

## FTE4312 • Assignment 2

Due: noon (12 o'clock) , November 24

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### Instructions:

- You must submit your assignment in **Blackboard**. Please save your report as a **PDF** file. The '.pdf' file name should be in the format '**studentnumber-last name-first name-ass2.pdf**'. Any nonstandard assignment will not be graded.
- The report must be written in English.
- Late submission will not be graded.
- Each student must not copy reports from another students.

### Requirement:

Investigate a decentralized application (DApp) and write a case study report.

Following are some recommended sections for your reference. You can add or remove sections according to the project you select.

**Project Name (Mandatory): Uniswap**

**URLs related to the project (website, twitter, OpenSea, etc. Mandatory):** <https://uniswap.org/>

**Brief Introduction to the Project (Mandatory, 100~200 words):**

<sup>1</sup>Uniswap is an innovative decentralized exchange (DEX) platform operating on the Ethereum blockchain. It stands out in the cryptocurrency world by facilitating direct peer-to-peer trading without intermediaries, using an Automated Market Maker (AMM) system instead of traditional order books. This system relies on liquidity pools, where users contribute and swap various cryptocurrencies efficiently and securely. Uniswap's intuitive interface makes it accessible to both novice and experienced traders, promoting broader participation in the crypto market. As a key player in the Decentralized Finance (DeFi) sector, Uniswap enhances financial transactions' transparency, security, and decentralization. Its impact extends beyond trading, influencing the development of the DeFi ecosystem and setting a benchmark for future decentralized applications (DApps).

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<sup>1</sup><https://uniswap.org/faq>

## **Project Innovations:**

The core innovation of Uniswap is its adoption of the Automated Market Maker (AMM) model, a significant departure from traditional cryptocurrency exchanges. Traditional exchanges depend on order books to match buyers and sellers, which can create liquidity issues and price discrepancies. Uniswap's AMM model, however, operates through smart contracts on the Ethereum blockchain, managing assets and transactions in a decentralized manner.

In this model, liquidity providers contribute assets to liquidity pools, which are essentially smart contracts containing funds. By depositing their assets, these providers enable trading on the platform and, in return, earn transaction fees based on their share of the pool. This system democratizes the liquidity provision, allowing anyone to become a liquidity provider.

Traders benefit from this model as well. They can swap assets directly from these pools without waiting for a counterparty. This mechanism ensures more efficient, seamless, and secure transactions. It also provides more consistent pricing, as the AMM uses a mathematical formula ( $X*Y=K$ ) to determine prices based on the supply and demand in each pool.

Uniswap's innovation thus lies in creating a self-sustaining, decentralized trading environment that is more accessible, transparent, and efficient than traditional exchanges. This approach not only benefits traders and liquidity providers but also significantly contributes to the overall growth and development of the DeFi ecosystem.

## **Project Merits:**

**Decentralized:** One of the primary merits of Uniswap is its decentralized nature. Unlike traditional centralized exchanges, Uniswap operates on a peer-to-peer model without the need for a central authority. This decentralization significantly enhances security as it reduces the risk of server downtimes, hacks, and centralized control over assets. In centralized systems, users' assets are often held by the exchange, making them vulnerable to external attacks. However, in Uniswap's decentralized framework, users have complete control over their funds, with transactions occurring directly between users' wallets via smart contracts. This approach also ensures

greater transparency, as all transactions are recorded on the blockchain and are publicly verifiable. Moreover, decentralization aligns with the ethos of blockchain and cryptocurrency, promoting a trustless and permissionless financial ecosystem.

**Low Transaction Fees:** Uniswap's model results in significantly lower transaction fees compared to traditional exchanges. In centralized platforms, users often face high fees due to the costs associated with maintaining the platform, including server costs, regulatory compliance, and profit margins for the exchange. Uniswap, however, leverages the efficiency of smart contracts on the Ethereum blockchain, eliminating the need for such overheads. The fees on Uniswap are primarily network transaction fees for Ethereum and a small percentage taken as a fee for liquidity providers. This structure not only makes trading more cost-effective for users but also democratizes access to liquidity, allowing a broader range of participants to engage in the cryptocurrency market without being deterred by high costs.

