



WHITE PAPER ON A POSSIBLE CRYPTOCURRENCY TRADING TOOL

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FOREWORD BY ZAK WILLIS - CEO OF INFO RHINO LIMITED (THIS DOCUMENT IS ENTIRELY OPINION BASED AND NOT INTENDED AS FINANCIAL ADVICE OR AN INITIAL COIN OFFERING).

A lot of our time has been spent working inside the financial services industry, building technology to meet regulatory and reporting needs of our clients. A lot of my time has been taken understanding client requirements and the market. To help with my understanding, the stock market, buying and selling shares, analysing risk and researching newer markets such as cryptocurrencies. What appeals instantly is whether the same approaches used in more traditional markets applies to the cryptocurrency market or whether completely new approaches make sense. Therefore, I advise anybody who may have an interest in cryptocurrency to at least own a small amount of cryptocurrency, just to experience it – you will learn so much.

Remember, I am not a certified financial professional, am not a financial advisor and am most certainly not advocating my strategy as guidance on how others should invest. The purpose is to create a tool people can use as part of their toolkit in the future.

With the short amount of time I have spent researching the cryptos several things stick out;

- A vast number of alternative mechanisms exist to help companies do business through cryptocurrencies.
- Most of the negative feedback on cryptos is already being resolved by improving technology.
- Because many (not all) cryptos are decentralised, a lot of the problems of traditional banking's ageing IT tech will be overcome.
- We at Info Rhino are already starting to look at offering crypto services for payment handling. It really does make a lot of sense.
- There are a lot of well publicised scams out there – bitcash being a Ponzi scheme for example.
- I am not going to advocate any trading platforms as different people have different experiences but you can always email me to ask me my current platforms at zak.willis@inforhino.co.uk.

Rather than list negatives, feel free to email us at solutions@inforhino.co.uk to discuss any ideas you have.

WHY AM I INTERESTED IN WRITING A CRYPTOCURRENCY TRADING TOOL?

I have personally been buying some coins and had some limited success in buying and selling them to exchange for slightly higher prices. It has all been speculative. My goal is to try and use these tools to plug into my findigl platform and to potentially see if, from say a small amount like £100, we can continually run an application on the 24 hr, 7 days a week cryptocurrency exchanges to generate income. What is being proposed can quickly become highly complicated and simplicity has been prevalent throughout the development of this toolset, but it doesn't make this a simple process. Right now, we have a demo application working off large data volumes pulling in real price feeds.

IT ISN'T JUST A CRYPTOCURRENCY TRADING TOOL





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You heard it here first, we called everything an asset meaning we could use this to pick up anything we wanted but what better place to model this on – assets where volatility of prices is high.

DOESN'T OTHER APPLICATIONS DO THIS, DON'T TRADING EXCHANGES ALREADY PROVIDE THESE TOOLS?

Why not consider this a method of collating data from different exchanges and not just relying upon the exchange to set the agenda?





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WHAT IS TRADING?

We exchange one item in exchange for another, unless you were very lucky, you would normally exchange an item of one class for another item of another class and we most commonly exchange cash for goods. As individuals, we are more familiar with giving cash for goods but will often produce goods in exchange for cash. An asset represents a quantity of a class or product and the most highly traded assets in the world are currencies.

BASICS ON CURRENCY PAIR TRADING

We all know, or should know, countries have and sometimes share currency known as fiat currency. Fiat = let it be done. Fiat represents a commitment to exchange goods in turn for a fiat amount. When you go on holiday, there is uncertainty on whether to pay in local currency or domicile currency and we tend to question whether it is expensive to buy currency at an airport or not. To understand more about why fiat exists at all read up on the "coincidence of wants".

A currency pair represents one currency versus another and is a trade whereby a buyer is long on one currency and short in another. I have ten pounds (long) and I want to buy some dollars (short). Once the trade has happened I have sold my pounds (short) in exchange for dollars (long). This is about it really and we do this all the time with a lot of things.

