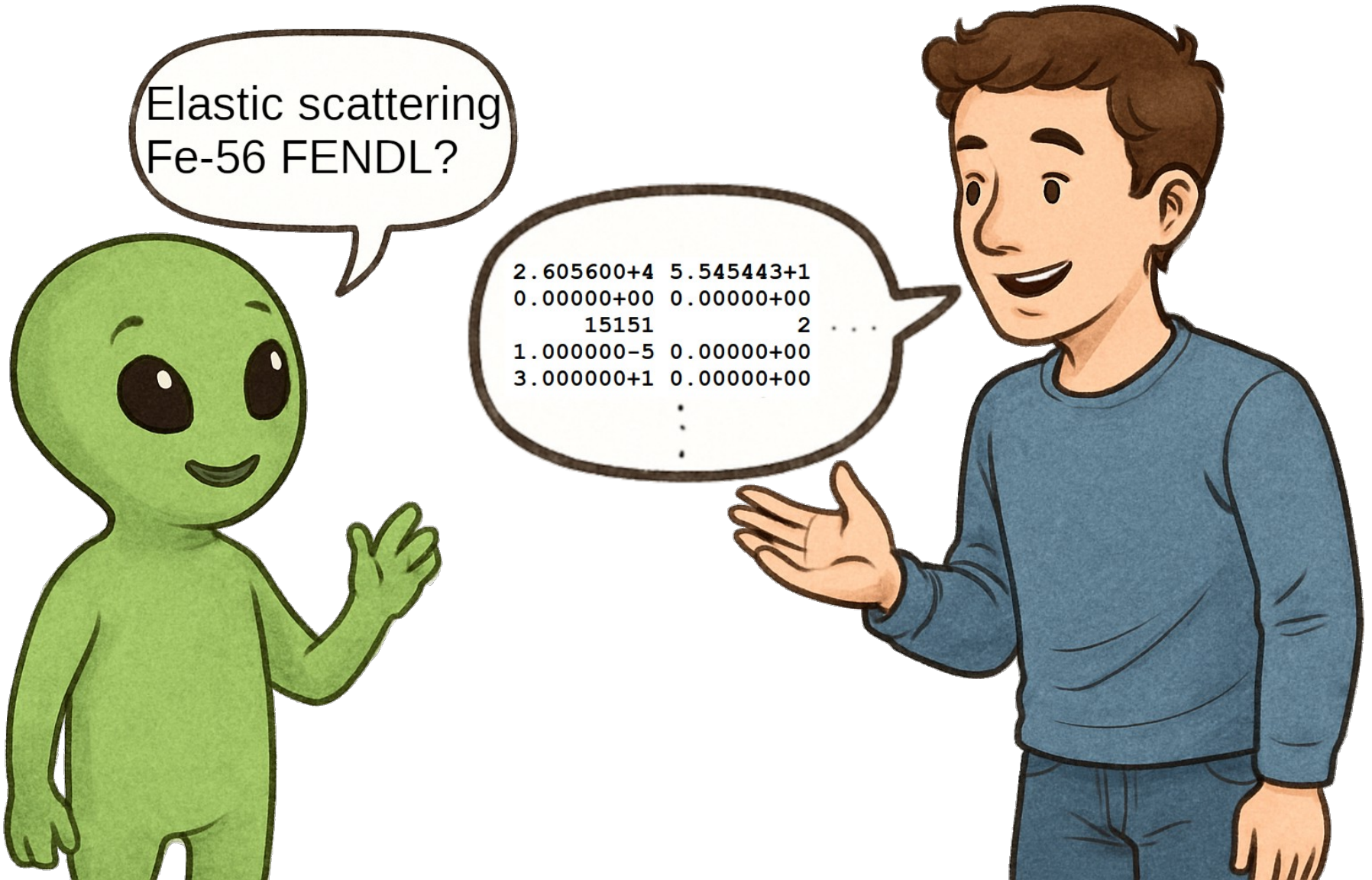
Making FENDL interplanetary

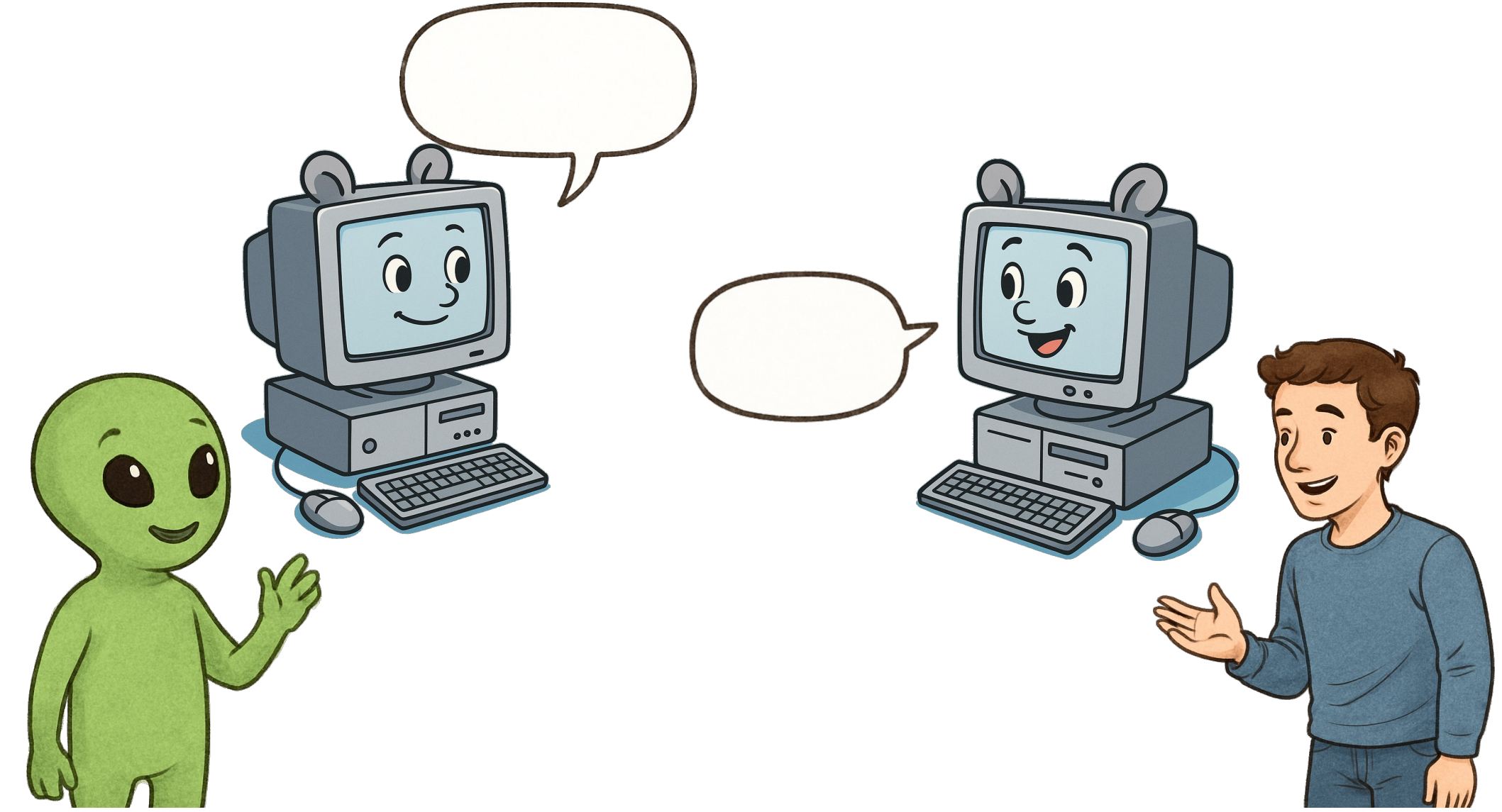
Grammar

Words

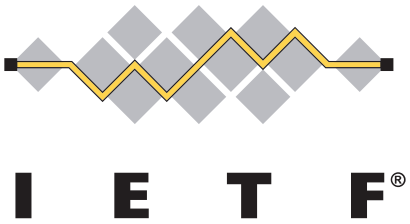
History

Grammar


Elastic scattering
Fe-56 FENDL?
2.605600+4 5.545443+1
0.00000+00 0.00000+00
15151 2 ...
1.000000-5 0.00000+00
3.000000+1 0.00000+00



Internet Engineering Task Force



The Internet Engineering Task Force (IETF), founded in 1986, is the premier standards development organization (SDO) for the Internet. The