advent of the computer



where are we?







calculating?



3500 bce: sundials

1400 bce: Egyptian water clocks

700 ce: hourglasses

1086: Su Sung's water tower



21-Hofl13-Computer 4

Daniel's Prophecy Vindicated.

conclude any thing from the account of Gabriel given unto Daniel in this place. This they plainly acknowledge in a Difputation which they had with a converted Jew before the Bifhop of Rome recorded in their Shebet Jebuda. Only they would except Daniel himfelf, affirming that he was not DUTD, a Computer of the time, but intr, a Seer; as though the Queffion were about the way and means whereby we attain a just computation of the time, and not about the thing it felf. Daniel received the knowledge of this time by Revelation, as he did the time of the accomplishment of the Captivity, though he made use of the computation of time limited in the Prophecy of Jeremiab; but in both he gives us a perfect Calculation of the time, and so cannot he exempted from the Talmudical Malediction. And I mention these things in the en-



computer

"I have read the truest computer of Times" -- The Young Man's Gleanings, 1614

In the Talmud ... they have laid down this general Rule, Male pereant qui temporum articulos suppetunt quibus venturus est Messiah. Or as they express it by a solemn Curse in the name of Rabbi Jonathan, a great man among them, **let their bones rot who compute the times of the end.** ... [Daniel] was not a Computer of the time but a Seer as though the Question were about the way and means whereby we attain a just computation of the time, and not about the thing it self. Daniel received the knowledge of this time by Revelation, as he did the time of the accomplishment of the Captivity, though he made use of the computation of time limited in the Prophecy of Jeremiah; but in both he gives us a perfect Calculation of the time, and so cannot be exempted from the Talmudical Malediction

> --John Owen, Exercitations on the Epistle of the Hebrews, 1688 21-Hofl3-Computer 5



automata



Richard of Wallingford 1292-1336

1300: mechanical clocks **Richard of Wallingford** celestial instruments & St Albans' clock



86

The Antiquity Chap. VI. Chap. VI. of Clock-workmodum dentata, quæ una motione coalia, locks, and fome other Automata, might verfando faciunt effectus, varietatefque me-tionum : in quibus moventur Sigilla, ver-tuntur Metæ, calculi aut Tona projiciuntur, blivion) might be revived there. But

87

Derham, The Artificial Clock Maker, 1696

beyond time







changing perceptions

changing business

the demand side

"attempts to locate causes of "technology revolutions" should consider the needs of society and its room for potential growth."

--Charlotte Banayan

past & future

inventions

Sammy Avila Munoz

Charlotte Banayan

Brian Freese

Keien Ohta

Ione Sterental

Sean Trott

Eilen Zeng

Sarah Zou



technology and society

"The invention [of television] was no single event. ... a very complex interaction between new needs and new inventions ... military ... government ... corporate interests" -- Williams, Technology and Cultural Form, 1973

eye witness account

"What constitutes an invention?--Few simple mechanical contrivances are new; and most combinations may be viewed as a species, and classed under genera ... [and] pronounced old or new according to the mechanical knowledge of the person who gives his opinion."

> --Babbage, On the Economy of Machinery, ...1832 21-Hofl3-Computer 10

where's the invention?

Inventions, Technologies, Applications, Media



Monday, April 8, 2013

1





computer technology





getting to (and beyond) the computer







individual inventors (and investors)

business / customers

government

military / intelligence

science / education

individual calculation



John Napier 1550-1617



Charles Babbage RS 1791-1871

John Napier

(a 'computer')

Mirifici Logarithmorum Canonis Descriptio, 1614

Charles Babbage

Table of Logarithms from 1 to 108000 1827

"I wish to God these calculations had been executed by steam" (1821)

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on the economy of machinery and manufactures

- 1: Sources of the Advantages Arising from Machinery
- 2: Accumulating Power
- 3: Regulating Power
 - ... that beautiful contrivance,

the steam governor ...

- 4: Increase and diminution of velocity
- 5: Extending the time of action of forces
 - ... watches & clocks ..

automatons

6: Saving time in natural operations

7: Exerting Forces too great for human power; and executing operations too delicate for human touch

8: Registering Operations

- 9: Economy of the materials employed
- 10: Of the identity of the work when it is of the same kind, and its accuracy when of different kinds
- 11: Of copying

. . .

12: On the method of observing manufacturies

19: On the division of labor

20 On the mental division of labour





Adam Ferguson 1723-1816

divisions and combinations

the division of labor

automata, computer, copying, registering

the "hands" --manual division of labor pin-making Adam Smith, *Wealth of Nations*, 1776

the "head" --mental division of labor

"And thinking itself, in this age of separations, may become a peculiar craft."