It is worth taking a step back and understanding a little about Gold and the Gold Standard, the Bretton Woods agreement and how President Richard Nixon exited the Bretton Woods agreement in 1971. This for many at this moment in time is what has lead us to the point at which cash backed by government no longer seems tenable which has paved the way for cryptocurrency. Many are campaigning for a Gold Standard to come back, others feel silver could make a suitable replacement for the US dollar. Certainly, right now, a lot of interesting events are happening.

SOME OBSERVATIONS ABOUT TRADING

None of these observations are particularly ground breaking on their own. They are well documented, evidenced and ridiculed depending upon who is interpreting these.

Exchange rates do vary but often have points to which they return - known as mean reversion. We also see there can be long term trends which seem irreversible - depending upon whether you are long or are short these long-term trends will make some happy and others demoralised. In terms of cryptocurrency trading it is like any other form of asset – over time the price varies; a little, wildly, or stays the same. As short-term traders, we need an asset with a price that varies to make money unless we are following Warren Buffett's strategies (which I do attempt to follow on other investment strategies). High price fluctuations are termed volatility. As an example of a theoretical way of making money on volatility, imagine you were lucky enough to buy five Ethereum at £100. You also keep £500 in a trading account. You set a trading rule that if the price of Ethereum reaches £200, you sell two, if it drops to £50 you buy two. Assuming you kept doing this and the prices kept fluctuating between £50 and £200 you will make a lot of money. Of course, it doesn't stay like this, in some scenarios Ethereum's price could drop so low it would not be mineable (worthless) and in other scenarios the value would keep going





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up. In an increasing market you may decide to reduce the volume you buy to keep the same profits but in a falling market this isn't so easy.

What we see is a need to have constant oversight on the state of one or more asset prices and an ability to keep extracting fiat whilst accumulating assets. There are two main ways to do this;

- Keep a track of other asset prices to help decide whether to buy or sell an asset.
- Consider non-asset related information in determining whether to buy or sell an asset.

Non-asset related information requires a lot more research, but we could think of this as being something like only trading cryptocurrencies if conditions such as the USA bond rate is above a certain value or the USD to GBP is below 1.5. For the first version of this model we will simply worry about asset price tracking.

SPREAD

Spread is the difference between what a seller asks for an asset and what a buyer offers to buy an asset for – a bid. Normally the market maker – the exchange making the trade will take all or some of the spread as profit. Again, we are not financial advisers so please do your own research, but spread is something to take into consideration.

VOLUME

A lot of people get excited about volumes when it comes to trading. When a lot of volume happens, it indicates liquidity – meaning it can be bought and sold easily.

PORTABILITY

How easy is it to convert one asset class to another? It is easier to convert fiat to cryptocurrency to other cryptocurrency to another fiat currency than to focus on stocks and fiat currency. Again, we are not advocating cryptocurrency over stocks but it seems to be more portable.





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A POSSIBLE TRADING APPLICATION?

TRADE CYCLING, A SIMPLE TRADE EXAMPLE

We decided to start with applications capable of making decisions upon information provided to it and acting upon those decisions to submit a trade. One theory is to only submit an order when a price is within a set range and once that has happened, undertake a different trade and keep alternating. Here is an example;

Trade number	Long asset (Owned)	Short asset (Want to own)	Value (GBP)	Amount staked (GBP)	Profit
1	GBP (Pounds)	ETH (Bitcoin)	1000	1000	0
2	ETH	GBP	1100	1000	100
3	GBP	ETH (Ethereum)	900	1000	0
4	ETH	GBP	1100	1000	200

From the above example, from four trades, we managed to make a £300 pounds profit. Of course, this is a hypothetical example and we haven't considered costs, or the time taken for these trades to happen, but we see the theory.

These trades can be cycled and repeated.

TRADING NOT JUST UPON THE PRICE OF ONE ASSET

We can consider the following features to be things we may care about at the point of undertaking a trade;

- The price of a long asset to a short asset.
- The volume traded of the long asset to the short asset.
- The value of another asset to an asset.

