COALA IP Protocol

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(and BigchainDB | IPDB)

Goals

- A licensing framework for digital assets that:
  - Is easily approachable by all participants *(devs, rights holders, copyright societies, …)*
  - Is easily extensible and future-proof
  - Guarantees immutability and tamper-resistance
  - Is blockchain-agnostic
  - Is free (free as in FOSS) for everyone to participate and use

History

- COALA - organize blockchain workshops & working groups. Meet 3-4 times per year.
- COALA IP working group started in fall 2015
- Contributors from COALA, IPFS, Ujo / Consensys, Mycelia, ascribe / BigchainDB, Synereo, mediachain, more.
  - Relations with Copyright Hub, Open Music Initiative, many blockchain IP startups
  - Bolt into Ethereum, IPFS, IPDB (public BigchainDB)
- Mantra: invent as little as possible, reuse well-considered building blocks

Building blocks

- **LCC framework**, it's concise and applicable
  - Generalizes DDEX (music), PLUS (photos), more
  - By Copyright Hub with 90 partner orgs
- **Linked Data**, it's easily extensible
  - JSON-LD: URI-linking of JSON objects
- **IPLD**, for cryptographically verifiable integrity
  - Via Merkle-linking of JSON objects
- **Interledger Protocol**, allows IP to live on many ledgers
  - Linking of ordered transactions on blockchains

The LCC Framework

A standard that generalizes existing, widely used IP standards, including DDEX (music), PLUS (photos)

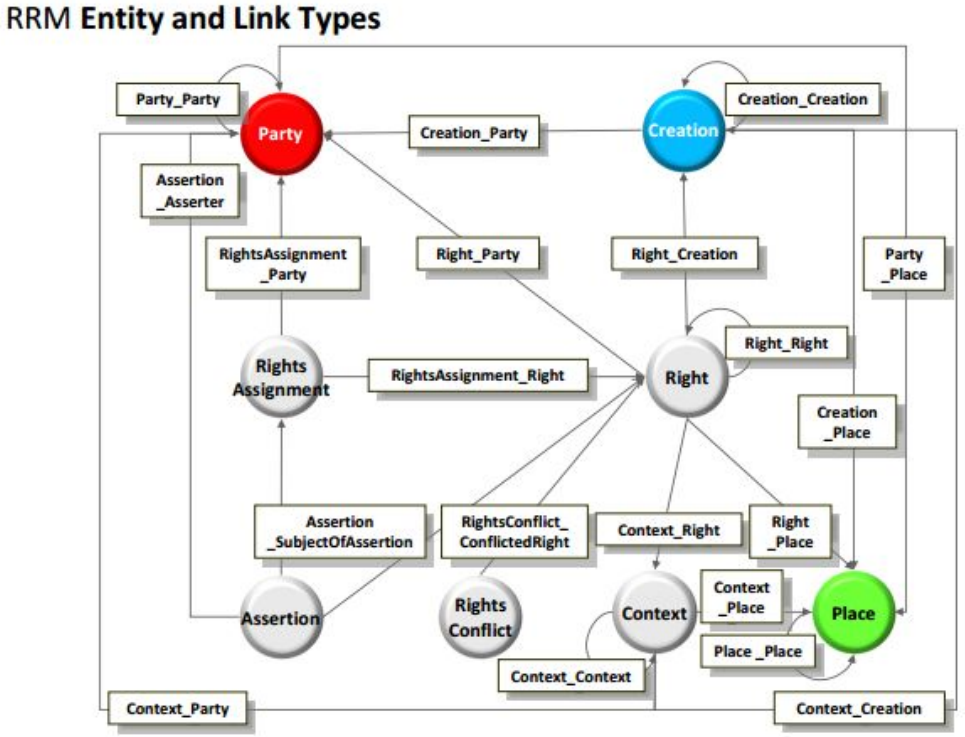
Documentation:

- LCC Ten Targets for a Rights Network
- LCC Principles of Identification
- LCC Entity Model (short: LCC EM)
- LCC Rights Reference Model (short: LCC RRM)

