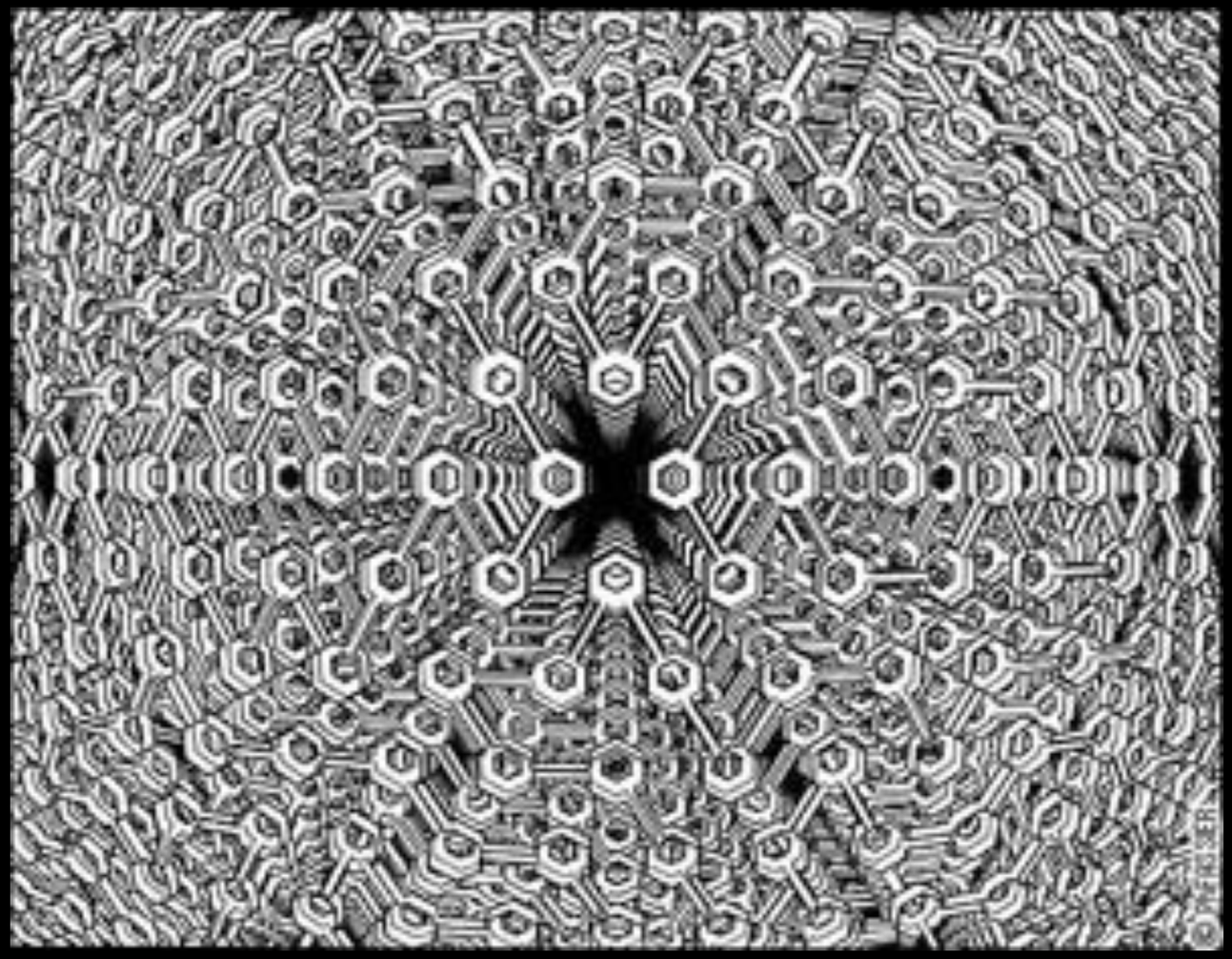
Borges vs Codd



S

S#	SNAME	STATUS	CITY
S1	SMITH	20	LONDON
S2	JONES	10	PARIS
S3	BLAKE	30	PARIS
S4	CLARK	20	LONDON
S5	ADAMS	30	ATHENS

P

P#	PNAME	COLOR	WEIGHT
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S1	P2	2
S1	P3	4
S1	P4	2
S1	P5	1
S1	P6	1
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S2	P2	4
S3	P3	4
S3	P5	2
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S4	P4	3
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S5	P6	5

Figure 1.1.1: the suppliers-and-parts data model (relational approach)

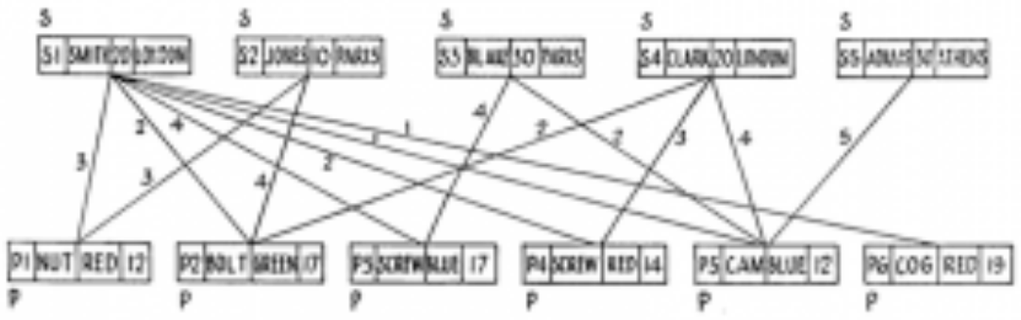
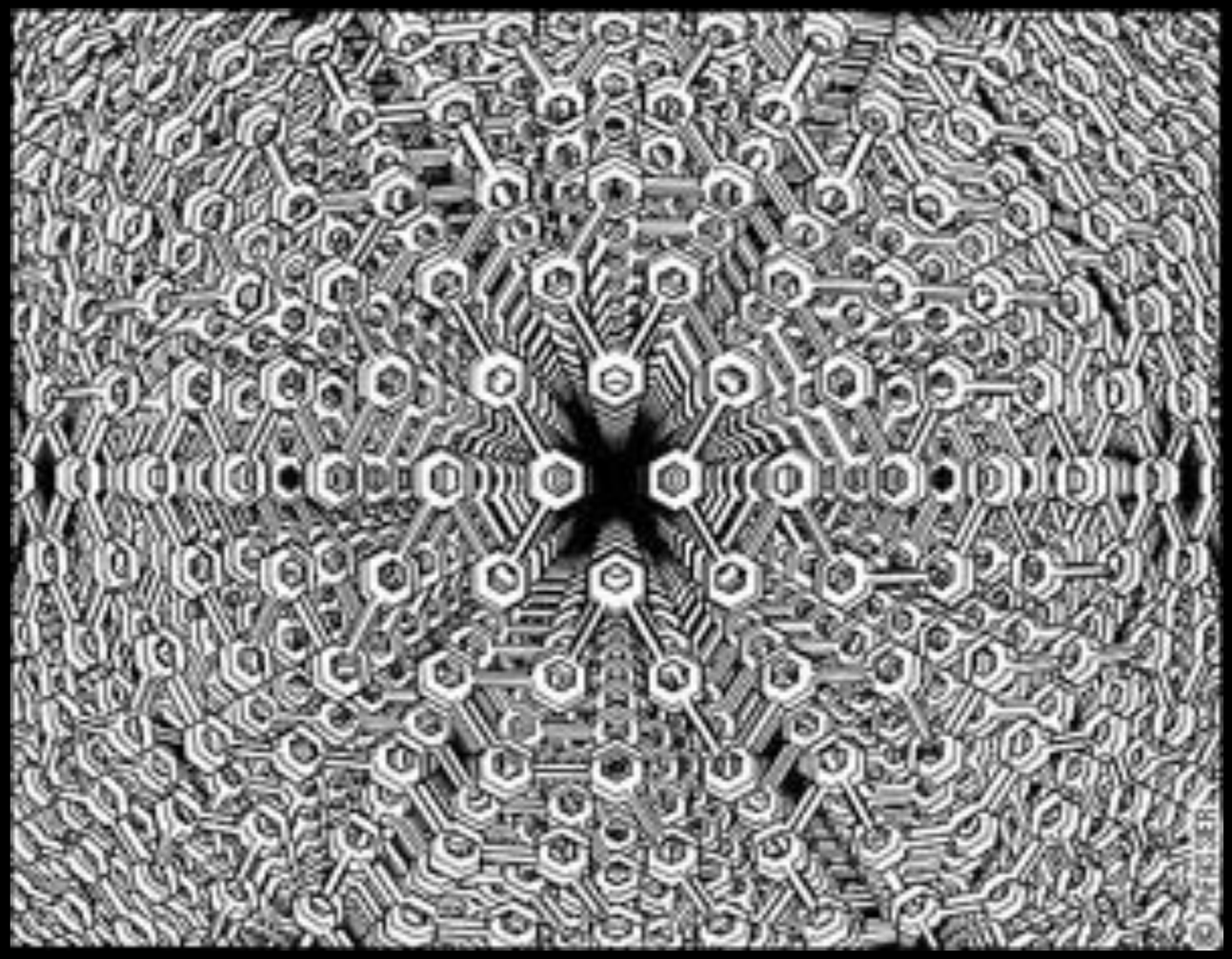


Figure 1.1.3: the suppliers-and-parts data model (network approach)