This starts to become interesting and we can give a theoretical example;

- I only want to buy 10 Ethereum for £8000 if;
- The British Pound is higher than 1.4 times higher than the United States Dollar.
- The volume of Ethereum is at least 10 percent of the market volume traded that day.
- Bitcoin is only 9 times higher than Ethereum.
- The Bitcoin price was 11 times the price of Ethereum a week ago.

One way to undertake this would be to have a dataset comprising of all necessary trading conditions and all necessary prices, something like;

- *ETHEREUM TO POUNDS PRICE.*
- *ETHEREUM VOLUME PER DAY.*
- *BITCOIN TO ETHEREUM PRICE.*





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- *HISTORICAL PRICES SAY 8 DAYS AGO TO 6 DAYS AGO.*

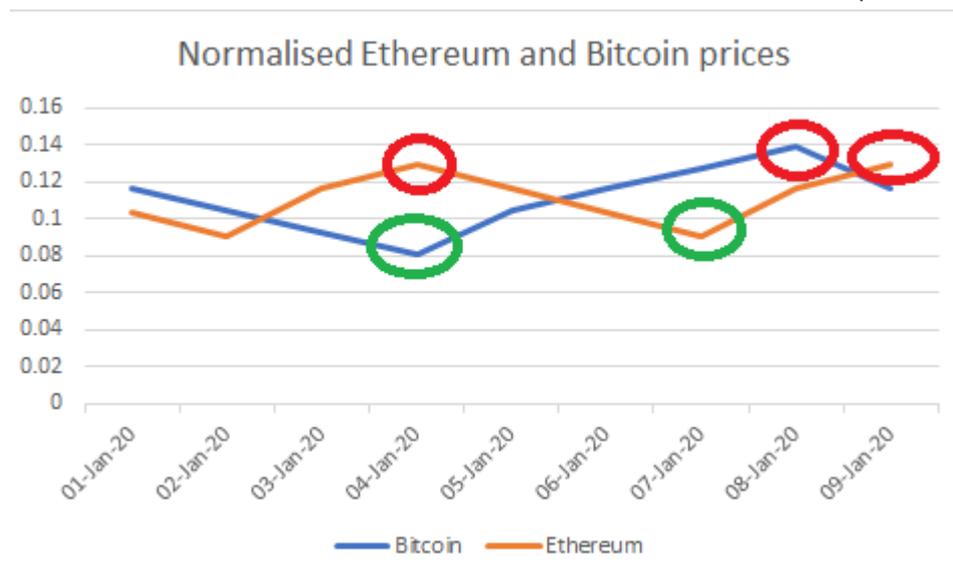
All that would be needed is the correct data made available to the trading application.

DEFINING WHAT TO TRADE

Originally, when the idea for this application was conceptualised, we knew there were certain relationships between certain cryptocurrencies. Initially, we could probably manually set up something like this;

- Trade 1 > Buy 10 Litecoins at £100 each.
- Trade 2 > Sell 10 litecoins for 2.5 Ethereum.
- Trade 3 > Sell 2 Ethereum for £1100.
- Trade 4 > Repeat, Buy 10 Litecoins at £100 each.

THEORETICAL PRICE HISTORY OVER NINE DAYS OF BITCOIN AND ETHEREUM (NORMALISED)



Looking at a fully theoretical chart (the prices were made up as they are set in the future), we may say the red circles indicate a good time to sell the expensive coin and buy the cheaper coin. The red circle on the 9th January is a more realistic exit point. Completely avoiding detail, machine learning, correlation and other techniques can predict points at which it can be good to buy and sell, but more importantly the prices can move over time. Of course, numerous statisticians and mathematicians may state this isn't true but this is where the fun is.

MAKING MONEY ON A DOWNWARD TREND?

