Talking Point
Discussion Document

FREEFORM DYNAMICS

In association with

IBM

Linux and sustainability

The emerging role of modern, high-scale consolidation platforms

Why this discussion...
...and why now?

As political, shareholder and public attention on sustainability has grown in recent years, many IT teams have already been pressed on what more they can do to support the organisation's ESG strategy. Add a global energy crisis into the mix, along with ever-increasing demands on IT systems as a result of digital transformation initiatives, and the chances are that datacentre power-efficiency is now high on your agenda. If not, brace yourself, because it's only a matter of time.

One option against this background is to continue on your existing trajectory using familiar tactics - replace old, power-hungry servers with more efficient modern equivalents, expand and 'cloudify' those x86 clusters so you can co-host less demanding workloads on general purpose resource pools, and/or shift applications into the public cloud. And modern software platforms increasingly allow you to do all of that, but you still need to manage the costs and risks that stem from the inevitable increase in complexity.

But what if you wanted to be more radical, to drive a step change in efficiency with a single platform-switch that could optimise critical as well as non-critical workloads with minimal risk and disruption? If you're going to do this, it makes sense to focus on those Linux-based stacks that underpin so many of your database, application and other workloads. This is exactly where a modern, high-scale Linux consolidation platform can help.

Read on to learn more about the background to these platforms and their fascinating origin, and how they can potentially allow you to rethink your approach to dealing with at least one aspect of datacentre optimisation.

The sustainability imperative

Datacentres are an essential fact of life, but they're not always great for the environment. Beyond the huge amounts of energy they consume on an ongoing basis, you also have the carbon cost inherent in the equipment they house. Each item of kit needs to be manufactured, shipped and ultimately disposed of, and the emissions mount up as you account for activity across the lifecycle of each device, rack, cable, etc.

Extend the carbon accounting to include the building itself, and claims that datacentres are responsible for at least 2% of the world's greenhouse gas emissions sound very plausible, as do assertions in relation to water consumption and management challenges.

If you are involved in running a datacentre yourself, the chances are that you've already come under pressure to play your part in addressing the sustainability imperative. Indeed you've probably already been taking action to consolidate where possible, and swap old equipment for modern power-efficient alternatives. You may even have redesigned your datacentre(s) to embrace best practices around the use of ambient cooling, hot/cold aisles, and other efficiency-enhancing techniques at a facility-level.

Migration of certain workloads to the public cloud has also been an option, but the net sustainability gains from this are notoriously difficult to assess. Meanwhile, the primary focus in terms of datacentre modernisation has typically been on solutions that help to maximise the density, utilisation and overall efficiency of x86-based infrastructure. As part of this we've moved from dedicated physical stacks, through virtualisation and early incarnations of private cloud, to modern cloud architecture as we know it today.

Thinking differently

Despite all of this good work, few claim to be fully optimised, and with demands on datacentres continuing to grow, the quest for new ideas to improve sustainability continues. With this in mind, an idea that's gaining momentum is actually concerned with making greater use of a platform that's preserved a consistent set of strong core attributes for decades.

While x86 estates have undergone radical transformation over the last 15 years, the most efficient occupant of many enterprise datacentres has always been - and remains so today - the mainframe. Whether judged on the basis of floor space requirements, power consumed per unit of work done, or longevity and upgradability to minimise the need for equipment replacement, mainframes have consistently outperformed pretty much all other platforms when it comes to sustainability.

This will be obvious to you if you already operate a mainframe. Less obvious, though, is the potential represented by the same underlying architecture beyond the kinds of workloads typically associated with the most common mainframe platform, e.g. critical large-scale business applications. We are talking here about the notion of using mainframe technology to host applications and workloads you would normally see sitting on x86-based infrastructure, specifically those running on the Linux operating system.

Reinventing the wheel

To appreciate the opportunity here, just consider the direction of travel of x86 estates over time towards greater performance and scalability, the ability to handle dynamic mixed-workload requirements effectively, and the incorporation of security and resilience measures lower and lower in the stack. With a bit of reframing, it could be argued that the aim seems to have been to emulate as many traditional mainframe attributes as possible.

The big difference, of course, is that no x86 architecture comes anywhere close to the mainframe at the moment in terms of what matters from a sustainability perspective - power/performance, physical footprint, and carbon-cost at an overall lifecycle level, etc.

But surely mainframe computing is a different world. Compared to the rest of IT, activity revolves around different application environments, skill sets and cost models, not to mention those cultural and mindset differences. Doesn't this limit how much you can take advantage of the mainframe architecture in a broader systems context, no matter the core characteristics?

Well, the first point to make is that the modern mainframe might be based on the same architectural principles as its ancestors, but the technology itself is as cutting edge as it comes. For example, the latest incarnations of the IBM zSystems, the most dominant mainframe platform in the market, support all the standards, techniques and delivery models that are relevant today, including DevOps, cloud-native, etc.

Bringing two worlds together

Most pertinent to our discussion of how to tackle the broader datacentre sustainability challenge is the IBM LinuxONE server platform. This is an offering within the IBM zSystems family designed to bring the key characteristics of mainframe technology to the world of Linux and open-source.

There's a whole value proposition around LinuxONE based on performance, scalability, economics, security and resilience related benefits, and the recent IBM LinuxONE III update has strengthened the offering even further. But in the context of sustainability, LinuxONE systems can simply be thought of as highly efficient appliances for hosting Linux workloads, from tens to many thousands of virtual servers (check your own numbers here). In line with this, the platform comes in various shapes and sizes, with LinuxONE options also available on-demand via the cloud. This makes the platform very accessible, including to small development shops with little or no mainframe heritage or experience. Mostly all you require is Linux expertise.

Have your cake and eat it

The main takeaway from all this is that you don't have to sacrifice your ESG goals on the altar of performance, scalability, security and resilience, as you often risk doing as you build out your x86 environments. If you're willing to think differently, alternative consolidation options based on the mainframe architecture or some other versatile high-scale platform can potentially let you deliver speed, capacity and flexibility while keeping the environmental impact to a minimum.

About Freeform Dynamics

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About IBM

IBM LinuxONE is an enterprise-grade Linux® server with a unique architecture designed to meet the needs of mission-critical workloads for regulated industries. It brings together IBM's experience in building secure, resilient and scalable systems with the openness of the Linux operating system.

For more information, visit www.ibm.com/it-infrastructure/linuxone

About this document

In March 2022, IBM briefed the Freeform Dynamics team on the latest developments in LinuxONE, with a particular emphasis on sustainability. Our feedback during the briefing call was generally very positive, but an issue was highlighted with respect to limited market awareness of where the platform potentially fits within the broader datacentre efficiency discussion. We were therefore commissioned by IBM to write this piece with a view to helping those concerned with the environmental impact of datacentres to at least consider how high-scale Linux consolidation platforms might be relevant to them.