Borges vs Codd

n-dimensional space



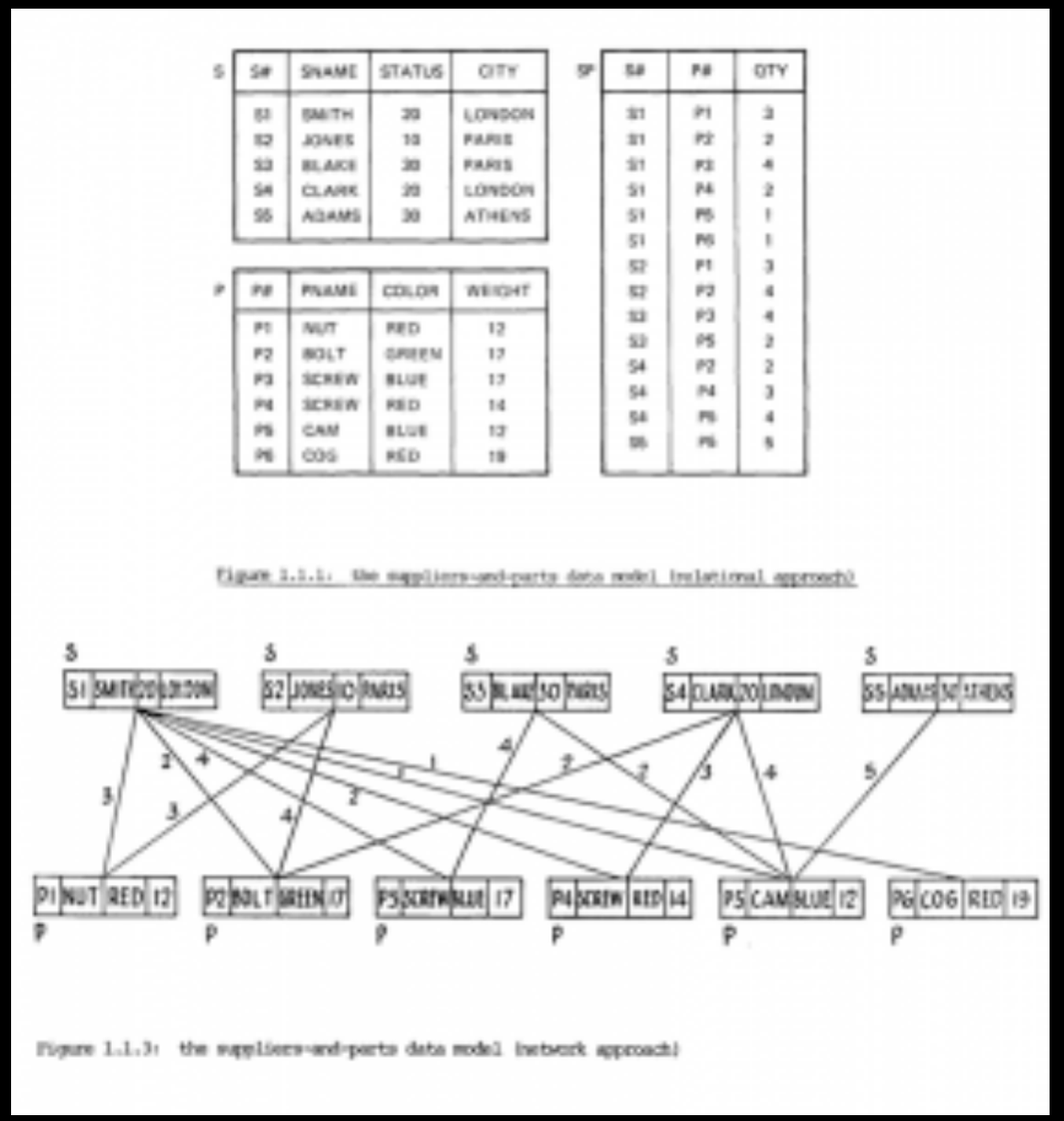


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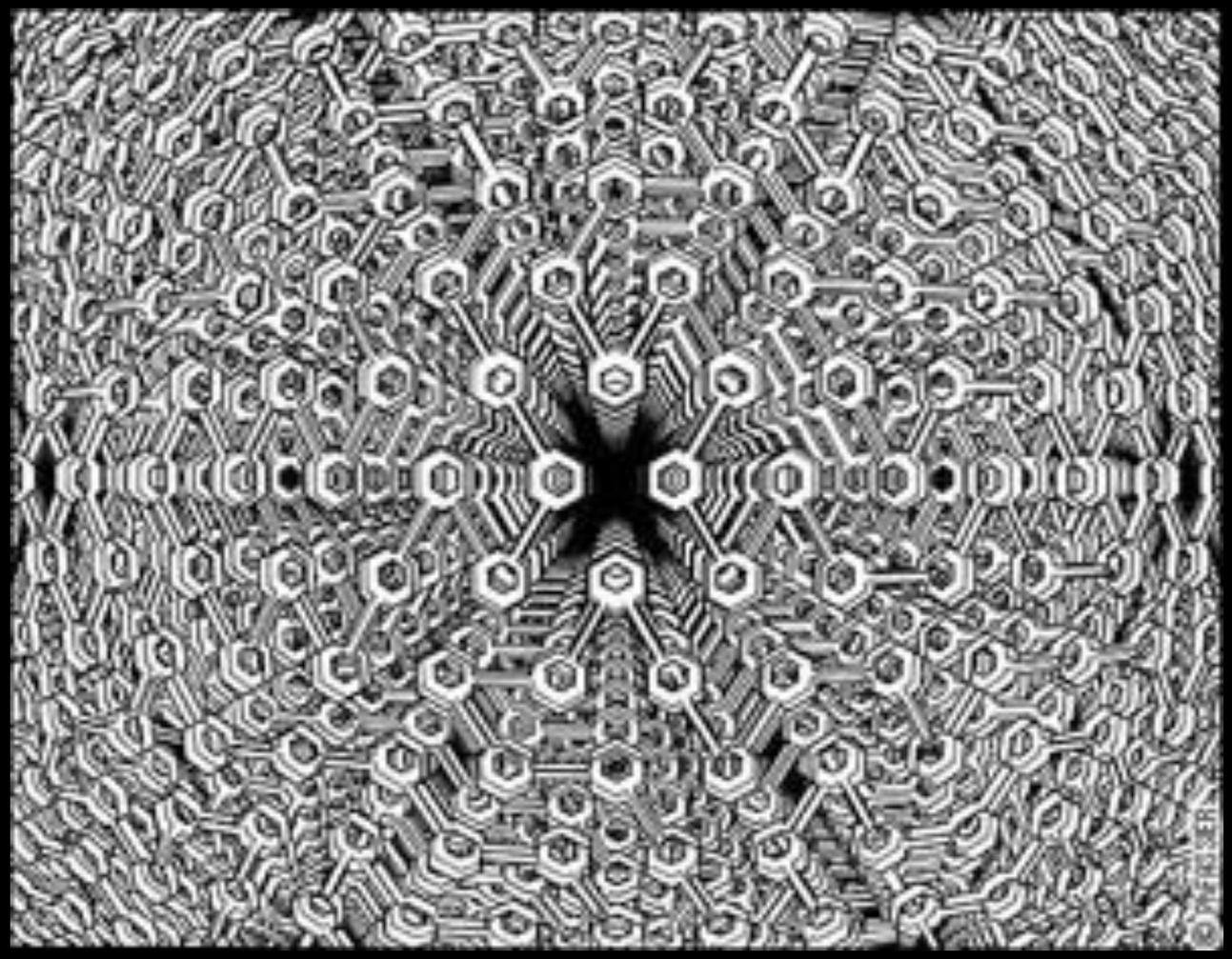
Figure 1.1.1: the suppliers-and-parts data model (relational approach)

Figure 1.1.3: the suppliers-and-parts data model (network approach)

Undefined maybe infinite…

Borges vs Codd

n-dimensional space: imagining a structure for information



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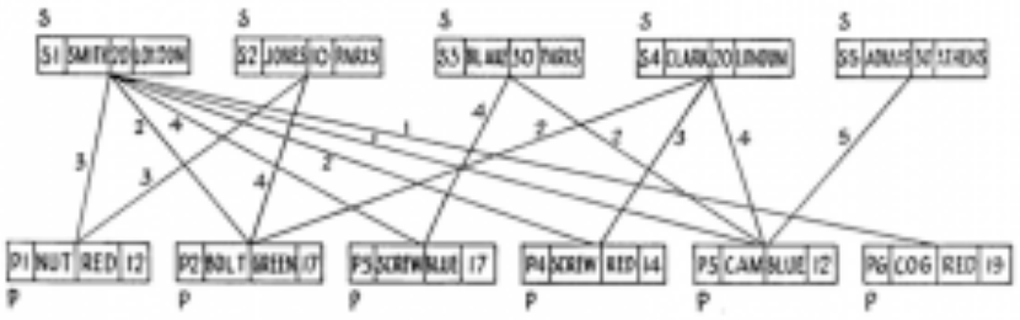
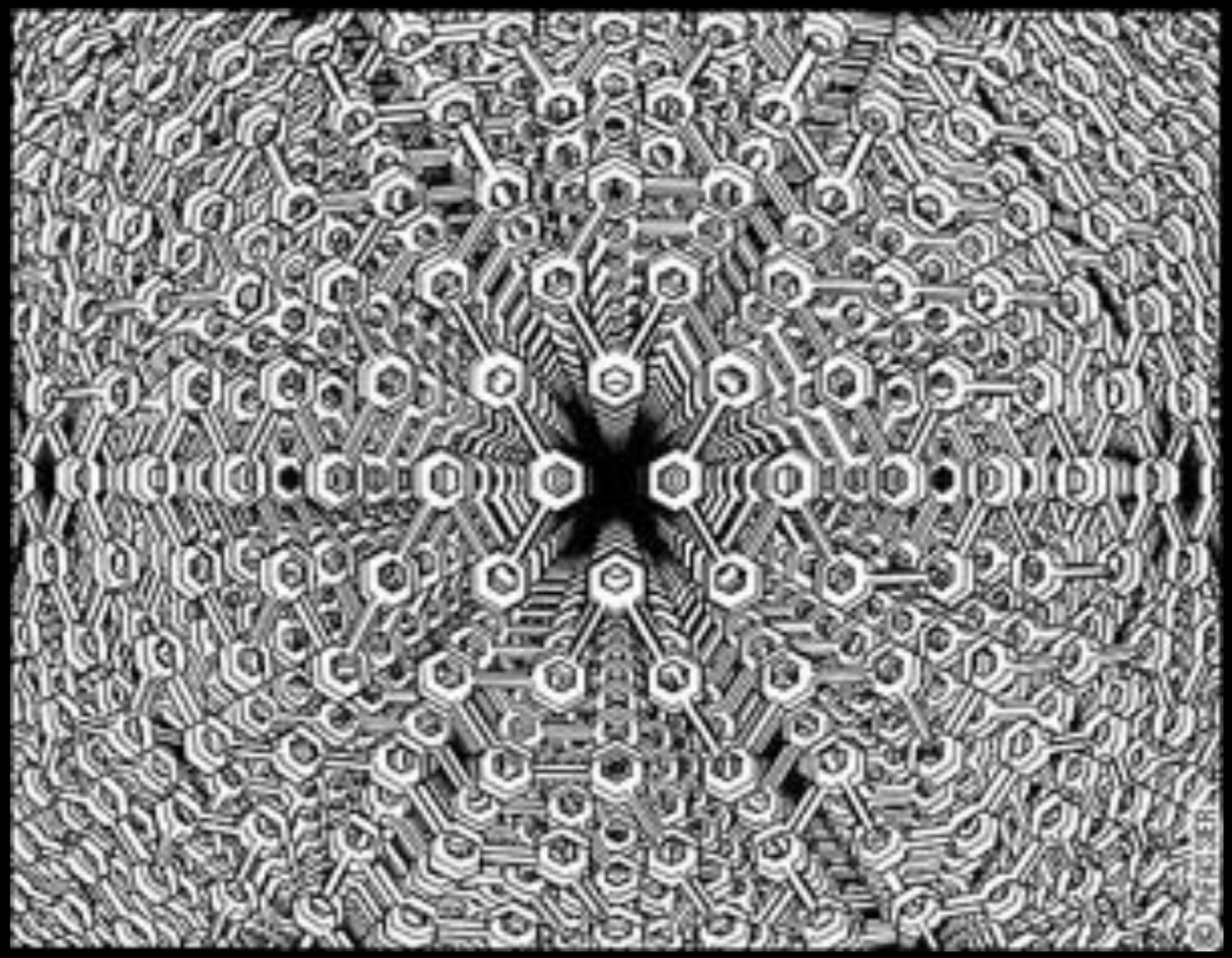