**No KYC Requirements:** Another significant advantage of Uniswap is the absence of Know Your Customer (KYC) requirements. Most centralized exchanges require users to undergo rigorous identity verification processes, which can be time-consuming and infringe on users' privacy. Uniswap, in contrast, allows users to trade directly from their wallets without providing any personal information. This feature is particularly appealing for individuals who value privacy and wish to maintain anonymity in their financial transactions. Additionally, the lack of KYC barriers makes Uniswap more inclusive, enabling access to users from regions where traditional financial services are limited or where identity verification poses a challenge. This aspect of Uniswap plays a crucial role in fostering a more open and accessible global financial system.

**Trustless Operation:** Uniswap operates on a trustless model, where users don't need to rely on the trustworthiness of a third party. Traditional financial systems and centralized exchanges require users to trust that their funds and transactions will be handled securely. Uniswap, however, automates transactions through smart contracts, eliminating the need for intermediaries or administrators. These contracts are pre-programmed, transparent, and executed on the blockchain, minimizing the possibility of fraud or mismanagement. Transactions occur directly between users' wallets and the smart contracts, enhancing both security and trust.

**Global Accessibility:** The decentralized nature of Uniswap means it is accessible globally without geographical restrictions. This feature is particularly important for regions where traditional banking services are scarce or restricted. Uniswap provides an equal and barrier-free trading platform, offering a gateway for global

users to participate in the digital asset market. This inclusive approach significantly contributes to the democratization of finance, allowing people from all corners of the world to engage with the cryptocurrency ecosystem.

**Asset Diversity:** Uniswap supports a wide range of Ethereum-based tokens (ERC-20 tokens). This diversity enables users to easily access and trade a variety of cryptocurrencies and digital assets, including smaller, newer tokens that might not be available on traditional exchanges. This contributes significantly to the growth and diversification of the cryptocurrency market, fostering a more vibrant and inclusive digital asset ecosystem.

**Automated Liquidity:** Uniswap provides instant and continuous liquidity to users through its liquidity pools. Users don't have to wait for a buyer or seller to appear, as trades are automatically executed via the liquidity pools. This not only improves the efficiency of transactions but also provides more equitable trading opportunities for small-scale traders.

These features collectively enhance the efficiency and security of cryptocurrency trading and drive innovation and growth in the decentralized finance (DeFi) sector.

### **Project Weaknesses:**

**Liquidity Constrains:** Tokens that are less popular or newly introduced often face liquidity challenges on Uniswap. Due to fewer participants in these liquidity pools, there can be significant price volatility. This volatility can deter traders, creating a vicious cycle where low liquidity leads to more volatility, which in turn reduces participation. This issue can impede the effectiveness of the AMM model, especially for tokens not widely recognized or traded.

**Security Risks:** While Uniswap's core protocol is considered secure, users are exposed to risks when interacting with smart contracts. These contracts might have vulnerabilities that can be exploited by malicious actors.(eg. Use a high return rate to attract users, and the contract has a vulnerability that allows the developer to drain assets from the pool) Additionally, the decentralized nature of the platform means there is no central authority to oversee or rectify such issues. Users must exercise due diligence and caution, especially when dealing with less known tokens or pools, as they might be susceptible to scams or fraud.

**Impermanent Loss:** Liquidity providers on Uniswap are subject to impermanent loss, which occurs when the price of deposited assets changes compared to when they were deposited. This loss becomes permanent if the provider withdraws their funds from the pool at a different price level. This risk is inherent in the AMM model and can lead to financial losses for providers, particularly in volatile market conditions.

**Ethereum Network Congestion:** Uniswap operates on the Ethereum blockchain, which can suffer from network congestion, leading to slow transaction times and high gas fees. This reliance on a single blockchain can be a bottleneck, especially during periods of high demand, affecting the user experience and increasing transaction costs.

**Lack of Fiat Integration:** Uniswap does not support direct fiat currency transactions, limiting its accessibility to those who already own cryptocurrencies. This barrier can deter new users from entering the crypto space, as they first need to acquire cryptocurrency through other means before they can use Uniswap.

