Today's Topics

Commercial and Scientific Computers

Based on William's Chapter 5

Lecture 11:

Commercial and Scientific Computers

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Today's Topics

EDVAC & Stored Memory
Developing the EDVAC
Branching Out
The EDVAC
Lyons and the Electronic Office
Commercialising the Computer
The UNIVAC
The BINAC
IBM CPC
IBM 650
IBM 701

EDVAC & Stored Memory

The ENIAC was not a stored program computer.

Von Neumann, Goldstine, Eckert and Mauchly then worked on producing the EDVAC, (Electronic Discrete Variable Automatic Computer which had a stored program, capable of storing the instructions of a program, plus the numbers on which it operated.

Developing the EDVAC

Von Neumann was keenly interested in biology and he used the word memory for a computer's storage facility.

Binary numbers were used for this machine.

First draft report on the EDVAC was written in June 1945. This was published in Von Neumann's name alone, and gave no credit to those actually doing the work. EDVAC report was widely circulated.

Eckert 'the Brunel of the computer age' Campbell-Kelly p96.
**Branching Out**

Eckert and Mauchly were engineering and commercially oriented, whilst von Neumann and others were academics, wanting to spread new ideas as widely as possible.

Eckert and Mauchly set up their own computer company in 1946.

The Moore School itself was worried that it would lose all grip on computing developments, so it set up lectures on the ENIAC, and mentioned stored program computing.

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**The EDSAC**

Electronic Delay Storage Automatic Calculator

Leslie Comrie was the first British visitor to the Moore School.

He went back and reported everything to Maurice Wilkes from Cambridge University.

Wilkes then attended the lectures himself. He arrived late with just 2 weeks left on the course, and easily grasped the basic principles.

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**Makin’ Plans**

Wilkes visited the Harvard Mark I and decided it was a mechanical dinosaur (it worked on relay switches).

On his return journey, Wilkes sketched out his own plans for a computer (the Moore School had only given a theoretical outline, not the physical details).
EDSAC I, January 1949

Maurice Wilkes

Wilkes had worked on radar and pulse electronics during the war.
He wanted a real machine, not a prototype.
He was given lots of spare components by the Ministry of Supply.
Programs punched on telegraph tape.

"It was the British thirst for a constant supply of tea and cakes that gave the world its first business computer."

Dan Sabbagh

When Lyons Roared 1999
LYONS Company History (1)

1872-3 Samuel Gluckstein (1821-1873) started a tobacco business with his 2 sons and son-in-law:

Isodore Montague Barnett Salmon
(1851-1920) (1854-1922) (1829-1897)

Samuel Died in 1873

LYONS Company History (2)

1875 Competition from American imports made them diversify into retail – Edgware Rd, London.

Montague travelled to exhibitions as a salesman and remarked on the poor state of catering and decided to enter this market.

LYONS Company History (3)

Fear of compromising good name of Salmon and Gluckstein in this new enterprise, so approached Joseph Lyons (1847-1917), cousin of Montague’s brother’s wife Rose.

Joseph had exhibition and commercial experience and ran a market stall in Manchester.
1887 J. Lyons and Company incorporated was founded, run by the Gluckstein brothers, Salmon and Lyons, from the same premises as the tobacco company. Lyons chairman for life.

1887 Newcastle 1888 Glasgow 1889 Paris.

1887 3d pot of tea and Hungarian band.
Joseph Lyons introduced shooting gallery.

1894 J. Lyons & Co. Ltd registered.

1894 New premises – Cadby Hall, Hammersmith Rd, until 1984.
First Teashop opened Piccadilly.

1896 Trocadero restaurant opened.
LYONS Company History (7)

1903 First tea and coffee production statistics.
1904 Popular Café Piccadilly. Tea Retail Sales.
1908 Franco-British Exhibition
1909 Coventry Street Corner House

LYONS Company History (8)

1909 Strand Palace Hotel.
1917 Lyons dies.
1919 First Royal Garden Party
1927 First ice-cream ammonia freezers.

LYONS Company History (9)

1918-45 was an extremely successful time for Lyons. Cadby hall contained many bakeries, kitchens and a massive ice cream plant.
Key innovations up to this point were in the use of advanced automatic machinery in all these areas, producing top quality goods in vast quantities.

Lyons was self-sufficient where possible. It supplied its teashops, hotels and restaurants and ran its own clothing and laundry business for the 'Nippies' clothes.

Lyons was a vibrant, forward-looking, food empire with highest reputation, run by family concern.

After the war Lyons was a leading catering company and food and drink manufacturer. However, they constantly strove to improve to:

• provide management with better information
• enhance the coordination between the manufacturing and distributive operations
• reduce the ever-increasing clerical burden.
Lyons offices dealt with a multitude of small transactions and there was no room for clerical inefficiency.

Lyons was the first company (1923) to recruit graduate trainees (5) and one of these was J.R.M. Simmons (1902-1985). Top Cambridge mathematician.

Simmons transformed office management.

He broke down jobs into their functional parts then introduced machinery to handle each one.

He set up Research Section (Organisation and Methods)

Institute of Administrative Management

Lyons came to be recognised as a centre of excellence in terms of office systems and management.

Simmons visited America to find out about office machinery is use there. Thomas Raymond Thompson (Simmons’ right hand man) and Oliver Standingford (Assistant comptroller) visited America to find out about the ‘Electronic Brain’.

They found American office management inferior to British and it was Standingford’s idea to use computers for business tasks.

They wrote a cogent report suggesting Lyons should build its own computer to carry out clerical tasks.
"Technically [Lyons] was a remarkably comprehensive and self-reliant organisation that had long experience of recognising way-out ideas and carrying them through to timely fruition."

