NEATIO

NEAT PAYMENTS

WHITEPAPER

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www.neatio.org

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[1]. ABSTRACT

One of the earliest attempts at creating a cryptocurrency actually predates Bitcoin[a] creation by about 20 years by a group of developers who attempted to link money to newly-designed smartcards. This may have been the earliest example of electronic cash, which has links to digital currencies as we know them today. Some other attempts to create digital money were made by Wei Dai who proposed an "anonymous, distributed electronic cash system" called B-money[b], Nick Szabo who proposed the first electronic cash with its own PoW[c] (proof-of-work) system and Hashcash[d] which was one of the most successful pre Bitcoin digital currencies. When Bitcoin was developed in 2009, it launched a new generation of digital currencies. Bitcoin differs from many of its predecessors in its decentralized status and its development of blockchain technology. Bitcoin has captured everyone's attention as being the currency of the world and we all love it and appreciate it since it introduced us a new way to transfer value. Satoshi Nakamoto described Bitcoin in the whitepaper as "a purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution" but because of the lack of scalability, slow processing time and expensive transactions, Bitcoin "failed" to be what Nakamoto envisioned 12 years ago. Bitcoin has become more of a "store of value" asset, rather than a decentralised payment system.

[2]. INTRODUCTION

What is Neatio?

Neatio is a decentralized peer-to-peer network based on blockchain technology like Bitcoin and Ethereum[e] which is composed of a main blockchain and multiple derived side-chains with the main focus on exchanging value (payments) fast, secure and inexpensive. Of course the platform is not limited to payments only, since Neatio can also be used by other developers to run their own dApps (decentralized applications) and/or launch their own cryptocurrencies.

Why is Neatio different?

Neatio is built to be an advanced payment solution, powered by state-of-the-art blockchain technologies which make it blazing fast, ultra secure, highly scalable and inexpensive to use. Say goodbye to network congestion and confirmations time, Neatio transactions are executed in real time and once they are included in a block they are final meaning that in Neatio network there is no need for subsequent block confirmations. This makes it an ideal payment solution for merchants in day-to-day use and also for individuals since we all need things to happen fast in our crazy fast-forward lives that we are living today.

[3]. PROOF-OF-STAKE EXPLAINED

Proof-Of-Stake or (PoS) for short is a an alternative newer method of consensus protocol and block generation was created as an alternative to Proof-of-Work (PoW), the original consensus mechanism used to validate a blockchain and add new blocks. The PoS consensus was invented by Sunny King and Scott Nadal and first introduced in Peercoin[f] in 2012. In a PoS network, the coin owners are the ones that verifies and validate entries into a distributed database (blockchain) and keeps the database secure.

However arguably one of the more secure methods of distribution though not as readily available to newcomers just climbing on board a project. This is because PoS uses the coins that a participant owns and is holding to generate a block, thus owning more coins and staking them provides the participant with a higher possibility of generating the next block.

Staking is the act of allowing one's client to remain online in order to support the network by having randomly selected coins become temporarily unavailable while the client forges a block and then compensates the participant with an earned interest on the coins used. This method is considered more secure as if properly distributed the participants will invalidate most any form of attack that abuses hashing power in order to gain control of a blockchain, however one must first obtain coins in order to stake which depending on their worth can be costly and overall a deterrent to the project if this is the only method available.

[4]. BFT CONSENSUS EXPLAINED

The consensus protocol is the core of blockchain to provide agreement services, whose efficiency highly affects the performance and scalability of a blockchain system. Without trusted intermediaries, the parties of blockchain may behave arbitrarily and deviate from the consensus procedures, in which we can literately consider them in a byzantine environment. Blockchain can benefit from many technologies developed for reaching consensus, replicating state, and broadcasting transactions, but in cases that network connectivity is uncertain, nodes may crash or be subverted by an adversary. Though there are many proof-based consensus protocols for blockchain assisting to solve these issues, i.e., Proof-of-Work (PoW) in Bitcoin , they are typically not energy efficient and may cause power starvation. Fortunately, Byzantine fault-tolerant or BFT[g] state machine replication (SMR) offers some opportunities to design consensus protocols that can tolerate arbitrary faults. Under the hood of BFT SMR, it replicates the state of each replica among the replication system. The capacity to tolerate arbitrary faults makes the BFT replicated system a reality when building some practical and critical applications.

