940 Blanshard Street
Victoria, British Columbia
V8W 3E6
Susan Fiddler
Co-op Coordinator
Faculty of Engineering
University of Victoria
P.O. Box 1700
Victoria, B.C.
V8W 2Y2

Dear Susan,

Please accept the accompanying Work Term Report entitled "Determining uses of JIRA and Confluence at OFI IBM."

This report is the result of work completed at the SOME GENEriC ORGANIZATION. During my first work
term as a University of Victoria student, I used charts and tables to display information about issue, complied documentation for critical applications in a wiki and researched add-ons to extend functionality. In the course of work, I gained exposure to a technical environment, and learned how software can integrate together.

Through the course of the term, I was given the opportunity to learn much agile software development, testing applications, and software products. I feel that this knowledge will be helpful in future work terms, and in my career.

I would like to thank my manager, MISTER MAN, for his patience and good judgement, as well as the RANDOM FOLK who were always willing to help.
Sincerely,

David Li

Table of Contents

List of Figures

List of Tables

Summary

In the continuing effort to organize high-quality reliable information, the **INSERT PREVIOUS EMPLOYEER IInfomration DIVIOSN** is presently experimenting with **JIRA**, an **issue** tracking tool and **Confluence**, **wiki** software for technical documentation. Although good quality information is critical to operations, **documentation** is inconsistent and scattered across multiple sources, some of which require access permissions.**JIRA** and Confluence are software tools that improve productivity and organization within MOTI IMB.

Benefits from connecting **JIRA** and **Confluence** include common user management, reporting on existing JIRA **issues** in **Confluence** and switching between application quickly. Extending the functionality of these tools by installing add-ons will assist in improving **documentation**. Purchasing software such as **Confluence** to solve the **documentation** problem is inadequate because software can be poorly designed or implemented. These software tools assist in information management, but full utilization and proper implementation is required to improve documentation.

Glossary

agile Iterative approach to software delivery that creates software incrementally from the beginning of the project, instead of trying to deliver it all at once near the end. 2, 4, 6, 7

blockchain A blockchain is a digitized, decentralized, public ledger of all cryptocurrency transactions. It constantly grows as the most recent transactions (blocks) are appended in chronlogical order. 1

Confluence Team collaboration software which allows team members to create, share and collaborate information. iv, 1, 7, 9–12

Dapp Decentralized Application have backend code running on a decentralized peer-to-peer network and not controlled by a single entity. In a decentralized application transactions are versified through consensus of multiple users. 1

Ethereum an open software platform based on blockchain technology that enables developers to build and deploy decentralized applications. The main unit of currency is ether. 1

HyperLedger group of open-source blockchain technologies started by the Linux Foundation 1

IMB Infomration DIVIOSN iv

issue unit of work to accomplish an improvement in a system such as access requests and tasks. iv, 2

JIRA Software development tool that is mainly used for bug tracking and project management by **agile** teams. iv, 1–4, 7, 11, 12

JQL Structured queries to search for issues in JIRA. It is the most flexible way to search for issues in JIRA and similar to **Structured Query Language (SQL)** 4

Kanban Kanban is a method for managing knowledge work which balances the demand for work to be done with the available capacity to start new work. 2, 3

MOTI Previous Employeer iv

Scrum Scrum is an iterative and incremental agile software development framework for managing product development. 2, 3

SharePoint A browser-based collaboration and document management platform from Microsoft. 2

smart contract computer program that directly controls transfer of digital currencies or assets under predefined conditions and used to automatic transactions on the blockchain. These transactions are trackable and irreservable. 1

System Documentation A collection of documents that describes the requirements, capabilities, limitations, design, operation, and maintenance of a system, such as a communications, computing, or information processing system. iv

wiki a website that allows collaborative editing of its content and structure by its users. iv

1. Introduction

TABLE 1 Timeline of Cryptocurrency

2008	Bitcoin White Paper
2009	Bitcoin Genesis Block
2013	1 BTC = $ 31 USD
2013	**Ethereum** White Paper
2015	**Ethereum** Genesis Block
2015	**HyperLedger** starts
2017	Over 1000 different cryptocurrencies
2018	AWS Blockchain Templates

In 2008 bitcoin white paper [1] described a way to solve the double spending problem without a centralized body using **blockchain**. Although, the value of bitcoin (BTC) has grown exponentially, high computational and energy consumption in mining and slow performance [2]. Released in July 30, 2015, Ethereum, an open-source platform based on blockchain technology, distinguishes itself from bitcoin through faster transactions, unlimited processing capability for **smart contracts**, and its network is optimized to support **Decentralized Application(DApp)** [3].

