ITIC 2017 Global Reliability Survey Mid-Year Update

Information Technology Intelligence Consulting

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IBM z Systems, IBM Power Systems and Lenovo x86 Servers Top ITIC Reliability Poll

ITIC Position

In the 21st Century Digital Age where servers, devices, operating systems and applications are increasingly interconnected via the Internet of Things (IoT), the cloud and on-premises, unplanned downtime is unacceptable and costly. It negatively impacts productivity. When network servers, OSes and applications are unavailable,

Audience

Corporate enterprises, CEO, CIO, CTO, VP/Manager of IT, Security Administrators, Compliance Professionals

Relevance

Reliability and continuous access to servers, systems and applications are crucial and essential for business productivity.

business ceases. This has a domino effect on corporate enterprises, customers, business partners and suppliers. Four nines – 99.99% uptime is now the minimum reliability required by 79% of organizations.

IBM z Systems Enterprise, IBM Power Systems and Lenovo x86 Servers Deliver Highest Uptime/Reliability

For the ninth year in a row, corporate enterprise users said IBM's z Systems Enterprise mainframe class server achieved near flawless reliability, recording less than 10 seconds of unplanned per server downtime each month **(See Exhibit 1)**. Among mainstream servers, IBM Power Systems devices and the Lenovo x86 platform delivered the highest levels of reliability/uptime among 14 server hardware and 11 different server hardware virtualization platforms.

Those are the results of the independent ITIC 2017 Global Server Hardware and Server OS Reliability survey which polled 750 organizations worldwide during April/May 2017. In order to obtain the most accurate and unbiased results, ITIC accepted no vendor sponsorship.

Survey Highlights

Infrastructure reliability is more important than ever. Corporate computing environments continue to increase in size and scope. Organizations are also expanding their use of complex technologies like virtualization and migrating key line of business applications to the cloud. Additionally, the scope of networks is expanding via Internet of Things (IoT) and the Network Edge/Perimeter deployments – all of which incorporate mobility and Bring Your Own Device (BYOD) solutions. In these situations, it is
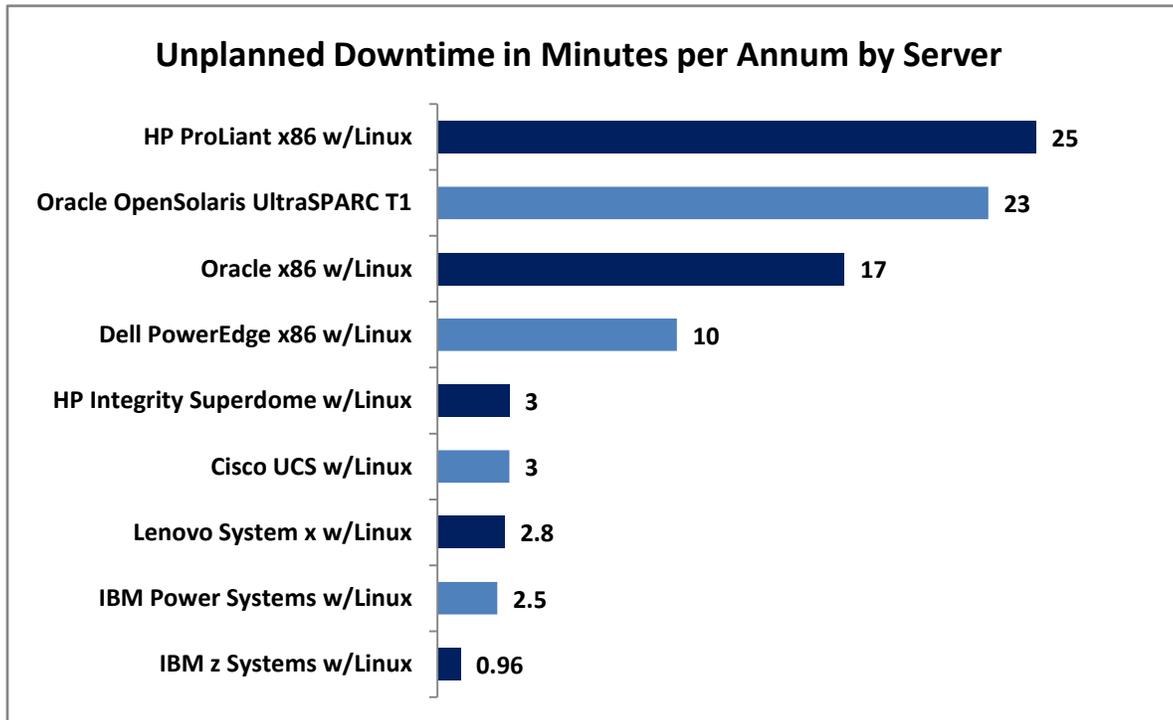
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imperative that the core infrastructure servers and server operating systems deliver the highest levels of uptime and reliability. The latest ITIC survey data indicates that 79% of corporate respondents now require 99.99% availability. This is an increase of seven percent from the 72% of respondents in ITIC's prior 2016 survey a year ago.