Adam Ferguson, An Essay on the History of Civil Society, 1767



difference engine





200 ON THE DIVISION OF MENTAL LABOUR.

			the second se		
	Repetitions of Process.	MOVE- MENTS.	CLOCK A. Hand set to I.	CLOCK B. Hand set to III.	CLOCE C. Hand set to II.
	í	Pull A.	TABLE. A. strikes 1	First diference.	Second difference
	1	B.	The hand is ad- vanced (by B.) 3 divisions }	B. strikes 3	
	l	—c.		The hand is ad- vanced (by C.) 2 divisions	C. strikes 2
Í	(Pull A.	A. strikes 4		
	2	<u> </u>	The hand is ad- vanced (by B.)	B. strikes 5	· · · ·
	l	— c.		The hand is ad- vanced (by C.) t divisions }	C. strikes 2
	- (Pull A.	A. strikes 9		
	3	— В.	The hand is ad- vanced (by B.)	B. strikes 7	• • • •
	l	c.		The hand is ad- vanced (by C.) 2divisions }	C. strikes 2
i	(Pall A.	A. strikes 16		
ĺ	Ł	В.	The hand is ad- vanced (by B.)	B. strikes 9	• • • •
	ł	— c.		The hand is ad. vanced (by C.) 2 divisions	C. strikes 2
1	(Pull A.	A. strikes 25		
	5	— в.	The hand is ad- vanced (by B.)	B. strikes 11	
	l	— c.		The hand is ad- vanced (by C.) 2 divisions	C. strikes 2
	(Pall A.	A. strikes 36		
	6	B.	The hand is ad- vanced (by B.)	B. strikes 13	
	(— c.		The hand is ad- vanced (by C.) 2 divisions }	C. strikes 2



21-monis-Computer 1/



analytical engine

general purpose machine

programmable

looping branching



21-Hofl13-Computer 18

Ada Byron/Lovelace

"a machine that not only would have foresight, but could act on that foresight"

"I want to put in something about Bernoulli's Number, in one of my notes, as an example of how an explicit function, may be worked out by the engine, without having been worked out by human head and hands first"

--Lovelace to Babbage, 1843

"Analytical Engine *weaves algebraical patterns* just as the Jacquard loom weaves flowers and leaves"

21-Hofl13-Computer 19

--Taylor's Scientific Memoirs, 1843



Ada Lovelace 1815-1852

"the greatest ... "

[people tend to]

"first, overrate what we find to be ... remarkable, and secondly, by a sort of natural reaction, to undervalue the true state of the case ... The Analytical Engine has no pretension whatever to originate anything"

--Ada Byron,

Taylor's Scientific Memoirs, 1843



Georg Scheutz 1785-1873

difference engines

Georg & Edvard Scheutz

Scheutz Difference Engine, with printer c 1853



Edvard Scheutz 1822-1881 Dudley Observatory, Schenectady



British Government, actuarial calculations "English Life Table" 1864



analog predictors



William Thomson, Lord Kelvin (1824-1907)

tide predictor, 1872

Lewis Fry Richardson (1881-1953)

Weather Predictions by Numerical Process, 1922 [1916]







changing perceptions

changing business

the demand side

past and future

inventions

computer

2012

end of an era Minitel (1978-2012) CEEFAX (1974-2012)

"Reinhold, on the other hand, had a vision of teletext and videotext. I would argue that those things actually do exist. For instance, skype is videotexting. People use it to stay in contact with friends and family as well as with work and interviews. Moreover 'Individuals may be able to use videotext systems to create their own newspapers, design their own curricula, compile their own consumer guides.' We can do that now with computers in our own homes. The fact that people had thought about this concept 30 years ago shows how things can transform and progress through the years to mold with current society and develop in parallel fashion."

> --Sarah Zou 21-Hofl13-Computer 24

DDG GELEDRHIIUN OF LIVE MUSIG IN UN Invitation to join in A Perfect Day	17
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tre recherche puis

STUDY SAYS TECHNOLOGY COULD TRANSFORM SOCIETY

By ROBERT REINHOLD, Special to the New York Times Published: June 14, 1982

WASHINGTON, June 13— A report commissioned by the National Science Foundation and made public today speculates that by the end of this century electronic information technology will have transformed American home, business, manufacturing, school, family and political life.

The report suggests that one-way and two-way home information systems, called teletext and videotex, will penetrate deeply into daily life, with an effect on society as profound as those of the automobile and commercial television earlier in this century.

