1972

SCIENCE RESEARCH COUNCIL

ATLAS COMPUTER LABORATORY
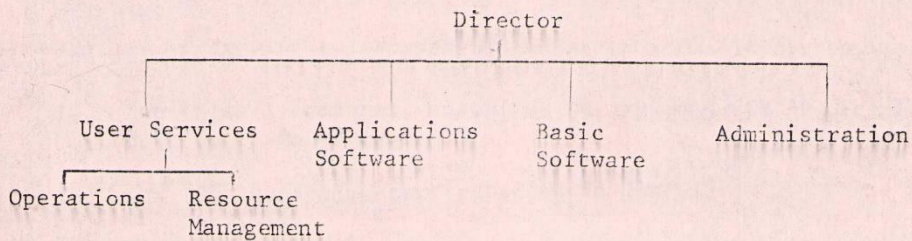

A T L A S   L A B O R A T O R Y   F A C I L I T I E S

ORGANISATION

The organisation of the Atlas Laboratory is based on distinguishing
three broad classes of activity.   Services to users, including the
operation of the main computers, the provision of programming services
both for support and the development of new systems, and the detailed
administration of a Laboratory which includes some 150 people.   The
following shows the 5 groups into which the Laboratory is structured:-

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                            Director
        ┌──────────────┬──────────────┬──────────────────┐
   User Services   Applications    Basic          Administration
                    Software       Software
  ┌───────────┐
Operations   Resource
             Management
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(a) Operations
    Operations Group is concerned with the provision and maintenance
    of a computing service on the main computers and ancillary
    equipment.   A limited data preparation service is provided and
    the group is also responsible for keeping records and accounts
    of the computer activity.

(b) Resource Management
    Resource Management liaises with the SRC and users to determine
    the user population, and controls the location of total computer
    time to the different user groups.   The maintenance, documentation
    and verification of the standard software systems together with
    the support for other software is provided.   The group monitors
    system performance and is concerned with the problems of user
    involvement with the computing service.

(c) Applications Software
    This group has the responsibility for producing and controlling
    specific software projects, problem-oriented programs and packages
    of general utility.   They are concerned with the detailed

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programming and operation of the data processing for space
research projects and provide maintenance and support for
special packages such as X-Ray crystallography, ASCOP, MVC,
etc.

(d) Basic Software

This group is responsible for the installation of major systems
on the main computers, for example the operating system GEORGE 4
has been installed and is vetted by this group. In addition
the group has responsibility in the evaluation of new computer
systems and in the development of communications, software and
hardware.

(e) Administration

Administration group is concerned with the day-to-day domestic
needs of the Laboratory, the control of expenditure, estimates,
stores, etc. In addition they are responsible for the security
of the buildings and machinery, and for the provision of a
reception section for the travelling and domestic needs of the
Laboratory's users.

BUILDINGS

Two main computers are currently housed in a two-level computer block:

(a) The Atlas 1 computer, installed in 1964 and due to be closed
     down on 31 March 1973.

(b) The ICL 1906A computer installed in June 1971.

In addition, a Sigma 2 acts as a subsidiary computer for the Atlas
multi-access system, and a PDP15 is installed and interfaced to the
1906A for graphics work.

Office accommodation of approximately 6,500 sq ft is available, and
additional office accommodation is being provided and should be
completed by the Autumn of 1973. This new addition will provide
3,000 sq ft. of additional office space together with a colloqium room
The office accommodation provides university users and others with
limited office accommodation whilst visiting the Laboratory for short
periods.

MAIN COMPUTERS

ICL ATLAS 1

The Atlas 1 computer has been in continuous service since 1965/66 and
is used mainly by university research workers. It is expected that
most of the work planned for this machine will be completed by the
New Year and that users with current Atlas programs will be
accommodated on alternative facilities. No decision has yet been
reached concerning the future use of the associated Sigma 2 subsidiary
machine.

