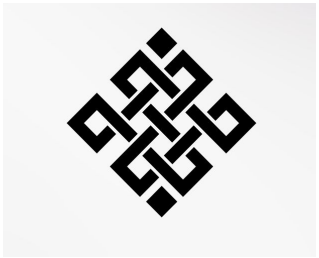
Agentic vs. Automated Block Building

Maryam Bahrani
Ritual



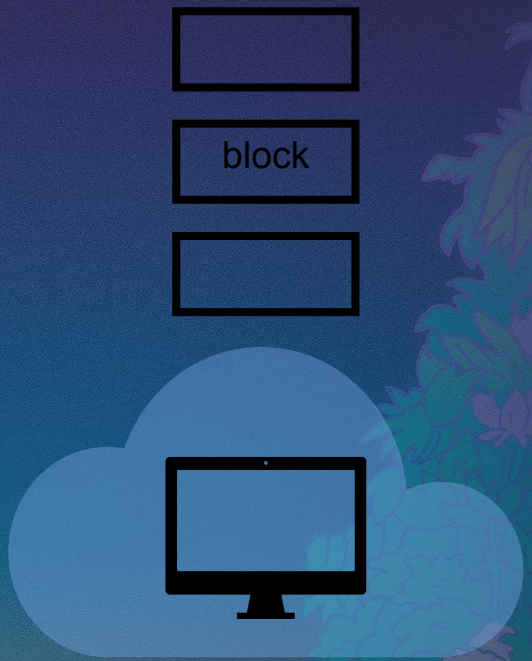
based on joint work with Naveen Durvasula

Agentic vs. Automated Block Building

Maryam Bahrani
Ritual

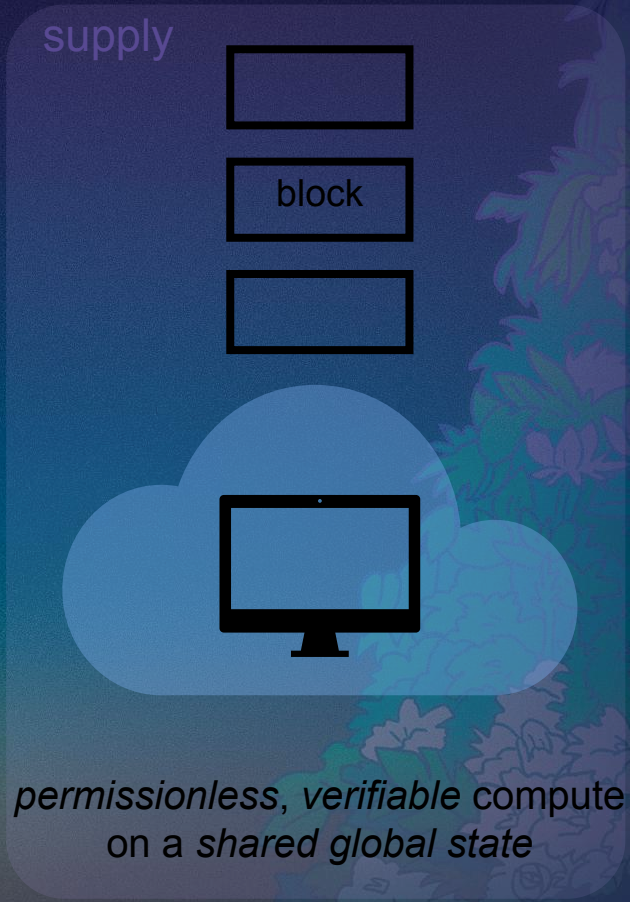
based on joint work with Naveen Durvasula