It conjured a vision, at once appealing and threatening, of a style of life defined and controlled by videotex terminals throughout the house.

+ SHARE

B PRINT

REPRINTS



concepts & abilities

Media



"It is the concept of the ability to communicate quickly through information technology that was transformative, not the actual systems of videotext and teletext. In both cases, it is the ideas that the machines and systems represent that are transformative, not necessarily that specific device itself. " --Eilan Zeng

Genres

ideas and imagination

"Their role of fine-tuning and making practical this art goes largely unnoticed though, despite these steps forward being necessary for a more complex fully general computer. Babbage himself epitomizes the difficulty in untangling the braid of people and ideas leading to a technological revolution. His Analytical Engine was only made possible by his reappropriation of Jacquard's loom technology, and once he had modeled the idea, he was so sure it would change the world forever, he was blind to the fact that the government at the time was as interested."

--Brian Freese

"The fact that neither the analytical engine nor videotex exists today, yet the imagined social consequences of their eventual widespread adoption rings an eerily familiar bell to us, says that it really does not matter what form the technology takes, because, going back to Williams, technology is driven by human intentions, and human intentions never change. There has not been "technology revolutions" in the past - not in the completely-societal-overhaul sense that it is usually meant, anyway - and it is unlikely that there will be one in the future, as long as humans are humans."

--Keien Ohta

ideology

Projecting an idea into the future is not very different from digging into the past and projecting it onto the present. Both Campbell-Kelly and Reinhold see information technology as more than just a physical presence. It has an ideological presence that stretches simultaneously into the past and future. Technology revolutions can take root in the vast space of ideas even if those ideas are never fully developed into tangible information technologies.

--Sammy Avila Munoz

society's role

"[I]n this argument of technological determinism; we can agree that a successful technology *does* impact society, but as illustrated by the fact that these the videotext and teletext are now obsolete, it seems indisputable that multiple factors extraneous to the technology itself—social or timing factors, etc.—are necessary for its success and widespread adoption and effects."

--Ione Sterental

"The flaw in all of these predictions is that they rely on a certain stasis in technological and social goals and needs. Society, of course, is constantly evolving, and this change is reflected in the development of certain technology. Reinhold's "teletext" and "videotext" systems were never carried to fruition, but parallels can be seen in modern information distribution systems like computers or televisions."





changing perceptions

changing business

the demand side

past & future

inventions

computer

on the demand side

[just one]

"would suffice

the needs of the

whole world"

- Georg Scheutz

who might want these machines?

why?

what would they want?



A generall Bill for this prefent year, ending the 19 of Detember 1665. according to the Ruport made to the KINGS mod Excellent Majeth By the Company of Parifie Circla of Lordon, No. The Difester and Cafuzhier this year. rive and Stilborne - 6 17 Executed - 19 Palice ed - 1945; Floz and Scall Port - 6: 9 Pague u and Parter - 93 17 Found dead in threets, fields, Sec. = Planne at a douddanly - 1: 6 Franch Pox - 6 Planni 1: 6 Fighted - 6 Pox - 6 Planni 1: 6 Fighted - 6 Pox - 6 Planni 12.15. Gout and Sciator 2003 Montefallen 14 Stangles and Switte -10 Montefallen 14 Stangles and Switte -12 States, Ultern, broa 46 Limbs nces, Gaugiene and Fillula se Jaundies ofume -624 Kildby feverall accidents - 1258 Sings Evill --134 Letharpy 1054 Meanam and Headach Cm Dweld Temies - \$112 Cm Dweld Temies - \$112 Ch all - \$555 Insertion of the Bindle in the so Dariber a the the Pathoneth's year. Insertion in the Bindle in the so Dariber a the the Pathoneth's year.

(194) The Spender of the Headings, Checker ings, and Bannish, the saws in the Pa- rich of Crachascole, from Matched, with the Beyllowinarian the part of the Beyllowinarian the Beyllowinarian the part of the Beyllowin	(198) The Table of the Party of Carabanak The Table of the Party of Carabanak	
--	---	--

"inextricably linked with our understandings of state and government"

--John Agar, The Government Machine, 2003

government information

registration

bills of mortality

births & marriages

parish members

population

"And it came to pass in those days, that there went out a decree from Caesar Augustus that all the world should be taxed. ... And Joseph also went up from Galilee, out of the City of Nazareth, into Judaea, unto the City of David, which is called Bethlehem; (because he was of the house of David:) to be taxed with his espoused wife, being great with child."

government records

taxpayers military eligible aliens racial groups the poor professions midwives prostitutes cars 'National Insurance' social security

