



A Reference Architecture for Trust over the Internet with Universal Interoperability

Wenjing Chu

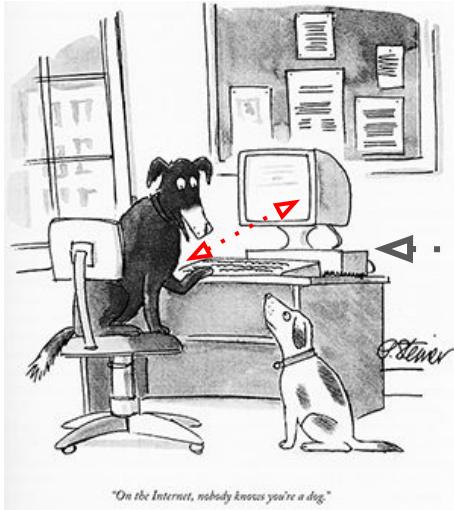
Futurewei Technologies, Inc.

OSS Europe - Dublin - September 13-16, 2022

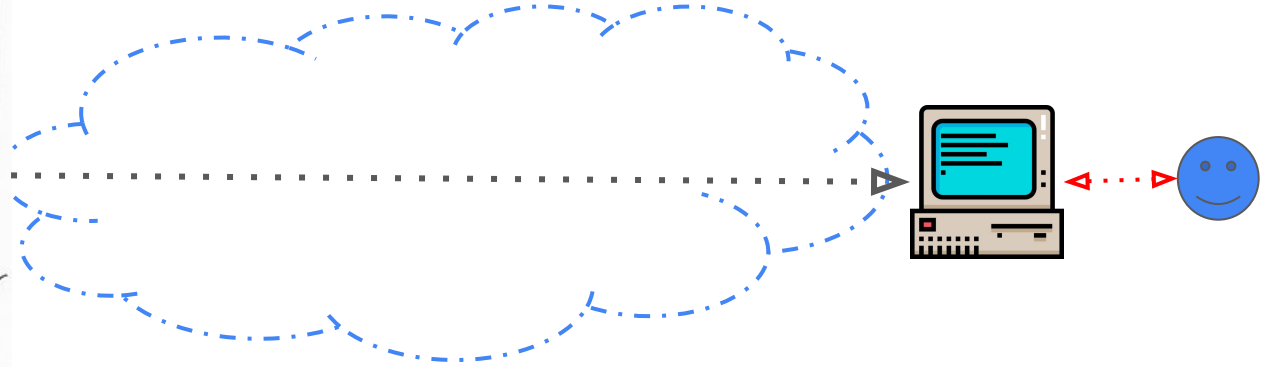
In this talk, we will discuss 3 things

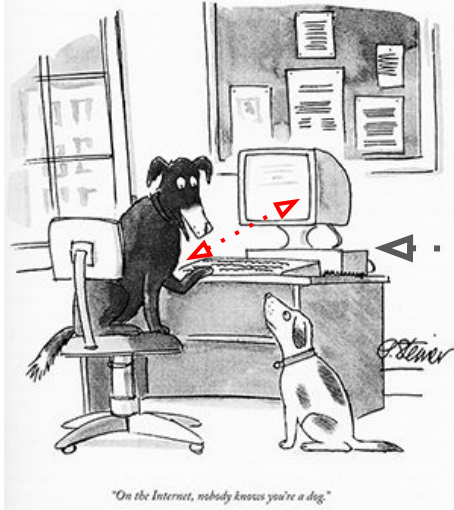
1. Trust over the Internet / Web
2. Universal interoperability
3. A reference architecture to achieve 1 and 2 ... with a few case studies

Trust is what is missing in today's Internet or Web.



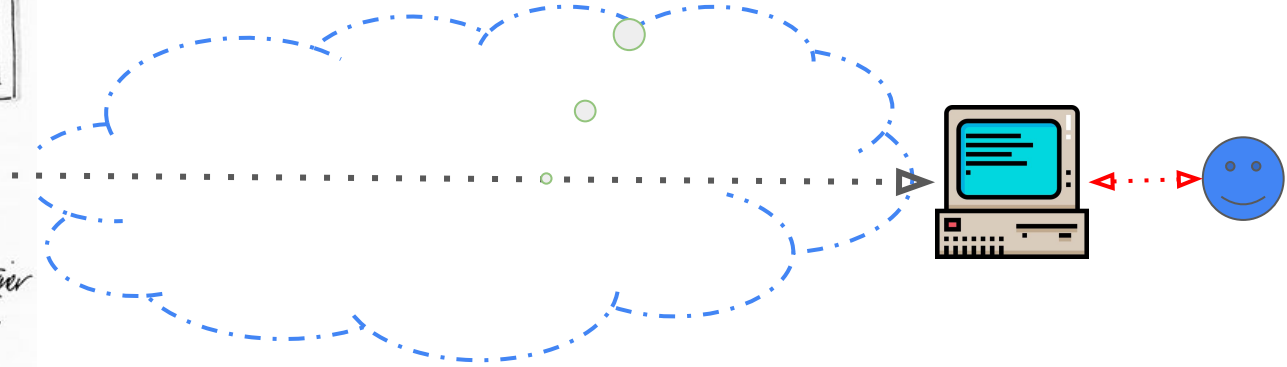
"On the Internet, nobody knows you're a dog"





"On the Internet, nobody knows you're a dog"

