Chapter 17
A Decision Framework for Decentralized Control of Distributed Processes:
Is Blockchain the Only Solution?

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ABSTRACT

A typical example of a distributed process is trade finance where data and documents are transferred between multiple companies including importers, exporters, carriers, and banks. Blockchain is seen as a potential decentralized technology that can be used to automate such processes. However, there are also other competing technologies such as managed file transfers, messaging, and WebAPIs that may also be suitable for automating similar distributed processes. In this chapter, a decision framework is proposed to assist the solution architect in deciding the technology best suited to support decentralized control of a distributed business process where there are multiple companies involved. The framework takes as input the different areas of concern such as data, processing, governance, technical, and the pros and cons of the technologies in addressing these areas of concerns and provides a method to analyze and highlight the best technology for any process in question. Two example processes, trade finance and price distribution, are used to show the application of the framework.

INTRODUCTION

Many critical business processes span across multiple companies or legal entities. These processes often have to be in real-time and can contain large data volumes. Furthermore, data and documents have to be passed back and forth during the process. Such distributed business processes require the cooperation across a network of companies where documents are exchanged between them. For example, in the international trade finance process, exporters, importers, carriers and banks are involved in the financing of goods being manufactured, shipped and received in different countries. The whole end-to-end process involves multiple banks to lend money and act as escrow throughout the process, and data and documents are created in one company and transmitted to another company to be processed before being sent again to another company. Traditionally, such processes have been manually executed through the exchange of physical documents.

Over the last decade, such processes have been automated partially or fully by leveraging various technologies. There are two approaches to automation; centralized or decentralized. In centralized processing, the process is controlled by a single system that manages the logic controlling the flow of documents across the multiple entities. In decentralized processing, each entity in the process manages the flow by applying logic that is local to that entity.

A business process system, such as an Enterprise Resource Planning (ERP) system, containing the process flow logic and data store capable of storing all the documents in one place is an example technology that can support centralized processing.

Decentralized processing has been achieved through technologies such as managed file transfers (MFT), messaging (managed e.g. MQ and unmanaged e.g. Email) and Open API/web services. These technologies can be used to support synchronous or asynchronous communication. However, a key requirement is that for each transmission of data, the different organizations in the business process must agree on the data specification, output formats and input validation and each organization needs to store the data separately in their own data stores. This can very easily lead to inconsistencies and also open up opportunities for illegal data manipulation and committing fraud. In order to mitigate these challenges, over the last five years, organizations have started seriously exploring the use of blockchain or Distributed Ledger Technology (DLT) to manage multi-party real-time business processes. With a blockchain, the different enterprises involved in the process can write entries into a record of information and, as a community, can control how the record of information is validated. The key advantage of DLT is that it eliminates the need to separately validate and store data as a consensus network provides constant validation, synchronisation and immutable storage. Furthermore, Smart Contracts in DLTs provide trusted shared processing capabilities.

All these technologies have their strengths and weaknesses. For example, blockchain maintains consensus of the data on the blockchain but all participants on a blockchain have access to the data on the blockchain. Open API/web services, also referred as Web APIs, can be accessed easily but have limited data volumes. And MFT can handle large volumes securely but involve significant effort to set up. For some inter-company processes such as trade finance, a blockchain may be more useful, enabling companies to easily access the shared data and update it as necessary in real-time. Alternatively, by considering the distribution of public stock pricing information, there is only a need for a trusted source of the pricing information which is then consumed by many companies. For this, a Web API pull mechanism may be a good solution.

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