

Industry 4.0 with Quantitative Open Source Software Engineering

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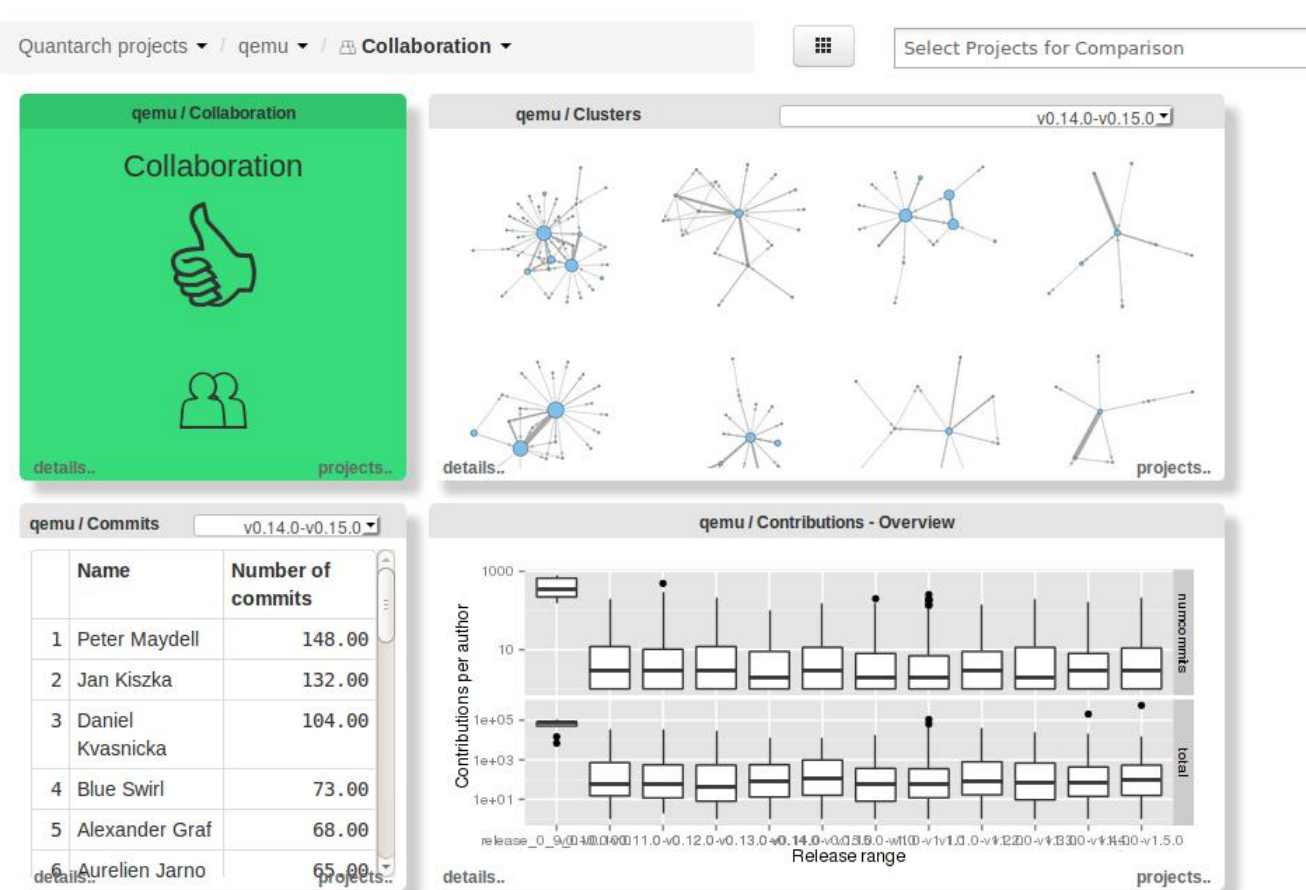
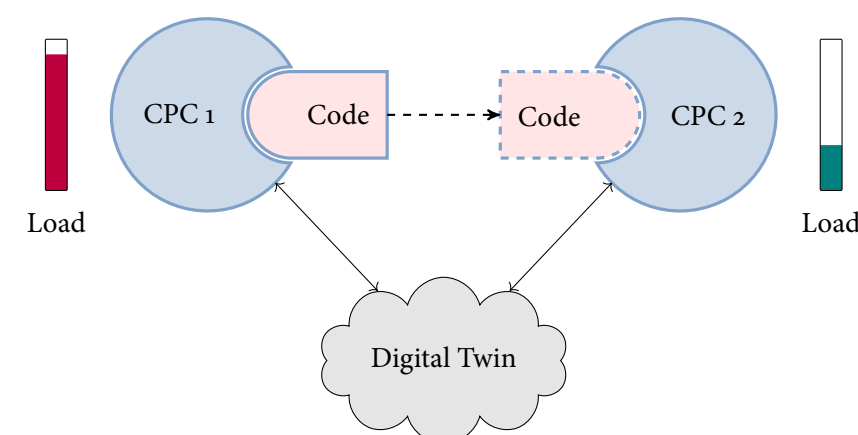


Asymmetric Virtual Computing Platform

Cyber physical systems often face the challenge of having to satisfy two different, conflicting requirements: reaction times to external events need to be as precise as possible (low latency and jitter). Data throughput should be as large as possible when tasks like signal processing are performed. We tackle these issues by integrating asymmetric computational units (FPGAs and GPUs) into CP systems, while providing backwards-compatible upgrade paths. This is augmented by mechanisms to transparently shift computational loads across nodes on the source code level, which provides new levels of flexibility and optimal hardware use.

Cyber Physical Off-The-Shelf

In a project with international industrial partners, we investigate how standard mechanisms of information technology can be judiciously adapted for industrial deployment – products from mass markets ranging from hardware via operating systems to programming languages are shaped for control and automation with structured additive and subtractive engineering techniques.



Codeface

Codeface is an open source (GPLv2 and MIT) framework and interactive web frontend for the social and technical analysis of software development projects. It captures various data sources (revision control systems, bugtracking systems, mailing lists and complexity metrics) to provide a fully automated, parallelised analysis framework that scales to largest projects. It offers a holistic database to coherently integrate all data sources that allows for complex, insightful queries. Finally, it serves as research platform for software engineering using advanced statistical techniques and methods of machine learning on a significant amount of projects, with a particular focus on the cooperative aspects of software engineering.

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