✨ UNIVERSAL HOSTLESS

SUBSTRATE

FOR A POST-SERVERLESS FUTURE 🚀

ANTWERP EDITION!

✨ UNIVERSAL HOSTLESS

SUBSTRATE

FOR A POST-SERVERLESS FUTURE 🚀

A UNIVERSAL HOSTLESS SUBSTRATE

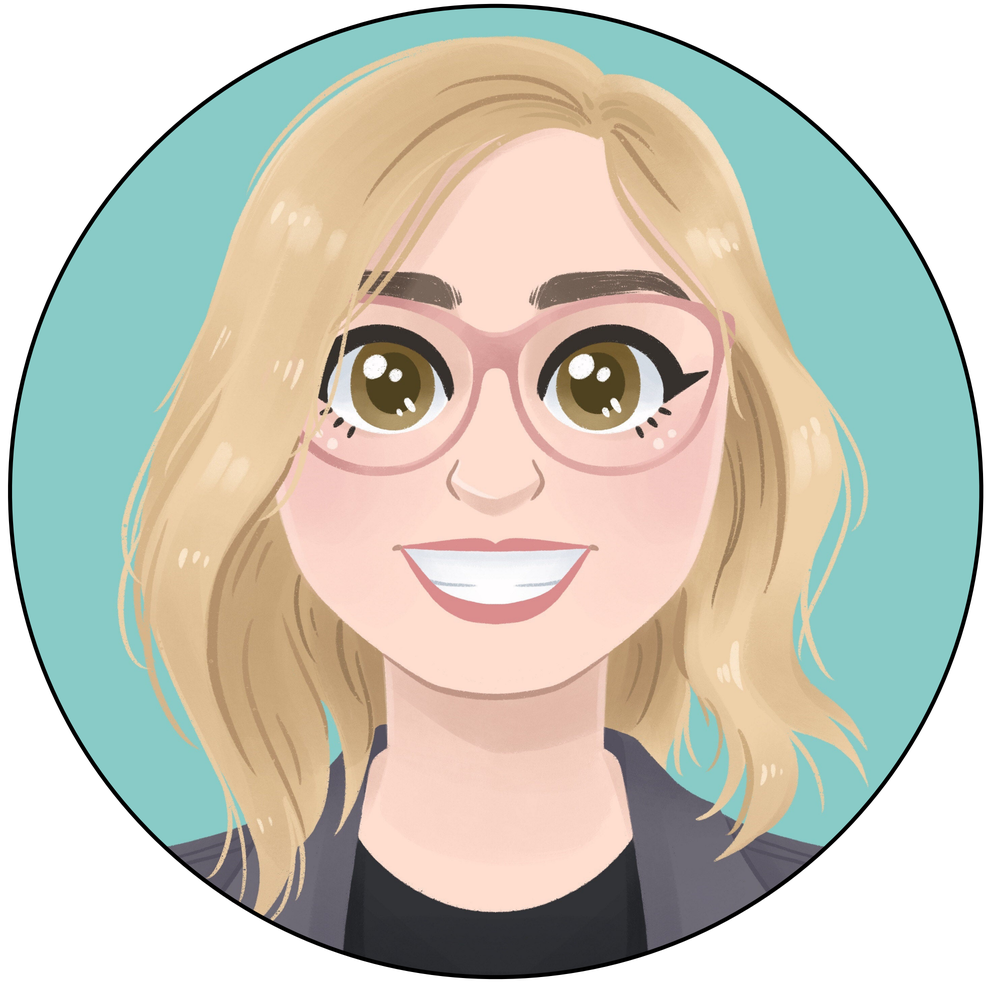
BROOKLYN ZELENKA, @expede

fission

A UNIVERSAL HOSTLESS SUBSTRATE

BROOKLYN ZELENKA, @expede

- Cofounder/CTO at Fission
  - `https://fission.codes`
- PLT & VMs
- Previously an Ethereum Core Dev
  - EIPs 615, 902, 1066, 1444
  - ECIP 1050
- Now spending a *lot* of time with IPFS & DIDs
- Lots of R&D (but still have to deal with segfaults, &c)



fission

A UNIVERSAL HOSTLESS SUBSTRATE

PARADIGM WAVES

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CONTAINERS

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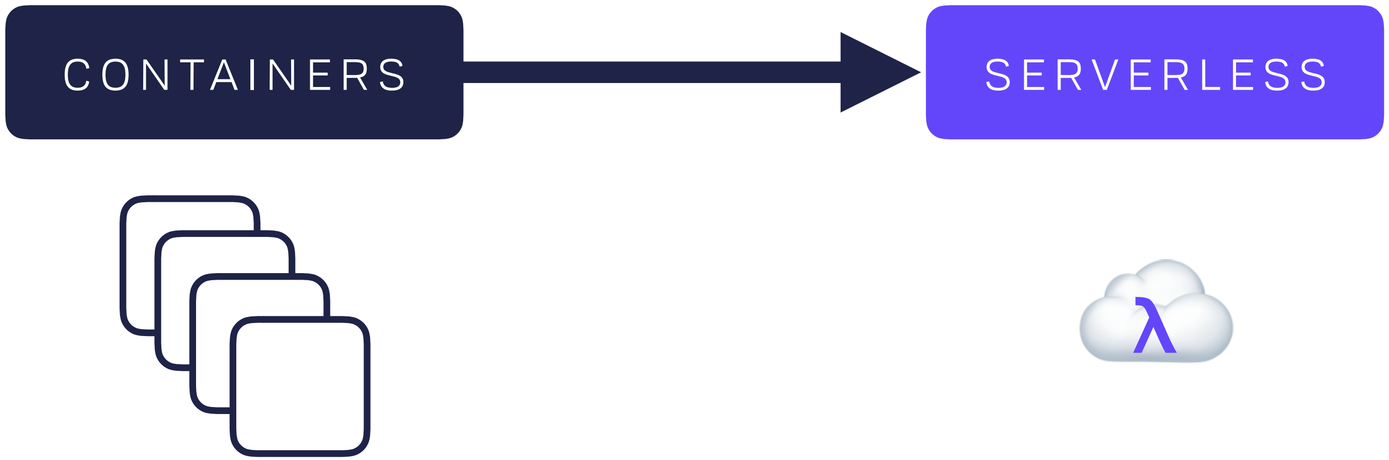

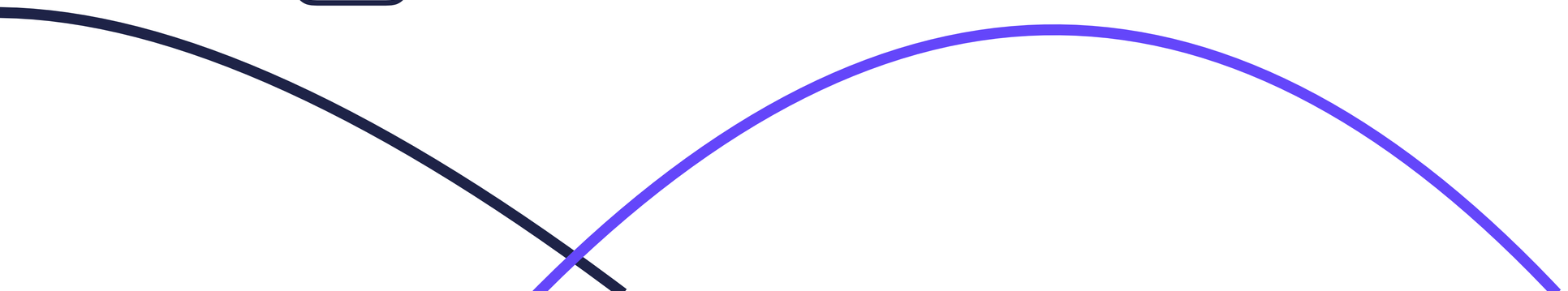

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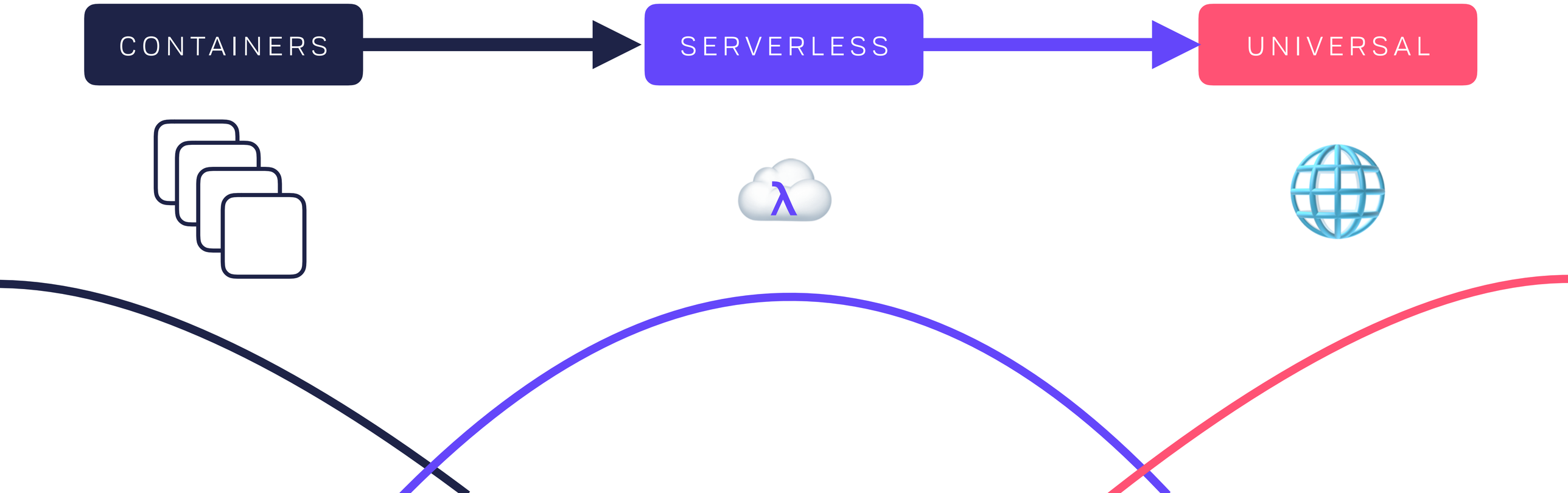

A UNIVERSAL HOSTLESS SUBSTRATE

NATIVE SDK FOR THE WEB

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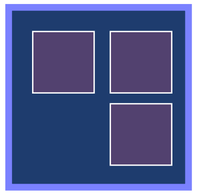

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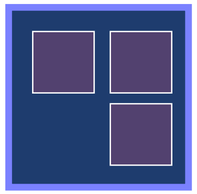

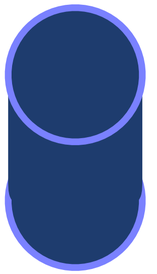

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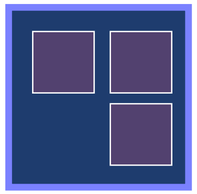
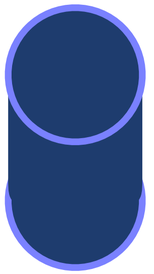




A UNIVERSAL HOSTLESS SUBSTRATE

UPSHOT?

