MARKETPROTOCOL

Bringing the $100+ trillion derivatives market to the blockchain.

September 2018

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Summary

Crypto is a rapidly growing asset class with many promising projects across a wide variety of use cases, however a serious challenge threatens the progress of this space. Due to extreme price volatility, many crypto assets are a poor store of value, medium of exchange, and unit of account. Furthermore, decentralized platforms and applications which incorporate crypto assets face an uphill battle for user adoption, since mainstream users are much less likely to hold and use assets that can rapidly lose value. It is abundantly clear that the future success of this community requires a solution to this problem of price volatility.

MARKET Protocol is an open and permissionless protocol built on the Ethereum blockchain that provides the framework needed for decentralized exchanges and applications to enable traders, users, and organizations to securely and trustlessly manage their exposure to price volatility (i.e. risk).

MARKET Protocol's smart contracts are agreements between two or more individuals, similar to traditional derivatives, which settle in the future based on the price of a reference asset. Traditional derivatives are the largest financial asset class in the world and are used to manage price risk, such as when airlines hedge the price of jet fuel or banks hedge interest rates. MARKET Protocol enables the creation of derivatives for crypto assets, allowing traders, users, and organizations to limit the price risk of their assets while also eliminating traditional counterparty risk. With MARKET Protocol traders can also go long or short an asset without needing to borrow or take custody of the asset itself, drastically simplifying trading. By facilitating short selling, a necessary piece of an efficient marketplace, MARKET Protocol contributes to the health of the crypto ecosystem by reducing overall price volatility. Finally, MARKET Protocol contracts can also be created for traditional assets such as commodities and equities, for example gold or Tesla stock (TSLA), allowing anyone anywhere in the world to trade the price of these assets.

Third parties can build decentralized applications or "dApps" on top of MARKET Protocol, enabling non-technical users to easily leverage the power of the Ethereum blockchain to create safe and solvent derivatives for any asset. The MARKET Protocol community is preparing the release of the first dApp for public beta, which will allow users to deploy MARKET Protocol contracts, test oracle queries, and explore all created contracts.

The core MARKET Protocol team has a diverse technical and financial background with over 30 years of cumulative experience in electronic trading on global exchanges. Co-founders Seth Rubin, Phil Elsasser, and Collins Brown have been working together since 2011, including managing a 24-hour algorithmic trading group in the 7 years prior to

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building MARKET Protocol. This experience catalyzed the development of MARKET Protocol, which will enable an open and globally decentralized derivatives marketplace.

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Problems Addressed By MARKET Protocol

Decoupling Price from Utility

Price volatility is a serious factor limiting growth in the blockchain space. Holders of crypto assets, ERC20 or otherwise, currently have no effective way to manage their price exposure. A Bloomberg article titled "Ethereum's Volatility is Undermining its Viability"[1] mentions an 8% move in the British Pound during Brexit as abnormally large and unprecedented. In 2017, Ethereum's standard deviation was ~7.5% compared to ~0.5% in the Euro to US dollar (USD) currency pair. Price volatility must be managed in order for crypto assets to mature as a store of value, a medium of exchange, and a unit of account, so that these assets can be used as both currencies and as core components of decentralized applications.

Traditional Centralized Exchanges

1. Margin Funding, Forced Liquidations, and Leverage

Traditional exchanges regularly deal with margin calls and forced liquidations. In times of market stress, forced liquidations tend to cascade into additional liquidations. MARKET Protocol removes the systemic risk of leverage from this environment, allowing traders to deploy capital efficiently and enter positions with a predefined downside, preventing dangerous and disruptive market liquidations.

For example, in June 2017 a large multimillion dollar sell order on Coinbase's GDAX exchange caused the price of Ethereum to drop from $317.81 to $224.48, triggering a flood of 800 stop-loss and margin liquidation orders that further dropped the price to $0.10, only to recover minutes later.[1] The 2017 Ethereum Flash Crash was a systemic risk that could have been prevented by using MARKET Protocol contracts.

2. Clearing Firms and Custody of Funds

Centralized derivatives exchanges rely on clearing firms to handle customer funds. In 2011, MF Global reported a shortfall in customer accounts as large as $1.2 billion.[2] When MF Global declared bankruptcy, approximately 33,000 customers had their funds frozen.[3]

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[1] Bloomberg News. (2017). Ethereum's Volatility Is Undermining Its Viability - Available at: https://www.bloomberg.com/news/articles/2017-07-13/ethereum-s-volatility-is-undermining-its-viability

[2] Crain's New York Business. (2011). MF Global shortfall may be more than $1.2B - Available at: http://www.crainsnewyork.com/article/20111121/FINANCE/111129988/mf-global-shortfall-may-be-more-than-1-2b

[3] Sauer, F. (2014). The MF Global Collapse Explained (And Why It Is a Crime). - Available at: http://www.fredsauermatrix.com/the-mf-global-collapse-explained-and-why-it-is-a-crime/

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Custody of funds and segregation of customer funds are concerns with current exchange models. On the other hand, MARKET Protocol uses smart contracts deployed on the Ethereum blockchain to securely escrow funds without an intermediary.

3. Market Solvency

By design, exchanges obfuscate counterparties, and in doing so make it difficult to view the market as a whole. Participants must trust that clearing firms and exchanges are appropriately monitoring traders' positions and capital balances. Overall, there is no way to guarantee market solvency. With MARKET Protocol, the terms of all contracts can be viewed using a contract explorer, while counterparties remain pseudonymous.

