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Abstract

Over the past decade, the Internet has become oligarchic and unfair. Dominated by big tech data monopolies, today's digital economy is driven by an aggressive competition for the collection of individuals' profile and behavioral data to be sold to third parties for targeted advertising. The tactics that have fueled Web 2.0 - surveillance, interruption, exploitation and monetization of personal data - are now deeply entrenched, with the centralization and cross-party use of data, without the individual's meaningful consent, firmly built into the web's business model.

Permission.io was created to put an end to the interruptive, exploitative economy that has built Web 2.0 and to give individuals back ownership of their time and information. With the creation of the Permission Coin (ticker ASK), Permission has developed a unit of exchange that allows the value of an individuals' time and data to be properly priced and permissioned within a transparent market system. In doing so, the company is building a totally decentralized Permission Economy, one that allows individuals all over the world to own, control, and profit from their engagement.

The Permission Platform today targets e-commerce retailers, enabling sellers/advertisers and buyers/users to transact on a permission basis. A fork of Ethereum, the Permission Blockchain allows for individuals to grant permission to advertisers and other marketplace participants for access to their time and data in a peer-to-peer fashion. Buyers are incentivized and compensated for their permission to engage in ASK while advertisers benefit from a 1:1 engagement, decreased costs and increased ROI. By enabling value to be distributed back to the individual along the buying journey, away from big tech's centralization and exploitation of data, Permission is bringing needed change to the current Internet business model.

Fundamental to Permission.io's mission and value creation for all stakeholders is its ability to provide permissioned visibility over an individual's full dataset. Currently, personal data is trapped in silos and applications, stifling e-commerce advertising and entrenching big tech's domination. Permission's proprietary query engine ("PermissionQE"), based on patented technology using Data Algebra, provides a mechanism for making individuals' data universally accessible and usable in a protected way. Applying innovations in Data Algebra, advertisers can now gain permissioned access to data across different databases, including 3rd party sources, enabling data interoperability. Individuals achieve true data sovereignty and the ability to 'permission' and be compensated for their data across the entire digital ecosystem.

The rise of decentralized applications and distributed ledger technologies point to a new web economy that respects and enables the monetization of individuals' time and data. As these new technologies mature and become scalable, Web 2.0's economy of Internet kings will be overtaken by an open, transparent and distributed Permission Economy. ASK, with worldwide circulation made possible by Permission-based applications that activate across the web, will be the currency that powers this economy and will be foundational to its growth.

To realize this ambitious vision, we are building applications and incentives that encourage mathematicians, technologists, developers, businesses, and consumers to build, contribute to, and expand the Permission ecosystem. We envision myriad vertical use cases (e.g., e-commerce, entertainment, gaming, travel, health and wellness, recruiting, market research, etc.) that are built on top of Permission standards and powered by ASK.

This whitepaper details the journey forward.
Background

The Problem

Since its inception, the Internet has launched a global tech boom and has made possible unprecedented access to products, services and information. With its growth, voluminous amounts of data appeared and so did the opportunity to use it for targeted advertising. An entire data economy emerged, heralded by big data, with those most skilled at leveraging data towering at the top. Today, more and more of our global economy runs on the free flowing of individuals’ personal data, with the biggest companies in the world having been built on its monetization.

If data is the new oil, then tactics used to mine that data - interruption, surveillance, tracking - have become the status quo. Corporate behemoths have witnessed growing resentment over their uncouth practices, and the undercurrents of revolt are growing fast. Consumers have lost trust and the demand for privacy has sparked a proliferation of regulation. Advertisers are also fed up, as they continue to waste time and money in an opaque, inefficient market.

For consumers’ part, they are exhausted by excessive advertising. Chronic interruptions have led to the biggest boycott in history. Ad Blockers (over 1 billion installed) enable 82% of Generation Z’ers and over 60% of millennials to skip or block ads,1 shrinking the market for ad-blocker-free engagement. Surreptitious tracking and harvesting of user data have contributed to a growing and well-deserved mistrust, largely propelled by the 2018 Cambridge Analytica scandal, a watershed moment in the public’s understanding of big tech’s misuse of personal data.

A rising tide of user data regulation has surfaced across the globe—as exemplified by the California Consumer Privacy Act (‘CCPA”) and the EU’s General Data Privacy Regulations (“GDPR”). Not surprisingly, these regulations have been a boon to the same powerful intermediaries that triggered their existence. “GDPR has tended to hand power to the big platforms because they have the ability to collect and process the data, entrenching the interests of the incumbent, and making it harder for smaller ad-tech companies.”2 Since violators face costly fines, advertisers are forced to consolidate their online ad spend in the industry’s walled gardens, whom they rely on to use their wherewithal to not run afoul of the rules.

As if regulations aren’t burdensome enough, advertisers face significant challenges in click fraud. Reportedly, 40% of digital ad traffic is the activity of bots clicking on ads. By 2022, a whopping

$44B is estimated to be lost in ad revenue, making click fraud the 2nd biggest organized crime in the world. It gets worse: advertisers aren’t able to assess the authenticity of their conversions and the overall effectiveness of their campaigns, as the dominant platforms use their own analytics products, effectively grading their own homework. All of these factors have contributed to the cost of engaging with users rising dramatically (by a factor of 8) over the past two decades, with digital advertising continuing to deliver a lower ROI year after year.

In response, e-commerce retailers have increasingly adopted loyalty and rewards programs to boost retention and drive down rising acquisition costs. Although consumers have come to expect rewards (nearly 4B rewards accounts in the US alone), only well-capitalized companies - Starbucks, AMEX, Target, Marriott, and the like - can boast successful programs. The overwhelming majority of businesses struggle to implement or maintain them. In fact, 58% of all loyalty accounts are dormant, which by some estimates equates to nearly $100B USD of loyalty points unclaimed each year. The primary reasons for a loyalty’s program failure are lack of liquidity, lack of uniformity, and limited shelf life, yielding little shared benefit.

Individuals are tired of being interrupted and treated like a product, and advertisers are tired of wasting their time and money on an inefficient media supply chain with poor standards. Trust has been damaged between all parties and is inhibiting engagement. Advertisers, e-commerce platforms, brands, retailers, ad agencies & users will all benefit from a transparent permission advertising model that incentivizes engagement & distributes value more equally along the journey, away from big tech’s centralization and exploitation.

The Permission.io Solution

Permission.io has created the infrastructure to enable a new advertising model for e-commerce based on permission and value exchange.

Our vision is to build a dynamic, wide-reaching ecosystem that:

- Transfers financial value direct to the individual (e.g., e-commerce advertising spend) currently captured by centralized platforms.
- Puts individuals back in control and creates a mechanism for monetizing their time and data across global e-commerce platforms and myriad advertising verticals.
Restores Trust by providing an alternative scenario for consumers to receive information about products and services online while avoiding the interruptive, covert tactics that dominate today’s web.

Creates value for businesses by enabling them to instantly tap into permission advertising, achieving 1:1 engagement and a holistic view of users’ needs and desires in real-time. True opt-in and permissioned data results in brand loyalty and increased ROI.