Figure 1.1.3: the suppliers-and-parts data model (network approach)

Borges vs Codd

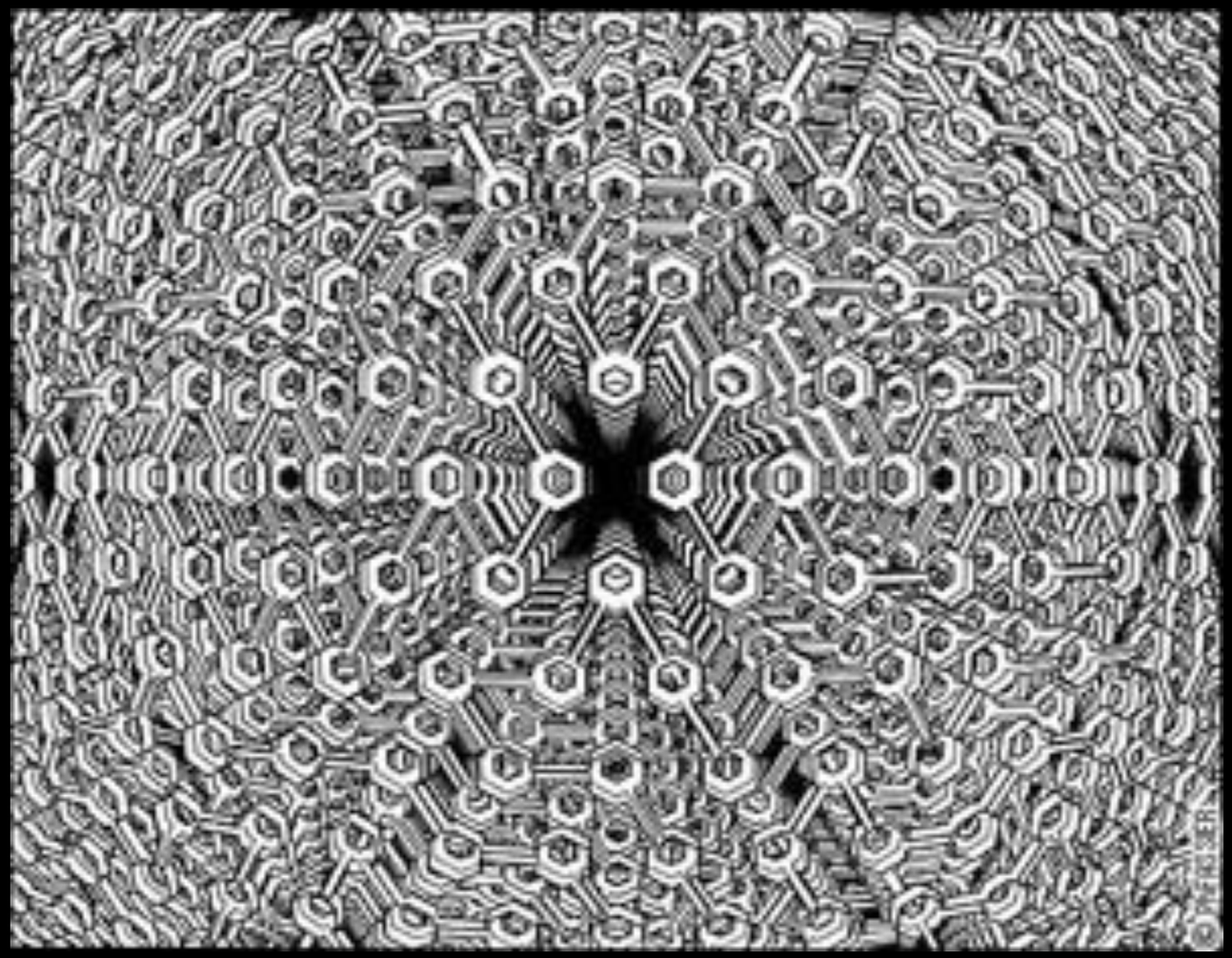
n-dimensional space: imagining a structure for information



Future users of large databanks must be protected from having to know how the data is organized in the Machine —Ted Codd

Borges vs Codd

abstraction, encapsulation, protection



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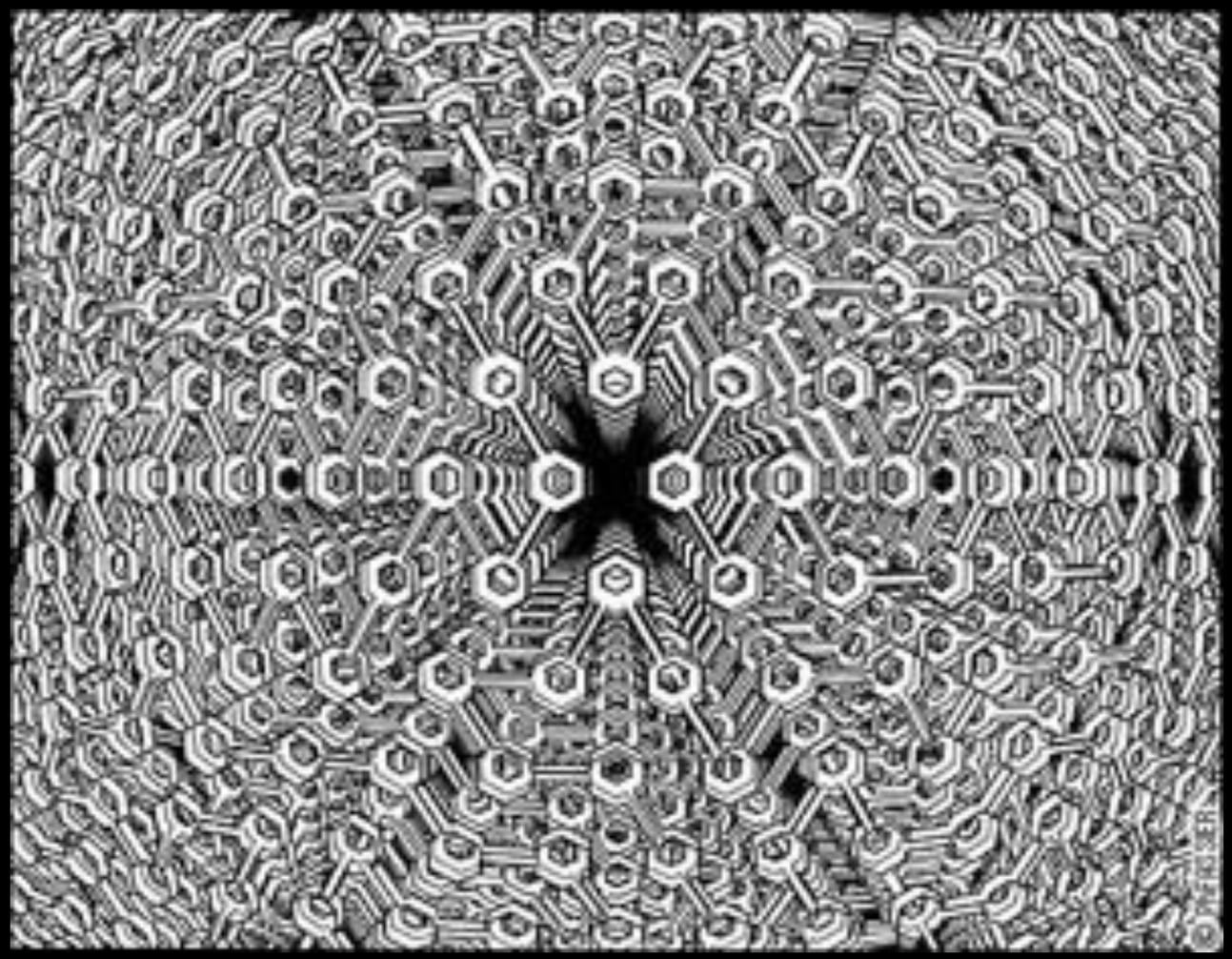