4. Commercial Contracts

As for-profit entities, financial institutions only offer derivative contracts which they believe will be commercially successful. They have minimum market participation and open interest requirements for new contracts, in order to attract institutional clients. As a result, potentially useful contracts may not get listed, allowing traders and businesses to only transact in contracts that large financial institutions deem worthy. As an open and permissionless protocol, MARKET Protocol contracts can be created by anyone anywhere in the world with even minimal capital.

5. Limited Access & Credit Verification

Existing exchanges require credit verification and minimum account balances, restricting the availability of derivatives to all but a narrow set of participants. MARKET Protocol has no such limitations.

Cryptocurrency Exchanges

Cryptocurrency exchanges are different from derivatives exchanges and more closely resemble the U.S. equity markets. Many cryptocurrency exchanges provide a venue for participants to engage in discrete transactions like trading bitcoin (BTC) for U.S. dollars (USD) or ether (ETH) for other ERC20 tokens.

Typically, these exchanges charge users a fee expressed as a percentage of the trade, or charge for withdrawals or deposits. Fees can vary depending on order type. Furthermore, cryptocurrency prices vary from exchange to exchange due to market participants' perception of each exchange's capital controls, solvency, liquidity, regulatory regime, and other factors.

Given the increasing worldwide user base of cryptocurrency exchanges and also institutional demand, The Chicago Board Options Exchange, the CME Group, and LedgerX began trading BTC options and derivatives in late 2017. However, these projects were built on top of traditional exchange and clearing models and will continue to perpetuate the

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problems discussed in prior sections. They also require traders to post “USD” as collateral.

1. Digital IOUs

Trades on centralized crypto exchanges such as Coinbase and Kraken do not result in actual transactions on the blockchain, instead they are transactions on the exchange’s internal ledger. Only when a user withdraws a crypto asset from an exchange to their personal digital wallet does a blockchain transaction take place, giving the user control over the asset. Until that point, assets reside in a commingled exchange wallet, exposing traders’ funds to the risks of theft and seizure. Users of MARKET Protocol do not face these risks because their assets are never custodied by a centralized exchange.

2. Limited Products

Existing decentralized exchanges allow trading of some ERC20 tokens, but these exchanges still exclude many Ethereum based assets, as well as all assets that are not on the Ethereum blockchain, including Bitcoin, Litecoin, and Ripple. Additionally, all trades are A for B (atomic transactions), and traders can only trade assets they own. If they want price exposure to multiple crypto assets, they must buy, hold, and store each of them. MARKET Protocol provides price exposure to any crypto asset without requiring the purchase or sale of the actual asset itself.

3. Cannot Short

Traders have limited options to short crypto assets or generally bet on a decline in price. Currently, there is no easy way for traders to borrow or sell assets, and shorting crypto assets is complicated for the average trader. This means there is no way to hedge or manage price risk, as this involves shorting. MARKET Protocol solves this need by opening up short selling to anyone anywhere in the world.

4. Inefficient Markets

Short sellers provide an essential force in the marketplace by allowing speculators and hedgers to bet on a decrease in price. Without short sellers, a fundamental piece of an efficient market is missing. Furthermore, most traders, including those based in the U.S., cannot deploy leverage on crypto assets and are thus forced to post the entire value of their open position, resulting in inefficient capital allocations. Furthermore, the margin products that are available have fundamental issues like auto deleveraging and socialized losses.

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MARKET Protocol

MARKET Protocol provides developers with a trustless and secure framework for creating decentralized derivatives exchanges, including the necessary clearing and collateral pool infrastructure. As a protocol, MARKET Protocol also enables third parties to build applications for trading, order routing, and related activities.

The decentralized protocol facilitates risk transference and a trustless trading system through smart contracts on the Ethereum blockchain. MARKET Protocol contracts derive their price from an underlying asset: either digital or real-world. Traders are not limited to owned or existing ERC20 tokens, allowing price exposure to other cryptocurrencies like Bitcoin, Ripple, and Monero.

As derivatives, MARKET Protocol contracts offer users continuous price exposure and automated future settlement. Traders can easily enter long or short positions in any contract where they find liquidity. Trade participants then contribute funds to a collateral pool before trade execution. Next, the contract distributes funds in a rule-based manner at an agreed-upon settlement date, or when traders exit positions prior to the settlement date.

The clearing functionality provides a safe and secure framework to manage crypto assets, positions, and leverage in a systemically responsible way. All smart contracts and collateral pool balances are publicly available on the blockchain. No person or entity controls the flow of assets among participants; order matching, contract creation, and dispute resolution are all decentralized.

Participants will govern the protocol in a democratic and equitable fashion. Traders of the protocol will be the owners and decision makers in the evolution of the protocol. The goal of MARKET Protocol is to provide users with the most efficient, safe, and secure environment possible while creating a robust and fair marketplace.

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Technical Specifications

Overview

MARKET Protocol allows third parties to create “markets” by hosting order books. Order book hosts are incentivized to host order books by collecting transaction fees, which the order book hosts independently set and control. Meanwhile, MARKET Protocol smart contracts handle the complexities of securing collateral, validating creditworthiness, executing settlement, and custodying user funds on chain.

Order book hosts are not responsible for matching trades or position management and never take custody of funds. Traders using the protocol can post orders as makers, or they can trade against resting orders as takers. Order book hosts act as bulletin boards, broadcasting all received maker orders and providing potential matches to takers, who ultimately select and then execute trades on the blockchain through MARKET Protocol smart contracts.

In the future, MARKET Protocol may pursue alternative order book solutions, such as fully decentralized order book hosting and order matching, as well as other scaling implementations.