IETF makes voluntary standards that are often adopted by Internet users, network operators, and equipment vendors, and it thus helps shape the trajectory of the development of the Internet. But in no way does the IETF control, or even patrol, the Internet.

from https://www.ietf.org/about/introduction/

Promising standards

Java**S**cript **O**bject **N**otation (JSON) format
(RFC 8259)

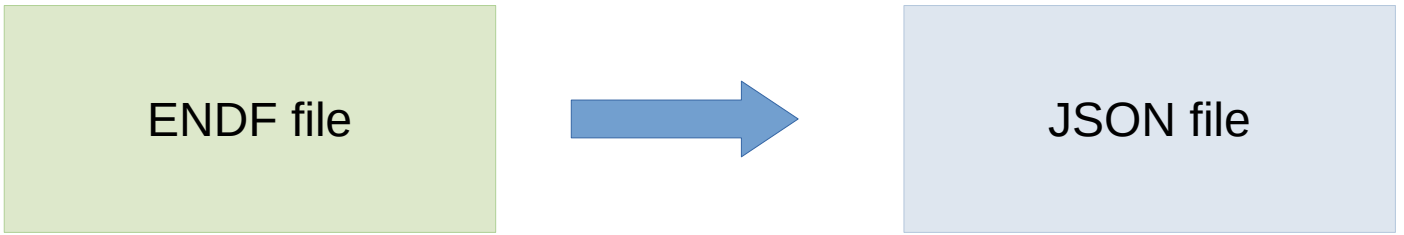
JSON Pointer (RFC 6901)

JSON Patch format (RFC 6902)

What if...

