

## Chapter 2

# Platforms and Tools Within the HyperLedger Framework

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### **ABSTRACT**

*During this last decade, the blockchain (BC) paradigm is being required in several use cases and scenarios in particular for security, privacy, and trust provisioning. Accordingly, the research community and developers developed several emulation tools and frameworks for BC-based systems performance analysis. Making an adequate decision regarding the choice of the most suitable tool that can be used to develop and validate the performances of a specific BC-based system or application still requires more investigation. In this context, this chapter describes and highlights the most features and characteristics of the BC platforms and tools within the Hyperledger framework. The goal is to illustrate the advantages and the limitations of several BC tools and development environments within Hyperledger. In addition, this chapter provides an insight into BC 3.0 as the new generation of BC that meets the requirements of the smart application.*

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## **INTRODUCTION**

Nowadays, the BlockChain (BC) technology is considered the most relevant invention after the Internet. There are three phases or generations of the BC development: BC 1.0 as digital currency, BC 2.0 as digital economy, and BC 3.0 as a digital society. This diversity requires the analysis of the BC technological innovation aspects that necessitates the design, development, and deployment of BC emulation tools and BC dedicated environments and frameworks. Therefore, the development of BC related tools gained huge interests from the software development community. BC Software (BCS) development tasks, BC testing support, BC emulators and frameworks, as well as debuggers for smart contracts have certain particularities and specific technical aspects. These findings motivate the authors to study and compare the technical aspects of BC related tools within the Hyperledger framework.

The fact that the development of BC applications on a BC network is costly leading to the necessity of using a simulation platform to test the BC-based applications and systems before their real deployments. Besides that, the number of available BC tools and emulation platforms is rapidly increasing, which complicate the choice of suitable emulation platforms and tools that fulfil the user requirements. Therefore, researchers need advice and guidelines to select a suitable tool that fit their applications needs. To the best of our knowledge, although the high number of the developed BC tools and benchmarks, there are few studies dedicated to explaining the functionalities, usages and the best practices of the different Hyperledger emulation tools, benchmarking, frameworks and utilities. Accordingly, this book chapter will fill this gap and presents a comprehensive investigation related to platforms and tools for hyperledger-based systems performance analysis. Therefore, this study will provide a wide-ranging view of hyperledger platforms and tools. Indeed, the manifolds of this chapter could be summarized into four points:

- Providing an overview regarding BC fundamentals
- Discussing and comparing the most known BC platforms.
- Analyzing the potentialities of Hyperledger benchmarks and tools to evaluate the performance of BC-based systems. Accordingly, a comparative investigation drew to guide the researchers in their choice of adequate Hyperledger tools.
- Highlighting potential open issues and future research directions that can be beneficial for the development and the deployment of BC-based solutions based on the use or exploitation of the Hyperledger framework.

The rest of this chapter organized as follows: The second section pinpoints the BC basic concepts corresponding to BC characteristics, structure and categories. The third section discusses and compares BC platforms. The fourth section provides basic knowledge's regarding Hyperledger frameworks and draws a comparative study between Hyperledger distributed ledgers and tools. The fifth section highlights potential open issues and future research directions related to the exploitation of the Hyperledger framework. Finally, the last section concludes this chapter and summarizes lessons learned via this chapter.

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