Introduction



permissionless, *verifiable* compute
on a *shared global state*

Introduction

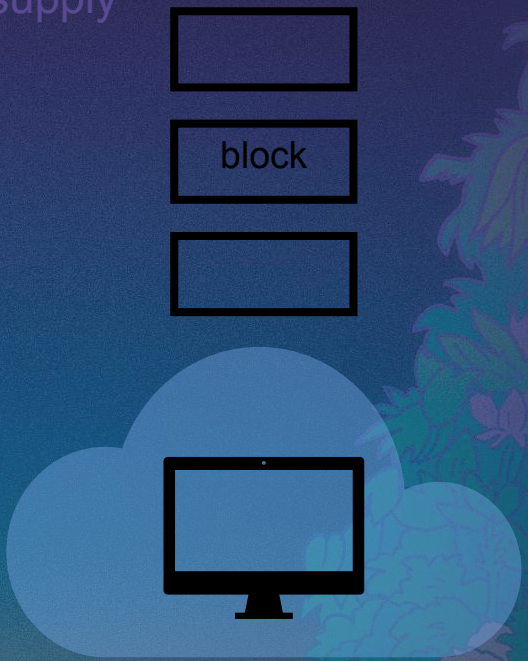


permissionless, *verifiable* compute
on a *shared global state*

Introduction

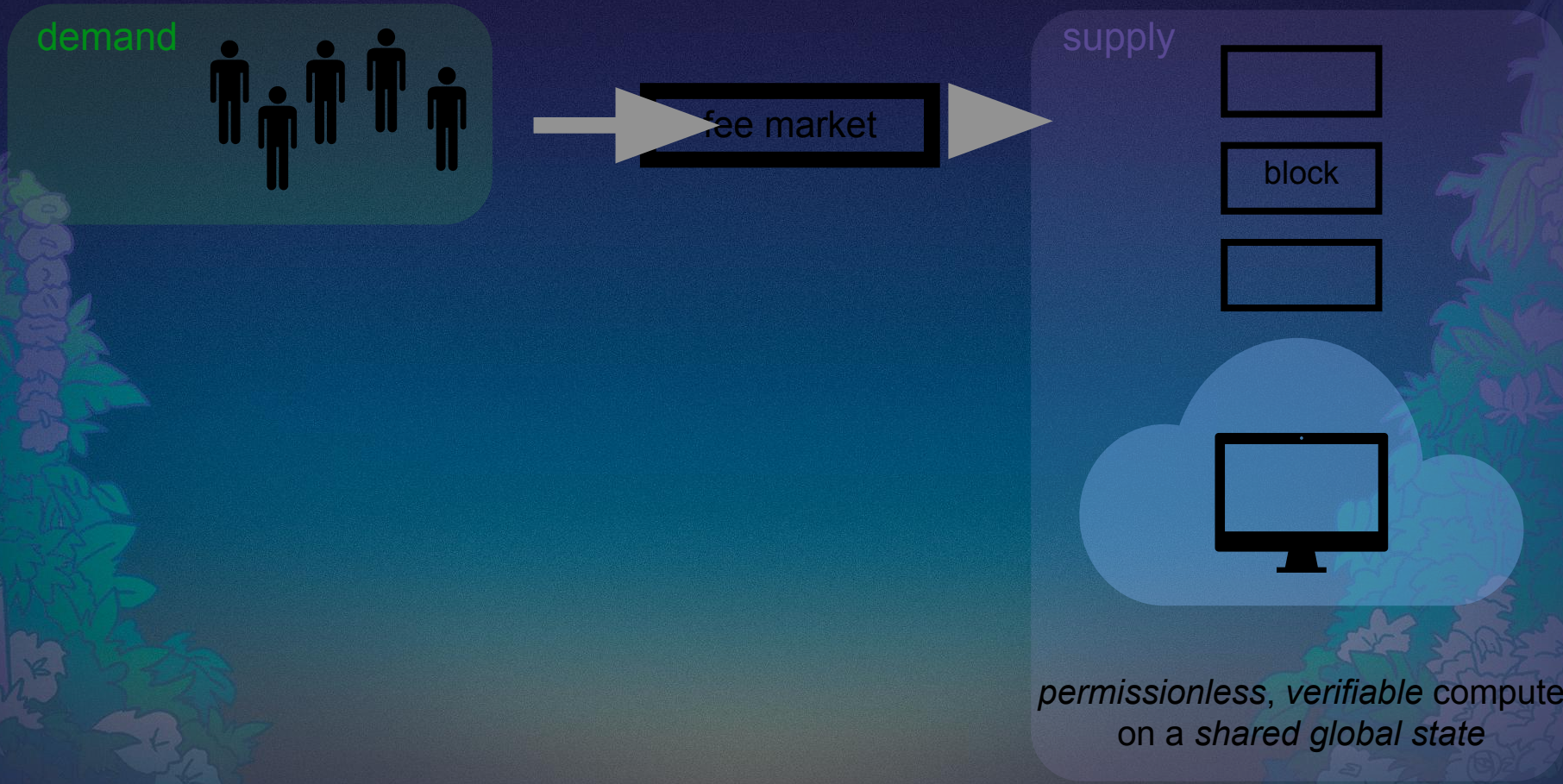
demand

supply

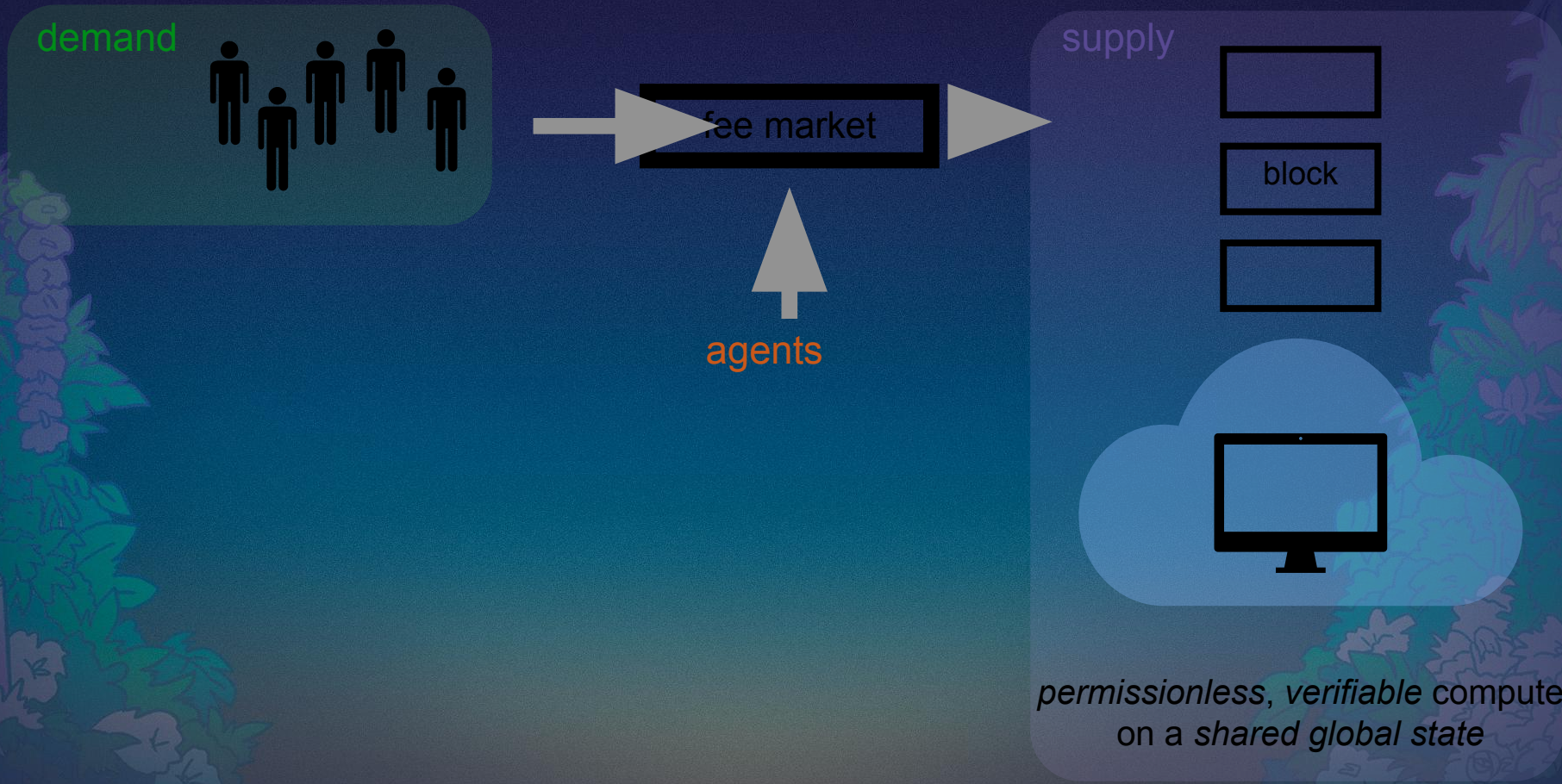


permissionless, *verifiable* compute
on a *shared global state*

Introduction



Introduction



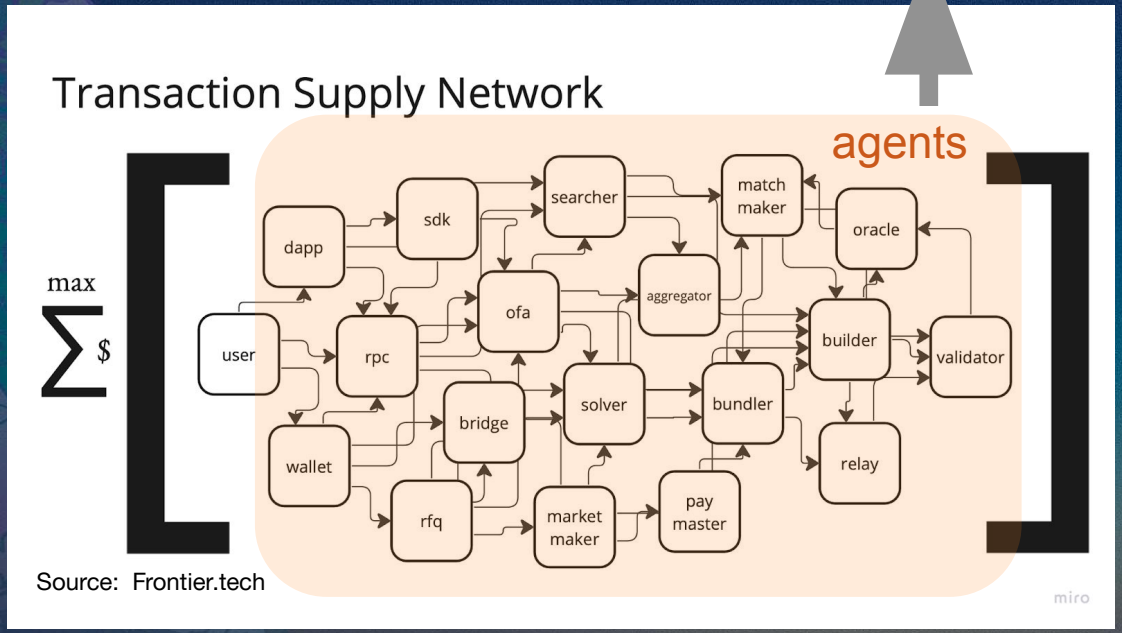
Introduction

demand

fee market

supply

block



permissionless, *verifiable* compute
on a *shared global state*

Introduction

demand

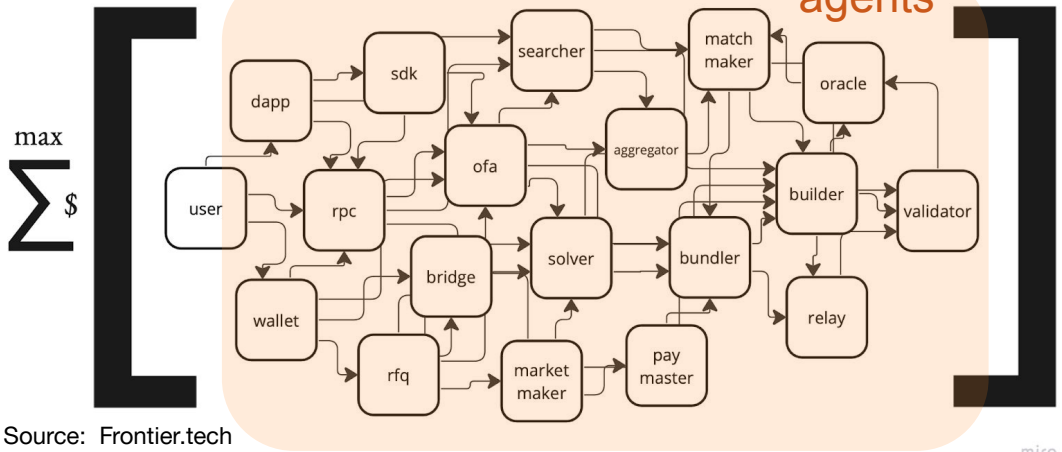
fee market

supply

block

“MEV”

Transaction Supply Network



Source: Frontier.tech

miro

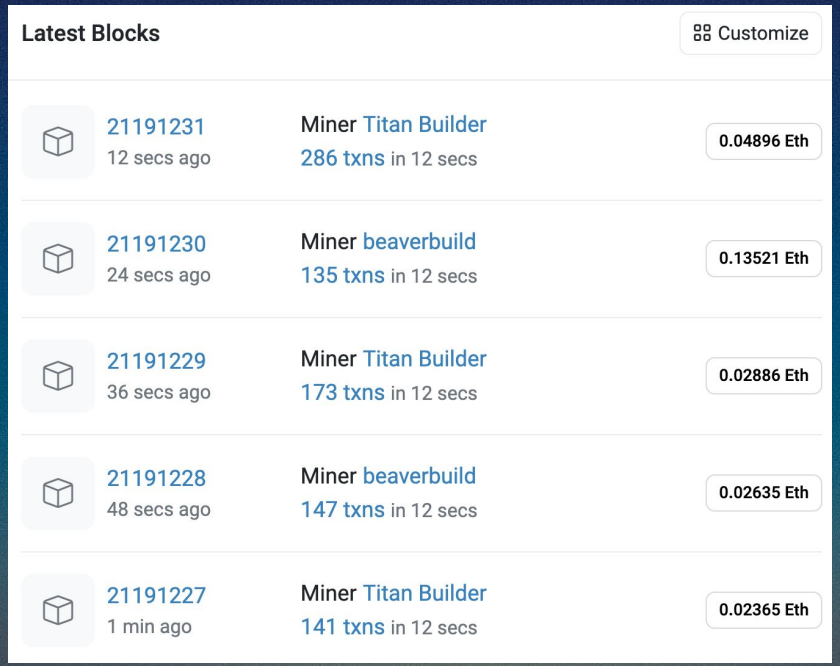
permissionless, *verifiable* compute on a *shared global state*

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production



“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

Transaction Fee Mechanism Design in a Post-MEV World*

Maryam Bahrani† Pranav Garimidi‡ Tim Roughgarden§

February 26, 2024

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

responses to MEV:

Transaction Fee Mechanism Design in a Post-MEV World*

Maryam Bahrani† Pranav Garimidi‡ Tim Roughgarden§

February 26, 2024

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

responses to MEV:

(reduce) at the app layer

Transaction Fee Mechanism Design in a Post-MEV World*

Maryam Bahrani† Pranav Garimidi‡ Tim Roughgarden§

February 26, 2024

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

Transaction Fee Mechanism Design in a Post-MEV World*

Maryam Bahrani† Pranav Garimidi‡ Tim Roughgarden§

February 26, 2024

responses to MEV:

(reduce) at the app layer

(mitigate) minimize the influence of agents

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

Transaction Fee Mechanism Design in a Post-MEV World*

Maryam Bahrani† Pranav Garimidi‡ Tim Roughgarden§

February 26, 2024

responses to MEV:

(reduce) at the app layer

(mitigate) minimize the influence of agents

(democratize) accept as “inevitable evil,” and counter its negative side effects on e.g. centralization and censorship resistance.

Goal of this talk

“Agents bad” — “MEV toxic”

“Agents ok?” — “MEV nuanced”

Goal of this talk

“Agents bad” — “MEV toxic”

“Agents ok?” — “MEV nuanced”

Give a framework for

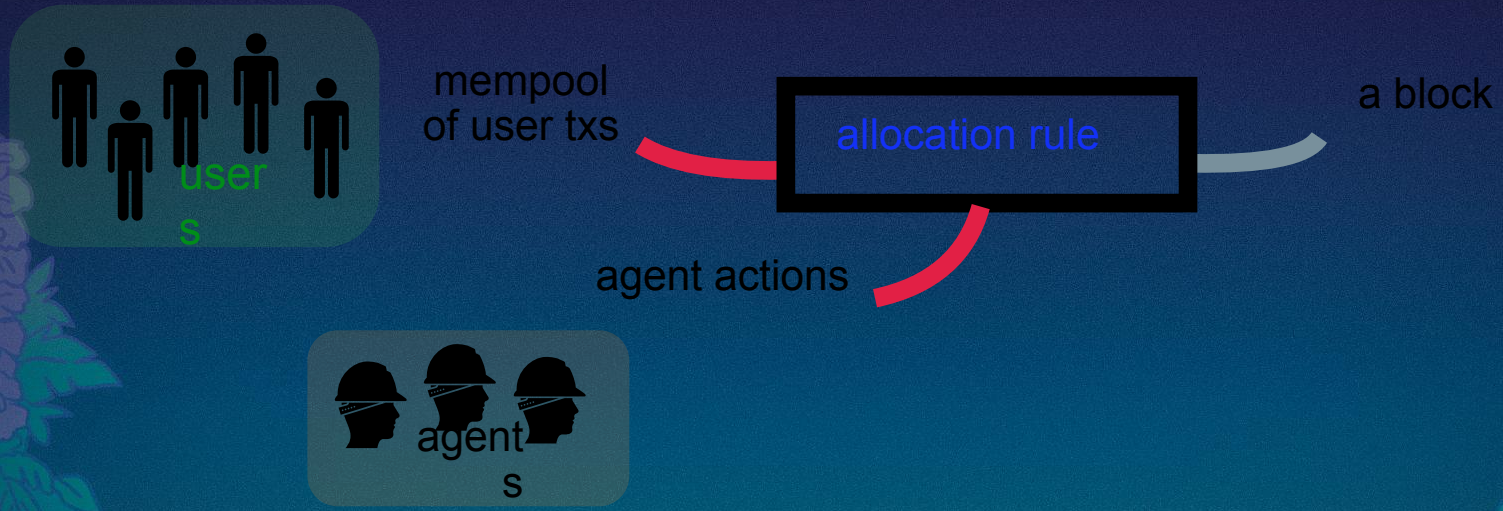
talking about degree of agenticism in different block production paradigms

reasoning about when an agentic design is appropriate

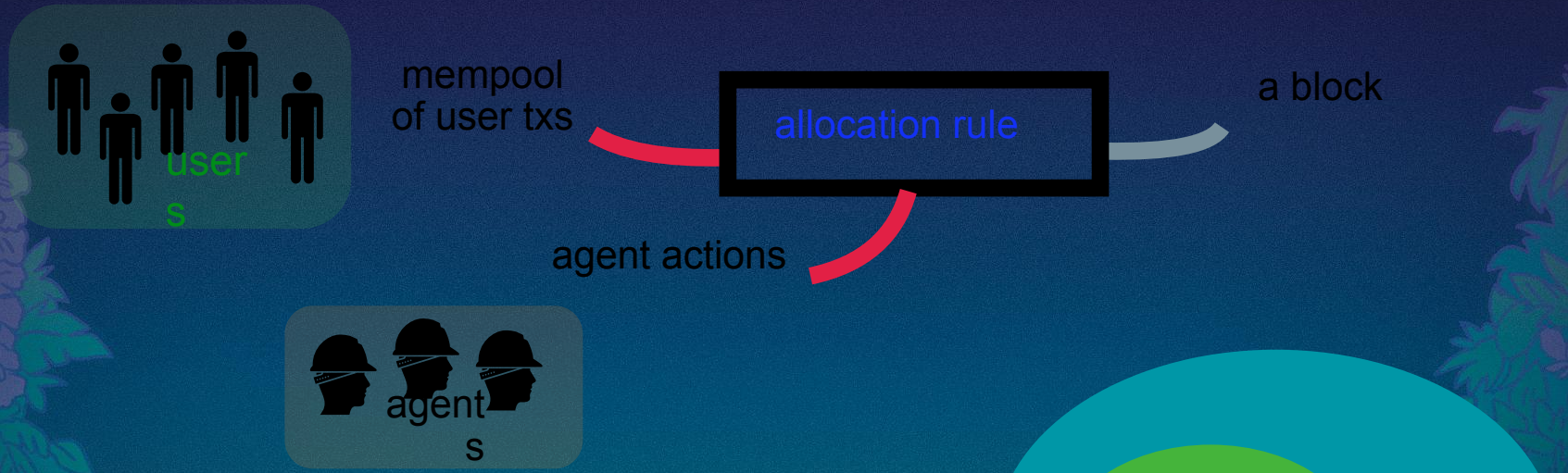
Automated Block Building

An allocation rule is *automated* if it is only a function of the mempool

Agentic Block Building



Agentic Block Building



An allocation rule f is *more agentic* than g if for all M,

The Agentic — Automated Spectrum

Bitcoin
Solana

The Agentic — Automated Spectrum

The Agentic — Automated Spectrum

The Agentic — Automated Spectrum

Bitcoin
Solana

EIP-1559
mev-boost

shared sequencing

ordering enforced by consensus/cryptography/TEE

The Agentic — Automated Spectrum

Bitcoin
Solana

EIP-1559
mev-boost

shared sequencing

Fair Sequencing Service

most L2 sequencers

ordering enforced by consensus/cryptography/TEE

The Agentic — Automated Spectrum

Bitcoin
Solana

EIP-1559
mev-boost

shared sequencing

SUAVE
PROF

Fair Sequencing Service
most L2 sequencers

ordering enforced by consensus/cryptography/TEE

The Agentic — Automated Spectrum

The Agentic — Automated Spectrum

How to choose the right place on the spectrum?

