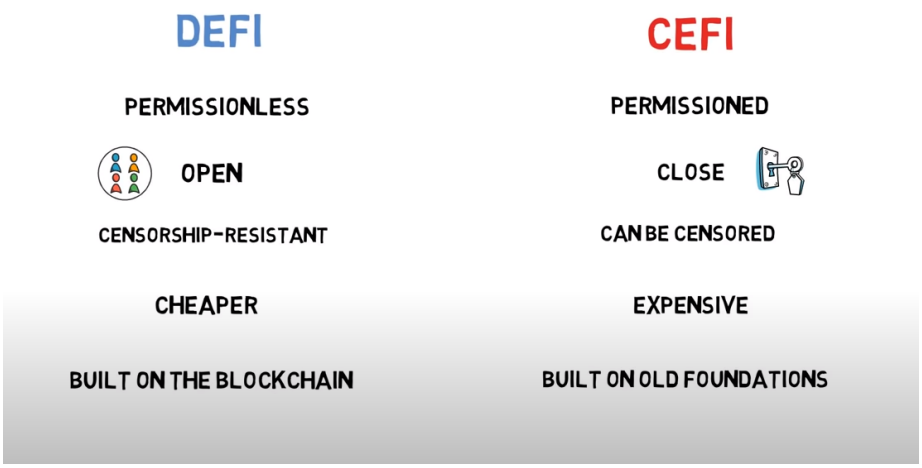
Defi - The Future of finance: https://www.youtube.com/watch?v=H-O3r2YMWJ4
Main Thesis: What is the future of finance? Is decentralized finance better than the current financial system? What problems does it solve? Does it have a chance to improve, or replace traditional finance?

- Financial system we know today went through several iterations
    - System we know today started in 1920s with accounting system and punchcards, followed by the introduction of mainframe system in the 1950s
    - Next revolution of the financial system was with the introduction of atm and credit cards in the 1970s
    - 1970s also saw traditional stock market systems replaced by computers and algorithms
    - 1990s, growing adoption of computers and the internet allowed financial system to be radically reshaped (accessing bank account, buying stocks, wiring money)
- Fintech (Financial Technology) Revolution
    - Paypal, robinhood, revolut, etc, brought financial services to a technological framework similar to how facebook and other social media platforms introduced tech to social culture
- Current financial system imperfect, doing any financial transactions such as bonds and stocks requires days to clear and require intensive human capital. Key financial decisions are made by privileged few behind closed doors. Huge banking scandals surfacing years or never after occurring. Inefficiency and high cost for international financial services. Unequal access to financial services with billions without accessing to banks across the world. Banks hiring thousands of people to keep inefficient process and deal with ever changing regulations. SUper high barrier for new players, stifling innovations.
- Current Fintech system built upon inefficient frameworks
- Defi aims to build a new system which seeks to eliminate the inefficiencies, inequalities, and secretive ways of past financial systems as well as being settled immediately and regardless of geographical location.
- Defi allows for openness as anyone can check transactions and volume on the blockchain
- TVL = total value locked, the amount of money locked into all platforms in the ecosystem
- Controversial example of the GME shorting by hedge funds would not occur in a defi network
- Brings more responsibilities to users however, up to user to be responsible for their own assets. Scaling also causes high gas fees, but this is being tackled.
- Traditional finance needs to adapt quickly or become irrelevant.

What is DeFi? https://www.youtube.com/watch?v=k9HYC0EJU6E
Main Thesis: Are defi apps the ultimate killer apps or just new hype?

- Movement that aims to make a new financial system that is open to everyone without trusting intermediaries such as banks.
- Relies on cryptography, blockchain, and smart contracts.