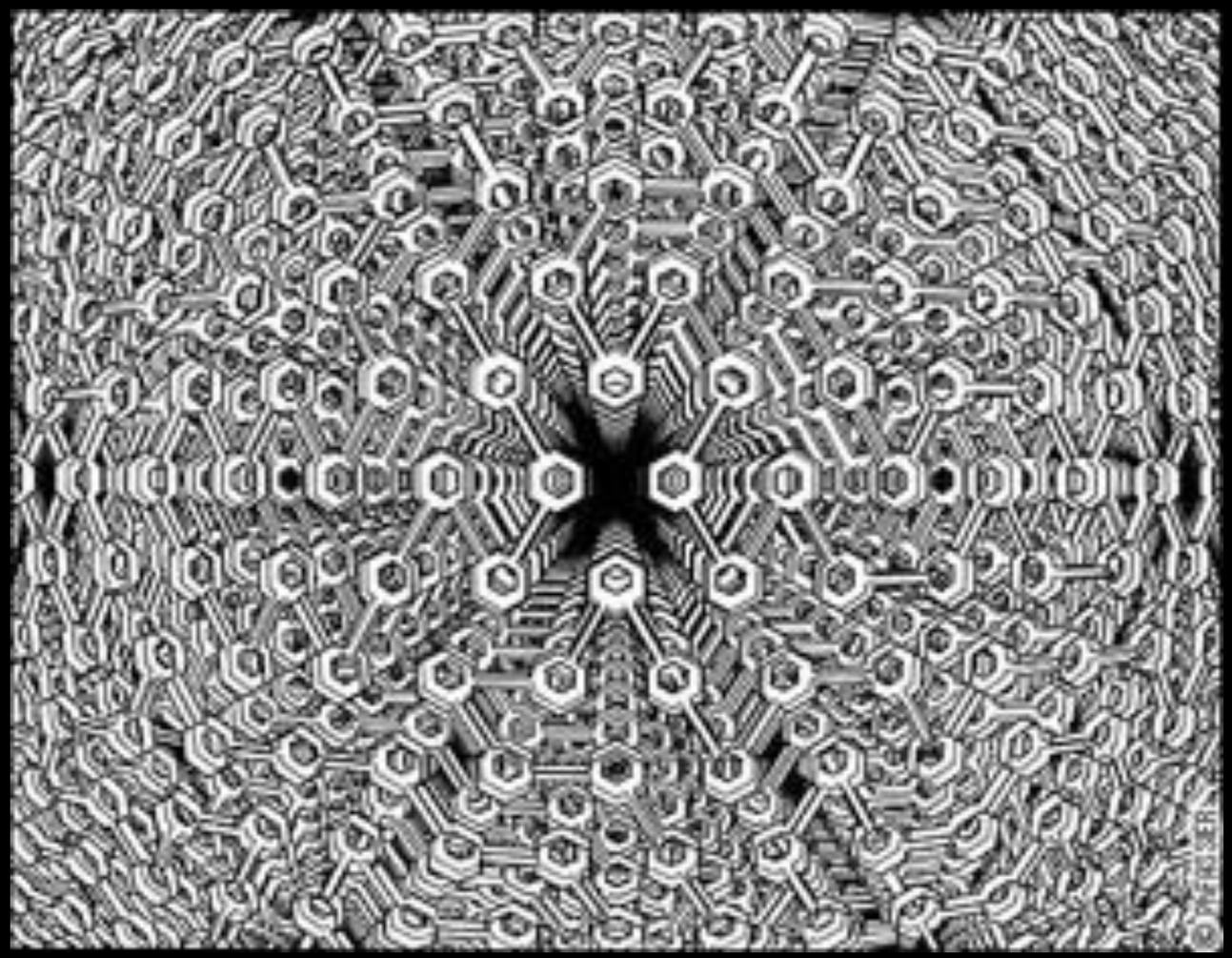
What are the datatypes?

What is being stored?

How is the information navigated?

Borges vs Codd

abstraction, encapsulation, protection

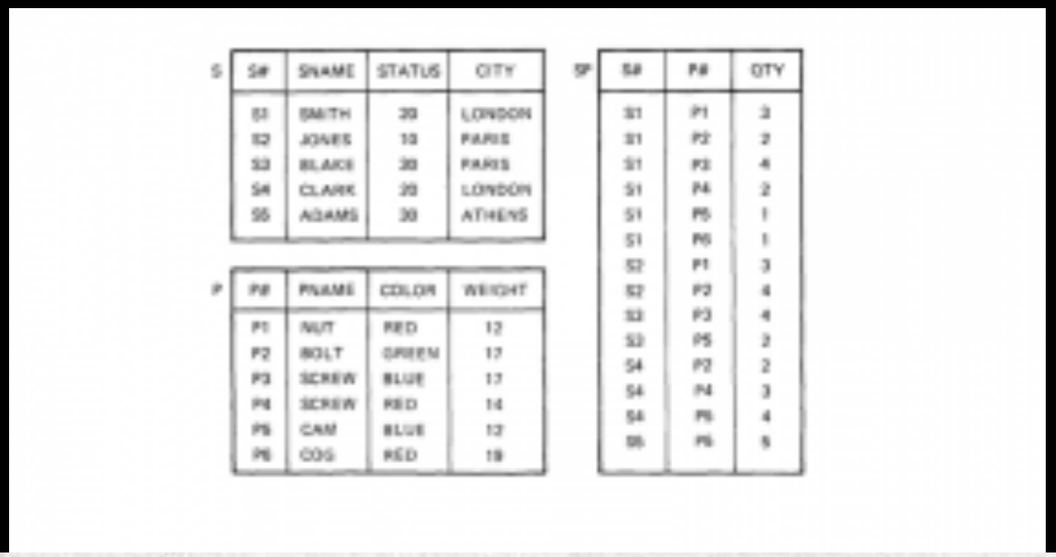


Borges: No map (all possibility)

Codd: ?

Borges vs Codd

The metaphor of tables (relations)



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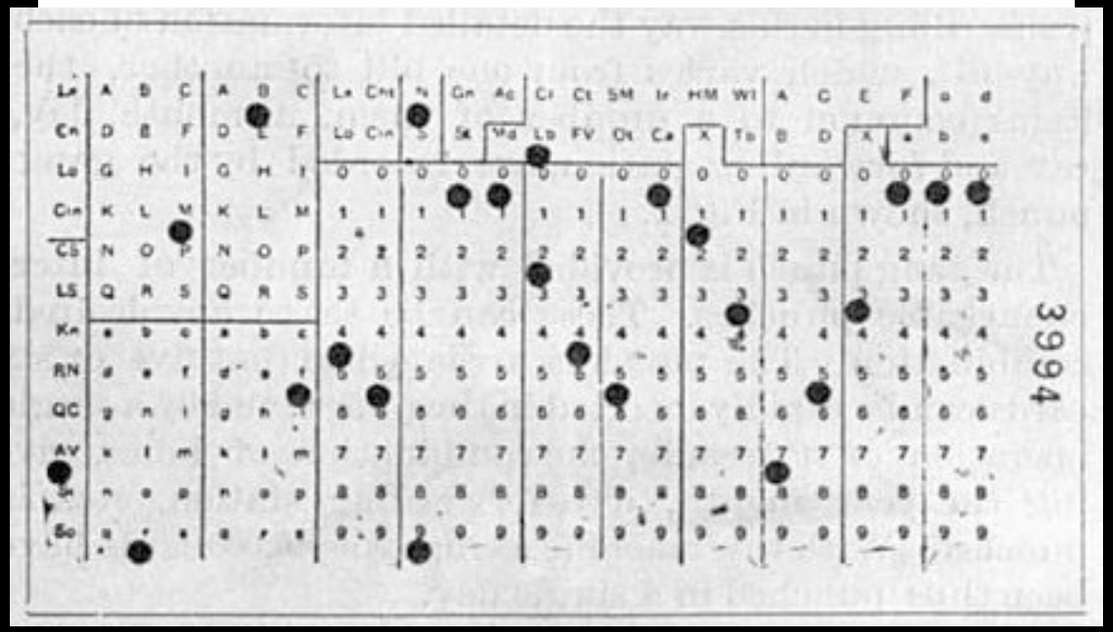
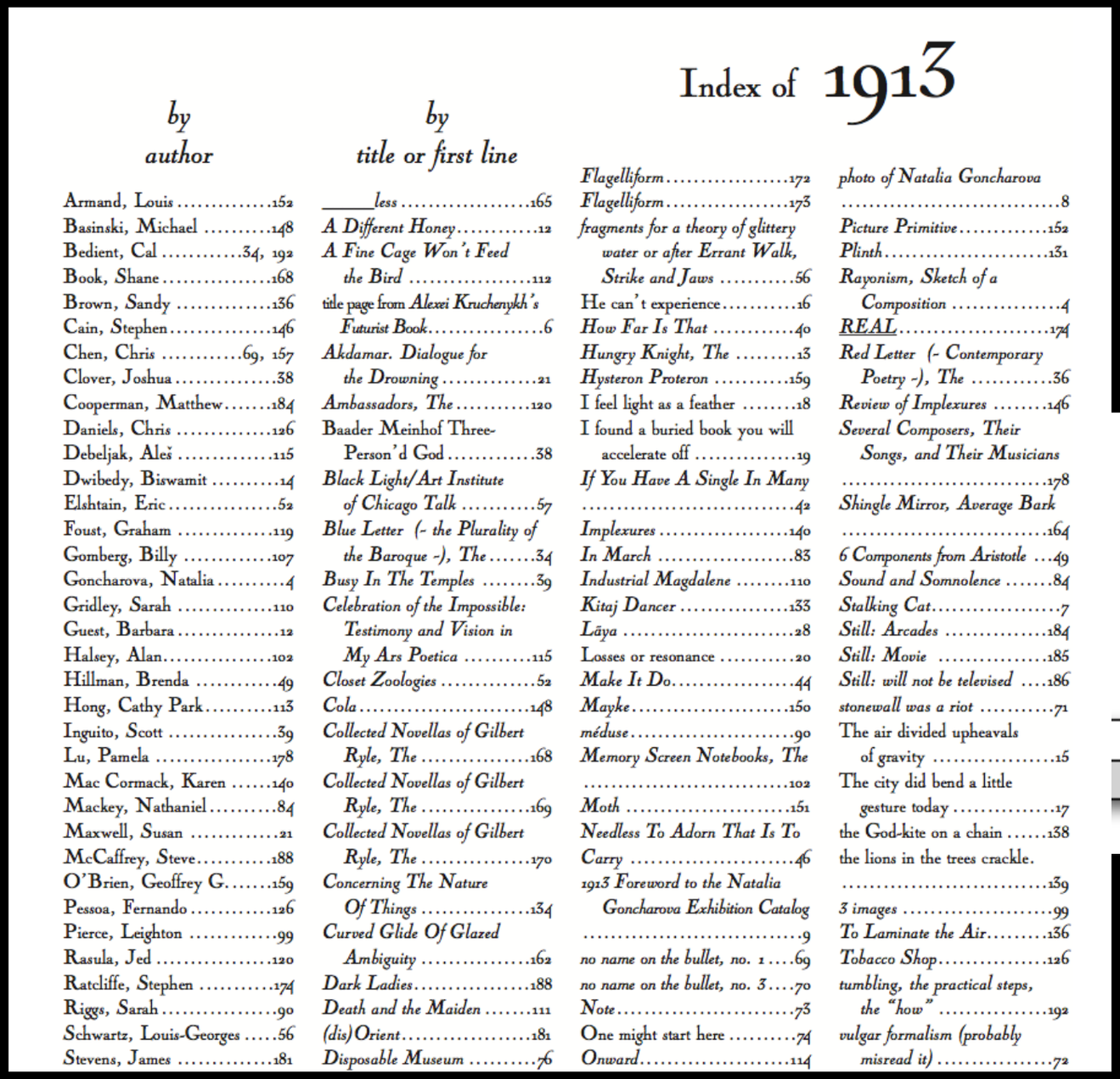