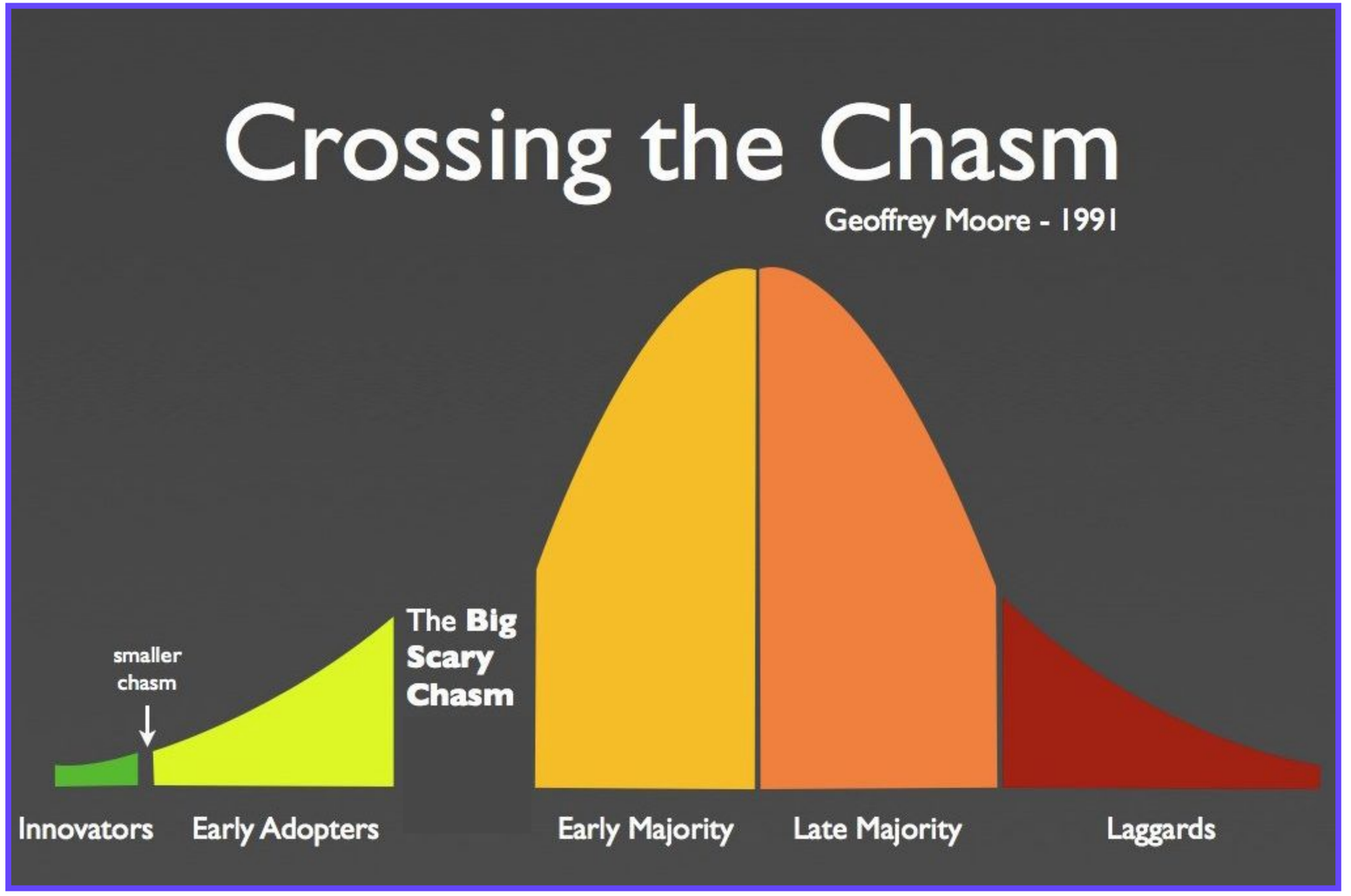
A UNIVERSAL HOSTLESS SUBSTRATE

UPSHOT?

- Go from zero to production *on a plane* ✈️
- Move data to compute and vice versa 🔄
- Logarithmic scaling 📈
- Serve areas that lack sufficient cloud hardware 🖥️
- *Anyone* can be a service provider (lower bar to entry) 💁‍♀️💁‍♂️

A UNIVERSAL HOSTLESS SUBSTRATE

WHY NOT NOW?



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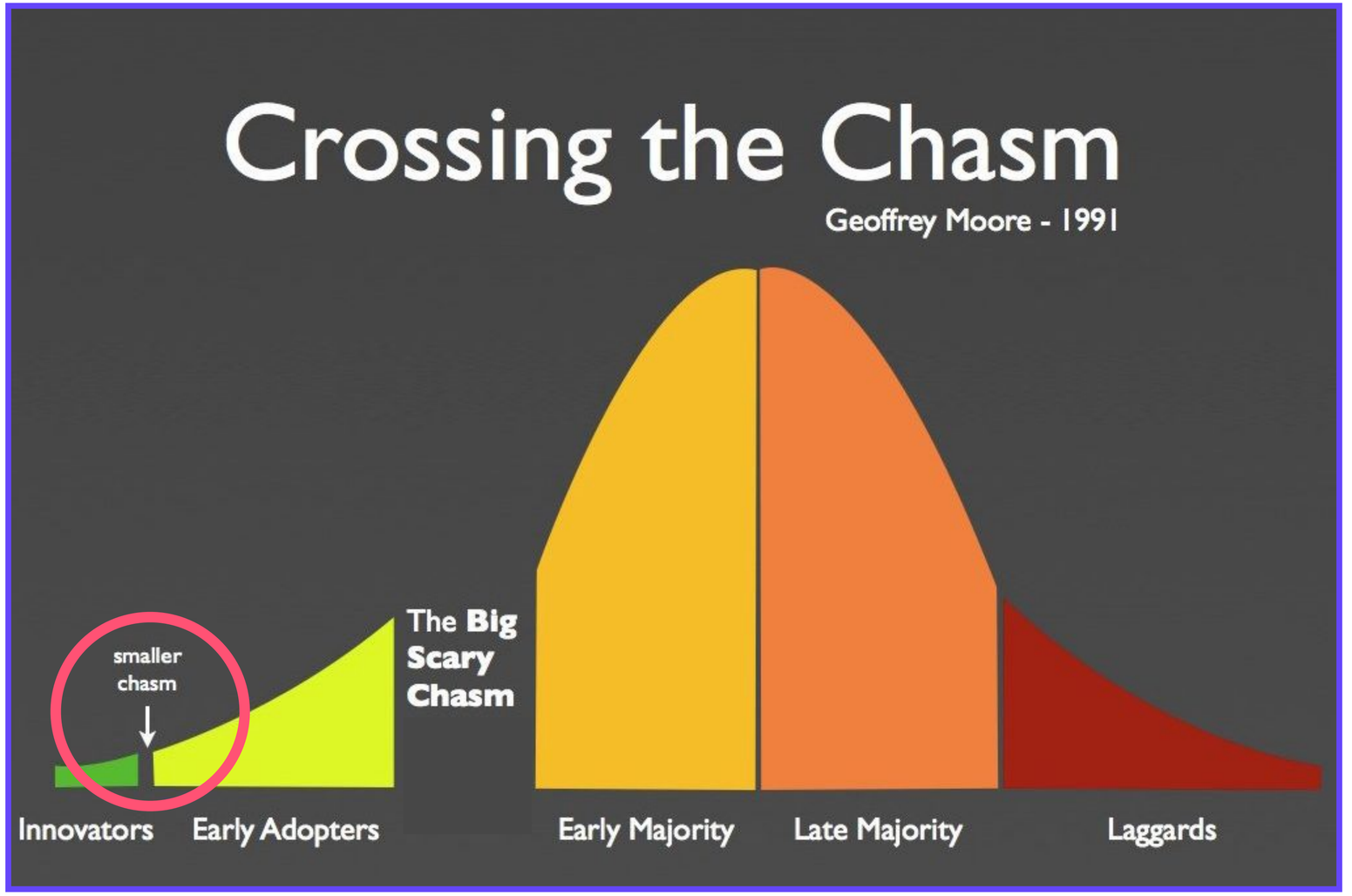

COMMONS INFRASTRUCTURE

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🤝 A SUBSTRATE FOR EVERYONE 🌍

COMMONS INFRASTRUCTURE

OPEN SOURCE

Lots of people work on it, everybody benefits from it, and then people can build upon it (even in a revenue generating fashion)

TED LEUNG (2005)

COMMONS INFRASTRUCTURE

OPEN NETWORKS

Lots of people work on it, everybody benefits from it, people can build upon it (even in a revenue generating fashion), and it's "owned" by everyone.

By participating — even with competitive goals — you are cooperating by serving the content and running compute of others.

IPFS PRIMER

IPFS PRIMER

 MEET THE CONTENT-ADDRESSABLE WEB 👋

IPFS PRIMER

INTERPLANETARY FILE SYSTEM

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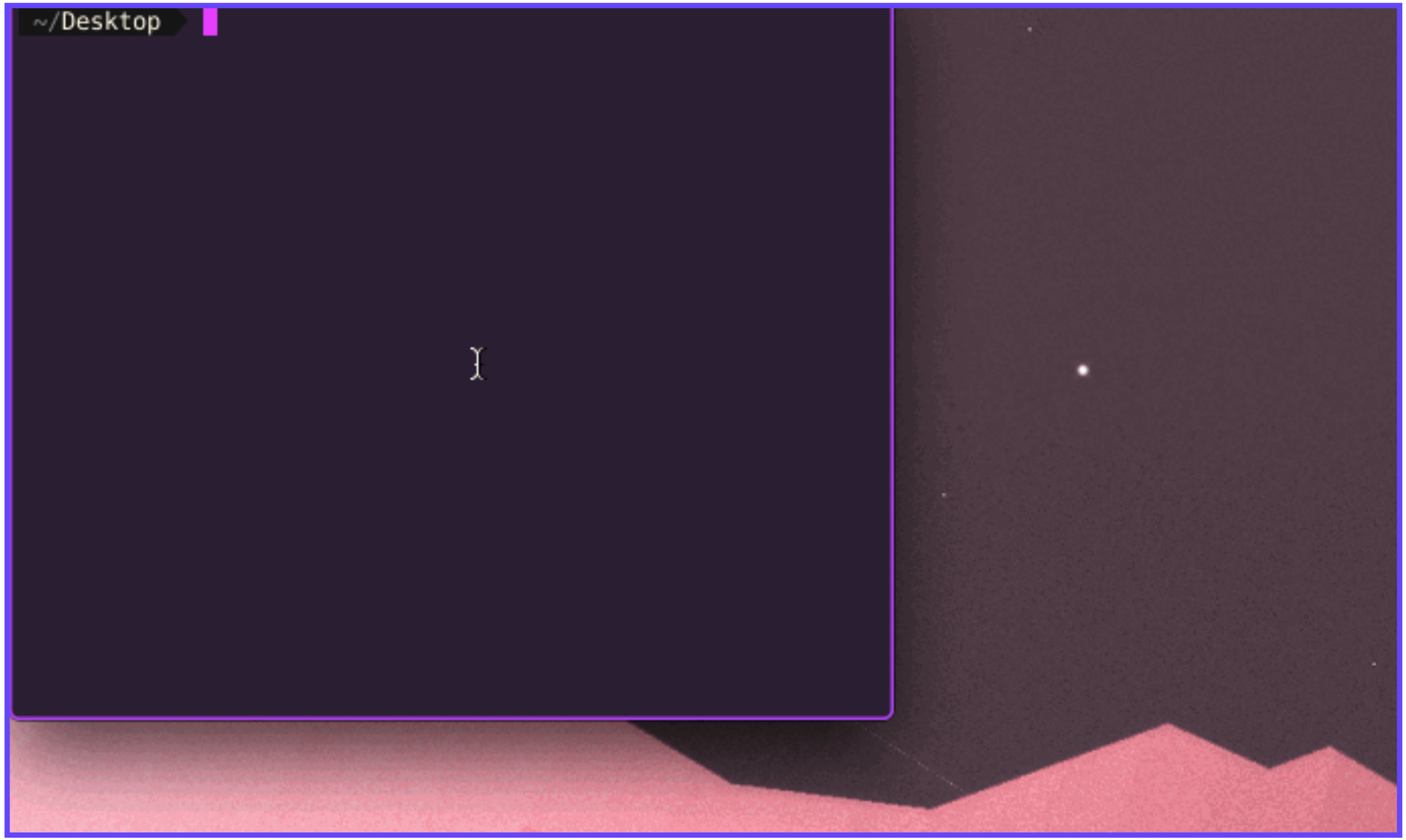

