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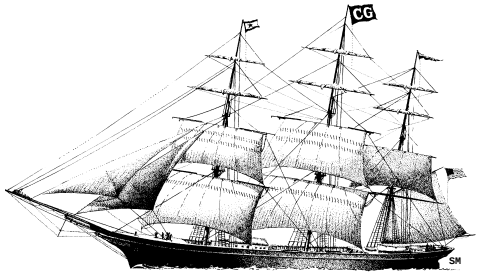

Navigating Information Technology Horizons℠

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Hewlett-Packard Foments Social Revolt in the Enterprise Network Fabric

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Management Summary

The revolution is coming! The revolution is coming! Technology companies have been building out product lines and adding capabilities and accommodating protocols for particular circumstances while waiting for the next revolutionary "discontinuity." Well, that discontinuity may just be the burden of complexity that we have accumulated while waiting for something to happen. Appliances were a gesture at simplicity, but integrating that simplicity into a network in the face of constrained budgets and the need to reuse existing assets becomes again complex. We need a rethink. **HP has been rethinking over the last 18 months, and has declared that the concept of federation of large, distributed, information and distribution devices to be the future of computing; the one vast opportunity that they can't miss.**

Revolutionary Premise #1: Hierarchies are not the answer. Your basic garden-variety hierarchical structures, whether human or informational, bulk up easy and slim down hard. They reconfigure, if at all, with ponderous recalcitrance. When they can scale large, so do latency problems. Hierarchies and alphabetization were once the only way to manage information. The move from the serial nature of paper-based organization to the multidimensionality of digitization (characterized by hotlinks, pop-up boxes and surfing) has changed that. People's concept of information has become more opportunistic, including fewer formal reports and more e-mail. Centralized management of enterprise information, whether by enterprise taxonomies (often draconian) or by vast databases (resource intensive) is becoming less effective and more expensive. Artificial intelligence and fuzzy logic can help mitigate the increases, but not prevent them. This leads to the next premise.

Revolutionary Premise #2: Preventing the problem is better than a retrofitted solution. A flurry of Enterprise Application Integration (EAI) and Business Process Integration (BPI) products has been launched in an attempt to unify enterprise information into a well-managed, coherent format. But unifying diversity as a process scales poorly as the rate of change in an organization accelerates. This is why we obsess about infrastructure, and encounter new protocols and file systems every month. As we try to do more things with the same data, often real-time, and as we start to encounter the consequences of workforce mobility, we run into the lack of commonalities again and again. Businesses grasp how technology can let them use people more productively – but their ideas often do not gibe with the way computer systems traditionally function.

Revolutionary Premise #3: Federation is the answer. Federation is a distributed approach, where hardware or software and the attendant data files are self-defining and self-indexing, using open protocols and procedures to exchange information in a decorous way, moving from a centrally-controlled topography to one of meshes. Enterprise computing vendors are taking up the ideas of "federation" and "distributed intelligence," both as a way to be "open" and as a way to keep their management frameworks both sufficiently flexible and adequately easy to use. "Distributed intelligence" is the ability of devices to manage not only themselves, but also other devices in their neighborhood. It is not hard to understand. The meaning of Federation is sometimes less clear.

HP is leading the charge and betting a good chunk of the farm on federation. Read on to find out how and why.

IN THIS ISSUE

The Need for Federalization

These days, enterprise information systems themselves, not just the applications that run on them, have become a critical part of how you manage information within your enterprise. People want capabilities in geographically specific places, but they cannot go back to the client/server days. Centralized data centers work for core processes, but are less good at providing spontaneous and geographically remote edge functionalities. Federation is the other alternative, but requires a rethinking of the principles of management. **The introduction of remote management to computer systems, divorcing management from the console/box on which it resides - and from the intelligence of that box - has enabled the concept of federation to move from an ideal to something pragmatically feasible.**

For the largest companies, federation is still an internal concept. Federation of information devices and appliances in such a context enables decentralized decision-making, customer responsiveness, business agility, and all sorts of contemporary business virtues. Behind the scenes, there is still some administrator or administrative process, which sets the business rules of who can do and share what with whom. There is a known topography with defined Internet-enabled links and defined portals to the external world. **Management is unified if not centralized, and control stays within the enterprise.**

When one talks about the hosting environment (xSPs), "federation" gets more complex, but in a fairly manageable way. Aliens (those unknown to you) may be sharing your server processors and alien data may be nestled in the LUNs next to your data. However, as with large companies, **there is a process for centralized management of the business rules to prevent inadvertent sharing of processes or data.** There are performance guarantees. Communications between co-habitants of the hosting center are done over the Web in a properly arbitrated fashion. **Management and control may be contractual rather than internal, but they are still based on a defined topography. This is the environment of computing as a utility, which will be attractive to more and more customers as computer system capability and configuration options get more and more complex.**

The Challenge

Then there are those businesses, where partnerships are key and capabilities are more important than corporate boundaries. These companies may be constrained from a hosting solution by custom applications, system peculiarities, the sensitivity of intellectual property, or an inability to pay the premium that outsourcing extracts. For these companies, suppliers, strategic partners and distributors of various stripes may be so inherently a part of the company's process that collaboration on neutral Websites is not close enough. Relationships may change frequently. Theirs is an environment of equals who may, in some cases, be bitter competitors. Maliciousness may be present within as well as without. Heterogeneity is the least of the problems, and hierarchies won't work at all. Federation is the answer, but it is a deeply distributed concept of federation. The players cannot be centrally managed, nor do they want to be.