Offers the global advertising and e-commerce marketplaces a trusted and independent identity verification for individuals and vendors to interact on an opt-in basis, creating transparency and eliminating ad spend waste.

Allows advertisers and ad-tech companies to overcome challenges posed by privacy regulations by 1) providing a privacy-compliant, opt-in, permissioned-based platform; and 2) enabling personal data integration that will practically and logically unite an individual’s personal data and present it, with permission, to persons or organizations that wish to interact with it.

Allows brands to instantly adopt an “out-of-box” loyalty program powered by a universal currency that provides a unified means for compensation on Permission.io and further into 3rd party platforms. Instead of accumulating rewards across a multitude of fragmented programs, this unification allows the consumer to derive significantly greater value and versatility, opening up exceptional liquidity, utility, ease of use, trading and spending freedom. The exact opposite of the current global advertising and rewards industries.

Creates new financial opportunities for ecosystem participants that contribute to the growth of the network (e.g. building new technology for Permission.io and its data integration capabilities, creating apps for new product verticals, and referring new members and businesses).

Allows developers to build empowering apps that solve pain points in the relationship between businesses and consumers and that reach new users who are seeking data ownership and compensation.

Transfers financial value stemming from data currently controlled by centralized repositories to all stakeholders in the entire ecosystem.

Promotes true sovereignty for individuals worldwide by enabling ownership and the ability to control and monetize their most precious resources: their time and data.
The Permission Platform

Permission.io is our core experience and the entry to the Permission Platform. Individuals sign up to become a member and obtain a wallet to be used on Permission.io and further into 3rd party applications. Currently, the Permission.io experience is focused on e-commerce and is being optimized for the North American and Asian markets, enabling buyers and sellers to connect on a permission basis. Members opt-in to register their interests, demographic and other key data, and embark on various shopping journeys. For ongoing sharing of data and for granting permission to receive invited ads that address their curiosity, desire to learn, and buy, members are rewarded with ASK. Members are also rewarded for linking and integrating personal data that already exists in Facebook, Instagram, LinkedIn, Google and, eventually, any other site holding their personal data. Members can HODL, exchange, or spend ASK on the platform and/or on other 3rd-party sites that accept ASK.

A core aspect of the member experience is watching video ads. Members earn for engaging with videos ranging in duration and format, including shorter, gamified ads, rewarded or opt-in value exchange video ads, and brand films lasting from a couple of minutes to a couple of hours long. Users will be able to directly monetize their data collected while engaging with video content, unlike typical platforms that sell their information to third parties. Over time, the platform will feature other opportunities for members to earn from their data while interacting with news, surveys, video games, premium content and more.

As of this writing, Permission’s ecosystem has the ability to compensate consumers for connecting with over 10,000 products from top global brands, including Toshiba, Samsung, Armani, Ray Ban, and more. Its current community is composed of individuals from 156 countries. The platform successfully exited beta in August, 2020, and has 350,000 registered ASK wallets. While the foundational elements of the Permission Platform have been developed by our core engineering team, we expect that considerable future development will come from our growing open-source community.
The Long Term Vision

We’ve created Permission.io as the initial application for acquiring members and for demonstrating how e-commerce participants can earn and spend ASK. We are working towards a fully decentralized network that hosts content and data profiles and allows any e-commerce retailer in the world to become a permission advertiser by acquiring ASK and running campaigns. Eventually, third-party websites, mobile apps, and new APIs will be layered on top of the network, allowing for numerous other advertising verticals to be applied that broaden its reach. Examples include entertainment, gaming, travel and tourism, health and wellness, recruiting, coupon strategies, club memberships, and market research.

Figure 1: The Permission Ecosystem Over Time
Going to Market: E-Commerce

Paramount to our mission to build a Permission Economy is the ability to quickly scale. E-commerce is the primary use case for permission advertising transactions powered by ASK, and, given its staggering growth trajectory, is also the most expedient means of promoting its circulation. By 2040, 95% of all purchases are expected to be made via e-commerce. Indeed, the cross-border selling of products and services is growing exponentially, particularly in Asia. By 2023, retail e-commerce sales in Asia Pacific (APAC) are projected to be greater than the rest of the world combined.

Digital advertising is growing equally fast. Global digital ad spend is projected to reach $435.83B USD in 2021, with its share in overall advertising reaching 50% by 2022. Here again, China is leading the way. By 2021, digital advertising will account for 75.6% of its total spend. Mobile in-app ads are also projected to dramatically increase to $240B USD in 2020, up 27% in 2019, with rewarded video seeing the most significant uptick, surging 245%. E-commerce advertising represents 37 percent of total digital ad spend share. Covid-19 is accelerating the trend, with “E-commerce ad spend doubling as consumers self-isolate.”

Another big business that is only getting bigger is customer loyalty. Last year, the total customer loyalty ecosystem amounted to a whopping $323B USD; of that, $75B USD was devoted to rewards in

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7 https://99firms.com/blog/ecommerce-statistics/#gref
10 http://www.netimperative.com/2019/08/01/40-ad-spend-increase-recorded-in-ecommerce-advertising/amp/
11 https://insights.digitalmediasolutions.com/articles/ecommerce-ad-spend-doubles
the form of discounts, merchandise or points.\textsuperscript{12} As for return on that investment, “a full 95 percent of companies reported that members spend more than non-members annually, with 60 percent reporting that members spend two to three times more than non-members.”\textsuperscript{13}

The Permission Platform represents and enables the convergence of these powerful macro-trends.

**Growing the Ecosystem: Widespread Retail Adoption**

The current functionality underlying Permission.io’s e-commerce app is being tested and optimized with a focus on creating simple and delightful ways for users globally to earn and spend with ASK. The longer term strategy is to make the application public and promote retailers worldwide to install the app.

To accomplish this, Permission is developing plugins for popular e-commerce platforms like Shopify, Magento, WooCommerce, Volusion, etc. that will allow the over five million independent operators on these platforms to gain new customers and increase their sales by incentivizing customer behavior with ASK. This will include a collection of features to optimize e-commerce properties, including a tiered reward system based on purchases over a period of time, redemption of ASK for discount codes, referral codes, email newsletter opt-in rewards, and the ability to receive payments in ASK.

The ability to earn ASK across vast Shopify/Volusion/Magento platforms is key to member acquisition. Shoppers on retailer sites that offer ASK must create a Permission wallet and account in order to claim their ASK, prompting activation. PermissionQE enables advertisers to reach large-scale audiences in a highly targeted way by learning about user interests and shopping behavior across the Permission ecosystem. Advertisers thus have the ability to influence and engage with users as they research, compare, and consider different options available to them.

As such, the plugin distribution will create a network effect of attracting both advertisers and users via a novel channel that will push awareness and adoption of ASK toward becoming a global rewards program working and thriving outside of the Permission Platform.