Again, we are not chartists, do not profess to be professional investors but here is a sample of Zcash prices taken from Coinmarket cap. I have drawn some green lines in. If on a daily basis it happened to be that the daily high happened after the daily low and you bought and sold those coins at that point, even in a downward trend you would/could make money. Of course, with cryptos, you don't need to do it on a daily basis. Some will say, but

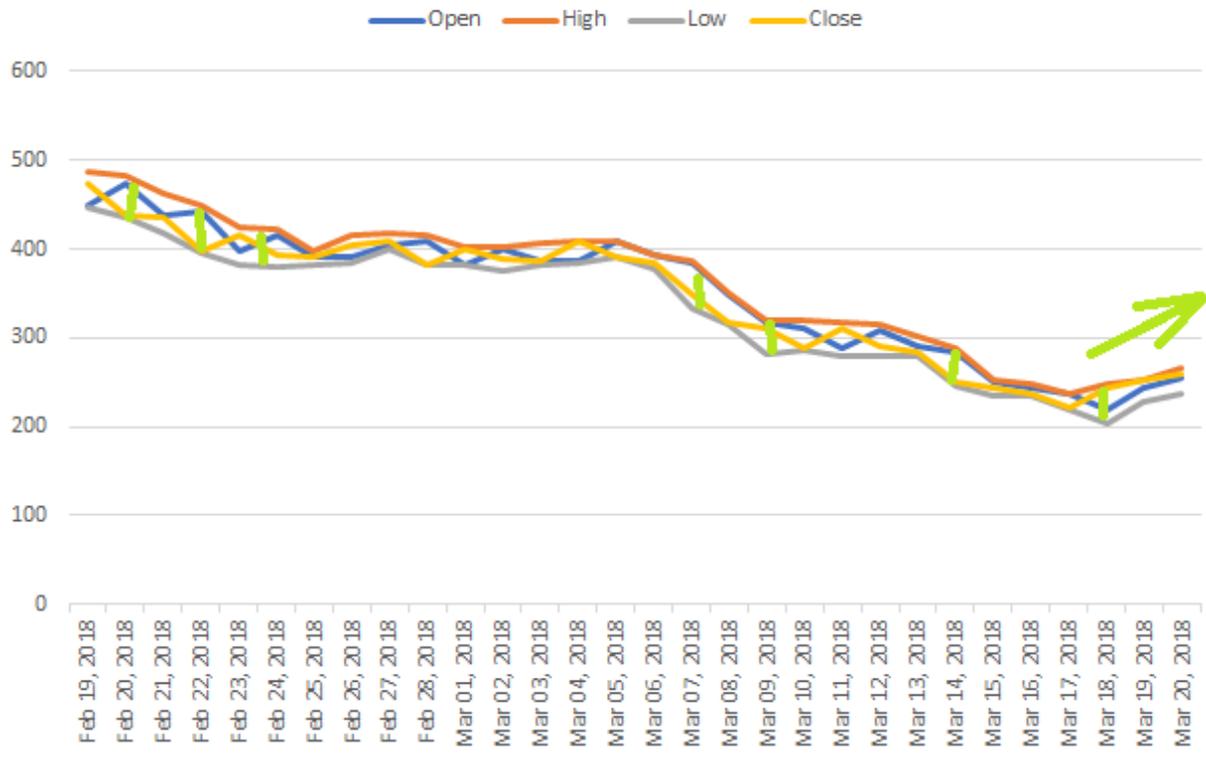




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the prices keep dropping, well, again, if you sold each amount of ZCash at a point you thought was just before a drop you would continue to make money. At some point, on the bounce, as indicated by the arrow, you would have a certain amount of coin to profit from.

Prices of Zcash Feb to March 2018



WHERE'S THE MATHS?

Read books by hedge traders, investment bankers, read journals, watch youtube videos or by direct experience of trading yourselves there is tons of data. We have already started collecting data and are likely to use some .Net maths libraries to validate various trading strategies and we are likely to publish these findings in due course.