Borges: No map

Codd: Tables and indexes

Codd

Tables and Indexes

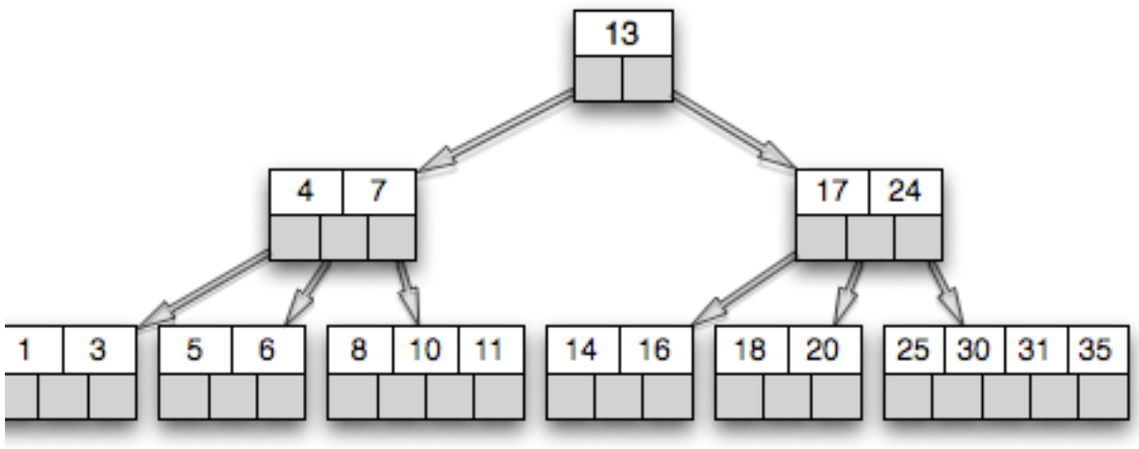


Index of 1913

by author

by title or first line

Indexing using symbols



Codd

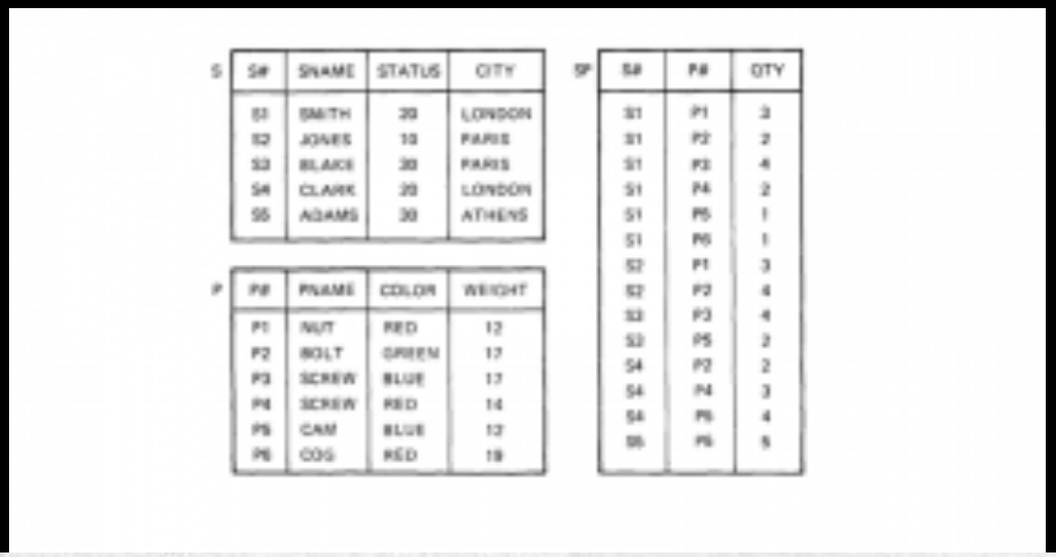
Tables and Indexes

Hierarchy (following the book metaphor):

title.section.chapter.paragraph.sentence.word.letter

Codd

Total information system



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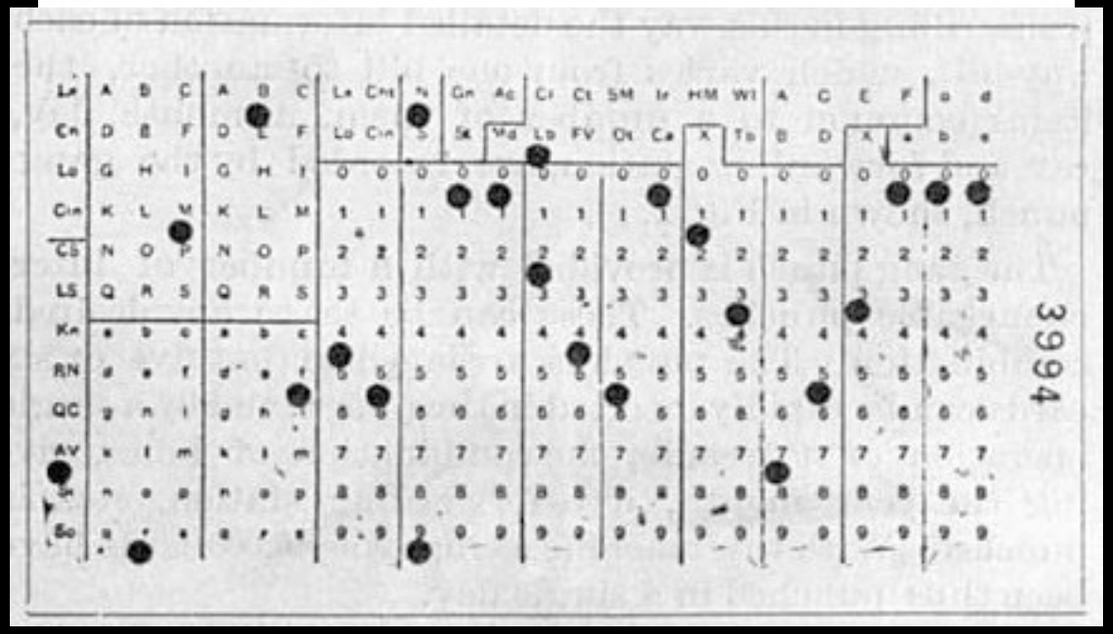