**Permission Browser Extension**

Widespread demand for ASK will be further accomplished with the launch of the Permission Browser Extension. The browser extension, to be installed initially via the Google Chrome Web


\textsuperscript{13} ibid.
Store, customizes the browser experience by enabling Permission members to earn ASK for viewing advertisements while they traverse and engage with the web as they normally do. Unlike popular browser extensions that interrupt, track, and collect personal data without user consent, Permission members are rewarded with ASK for volunteering or “declaring” their data as they search, shop, and browse. Advertisers benefit from capturing dynamic, actionable insights from permissioned data, including sites visited, clicks, time spent, social media preferences, search intent, etc., all with the expressed consent of the user. Advertisers can serve highly relevant ads - with the user’s permission - in real time, resulting in better performance and a more trusted, transparent relationship between brand and consumer.

**Permission Demand-Side Platform**

Just as Google derives revenue from its AdSense network (publishers), which connects to its Ads network (advertisers), so too will Permission derive revenue from the operation of its own demand-side platform. Retailers, content producers, and other advertisers that seek to reach Permission members via the Permission Platform, including advertisers that integrate the Permission plugin within their own software and/or advertisers serve ads vis-a-vis the Permission browser extension, will be able to compensate members in an automated fashion, enabling widespread expansion of ASK across advertising verticals and economic sectors.

Together with its developer community, Permission will create additional applications to propagate ASK to outside advertising platforms that allow members to monetize their data across an integrated ecosystem.

**Decentralization: The Technology Imperative**

Permission.io believes that the technical governance of the Permission Platform is key to its success. The goal is to provide all participants in the market the possibility of becoming stakeholders in the operation of the Permission blockchain. The aim is to decentralize the governance of the blockchain and its network. Permission as it evolves will have a growing need for increased computer resources, for content storage and for more full nodes that implement the Permission blockchain.

The decentralization of the network will guarantee that its software and its future development cannot be controlled by a single central authority or a cartel of interested parties. Instead, future development will be determined by a globally diverse population of stakeholders, including Permission.io members, computing resource providers, developers and businesses that make up the Permission ecosystem. We will encourage all stakeholders to become providers of storage resources.
and possibly to participate by running consensus nodes.

The Permission blockchain will initially adopt a hybrid Proof of Authority (PoA)/Proof of Stake (PoS) approach to governance to ease the inclusion of PoS. It will then move completely to PoS when sufficient distribution has occurred.

**The Permission Community**

**Members**

Permission membership comes with many benefits, the primary being that Permission.io serves as an “agent” for a member’s data; that is, any time an advertiser within the Permission ecosystem wishes to use a member’s information to reach a member, that member is rightfully compensated. The more data a member provides via opt-in engagement, the more personal and comprehensive their “data store.” As the Permission ecosystem grows, and by virtue of the data integration and enrichment made possible by Permission QE, active users can maximize their earning by permissioning their data across the Permission Platform, 3rd party platforms and, eventually, across all permission-based interactions spanning multiple industries. Naturally, all transactions are recorded immutably on the Permission.io blockchain.

As a consequence of GDPR, individuals are able to retrieve their data from any business that holds it, including the likes of LinkedIn, Facebook, Amazon and Google. Permission.io will assist its members in retrieving their data from all such sources by ingesting and claiming it and help individuals assemble a far richer pool of their own data. The initial types of profile data will include, but not be limited to, Shopping, Gaming, Sports, and Fashion. Members will be encouraged to enrich their data store with more and more data, enabling them to receive better, more relevant ads and thus maximize the earning power of their data.

Members’ permissioned data will be securely stored in a private, self-sovereign method, with the members controlling access. Advertisers, merchants, governments and others may ask permission to use that revocable data for various purposes, providing them with access to the richest collection of first-party data available.

**The Reputation Engine**

Just as the blockchain enforces immutability, provenance and security, Permission apps will create transparency, honesty, and integrity. Permission.io’s goal is to build trust by integrating into its sys-
tem a sophisticated reputation score (“Permission Score”) for members, advertisers and merchants. Good behavior is incentivized and bad behavior is penalized.

**Member Reputation**

The member’s ideal behavior is to browse, search for and purchase products and services in a similar way to how they currently browse the Internet for what interests them. To be exact, we expect their browsing and shopping behavior not to vary significantly from the current norm.

We encourage merchants and advertisers to provide consumers with relevant product descriptions, as well as promotional and/or exclusive offers, that entitle the buyer to rewards/discounts as they move through each step of the sales funnel. In so doing, we will be able to analyze not only member responses, but also sales cycle behavior, “from search result or ad to purchase.” Using machine learning data analysis techniques, we will be able to identify the normal range of member patterns, both for searching for products and for the sales conversion on partner sites.

The reputation engine will analyze members’ behavior and calculate their “Permission Score” through multiple identity points and behavioral factors. Those members who try to game the system by searching for goods or services in which they have no interest, and hence never buy, will be excluded from the more rewarding opportunities by their low reputation score. Their earning power will be diminished.

**Advertiser Reputation**

In order to promote trust with consumers and fair competition among advertisers, the advertiser will also be accorded a “Permission Score.” The advertiser’s Permission Score is based on their behavior as enforced by the platform’s established and transparent rules (Terms of Use), as well as consumers’ evaluation of their relationship with the advertisers. Consumers will have the ability to report misleading advertising/products and deceptive practices. Similar to the member’s reputation score, advertisers and merchants will be scored by reviews, comments and behavior that may be made available to all Permission members.

The natural market forces created between advertiser andadvertisee will bring reputation scoring on both sides to a real-time trusted equilibrium, and will discern the competitive price for giving and receiving ASK.
Building a Developer Community

Having a world-class developer community is paramount to the success of Permission.io. We believe that a successful developer community should cultivate discussion, emphasize the mission and values, provide tools, resources, and online support, establish a clear code of conduct, and reward participation, loyalty, and success.

A Software Developer Kit (“SDK”) that includes the technical details of the Permission blockchain will be made available for developers to harness their creativity and build complementary applications to existing Permission apps. Internet services over time will become increasingly available through blockchain (e.g., social media, messaging, publishing, banking, investment, credit checking, educational services, health services, dating, advertising and more), and certain of these apps may be developed on Permission.io. Others will become available through directly linking to other blockchain capabilities that currently exist or are in the process of being created.

In addition to growing our developer community vis-a-vis the building of apps on the Permission blockchain, PermissionQE, a query engine that deploys Permission.io’s patented Data Algebra technology, will be the foundation for a global developer community.

PermissionQE: A Query Engine Like No Other

Marshalling Personal Data

In order to maximize the value of personal data for users and advertisers, data needs to be accessible and integrated. To accomplish this goal, Permission.io has developed PermissionQE, a query engine deploying Permission.io’s innovations in Data Algebra. PermissionQE makes different data sources queryable as a whole, as a single logical data store, enabling our members to manage and control their full personal data set, including the ability to provide permission to advertisers to use it in targeting.