Desired Properties in a fee market

low latency		

Desired Properties in a fee market

low latency		
tractability	possible to run on-chain (computationally)	

Desired Properties in a fee market

low latency		
tractability	possible to run on-chain (computationally)	
simple UX	users shouldn’t need to do complex strategization	

Desired Properties in a fee market

low latency		
tractability	possible to run on-chain (computationally)	
simple UX	users shouldn’t need to do complex strategization	
surplus maximization	creates the most economic value / “gains from trade”	

Desired Properties in a fee market

low latency		
tractability	possible to run on-chain (computationally)	
simple UX	users shouldn’t need to do complex strategization	
surplus maximization	creates the most economic value / “gains from trade”	
no extraction	the generated surplus goes to users	

Desired Properties in a fee market

low latency		
tractability	possible to run on-chain (computationally)	
simple UX	users shouldn’t need to do complex strategization	
surplus maximization	creates the most economic value / “gains from trade”	
no extraction	the generated surplus goes to users	

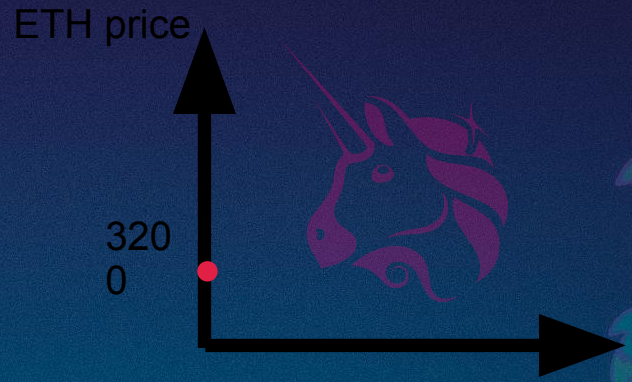
Two Examples

frontrunning

CEX-DEX arbitrage

Frontrunning

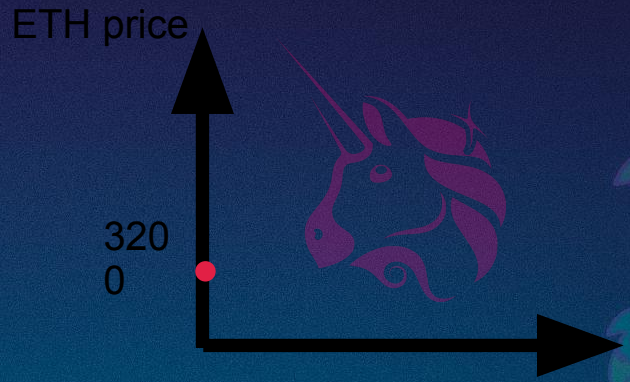
user pays
3200



Frontrunning

user pays
3200

Buy 1 ETH



Buy 10 ETH

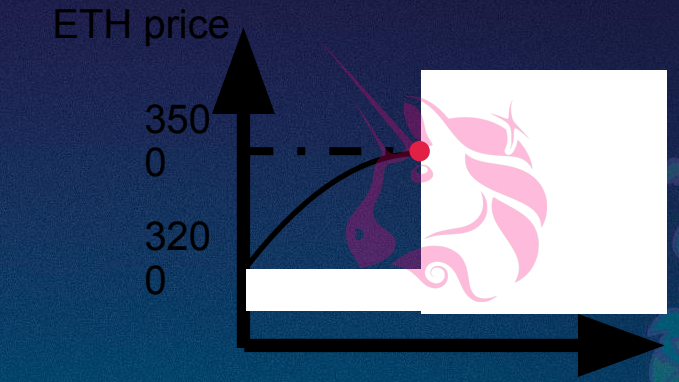
Buy 1 ETH

Sell 10 ETH

Frontrunning

user pays
3200

Buy 1 ETH



Buy 10 ETH

Buy 1 ETH

Sell 10 ETH

Frontrunning

user pays
3200

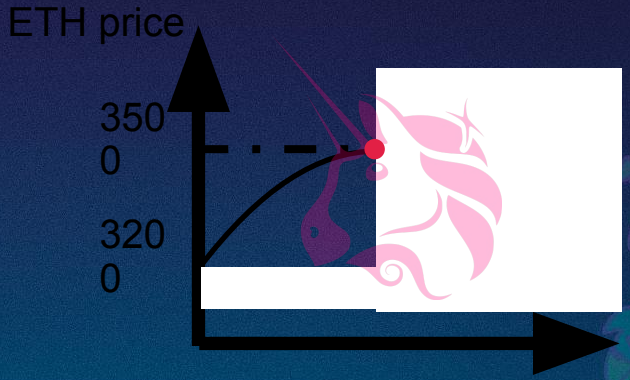
Buy 1 ETH

user pays
3500

Buy 10 ETH

Buy 1 ETH

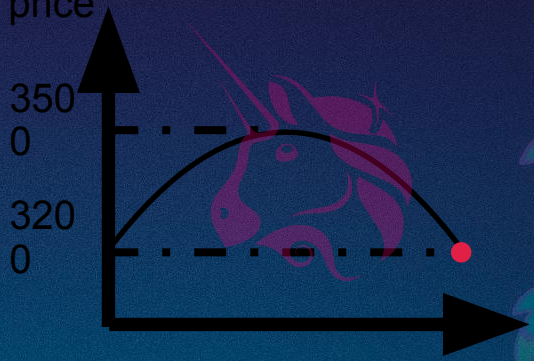
Sell 10 ETH



Frontrunning

user pays
3200

ETH price

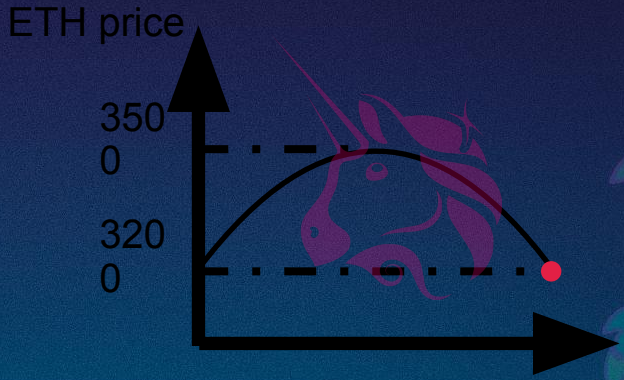


user pays
3500

Frontrunning

user pays
3200

user pays
3500



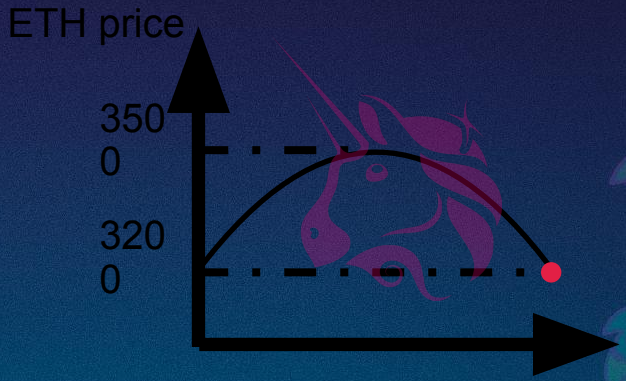
zero-sum game between user and agent:

user paid $300 extra
agent made $300 profit

Frontrunning

user pays
3200

user pays
3500



zero-sum game between user and agent:

purely extractive MEV!

user paid $300 extra
agent made $300 profit

Frontrunning (extractive MEV)

Agentic block building can be vulnerable to extraction
e.g. Ethereum public mempools / mev-boost

Frontrunning (extractive MEV)

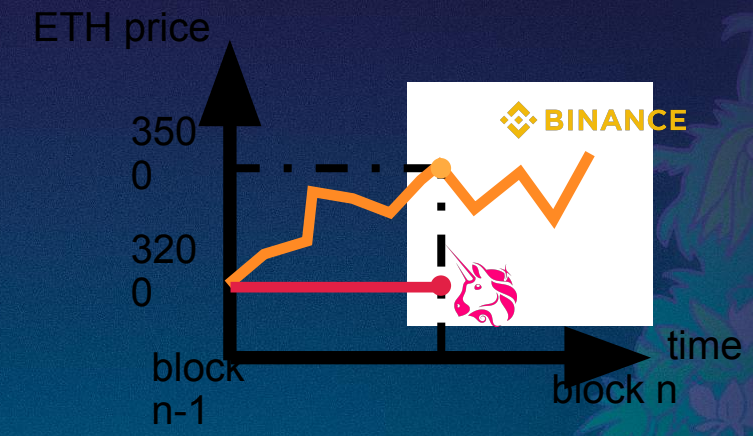
Agentic block building can be vulnerable to extraction
e.g. Ethereum public mempools / mev-boost

Automated block building can achieve no extraction

e.g. SUAVE — encrypted mempool + deterministic ordering

CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain



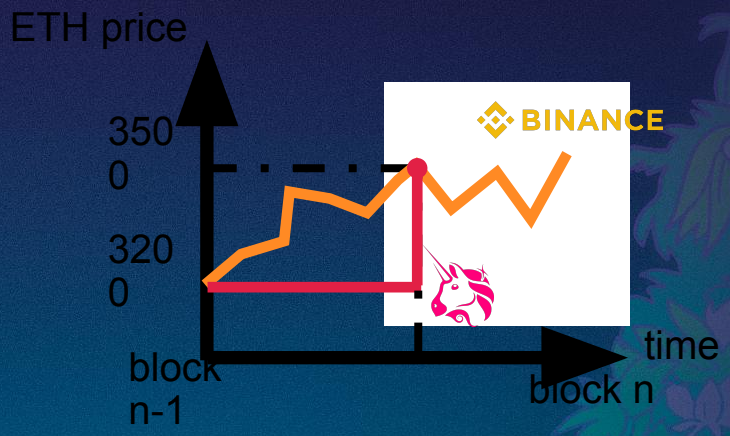
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

Buy 10 ETH — *on-chain*

Sell 10 ETH on BINANCE — *off-chain*



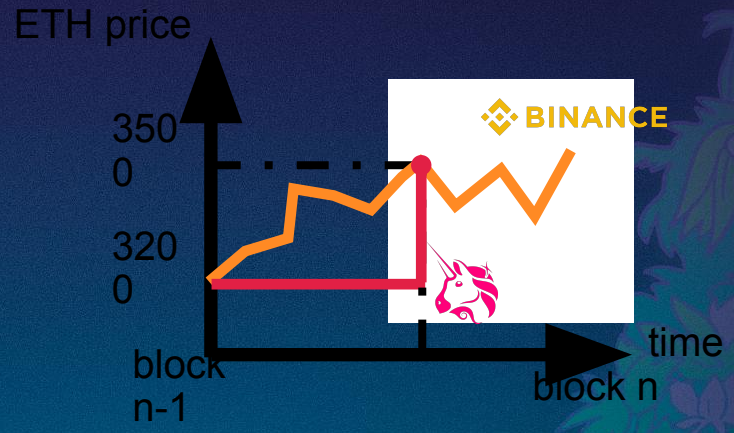
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

Buy 10 ETH *on-chain*

Sell 10 ETH on BINANCE *off-chain*



surplus generation for users:
Uniswap prices will reflect the most recent market information

CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

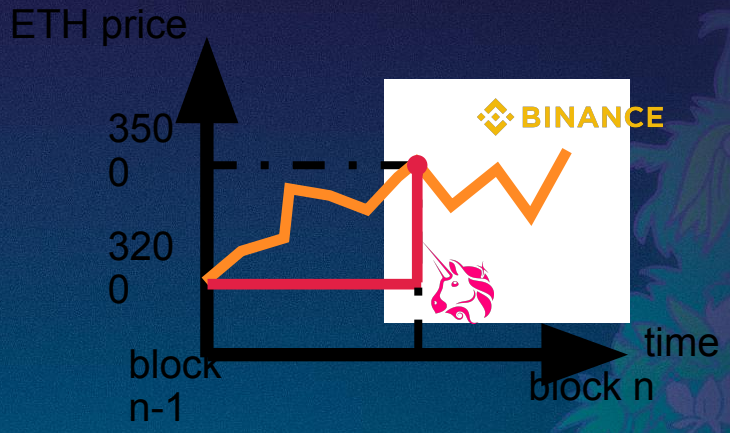
simultaneously:

Buy 10 ETH

on-chain

Sell 10 ETH on BINANCE

off-chain



surplus generation for users:
Uniswap prices will reflect the most recent market information

extraction from liquidity providers:
agent's profit = loss to liquidity providers (minus trading fees)

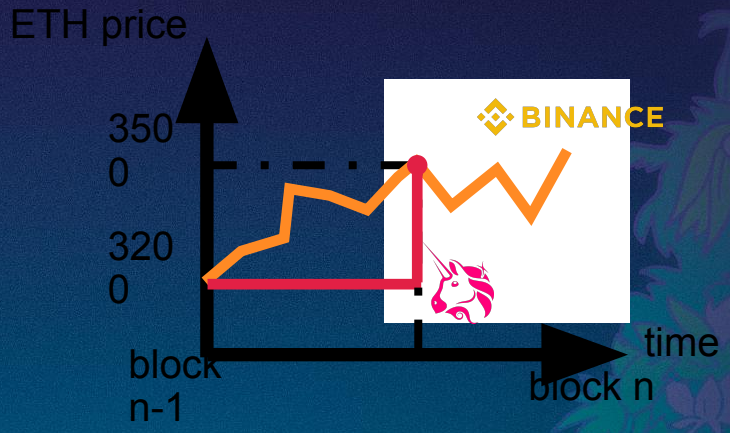
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

Buy 10 ETH *on-chain*

Sell 10 ETH on BINANCE *off-chain*



surplus generation for users:
Uniswap prices will reflect the most recent market information

extraction from liquidity providers:
agent's profit = loss to liquidity providers (minus trading fees)

"Loss-vs-Rebalancing (LVR)"

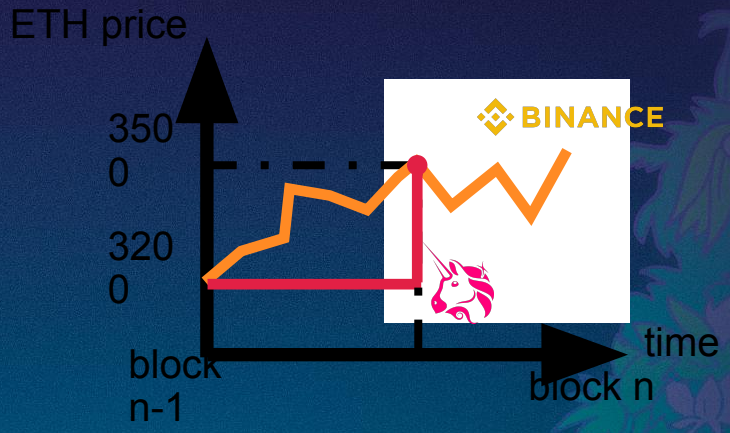
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

Buy 10 ETH *on-chain*

Sell 10 ETH on BINANCE *off-chain*



surplus generation for users:
Uniswap prices will reflect the most recent market information

extraction from liquidity providers:
agent's profit = loss to liquidity providers (minus trading fees)

"Loss-vs-Rebalancing (LVR)"

tension between surplus maximization and no extraction!