Contract Creation & Clearing

MARKET Protocol allows a user to create a derivative contract, specify its terms, and then publish those terms; while also providing a mechanism for automated settlement and ensuring contract solvency through collateral pools. Any trader can create a new contract by outlining the contract specifications. The contract creator will be presented with the following options:

- Underlying Instrument: What is the underlying asset for pricing? This could be a digital or real world asset.
- Price Floor and Cap: This defines the maximum gain or loss for participants and the amount of collateral each participant must post in order to take a long or short position.
- Expiration Date: This is the date at which the contract is settled.
- Settlement Mechanism: Creators select an oracle-based solution for the final settlement price to be used in the contract’s profit and loss calculations.
- Base Token: What will the base currency be for pricing? This dictates the ERC20 token contributed to the collateral pool.

Since the value of the contract is derived from the value of the cryptocurrency held as collateral, contracts can be created for any conventional or digital asset.

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Shared Collateral Pool

Each MARKET Protocol contract is comprised of multiple smart contracts that create the shared collateral pool and necessary accounting of an individual trader's balances, denoted in the chosen base token (any ERC20 token). Traders will deposit collateral in the form of ERC20 tokens to the smart contract prior to trading, and all profits and losses from trades will be settled using these tokens.

After depositing tokens, the trader can submit orders and enter positions based on their smart contract balance. When a trader opens a position, tokens will be transferred from the trader's balance to the collateral pool. The tokens in the collateral pool fully fund the max loss of all open positions within a specific contract. If a trader closes a position prior to settlement, their previously allocated capital, plus or minus any profit or loss, is available for withdrawal or further trading. Alternatively, a trader can hold their position until expiration. In this case, an oracle will provide a settlement value, which is used to determine the trader's profit or loss. Once the contract enters a settled state, users may call a function to return their collateral.

```
    /// @notice determines the amount of needed collateral for a given position (qty and price)
    /// @param priceFloor lowest price the contract is allowed to trade before expiration
    /// @param priceCap highest price the contract is allowed to trade before expiration
    /// @param qtyDecimalPlaces number of decimal places in traded quantity.
    /// @param qty signed integer corresponding to the traded quantity
    /// @param price of the trade
    function calculateNeededCollateral(
        uint priceFloor,
        uint priceCap,
        uint qtyDecimalPlaces,
        int qty,
        uint price
    ) pure internal returns (uint neededCollateral) {

        uint maxLoss;
        if(qty > 0) {   // this qty is long, calculate max loss from entry price to floor
            if(price <= priceFloor) {
                maxLoss = 0;
            }
            else {
                maxLoss = subtract(price, priceFloor);
            }
        } else {        // this qty is short, calculate max loss from entry price to ceiling;
            if(price >= priceCap){
                maxLoss = 0;
            } else {
                maxLoss = subtract(priceCap, price);
            }
        }
        neededCollateral = maxLoss * abs(qty) * qtyDecimalPlaces;
    }
}
```

All open positions are fully collateralized at the time of execution, removing counterparty risk and replacing one of the core functionalities of traditional exchanges. A smart contract governing the collateral pool will provide a secure and trustless solution to traditional custody of funds issues.

The executed trade price and quantity determine the amount of collateral to be moved from the trader's balance to the collateral pool. Allocated collateral equals the maximum loss possible for that position. For buyers, it is the entry price minus the contract minimum; for sellers, it is the contract maximum minus the entry price. This collateral remains in the pool until the trade is closed. Next, the contract updates the price and quantity of the users' open positions.

Leverage & Contract Range

MARKET Protocol contracts offer continuous profit and loss exposure derived from an underlying asset up to a PRICE_CAP and PRICE_FLOOR specified during contract creation and defining the contract range. Leverage offered through MARKET Protocol differs from traditional leverage, which runs the risk of forced liquidations and unfunded positions.

Traders will commit the difference between the executed price and their maximum loss price to the collateral pool when they initiate a new trade. This action will require less equity than the total notional value of the position, providing implicit leverage. All prices within the contract range are tradeable. The outcomes are not binary.

If the high or low of the range is breached, the contract is settled with the participant on one side awarded their maximum gain, while the other side receives nothing (their maximum loss). It is possible neither end of the range is breached; in that case, the contract trades and expires conventionally. We plan to implement this functionality to ensure that the market remains solvent. *This process is one of the most important features of the contract framework and MARKET Protocol.* The amount of leverage afforded to an open position depends on where the price of the trade executed relative to the ranges of the contract. For example, users will post less margin when selling near the maximum loss, as they have less downside.

Traders can replicate uncapped payoff structures by stripping together a series of contracts. We expect third-party implementations built on MARKET Protocol to provide multiple strikes per contract as well as an easy and cost-effective way for traders to create the exposure they seek. This may present traders with arbitrage opportunities as traders can spread-trade multiple contracts against each other.

Detailed examples of trading with MARKET Protocol are included later in this document.

Short Selling

Currently, there are limited and inefficient options to short crypto assets, however a MARKET Protocol contract makes shorting simple. If two parties are willing to transact at a predefined price they can trade. There is no need for the short to locate or borrow the underlying asset. With MARKET Protocol, if a contract is listed and has liquidity, it can be shorted.

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Order Submission & Execution

To begin trading, a user will first commit the requisite amount of a base token to the collateral pool smart contract, thus ensuring funds are available to trade. Funding the smart contract prior to execution results in fewer transactional failures during order matching and creates a better user experience.

