Lesson 10 - Introduction to DeFi
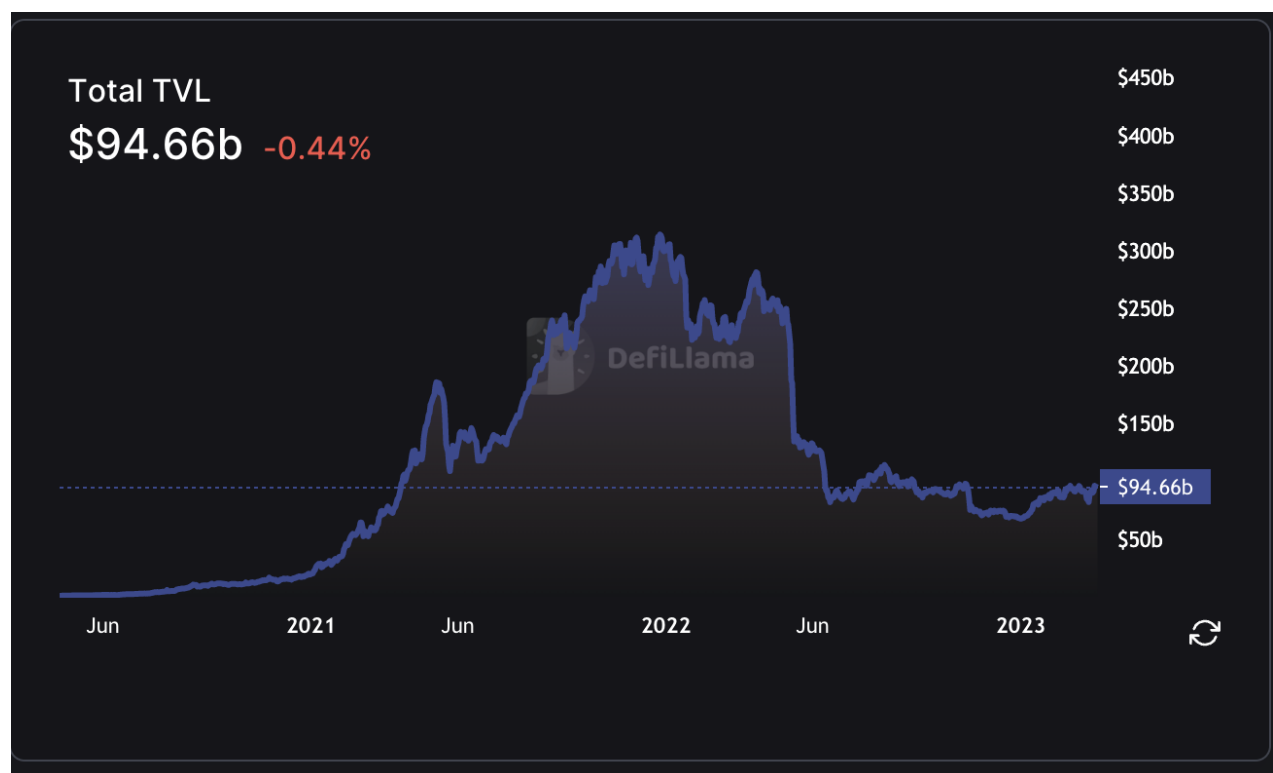
Decentralised Finance

" Decentralized Finance aims to provide the same financial services as traditional banking without any central authority or intermediaries. Without a central authority, DeFi allows everyone to engage with financial services like payments, lending, borrowing or investing with high autonomy and fewer barriers. "
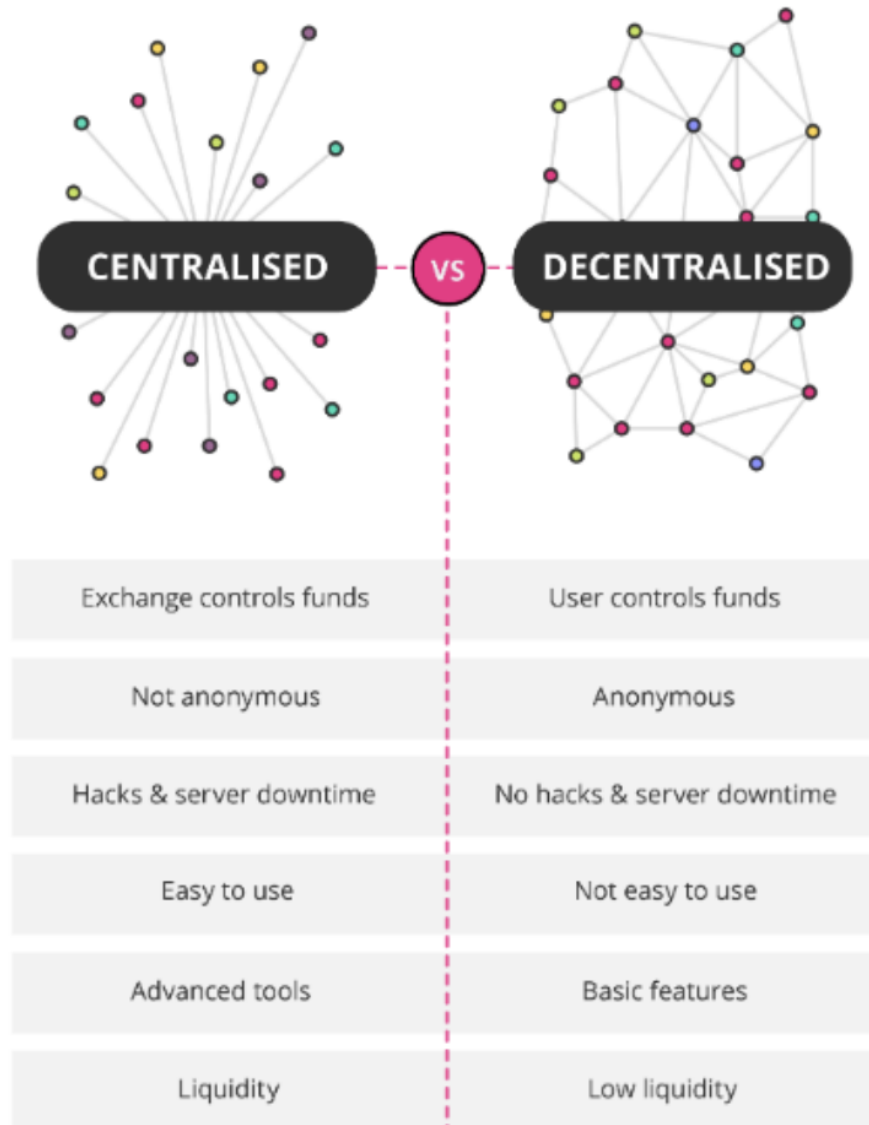
Areas of DeFi

