Information Technology Intelligence Consulting

ITIC

ITIC 2017 - 2018 Global Server Hardware, Server OS Reliability Survey

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Principal

Overview: Methodology

- ITIC's annual Hardware and Server OS Reliability survey polled **800** global businesses from August through December 2017.
- The Web-based survey included multiple choice questions and one Essay question.
- ITIC's latest Reliability survey focused on:
  - Server and OS reliability
  - Chief causes of unplanned downtime
  - Customer satisfaction with vendor service and support
- Two accompanying surveys detailed the latest Annual Cost of Hourly Downtime; Downtime Costs by Vertical Market segments and Minimum Uptime and Reliability requirements.
- The survey was independent; ***No Vendor Sponsorship***
- ITIC analysts again conducted two dozen, in-depth first person customer interviews to validate the updated Web survey responses.
- Approximately 70% of respondents hailed from North America; 30% were international customers
- All market sectors were represented: SMBs = 31%; SMEs = 26% and Enterprises = 43% of respondents
- Survey respondents hailed from 22 vertical markets
- ITIC deployed security and authentication mechanisms to prevent tampering

Survey Highlights: Reliability Trends

- ***Overall,*** the **inherent reliability** of the majority of server hardware platforms, server operating systems and the underlying processor technology continues to improve. However, Human Error, Increasing complexity and Security issues undermine reliability particularly with respect to mainstream, "work horse" commodity servers.

- **Vendor Performance:**
  - **IBM, Lenovo servers continued to deliver highest reliability for 10th straight year.**
  - **IBM and Lenovo server** reliability is up to **18x** more reliable than some competitors
  - **Cisco, HPE's** Superdome X; Integrity Superdome 2, **Stratus** FT Server and **Fujitsu** PRIMEQUEST also scored high
  - Newcomer **Huawei's** Kun Lun server tied for third in Reliability with Cisco, HPE Superdome and Stratus FT Server
  - **Cisco, IBM and Lenovo** rated highest in customer satisfaction

- **Reliability Trends:**
  - **Majority of corporations - 80% Require "Four Nines" of Uptime -** 99.99% for mission critical hardware, operating systems & main line of business (LOB) applications.
  - **Cost of Hourly Downtime Increases: 98%** of firms say hourly downtime costs exceed $150K; **31%** of respondents estimate hourly downtime costs their companies up to $400K.

- **Overall Top Issues Negatively impacting network reliability are:**
  - Human Error (e.g., misconfiguration, right-sizing server workloads etc.) – **80% followed by Security – with 57%** and **Complexity at 44%** are the Top Three causes of unplanned downtime.

Survey Highlights

- **IBM z Systems Enterprise, continues to have the** lowest incidence – **0% --** of > **4 hours of per server/per annum downtime** of any major mainstream hardware platform.

- **IBM and Lenovo hardware and the Linux operating system distributions** were either first or second in every reliability category, including server, virtualization and security.

- **Lenovo x86 servers** achieved the highest reliability ratings among all competing x86 platforms
- **Users rated Lenovo tech support the best followed by Cisco and IBM**
- 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 **sixth straight** year on the HPE 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.

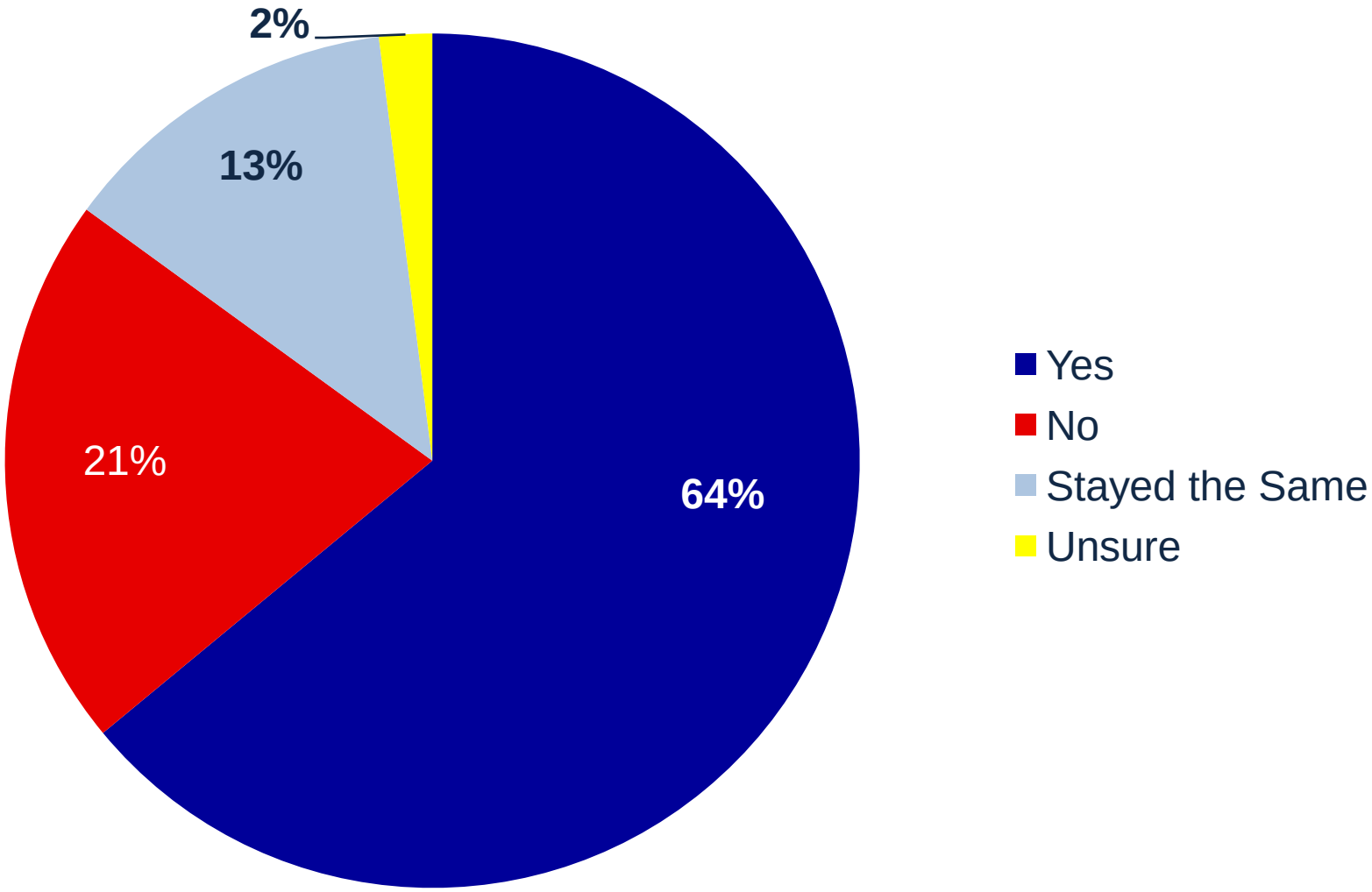
- Some **16%** of Oracle customers rated service & support as Poor or Unsatisfactory. Dissatisfaction with Oracle licensing and pricing policies remains consistently high for the last three years.

- **Only 1% of IBM, Lenovo and Cisco; 3% of HP, 3% of Fujitsu and 4% of Toshiba** users gave those vendors "Poor" or "Unsatisfactory" customer support ratings.