Part of the PermissionQE project is to create the capability to integrate member personal data that already exists on popular websites such as Facebook, Instagram, LinkedIn, and Google and on any other kind of site that might store personal data. The query engine makes such data accessible, versus stuck in the silos that retailers are currently funneled into by traditional ad networks. The managed integration of such data will form a rich and unique data source for advertisers to directly target Permission members in their campaigns. Advertisers would be able to leverage the most comprehensive set of personal data possible.
In devising the project, the goal was to integrate member data and give members the ability to grant or deny access to it, thus providing advertisers with a rich data resource for targeting. Members benefit from having their own personal “data store” to monetize and permission out to sellers and service providers.

The PermissionQE project thus has the following two components.

- A secure personal data resource for Permission.io members. Their personal data remains distributed but all personal data is associated with an authenticated member ID.
- The creation of a query engine and data analysis capability. Advertisers are provided with a portal through which they can query the data of Permission.io members and apply analytical algorithms for the purpose of targeting.

Personal data will be managed securely via encryption. Data ownership, lineage and usage permissions will be recorded, as will an audit trail of the data’s use.

The query engine will be built to allow access to any collections of data from a wide variety of environments. It will thus include a library of specific API plugins to access common data sources. It will be built so that it integrates with the open source framework and possibly other frameworks.

The provision of a versatile personal data resource will be useful to Permission.io and its members beyond its use in targeting ads. From a security perspective it will help to validate new users as unique; fake sign-ups will not be able to link to multiple data sources. This in itself may prove to be an attractive benefit to members, and thus act as an incentive to sign up. We are providing a foundation for members to monetize their personal data from permission-based advertising. Once members have such a data resource there is no reason not to invent and add new ways for members to monetize their data, such as using their data to participate in research projects and consumer surveys. In the long run, PermissionQE can evolve into a platform for comprehensive personal data monetization.

PermissionQE is made possible by the data integration and management capabilities of Data Algebra. Before discussing the Application of Data Algebra in the PermissionQE Project, it is important to define the technology’s origin and implications.

**Permission.io and Data Algebra**

**The Origin of Data Algebra**

Permission.io Inc (previously known as Algebraix Data Corp) invented Data Algebra following a
multi-year research project and a considerable amount of exhaustive testing. It is an entirely new and original field of mathematics that applies directly to data structures and definitions, data manipulation, and data storage. Once Data Algebra had been thoroughly proved to be computationally efficient in multiple environments, a comprehensive definition and explanation was made generally available with the publication of The Algebra of Data, A Foundation for the Data Economy* by Professor Gary Sherman, PhD, and Robin Bloor, PhD.

During the eight years the company spent developing data algebra it was awarded 9 registered patents, primarily relating to techniques that deliver high-performance data retrieval in multiple software contexts and which scale-out over very large data volumes.

**9 Database-Optimization Patents**

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**Data Storage & Retrieval**

*Figure 3: Table of Database-Optimization Patents*

Data Algebra translates and transforms data from one form to another, making different systems queryable and communicable in any format.

Until its development, no complete means of representing and transforming data (and metadata) existed. Data algebra technology is capable of defining and manipulating all possible data structures in any way at any known scale. Throughout the course of its development, it was applied in multiple
contexts to prove its efficacy. Additionally it has been licensed by major enterprise and government agencies.

Permission.io utilizes Data Algebra IP internally to manage its data catalogs and implement Machine Learning algorithms to enhance the services provided to its members, advertisers and sellers.

Data Algebra fully represents the spectrum of personal data that Permission.io members might choose to store (or reference) including flat files, database data of every kind, tabular data, data objects, complex data relationships graphs and semantic metadata structures (ontologies).

**A Natural Application for PermissionQE**

Data Algebra is particularly effective at translating and transforming data from one form to another. In creating an interoperable, authenticated ID (and attaching all personal data to it) there is a clear need to maintain a dynamic map of multiple distributed sources of identity data and metadata along with other kinds of personal data and make it available (with appropriate permissions) in any form it is requested (relational database form, document database form, flat file form, triple store form, IPFS or whatever.) Data Algebra will help to achieve this.

The primary goal of the PermissionQE project is to create a query engine that efficiently spans widely distributed sources of data. The environment will empower individual users to define multiple sources of data located anywhere, and query them as a unified whole as if the disparate data sources were a single data store or database. The environment will also enable the querying of aggregations of such personal and identity data.

This is a natural Data Algebra application. Data Algebra is employed in the specification and design of the query environment. It provides a universal data definition language to reflect the structure of any data source whatsoever—whether that be tabular, JSON, XML, key-value store or any esoteric format, such as a blockchain. The algebra is used to create appropriate subqueries for each data source and to combine the results into a single answer. It is also applied to optimize the performance of similar queries and queries with common elements.

The query environment will thus consist of three components:

- A query interface for users to query the data and store the results. We currently consider PartiQL to offer the best option as a query language for this, as it bridges SQL and JSONiq.
- An algebraic query engine that efficiently retrieves data from multiple sources.
- Connectors that provide access to technically different data sources.
Permission.io will make its nine data algebra patents available for use by the project team.

It is possible that in time this will become an open-source project, in which case it will spawn specialized use cases that target specific problems in specific industries, such as retail, banking, real estate, oil & gas, and many more. We suspect that the first use case described (personal data) will itself spawn particular applications, particularly personalized bots (software robots).

**Query Acceleration**

The unique capability that Data Algebra provides in respect of data and metadata management is complemented by its effectiveness in other critically important areas of data management and network performance. Specifically, it will accelerate query processing speeds significantly using its proven query acceleration capabilities and it will enable the data management of data volumes far beyond the petabyte level.

Ultimately, Permission.io software may need to accommodate hundreds of millions of data records and their frequent individual usage. Data Algebra will be key to delivering acceptable performance in such an environment and ensuring the economic use of resources.

Permission.io’s 9 patents issued by the USPTO relate to the use of Data Algebra in this area of data management. Most of these techniques monitor query activity and identifying opportunities for intelligent data reuse—as such, they enable the precise mathematical caching of results. They have proved effective for queries serving BI, analytics and ETL workloads, and for RDF database workloads—often accelerating performance dramatically, by one or two orders of magnitude.

Aside from query acceleration, Data Algebra IP can be used to monitor and manage all data usage within a given data environment. It can optimize data storage structures and data location in ways that will reduce access times and minimize resource usage (CPU, RAM, etc.).

**The Permission.io Blockchain**

The Permission.io blockchain and its environment consists of a network of server nodes with specific functions. Before we describe it, we will explain the process that determined its design. Over the past two years, we investigated a series of blockchain technologies and concluded that developing our own robust blockchain technology was critical to a successful endeavor for the following reasons:

**Scalable.** The blockchain needs to be able to scale to accommodate in the region of 1 million users relatively quickly, and up to 1 billion users in the long term. This level of scalability was beyond the capability of most “off the shelf” open source blockchain technology.
**Functionality.** The blockchain has to be an independent chain, designed for smart contracts and not present developer recruitment problems, as well as have a single coin for a better user experience.

**Cost.** The blockchain needs to provide a low cost per transaction, which in turn means that the blockchain consensus mechanism needs to involve minimal computer power.