Practical Byzantine Fault Tolerant pBFT[h] in short has been long-termly as a consensus protocol to cope with Byzantine systems, which can tolerate up to a 1/3 of Byzantine faults in a system. One replica, the leader replica, decides the order for clients requests, and forwards them to other replicas, the secondary replicas.

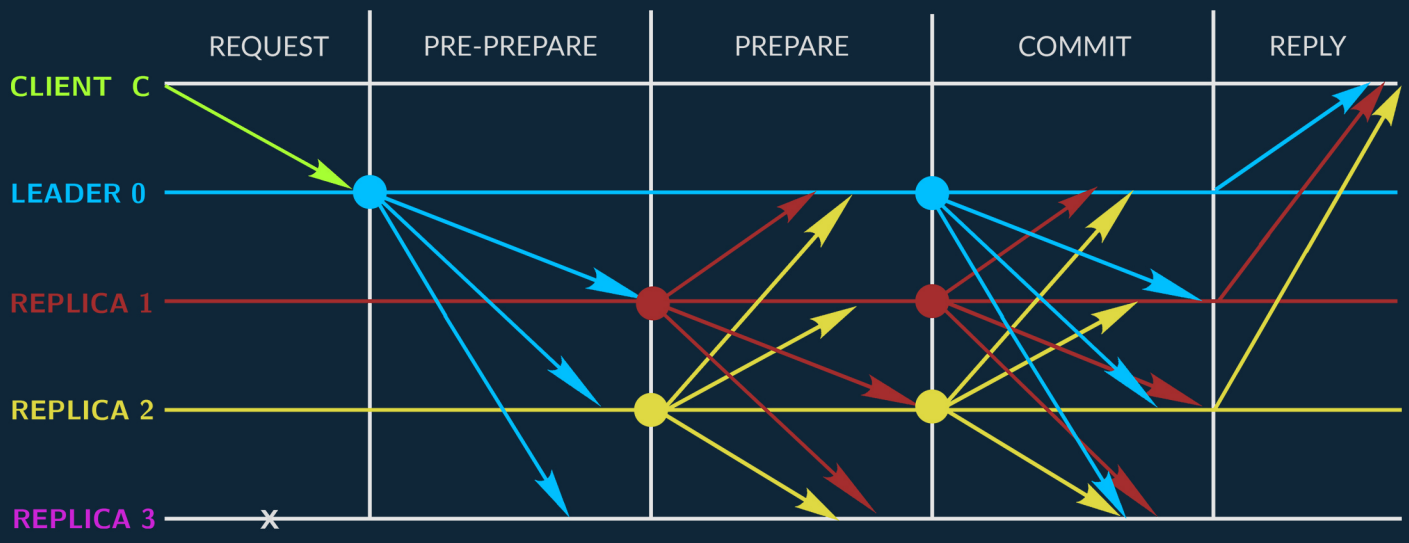


Figure 1. The three-phase of the pBFT consensus rounds.

The three-phase consensus rounds as showed in Figure 1 explained:

1) A CLIENT C sends a request to invoke a service operation to the primary process 0. This is the LEADER for this round of consensus.
2) The LEADER broadcast the request to other other processes, 1, 2 and 3. These processes are called replicas.
3) Replicas execute the request and send a reply to the CLIENT .
4) The client waits for f+1 replies from different replicas with the same result; This is the result of the operation.

The pBFT protocol guarantees that safety is maintained even during periods of timing violations, because progress only depends on the leader. On detecting that the leader replica is faulty through the consensus procedure, the replicas trigger a view-change protocol to select a new leader to coordinate the consensus procedure. The leader-based protocol works very well when the number of participating replicas are small, but, it is subject to scalability issues. In general, pBFT is regarded as the baseline for almost all BFT protocols published afterward. Even though many pBFT-like solutions are proposed in the literature, most of them are still subject to scalability issues, which cause them not to fit some large-scale mainstream distributed systems, such as public blockchain systems.