The LCC Rights Reference Model

- Represent IP rights digitally
- Data model on top of the LCC EM

⇒ 7 (main) entities



IPLD

- Merkle-linking JSON objects
  - Cryptographic integrity-checking of data
- Merkle-paths JSON objects
  - Content-addressable data/storage

IPLD: Merkle-Linking example

```
import ipld

In [2]: person = {

...:     "givenName": "Andy",

...:     "familyName": "Warhol",

...:     "birthDate": "1928-08-06"

...: }

In [3]: serialized_person = ipld.marshal(person) # serialize using CBOR

Out[3]: b'\xa3ibirthDatej1928-08-06jfamilyNamefWarholigivenNamedAndy'

In [4]: ipld.multihash(serialized_person) # hash CBOR value and get a hash digest

Out[4]: 'QmRinxtytQFizqBbcRfJ3i1ts617W8AA8xt53DsPGTfisC'
```

Linked Data:
Resource Description Framework (short: RDF)

- A way to express assertions in a schematic way


```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
         xmlns:xhtml="http://www.w3.org/1999/xhtml/vocab#">

  <rdf:Description rdf:about="http://lessig.org/blog">
      <xhtml:license resource="http://creativecommons.org/licenses/by/3.0/" />
  </rdf:Description>

</rdf:RDF>
```

Linked Data: JSON-LD

- A data structure to serialize RDF in JSON

```
{
  "@type": "http://schema.org/Person",
  "@id": "http://example.com/data/AndyWarhol",
  "givenName": "Andy",
  "familyName": "Warhol",
}
```

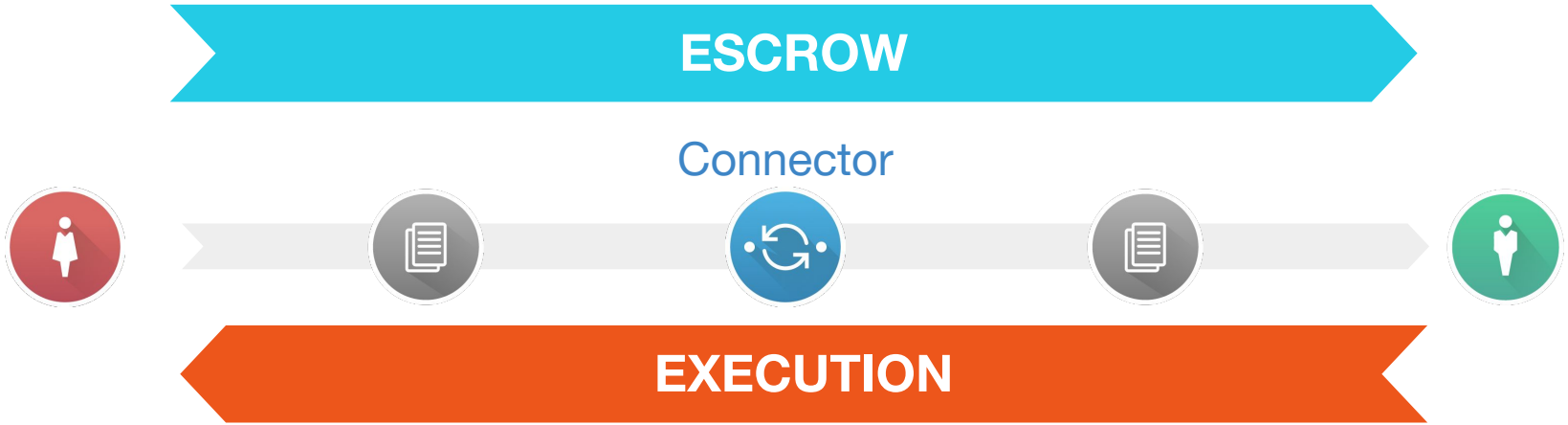
```
http://example.com/data/AndyWarhol
  http://www.w3.org/1999/02/22-rdf-syntax-ns#type
    http://schema.org/Person .
```

