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INFORMAL Draft

An introduction to the Computer Science Department

This is an introductory note for new members of staff. Hopefully it will give you some background to the way the department works. It is as accurate as I can make it but you'll have to allow for the odd bit of inaccuracy and prejudice.

The Department is here to educate students in Computer Science and to make advances in the subject through research. Note the word is educate not train. A bit about people..

Computer Science staff and activities can be split into groups in several different ways..

You could divide it by the post held..

The top brass.

There are four professors - Sidney Michaelson, Roland Ibbett, Robin Milner and Rod Burstall - and a Head of Department - Peter Schofield (PDS). I would not like to define too accurately what the duties of each might be, but I guess it is fair enough to say that the professors are responsible for guiding and directing academic teaching within the Department and will each head up their own research group in a particular field. Peter is the elected Head of Department and is ultimately responsible for everything - finances, organisation, recruitment and so on by the authority given him by the Departmental Meeting who elected him.

The Departmental meeting IS the department in a way and advises the Head on matters which concern the department as a whole. It meets on the first Friday of each month and is open to all staff.

The rest of the Academic staff

These are lecturers and Senior lecturers, visiting Fellows and so on. These form the backbone of the department and will variously teach and/or perform research according to abilities and inclination. Ideally, most academic staff would like to perform research and teaching, essential as it is is sometimes seen as something of a necessary evil. The result is that in practice some lecturers teach almost exclusively and others are almost exclusively devoted to research.

The Computing Officers

The departmental Computing Officers (CO)s are responsible for the service aspects of the department i.e. writing specific software and maintaining it thereafter and administering the departmental services and so on. They may teach but are not obliged to and may have development projects of their own (development not, not research). We now have one administrative CO (hello Dorothy) who is responsible for ensuring the smooth running of various aspects of Departmental administration.

The Computing Support Officers

The departmental Computing Support Officers (CSO)s are responsible for some of the day-to-day operations of the department. Their duties are part operational, part clerical and possibly part programming. That's Linda and Lise.

The Research Assistants

RAs are generally staff appointed on fixed-term contracts (typically 3 years) as part of a research grant. They will assist in the research undertaken under the grant and may be working on a degree or papers of their own while they do.

The Secretaries

Unquestionably the most vital part of the department (after the COs). We have seven? secretaries, one for each professor, one for the Head of Department, one for the LFCS deputy director (George Cleland) and one other (hello Margaret) who is principally an administrative secretary. The secretaries provide general support for particular groups of staff as well as their prime responsibility.

The PostGraduates

The PGs are graduated students working on their Doctorates. They will generally be on three year postgraduate student grants and will generally be expected to complete their PhD in that time. Postgraduates can sometimes extend this period by seeking employment as RAs.

The Undergraduates

The bread and butter of the departments teaching. There are four undergraduate years plus M.Sc. students who tend to be taken together with the undergraduates.

CS1 and CS2 will be taken as a main course by intending Computer Science graduates and as a side course by graduates in other subjects (CS1 more than CS2). There are about 250 CS1 and 80 CS2.

Information Sciences 1 (IS1) is explicitly a side course taken mostly by students in the arts and humanities. There are about 180 IS1.

CS3 and CS4 are taken as a main course by CS graduates and in a restricted form by those taking one of the five joint CS degrees. CS4 do a 4 month project in their final year, lasting from approximately Christmas to June (with breaks for vacations and Final examinations). There are about 60 CS3 and 45 CS4.

The M.Sc. students will generally be graduates who have not carried on to do a PhD but wish to obtain a second degree in Computer Science. Their first degree may well be in something completely different and the CS M.Sc. is a conversion. The M.Sc. lasts for up to three years (usually one) and they do a five month project from about April to September in their final year.

You could divide up the department by subject

Computer Science is not a monolithic subject and different groups have different areas of specialisation. It is regrettable but true that in practice one can divide the department into "Theorists" and (for lack of an established term) "Pragmatists". It is probably fair to say that the department's substantial international reputation is based largely on the work of the theorists, now regrouped as the LFCS, but with the appointment of a hardware Professor (Roland) and a new (vacant) post in software the Pragmatists are regrouping fast.