… we stored all our nuclear data in the JSON format?

How to do




```
endf-cli convert --to json n_2631_26-Fe-56.endf n_2631_26-Fe-56.json
```

Query data

```
jq '."3"."1".AWR' n_2631_26-Fe-56.json
```

```
Output: 55.45443
```

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jq '."3"."1".AWR' n_2631_26-Fe-56.json
```

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Output: 55.45443
```
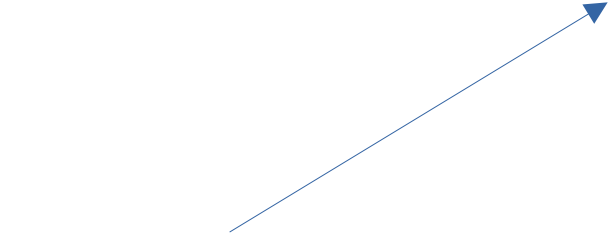
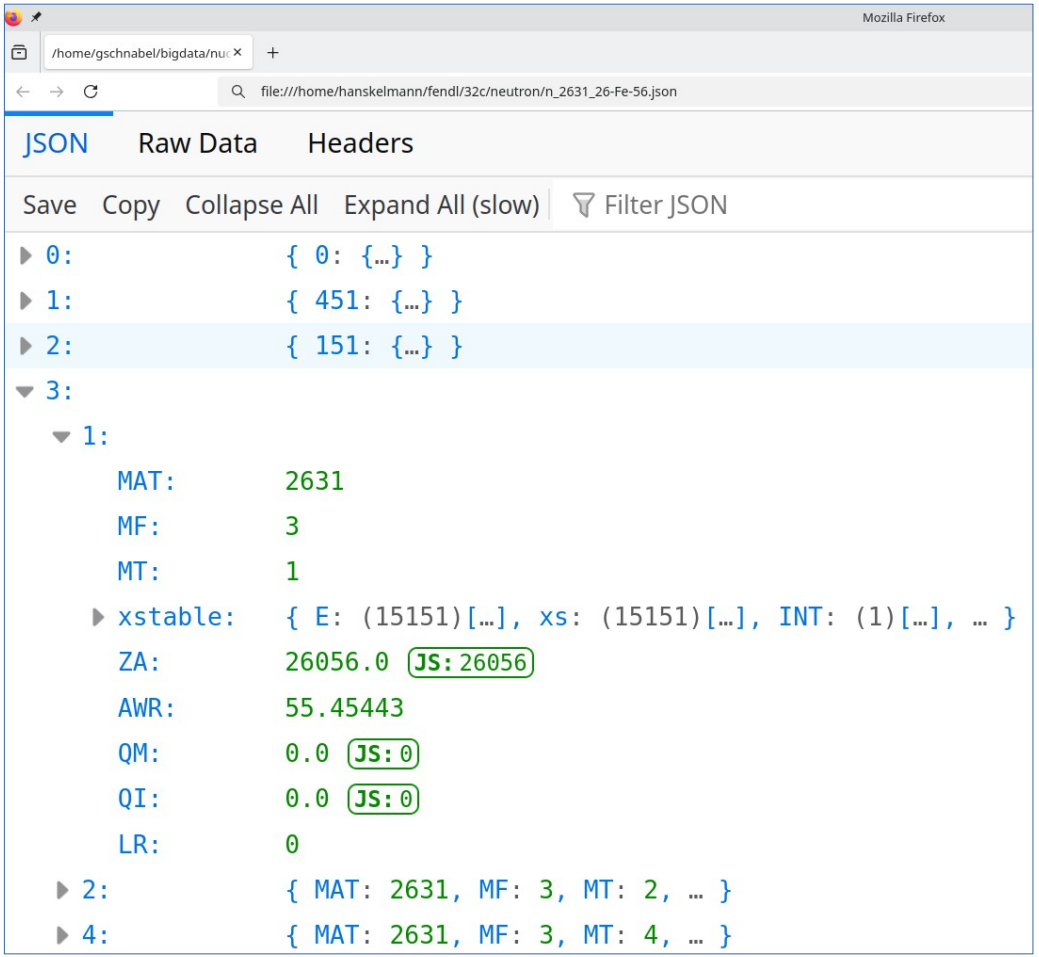



Query structure

```
jq '."3"."1" | keys' n_2631_26-Fe-56.json
```

```
Output: [AWR, LR, MAT, MF, MT, QI, QM, ZA, xstable]
```

Command Line :-(, then



Modify data

Change AWR to 1234

```
jq '."3"."1".AWR=1234' n_2631_26-Fe-56.json > modified.json
```

