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PEER-REVIEWED JOURNAL ON THE INTERNET

„NETWORK-CENTERED" IS AN OXYMORON

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Over the past year, a new fashion has taken hold of the computer industry. Almost everybody has something to say about it. Most, especially Oracle, Sun and lately, IBM, are in favour, seeming quite a la mode. Stodgily conservative, on the other hand, is Microsoft. But just as fashions are noteworthy more for not being the old than for being the new, the craze for "network-centered" computing has more to do with Bill Gates than Larry Ellison or Lou Gerstner. The term "network-centered" itself, has little to do with anything at all.

Let's start at the beginning, and examining what "network- centered" could mean. It is possible that "the rise of network-centered computing" refers simply to the increasingly important role of networks in a computer's daily life. Such innocent usage of the adjective "centered", in its common English sense with no topological implications whatsoever, is perfectly all right. It is also quite unconnected to what Oracle is talking about.

The network of the proletariat

It is in the nature of many oxymorons to appear very logical, or at least coherent, on the surface. Such a phrase, rather popular once upon a time, is the "dictatorship of the proletariat." On the face of it, whatever one's politics are, there is nothing contradictory about this phrase. After all, anyone can be a dictator; so, presumably, can the proletariat. One can be centered around anything - a server, perhaps - so why not a network? True, the proletariat, like a network, is a collective; true also that the individual components of the proletariat are distributed widely, like the individuals that make up a network. Obviously, the proletariat can dictate; the network can be the centre.

We meet the first hint of inconsistency when we try to find the dictated for the dictating proletariat; the periphery for the centered network. The proletariat is - at least for the sake of our current argument - powerless commoners. Once empowered by dictatorship, though, the proletariat remains so no longer. If we are to comprehend the situation at all, we must come to the conclusion, after some contortions of circular logic, that the proletariat dictates itself. The network is - not just for our argument, but as a point of fact - individuals, computer or human depending on your point of view. Once made the centre, the network, searching for what it is the centre of, just finds itself. The network-centered network.

Could that be what Oracle means? If so, the solution would be to send the computer industry, journalists included, to a short course in logic, and forget about it. Unfortunately, "network-centered", as it is now used, means something else altogether. Oracle's vision (and that of various hype-mongers elsewhere) is a world of cheap "Internet boxes", low-powered computers that get you on- line and do little else. Apart from very basic stuff, such as text-editing, which will be performed by "applets" often downloaded off "the network", your computer will essentially act as an interface to the more powerful computing resources of, that term again, "the network." As your computer won't have the power to do too many things - it won't need to, say the network-centered - fancy processing would also be offloaded to "the network".

Obsessed with Bill Gates

This network-centered scenario will allow us to escape neatly from the vicious Gates-and-Grove circle of ever- increasing demand for computing on the desktop. Rather than have increasingly complex software swallow the processing power

provided by falling hardware prices, thereby keeping average computer costs static, we would have a glut of really cheap machines. ("Cheap" appears to mean $500 - so we may end up having increasingly complex "Internet boxes" providing more colour and sound support swallowing the benefits of better price performance, keeping average computer costs static, but we won't talk about that.) What of the increasingly complex needs users have (you may not believe it, but I like my automatic table-of-contents generator)? Don't worry, leave all that to "the network". Don't even think about annual software upgrades that you have to make lest you become obsolete. Constant, instant upgrades will be available for everything, on "the network". They won't even be real upgrades, as you don't need to upgrade anything - your Internet box interfaces to the applications on "the network" just as it used to.

So where's the catch? Well, as we saw in our seemingly irrelevant discussion of oxymoronic semantics, "the network" is another term for "a collection of individual machines". Now that we've eliminated Gates-and-Grove Pentium 150 Mhz 64Mb RAM 2Gb disk PCs, all those individual machines must be $500 Internet boxes. So which one of them will maintain my table of contents (or recalculate my elaborate income tax returns)? None of them, alone, could do it, as in that case I'd prefer it to be my own Internet box. In theory, several boxes belonging to random unknown people could calculate my tax returns for me in their spare time, with the right protocols for distributed computing in place. This, however, is not Oracle's dream. Nor does it seem to be Sun's, although that company practically invented distributed computing - remember the fractals generated on 150-SPARC networks? No: what Oracle, IBM, and to a much lesser extent Sun would like to see requires my tax returns computed not by "the network" but by a server.