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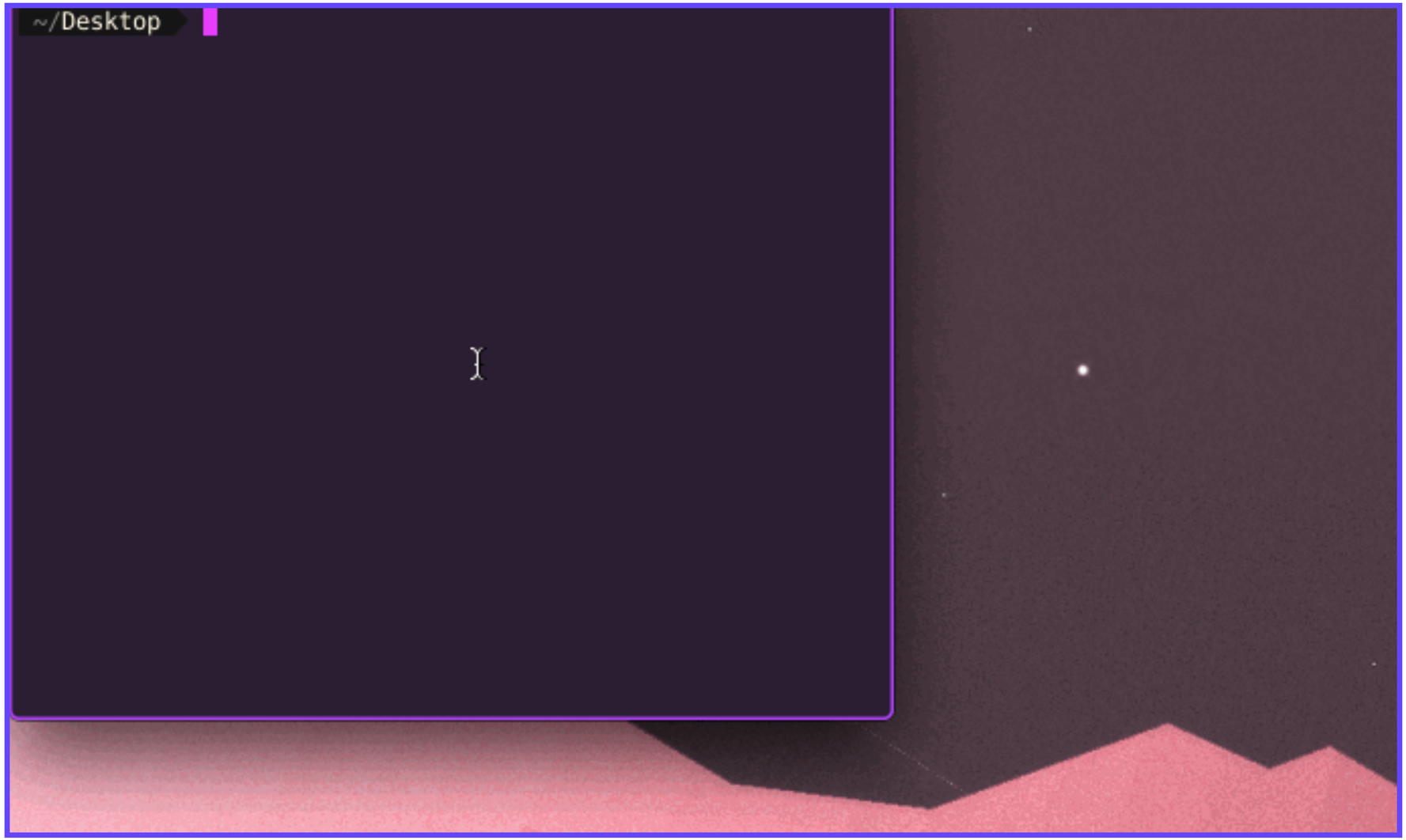

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- Predominantly single-source (per file) server/client

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- “Location addressing”
  - DNS maps names to IP addresses
  - Focused on the physical network

VIRTUAL ADDRESS

PHYSICAL LOCATION

IPFS PRIMER

THE WEB TODAY

- Predominantly single-source (per file) server/client
- Like a key/value store **`{ip => {path => content}}`**
- “Location addressing”
  - DNS maps names to IP addresses
  - Focused on the physical network
- Mutable addressing
  - `www.foo.com/baz` may be JSON today, but a video tomorrow
  - …or altered content

VIRTUAL ADDRESS

PHYSICAL LOCATION

IPFS PRIMER

CONTENT ADDRESSING

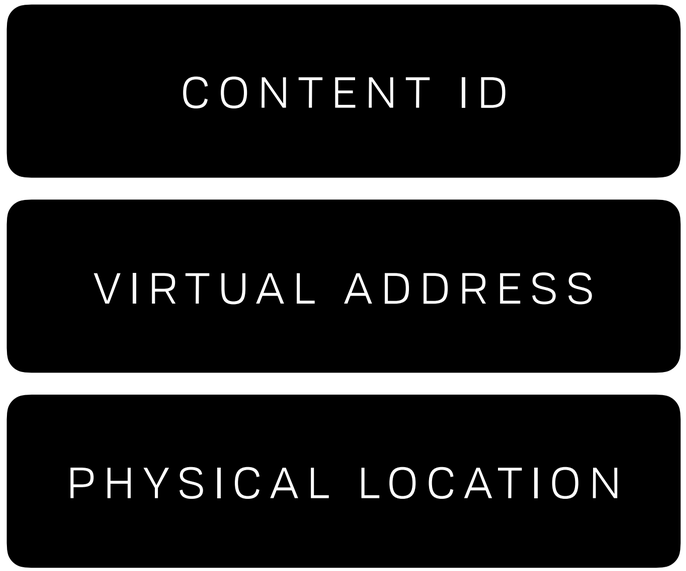
VIRTUAL ADDRESS

PHYSICAL LOCATION

IPFS PRIMER

CONTENT ADDRESSING

- A layer of abstraction above location



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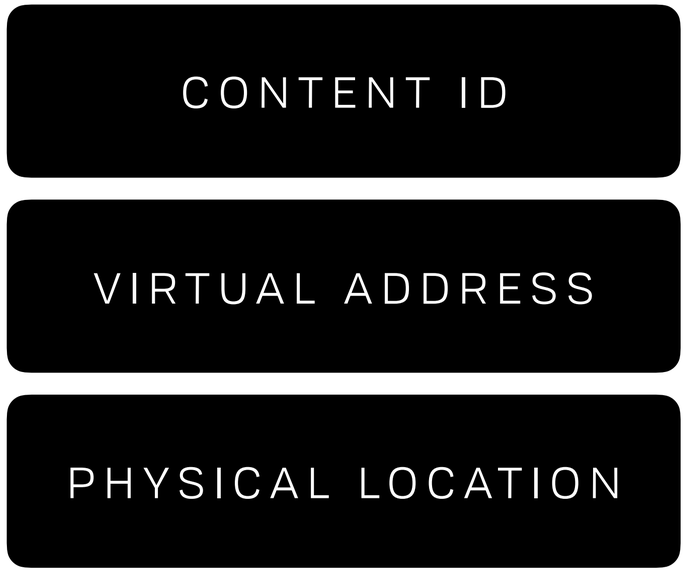
CONTENT ADDRESSING

- A layer of abstraction above location
- Like a key/value store **`{hash(content) => content}`**
  - Content hash AKA “content identifier” or CID
  - Special “universal” relationship to content



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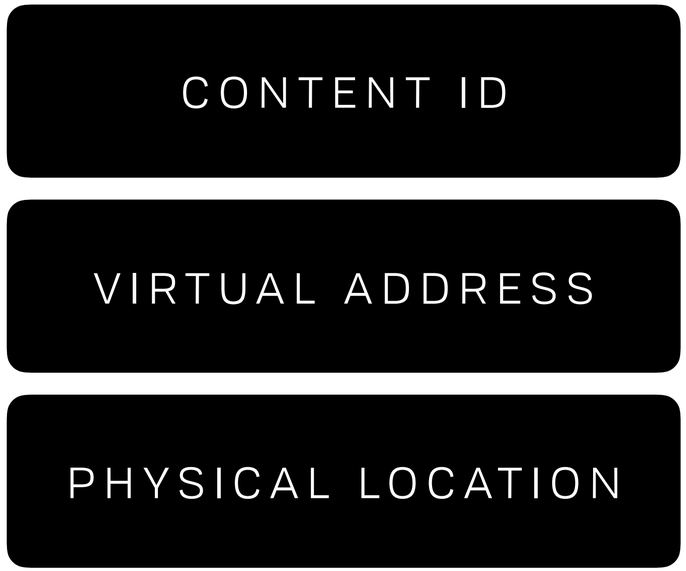

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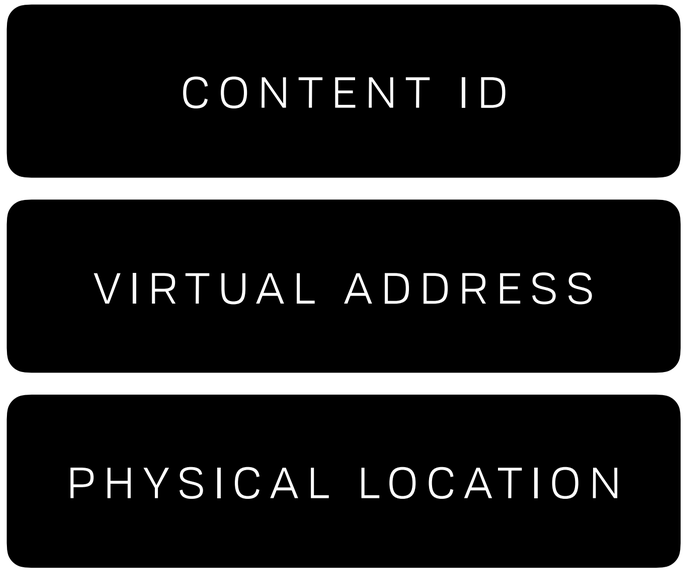
- Does not care where it lives



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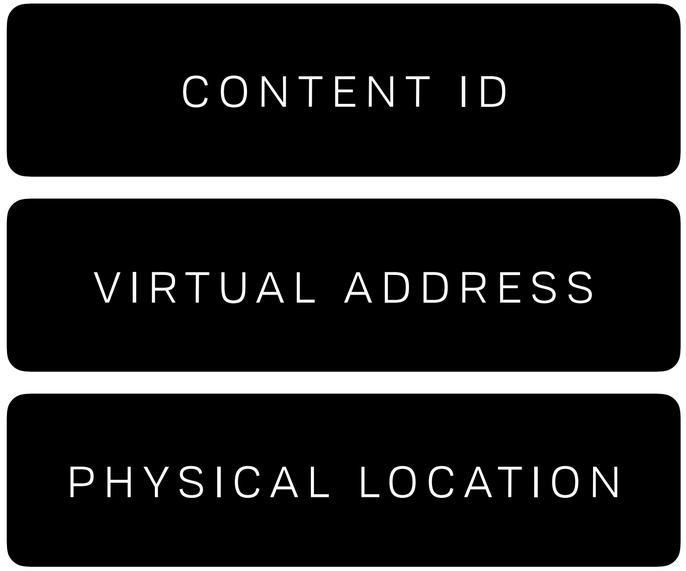
  - Content hash AKA “content identifier” or CID
  - Special “universal” relationship to content
- Focused on *the data*
- Does not care where it lives
- Still have paths
  - Immutable DAG
  - Why no loops?