	CENSUS OF 1850.							
STATES AND TER- RITORIES.	Whites.	Free colored.	Slaves.	Total.				
Mnine	$\begin{array}{r} 581,813\\ 317,456\\ 985,459\\ 143,875\\ 361,019\\ 312,409\\ 3,048,395\\ 465,510\\ 9,958,160\\ 71,109\\ 417,943\\ 894,800\\ 553,028\\ 974,563\\ 591,579\\ 761,413\\ 594,800\\ 553,059\\ 977,154\\ 995,050\\ 977,156\\ 995,050\\ 977,156\\ 995,050\\ 977,156\\ 995,050\\ 977,156\\ 995,050\\ 977,156\\ 995,050\\ 977,156\\ 995,050\\ 977,156\\ 995,050\\ 977,156\\ 995,050\\ 977,156\\ 995,050\\ 977,156\\ 995,050\\ 975,000\\ 975,000\\ 975,000\\ 975,000\\ 975,000\\ 975,000\\ 975,000\\ 97$	$\begin{array}{c} 1,356\\ 9,054\\ 7,510\\ 9,054\\ 7,510\\ 9,050\\ 7,510\\ 9,050\\ 10,010\\ 5,000\\ 11,51,500\\ 10,51$	9,990 90,358 473,528 988,548 344,984 384,683 910,981 920,459 300,878 3,687 300,878 3,687 319,844 47,100 39,310 58,161	$\begin{array}{c} 583,169\\ 317,976\\ 994,514\\ 147,545\\ 370,792\\ 314,199\\ 3,007,394\\ 489,555\\ 2,311,786\\ 91,532\\ 583,034\\ 1,421,661\\ 869,039\\ 91,532\\ 583,034\\ 1,421,661\\ 869,039\\ 91,532\\ 582,405\\ 1,002,717\\ 1,980,329\\ 988,416\\ 606,526\\ 51,687\\ 851,470\\ 397,654\\ 517,762\\ 682,044\\ 771,623\\ 209,897\\ 87,445\\ 303,391\\ 192,914\\ 912,592\\ 99,597\\ 6,077\\ 61,547\\ 13,294\\ 11,369\\ \end{array}$				
Aggregate	19,553,058	434, 495	3, 204, 313	23, 191, 875				

counting

This is the official form for all the people at this address. It is quick and easy, and your answers are protected by law. 5. Passa provide information for saint parson loing have. Blart with a Use a blue or black pas paraon loing have who parts or minis this house, spartment, or mobile tone. If the parties or factor these spinal-tank date, don't with any solutioning term. This will be Person 1. Start here What is Parase it's canal fort tarm inite The Carmus must sount every parent living in the United. Las lists Before you broker Guardian 1, pourt the people fixing in this focuse, againment, or mobile home using our guidelines Partiene 100 E. What is Parson 1's seaf time & Chill Ans . Court all people, including better, who has and even here No. Paras 7. What is Person 1's age and what is Ferson 1's date of lotter! The Census Runda area conducts pound in institutions Passe appropriate as app 2 when the price is was then 1 year one Pass approx in Sound. Age on April 5, 2010 Minute, Tail, Taily Travel and To not much anyone long avail after all splage or in the Annual Porties. . Do not pouril anyone in a nurang tome, lai, pressi Delettion facility, etc. of April 1, 2010 - NOTE: Plasse braver BOTH Question & about Hapanic pright and a Lease a measi people of your form, as an in they will refure to Gastion & about took. For the census, Meperic origins are not miss. the fare afer they leave tolege. He running forte, the 2. in Parase 1 of Hispanis, Latins, or Spanian origin? millery all etc. Otherway, they have be sourced wide. No. 10107 Historic, Latin, or Boartant anger The Centus must also include people without a permanent Yes, Wesslar, Maxian Am., Orcano THE PLATS ROAT · Capitality who has no permeterit place to may is maying fue Outer have on April 1, 2010, munt that parent. Otherwise, ha or Yes another regard, Latins of Bastien anger -- Anterprintwarge reported bonder bonder transport braden Sanat at any 2 and they be mideat in the particula Mose many pacific uses buing or slaying in this house, apartment, or mobile home on April 1, 20101 8. What is Parage 1's receiving a pre-primple coust. 2. Non hers are antitural service staying two 100.00 Black, Allower &rs. or Tappy. April 1, 2010 that you gid not resture a Guessian 17 American Indian to Alaska Satisa -- Per land a reacconduction 2 Original, mart an revolute balant or them original Realizes, and as add million, sharing of himse formations, aust an community of the if bally afters Asian Instan Instru Manadati -interiment Paulo anong test amounting Chirate Summittee to Disease. WOMAN . No additional particle. P Agenta Vallation Bettert Etter Aust - Fot als bi 3. 16 His house, systhest, or mobile hors-Other Pacific Learning -- Prot aunce, more Letter, the Notes: Cartester, are an at 2 nes to average files forget and each 2 Certain by you or acreative in the household with a nortgage or card include home equity care Owned to you of achieve in the household fee and year (white a nortgage of ban?) Barre arter tete -- Pire tabe 27 Designed without payment of rend. 4. What is your beliephone number? If a may set if we 10. Dons Person 1 sometimes for at site somewhere star? pirri umpersenti an ansuer In college housing Pur print surprise in the million In tail of prison 41 a mission It is furning home. Delling between Charles Barre Mittern or second reactions. The amplifier insert Proce people view counted in Question 1, continue with Person 8. USCENSUSSUATAU