**Permission.io Blockchain Technology Choices**

After investigating alternatives, Permission.io chose a blockchain based on Ethereum with the Clique consensus mechanism, as implemented in Geth (Go Ethereum). This technology combination is publicly available for test on the Rinkeby testnet, and since the choice was made, the team has been testing its capabilities. As many readers of this paper will be unfamiliar with the technology described, we summarize it with the following words:

“*It is an Ethereum-based blockchain that uses a Proof of Authority (PoA) consensus mechanism.*”

We have adopted this combination of technology and are further developing it to suit our longer term needs. At the time of writing, it meets all of the above-listed requirements. As the technology is derived from Ethereum, it will also be able to take advantage of the various Ethereum performance enhancements that are currently in progress, such as Plasma, the Raiden Network, Truebit and the various chain-sharding experiments.

**The Clique “Proof of Authority” (PoA) Consensus Mechanism**

This is a remarkably simple consensus mechanism that uses a central ring of nodes which compete to create new blocks. On average all are equally successful so it is as if they took turns in a round robin manner to create the next block. The decision as to which node to choose next is determined by the Clique PoA protocol. The Authority node pool can be extended to include new nodes.

A significant advantage of PoA for Permission.io is that it considerably simplifies network launch, since it will be easy to assemble a small number of honest nodes to form the initial Authority pool.
As illustrated in Figure 4 above, the Permission.io network has the following components:

**Permission coin wallets:** We will offer our own, and other third parties may also provide such wallets.

**Full node:** Full nodes hold a full copy of the Permission.io blockchain and can be operated by anybody. They could include a Permission wallet.

**Boot nodes:** These are the entry points into the network for new nodes.

**API nodes:** These nodes provide blockchain API access to Permission.io’s internal services and third parties.

**Authority nodes:** These are the “mining” nodes that create new blocks.

The Boot Node provides New Nodes with the connection information they require to connect to the blockchain network. They could be a node that wishes eventually to become an Authority node or they might become an Internal API node or an External API node or simply a Full Node. The Boot Node (in practice, a cluster of nodes for the sake of load balancing and redundancy) provides them with a list of node addresses. Although all nodes run Geth, the Boot Nodes are distinct in
having fixed IP addresses which Permission.io publishes.

Public access to the network for processes that need continuous access is provided by External API nodes. This includes Permission wallets and 3rd party apps. If so, it could build an API node. The internal API nodes are for private access by Permission.io processes that need to post Permission transactions to the blockchain.

Finally, there are the Authority Nodes which share the work of adding new blocks to the blockchain as indicated by the circular arrow. At launch, Permission.io will provide most of the network nodes. However, it will be possible for other nodes to be added by third parties further decentralizing the PoA consensus.

**Permission.io Blockchain Governance and Proof of Authority**

The Clique PoA protocol imposes a dynamic randomized weighting scheme. It has the effect of increasing the probability of any node completing the next block when it has not completed a block for a while. The protocol divides the workload fairly evenly although also somewhat randomly between the pool of Authority nodes. As the Permission.io blockchain is based on the Ethereum blockchain, there is the concept of “gas”; gas is used to pay the transaction cost. The Authority node which completes a block is rewarded with the total of all the transaction fees paid by the transactions in the completed block.

The blockchain will comprise a small number of Authority nodes owned by Permission.io, together with other nodes owned by developers and other third parties. However, the pool of Authority nodes is not static. Aside from the fact that occasionally a node will fail and the pool will be diminished until it is restored, new nodes can be promoted into the pool and nodes can also be relegated.

**Governance**

Permission.io intends the blockchain to be fully decentralized and will encourage other participants to try to enter the Authority pool. The main risk to the blockchain is that some individual or group could acquire 51% control of the Authority nodes and thus post false transactions (a 51% attack).
For that reason, a fairly complex set of governance rules is being created. The plan is that a four-layer process will be implemented, consisting of Governing Nodes, Authority Nodes, Trusted Nodes and Ordinary Nodes, as illustrated in Figure 5, above.

Every new node will start out as an Ordinary Node, and will run on the test network for 6 months before there is any possibility of it being promoted. For an Ordinary Node to become a Governing Node, it has to be promoted through the ranks by the layers above, using the following procedure:

All hierarchically superior nodes, including Trusted Nodes, vote for or against the promotion of an Ordinary Node to a Trusted Node. A Trusted Node can only be promoted to become an Authority Node if the Authority Nodes and Governing Nodes vote for its status elevation. When it becomes an Authority node, it can participate in forming blocks on the blockchain. Nodes can be relegated by vote or can simply drop out. Nodes will be automatically relegated if they fail to meet the reliability, availability and performance requirements of the blockchain. Voting occurs between the 30,000 block epochs.

Permission.io’s goal is to encourage its members to configure Ordinary Nodes on a global basis. In time, members will take control of the governance of what will have become a widely decentralized blockchain network.
Storage Nodes

The purpose of Storage Nodes is to store the data, both profile data and content, to serve up to members who wish to access it and to content providers who wish to upload it. The Storage Nodes are required to meet reliability and performance criteria, but aside from that there are no specific requirements. We will encourage all content providers to run Storage Nodes either individually or collaboratively.

Distributed data storage will be managed through smart contracts that are stored on the blockchain. This will provide a public audit trail of all data storage activity and all associated Permission coin payments associated with it. Our current intention, as we have already noted, is to implement IPFS for data storage. Using Permission.io’s Data Algebra technology (discussed within the Data Algebra and Permission section) we will implement a metadata layer to provide a more comprehensive directory of the distributed data resource.

Because of the structure of IPFS, the stored data will automatically be secure, versioned and backed up. It will also be efficiently located within the network, providing a peer-to-peer access capability to its users.

Permission.io Security

There are two aspects of security to describe here. The first is the management of keys and the second is ensuring that members are real people and that no person can acquire more than one membership of the network.

Key Management

Given that Permission.io needs to be able to support millions if not hundreds of millions of members, there is a requirement for a highly scalable key management system. Members will be provided with a key (a public and private key pair) when they register. The private key they are allocated will be used for access to their wallet and the data stored in their data vault.
The proposed solution is illustrated in Figure 6, below.

Permission.io will be using open source technology to manage all keys and passwords. This will be backed by a pool of Hardware Security Module (HSM) servers, backed by a disaster recovery pool. The HSM servers will be located in different regions, providing secure high availability and redundancy.

As indicated in the diagram, there will be a cluster of redundant Vault Instance Masters interacting with members to provide keys for secrets. Similar key management architecture will be used for all other services involved in accessing, developing or running Permission.io. The primary function on this proposed architecture is for managing keys in a zero trust environment with zero knowledge of the stored secrets.

Identity Management

From both a security and business perspective, it is vitally important that every member is a genuine person and cannot be a software robot and that no one is able to establish more than one identity.
Permission.io will use certain data, where members provide it, to help validate a member’s Permission ID and compute their “Permission Score.” We will be able to assign a probability as to whether a given member represents a single, real-world individual and we will be able to limit a member’s capability and ability to earn until a believable set of identity data has been uploaded.