**Regulatory Uncertainty:** The decentralized and anonymous nature of Uniswap could attract regulatory scrutiny, especially as governments worldwide are trying to regulate the cryptocurrency market. This uncertainty can impact user confidence and the platform's ability to operate without legal complications in various jurisdictions.

**Slippage Issues:** Due to the AMM model, large trades on Uniswap can suffer from slippage, where the final execution price differs from the expected price. This issue is more pronounced in pools with lower liquidity and can lead to less favorable trade outcomes, particularly for large volume traders.

Each of these weaknesses represents areas where Uniswap, despite its innovative approach, faces challenges that can affect its efficiency, security, and accessibility.

## **Horizontal Comparison with Competing Products:**

**Uniswap vs. <sup>2</sup>Binance (A Centralized Exchange):**

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<sup>2</sup> <https://en.wikipedia.org/wiki/Binance>

**Decentralization:** Unlike Binance, which is a centralized exchange, Uniswap operates on a fully decentralized and permissionless model. This means there's no central authority overseeing operations, offering users full control over their funds and trades.

**Anonymity and Privacy:** Binance requires users to undergo KYC (Know Your Customer) procedures, while Uniswap allows users to trade without revealing their identity, preserving their privacy.

**Asset Ownership:** On Binance, users' funds are held by the exchange, whereas on Uniswap, users have complete custody of their assets, trading directly from their wallets.

**Liquidity Model:** Binance uses a traditional order book model for trading, which can offer deeper liquidity for popular assets but can also lead to centralization of control. Uniswap's AMM model democratizes liquidity provision, allowing anyone to become a liquidity provider.

#### Uniswap vs. <sup>3</sup>SushiSwap (Another Decentralized Exchange with AMM):

**Governance and Community Involvement:** SushiSwap, a fork of Uniswap, offers more community-driven features and governance. SushiSwap users have a greater say in the platform's development through its governance token, SUSHI.

**Revenue Sharing:** SushiSwap provides an added benefit to its liquidity providers by sharing a portion of the exchange's revenues, a feature not present in Uniswap.

**Product Diversification:** SushiSwap has expanded its offerings beyond the AMM, including lending and borrowing services, which Uniswap does not currently provide.

**Interface and User Experience:** While both platforms offer a user-friendly interface, SushiSwap tends to offer more features, which can be advantageous or overwhelming, depending on the user's experience level.

#### Uniswap vs. <sup>4</sup>Curve Finance (Specialized in Stablecoin Swaps):

**Target Market and Asset Focus:** Curve Finance is specialized in stablecoin trading and typically offers better rates and lower slippage for such trades compared to Uniswap.

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<sup>3</sup> <https://sushiswap.github.io/>

<sup>4</sup> [https://tokeninsight-support.gitbook.io/ti\\_defi/ti-defi-knowledge-base/trading/spot-trading/curve-finance](https://tokeninsight-support.gitbook.io/ti_defi/ti-defi-knowledge-base/trading/spot-trading/curve-finance)

**Efficiency in Stablecoin Trading:** Due to its focus on stablecoins, Curve can offer lower fees and better exchange rates for these assets, whereas Uniswap is more generalized, catering to a wider range of tokens.

**Liquidity Pool Design:** Curve uses a different AMM algorithm optimized for stablecoins, which reduces impermanent loss significantly for these types of assets, a contrast to Uniswap's broader AMM approach.

**User Base and Usage:** While Uniswap attracts a diverse range of traders due to its wide variety of supported assets, Curve appeals more to those specifically interested in stablecoin trading.

## **User Profiling:**

**Cryptocurrency Traders:** A significant portion of Uniswap's users are individual cryptocurrency traders. These users range from beginners to experienced traders and are attracted to Uniswap due to its ease of use, the wide range of tokens available, and the ability to engage in trading activities without the need for intermediaries. They benefit from the platform's decentralized nature, which provides a high degree of autonomy and control over their trades. Additionally, the anonymity and privacy offered by Uniswap are appealing to traders who prefer to keep their financial transactions private.