IPFS PRIMER

LINKED DATA

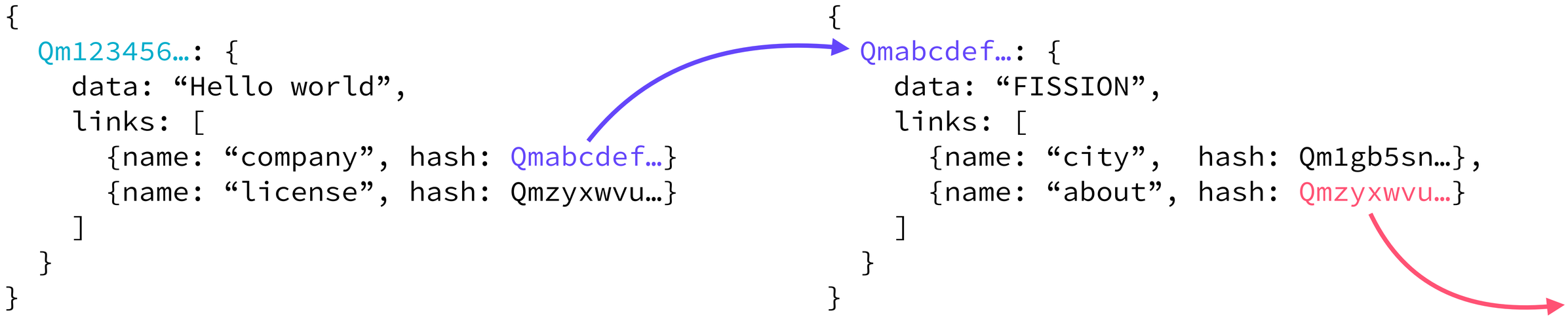
IPFS PRIMER

LINKED DATA

```
{
  Qm123456…: {
    data: “Hello world”,
    links: [
      {name: “company”, hash: Qmabcdef…}
      {name: “license”, hash: Qmzyxwvu…}
    ]
  }
}
```

IPFS PRIMER

LINKED DATA



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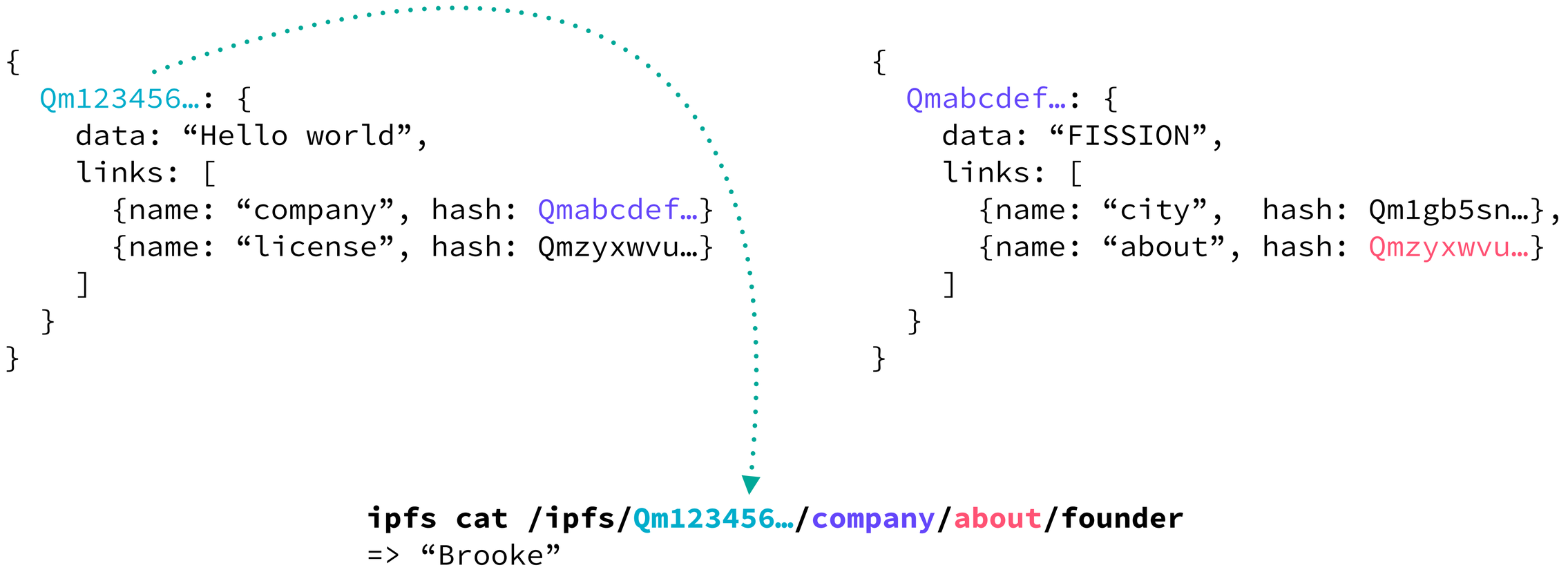

IPFS PRIMER

ROUTING & LOOKUP 🔍🌊

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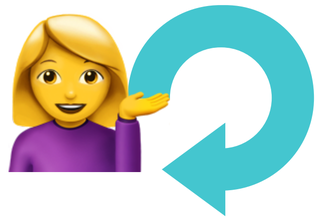

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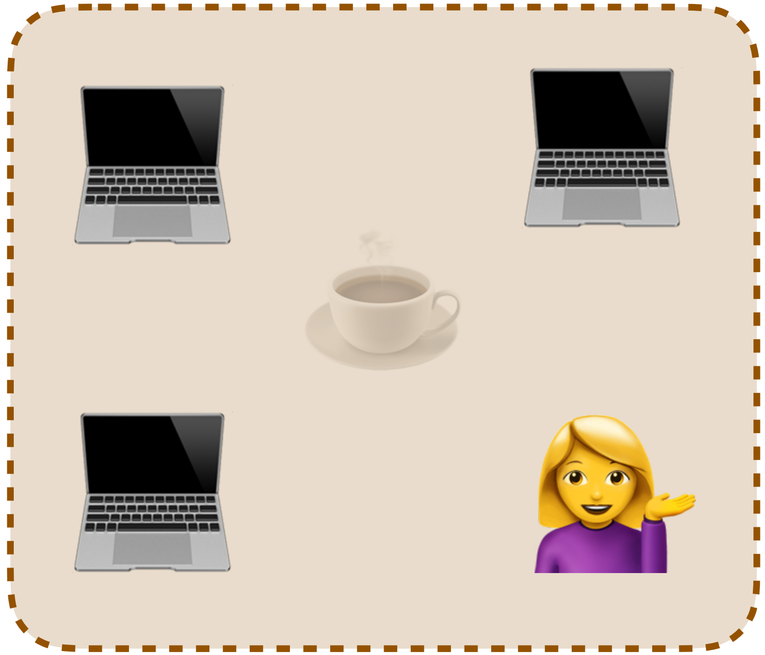

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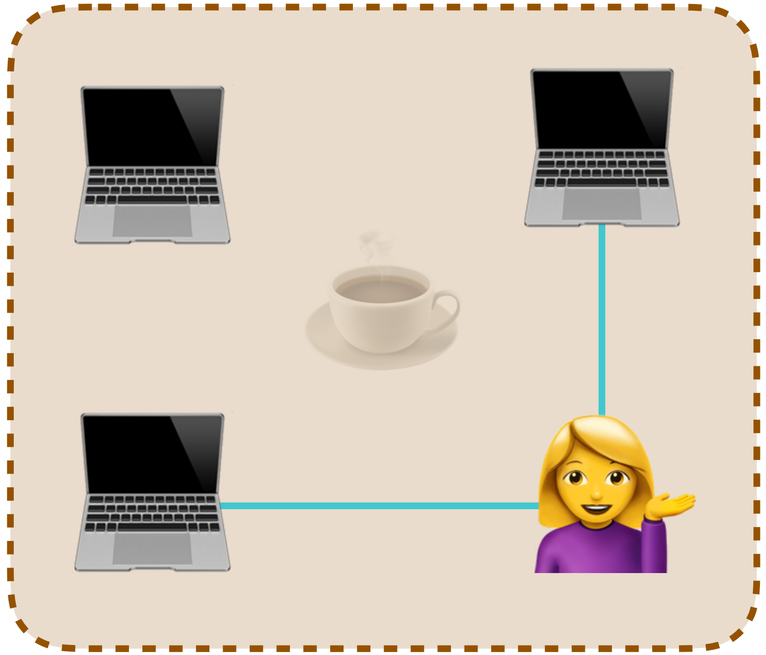

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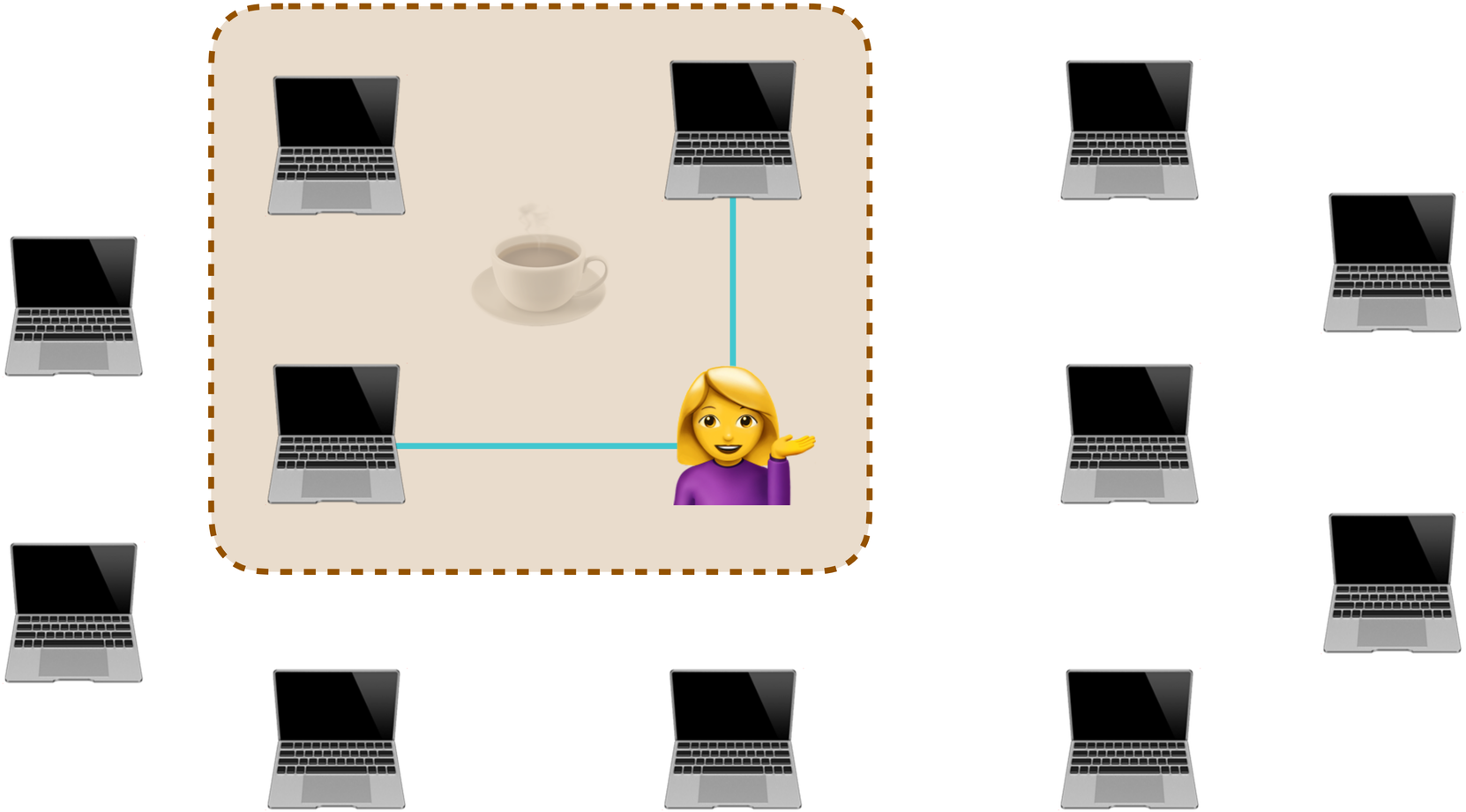

