



IMPLEMENTING AN OPEN IT INFRASTRUCTURE TO SUPPORT ADVANCED COMPUTING SOLUTIONS

Stratecast

F R O S T  S U L L I V A N

An Executive Brief Sponsored by Red Hat

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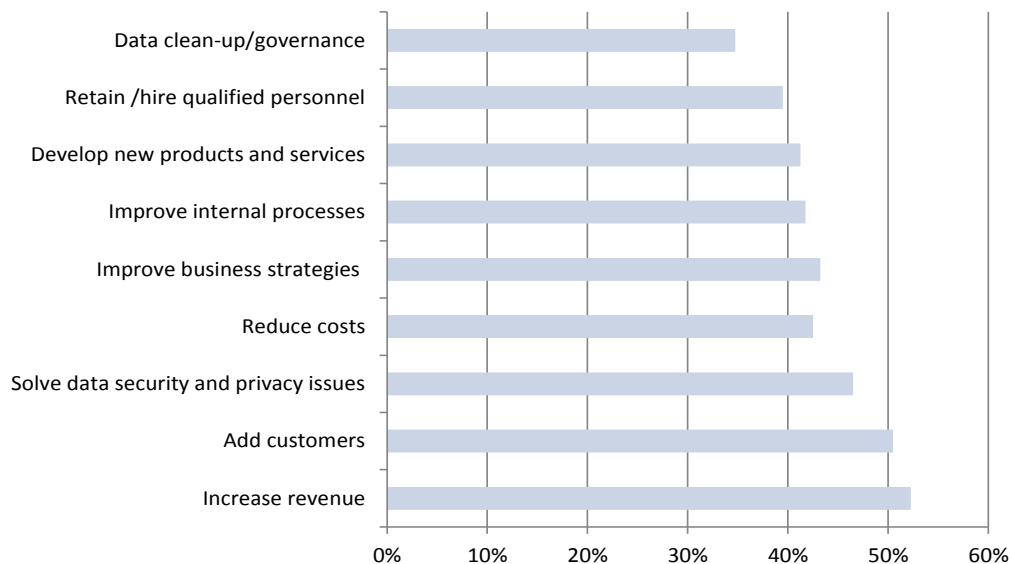
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INTRODUCTION

Enterprises that have not adopted open source solutions are falling behind, and will increasingly be at a significant competitive disadvantage compared to those that have. As competition heats up, those enterprises using proprietary IT technology are finding that they are playing a game of catch up that they can't win. This is especially ironic when compared to the objectives of enterprise IT organizations. Consider a few statistics from a recent Stratecast survey of IT decision makers:

- 42 percent indicated that improving business processes is extremely important
- 43 percent indicated that improving business strategies is extremely important
- 43 percent note that reducing costs is also extremely important; but over 50% note that increasing revenue is extremely important as well: the highest rated objective

Importance of Business Objectives



Yet, achieving these objectives while using single source IT solutions is difficult and expensive. As growing revenue and improving business strategies increasingly depend on an enterprise's IT infrastructure, many businesses are encountering the following challenges:

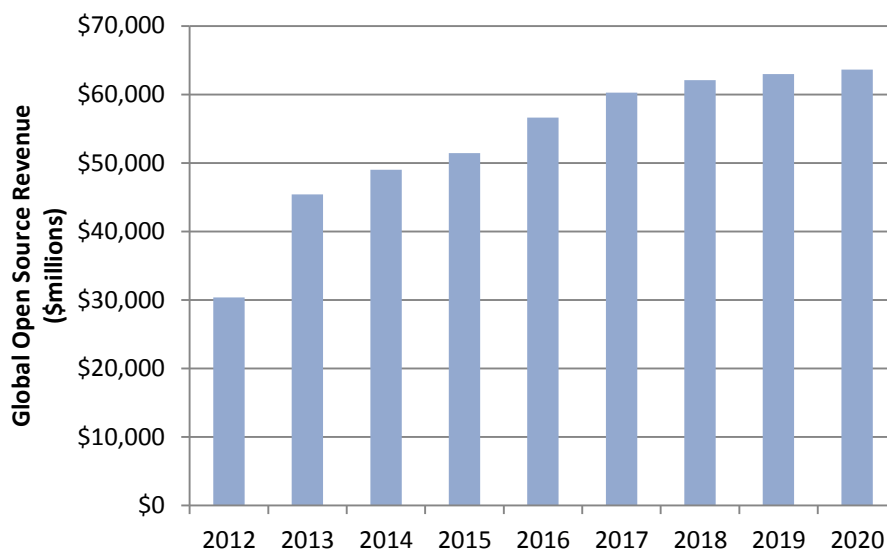
- Legacy systems cannot keep pace with business requirements. Hyper-competition causes enterprises that attempt to maintain proprietary IT infrastructure to fall behind the technology curve. Changes in the economy, an ever higher bar of customer expectations and demand, and competitive pressures ensure that doing so becomes cost prohibitive.
- Operational expenses (OPEX) associated with hardware and software maintenance for proprietary computing solutions can rapidly eat up IT budgets, leaving fewer resources for strategic development.

- As advanced computing such as Artificial intelligence (AI) becomes the norm, integrating such capabilities into existing architectures can be challenging and not always compatible with the way existing computing tasks are being performed.

Open source offers a solution: rather than depending on a single vendor or small group of vendors to deliver the latest IT solutions, open source enables an enterprise to leverage the expertise of thousands of innovative developers and users. Now that open system architectures are being combined and engineered to work with open source software, and high quality support is available to enterprises, open source platforms are achieving the scale to address even the most demanding computing problems. Effectively deploying open source applications becomes achievable and cost effective when using open source platforms. This paper explores the opportunities of open source in the enterprise computing environment, and illustrates how this can be accomplished in a trusted and low risk way.

AN OPEN SOURCE WORLD

Open source dates to 1988, when Eric Raymond and Bruce Perens founded the Open Source Initiative. Since then, open source software has become a major and growing market. Stratecast estimates that the global market will to be over \$63 billion by 2020.



Meanwhile, Statista estimates that over 80% of all companies have adopted open source software to some extent. Open source has proven that it can enable the most advanced computing problems and applications, ranging from advanced space vehicles to the world's largest stock exchanges.

Open source leverages the talents of thousands of users, all of whom are devoted to creating the best solutions for their own use. Sharing of intellectual property ensures that any user of an open source product can tap into an ever-expanding base of tools, and access the best and most current solutions available. However, for strategic enterprise deployments, open source software delivers the best results when it is supported by established vendors; as will be discussed later in this paper.

ADVANCED COMPUTING AND OPEN SOURCE

Some of the most intractable business problems are now yielding to advanced analytics running in an open source environment. Leveraging the experience gained from running high performance computing (HPC) applications in an open source environment, the new wave of AI applications—such as machine learning (ML) and cognitive computing, which frequently depend on dynamically scaling computing resources—are optimally supported in an adaptive operating environment characterized by flexible code and highly scalable computing platforms. Open source is a natural way to build such an environment.

In fact, as processing demands increase, open source is often the only practical way to architect systems that can effectively meet AI's resource intensive requirements. Examples where open source has been successfully applied to AI problems include improving:

- **Customer Experience.** “Intelligent virtual assistants,” which provide natural language interfaces via the Internet, to help customers engage with the business to place orders, book travel, troubleshoot service and a growing number of additional service-delivery transactions.
- **Manufacturing Processes.** In a “smart factory,” data from production lines and quality control can minimize downtime and increase productivity. Predictive analytics, informed by telemetry from deployed products, is being used to adjust production and design, to reduce failure rates, improve quality and reduce manufacturing costs.
- **E-Commerce.** Increase sales and satisfaction by recommending relevant products based on past behavior and context. There is a reason that big box retail centers are being challenged by online e-tailers: utilizing advanced analytics, e-tailers are able to predict those products and services that will best resonate with a consumer.
- **Retail Inventory Management.** Improve the distribution process, and maximize sales, by ensuring the optimal quantities and optimal mix of products are shipped to each retail outlet. ML enables business systems to learn to predict demand curves, which reduce inventory overhead and churn.
- **Internet of Things (IoT).** Data from sensors can yield valuable business insight when AI is applied. In fact, data collected by IoT sensors is virtually meaningless without valuable business insights provided by advanced analytics, including AI. Because of the problem of scale, such analytics systems often can only be supported by high performance clusters, often found in HPC.

In the past, these capabilities have been built on special purpose platforms that utilize proprietary hardware and software solutions. However, using a single source vendor is frequently expensive and usually requires the enterprise to have a great deal of in-house vendor-specific expertise. Open source software—from operating systems, to databases, to analytic tools—provides a scalable and cost effective basis to support advanced computing problems. Open source software also leverages the expertise of an entire industry to solve enterprise's advanced computing problems: it is likely that the problem the company is trying to solve has been solved by others already.

Yet, open source software by itself is not enough: there is always a hardware component, as well. An open hardware platform has well documented and open specifications, and has a community of interest dedicated to identifying issues and opportunities for improvement. There are several open hardware platforms available; and

many cutting edge big data applications, including open source databases such as EDB PostgreSQL, MongoDB, and RedisLabs, are currently running on them. In fact, many of the largest consumer-touching applications were built on open hardware architectures.

Combining open source software and an open architecture hardware platform creates an open IT infrastructure; and provides the best of both worlds: software that has a vast community of intellectual property developers, as well as a hardware architecture that is well-documented, has many suppliers, and is scalable and reliable.

BUILDING AN OPEN INFRASTRUCTURE

In spite of the virtues of open source computing, though, the enterprise should not attempt to develop an open source strategy by itself. Just as collaboration is the key to success in the open source community, collaboration with a trusted partner is key to achieving a successful open IT infrastructure. An enterprise needs to seek out partners who can bring the following:

- **Expertise to create a path to the intended outcome.** What applications will help an organization achieve its goals; and how can those be optimally implemented on open source infrastructure? How will needs change over time; and what kinds of expertise will be required as the application mix changes?
- **Solutions that have an established and growing user and developer community.** Just because software is open does not mean that it is necessarily popular enough to attract the best industry minds. A growing user and developer base is essential to innovation.
- **A proven track record of solving real world problems.** There are lots of boutique open source support companies; however, few of them have experience with industrial grade software problems. Finding a partner that has “seen it all” is essential to successful adoption of open infrastructure.
- **Ongoing support and maintenance.** Open source does not mean that an enterprise will find solutions to operational issues quickly or easily. Having a vendor partner that monitors the open source community for innovative new capabilities, and then vets, tests and certifies them, is a critical success factor. Regular release schedules, and on-call support for day-to-day problems and issues, are also essential vendor partner functions.

Critical to an open source strategy is building for future computing requirements. Conventional business applications can tax computing infrastructure; but the evolving world of big data, artificial intelligence (AI), high performance computing (HPC) and highly scalable databases will rapidly overwhelm a poorly executed open infrastructure. AI, in particular, with its dependence on cognitive computing algorithms that scale dynamically and rapidly, can be extremely taxing for even the most specialized architectures. Supporting AI applications in an open source environment requires careful planning and trusted advisers. Enterprises must ensure that not only the intended hardware platform and software applications are capable of supporting such demands, but that the selected vendors also have experience with such cutting edge applications.