For a trader to enter a trade, they will submit an order, as a maker, to an order book host, providing both a price and quantity. Upon receipt, the order book host confirms that the maker's address has the necessary balance in the smart contract to place the order. Next, the order book host will post and maintain the order in the order book until another trader (a taker) fills it. For providing this service, the order book host may set and collect a transaction fee. The taker is responsible for filling the maker order by calling the trade function via a smart contract and supplying their wallet address. In this way the taker controls order matching, reinforcing the trustless role of the order book host. At that point, funds are moved from the traders' smart contract balances to the collateral pool. The order book host never handles the assets themselves. Finally, the new positions for each participant are recorded in the smart contract and on the blockchain.

```
struct Order {
    address maker;
    address taker;
    address feeRecipient;
    uint makerFee;
    uint takerFee;
    uint price;
    uint expirationTimeStamp;
    int qty;
    bytes32 orderHash;
}
```

If multiple executions exist, positions are exited in a LIFO (Last In, First Out) manner. After exiting a position, the appropriate amount of collateral (including any profit or loss) will be allocated back to the users' smart contract balances and become available for trading or withdrawal.

```
struct UserNetPosition {
    address userAddress;
    Position[] positions;   // all open positions (lifo upon exit - allows us to not reindex array!)
    int netPosition;        // net position across all prices / executions
}

struct Position {
    uint price;
    int qty;
}

```

Expiration & Settlement

Upon the expiration of a contract, functionality built into MARKET Protocol allows contracts to be settled using an oracle such as Oraclize.it or Thomson Reuters Block1IQ.

These oracles provide external data to the blockchain. The contract creator will have the ability to set the frequency of oracle queries.

```
    /// @param queryID of the returning query, this should match our own internal mapping
    /// @param result query to be processed
    /// @param proof result proof
    function __callback(bytes32 queryID, string result, bytes proof) public {
        require(validQueryIDs[queryID]);
        require(msg.sender == oraclize_cbAddress());
        lastPriceQueryResult = result;
        lastPrice = parseInt(result, PRICE_DECIMAL_PLACES);
        UpdatedLastPrice(result);
        delete validQueryIDs[queryID];
        checkSettlement();
        if (!isSettled) {
            queryOracle();  // set up our next query
        }
    }
```

Typically, the oracle is queried once a day to determine if a contract's price bands have been exceeded or if the contract is past the expiration date. If either of these criteria are met, the contract enters an expired state, and the settlement process automatically begins. Additionally, a user may call a function at any time to induce settlement if a settlement condition is met, such as an exceeded price band.

```
    /// @dev checks our last query price to see if our contract should enter settlement due to it being past our
    //  expiration date or outside of our tradeable ranges.
    function checkSettlement() private {
        if(isSettled)   // already settled.
            return;

        if(now > EXPIRATION) {  // note: miners can cheat this by small increments of time (minutes, not hours)
            isSettled = true;   // time based expiration has occurred.
        } else if(lastPrice >= PRICE_CAP || lastPrice <= PRICE_FLOOR) {
            isSettled = true;   // we have breached/touched our pricing bands
        }

        if(isSettled) {
            settleContract(lastPrice);
        }
    }
```

Contracts can be settled to the price of any actively traded ERC20 token, crypto currency, or other listed asset by calling an exchange API via an oracle. For example, the defined contract settlement terms could specify the last traded price of a token on Kraken at a predetermined time.

To avoid incorrect or inaccurate settlement prices, we will implement a time delay between the initial execution (contract expiration) and the time at which users may withdraw their funds. If more than a certain percentage of the participants with open positions initiate a settlement dispute, then the contract enters a disputed state.

In the event of a settlement dispute, a backup oracle or group of backup oracles can be used to obtain a settlement value. As crowd-based consensus mechanisms evolve, MARKET Protocol intends to implement additional resolution mechanisms. Until that point, disputed settlements may be resolved through a more centralized process to ensure funds are equitably returned to participants and not permanently trapped in the contract.

DApps

In order for non-technical users to get the most out of MARKET Protocol, open-source decentralized applications or “dApps” will be built by the MARKET Protocol team, in addition to third party applications. As part of this initiative, the MARKET Protocol team plans to create simple user interfaces that intuitively explain the process of selecting contract specifications and deploying MARKET Protocol contracts to the blockchain. Additionally, a contract explorer will provide the ability to search previously deployed MARKET Protocol contracts and view their specifications. Users will also be able to test their oracle queries to ensure they function as expected prior to contract deployment.

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MKT Token

MKT will be the base token of MARKET Protocol and will benefit from integration into all facets of MARKET Protocol. Peer-to-peer trading is free on MARKET Protocol and fees are not native to the protocol, however order book hosts providing exchange-like services have the option to set and collect transaction fees for providing these services. Orders submitted without a sufficient transaction fee denominated in MKT may be rejected by an order book host. MKT holders will vote on protocol improvements and development. This ensures that both end users and projects building on MARKET Protocol have a voice in protocol governance.

Token Use

1. Transaction Fees: Order book hosts provide a service to users of MARKET Protocol and, in exchange for this service, may charge a transaction fee denominated in MKT. Each order book host sets its own fee for its service.

2. Contract Creation: Users will be required to have a minimum of 500 MKT to create a new contract. The purpose of this arbitrary amount is to encourage thoughtful contract creation.

3. Contract Access: Participants will be required to post 25 MKT tokens to trade each user-defined contract. MKT posted in this way is returned to the user when they stop trading a specific contract or upon expiration of the contract.