Symbolic and tabular representation to the user

Better mapping of batch processing

Allows for concurrent transactions

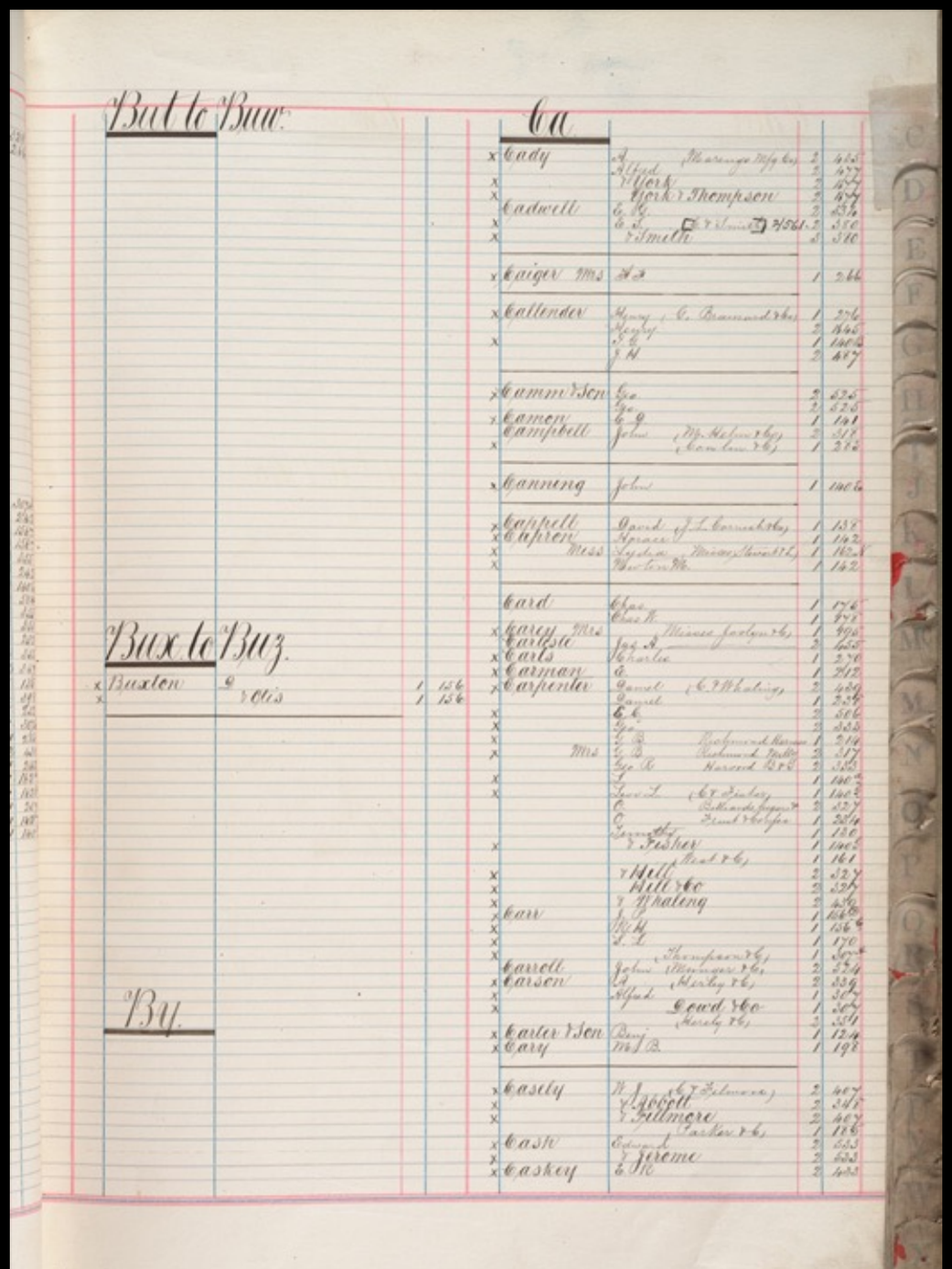
The rise of the relational database

Bureaucracy / Transactions

Methods for data storage and retrieval we're more influenced by managers and administrators then scientists

The rise of the relational database

Bureaucracy



1. Unification in centralization of records

2. Efficient querying and processing

3. Reliable and secure tracking

clearing houses/ ledgers

The rise of the relational database

Transactions

Atomicity
Consistency
Isolation
Durability

ATMs

The rise of the relational database

End goals

Simplifying the logical data structures

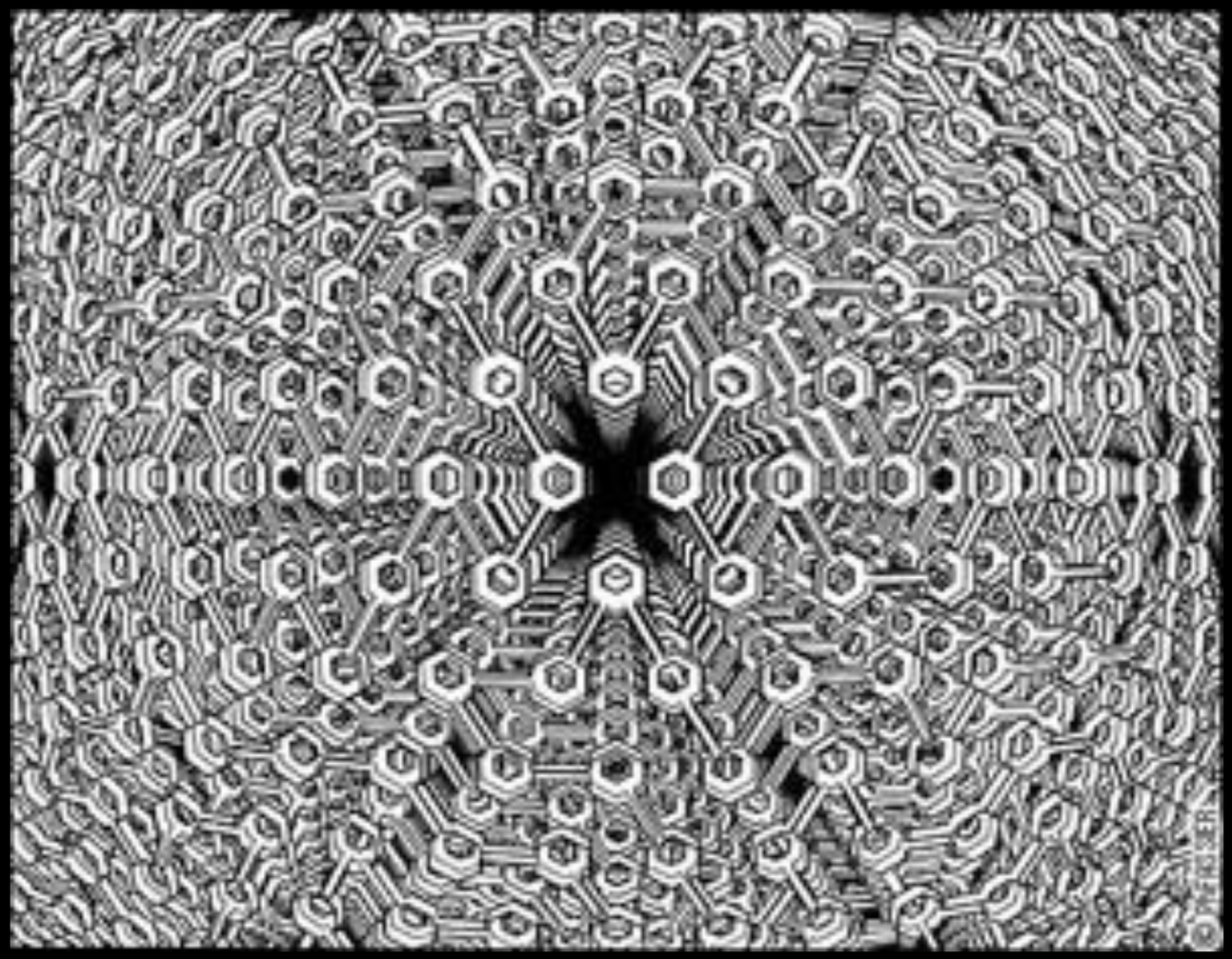
Allowing programmers and non-programmers to navigate

English language interface

Rules about access and integrity

The rise of the relational database

Why? (Why us?)

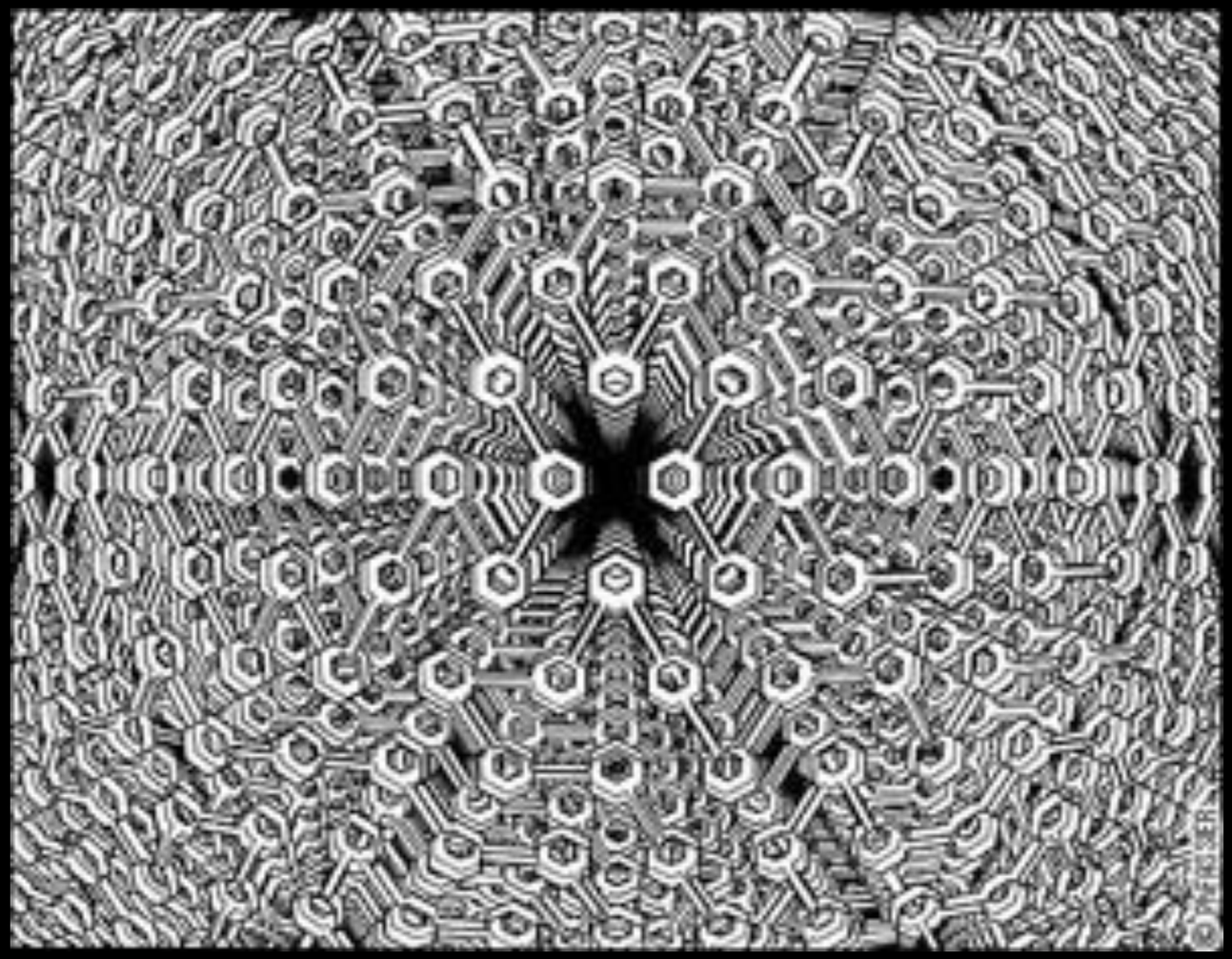


Alienation / Abstraction

(Borges, you are the librarian)

The rise of the relational database

Why? (Why us?)