No one player rules, so no single management system rules. You can address this by peppering security point products everywhere and then trying to manage them, or you can build in a generally accepted, open underlying code of conduct (business rules) that enforce a degree of civility. UDDI, HP's *e-speak* and Sun's *Jini* and now *Jxta* are examples of such initiatives.

HP's Response

Hewlett Packard is addressing these chaotic outer limits. They are exploring the specifics behind a federated approach to information networks, in large data centers of federated components, in mobile wireless networks for delivering rich content, and in non-hierarchically based knowledge management systems to access the tacit knowledge base of organizations. Each project explores the ramifications of moving away from defined, hierarchical systems and their comforting sense of a persistent edge. This is

not add-a-module thinking. It is pure research. **HP feels that, as all computing systems evolve from a state of agility and constant change to accommodate mobile and nomadic business, all will need the capabilities that HP will develop in its exploration of the formless federation.**

Dethroning The Server

While HP's vision dethrones the server, it is not the first to do so. First appliances were introduced to "take some of the burden" off servers (primarily UNIX) which could be swamped by unpredictable workloads. Workarounds were developed to deal with NT servers' tendency to freeze. Somewhere along the way the mainframe was pronounced dead (prematurely), and training on the platform plummeted. Then EMC and others accelerated servers' fall from glory by displacing intelligence and management from servers to storage arrays, routers, and other elements. **It isn't such a stretch from here to treating servers as just another network node.**

Enabling The Peripherals

HP also champions peripherals in general (and its own printers in particular) as "equal citizens of the network." They are determined to leverage HP expertise in imaging and printing to unhook printers not only from PCs, but also from the network itself. The limited pixel displays of PDAs, which do justice to neither information nor images, beg the development of an additional geographically-dispersed imaging capability. HP has proposed a whole slew of advanced imaging devices, starting with its Jet-Send–enabled printers. HP spices things up with a radical idea. It gives HP devices the capability to accept work from clients who have no ownership link with the device. Think kiosks.

This revolution has already begun

This nomadic connectedness changes the spatial and economic underpinnings of computing. However, it is not the first step in the development of a "virtual network." Already there are decorous on-line financial transactions between entities that have no long-term or off-line relationship, where trust is achieved by accumulating the history of the particular players within the context of the transaction network space. Cookies or agents (with an accumulative trustworthiness rating and other functionalities) may enable other transactional elements on each entity's device. Retribution for inadequate service could be handled similarly at either the device or application level. Nomadicity of end-user interfaces, which demand but do not contribute functionality (instead contributing cash equivalents), should not be a functionality problem, though availability and quality of service issues will have to be addressed.

The Next Step In This Revolution Is More Difficult

Shared-function peer-to-peer systems are difficult. An inspiring and unifying goal or a dire common peril can inspire people to put up with the tedium of membership, but in more mundane circumstances, there is ambivalence about enrolling and lock-in – a desire to be able to leave, compounded by the human tendency to freeload when possible. A federation needs some kind of enforceable buy-in by functional parts to prevent spontaneous bugging-out. These rules will have to seem as automatic as driving on the right side of the road.[1] If the rules are obnoxious or onerous, they will be subverted.

HP sees functionally complete peer-to-peer systems or fabrics as the natural evolution from the componentization of hardware into functional bricks. Such a mesh must have distributed self-management, at least at device, application and system performance (load-balancing) levels. The resilience to accept a device drop-out or an add-on has already been presaged by the automatic transparent fail-over and hot-swap capabilities of many modern system and network management frameworks, including HP's *OpenView*. A federation of nomadically connected devices would up the frequency and reduce the momentousness of such occasions. This is not to say it would not be easy, but it is,

[1] Unless you are used to driving on the left!

at a conceptual level, an extension of existent capabilities.

How HP Will Help

HP proposes a fabric operation system extension of *OpenView's Distributed Network Management,* using the e-speak service negotiation capabilities, to manage the peer-to-peer network. Like existing system management products, which it would ride on top of, it would be designed to be transparent to the end user.

The willingness of companies to use and to depend on such networks depends on their willingness to give up the comfort of ownership and control, or at least the perception of control (think virtualization). It will require a more overt acknowledgement of the transparent-to-the end-user systems and routines (agents or cookies) which make interactions succeed at an acceptable risk rate. **Think of it as computing diplomacy, which only works if all parties understand its extent and ramifications.**

Conclusion

Cheap transportation has lessened the importance of distance. Cheap communication has lessened the importance of proximity. Together they have knocked out a lot of the parameters that constrained – and defined – businesses. These businesses are left with portfolios of products and varieties of customer interface opportunities, and an urgent need for to maximize and stabilize revenue sources**. In such a disembodied environment, the availability of services with predictable integrity is important. If you are going to go beyond your known network for computing services, those services had better be pervasive, and they had better be branded so you can trust that they will work.** HP's *JetSend* is a pilot in this area. HP has the brand recognition, the low-cost printer lines and a hungry sales force eager to take on the challenge of achieving pervasiveness.

This space is the user edge of the network - a messy space which demands applications and capabilities - a space which is the enterprise network equivalent of a telco's "last mile." Many telecommunications companies have came to grief ignoring the last mile in favor of aspects of their network that were more technologically interesting or addressable (carrier data centers). The user edge of the enterprise network earns the revenues to pay for the data center, and without proper edge capabilities, the growth of enterprise computing systems (and of data centers) will stall. **HP, in its focus on the intersection of the Internet, information appliances, and the delivery of applications as e-services, is firmly committed to making that edge space blossom.**

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