We will assist the identity validation process by using the services of third-parties, such as Auth0’s authentication platform and the Regula document verification platform. Third party validation will be a “pro tem” solution that will precede and eventually merge with a formal approach to our native, authenticated ID as such technology becomes available.

Security, Manageability and Storage

Members gain access to Permission.io via OIDC compatible login credentials and use of multi-factor authentication (MFA) to ensure that only they can access their data. Their data, under their personal control, is stored within an encrypted storage object using AES-256 encryption, in flight and at rest. When any user data is made available to advertisers and merchants for targeting, it is stripped of all identifying data and exposed only as an anonymized, aggregated data set. All data activity is logged and will eventually be auditable by the member.

No third party will ever have access to the data held in the encrypted storage object unless they are granted permission by its owner. The owner may confer specific data access items and grant such access in the context of specific personal or business interactions. The platform software is designed to involve the minimal exposure of data and to make it uneconomic for any business to attempt to aggregate such data.

As we evolve, the innovative and comprehensive IPFS (the so called InterPlanetary File System) is anticipated as an ideal file system layer for storing data. This is a good fit within our algebraic approach to metadata (alternative approaches will be catered to as needed, e.g., where data is stored on other ledgers). The following points about IPFS are worth noting:

Every file can be found by human readable names via the decentralized IPNS naming system.

Each IPFS file and all blocks it contains are given a cryptographic hash (unique fingerprint).

IPFS removes duplications (across the network) and tracks version history.

Each network node stores only files it is interested in along with indexing information that can be used by the algebraic metadata catalog (to figure out what is stored where).
When looking up files, it asks the network to find nodes storing the content behind a unique hash.

**Permission Coin Economics**

The Permission Coin is designed to provide utility within the Permission Ecosystem and its applications. Individuals earn ASK for their time and data and as applications are developed on the Permission blockchain, individuals will be able to not only shop and spend ASK on the Permission Platform by purchasing both tangible and digital goods, they will also be able to connect with and engage other individuals through various “ask-permission-first” applications. We call this a two-sided marketplace where members earn for granting their permission and can spend ASK by engaging others with their permission.

**Dynamic Incentivization Plan**

**Users:** Attracting a large user base in the shortest time possible is critical for the success of Permission given the protocol features a two sided marketplace of users and advertisers. To achieve this, Permission leverages a proprietary model to incentivize users to sign up on the platform and register their data.

The dynamic user incentivization plan leverages a pool of 40B coins (40% of the supply) slated for users and dynamically adjusts the amount of ASK given to a user based on Permission’s market capitalization (higher market capitalization results in less coins and vice versa) and if the user is an earlier signup (more coins given to earlier users to drive adoption).

This allows Permission to reward users with a similar USD value for signups regardless of market capitalization, to ensure the pool has enough coins for ~500M signups and rewards earlier users more to drive uptake. The pool of 40B coins is broken down into three pools:

- 38B tokens for signups overall
- 1B additional tokens granted to the first 5M users
- 1B additional tokens given to users between 5M and 20M
The amount of coins granted to users is dynamically adjusted based on the market capitalization of ASK. At the base level, 60 coins are granted to new users and this decreases as ASK’s market capitalization increases to adjust the dollar value of coins granted to users to ensure the pool has enough coins to incentivize 500M users to signup, but also as an incentivization method to reward early adopters with more ASK awarded to drive signups.
On top of this, users who within the first 5M signups will receive a bonus of 175% of the baseline coins for registering and users within the 5M-20M base will receive a bonus of 100% of baseline coins for signing up. Since the baseline number of coins is dynamically adjusted based upon market capitalization, these bonus coins are also dynamically adjusted as well.

This model is set to end once 500M users are reached. At this time, it’s logical to believe users will have other strong reasons to adopt ASK within the platform outside of a registration reward.

While user projections are helpful, most are ultimately impossible to accurately predict given the number of inputs, extended timelines and changes to the models and platform. Instead, the team has focused on optimizing the internal dynamics of our coin model to help drive users to signup on the platform which we believe is more tangible.

**Referral Program:** To further drive the user incentivization plan, Permission will also feature a bonus reward to users who refer other users. Referral coin rewards are also dynamic, and are equal to 35% of the baseline coins at the corresponding market capitalization. This ensures that referral coins rewarded are fair based on a varying ASK market capitalization. To ensure the pool of coins won’t exhaust before 500M users are reached, we assume 75% of the coin pool will be for referral rewards as it is a key driving factor for signups.

**Network Effects and User Growth**

Understanding network effects and the impact of our referral platform is critical in understanding
the potential growth of our platform and how many users may ultimately be on the protocol. Below we share two different user extrapolations, one driven from comparables and the other from our referral platform.

**Comparables:** While the protocol is earlier in its life than its comparables, our team leveraged real user growth rates from comparable platforms (Facebook, Twitter, Snap, and Pinterest) to ascertain a potential number of users on the protocol.

<table>
<thead>
<tr>
<th>User Growth Projections Based On Comps</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
</tr>
</thead>
<tbody>
<tr>
<td>End of Year MAU (in millions) - Comps</td>
<td>0.2</td>
<td>7.06</td>
<td>23.07</td>
<td>46.11</td>
<td>108.04</td>
<td>184.4</td>
<td>281.84</td>
<td>388.36</td>
</tr>
<tr>
<td>Change (in millions)</td>
<td>6.66</td>
<td>16.01</td>
<td>23.04</td>
<td>62.93</td>
<td>75.37</td>
<td>97.43</td>
<td>106.53</td>
<td></td>
</tr>
<tr>
<td>YYY User Growth Rate</td>
<td>342.9%</td>
<td>227.3%</td>
<td>100.0%</td>
<td>136.0%</td>
<td>69.0%</td>
<td>53.0%</td>
<td>38.0%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAU Growth Rates from Comps</th>
<th>Yr 1</th>
<th>Yr 2</th>
<th>Yr 3</th>
<th>Yr 4</th>
<th>Yr 5</th>
<th>Yr 6</th>
<th>Yr 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>45%</td>
<td>127%</td>
<td>384%</td>
<td>150%</td>
<td>148%</td>
<td>69%</td>
<td></td>
</tr>
<tr>
<td>Twitter</td>
<td>200%</td>
<td>200%</td>
<td>117%</td>
<td>58%</td>
<td>30%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Snap</td>
<td>78%</td>
<td>51%</td>
<td>48%</td>
<td>18%</td>
<td>-1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinterest</td>
<td>180%</td>
<td>21%</td>
<td>18%</td>
<td>50%</td>
<td>33%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Average (Used)</td>
<td>227%</td>
<td>100%</td>
<td>136%</td>
<td>69%</td>
<td>53%</td>
<td>38%</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>190%</td>
<td>89%</td>
<td>82%</td>
<td>54%</td>
<td>32%</td>
<td>25%</td>
<td></td>
</tr>
</tbody>
</table>

Based on an analysis of comparables, Permission could reach 5-25M users by the end of FY22. This is subject to numerous other factors, including attracting users and virality and usage of the platform itself.