**Liquidity Providers:** Another critical segment of Uniswap's user base comprises liquidity providers. These are individuals or entities that supply liquidity to the platform's pools, earning transaction fees in return. This group includes both small-scale providers, who are typically individual investors looking to earn passive income on their crypto holdings, and larger institutional players, who see the provision of liquidity as a strategic investment. Liquidity providers are crucial to the functioning of Uniswap's AMM model, as they enable the platform to offer immediate and continuous liquidity.

**Users Seeking Low Transaction Fees:** Users frustrated with the high fees on traditional and centralized exchanges are drawn to Uniswap. The platform's lower transaction costs, stemming from its decentralized structure and the absence of intermediaries, make it an attractive alternative for cost-conscious users. This aspect is particularly appealing in an environment where transaction fees can significantly impact the profitability of trading activities, especially for frequent traders.

**Participants in the DeFi Ecosystem:** Uniswap also attracts users who are actively involved or interested in the broader DeFi ecosystem. These users value the principles of decentralization, transparency, and

accessibility that DeFi platforms promote. Uniswap, with its innovative use of smart contracts and the AMM model, represents a key component of the DeFi landscape, attracting users who are interested in the future of decentralized finance.

**Tech-Savvy and Experimentative Users:** The platform also appeals to a more tech-savvy crowd that is keen on exploring new developments in blockchain and cryptocurrency technologies. These users are often early adopters of new financial technologies and are attracted to Uniswap because of its innovative approach to decentralized exchange.

In summary, Uniswap's user base is a mix of cryptocurrency enthusiasts, traders, investors, DeFi participants, and technology explorers. This diversity is a testament to Uniswap's broad appeal across different segments of the cryptocurrency market.

## **Discussions:**

The rise and success of Uniswap have been pivotal in illustrating the vast potential of Decentralized Finance (DeFi) within the cryptocurrency realm. This platform has not only challenged traditional notions of asset exchange but has also innovatively redefined them through its Automated Market Maker (AMM) model. This model offers a more democratic and accessible approach to trading, broadening user choices and participation in the cryptocurrency market.

Uniswap's AMM system, a cornerstone of its functionality, has disrupted the conventional exchange mechanisms by removing the need for order books and central authorities. This approach to liquidity provision, where users themselves fuel the market by contributing to liquidity pools, democratizes market making and allows for greater inclusivity. It also reflects a significant shift towards user-centric financial services, where power and control are redistributed to the individual participants.

However, while Uniswap's model offers numerous advantages, it also brings forth challenges and risks, particularly in terms of smart contract security. Users need to be well-informed and cautious. Understanding how smart contracts operate is crucial, as these are the foundational elements of Uniswap's trading mechanism. Since these contracts are immutable and execute automatically, any vulnerability or



flawed code can lead to significant financial losses. User education and awareness about these risks are paramount for the safe and effective use of DeFi platforms like Uniswap.

Looking ahead, the landscape of DeFi and decentralized exchanges (DEXs) is rapidly evolving, with increasing competition and innovation. Uniswap, despite its current success, will need to continually adapt and improve to maintain its competitive edge. Factors such as enhancing smart contract security, increasing scalability, reducing transaction fees further, and possibly integrating cross-chain functionalities could be key areas of focus.

The future of Uniswap and similar platforms will likely continue to revolve around core DeFi concepts such as decentralized trading, liquidity provisioning, and smart contract innovation. These platforms could play a significant role in shaping the future of finance, challenging traditional financial systems and offering more equitable, efficient, and transparent financial services.

For anyone studying or engaging with the DeFi space, understanding these aspects—decentralized trading, AMM models, liquidity provisioning, and smart contract security—is vital. These are not just the current focal points of innovation but also the likely drivers of future developments in the field.

#### **Reference:**

1. <https://uniswap.org/faq>
2. <https://en.wikipedia.org/wiki/Binance>
3. <https://sushiswap.github.io/>
4. [https://tokeninsight-support.gitbook.io/ti\\_defi/ti-defi-knowledge-base/trading/spot-trading/curve-finance](https://tokeninsight-support.gitbook.io/ti_defi/ti-defi-knowledge-base/trading/spot-trading/curve-finance)