- Currently, most DeFi programs are on the ETH network, due to the solidarity program which allows for the logic for DeFi Apps, as well as a developed ecosystem with thousands of developers there and with high value locked in the ETH network already.
- One of the first projects was Makerdao. Founded in 2015 allows users to lock in collateral to generate DAI, follows the price of USD and can be used for savings. This creates one of the pillars of banks (lending and borrowing). This is only one part of the DeFi ecosystem.
- Other DeFi ecosystem include stable coins, decentralized exchanges, derivatives, margin trading, and insurance.
- Compound is the biggest DeFi project in lending and borrowing project. Algorithmic autonomous interest rate protocol, allows users to supply assets to make interest. Assets act as collateral for borrowing other assets.
- DAI is a stable coin which operates on an algorithm based upon smart contracts, this means it is not tied to a one to one equivalent to the US dollar. USDT, USDC, and some other stablecoins are non-algorithmic stable coins and are tied to the physical US dollars meaning they are centralized behind a company that holds the real fiat currency.
- Decentralized Exchanges (Dexes) are oppose of centralized crypto exchanges which are a decentralized and permissionless way to exchange without giving up custody. Two types of Dexes: Liquidity Pool Based Dex, and Order Book Based Dex
- Examples of Liquidity Pool Based Dex are uniswap, kyber, bancor, while order book based dex would include loopring and Idex
- Derivatives are contracts that derive their value off of assets and their underlying values. Synthetix provides a decentralized platform for on-chain exposure to different assets
- Margin trading is the practice of using borrowed funds to increase a position in a certain asset. DY/DX and fulcrum are examples of this
- Insurance provides guarantee of compensation for a payment of a premium. Protect against smart contract failure and protect of depositions. Nexus Multural and Opyn are examples here.
- Oracle services provide reliable data feeds to smart contracts, this include chainlink.



- Potential risks of DeFi: bugs in smart contract and protocol changes which can affect existing smart contracts. Users can take insurance to lower risk of smart contract risks.

- What are the shutdown procedure? Is there an admin key or a governacce that can shut down the system?
- Systemic risk can cause cascade of liquidations across various protocols.
- Network fees and congestion

What is Gas? ETH High Transaction Fees Explained:
https://www.youtube.com/watch?v=Yh8cHUB-KoU
Main Thesis: What exactly is gas? Why are transactions fees so high at the moment? What are ways to make transactions fees lower?

- Gas is a unit to measure the computational power required to perform a transaction on the ETH blockchain
- Transaction fees is determined by multiplying Gas by Gas price (GWEI)
- Gwei is a measure of gas price that is worth approx 0.000000001 ETH
- Cost of transaction is not determined by the price of ETH, rather, it is dependent on the amount of transactions occurring on the EVM (Etherium Virtual Market). More transactions occurring will result in higher GWEI
- Mempool is the place where pending transactions are waiting for miners to be added to the next Eth block. Miners are incentivized to pick up transactions with the highest gas price first
- Gas exists to prevent malicious acts of halting the EVM by creating transactions that will never finish

ERC20 Tokens: https://www.youtube.com/watch?v=cqZhNzZoMh8

- ERC20 exist on eth network, all tokens based around ERC20 exist in the Ethereum blockchain
- Tokens can also represent things such as currency (BUSD, DAI, USDT), Shares of a company, loyalty points, gold certificates, etc
- Token can be created by smart contract, it also manages transactions and keeps track of balances. On the EVM, you power the smart contract with ETH. Once a smart contract is deployed, it cannot be changed, which can be risky if there are bugs within the code
- Token contracts can be different from others, the exchange has to write custom code to communicate with the contracts. If there are hundreds of tokens, it complicated the exchange, to get around this, the community created the Etherum Request for Comments 20.
- ERC20 is the template for creating smart contracts with 6 mandatory functions (total supply, balanceOf, transfer, transferFrom, approve, allowance) and 3 optional ones (name, symbol, and decimal which refers to how much a token can be divided)
- With ERC20, exchanges only needs to run a code that communicate with the tokens once since they all follow the same ERC20 template
- A problem with ERC20 is when buying tokens. Usually uses ETH to get new tokens, but some would use tokens created with smart contacts instead, this would result in said tokens being lost