**Referral Program:** While starting with a base of 350K users (Permission currently has 350k+ registered wallets), the team has built an extrapolation of our referral program to better understand how fast the program could attract users under optimal conditions. This again is simply an educational extrapolation.

We begin our referral mode with a base of 350K users, expect 30% of users to engage with the platform, expect each user to refer 4 other users (driven by past internal estimates) and assume it will take 15 days for a user to refer 4 other users. Users who refer 4 users are then taken out of the program as exhausted users. We also assume a 4.5% churn rate within the platform as well to account for users who leave the referral program or no longer engage with it.
While the dynamics and user psychology of the referral program will change over time, the program has the potential to drive users to the platform over time. Under our initial model inputs, Permission could have between 10M-30M users by the end of the second year.

These two examples, comparables and an extrapolation of our referral program, are simply informational as we are optimizing for our internal coin dynamics over projections, but nonetheless demonstrate the potential speed users could join the protocol.

**Coin Supply**

There is a hard cap of 100B ASK for the protocol. Of this 100B, 40% are allocated to users and the ecosystem (namely the user incentivization and referral program), 15% are allocated to the team to ensure management is aligned, 25% are allocated to purchasers and supporters who intend to participate and render supports to the ongoing development of the Permission network and ecosystem, and 20% are allocated for developer incentives to build on top of the platform and for advisors to help drive adoption.
Given the supply of coins slated for the dynamic user incentivization program is a significant portion of ASK’s total supply at 40% of coins, the supply schedule for ASK will vary based upon how fast these coins are allocated to users. The team believes it will take 120 months, or ten years for these coins to be fully allocated to users. With this in mind, ASK’s coin schedule for the next ten years is shown below.

ASK will not reach its 100B hard cap over the next ten years as there are still coins to allocate.
Over the next ten years, the total committed supply of ASK will grow from ~15B to ~60B given unlock schedules and our incentivization plan (above chart) although a small fraction of these coins will actually be unlocked and in the circulating supply (3.4B at the initial exchange listing).

Of the remaining coins, 5% or 5B, in total coins allocated to Permission’s team coins can still be allocated in the future to incentivize new and existing team members.

Additionally, 15% of total coins or 15B are still free to be allocated or sold to purchasers and supporters and the team has 20% of coins to allocate to developers. The rate at which these two remaining coin supplies are allocated will change the above coin supply schedule.
A viral developer ecosystem is crucial to the success of Permission, as such The Permission Foundation has allocated 20% of its coin supply to incentivize developers to build on the platform. The Permission Token Foundation believes its 20% allocation to developers is significant and will help drive usage and next gen uses cases of the platform.

**AD Spending Projections and Demand for ASK**

Understanding the demand for ASK by advertisers and other stakeholders is important for the success of the platform.

To better understand demand for ASK, the team has generated an informational model, that comprises the following:

- Using estimates on user growth from our referral program, since users are the backbone of demand for ASK.
- Projections on the number of advertisers that will join the platform based on the number of users, driven from comparables, and estimates on the total number of AD campaigns these advertisers will run based on the number of users on the platform to derive a total number of AD campaigns.
- Real world data from Statista on the breakdown of AD spending by channel and the average spent per AD on each channel. Our estimate of the number of AD campaigns on Permission are then multiplied against this breakdown to achieve an estimate of AD spending on the platform.
- AD prices per channel are driven from Statista, but a discount is applied which decreases each year as the platform grows.
- From here we are able to derive an estimate of total AD spend on the network. When supply is pulled in from our supply estimates (the largest driver being the speed at which the 40B coins slated for users are granted) and on market capitalization of ASK, we can derive the number of ASK which may be demanded in the market.
- While this is strictly informational and not a solicitation to purchase ASK, our goal is to better visualize and understand the demand for ASK as the number of users and advertisers on the platform grows.

**Model Walk Through**

While our referral program is sensitive to changes in the model, it allows us to project the number of potential users on the platform, who are incentivized to join through our dynamic incentivization program which rewards users to sign up and share their data.
Now that we have a top line estimate on users, we leveraged data from comparable advertising platforms (Facebook has 357 users per advertiser), to estimate the total number of advertisers per user. Permission could have as users grow and the number of AD campaigns these advertisers will run each year.

As users grow, the number of advertisers per user and the number of ad campaigns these advertisers run increases.
Now that we have an estimate on total ad campaigns (driven by users, ad campaigns per user and total advertisers for users) we are able to input real world data on the breakdown of AD spending by channel (classifieds, video, social media, banners and search) to get a better understanding of total potential AD spend on the Permission network.

We leveraged the breakdown of spending per channel, and the cost of spending per AD within each channel from Statista. We also applied a discount given Permission’s platform will be cheaper to incentivize advertisers to switch to the platform. The discount per ad type begins with an 80% discount in year 1 and the discount decreases 10% each year until it reaches 30% for this model. This leads to a superior ROI for advertisers versus other platforms, both traditional and blockchain based.
Since we estimated total AD campaigns earlier, we can apply these campaigns to the channel buckets based on the real world breakdown of AD spending by category and against the price per AD within each channel (with the discount applied) to reach a projection on the potential AD spending within the Permission Protocol.

Once we have total AD spend, we are able to make estimates on the total demand for ASK. We admittedly understand this is a complex formula given velocity is hard to quantify, and the demand for ASK is derived from total AD spend divided by a projected ASK price. To reach an ASK price, we estimate ASK’s circulating market cap to be $300M in year 1 and increase each year, while the denominator (supply) is driven from our projections on supply which are most influenced by our the user incentivization program (40B coins) that we expect to exhaust over 10 years.
With these assumptions in mind, we are able to back into a demand for ASK on an annual basis, which can further be broken down into more granular estimates.

Understanding velocity is a complex topic fraught with opposing views. We prefer to take the position that directionally ASK will be kept within the Permission ecosystem at an increasing rate as the utility and use cases for ASK for users, advertisers and stakeholders increase over time.

Once we have an idea of velocity, we are able to apply these breakdowns to the demand for ASK we found earlier. Given our assumptions, we believe there will be a positive net daily demand for ASK.
Permission.io Timeline

July 2017
- Conceives and Develops Permission Blockchain

February, 2018
- Launches “Watch & Earn” pilot app (earn rewards for viewing video ads)

May, 2019
- Launches ASK on Permission.io Mainnet
- Integrates with Hardware Wallets (e.g. Trezor)

September, 2019
- Launches Core “Permission Platform” in Beta
- Develops Ability to run Permission node (3rd Party)

February, 2020
- Releases Shop with ASK on Permission Platform
- Integrates with ID Management and Payment Systems

August, 2020
- Launches “Shop & Earn” (earn rewards for viewing ads, shopping, etc.)
- Develops “My Permission ID”
- Implements Enhanced Reporting & Analytics
Product Roadmap

Q4 - 2020
- “My Data” User Profiles and Enhanced Personal Datasets
- Integrate KYC/Advanced Security Protocols
- Develop and Launch “The Daily Earn”

Q1 2021
- Shopify App
- Chrome Browser Extension
- E-Commerce Gamification
- Custom Surveys & Wishlists

Q2 2021
- Android App Release
- Firefox Browser Extension
- BigCommerce App
- Permission Loyalty Program

Q3 2021
- Additional E-Commerce Apps
- Permission Query Engine
- Magento Plugin
- PoS - Staking

Q4 2021
- iOS App Release
- Permission Demand-Side Advertising
Permission.io Executive Team

Charles Silver, Chief Executive Officer

Charles Silver has been building companies and creating liquidity events for shareholders for 30 years. He was an early visionary in the dot com era as founder and CEO of RealAge.com, which was amongst the first companies to use Big Data to connect individuals to advertisers on a permission basis. The company raised capital in the dot com boom, survived the crash by building a profitable business, and was sold very successfully to Hearst for over 9 figures.

