2018

# iagon

# WHITEPAPER

WWW.IAGON.COM

v3.0

# TABLE OF CONTENTS

# OVERVIEW

IAGON is a platform for harnessing the storage capacities and processing power of multiple computers over a decentralized blockchain grid. IAGON utilizes enables to store big data files and repositories, as well as smaller scales of files, and to carry out complex computational processes, such as those needed for artificial intelligence and machine learning operations, within a fully secure and encrypted platform that integrates blockchain, cryptographic and AI technologies in a user- friendly way.

The size of the cloud services market providing both storage capacities and computational processing capabilities to companies and to corporates is estimated by 45 billion USD per annum and it steadily grows. The market is dominated by four major players: AWS, Google Cloud, Microsoft and IBM, all utilize central and less trusted storage and computation facilities. Due to their oligopolistic dominance, the four providers of cloud services set high pricing levels. These providers are also capable of hampering any competition and preventing new market entrants from competing with them, due to the broad scale of their operations and their substantial investments in data centers, servers and storage facilities.

Interestingly, however, the demand for computational processing capabilities and storage is expected to dramatically increase in the near future due to two major trends in the business and computing worlds: Big Data and Artificial Intelligence (AI). Big Data is the collection, management and storage of vast amounts of information obtained from any internal of external sources (such as the company's IT systems, social networks, sensors and so on). The data management of companies promotes collection and storage of any data related to its operations, clients and competitors, should a need to analyze any of these data ever present itself. The other major trend is the emergence of Artificial Intelligence methods that "learn" from data on past operations, find patterns and business rules and predict future behavior. AI-based processes consume require vast amounts of computations and consume significant processing power of CPU and GPU processes. The demand for storage and for processing power is expected to exponentially increase with broadening the introduction of AI applications in new areas and with the widespread adoption of data collection from multiple channels (such as sensors, social networks, data providers, etc.) and later processing them.

IAGON's major aim is to revolutionize the cloud and web services market by offering a decentralized grid of storage and processing. By joining the unused storage capacity in servers and personal computers and their processing power, we can create a super-computer and super data center that can compete with any of the current cloud computing moguls.

We aim at providing companies and individuals storage and processing services at a fraction of the market prices and at a better security level by connecting data centers, business computers and personal users and utilizing their free storage capacities and their CPU and GPU processors
during idle times. Doing so, IAGON overcomes the entry barriers imposed by the high level of investments required to compete in this market.

Our token-based economy is based on computer, server and data center owners who join the storage and processing power grids. In return for sharing the capabilities of their machine, they will be granted IAGON tokens that can be traded back to fiat money, while any party who wishes to utilize their capabilities will purchase IAGON tokens to distribute them to the parties that provide their services to the grid. The storage mechanism will be based on blockchain encryption and delivery of encrypted file fragments to many storage facilities. Contributors to the grid can publish their skills and free capacity and offer their service on the basis of their experience, available resources and storage space and bidding on price. Advanced machine learning and AI algorithms will assist in recommending prices to parties involved in this venture and classifying them according to their price levels and assuring continuity of services and access to all files.

As more and more companies will recognize the benefits of IAGON's platforms for storing files and processing them, the demand will increase and so will be the demand for the token – the way customers pay grid participants.

IAGON's token and platform are proven services with our Ethereum-based blockchain beta version, proving the concept of blockchain-based distributed computing and storage grid. IAGON plans to support also the new and innovative Tangle technology that provides an alternative, rapid and lower cost solution for operating the blockchain technology. Thus, IAGON will establish two blockchains – on Ethereum and on Tangle – providing the complete flexibility and freedom of choice to our users and miners.

Our ICO aims at further developing our platform and the client program that will be used by any party that would like to join our IAGON grid and benefit from its unused computer resources.

IAGON will offer the lowest fees in the cloud industry to customers who purchase storage capacity and/or processing capabilities, as both are abundant and can be fully utilized and scaled, inter-connected by our platform.

The IAGON pre-ICO begins on April 2nd, 12 pm WEST, lasts for 18-28 days, and ends either April 20th or 30th depending on sales. The pre-ICO offers 20% of the tokens at a price of:

- 0.07 USD per IAG token for first 100 million tokens;
- 0.10 USD per token for next 100 million tokens.

Purchases can be made in ETH.

Pre-ICO will be done solely through Dragonchain, and only holders of Dragon tokens can participate in it. Please visit the Dragonchain website for more information - dragonchain.com.

The IAGON crowdsale (ICO) begins either April 20th 12 pm WEST or April 30th. ICO lasts for 30-60 days, depending on sale.

In addition to the pre-ICO, the crowdsale offers 50% of the IAGON tokens to the public (offering in total 500,000,000 tokens).

Purchases can be made via all ETH, Bank Transfer or debit/card (We also use Changelly as our API and this allows for us to convert other curriences to ETH on site, before purchase ) according to the following rates:

- 0.12 USD per all 500 millions tokens

Total amount of IAG tokens for two phases: 700,000,000 tokens.

Other 30% of the tokens (max. 300,000,000 tokens) will be dedicated to:

- 10% for IAGON's team;
- 10% for advisors and bounty hunters;
- 10% for development.

IAGON's team works hard to support the reputation of IAGON as the leading platform for storage and processing services, enhancing its adoption among users that allocate their computational resources and among potential customers.

# INTRODUCTION

The recent development in Artificial Intelligence (AI) and Big Data technologies and the dramatic increase in adoption of these technologies signify an ongoing and exponentially growing demand to both storage capacity and for computational processing power vis-à-vis the broader adoption of these technologies.

Big Data technologies such as the Hadoop framework (notably its MongoDB, HDFS and Spark databases) require vast amounts of storage capacity, either in a centralized or a distributed manner, for processing and managing Big Data files. To a large extent, Big Data technologies support the exponential growth of data in any type of organization, within web based services and social networks and their implementation is essential to support the proper operation and processing of these vast amounts of data (see Fig. 1).

Machine learning and deep learning processes (notably Google's TensorFlow, Caffe and Theano; see also: Dean et al., 2012, Ray, 2017) carry out advanced computational pattern recognition, image recognition and predictive analytics that require high volume of computations. The scenario of an exponentially growing demand for both Big Data and AI capabilities is solid and highly tangible, given that both technological areas are the basis to support IoT and Industry 4.0 systems. Additionally, though Big Data and AI technologies are only at their infant stages of implementation, most of the corporates and public institutes have begun examining their application to improve many aspects of their operations.