What is an NFT: https://www.youtube.com/watch?v=a8ww4aNIPQU

- NFT stands for Non-Fungible Token
- fungiable means something that can be exchanged or substituted for something and will hold the same value. It's interchangeable, for example money, gold, casino chips, bitcoin, eth, loyalty points
    - If you exchange 2 dollars for 2 dollars of gold or casino chips, that's no problem since they both hold the same value
- NFT is an asset that cant be substituted, has unique attributes that makes it different form something else in the same attribute class
    - Paintings, houses, tickets, game skins, copyrights, crypto key
    - All NF have different values, no set standard which makes exchanging it difficult. i.e. you cant trade a house for a painting since a house and painting are ambiguous and have no standard value
- NFTs are digital assets, publicly verifiable, intellectual properties authenticated on the blockchain

What is an ERC-721 Token? https://www.youtube.com/watch?v=HTm-1JtI0fA

Main Thesis: What does ERC-721 mean? How can it be used to create unique digital tokens that represent valuable collectibles?

- ERC-721, according to their website, is a smart contract that must be implement to allow for unique tokens to be managed, owned and traded
- Any collectable can be referred to as non-fungible, derived from their rarity
- ERC-721 tokens are verifiable unique and it's value is tied directly to it's rarity
    - Guarenteed by the block chain to be limited, only X amounts of a token will exist and no more will ever be generated
- First example of ERC-721 collectable is seen with the crypto kitty

What is the ERC-1155 Token Standard?
https://www.youtube.com/watch?v=KZbKJGJshtM

- Allows the creation for the creation of fungible, semi-fungible, and non-fungible tokens all in the same token standard, Acts as a hybrid of the ERC-20 and ERC-721 tokens
- Main rationale behind this is in video games, you can trade gold for things like weapons and potions. ERC-20 being gold, and ERC-721 being swords and potions
- ERC-1155 allows for only one smart contract to handle tokens as opposed to two separate one for each standard
- Real life scenarios include digital content and artwork, there can be one original copy of a digital artwork as a NFT with replicated "print" tokens acting as fungible tokens to be distributed

OpenSea NF Marketplace Explained https://www.youtube.com/watch?v=U8N1TV305Uc

Main Thesis: What is Opensea and what are NFT

- If bitcoin crashes, no OpenSea currencies will crash
- OpenSea is a marketplace that specializes in NFT, company based in San Francisco and operates on the ETH network
- Fungible is exchangeable or equivalent to another thing, cash, btc, fiat currencies

- ERC721 is non replaced and are not divisible
    - Divisible can be thought of in terms of traditional fiat currencies or ERC20, you can get cents to a dollar, and decimal points in BTC

What is Rarible (RARI) Explained: https://www.youtube.com/watch?v=UyhkzZ7s6Oc

- RARI is a NFT, platform to buy and sell NFT tokens, get rewarded with RARI tokens which are used as governance tokens to determine the direction of the platform
- Cannot buy RARI, have to earn through NRT token purchases

What is Crypto Art? A basic explanation:
https://www.youtube.com/watch?v=DYyW_tTPAhU

- All crypto art are nfts, but not all nfts are crypto art
- Digital artwork linked to a NFT
- Artwork in the real world has the issue of being replicated and copied, but crypto art are based on the blockchain and can be verified as the only authentic copy there, great for digital artists
- Crypto art NFT can be bought and sold by collectors at whim without any infringement on the original copy that is owned by the artist themselves
- https://superrare.co/mankind
- https://makersplace.com/mankind
- https://niftygateway.com/collections/...
- https://opensea.io
- https://rarible.com
- https://knownorigin.io
- https://foundation.app
- https://www.bitski.com
- https://zora.co
- https://mintbase.io
- https://mintable.app
- https://niftykit.com
- https://viv3.com

Binance Smart Chain and CeDeFi Explained:
https://www.youtube.com/watch?v=iJDoc0kvXLc
Main thesis: What is Binance Smart Chain? How is it different from ETH, What is CeDeFi all about?