- Exchanges
- Asset management
- Stablecoins
- Lending / Borrowing
- Remittance

Total TVL
$94.66b -0.44%

$450b
$400b
$350b
$300b
$250b
$200b
$150b
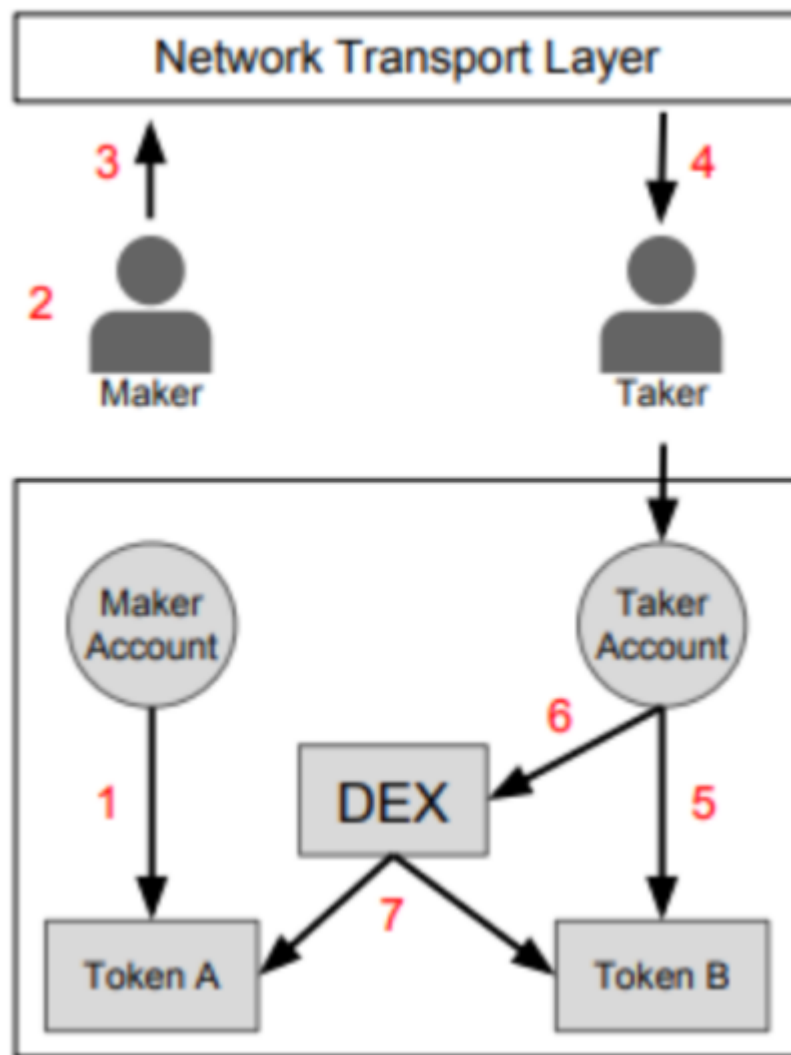$94.66b
$50b

Jun   2021   Jun   2022   Jun   2023

Decentralised Exchanges

Decentralised Exchanges are a protocol to provide asset exchange without the platform holding the users assets
Vitalik "centralised exchanges go burn in hell as much as possible"

CENTRALISED	DECENTRALISED
Exchange controls funds	User controls funds
Not anonymous	Anonymous
Hacks & server downtime	No hacks & server downtime
Easy to use	Not easy to use
Advanced tools	Basic features
Liquidity	Low liquidity

Early Exchanges - 0x Protocol

1. Maker approves the decentralized exchange (DEX) contract to access their balance of Token A.
2. Maker creates an order to exchange Token A for Token B, specifying a desired exchange rate, expiration time (beyond which the order cannot be filled), and signs the order with their private key.
3. Maker broadcasts the order over any arbitrary communication medium.
4. Taker intercepts the order and decides that they would like to fill it.
5. Taker approves the DEX contract to access their balance of Token B.
6. Taker submits the makers signed order to the DEX contract. 7. The DEX contract authenticates makers signature, verifies that the order has not expired, verifies that the order has not already been filled, then transfers tokens between the two parties at the specified exchange rate.

December 2017 Ether Delta is attacked

The DNS for Ether Delta is redirected to a fake site
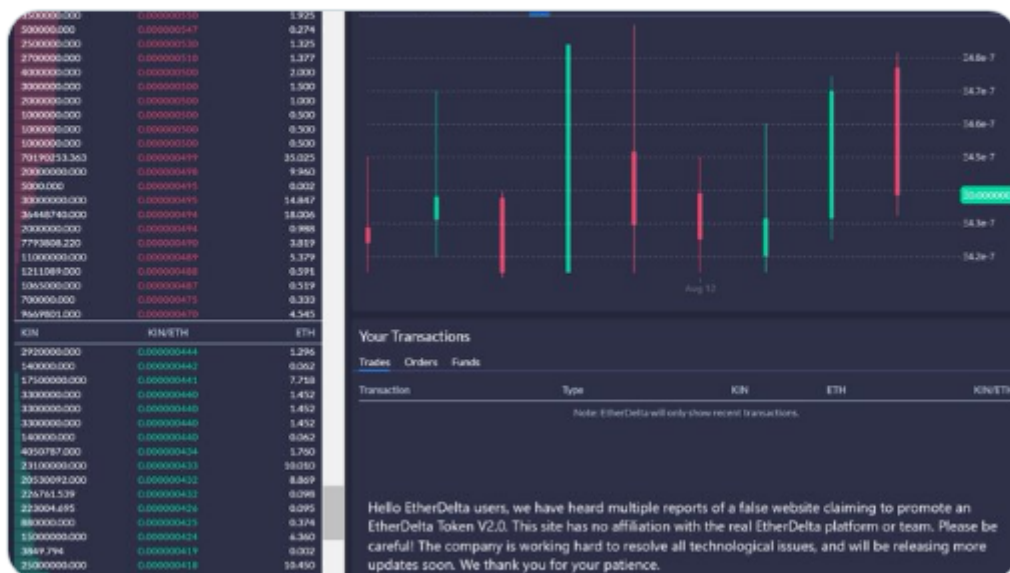Many people send tokens to this site thinking it is genuine
308 ETH stolen

EtherDelta @EtherDelta · 15 Aug 2018

Hello EtherDelta users, we have heard multiple reports of a false website claiming to promote an EtherDelta Token V2.0. This site has no affiliation with the real EtherDelta platform or team.

Hello EtherDelta users, we have heard multiple reports of a false website claiming to promote an EtherDelta Token V2.0. This site has no affiliation with the real EtherDelta platform or team. Please be careful! The company is working hard to resolve all technological issues, and will be releasing more updates soon. We thank you for your patience.

