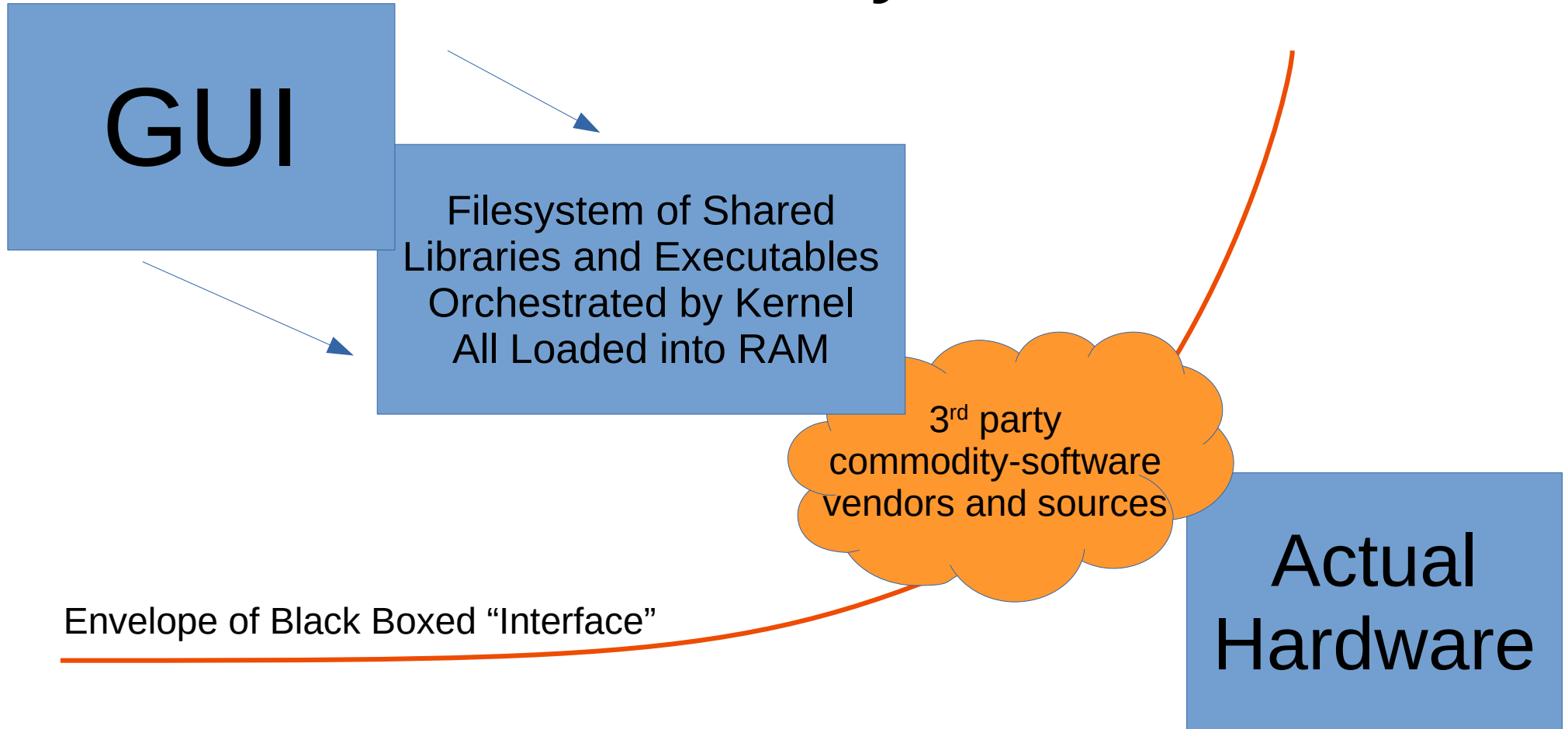


The Long History of Metrics Before and After Cybernetics

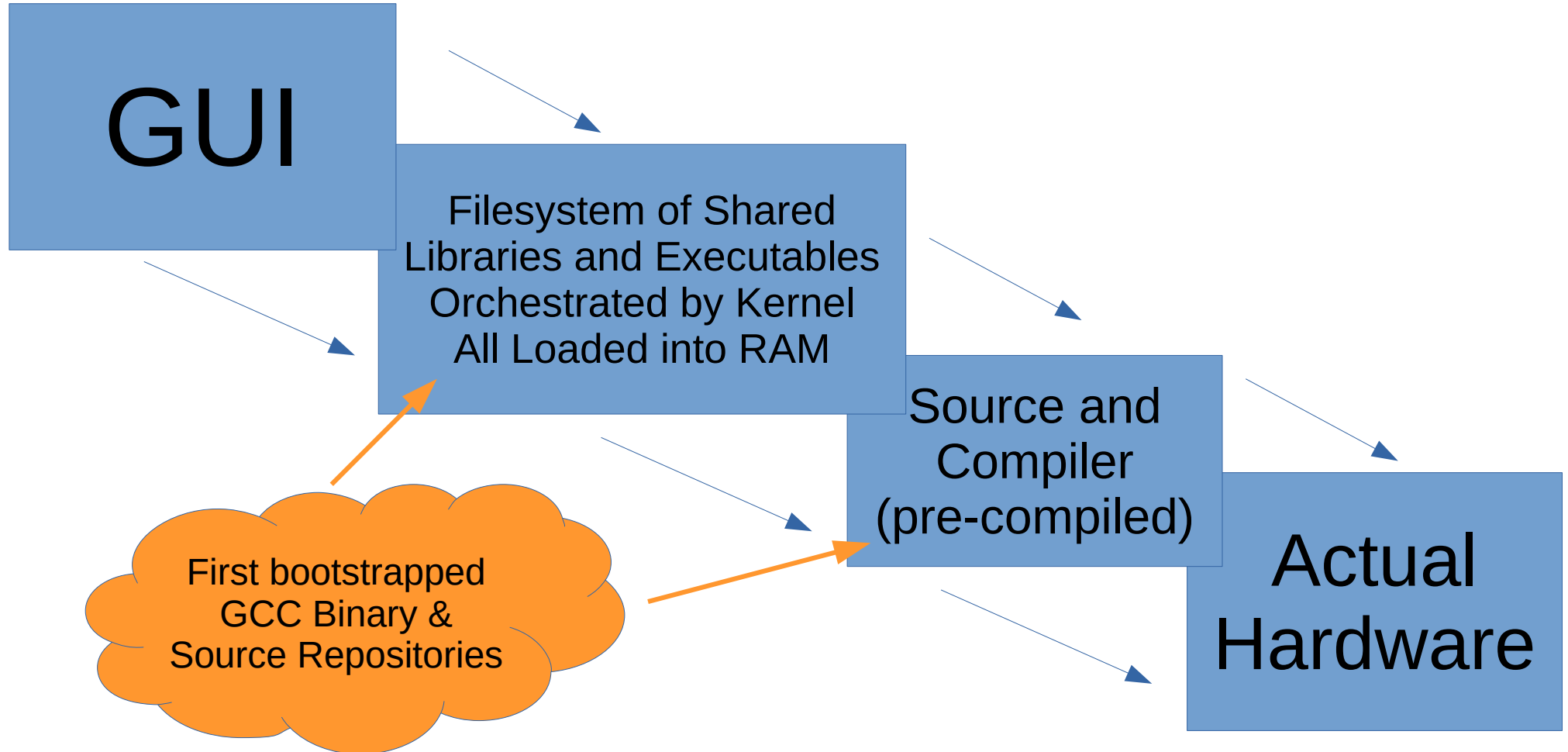
Clinton Ignatov
LibrePlanet 2023, Boston MA
March 19, 2023

<http://concernednetizen.com>

Consider the Binary-Based Stack



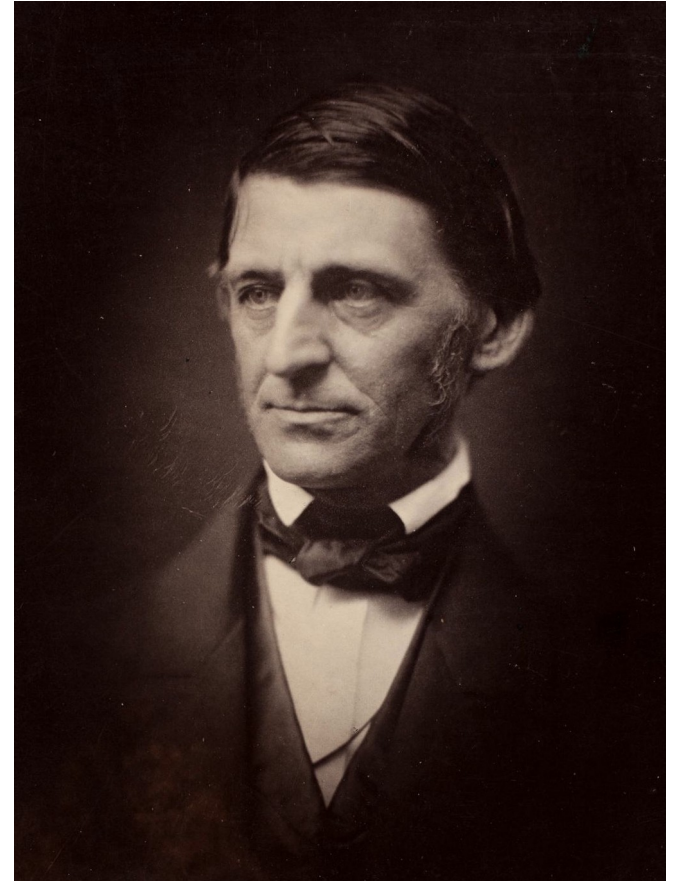
Consider the Source-Based Stack



Ralph Waldo Emerson

Our nineteenth century is the age of tools. They grow out of our structure. “Man is the metre of all things,” said Aristotle; “the hand is the instrument of all instruments, and the mind is the form of forms.” The human body is the magazine of inventions, the patent-office, where are the models from which every hint was taken. **All the tools and engines on the earth are only extensions of its limbs and senses.**

—Emerson, *Society and Solitude*, 1870



The Double-Entry Account Ledger

Luca Pacioli (1447-1517) wrote *Summa de Arithmetica, Geometria, Proportini et Proportionalitá* in Venice during the height of the financial empire of the Medici family. This book prescribed double-entry accounting as the surest—and most sublimely *balanced* and divine—means of book keeping, and was exported across the world. This created modern accounting.