Exhibit 1. IBM z Systems, Power Systems and Lenovo Record Least Amount of Downtime

Unplanned Downtime in Minutes per Annum by Server

Server	Minutes
HP ProLiant x86 w/Linux	25
Oracle OpenSolaris UltraSPARC T1	23
Oracle x86 w/Linux	17
Dell PowerEdge x86 w/Linux	10
HP Integrity Superdome w/Linux	3
Cisco UCS w/Linux	3
Lenovo System x w/Linux	2.8
IBM Power Systems w/Linux	2.5
IBM z Systems w/Linux	0.96

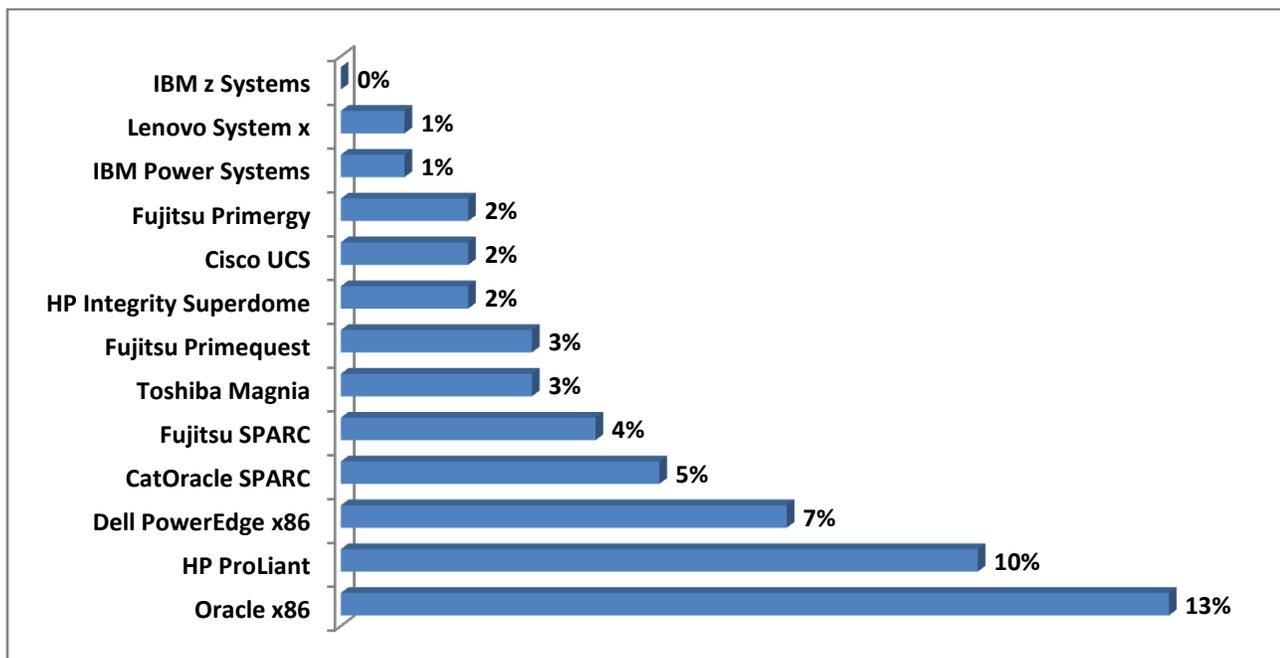**Source: ITIC Global Server Hardware, Server OS Reliability Survey 2017**