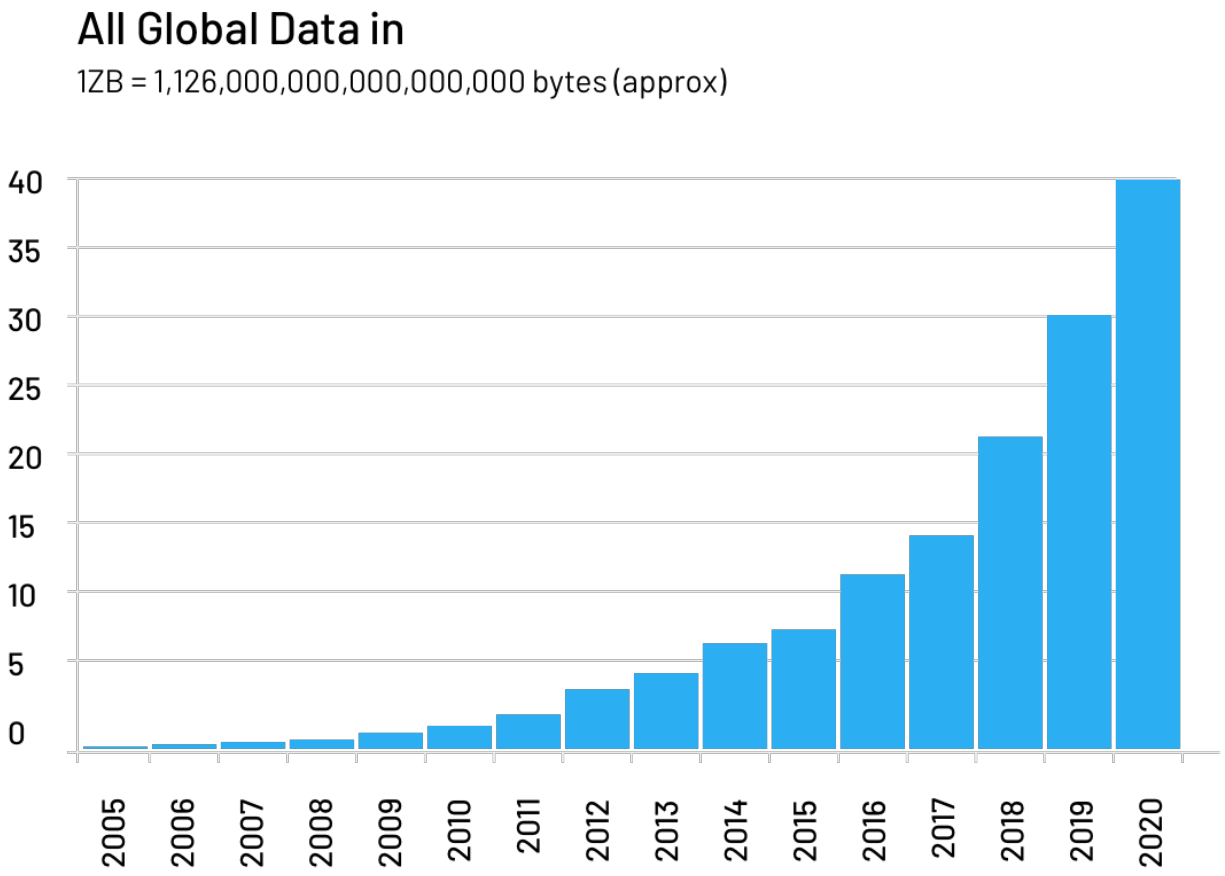


**Figure 1:** Historical and predicted volumes of data per annum worldwide
*(Source: United Nations Economic Commission for Europe)*

# MARKET OUTLOOK OF CLOUD STORAGE SERVICES

Cloud data storage is based on the delivery of files from local computers and servers into the remote servers and storage facilities that are obscure to the user, but can be accessed and managed at any time. Thereby, the reliability of cloud storage services and the privacy of users (i.e. protecting the files from being accessed by any party other than their owner) are paramount to subscribing to and implementing any cloud services.

The market of cloud storage services is composed by a large number of companies that operate and offer data storage programs, from small data centers who cater to the needs of individuals and SMEs to large storage facilities of companies (such as Amazon, Google and Microsoft), aiming at managing their own gigantic volumes of data, but also offered to external customers. However, since the first days of cloud storage services and until recently concerns over the protection of data, the reliability of centralized data centers, the liability of cloud storage companies in cases of lost or incorrectly stored files and the privacy of users are often expressed by experts (see for example Hu et al., 2010; Dai et al., 2017).

Faults associated with technical performance of the cloud emerge from its servers, from retrieval systems (Content Distribution Networks, or CDNs) and from clients. Some are faults are defined as crash faults while others are performance-degrading faults. Crash faults are the most common category, categorized by service "blackouts", whereas services that are temporarily disabled or exhibit lower degrees of performance are performance-degrading faults. For example, an incident in which file that were uploaded to the cloud are not accessible due to writing errors to a folder is a crash fault, while CPU leaks that cause lower performance of a server (and therefore slower retrieval of a file) are performance-degrading faults (Wang, 2017). When data and files are managed through a centralized data centers (or through a series of them), a wide scale fault, and in particular a crash fault that terminates the access of users to their stored files, can cause the termination of operations of companies, organizations and individuals as long as the outage persists. For example, AWS' recent outage in March 2017 continued for several hours, causing damages that are estimated by more than 300 million USD (Sverdlik, 2017).

# MARKET OUTLOOK OF CLOUD COMPUTING SERVICES

Artificial Intelligence is a set of advanced computational models and processes inspired by research of the human brain. These models and tools operate behind the scenes of many apps, websites and applications in a seamless way that does not interfere with the user's interaction through the UI. For example, web searches and similarity between terms, automated translation, face recognition and recommendation systems are some of the applications of AI.

Artificial Intelligence is often used to generate better user experience. A simple case of this would be Google. Google uses advanced machine learning algorithms to narrow down its search results to provide its users with results closely matching what the users are looking for. As the algorithm learns and refines its search definition, users can sometimes notice that search results may vary from day to day or user by user. Targeted ads often use machine learning algorithm to propose possible products and advertisement on sale based on the users search results.

The market for AI applications is expected to grow substantially in the coming years. Figure 2 presents some of the expected common uses and the revenues from their commercialization in the near future. Nonetheless, the widespread implementation of AI processes requires increasingly powerful computational facilities, due to the complexity of these operations. Therefore, companies
invest vast amounts in purchasing GPU and CPU units that are dedicated to carry out this scope of computations, or purchase at a great expense processing power from one of the cloud processing providers (i.e. Amazon Web Services, Google Cloud, Microsoft Azure and IBM).

