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CLOUDSTARS News from AGH

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One of the results of the research visits of Bartosz Balis, Maciej Malawski and Tomasz Szydło from AGH to IBM TJ Watson Research Center, Yorktown Heights, NY, USA was the completion of a book chapter on “Serverless Workflow Execution Models and Engines” prepared with Alek Slominski from IBM. The book

will soon be published in Open Access by Humboldt-Universität zu Berlin and will provide a comprehensive overview of recent research on workflow systems. In this chapter, we provide an overview of serverless computing applied to workflow applications, discuss serverless workflow execution models, and survey the workflow execution engines that support the serverless model. This is based on AGH experience developing the HyperFlow workflow engine and adapting it to serverless computing, and on IBM's experience developing the OpenWhisk serverless platform. More results on workflows can be found in a recent publication co-authored by Bartosz Balis: A terminology for scientific workflow systems, published in Future Generation Computer Systems: Volume 174, January 2026, 107974

Continuing one of our research scopes within the CLOUDSTARS project, we are exploring adaptive and efficient approaches to serverless and edge computing for the Internet of Things (IoT) systems. In particular, recent works such as *SWITCHER: Adaptive Machine Learning Model Serving for Internet of Things Devices (CCGrid Workshop 2025)* and *MicroFaaS: Adaptive Serverless Computing for Internet of Things (FGCS 2025)* propose architectures that dynamically adapt computation between edge devices and the cloud to optimise performance, latency, and resource utilisation. These works highlight how adaptive model serving and lightweight Function-as-a-Service (FaaS) frameworks can enhance the flexibility and scalability of IoT applications—principles closely aligned with the goals of serverless workflow systems.

In parallel, we are investigating the concept of Autonomic Computing, originally proposed by IBM, and exploring its application to Internet of Things environments characterised by strong resource constraints. Our goal is to leverage TinyML algorithms and integrate self-management capabilities such as self-configuration, self-optimisation, and self-healing into lightweight IoT frameworks, enabling devices to adapt to dynamic conditions autonomously. This research complements our ongoing work on adaptive serverless and edge computing, paving the way for more intelligent, efficient, and resilient systems that operate seamlessly across the IoT–Edge–Cloud continuum.

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