Decentralized Finance (PHDBA297T4.)

Introduction

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What is Decentralized Finance?

Traditional finance

- Permissioned
  - Closed-source system, built on top of centralized databases
  - Needs approval & agreement for third-party to use & build on
- Custodial
  - Assets are custodied by licensed third-parties
- Centralized trust & governance
  - Single entity responsible for upgrade decisions & admin privileges
- Real identity
  - Users register with real identity, e.g., for KYC/AML compliance

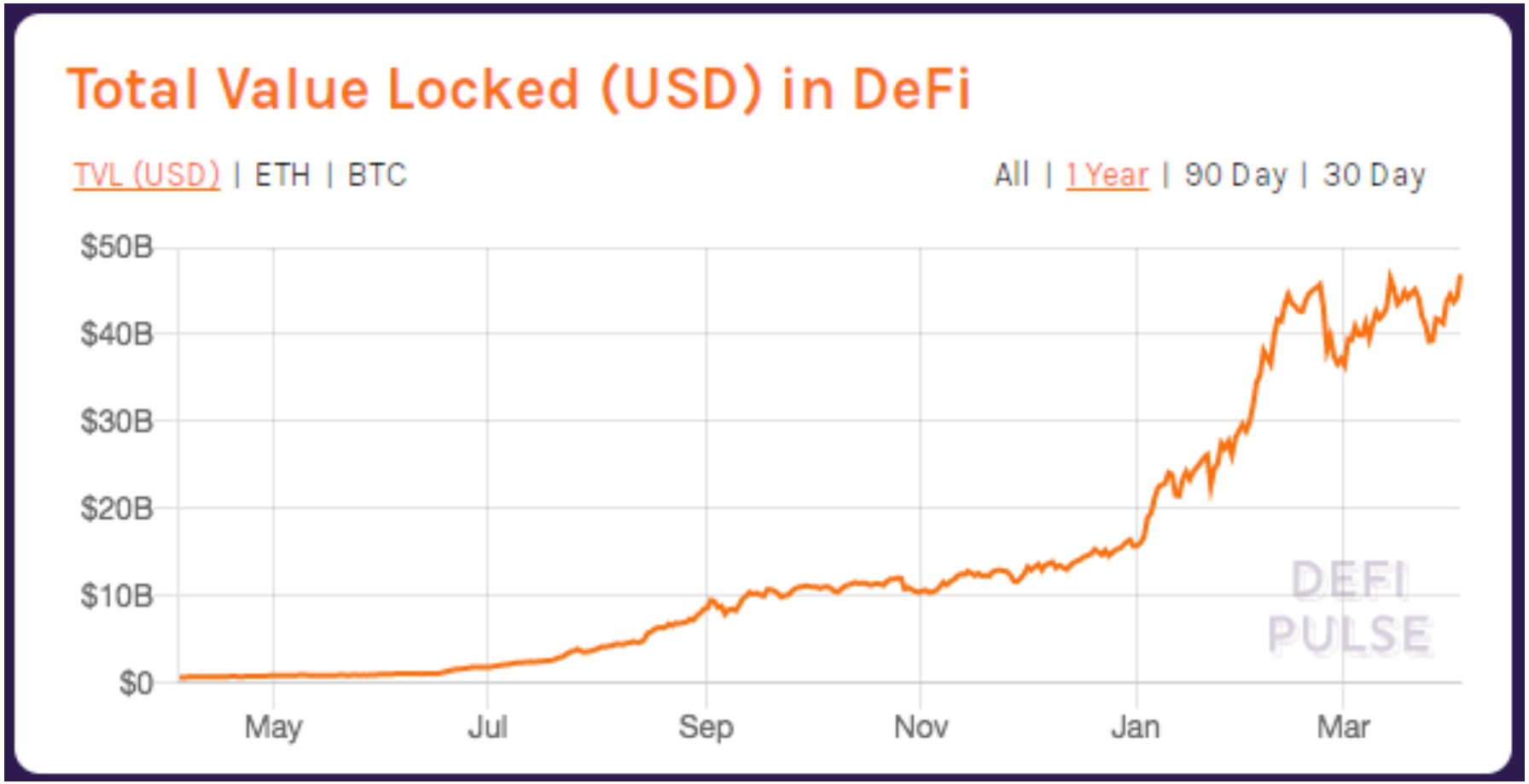
Decentralized finance

- Permissionless
  - Open-source system; built on top of permissionless blockchains
  - Anyone can use/ interoperate or build on top without third-party approval & agreeement
- Non-custodial
  - Assets are not custodied by a single third-party
- Decentralized trust & governance
  - No single entity responsible for upgrade decisions & admin privileges
- Pseudonymous
  - Users usually do not provide real identities

