Titre

High-performance practical blockchain systems

Programme d'études visé

M. Sc. A., M. Ing., Doctorat - PhD.

Domaines de recherche

Software Engineering, IT Engineering

Description

This is a multi-faceted project on improving core blockchain components in order to improve its performance. Students will be in charge of investigating one or more aspects of blockchains, formulating novel problems, designing, implementing, and evaluating their solution.

The objectives of this project include the following. Note that students are expected to choose a subset of goals to fulfill:

1- Investigate relevant blockchain use cases in the public and private sectors, identify suitable blockchain platforms, and develop Proof-of-Concept applications.

2- Develop and improve upon existing consensus algorithms, such as Proof-of-Work, PBFT, to support more peers, provide a higher transaction throughput, and deliver predictable commit times.

3- Improve the blockchain data structure (e.g., Merkle tree) for fast insertion, querying, and compressibility. Propose new blockchain structures (e.g., tree) with increased transaction parallelism.

4- Propose a data structure for storing off-chain information, with on-chain verification mechanisms, and a dynamic algorithm for offloading data.

5- Study the effect of networking on blockchain commit time, resilience to attacks, and fork rate. Develop networking protocols for enhanced performance.

6- Create blockchain middleware, delivering reusable services in a reliable and safe manner, such as messaging, identity management, replication, etc.

Financement

Scholarship is available for this project.

Autres informations

Début du projet: 2018-01-01

Candidat recherché

Master degree in computer science, software engineering

Experience in system research, deployment, evaluation

Strong programming skills in C++, Java, or Go

Familiarity with Ethereum (Solidity), Hyperledger (Fabric and Composer), other blockchain systems, and cryptography

Responsable à contacter

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Titre

Unified Platform for Event dissemination and Event processing

Programme d'études visé

M. Sc. A., M. Ing., Doctorat - PhD.

Domaines de recherche

Software Engineering, IT Engineering

Description

This is a multi-faceted project on unifying event dissemination and event processing in a single, high-performance, platform. Students will be in charge of investigating popular applications, formulating novel problems, designing, implementing, and evaluating their solution.

The objectives of this project include the following. Note that students are expected to choose a subset of goals to fulfill:

1- Integrate event processing operations (e.g., aggregation, top-k filtering, stream joins) with event dissemination (e.g., publish/subscribe). The integrated solution should provide better performance than a disconnected baseline.

2- Integrate event dissemination with emerging networking technologies, such as Software-defined Networking (SDN), Network Function Virtualization (NFV), and Future Internet Architectures (e.g. CCNx). Demonstrate the performance benefits of leveraging advanced networking.

3- Support techniques for machine learning (e.g., convex optimization) with on-the-fly processing in an event dissemination system. Demonstrate the increase in velocity in the unified system.

Financement

Scholarship is available for this project.

Autres informations

Début du projet: 2018-01-01

Candidat recherché

Degree in computer science, software engineering

Experience in system research, deployment, evaluation

Strong programming skills in C++, Java, or Python

Familiarity with Big data systems (Storm, Spark, Hadoop), SDN (OpenFlow, OpenVSwitch), or machine learning systems (TensorFlow, Torch, ...)

Responsable à contacter

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Titre

Middleware for online games

Programme d'études visé

M. Sc. A., M. Ing.

Domaines de recherche

Software Engineering, IT Engineering

Description

This a project on developing reliable middleware providing common services for massively multiplayer online games. Students will be in charge of investigating a specific game-related topic and design, implement, and evaluate their solution.

The objectives of this project include the following. Note that students are expected to choose a subset of goals to fulfill:

1- Develop an action system which allow for highly interactive battles with hundreds of players using multiple game servers. The system needs to be dynamically optimized to the game semantics in order to achieve maximum performance.

2- Create a persistence middleware for storing player information. The middleware should decide which information should be sent and when from the game servers to the database. The persistence data can be used to recover from server failures, or player disconnects.

3- Design and implement a replication system for game objects. The replication system should intelligently decide which player require what information, based on game semantics. The replication system should handle insertion, deletion, and update of client replicas, and be resilient to failures.

Financement

Scholarship is available for this project.

Autres informations

Début du projet: 2018-01-01

Candidat recherché

Degree in computer science, software engineering

Strong programming skills in C++, Java, or Python

Experience with Unity, JMonkeyEngine, or other game engine

Responsable à contacter

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