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PULL-PRINT WORKFLOW SOLUTION WITH BLOCKCHAIN

HP INC

Pull-print workflow solution with blockchain

Abstract

This disclosure is about integrating the blockchain technology (originally used in crypto-currencies such as bitcoins, litecoins, ethereum etc.,) in enterprise secure pull-print solutions. Pull-print solutions on enterprise printers work with a centralized server. Any data maintained at one location, however secure the server may be, is vulnerable. In this disclosure, it is described as to how blockchain technology can be used to bring in the new workflow whereby the print data in an enterprise is always secure.

Problem statement

Secure pull-print solutions are widely used in large enterprises such as banks, hospitals, universities, defence organizations etc., When the employees in these organizations want to print something, print data needs to be sent to a pre-defined server. The employees will then walk up to any available printer which is configured with this solution, authenticate themselves and with the help of the pull-print solution, they can view and print the job that they submitted. If someone with mal-intent, knows the ip address of the server, they can hack and get the contents of this print job and can even remove it from the server altogether. If this data has confidential/critical information, then the enterprise as well as the solution provider are at huge loss.

Solution

This disclosure proposes that, the data that a centralized pull-print server holds, be distributed across all the printers in the network using the block-chain technology, thereby ensuring that the surface area of attack for any hacker is widened, making it difficult to hack and tamper with the data.

As a first step, a printer which has pull-print solution configured, comes on-board with the blockchain network, created for the particular enterprise. As per the design of blockchain, the newly added printer gets a complete copy of all the secure printing (maintaining the anonymity) that's happened in this blockchain network in the form of the private ledgers where all the transactions are recorded. This ledger is visible to only those printers (or specific set of printers) within an organization on that blockchain network.

As a next step, when a user sends a secure print job to a printer in the blockchain network, the transaction details of this job (which includes the user's credentials, job time stamp, the job data itself, along with a hash of this data) is created. This constitute a block. This block, once validated by the nodes (or the printers) in the blockchain network, becomes part of the currently maintained blockchain which is distributed across all the printers on this blockchain network and this transaction remains permanently in this chain.

The user can walk up to any printer on the blockchain network, login with her credentials. Since the print transaction is known to all the printers on the blockchain network, the private ledger is queried,

the job is retrieved and printed on the particular printer.

Since this transaction is distributed, even if the hacker tries to modify or tamper the transaction on one printer, all other printers that have the original transaction details, invalidate the tampered transaction as per the design and philosophy of blockchain.

Secure pull-printing workflow

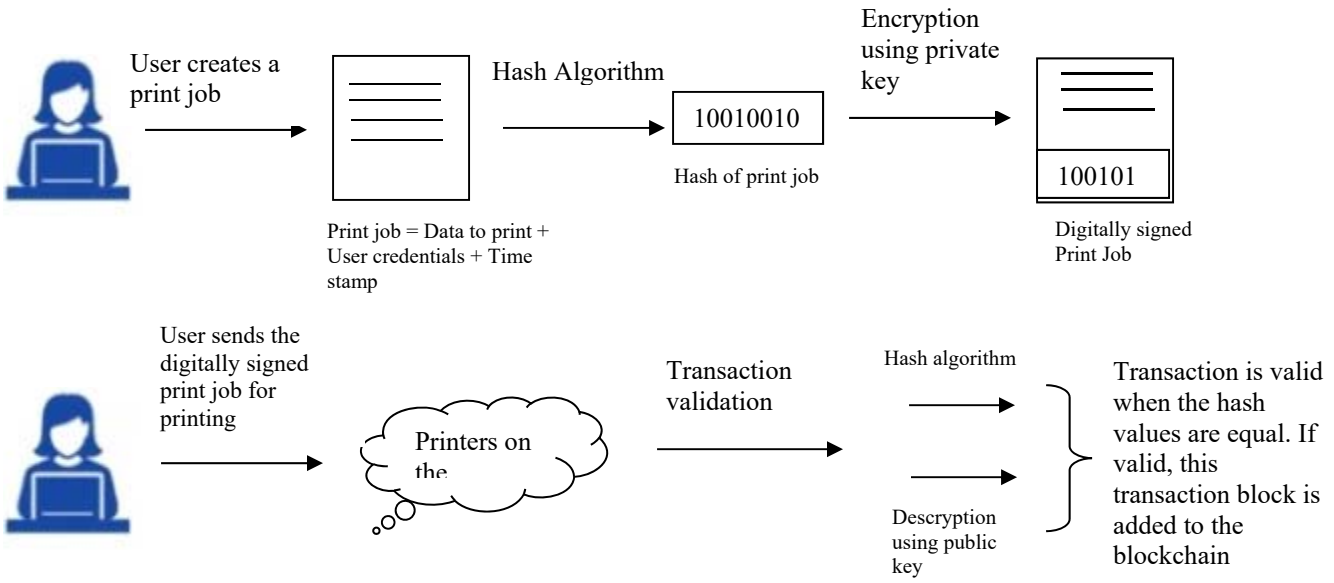

Fig 1. Transaction creation

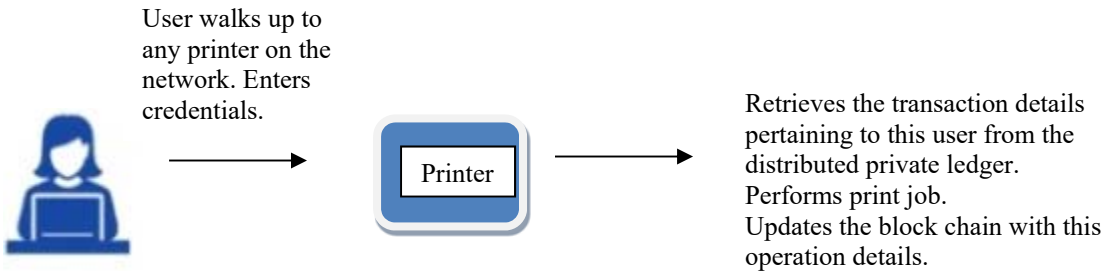

Fig 2. Pull-printing

Future scope of improvement

1. Ensuring that the validation and retrieval of blocks happens almost in real-time.
2. Ensuring that there is a good memory management to hold the private ledger.

Prior Solutions

No prior disclosure has been found that uses the same solution proposed in this paper.

Advantage

1. User's print data is always secure. Blockchains haven't been broken so far at all and it is very hard to do so. Company retains its world's most secure printer tag.
2. Enterprises do not need to invest in a centralized server and its maintenance for using pull-print solutions.

Disclosed by Chaitra S, HP Inc.