[5]. NEATIO KEY FEATURES

- One second block time; enforced by the consensus protocol to have a constant block generation and reward our validators with a constant amount of NEAT;
- High scalability with no confirmation time; Neatio can handle around 4000 transactions per second on the main-chain alone with transaction finality.
- Dynamic block size; every block can stretch from 512 Bytes up to 20971520 Bytes (20 MB) when more transactions have to be executed at the same time.
- Smart contract support; Based on EVM (Ethereum Virtual Machine) Neatio blockchain is compatible with Solidity and Ethereum smart contracts.
- Side-chains implementation for limitless scalability. With the help of side-chains Neatio network can handle tens of thousands of transactions per second.
- Eco-friendly; block validations doesn't need specific mining equipment and huge amount of electricity to secure the chain like in PoW blockchains (i.e Bitcoin).

[6]. NEATIO TECHNICAL DETAILS

- Hashing algorithm: SHA256;
- Signing algorithm: Secp256k1
- Proof-of-Stake with custom pBFT consensus;
- Max supply will ever exist: 77000000 NEAT (77 Million NEAT);
- Decimals: 18; The smallest unit is 0.000000000000000001 NEAT;
- Network main-net port: 9910 (side-chains uses the same port number);
- Network test-net port: 9911 (side-chains uses the same port number)

[7]. NEATIO CONSENSUS EXPLAINED

NEATCON, the custom implementation of the pBFT consensus in the Neatio network is based on the classic pBFT protocol (see section 4), with 2 major improvements:

1. BLS[i] signatures; Boneh–Lynn–Shacham signature keys, improves nodes communication.
2. RLS validation; Random Leader Selection by using a verifiable random function or VRF[j].

The pBFT consensus is a protocol with three phases: pre-prepare, prepare and commit. In phase prepare and commit, each validator has to broadcast its vote for the proposed block. Upon receiving 2f+1 commit votes, each validator finalizes the block. Due to the broadcasting of votes, the complexity of communication grows as the square of the number of nodes, O(n^2). To reduce this, NEATCON establishes a leader for each voting round to collect votes from all validators. In addition, NEATCON adopts BLS threshold signatures to achieve linear communication. An (n,t)-threshold signature on a message m is a single, constant-sized aggregate signature that passes verification if and only if at least t out of the n participants sign m. Note that the verifier does not need to know the identities of the t signers. Each collector derives an (n,2f+1)-threshold signature after collecting 2f+1 votes. The threshold signature can be seen as a single signature with constant size. After that, the collector broadcasts the threshold signature and each validator can confirm that more than 2f+1 validators have voted for the proposed block via verify threshold signature. In classic pBFT, two rounds of voting are used to guarantee the safety and liveness of protocol. However, in NEATCON, a single round of voting achieves this without losing safety or liveness. And as each vote for the current block specifies the hash of the previous block, each vote is the confirmation for the previous block as well. Hence, the vote for the current block is the prepare-vote and commit-vote for the current block and the previous block at the same time. If more than 2f+1 votes for the current block are collected by a validator, the previous block is finalized at once. Therefore, each block is finalized after just two rounds of voting which ensures the safety of the network.

Similar to pBFT, the view change sub-protocol of NEATCON is triggered when the validators cannot reach consensus in a single round. This can be due to an asynchronous network (e.g., when more than 1/3n nodes are offline), or the presence of malicious collectors/leaders. NEATCON handles a view change with the Linear View Change (LVC) algorithm. The essence of LVC is that the leader of the next round sends its highest commit certificate instead of all commit certificates, which reduces transmission volume during a view change by a factor of O(n). In pBFT or tendermint, each leader is decided in a round-robin scheduling which can be predicted by the adversary. NEATCON avoids this situation by selecting its leaders randomly, using a VRF (verifiable random function). A VRF is a pseudo-random generator whose output is verifiable (i.e., on whether a given number is indeed the output of the VRF), random, uniformly distributed, and unpredictable beforehand. With random leaders, the leader of the next round is unpredictable and the adversary can not attack the leader in advance.

[8]. NEATIO PROOF-OF-STAKE

Some more technical details

- The block reward is: 0.08 NEAT per block;
- Epoch duration is approximately 1 (one) day or 86400 blocks;
- Total epochs number is 254040 (the reward per block is paid);
- Total time the reward per block is paid for validating blocks 29 years;

Validators requirements

- System 2 CPU, 4 GB RAM, 40GB SSD, Static IP;
- Cloud (VPS) is strongly recommended;
- Collateral: 77 000 NEAT;

[9]. NEATIO TOKENOMICS

On Neatio genesis, (January 01, 2022) the initial token supply was 4751024 NEAT which later was distributed to the dedicated wallets listed in the table below and will be used for the development, promotion and on-boarding new developers/contributors to the Neatio project.