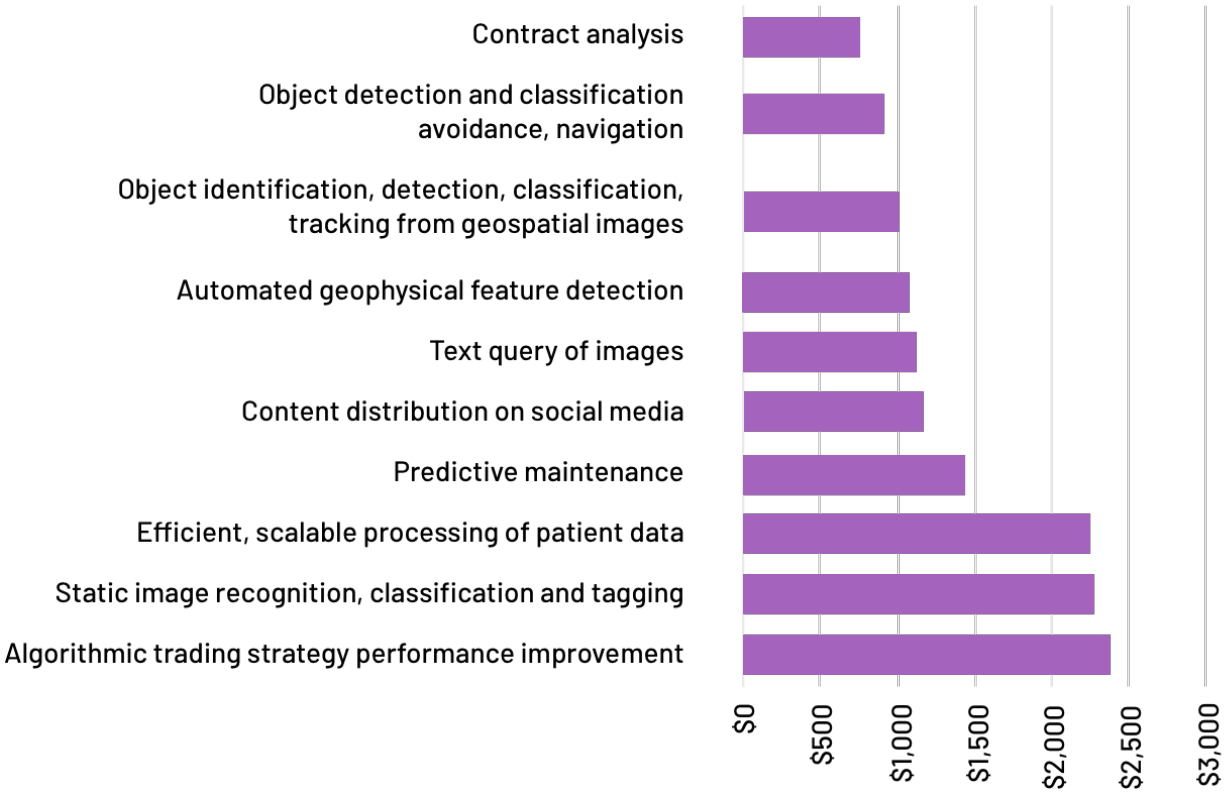


**Figure 2:** Estimated revenues for typical AI use cases in 2025
*(Source: Tractica)*

## IAGON'S AI-BASED COMPUTATIONAL PROCESSES

Just like a human brain, AI and machine learning algorithms require inputs of data to deduce an inference. Data mining is the computing process of discovering patterns in large data sets and helps reduce large sets of data structures to allow machine learning algorithms to make decisions and inferences. Consequently, as organizations and companies accumulate large datasets as a part of their day-to-day operations virtually on every aspect of their performance, suppliers and clients, they seek new ways to apply AI and machine learning methods to derive new managerial insights from the data on a continuous basis.

Nonetheless, AI and machine learning tools for analyzing vast amounts of data require large volumes of computational power that organizations often lack, hence requiring them to subscribe to a commercial cloud service and uploading their sensitive data files into another company's servers. Due to the confidential nature of data and its commercial value, many companies avoid doing so, hence not benefitting from the potential value of analyzing their databases with advanced AI methods.

The blockchain technology provides a unique and fully secure solution towards processing, storing and distributing data and maintaining their consistency and integrity that can be used for use cases like decentralized processing. The blockchain is simply blocks of data hashed together and chained using previous hashes and its current block to maintain consistency across the chain (Vijayan, 2017). Blockchains use the SHA256 algorithm to create a hash. The unique nature of the hash makes its resource intensive to crack as the SHA256 hash can only be broken today through brute force with computational power that is not available yet in the commercial hardware market (Vijayan, 2017).

Distributed data mining of large datasets was introduced by the SETI Institute through its BOINC program (Estrada et al., 2009). The introduction of 'Bitcoin' and the proof of work mechanism allowed a framework for providing incentives to data miners for work and energy to accomplish a large series of computations expanded to process data over a decentralized network (Nakamoto, 2008).

There are many projects ongoing in terms of providing secure storage over a decentralized network. A decentralized storage network is defined as a cloud platform where nodes either store a part of the data or file or the entire chain of data in a blockchain. Some of the more well-known names in this space are FileCoin, IPFS, SiaCoin, Storj, NextCloud, and NEM's Mijin project (see e.g. Protocol Labs, 2017). Reliability and privacy on a decentralized network can be a major issue. Most decentralized networks are not equipped to recover lost data in the event the hosting node experiences hardware crashes or nodes with malicious intent configure files in order to hack the file recipient (a common problem that plagues torrent).

IAGON was built not only to serve the decentralized network but also work with current data storage facilities like SQL and NoSQL databases. The approach taken with IAGON is unique to the point that IAGON utilizes is machine learning algorithm to distribute load across a decentralized network for processing and then encrypts/decrypts data which flows through its system.

There are many use cases that IAGON can serve. IAGON can provide secure storage over centralized, clustered or decentralized networks, distribute data processing load across its network of data miners for data analytics, provide a secure solution for creating smart contracts over the blockchain, or serve to identify honest and attacking nodes within a system.

## IAGON'S MULTIPLE BLOCKCHAIN SUPPORT

IAGON aim at providing its users and miners complete flexibility and freedom of choice in providing and consuming decentralized cloud services . Hence , IAGON will provide a multiple blockchain solution , running its cloud storage and processing operations both on the Ethereum blockchain and on Tangle.

Users and miners can choose either Ethereum or Tangle to fully securely store their files, to process com - putational tasks , to pay and to receive IAGON tokens for cloud services , and primarily to benefit from huge advantages in gaining access to the market's prominent and state-of-the-art technologies.

## IAGON'S SECURE LAKE TECHNOLOGY

The Big Data market is characterized by the recent adoption of Data Lake architectures, such as information systems that are based on the Hadoop framework, by large companies. The Data Lake architecture is based on implementation of a NoSQL central database (such as MongoDB, HBase or Cassandra) in which files of any sort can be stored and be retrieved from. Companies can virtually define a central depository for their information and data files that does not depend on the contents or on the file types and provides a user-friendly and accessible source for all the files managed either in SMEs, middle sized companies or large corporations.

Nonetheless, the data lake architecture suggests that once it is hacked, an intruder can "swim" in the database system, explore the files and gain access to valuable data describing every aspect of the operations of an organization that is hacked. One of the major uses of IAGON's Secure Lake technology in encrypting, slicing and distributing the data lake files is "freezing" the lake, that is prohibiting by means of encryption and decentralization of files any party from navigating within the data lake after gaining access to it (see Figure 3).

*Data lake architecture* *IAGON's Secure Lake solution.*

**Figure 3:** The data lake architecture vs. IAGON's Secure Lake solution.

Hacking a Data Lake of any organization exposes it to unlimited number of security, privacy and financial risks, from online publication of private information of clients, through use and sale of suppliers and commercially sensitive data to trading trade secrets, internal correspondence and digital goods (such as source code and designs of new products).

The vulnerabilities as well as the hacking possibilities of databases of Big Data and Data Lake infrastructure are publicly posted online, mainly warning organizations against security breaches that may rise due to use of these platforms.

Few examples from the recent years illustrate the broad scope of threats and risks to organizations (as well as to their customers and suppliers) that result from hacking their IT systems and databases:

- In January 2017, Camarda (2017) reported that "Hadoop attacks followed ongoing attacks on MongoDB, ElasticSearch, and Apache CouchDB. In some cases, criminals have been know to clone and wipe databases, claiming to hold the originals for ransom. In other attacks, they have simply deleted databases without demanding payment."

- At the same period , Constantin (2017 ) reported that "It was only a matter of time until ransomware groups that wiped data from thousands of MongoDB databases and Elasticsearch clusters start ed targeting other data storage technologies ... 126 Hadoop instances have been wiped so far. The number of victims is likely to increase because there are thousands of Hadoop deployments ac cessible from the internet although it's hard to say how many are vulnerable. The attacks against MongoDB and Elasticsearch followed a similar pattern. The number of MongoDB victims jumped from hundreds to thousands in a matter of hours and to tens of thousands within a week. The latest count puts the number of wiped MongoDB databases at more than 34,000 and that of deleted Elasticsearch clusters at more than 4,600."

- Claburn (2017) indicates that the actions of the attackers on Hadoop based systems "may include destroying data nodes, data volumes, or snapshots with terabytes of data in seconds".

- Earlier reports explain how to hack into Hadoop systems and to exploit their vulnerabilities to destroy of copy large volumes of data (see for example Gothard, 2015).

Given the nature of the vulnerabilities exposed, and those that have not yet been exploited by attackers, but may exist in the systems , as well as the lack of policies of ongoing cyber security auditing in many organizations, databases at large are exposed to other parties, should they decide to apply these intrusion techniques. The results for any organization can be catastrophic and have a large magnitude of impact on its operations. To illustrate, the Equifax hack, reported in September 2017, exposed the personal data of 143 million customers, causing a daily fall of 19% in Equifax's market value.