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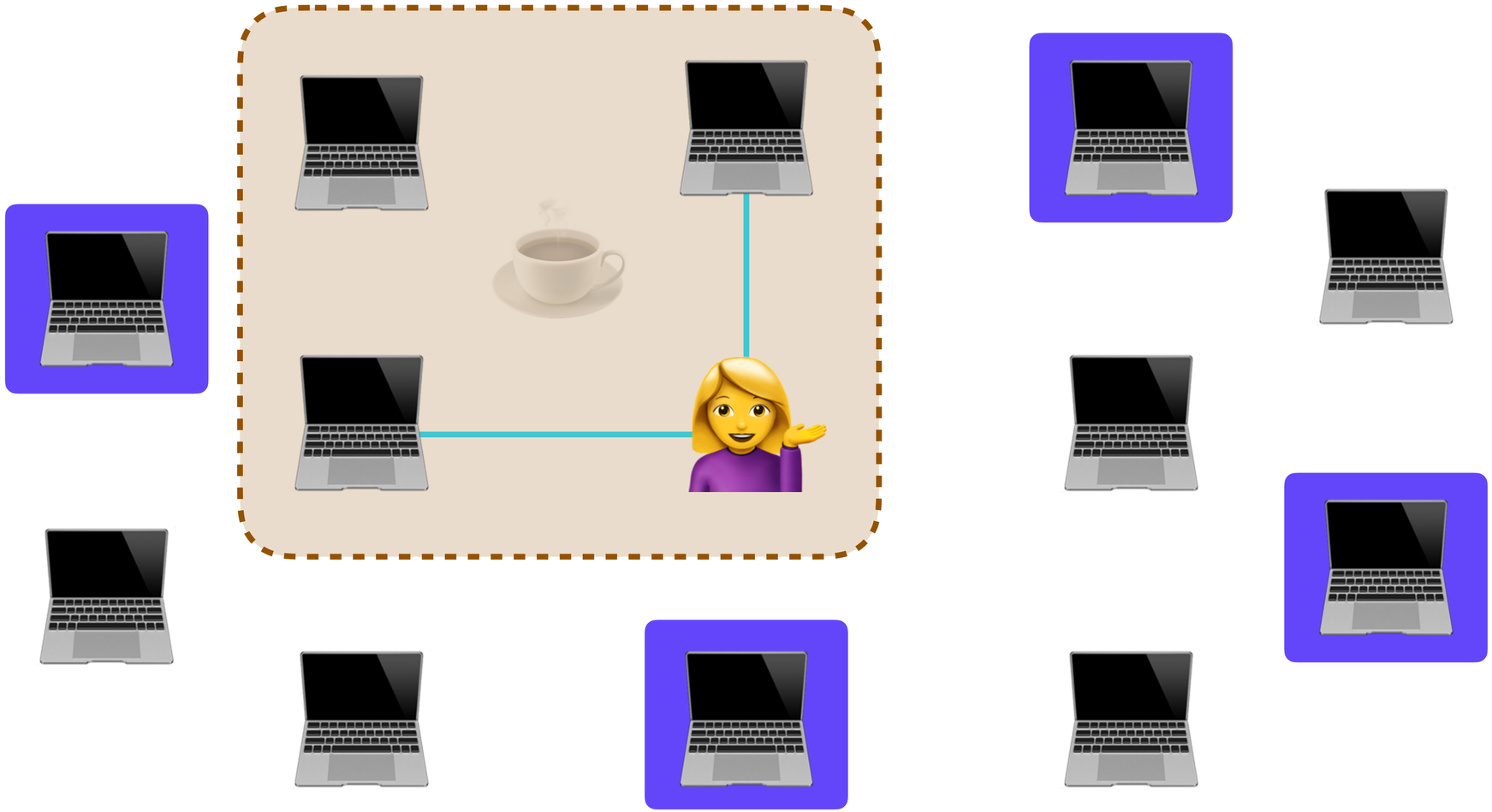

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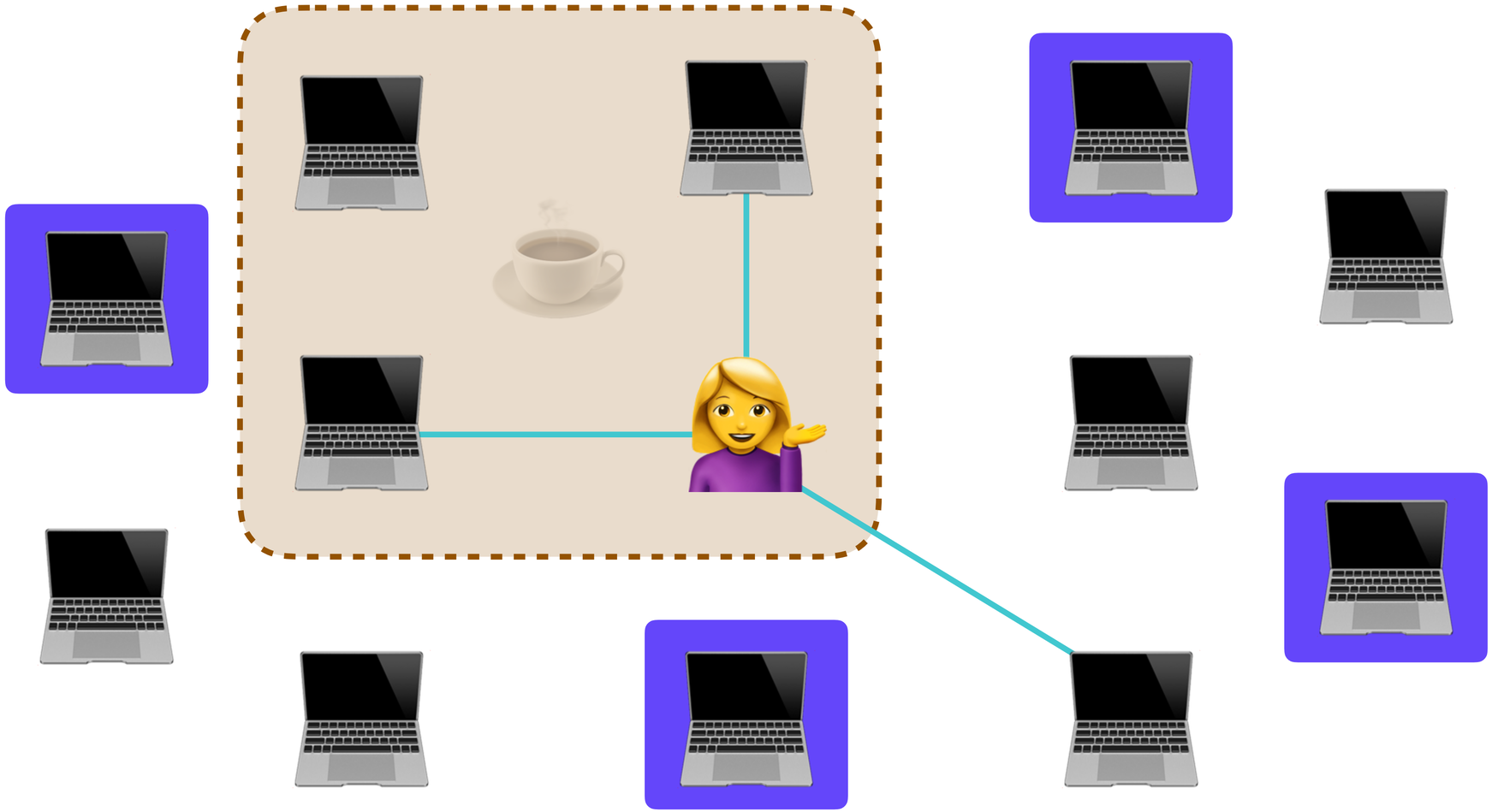

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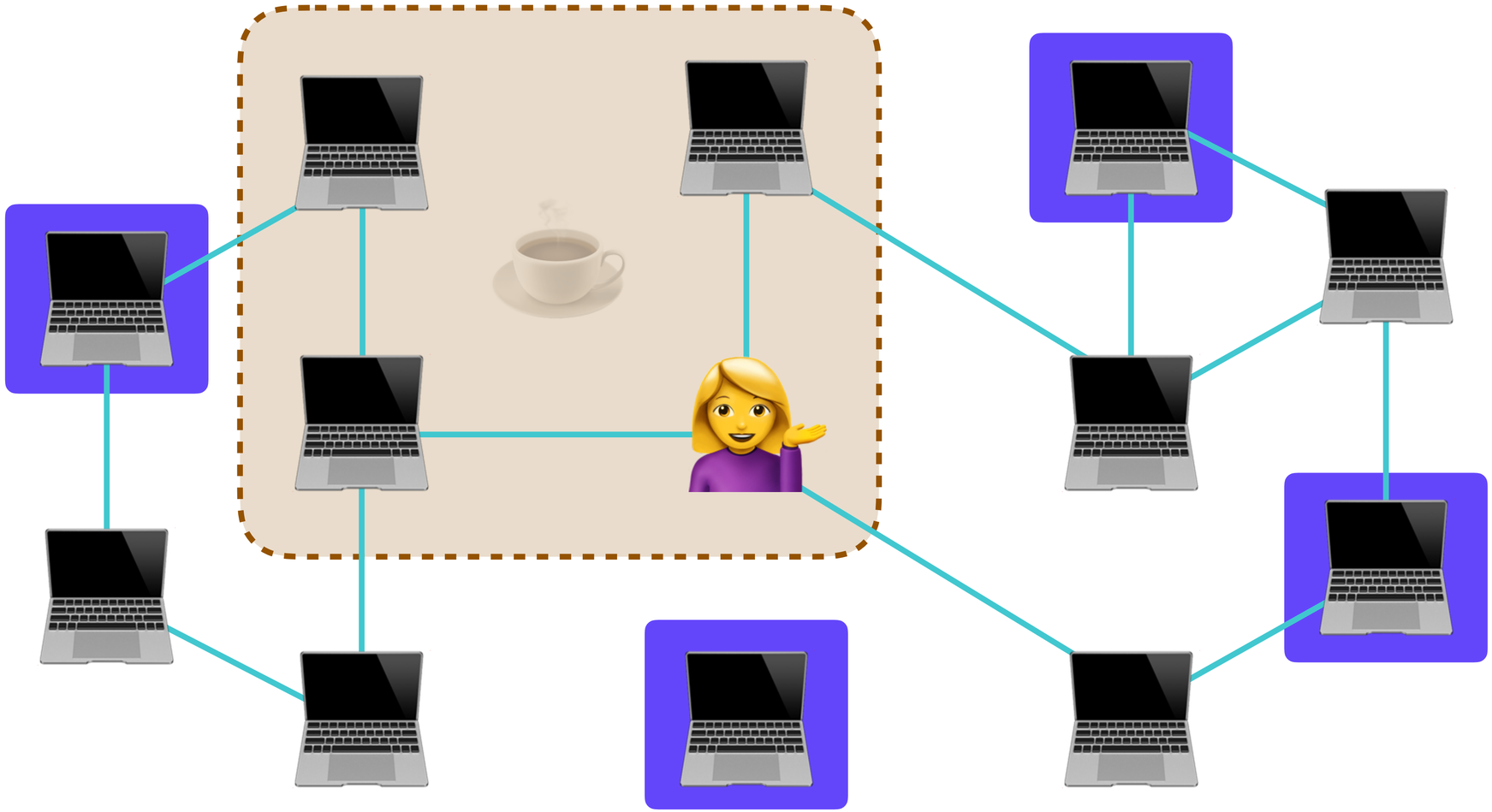