WALLET NAME	AMOUNT	PERCENT
Ecosystem Development	1.900.409,60	40%
Neatio Developers Team	950.204,80	20%
Our Angel Investor Share	712.653,60	15%
Project Marketing Budget	950.204,80	20%
Airdrops And Giveaways	237.551,20	5%

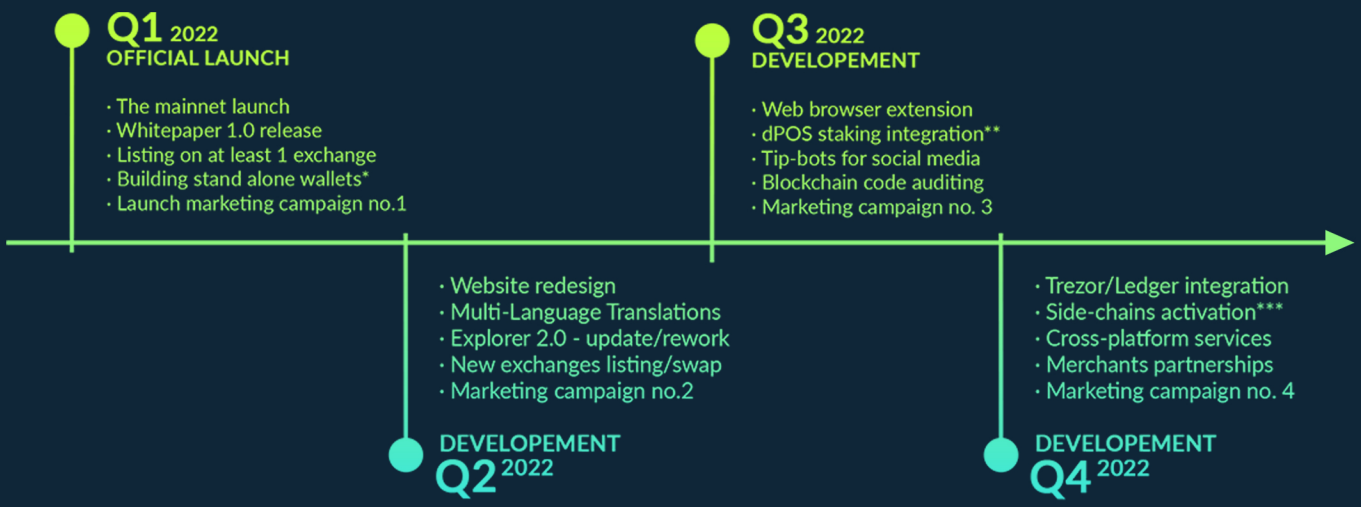
Since Neatio total supply is capped at 77000000 NEAT, the minting will last for 29 years and will last until the end of year 2050 with a daily inflation of 6821 NEAT.

YEAR	SUPPLY	INFLATION	PERCENT
2022	7242368	2491344	52,44%
2023	9733712	2491344	34,40%
2024	12225056	2491344	25,60%
2025	14716400	2491344	20,38%
2026	17207744	2491344	16,93%
2027	19699088	2491344	14,48%
2028	22190432	2491344	12,65%
2029	24681776	2491344	11,23%
2030	27173120	2491344	10,09%
2031	29664464	2491344	9,17%
2032	32155808	2491344	8,40%
2033	34647152	2491344	7,75%
2034	37138496	2491344	7,19%
2035	39629840	2491344	6,71%
2036	42121184	2491344	6,29%
2037	44612528	2491344	5,91%
2038	47103872	2491344	5,58%
2039	49595216	2491344	5,29%
2040	52086560	2491344	5,02%
2041	54577904	2491344	4,78%
2042	57069248	2491344	4,56%
2043	59560592	2491344	4,37%
2044	62051936	2491344	4,18%
2045	64543280	2491344	4,01%
2046	67034624	2491344	3,86%
2047	69525968	2491344	3,72%
2048	72017312	2491344	3,58%
2049	74508656	2491344	3,46%
2050	77000000	2491344	3,34%

[10]. NEATIO ROADMAP

In this section you'll find the Neatio Roadmap for the year 2022, which will have a lot of core milestones including our browser extension development for a better user experience in everyday use, among a wide range of other features plus a lot of marketing campaigns. And last, but not least, we aim for as many e-commerce merchants partnership to integrate Neatio payments, which is one of our priority for next year.