21-Hofl13-Computer 33

Simes an April 1, 2012.

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Number of people +

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Renault.

7-0-61

Area Dide + Number

"Statistics should reveal the quantum of happiness in a population [and] the means of further improvement." John Sinclair

statistics and the state

Statistics: a word lately introduced to express a view or survey of any kingdom, country, or parish

Encyclopaedia Britannica, 1797

> John Sinclair, 1754-1835

John Sinclair 1754-1835









making states

An act concerning...

- 1. public archive
- 2. state printer
- 3. pilots for SF
- 4. comptroller
- 5. treasurer
- 6. sec. of state
- 8. translator
- 11. AG
- 14. Supreme Court
- 30. incorporation of cities
- 36. commissioner of deeds
- 41. notaries
- 49. lawful fences

- 48. incorporation of towns
- 53. weights & measures
- 55. limited partners
- 59. recorder's office
- 64. officers of health
- 67. surveyors
- 69. librarian
- 72. register of wills
- 89. marks & brands
- 90. reporter
- 93. conveyances
- 95. common law
- 117. incorp. of colleges
- 123. assayer

Statutes of California, 1849-50 21-Hofl13-Computer 35



business interests

sorting operation: the clearing house

"In a large room in Lombard-street, about thirty clerks from the several London bankers take their stations ... at desks placed around the room. ... From time to time other clerks from every house enter the room, and passing along, drop into the box the checks due by that firm to the house from which this distributor is sent. ... The whole of these payments are made by a double system of balance, a very small amount of bank notes passing from hand to hand. --Babbage, On the Economy, 1835

"[1839] £954 million was cleared--\$250 billion in today's money."

--Campbell-Kelly & Aspray

1 Marty Litra - Alton for 1 Marty Litra - Alton for 2 Junt - Star Barry 2 Martin Star Barry 2 Martin Star Bland 2 Martin Star 2 Martin

And a had by the and the fills

A Joseph Jahrun Hogo J.



information technology



carbon paper Wedgewood, 1806

typewriter Remington, 1874

calculator Burroughs, 1892

cash register mechanical register, 1884



"No simple economic explanation

- ... America was gadget happy"
 - --Campbell-Kelly and Aspray, Computer, 1996
the office



clerks (UK) 1871: 262,100 1891: 534,622 1911: 918,186

female clerks

|89|: |7,859 |9||: ||7,057

1921, women 46% of all clerks

typewriter girls

1931, 212,296 female typists 5,155 male typists

information technology

"In his office in San Francisco, seated before a massive desk of polished redwood, very ornate, Lyman Derrick sat dictating letters to his typewriter." -- Frank Norris, The Octopus, 1902

"Una had not realized how many tools she had to know ... Desks, filingcabinets, mimeographs, adding-machines, card indexes, desk calendars, telephone-extensions, adjustable desk-lights. Wire correspondence-baskets, erasers, carbon paper, type-brushes, dust-rags, waste-baskets. Pencils hard and soft, black and blue and red. Pens, pen-points, backing-sheets, notebooks, paper-clips. Mucilage paste, stationery; the half-dozen sorts of envelopes and letter-heads ... the rhapsodic advertisements of filing-cabinets that are built like battle-ships; of carbon-paper that is magic-inked and satin-smooth."