💬 13   🔁 8   ♡ 23   ⬆   ⚠ Tip

Uniswap

The first ideas came from Vitalik, Nick Johnson and Martin Koppelmann in 2016 in a [Reddit post](#)

It was followed by an implementation from Hayden Adams and launched in Nov 2018

- Launched in 2018, Uniswap is a DEX featuring an AMM
- Solves the problem of illiquid assets since anyone can set up a liquidity pool

Total value locked in Uniswap as of 27 August 2020 (source: DeFi Pulse)
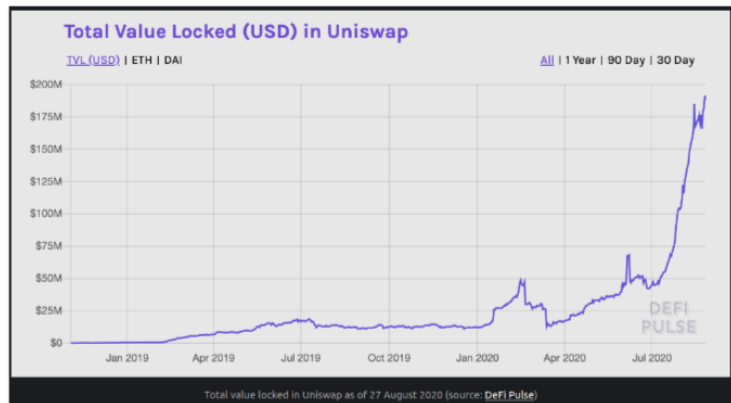
- Truly Decentralised
- Allows swap between any ERC20 pairs
- The code is robust

V2 Launched May 2020 allowing direct token swaps - halving gas fees

It solved many of the problems of the initial exchanges such as lack of incentives to provide liquidity for rarely traded assets.
It relies on a smart contract acting as an automatic market maker (AMM)
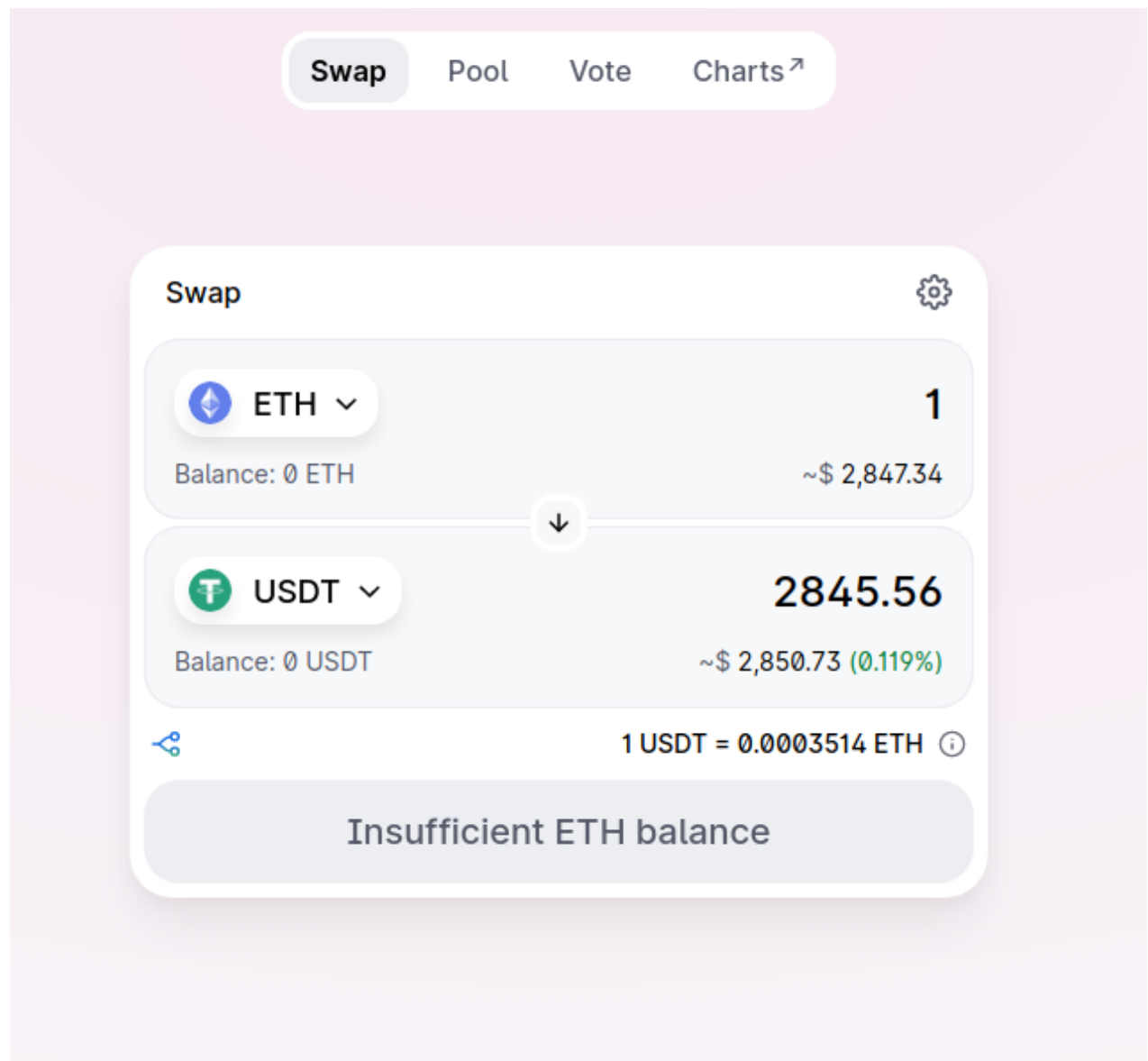
Automatic Market Makers

Incentivising Users

- Users deposit funds into a liquidity pool, for example ETH and USDT

- This pool (a token pair) allows users to exchange (or maybe lend or borrow) tokens

- Interacting with the exchange incurs fees

- These fees are paid to the liquidity providers

They are characterised as constant function market makers.

From [Constant Function Market Makers](#)

The term "constant function" refers to the fact that any trade must change the reserves in such a way that the product of those reserves remains unchanged (i.e. equal to a constant).

Swap   Pool   Vote   Charts↗

Swap

ETH ∨   **1**

Balance: 0 ETH   ~$ 2,847.34

↓

USDT ∨   **2845.56**

Balance: 0 USDT   ~$ 2,850.73 (0.119%)

1 USDT = 0.0003514 ETH ⓘ

Insufficient ETH balance

LP Tokens

Typically the liquidity provider receives LP tokens when they add liquidity, say ETH and USDT

Later they can take liquidity by providing LP tokens to the contract and will receive back ETH and USDT.

