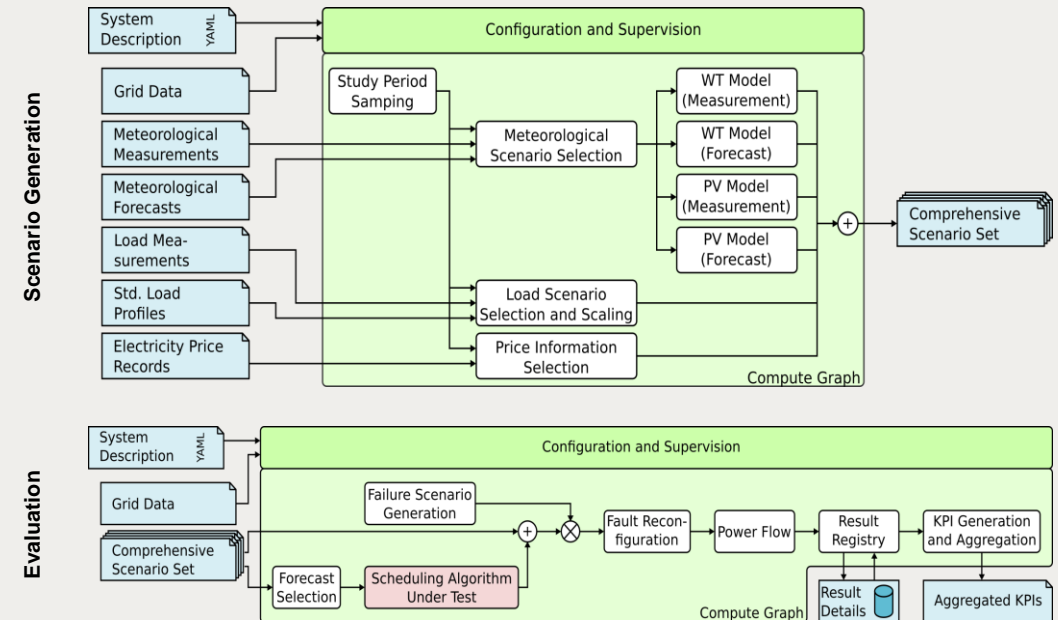# Proposed Approach and Potential Technical Solution

- Simulation-Based Assessment Method
  - Verify schedules by independent simulations
  - Series of extended power-flow computations
  - Include steady-state response of devices and low-level controls
  - Extensive scenario set (>300.000 scenarios)

- Integrated Development and Simulation Workflow
  - Scripting-friendly software interface
  - Tight integration into software development platforms
  - Fully automated assessment procedures
  - Precise link between software versions and test results

Group Discussion Meeting
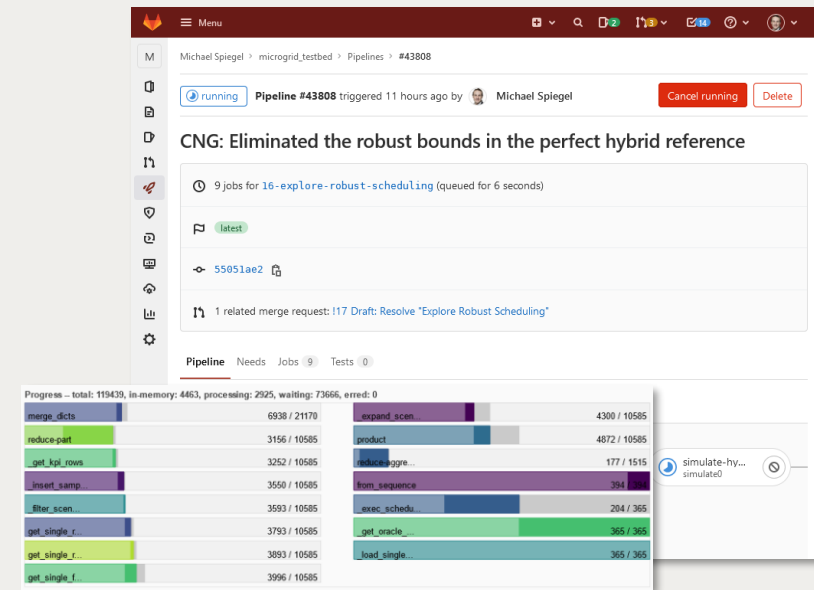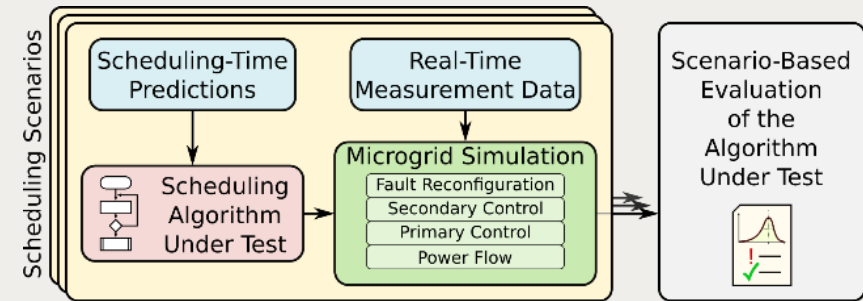
Conclusions

- Reflections on the architecture

  - Avoidance of global states supports parallelization

  - Additional development overhead of distributed computing is well justified for extensive workloads

  - Frequent assessment of code changes by rapid and automatized test execution

  - Tight integration into the development toolchain by text-based inputs

- Summary

  - Comprehensive assessment of multi-microgrid scheduling possible

  - Scalability pushed by testbed architecture

  - Engineering efficiency pushed by integrated development workflow

More details
→ Paper 10806