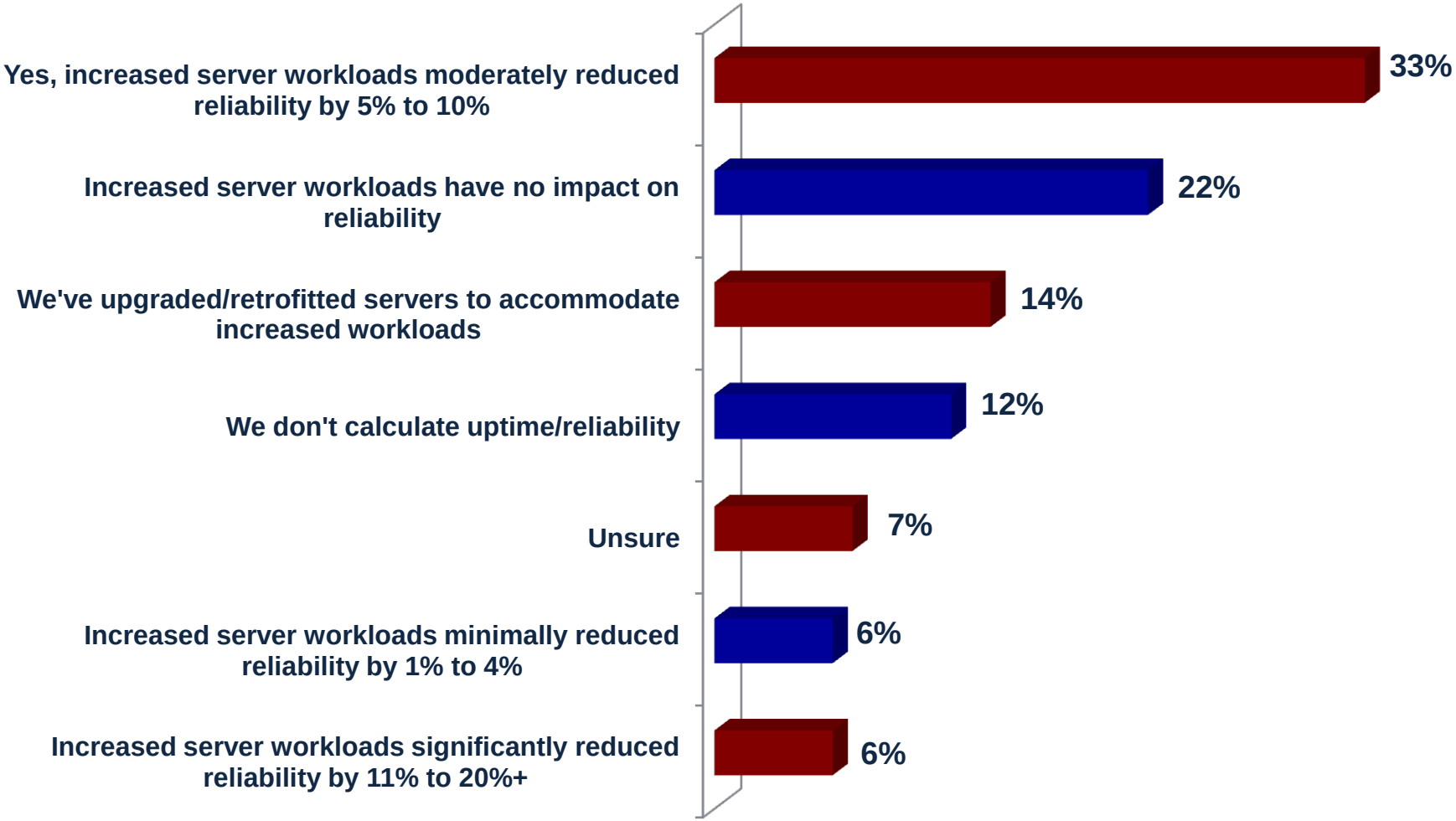
Reliability Results

Corporate enterprise minimum Server Hardware, Server OS Requirements Increase Year Over Year (Y0Y): 80% of Organizations Now Need 99.99% Uptime an Increase of over 25% in the last 30 months.

Have Your Server Workloads Increased Since 2016?

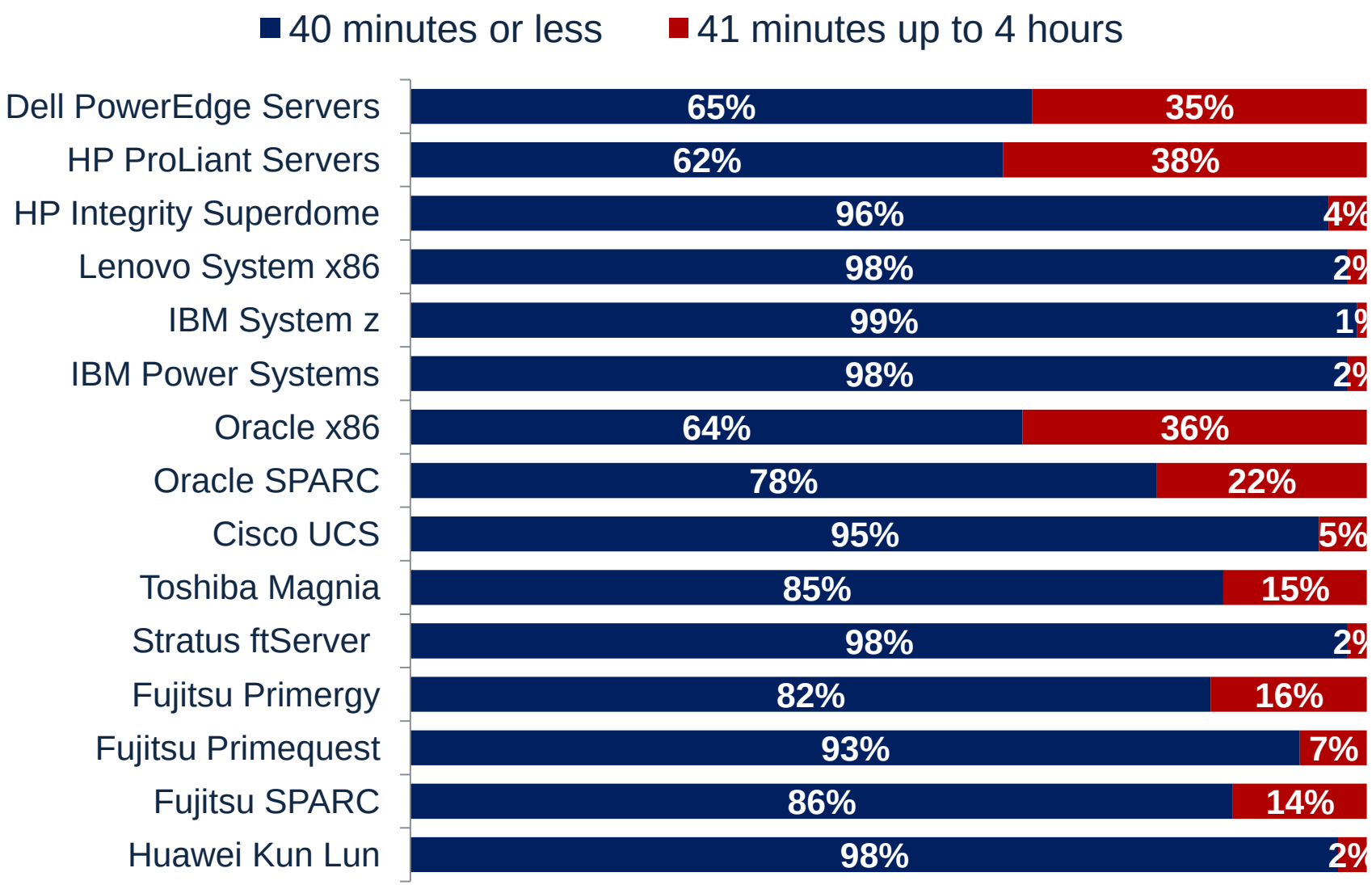


Has the increase in your server workloads had any noticeable impact on monthly and annual server reliability/availability and uptime?