Merge MF3/MT1 from modified.json into file and output as combined.json

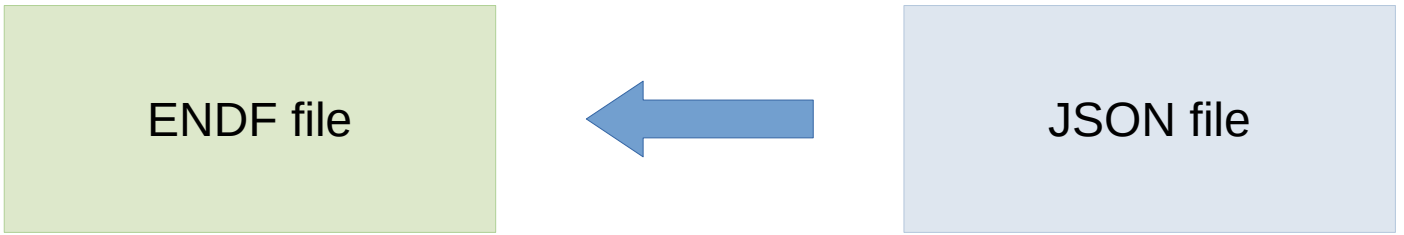
```
jq '(."3"."1") += (input | ."3"."1")' n_2631_26-Fe-56.json modified.json > combined.json
```

First take-aways

Conversion to JSON: Vastly increased interoperability

Many tools online and offline available for interacting with JSON

What about NJOY, MCNP, etc.?




```
endf-cli convert --to endf n_2631_26-Fe-56.json n_2631_26-Fe-56.endf
```

Words

???

???

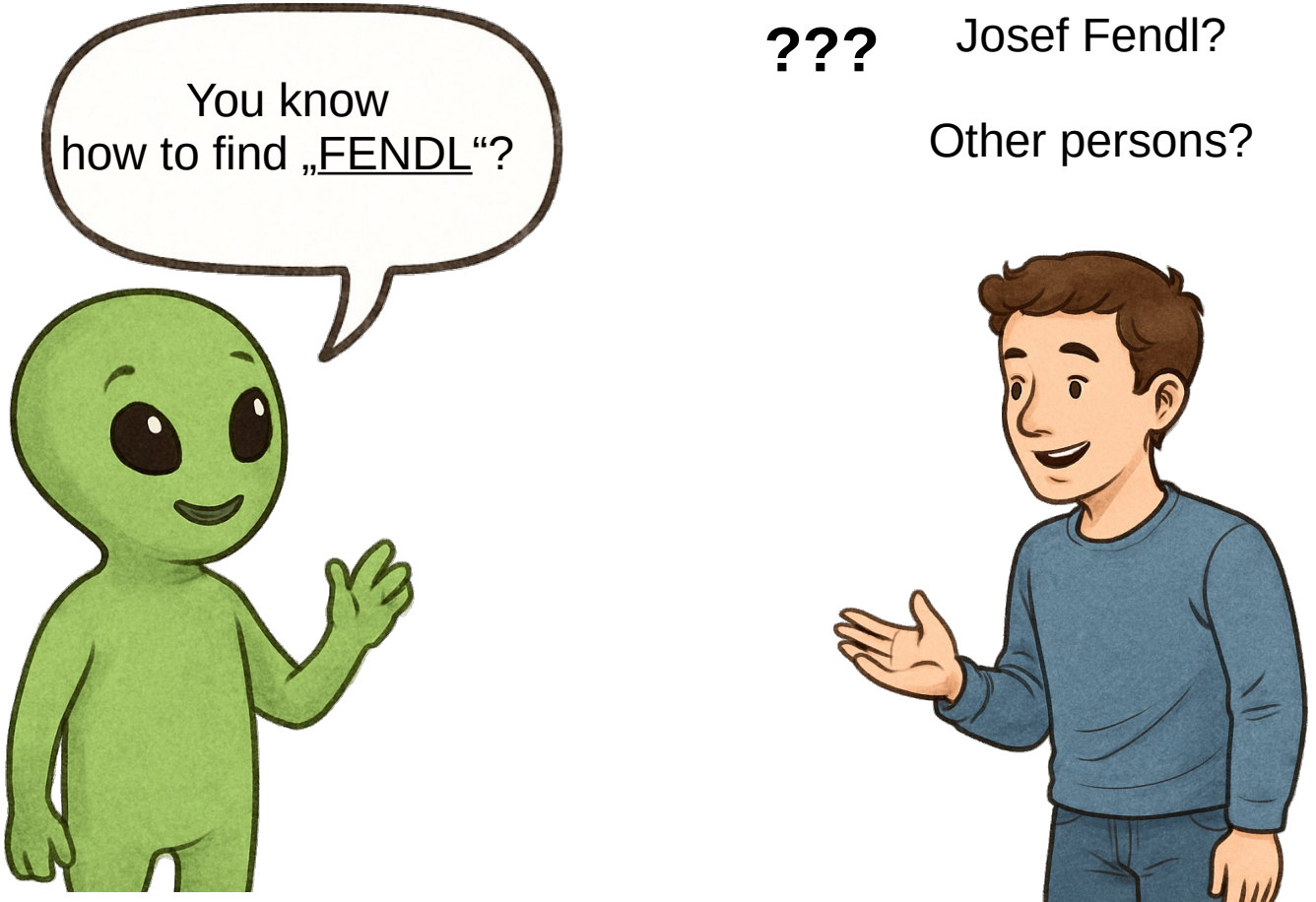
Awesome nuclear data library?