Hey Bob, check out this crypto ... Great opportunity! - Ruff



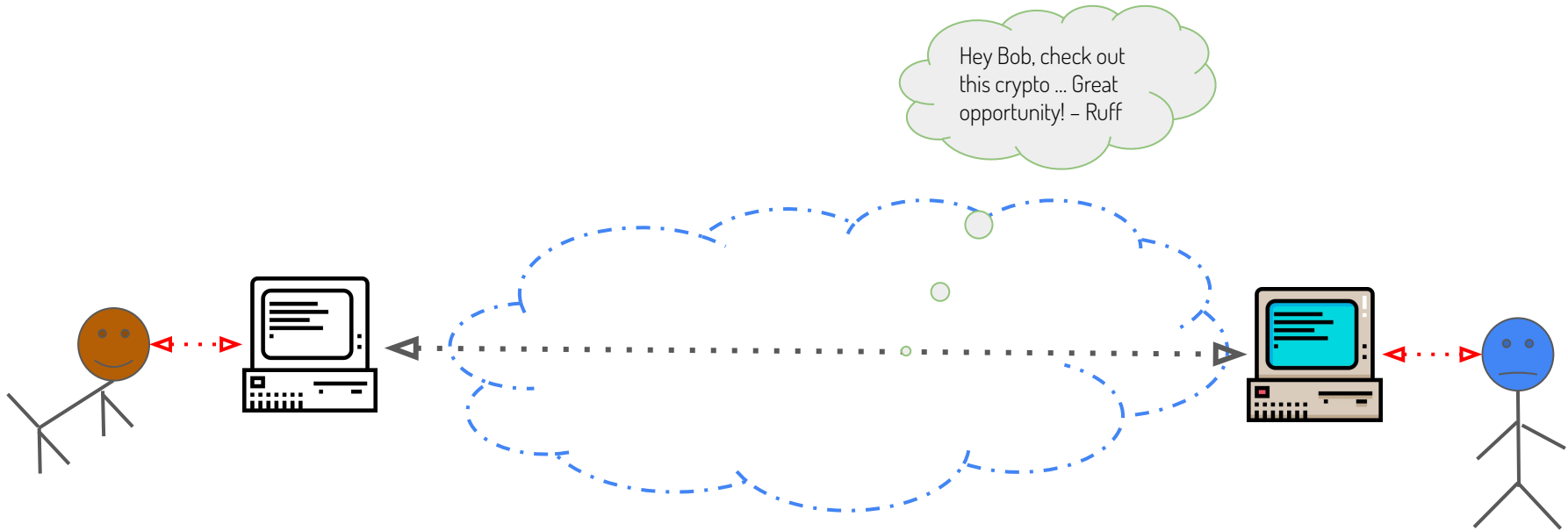
Trust is a complicated matter ...

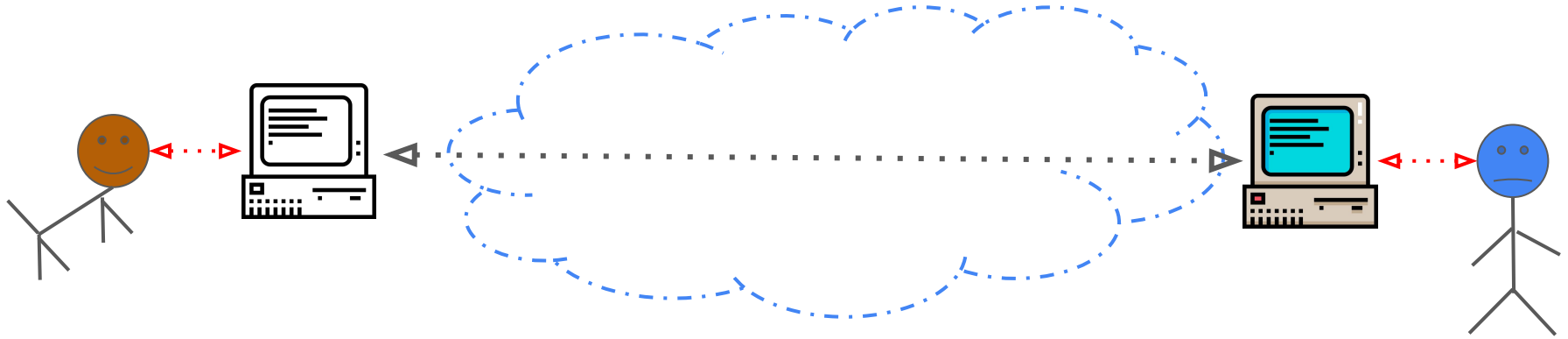
- Who, identity & authenticity
- Competence
- Benevolence, intent
- Reputation, past experience
- The medium itself (i.e. Internet, web, social media...)
- ... numerous more
- Trust is as complicated as humans can be!
 - So there is no silver bullet to solve all trust problems with technology alone!
- But we can help:
 - Fix the medium (Internet) , reduce the risk
 - Make tools for people to better handle the risk - therefore open huge new opportunities

Trust is a complicated matter ...

- Who, identity & authenticity
- Competence
- Benevolence, intent
- Reputation, past experience
- The medium itself (i.e. Internet, web, social media...)
- ... numerous more
- Trust is as complicated as humans can be!
 - So there is no silver bullet to solve all trust problems with technology alone!
- But we can help:
 - Fix the medium (Internet) , reduce the risk
 - Make tools for people to better handle the risk