Caminer

May 1949 the decision was taken to build LEO
(Harry Salmon, Chairman of the Board).

**History of Computing**

**LEO: Taking the plunge**

John Pinkerton, a Cambridge physicist, built the Lyons Electronic Office, modelled on the EDSAC at Cambridge, built by Maurice Wilkes.

**History of Computing**

**LEO: John Pinkerton**

David Caminer was initially Systems Research Office Manager and became the Programming Manager for LEO.

He re-wrote all the specifications for the programs used on it.

Programs written and tested whilst LEO being built.

**History of Computing**

**LEO: David Caminer**
LEO: Bakery Evaluation Job

In November 1951 the Bakery Evaluations Job ran live successfully and was run weekly thereafter.

This job entailed valuing all the stock at each individual bakery and reporting to the statistical office and management to calculate trading analyses.

LEO integrated tasks previously carried out separately.

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LEO: Key Programs

“...because we'd embarked on the problem of systems analysis and programming before the computer was finished we had complete programs ready for three jobs: the payroll (if they were not completely ready they were nearly ready), the Teashop Orders, and another one concerned with the tea business.”

Simmons c. 1970s

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LEO Program Chronology

- **August 1953** L1 Full Scale Bakery Evaluation Job
- **October 1954** L2 Teashops Distribution Job
- **October 1954** L4 Draft Specification for Tea Blending Job
- **January 1956** L3 Lyons Bakery Sales Invoicing Job
- **July 1956** L4 Tea Blending Job

L1, L2 and L3 well-documented in the literature. L4 has been neglected.
Previously overwhelmed by paperwork
Recordak photo - one document.
Clerical job already efficient.
LEO efficiency – absorbing subtasks
  reducing key-punching

"Simmons stresses the courage of the General Management
that is the family directors in being prepared to go along with
the scheme:
The company, which had long enjoyed a reputation for being
enterprising in its own fields of catering and food
manufacture, was evidently equally prepared to experiment in
a purely clerical field even though it would strike across the
accepted procedures on the so-called productive side of
business. *  from Caminer et al

This machine first ran in early 1949. Wilkes
  and one student ran a simple program, which
  printed the squares of the integers.
  This was the first practical example of a
  stored program
  computer (The Manchester Baby was
  the first, but it was a small-scale
  experimental machine.)
Around 1949, Watson felt there was no market for IBM selling computers!
Eckert and Mauchly did, and pressed ahead.
The Ferranti Mark I was the successor to the Manchester Baby and was the first computer on the market.

Eckert and Mauchly set up the Electronic Control Company in 1946 and were the only ones to see the business application for computers.
E & M agreed far too low a price for their first sale to the Census bureau – they were desperate.
UNIVAC used magnetic-tape storage.
UNIVAC (1951)  
(at the US Dept. of Commerce, Bureau of the Census)

UNIVAC Digital Recording Tape  
(1950's)

UNIVAC Vacuum Tube

Shown is a 10-inch high vacuum tube used in the rectifier of the early UNIVAC computer power supply. The UNIVAC was produced in the 1950's by Remington Rand Univac.
**UNIVAC Small Diode Board (circa 1950s)**

Front of diode board.  
Rear of diode board.

**Grace Hopper with UNIVAC**

Showing Rear Admiral Grace Hopper, USN, with other programmers.  
(Photo taken for Philadelphia "Your Neighbors" article, August 13, 1957)

**BINAC**

BINAC Binary Automatic Computer ordered by Northrop Aircraft Corporation for use as an airborne computer. It would be small and scientific. This was the first American stored program computer to work. It was unreliable.

Remington Rand took them over in the early 1950s. They ran a public prediction on the night of the elections and were accurate. Computers now really in the public eye.
IBM: A change of policy

Around 1950, IBM reversed their policy regarding electronic computers. Uncertainties in the market had stopped them converting their electronic and computing prototypes into full-scale machines. By mid 1950s IBM were dominant in the computer industry.

IBM SSEC

Thomas Watson Sr was one of the first to recognize the potential of electronic computing. Watson tried to hire the best electronics professor in the country to build a computer to put Howard Aiken in his place. Electronics professors were all busy with the war.

Eventually in 1945 he hired Wallace Eckert (no relation) to work on the SSEC (Selective Sequence Electronic Calculator). This was a one-off machine and wasn’t based on the EDVAC design.
IBM put electronic components into its electromechanical machines. Its Card Programmed Calculator, used for aircraft, was very popular and showed a demand for scientific computing. Watson called it a calculator because the term ‘computer’ had always been applied to people and could be seen as replacing human beings in the workplace.

IBM had other computers – the IBM 650 (a Magnetic Drum Calculator) and a Tape Processing Machine.

The Defense Calculator was developed for the Korean War and advanced IBM’s entry into the scientific market. This caused the two data-processing machines to be shelved.
IBM 701 Defense Calculator

The Defense Calculator was renamed as the 701 and the first one was produced in 1952.

The 702 was based on the Tape Processing Machine and used the Williams tube from the Manchester Baby (this proved unreliable).

For the IBM machines and the UNIVAC there was a long time between order and delivery.

IBM’s 700 series was modular.

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IBM Capturing the market

The IBM 650 series based on the Magnetic Drum Calculator was cheap and IBM sneakily sold these cheaply to Universities so that students were trained on them. The 650 was a success and overshadowed the UNIVAC.

By 1960, 5,000 computers had been sold in U.S.A. and a couple of thousand in the rest of the world.