Among the other Survey Highlights:

- **IBM z Systems Enterprise** mainframe class servers once again had the distinction of being ranked "best in class" for reliability, accessibility, performance, and security among all server platforms. The z Systems servers had highest reliability/uptime ratings across the board in terms of actual minutes of unplanned per server/per annum downtime. Specifically, IBM z Systems mainframe class servers exhibit true mainframe fault tolerance experiencing just 0.96 - less than one minute of *unplanned* per server, per annum annual downtime. That equates to just eight (8) seconds per month or "blink and you miss it," 2 seconds of weekly downtime.
- The z Systems family of servers also the lowest incidence – **0% —** of > **4 hours of per server/per annum downtime** of any hardware platform.
- **IBM Power Systems and Lenovo System x running Linux** once again exhibited the least amount of *unplanned* downtime 2.5 and 2.8 minutes per server/per year of among all mainstream Linux

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server platforms. These results are notable both for the low unplanned downtime rates as well as for the consistency of both the IBM and Lenovo server platforms.

- 88% of IBM Power Systems and 87% of Lenovo System x users running RHEL, SUSE or Ubuntu Linux experience fewer than one *unplanned* outage per server, per year.
- **Only one percent of IBM and Lenovo** servers recorded over four (4) hours of unplanned per server/per annum downtime; followed by six percent of HPE servers; eight percent of Dell servers and 10% of Oracle servers (**See Exhibit 2**).
- **IBM and Lenovo hardware and the Linux operating system distributions** were either first or second in every reliability category, including virtualization and security.
- **Cisco UCS and HPE Integrity Superdome** servers are getting more competitive with each subsequent ITIC Global Server Hardware and Server OS Reliability survey. In this latest 2017 Mid-Year Update poll, only two percent of Cisco, HPE Integrity and Fujitsu Primergy servers recorded in excess of four (4) hours of unplanned downtime.
- **Lenovo x86 servers** achieved the highest reliability ratings among all competing x86 platforms.
- Some **66%** of survey respondents said aged hardware (3 ½+ years old) had a negative impact on server uptime and reliability vs. **21%** that said it has not impacted reliability/uptime. This is 22% increase from the **44%** who said outmoded hardware negatively impacted uptime in 2014
- **Reliability continues to decline** for the **fifth** year in a row on the HP ProLiant and Oracle's SPARC & x86 hardware and Solaris OS. Reliability on the Oracle platforms declined slightly mainly due to aging. Many Oracle hardware customers are eschewing upgrades, opting instead to migrate to rival platforms.
- **Only 1% of Cisco, 1% of Dell, 1% of IBM and Lenovo, 3% of HP, 3% of Fujitsu and 4% of Toshiba** users gave those vendors "Poor" or "Unsatisfactory" customer support ratings.