???

Josef Fendl?

Other persons?

You know
how to find „FENDL“?

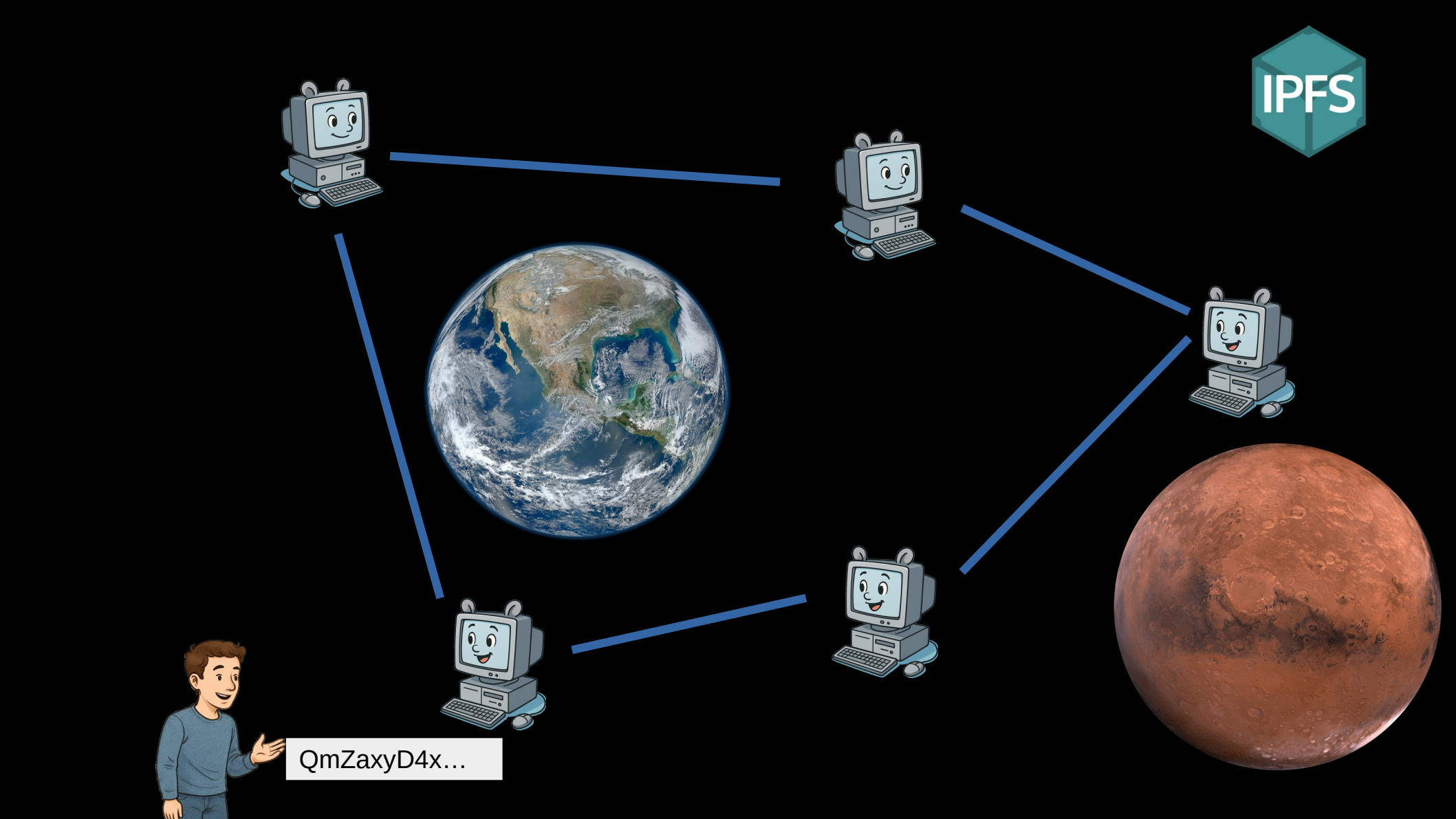


„DNA“ strings as words

ACGATTCGCA...

Nuclear data file → QmZaxyD4x...


You know
how to find „QmZaxyD4x“?
Ah yes, QmZaxyD4x… the awesome nuclear data library! Let me check on which planet the files are located...