Theory of Computer Science has its roots firmly in mathematics and the theorists are principally renegade mathematicians. The topics of interest such as Complexity theory, Semantics, Logic of Concurrent Systems and so on tend to produce work which has a long-term effect on the subject as a whole. The work of the theorists has resulted in the establishment of the Laboratory for the Foundations of Computer Science (LFCS) which is a daughter group within the department

devoted principally to research in these areas.

The prime movers of the Theory side of the department are professors Rod Burstall and Robin Milner with Gordon Plotkin and so on.

The pragmatic side of Computer Science is less easy to define but includes operating systems, hardware, networks, VLSI, CAD/CAM, image processing, stylistic analysis and so on. The pragmatists tend to be renegade physicists and engineers and the research tends to aim at the medium- term (5 years say).

The prime movers are Professor Sidney Michaelson (one of the "founding fathers" of the departmment) and the recently appointed Hardware professor Roland Ibbett.

You could divide the department geographically

Worse luck.

The University is spread generously around the city (and is much larger than it may appear), but the two main campuses are around George Square (in town) and Kings Buildings (on the south side). First year teaching is carried out at the Appleton Tower in town and everything else is taught at KB. This means that those lecturing or tutoring first year students have a regular commuting run into town. We also have a terminal room in the Tower level 3 which provides CS1 with about 45 terminals and share a microprocessor laboratory with the Regional Computing Centre (ERCC) on level 4 which we use for teaching IS1. This comprises mostly Apple Macintoshes and Sirius microcomputers. An attempt to spead APM technology to the micro lab was not one of the department's major successes.

A few scurrilous remarks about the support staff (in alphabetical order with their Vax mnemonic) No way am I going to put down duties of the new COs in writing just yet by the way.

Mike Allen MA (CO)
Non-LFCS Unix support, Text processing (mainly TeX - till Christmas) Unix port to APMs

David Baines DWB (CO)
Looks after the Gandalf contention switch and supports CS2.

Jo Blishen JTB (CO)
VLSI support, Publicity plus a few things to come.

John Butler JHB (CO)
Me. I am the service manager and pick up anything which doesn't fall into an obvious category. (i.e. if it goes wrong it's my fault). I also support CS2 Real-Time systems

Ken Chisholm KJC (CO)
Graphics, VLSI and some CAD/CAM. moving into Databases.

George Cleland GLC (CO)
Deputy Director, LFCS. Previous service manager and general handy lad to have around.

Lise Desjardins LD (CSO)
Looks after the Vax databases

John Dow JCD (Snr. Tech.)
Supervises technician activities. Safety officer, liason with works dept., purchasing etc.

Russell Green RTG (CO)
Hi Russ. CS1b course coordinator, Graphics (as I recall)

Archie Howitt AH (CO)
Rowland's C.O. Hardware (esp. 3rd year lab)

Kathy Humphry KMH (CO)
Supports IS1 and administration services

Jimmy Johnstone JJ (Snr. Tech.)
APM construction and maintenance

Fred King FRED (CO)
CS1 course coordinator. Prime mover behind APMs (also called Fred machines). Hardware development. Unix port to APMs

Peter Lindsay PJL (Snr. Tech.)
Real-Time systems, BEPI solder-wrap machine, MSc support, some Roland Ibbett work.

George Ross GDMR (CO)
APM filestores, liason with distributed operating system research, systems integration.

Alastair Scobie AJS (CO)
VAX manager (Much to his disgust), APM operating system, gateway and communications infrastructure.

Julian Turnbull (CO)
IS1 and CS2 real-time systems support

Rainer Thonnes RWT (CO)
APM guru. Operating system, hardware etc. etc. etc.

Dorothy Welch (DAW) (CO)
Administration. Hi Dorothy.