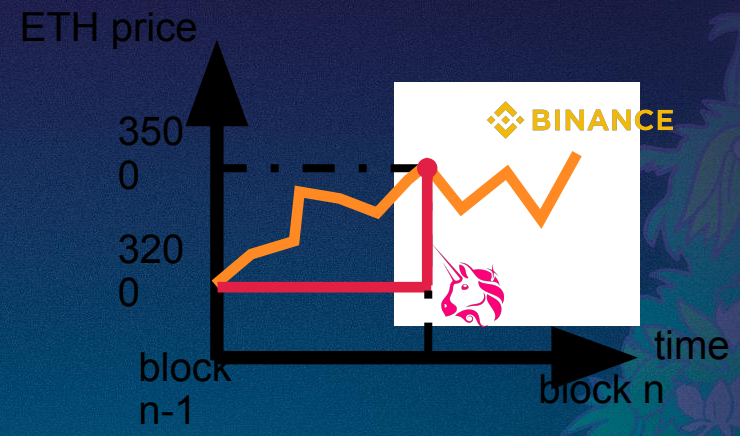
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

Buy 10 ETH — *on-chain*

Sell 10 ETH on BINANCE — *off-chain*



surplus generation for users:
Uniswap prices will reflect the most recent market information

observation. Crucial that the agent has certainty about the on-chain trade going through.

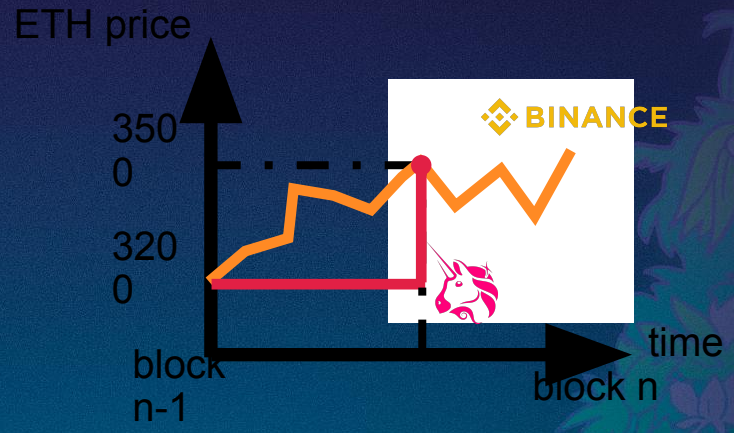
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

Buy 10 ETH *on-chain*

Sell 10 ETH on BINANCE *off-chain*



surplus generation for users:
Uniswap prices will reflect the most recent market information

observation. Crucial that the agent has certainty about the on-chain trade going through.

Uncertainty -> higher arb bounds -> less efficient DEX prices

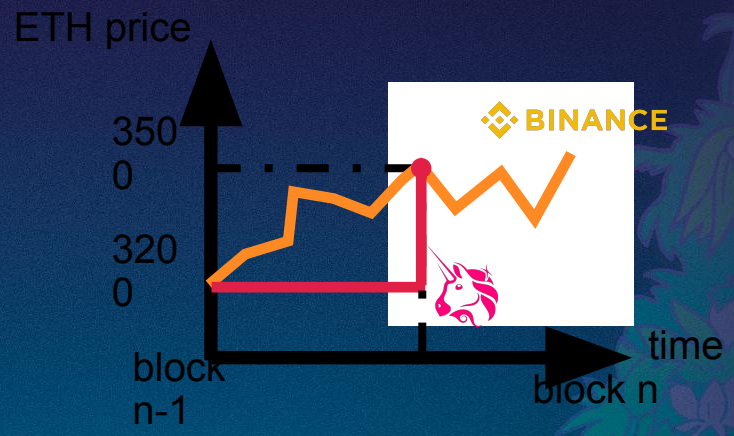
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

Buy 10 ETH — *on-chain*

Sell 10 ETH on BINANCE — *off-chain*



surplus generation for users:
Uniswap prices will reflect the most recent market information

observation. Crucial that the agent has certainty about the on-chain trade going through.

Uncertainty -> higher arb bounds -> less efficient DEX prices

CEX-DEX arbitrage (external coordination)

claim. Automated block building can’t get *surplus maximization + tractability*

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering
rules:

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering:

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering:

coordination in mempool: competition => contention => uncertainty due to reversions

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering:

coordination in mempool: competition => contention => uncertainty due to reversions

observation. Crucial that the agent has certainty about the on-chain trade going through.

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions

- Ordering Rule with Reversion Protection:

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions

- Ordering Rule with Reversion Protection:
  - allow transactions to submit *bids conditioned on state*
    - "Include my transaction only if I'm the first person to do this arbitrage"

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions

- Ordering Rule with Reversion Protection:
  - allow transactions to submit *bids conditioned on state*
    - "Include my transaction only if I'm the first person to do this arbitrage"

"*interdependent valuations*"

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability.*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions

- Ordering Rule with Reversion Protection:
  - allow transactions to submit *bids conditioned on state*
    - "Include my transaction only if I'm the first person to do this arbitrage"

"*interdependent valuations*"

  - computationally hard to optimize => intractable to run on-chain

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability.*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions
- Ordering Rule with Reversion Protection:
  - allow transactions to submit *bids conditioned on state*
    - "Include my transaction only if I'm the first person to do this arbitrage"

"*interdependent valuations*"

  - computationally hard to optimize => intractable to run on-chain

claim. Agentic block building can *surplus maximization + tractability!*

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability.*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions
- Ordering Rule with Reversion Protection:
  - allow transactions to submit *bids conditioned on state*
    - "Include my transaction only if I'm the first person to do this arbitrage"

"*interdependent valuations*"

  - computationally hard to optimize => intractable to run on-chain

claim. Agentic block building can *surplus maximization + tractability!*

e.g. mev-boost

The trade-offs

	agentic	automated
low latency		+
tractability	+	
simple UX	+	
economic efficiency	?	?
no extraction		+

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Automated block building has low latency and less extraction, but can fail to create the most economic value due to on-chain computational constraints

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Automated block building has low latency and less extraction, but can fail to create the most economic value due to on-chain computational constraints

> “NYSE on-chain”

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Automated block building has low latency and less extraction, but can fail to create the most economic value due to on-chain computational constraints

> “NYSE on-chain”

Agents are particularly well-suited for surplus-maximization, especially in the presence of complex user preferences, but utilizing them opens up the possibility of extraction

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Automated block building has low latency and less extraction, but can fail to create the most economic value due to on-chain computational constraints

"NYSE on-chain"

Agents are particularly well-suited for surplus-maximization, especially in the presence of complex user preferences, but utilizing them opens up the possibility of extraction

Ritual Resonance Marketplace for AI computation
complex preferences (heterogenous supply and demand)
potential for generating *large surplus* from optimal resource allocation
low toxicity — few extraction opportunities

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Automated block building has low latency and less extraction, but can fail to create the most economic value due to on-chain computational constraints

"NYSE on-chain"

Agents are particularly well-suited for surplus-maximization, especially in the presence of complex user preferences, but utilizing them opens up the possibility of extraction

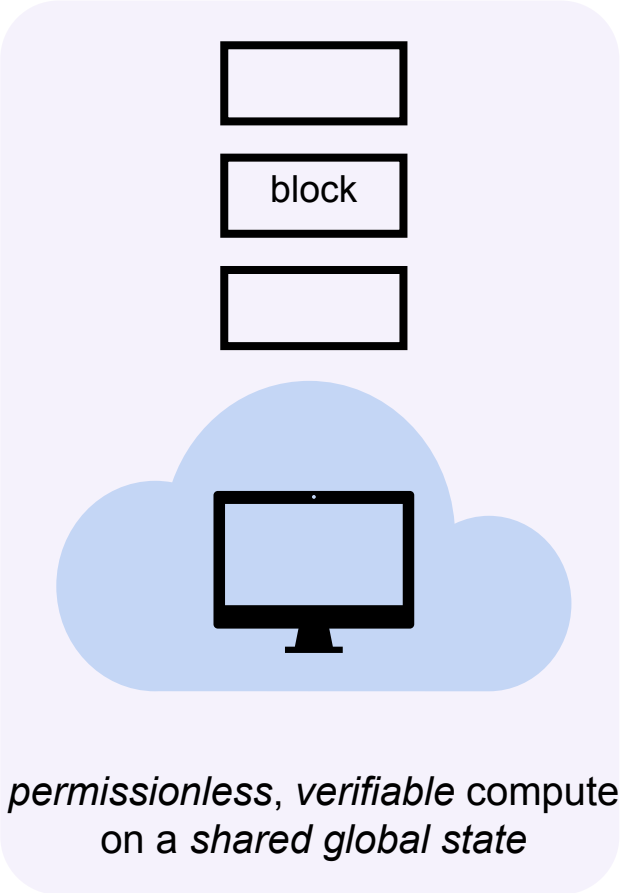
Ritual Resonance Marketplace for AI computation
complex preferences (heterogenous supply and demand)
potential for generating *large surplus* from optimal resource allocation
low toxicity — few extraction opportunities

devnet today!

anks :)

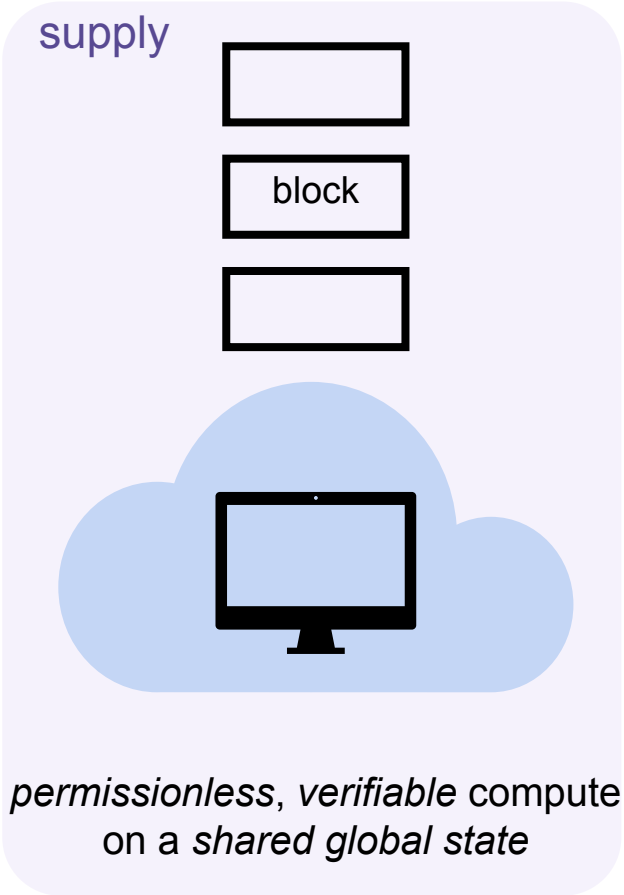
@ritualnet
@bahrani_mary
am

Introduction



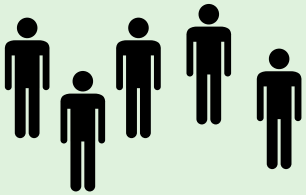
permissionless, *verifiable* compute
on a *shared global state*