Exhibit 2. IBM z Systems, Power Systems and Lenovo x86 System Record Least Amount of *Unplanned* Downtime of >four (4) hours in the Last 12 Months (2016 - 2017)
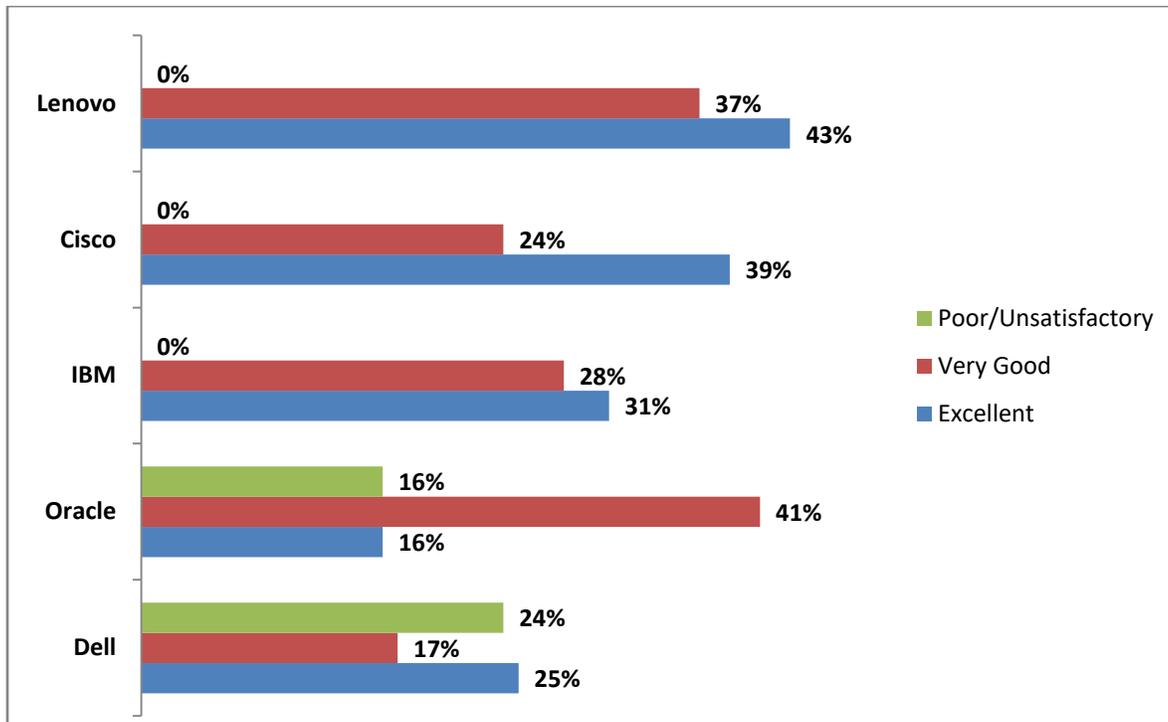
Platform	Percentage
IBM z Systems	0%
Lenovo System x	1%
IBM Power Systems	1%
Fujitsu Primergy	2%
Cisco UCS	2%
HP Integrity Superdome	2%
Fujitsu Primequest	3%
Toshiba Magnia	3%
Fujitsu SPARC	4%
CatOracle SPARC	5%
Dell PowerEdge x86	7%
HP ProLiant	10%
Oracle x86	13%

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Lenovo, Cisco and IBM Score Highest in Customer Satisfaction

Lenovo jumped to the head of the class in terms of customer satisfaction with its products and after-market technical service and support (**See Exhibit 3**). Eight-in-10 survey respondents – 80% - rated Lenovo's technical service and support as "Excellent" or "Very Good." Cisco and IBM also scored well in this category with 63% of respondents rating Cisco technical service and support as "Excellent" or "Very Good" while 59% of IBM customers support the best followed by Cisco and IBM. Ironically, while 57% of Oracle survey respondents rated the product quality and technical service and support as "Excellent" or "Very Good", while **16%** rated service & support as "Poor" or "Unsatisfactory. "Dissatisfaction with Oracle licensing and pricing policies remains consistently high for the last three years.

