

SCIENCE AND ENGINEERING RESEARCH COUNCIL  
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COMPUTING DIVISION

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VISITS

Notes on a visit to Professor J Fitch  
and Dr P Willis - 18 September 1981

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INTRODUCTION

The purpose of the meeting was freefold. Firstly to gain an impression of the computing research at Bath. Secondly to discuss a forthcoming grant application for Professor Fitch and Dr Willis and, thirdly, to discuss SERC's Software Technology Initiative with Professor Fitch who is Professor of Software Engineering at Bath.

Background

The University of Bath is organised as a set of schools and a school as a set of groups. Professor Fitch heads the Numerical and Analysis Computing group. Until one year ago the head was a Numerical Analyst but had to retire due to ill health. There was also an Analogue Computing group in the school.

Dr Phil Willis was appointed to a new lectureship in the department two years ago. Dr Peter Wallace was appointed just before Phil.

The Chair of Software Engineering at Bath was created about a year ago when the Director of the Computing Unit retired. John Fitch is now Professor of Software Engineering and Director of the Computing Unit and also head of the Numerical Analysis and Computing group.

Tim King who was formerly involved in the Database project with Cambridge has just been appointed to a lectureship in the group and a further lectureship is currently frozen.

The research being carried out by the group falls into four categories:

1. Databases (Tim King)
2. Hardware/Graphics (Phil Willis)
3. Languages and Semantics (Peter Wallace)
4. Symbolic Computation (John Fitch)

John Fitch has spent some time at Utah and is deeply involved in Symbolic Computation. His background includes Leeds and Cambridge where he did his Phd with John Larmouth.

Phil Willis was at Sussex before moving to Bath.

There are five and a half computing lectures in the department (the half being John Fitch) and three numerical analysis lecturers. The two lecturers not covered above are John Barker whose main work is teaching but does a little research on Medical Instrumentation, and Alan Charlesworth whose time is entirely devoted to teaching.

The school give four types of degrees:

1. Mathematics
2. Statistics
3. Mathematics plus Computing
4. Mathematical Studies.

The fourth degree is a descendant of the Bath College of Technology degree course. Students may choose from the full range of courses in the department.

The first year is common to all students and includes pure mathematics, applied maths, computing and statistics. The second year course includes a core mathematics course plus two further options and in the third year another option may be dropped.

Because the course is unified, Fortran is taught as a first language.

The second year course includes introduction to computing (algorithms, data structure, complexity). An assembler for PDP 11's, Unix, BCPL and the micro-electronics course which includes basic logic and small assembler programming. The micro-electronics course is very laboratory oriented and has proved very popular. It is run by one of the lecturers formerly in the analogue computing field.

The Bath courses are sandwich courses. Students have the option of taking one times twelve month industrial period or two times six months. The third academic year course comprises six blocks divided into pairs. The first pair is call material including data structures, compilers and systems programming. The first half covers hash tables, tree manipulation etc, whereas the second half is operating systems.

The second pair may loosely be described as languages. The first of the pair is compiler studies, the second semantics, knows very little practical work in these courses which are taught by Dr Wallace.

The third pair is real-time control and signal processing. The signal processing course is something of an oddity and may be replaced by graphics course in the future.

The intake for the school of mathematics this year was seventy-two, approximately twenty of whom will turn out as computer specialists. The entry requirements for the Bath course are very high being below Oxford, Cambridge, Bristol and Durham.

The policy of the University is to encourage co-operation with industry. The University also has a positive policy to consultancy work and in fact a list of consultancies is published in the Universities annual report.

#### DCS Project

John Fitch and Phil Willis sent a draught application for a feasibility study of a tree structured arrangement of processors. They have a specific application in mind which is the representation of three dimensional objects. The general impression gained was that they had a reasonable idea which they have worked up into a grant application but they seem to lack long term direction and lack an appreciation of the software problems they are likely to encounter.

#### Software Engineering Initiative

Rob Witty gave the background to SERC's to Software Engineering Initiative.

John Fitch's view of technology which will be transferred into industry in five to ten years time includes the following:

1. Verification seems to be making good progress.
2. In five to ten years time theorem provers will still be nowhere.
3. Ada is an industrial disaster!

Many of the problems faced by industry are not encountered in the academic environment. In the academic world any large software systems built are built with very small teams of people. One exception might be the University of York who at the end of the Ada project should be able to produce some statement on how the project should have been tackled.

John Fitch's view of programming centres around applicative languages where one of these stands some chance of being able to prove at least some of the programme.

John Fitch feels there is merit in centralising expertise and tools for symbolic computation which is his own special subject. The Maxima software system can be obtained on a VAX under UNIX, if the system were implemented centrally then it should be possible to provide an advisory service amongst UK academics. John Fitch thinks he could get together a small team to provide such service. One problem however could be that Maxima is about to go commercial.

Maxima is the best system at present for performing complex mathematics on simple problems. John's own system is probably the best for providing simple mathematics on large problems and the Reduce system falls between the two extremes. John Fitch plays a large part in maintaining the Reduce software.

John Fitch was invited to put together a document estimating credible usage of algebra systems in the UK and making the case of implementation of an algebra system on the column base hardware. During the informal conversation at lunchtime it became clear that symbolic algebra systems

are very important in the number of disciplines e.g. astrophysics and relativity theory. However many researchers are unaware of their existence and the benefit they could derive from them.

#### CAD Application

John Fitch and Phil Willis have applied to SERC for a machine to support the graphics work they are doing in conjunction (but not receiving money) with a local company. The title of the project is CAD off commercial art work. It became clear that their real requirement was for a Perq-like machine. This matter will be discussed further when John Fitch has seen Perq.