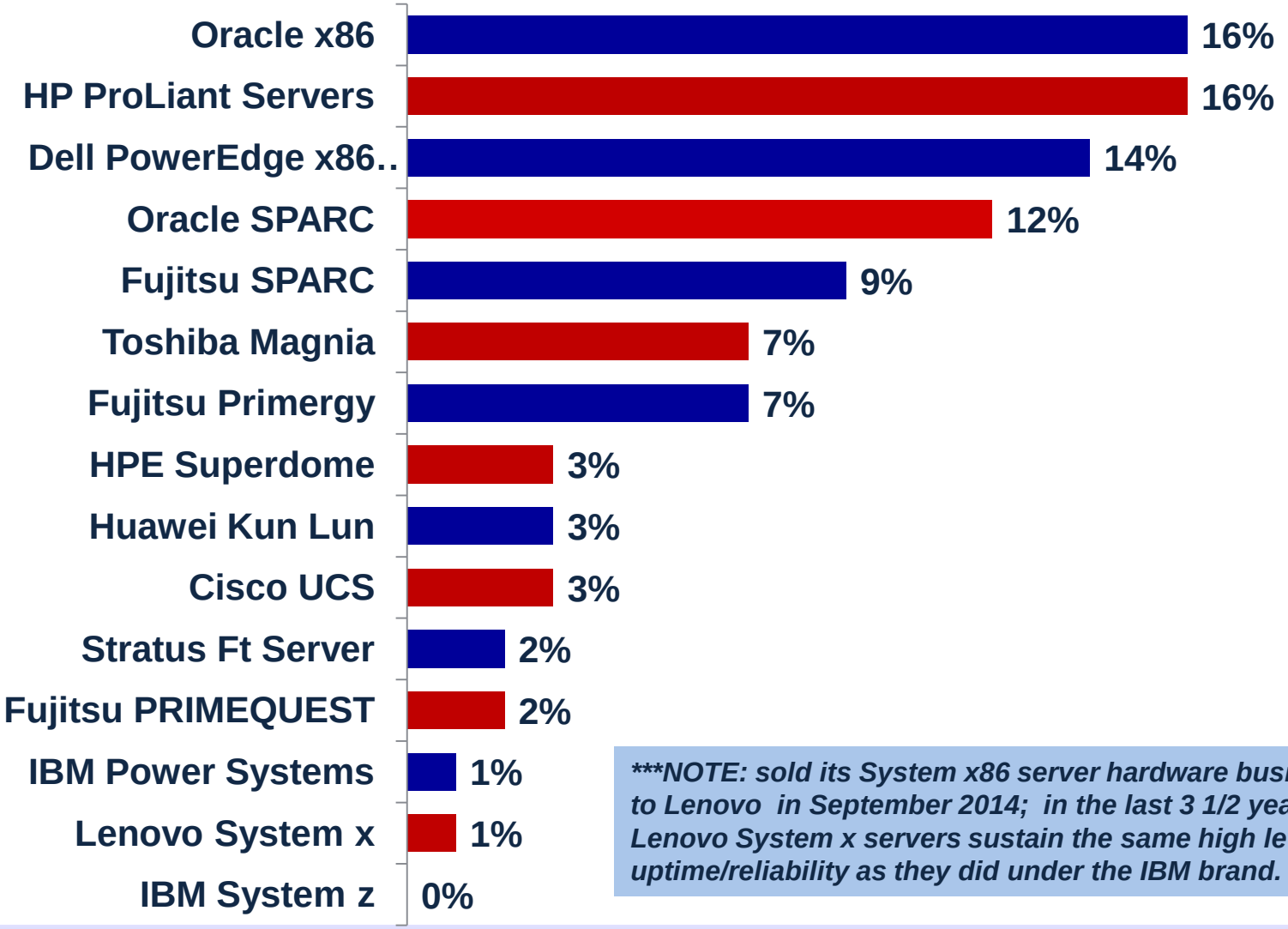


Some 45% of corporations report that increased server workloads negatively impact reliability

Unplanned Downtime of up to four (4) hours during the past 12 months on each server hardware platform (2018)

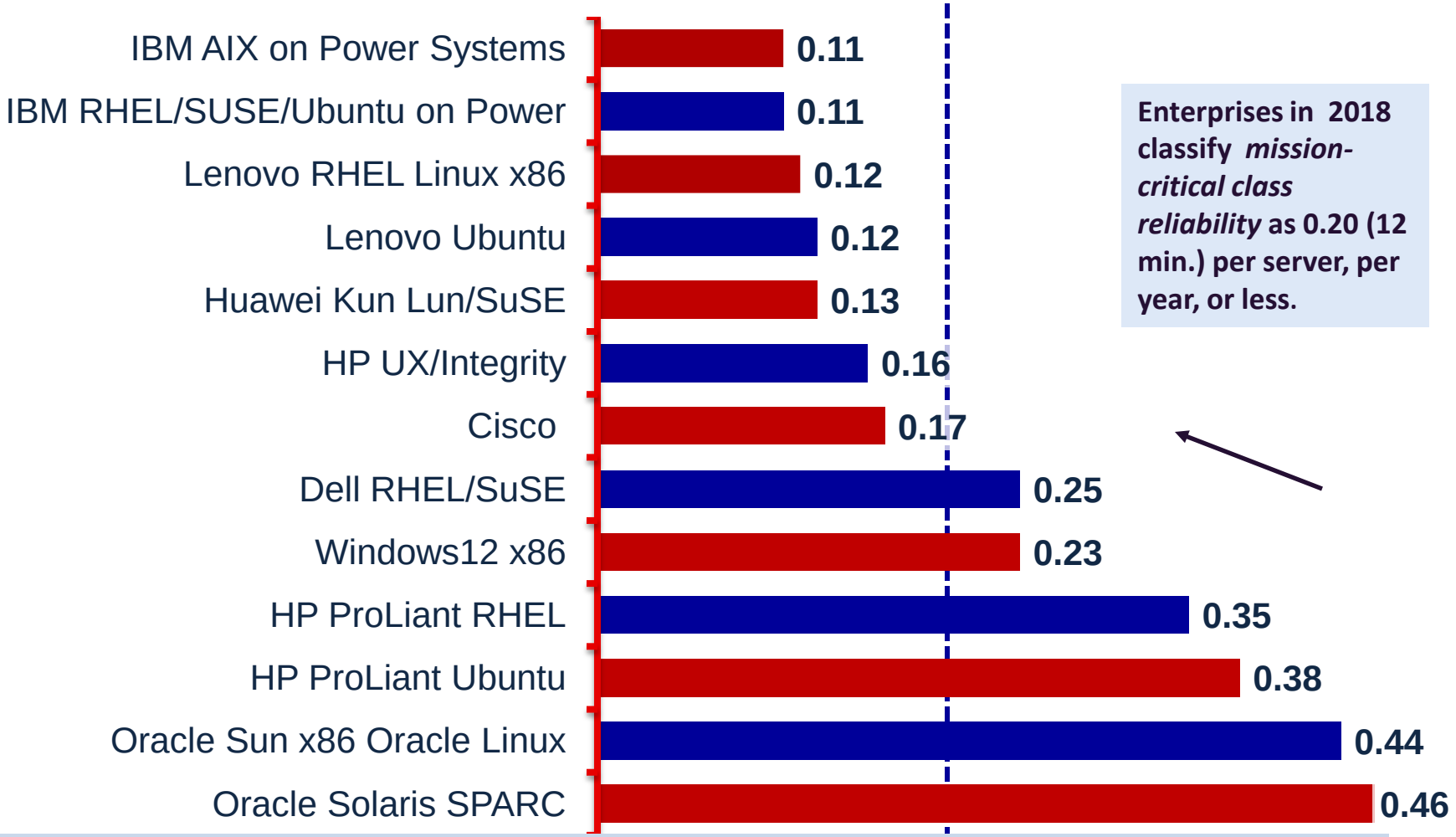


IBM Power Systems and Lenovo x86 System x Record Least Amount of *Unplanned* Downtime of >Four (4) Hours on Each Server Hardware Platform (2017 - 2018)



***NOTE: sold its System x86 server hardware business to Lenovo in September 2014; in the last 3 1/2 years Lenovo System x servers sustain the same high level of uptime/reliability as they did under the IBM brand.*

