31 MARCH 2025

NEWSLETTER 3/2025

TALON PROJECT

TALON

Autonomous and self-organised artificial intelligent orchestrator for a greener industry 5.0

talon-project.eu

EDITORIAL

This newsletter presents a summary of the primary dissemination outcomes of the project, which include organization of events and technological developments. Specifically, two (2) publications, one (1) organization of a webinar, and one (1) insight by TALON partners.

Stylianos Trevlakis, InnoCube

TALON STANDARDIZATION WEBINAR

🚀 Join Us for an Exclusive Webinar on Trustworthy AI! 🤖🔍

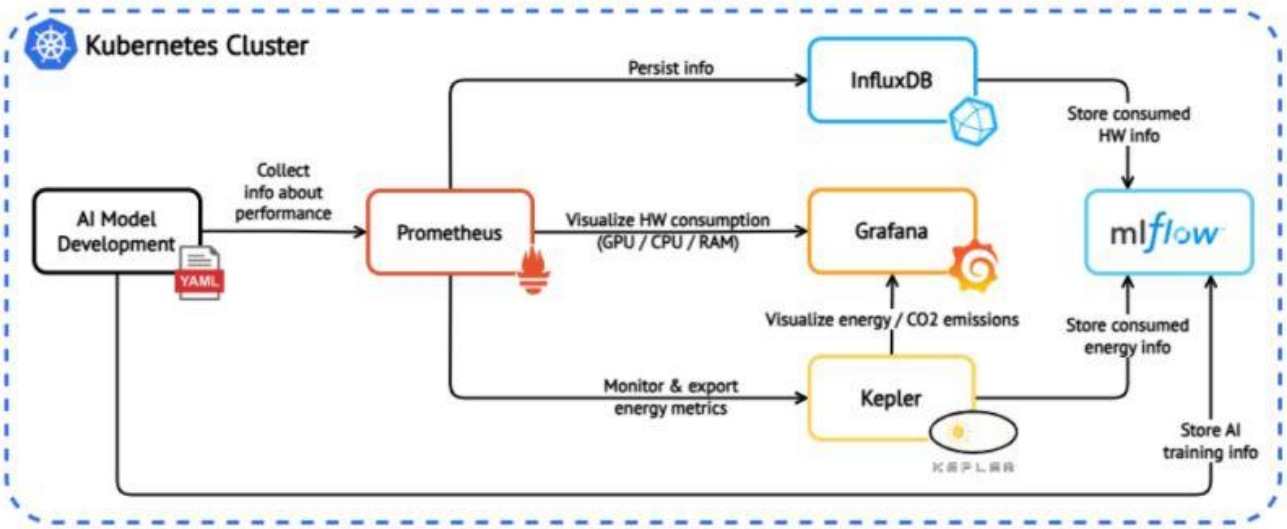
TALON is excited to invite you to our upcoming online workshop:
📌 AI You Can Trust: Standards, Ethics, and Innovation
🗓️ Date: Monday, April 7
⏰ Time: 3 - 5 PM EEST
📍 Location: Online

As AI continues to shape our world, ensuring its trustworthiness is more important than ever. This webinar will explore the latest standards for Trustworthy AI and showcase insights from leading EU projects in the field.

Whether you're an AI researcher, policymaker, or industry professional, this session will provide valuable knowledge on how to align ethics, innovation, and regulations in AI development.

ON ENERGY-AWARE AND VERIFIABLE BENCHMARKING OF BIG DATA PROCESSING TARGETING AI PIPELINES

Abstract: As Artificial Intelligence (AI) is revolutionizing various industries and applications, understanding the hardware requirements and energy consumption of AI pipelines in Big Data (BD) applications has become increasingly essential. This paper presents a comprehensive, scalable framework, designed to systematically measure hardware resources, energy usage, and model performance across two prominent data modalities: tabular data and images. The framework is generalizable, facilitating replicability across the AI research community, and encourages the deployment of AI models with comprehensive metrics beyond traditional accuracy, promoting the optimization of pipelines for real-world scenarios. Through detailed benchmarking, we identify EfficientNet as a standout model for image classification, and XGBoost for tabular data, both excelling in their respective domains. Notably, our findings show that Graphics Processing Units (GPUs) account for approximately 90% of total energy consumption in image-based tasks, while Central Processing Units (CPUs) are responsible for around 50% of energy use in tabular data processing. The merit of our innovative proposed framework combines information theory and probability theory to enhance our understanding of AI model performance in Edge-to-Cloud (E2C) applications that demand efficient Big Data processing in distributed environments. By seamlessly integrating energy efficiency with hardware optimization, it enables realtime monitoring of energy consumption and computing resources in containerized environments, providing precise insights for optimizing AI workloads. This framework facilitates scalable AI deployment on resource-constrained edge devices, reducing energy consumption while enhancing AI model robustness and interpretability, thereby promoting greater trust and transparency in AI-powered decision-making for critical real-world applications. This emphasizes the importance of multi-objective optimization for more sustainable and efficient Big Data AI workflows.