IAGON's Secure Lake is based on the blockchain unbreakable encryption technology, on file slicing and storage of small, anonymous and strongly encrypted slices of the original files ensures the complete protection of data files, other types of files (such as scans, photos and videos) and databases of any size and ensures the rapid retrieval and update of any stored file. Except from the user who securely uploads a file and has the password (key) to retrieve and encrypt it, no one can read the contents of the small file slices, encrypt, delete, change, retrieve them, identify their source or even associate them with other file slices that are generated from the original, uploaded file. IAGON's technology ensures that even when information systems are breached in any way, the data and files that they use cannot be accessed, deleted or modified in any way.

# IAGON'S SMART GRID PLATFORM AND AI-TRACKER TECHNOLOGY

The increasing demand for processing power is evident for example by the growing sales of NVIDIA systems for Machine Learning and Deep Learning operations, as well as other advanced operations of Artificial Intelligence that require vast volumes of computing and processing capabilities. The technology domain of AI based innovations that require large capacities of processing power (mostly supplied by batteries of servers with large amount of CPUs and GPUs) include face recognition, video processing, voice analysis, text analysis, pattern recognition in Big Data databases and digital document repositories, autonomous cars, IoT based decision support systems and many more. AI technologies and applications are expected to exponentially grow
over the next years, thereby increasing the demand for processing power to support both research and their day-to-day operations.
IAGON's Smart Grid is equivalent to any other power grid (such as solar production of electricity):

- It connects multiple producers to customers
- Smart Grid fulfils the demand for the necessary resource
- It transfers unused resources to customers in need (CPU and GPU processing power and storage space), and
- It benefits the miners providing processing power and storage space to the grid without requiring efforts when their servers and computers are not used by them.

The Smart Grid is based on advanced Artificial Intelligence components that include more than 100 Machine Learning algorithms, methods and techniques that integrate to form our AI-Tracker system. AI-Tracker is the "brain" behind IAGON's Smart Grid. It optimally allocates encrypted file slices to the miners' free storage spaces and computational tasks to the miners' free (idle) CPUs and GPUs that compose the Smart Grid. AI-Tracker is a dynamically learning system that continuously analyzes past and current data streams that reflect the availability of storage space and processing capacities of miners. AI- Tracker carries out the tasks of optimally allocating and transmitting encrypted file slices to designated storage spaces, allocation for processing tasks for rapid, optimal performance of the grid and identification of rogue nodes that should be blocked and removed from the grid and continuously fine tuning the grid's attributes to optimize its performance at any time (see Figure 4).

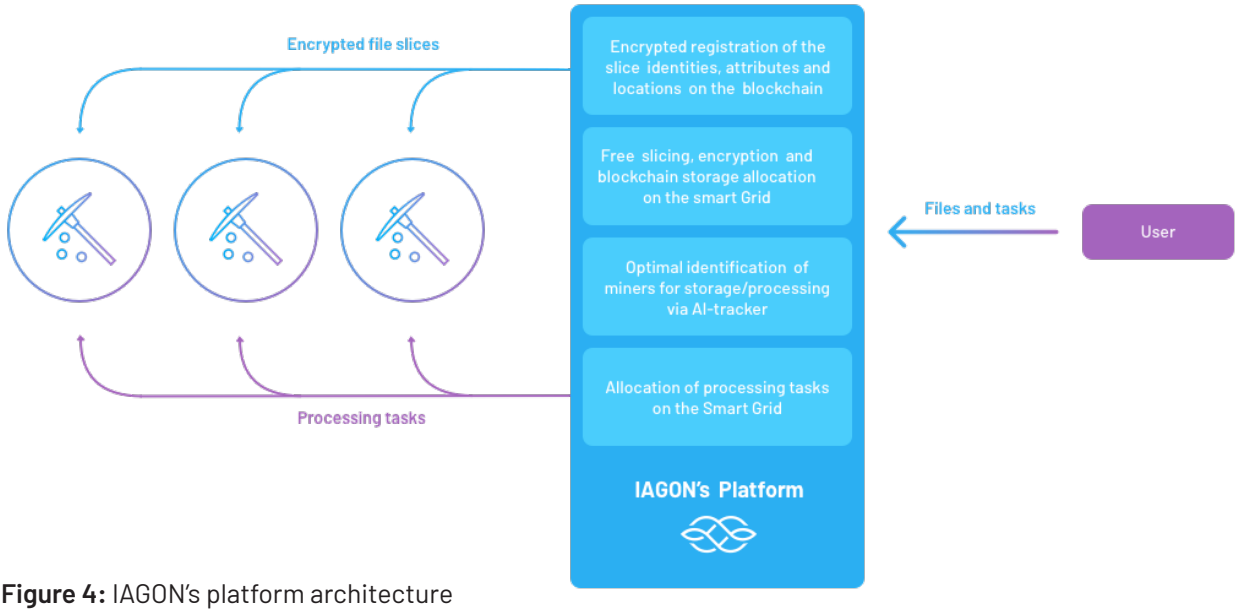


**Figure 4:** IAGON's platform architecture

# CASE STUDY

IAGON intends to bring decentralization into mainstream businesses and consumer markets. In order to achieve this, IAGON was designed and built to integrate seamlessly into existing IT infrastructure without the need for expensive resources to deploy.

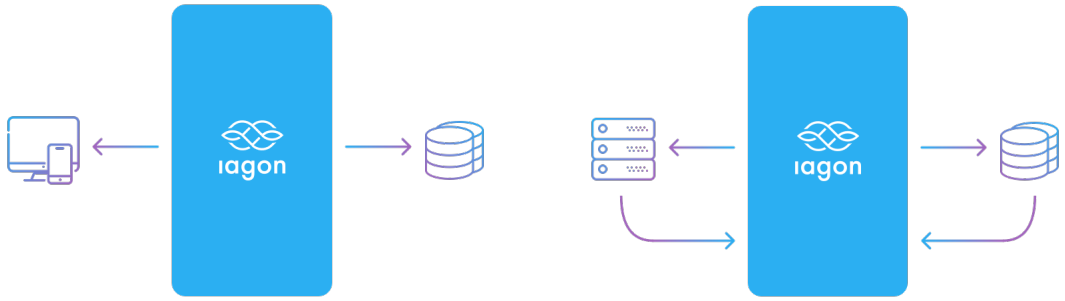


**Figure 5:** IAGON in a typical server-database architecture and frontend-backend architecture

Figure 5 is a graphical representation of IAGON serving as a middleware between server- database and frontend-backend in existing IT infrastructure. IAGON can work with both SQL and NoSQL database structures that are commonly used today without the need for expensive migration processes or specialized resources to implement and deploy. IAGON provides a security layer because it identifies specific digital fingerprints associated with the request going through the server to identify if a request is an honest node.