1.1. Harvest Rewards Program

The prevalence of music streaming platforms has been great for its ability to expose listeners to new music in an easy and accessible way, but the shift from physical music sales to digital streaming has created tension and confusion in the music industry. Artists may receive compensation based on total listens from streaming services, but there are many stories which outline how little profit artists actually receive from these royalties. This is an issue even for massively successful artists, let alone emerging or independent artists. As traditional record sales decrease, artists will become increasingly reliant on revenue from streaming platforms. The current model cannot meet this demand and so a new method of compensation and exchange must be developed to allow the music industry and economy to have continued growth while not leaving behind the artists and creators that drive the industry.

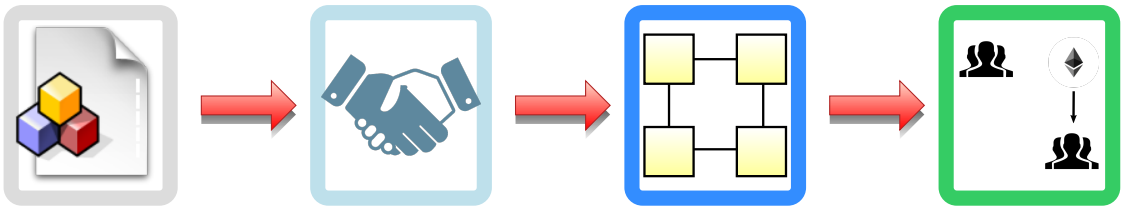
Goal of System The Membran Entertainment Canada Rewards Program harnesses the Ethereum blockchain to provide a tool that music businesses can use as an additional incentive for their artists and clients. The goal is not to fix the royalty system, but to instead add a new method by which artists can be compensated for plays of their music. In theory, this program can create a new exchange economy where musicians and artists can reinvest the value of streaming plays into their product and brand.

Any participating music businesses could implement this program. They will be able

to issue digital tokens to their roster of artists using their own measurements, but the recommended method would be 1 Token for 1 Play. This can be done in addition to or instead of traditional streaming royalty payments, at the discretion of the music business. Tokens will be distributed on a regular basis (monthly, quarterly, etc.) to the participating artists.

1.2. Smart Contracts

Traditional legal contracts are written to represent the contracting parties. In a smart contract, self-executing source code is used to automatic transactions that are publicly available on the blockchain [3]. Furthermore, **smart contracts** allow buyers and sellers exchange money, property, shares, or anything of value in a transparent, conflict-free way while avoiding the services of a middleman. This allows validation of complex transactions swiftly while maintaining transparency. Although the benefits of using smart contracts are obvious, legal enforceability is difficult because "no central administering authority to decide a dispute" exists [**keyfindings:Online**].



SOURCE CODE	TRANSPARENT	BLOCKCHAIN	PAYMENT
self-executing code that faciliates agreement between parties	terms of contract are available on the public ledger	event triggers the execution of the contract (redeeming a ticket)	accounts are updated, parties recieve amounts based on contracts

Figure 1: Illustrating how a smart contract works

In addition, irreversible and immutable transactions are a disadvantage that hackers can exploit. For example, an amateur coder killed the contract that allowed users to transfer Ether for the Parity **Ethereum** Wallet, rendering 150 to 300 million dollars completely useless [4]. Scrutinizing smart contracts and reducing bugs in production code is essential. An example of smart contract is available in Appendix A

The desirable properties of a **blockchain** such as integrity and immutability of data, e.g., transactions and smart contracts, require an active mining pool. In a proof of work consensus (POW) mechanism, miners need to invest energy and resources, i.e. computational power, to participate in the consensus process and prevent tampering blocks. Additionally, miners are incentivized to run nodes that verify transactions through bitcoin or ether.

1.3. Representation of Digital Assets on the Blockchain

ERC20 Token Standard The ERC20 token standard allows any tokens on Ethereum to be re-used by other applications: from wallets to decentralized exchanges. This is the most commonly used token on the Ethereum network at the moment.