TRADE EXECUTION

Most exchanges that allow for buying and selling of coins expose what is known as an Application Programmable Interface and the protocol for interaction is known as REST. One remarkable feature of this is most exchanges accept a fairly simple trade instruction, here is one from GDAX;

<https://docs.gdax.com/#orders>

```
{  
  "size": "0.01",  
}
```





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```
"price": "0.100",  
"side": "buy",  
"product_id": "BTC-USD"  
}
```

Obviously, we haven't handled the complexity of authenticating and that different trade orders may have different behaviour.





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APPLICATION REQUIREMENTS OF A TRADING TOOL

We have established that;

- We want to set up a series of trades that will fire when a condition is appropriate.
- Each trade from the set could be the same or a different trade item.
- We may want to only trade if a set number of conditions are appropriate.
- We will want to set trading parameters based off some informed analysis – ideally this could be automated and potentially fed in.
- We want to be able to submit trades to an exchange or at least have the ability to switch this on soon.
- We want to have evidence of being able to source prices regularly to provide information to the trading application.

IGNORED REQUIREMENTS – OR ARE THEY IGNORED?

It is tempting for third parties to start offering all kinds of complicated trading scenarios or alternatively to tell you these things are already being done etc. What becomes clear from this application's approach is that certain use cases may be achievable by extra configuration or data, here is a simple example to illustrate the point.

- I decide to buy a bitcoin for £8000 and submit a trade order.
- I later discover bitcoin is only worth £2 and want to cancel that order.

It might be easier to configure two applications, one to handle cancellations or to simply enhance the trade instruction to include a limit order or a stop.

Another example is to prevent self-trading, GDAX allows this and perhaps a more flexible trade message mapper could handle this.

A PROTOTYPE CRYPTOTRADING APP

Putting in a few hours here and there over the last few weeks we have built a number of applications to pull together a theoretical fully working cryptocurrency trading engine. We don't want to dwell too much on the detail and instead explain approximately what has been written so far.

INFO RHINO PRICE RETRIEVER APPLICATION

This is a console application that runs against coinmarketcap every few minutes and looks for changed price data using REST protocol. Now, whether the data is completely accurate is not of primary concern. Writing this application;

- Proves we can embed a realtime price collection engine into our applications.
- Gives us historical data to examine, we are likely to run this through Machine Learning applications.

We have created a zipped copy of data collected from coinmarketcap – we only retrieve prices every five minutes to respect coinmarketcap's API. www.inforhino.co.uk/documents/CoinMarketCap.zip





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TRADE EVALUATOR APPLICATION

We don't want to go into too much detail on this but in principle, the application;

- Accepts trade instructions, asset prices, trade conditions, trade accounts and adhoc (yet to be implemented) conditions.
- Validates whether a trade should happen or not.
- Upon testing a trade instruction for a given trade writes out;-
 - A valid trade message in the trades file.
 - The asset prices involved in the evaluation.
 - The trade conditions being tested in the evaluation.
 - An indication whether the conditions made a trade or not.

The application has been built in a way that once we decide to point to a live trade exchange it would just work - with a bit of effort.

TESTING THE TRADE EVALUATOR APPLICATION

Naturally, we can't just run this live – firstly, more development would be needed, and we wouldn't want to use real money right now. Instead it makes more sense to just run a version of the application that acts as if it is working on real prices. The testing application does the following;

- Defines asset pairs to trade; i.e. EUR to BTC, BTC to ETH, ETH to BTC etc.
- Defines a set of trading conditions for these pairs.
- Generates hundreds of thousands of prices for these assets within a set time window and within a certain tolerance of price conditions.
- Cycle over these prices as per the conditions and pass this information to the trade evaluator application.
- Writes this information to files. Within two minutes of simulated testing we produced 5000 files.

We have attached a zipped folder on our website here www.inforhino.co.uk/documents/CryptoTrades.zip