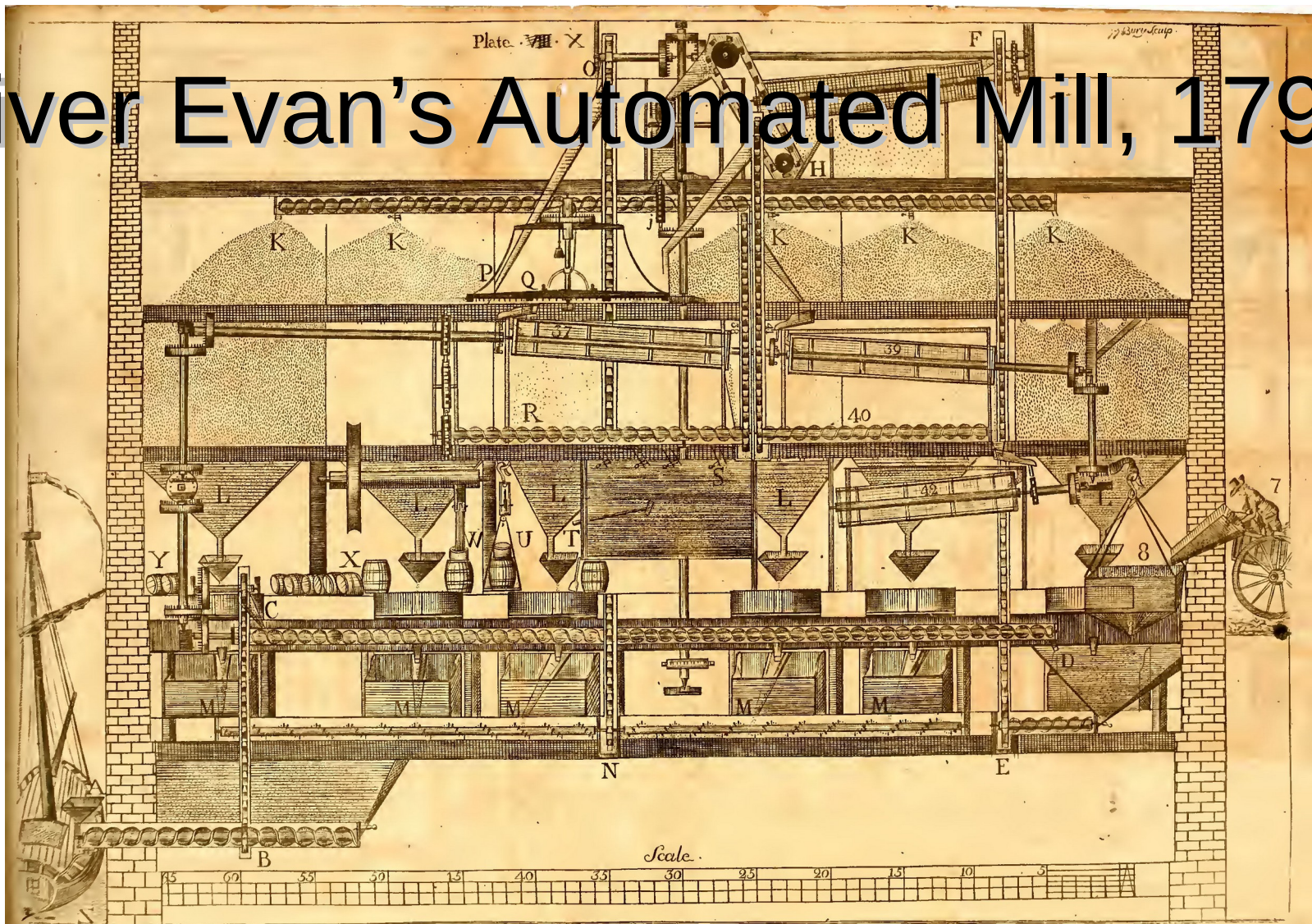
Rationalization and the Iron Cage

- Sociologist Max Weber's explained, in 1906, the imprisonment of the modern subject within the **iron cage** (Talcott Parson's translation) of an ever-optimizing, efficient system or social machine as owing to Protestant ascetism and ideal of "hard work."
- **Rationalization**, as a buzz-word, was applied at unprecedented scale in Germany in the 1920s, as a post-war economic reconstruction project. Everything was measured and optimized toward most efficiency. Work, life, society all redefined within mathematical paramaters.

From Handicraft to Total Automation

- **Job Production:** Single, one-off creations. A custom tailored suit, a wedding cake, a single building.
- **Batch Processing:** The parallel production of units collectively in batches. Vintage of wine, a bakery's single-day production, housing development.
- **Flow Production:** perpetual production, constant inflow and outflow without storage. Just-in-time economics. 24/7 factory line work. ***Most Efficient***