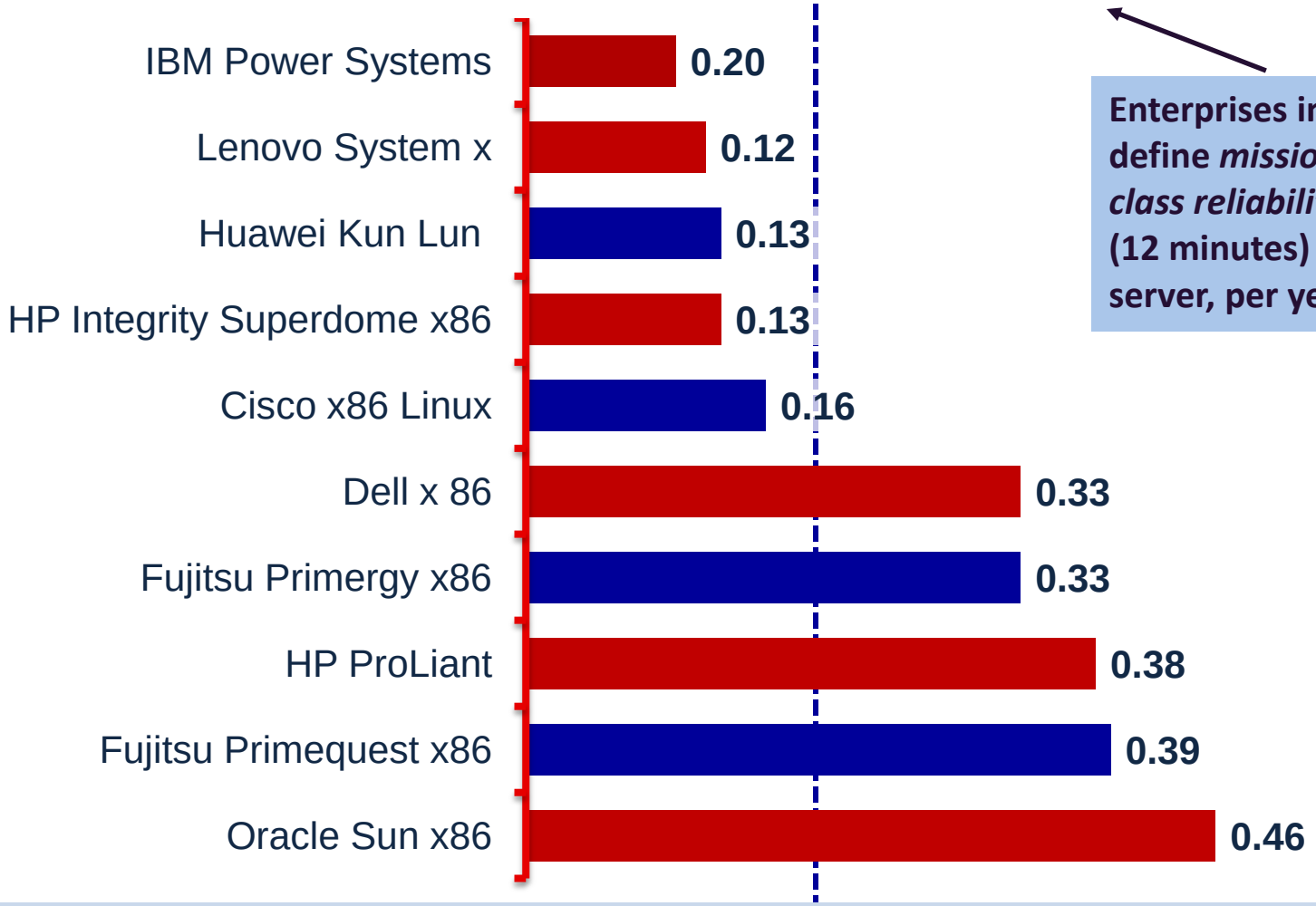
Xeon E7 v3 and v4 RAS x86 and UNIX/RISC Processors Provide Equivalent Levels Enterprise Server OS System Availability & *Unplanned* Downtime in 2017 - 2018 (Hours per Year)



Enterprises in 2018 classify *mission-critical class reliability* as 0.20 (12 min.) per server, per year, or less.

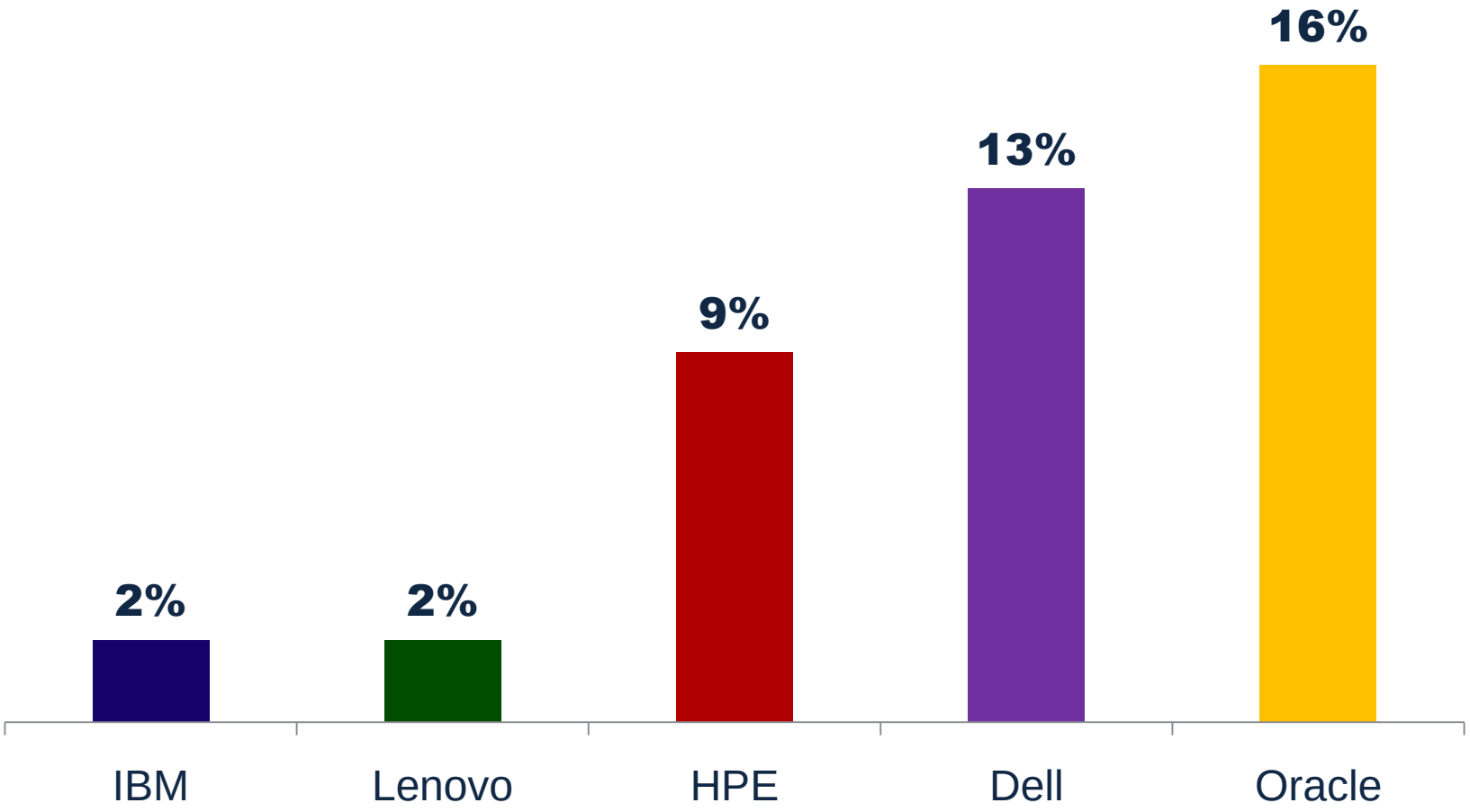
***NOTE:** In comparable server configurations, similar workloads and age of servers (new to 3 1/2 years old) Intel Xeon E7 v3 and v4 RAS processors achieved equivalent levels of 99.99% and 99.999% > uptime as competing UNIX/RISC servers. As of December 2018, reliability of operating systems running Lenovo and Cisco improved Dell and HP ProLiant reliability both declined slightly due to longer server upgrade cycles without retrofitting and failure to right-size server to accommodate greater application workloads.*

Xeon E7 v3, v4 RAS x86 and UNIX/RISC Processors Provide Equivalent Levels of Enterprise *Unplanned* Downtime 2017 - 2018 (Hours per Year) in Comparable Server Hardware Configurations and Workloads