Introduction

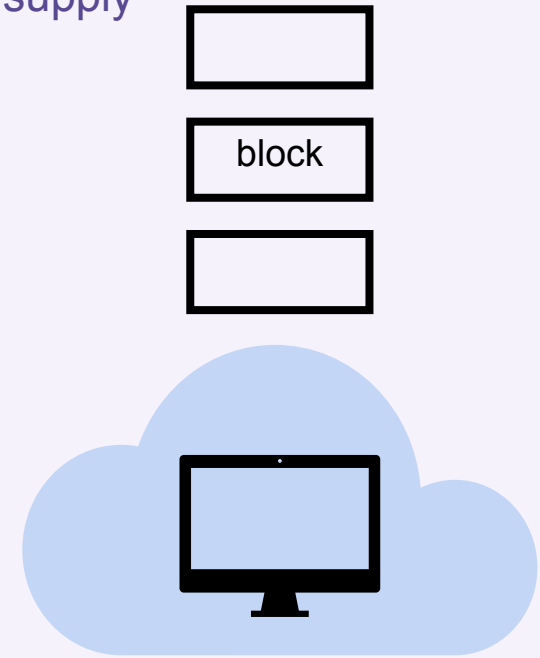


Introduction

demand

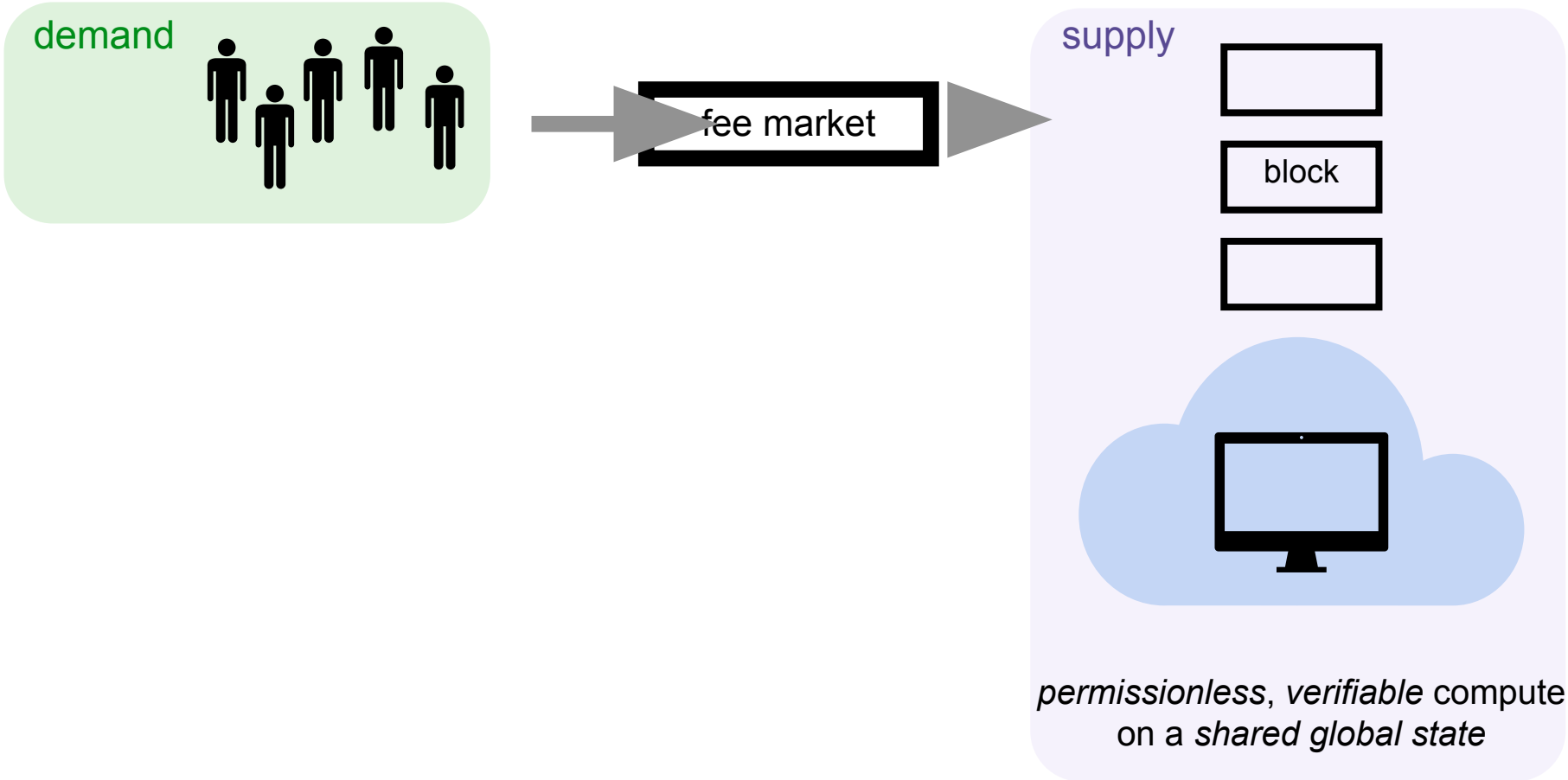


supply

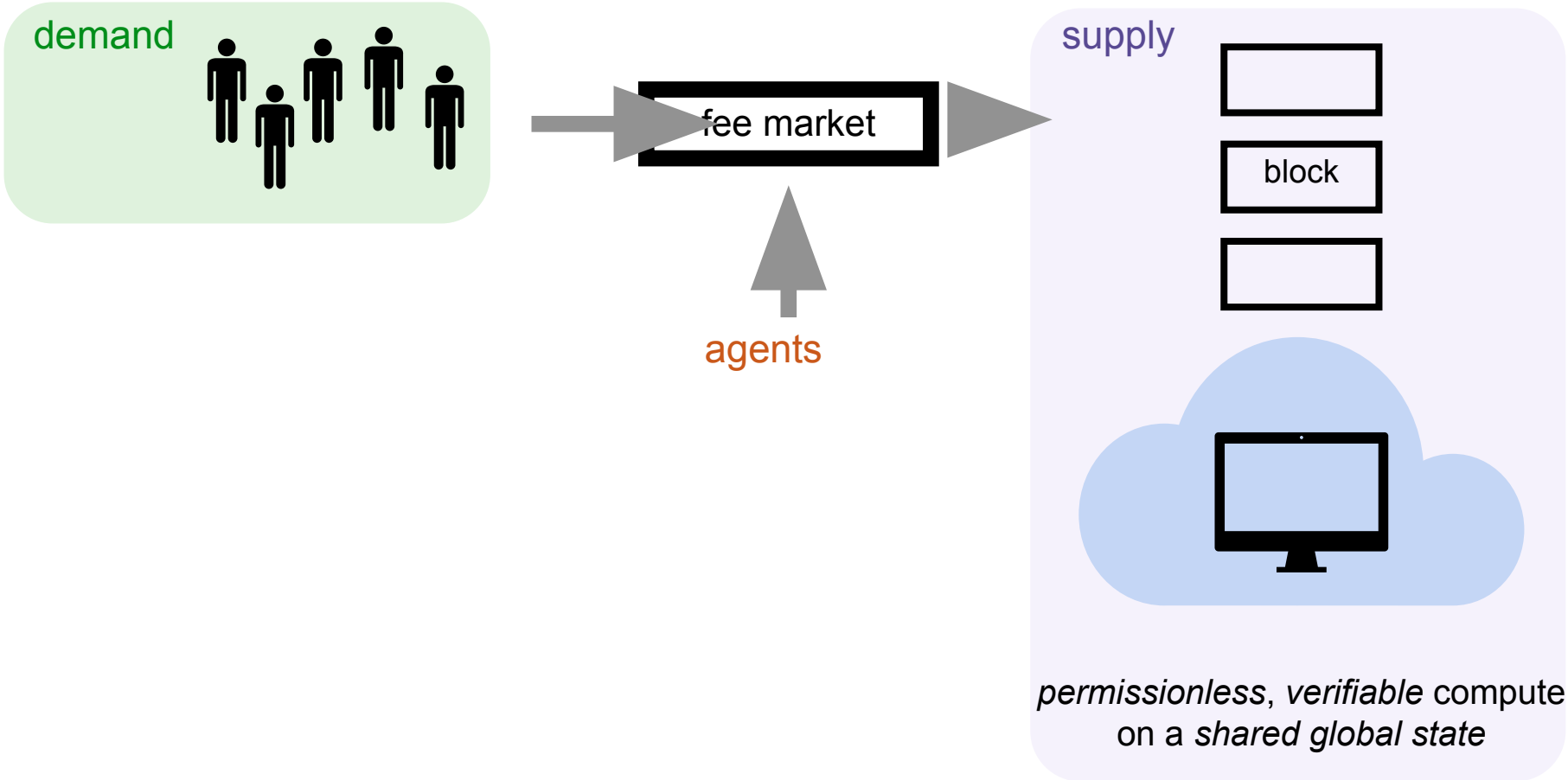


permissionless, *verifiable* compute
on a *shared global state*

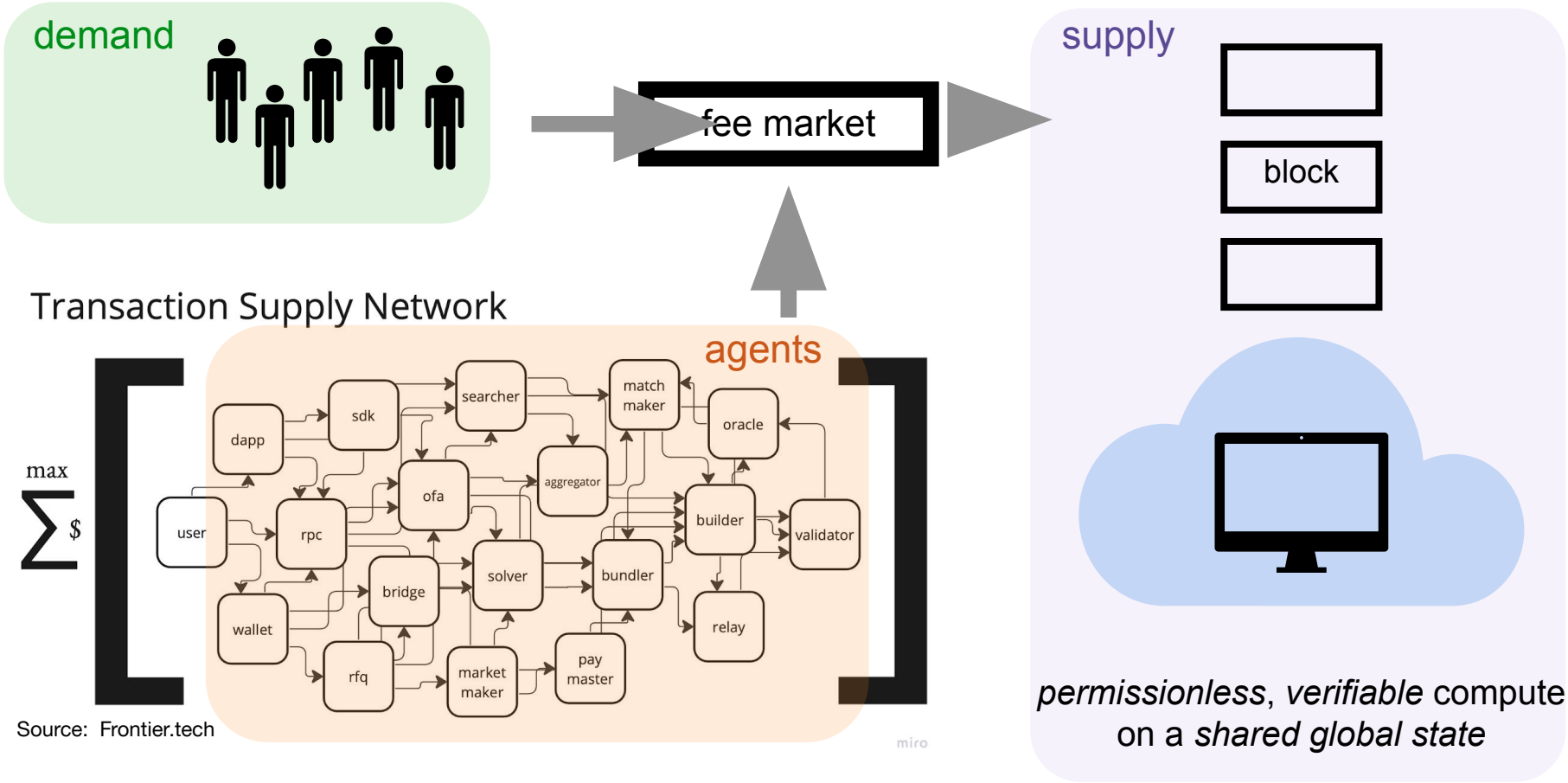
Introduction



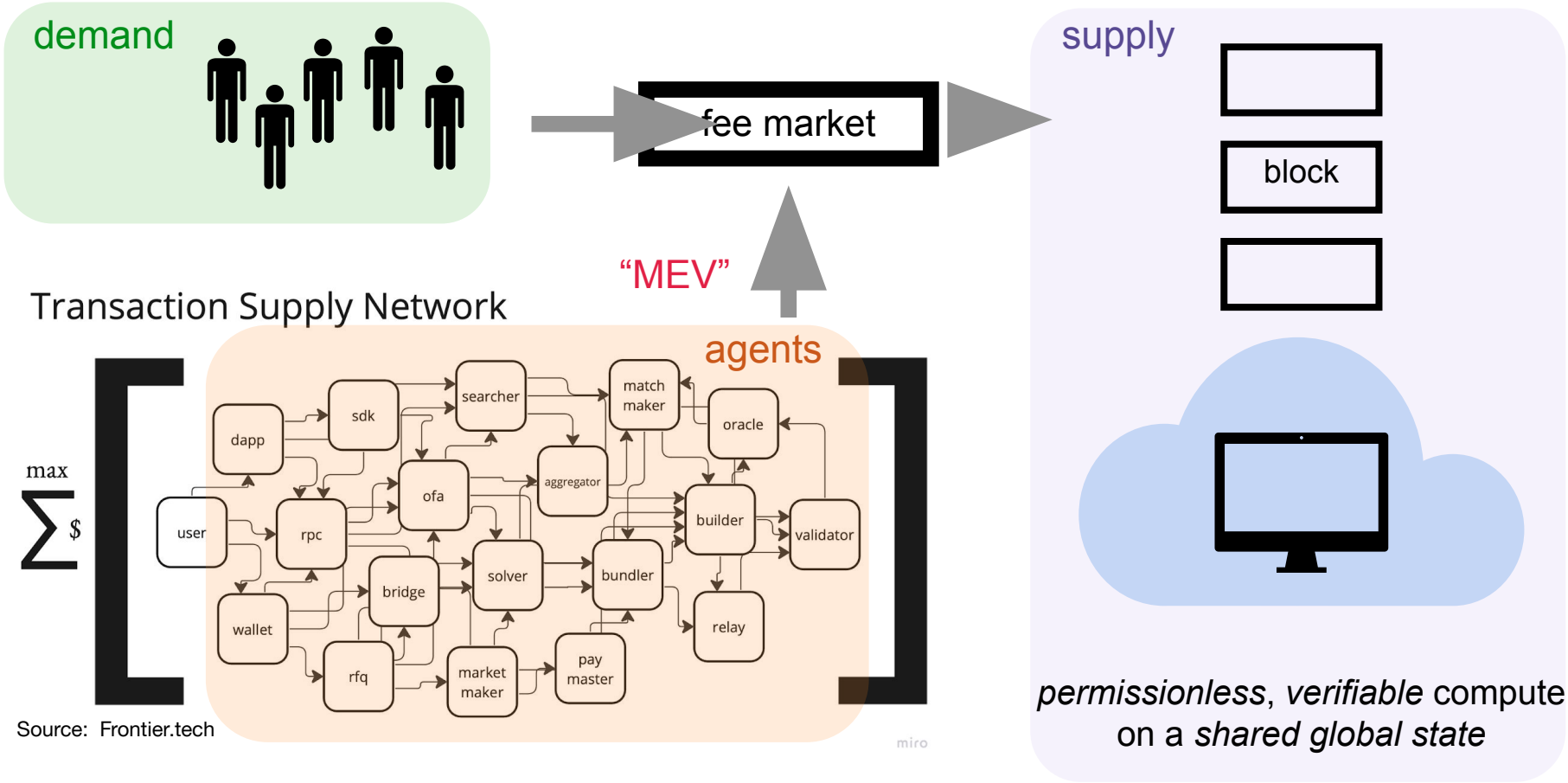
Introduction



Introduction



Introduction

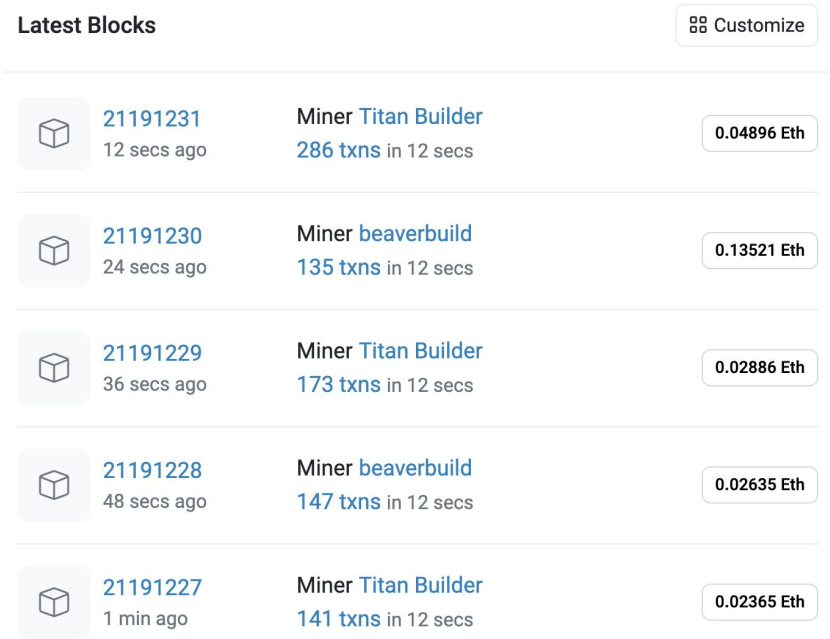


“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production



“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

Transaction Fee Mechanism Design in a Post-MEV World*

Maryam Bahrani† Pranav Garimidi‡ Tim Roughgarden§

February 26, 2024

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

responses to MEV:

Transaction Fee Mechanism Design in a Post-MEV World*

Maryam Bahrani† Pranav Garimidi‡ Tim Roughgarden§

February 26, 2024

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

Transaction Fee Mechanism Design in a Post-MEV World*

Maryam Bahrani† Pranav Garimidi‡ Tim Roughgarden§

February 26, 2024

responses to MEV:

(reduce) at the app layer

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

Transaction Fee Mechanism Design in a Post-MEV World*

Maryam Bahrani† Pranav Garimidi‡ Tim Roughgarden§

February 26, 2024

responses to MEV:

(reduce) at the app layer

(mitigate) minimize the influence of agents

“Agents bad” — “MEV toxic”

- agents have their own objectives and outsized control over block production