The 1906A computer has been fully accepted and is currently working
three shifts covering a total of 110 hours a week, and is now showing
an acceptable reliability both in hardware and software.   GEORGE 4,
a paged version of the ICL GEORGE 3 operating system, has been
installed and has been accepted as the Laboratory's standard operating
system.

ICL 1906A

Principal Hardware

Central Processor with the Extended Floating Point feature;

Main Core Store of 256K words (24 bits), paged, interleaved 4 ways,
cycle time 650 nanoseconds.

2 Magnetic Drums on a single control, each with a capacity of 2M
characters (=0.5M words), a transfer rate of 1.4M characters per
second, and an average latency of 6.3 milliseconds.

1 Multi-spindle Exchangeable Disc Store with 7 drives, each cartridge
having a capacity of 30.8M characters, a transfer rate of around 400K
characters per second, an average latency of 12.5 milliseconds, and an
average access time of 87.5 milliseconds.

1 Fixed Disc Store with a capacity of 741M characters and an average
transfer rate of 230K characters per second.

6 Magnetic Tape drives on two controls using 9-track phase-encoded
recording at 1600 bits per inch and having a transfer rate of 160K
characters per second.

4 Magnetic Tape drives on two controls using 7-track NRZI recording
at densities of 200, 556 or 800 bits per inch and having transfer
rates of 15K, 41.7K or 60K characters per second according to density.

Slow Peripherals

2 Lineprinters (120 print positions and 1350 lines per minute)

2 Card Readers (1600 cards per minute)
2 Paper Tape Readers (1000 characters per second)

1 Card Punch (100 cards per minute)
1 Paper Tape Punch (110 characters per second)

Communications

7903 Communications Processor able to control up to 32 teletype
terminals and 4 card reader/lineprinter terminals, with scope for
later expansion.   Three Remote Job Entry terminals are connected
to the system and access is also available via teletype terminals.
The Laboratory's internal teletype equipment can be used both to the
Atlas and to the 1906A.

Software

The ICL operating system GEORGE 4 is in regular use. This provides
a series of commands for the running of a batch computing service
together with multi-access working via MOP terminals. It supports
a large filestore with automatic facilities for the dumping of
information stored therein.

The Laboratory makes use of standard ICL compilers for Fortran and
Algol. In addition compilers for a number of other languages are
available but the Laboratory may not be able to support these fully.

Program systems are available for both crystallography and quantum
chemistry, based respectively on the X-RAY system and ATMOL 2. A
program for survey analysis analogous to but not identical to MVC on
Atlas is currently under development and should be available early in
1973. A program for text analysis is nearing completion based on
the Atlas Concordance program COCOA. Its facilities will be slightly
extended and it is hoped to release this in October 1972. The
Laboratory is taking steps to acquire the 1900 version of ASCOP which
provides a coherent data management and statistical analysis system.
For graphical work the SD4020 may be used from the 1906A through
implementations of the Algol GROATS package and the Fortran graphical
package.

The Laboratory is considering other packages and program suites
including a large number of ICL applications packages. Some of
these may be supported and the Laboratory will be pleased to hear
from users of packages and programs which are generally useful.

IBM 370/195 COMPUTER

The Atlas Laboratory has a 20% share of the IBM 370/195 installed in
the neigbouring Rutherford High Energy Laboratory.   The 370/195 was
installed in November 1971 and is now providing a full 3-shift
computing service to the Nuclear Physics community and to the Atlas
Laboratory.   To deal with this work the Atlas Laboratory has
installed a remote job entry terminal locally, consisting of an
IBM 1130 computer operating over a fast 40.8 Kb line.

Principal Hardware

Central processor with 2M Bytes (8us) of core and a fast buffer store
32K bytes (290 nanoseconds).

A fixed head file with a capacity of 11.2M bytes, average access 5.0
milliseconds.

IBM 3330 Disk Storage - 8 drives with a capacity of 100M bytes per
pack.