However, the worst customer satisfaction scores were reserved for Dell and HPE. Nearly one in four survey respondents gave Dell "Poor" or "Unsatisfactory" ratings while HPE fared even worse: some 31% of those polled said they found HPE support "Poor" or "Unsatisfactory."

Exhibit 3. Lenovo Rated Highest in Customer Satisfaction

Source: ITIC Global Server Hardware, Server OS Reliability Survey 2017

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Human Error, Security are Chief Culprits Causing Downtime

And continuing a trend that has manifested over the past three years, Human Error and Security remain the chief issues that negatively impact server hardware/server operating system reliability and cause downtime.

The survey results showed that 80% of respondents cited human error as the chief culprit of unplanned downtime, surpassing Security issues which were pinpointed by 59% of those polled.

Additionally, ITIC's latest 2017 Reliability research reveals that a variety of other external factors are having more of a direct impact on system downtime and overall availability. These include overworked and understaffed IT departments; the rapid mainstream adoption of complex new technologies such as the aforementioned IoT, Big Data Analytics, virtualization and increasing cloud computing deployments and the continuing proliferation of BYOD and mobility technologies.

In the context of its Reliability Surveys, ITIC broadly defines human error to encompass both the technology *and* business mistakes organizations make with respect to their network equipment and strategies.

Human error as it relates to technology includes but is not limited to:

- Configuration, deployment and management mistakes
- Failure to upgrade or right size servers to accommodate more data and compute intensive workloads.
- Failure to migrate and upgrade outmoded applications that are no longer supported by the vendor.
- Failing to keep up to date on patches and security.

Human error with respect to business issues includes:

- Failure to allocate the appropriate Capital Expenditure and Operational Expenditure funds for equipment purchases and ongoing management and maintenance functions
- Failure to devise, implement and upgrade the necessary computer and network to address issues like Cloud computing, Mobility, Remote Access, and Bring Your Own Device (BYOD).
- Failure to construct and enforce strong computer and network security policies.
- Ignorance of Total Cost of Ownership (TCO), Return on Investment (ROI).
- Failure to track hourly downtime costs.
- Failure to track and assess the impact of Service Level Agreements and regulatory compliance issues like Sarbanes-Oxley (SOX), Health Insurance Portability and Accountability Act (HIPAA).

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To reiterate, in the 21st Century Digital Age, the functionality and reliability of the core, foundation server hardware and server operating systems is more crucial than ever. The server hardware and the server OSes are the bedrock upon which the organization's mainstream line of business (LOB) applications rest. High reliability and near continual system and application availability is imperative for organizations' core on-premises, cloud based and Network Edge/Perimeter environments. Infrastructure — irrespective of location – is essential to the overall health of business operations.

The inherent reliability and robustness of server hardware and the server operating systems are the most critical factors that influence, impact and ultimately determine the uptime and availability of mission critical line of business applications, virtual machines (VMs) that run on top of them and the connectivity devices that access them.

The overall health of network operations, applications, management and security functions all depend on the core foundation elements: server hardware, server operating systems and virtualization to deliver high availability, robust management and solid security. The reliability of the server, server OS and virtualization platforms form the foundation of the entire network infrastructure. The individual and collective reliability of these platforms have a direct, immediate and long lasting impact on daily operations and business results.

The ITIC survey also polled customers on the minimum acceptable reliability requirements for their organizations' main line of business servers and applications. And to reiterate our statements above, 79% of respondent businesses said their organizations now require a minimum of "four nines" or 99.99% uptime.

Minimum Reliability Requirements Increase Year over Year

In 2017 time is not only measured by money, it also equates to productivity and, the efficiency, continuity of ongoing, *uninterrupted* daily operations. If any of these activities are compromised by outages for any reason – business issues that force the company to shut the networks down or operational failure that render the systems, applications or networks unavailable, or that make it impossible for the IT Department and the organization's knowledge workers to do their jobs, business grinds to a halt. This negatively impacts the corporate enterprise but also potentially its customers, business partners and suppliers. All of this has a domino effect that can raise Total Cost of Ownership (TCO) and undermines the return on investment (ROI). Hence, high reliability is necessary to manage the corporation's level of risk and exposure to liability and potential litigation as a consequence of unplanned downtime. This is evidenced by corporations' reliability requirements which have increased every year for the past decade ITIC has polled firms on these metrics.