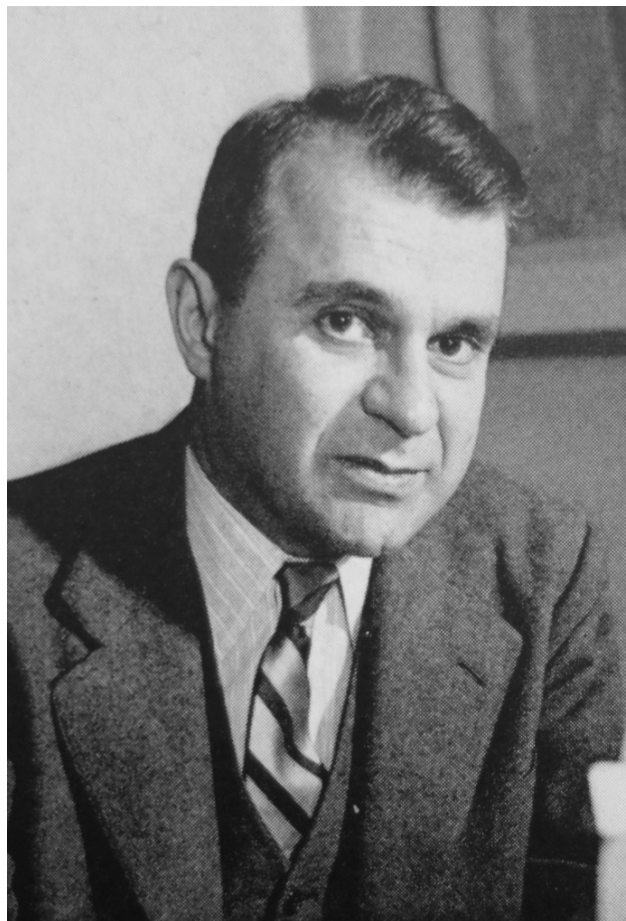
Oliver Evan's Automated Mill, 1795



The Ford Assembly Line, 1939



Wassily Leontif's I/O Analysis

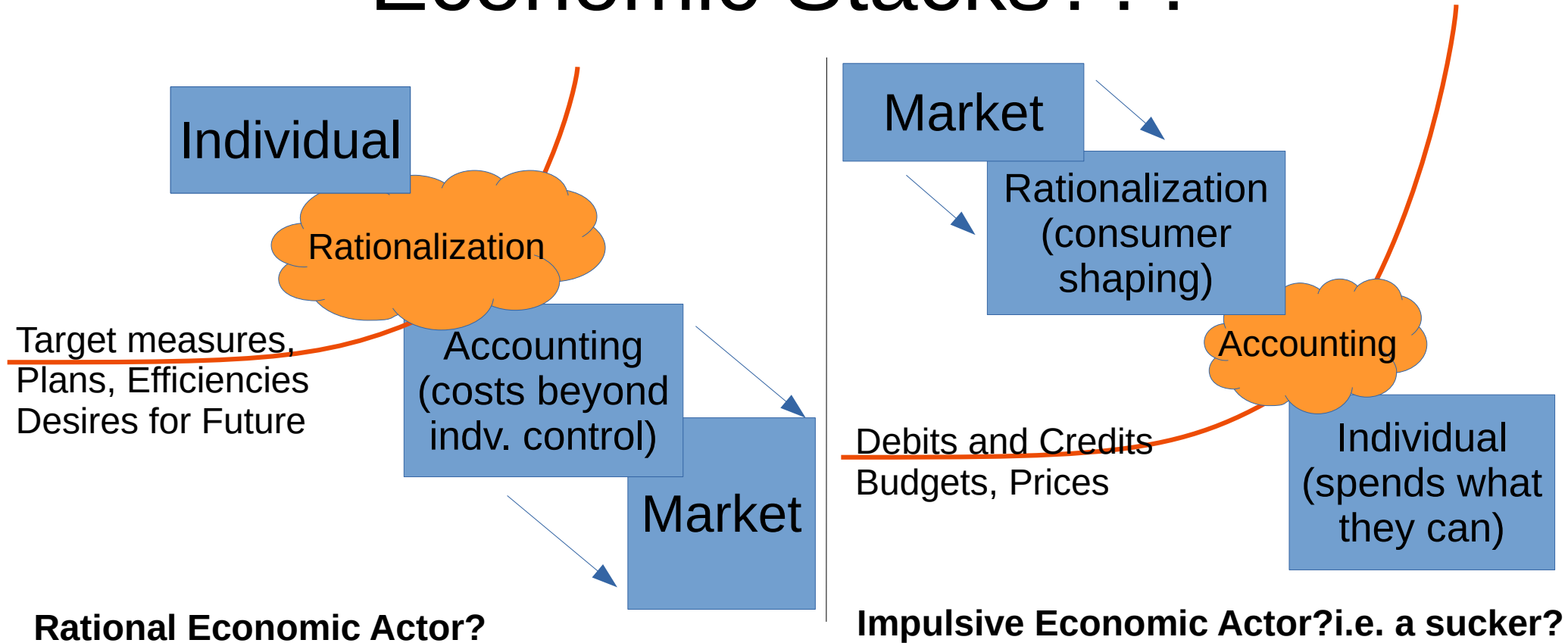


INTERINDUSTRY FLOW OF GOODS AND SERVICES BY INDUSTRY OF ORIGIN
AND DESTINATION, 1947*
(In millions of dollars)

	(1) Agri- culture and fisheries	(2) Food and kindred products	(3) Chem- icals	(4) Iron and steel	(5) Non- ferrous metals	(6) Motor vehicles
1. Agriculture and fisheries	10,856	15,048	1,211	...	11	...
2. Food and kindred products	2,378	4,910	685	3	... ^a	...
3. Chemicals	830	1,451	2,655	99	85	111
4. Iron and steel . . .	6	2	5	3,982	33	1,102
5. Nonferrous metals	189	324	2,599	176
6. Motor vehicles . . .	111	3 ^a	... ^a	4,401
7. Coal, gas, and electric power . . .	61	193	188	242	104	62
8. Railroad trans- portation	440	548	287	423	100	228