- April 2018, Binance launched their own blockchain, the Binance Chain
    - Wanted to create a platform that can support large flows of transactions
    - Issues with competition with the ETH blockchain and unwillingness to sacrifice performance caused Binance to eventually launch the Binance Smart Chain in September 2020
- BSC forked ETH blockchain and optimized it for lower gas fees and higher transaction throughput by sacrificing decentralization and censorship properties of the network
- BNB is native to the BSC similar to how ETH is native to the ETH Blockchain

- Replaced ETH proof of work model with proof of stake authority model
- Scalability Trilemma helps visualizer what tradeoffs have to be made when creating blockchain architecture
    - Security, Scalability, and Decentralization are three things that cannot be archived simultaneously
        - Sharding is one of the ideas improve scalability by greeting shards of the blockchain which is one of the ideas behind the ETH2 upgrade, however, it still cannot fully handle the high demands without sacrificing the other two factors

Proof of stake model

- Uses validators to confirm proof of stake transactions in the BSC
- 21 Active validators are determined by ranking validators by the amount of BNB tokens they hold, they take turns validating blocks once a day
- No fixed rewards per block, validators only receive the BNB transaction fees

CeDeFi

- Describes a mixed solution between CeFi and DeFi
- Allows users to get a feel of using DeFi without paying high transaction fees, allows users to play around with various DeFi protocols such as exchanges, lending protocols, liquidity aggregators, farming tools and others,

- Because being a forked of the ETH network, many of the functions native to ETH can be found on BSC,

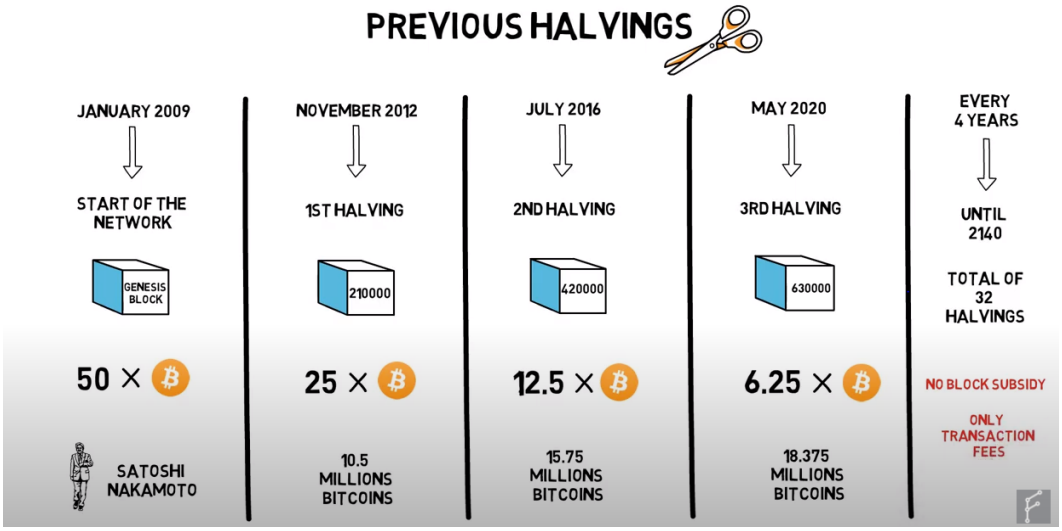
Main thing to consider about BSC is whether this is substantiate growth, or just driven by high gas fees on the ETH Network

What is Bitcoing Halving? https://www.youtube.com/watch?v=OWeGcD6zJhA

Main Thesis: What is Bitcoin Halving?