IPFS
QmZaxyD4x…

Not just a utopia

- JEFF (interplanetary word: QmZdAyLfvDwQ3GSRUt8BEwE6eCPjvYZ7dXRGCT9vd6nh6U)

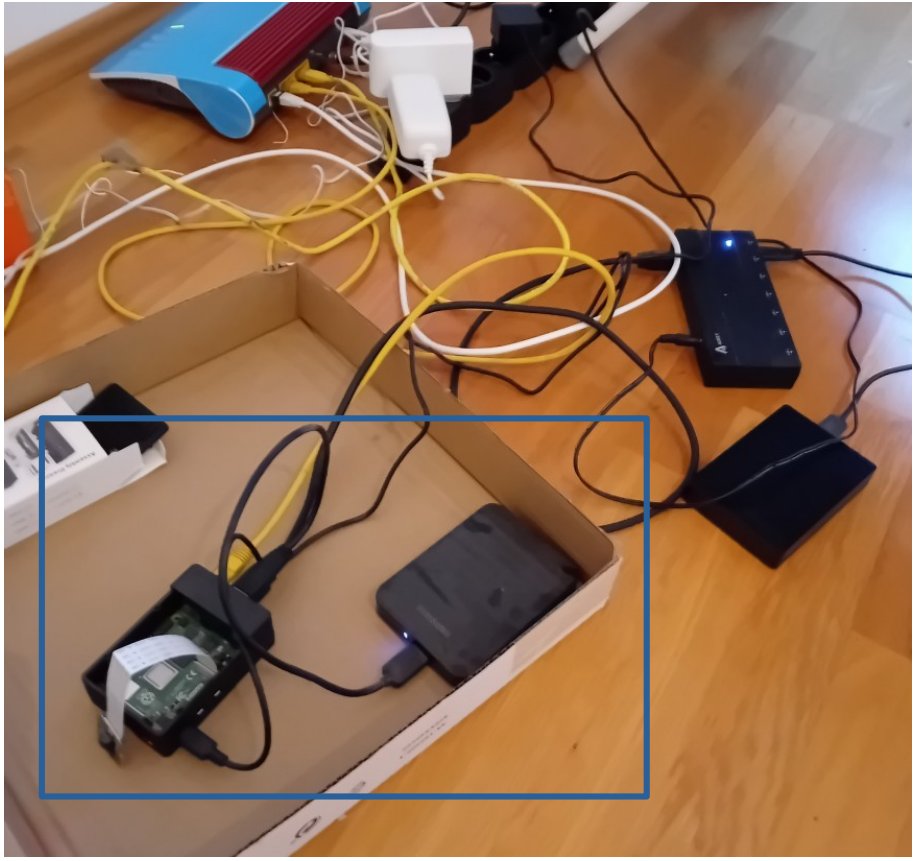
  https://dweb.link/ipfs/QmZdAyLfvDwQ3GSRUt8BEwE6eCPjvYZ7dXRGCT9vd6nh6U

  https://w3s.link/ipfs/QmZdAyLfvDwQ3GSRUt8BEwE6eCPjvYZ7dXRGCT9vd6nh6U
- FENDL (interplanetary word: QmVHiUnr57vv3D6JyXpyeDuQ16CS5n24PMaAw7wLL8aASy)

  https://ipfs.io/ipfs/QmVHiUnr57vv3D6JyXpyeDuQ16CS5n24PMaAw7wLL8aASy

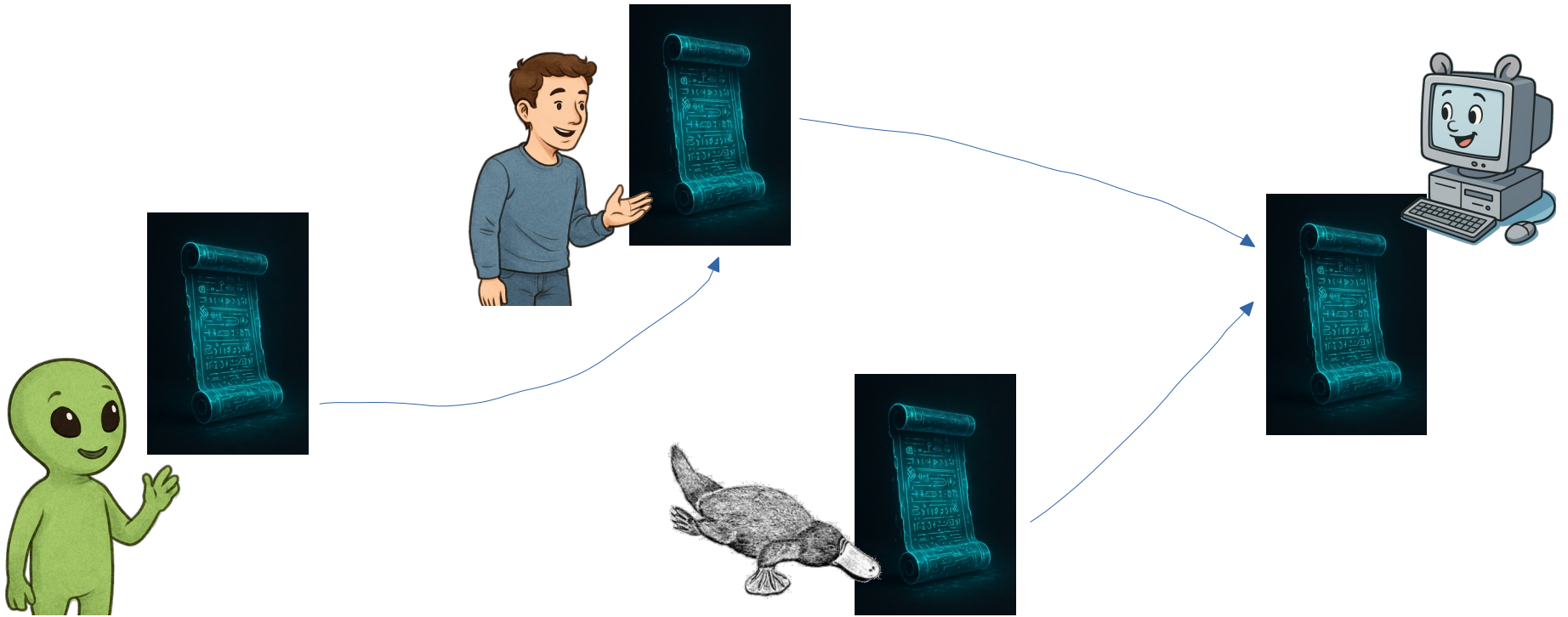
  https://dweb.link/ipfs/QmVHiUnr57vv3D6JyXpyeDuQ16CS5n24PMaAw7wLL8aASy