4. Governance: MKT token holders will vote on protocol improvement decisions and development. This responsibility will include deciding the ongoing number of MKT tokens required for contract creation and access. The more MKT an account holds; the more influence in governance it will have.

5. Dispute Resolution: In most cases, contracts will settle automatically according to publicly accessible oracle solutions. In the event of a settlement dispute, or a disrupted settlement process, MARKET Protocol will rely on crowd-sourced resolution derived from MKT holders.

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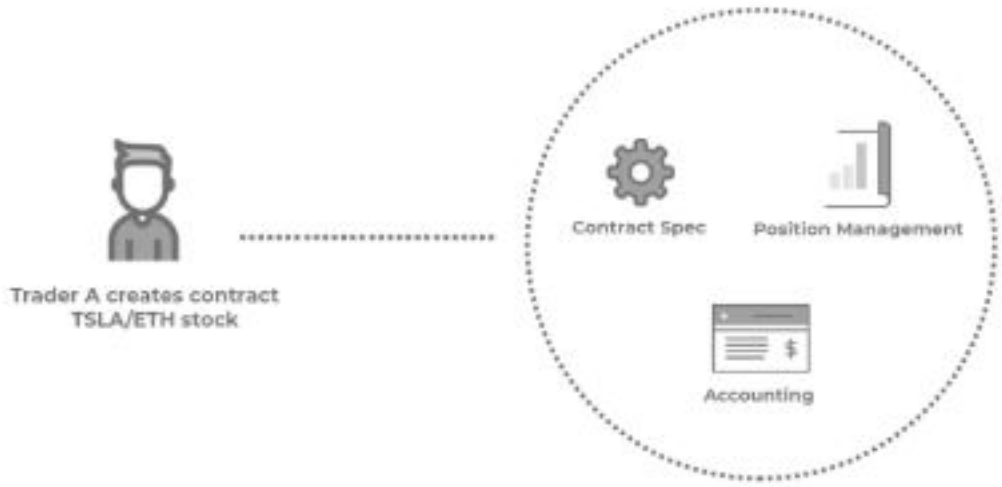
MARKET Protocol Contract Examples

Example A – Single Stock Contract

In this example, we showcase how MARKET Protocol can be used to create a derivative contract between ETH and Tesla stock (NASDAQ: TSLA), a public U.S. stock.



Trader A will define:

1. A base currency (any ERC20 token, or in this case ERC20-compliant wrapped ETH)
2. An underlying asset (in this case TSLA)
3. Settlement (with oracle)
4. CAP and FLOOR - For example, if the price of TSLA/ETH is currently 10, the contract may be created with a CAP of 15 and FLOOR or 5. If the underlying asset goes to 5 or 15, the contract expires. All prices are tradeable between 5 and 15.

At expiration all users will be paid their gain or loss.

Pre-Trade

1. Trader A identifies a contract specification that they want to trade. In this case it is the newly created TSLA/ETH contract.
2. Trader A deposits 10 ETH and Trader B 7 ETH to the smart contract to begin trading. They also deposit 25 MKT each.
3. The traders can freely withdraw their funds, up to the moment they are committed to open positions and therefore not eligible for withdrawal.

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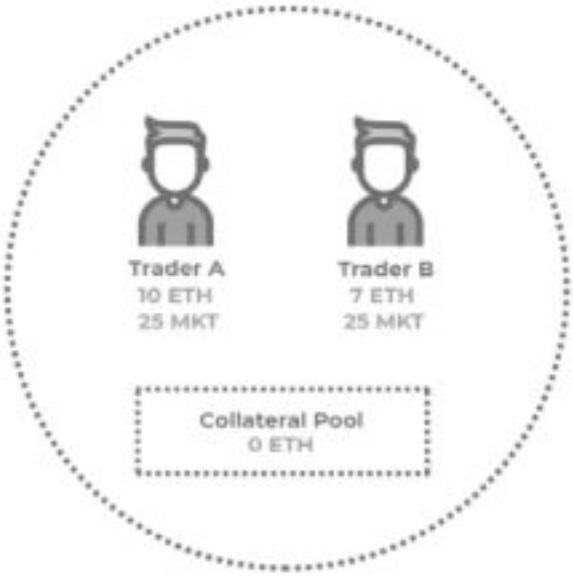
4. Contracts have a shared collateral pool used to hold funds for open orders and positions.



TSLA/ETH initial balances

Placing an Order

1. Trader A creates an order to buy 1 TSLA/ETH at price 10, signs it, and transmits the order to an order book host.
2. The defined TSLA/ETH contract has a CAP of 15 and a FLOOR of 5.
3. The order book host confirms that Trader A has funds available in the smart contract to create this order.

AAPL/ETH after order placed

4. The order book host accepts the order and displays a bid for 1 TSLA/ETH at price 10.

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Trade Execution

1. Trader B looks at the orders held by the order book host and sees Trader A's order for 1 bid at price 10. User B wants to sell 1 TESLA/ETH at price 10.
2. Trader B then takes Trader A's order, calling the fill trade function to the MARKET Protocol smart contract with the order information.
3. The MARKET Protocol smart contract then fills the order and allocates positions.
4. Collateral balances and trader balances are updated. Each trader has their max loss added to the collateral pool.
5. Transaction fees designated by the order book host (in MKT tokens) are transferred at trade execution.

Post-Trade

A TSLA/ETH contract with a CAP of 15 and FLOOR of 5 can encounter three post-trade scenarios.

1. Traders exit positions prior to expiration. All prices in MARKET Protocol are tradeable between the CAP and FLOOR.
2. Traders hold positions to expiration.
3. Contract price CAP or FLOOR is breached; if either 15 or 5 is traded in the underlying TSLA/ETH pair, then the contract expires and goes to settlement.