Numerous improvements can be made to make this better

TEST OUTPUT

SUCCESSFUL TRADE AND CONDITIONS

ASSETS

LongRateForOne	1	1
ShortRateForOne	0.1812	0.35
PriceTimeUTC	13/02/2018 22:06	13/02/2018 22:07
ExchangeSource	coinbase	coinbase
AssetCode	BTC	BTC





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AssetName	Bitcoin	Bitcoin
AssetType	Crypto Asset	Crypto Asset
UnitaryName	Coin	Coin
AssetCode	ETH	ETH
AssetName	Ethereum	Ethereum
AssetType	Crypto Asset	Crypto Asset
UnitaryName	Coin	Coin

TRADE CONDITIONS

AllowIfLongToShortRateDropsBelow	0.3993
AllowIfLongToShortRateIsAbove	0
ProportionToRetain	0.3993
PriceMustBeNowMinusThisTimePeriod	00:00:00
AssetCode	BTC
AssetName	Bitcoin
AssetType	Crypto Asset
UnitaryName	Coin
AssetCode	ETH
AssetName	Ethereum
AssetType	Crypto Asset
UnitaryName	Coin

TRADE HIT

TestName	EvaluateAllowIfLongToShortRateDropsBelow	EvaluateAllowIfLongToShortRateDropsBelow
TestedTradeability	TRUE	TRUE
TradeableTest	PassedConditionFromTest	PassedConditionFromTest
AllowIfLongToShortRateDropsBelow	0.3993	0.3993
AllowIfLongToShortRateIsAbove	0	0
ProportionToRetain	0.3993	0.3993
PriceMustBeNowMinusThisTimePeriod	00:00:00	00:00:00
AssetCode	BTC	BTC
AssetName	Bitcoin	Bitcoin





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AssetType	Crypto Asset	Crypto Asset
UnitaryName	Coin	Coin
AssetCode	ETH	ETH
AssetName	Ethereum	Ethereum
AssetType	Crypto Asset	Crypto Asset
UnitaryName	Coin	Coin

FAILED TRADE – CONDITIONS WEREN'T MET

We won't paste this data in for brevity. The test files will be uploaded to Info Rhino in a zipped folder.

WHAT HAPPENS NEXT

The obvious thing to do is to do some more testing and perhaps look a little deeper into the trade messages required by different applications to ensure it is being used appropriately and it makes sense to see how hard it will be to authenticate trades etc.

Probably, for each cryptocurrency exchange – a slightly different trade application would be needed – something dynamic would probably be too complicated and the idea of arbitraging different exchanges wasn't the purpose. Similarly, we haven't considered the implication of fees at this point.

INTERESTED - GET IN TOUCH?

You can contact me – Zak Willis at zak.willis@inforhino.co.uk or simply email solutions@inforhino.co.uk

INFO RHINO WOULD BE HAPPY TO RECEIVE INVESTMENT OR DEVELOPMENT ASSISTANCE ON THIS PLATFORM





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CONCLUSION

It has been a fascinating journey to simply come up with a concept and to see if a working model could quickly be constructed capable of becoming a trading application for end users. We at Info Rhino Limited have been considering anything price related to be of importance to many of our projects we are working on presently and for future products and services we are looking to deliver. To give a couple of examples of where buying/selling of products is of use;

BUILDING MATERIALS ACQUISITION ON PRIVATE AND COMMERCIAL DEVELOPMENTS

A key challenge to any builder being able to price a job is the indeterminant prices of goods and materials. Typically, a builder will quote just for the labour and base materials. We know there are constant variations in prices and discounts meaning at certain points goods can be purchased cheaper. We are investigating whether builder's merchants prices can either be scraped or accessed via an API and combining Natural Language Processing we can interrogate to devise a materials acquisition application.

GOODS AND TRACKING

We aren't that far off, and are probably already there, from having image recognition pick out brands – work out what we like wearing and we could imagine tools designed to identify when these goods appear at the right prices.

SERVICE PROVIDERS – CONTRACTS VERSUS RATES

A similar idea to what search engines does already on job sites but it can be done better. As a contractor or permanent member of staff – you know what you like to do and what you feel you should get paid for it. Is it possible to create automated bidding applications based upon suitability?

SKI HOLIDAYS

As a skier, there seems to be a formula for what makes a great skiing holiday;

- Decent flights and cheap ski carriage.
- Resort not too far from the airport.
- Many runs.
- Good altitude.
- Good historical snowfall (is this possible).
- Good hotels.

What varies – the price of accommodation, lift passes, and travel.

PROPERTY

FINDIGL is our soon to be resurrected project on property and much of the work undertaken to determine prices etc will be hooked into the asset trading app.

EVENTS AND BOOKINGS





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A key challenge with any event is ensuring people can meet up at a mutually convenient time – can this tool manage that – yes it can.