- incentive misalignment between users and agents -> reduced user welfare

Transaction Fee Mechanism Design in a Post-MEV World*

Maryam Bahrani† Pranav Garimidi‡ Tim Roughgarden§

February 26, 2024

responses to MEV:

(reduce) at the app layer

(mitigate) minimize the influence of agents

(democratize) accept as “inevitable evil,” and counter its negative side effects on e.g. centralization and censorship resistance.

Goal of this talk

“Agents bad” — “MEV toxic”

“Agents ok?” — “MEV nuanced”

Goal of this talk

“Agents bad” — “MEV toxic”

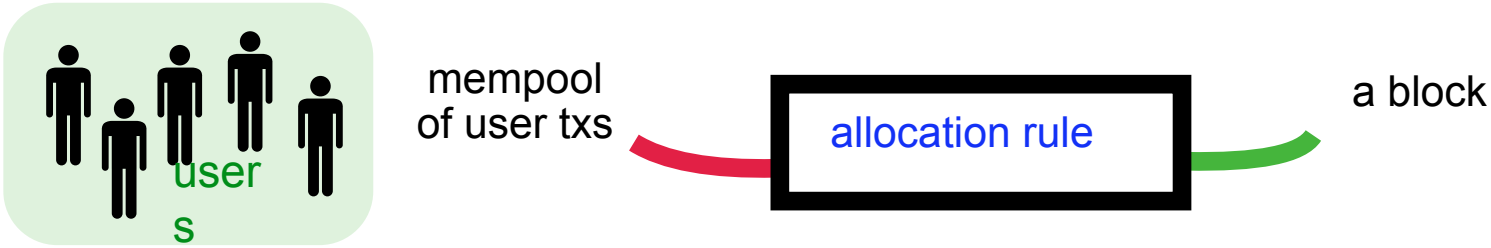
“Agents ok?” — “MEV nuanced”

Give a framework for

talking about degree of agenticism in different block production paradigms

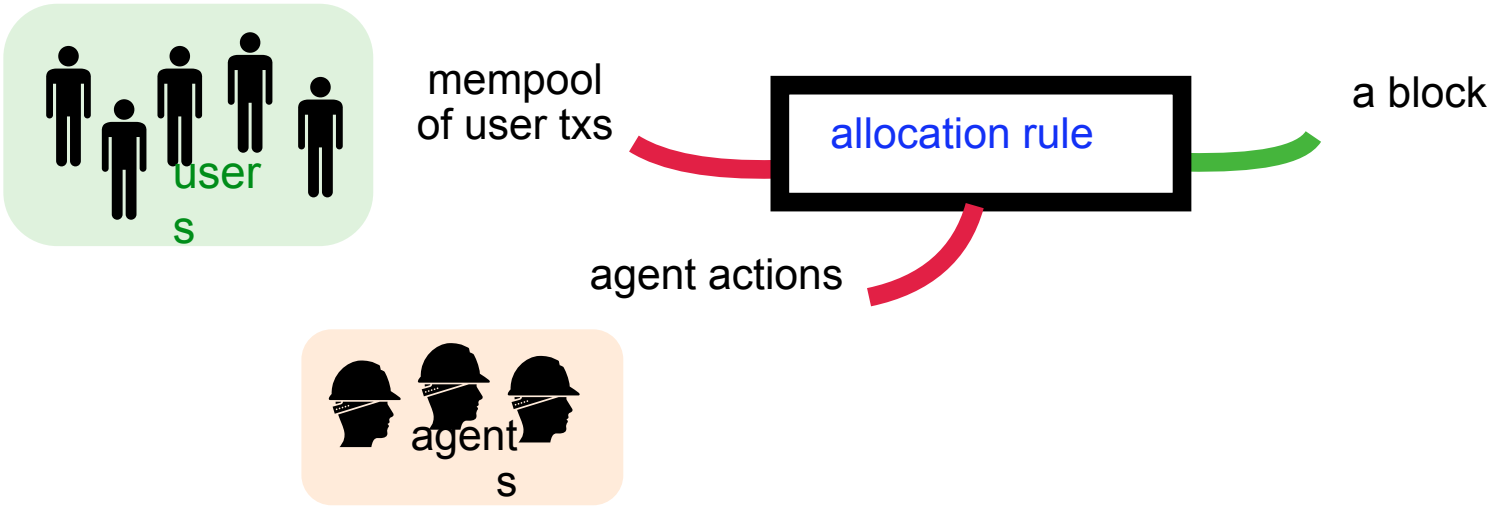
reasoning about when an agentic design is appropriate

Automated Block Building

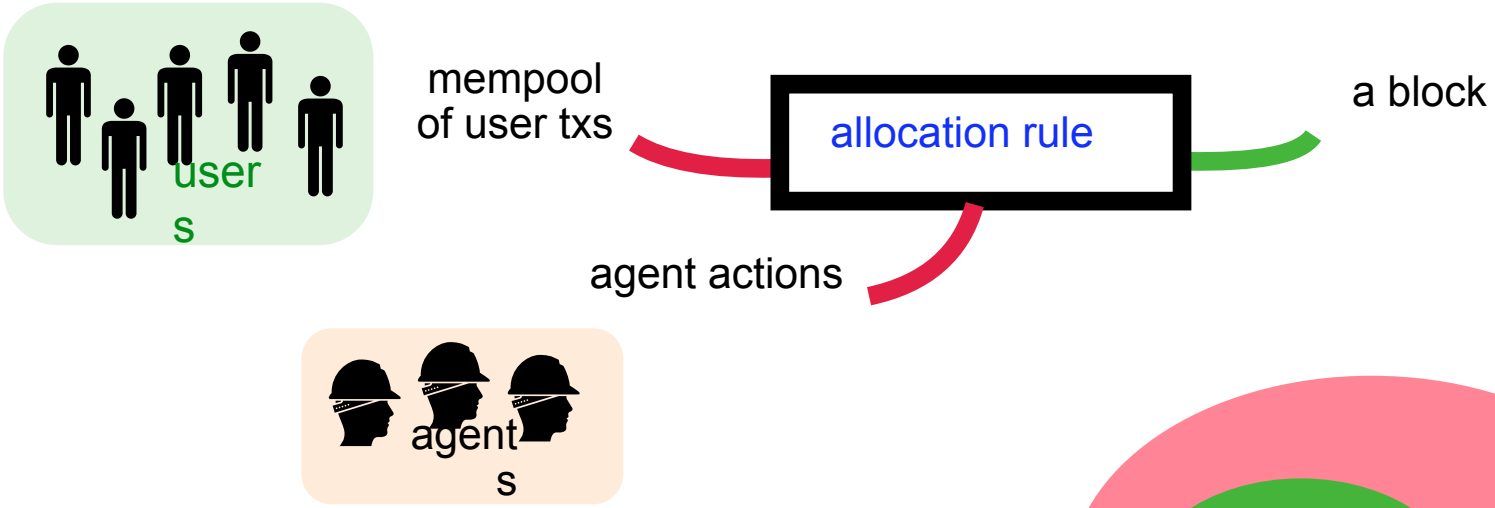


An allocation rule is *automated* if it is only a function of the mempool

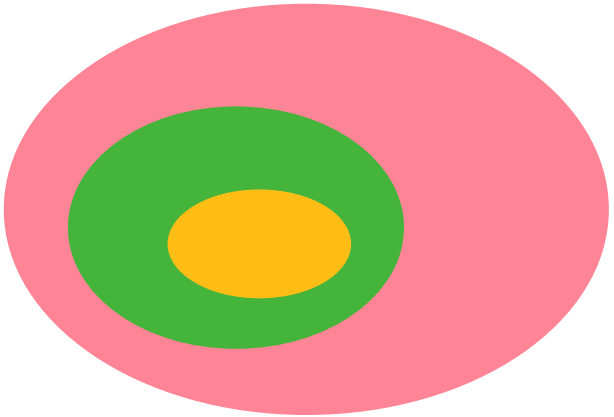
Agentic Block Building



Agentic Block Building



An allocation rule f is *more agentic* than g if for all M,



The Agentic — Automated Spectrum

Bitcoin
Solana

The Agentic — Automated Spectrum

The Agentic — Automated Spectrum

The Agentic — Automated Spectrum

The Agentic — Automated Spectrum

The Agentic — Automated Spectrum

The Agentic — Automated Spectrum

The Agentic — Automated Spectrum

How to choose the right place on the spectrum?

