May 2001
Features

Career interview: Systems administrator

by Mark Wainwright

Until recently **Steve Traylen** worked for *Plus*'s sister site, NRICH. Here he talks to *Plus* about being a systems administrator.

Plus: First of all, what do systems administrators do?

Steve: They're responsible for the smooth running of a computer system, and for creating an environment where other people can do their job effectively. On a day to day basis I have to buy hardware, install the hardware and software, solve problems that people have with their computing. Many of these problems are new to you so the important thing is knowing how to find things out, rather than just knowing the answer. I am constantly learning new things.

Plus: You took a degree in mathematics. When did you first decide that was what you wanted to do?

Steve: When I was about 15 or 16. That's when you start doing real mathematics, not just learning arithmetic, and I found I enjoyed it greatly.

Plus: And when you left school you went straight to university ...

Steve: Yes, I didn't think of taking a year out then. I went to Sheffield University, which was my first choice. Lots of friends from school were there. And the course was recommended by one of my maths teachers as well. It had the merit of flexibility; probably that's true at most universities now, but perhaps then it was ahead of the field on that front.

Plus: What sort of courses did you pick?

Steve: We did pure, applied and statistics in the first year; I enjoyed the pure most. I more or less dropped statistics after the first year. Towards the end of my degree I was tending towards applied, including some almost engineering sorts of things: signal processing for instance, which looks at wave equations, and processing electromagnetic waves for communications, and such like.

This was the first bit of mathematics I had done which seemed like real maths: it was being used every day in engineering, and it was an area that was going to grow and grow. Some of the maths went back to Fourier, or back to the Second World War, but since then it's grown very fast. It seemed really modern. This was something that might not have been a subject ten years ago.

Plus: Then when you graduated, you started a PhD.

Steve: Yes. Actually my main reason for doing a PhD was to remain a student and to have an excuse to remain in Sheffield! Sheffield is a great city, I like it a lot. Though of course, that's not the best possible motivation, which may be one of the reason I never finished the PhD.

The PhD was about signal processing being used for remote sensing of the ocean surface. The idea is that you can measure the wave height from radar equipment on the back of a Land Rover. Then say you have an oil slick; you can quite quickly deploy your Land Rover and see where the oil is going to go the next day. I was working on a particular aspect of this, trying to improve its accuracy by removing some noise that was creeping in from somewhere. I started out by getting up to speed on lots of research journals, which was very interesting.

Once we had a new idea we had to try to apply it, and that really came down to writing computer programs in C. It was a surprise when I realised I was going to spend all my time doing my PhD programming, because I hadn't touched computers at all during my maths degree. Once as an undergraduate I started a course and then dropped it because it involved computing! I hadn't ever even sent an e−mail. My first e−mail was during the first week of my PhD when my supervisor insisted that I send her one. I think I had to go and ask someone how.

Plus: And you took to programming, evidently.

Steve: I realised that programming was very mathematical, especially because of the kind of programming I was doing, implementing numerical methods and things like Fourier transforms. I would read a maths paper, which would introduce a lot of functions used to describe a signal, and then have to convert that into code to run on machines.

What I liked was that things had a definite solution. I liked repeating things that people had done before me, recipe mathematics almost, where you're applying a quite standard technique to some new data. The maths itself is not particularly new, but it's a new application of it. The mathematics I was using for my PhD had previously been used mainly in cosmology, and at the other end of the scale in crystallography, looking at diffraction in crystals. We were applying to the sea and effectively treating sea waves like the layers of a crystal. There were new problems too, for example crystals don't move but the sea moves quite substantially. The sea is a lot more "noisy" so you've got more statistical problems, which means you have to use averaging techniques.

Plus: But you didn't finish the PhD ...

Steve: There were probably a number of reasons for that. When I started I didn't really think through what doing a PhD would entail very well. One thing it did entail was an awful lot of reading and writing − there's a lot of literature to review, and obviously a PhD is a massive document to produce. Although I've never been

formally diagnosed as dyslexic, I find reading and writing ... I wouldn't say difficult, but I'm slower at them than other people. At the same time I was becoming more interested in computing, and I was doing things not directly related to my PhD, or at least emphasising the aspects I found most interesting. So I was spending more and more time programming and less and less reading around the subject.

Also I had problems with the project itself: what I discovered about the new method I was using was that it didn't actually make much difference. There was no definite answer really, and I like answers. At best it would have been a PhD saying "this new method doesn't do very much", which was demoralising. I had hundreds and hundreds of graphs which all looked absolutely identical. They were supposed to demonstrate the differences between various methods!

Plus: What happened next?