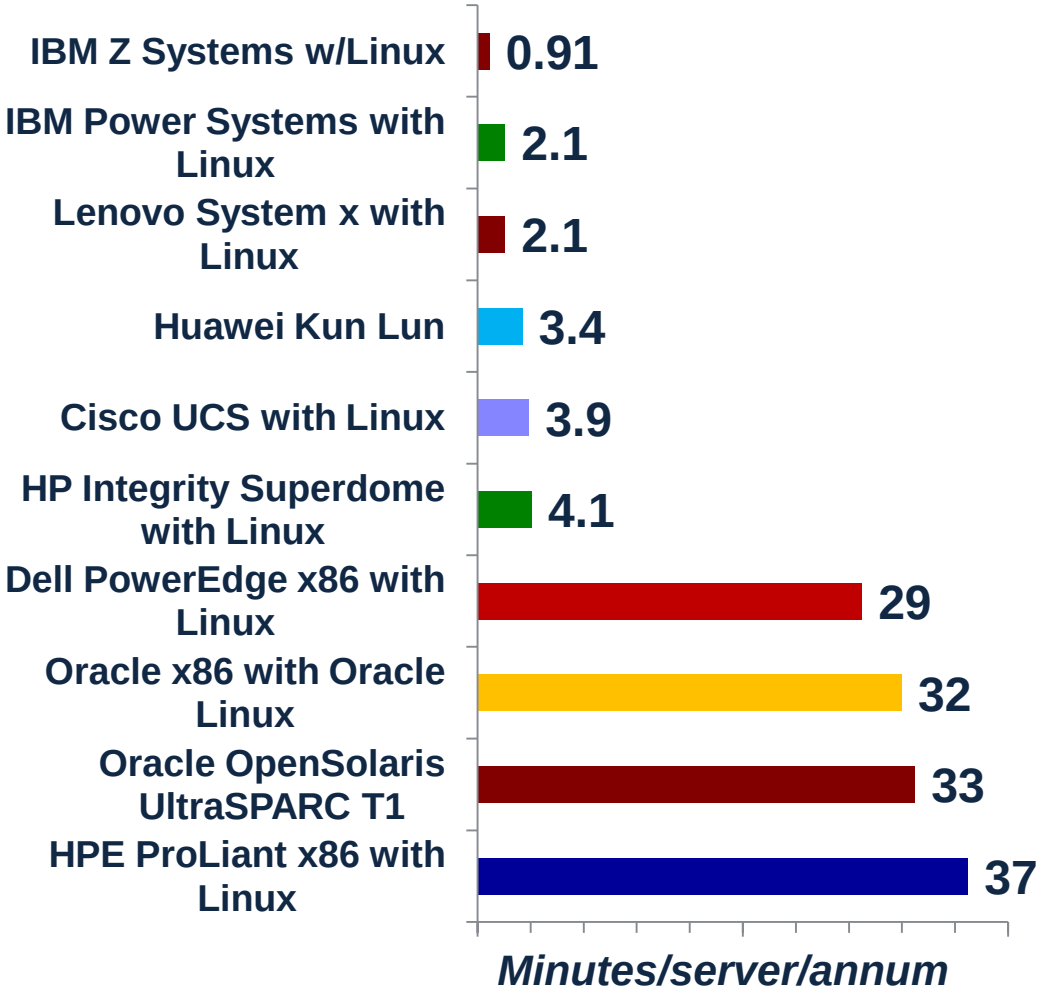
***NOTE:** In comparable server configurations (similar workloads, age of servers) Intel Xeon E7 v3 and v4 RAS processors achieved equivalent levels of 99.99% and 99.999% > uptime as competing UNIX/RISC servers. However, reliability declined when Intel-based servers were retained for four, five or six years*

Annual Server Downtime of >4 hours by vendor platform in 2018



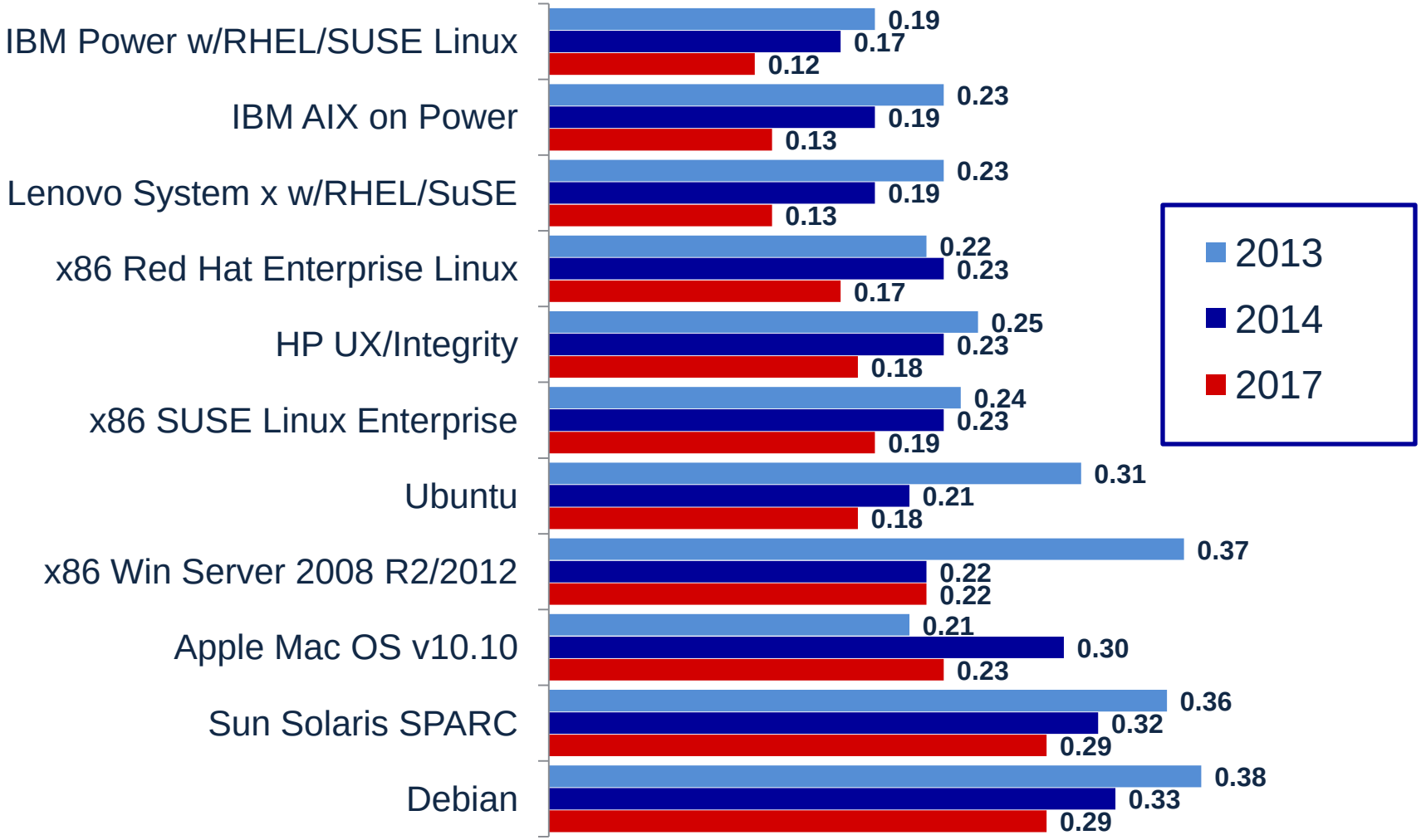
NOTE: Lenovo System x, IBM Power Systems servers averaged the lowest percentage (2%) of >4 hours of per server/per annum server outages compared to HPE ProLiant servers, Dell PowerEdge, Oracle x86 and SPARC hardware platforms. On average HPE Integrity server downtime improved to 6% but HPE's overall average downtime of >4 hours increased to 9% due to worsening reliability of the ProLiant platform

How much *Unplanned* Downtime have you experienced, per server/per annum in minutes in 2017 - 2018?