Consider the following: in 2008, the first year that ITIC surveyed enterprises on their Reliability requirements, just 27% of businesses said they needed 99% uptime; four-in-10 corporations – 40% required 99.9% availability. In that same 2008 survey, only 23% of firms indicated they required a minimum of "four nines" or 99.99% uptime for their servers, operating systems and virtualized environments, while a seven percent (7%) minority demanded the highest levels of "five nines" – 99.999% or greater availability.

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Just four years ago in ITIC's 2013 Hourly Cost of Downtime poll, 67% of businesses needed at 99.99% or greater reliability/uptime; up 34% from 2008. 99.99%+ and greater reliability are mission-critical.

In our latest 2017 survey – **none – 0% of survey respondents** indicated their organizations could live with just "two nines" – 99% uptime or nearly 88 hours of annual unplanned per server downtime! And only a miniscule one percent – 1% - minority said their firms required just 99.9% reliability.

Additionally, 18% of respondents indicated their businesses now require "five nines" or 99.999% server and operating system uptime which equates to 5.26 minutes of per server/per annum unplanned downtime. And three percent (3%) of leading edge businesses need "six nines" 99.9999% near-flawless mainframe class fault tolerant server availability of 31.5 seconds per server/per month.

At the same time, the cost for a single hour of server, server operating system or application downtime continues to increase. The most recent 2017 ITIC survey indicates that 98% of firms say hourly downtime costs exceed $150K; 31% of respondents estimate hourly downtime costs their companies up to $400K; this is a seven percent increase from 2014 survey and 33% indicate that one hour of downtime now costs $1 million (USD) to over $5 million. These statistics are exclusive of any civil or criminal penalties that may ensue in the wake of the outage.

Conclusions

Reliability is and will continue to be among the most crucial metrics in the organization. Improvements or declines in reliability can either mitigate or increase technical and business risks to the organization's end users and its external customers. The ability to meet service-level agreements (SLAs) hinges on server reliability, uptime and manageability. These are key indicators that enable organizations to determine which server operating system platform or combination thereof is most suitable.

The ITIC 2017 Global Server Hardware and Server OS Reliability survey finds that IBM and Lenovo continue to exhibit the highest levels of uptime and reliability. IBM and Lenovo server performance, reliability and manageability are also among the most consistent as evidenced by their continuing superior customer satisfaction scores.

Additionally, Cisco servers and services are rapidly gaining ground and becoming more competitive with each successive survey. HPE has also made impressive strides over the last 12 months with its high end mission critical HP Integrity Superdome server, although the ProLiant line continues to lag.

None of the server hardware vendors can rest on their laurels. Competition is cutthroat in the server industry and it is a buyer's market.

To ensure business continuity and increase end user productivity, it is imperative that businesses maximize the reliability and uptime of their server hardware and server operating systems. A 79% majority of corporations now require "four nines" or 99.99% minimum uptime. Organizations are advised to "right size"

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their server hardware to accommodate increased workloads and larger applications. Businesses should also regularly replace, retrofit and refresh their server hardware and server operating systems with the necessary patches, updates and security fixes *as needed* to maintain system health. At the same time, server hardware and server operating system vendors should be up front and provide their customers with realistic recommendations for system configurations to achieve optimal performance. Vendors also bear the responsibility to deliver patches, fixes and updates in a timely manner and to inform customers to the best of their ability regarding any known incompatibility issues that may potentially impact performance. Vendors should also be honest with customers in the event there is a problem or delay with delivering replacement parts.

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