



CLABBY ANALYTICS

## *Speculation/Extrapolation/Opinion*

### **The Curious Case of Union Pacific's Move from Mainframes to x86 Blades**

#### *Introduction*

In August, 2009, eWeek published an article that described railroad giant Union Pacific's (UP's) plan to dump its existing mainframe computers and move to a homogeneous distributed blade server environment. At that time, *Clabby Analytics* attempted to obtain an interview with UP information technology (IT) executives for an article that we were planning to write for *Mainframe Executive Magazine* — but the company denied our request. Frankly, we don't blame them — *Clabby Analytics* is known for its advocacy of mainframe computers (although we are also big proponents of blade architecture).

Today, just over a year later, we remain intrigued by UP's decision. **We consider UP's migration to be a grand experiment that has far reaching implications for the IT industry.** The way we see it, UP's move to a homogeneous blade server environment — and its move to completely rebuild its application base and streamline its process flows — will answer some important IT industry questions about workload optimization, such as:

- Does it make sense to move to an entirely homogeneous information infrastructure?
  - What are the cost implications of doing this (including migration costs, applications/process flow redesign, power/cooling, manageability, etc.)?
  - Will Union Pacific become the poster child for vendors who argue that homogeneous x86 multi-core architecture will obviate the need for heterogeneous servers?
- Can the new x86 multi-cores really run the same workloads as efficiently as midrange RISC/EPIC and mainframes servers? And,
- How will Union Pacific ensure that its service level requirements are met?

*Unfortunately, because we have still been unable to interview Union Pacific IT executives, we can only speculate on some of the reasons why UP has made its decision to "go homogeneous". And we can only extrapolate what may transpire as this company seeks to build its information systems of the future.*

*Fortunately, however, thanks to 32 years of experience in the IT industry, Clabby Analytics can fall back on the knowledge that we have gained by conducting interview after interview with IT executives around the globe who are faced with the same issue as UP: how to build the most efficient information systems environment to support their organizations' business process flows.*

#### ***The Information Systems Problems Currently Being Faced by Union Pacific***

To understand the problems being faced by Union Pacific — and the company's reasons for moving to a homogeneous, x86-based distributed systems architecture, start by reading eWeek's article entitled "*Union Pacific Railroad Moving From Mainframes to Blades*" that can be found at: <http://www.eweek.com/c/a/IT-Infrastructure/Union-Pacific-Railroad-Moving-from-Mainframes-to-Blades-360430/>.

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### *Our Take on This Article*

The salient points that we derived from this article are:

- Union Pacific sees itself as a technological leader/innovator (so making this avant-garde movement from mainframes to x86 multi-cores is consistent with the company's own view of itself);
- UP states that new business demands coupled with the growing use of open-source technology — and the aging of its mainframe programmers/administrators — are the big reasons why the company plans to move off of mainframes;
- UP seems to believe that moving to the Java programming language will simplify the company's code development/maintenance issues (UP currently maintains 11 million lines of macro assembler code). As one executive put it: "it's a whole lot easier to find people skilled in new languages";
- UP is not focusing strongly on server virtualization (one executive points out that x86 servers cost about \$3,000 each — so adding more servers[to scale capacity] doesn't present a major challenge to UP). He indicated, however, that UP will exploit some of the virtualization software that accompanies their Red Hat Linux and Microsoft Windows operating environments;
- The company appears to have "special challenges" or "special opportunities" that can't be met by the packaged order taking, monitoring, shipment scheduling and train scheduling software provided by other software vendors. (Oracle, for instance, is one of UP's major infrastructure suppliers — and Oracle offers advanced order taking, monitoring, and asset management software products). But instead of using Oracle's packaged order taking/monitoring/asset management software, UP has chosen to build its own system called "NetControl");
- UP will use an SAP ERP (enterprise resource planning) packaged environment on its distributed servers;
- Cost of this project is expected to be in the \$150,000,000 to \$200,000,000 range;
- UP is insisting that all of its people use the same management tools and software in order to help overcome management and security issues.