They don't always say that, since in the age of the PC and Internet, "server" is a dirty word if it refers to centralised computing capacity (webservers just centralise some storage for convenience, to provide a single source, but in fact are quite distributed). There's little difference between a network of terminals providing a front- end to a mainframe - truly a dirty word, that - and one consisting of Internet boxes providing a front-end to a computing server.

Mainframe redivivus!

This is not an open secret, it's not a secret at all - so nobody talks about it. They talk about the headline-worthy price tag, the benefits of saving on software upgrades, the pleasure of getting one over Bill, the importance of being centered around something as wonderful as the network - a word that has a strangely soothing effect on novice computer users. But these users never hear about the still- imaginary days of infinite bandwidth, without which "off- site computing" on such a large scale will be impossible. The small squeaks about security (with viruses now written in the constricted environment of Microsoft Word's script language, it's natural to worry about the much more generic Java) were swiftly buried with confident but empty statements. The even rarer whines about privacy (do I really want my tax computed anywhere but on my own desktop?) were ignored. So was the old aphorism on keeping many eggs in one basket - what happens to your server- supplied dictionary or download-when-you-need-it word processor when the next blizzard kills your ISDN line?

No matter. If the hype catches on, $500 Internet boxes will fly off the shelves. That would be nice, but even better, for server-oriented Oracle and the IBM that continues to hang on to its mainframe experience, would be the parallel demand for computing dinosaurs required to do all the work innocently left to "the network". Dinosaurs, we are told these days, were actually fleet-footed if rather large birds. The network dinosaurs, unlike their ancestors the reptilian, obsolescence-prone mainframes, will need the flexibility to carry the burden of all those perpetual upgrades end-users have stopped making. This flexibility, naturally, will be tailored, customised, to meet the unique requirements of each software provider, by, naturally, companies with years of experience in managing just this sort of service. Guess who.

Of course, this will fall flat for the very reason mainframes did, that the world is moving towards distributed everything, and computers, which started this movement, couldn't possibly return to centralisation. If anything, the latest fad for computing centered around the server - sorry, the network - will come back to earth with a more resounding thud than any refrigerator-sized mainframe, as the wide-area, open Internet amplifies rather than reduces the problems with centralised computing. I do not, after all, particularly care whether the accounts for my company are processed on my desktop, or by the mammoth in the basement computer-room. I do not want them going to any mammoth in somebody else's basement, even if it does belong to a respectable software company and is continuously upgraded. What could, for some time, succeed in a corporate environment, will certainly not do for a much wider - indeed global - one.

Is there anything of substance at all to be extracted from these months of network-centered headlines? In fact, there are a couple, both lessons in economics as much as technology.

Bloated software

What most impresses those who read (and, for that matter, write) the headlines is not only the attractive price of Internet boxes and their kin, but also the sense that software is getting rather bloated these days. There was a time, after all, when fairly decent applications ran on machines based on the 80286; even PC XTs weren't that bad at word processing; the Mac Plus was pretty good. Productivity has not greatly increased with fancier software running on machines more powerful by a few orders of magnitude (through they don't cost much more than the weaklings of the past).

There doesn't seem to be any reason why the simplest of applications now require several megabytes of memory and disk space to feel comfortable - those of us who have ever programmed in assembly find today's

software ridiculously bloated and inefficient. But human productivity remains more or less static, and today it is far cheaper to require more RAM than to spend much effort optimising software (not to speak of hiring assembly language programmers). Even in real terms, adjusting not only for inflation but for a higher standard of what is a minimal computer (today this is perhaps a Pentium running Microsoft Office 95), prices are falling. Perhaps not very quickly, but certainly not slow enough to justify a return to server-based computing.

New technology is never best used to do the same old things in a new way, but to do what could never be done before. The same is true for network-centered computing - used, this time, in the ordinary sense, of computing dependent on the existence of networks. For reasons of its own, Sun - whose products fall more naturally in this correct definition of network-centered that those of Oracle - isn't being particularly imaginative about this technology. Sun seems to think people will love Java, although it is nothing special, being just a proprietary, client-side version of the open Common Gateway Interface that, unlike CGI (which is for web servers), is limited to a single, complex and proprietary programming language. Assuming that for a while Sun's marketing works, and people do use Java, it will not be for the download-on-demand word processors and cute in-line animations of which Sun is so proud. Users will want client-side scripting for a much more powerful application - distributed computing.