Desired Properties in a fee market

low latency		

Desired Properties in a fee market

low latency		
tractability	possible to run on-chain (computationally)	

Desired Properties in a fee market

low latency		
tractability	possible to run on-chain (computationally)	
simple UX	users shouldn’t need to do complex strategization	

Desired Properties in a fee market

low latency		
tractability	possible to run on-chain (computationally)	
simple UX	users shouldn’t need to do complex strategization	
surplus maximization	creates the most economic value / “gains from trade”	

Desired Properties in a fee market

low latency		
tractability	possible to run on-chain (computationally)	
simple UX	users shouldn’t need to do complex strategization	
surplus maximization	creates the most economic value / “gains from trade”	
no extraction	the generated surplus goes to users	

Desired Properties in a fee market

low latency		
tractability	possible to run on-chain (computationally)	
simple UX	users shouldn't need to do complex strategization	
surplus maximization	creates the most economic value / "gains from trade"	
no extraction	the generated surplus goes to users	

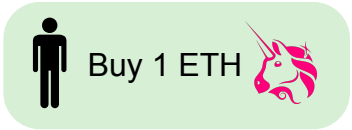
Two Examples

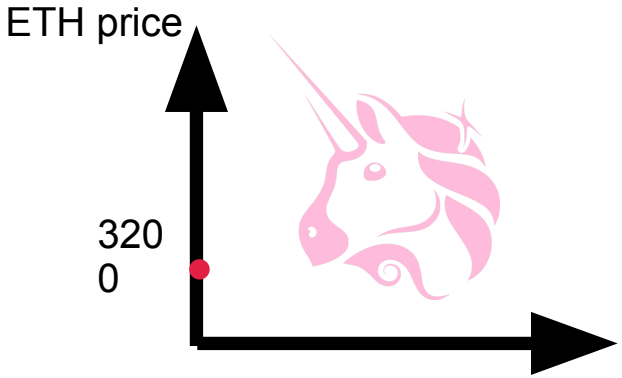
frontrunning

CEX-DEX arbitrage

Frontrunning

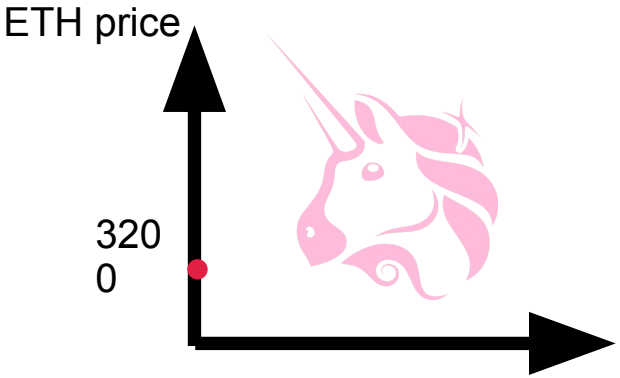
user pays
3200





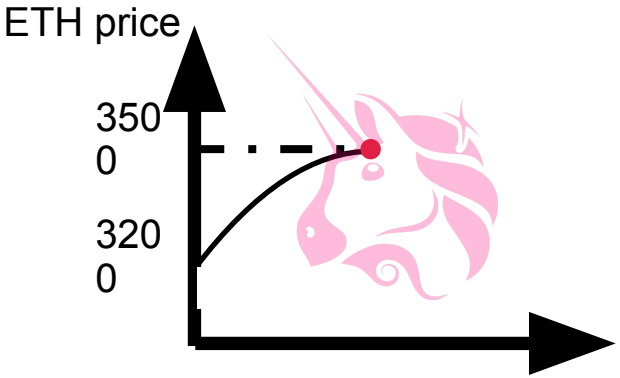
Frontrunning

user pays
3200



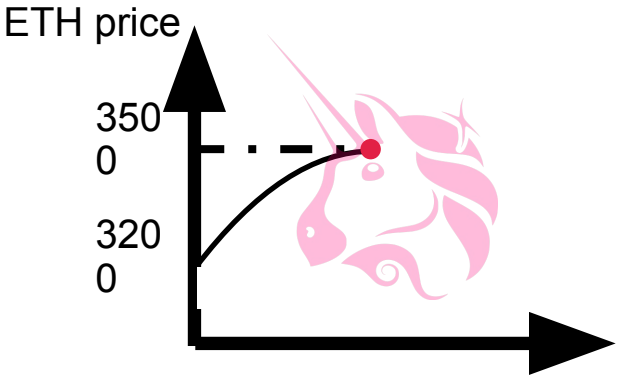
Frontrunning

user pays
3200

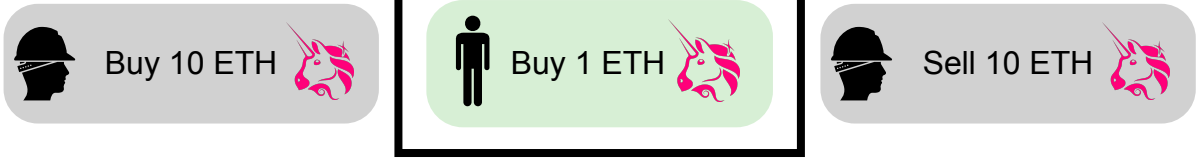


Frontrunning

user pays
3200

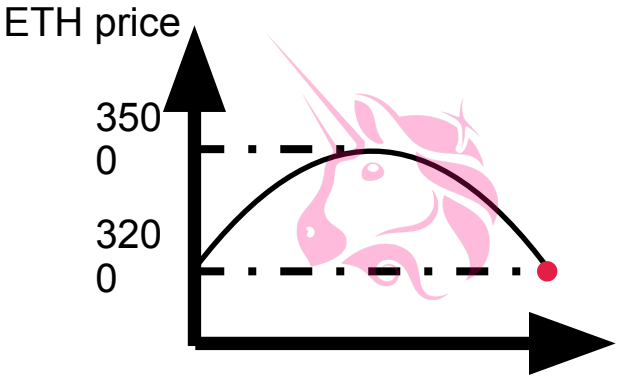


user pays
3500



Frontrunning

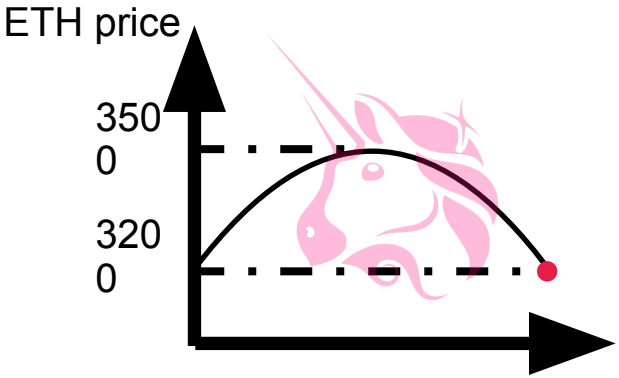
user pays
3200



user pays
3500

Frontrunning

user pays
3200



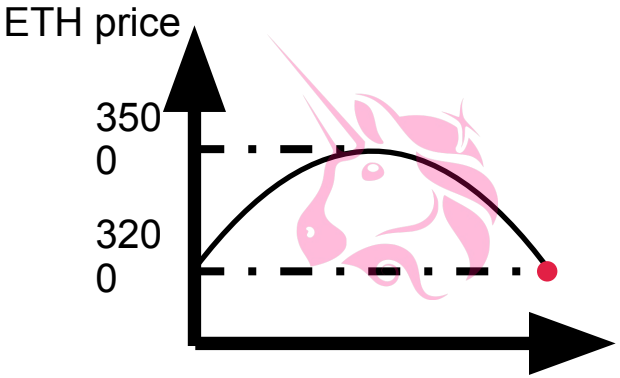
user pays
3500

zero-sum game between user and agent:

user paid $300 extra
agent made $300 profit

Frontrunning

user pays
3200



user pays
3500

zero-sum game between user and agent:

purely extractive MEV!

user paid $300 extra
agent made $300 profit

Frontrunning (extractive MEV)

Agentic block building can be vulnerable to extraction
e.g. Ethereum public mempools / mev-boost

Frontrunning (extractive MEV)

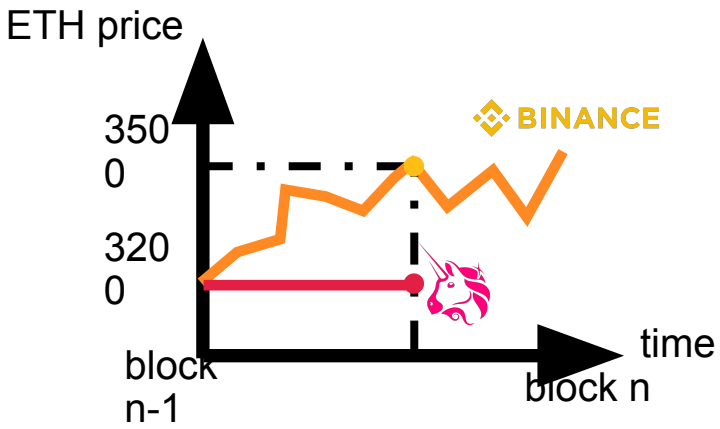
Agentic block building can be vulnerable to extraction
e.g. Ethereum public mempools / mev-boost

Automated block building can achieve no extraction

e.g. SUAVE — encrypted mempool + deterministic ordering

CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain



CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

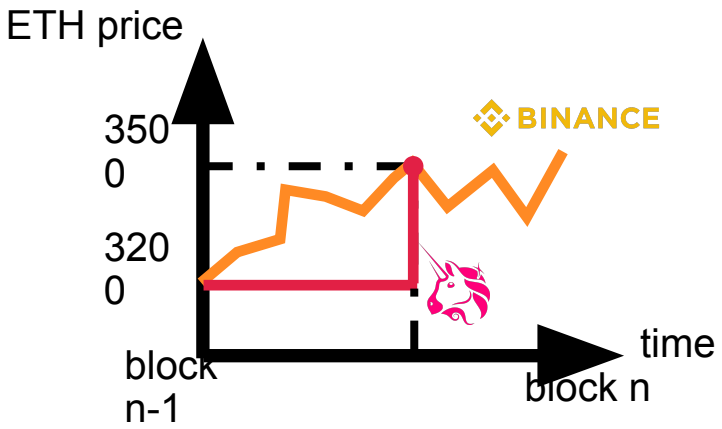
simultaneously:

Buy 10 ETH

on-chain

Sell 10 ETH on BINANCE

off-chain



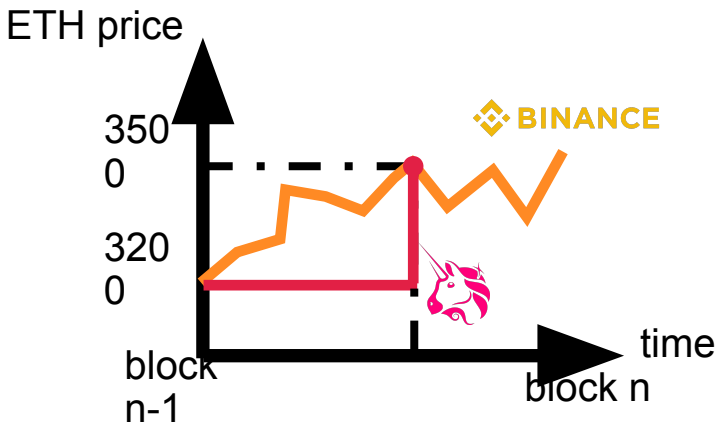
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

Buy 10 ETH *on-chain*

Sell 10 ETH on BINANCE *off-chain*



surplus generation for users:
Uniswap prices will reflect the most recent market information

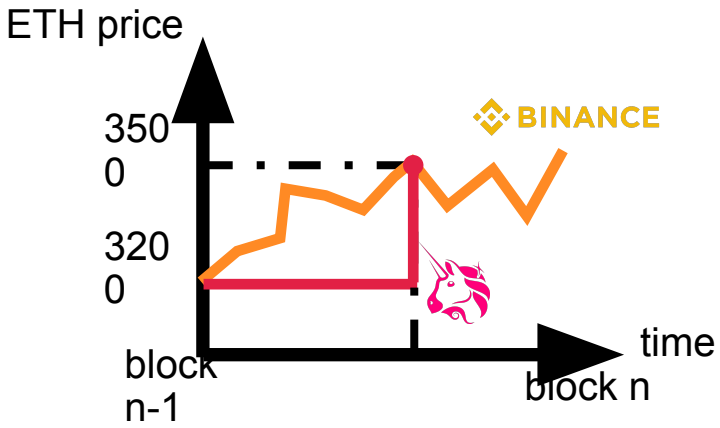
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

on-chain

off-chain



surplus generation for users:
Uniswap prices will reflect the most recent market information

extraction from liquidity providers:
agent's profit = loss to liquidity providers (minus trading fees)

CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

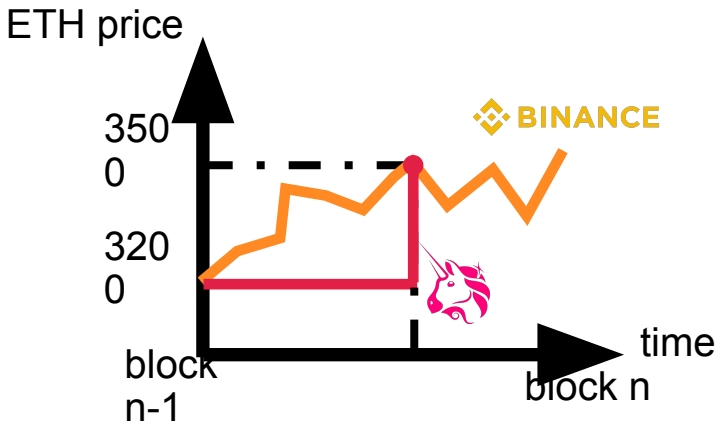
simultaneously :

Buy 10 ETH

on-chain

Sell 10 ETH on BINANCE

off-chain



surplus generation for users:
Uniswap prices will reflect the most recent market information

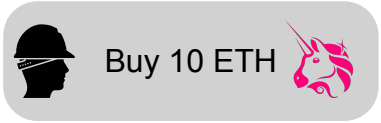
extraction from liquidity providers:
agent's profit = loss to liquidity providers (minus trading fees)

"Loss-vs-Rebalancing (LVR)"

CEX-DEX arbitrage (external coordination)

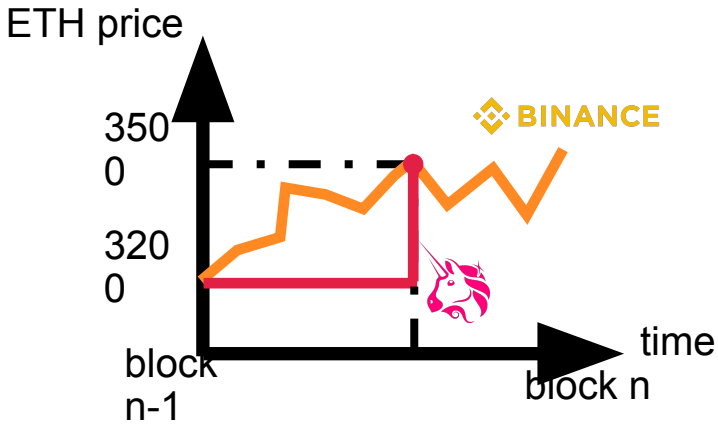
bringing off-chain information on-chain

simultaneously :



on-chain

off-chain



surplus generation for users:
Uniswap prices will reflect the most recent market information

extraction from liquidity providers:
agent's profit = loss to liquidity providers (minus trading fees)

"Loss-vs-Rebalancing (LVR)"

tension between surplus maximization and no extraction!