Below is a short representation of our goals and the development plan for 2022.



As you may noted already from the tokenomics and the roadmap, marketing is paramount for the Neatio project, because we think that marketing is very important for any product. Why? Because even you you have an outstanding product but no one heard of it, is worthless. If you look at the biggest companies in the world, and you'll see how much they spend on marketing which is billions of dollars, you'll understand the statement above. To name few: Coca-Cola - 4.25 billion, Amazon - 4.47 billion, General Motors - 3.14 billion, Procter & Gamble - 4.3 billion, Google - 2.96 billion, Walt Disney - 3.13. (* numbers pre-pandemic).

With this being said, even that Neatio is a state-of-the-art blockchain technology, if no one will find out about it and use it, our product will be worthless. And that's why we have a 20% marketing budget from the total coin generated in the genesis. But note that the marketing budget is not limited to this amount, we can always use more tokens from the "Ecosystem Development" fund, if needed, since marketing is also part of the ecosystem development.

[11]. NEATIO OBJECTIVES

Neatio is trying to revolutionize the traditional payment system which is inefficient, unsecure and expensive to use. Our platform is bringing the latest blockchain technologies to masses and the end user can benefit from the advantages of our platform in terms of decentralization, speed, security, privacy and costs.

Here are pointed out few advantages of Neatio blockchain over a traditional payment system:

Decentralization

Even thought a centralized payment system have very high security requirements for their central servers at any time f a security vulnerability can be exploited and the hole network is at risk and can collapse. Many times the users can't use the network anymore leaving them without access to their funds or worse have their funds stolen. On Neatio platform the network is secured by many servers spread all around the globe and the transactions are executed by the network validator nodes, making the Neatio paym ent system available 24/7, 365 days a year.

Speed

In terms of speed no traditional payment system can match Neatio, not even Visa, PayPal or Skrill. Here we don't have anything to compare with since not even the top blockchain networks or platforms out there like Bitcoin, Litecoin, Monero nor Ethereum, Cardano, can match Neatio in terms of speed and scalability. Neatio can execute more than 100000 transactions per second with 1 second time for the money sent to arrive and be ready to be spent from the destination wallet in the next second.

Costs

The costs are negligible, every transaction costs 0.00001 NEAT in terms of USD it can't be expressed since NEAT price is unknown at this moment. In comparison with bank transfers, WesternUnion, Neatio transactions are basically free. In comparison with Visa, PayPal or Skrill is also negligible, their free transfer fees are not really free as you will find out from the next paragraph.

Privacy

Existing centralized payment systems can collect their users data at will. They can collect many information, and use this data for digital advertising, website analytics and even sell users data to 3rd party companies for money. Why? Do you ever wondered how can a company afford to pay their huge infrastructure costs and maintenance, employees and also making profit if using their services *"is free"*?

Like we state in the first part our main focus is on creating an efficient payment system, but our platform is not limited on the transfer of value alone, Neatio network can also be used to create new tokens or to run dApps such as DeFi and NFTs on top of it.

[12]. MEET THE TEAM

- **Silviu Georgescu** | Founding member, Lead Developer and Project Manager
  [skill set: HTML, CSS, JavaScript, jQuery, Node JS, Python, Golang]

With a master's degree in Computer Security and Information Assurance, Silviu graduated from the University of Milan with a major degree in Computer Science. He worked for companies like Alfa Romeo and Renault Digital. He has rich experience in software development technologies, information security and other fields. He is a crypto believer and decided to start Neatio project in early 2020 funded by himself and his old fellow co-worker Angelo Goretti. He describes himself as a serious and honest guy.