ERC721 Token Standard Non-fungible tokens The following standard allows for the implementation of a standard API for NFTs within smart contracts. This standard provides basic functionality to track and transfer NFTs.

We considered use cases of NFTs being owned and transacted by individuals as well as consignment to third party brokers/wallets/auctioneers ("operators"). NFTs can represent ownership over digital or physical assets. We considered a diverse universe of assets, and we know you will dream up many more:

Physical property houses, unique artwork Virtual collectables unique pictures of kittens, collectable cards "Negative value" assets loans, burdens and other responsibilities

Other Smart Contracts Other contracts in the Harvest system, such as the storefront contract allow creation of reward tokens (ERC721s), however, since deploying ERC721s is gas intensive, a separate reward deployer contract is used and transfers ownership to the storefront. As shown in Figure xxx this averages out the deployment costs among other contracts.

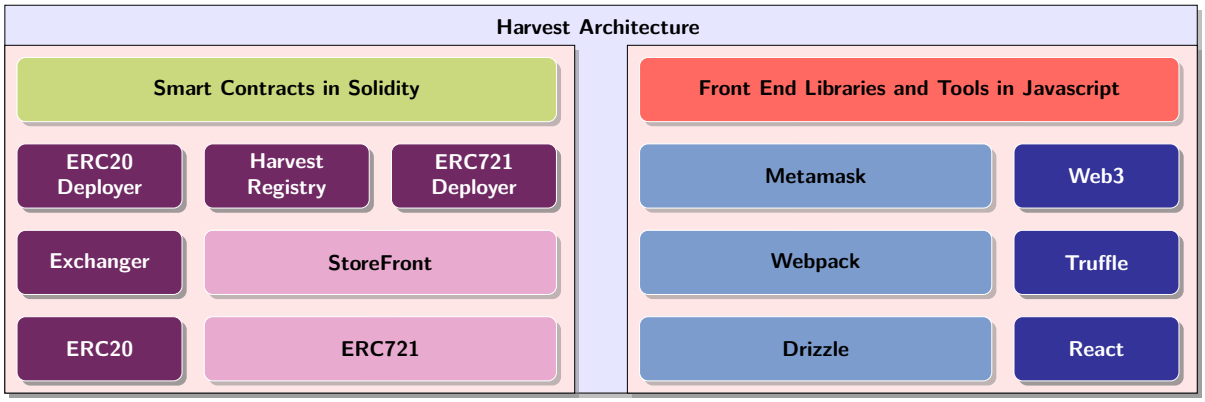


Figure 2: Architecture for smart contracts and front-end for harvest application

Although determining the digital value of assets is challenging, the ability for a users to trade assets between themselves is essential for a decentralized marketplace. Implementation of a exchanger contract to buy/sell rewards and currencies are outside the scope of a proof of concept application.

2. Discussion

The tools used in the harvest application are, a firefox/chrome plugin, metamask for connecting to the ethereum blockchain and testnets, the most popular framework for smart contract development truffle, and drizzle, which manages contract state.

2.1. Decentralized Applications

Decentralized systems are inherently more reliable, currently face scalability issues, and are trustless systems [1, 3]. Fulfillment of smart contracts is limited due to off-chain information, logistical challenges in obtaining impartial or truthful inputs from stakeholders, and verification of transaction completion involving real-world assets. This suggests effectiveness of smart contracts is currently limited to digital assets rather than for physical assets. In addition, translating legal-binding contracts to code is challenging because the majority of programmers lack a legal background.