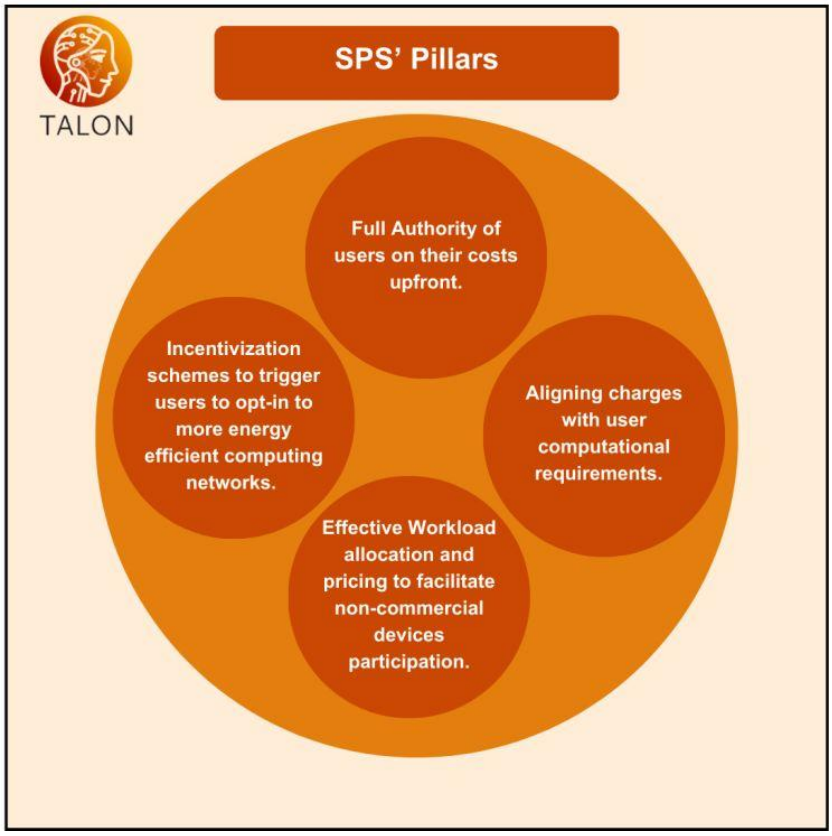
TALON'S FORECASTING FRAMEWORK

🔍 Smarter Resource Allocation in AI Orchestration with TALON's Smart Pricing Simulator (SPS)

One of the key enablers behind TALON's efficient AI resource orchestration is the Smart Pricing Simulator (SPS) — seamlessly integrated into TALON's User Interface.