Ideally they will make a profit

Risks associated with AMMs

- Slippage
- Large trades can move the price
- Impermanent loss

**

ETH+DAI (50/50) | HODL vs Pooling
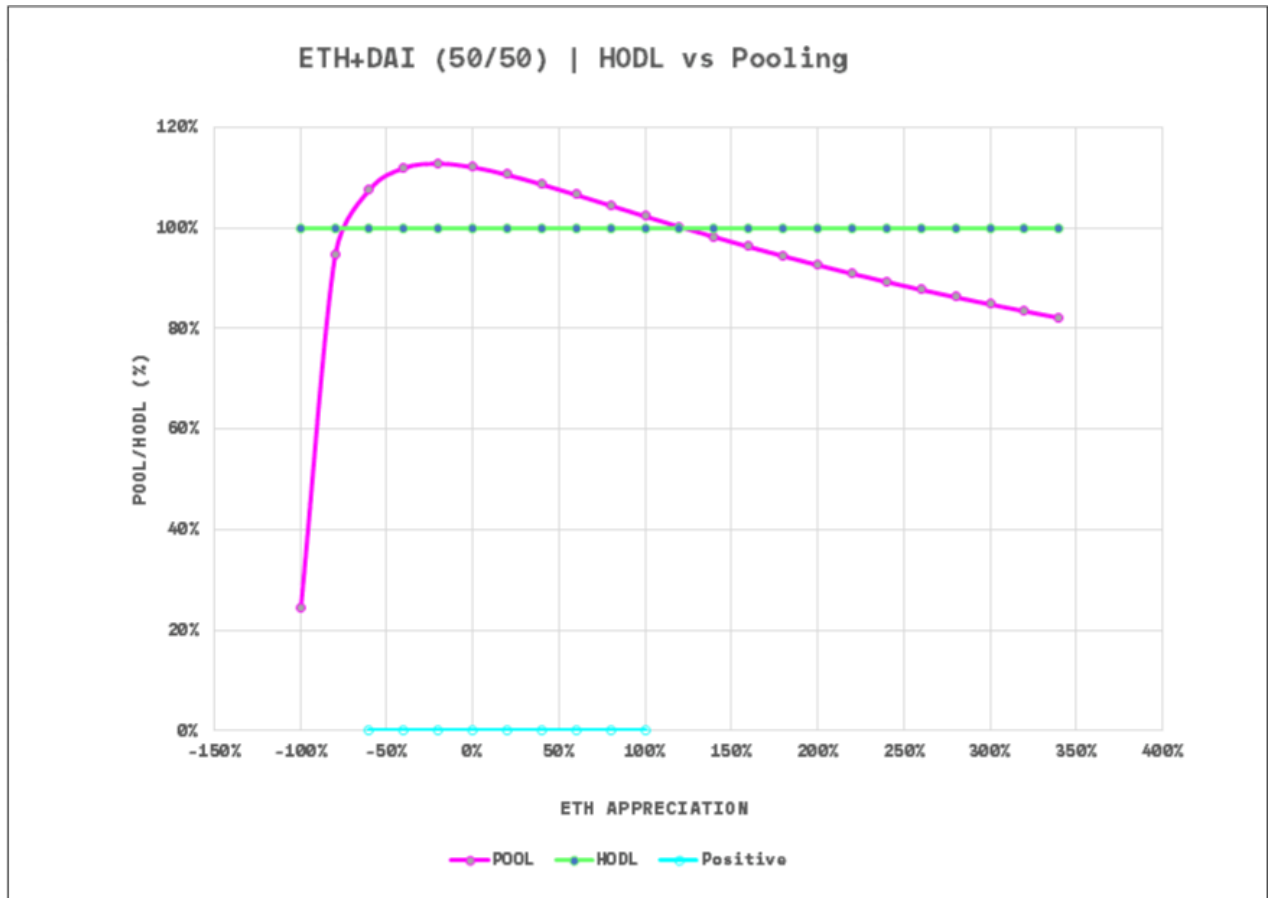
Impermanent Loss Calculator

Summary

Impermanent Loss

0.3122%

Expected Redeemable Amount

1.08234771 BETH + 1,584.30217811 USDT

ⓘ This calculation shows an estimated impermanent loss. This is provided as a reference only and it does not represent actual impermanent loss you can incur. Please refer to our FAQs to learn more about impermanent loss.

⚠ **BETH + USDT**   ✕

The liquidity pool is composed of two token assets; the calculation is based on two tokens being added or redeemed as the normal process of liquidity. Please note single tokens added or redeemed will be swapped into two tokens automatically.

Select Pool

◆⬥ BETH/USDT   ▾

BETH Amount

| 1 | ◆ BETH |

USDT Amount

| 1714.76584872 | ⬥ USDT |

Initial Price

| 0.00058317 | ◆ BETH | ≈ 1 ⬥ USDT ⇄ |

Expected Price at Redemption

| 0.00068317 | ◆ BETH | ≈ 1 ⬥ USDT |

Close

While liquidity providers can use stablecoins, yields, and rewards to help lessen the impact of impermanent loss they can also reduce this by using liquidity pools that use ratios other than 50/50. Balancer is a platform that offers liquidity pools with ratios like 60/40 or 80/20. When ETH is deposited into a pool that is 50/50 the liquidity provider has to have 50% exposure to another token. With an 80/20 pool, they only need 20% exposure to another token. You can see below how three liquidity pool ratios are affected by impermanent loss differently, with the 95/5 pool seeing the least impermanent loss.

Impermanent Loss

95/5
80/20
50/50

Relative price change
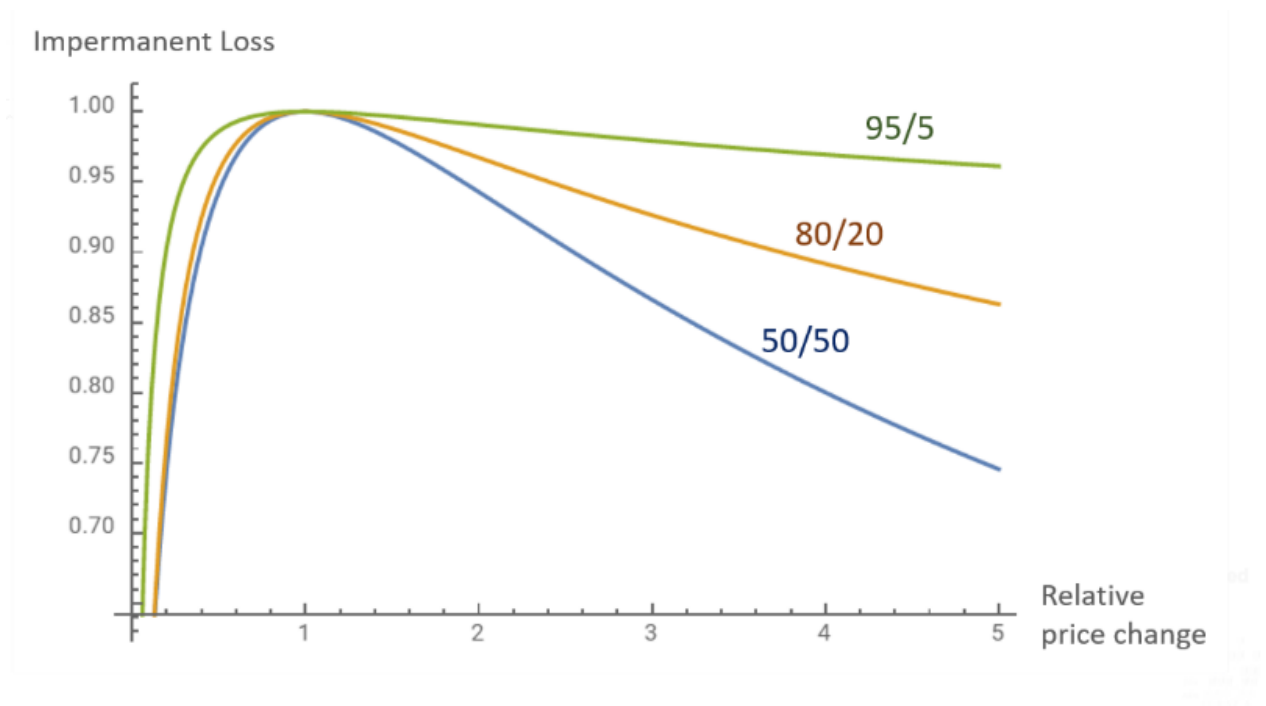
Borrowing / Lending

Compound

Compound III is an EVM compatible protocol that enables supplying of crypto assets as collateral in order to borrow the *base asset*. Accounts can also earn interest by supplying the base asset to the protocol.

