



Growing a **Workflow Language** with GNU Guix

Ricardo Wurmus
FOSDEM 2021



Matrakçı Nasuh
Map of Istanbul (1536)



download



unpack



first 10 lines



sort



compress



wget



gunzip



head



sort



gzip

The Frobnicator



|



|



|



|



wget

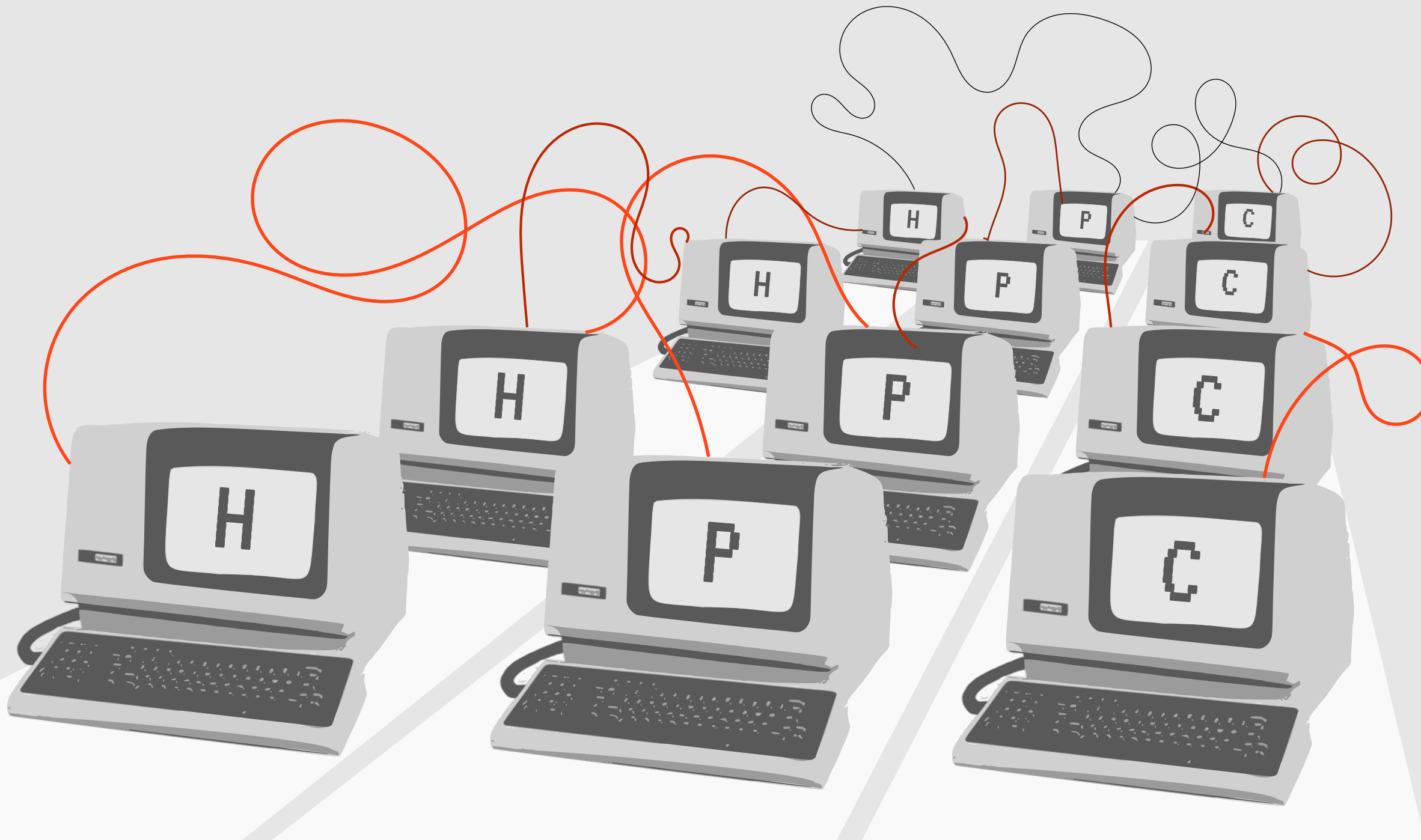
gunzip

head

sort

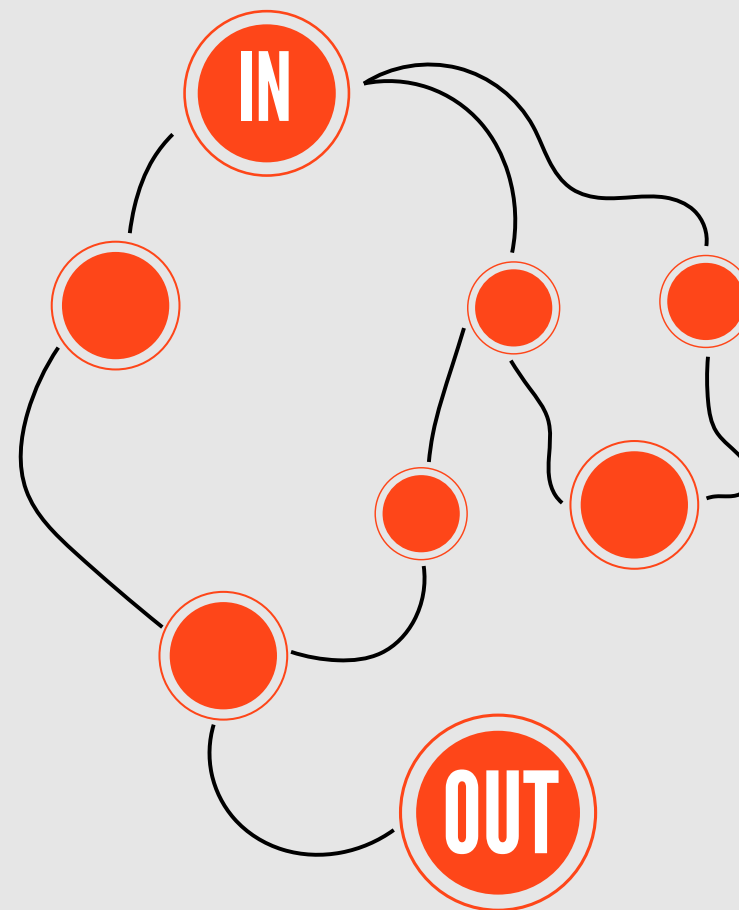
gzip



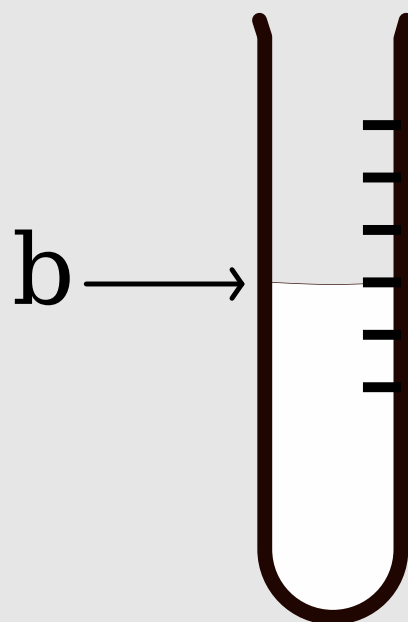
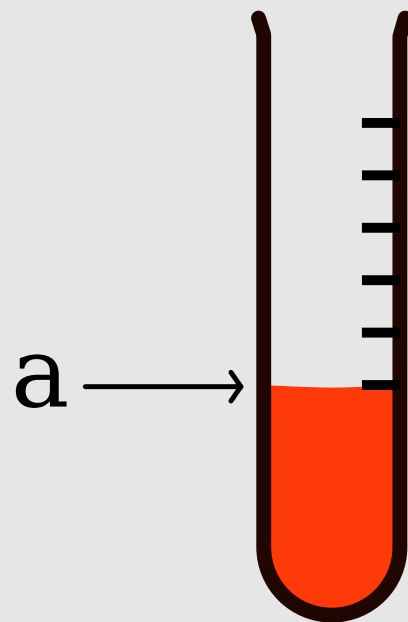