This is the focus of my talk





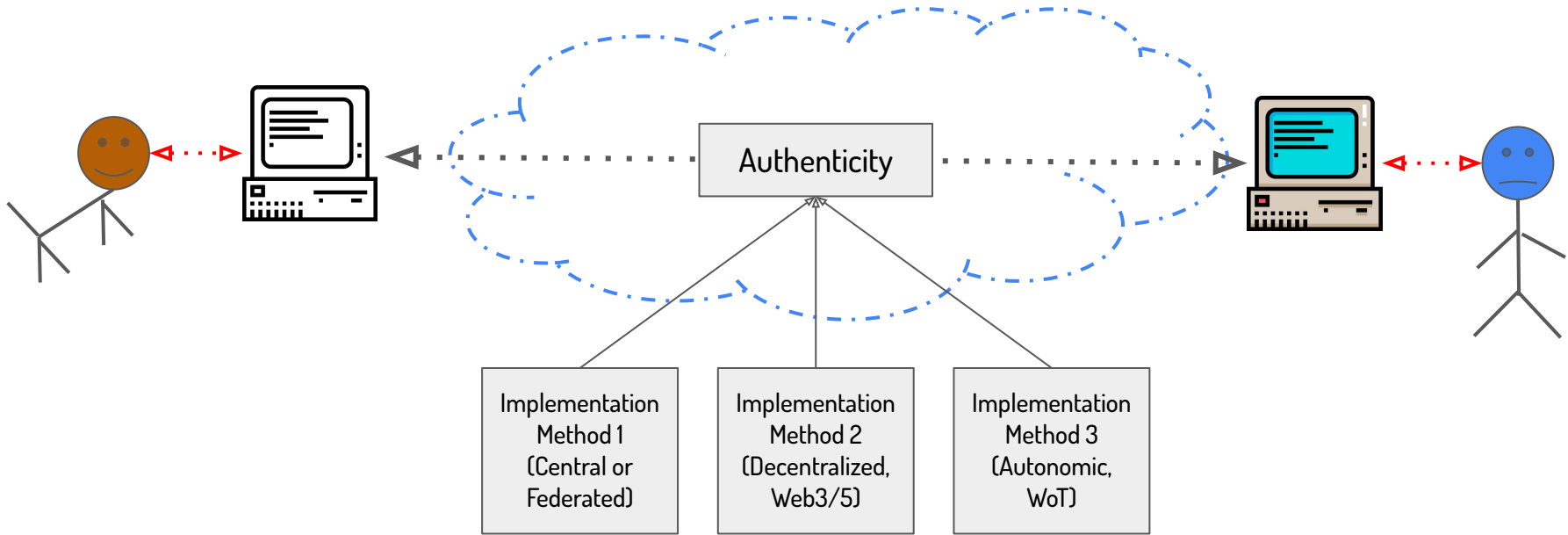
Foundational requirement: authenticity

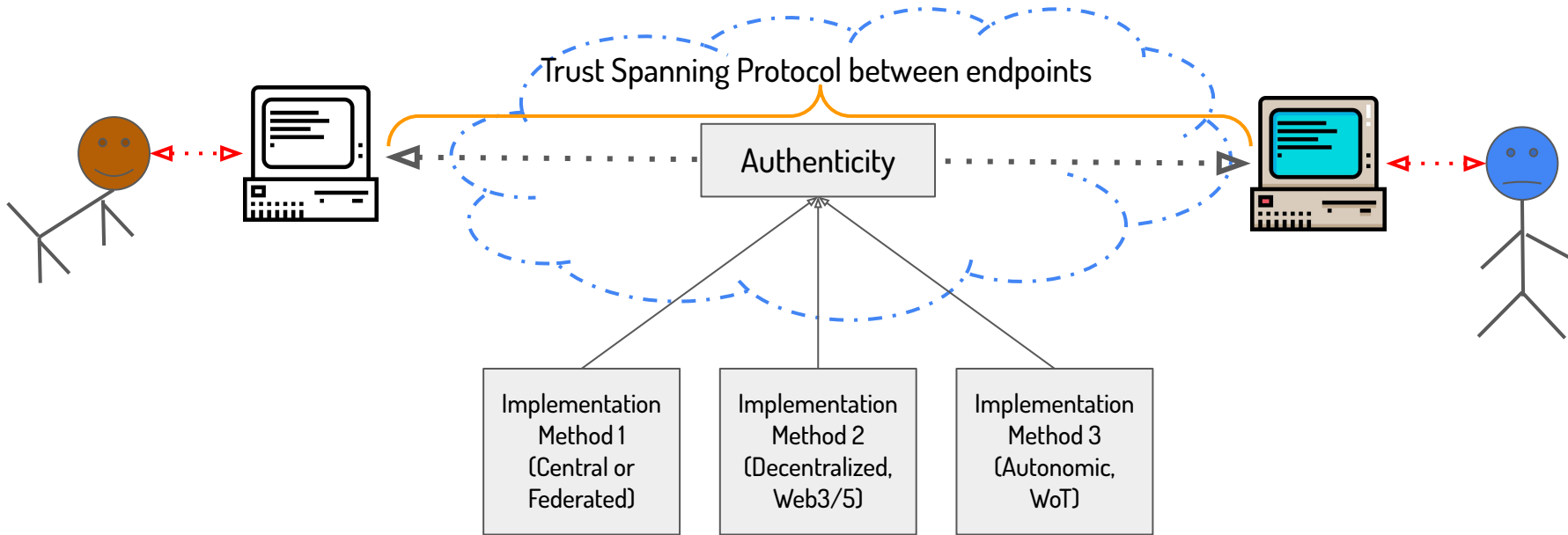
- Verifiable unique identification (ID)
- Has good control its environment (autonomy)

Necessary, and largely sufficient.

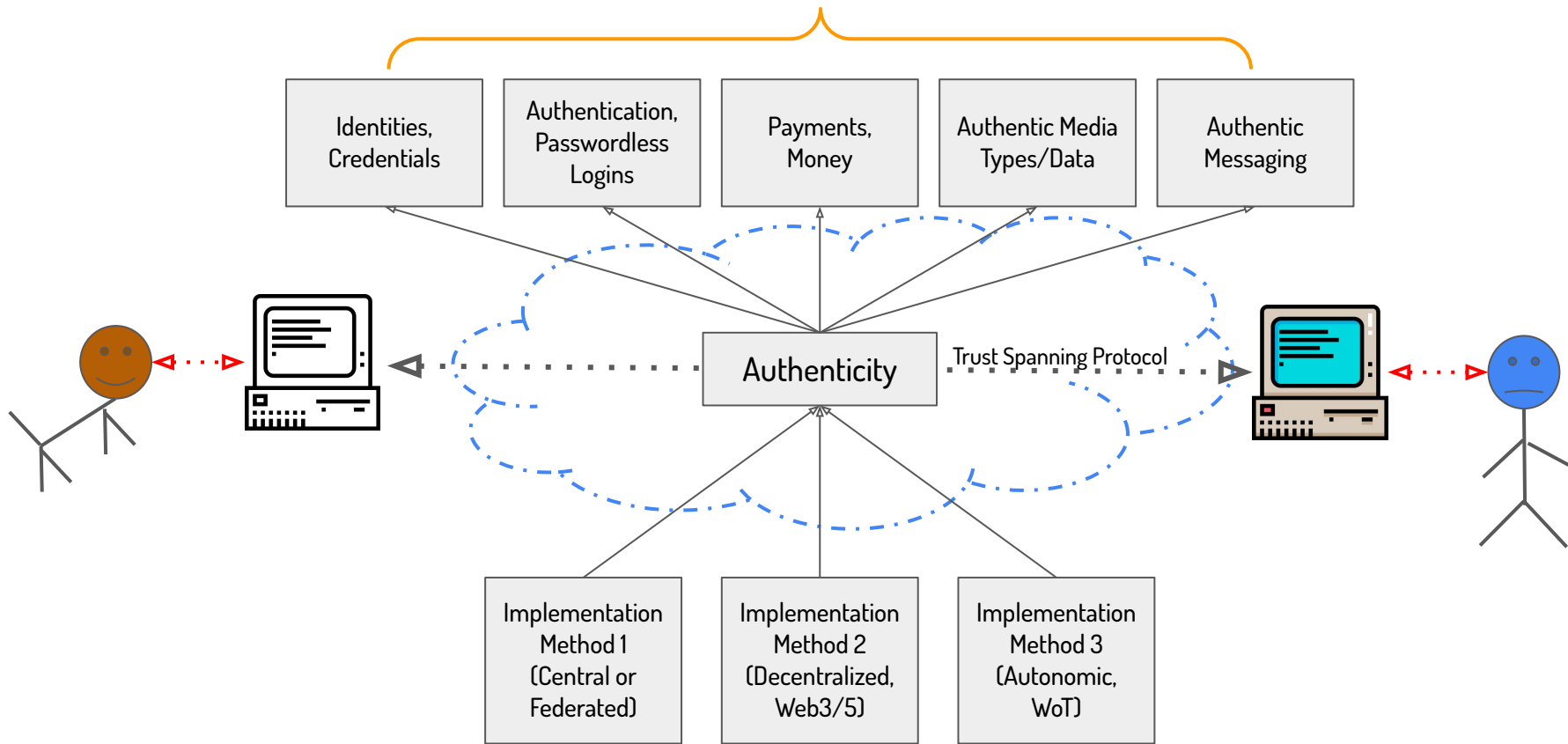
All other features can be built on top of this foundation.