Useful RDF schemata

- LCC RRM Party:
  - schema.org/Person
  - schema.org/Organization
- LCC RRM Creation:
  - schema.org/CreativeWork
  - And its subtypes: Book, Movie, MusicComposition
- LCC RRM Place:
  - schema.org/Place
- LCC RRM Assertion:
  - schema.org/AssessAction
  - Additionally: Web of Trust Ontology

Interledger Protocol (ILP)

- A standard in progress as a W3C Community Group
- To connect many blockchains / ledgers for transfer of value
- Crypto-conditions: building blocks of crypto primitives
    - Includes multisig, escrow but not loops, recursion



Bringing it together: COALA IP Protocol

- A community-driven *minimum-viable set of data* for IP licensing (RDF schema definitions, JSON-LD)
- A free and open *messaging* protocol for license-transactions (LCC, Interledger, IPLD)

COALA IP: Place

```
{
    "@type": { "/": "<hash pointing to RDF-Schema of Place>" },
    "geo": {
        "@type": { "/": "<hash pointing to RDF-Schema of GeoCoordinates>" },
        "latitude": "40.75",
        "longitude": "73.98"
    },
    "name": "Empire State Building"
}
```

COALA IP: Party (only Individual)

```
{

    "@type": { "/": "<hash pointing to RDF-Schema of Individual>" },

    "givenName”: “Andy”,

    “familyName”: “Warhol”,

    “birthDate”: “1928-08-06”,

    “deathDate”: “1987-02-22”

    // and any other arbitrary meta data

    // TDB: Let’s use an established identity protocol here

}
```

COALA IP: Creation

```
{

    "@type": { "/": "<hash pointing to RDF-Schema of Creation>" },

    "name”: “Lord of the Rings”,

    “author”: { "/": "<hash pointing to the Author>" }

}
```

COALA IP: Creation (a *digital* Manifestation)

```
{   "@type": { "/": "<hash pointing to RDF-Schema of Manifestation>" },

    "name": "The Fellowship of the Ring",

    "creation": { "/": "<hash pointing to the Creation>" },

    "digital_work": { "/": "<hash pointing to a file on e.g. IPFS>" },

    "fingerprints": [

        "Qmbs2DxMBraF3U8F7vLAarGmZaSFry3vVY5zytuN3BxwaY",

        "<multihash/multifingerprint value>"

    ],

    "locationCreated": "<URI pointing to a Place object>"

}
```

COALA IP: Creation (a *physical* Manifestation)

```
{   "@type": { "/": "<hash pointing to RDF-Schema of Manifestation>" },

    "name": "The Fellowship of the Ring",

    "creation": { "/": "<hash pointing to the Creation>" },

    "datePublished": "29-07-1954",

    "locationCreated": "<URI pointing to a Place object>"

}
```