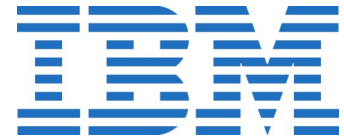
RED HAT SOFTWARE RUNNING ON IBM POWER SYSTEMS

Red Hat has been a leader in open source software since its inception, and has set the standard for Linux. With Statista estimating that nearly 80% of all supercomputing installations use some form of Linux, this proven base ensures that Linux is not only able to support routine business computing, but also the most cutting edge applications. Red Hat® Enterprise Linux® is an industry leading Linux operating system built on an open source base, with world-class support. It has proven its compatibility with the widest variety of available computing platforms.



Additionally, Red Hat® has developed OpenShift Container Platform, which improves application delivery, scalability, and workflow automation across hybrid clouds; and enables users to quickly deploy modern applications over multiple infrastructures. It has also launched Red Hat® Virtualization, allowing applications to scale flexibly as hardware resources are increased. Plus, with the newest release of Red Hat® Enterprise Linux®—which increases application performance, provides a more secure, reliable and innovative enterprise platform, while supporting existing mission-critical workloads and emerging technology deployments—Red Hat® delivers an enhanced functionality for supporting Linux containers and Internet of Things (IoT) applications.

Red Hat has always been comfortable running on the widest variety of computing platforms; and now is closely collaborating with IBM to deliver solutions on IBM's Power Systems architecture. Power Systems was constructed, from its inception, to support multiple computing cores, giving it a substantial ability to scale in the presence of high computing demands. With the support of the OpenPower Foundation, IBM Power Systems are being utilized to address the need for the scalable architectures that various modern applications and workloads require. The latest IBM Power Systems servers represent the next generation of advanced computational platforms, and are supported by the oldest and most experienced computer manufacturer in the world.



Together, Red Hat's software portfolio and IBM Power Systems provide a proven and secure platform upon which Enterprises can build advanced solutions powerful enough to run the most demanding applications. As leaders in their respective markets, Red Hat and IBM are at the forefront of innovation in the open source arena. Their solutions are providing assurance to enterprises—those already committed to open source, as well as those that are just now endeavoring to deploy open source infrastructure—that their computing needs, now and in the future, will be supported effectively.

Ultimately, IT is about supporting business revenue production; but this must be done while minimizing the risk to the company: both the outright risk of failure and the risk that computing performance will not be able to keep up with demand. Building IT capabilities on proven and open solutions is one way to reduce such risks. Using proven vendors, which stand behind their products, is another. Combining these approaches—using Red Hat's software and IBM's hardware—is a good way to lower the uncertainty associated with deploying technology: reducing risk and making success more likely.

LAST WORD

For enterprises that have not begun to deploy an open IT infrastructure, time is running out. Business success is increasingly tied to the ability to harness and leverage cutting edge computing capabilities. Big data provides the ability to access all of the data that is pertinent to any decision; while advanced analytics applications, many of which depend on AI and HPC capabilities, provide the means for extracting meaning from large collections of data. These capabilities are essential for understanding customers and managing production, but are complex and expensive. Open source provides a way to reduce complexity and cost.

However, simply buying open source software and open architecture hardware will not deliver the increases in capability that are required to keep up with computing demands—a well-considered strategy and trusted vendor partners are also essential to deploying a scalable and reliable computing infrastructure. Enterprise IT organizations need to consider not only current computing needs, but the likely increase in demand that advanced computing—such as open source databases (OSDB), AI and HPC applications—will pose in the future.

Combining Red Hat's software portfolio with IBM Power Systems provides one approach to developing an open IT architecture, and brings decades of experience solving the most demanding computing problems, as well as extensive support capabilities. Additionally, each of these companies has an extensive user community, with significant industry fora that could serve as a repository of experience and a source of innovation.

Stratecast believes that every enterprise should consider utilizing open source as a foundation for its computing needs; and believes that any enterprise that doesn't have such a foundation should begin, now, to develop one. Red Hat and IBM are two proven vendors that, together, can help with that process.

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