A music app fully owned and run by its users

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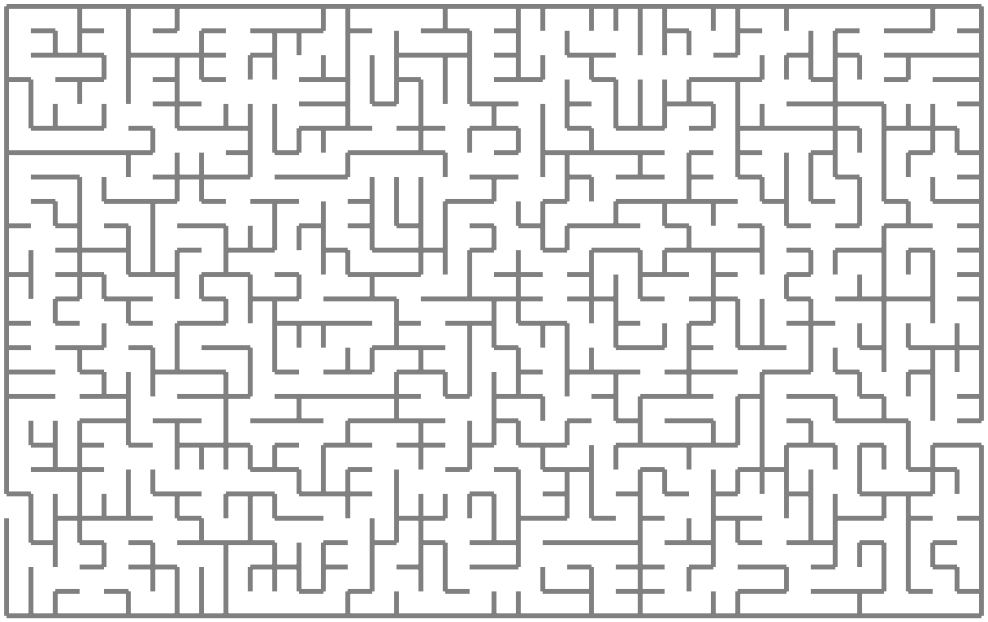

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THESIS

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Cover picture: Random maze.

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Abstract

Widely used paid audio streaming services such as Spotify, Google Play, iTunes pay their artists only a small amount of income. A decentralized audio streaming system can directly connect artists to listeners, without a middleman. This can lead to a near-100 percent cut of revenue for the artist. This describes a decentralized autonomous audio streaming system called X. X is hosted, used and updated by a decentralized autonomous organization (DAO) consisting of artists and listeners. X uses torrents for serving audio files and the Delft TrustChain (a blockchain implementation) for an immutable database of artists and releases. In addition, X uses a micro-payment system for peer-to-peer donations to artists using EuroToken (TODO).

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Preface

Preface here.

Tim Wissel
Delft, the Netherlands
April 28, 2020

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Related work

3.0.1 Decentralized audio streaming services

Multiple decentralized audio streaming services exist. Examples are Audius[1], ResonateLindner 2018 and eMusic[2]. All of these systems have in common that they save metadata and identifiers of audio files on a blockchain, and save the audio files in an off-chain database. All these off-chain databases are structured like IPFS[3] with a company-run centralized interface between the user interface and the database. For a system to be fully decentralized, this layer should be removed. These solutions are closed source. Moreover, they use their own cryptocurrency to pay their artists which is an unstable income.

3.0.2 Decentralized content delivery networks

Decentralized content delivery networks are being investigated by multiple systems such as VideoCoin[4] and DCDN[5]. Most of these start-ups use blockchain technology and their own-released cryptocurrency as a token to pay nodes that serve the content. This means that the incentive for running a node depends on the value of those cryptocurrencies, so this is an unstable situation for workers.

A fully decentralized audio streaming service requires sharing and streaming audio files over a network of nodes in which any participant can start and run a node. An example of such network is BitTorrent. The challenge with BitTorrent acting as a streaming service is that the requirement from the user perspective is to have low latency for streaming and buffering media files. For each file, the peer discovery algorithm is run, which is a slow-start algorithm. It also relies on having enough seeders per file available.

Torrent files contain a list of chunks, which represent the different parts of the related file. These chunks are called torrent pieces. Flawless streaming of media files over BitTorrent requires a smart algorithm to predict what file is requested next, and what torrent pieces should be loaded. BitTorrent relies on trackers to perform peer discovery. However, trackers are a central point of failure. To make the system more decentralized, a solution using independent trackers and a gossip protocolDán, Carlsson, and Chatzidrossos 2011 can be used.

3.0.3 Incentives for file spreading

In a DAO, the party responsible for hosting and spreading of files is not well-defined. To tackle the tragedy of the commons, entities should be incentivised just enough for the sys-

[1] https://audius.co
[2] https://eMusic.com
[3] https://ipfs.io/
[4] www.videocoin.io
[5] https://www.dcdn.com/

tem to be sustainable and usable, but no more. An example incentive system is bandwidth tokensVos and Pouwelse 2018.

Chapter 4

Conclusion

Conclusion here.

Bibliography

Dán, György, Niklas Carlsson, and Ilias Chatzidrossos (2011). "Efficient and highly available peer discovery: A case for independent trackers and gossiping". In: *2011 IEEE International Conference on Peer-to-Peer Computing*. IEEE, pp. 290–299.

Lindner, Paul (2018). "Investing in a better Internet: Resonate, a music coop". In:

Sústrik, Martin (2012). *ZeroMQ*. URL: `http://aosabook.org/en/zeromq.html` (visited on 02/16/2018).

Vos, De and Johan A. Pouwelse (2018). "A Blockchain-based Micro-Economy of Bandwidth Tokens". In:

Acronyms

AST abstract syntax tree

DSL domain-specific language

Appendix A

A

Appendix here.