- Event that reduce the supply of newly produce bitcoin by half, occurs every 4 years or 210000 Blocks, part of the validation logic
- Affects miner's profitability, which will impact the bitcoin price

- Idea behind halving is sound money since Inflation will trend toward zero, and becoming deflationary in the long run, something contrary to all other fiat currencies



- Sound Money Theory shows how bitcoin is a controlled issuance currency with a predictable inflation trajectory, will eventually become deflation once no new bitcoin are created. The current inflation rate (as of Mar 2020) was 3.6% which will drop down to 1.8% after the 3rd halving. Inflation rate will keep reducing until around 2140 when no more bitcoin will be created.
- Price Impact (Supply Shock). If the demand status the same, and supply is cut in half, the price of bitcoin will go up, not guaranteed however as some tried to model the futures of bitcoin with the Stock to Flow Model which is based upon the stock (coins in existence) and the flow (issuance of new coins)
- Rewarding early adopters, inflation was highest at start of the network, meaning early miners received the highest of rewards.

What is yield farming? https://www.youtube.com/watch?v=ClnnLI1SClA
Main thesis: What is yield farming? How did it all start? What are some examples? What are the risks involved?

- Maximise a rate of return on capital by leveraging different defi protocols.
- Highest yields with different strategies involving different protocols.
- Can think of this in the traditional sense of finance with people switching around banks to find the ones with the highest interest rates.
- APY = Annualised Percentage YIeld which compares the rates of return on your investments
- Liquidiity mining is a process of distributing tokens to the users of a protocol. Creates additional incentives for yield miners as it is added on top of the yield.
- Leverage is a strategy of using borrowed money to increase the potential return of an investment. Miners can deposit coins as a collateral to borrow other coins to further their collateral.

- Risk that farmers are willing to take. Leverage risks, smart contract bugs, partform changes, admin keys, and systemic risks such as ETH suddenly losing value. DeFi specific risks such as attacks on draining liquidity pool.
- Yield Farming is a high risk but high reward idea
- Farmers can supply stablecoins to get a return on their capital. Liquidity mining rewards farmers who put in a deposit with comp token which further increases their investment.
- Farmers can supply capital to liquidity pools such as uniswap to get rewarded with fees when someone swaps tokens
- Some protocols allows farmers to stake LP tokens to further get other tokens which increases their investments.
- Strategies can become obsolete very quickly with protocol and incentive changes.

How do liquidity pools work? https://www.youtube.com/watch?v=cizLhxSKrAc

Main Thesis: What are liquidity pools and how do they work?

- LP are pools of tokens that are locked in a smart contract, used to facilitate trading by providing liquidity for the transactions.
- Coinbase and Binance uses the order book model which is how traditional institutions such as NYSE and Nasdaq operates on. Buyers and sellers come together and place their orders. Market makers are always wiling to facilitate trades when buyers and sellers dont budge on their offers. MM are always wiling to buy or sell and assets, this way they provide a liquidity so that users can always trade without having to wait for another counterparty offer.
- We can replicate this in Defi but it is slow, expensive and poor user experience. Order book model relies on MM to “make the market” which makes the market become illiquid and unusable. Will result in high number of cancel orders on the exchange, not viable on platforms with limited number of transactions and high gas fees.
- LP holds 2 tokens and each pool creates a new market for the pair of token. (DAI/ETH). When new pool is created the 1st liquidity provided sets the initial price and is incentivised to supply. If the Liquidity provider diverges from global price by arbitrage, it can result in lost capital for the liquidity provider
- Liqudity providers receive LP tokens based on the amount of their deposits. These LP tokens can be burned should the provider decide to take out their liquidity.
- Ratio of the tokens in a LP dictates the price. For example, if a user buys ETH from a DAI/ETH pool, the amount of DAI increase while ETH increases resulting in a lower price for DAI and a higher one for ETH.