> --Sinclair Lewis, The Job, 1917 21-Hofl3-Computer 39

"[An] Enumeration shall be made within three Years after the first Meeting of the Congress of the United States, and within every subsequent Term of ten Years, in such Manner as they shall by Law direct."

back to government

		Year	Population	Gain		Clerks
Spain:	1787	1900	76,212,168	13,232,402	21.0	
		1890	62,979,766	12,790,557	25.5	
JS:	1790	1880	50,189,209	11,630,838	30.2	2000
JK:	1801	1870	38,558,371	7,115,050	22.6	1495
		1860	31,443,321	8,251,445	35.6	483
		1850	23,191,876	6,128,523	35.9	
		1840	17,063,353	4,202,651	32.7	28
		1830	12,860,702	3,222,249	33.4	
		1820	9,638,453	2,298,572	33.1	
		1810	7,239,881	1,931,398	36.4	
		1800	5,308,483	1,379,269	35.1	
		1790	3,929,214	-	-	puter 40



0 2 4 10 0n 5 A C E a 0 0 E ED SO Ch Sy Sh Hk Dr Rm SY X Fp Cn 0 0 0 0 0 0 0 0 0 0 0 D 4 . . . 3 3 A F H 6 6 0 9 9 9 9 9 9

tabulating

Hollerith

Electronic Tabulating Machine

Herman Hollerith 1860-1929



1890 Census

"This apparatus works unerringly as the mills of the gods, but beats them hollow as to speed."

-The Electrical Engineer, 11 Nov 1891

the punch card



"Hollerith, then IBM, managed to maintain a near monopoly by periodically filing for new key patents or by acquiring those of unsuccessful rivals."

-- Mounier-Kuhn,2012

government & business

Hollerith

Tabulating Machine Company



CTR: Computing-Tabulating-Recording Company

Thomas Watson

NCR to CTR to ...

the new deal

Social Security Act, 1935

"the world's largest bookkeeping job"

Seventy-fourth Congress of the United States of Imerica; At the first mession,

an the Jurst mession,

Begun and held at the City of Washington on Thursday, the third day of January, one thousand nine hundred and thirty-five.

AN ACT

To provide for the general welfare by establishing a system of Federal old-age benefits, and by enabling the several States to make more adequate provision for aged persons, blind persons, dependent and crippled children, maternal and child welfare, public health, and the administration of their anemployment compensation laws; to establish a Social Security Board; to raise revenue; and for other purposes.

Be it exacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I-GRANTS TO STATES FOR OLD-AGE ASSISTANCE

APPROPRIATION

SECTION 1. For the purpose of enabling each State to furnish financial assistance, as far as practicable under the conditions in such State, to aged needy individuals, there is hereby authorized to be appropriated for the fiscal year ending June 30, 1936, the sum of \$49,750,000, and there is hereby authorized to be appropriated for



ollerith-Maschine Dehomag D11, die 1933 in Deutschland

controlling numbers

Name Name



controlling people

"the Nazi census" --Aly & Roth, 2004

IBM DI I

Census, 1933, 1939

Labor Book, 1935

Health Pedigree book, 1936

Registry of the Populace, 1939

Blood (high, average, acceptable, inferior), 1940

Personal Identification Number, 1944



still registering

Scanning 2.4 Billion Eyes, India Tries to Connect Poor to Growth



Ruth Fremson/The New York Times

A migrant farm worker peers into an iris scanner in New Delhi in the first effort to officially record each Indian's identity as an individual.

military takeover







military processing

ballistics "firing tables"

Vannevar Bush, 1935,

Differential Analyzer



analytical work

(Babbage)

Bush

Shannon, "A Symbolic Analysis of Relay and Switching Circuits," 1937





Harvard mark I

aka IBM Automatic Sequence Controlled Calculator





John von Neumann 1903-1957



military processing



Monday, April 8, 2013



Alan Turing 1912-1954

decoding

1943, Colossus

Bletchley Park



ZI-HOILIS-Computer Su



back to Thamus

"I went to see Professor Douglas Hartree, who had built the first differential analyzers in England and had more experience in using these very specialized computers than anyone else. He told me that, in his opinion, all the calculations that would ever be needed in this country could be done on the three digital computers which were then being built-one in Cambridge, one in Teddington, and one in Manchester. No one else, he said, would ever need machines of their own, or would be able to afford to buy them."

> --Lord Bowden, American Scientist 58 (1970) pp. 43-53 21-Hofl3-Computer 51



[just one] "would suffice the needs of the whole world" - Georg Scheutz

back to Thamus

"I went to see Professor Douglas Hartree, who had built the first differential analyzers in England and had more experience in using these very specialized computers than anyone else. He told me that, in his opinion, all the calculations that would ever be needed in this country could be done on the three digital computers which were then being built-one in Cambridge, one in Teddington, and one in Manchester. No one else, he said, would ever need machines of their own, or would be able to afford to buy them."