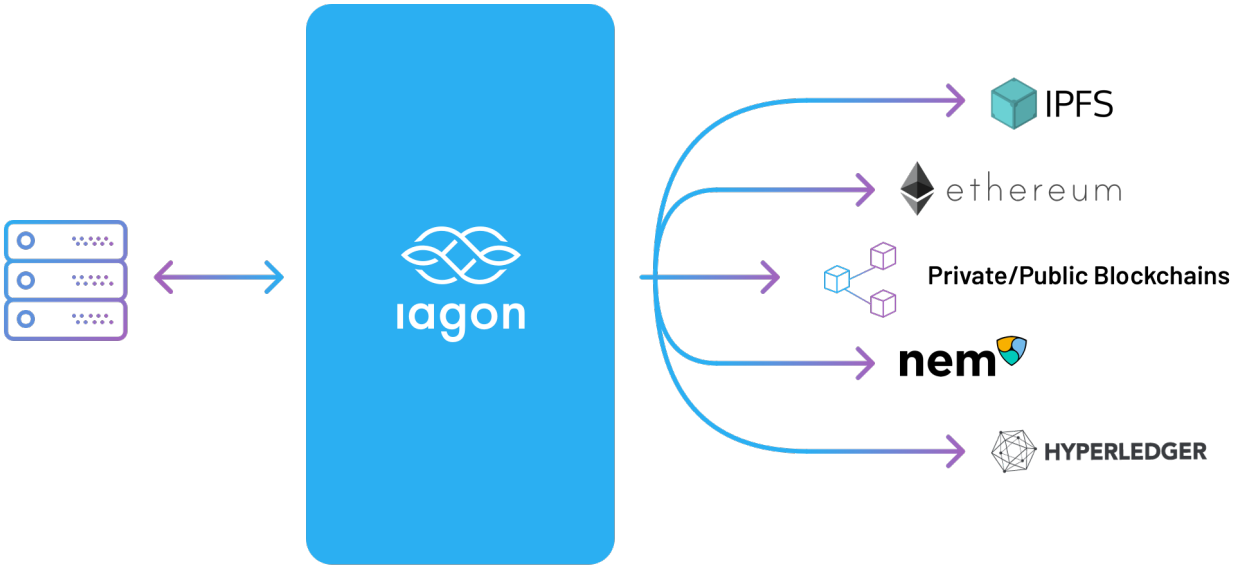


**Figure 6:** IAGON in public/private blockchain architecture.

Figure 6 provides an overview of IAGON in a private and public blockchain network. It serves as a layer to allow data to be securely stored within both private and public blockchains. Using machine learning algorithms and encryption/decryption protocols, IAGON is able to provide a secure method in storing data across platforms.
IAGON can be configured to serve not only as a secure platform to integrate with existing blockchains but also utilize its data mining feature to process data. IAGON scales by distributing processing load across a decentralized network and securely stores data the across different decentralized platforms. This is done through IAGON machine learning algorithm that works to distribute the data based on the task it is required to undertake. IAGON uses both supervised and unsupervised machine learning method known as semi-supervised learning to both process and distribute data across decentralized networks.

## REGULATIONS

The introduction of Regulation EU 2016/679 to replace Directive 95/46/EC, introduced more stringent regulations in regards to data processing and mining of data of personal records. The regulation introduces certain restriction on the collection and processing of personal data including limitations on the free movement and sharing of such data (EU, 2016).
In order to remain compliant with local regulatory restrictions on data mining and processing, IAGON will limit and restrict the type of processing being done on its platform. It will perform this by using geolocation algorithms to identify the source of the user and the destination the data is being sent. In general IAGON encrypts all data within its platform hence the process of piecing together personal data or identifying individuals based on the data it processes is technically impossible. In most use cases IAGON is a pass-through entity as such is holds no data within its facility and only serves as a security layer between the data flowing through its systems.

# ARCHITECTURE

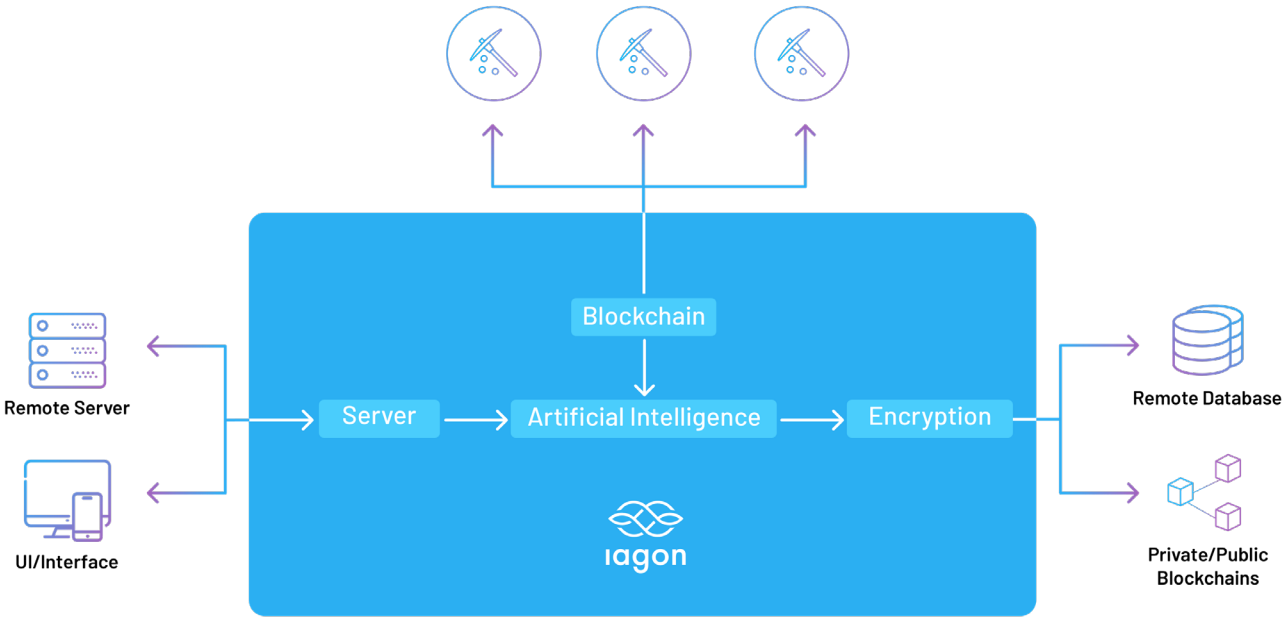


**Figure 7:** An Overview of IAGON's Architecture

The architecture of IAGON's platform can be broken down into three unique sections. The sections are the machine learning algorithm, the blockchain and miners, and the encryption/decryption protocol. When a request is sent to IAGON, the machine learning algorithm sends blocks of data over to the miners to process and find for matching signatures. These blocks of data are then sent back to be validated over the blockchain along with an output which the machine learning algorithm will use to identify a node. It will be impossible to identify a node without processing the data in multiple blocks and to identify a correlation thus this provides a level of anonymity and privacy to the users utilizing IAGON's platform. Individual miners will not be able to identify a certain request or node unless they have access to enough blocks. Blocks are distributed evenly to miners by utilizing proof of variance and does not store any of the data within their local systems. This allows data to be process anonymously without being able to identify any single node individually except through the machine learning algorithm. In addition, Miners are incentivized to process the data quickly to earn rewards, as such it would not be ideal for miners to actually spend time, energy and money to try to store or process the data.

The blockchain allows data to be broken down into blocks and sent across nodes. The hashing algorithm utilizes SHA256 and hashes each block with its previous hash to create a chain. When data is received back from an individual node, the data output will be matched against the hash of its corresponding block and validated against its header to determine if the output data is valid. This way of processing provides a unique method towards distributed processing as it provides a layer of integrity to the data being processed and to determine if the output has been tempered in any way. In the event any of the miners have manipulated the data in anyway, the returning block will be rejected and the block will be sent over to a different node to be reprocessed. Miners receive incentives based upon the number of processes they perform – in simple speak, the more data they process the bigger the incentives.

The encryption and decryption protocol allows for secure storage of data within any external or internal platforms. This provides a unique approach towards decentralization as any external platform with an API can simply be intergrated to IAGON's platform to utilize its services. What makes IAGON unique is the fact that IAGON is able to integrate seamlessly with current database architecture including SQL, NoSQL, Big data databases, private blockchain, hyperledger, or any public blockchain or decentralized network.

# REINFORCEMENT LEARNING

IAGON is an AI that learns over time. To achieve this, IAGON learns through a method known as reinforcement learning. Reinforcement learning is the science of decision making to handle a dynamic environment. This means IAGON undergoes an active learning process to optimize its decision making process to determine its course of action. This creates and unparalleled paradigm towards how IAGON handles its input. Using a method known as Markov Decision Process that is based on probability theory, IAGON tries to determine an optimized form of reward system that improvises its actions to maximize its reward system over time.