The initial deployment of Compound III is on Ethereum and the base asset is USDC.

$813,792,841 of borrowing backed by $2,333,691,424 of collateral across 4 markets

17	V2	Ethereum		USDC	Ethereum		USDC	Polygon		ETH	Ethereum
$1,979.10M	$276.47M	$8.28M	$69.82M
$637.63M	$114.29M	$4.54M	$57.32M
APP	MARKET	APP	MARKET	APP	MARKET	APP	MARKET

Yield Farming

Yield Farming at its simplest is a means of earning rewards for depositing tokens
Users are rewarded for providing liquidity

Different strategies are used by investors to maximise their rewards from the many DeFi projects

Compound and yearn.finance introduced this area to DeFi

June 2020 BAT token

| | Assets ▾ | Market size ▾ | Total borrowed ▾ | Deposit APY ▾ | Borrow APR | |
					Variable ▾	Stable ▼
	Basic Attention Token...	1.85M	1.47M	110.63 % 30D 1.51 % Avg.	193.70 % 30D 4.23 % Avg.	199.70 %
	WBTC Coin (WBTC)	143.78	127.03	24.17 % 30D 0.76 % Avg.	28.87 % 30D 1.36 % Avg.	38.04 %
	sUSD	332.92K	281.76K	14.03 % 30D 6.60 % Avg.	16.58 % 30D 8.07 % Avg.	—
	Binance USD (BUSD)	254.55K	216.03K	14.57 % 30D 5.38 % Avg.	17.17 % 30D 6.78 % Avg.	—

USD / Native

Yearn finance

Vaults

Capital pools that automatically generate yield based on opportunities present in the market. Vaults benefit users by socializing gas costs, automating the yield generation and rebalancing process, and automatically shifting capital as opportunities arise.
End users also do not need to have a proficient knowledge of the underlying protocols involved or DeFi, thus the Vaults represent a passive-investing strategy.

After depositing, your funds first go to the vault contract and then are deployed to one or more strategy contracts. Guardians and strategists monitor deposits to ensure optimal returns and to be available during critical situations.

Vault and Strategies Introduction: [What are Vaults and Strategies?](#)
Vault and Strategies Contracts: [Yearn Watch](#)
Vault and Strategies Descriptions: [The Vaults at Yearn](#)
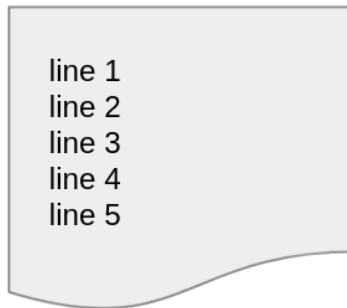
Flash Loans

An innovative financial product
Does a risk free loan with no collateral required, of virtually any value ,
with an extremely low fee (say 0.09 %) seem to good to be true ?

Imagine that line 2 in this contract increases the account balance by 5

Processing a transaction
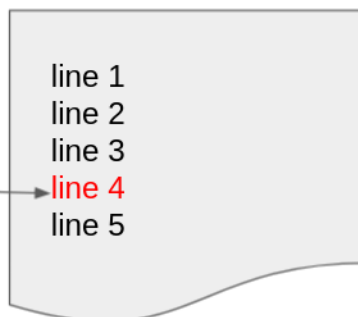
Initial account balance = 5

```
line 1
line 2
line 3
line 4
line 5
```

Process flow

Final account balance = 10

Transactions are atomic

Initial account balance = 5

```
line 1
line 2
line 3
line 4
line 5
```

EVM reverts transaction

Process flow

Final account balance = 5

Camila Russo
@CamiRusso

The new flash boys are here ⚡⚡

Someone made the first defi uncollateralized loan on @AaveAave to arbitrage between Dai and Sai

They earned 5.45 dai (9 dai profit - 3.66 gas cost). Not bad for a few seconds of work!

tx: etherscan.io/tx/0x4555a69b4…

h/t @StaniKulechov

10:06 PM · Jan 18, 2020 · Twitter Web App

Also see
[Attacking the DeFi Ecosystem with Flash Loans for fun and profit](#)

Flash swaps on Uniswap

Uniswap V2 flash swaps allow you to withdraw as much as you want of any ERC20 token on Uniswap at no upfront cost and do anything you want with them (execute arbitrary code), provided that by the end of the transaction execution, you either:

- pay for all ERC20 tokens withdrawn
- pay for a percentage of ERC20 tokens and return the rest
- return all ERC20 tokens withdrawn

Liquidity provider fees are enforced by subtracting 0.3% from all input amounts, even if the input ERC20 tokens are being returned as part of a flash swap.

Composability

A multitude of DeFi applications ("Money LEGOs") can be connected to create new financial products.
See [Monolith article](#)

The applications on the Ethereum network can run interchangeably, and they all support ETH and other ERC-20 tokens. They can be used in endless combinations, with no third party intermediary controlling any element of the network activity. Composability is a core basis of DeFi, and it's what's helped the ecosystem grow so quickly.

Risks associated with composability

There are the usual risks associated with a protocol or smart contracts, but in addition there is a risk when combining products.
The contracts for one application may be secure until combined with those of another application. For example, on 12th March 2020, a crash in the price of ETH wreaked havoc for DeFi protocols as holders rushed to exit their positions. A gas price spike caused a lag across price oracles, leading to widespread liquidations in protocols like Maker.

The recent attack on [Euler Finance](#) for example impacted (figures from rekt.news)
[Angle Protocol](#) (over $17M of agEUR collateral, [ANGLE](#) down over 50%)
[Balancer](#) ($11.9M of bbeUSD)
[Temple DAO](#) ($5M, [TEMPLE](#) down 30%)
[Idle DAO](#) (~$5M)
[Swissborg](#) ($2.6M in ETH and $1.7M of USDT)
[Yield Protocol](#) ($1.5M)
[Yearn](#) ($1.38M of indirect exposure, losses to be covered by Treasury)
[Inverse Finance](#) ($800k)
And [others](#)

History of DeFi

Summer of DeFi

From (https://twitter.com/econoar/status/1526417888029970432)
It's August 2020
Your friend pings you on Discord about a new defi contract from a well known deployer You quickly load up diffchecker and paste in the code to compare it to the last food farm.
No diffs, it all checks out
APY is 45000%.
You ape in your net worth
Life is good