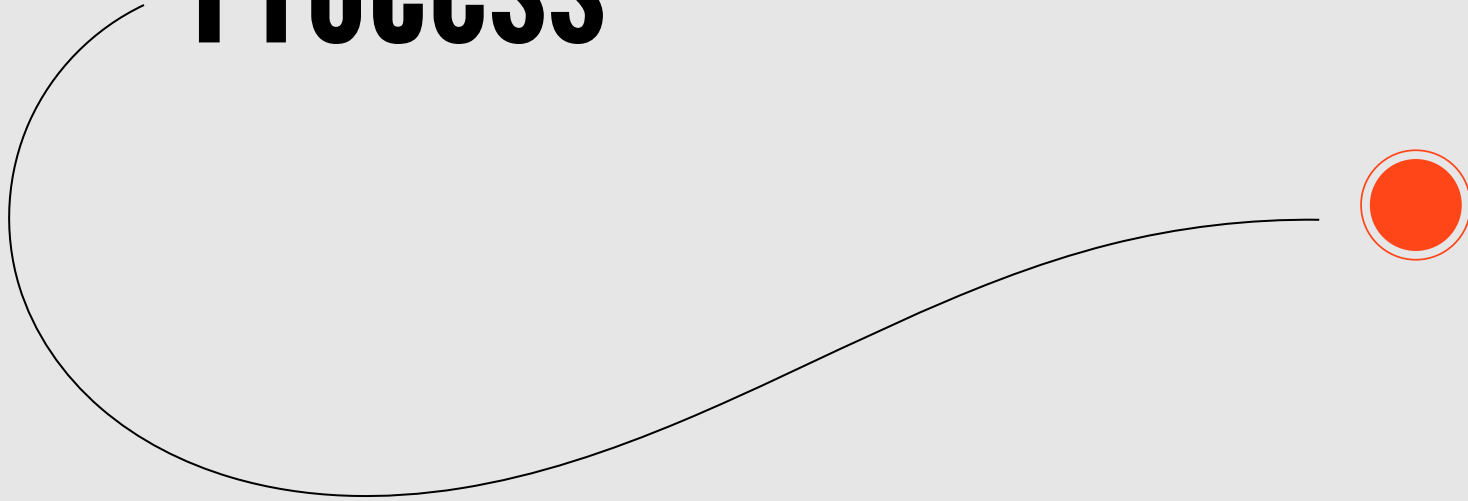
Pipeline



Workflow

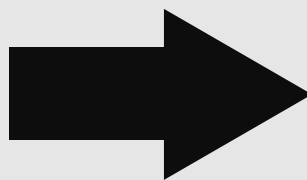