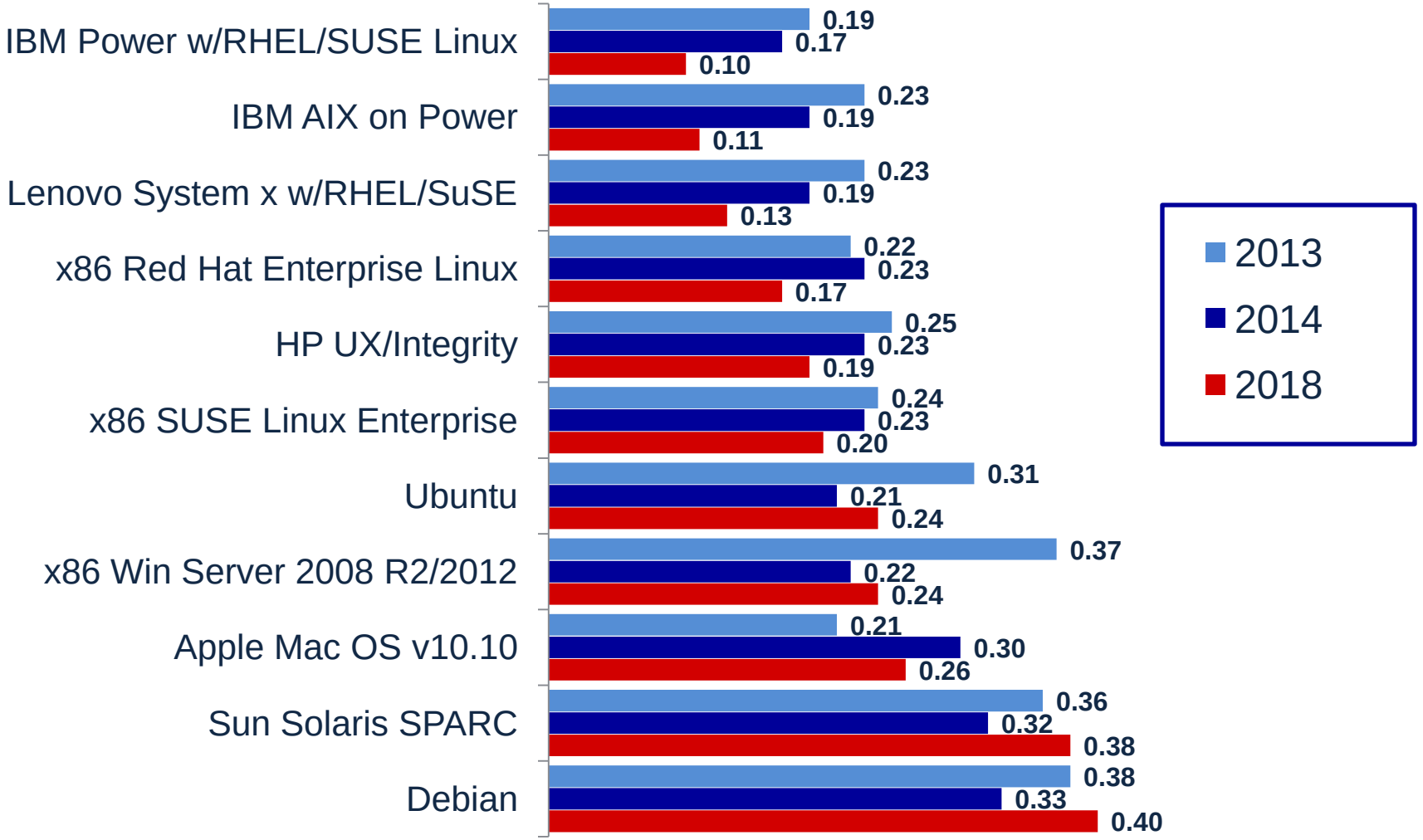


- IBM z Systems mainframe class servers exhibit true fault tolerance experiencing just 0.91 minutes of ***unplanned*** per server, per annum annual *downtime.* This is an improvement over the 1.12 minutes per server/per annum over ITIC's 2016 – 2017 Reliability survey.
- IBM Power Systems and Lenovo System x running Linux have least amount of ***unplanned*** downtime 2.1 and 2.1 minutes per server/per year of any mainstream Linux server platforms, respectively
- 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.
- 84% of IBM Power Systems Linux users experience <10 minutes of ***unplanned*** server downtime annually

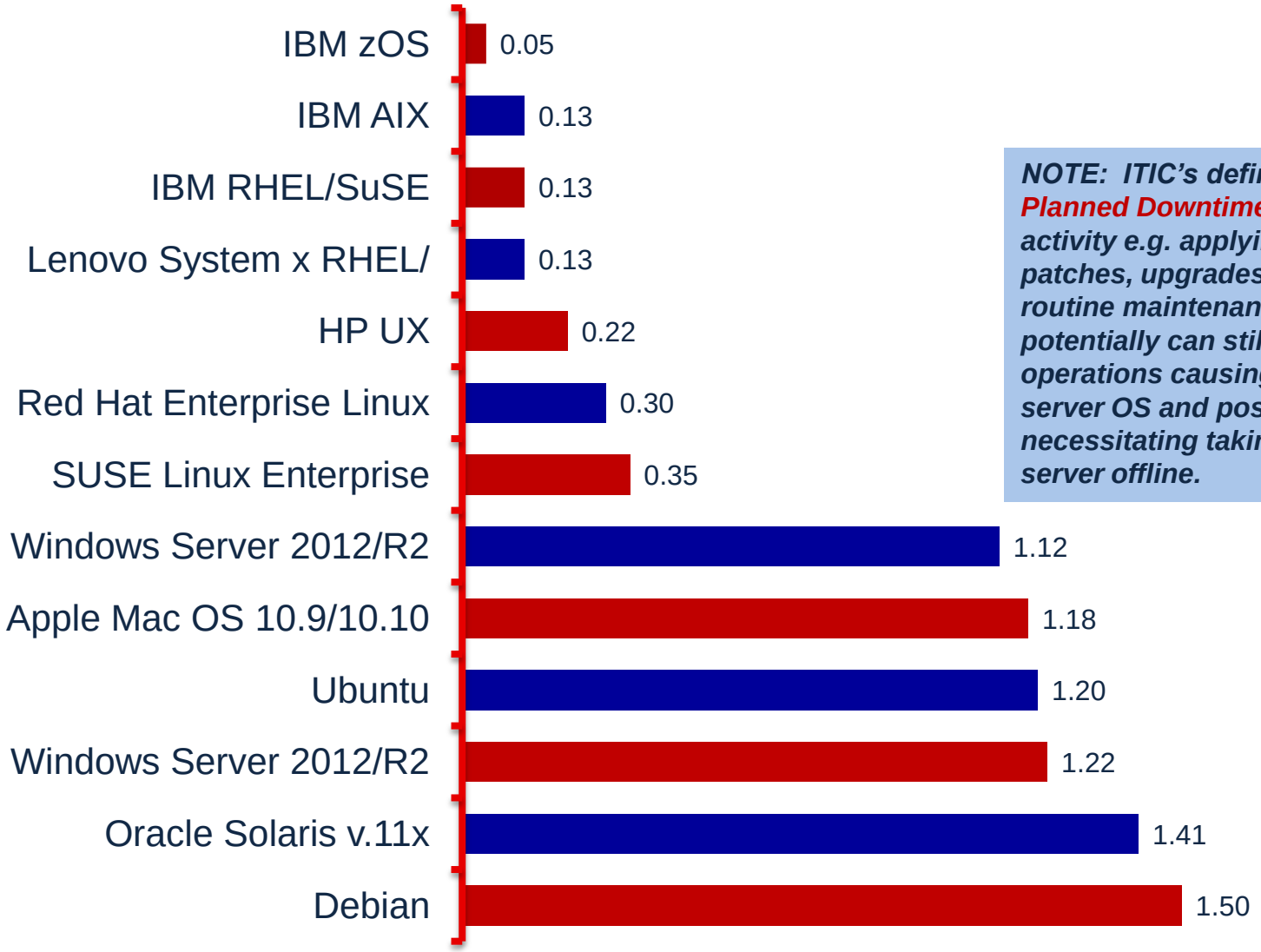
Comparing Corporate Enterprise *Unplanned* Downtime from 2013 through 2017 (Hours per Year)



Comparing Corporate Enterprise *Unplanned* Downtime [15] from 2013 through 2018 (Hours per Year)



Comparing Corporate Enterprise Server OS *Planned* Downtime and System Unavailability 2017 - 2018 (Hours per Month)