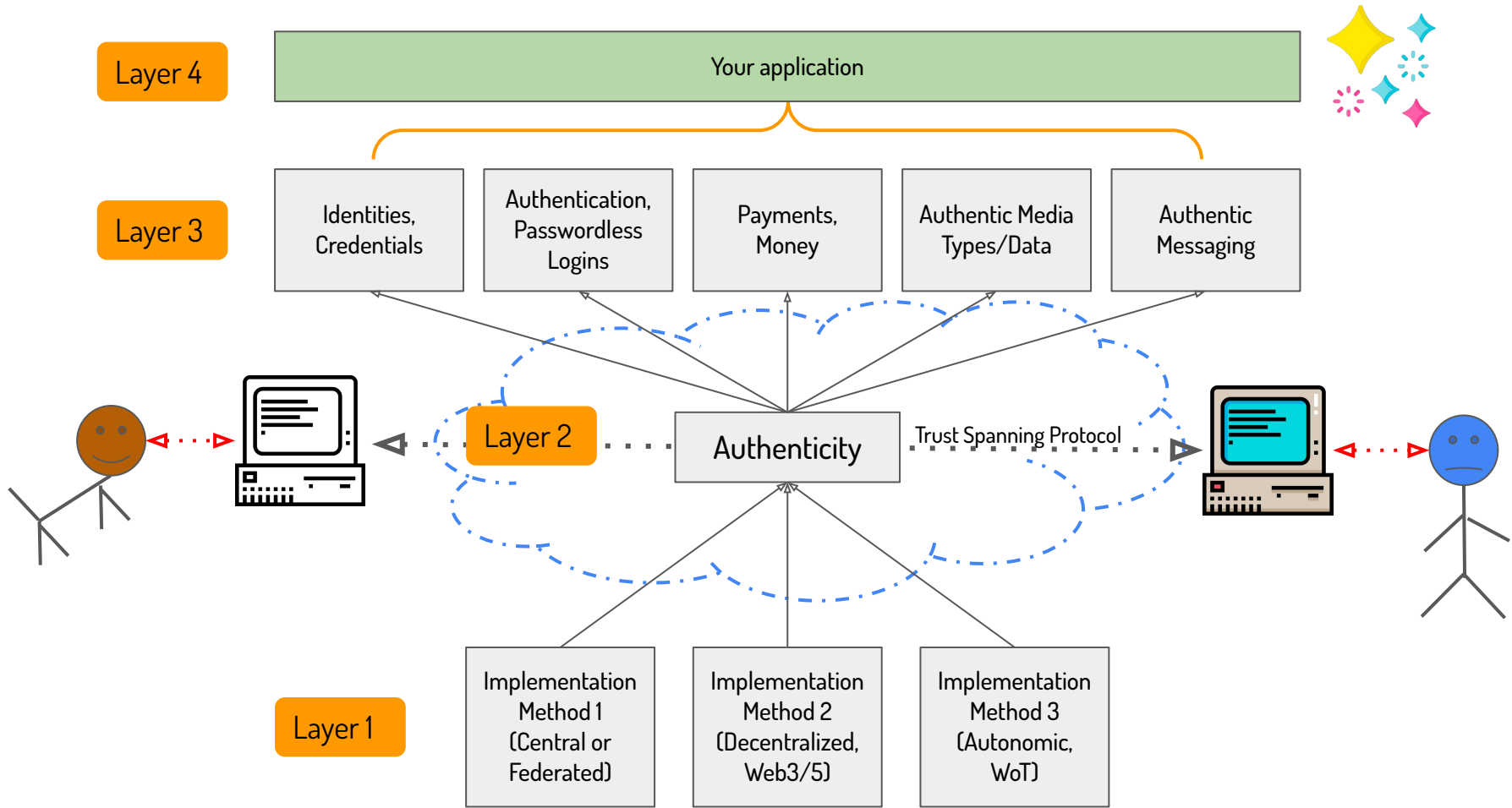
Simple enough for ALL devices on the Internet.