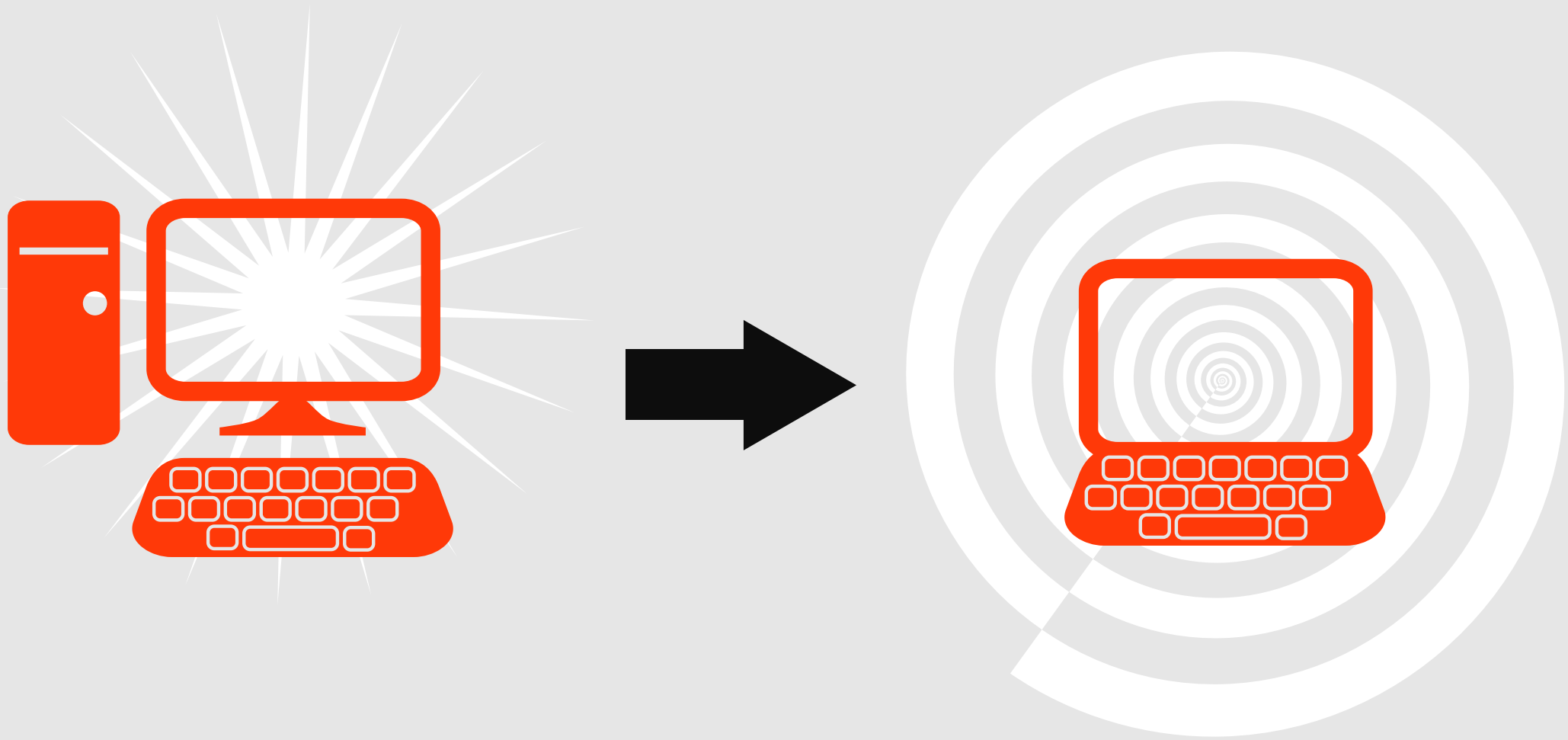
Process



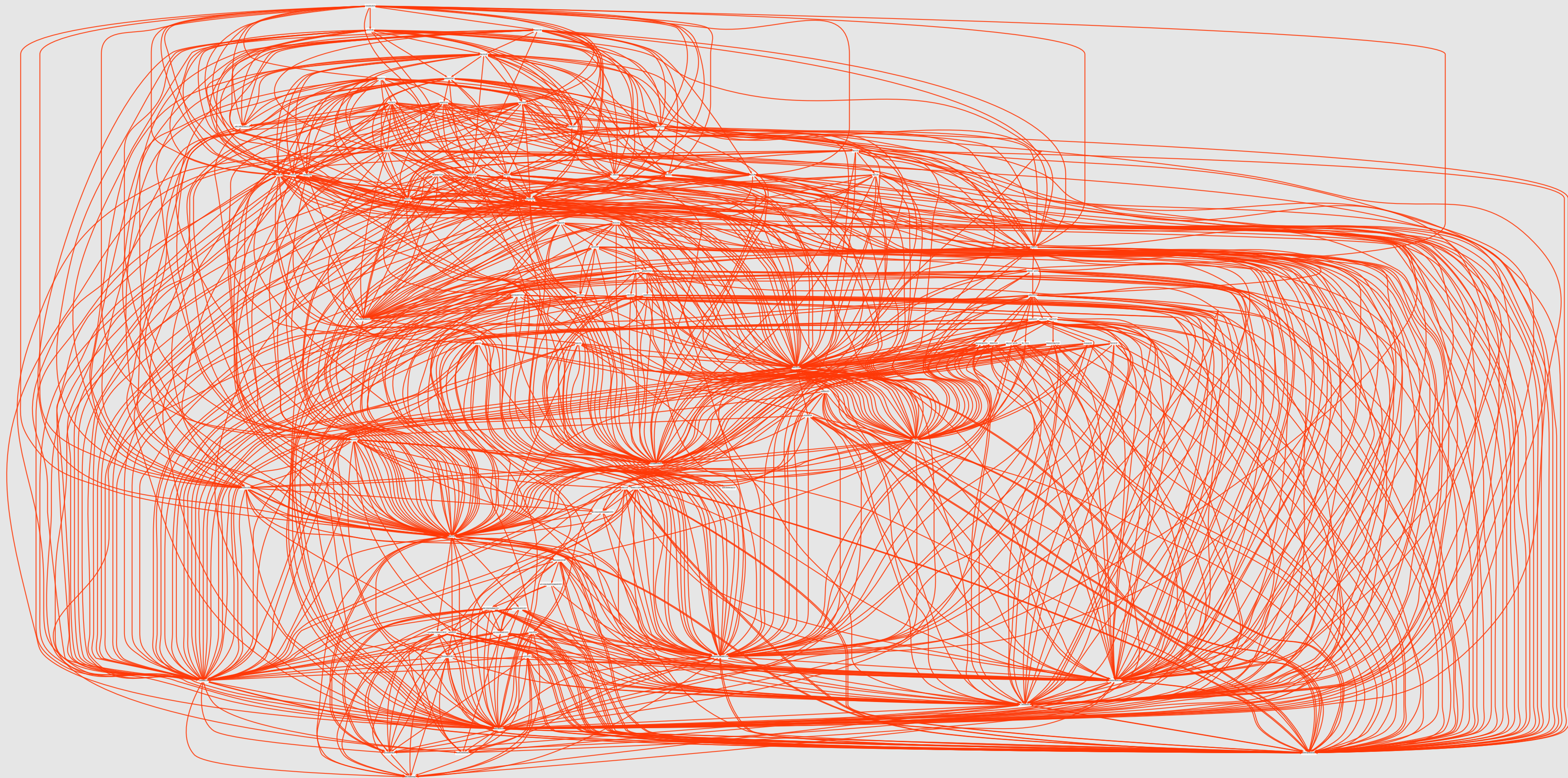
Environment