8 IBM 3420-7 Magnetic Tape Decks, 320K characters per second, 800 BPI
phase-encoded, 9-track.

2 IBM 3420-7 Magnetic Tape Decks, 320K characters per second, 800 BPI
NRZ, 1600 BPI phase-encoded.   9-track.

2 IBM 3420-5 Magnetic Tape Decks, 200K characters per second, 556 BPI
NRZ, 800 BPI NRZ, 7-track

Slow Peripherals

4 lineprinters (1100 lines per minute, 132 print positions).
1 card reader (1000 cards per minute).
1 card reader/punch (1000 cards per minute, 300 cards per minute)

IBM 1130 Work Station

IBM 1131-2B central processing unit with 8K (16 bits) core store 3.6 us
access time.

1 card reader (1000 cards per minute)
1 lineprinter (1100 lines per minute 132 print positions)
1 Synchronous Communications Adapter (600-4,800 bits per second)
1 Fast Communications Adapter (40.8KB)

Communications

Communications equipment includes IBM 2701 Data Adapter Unit.
Communications via Post Office leased lines or dial-up facilities are
handled by a Memorex 1270 Terminal Control Unit which operates at
speeds up to 1200 baud asynchronous, and up to 9600 baud for synchronous
transmission.

The 370/195 operates using OS/MVT with the HASP system handling a
number of remote job entry terminals.

The Rutherford Laboratory supports Fortran and little support is available for other compilers.

The Atlas Laboratory users are university research workers who need very substantial amounts of computing for their work, eg theoretical chemists and physicists working with 3-dimensional systems.

PDP15

The Laboratory has been actively concerned with graphical output for many years using the SD4020 microfilm plotter. In developing the work in graphics the PDP15 is being used to develop new software for workers in the graphics field and new systems for driving the SD4020 should become available in the near future.

Principal Hardware

Central processor with Extended Arithmetic Element, automatic priority interrupt system, memory protect, real-time clock.

Main core store of 32K words (18 bits) cycle time 800 nanoseconds

1 RF15 DEC disk control with an RS09 random-access disk file capacity 262, 144 words

3 DEC tapes

2 TU20 magnetic tape drives on one control using 7-track NTZI recording at densities of 200, 556 or 800 bits per inch and having transfer rates of 45 inches per second.

Slow Peripherals

1 DEC high speed paper tape reader/punch
1 KSR 35 teletype
1 KSR 33 teletype

Graphic Peripheral

1 VT15 refreshed display with 17-inch tube producing approximately 4000 flicker-free characters or 6000 inches of flicker-free line

1 VL04 light pen
1 VW0 1 BP writing tablet
1 LK35 keyboard (68 characters)

Communications

BS1 current driven interface to the 1906A capable of running at approximately 1 megabaud.

ANCILLARY EQUIPMENT

The Laboratory makes available to its users the standard card
preparation and paper-tape preparation equipment both for the 370/195
using EBCDIC and the 1906A using the ICL codes.   In addition,
reproducers and interpreters are available together with a DMAC pencil
follower.

D-MAC Pencil Follower

A type PF 10,000 Mark 1A pencil follower with a 100 x 100 cm table.
The standard output device is a Westrex Teletype paper tape punch type
BRPE 29 capable of producing 5, 7 or 8-track paper tape.   Code
conversion boards allow output in either 5-hole Atlas code, 7-hole
Atlas code or 8-hole 1900 code.   There is a variety of input pencils
depending on the type of digitising required.   A 31-character keyboard
allows headings to be added to the output.   The D-MAC is also interfaced
to the PDP15 via an SSI interface.

SD4020 Microfilm Recorder

A Datagraphix SD4020 accepts input from an IBM 729 Mark 4 magnetic
tape unit at 556 bits/inch 7-track NRZI.   Output is available via

     Photographic paper

     16/35 mm cine film

     Large photographic plate film (3 sizes)

Software systems in Fortran and Algol are available on all the
Laboratory's main computers.

SUPPORTING SERVICES

The Laboratory has support staff to assist users to become acquainted
with the Laboratory's facilities and to help in the day-to-day
difficulties of computer use.   In addition, the Administration Group
looks after the accommodation and transport of visiting users and
over the years have gained considerable experience of this important
activity.

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