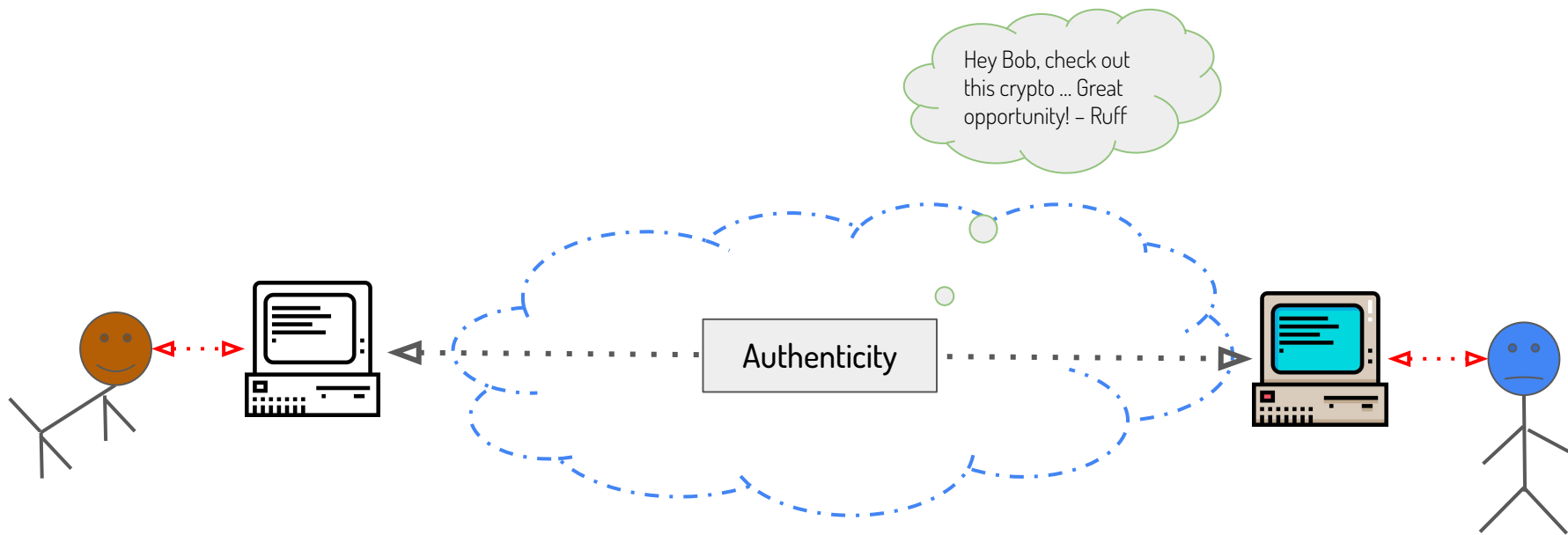




Commonly reusable trust tasks

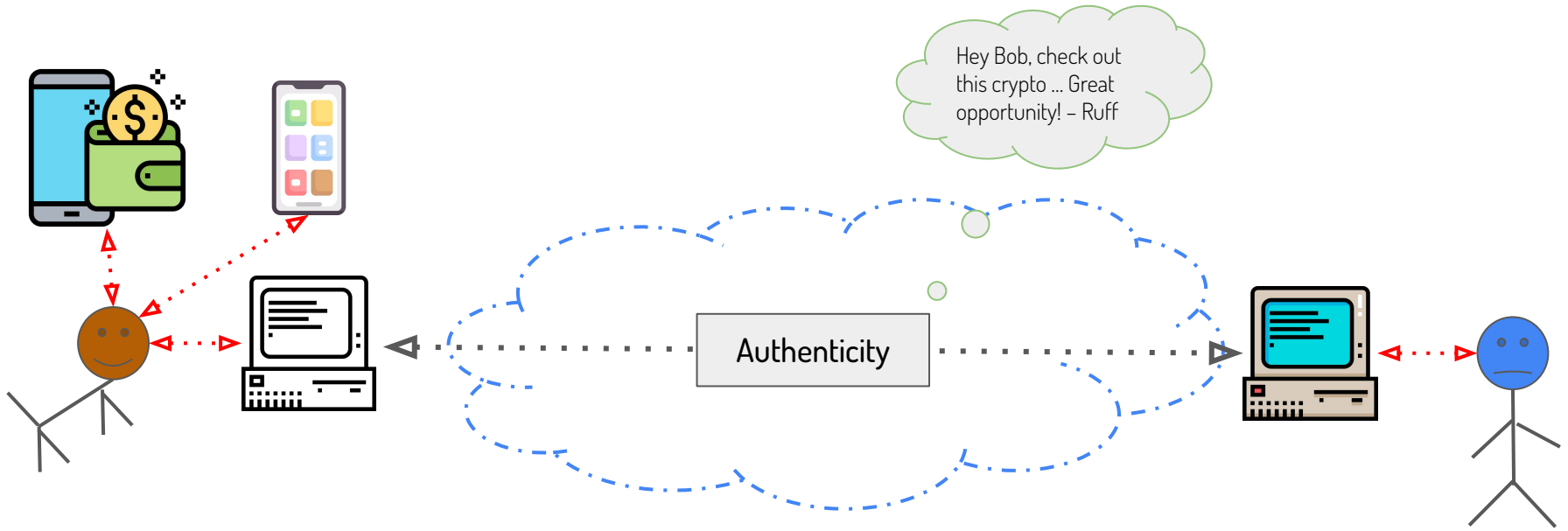






Foundational requirement: authenticity

- Verifiable unique identification (ID)
- Has good control its environment (autonomy)



Foundational requirement: authenticity

- Verifiable unique identification (ID)
- Has good control its environment (autonomy)

Universal interoperability

How does this architecture enable universal interoperability?

- Inspiration from the Internet architecture: IP, TCP/UDP, HTTP/HTTPS ...
- The authenticity support in the Trust Spanning Protocol \Leftrightarrow reachability support by the Internet Protocol (IP)
- It is simple enough for ALL devices on the Internet
- It is necessary and largely sufficient (minimal requirement)
- More sophisticated features can be based on the basic authenticity support \Rightarrow reusable trust tasks

Universal interoperability

- Most implementations already support it, but
 - Needs to be refactored out modularly
 - Needs to conform to a common standard
- Let's take a look at some examples ...