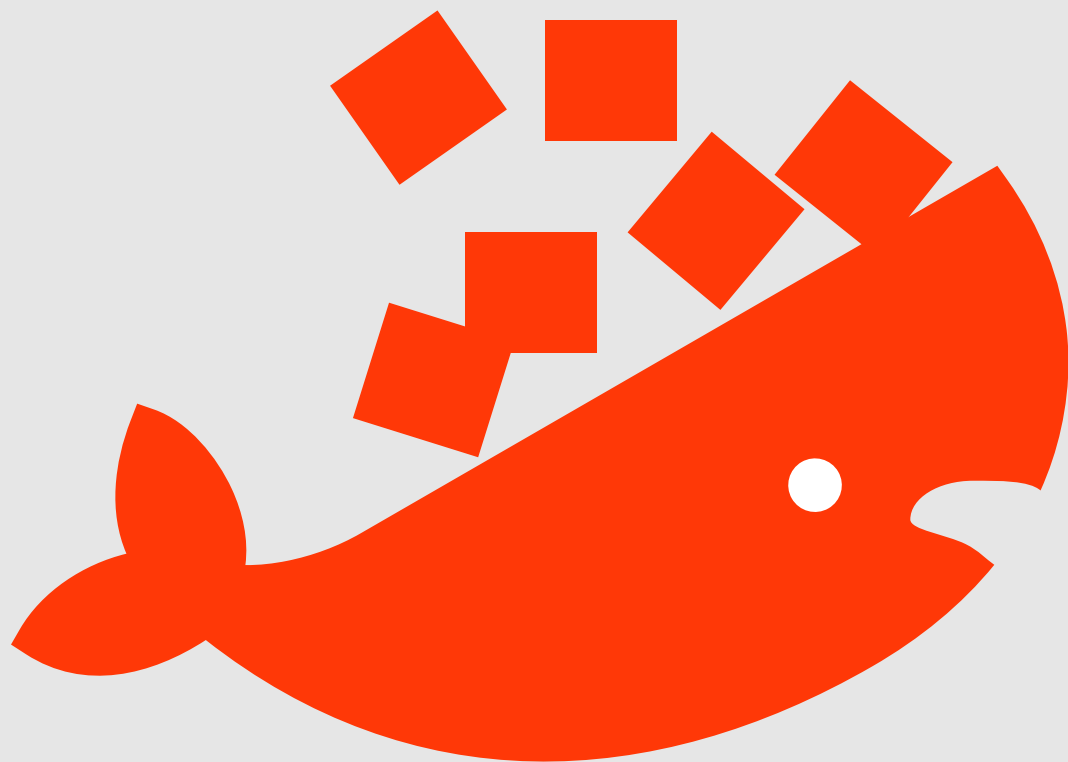




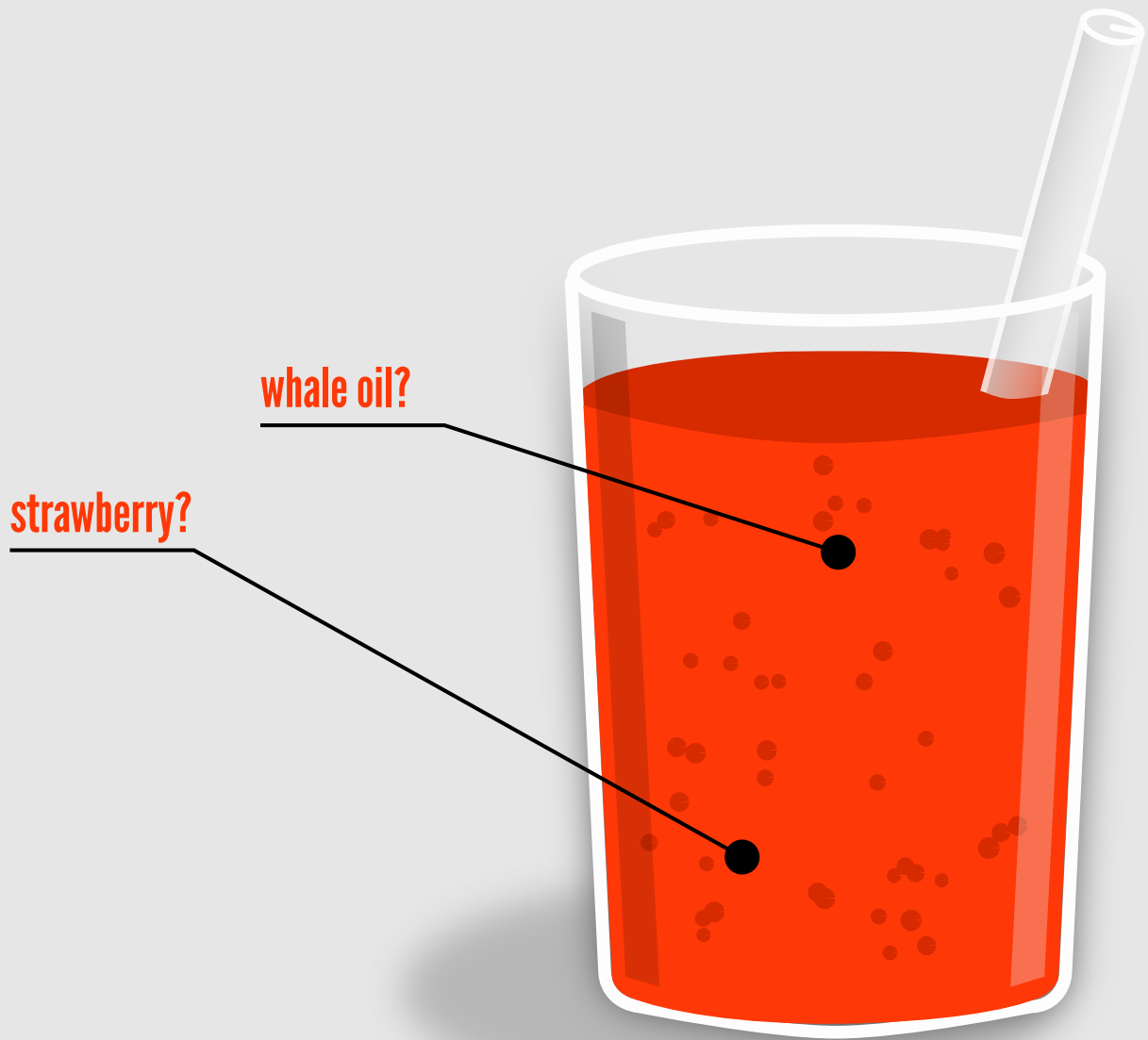


How hard could this possibly be?

