Chapter 6
Blockchain as a Disruptive Technology:
Architecture, Business Scenarios, and Future Trends

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ABSTRACT

Blockchain is a digital, distributed, and decentralized network to store information in a tamper-proof way with an automated way to enforce trust among different participants. An open distributed ledger can record all transactions between different parties efficiently in a verifiable and permanent way. It captures and builds consensus among participants in the network. Each block is uniquely connected to the previous blocks via a digital signature which means that making a change to a record without disturbing the previous records in the chain is not possible, thus rendering the information tamper-proof. Blockchain holds the potential to disrupt any form of transaction that requires information to be trusted. This means that all intermediaries of trust, as they exist today, exposed to disruption in some form with the initiation of Blockchain technology. Blockchain works by validating transactions through a distributed network in order to create a permanent, verified, and unalterable ledger of information.

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INTRODUCTION

Satoshi Nakamoto invented the Blockchain in 2008 (Economist, 2015) to serve as the public transaction ledger of the cryptocurrency bitcoin. Nakamoto's research paper (Nakamoto, 2008), contained the blueprint that most modern cryptocurrency schemes follow (although with variations and modifications). Bitcoin was just the first of many Blockchain applications. The invention of Blockchain for bitcoin was the first digital currency to solve the double-spending problem without the need of a trusted authority or central server. This technology became fully recognized in 2009 with the launch of the Bitcoin network, the first of many modern cryptocurrencies.

The words Block and Chain were used separately in Satoshi Nakamoto's original paper (Nakamoto, 2008), and by 2016 became mainstream, as a single term, Blockchain. The label Blockchain 2.0 refers to new applications of the distributed Blockchain database (Kariappa, 2015). As of 2016, Blockchain 2.0 implementations continue to require an off-chain oracle to access any external data or events based on time or market conditions to interact with the Blockchain (Gray, 2017). In July 2016, IBM opened a Blockchain Innovation Research Center in Singapore (Williams, 2016). A working group for the World Economic Forum met in November 2016 to discuss the development of governance models related to Blockchain. According to Accenture, the Blockchains attained a 13.5% adoption rate within financial services domain in 2016 (Raconteur, 2016). In May 2018, Gartner found that only 1% of Chief Information Officer's (CIO) indicated any kind of Blockchain adoption within their organizations, and only 8% of CIOs were in the short-term "*planning or looking at active experimentation with Blockchain"* (Artificiallawyer, 2018). In November 2018, Conservative Member of the European Parliament, Emma McClarkin mooted a plan to utilize Blockchain technology to boost trade backed by the European Parliament's Trade Committee (McClarkin, 2018).

Figure 1 shows blockchain developments on a timeline.

Market Research predicts that, by 2024, global Blockchain market expected to be worth over $20 billion (Transparencymarketresearch, 2018). Recently, the Dubai government announced that they would put 100% of their records pertaining to land registry on Blockchain. Dubai Land Department (DLD), in fact, has claimed to be the first such governmental department anywhere in the world, to adopt

Figure 1. History of Blockchain