Case Studies with Well Known Implementations

All can be refactored to Trust Spanning layer architecture

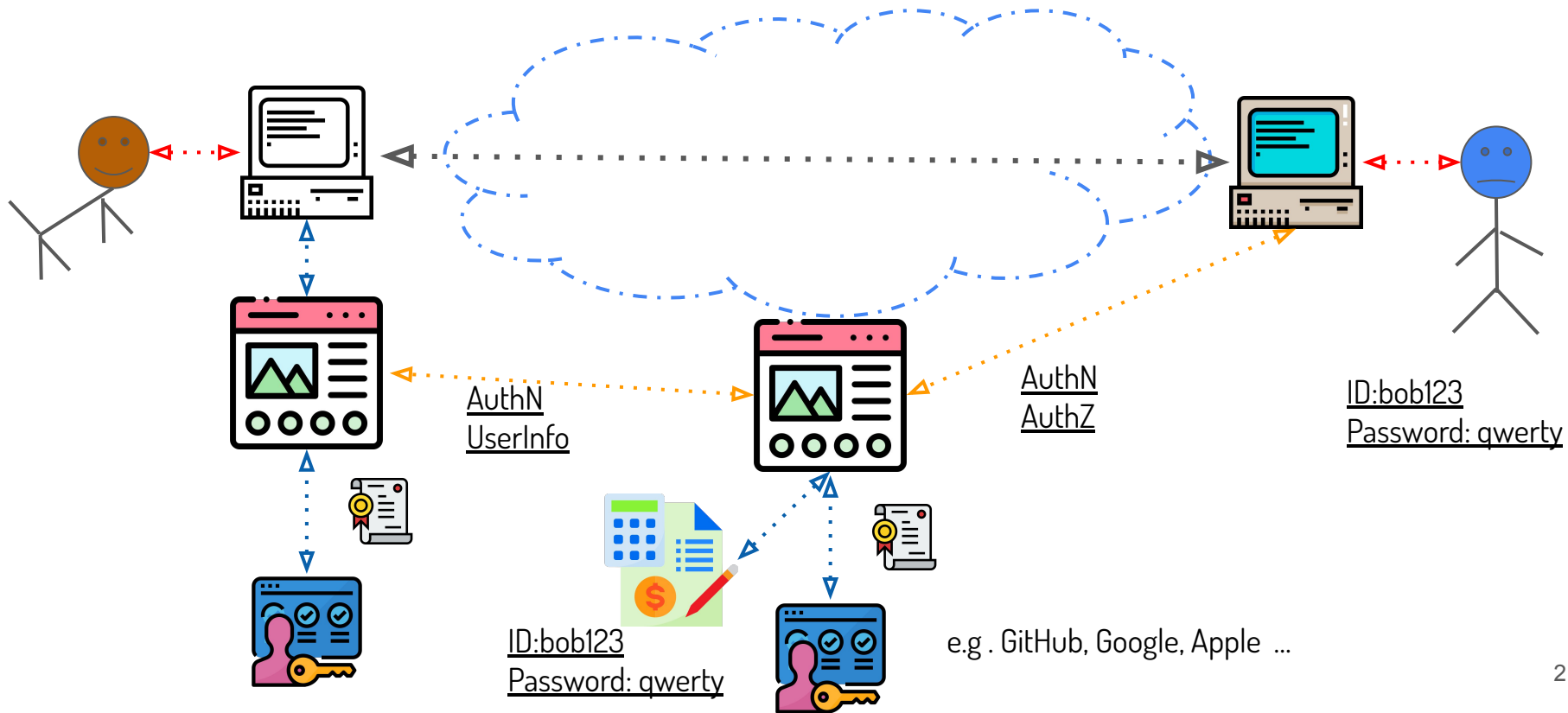
Traditional / Current State: Central, Federated, FIDO