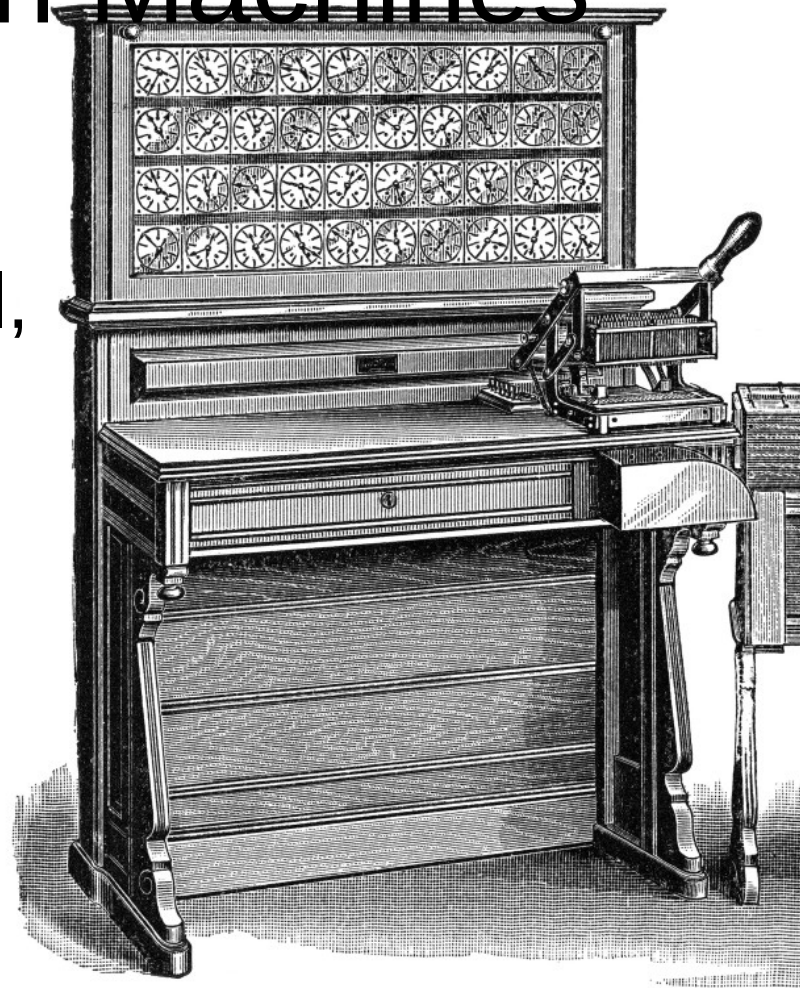
SOURCE: W. Duane Evans and Marvin Hoffenberg, "The Interindustry Relations Study for 1947," *Review of Economics and Statistics*, May, 1952, table 4.

How Does it All Fit Together? Economic Stacks???



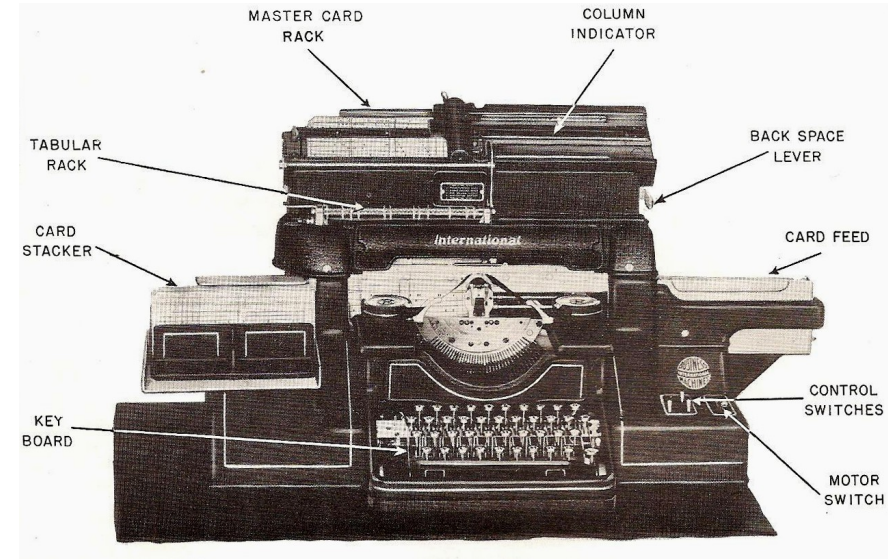
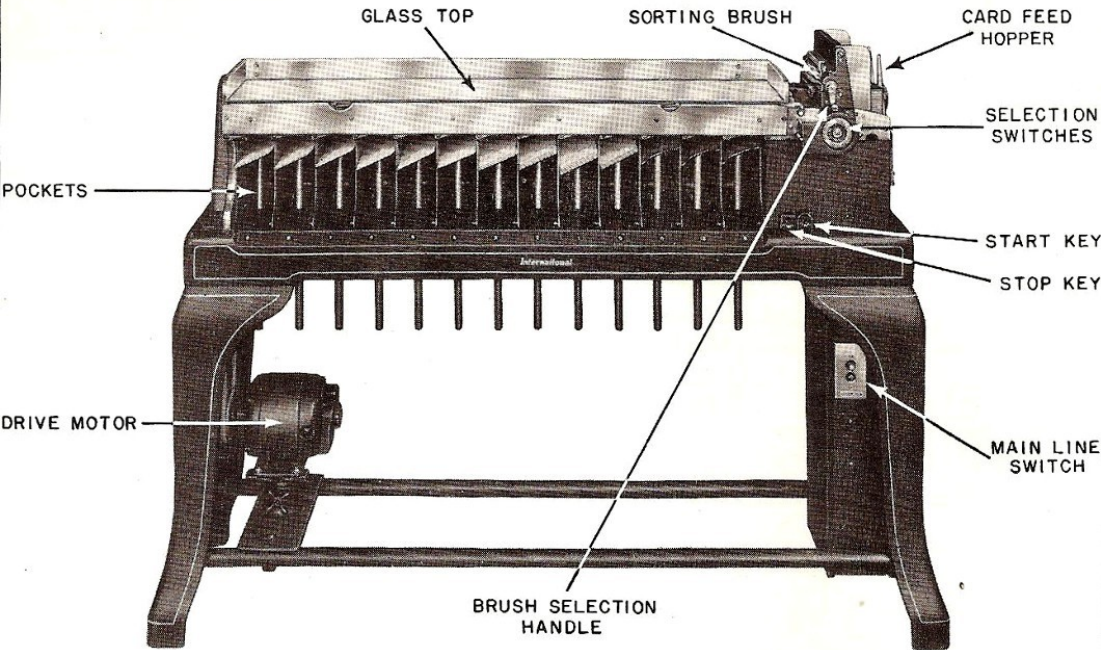
Automatic Tabulation Machines

- As is oft-recounted in computer histories, Herman Hollerith invented and sold a mechanical, card-based tabulating machine the US Census Office in 1890. Company and patents eventually sold to the Computing-Tabulation-Recording Company, CTR—later rechristened **IBM**.