Reinforcement learning is the intersection of various paradigms in science as describe in Figure 8:

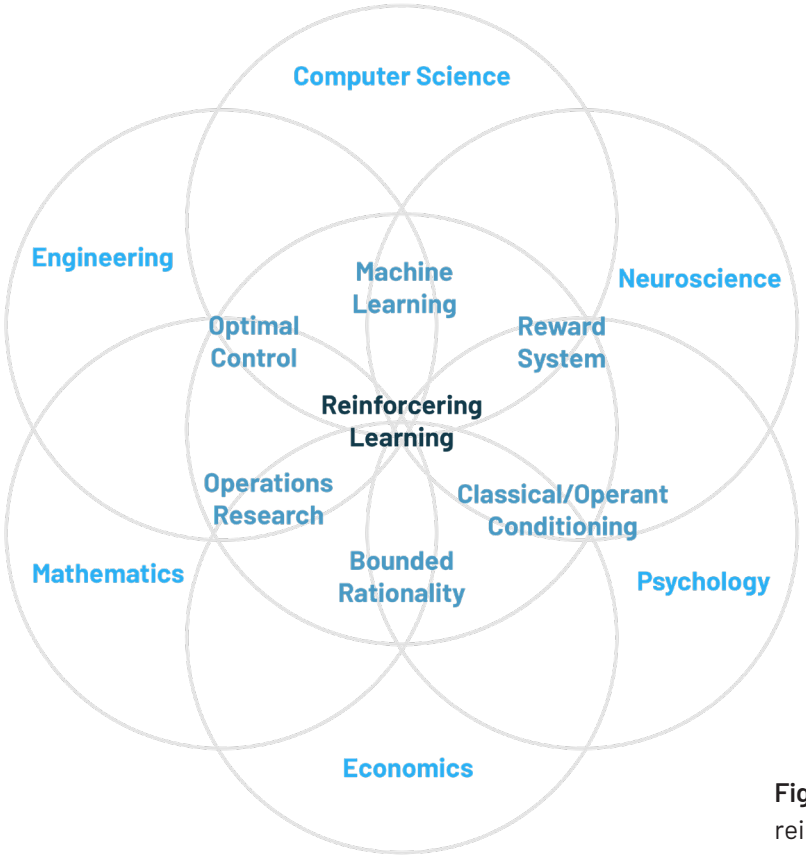


**Figure 8:** Venn diagram of reinforcement learning.

The Markov Decision Process can be describe using the following algorithm:

- S, a set of states of the world
- A, a set of actions
- R, the expected reward from a state and action
- , expected reward for transition from where some action is taken
- Rules to describe the observation the agent makes

The end goal is pick actions that maximizes future rewards

Markov state is unique in its approach because it bases decision making of the future independent of the past given the present (David Silver). This is represented by the information state (a.k.a Markov state) if and only if:

The information state proves that if the present state of a system is known, then the historical actions need not be considered as the results of the future will be independent to the historical state.

# DATA MINING

IAGON takes a very different approach towards data mining. IAGON does this by utilizing a private blockchain with public network protocols over API networks. A miner does not need to store any of the data in order to mine, the miner's sole duty is to honestly process the data and send the output back to IAGON's machine learning algorithm for analysis.

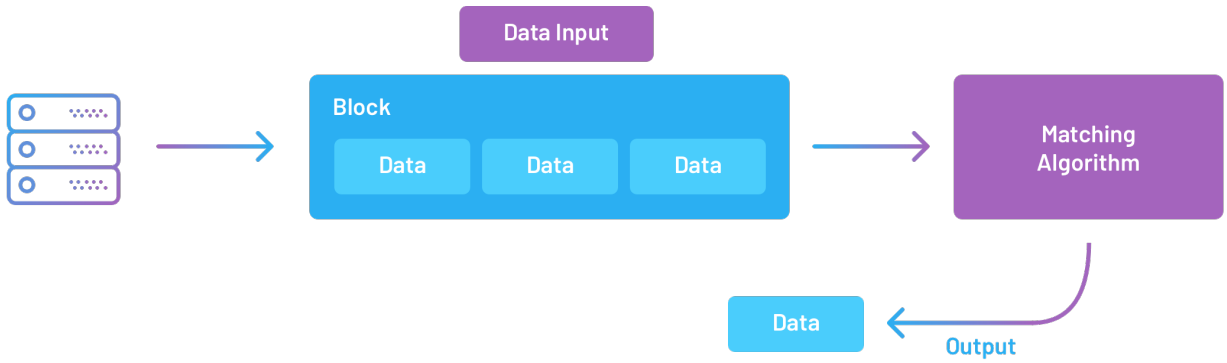


**Figure 9:** Mining data flow on IAGON's platform.

Data mining on IAGON's platform does not have the need to perform complex algorithm to solve an equation. Instead, IAGON uses the decentralized computing network to distribute load and increase speed for mundane data processing tasks. Block tasks are distributed to miners using the proof of variance method. Miners will need to match the data signature from the data input and find its corresponding data object in the block and return the data output. The miners do not need to store any of the data it processes, and once the data has been validated to belong to the specific block, the miner is considered to have mined the block. The miner receives rewards based on the number of data points it mines, and if no data is found within the block the miner does not receive any reward. This will incentivize miners to complete mining the entire block and to increase the number of blocks they mine. The incentive mechanism discourages miners from just mining a block until the first data output is achieved because of the speed limitations associated with network connections will prove to be uneconomical, as such miners will be encouraged for their own benefit to completely mine the entire block to find all possible data points that matches the data input.

Blocks are generated at a bounded rate and there are no communication between miner's clients. The server connecting the miners to IAGON's platform uses a multithreaded server to distribute and receive results. Blocks are sent over HTTP-based protocols so that clients inside firewalls can connect to it. There are two methods currently to approach block storage and removal from miner's unit. The option would be to process purely in memory provided by the random-access memory unit in a computer or introducing a garbage collector program that effectively removes the block from disk. The mining client architecture should allow it to run as a background process or a GUI application. To support different architectures, the best approach would be to create multiple threads, where one thread does communication and data processing while the other thread handle GUI interactions (Anderson, 2002). Proof of variance allows IAGON to identify the typical speed at which miners take to process a block. In the event a miner is disconnect, goes offline or does not complete computation on its block, the block is resent to other nodes in the network.

# BLOCKCHAIN

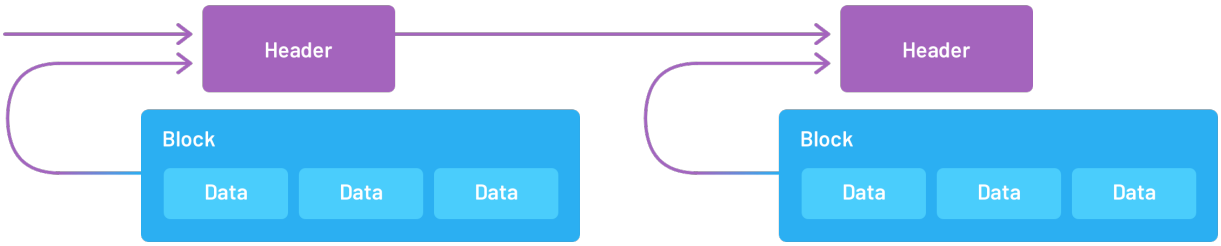


**Figure 10:** IAGON's Blockchain Protocol

IAGON leverages the blockchain technology to maintain honesty of nodes across IAGON distributed data mining algorithm. The blockchain uses SHA256 algorithm of previous blocks to maintain a chain link to its historical state (in this case data).This allows IAGON to incentivize miners on its platform to process data honestly and to guard against deliberate manipulation of the data output. Using the blockchain, IAGON's machine learning algorithm can quickly identify if a data output mined from a block is actually a valid part of the block. This can be achieve within the framework of a simple blockchain similar to that used by 'Bitcoin' by hashing the inputs with the hash of the previous block. Genesis block are created internally within the private blockchain. The blockchain presents a unique approach towards sharing data across a decentralized network. The data can be stored, processed and validated by a network of nodes or it can be stored and validated within an internal facility where the processing is outsourced to a decentralized network of nodes. The blockchain allows consistency to be maintained throughout the entire data structure.