Approximate Milestones

Pre 2020

First DEXs
Uniswap

Early 2020

Synthetix
Aave - Flash loans
Ampleforth
Compound
Yearn.finance

Summer 2020

YAM
Food coins
Sushi swap

Autumn 2020
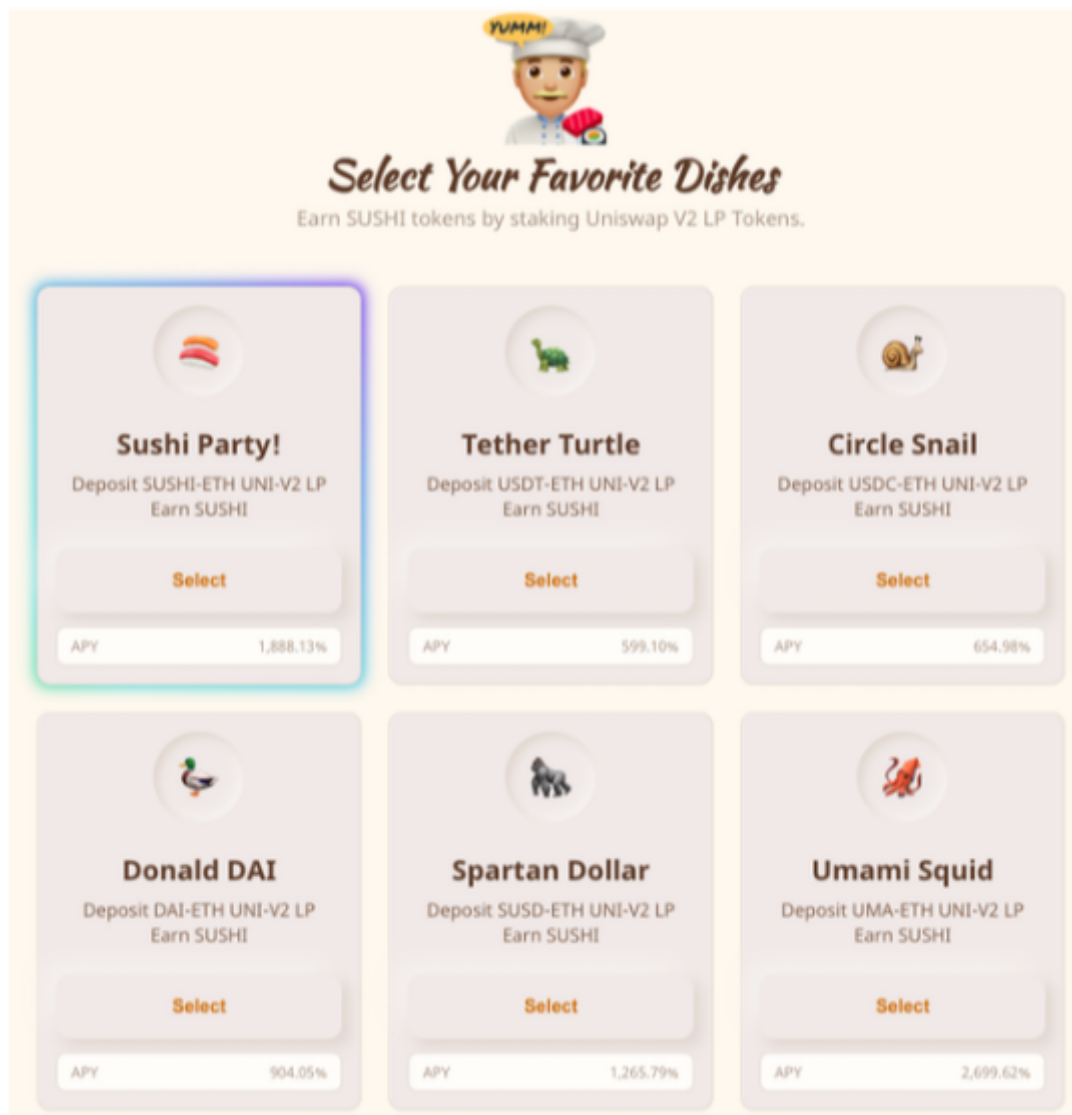
Area cools
NFTs increasingly popular

Food Coins

Some products

- YAM
- Sushi
- Hotdog
- Burger
- Kimchi
- Spaghetti
- Pizza

Products promoted with
Social Networking / Memes / Emojis / Gamification

Yam

YAM = AMPL + YFI

[Yam the emoji](#)that drew $400M in less than a day
"$90M USD was deposited in the protocol within the first 90 mins
Less than 24hrs later, more than $400M has been deposited in Yam's
smart contracts, and YAM has climbed to ~$95."

From Coindesk [The Rise of Crypto's 'Weird DeFi' Moment](#)

Decentralized finance (DeFi) started out by imitating the regular financial
world, but the way its pieces can be mixed and matched has become so
easy that new entrants are starting to get strange.

Yearn Finance (YFI), YAM, Spaghetti, Based, whatever today's variant is –
the "Weird DeFi" cohort keeps growing.
Yearn.Finance seems to have been a key shift in the market. It's
effectively a robo-adviser for yield in a smart contract, but something
about it got creative juices flowing.

Weird DeFi started earlier than this. But the broader crypto world first
noticed it with YAM, which seems to be a serious effort to unite people
first and BUIDL later.

Weird DeFi has also advanced the model of fair token distributions, where
all participants have equal access to distributions from launch. But that's
not without tradeoffs.

YAM seemed to begin the era of "liquidity first, purpose later." (In
actuality: liquidity first, get copied, explode and then resolve to carry on.
Purpose comes eventually.)

YAM - the first food coin

Taking inspiration from Yearn, Ampleforth and Compound

Aug 11 - YAM launches
- In the launch announcement, the founders noted that no formal audits had been conducted on the protocol and that this was a "10-day project from start to launch", resulting in criticism from people immune to hype.
- In less than 24 hours after launch, YAM Finance is already managing around $580 million in crypto assets.

Aug 12 / 13 - A bug is discovered, which made the governance unworkable.
- Within 6 hours the price of YAM falls from $160 to $4

brock
@brockjelmore

i'm sorry everyone. i've failed. thank you for the insane support today. i'm sick with grief

9:01 AM · Aug 13, 2020 · Twitter for iPhone

Fair Launch

(From fairlaunch.capital)
What is a Fair Launch?

- A decentralized crypto network that is earned, owned and governed by the community from the outset.
- Everyone can participate on equal footing.
- There is no early access, pre-mine or allocation of tokens.