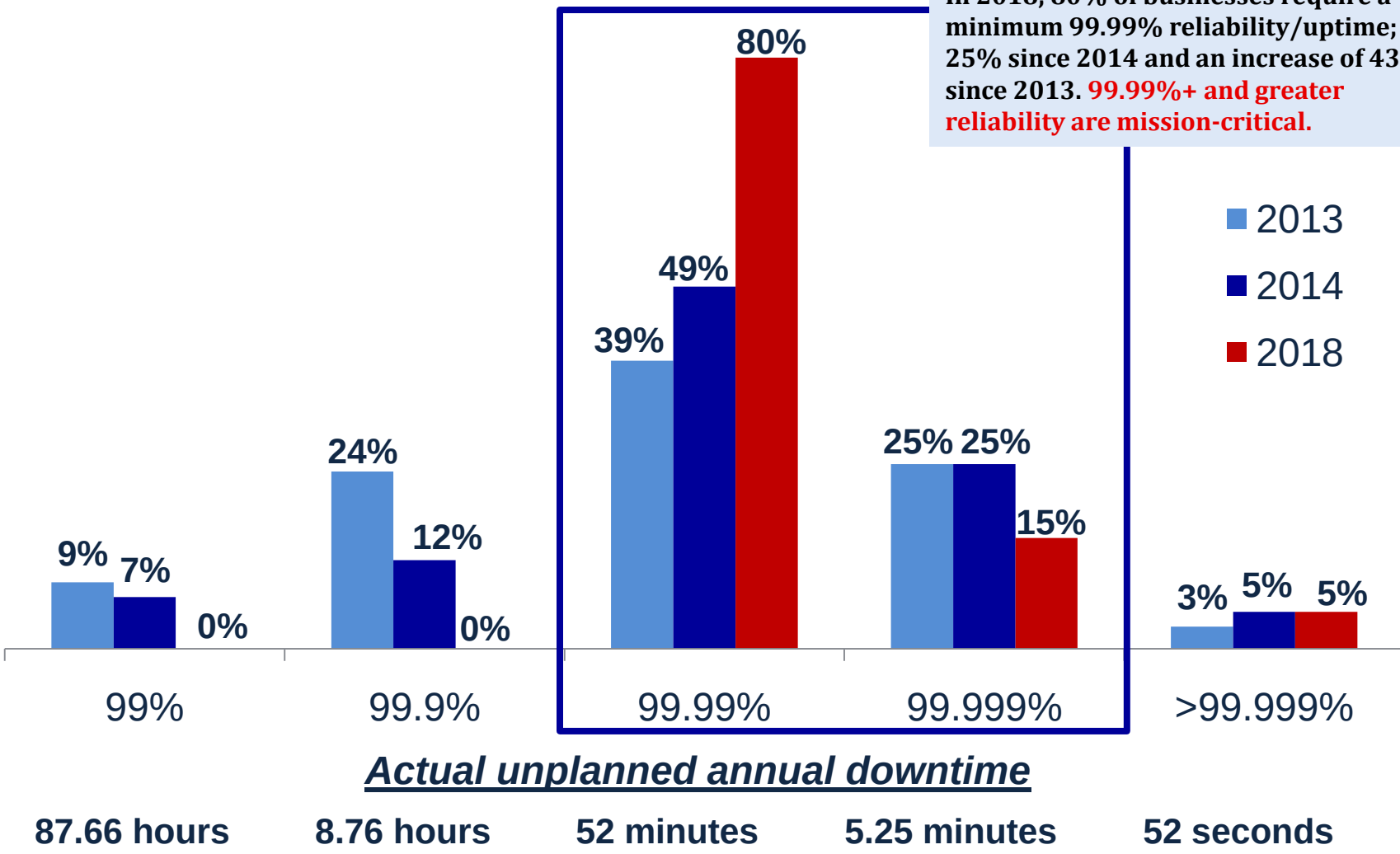


NOTE: ITIC's definition of Planned Downtime is any activity e.g. applying patches, upgrades or routine maintenance. This potentially can still disrupt operations causing in the server OS and possibly necessitating taking the server offline.

Corporate Minimum Reliability Requirements

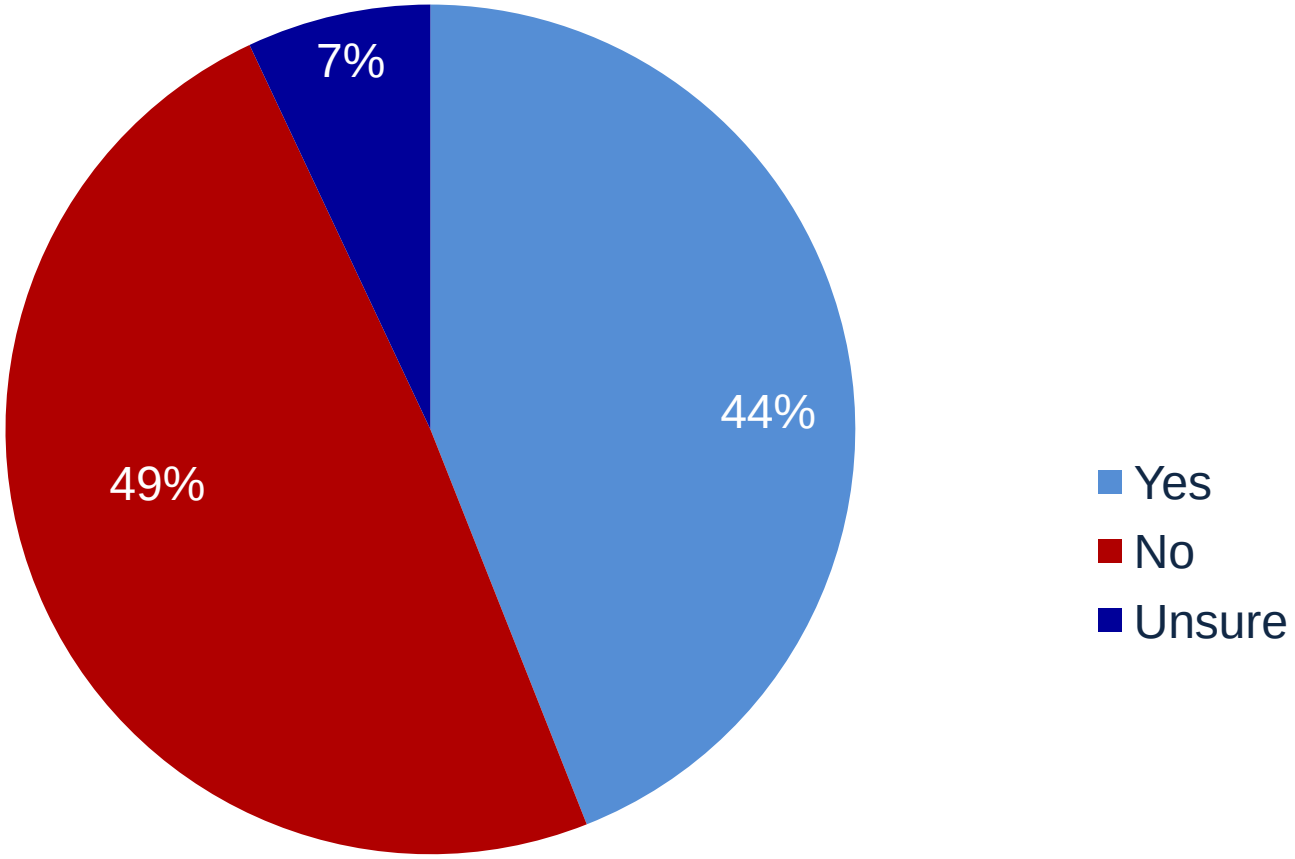
Enterprise Minimum Required Levels of Reliability/Uptime Increase Dramatically from 2013 to 2018

In 2018, 80% of businesses require a minimum 99.99% reliability/uptime; up 25% since 2014 and an increase of 43% since 2013. 99.99%+ and greater reliability are mission-critical.



