



M.Sc./B.Sc. thesis on Container Orchestration with Stateful Failover Support (f/m/d)

At Hitachi Energy our purpose is advancing a sustainable energy future for all. We bring power to our homes, schools, hospitals and factories. Join us and work with fantastic people, while learning and developing yourself on projects that have a real impact to our communities and society. Bring your passion, bring your energy, and be part of a global team that appreciates a simple truth: Diversity + Collaboration = Great Innovation

With more than 35'000 employees, Hitachi Energy is the largest global supplier of products, systems and services for building and operating electric power infrastructure. At Hitachi Energy Research, the globally distributed research organization of Hitachi Energy, we apply interdisciplinary knowledge to invent and design the power system of the future. In close collaboration with our business units, academia, and customers, we aim to address societal challenges such as rising global energy demand, growing integration of renewable energy sources and climate change. We deliver innovations that ensure that electrical power is supplied reliably, efficiently, and effectively.

Are you looking for an M.Sc./B.Sc. thesis in software systems? At Hitachi Energy Research, we have a thesis proposal on supporting stateful failover in container orchestrators such as Kubernetes.

More specifically, the default Kubernetes redundancy concept involves multiple active replicas, which share the load among each other, and are independent. As a result, when a replica fails or the node on which it is running fails, other replicas can ensure continued service availability. This mechanism is well-suited for stateless services. However, this is not the case for stateful services having an internal state that needs to be preserved. In this thesis, you will explore and evaluate the use of tailored Kubernetes operators or alternative concepts to implement an active-standby failover mechanism with the support of a checkpoint and restore tool (e.g., CRIU). The target use case for this work is a critical infrastructure scenario, in particular power grids.

Apply now for this opportunity and become a member of our team of highly skilled researchers and engineers. The expected duration for this thesis is 6 months.

Our flexible work practices help you optimize personal and business performance while creating an environment where all employees can develop their skills and grow.

Your responsibilities

Acquire knowledge on the theory (failover, redundancy, fault tolerance) and related technology (Kubernetes, CRIU) and summarize findings
Design, implement and evaluate the performance of the proposed Kubernetes operator
Report on your work, including presentation and interpretation of results
Contribute to a scientific publication

Your background

Currently pursuing an M.Sc. (or B.Sc.) degree in Software Engineering, Computer Science, or adjacent field
Comfortable with Linux. Experience in Linux kernel development is a plus
Experience with the Go programming language or willingness to learn it
Experience with Docker, Kubernetes
Fluent in spoken and written English
Self-driven and curious, with good organizational skills

More about us

Hitachi Energy is a global technology leader that is advancing a sustainable energy future for all. We serve customers in the utility, industry and infrastructure sectors with innovative solutions and services across the value chain. Together with customers and partners, we pioneer technologies and enable the digital transformation required to accelerate the energy transition towards a carbon-neutral future. We are advancing the world's energy system to become more sustainable, flexible and secure whilst balancing social, environmental and economic value. Hitachi Energy has a proven track record and unparalleled installed base in more than 140 countries. Headquartered in Switzerland, we employ around 38,000 people in 90 countries and generate business volumes of approximately \$10 billion USD. www.hitachienergy.com

Interested in joining our team? If so, we look forward to receiving your full application (motivation letter, CV, references) only via our online careers tool.

Hitachi Energy Switzerland Ltd.
Sonia Granizo
Talent Acquisition

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