> --Lord Bowden, American Scientist 58 (1970) pp. 43-53 21-Hofl3-Computer 51

BRAIN

THE MECHANICAL

ANSWER FOUND TO 300 YEAR-OLD SUM From Our Special Correspondent

Experiments which have been in progress in this country and the United States since the end of the war to produce an efficient mechanical "brain" have been successfully completed at Manchester University, where a workable "brain" has been evolved. Not only is it working satisfactorily, but for the first time a machine has been brought to the point at which it can work out problems which it is practically impossible to execute on paper.

The Manchester "mechanical mind" was built by Professor F. C. Williams, of the Department of Electro-Technics, and is now in the hands of two university mathematicians, Professor M. H. A. Newman and Mr. A. W. Turing.

It has just completed, in a matter of weeks, a problem, the nature of which is not disclosed, which was started in the seventeenth century and is only just being completed by human calculation.

Its appearance is somewhat unprepossessing. It is composed of racks of electrical apparatus consisting of a mass of untidy wires, valves, chassis, and display tubes. When in action, the cathode ray becomes a pattern of dots which shows what information is in the machine. There is a close analogy between its structure and that of the human brain. It differs from other mechanical brains in its method of storing information. The electronic method ensures that information is more readily accessible.

CALCULUS TO SONNET

Mr. Turing said yesterday: "This is only a foretaste of what is to come, and only the shadow of what is going to be. We have to have some experience with the machine before we really know its capabilities. It may take years before we settle down to the new possibilities, but I do not see why it should not enter any one of the fields normally covered by the human intellect, and eventually compete on equal terms.

"I do not think you can even draw the line about sonnets, though the comparison is perhaps a little bit unfair because a sonnet written by a machine will be better appreciated by another machine."

Mr. Turing added that the university was really interested in the investigation of the possibilities of machines for their own sake. Their research would be directed to finding the degree of intellectual activity of which a machine was capable, and to what extent it could think for itself.

News of the experiments was disclosed by Professor Jefferson in the Lister oration reported in The Times yesterday.

Times, June 11, 1949

only a foretaste

"In reports to the US government, and in funding requests to the military (to calculate the effects of thermonuclear explosions), von Neumann and his colleagues expressed the view that 'at most six or so machines should suffice for the whole country.' Turing, in an interview with the Times in 1949, declared: 'This is only a foretaste of what is to come, and only the shadow of what is going to be ... I do not see why it should not enter any one of the fields normally covered by the human intellect and eventually compete on equal terms.'"

Philip Welch, London Review of Books, 2012



Manchester's mechanical brain





THE MECHANICAL BRAIN.—The apparatus which has been evolved in the electrical engineering laboratories of Manchester University to work out problems which are almost impossible to execute on paper. The section on the left contains the control circuit, in the middle rack of which is a cathode ray tube screen with (below) the control desk. The racks on the right-centre of the picture with the box-like containers provide the memory section of the machine. Nearer the camera are racks containing the calculating circuits. The machine is "fed" at the control desk and the answer is read on the cathode ray tube, which is the only visible means of showing that the brain is at work.





changing perceptions

changing business

the demand side

past & future

inventions

computer







back in business vertical integration



John Simmons

Lyons & Cambridge (1947) ENIAC, EDVAC, UNIVAC EDSAC

1954

LEO (Lyons electronic office) CLEO (Clear language for expressing orders)

from payroll to baking







back in business vertical integration



How a chain of tea shops kickstarted the computer age

In November 1951 a British company switched on the world's first business computer



Image 1 of 3 LEO at Lyons HQ in Hammersmith

By Christopher Williams, Technology Correspondent 7:00AM GMT 10 Nov 2011

breaking down



Cathode-ray tube memory, from the IBM 701 Defense Calculator, 1952



breaking things down

1947 transistor

Bell Labs John Bardeen, William Brattain, William Shockley



1958 integrated circuit

Texas Instruments Jack Kilby

Shockley Fairchild Intel





corporate computing

1960 DEC PDP-I "programmable data processor"

1964 IBM 360

00. Console - IBM System/360 Model 30



1969 Xerox PARC "the architecture of information"

(**I946** SRI)