- **Angelo Goretti** | Founding member and Marketing Manager
  [skill set: Communication, Strategic Thinking and Planning]

Father of three, Angelo have graduate the UNIBO University in 2003 and since then he is working on Stellantis car manufacturer in a Sales Manager position. After betting on Ethereum in its early days he became a crypto enthusiast and Ethereum maximalist. In 2020 Angelo teamed up with Silviu to launch their unique version of Ethereum blockchain, Neatio. He describes himself as a familist guy, pacifist and nature lover guy.

- **Adrian Vasile** | Frontend Web Developer and Community Manager
  [skill set: #HTML #CSS #JavaScript #Vue]

Adrian first got in contact with the crypto space in the end of 2016 and since then he never left the space. He got involved in few projects as marketing specialist and community manager. Self-taught front-end web developer, now is working on Neatio project as front-end web developer. He describes himself as a funny but hardworking guy.

- **Luckas83** | Assistant Developer and Project Logistics
  [skill set: Java, JavaScript, ReactJS, Golang]

Luckas took contact for the first time with cryptocurrencies in late 2017 but was not interested to get involved in the space until early 2021 after the DeFi and NFT boom. He stated that he is currently working on a hi-tech company as Software Engineer and he decided to remain anonymous for now. He describes himself as a disciplined guy.

- **Gessius** | Graphic Designer and Marketing Assistant
  [skill set: Blender 3D, Adobe Illustrator]

Gessius have a degree in Marketing but always had a call for drawing and design. He worked with many projects in the crypto space, some defunct some still alive, our graphics designer who made our logos and still makes our flyers, website and wallet icons also wanted to remain anonymous. He describes himself as a perfectionist and humble guy.

- **Daniel Munteanu** | Advisor and Angel Investor
  [skill set: Mentorship, Risk Management]

Daniel is undeniably a valuable asset not only for Neatio project but also for the crypto space itself. He is a former Software Engineer who graduated UPB in Bucharest who got involved into Bitcoin and other cryptocurrencies back in 2012. Whiteness of the first halving, Bitcointalk.org hack, MtGox fall, Ross Ulbright arrest, OneCoin scam and so on, Daniel had seen it all. He describes himself an energetic and smart guy.

[13]. DISCLOSURE

The information in our whitepaper is used only for the purpose of conveying information and does not constitute an opinion on the trading of Neatio (NEAT) cryptocurrency. Any such proposal shall be carried out under a trustworthy term and with the permission of the applicable securities law and other relevant laws. The above information and/or analysis shall not constitute investment decisions or specific recommendations. The whitepaper does not constitute any investment advice on the form of securities, investment intent or abetting investment. Our whitepaper is not composed nor construed as providing any transaction or any invitation to buy or sell, nor any form of securities or any form of contract or commitment. We express the intention that the user has a clear understanding of the risks of the cryptocurrency platforms. Once the investor participates in the investment, he/she will understand and accept the risk of the project and be willing to bear all the corresponding results or consequences. We expressly disclaims that Neatio (NEAT) will not bear any direct or indirect damages resulting from any participation in our project, including this whitepaper, website and any software and/or materials provided on our websites and social media channels. Please do your own research before making any investment decisions. None of the information in this document constitutes. Cryptocurrency investments are volatile and high risk by nature. Do not invest more than what you can afford to lose.

Also take note of the risk associated with the Ethernet core agreement since Neatio (NEAT) is based on the Ethernet protocol development, any failure, unpredictable functional problems, or attacks that occur in any Ethernet core protocol can cause Neatio (NEAT) or our applications to stop working or can behave in an unpredictable manner. The risk associated with using third party apps, websites and/or tools that can obtains the user's login credentials or private keys will be possible to directly control the user's funds. In order to minimize the risk, the user must protect its electronic devices to prevent unauthorized access requests from accessing the device content. The risk that our applications and/or products may not meet the expectations of users since our applications and/or products are currently in the development phase and may be subject to major changes before the release of the official versions. Phishing and/or Theft risks associated with hackers, other organizations or even countries have the potential to attempt to interrupt our applications and/or functionality in any way, including service attacks, Sybil attacks, malware attacks, or consistent attacks. The risk of uninsured losses since the coins stored in your account is not insured like the money stored in the bank accounts or any other financial institutions. The risk of the presence and/or application failure, meaning that our websites and/or platforms may break down due to various reasons, and therefore may not be able to provide the normal expected services.

[14]. REFERENCES

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