IPFS node in practice



History


I have produced the evaluation „QmZaxyD4x“.
Awesome work! I’ve tweaked one resonance parameter for even better performance, the file is „QmDb3aA74“.

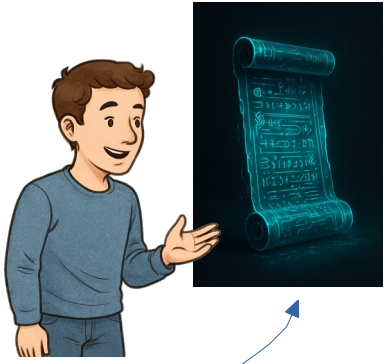


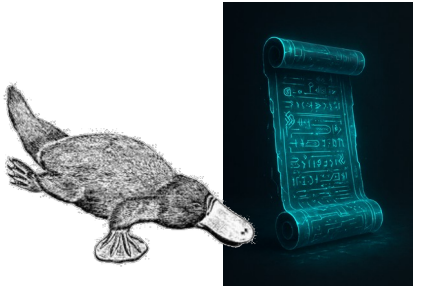
QmZaxyD4x

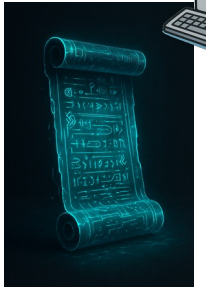
QmDb3aA74

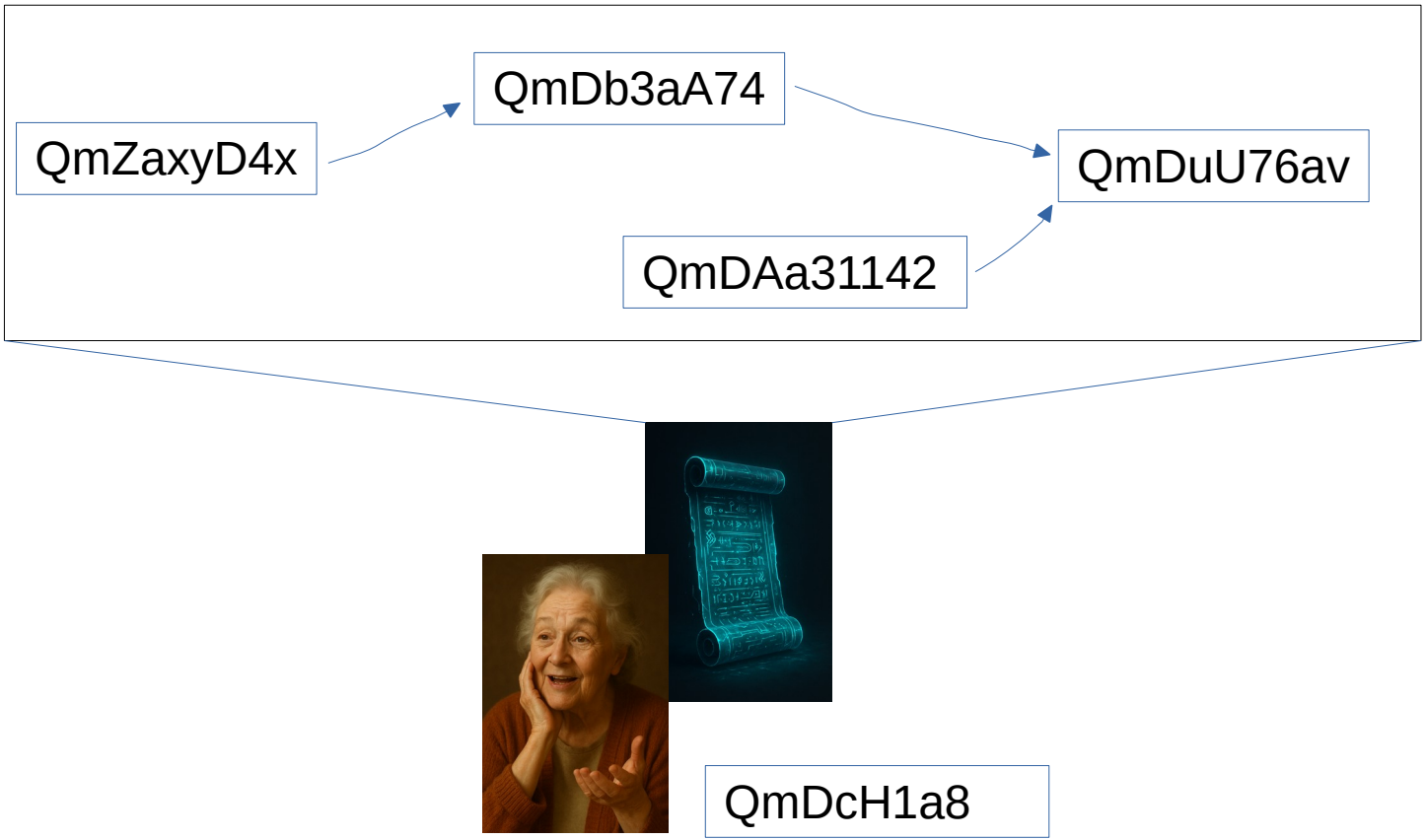
QmDAa31142

QmDuU76av








QmZaxyD4x
QmDb3aA74
QmDuU76av
QmDAa31142
QmDcH1a8

jsonvc track my_evaluation.json -m „my iron-56 evaluation’

Output: QmZaxyD4x

jsonvc track my_evaluation.json -m „my iron-56 evaluation’

Output: QmZaxyD4x

jsonvc showdoc QmZaxyD4x > eval.json

(doing some tweaking)

jsonvc update QmZaxyD4x eval.json -m „I updated R-matrix params“

Output: QmDAa31142

jsonvc track my_evaluation.json -m „my iron-56 evaluation’

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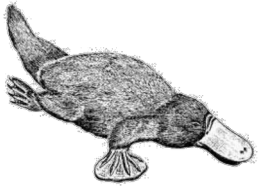


jsonvc track comprehensive_eval.json -m „comprehensive iron-56 evaluation“

Output: QmZaxyD4x

jsonvc track my_evaluation.json -m „my iron-56 evaluation’

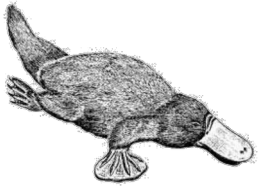
Output: QmZaxyD4x

jsonvc showdoc QmZaxyD4x > eval.json

(doing some tweaking)

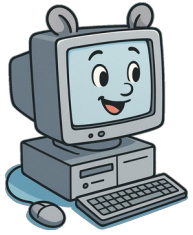
jsonvc update QmZaxyD4x eval.json -m „I updated R-matrix params“

Output: QmDAa31142



jsonvc track comprehensive_eval.json -m „comprehensive iron-56 evaluation“

Output: QmZaxyD4x



jsonvc update –json-patch ai_patch.json
-m „X-323 successfully merged QmDAa31142 and QmZaxyD4x“

jsonvc showlog QmDAa31142

```
f71c843a1b: my iron-54 evaluation
eaba3141b2: did some fixing
```

jsonvc showdiff QmZaxyD4x QmDAa31142

```
[ {
   "op": "replace",
   "path": "/3/1/AWR",