As an early investor in Permission.io Inc. (formerly Algebraix Data Corp.), Charles recognized the significance of Data Algebra to the entire software field and realized important use cases for the applied math. With the growth of the blockchain and big data industries, a natural application for Data Algebra emerged. ASK and PermissionQE were born, enabling individuals all over the world to own and monetize their data.

In addition to founding Permission.io Inc., Mr. Silver is co-founder of LoveStoriesTV, the leading wedding-video platform, and is also co-founder and serves on the Board of Reality Shares (dba Blockforce Capital), an SEC registered investment adviser with five publicly traded ETFs and two cryptocurrency hedge funds.

Mr. Silver is a graduate of the University of Michigan, and prior to his entrepreneurial career, Mr. Silver served for two years as a staff member for a United States Congressman.

Hunter Jensen, Chief Technology Officer

Hunter Jensen is responsible for translating strategic company goals into deliverable permission-based products. In addition to his role at Permission, Hunter is the Founder and Chief Executive Officer at Barefoot Solutions, a pioneer in web and mobile application development. Since 2003, Hunter has motivated, directed, and led product teams to release best-in-class web and mobile applications for a wide variety of tech, e-commerce and media companies, including Samsung, Cisco, Salesforce.com, Avalara, Antengo and many more. Well-known for establishing impeccable software development protocols and standards, as well as for designing digital strategies that successfully drive user engagement and ROI, Hunter is a distinguished speaker, author, entrepreneur, and thought leader in the digital world. Hunter graduated with a B.S. in Computer Science from University of Virginia.
Jennifer Silver, Chief Marketing Officer

Jennifer Silver has over 20 years of executive experience in brand strategy, business development, marketing and communications. She is an attorney and strategic advisor and brings to Permission an extensive background in law, entertainment and media. Jennifer got her start in entertainment at Del, Shaw, Moonves, Tanaka, Finkelstein & Lezcano, one of the most respected entertainment law boutiques in the world. She went on to build a thriving turnaround practice focused on leadership reorg, debt restructuring, marketing and branding. While continuing to practice law, she served as Chairman of the Board of an international school, which enhanced her global knowledge base, including her familiarity and comfort level when dealing with international business and cultures. Jennifer graduated Cum Laude with a B.A. in Political Science from the University of Miami and received her J.D. from the University of California, Hastings College of the Law.

Robert Gregory, EVP, Business Development

Rob Gregory has more than 30 years’ experience building revenue growth, brand strategy, and media business P&L management. He has successfully positioned and launched media businesses in the social media, affluent consumer, thought leadership, news, and millennial spaces. He has received numerous professional honors, is a frequent speaker at industry events, has appeared live on MSNBC, Fox Business News, and other prominent media outlets, and was named to Media Industry Newsletter’s “Most Intriguing People in Media.” Rob was a co-founder of WHOSAY, where he built the go-to-market positioning, editorial, sales, and marketing strategy. WHOSAY, a social media platform for celebrities, thought leaders, and influencers, was successfully sold to Viacom in January 2018. Additionally, he served as President of The Newsweek Daily Beast Company and as Group Publisher at Dennis Publishing, where he oversaw multi-platform revenue streams for Maxim, one of the largest and most profitable media properties in the world. He also served as Publisher of Rolling Stone and Men’s Journal, and held leadership positions at Gourmet and Scientific American. Rob is a graduate of Boston University.

Joe Underbrink, Chief Data Scientist & Mathematician

Joe has been innovating in data management and data science for over a decade. He spent several years as a mathematician and data scientist at Algebraix Data Corp where he was Instrumental in the development and application of Data Algebra to relational and graph-based database management systems. Joe has spent the last several years using machine learning and AI to develop predictive and prescriptive analytics tools for the energy and medical sectors. Having designed and
delivered numerous solutions ranging from inferencing on knowledge graphs, to evaluating and optimizing energy assets for EOG Resources, to building complex business process simulations for 3M, Joe has a passion for combining modern data tools with fundamental mathematics and creative problem solving to deliver elegant and scalable solutions that unleash untapped opportunity in the enterprise. Joe graduated with a B.S. in Mathematics from Indiana University-Purdue.

**Bobby Petersen, VP of Marketing**

Bobby Petersen brings a varied range of entrepreneurial and strategic skills to the Permission team. At the ripe age of 22 he was invited to take over as Co-President of a fledgling promotional tent business, which he and his team rescued, grew and eventually exited at a 20x multiple. He then went on to help start and run the marketing for an international running race business in which he broke records in Australia with back-to-back weekends of 50,000 total participants across Sydney and Melbourne. He has since founded 2 thriving product distribution / e-commerce companies, a successful marketing & strategy consultancy and has ultimately recorded over $100mm in direct lifetime sales. Bobby earned his Bachelor’s degree in Commerce (Marketing & Management) from the University of Virginia.

**Professor Gary Sherman, PhD, Founding Mathematician**

Gary will act in a consultancy capacity to Permission.io focusing on the application of Data Algebra to the data catalog and to database functionality required by the system.

Gary Sherman has a long history of studying (PhD from Indiana University, 1971), teaching (Professor Emeritus, Rose-Hulman Institute of Technology, 1971 to 2006) and doing mathematics (29 refereed publications). He was a founder and the Principal Mathematician for Permission.io from 2008 to 2014 where he invented and gradually proved the applicability of Data Algebra.
Summary

The era of data centralization and exploitation has peaked. As blockchain and other distributed technologies mature and become a foundation of Web 3.0, the Internet economy will be driven by peer-to-peer, permission-based transactions and communications that eliminate the need and functions of central authorities and monopolistic gatekeepers.

Permission.io is perfectly poised to lead the web toward this new and equitable economy. Our core technologies, values and leadership are bringing needed change by creating a model that enables individuals to own and profit from their data and that solves pain points for businesses and advertisers. We have devoted a number of years to building technologies that would provide the right infrastructure to support the Permission Economy. We are eager to build upon our foundation and grow our community of technologists, mathematicians, businesses and individuals who believe in our mission to bring evolved formats of trust and transparency to the web.

We invite you to join us on this exciting journey.
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