Traditional / Current State: Central, Federated, FIDO

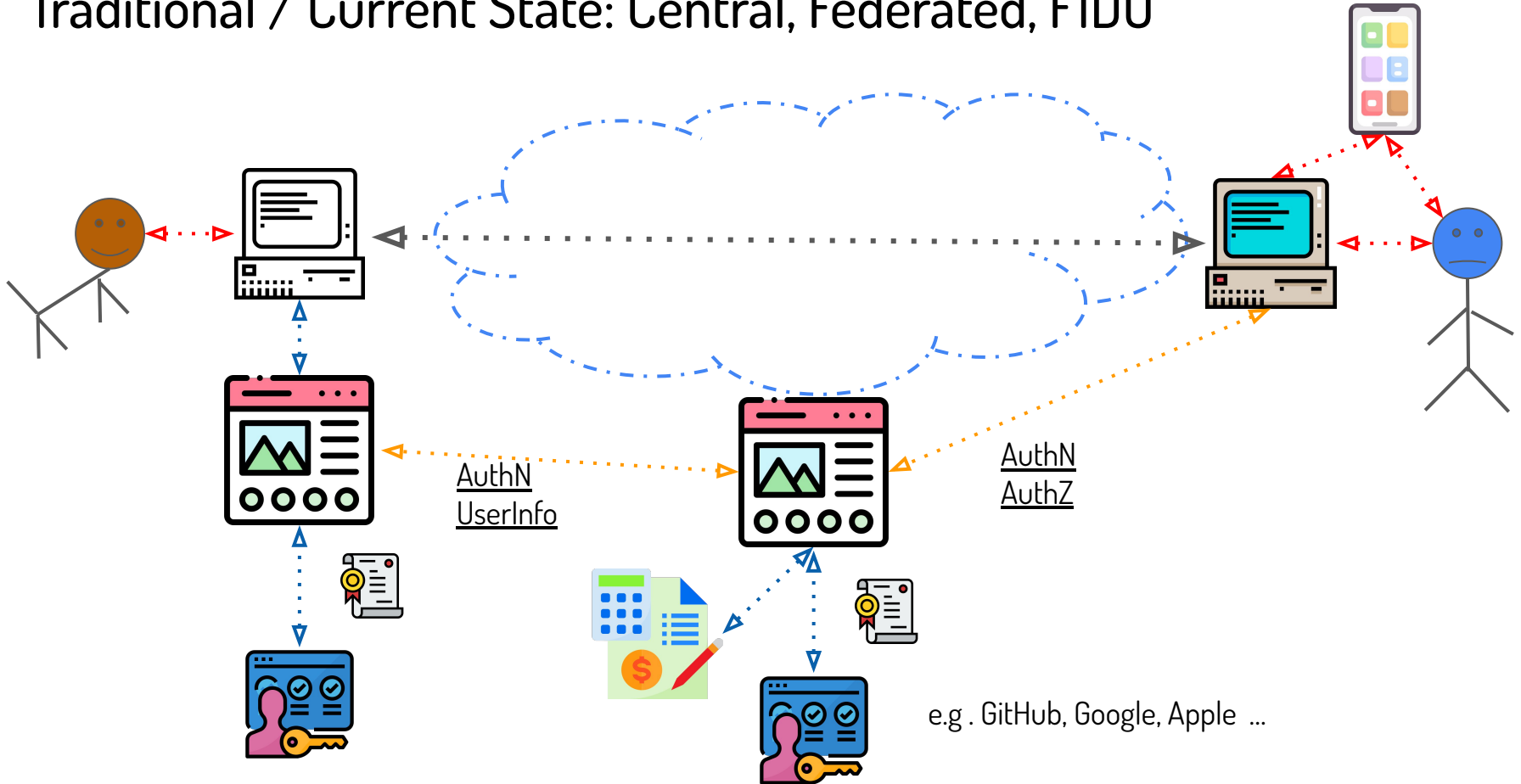


Traditional / Current State: Central, Federated, FIDO

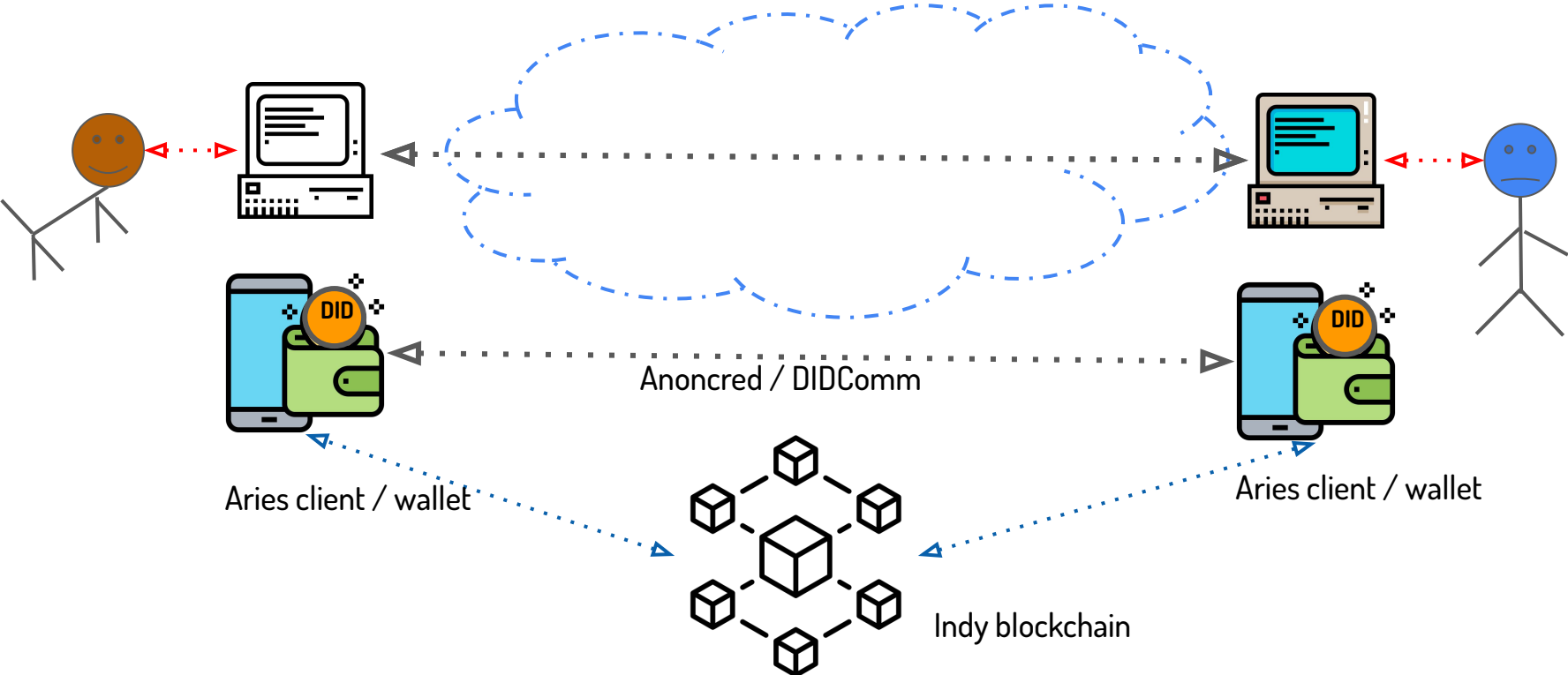


e.g. GitHub, Google, Apple ...

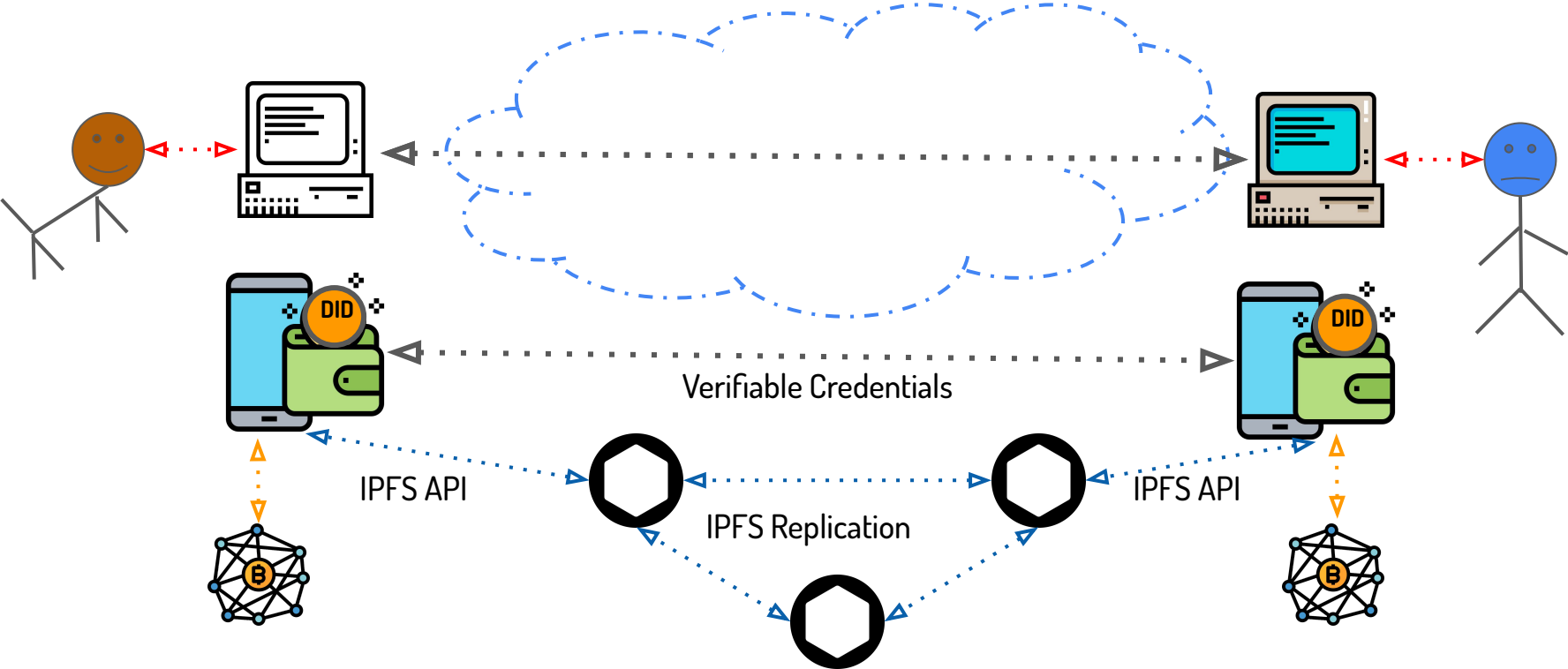
Traditional / Current State: Central, Federated, FIDO