John Wexler WEX (CO)
On Sabbatical from ERCC. Operating systems, Publicity, Liason with Physics on MEIKO transputer array etc.

Linda Wilkie LINDA (CSO)
Looks after the day-to-day running and housekeeping of the various systems. Liases with technicians and systems staff.

There is not much management structure within the department, but Fred, Archie, Rainer and Peter Lindsay report to Roland Ibbett, Dorothy, Kathy and I report to PDS, the technicians report variously to John Dow and Jimmy Johnstone. Dave, Mike, Alastair, George Ross and Linda report to me. Lise reports to Kathy and me. Ken reports to David Rees. Jo reports to Dave Rees and me. I can't recall who Jimmy and John report to but it'll be PDS or Roland. The newer COs report all over the place at the moment.

A bit about money..

Computer Science purchases and uses computers in two rather different ways, depending on where the money concerned came from.

There are three funding bodies: The Science and Engineering Research Council (SERC) funds Research. The University Grants Council (UGC) funds teaching and the general services required by research staff plus some research. The Alvey Directorate funds collaborative projects between Universiities and industry. It was a five-year exercise which has now finished, but funded projects are still carrying on, the prime example being the LFCS. Alvey and SERC research grants are awarded to individuals or groups and the equipment is primarily for their own use. UGC money is awarded to the department as a whole and provides general facilities. Some additional money comes from industry either as gifts (such as the Gould) or as grants to specific projects.

The equipment..

The Department has two VAX mainframes. The smaller one (VAX 11/750) was purchased on SERC money for the use of the Theory group. The larger one (VAX 11/780) is part of the main departmental computing facilities and is the general departmental workhorse for administration, mail, text processing and so on. It is about to be augmented by a MicroVax after Christmas.

We are one-third owners of two GEC series 63 mainframes and a Gould Powernode 9080. These machines were obtained through Alvey money (GECs) and a gift (Gould) for use by the School of Information Technology, a consortium of Computer Science, Artificial Intelligence, Electrical Engineering and Cognitive Science. They both run UNIX and are used for both teaching and research.

The remainder of the departmental computing service is based round powerful single-user machines. These fall into two groups - the SUNs and the APMs.

The SUN workstation is a proprietary workstation costing from about £7000 which is used in this department to give a single user a powerful computing facility and a high-resolution screen.

The APM is a home-grown workstation which provides a somewhat different kind of facility - It is less powerful but more flexible. It offers colour graphics and a range of specialised "one-off" facilities. It is a useful "hacking" machine for teaching purposes. It should also be noted that it provided SUN-type computing within the department about five years before anything similar appeared on the open market, but had problems for a while finding a particular operational "niche".

Communications.

None of these machines could work satisfactorily without network connections.

There are three types of network in the Department or accessible to it.

We have a Gandalf 200 contention switch or "PACX". This switches circuits between our 200 or so terminals and our 150 or so mainframe ports. These are asynchronous lines and the Gandalf is best regarded as switchable "smart wire".

ERCC (next door) runs a large "wide-area" network called EdNET. There are about 25 mainframes attached to it varying in size from the ERCC Amdahl to small VAXes and PDP-11s. This network connects to the UK-wide PSS network and thence to the world. The lines connect through GEC switches (large

computers in their own right) and run at speeds typically 4.8 Kbaud to 48Kbaud. ECSVAX, CSTVAX the Gould and GEC 63s are all connected to this network.

We run two Ethernets. These are lengths of coax cable and are an example of "Local-area" networks. The two in the department run at different speeds. The 2 Mbaud network connects all the APMs and the ECSVAX. The 10 Mbaud runs newer international standard protocols and connects the Gould, Suns, ECSVAX, CSTVAX, GEC 63s and Pyramid. As yet the 2 and 10 Mbaud ethernets cannot talk to each other but that is being worked on. The 10 Mbaud Ether is connected to the Electrical Engineering (EE) Ethernet by a fibre-optic link.