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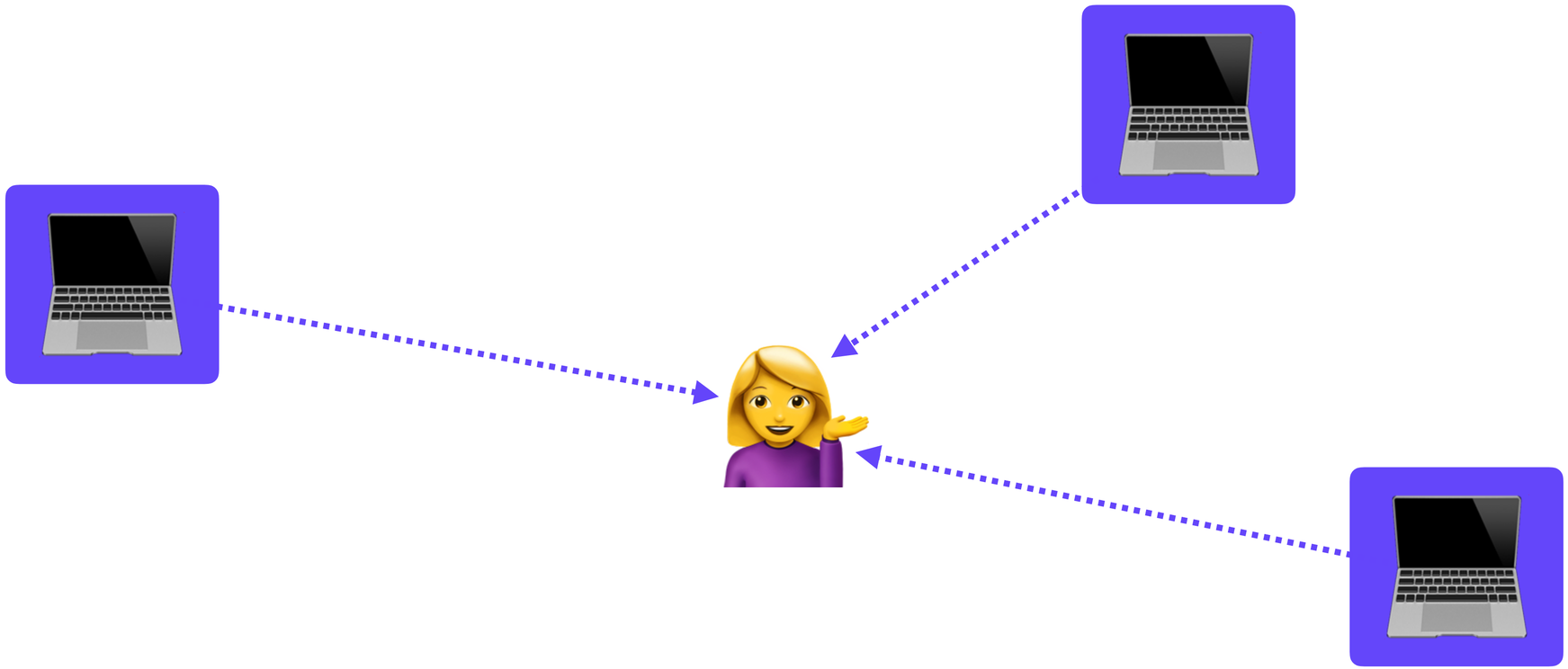

QUICK DEMO

GETTING ONLINE

QUICK DEMO

GETTING ONLINE

QUICK DEMO

NO STEP 2

DIDS

DIDS

🔑 HIGHLY AUTHENTIC 🦹‍♀️

DIDS
STANDARDIZATION

DIDS
STANDARDIZATION

- W3C
- Microsoft
- Government of British Columbia
- Based on public-key cryptography
- Truly “universal” UUIDs
- Agnostic about backing
- For users, devices, and more

FEBRUARY 12, 2018

Decentralized digital identities and blockchain: The future as we see it

By Alex Simons, Vice President of Program Management, Microsoft Identity Division

EXAMPLE 2: Minimal self-managed DID Document

```
{
  "@context": "https://w3id.org/did/v1",
  "id": "did:example:123456789abcdefghi",
  "publicKey": [{
    "id": "did:example:123456789abcdefghi#keys-1",
    "type": "RsaVerificationKey2018",
    "owner": "did:example:123456789abcdefghi",
    "publicKeyPem": "-----BEGIN PUBLIC KEY...END PUBLIC KEY-----\r\n"
  }],
  "authentication": [{
    // this key can be used to authenticate as DID ...9938
    "type": "RsaSignatureAuthentication2018",
    "publicKey": "did:example:123456789abcdefghi#keys-1"
  }],
  "service": [{
    "type": "ExampleService",
    "serviceEndpoint": "https://example.com/endpoint/8377464"
  }]
}
```

DIDS
CLAIMS

DIDS

CLAIMS

- Principle of least information
- “Can attest that this user is over 18”
- All claims signed with private key
- Age, credentials, country residency, job history, event attendance, …

PORTABLE COMPUTE

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⚡ JUST ADD MORE POWER TO JS & WASM AND STIR 🤖

PORTABLE COMPUTE
DYNAMIC FAAS

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- Run everything locally by default
  - Good for devs with powerful machines
  - Slow for students with Chromebooks

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- Farm out longer running computation to service providers
  - …dynamically at runtime

PORTABLE COMPUTE
DYNAMIC FAAS

- Run everything locally by default
  - Good for devs with powerful machines
  - Slow for students with Chromebooks
- Farm out longer running computation to service providers
  - …dynamically at runtime
- Heavy compute, parallel workloads, &c

PORTABLE COMPUTE

APPROACH & TRADE-OFFS

PORTABLE COMPUTE

APPROACH & TRADE-OFFS

- Code-as-data
- Memoization
- Compiler techniques at web scale (“world computer”)
- Network latency (normally zero, now x)
- Restricted subset (e.g. total)
- Event-based w/ two-phase commit
- Trusted (incl. AWS Lambda 🤷‍♀️)

PORTABLE COMPUTE

EVENT BASED (ABSTRACT USER STREAM, CRDTS)

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Off-Platform Side Effect Stream

Platform Effect Stream

Pure Function Stream

Base Event Stream

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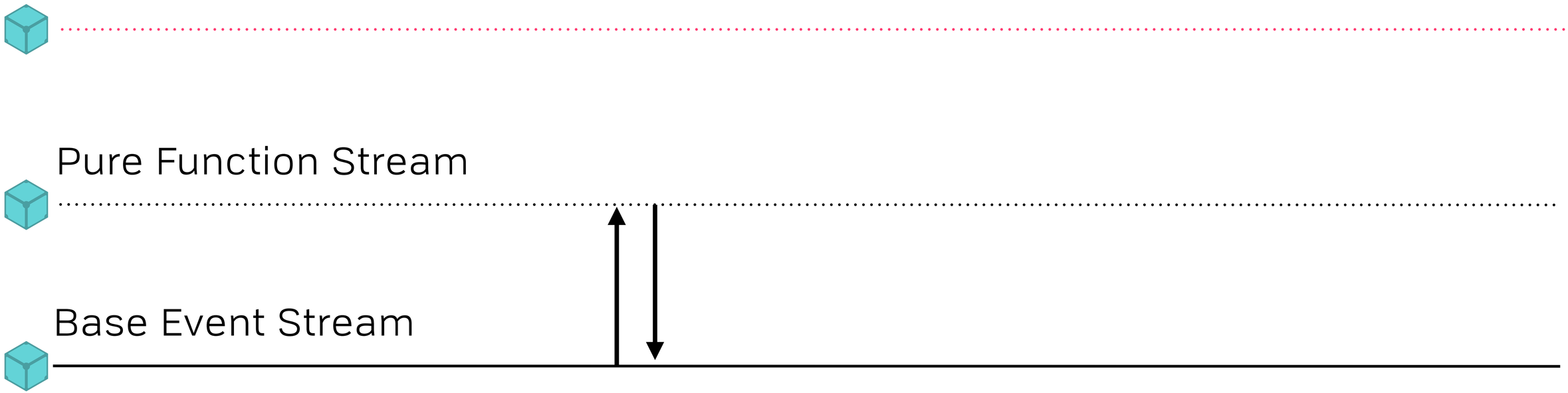

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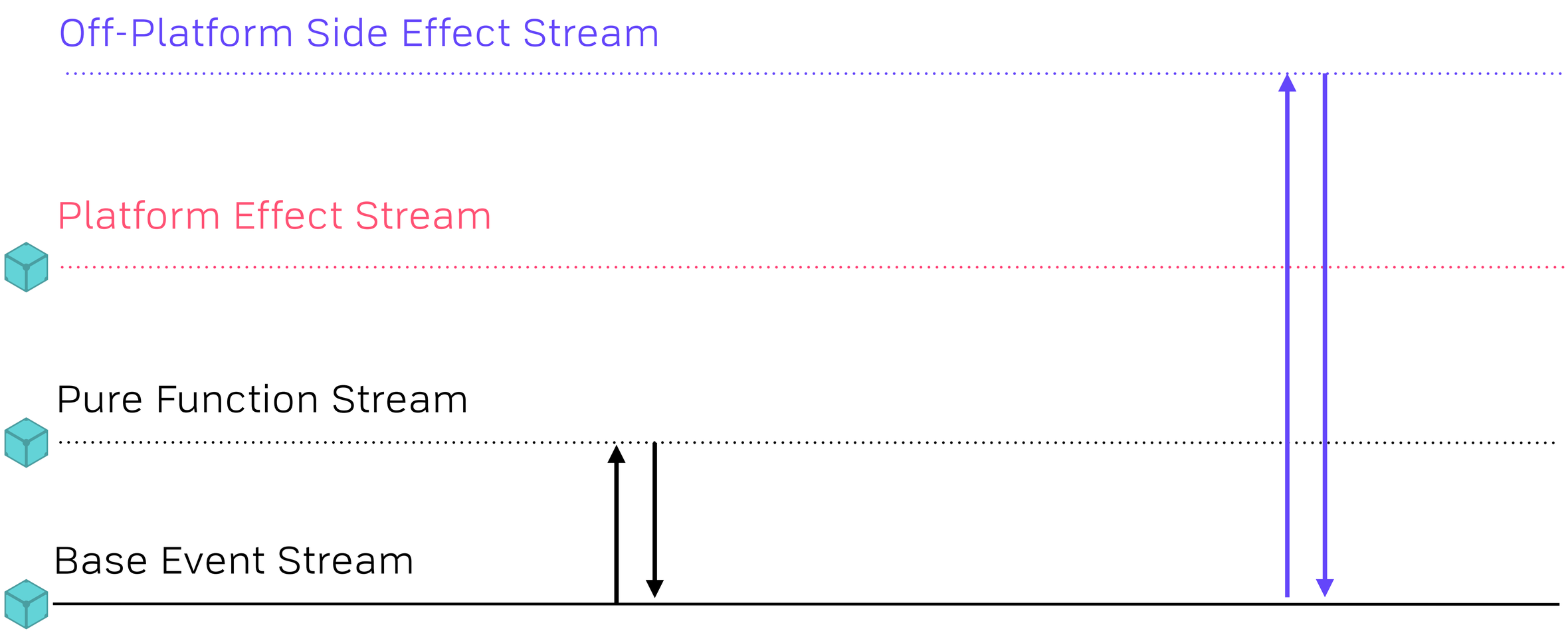