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Scenario 1: Traders exit positions prior to expiration

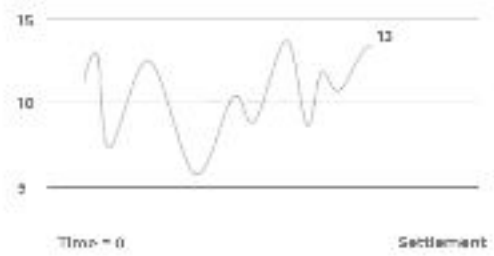
Both traders have an open position, Trader A is long 1 at 10 and Trader B is short 1 at 10. The TSLA/ETH relationship which was trading at 10 is now trading at 13.

Trader B wants to realize a loss and creates a new order in the same process indicated previously, submitting the order to an order book host. As a closing order, there is no need for additional collateral.

Trader A wants to realize a profit and fills Trader B's order which closes both traders' open positions.

Trader A has gained 3 ETH and Trader B has lost 3 ETH.

Initial collateral balances were 5 ETH each. Trader A receives back 8 ETH while Trader B receives 2 ETH. The total balance of the collateral pool was 10 ETH but is now 0. If the traders are done trading this contract, then they also receive back their MKT tokens.



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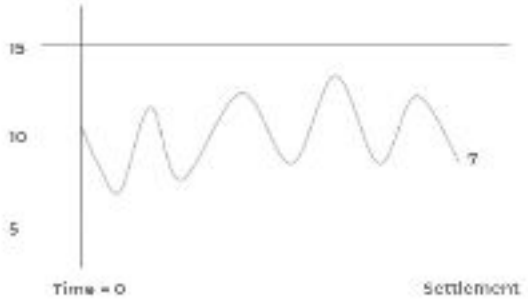
Scenario 2: Traders hold trade till expiration

Both traders have an open position, Trader A is long 1 at 10 and Trader B is short 1 at 10. At expiration (1 month after contract creation), the contract is automatically settled. An oracle delivers the necessary settlement price based on the contract specification, which is used to determine the traders' profit or loss.

In this case, the contract settles at 7.

Trader A has lost 3 ETH and so receives back 2 (initial collateral minus loss), while Trader B gained 3 ETH and receives back 8 (initial collateral plus gain).



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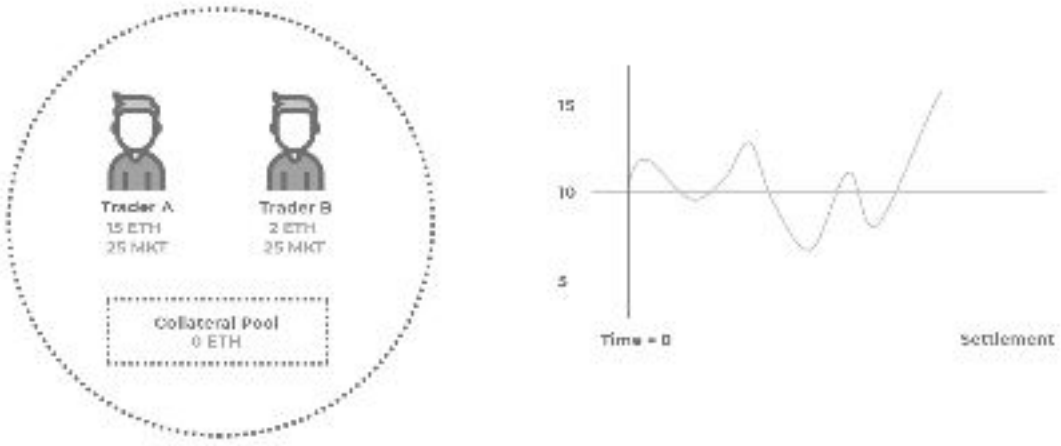
Scenario 3: Contract Hits CAP of 15

Both traders have an open position, Trader A is long 1 at 10 and Trader B is short 1 at 10.

In this case, the contract hits the upper bound of 15 and automatically expires.

Trader A gained 5 ETH and receives back 10 (initial collateral plus gain) while Trader B lost 5 ETH and receives back 0 (initial collateral minus loss).



All open positions are recorded on the blockchain and transparent to all other traders. The balance of the collateral pool is always fully funded to cover all open positions. As a user trades out of open positions, the accounting is done according to LIFO (Last In, First Out).

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Example B – Hedging a Utility Token

Users can hedge utility tokens with MARKET Protocol, removing price movement both up and down. The majority of dApp tokens provide their owner with some benefit or utility, however these tokens may be subject to considerable price volatility, which could outweigh any potential benefits associated with a specific token. MARKET Protocol provides owners of utility tokens with a way to hedge their price exposure while maintaining the utility associated with owning and using tokens.

In this example, we will use SALT lending tokens. SALT is a peer to peer lending platform that allows users to borrow fiat through loans backed by crypto assets. SALT Lending tokens are necessary to participate in the platform and obtain loans.

Since their issuance, SALT tokens have traded from below $1 to a high of over $17. With MARKET Protocol, traders can hedge against this price volatility.

To illustrate this example, suppose Trader A owns a number of SALT tokens and wants to hedge their price exposure:

Pre-Trade

1. Trader A owns 10 SALT tokens worth 5 ETH and wants to hedge them, so he would need to sell 10 contracts.
2. Trader B does not own any SALT tokens but wants to speculate on the price of SALT tokens.