One of the major reason the blockchain is maintained privately is to compete with big data databases in the market in terms of volume, variety and velocity. A private blockchain allows for the research, development and facility cost to be borne by IAGON's team with input from various stakeholders as oppose to getting multiple parties to reach a large enough consensus before making big development changes to improve the system. In order to keep up with massive read and write operations within its private blockchain, IAGON might in the future scale to introduced multiple private blockchains to reduce the potential of a single point of failure which can bring the down whole system by using a master-less architecture.

## THE TANGLE TECHNOLOGY

IAGON will expand its operations to support using its Smart Grid and Secure Lake technologies on the Tangle platform, in addition to operating them on the Ethereum blockchain. The Tangle technology is based on application of a directed acyclic graph (DAG). Mathematically, the Tangle generates a stochastic process on the space of Directed Acyclic Graphs (DAGs) that "grows" in time by attaching new vertices to the graph according to a Poissonian clock. Yet, no vertices (edges) are deleted. When that clock signals the system, a new vertex appears and attaches itself to positions on the graph selected by random walk processes on the prior state of the graph (Popov et al., 2017).

The application of the Tangle technology assists in resolving some of the issues associated with the implementation of the blockchain technology for a large scale of operations, including the difficulties to scale the blockchain, to achieve consensus on the validity of blocks when the new blocks continuously arrive. By applying the Tangle technology, IAGON can offer an alternative solution for organizations with Big Data repositories that can support large scales of processing and storage management tasks.

## MINING ALGORITHM

IAGON does not use the blockchain like other cryptocurrencies. Even its use case approaches data processing in a more conventional method hence using a POW (proof of work) or POS (proof of stake) mechanism to reward a particular miner for discovering a particular block is not a viable solution. Hence IAGON uses its own mechanism for determining miners' contribution and processing speed using a method know as proof of variance. Proof of variance classifies each miner based on their contribution into a pool. Miners within the same pool then compete which each other. Miners from lower pools get upgraded or downgraded based on several factors but the two main factors are speed and amount of data miners are able to find. Proof of variance uses a combination of algebraic theory and probability functions to compute a miner's contribution and which pool the miner can be classified under. This allows for newer miners to profit from mining data and increase their processing assets exponentially while miners investing more into their assets can obtain an immediate return on their investment. The probability theory utilizes both discrete and continuous functions and results of mining change over time.

**Block Imaging:** Block imaging is the method in which certain subset of the blockchain is imaged or copied to be randomly distributed across the node. An image of the block sent to nodes will mean the blockchain does not undergo any sort of permutation and remains immutable. Theoretically, randomly selected blocks are branched and distributed to nodes for processing. The imaging algorithm is a suitable method that is scalable to solve arbitrarily large problems by using distributed nodes. To create the algorithm for block imaging, we assume that  and  are block separable:

$$f(y)=\sum_{i=1}^{M} fi(yi), g(x)=\sum_{j=1}^{N} g_j(x_j),$$

where,

$$y=(y_1,\cdots,y_M), x=(x_1,\cdots,x_N),$$

assuming a variable A as a block:

$$A = \begin{bmatrix} A_{11} & A_{12} & \cdots & A_{1N} \\ A_{21} & A_{22} & \cdots & A_{2N} \\ \vdots & \vdots & \ddots & \vdots \\ A_{M1} & A_{M2} & \cdots & A_{MN} \end{bmatrix}$$

If , where  is treated as the block row index and  as the block column index the function can be expressed as:

$$y_i = \sum_{j=1}^{N} A_{ij} x_j, i = 1, \ldots, M$$

When hence  and once all subvectors are size 0,  and  are fully separable. Fully separable blocks have no restrictions on partitioning with the end goal is to allow for each block to be handled by separate process and does not involve the transfer of block matrices among processes (Parikh and Boyd, 2012).

**Binomial Distribution:** To ascertain distribution of blocks within a set (blocks are assumed to include 0 as the genesis block), for natural numbers n and k, where n ≥ k ≥ 0, the binomial coefficients are arranged into rows for successive values of n, and in which k ranges from 0 to n. Since blocks are defined in natural numbers and can be defined as the coefficient of the monomial  in the expansion of . The coefficient allows for the use of binomial theorem to scale data block distribution using:

$$(x+y)^n = \sum_{k=0}^{n} \binom{n}{k} x^{n-k} y^k$$

Solving for  where  is a non-negative integer provides the number of k-combinations (Molenaar, 1970; Fog, 2008).

This method allows for scalability as block numbers grow and dependent algorithms no longer require data to be parsed from the entire blockchain once sufficient volume has been obtained.

**Continuous Time:** IAGON uses a particular mathematical dynamic knows as continuous time as a framework to perform its calculations given that the time dimension grows linearly. Continuous time would account for the potential limitations that exist with using discrete time models when dealing with continuous simulations.

**Proof of Variance:** IAGON uses probability density function in determining data distribution and miner classification. It utilizes a function of continuous random variables whose value at any given point in a sample space is defined as the relative likelihood of a miner finding a data output within an n number of blocks. Blocks are distributed in this manner to miners throughout its system where the general likely hood of miners with higher probability levels can process data at higher speeds. Since the function utilizes continuous variables over time, it allows the classification of miners based on performance rather than a lottery system or having a stake within the particular system.

Given that: $f(t) = \frac{1}{2}(\delta(t+1) + \delta(t-1))$

Where the Gaussian distribution is denoted as: $f(x) = \frac{1}{\sqrt{2\pi}} e^{-x^2/2}$

And joint continuously in a domain, D in the n-dimensional space of variables between X1....Xn:

$$Pr(X_1,\ldots,X_n \in D) = \int_D f_{X1,\ldots,X_n}(x_1,\ldots,x_n)dx_1\ldots dx_\eta$$

Finally, variance is used to identify a particulars miner grouping within a performance vs time metric:

$$\sigma^2 = \frac{\sum(X-\mu)^2}{N}$$

The proof of variance algorithm is unique to the use case in regards to different domains used in its calculations. Since blocks are generated in continuous time and processing happens asynchronously, the usage of probability functions allows for a fairer system of rewarding miners based on the group the miner is competing in. Proof of variance allows for new miners to improve their computational power over time and existing miners with greater computational power and connection speed to earn rewards proportional to their contributions.

## RESOLUTION PROTOCOL

Like all autonomous systems, there is always a need for some form of manual intervention when dealing with anomalies. The resolution protocol has a set of rules when dealing with anomalies to either resolve it automatically or perform further processing by sandboxing the request and allow manual intervention to resolve the conflict.

## ENCRYPTION/DECRYPTION

The encryption/decryption protocol is used for internally stored data. All data stored within IAGON's platform is encrypted to some degree to protect the data in the event of a breach. IAGON has a variety of options to store data on its platform including SQL, NoSQL, private blockchains and other 3rd party storage providers which are compliant with regulatory requirements. IAGON at its core use AES-256 to encrypt and decrypt data. AES-256 is the encryption standard recommended by the NIST (National Institute of Standards and Technology) and uses a symmetric key algorithm.

## ICO AND OPERATIONS

The IAGON pre-ICO begins on April 2nd, 12 pm WEST, lasts for 18-28 days, and ends either April 20th or 30 th depending on sales. The pre-ICO offers 20% of the tokens at a price of:

- 0.07 USD per IAG token for first 100 million tokens;
- 0.10 USD per token for next 100 million tokens.