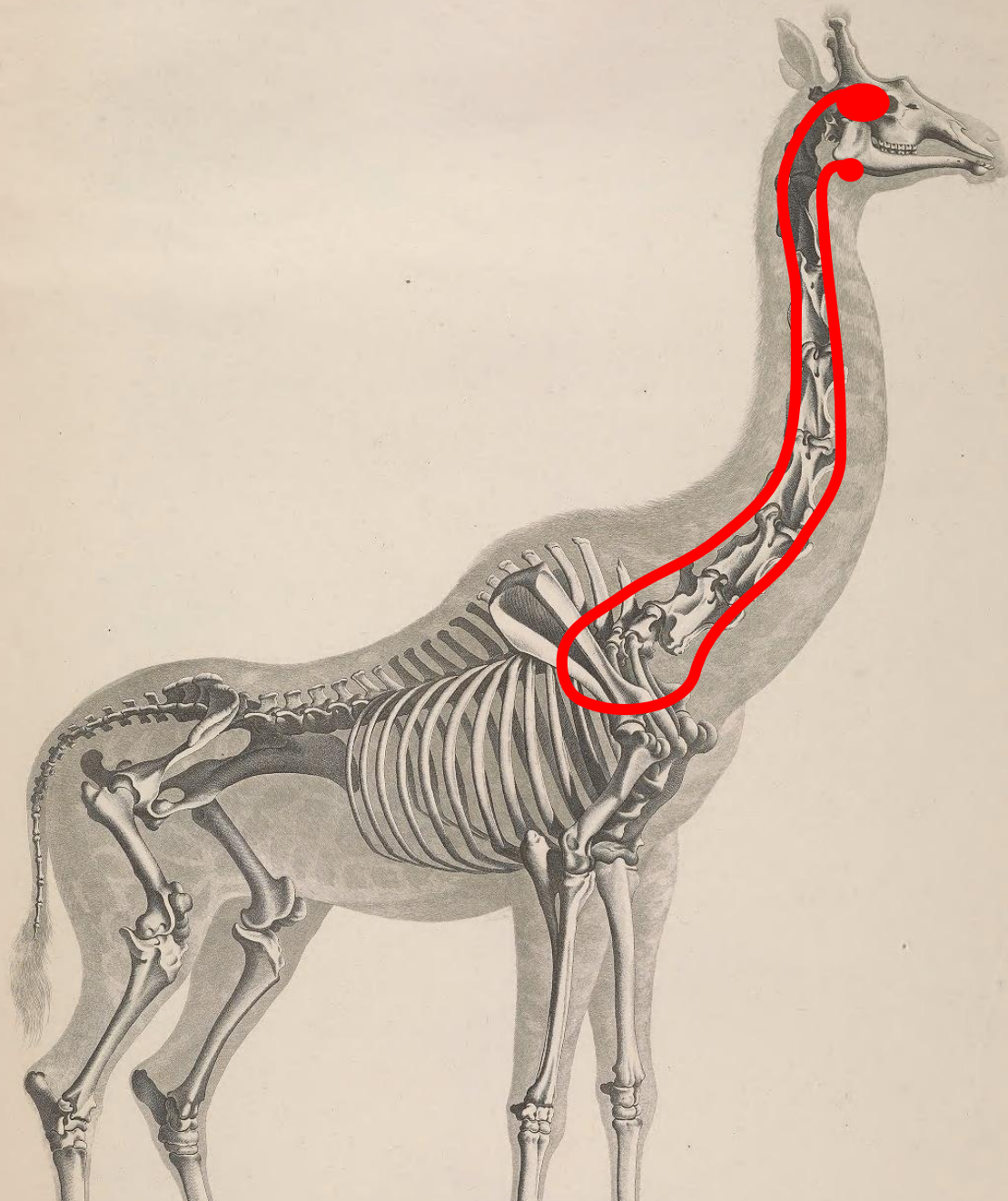




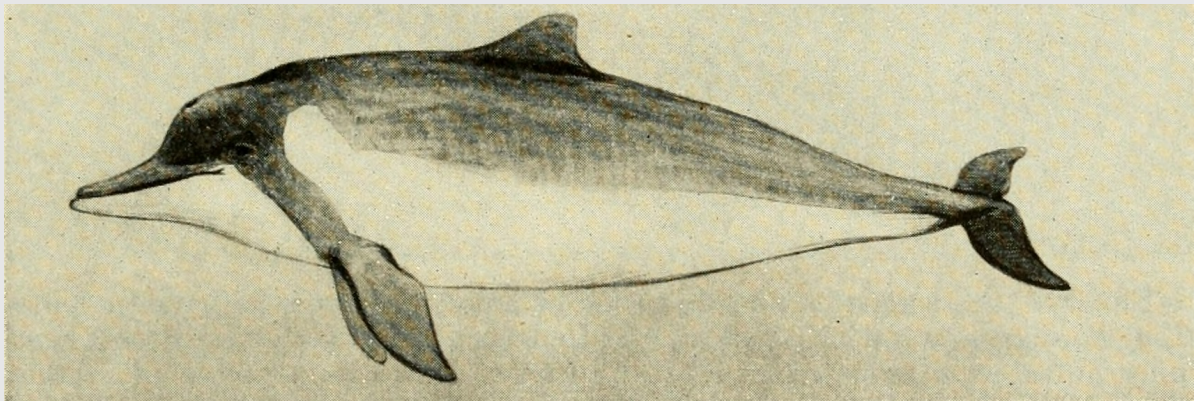
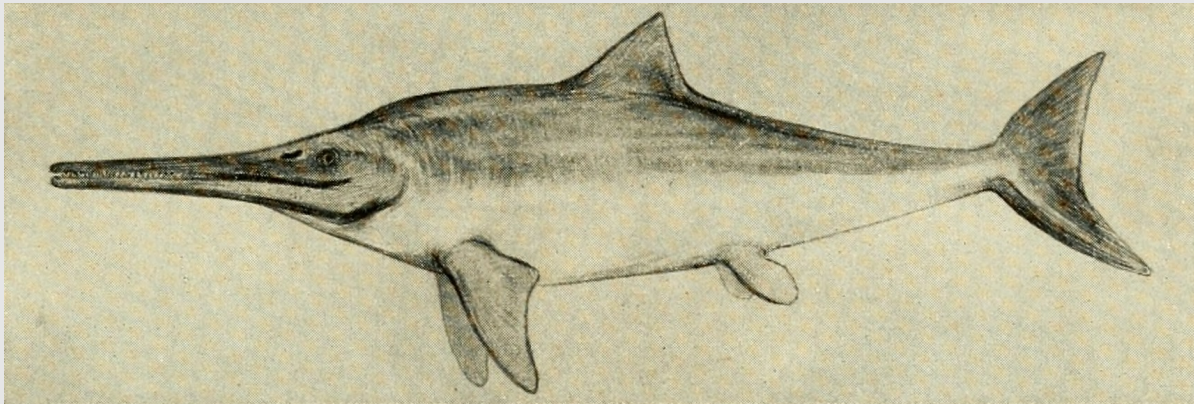
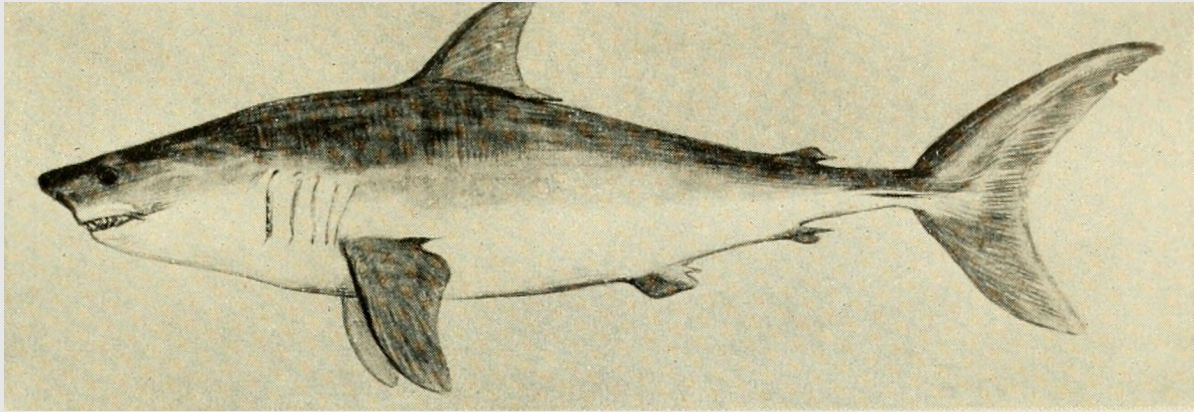
Containers
to the rescue?



Containers
lack transparency



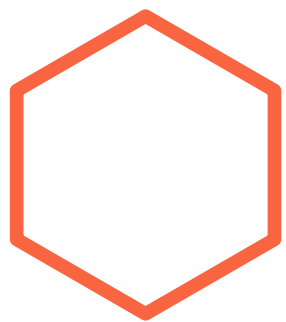
C.H. Pander & E. d'Alton
“Die vergleichende Osteologie” (1821)
<https://doi.org/10.5962/bhl.title.61021>



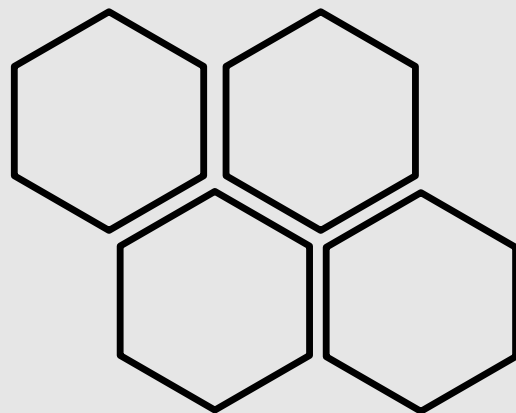
H. W Rand
“The chordates” (1950), page 388
[urn:oclc:record:1041802847](https://nbn-resolving.org/urn:oclc:record:1041802847)