What is Impermanent Loss? https://www.youtube.com/watch?v=8XJ1MSTEuU0

- Impermanent Loss is a temporary loss of funds, occurs when a change of a token’s price occurs in a liquidity pool
- If an impermanent loss occurs and the liquidity provider withdraws their liquidity, they will lose what was loss and the impermanent will be permanent
- Example. Assuming liquidity provider provides liquidity to a 50/50 pool they must provide both liquidity into the pool. If the price of one of the liquidity changes on an external platform, and arbitages takes the opportunity to buy, the liquidity provider will incur an

impermanent loss due to the reduced liquidity of the token which has appreciated in value.

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- Impermanent loss occurs more commonly in volatile tokens whose price can fluctuate greatly and very fast

Short Story of UNISWAP and UNI Token
https://www.youtube.com/watch?v=LpjMgS4OVzs

- Uniswap is a protocol for decentralized exchange of tokens on the ethereum chain
- Built on liquidity pools and automated market maker (X * Y = k)

Borrow Millions in DEFI with no Collateral? Flash Loans Explained
https://www.youtube.com/watch?v=mCJUhnXQ76s

- Flashloan is a feature that allows you to borrow any amount of assets from a designated smart contract pool with no collaterals.
- Flashloans must be paid back in the same transaction
- Some usage of flashloans could include arbitrage, where you take a flashloan to buy a token discrepancy to profit

ETH Layer 2 Scaling https://www.youtube.com/watch?v=BgCgauWVTs0

- Scaling occurs when offloading some of the transactions handling to another layer.
- Layer 2 is built upon Layer 1 using existing elements such as smart contracts. ETH scaling for example, Layer 1 can process 15tx/s while layer 2 can process around 2k-4kTX/s
- Channels is a scaling solution, allows 2 users to conduct multiple transactions through a channel while only sending 2 transactions to the blockchain, no open participation and must lock funds. Also application specific.
- Plasma is a scaling concept which creates child chains from the parent block chain. This would result in faster and cheaper transaction
- Sidechain are ETH compatible and are independent blockchain using the same EVM.

- Rollups take multiple transactions and submit only 1 transaction to the base layer. All Tx execution occur in a side chain
- Rollup potent route for ETH 2.0 scaling

Lending and Borrowing in DEFI
https://www.youtube.com/watch?v=aTp9er6S73M

- Lending and borrowing are the most important aspect of financial life.
- Lend and Borrrow occur in the ETH space through DEFI and CEFI protocols. CEFI vulnerable to hacks, bad loans, and other forms of negligence.
- Defi lending is based on smart contracts that run on open smart chains such as ETH. Accessible to everyone without providing personal details or requiring someone else to hold your funds.
- Users who wishes to be lender put their assets to a money market who are issued a supply token + interest whenever someone borrows their assets. Supply token can be redeemed for underlying protocol tokens.
- Borrowers need to put in token worth more than the borrow as collateral, this can still make borrowing viable if the borrower does not wish to liquidate their tokens.
- Limit for borrowing is capped by tokens in the market, collateral factor is also a limiting factor based upon the token collateral.
- Interest borrower pays and lender receive is based upon ratio of supply and borrowed tokens in a particular market. Interest paid by borrowers is the interested earned by lenders.
- Lenders earn passive income through their assets as the value of their supply token increases with each new block, meanwhile, borrowers must pay more per added block
- DeFi lending risks include high changing APY, can cause unaware users have their assets liquidated if they do not pay attention

DeFi Wallets for 2021 **https://www.youtube.com/watch?v=JCYIFtb8DwM**

- Defi Wallets allow for the storing and sending of cryptocurrency
- Examples of wallets can include a browser extension, an external hard/flash drive wallet, a mobile app, or an in-browser wallet
- Metamask allows users to connect to all popular DeFi apps. Metamask is non-custodial which means users have all control of their wallets. This also means metamask does not help users recover their wallet, and users must use their recovery phrase (seed phrase) to recover their wallet. Never store recovery phrase online!
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