Analogue Algorithms—Punchcard Workflows circa 1930s-1950s

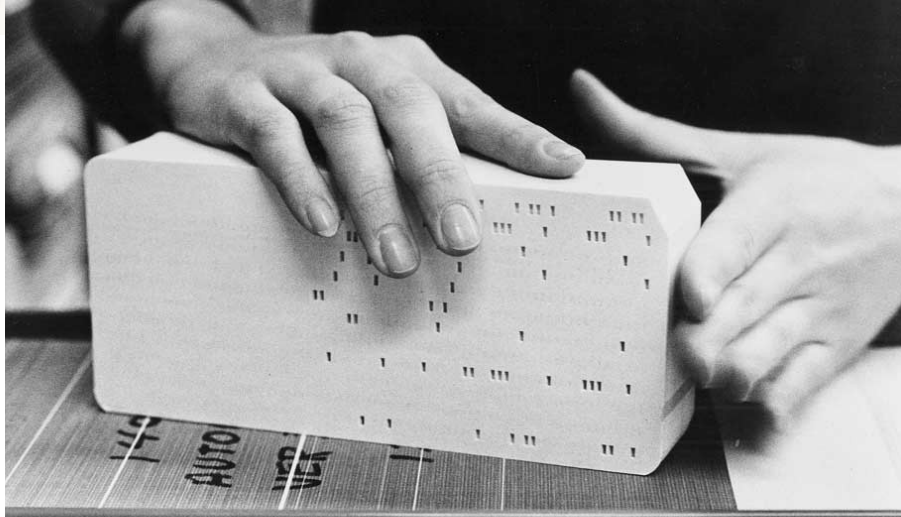
IBM Type 80 Sorter



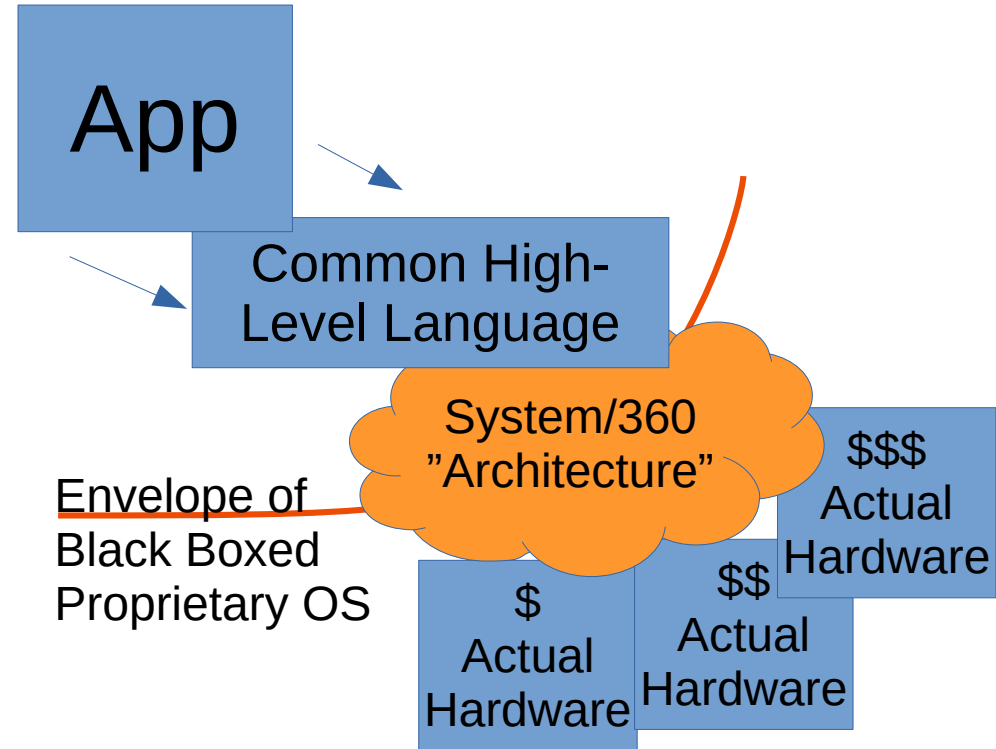
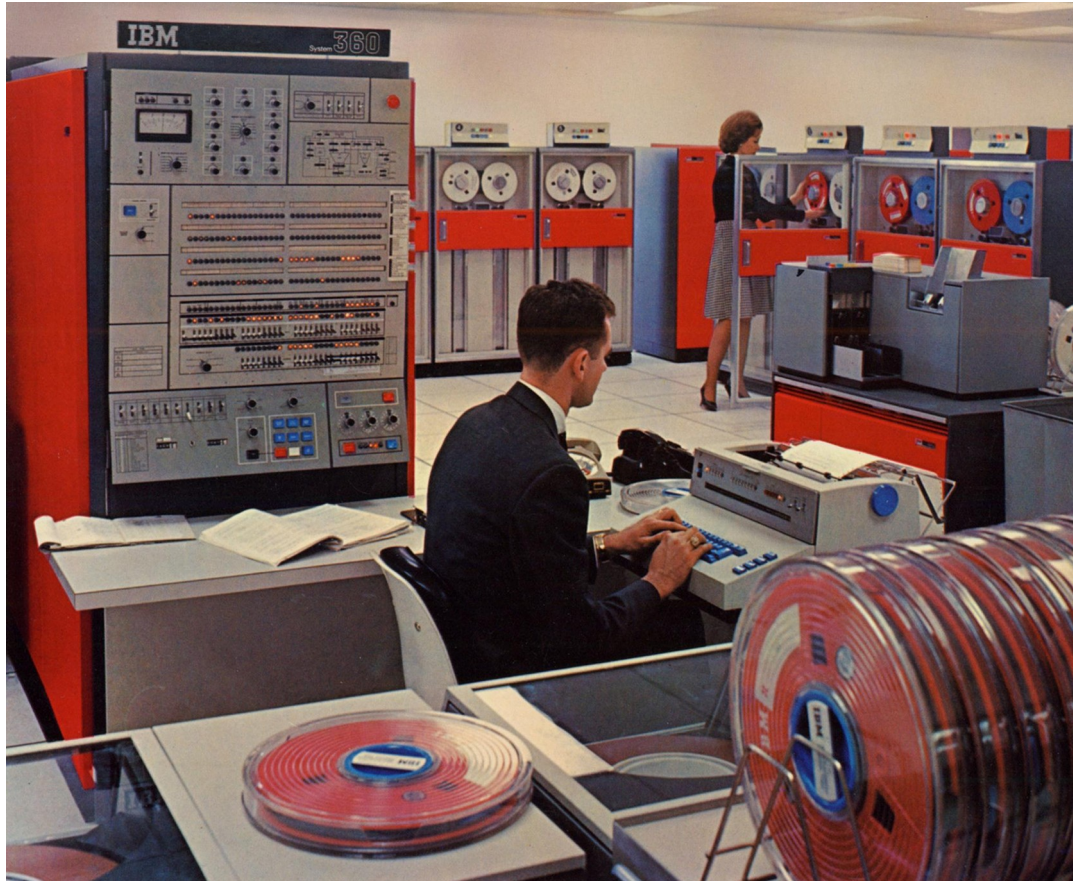
IBM Type 31 Alphabetic Duplicating Punch