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Monday, April 8, 2013

vertical disintegration 1970-1990

Software	IBM	DEC	3d party	3d party	3d party
OS	IBM	DEC	Apple	AT&T-Unix	<u>Microsoft</u>
CPU	IBM	DEC	Apple	Sun	<u>Intel & co</u>
Hardware	<u>IBM</u>	<u>DEC</u>	<u>Apple</u>	<u>Sun</u>	[IBM]/ <u>OEM</u>





changing perceptions

changing business

the demand side

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computer





culture clash



home brew, fone freaks

1975 Altair

1976 Apple 1

1983 Lisa

1984 Macintosh

21-Hofl13-Computer 61

Monday, April 8, 2013



fast forward

Stewart Brand, "Fanatic Life and Symbolic Death Among the Computer Bums" --Rolling Stone, 7 December, 1972

a libertarian vision

Brand, Barlow, Dyson, Gilder, Kelly, Rosetto,

"the internet ... an exciting kind of metaphor for spontaneous order" -- Gilder

--Fred Turner, From Cyberculture to Counterculture, 2006

21-Hofl13-Computer 62

Monday, April 8, 2013



Charles Simonyi Xerox PARC



Dan Briklin & Bob Frankston HBS Bravo, 1974

Visicalc, 1978

Lotus 1-2-3, 1983

Excel (for Mac), 1984

killer apps



Ken Thompson Dennis Ritchie Bell Labs

unix

Thompson, Ritchie, & AT&T

1965: AT&T, MIT& GE work on multics

1969: multics to unix

"What we wanted to preserve was not just a good environment in which to do programming, but a system around which a fellowship could form. We knew from experience that the essence of communal computing, as supplied by remote-access, time-shared machines, is not just to type programs into a terminal instead of a keypunch, but to encourage close communication."

--Ritche, "Evolution of the Unix Time-Sharing System"

unix at ucb



Bill Joy UCB 1973: Thompson at Berkeley

Bill Joy develops em editor

1977: IBSD released

1979: 3BSD (for Vax)

1981: 4.1BSD

1983: 4.2 BSD (with tcp/ip stack)

I-800-ITS-UNIX

SO ...

1991: Networking release 2; 386 BSD

1992: AT&T sues UCB

UNITED STATES DISTRICT COURT FOR THE DISTRICT OF NEW JERSEY

UNIX SYSTEM LABORATORIES, INC.))	
Plaintiff,))	
)	Civ. No. 92-1667
vs.)	OPINION
)	
BERKELEY SOFTWARE DESIGN, INC.,)	
and certain named individuals in)	
their collective capacity as The)	
Regents of the University of)	
California,)	
)	
Defendants.)	
)	

settlement

1994 settlement: USL, UCB, Novell

SETTLEMENT AGREEMENT

This Settlement Agreement is entered into between UNIX System Laboratories, Inc. ("USL"), a Delaware corporation, and The Regents of the University of California (the "University"), a California corporation.

Recitals

1. USL contends it is the owner of the intellectual property rights in portions of certain computer operating system software (the "UNIX System").

 USL and USL's predecessor in interest, the American Telephone and Telegraph Co. ("AT&T"), have licensed the University to use certain versions of UNIX® system software,



Richard Stallman MIT



Linus Torvalds Helsinki

elsewhere ...

From: torvalds@klaava.Helsinki.FI (Linus Benedict Torvalds) Newsgroups: comp.os.minix Subject: What would you like to see most in minix? Summary: small poll for my new operating system Message-ID: Date: 25 Aug 91 20:57:08 GMT Organization: University of Helsinki

Hello everybody out there using minix -

I'm doing a (free) operating system (just a hobby, won't be big and professional like gnu) for 386(486) AT clones. This has been brewing since april, and is starting to get ready. I'd like any feedback on things people like/dislike in minix, as my OS resembles it somewhat (same physical layout of the file-system (due to practical reasons) among other things).

I've currently ported bash(1.08) and gcc(1.40), and things seem to work. This implies that I'll get something practical within a few months, and I'd like to know what features most people would want. Any suggestions are welcome, but I won't promise I'll implement them :-)

Linus (torvalds@kruuna.helsinki.fi)

PS. Yes - it's free of any minix code, and it has a multi-threaded fs. It is NOT protable (uses 386 task switching etc), and it probably never will support anything other than AT-harddisks, as that's all I have :-(.



101 Ways to Save Apple

By James Daly

An assessment of what can be done to fix a once

Dear Apple,

In the movie Independence Day, a PowerBook saves the ea you look a little beleaguered these days: a confusing produ

But who wants to live in a world without you? Not us. So we salvation. We chose not to resort to time travel or regurgita your price/performance in 1993).

We don't believe Apple is rotten to the core. Chrysler nearly to fix your once-great company using the material at hand.

Edited by James Daly

 Admit it. You're out of the hardware game. Outsource your hardware production, or se manufacturing boxes.

 License the Apple name/technology to appliance manufacturers and build GUIs for them all use the same communications protocol. Result: you monopolize the market for sma

9:41 AM



going open?

21-

the story so far

registering

predicting

calculating

controlling

communicating

controlling again?



coming up

II Apr: Visualizing Information