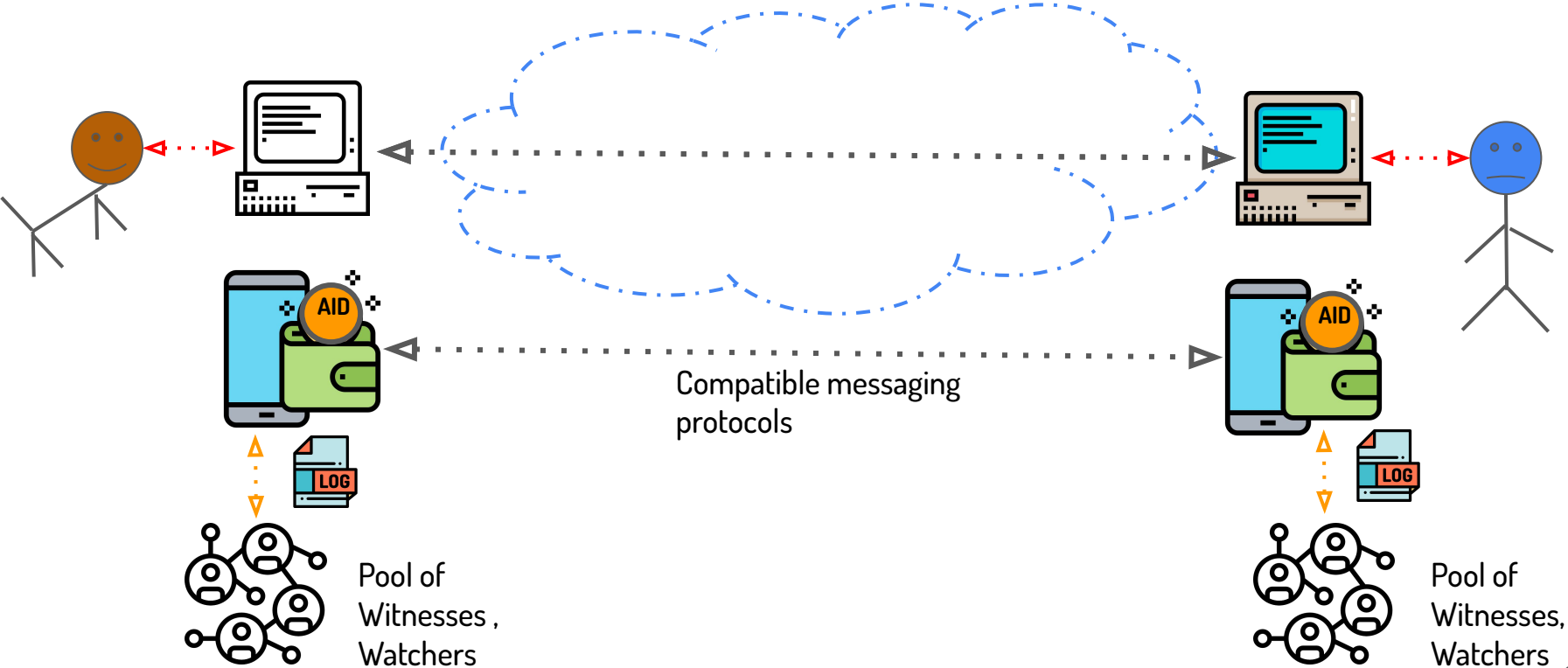
Decentralized: Indy/Aries, DIDComm



Decentralized Web Platform (DWP) - (aka TBDex) - aka Web5



Decentralized: KERI, Web of Trust



Key Takeaways

1. Building a better trust layer is not just a concern for special Internet service such as cryptocurrencies or payment, but all the valuable activities we do on the Internet.
2. There are many non-compatible implementations - we need to refactor them into
 - a. A base layer of the minimal foundation - i.e. to support authenticity - by the Trust Spanning Protocol as a common standard,
 - b. And other trust tasks built on top of this basic trust spanning layer.
 - c. This is the right architecture for the Internet and universal interoperability
3. One or more open source implementations will be a key contribution we can make for a more trustworthy Internet !



Wenjing Chu

Senior Director of Technology Strategy
Futurewei Technologies, Inc.

Thank you !

Additional information :

- Join my deeper technical presentation in the co-located TolP Mini Summit:
 - Wednesday September 14, 2022 14:00 - 17:30 IST
 - [Wicklow Meeting Room 4 \(Level 2\)](#)
- Recorded presentation for the Internet Identity Workshop (IIW 34) - April 2022:
<https://youtu.be/QZssxxZ9f88>
- Ongoing work towards a community specification at the Trust over IP Technology Architecture Task Force:
<https://github.com/trustoverip/TechArch/blob/main/spec.md>

Thanks to free icons from flaticon.com for non-commercial use: <https://www.flaticon.com/free-icons>