Steve: When my PhD funding ran out I stayed on as a Research Assistant for six months, half−time; the other half−time I worked for Computing Services. I was fairly decided by that time that working with computers was what I was going to carry on with afterwards.

Then in 1998 I managed to go to Japan for three months as part of an project that sends research students and postdoctorates to work in Japanese research institutes. I went to Okinawa which is an island in the far south of Japan, near Taiwan. The idea of the scheme is to encourage British, German and American scientists to go over to Japan, so they looked after us very well. This included a week's Japanese lessons at the start, which weren't too productive, because I found for the first month Japanese sounds like noise and it's not till you've been there a month that you can really make out a word.

I had a very good time out there, and did some reasonable work as well, comparing some remote sensing data from a Japanese and a British radar. It hadn't been done before. They produced a report for all of us who went out there, about 150 of us, and I had an article in there. It wasn't an official scientific publication but at least it's written up.

At this point I'd been in Sheffield nearly seven years, so even though it's wonderful I decided it was time to run away. I was supposed to be finishing my PhD, but I wasn't going to, so I had to make a definite run for it. So I started applying for jobs. My two prerequisites were that I wanted to work with Unix, which I'd been using for the last few years, and also to stay within a maths or science background.

Plus: And that was when you saw the job at NRICH ...

Steve: Yes, I'd been applying for system administrator jobs in maths departments, but this job particularly interested me. It was working for the NRICH mathematics project, which creates extracurricular maths material for interested five− to nineteen−year−olds. I remember when I was doing A−level I used to do maths problems, and I could never get enough of them, so I knew that definitely, if you provide that sort of material, there were people out there who would benefit greatly from it.

Plus: What did your job there involve day−to−day?

Steve: I was doing webmastering, system administrating and generally helping out with computing. There are a number of editors who provide the content and ideas. They're mainly from a teaching background, and they're not necessarily very computer−literate, but they have a lot of great material which I supported them in putting online. And there are obviously some things you can produce that you couldn't put in a book, like interactivities and games and little dynamic problems.

We worked on Linux machines and obviously wrote a lot of HTML, but besides that we used things like Java and Flash for interactive puzzles, and produced quite a lot of graphics, which is fun. And we had to look after things "round the back", rather than what people out front see, and to do that we did a lot of scripting in languages like Perl and Python.

Plus: What are you doing now that you've left NRICH?

Steve: I now work at the Cambridge Crystallographic Data Centre, which produces a large database of chemical strutures which is then used by a selection of chemists for their research. Here I work with a variety of machines from Linux on cheap PCs up to AIX and Digital Unix on multiprocessor machines.

I provide, with the help of my group of 4 people, computing support to the 40 members of staff at the CCDC including administrative staff, chemists and also some C++ and Python developers.

Plus: What are your other interests?

Steve: As a teenager I was a Venture Scout, and it was a big part of my life for five or six years. We used to go for walks in the Brecon Beacons and do a lot of climbing and cycling. One of the reasons I went to Sheffield was because of the climbing and cycling there. Most of the best cyclists in the country come from around Sheffield way. Because it's so hilly there you have to be extremely good − you can't really be unfit and cycle in Sheffield. And all the best English climbers come from around there, because of all the climbing areas.

Plus: Do you still climb?

Steve: I don't, actually. After going to Sheffield to climb I then didn't actually do much climbing. I carried on cycling, though, and am still cycling a bit now, though not as actively as I'd like to. It's something I'd like to improve on.

Recently I've been travelling a lot abroad. I like going places on trains. I've been to Orkney recently, camping and walking. I've also just been out to the Baltics − I went to Lithuania and Latvia − which was interesting because they are ex−Soviet, and also there's the Scandinavian influence. I'm going to Morocco soon, and I'll do some travelling around by train there, hopefully.

Plus: What would you say was the best route into a job like yours?

Steve: The two obvious ways to go would be a degree in either maths or computer science. Computer scientists tend to work more with hardware and systems − though I don't know if they'd agree with that! − but mathematicians make very good programmers. One problem with mathematicians is that they can be far worse at leaving their code so that other people can read it, because they tend to think of their own way of doing things.

To do this sort of job you have to be interested in problem−solving. That's the skill you learn from doing mathematics. When you attack a maths problem you have to work out precisely what the question is, you draw a little picture of it, think of all the consequences, and come out with the best solution. That skill is something you can apply in lots of areas.

About the author

Mark Wainwright is an assistant editor of *Plus*.

Plus is part of the family of activities in the Millennium Mathematics Project, which also includes the NRICH and MOTIVATE sites.