   "value": 27
 } ]
```

JSON Patch format (RFC 6902)

Why?

Why?

- **Why JSON:** Device interoperability, vast support across devices, removal of technological entrance barrier, accelerated data development
- **Why „Interplanetary Naming“:** Unambiguous link between name and object, reduces errors in communication, tamper-proof
- **Why „Interplanetary file system“:** Storage location does not matter but content does; Having the interplanetary name is enough to find the resource; migration of digitial objects to other location is irrelevant at this layer of abstraction; while location is irrelevant, IPFS participants still have full control of what they want to share and what not
- **Why „JSON version control“:** Understands natively the structure („grammar“) of JSON documents; Modification, query and merge operations become trivial, irrespective of the type of content

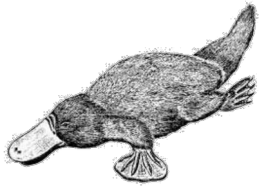
Why all of that

The profound removal of all technological barriers (space, time, formats, etc.) between people and scientific knowledge promotes global (if not interplanetary) knowledge exchange and collaboration. No matter who you are or where you are, you should not only be able to seamlessly retrieve scientific knowledge but also be able to participate in the process of expanding it, for instance, by sharing your analytical work and suggestions easily with a global community. Irrespective of whether you want to share a brief statement with ten words or a two terabyte file with fundamental nuclear data, ideally your intention of doing so should be enough to make it happen.

Resources

https://github.com/CodeVisionaries

https://github.com/iaea-nds/endf-parserpy



Thank you!