It is important to note that Trader A will maintain possession of his SALT tokens and can use them to access the SALT platform, while Trader B does not (and may never) own SALT tokens.

For Trader A to hedge his SALT token price exposure, he would need to sell 10 contracts. The current price is 0.5 ETH. This means his contracts have a maximum downside of 0.25 ETH * 10 contracts = 2.5 ETH.

Trader B is willing to buy SALT/ETH at the same price. From there, SALT tokens can go up or down in price.

Post-Trade

We will cover two post trade scenarios:

1. SALT goes down
2. SALT goes up

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Scenario 1: SALT falls from 0.5 to 0.375 ETH, traders exit positions

Trader A gains 0.125 ETH * 10 contracts = + 1.25 ETH

Trader B loses 0.125 ETH * 10 contracts = - 1.25 ETH

Traders' balances are updated.

Trader A's original SALT tokens were worth 5 ETH (0.5 ETH * 10), but they have since decreased in value to 3.75 ETH (0.375 ETH * 10). However, trader A gained 1.25 ETH on the SALT/ETH contracts, fully offsetting the loss of 1.25 ETH on his actual SALT token holdings. If Trader A did not hedge his holdings with MARKET Protocol, then he would have been fully exposed to this loss.

Trader B never owned any SALT tokens but through the SALT/ETH MARKET Protocol contracts bought the equivalent of 10 tokens which decreased from 0.5 to 0.375 ETH and resulted in a loss of 1.25 ETH. This is the same impact as if the trader had owned 10 SALT tokens, but without ever holding the tokens themselves.

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Scenario 2: SALT rises from 0.5 to 0.625 ETH, traders exit positions

Trader A loses 0.125 ETH * 10 contracts = - 1.25 ETH

Trader B gains 0.125 ETH * 10 contracts = + 1.25 ETH

Traders' balances are updated.

Trader A's original SALT tokens were worth 5 ETH (0.5 ETH * 10), and they have since increased in value to 6.25 ETH (0.625 ETH * 10).

Trader A lost 1.25 ETH on the SALT/ETH contracts, but gained 1.25 ETH in value on their actual SALT token holdings, fully offsetting that loss.

Trader B never owned any SALT tokens but through the SALT/ETH MARKET Protocol contracts bought the equivalent of 10 tokens which increased from 0.5 to 0.625 ETH and resulted in a gain of 1.25 ETH, which is the same impact as if the trader had owned 10 SALT tokens, but without ever holding the tokens themselves.

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Team

The MARKET Protocol team has a diverse technical and financial background with over 30 years of cumulative experience in electronic trading on global exchanges. Co-founders Seth Rubin, Phil Elsasser, and Collins Brown have been working together since 2014, when they managed a 24-hour algorithmic trading group that started trading cryptocurrencies the following year. This experience together enabled the team to see how blockchain could solve many of the problems inherent in both traditional and crypto exchange models. These insights catalyzed the development of MARKET Protocol which will enable an open, trustless, and globally decentralized derivatives trading marketplace.

Seth Rubin
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Since starting his career as a derivatives trader in 2005, Seth has directed multiple algorithmic trading desks, operated as a registered market maker, and launched numerous products. In 2013 he co-founded the algorithmic trading group BRE Trading, where he focused on global short term interest rates, as well as a number of commodity and equity products. He was also responsible for building and maintaining the firm's exchange relationships. In 2015 Seth began trading cryptocurrencies, and soon afterwards he and his partners successfully developed and implemented a number of arbitrage and relative-value crypto strategies. Seth has a deep understanding of centralized and decentralized trading and exchange infrastructures, and he now leverages this experience to develop and execute the practical strategies incorporated into MARKET Protocol.

Phil Elsasser
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Phil has extensive experience developing trading infrastructures, user interfaces, execution platforms, and quantitative trading analytics. For 6 years he was the lead software developer for an algorithmic trading group where he built and directed teams of developers. He has written low-latency connectivity and trading strategies for futures exchanges such as the CME, ICE, TOCOM, SGX and others. Leveraging his experience with traditional derivatives, Phil has also written strategies for a number of crypto exchanges, and he is currently a technical and security advisor to a crypto asset hedge fund. Phil has the skills, creativity, and passion required to implement technical solutions to solve the challenges encountered by decentralized marketplaces.

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Collins Brown

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Collins has over 13 years of experience trading derivatives on exchanges around the world. He began trading U.S. government bonds, U.S. Treasury futures, Eurodollars, and international interest rates at Transmarket Group in 2005, eventually expanding into metals, soft commodities, and currencies in 2010. In 2013 he co-founded BRE Trading with a focus on automated and quantitative trading strategies. While trading full time at BRE, he led the firm's development team, building flexible, low latency, proprietary trading systems to implement the firm's strategies. As an experienced trader, Collins understands the complex demands of exchanges and traders. He believes MARKET Protocol is the bright future of the global derivatives industry.

Robert Jordan

Product Manager
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Robert combines a passion for investing and derivatives with decades of experience in software and product development. He's served in a variety of product and engineering leadership roles, from startups to Fortune 50 companies. Robert has a strong interest in distributed ledger technologies, smart contracts, and cryptocurrencies, and he looks forward to a decentralized future where individuals control their own identities and data.

Lazar Jovanovic

Marketing / Brand Ambassador
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As a crypto trader and enthusiast, Lazar has evaluated many new projects, pursuing the technical side of more successful ones. He has been involved with strategy development and community support for a number of blockchain based startups.

