UNIVERSIDAD DE GRANADA

Máster Universitario en
Desarrollo del Software

Conferencia "DAG-based Efficient Parallel Scheduler for Blockchains: Hyperledger Sawtooth as a Case"

07/11/2024

Se invita a la comunidad universitaria a la conferencia virtual organizada dentro del marco del Máster en Desarrollo de Software del Departamento de Lenguajes y Sistemas Informáticos de la Universidad de Granada y con el apoyo de la Escuela Internacional de Posgrado de la Universidad de Granada:

Titulo: **DAG-based Efficient Parallel Scheduler for Blockchains: Hyperledger Sawtooth as a Case Study.**

Ponente: **Dr. Satya Peri** is currently a Professor in CSE Department of IIT Hyderabad (IITH). His research interests broadly comprise of parallel and distributed systems. One of the areas he looks at is efficient ways to parallelize using Software Transactional Memory Systems (STMs) while also exploring lock-free & wait-free algorithms. In the context of distributed systems, his interest includes Blockchain and Peer-to-Peer Systems. He is currently working on improving the efficiency of Smart Contract Execution in Blockchains Systems.

Día y Hora de impartición: **8 de Noviembre de 2024** a las 16.00h (hora de España)
Sala remota a través de Google Meet: https://meet.google.com/ekr-khnq-ere

Resumen:
Blockchain technology is a distributed, decentralized, and immutable ledger system. It is the platform of choice for managing smart contract transactions (SCTs). Smart contracts are pieces of code that capture business agreements between interested parties and are commonly implemented using blockchains. A block in a blockchain contains a set of transactions representing changes to the system and a hash of the previous block. The SCTs are executed multiple times during the block production
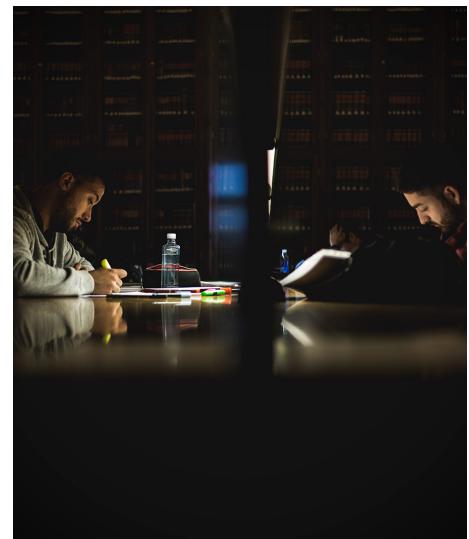
and validation phases across the network. In most of the existing blockchains, transactions are executed sequentially.

In this work, we propose a parallel direct acyclic graph (DAG) based scheduler module for concurrent execution of SCTs. This module can be seamlessly integrated into the blockchain framework, and the SCTs in a block can be executed efficiently, resulting in higher throughput. The dependencies among the SCTs of a block are represented as a DAG data structure which enables parallel execution of the SCTs. Further-more, the DAG data structure is shared with block validators, allowing resource conservation for DAG creation across the network. To ensure secure parallel execution, we design a secure validator capable of validating and identifying incorrect DAGs shared by malicious block producers. For evaluation, our framework is implemented in Hyperledger Sawtooth V1.2.6. The performance across multiple smart contract applications is measured for the various schedulers. We observed that our proposed executor exhibits a 1.58 times performance improvement on average over serial execution.