Governance and governance tokens

Tokens are issued to users of the application, who can then take part in the governance of the project, often as part of a DAO

Holding the token gives the holder the right to vote on aspects of the protocol, typically economic settings, inclusion of assets

The tokens may have a yield

🔒 [Proposal] Transparency for Vault Fees

■ Proposals ■ Vaults

M **Maximo**   Dec '22

Summary

Improve public-facing visibility of Fees on Vaults

Background

- Current Vault Fee structures are dependent on multiple variables (including difficulty/complexity), and thus, have different Strategist and Fee structures.
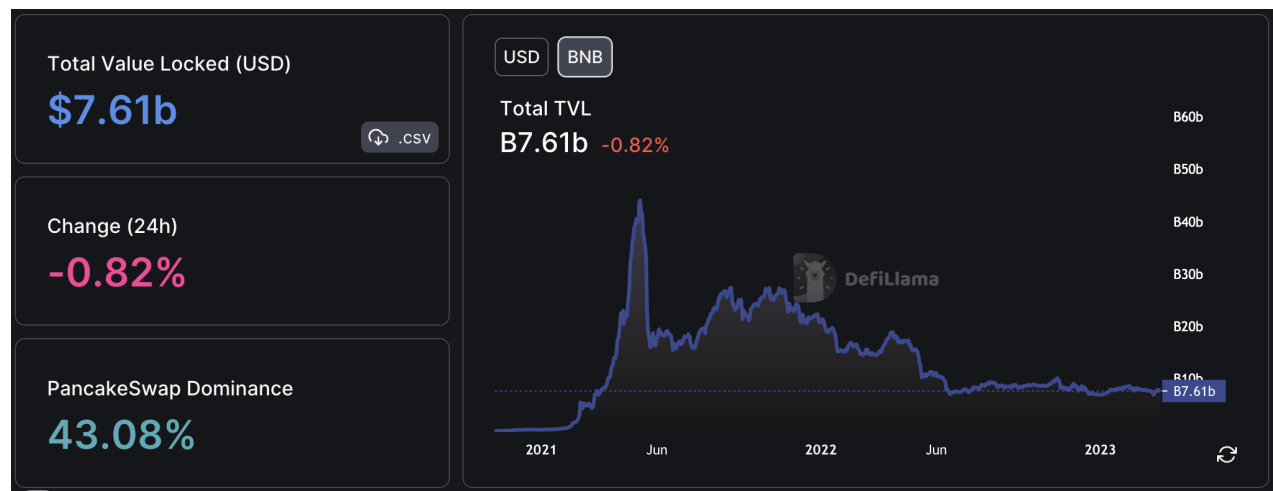- A recent reduction in Fees has created a 0/10 Fee structure for most Vaults:

  > **banteg** ☑ 10/17/2022 7:11 AM
  > yearn has moved from 2/20 to 0/20 for old products and 0/10 for new products
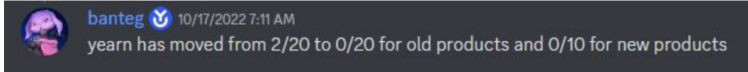
- However, Fee structures for Vaults are difficult to find, and not readily available for quick reference to Yearn Users.

Motivation

Due to the evolutionary growth of Yearn's Fee structures, there is a lack of transparency on the Fee structures for each given Vault.
A move to greater transparency will provide another dataset that Yearn and Users can both utilize in their investment decisions, and will be helpful in making additional improvements to Yearn's strategies & tokenomics in the future.

DeFi on Binance

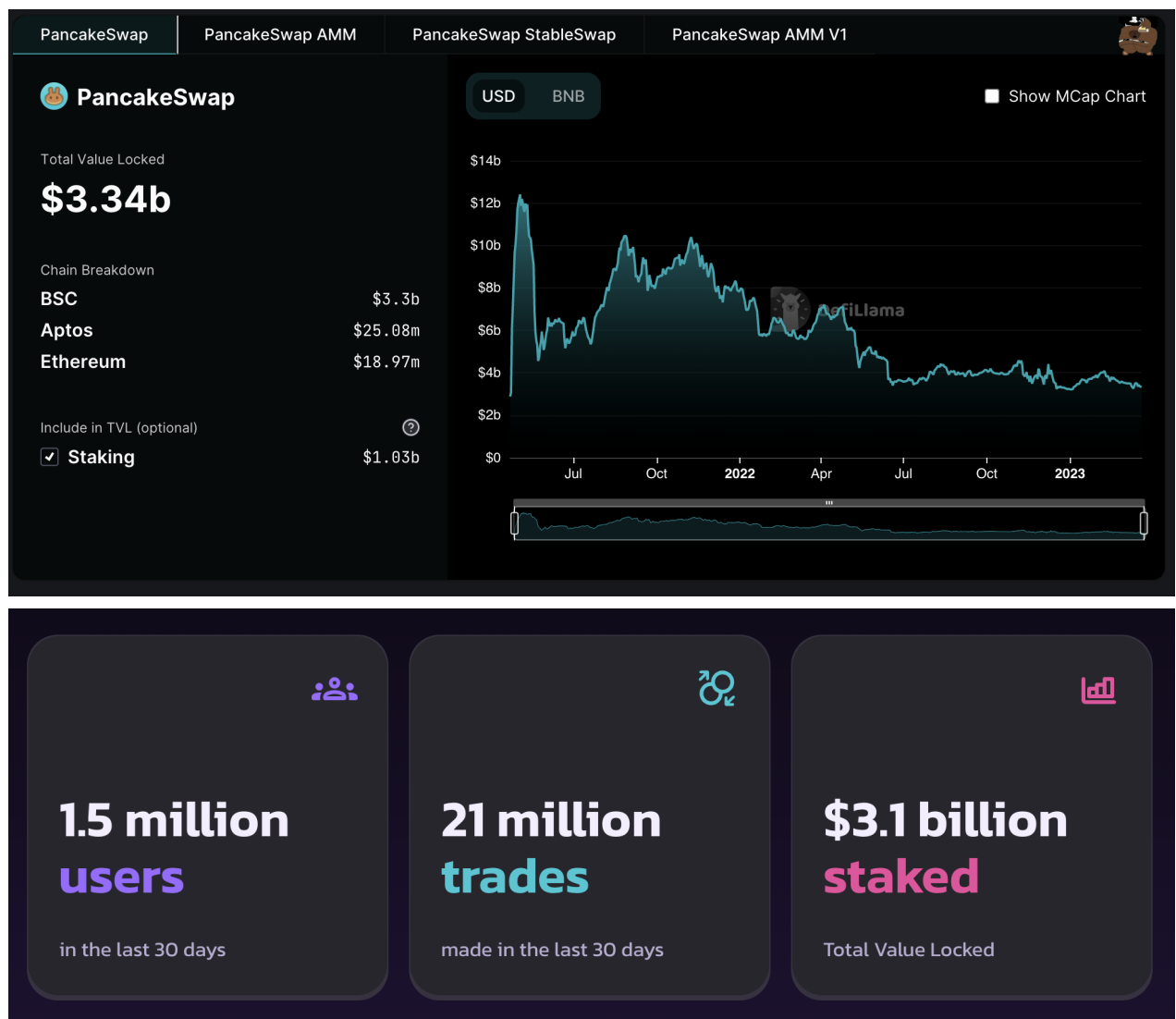Total Value Locked (USD)

$7.61b

⬇ .csv

Change (24h)

-0.82%

PancakeSwap Dominance

43.08%

[USD] [BNB]