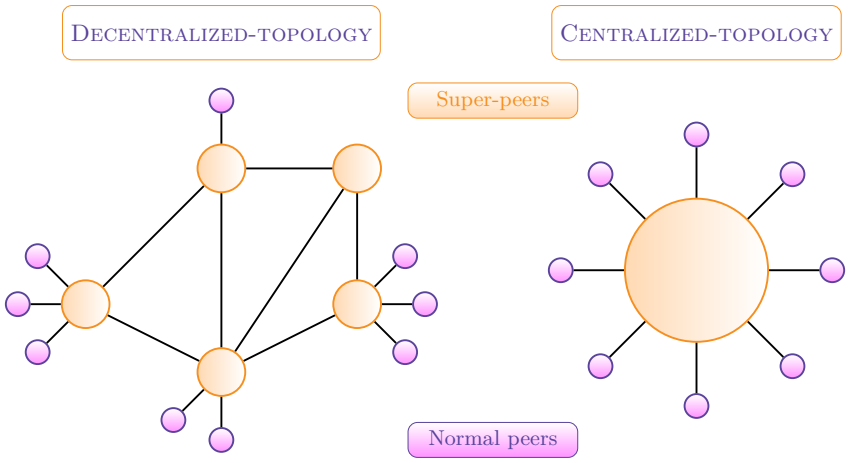


Figure 3: Decentralized structure vs Centralized Structure

Despite shortcomings that involve transactional steps that are computational impossible to verify (package is delivered), performance of smart contracts is superior as transactions are tamper-proof. Additionally, reduction of ambiguity from usage of smart contracts is highly probable because only one interpretation is possible. Coding errors or bugs exist in every non-trivial application, therefore transactions through smart contracts intrinsically carry some risk. This implies protocols and prior real-world agreements are necessary to migrate risk when executing smart contracts. Furthermore, increased precision and detail for transactional inputs and outputs required for creating smart contracts would benefit all parties.

2.2. Functionality of Harvest

2.3. Trading digital currency for rewards

Algorithm 1 My first algorithm

Require:
If there are multiple lines here, line's number will be wrong.
This error doesn't happen in package algorithmic.
Ensure:
If I write \\ here, line's number will be wrong too.

1: **if** $i = 1 \rightarrow n$ **then** ▷ This line's number should be 1
2: $HU_i \leftarrow NGU_i + HU_i$ ▷ Comment
3: **end if**

Algorithm 2 Reward Creation

Require:
If there are multiple lines here, line's number will be wrong.
This error doesn't happen in package algorithmic.
Ensure:
If I write \\ here, line's number will be wrong too.

1: **if** $i = 1 \rightarrow n$ **then** ▷ This line's number should be 1
2: $HU_i \leftarrow NGU_i + HU_i$ ▷ Comment
3: **end if**

2.4. Optimization of smart contracts

Limitations of Smart Contracts As shown in figure 5 multiple parties are required to create comprenhensive smart contract, input from legal professions and negotiations are required.