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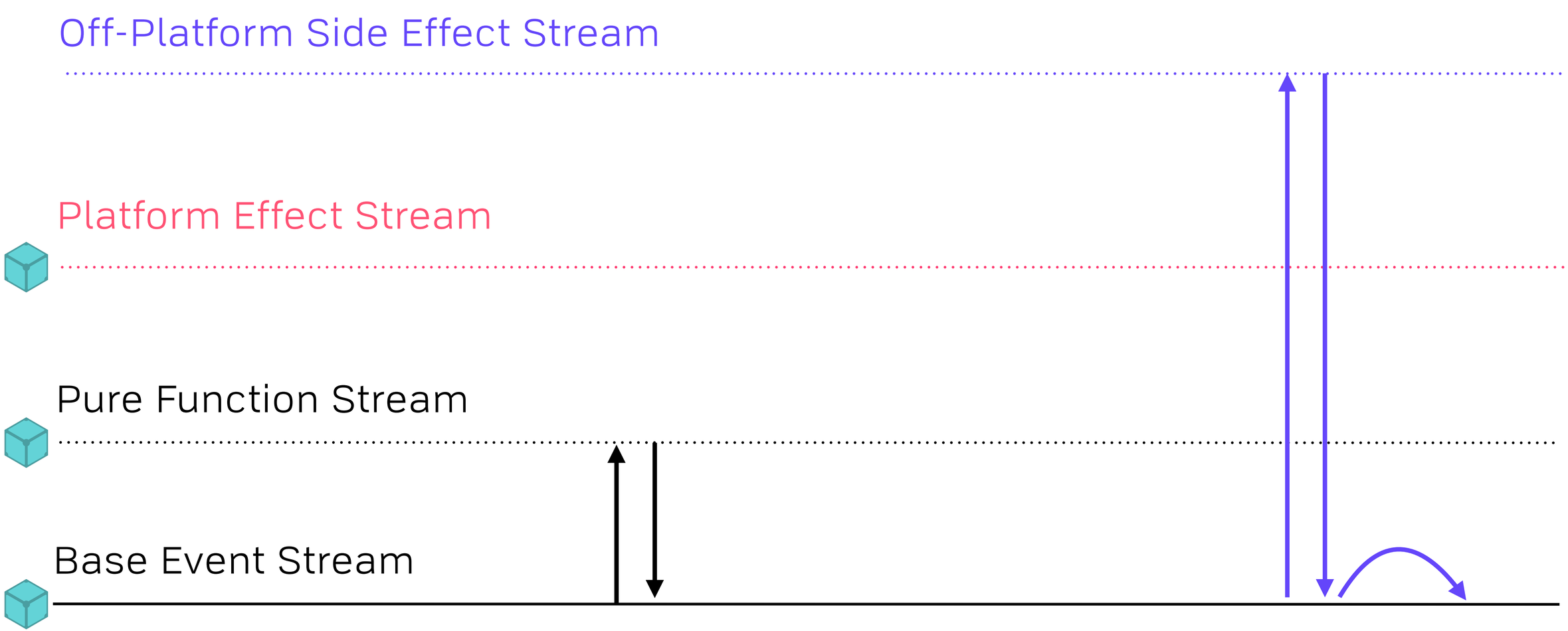

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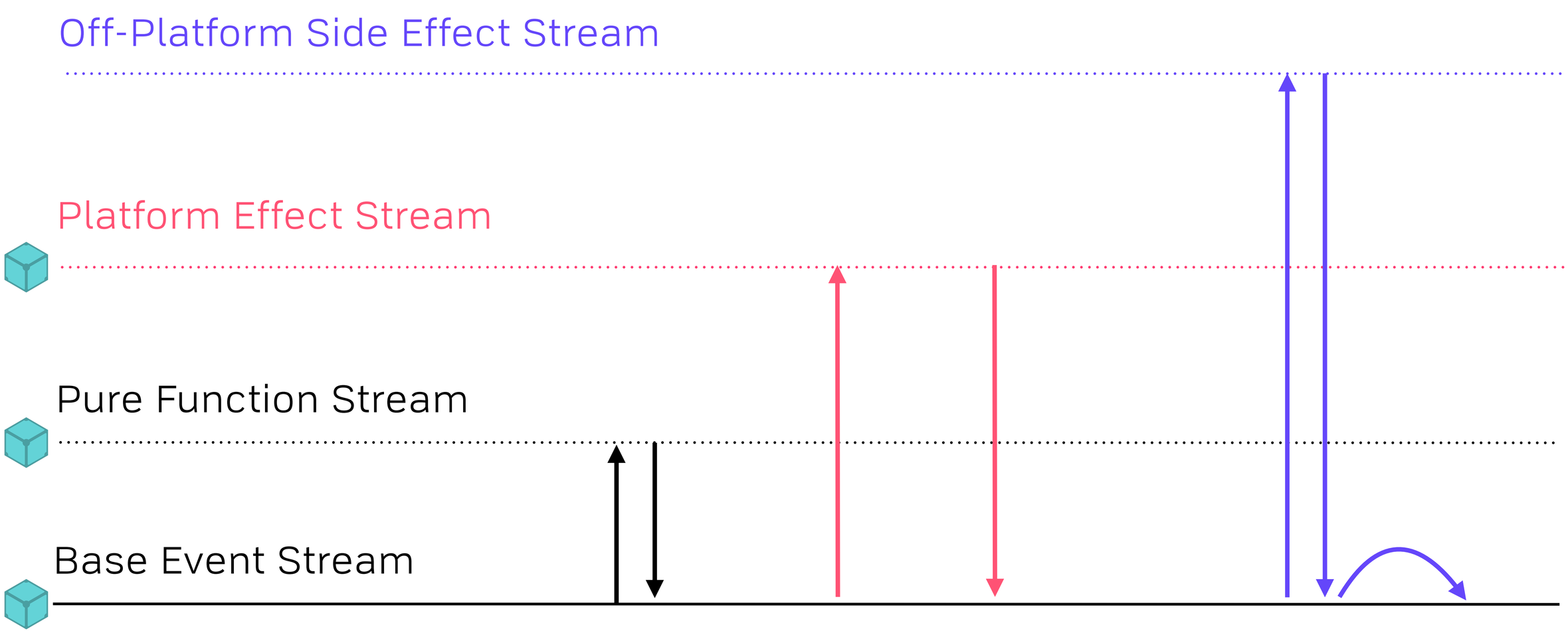

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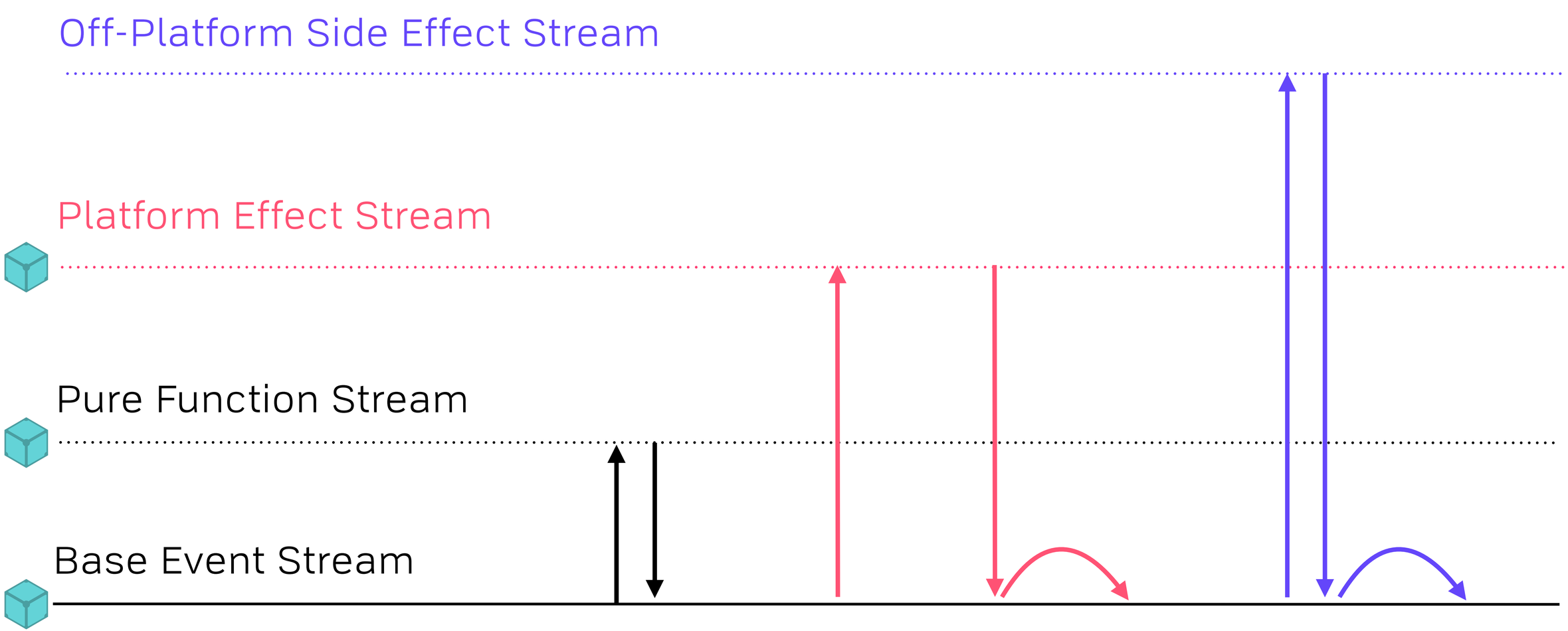

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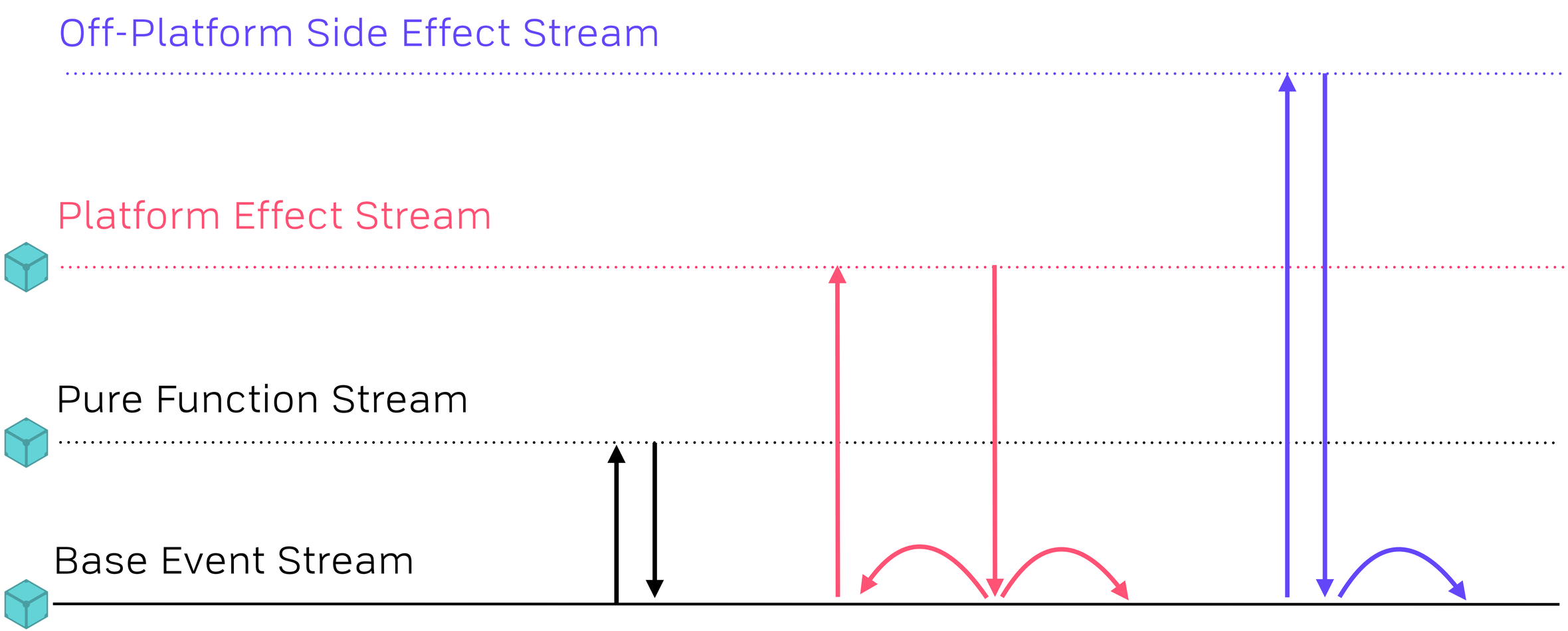