*Four of these points really captured our attention. They are: 1) UP's willingness to spend between \$150m and \$200m to move away from a fully functional mainframe environment; 2) a seeming dismissal of the importance of virtualization as it impacts efficiency; 3) a failure to leverage packaged software; and, 4) the insistence that all of its people use the same management tools and software.*

### ***What We Like — and Don't Like — About Union Pacific's Migration Plan***

We believe that Union Pacific will ultimately be able to successfully implement its train management system on homogeneous x86 architecture. But we think the company is leaving BIG MONEY on the table by not implementing its solution on heterogeneous systems. The remainder of this section describes what we like and dislike about UP's decision.

#### *What We Like*

What we like about UP's migration plan is:

- Union Pacific is focused on streamlining its business processes. By streamlining process flows, enterprises can reduce their sales, general, and administrative

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(SG&A) operational costs — and these cost savings pass directly to the enterprise bottom line in terms of PROFIT.

**Remember: information systems are only a tool designed to serve the efficient flow of business processes. Information systems are a means to an end, not the converse.**

- We also believe that the new x86 Xeon multi-core architecture is fully capable of handling a variety of workloads well — and its reliability, availability, security, and power management facilities have improved greatly over the past few years.
  - The real question is: “can Xeon handle all of UP’s workloads in the *most efficient manner?*”
- We like UP’s position on homogeneous systems management. UP IT architects are insisting that information systems managers and administrators use the same management tools and software across its newly-designed homogeneous distributed computing environment.

**IT managers regularly tell us that using a homogenous management environment over a common infrastructure greatly simplifies the management of information systems and associated storage — and this simplification leads to tremendous savings in operational costs (particularly in North America and Western Europe where human labor-related systems/storage management costs can represent 50% of the cost to operate a data center). By insisting that its people use the same management tools over a common infrastructure, we expect that UP will be able to greatly reduce its current IT labor costs.**

- Finally, we fully understand UP’s desire to move out of the macro-assembler application code support business.
  - We do, however, note that the company did have other options when it comes to supporting macro-assembler code such as outsourcing and application modernization, but we don’t know if UP evaluated these options, nor why they determined they couldn’t support their current code base.

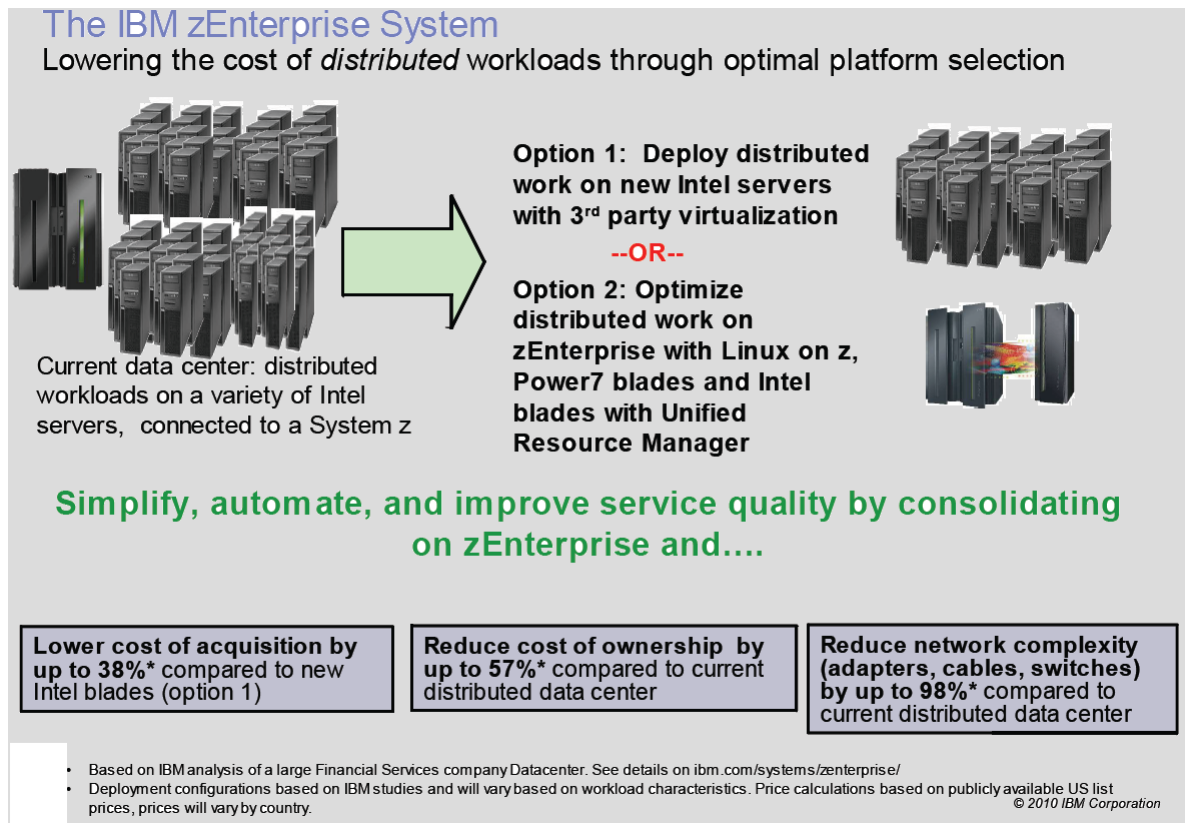
### *What We Don't Like About UP's Decision to Migrate to x86 Architecture*