The Living Web that could

Client-side scripting is essentially a method of running your application on someone else's machine. Using it merely for user interface extensions that could as well be implemented by changes in the server, client (browser) or mark-up language (as is happening with HTML 3.0 in any case) is very limiting. So is restricting this ability to the World Wide Web, a far less decentralised thing than it could be (which is why we need web servers). There is no reason why scripts cannot be included in e-mail; in fact, this can easily be done with properly configured MIME mail programs.

Web pages with client-side scripts would become live, not just limited to livelier interfaces. E-mail with enclosed scripts would be the simplest form of "intelligent agent" possible. Web servers would also be process servers - not serving their own processing power as Oracle imagines, but managing complex processes distributed across several client computers. People could join electronic mailing lists broadcasting scripts, to be run across hundreds of machines in their spare time - and, once electronic payment systems are efficient, be paid for it. This would be a far more optimal allocation of processing capacity, balanced by affordability, than scaled-down $500 computers.

As might be expected, these ideas for a Living Web of computers, server and client, powerful enough for practical distributed computing using real-time as well as time- delayed protocols, are not new. There is already a truly open equivalent of the Web's Common Gateway Interface for client-side scripting - the Common Client Interface (CCI) which, like CGI (but unlike Java-Netscape), can be used with any programming language.

A Living Web of open distributed computing is not especially complex in its requirements - which are probably easier, and more pragmatic, than attempting to cram enough computing into $500 boxes, or expecting the instant bandwidth for downloadable word processors. And the Living Web is certainly truer to the spirit of the Internet - it needs non-proprietary protocols in an existing or slightly modified form; it is resilient and has a low barrier to entry (imagine Java by e-mail); most of all, it is fully supportive of distributed computing. Its only disadvantage, compared to Oracle or Sun (or Netscape, which enjoys calling its proprietary standards "open") is the lack of marketing.

What the Internet has to teach us

Marketing, in the long run, can be irrelevant when technology is concerned - nobody ever credited the fall of the mainframe to poor marketing. The Internet itself is actually the best example of this. Most of the technology behind it is, as technologies go, pre-historic. It has swallowed the world in a giant wave not because it had a good PR firm, but because people saw its use. The media hype that accompanied it was self-fulfilling, and in the end irrelevant as it usually followed, not caused, the 100% annual growth figures. Microsoft, which came closer to controlling the world of computers than any other firm, missed the Net totally, waking up to it as late as 1993 (according to Bill Gates in his famous December 7th chat with financial analysts); their marketing power obviously couldn't do much about it, and the Microsoft Network became Net-friendly after all. Netscape, the company that built itself on all the hype, succeeded not by its own marketing, but by that surrounding the Net itself. It will not control the Net; far from being another Microsoft, Netscape is simply riding on the crest of a wave.

This wave is leading somewhere, and it is certainly not back to a world of proprietary standards, oligarchic control over technology and centralised computing power. While it is true that the central role of Microsoft and Intel in the computing world is diminishing, this does not mean that the technology with which they are best identified - the (ever-powerful) personal computer - is dead. Far from it. The popularity of home pages is proof that users want to produce content, not just consume it over Internet boxes. They would probably be happy running their own web servers, if it were easy enough. So the PC is, if anything, more alive than ever, and is, by spurring the growth of a decentralised Internet, confounding its own creators. The use of solely PC-based computing may slow down somewhat, not for a return to centralised systems of any form, but due to the spurt in growth of distributed computing. And, however things appear for now, this will not be the result of any company - though it may cause the birth and growth of several. It is possible, after all, to ride a wave for a long time, but that's not the same as controlling it.

Marketing cannot counter basic shifts in technology: this is the first lesson of the Net. Second lesson: "network centered" is an oxymoron in many ways, not least of all being that when the network gains importance, so does decentralisation;

true network centered computing means computing without a centre at all. A final lesson, that will be learnt by Oracle, Sun and perhaps Netscape in the not-very distant future: those who dabble in vapourware would do well to remember that when gas catches fire, it explodes.

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