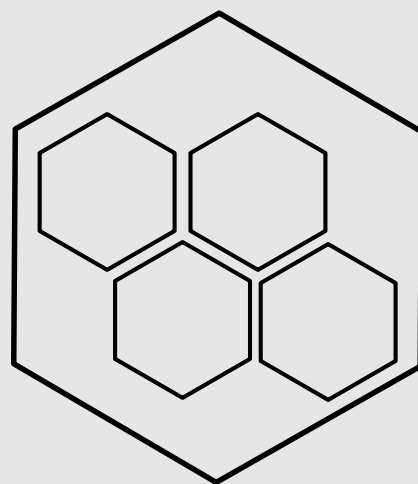
Guix



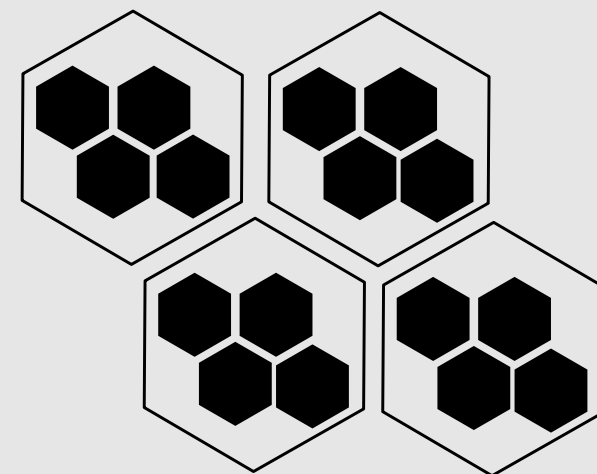
package



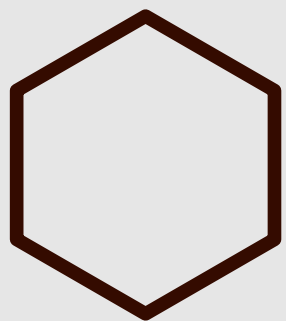
environments



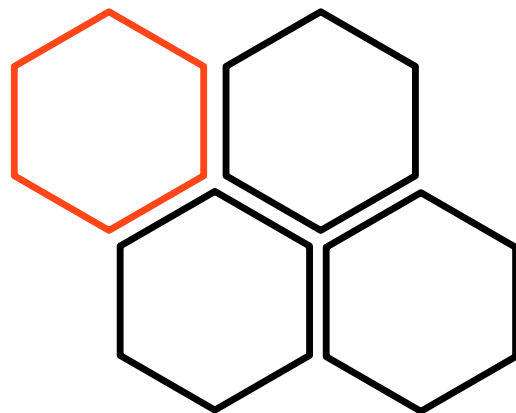
containers



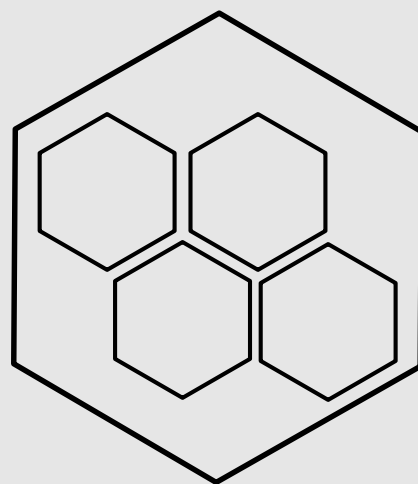
systems



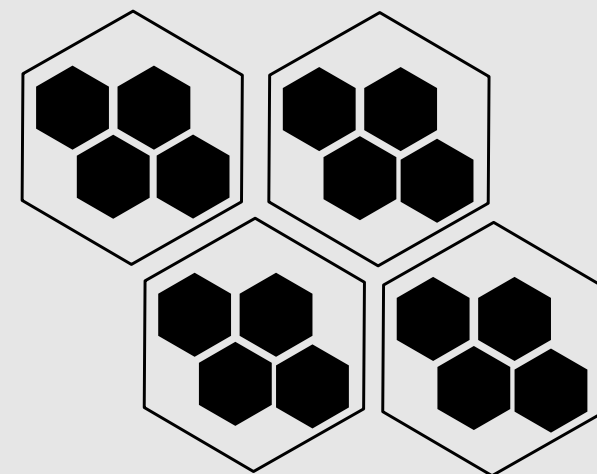
package



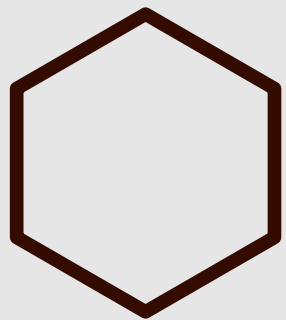
environments



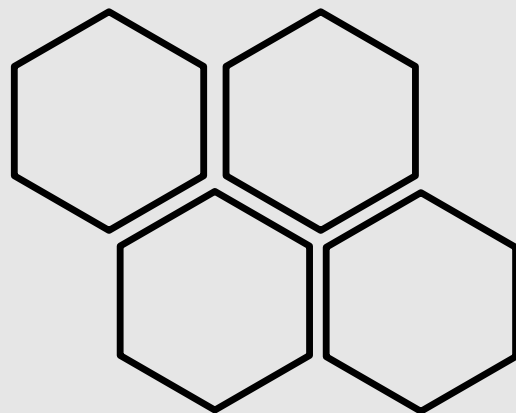
containers



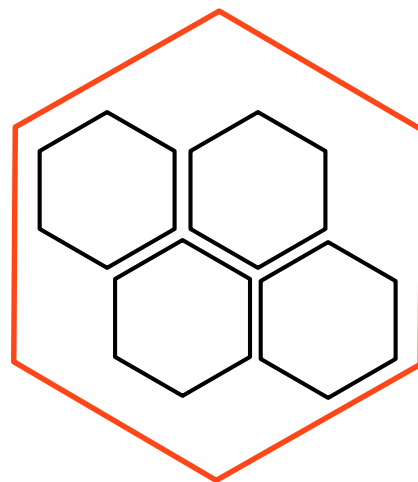
systems



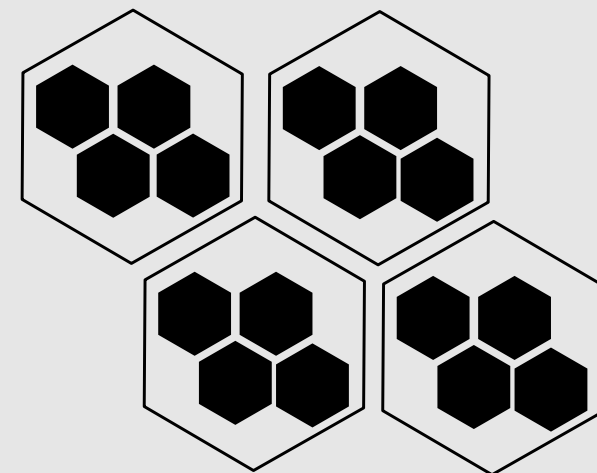
package



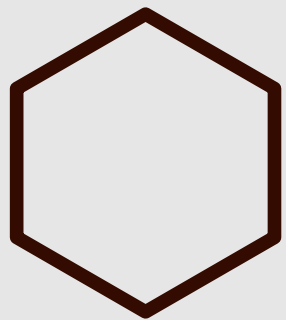
environments



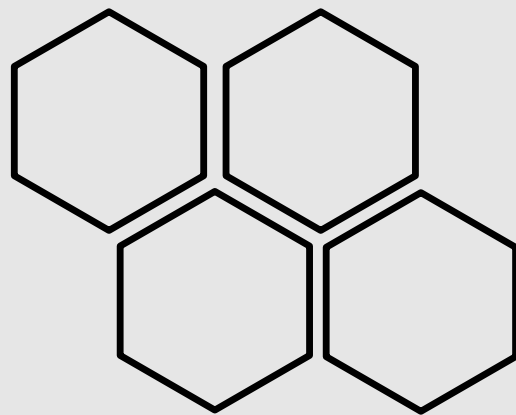
containers



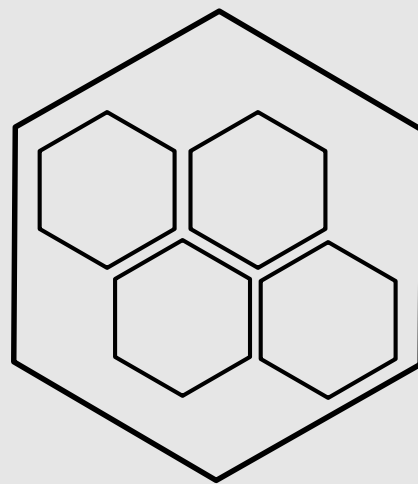
systems



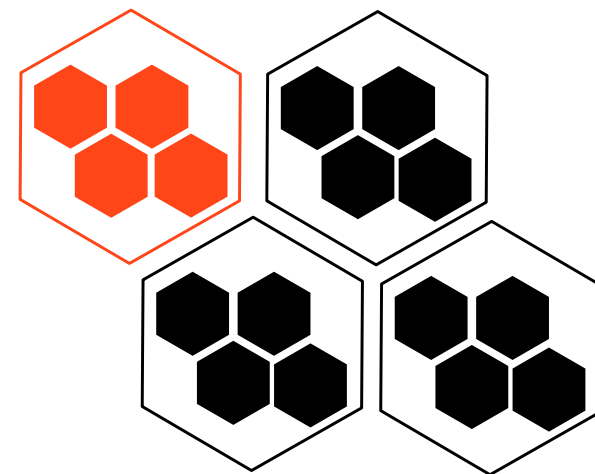
package



environments



containers



systems

**Reproducible
deployment**



package



containers



systems

 **transparent**

 **stateless**

 **verifiable**

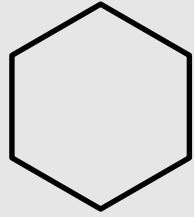
 **reproducible**

 **fine-grain control**



**Workflow language
extension**

(not to scale)



Process



Workflow

```
guix workflow run flow.w
```



R. Magritte
“La Trahison des Images” (1928).

```
(define train
  (make-process
    (name "train")
    (packages
      (list "hello"
            "automake"
            "perl"))
    (description
      "Train AI for 5G augmented reality blockchain." )
    (procedure
      (display "Choo choo!")))))
```

```
process train
```

```
packages
```

```
  . "hello"
```

```
  . "automake"
```

```
  . "bash"
```

```
description
```

```
  . "Train AI for 5G augmented reality blockchain."
```

```
# bash {
```

```
  echo "Choo choo!"
```

```
}
```

```
process stats (with file)
  packages
    . "r"
    . "r-genomation"
  inputs
    string-append file "-big.gff"
  outputs
    string-append file "-small.gff"
  # R {
    library (genomation )
    gff ← gffToGRanges ("{{inputs}}", split.group=TRUE )
    head(gff )
  }
```

process A ...

process B ...

process C ...

process D ...

workflow

processes

graph

A → B C

B → D

C → B

process A ...

process B ...

process C ...

process D ...

workflow

processes

auto-connect A B C D

- ✓ **processes + environments**
- ✓ **transparent & bit-reproducible**
- ✓ **lightweight containers**
- ✓ **15,000+ reproducible packages**
- ✓ **workflow bundles**

Growing a Workflow Language with GNU Guix

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<https://workflows.guix.info>
#guix-hpc on irc.freenode.net
@GuixHPC on the bird thing

