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Numerical Algorithms Group Bridging Theory and Practice with Precision and Portability

By Duncan Wood

The work of a broker has remained essentially unchanged since the birth of the retail investment industry. It's a job that is not without its difficulties. Brokers have hundreds of accounts to look after and are expected to provide a tailored service for each, but those accounts belong to individuals with their own objectives, with different tolerances of risk and different expectations of return.

This could be fruitful ground for the use of powerful analytical tools, and Rob Meyer, president and CEO of Numerical Algorithms Group (NAG), says it's an area of growing interest for the company's clients.

"What we've seen over the last few years is the emergence of a group of software companies building fairly sophisticated analytical applications to help brokers help their clients," he says.

The intention is to give each broker a desktop application with which to perform periodic analyses of each client account using a range of factors – from age and tax position to risk tolerance and market volatility – to produce recommendations that are rigorous, methodologically-consistent and tailored to individual circumstances.



Rob Meyer

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- Rob Meyer, president and CEO of Numerical Algorithms Group

This coming shift in the way brokers work is underpinned by the numerical and technical know-how of NAG. The company started life in 1970 as a collaborative project between four British universities and a large computer research laboratory who collectively decided that a shared library of numerical and statistical subroutines would be a helpful resource. The first version of the library was released towards the end of 1971 and contained 98 routines.

By 1976, interest in the library had grown to the extent that the project was incorporated as a not-for-profit company – and it continues as such in 2005, but NAG's library today contains over a thousand mathematical and statistical functions and has over 10,000 customers. Industrial users are now as impor-

tant a constituency as the academic research community that gave birth to the project 35 years ago. So, for example, when a suspension cable needed to be replaced on a busy suspension bridge in France, civil engineers used NAG's resources to assess the repairs needed and to schedule the work without interrupting the traffic flow.

The depth of NAG's library and the breadth of the company's customer base aren't the only changes that have taken place. The proliferation of different IT architectures poses a real, practical problem for any shared library of numerical resources – ordinarily, there's no guarantee that a single routine will produce the same results when run on two different computers.

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“This is one of the dirty secrets of the computer business and people don’t like to talk about it. The ability to get the same answer, and the right answer, on different computer platforms is a bit of an art. It’s an art we’ve been practicing for a long time.”

In fact, although IT architectural issues may seem like a relatively recent headache for programmers, the portability of NAG’s routines has been an issue right from the start. The first library had to be released in two different languages – Algol 60 and ANSI Fortran because the different research centers involved in the project had different biases. Today, of course, only having to worry about two different languages would be bliss – but Meyer says that NAG is equal to the challenges of the modern IT environment.

“We’ve been doing this for 35 years, so we’ve got the expertise to ensure that you can write some code for a Windows PC and then make a version of it that runs on an Apple or on a Solaris server and still get the same answer.”

Portability isn’t the only issue that NAG faces in ensuring that its library has practical value – it can even be a challenge to ensure that a single computer gives the correct result. As a simple example, Meyer notes that there are only a finite number of digits that can be used by any computer. Much of the time, people imagine that this isn’t a practical problem but, he says, it’s actually relatively common for some applications to use combinations of large and small numbers that can cause a computer to effectively run out of digits. The result is that a few digits of precision can be lost on each calculation.

“If you repeat that enough times, pretty soon the answer will be quite wrong. When you are doing portfolio optimization or something similar, and your answer says ‘buy x amount of stock in sector y’ and it’s out by even one percent, that could mean the misallocation of hundreds of thousands or even millions of dollars.”

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This isn’t the heavy-duty back-office stuff, this is about individuals’ portfolios. It’s starting to happen now because of increased computing power, because of software sophistication and because - let’s face it - industries have to work out a better way to serve their customers.

When banks started to get involved in derivatives, many of them turned to NAG to get their hands on the algorithms they needed to model and price options. When asset managers started employing quantitative portfolio management techniques, again, NAG helped provide the technical foundations. Today, says Meyer, other sectors of the industry are showing a marked interest.

“There are certainly times when one type of customer seems to be growing significantly – and in the last few years it’s been hedge funds. But that’s possibly because hedge funds have been springing up like dandelions in the lawn.”

In the past, the financial services industry has tended to use NAG’s library as a resource to build industrial-scale analytics: tools to value derivatives or run simulations involving masses of data. Meyer believes that the interest shown in developing desktop analytics for brokers may be the first evidence of a broader trend.

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