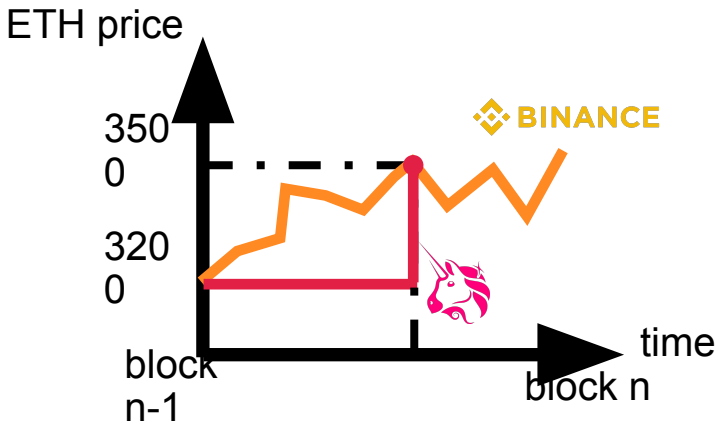
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

on-chain

off-chain



surplus generation for users:
Uniswap prices will reflect the most recent market information

observation. Crucial that the agent has certainty about the on-chain trade going through.

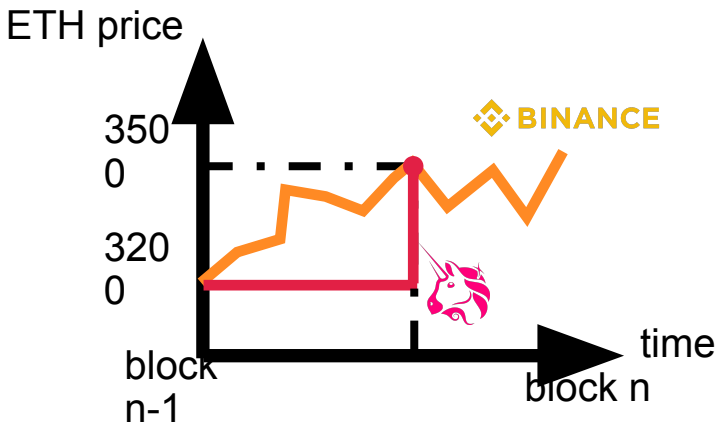
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

Buy 10 ETH — *on-chain*

Sell 10 ETH on BINANCE — *off-chain*



surplus generation for users:
Uniswap prices will reflect the most recent market information

observation. Crucial that the agent has certainty about the on-chain trade going through.

Uncertainty -> higher arb bounds -> less efficient DEX prices

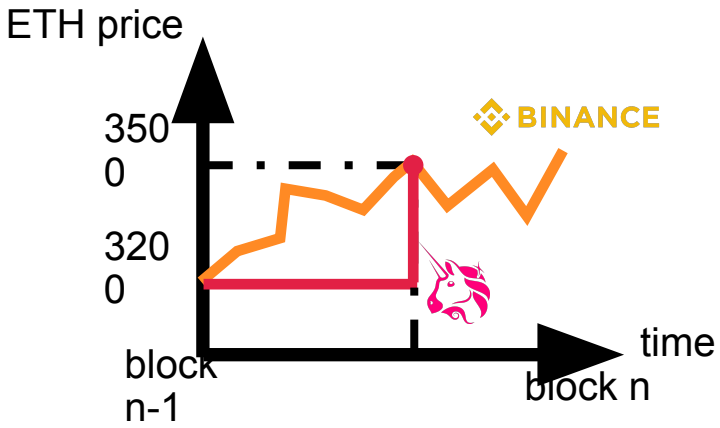
CEX-DEX arbitrage (external coordination)

bringing off-chain information on-chain

simultaneously:

on-chain

off-chain



surplus generation for users:
Uniswap prices will reflect the most recent market information

observation. Crucial that the agent has certainty about the on-chain trade going through.

Uncertainty -> higher arb bounds -> less efficient DEX prices

CEX-DEX arbitrage (external coordination)

claim. Automated block building can’t get *surplus maximization* + *tractability*

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering
rules:

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization* + *tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization* + *tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming

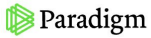
CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering:

Priority Is All You Need

06.04.2024 | By Dan Robinson, Dave White



CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering:

Priority Is All You Need

06.04.2024 | By Dan Robinson, Dave White Paradigm

coordination in mempool: competition => contention => uncertainty due to reversions

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering:

Priority Is All You Need

06.04.2024 | By Dan Robinson, Dave White Paradigm

coordination in mempool: competition => contention => uncertainty due to reversions

observation. Crucial that the agent has certainty about the on-chain trade going through.

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions

- Ordering Rule with Reversion Protection:

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions

- Ordering Rule with Reversion Protection:
  - allow transactions to submit *bids conditioned on state*
    - "Include my transaction only if I'm the first person to do this arbitrage"

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions

- Ordering Rule with Reversion Protection:
  - allow transactions to submit *bids conditioned on state*
    - "Include my transaction only if I'm the first person to do this arbitrage"

"interdependent valuations"

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability.*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions

- Ordering Rule with Reversion Protection:
  - allow transactions to submit *bids conditioned on state*
    - "Include my transaction only if I'm the first person to do this arbitrage"

"interdependent valuations"

  - computationally hard to optimize => intractable to run on-chain

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability.*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions

- Ordering Rule with Reversion Protection:
  - allow transactions to submit *bids conditioned on state*
    - "Include my transaction only if I'm the first person to do this arbitrage"

"interdependent valuations"

  - computationally hard to optimize => intractable to run on-chain

claim. Agentic block building can *surplus maximization + tractability!*

CEX-DEX arbitrage (external coordination)

claim. Automated block building can't get *surplus maximization + tractability.*
candidate automated ordering rules:

- First-come-first-serve: side competition for latency reduction
- Random: incentivizes spamming
- Priority Ordering: vulnerable to reversions

- Ordering Rule with Reversion Protection:
  - allow transactions to submit *bids conditioned on state*
    - "Include my transaction only if I'm the first person to do this arbitrage"

"interdependent valuations"

  - computationally hard to optimize => intractable to run on-chain

claim. Agentic block building can *surplus maximization + tractability!*

e.g. mev-boost

The trade-offs

	agentic	automated
low latency		+
tractability	+	
simple UX	+	
economic efficiency	?	?
no extraction		+

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Automated block building has low latency and less extraction, but can fail to create the most economic value due to on-chain computational constraints

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Automated block building has low latency and less extraction, but can fail to create the most economic value due to on-chain computational constraints

"NYSE on-chain"

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Automated block building has low latency and less extraction, but can fail to create the most economic value due to on-chain computational constraints

"NYSE on-chain"

Agents are particularly well-suited for surplus-maximization, especially in the presence of complex user preferences, but utilizing them opens up the possibility of extraction

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

Automated block building has low latency and less extraction, but can fail to create the most economic value due to on-chain computational constraints

> “NYSE
> on-chain”

Agents are particularly well-suited for surplus-maximization, especially in the presence of complex user preferences, but utilizing them opens up the possibility of extraction

> Ritual Resonance Marketplace for AI computation
> *complex preferences* (heterogenous supply and demand)
> potential for generating *large surplus* from optimal resource allocation
> low toxicity — few extraction opportunities

Conclusion

The Agentic—Automated spectrum as a design axis for block building mechanisms

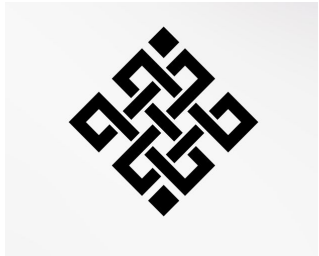
Automated block building has low latency and less extraction, but can fail to create the most economic value due to on-chain computational constraints

> “NYSE on-chain”

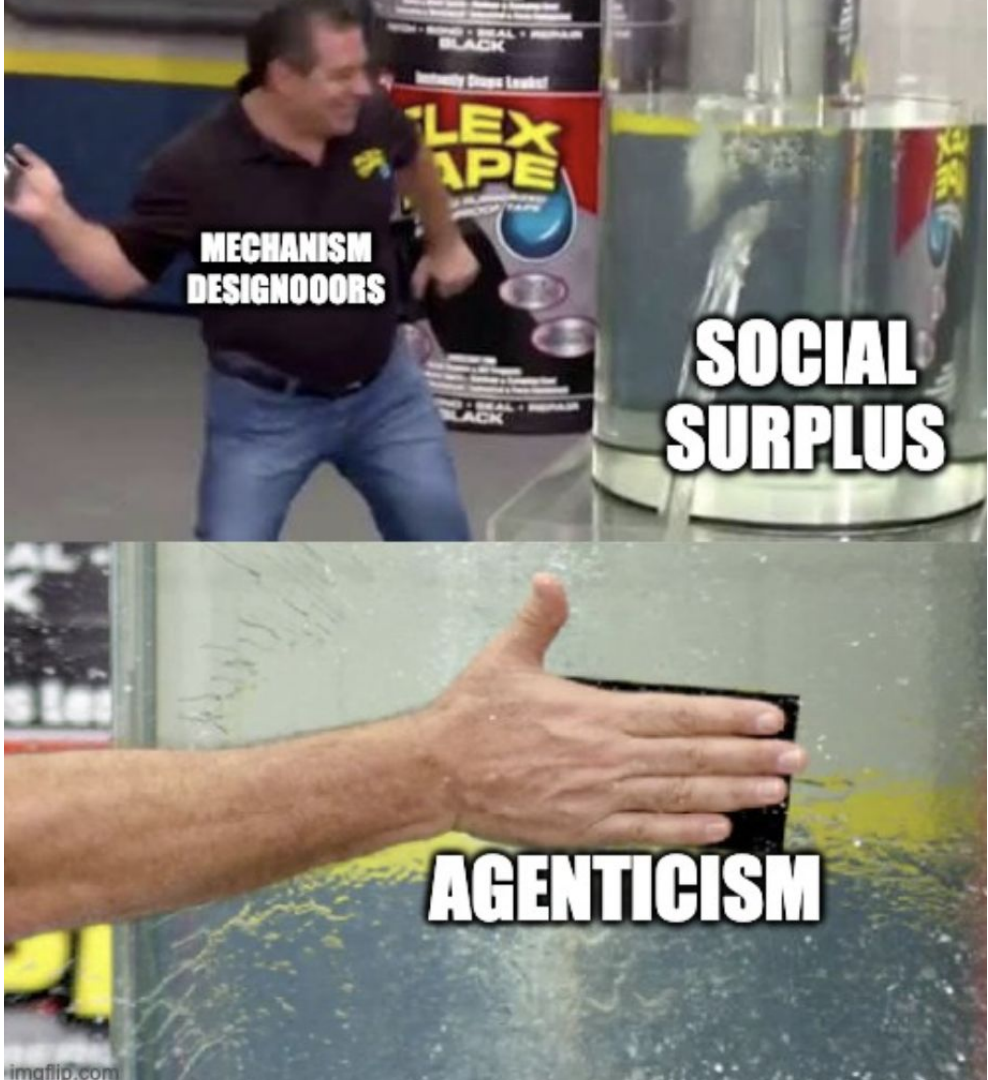
Agents are particularly well-suited for surplus-maximization, especially in the presence of complex user preferences, but utilizing them opens up the possibility of extraction

> Ritual Resonance Marketplace for AI computation
> *complex preferences* (heterogenous supply and demand)
> potential for generating *large surplus* from optimal resource allocation
> low toxicity — few extraction opportunities

devnet today!



anks :)



@ritualnet
@bahrani_mary
am