Alienation / Abstraction

(Borges)

Storytelling…

Data: A Structured Series of Measurements

THE ARCHIVE —-> TABULAR DATA

Human development index (HDI)

HDI Rank	Country	1980	1985	1990	1995	2000	2005	2010	2011	2012
171	Afghanistan	0.228	0.273	0.297	0.321	0.334	0.399	0.448	0.456	0.463
85	Albania	0.625	0.623	0.624	0.619	0.656	0.695	0.722	0.728	0.729
83	Algeria			0.574	0.596	0.640	0.687	0.725	0.730	0.732
34	Andorra							0.823	0.821	0.844
149	Angola					0.390	0.449	0.509	0.521	0.524
58	Antigua and Barbuda							0.782	0.778	0.781
40	Argentina	0.675	0.694	0.705	0.731	0.762	0.775	0.811	0.818	0.831
85	Armenia			0.632	0.605	0.648	0.695	0.721	0.723	0.728
2	Australia			0.865	0.882	0.898	0.912	0.927	0.930	0.932
23	Austria	0.747	0.764	0.794	0.815	0.836	0.853	0.879	0.881	0.884
78	Azerbaijan				0.609	0.640	0.688	0.741	0.742	0.745
55	Bahamas					0.778	0.780	0.774	0.778	0.783
45	Bahrain	0.679	0.727	0.746	0.775	0.794	0.816	0.819	0.817	0.819
142	Bangladesh	0.338	0.356	0.386	0.424	0.468	0.505	0.546	0.559	0.563
57	Barbados	0.670	0.700	0.716	0.731	0.753	0.765	0.780	0.786	0.793
50	Belarus					0.683	0.723	0.786	0.793	0.796
21	Belgium	0.755	0.774	0.806	0.851	0.874	0.866	0.883	0.886	0.889
101	Belize			0.644	0.664	0.683	0.701	0.710	0.711	0.716
166	Benin	0.286	0.327	0.344	0.368	0.392	0.433	0.468	0.473	0.475

Left: illustration of Borges, *The Library of Babel*
Right: UNDP Human Development data

Measurements —> Meaning

Five Steps

1. Reading / Research

2. Organizing / Taxonomies

3. Building / Data Structures

4. Searching / Aggregating

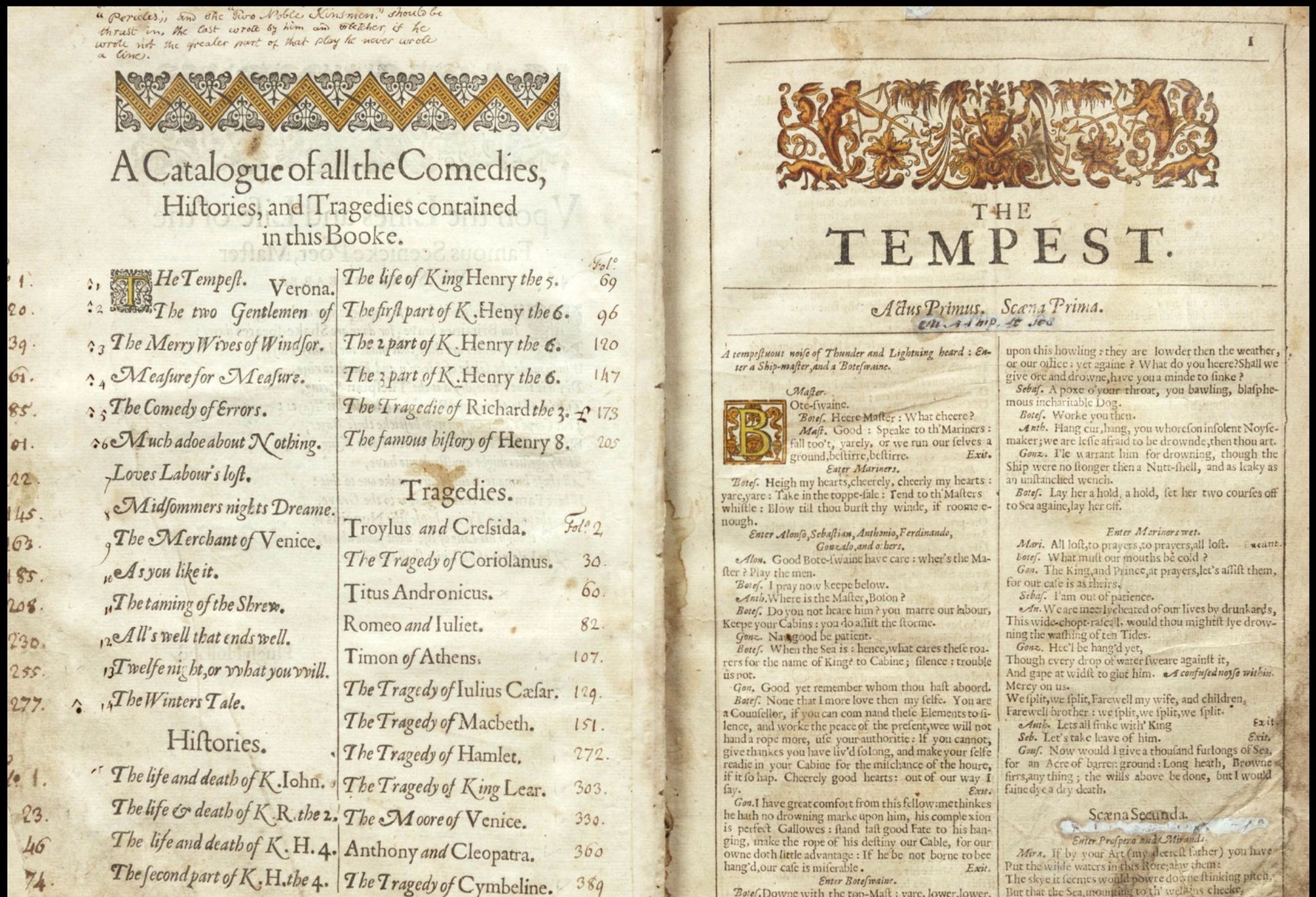
5. Displaying / Generating Knowledge

Meaning is built as each stage — different kinds of meaning…

Measurements —> Meaning

1. Reading / Research

Folio image of Shakespeare's works.



"Pericles," and the "Two Noble Kinsmen" should be thrust in, the last wrote by him and Fletcher, if he wrote not the greater part of that play he never wrote a line).

A Catalogue of all the Comedies, Histories, and Tragedies contained in this Booke.

THE TEMPEST.

Actus Primus. Scæna Prima.

A ship at sea

A tempestuous noise of Thunder and Lightning heard: Enter a Ship-master, and a Boteswaine.

Master.

Bote-swaine.

Bote. Heere Master: What cheere?

Mast. Good: Speake to th'Mariners: fall too't, yarely, or we run our selves a ground, bestirre, bestirre. *Exit.*

Enter Mariners.

Bote. Heigh my hearts, cheerely, cheerly my hearts: yare, yare: Take in the toppe-sale: Tend to th'Masters whistle: Blow till thou burst thy winde, if roome enough.

Enter Alonso, Sebastian, Anthonio, Ferdinando, Gonzalo, and others.

Alon. Good Bote-swaine have care: wher's the Master? Play the men.

Bote. I pray now keepe below.

Ant. Where is the Master, Boson?

Bote. Do you not heare him? you marre our labour, Keepe your Cabins: you do assist the storme.

Gonz. Nay good be patient.

Bote. When the Sea is: hence, what cares these roarers for the name of King? to Cabine; silence: trouble us not.

Gon. Good yet remember whom thou hast aboord.

Bote. None that I more love then my selfe. You are a Counsellor, if you can com nand these Elements to silence, and worke the peace of the present, wee will not hand a rope more, use your authoritie: If you cannot, give thankes you have liv'd so long, and make your selfe readie in your Cabine for the mischance of the houre, if it so hap. Cheerely good hearts: out of our way I say. *Exit.*

Gon. I have great comfort from this fellow: methinkes he hath no drowning marke upon him, his complexion is perfect Gallowes: stand fast good Fate to his hanging, make the rope of his destiny our Cable, for our owne doth little advantage: If he be not borne to bee hang'd, our case is miserable. *Exit.*

Enter Boteswaine.

Bote. Downe with the top-Mast: yare, lower, lower. upon this howling: they are lowder then the weather, or our office: yet againe? What do you heere? Shall we give ore and drowne, have you a minde to sinke?

Sebast. A poxe o'your throat, you bawling, blasphemous incharitable Dog.

Bote. Worke you then.

Anth. Hang cur, hang, you whoreson insolent Noysemaker; we are lesse afraid to be drownde, then thou art.

Gonz. I'le warrant him for drowning, though the Ship were no stonger then a Nutt-shell, and as leaky as an unstanched wench.

Bote. Lay her a hold, a hold, set her two courses off to Sea againe, lay her off.

Enter Mariners wet.

Mari. All lost, to prayers, to prayers, all lost. *Exeunt.*

Bote. What must our mouths be cold?

Gon. The King, and Prince, at prayers, let's assist them, for our case is as theirs.

Sebast. I am out of patience.

An. We are meerely cheated of our lives by drunkards, This wide-chopt-rascall, would thou mightst lye drowning the washing of ten Tides.