Total TVL

B7.61b -0.82%

B60b
B50b
B40b
B30b
B20b
B10b
B7.61b

DefiLlama

2021   Jun   2022   Jun   2023

Top Applications

Name	Category ⇅	1d Change ⇅	7d Change ⇅	1m Change ⇅	TVL ⇅	Mcap/TVL ⇅
> 1 🐰 PancakeSwap 3 chains		-2.01%	-4.85%	-9.20%	$3.28b	
▯ 2 Venus 1 chain	Lending	-2.08%	+34.29%	+20.95%	$1.66b	0.04
> 3 Alpaca Finance 2 chains		-1.00%	-16.66%	-15.70%	$328.97m	
▯ 4 BiSwap 1 chain	Dexes	-1.53%	-14.10%	-26.44%	$214.97m	0.34
▯ 5 PinkSale 6 chains	Launchpad	-2.08%	+6.10%	+2.12%	$178.79m	0.11
▯ 6 Coinwind 3 chains	Yield	-1.44%	+2.38%	+1.62%	$174.6m	
▯ 7 UniCrypt 5 chains	Launchpad	-1.74%	+1.66%	-1.49%	$106.37m	0.15
▯ 8 Thena 1 chain	Dexes	-5.62%	-36.05%	-36.49%	$94.65m	0.06
▯ 9 Ankr 7 chains	Liquid Staking	-1.90%	+8.54%	+8.24%	$73.94m	3.68
▯ 10 Tranchess 2 chains	Yield	-2.98%	+8.69%	-2.05%	$72.12m	0.43

PancakeSwap

See website

🥞 **PancakeSwap**

USD BNB

☐ Show MCap Chart

Total Value Locked

$3.34b

Chain Breakdown

BSC	$3.3b
Aptos	$25.08m
Ethereum	$18.97m

Include in TVL (optional) ⑦

☑ **Staking** $1.03b

**1.5 million
users**

in the last 30 days

**21 million
trades**

made in the last 30 days

**$3.1 billion
staked**
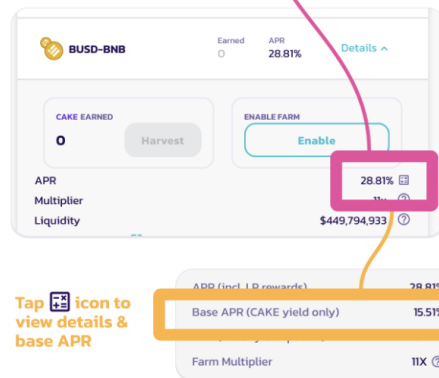
Total Value Locked

Yield Farm rewards on PancakeSwap

Yield Farm APR calculations include both:

- **LP rewards APR** earned through providing liquidity and;
- **Farm base rewards APR** earned staking LP Tokens in the Farm.
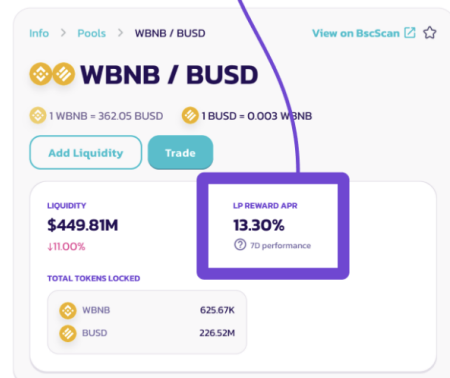
Why? Because when you stake your LP tokens in a farm to earn CAKE, you're still providing liquidity to the liquidity pool, so you earn LP rewards as well!

Venus

A Decentralized Marketplace for Lenders and Borrowers forked from Compound

Tokens Breakdown

Others: (1.57%)
LINK: (0.37%)
XRP: (0.39%)
MATIC: (0.42%)
TUSD: (0.43%)
LTC: (0.55%)
SXP: (0.65...
DAI: (0.6...
WETH: (...
CAKE: (...
BUSD: (...
USDC: (...
ETH: (11...

WBNB: (25.31%)

BTCB: (22.59%)

USDT: (18.01%)
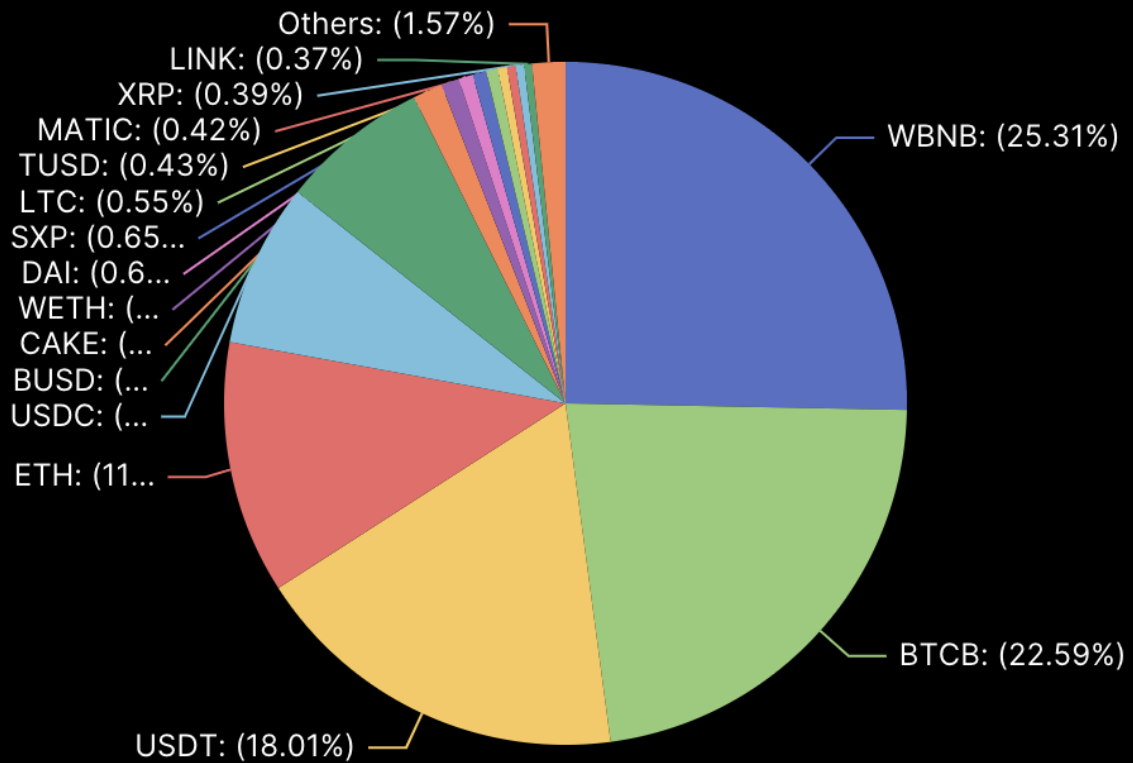
vToken and Underlying Decimals

Prices and exchange rates are scaled by the decimals unique to each asset; vTokens are BEP-20 tokens with 8 decimals, while their underlying tokens vary, and have a public member named decimals.

vToken	vToken Decimals	Underlying	Underlying Decimals
vBNB	8	BNB	18
vBUSD	8	BUSD	18
vSXP	8	SXP	18
vUSDC	8	USDC	18
vUSDT	8	USDT	18
vXVS	8	XVS	18

Stablecoins

We will cover these in detail in a later lesson.

They were created because of the perceived volatility of crypto currencies, and (usually) aim to have fixed exchange rate against an established asset such as USD, or gold.

They have various mechanisms to maintain their 'peg' against the asset, this is not always successful, see the recent volatility of USDC for example.

USD Coin to USD Chart