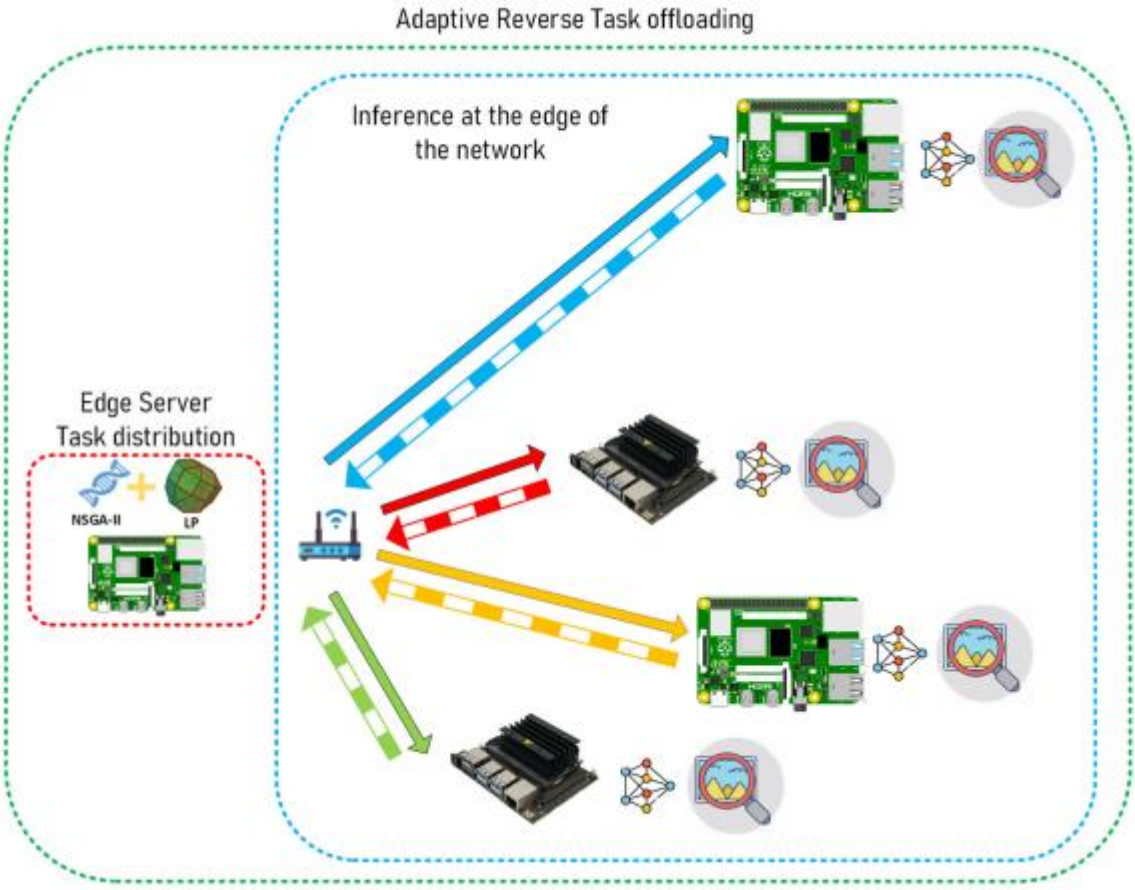
The SPS transforms the way computational resources are managed across the edge network, supporting sustainable and cost-efficient use in four powerful ways:
1️⃣ Aligning usage charges with actual computational requirements
2️⃣ Empowering users through a pay-as-you-go model, ensuring full cost control
3️⃣ Optimizing workload distribution across non-commercial edge devices
4️⃣ Incentivizing energy-efficient choices, advancing TALON's vision for a greener, smarter edge-computing ecosystem

As AI continues to demand smarter infrastructure, tools like SPS are paving the way toward a more transparent, sustainable, and user-centric future.



MULTI-OBJECTIVE REVERSE OFFLOADING IN EDGE COMPUTING FOR AI TASKS

Abstract: Offloading tasks between edge nodes is a subject that has drawn a lot of attention since edge computing first emerged. A large number of edge IoT devices utilizing increased computing resources such as autonomous vehicles and UAVs can be used to execute AI tasks close to users. We present a novel approach that deviates from the conventional edge computing offloading concept namely offloading computationally intensive tasks from cloudlets to nearby end nodes. Specifically, we enhance a scenario where end nodes assist more powerful nodes (like cloudlets) in executing AI inference tasks. In edge computing networks, as end nodes grow in number, they build an idle computing capacity which can solve and provide efficient solutions. Our goal is to solve a defined Multi-Objective optimization problem with three objectives namely the overall execution time (slowest substasks), the execution accuracy, and the total energy consumption. We address this challenging optimization problem using a novel method with our released Multi-Objective Edge AI-Adaptive Reverse Offloading, or MOEAI-ARO, algorithm. Using an edge computing testbed and a representative AI service, we demonstrate the effectiveness of our reverse offloading proposal and method. The results indicate that our method further optimizes the system's performance compared to baseline algorithms.



TALON

ENGINEERING
THE DIGITAL TRANSFORMATION COMPANY

ERICSSON

MINDS

netcompany
intrasoft

INTERNATIONAL
HELLENIC
UNIVERSITY

Kingston
University
London

CERTH
CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

uni.lu
UNIVERSITÉ DU
LUXEMBOURG

UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA

EIGHTBELLS
Independent Research & Consultancy

UBITECH
ubiquitous solutions

SIDROCO

InnoCube

factor
Ingeniería y Decoletaje S.L.

EXOS
Operational Consulting

PROBOTEK