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Perfect Makanju
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Perfect is passionate about building smart solutions related to Android, AI, and smart contracts in order to make people's lives better. He also has experience with machine learning, image processing, and web applications (backend with PHP and Node.js).

Eswara Sai
Software Developer
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Eswara Sai is a talented frontend developer proficient in HTML, CSS, and JavaScript. He is also experienced with JavaScript frameworks such as ReactJS and AngularJS used in building dynamic single-page web applications. He has worked closely with Phil Elsasser and the rest of the team to build a dApp for MARKET Protocol to be used to deploy and test MARKET Protocol contracts.

Travis Mathis
Software Developer
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Travis Mathis is a software developer from Burlington, VT. He has a web 2.0 development background and has owned and operated several startups. He has over 10 years experience in software engineering and has worked on numerous projects as a contractor, freelancer, and team member.

Nitin Gupta
Product Designer
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Nitin is a software designer by profession and a software developer by passion. He is a person who believes in having a healthy relationship between design and

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code. As a product designer over the past four years, he has gained valuable frontend development skills such as ReactJS, AngularJS, KnockoutJS, Less, SaSS.

Przemyslaw Szulczynski
Software Developer
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When Przemyslaw was 9 years old his father bought him a Commodore 64 with a 5.25'' floppy drive. There were not many books around on the subject at that time; the only book he had was Commodore 64 Memory Map, which he read several times. After he got his first 90 Mhz PC, Przemyslaw spent two years on the Internet without an Internet connection, browsing offline mirror copies of websites. Hyperlinks sometimes worked as expected. Many years and projects later, he is still a technology enthusiast. Przemyslaw has worked with great teams in multinational environments, and he has an in-depth knowledge of Digital TV, MPEG2/H.264, HDCP, embedded devices, navigation devices, advanced routing algorithms, and automotive projects that include bleeding edge hypervisors. He has also written several articles on MQL5 and is interested in both blockchains and derivatives trading.

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Advisors

Patrick Charles
Data Science and Analytics Pipeline Architect
LinkedIn

Patrick Charles has over twenty years of experience building software in a variety of industries including finance, education, health care, and computer security. He has worked as a technology leader, consultant, software architect, engineer, and researcher. Patrick is an open-source contributor, has authored a number of technical papers, is an inventor with two U.S. patents, and is co-author of the opening chapter in the soon to be published book titled *Frontiers of Cyberlearning*.

Josh Fraser
Co-Founder, Origin Protocol
LinkedIn

Josh started coding at the age of 10. Prior to Origin, he co-founded three other venture-backed companies: EventVue, Torbit (acquired by Walmart Labs), and Forage.

Dan Horowitz
Senior Vice President Engineering, 1010data
LinkedIn

As VP of Engineering, Dan oversees systems development for 1010data. He focuses on making 1010data the fastest, most reliable big data discovery and sharing platform on the web. He has been instrumental developing scaled solutions to gracefully manage petabytes of data with world-class reliability and fast query response times. During his 8-year tenure at 1010data, Dan has worked on numerous critical development projects across the company, including the Trillion-Row Spreadsheet and various MBS data products. Before joining 1010data, Dan was a developer at Accenture on the Global Architecture Team building custom enterprise management software. Dan holds a BS in Computer Science from the University of Rochester.

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Casper Johansen

Co-Founder, Spartan Group
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Based in Asia since 2004, Casper has worked as an investment banker, tech entrepreneur, corporate executive, and private equity investor. He is currently a co-founder of Spartan Group, an investment management and advisory firm focusing on blockchain technology. Casper co-heads Spartan's advisory business, which works with industry leaders in the blockchain and ICO space. Prior to Spartan, Casper spent 10 years in the Investment Banking Division at Goldman Sachs in their London, Hong Kong, Beijing, and Singapore offices. Casper has been an active tech angel investor for over a decade, and is an active blockchain and crypto investor.

Brian Shields

Co-Founder, Coder Inc.
LinkedIn

Brian has over a decade of experience in debt and capital markets, digital marketing, and technology entrepreneurship. A recognized innovator, he has a wealth of business acumen developed through years of working with Fortune 500 and Inc. 5000 companies, as well as early stage startups. Brian acts as the venture mind for Coder, leading sales, marketing, finance, and strategy. Before founding Coder, Brian was an Associate Director at Brafton, a digital marketing agency with offices in Boston, Chicago, and San Francisco. Brian graduated with a Bachelor's degree in finance from the University of Illinois at Urbana-Champaign.

Brent Traidman

Chief Revenue Officer, Bread
LinkedIn

Brent has over 15 years of experience leading high impact growth software companies, of which many have had successful exits. Brent is currently the Chief Revenue Officer at Bread (BRD), one of the world's fastest growing crypto financial platforms. Bread is considered a thought leader in the world of crypto, with over one million users in over 140 countries. Prior to Bread, Brent worked in the Vista Equity Partners portfolio where he helped drive two exits. Brent builds revenue engines and helps develop growth strategies. When not at work, he helps advise a Silicon Valley venture capital firm on early stage investments and regularly speaks, mentors, and attends global accelerator conferences.

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Kevin Owocki
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Kevin Owocki, the founder of Gitcoin.co, is a software engineer interested in hacking, learning, and writing about the intersection of next-generation technologies, especially machine learning, computer vision, VR, AR, and plenoptic photography. He has a BS in Computer Science and also 10 years of engineering leadership experience in startups and open source software. Additionally, Kevin plays an active role in the Boulder, Colorado tech scene, co-organizing the Boulder Blockchain meetup alongside Phil Elsasser, CTO of MARKET Protocol.

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