...and Tabulators, Verifiers, Reproducers, Multiplying Punches, and more complex, purpose-built units.

Cybernetics, Batch Processing to Realtime



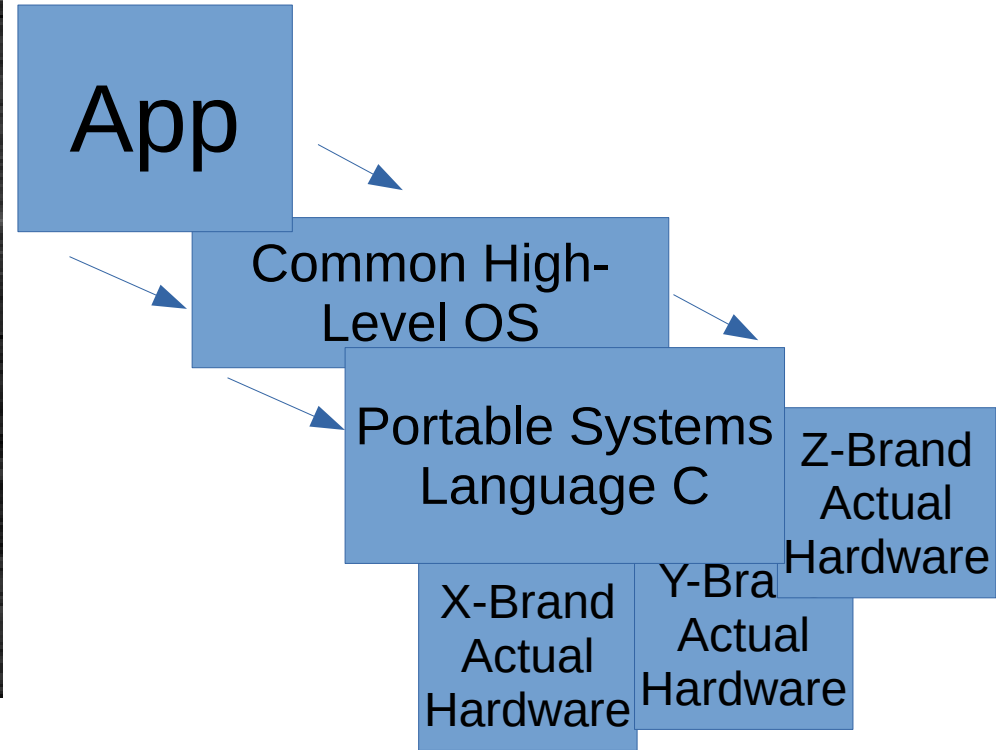
IBMs System/360 Series circa 1960s



Unix, C, and the Portable C Compiler: Portability across Hardware



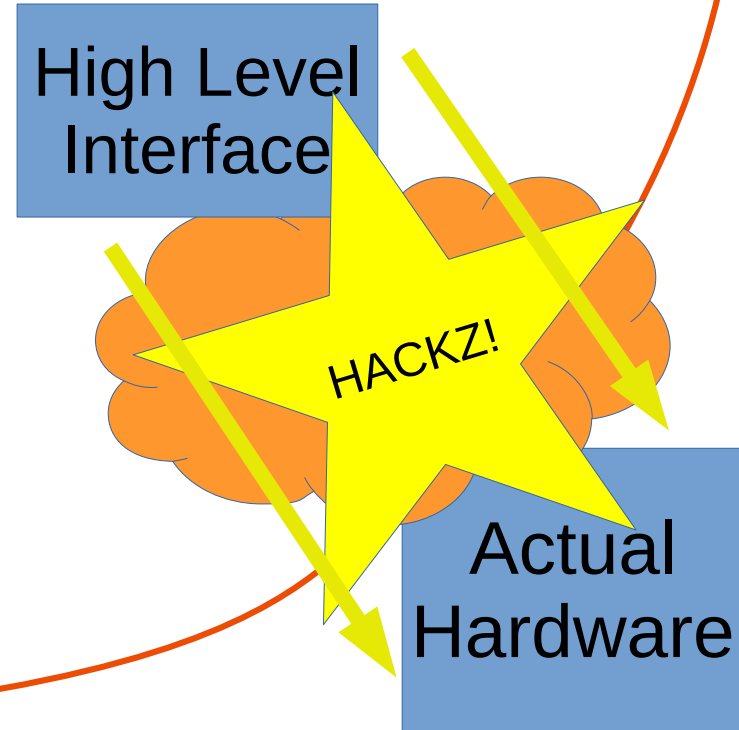
Dennis Ritchie and Ken Thompson



More Envelope Breaking!

- VisiCalc breaks accounting/markets
- GCC breaks commercial compiler business
- GPL breaks software licensing
- Compaq breaks IBM PC BIOS
- WWW and P2P breaks OSP walled gardens (AOL, CompuServe etc.)

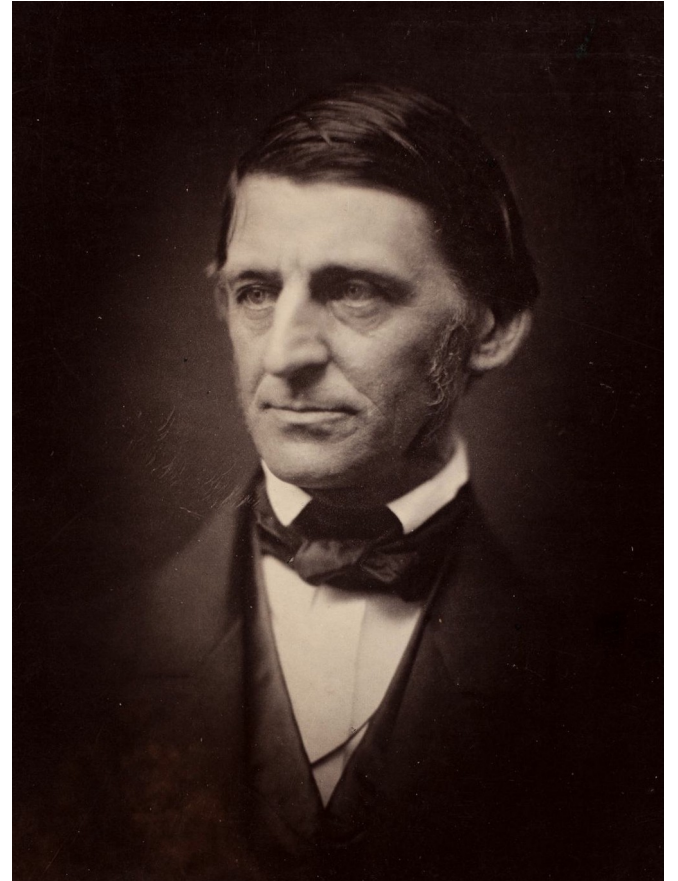
and so on, and so on...



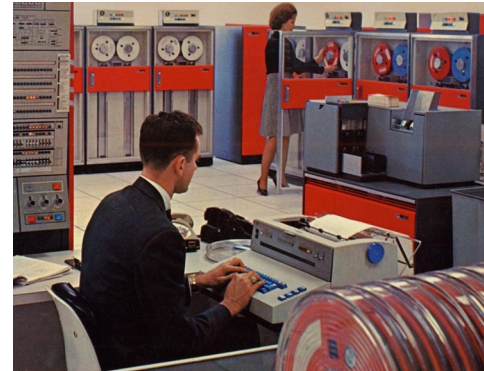
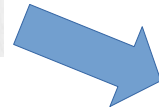
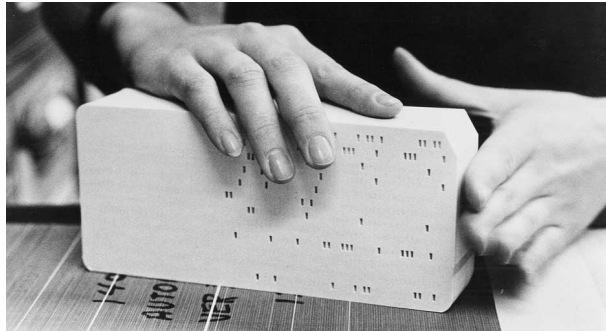
Ralph Waldo Emerson

Many facts concur to show that we must look deeper for our salvation than to steam, photographs, balloons or astronomy... Machinery is aggressive. **The weaver becomes a web, the machinist a machine. If you do not use the tools, they use you.** All tools are in one sense edge-tools, and dangerous. A man builds a fine house; and now he has a master, and a task for life: he is to furnish, watch, show it, and keep it in repair, the rest of his days. A man has a **reputation**, and is no longer free, but must respect that. A man makes a picture or a book, and, if it succeeds, 't is often the worse for him.

—Emerson, *Society and Solitude*, 1870



Since everything in the machine...



... is hacking through the stack not the same as breaking out of the iron cage?