We have no doubt that Union Pacific will be able to save money by moving to a homogeneous x86 systems design. We suspect that the company is running separate management silos on its existing low-end, midrange, and high-end servers — and its inability to neatly tie all of its information systems under one common umbrella is more than likely resulting in very costly operational inefficiencies. But, to us, a better approach for UP would be to use IBM’s new mainframe/blade hybrid environment to accomplish the same thing (homogeneous management), only across heterogeneous, workload optimized systems (we call this approach “*the homogeneous management of heterogeneous systems*”).

**In other words, the most disturbing element of UP's decision to standardize on x86 architecture is that the company may be leaving BIG MONEY on the table by not optimizing its workloads on mainframes, midrange servers, and low-end servers and managing those servers homogeneously.**

Figure 2 (next page) illustrates the situation that we believe that Union Pacific is now in; describes the company’s options (go distributed homogeneous or centralized heterogeneous); and then show the implications of making the decision that Union Pacific has made.

**Figure 2 — Union Pacific's Situation; Its Options; and the Implications of Its Decision**



Source: IBM Corporation — June, 2010

Because we have not been granted an interview at Union Pacific, we are speculating that its current IT environment is a combination of mainframes and x86 servers (and maybe some midrange servers). As UP planned its strategy, it could choose Option 1 (to deploy on distributed x86 multi-core servers — which it did); or it could have chosen Option 2 (to deploy a unified mainframe/blade hybrid environment — which it did not).

***Had UP chosen Option 2, we believe that the advanced virtualization management combined with other advanced service management functions had the potential to save Union Pacific up to 38% in acquisition costs; up to 57% in cost of ownership costs; and up to 98% in reduced networking costs! These are huge numbers — and this is exactly what we mean by UP leaving BIG MONEY on the table by choosing the wrong architectural approach.***