Purchases can be made in ETH. Pre-ICO will be done solely through Dragonchain , and only holders of Dragon tokens can participate in it. Please visit the Dragonchain website for more information - dragonchain.com.

The IAGON crowdsale (ICO) begins either April 20th 12 pm WEST or April 30th. ICO lasts for 30-60 days, depending on sale. In addition to the pre-ICO, the crowdsale offers 50% of the IAGON tokens to the public (offering in total 500,000,000 tokens) according to the following rates:

- 0.12 USD per all 500 millions tokens

Total amount of IAG tokens for two phases: 700,000,000 tokens.

Other 30% of the tokens (max. 300,000,000 tokens) will be dedicated to: 10% for IAGON's team; 10% for advisors and bounty hunters; 10% for development.

IAGON's team works hard to support the reputation of IAGON as the leading platform for storage and processing services, enhancing its adoption among users that allocate their computational resources and among potential customers.

The development of the IAGON platform and miner's client software will continue immediately after the completion of the ICO. The introduction of the beta version of the platform and the client are expected by Q4 2018.

## PURCHASING TOKENS VIA FIAT MONEY TRANSFERS

Purchases can be made via all ETH, Bank Transfer or debit/card (We also use Changelly as our API and this allows for us to convert other curriences to ETH on site, before purchase).

Please follow the detailed instructions for ICO fiat money transfers on our website.

## THE IAGON TEAM

IAGON's executive team is lead by Dr. Navjit Dhaliwal, a highly experienced professional in the field of cryptocurrency investments and financial operations.
IAGON's team members are:

Dr. Navjit Dhaliwal
Chief Executive Officer

Dr. Navjit Dhaliwal is IAGON's CEO and founder, aiming to revolutionize the world's centralized cloud industry by offering a decentralized cloud services platform. In the past, Navjit was a medical entrepreneur in the field of dentistry, successfully leading Norway's Mjøsa Tannklinikk's operations and doubling its revenues in one year.

Dr. Elad Harison
Chief Architect and Chief Operations Officer

Dr. Elad Harison in an expert on Data Mining and Machine Learning, Economist and Industrial Engineer, who is in charge of IAGON's architecture planning and operations. He is the former Head of the Industrial Engineering Department at Shenkar College and an accomplished economic advisor and analyst in the private sector in Israel and in the EU, where he led business feasibility studies, market research and statistical analysis and IT architecture changes for the European Commission, several European governments, KLM-Air France and an Israeli Bank, among others.

## PUBLIC REVIEW OF THE TOKEN CONTRACT

The Token Contract and associated audits will be published at a later date on Etherscan. We invite all potential participants to review them for features and functionality.

## DISCLAIMER

IAGON are only functional tokens intended to be used to compensate IAGON for the use of the IAGON platform. The IAGON tokens will give token holders and users access to the IAGON platform. IAGON are not for speculative investment. No promises regarding value or future performance are made regarding IAGON. No promises regarding any particular value of IAGON are made. No other rights associated with holding IAGON are given. Proceeds of the token sale may be spent as the company sees appropriate, which may change as deemed necessary in the maturation and advancement of IAGON.

Our team is investing heavily in the safety and security of the services IAGON provides. However, we cannot protect against all possible sources of error and malicious deeds initiated by any party. Therefore all risks assumed by using the IAGON platform in any capacity, transferring' receiving and accumulating IAGON tokens are solely assumed by the user. IAGON tokens are meant to be held and used by those well experienced and knowledgeable in cryptographic tokens, their acquisition, transfer and use only for accessing the services offered on the IAGON platform.

IAGON and its team must abide within the laws set forth in its operational country(ies). We intend to provide our services in as decentralized a fashion as reasonably feasible, but our legal entity must act according to the rules and bounds encoded in applicable laws. This includes but is not necessarily limited to laws governing financial operations, employment, fee charging, and sales.

# REFERENCES


Anderson D.P. (2002). Seti@home : An Experiment in Public-Resource Computing. Retrieved from https://setiathome.berkeley.edu/sah_papers/cacm.php

Camarda B. (2017). As attacks rise, we ask: how secure is your Hadoop installation?. Naked Security, January 2017. Retrieved from https://nakedsecurity.sophos.com/2017/01/24/as- attacks-rise-we-ask-how-secure-is-your-hadoop-installation/

Claburn T. (2017). Clusters f**ked: Insecure Hadoop file systems wiped by miscreants. The Register, February 2017. Retrieved from https://www.theregister.co.uk/2017/02/09/hadoop_clusters_fked/

Constantin L. (2017). Attackers start wiping data from CouchDB and Hadoop databases. PC World, January 2017. Retrieved from https://www.pcworld.com/article/3159527/security/attackers-start-wiping-data-from-couchdb- and-hadoop-databases.html

Dai D., Zheng W., Fan T. (2017). Evaluation of personal cloud storage products in China. Industrial Management and Data Systems, 117(1):131-148.

Dean, J. et al. (2012). Large scale distributed deep networks. Advances in Neural Information Processing Systems, 1223–1231.

Estrada, T., Taufer M., Anderson D.P. (2009). Performance Prediction and Analysis of BOINC Projects: An Empirical Study with EmBOINC. BOINC Berkeley. Retrieved from http://boinc.berkeley.edu/estrada_09.pdf

Fog, A. (2008). Calculation Methods For Wallenius' Noncentral Hypergeometric Distribution. Communication in Statistics. Retrieved from http://www.tandfonline.com/doi/abs/ 10.1080/03610910701790269

Gothard P. (2015). How to hack Hadoop (and how to prevent others doing it to you). Computing, October 2015. Retrieved from https://www.computing.co.uk/ctg/news/2431101/how-to- hack-hadoop-and-how-to-prevent-others-doing-it-to-you

Hu W., Yang T., Matthews J.N. (2010). The good, the bad and the ugly of consumer cloud storage. ACM SIGOPS Operating Systems Review, 44(3):110-115.

Korpela, E. et.al (2001). Seti@home – Massively Distributed Computing For SETI

Molenaar, W. (1970). Approximations to the poisson, binomial and hypergeometric distribution functions. Narcis. Retrieved from https://www.narcis.nl/publication/RecordID/oai:cwi.nl:13049

Nakamoto, Satoshi (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. Bitcoin Org. Retrieved from https://bitcoin.org/bitcoin.pdf

Parikh, N., Boyd S. (2012). Block Splitting For Distributed Optimization. Springer. Retrieved from https://web.stanford.edu/~boyd/papers/pdf/block_splitting.pdf

Popov S., Saa O., Finardi P. (2017). Equilibria in the Tangle. Retrieved from https://arxiv.org/pdf/1712.05385.pdf

Protocol Labs (2017). Filecoin: A Decentralized Storage Network. Filecoin. Retrieved from https://filecoin.io/filecoin.pdf

Ray, S. (2017). Essentials of Machine Learning Algorithms (with Python and R Codes). Analytics Vidhya. Retrieve from https://www.analyticsvidhya.com/blog/2017/09/common-machine- learning-algorithms/

Regulation (EU) 2016/679 Of The European Parliament and of The Council. Official Journal Of The European Union, Retrieved from http://eur-lex.europa.eu/legal- content/en/TXT/?uri=CELEX %3A32016R0679

Vijayan, J. (2017). Researchers from Google, CTI Break SHA-1 Hash Encryption Function. eWeek. Retrieved from http://www.eweek.com/security/researchers-from-google-cti-break- sha-1-hash-encryption-function

Sverdlik, Y. (2017). AWS Outage that Broke the Internet Caused by Mistyped Command. Retrieved from http://www.datacenterknowledge.com/archives/2017/03/02/aws-outage- that-broke-the-internet-caused-by-mistyped-command

Wang C. (2017). QoE Based Management and Control for Large-Scale VoD System in the Cloud. PhD Dissertation, Carnegie Mellon University.


WWW.IAGON.COM