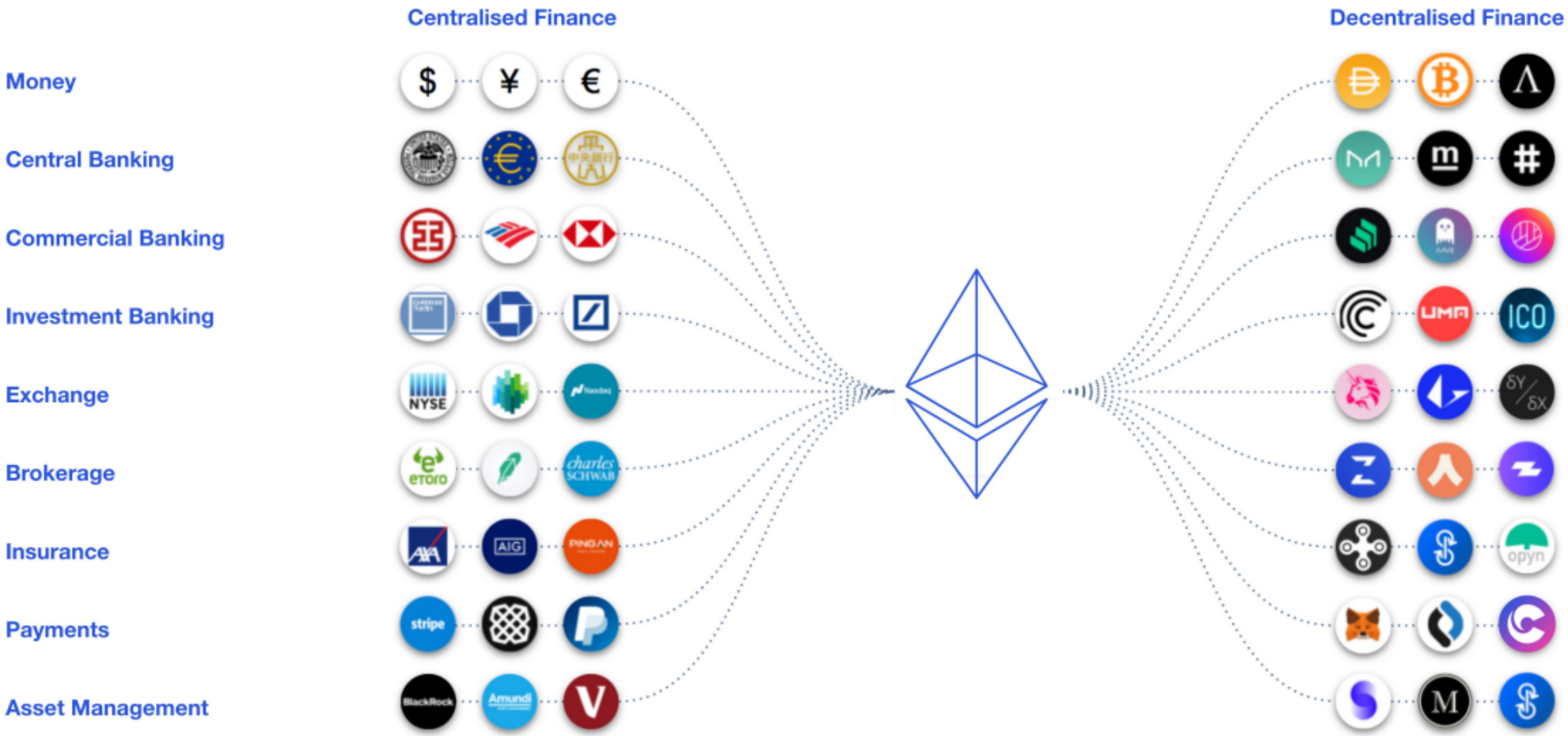
Why Decentralized Finance?

- Efficiency
  - Removing rent-seeking intermediaries
- Open finance & transparency
  - Inclusive, interoperable
- Automation & programmable
- Innovation
  - DeFi applications often are much simpler and faster to develop than CeFi counterparts
    - E.g., Uniswap vs. CEX

Fast Growth


Total Value Locked (USD) in DeFi
TVL (USD) | ETH | BTC
All | 1 Year | 90 Day | 30 Day
$50B
$40B
$30B
$20B
$10B
$0
May
Jul
Sep
Nov
Jan
Mar
DEFI PULSE

Centralized vs. Decentralized Finance



Course Overview

- Explore open research questions in DeFi
  - For each financial function, investigating CeFi & DeFi options:
    Is either one of these optimal? We will evaluate both through the lens of CS and finance. Is the application computable (efficiency, decidable), programmable (automatic)? Is the application welfare-enhancing and stable (not a source of systemic risk). How do the new and old systems interact?
- Intersection of Finance & Computer Science
  - Investigate through both lenses

Course schedule (subject to change)

Date	Topic
04/01	Introduction to traditional financial systems
04/08	Introduction to blockchain and smart contracts supporting DeFi applications
04/15	New ways to organize existing financial functions Part I: Stable coins Part II: DEX (decentralized exchanges)
04/22	New ways to organize existing financial products Part I: Lending Part II: Insurance
04/29	New ways to issue assets and trade risks: synthetics and derivatives, portfolio management
05/06	Auditable privacy; decentralized identity (DID); decentralized reputation; related regulation
05/13	Information markets: oracles, prediction markets, data market, data valuation, data tokenization
Bonus	Security issues and countermeasures in DeFi

Course Goals & Expectations

- First DeFi course
- Highly exploratory & experimental
  - Limited enrollment & participation (by instructor approval)
  - Comments & feedback welcome
- Identify open research questions & foster research projects in DeFi & intersection of CS & Finance
- Grading:
  - A short writeup on an open research question in this area
  - Due May 14


DeFi
Traditional Finance
This is the beginning of the end