It is worth noting that a 10Mbaud network can carry 1 Million characters per second: In other words you could send every character in the Edinburgh Telephone directory down the Ethernet in 15 seconds.

This speed enables the APMs and SUN workstations to run without discs. If you consider a typical home micro, you have the micro and screen as with the APM, but in order to use it you require discs or tape to store data. The APM has done away with this - instead it obtains all its data from the filestores over the Ethernet. This avoids having to have large numbers of disc drives and discs which have to be backed up and so on.

A look at the service..

The service machines, then are..

The ECSVAX VAX 11/780, located in the machine room.
Medium-sized mainframe, capable of handling about 40 simultaneous users (depending on what they are doing). It has eight disc drives (five for system and user files, one for APM filestore backups), one magnetic tape drive and one 8" floppy drive. It connects to the 2Mb (APM) Ethernet via an interface known as the brown box and to the 10Mb Ethernet via a DEC interface called a DEUNA. Runs VMS.

It is used by all CS staff and students (other than CS1) to some degree.

The APMs, located throughout the JCMB.
64 single-user machines each with a 68000 main processor and 1 - 4 Megabytes of main store. Four APMs have 86Mb Winchester discs, one has two floppy discs. 25 have colour graphics systems. These are each about 1/2 as powerful as the CSTVAX VAX 11/750 (depending on how you rate power) and are capable en masse of handling more work than the VAXes Gould and GECs put together.

They are used by all except CS1, for VLSI (Very Large Scale Integrated Chip Design), project work, operating systems teaching and so on. Real-Time Systems use a cluster of them for teaching about the interactions between computers and hardware. They run home-grown operating systems.
Total cost to develop and manufacture about £7500 each.

CSTVAX
Vax 11/750 purchased on a theory grant. Attached to EdNET and the 10MHz Ethernet. Used principally by the LFCS and can support about 12 simultaneous users. Runs Unix BSD4.2.

The Gould Powernode PN9080
Twin-processor 10 Mip mainframe, 16 Meg. of main store, 64 directly connected

terminals plus X25 and Ethernet connections. Runs Unix BSD4.2
Managed by ERCC for the School of I.T.
Total cost to purchase ca. £700,000 - received by the IT school as a gift.

The GEC63s

Two medium-power mainframes ?25-30 users each, running Unix 5. One purchased on Alvey money. These are used more by Artificial Intelligence than by ourselves - the discs are too slow for most of our applications. Managed by ERCC for the School of I.T.

The Pyramid 98xe

High-power mainframe, used by the LFCS as a fast filestore for the SUN workstations. Runs CHEOPS but I can't tell you much more than that. Unix 4.2-ish.

The SUNs

About 15 powerful single-user workstations. 68020 processor, 4 Meg of store each plus high-resolution screen and Ethernet connection. They give about 2 Mips each, run Unix and go like bats out of hell.
Cost about £11000 each when you include filestore provision etc.
Most belong to the LFCS but 2 (shortly 4) belong to the VLSI group and two more belong to the Vision group (Andrew Blake). Nice work if you can get it.

ERCC

The Edinburgh Regional Computing Centre (next door, in the JCMB) provides the main University-wide computing service. It has a very large computing network with about 1500 terminals. These can access about 12 mainframes, the biggest of which are 2 ICL 2976s, an ICL 2988 and an Amdahl V7, all in the JCMB. These can cope with about 360 simultaneous users between them. We use ERCC machines principally for teaching our CS1 and IS1 students.
It's just been renamed EUCS (Edinburgh University Computing Service). That's pronounced "ERCC". They have a new director as of 25 Nov.

The ICL machines and the Amdahl all run EMAS, an operating system designed and implemented at Edinburgh specifically for academic computing.
It goes like a train but you won't find it anywhere else except Kent.
EMAS and the locally-produced language IMP are the mainstays of an policy of "going-it-alone" which has given us good computing resources at the expense of cutting us off from the rest of the world.

John Butler

..And I reserve the right to deny absolutely anything you see in this document.