THE FUTURE

THE FUTURE

 LIKE... WITH JET-PACKS 

THE FUTURE

THE NEXT WAVE OF PLATFORMS

THE FUTURE

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Global Storage

FILES

DATABASE

THE FUTURE

THE NEXT WAVE OF PLATFORMS

Global Storage

FILES 📄

DATABASE 🛢️

Digital Scarcity

IDENTITY 🤷‍♀️

CHECKPOINTS 🕐

THE FUTURE

THE NEXT WAVE OF PLATFORMS

Global Storage

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Digital Scarcity

IDENTITY 🙆

CHECKPOINTS 🕐

Portable Compute

DISTRIBUTED COMPUTE 🖥️

SMART CONTRACTS 📝

THE FUTURE

THE END OF HISTORY

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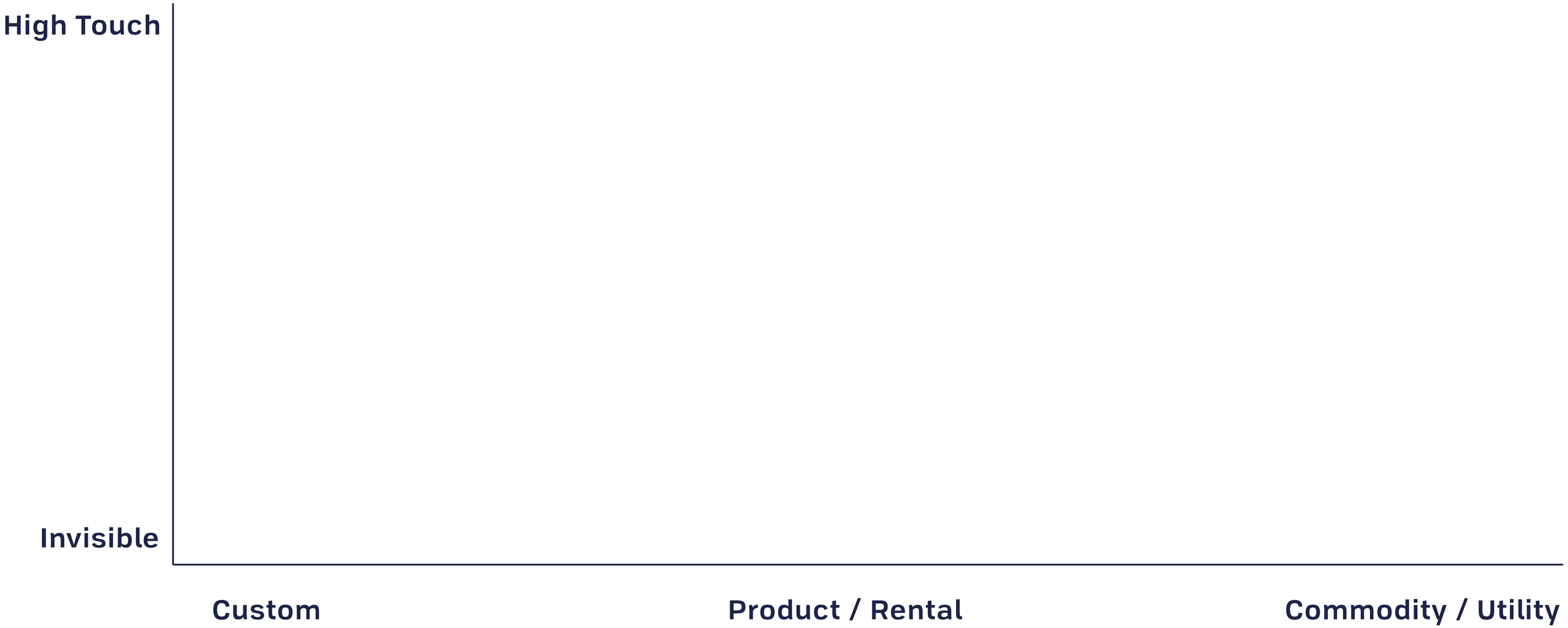

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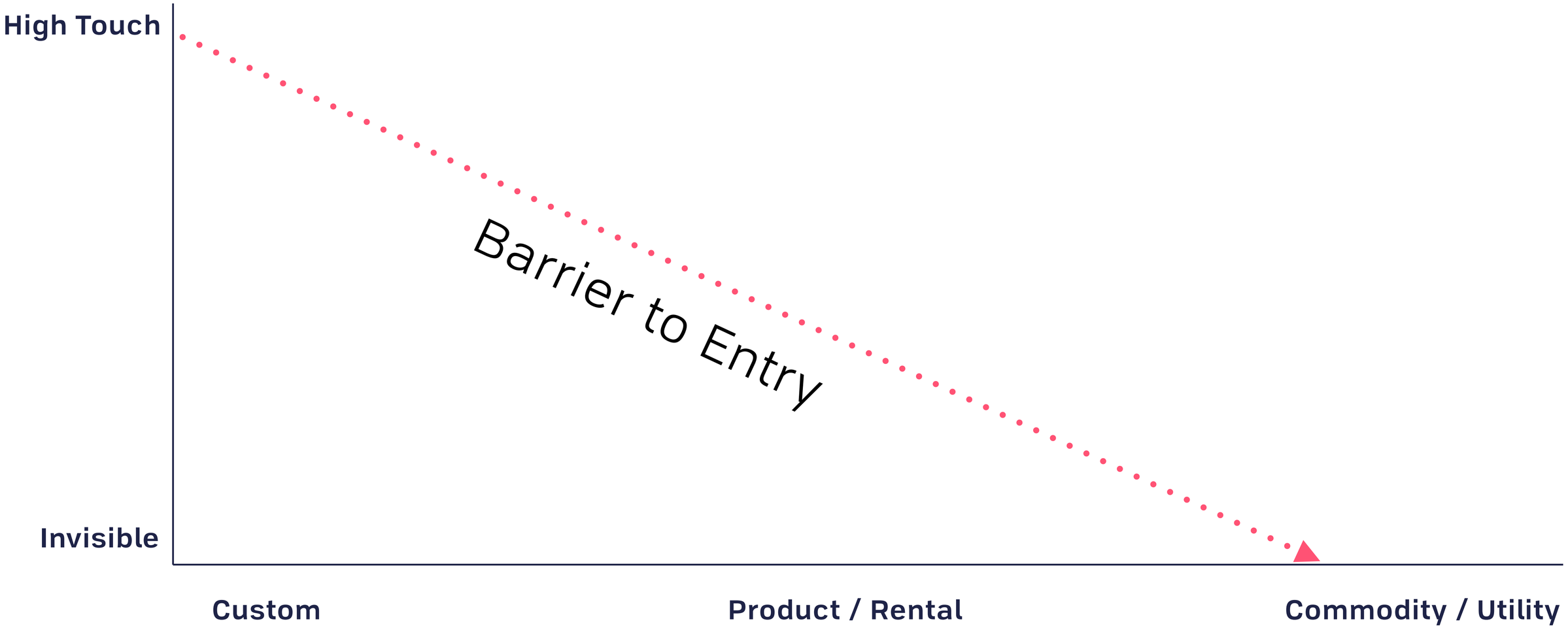
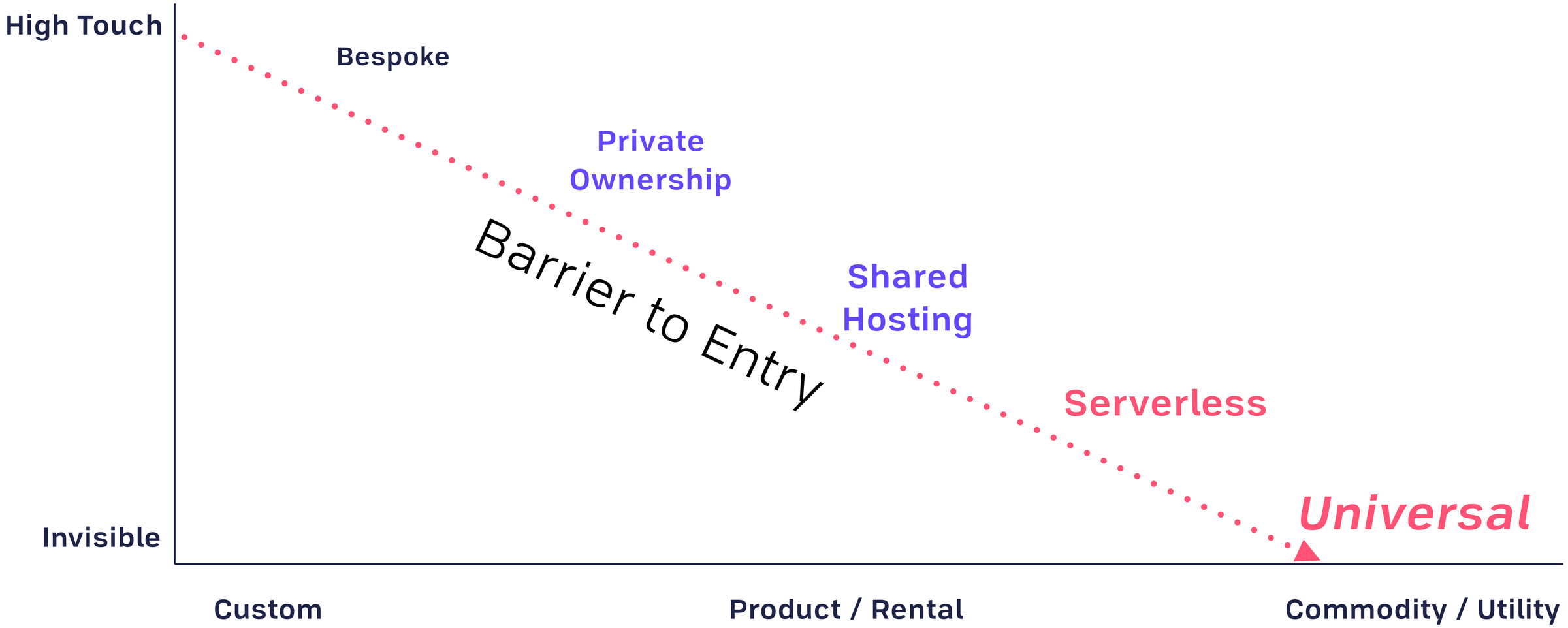


THE FUTURE

THE END OF HISTORY



https://fission.codes
https://talk.fission.codes
https://tools.fission.codes

🇧🇪 THANK YOU, ANTWERP 🎉

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