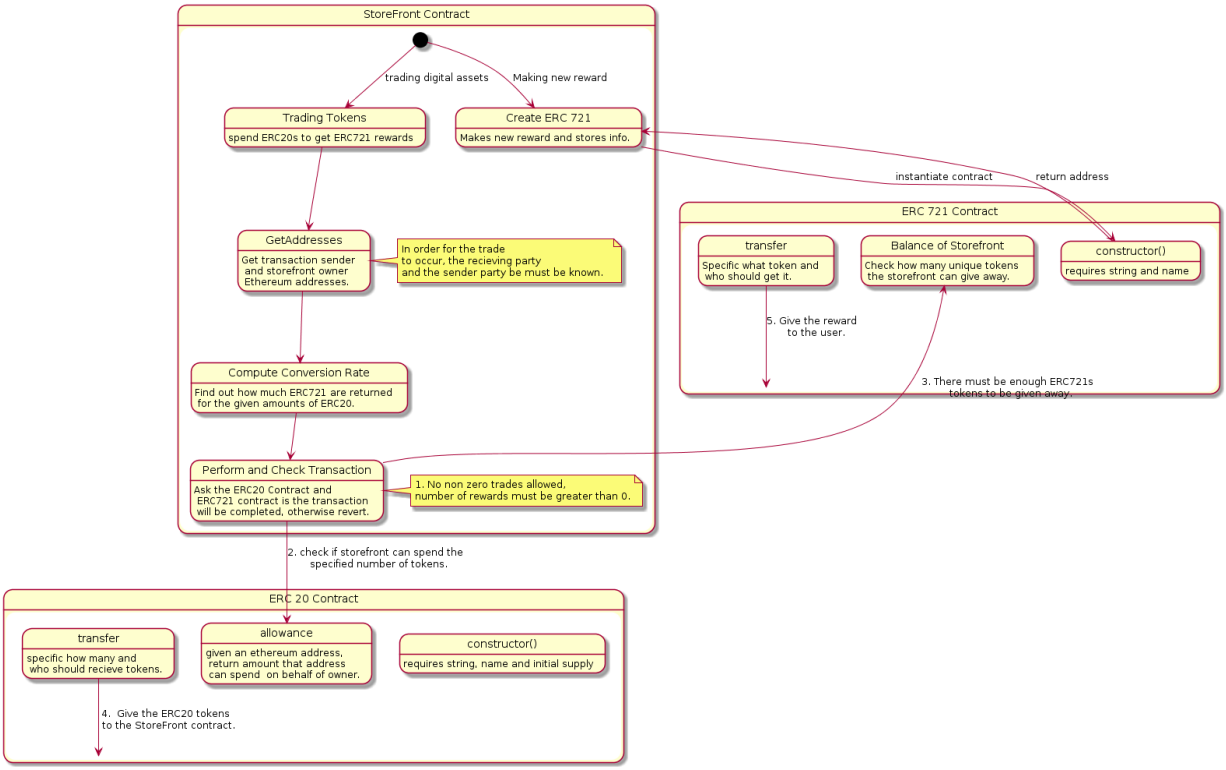


Figure 4: State Diagram when a User wants to trade tokens

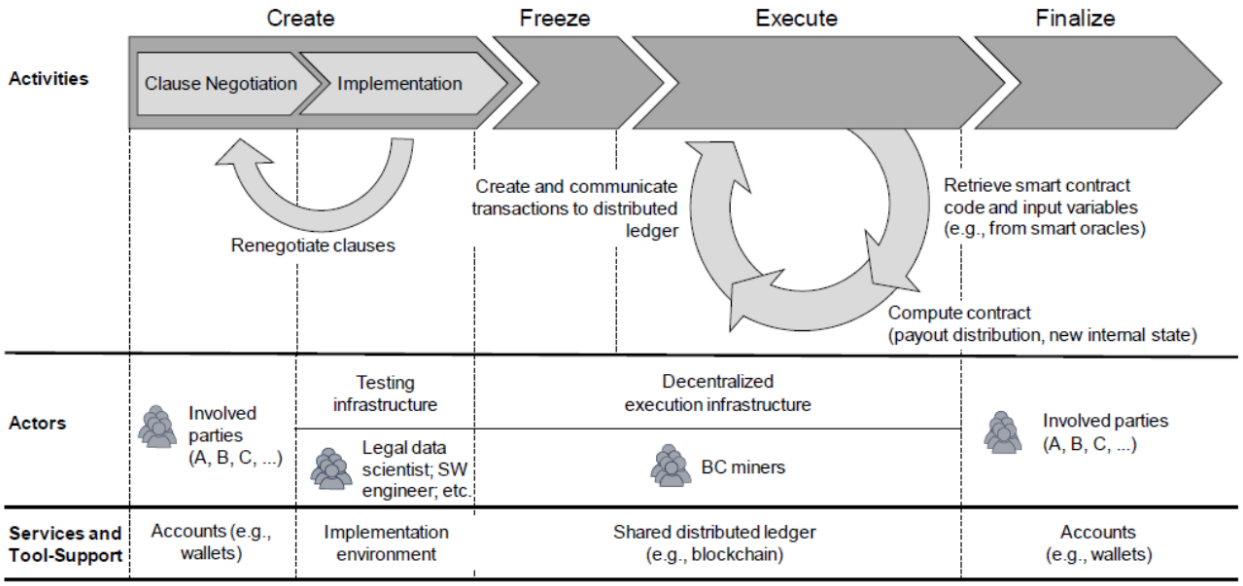


Figure 5: Lifecycle of Smart Contract Creation [5]

3. Conclusion

Adopting JIRA has benefited ME by reducing response time, improving record keeping and sharpening communication. Although JIRA has benefited the organization by improving efficiency, lack of education resulting in underutilisation of dashboards and filters, occasional performance issues causing issue backlogs to pile up, and perceived unreliability for sending emails. Agile software development methodologies such as Scrum and Kanban are supported by the JIRA suite of applications. JIRA has add-ons that extend functionality will complexity ranging from a single feature to full product. Interestingly, when JIRA is integrated with Confluence usage of both applications will increase because jumping between application is quick and simple.