Gonz. Hee'l be hang'd yet,
Though every drop of water sweare against it,
And gape at widst to glut him. *A confused noyse within.*
Mercy on us.
We split, we split, Farewell my wife, and children,
Farewell brother: we split, we split, we split.

Ant. Lets all sinke with' King *Exit.*

Seb. Let's take leave of him. *Exit.*

Gonz. Now would I give a thousand furlongs of Sea, for an Acre of barren ground: Long heath, Browne firrs, any thing; the wills above be done, but I would faine dye a dry death.

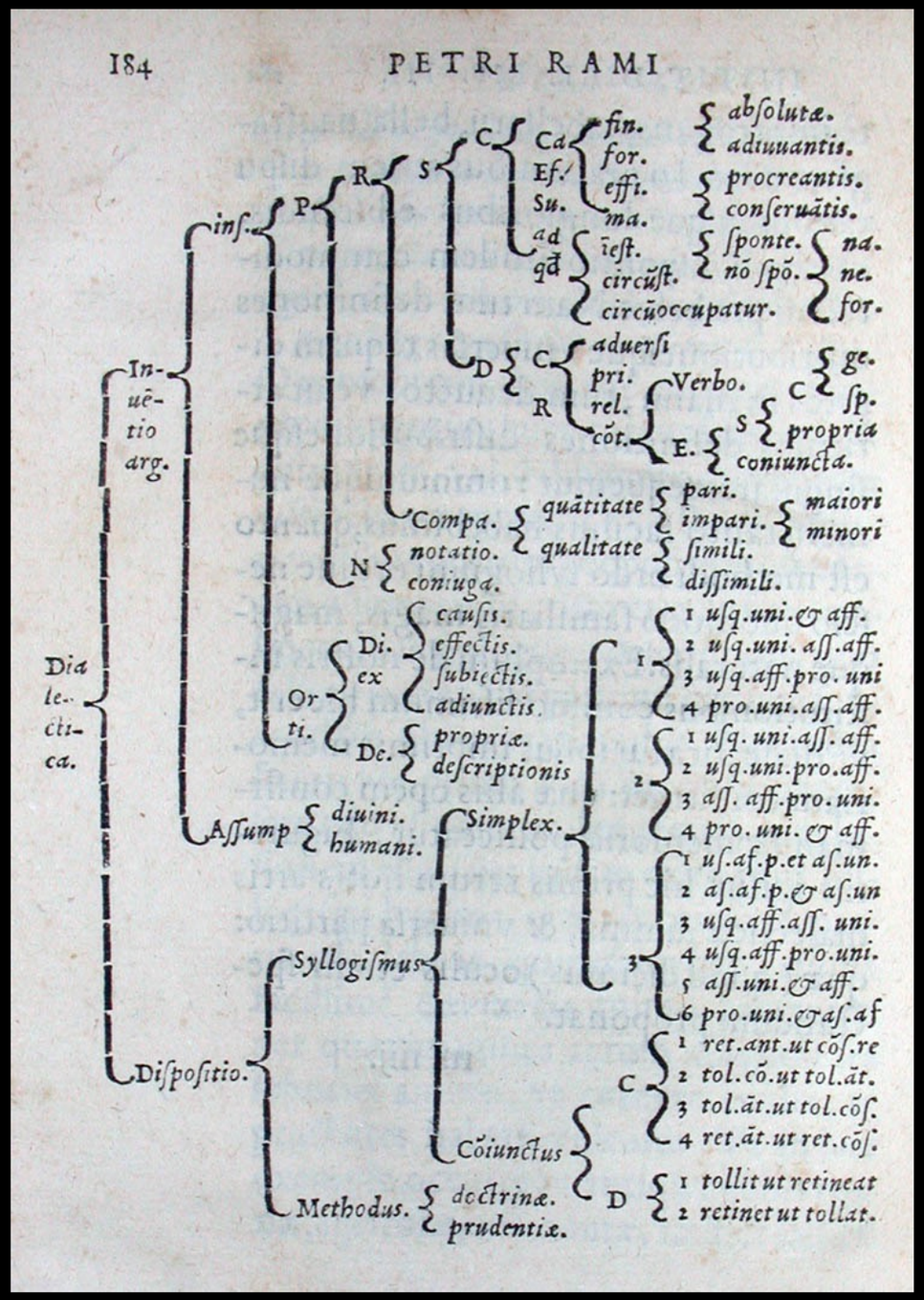
Scæna Secunda.

Enter Prospero and Miranda.

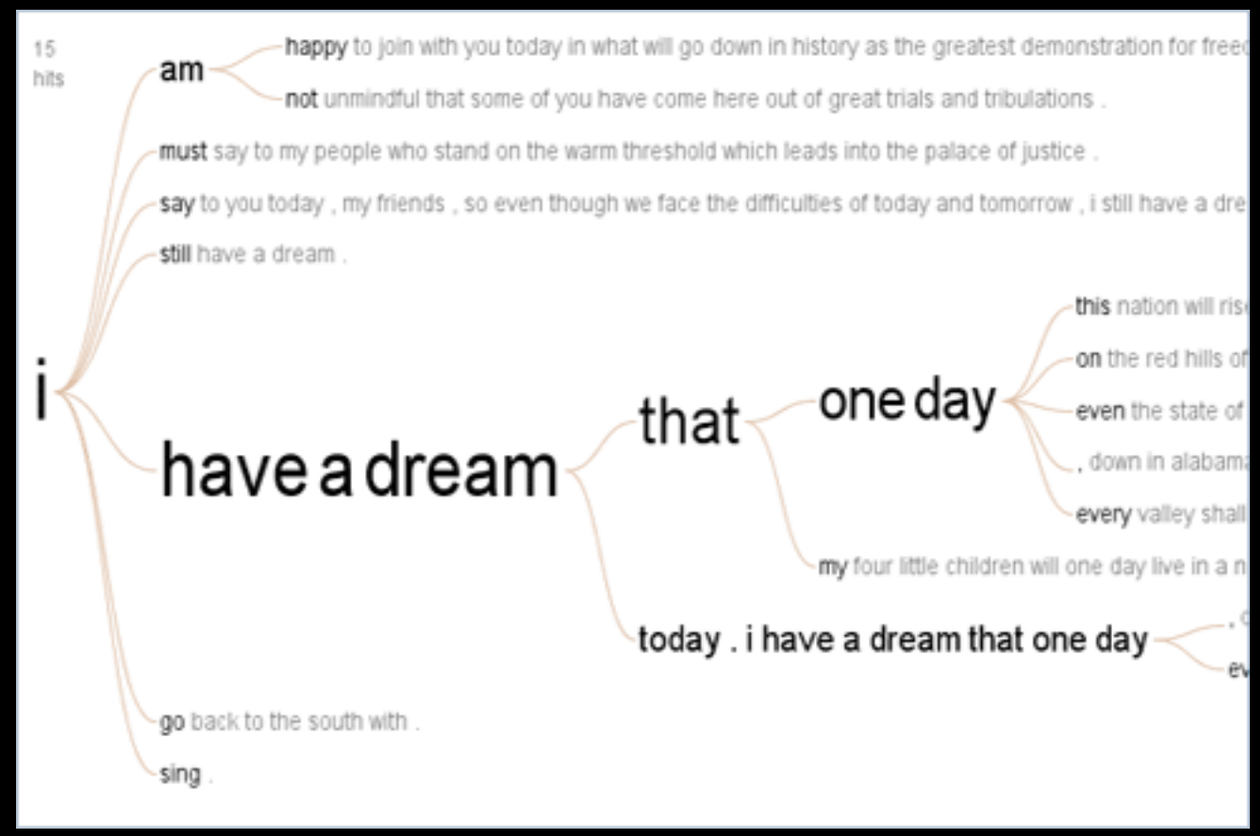
Mira. If by your Art (my deerest father) you have
Put the wilde waters in this Rore; alay them:
The skye it seemes would powre downe stinking pitch.
But that the Sea, mounting to th' welkins cheeke,

Measurements —> Meaning

2. Organizing / Taxonomies



Digitization



Left: Petrus Ramus, classification structure from *Dialectique,* 1555
Right: Fernanda Viegas & Martin Wattenberg, Word Tree 2007

Measurements —> Meaning

3. Building / Data Structures

```
mondial=# SELECT country, max(population)
mondial-#     FROM city
mondial-#     WHERE population IS NOT NULL
mondial-#     GROUP BY country
mondial-#     ORDER BY country
mondial-#     LIMIT 15;
 country |   max
---------+---------
 A       | 1761738
 AFG     | 2435400
 AG      |   22219
 AL      |  418495
 AND     |   22256
 ANG     | 2107648
 ARM     | 1066264
 AUS     | 4605992
 AZ      | 2150800
 B       |  507911
 BD      | 7423137
 BDS     |   88529
 BEN     |  665100
 BF      | 1475223
 BG      | 1270284
(15 rows)

mondial=#
```

SQL:
Standard Query Language

The Data is Out There…
Maybe…

Measurements —> Meaning

4. Searching / Aggregating

Python!!!!

```
html_str = urlopen("http://www.journalism.columbia.edu/page/10/10?category_ids
s%5B%5D=3&category_ids%5B%5D=37").read()
document = BeautifulSoup(html_str, "html.parser")
faculty_list = []
for faculty_tag in document.find_all('li'):
    # create empty dictionary to store this faculty member
    faculty_dict = {}
    # faculty name
    h4_tag = faculty_tag.find('h4')
    a_tag = h4_tag.find('a')
    faculty_dict['name'] = a_tag.string
    # image URL
    img_tag = faculty_tag.find('img')
    faculty_dict['img_src'] = img_tag['src']
    # title
    p_tag = faculty_tag.find('p', attrs={'class': 'description'})
    faculty_dict['title'] = p_tag.string
    # append to list
    faculty_list.append(faculty_dict)
```

Measurements —> Meaning

5. Displaying / Generating Knowledge

Design/Aesthetics
Interactivity/Screen Space