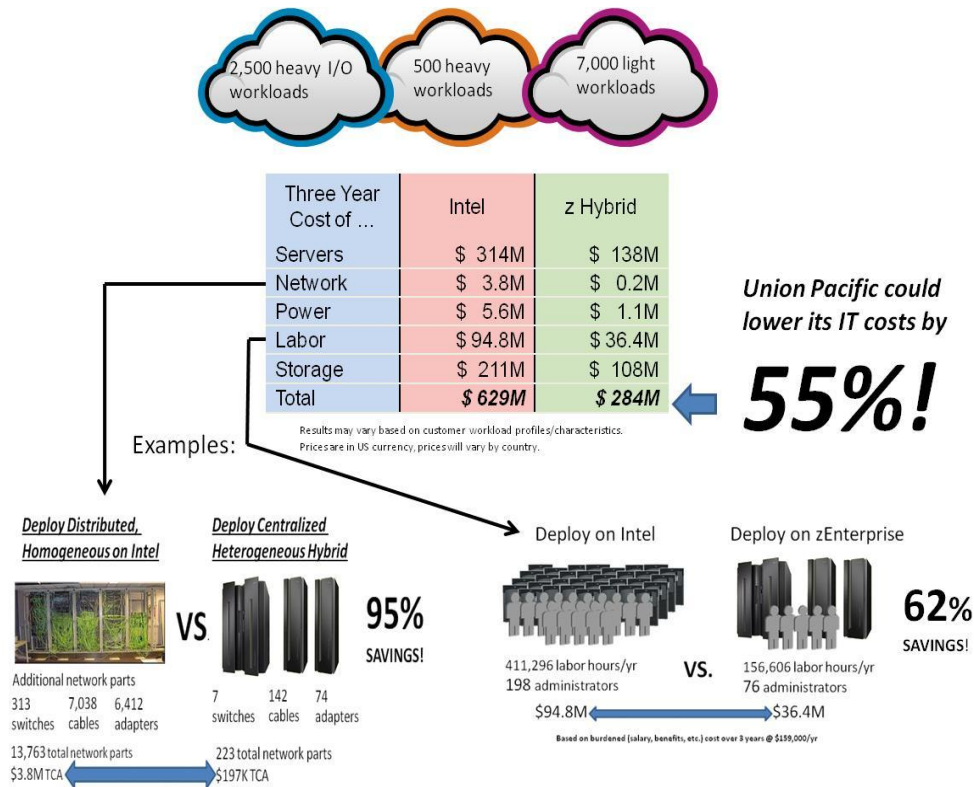
***You Do the Math...***

What do we mean by “BIG MONEY”? Because we have no direct access to Union Pacific’s system design/configuration data, this subsection presents a view of the kind of savings that Union Pacific could experience if it adopted a workload optimized, centralized, heterogeneous systems approach as opposed to an x86 multi-core approach. And this data shows that UP could theoretically save 55% of its IT costs by adopting a workload optimized approach.

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Suppose that Union Pacific needs to run 2,500 heavy input/output workloads; 500 heavy workloads; and 7,000 light workloads. Figure 3 compares a homogeneous Intel environment versus a heterogeneous z hybrid environment. And note, the saving can be HUGE using a heterogeneous, workload optimized approach (up to 55%)!

**Figure 3 — Comparing Homogeneous x86 Architecture to Hybrid Heterogeneous z Architecture**



Source: Clabby Analytics illustration combined with IBM data — August, 2010

### Will Union Pacific Be the Poster Child in the Battle Between Homogeneous and Heterogeneous Computing?

As stated at the outset, Union Pacific makes an interesting case study when comparing heterogeneous modes of computing to homogeneous, centralized computing. But *Clabby Analytics* also believes that the computer market is bifurcating along heterogeneous and homogeneous lines — with Dell and Hewlett-Packard positioning as homogeneous systems/solutions suppliers and IBM (and argumentatively Oracle) positioned as heterogeneous players (but note: IBM and Oracle can also position as homogeneous x86 vendors as well).

**We expect both HP and Dell to make a very big deal out of their win at Union Pacific — and well they should. We further expect them to both point out how the dethroned a mainframe — and given the financial information presented in this report, perhaps they shouldn't.**

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### *Summary Observations*

Union Pacific represents the computing industry in a microcosm. The company is focused on controlling IT costs and is working hard to build information systems that can most efficiently flow the company's business processes.

Has Union Pacific made the right choice in terms of choosing an architecture that can deliver maximum efficiency? *Clabby Analytics* thinks not. The names of the company's new point programs "NetControl" and "Positive Train Control" indicate that "control" is important to UP. And, to us, it is far, far easier and far, far less expensive to control events using a centralized architecture than using a distributed architecture. And we think some of the figures presented in this report bear out this perspective.

*Taking the distributed, centralized approach is a valid approach for certain environments — especially in small and midsized business that are geographically distributed and where the need for centralized control is not a strong requirement. But we don't think this is the case at UP.*

We are also bothered by statements made to the press regarding UP's virtualization strategy. Tremendous efficiency can be gained by virtualizing underlying computing resources — with huge savings in acquisition, management, and power/cooling costs. UP's statements in the news article cited earlier seemed to minimize the importance of virtualization. And we think that is a huge mistake given that the company could potentially halve its IT costs by using a highly virtualized heterogeneous computing architecture.

*Our bottom line analysis is this: Union Pacific's strategic direction with NetControl and Positive Train Control seems to demand centralized control — yet the company is redeploying its IT resources on a distributed systems architecture. We think that the company may be leaving close to \$100,000,000 of potential cost savings on the table (based upon a project cost of \$200,000,000 as stated in the news article) by not adopting a workload optimized, heterogeneous strategic approach. And to us, it appears that the company's failure to adopt a workload optimized approach will result in a huge waste of its IT budget.*

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