COALA IP: Right

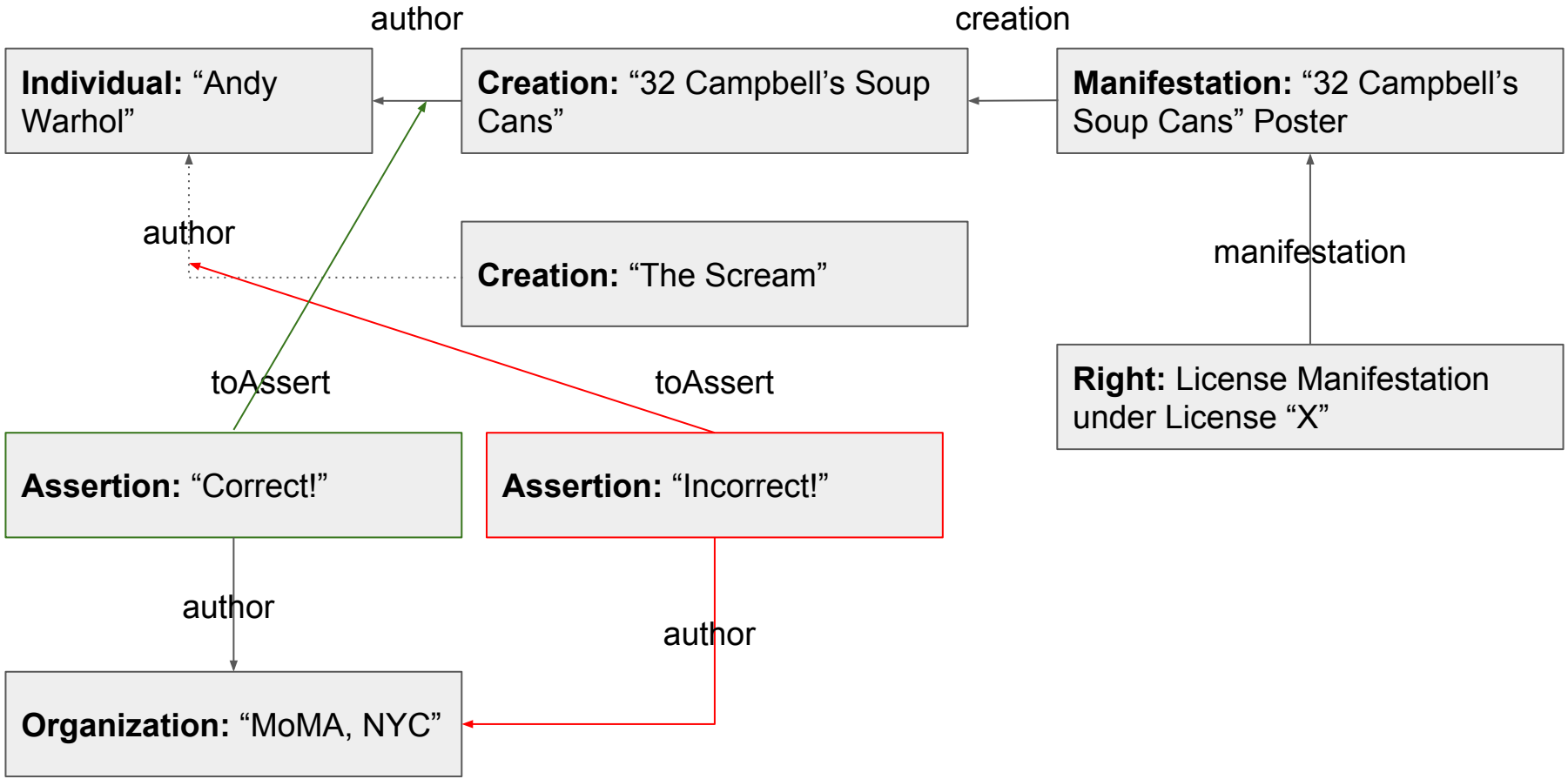
```
{   "@type": { "/": "<hash pointing to RDF-Schema of Right>" },

    “usages”: “all|copy|play|stream|...”,

    “territory”: { “/”: “<hash pointing to a Place>” },

    “context”: “inflight|inpublic|commercialuse…”,

    “exclusive”: true|false,

     ...

    "manifestation": { "/": "<hash pointing to the Manifestation>" },

    "license": { "/": "<hash pointing to the License>" }

}
```

COALA IP: RightsAssignment

- A special case: RightsAssignments must be stored in an *ordered fashion*

- Store on an **Interledger Protocol compliant ledger**
    - Provenance of assets (chain of events)
    - *True* ownership of assets (priv and pub key)
    - Enhanced transfers (escrowed, multi-sig)

COALA IP: Assertion



Summary

- Goal is licensing framework for digital assets
  - Using previous building blocks as much as possible
- COALA IP Protocol is
  - A *minimum-viable set of data* for IP licensing (RDF schema definitions, JSON-LD)
  - A free and open *messaging* protocol for license-transactions (Interledger, IPLD, LCC)
- A community is defining, refining and deploying it
  - Into Ethereum, IPFS, IPDB (public BigchainDB) networks