In order to streamline the adoption of **Confluence**, usage intentions must be conveyed as well as detailed guidance on how to use it. Confluence is wiki software used to create knowledge bases, centralize information into a single system and for technical documentation. Useful features of Confluence include integration with **JIRA**, word processing, and team collaboration. Connecting JIRA and Confluence applications allows enable users to rapidly switch between applications. Overall, JIRA and Confluence are software tools that improve productivity and organization within BTI IM.

4. Recommendations

Even though JIRA and Confluence are powerful software tools, failing to grasp the full capabilities limits what can be done. Potential uses of JIRA include issue management, project management and lengthy daily activities that require documentation. Although there are multiple issues types at this time, clear definitions for these issues and when to use them are missing. Adding a wider range of types will allow JIRA to be for a wider range of problems. Also, users are inconsistent in their use of JIRA, failing to include details, documents or work offline. Increasing understanding of how it works and guidance on when to use it needed. Creating business rules on how and when to use JIRA and Confluence will improve documentation consistency. Confluence should be configured to support day to day JIRA activities at IBF MSD. Furthermore, research into the plethora of add-ons available for JIRA and Confluence to see what functionality can be added.

5. References

[1] *Bitcoin White Paper*. [Online] Available: https://bitcoin.org/bitcoin.pdf. Accessed April 25, 2018.

[2] Saeed Elnaj. *The Problems With Bitcoin And The Future Of Blockchain*. [Online] Available: https://www.forbes.com/sites/forbestechcouncil/2018/03/29/the-problems-with-bitcoin-and-the-future-of-blockchain. Accessed May 06, 2018.

[3] *Ethereum White Paper*. [Online] Available: https://github.com/ethereum/wiki/wiki/White-Paper. Accessed April 25, 2018.

[4] Thijs Maas. *Yes, this kid really just deleted 300 MILLION by messing around with Ethereums smart contracts.* [Online] Available: https://hackernoon.com/yes-this-kid-really-just-deleted-150-million-dollar-by-messing-around-with-ethereums-smart-2d6bb6750bb9. Accessed May 29, 2018.

[5] Christian Sillaber and Bernhard Waltl. "Life Cycle of Smart Contracts in Blockchain Ecosystems". In: *Datenschutz und Datensicherheit - DuD* 41.8 (2017), pp. 497–500. ISSN: 1862-2607. DOI: 10.1007/s11623-017-0819-7. URL: https://doi.org/10.1007/s11623-017-0819-7.

A. Token Standards

Listing 1: ERC20 Token Standard Interface

```
pragma solidity ^0.4.20;
contract ERC20Interface {
    function totalSupply() public constant returns (uint);
    function balanceOf(address tokenOwner) public constant returns (uint
        balance);
    function allowance(address tokenOwner, address spender) public constant
        returns (uint remaining);
    function transfer(address to, uint tokens) public returns (bool success);
    function approve(address spender, uint tokens) public returns (bool
        success);
    function transferFrom(address from, address to, uint tokens) public
        returns (bool success);

    event Transfer(address indexed from, address indexed to, uint tokens);
    event Approval(address indexed tokenOwner, address indexed spender, uint
        tokens);
}
```

Listing 2: ERC721 Token Standard Interface

```
pragma solidity ^0.4.20;

contract ERC721 {
    event Transfer(address indexed _from, address indexed _to, uint256 indexed
         _tokenId);
    event Approval(address indexed _owner, address indexed _approved, uint256
        indexed _tokenId);
    event ApprovalForAll(address indexed _owner, address indexed _operator,
        bool _approved);
    function balanceOf(address _owner) external view returns (uint256);
    function ownerOf(uint256 _tokenId) external view returns (address);
    function safeTransferFrom(address _from, address _to, uint256 _tokenId,
        bytes data) external payable;
    function safeTransferFrom(address _from, address _to, uint256 _tokenId)
        external payable;
    function transferFrom(address _from, address _to, uint256 _tokenId)
        external payable;
    function approve(address _approved, uint256 _tokenId) external payable;
    function setApprovalForAll(address _operator, bool _approved) external;
    function getApproved(uint256 _tokenId) external view returns (address);
    function isApprovedForAll(address _owner, address _operator) external view
         returns (bool);
}
```