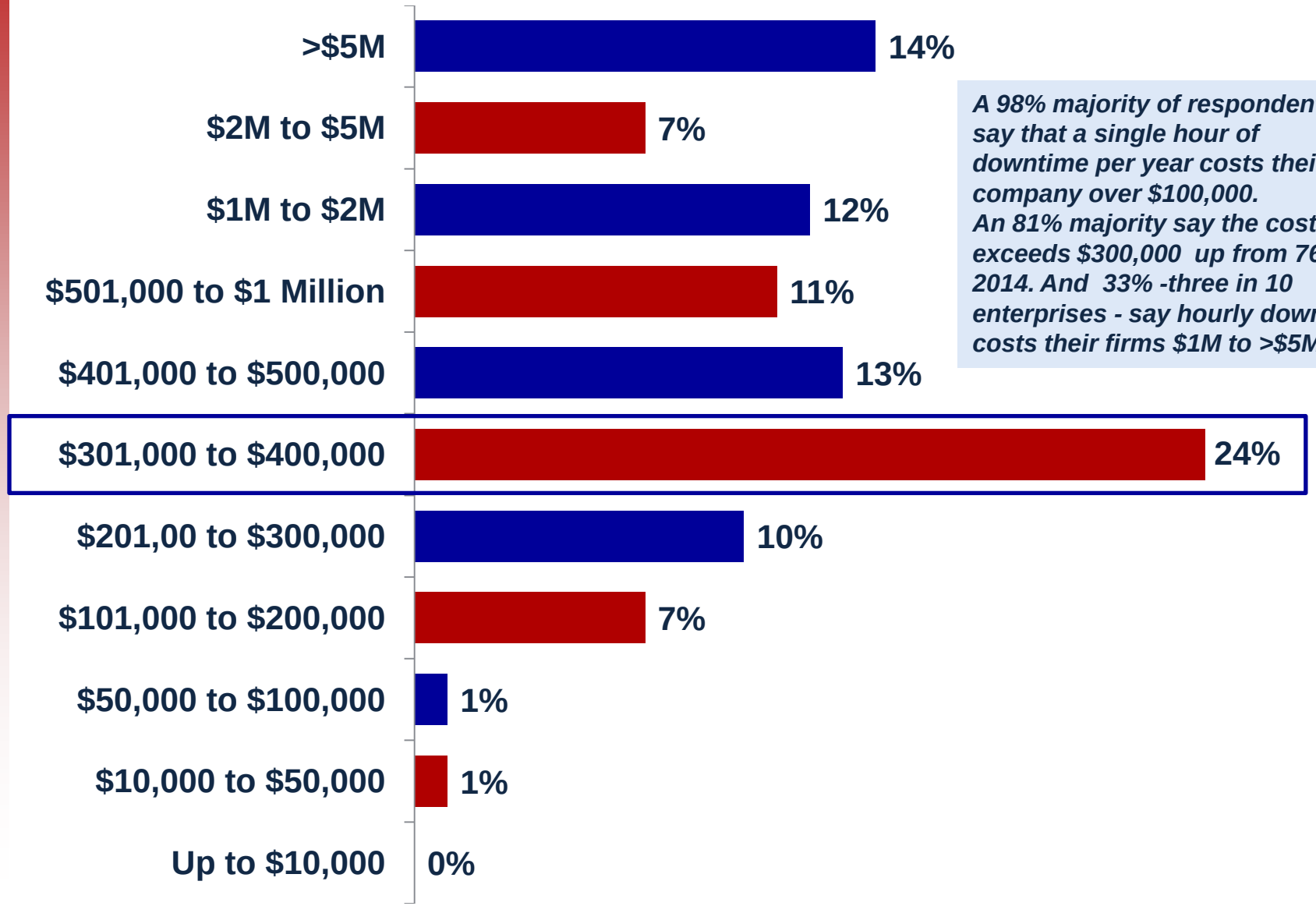
Cost of Hourly Downtime Increases

Has your firm calculated the hourly cost of downtime for its mission critical systems and Line of Business applications?



The percentage of enterprises unable to calculate the hourly cost of downtime consistently outpaces those that can over the last 10 years. Of the 44% that responded "Yes" only half --50% - can make detailed downtime estimates. In actuality, only 22% of organizations, approximately 1 in 5 can accurately assess the hourly cost of downtime & its impact on productivity and the business' bottom line.

Cost of Hourly Downtime for Enterprises in 2017 - 2018



A 98% majority of respondents say that a single hour of downtime per year costs their company over $100,000.
An 81% majority say the cost exceeds $300,000 up from 76% in 2014. And 33% -three in 10 enterprises - say hourly downtime costs their firms $1M to >$5M.

Average Hourly Downtime Costs for Nine Top Verticals

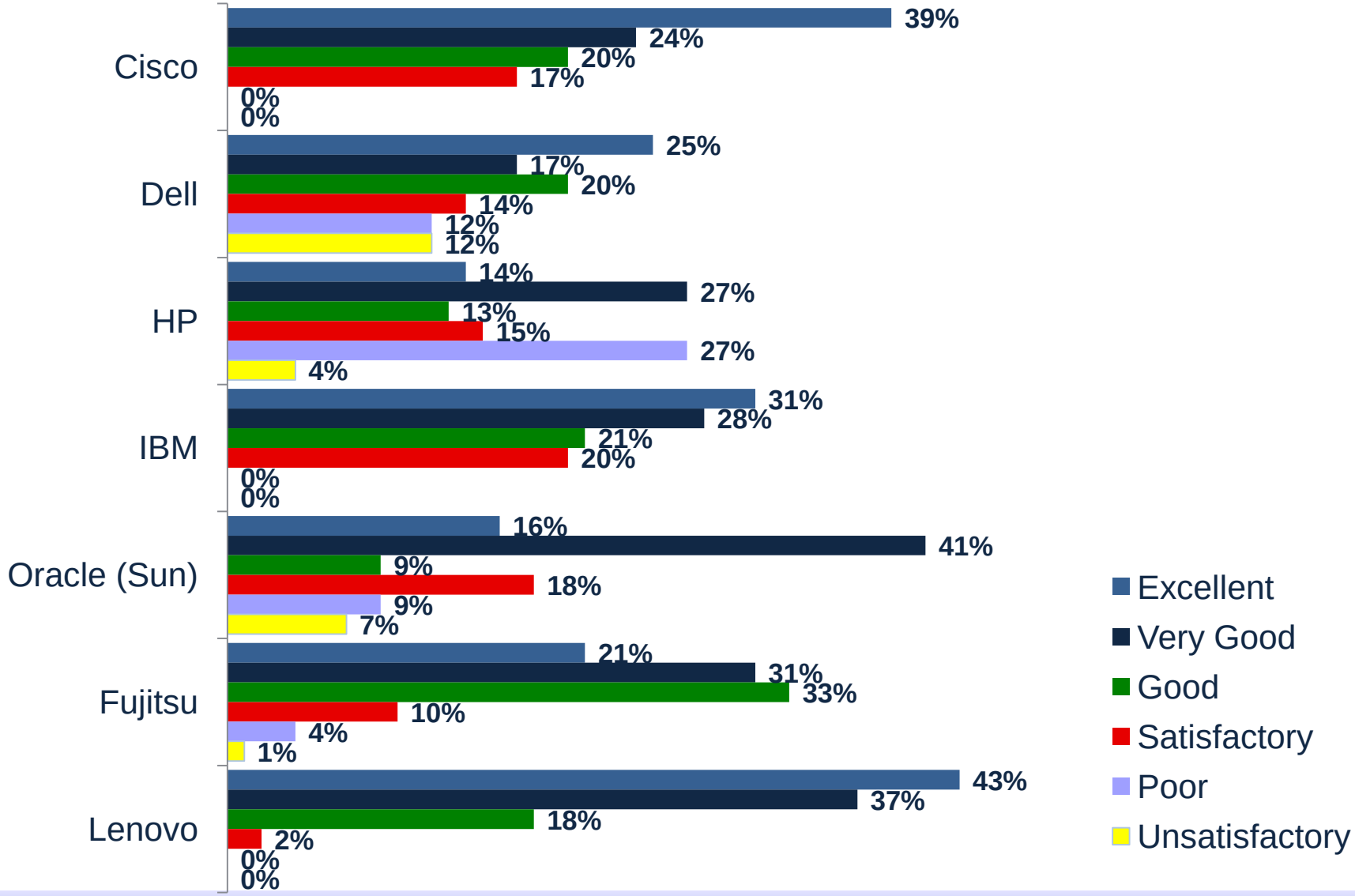
Vertical Market Segment	Average Hourly Downtime Cost
Banking/Finance	$9.3 Million (US Dollars)
Government	$7.8M
Food/Hotel/Hospitality	$7.7M
Healthcare	$6.9M
Manufacturing	$8.5M
Media & Communications	$9.0 M
Retail	$6.6M
Transportation	$7.1 M
Utilities	$6.7M

Minimum Reliability Requirements by Vertical Industry

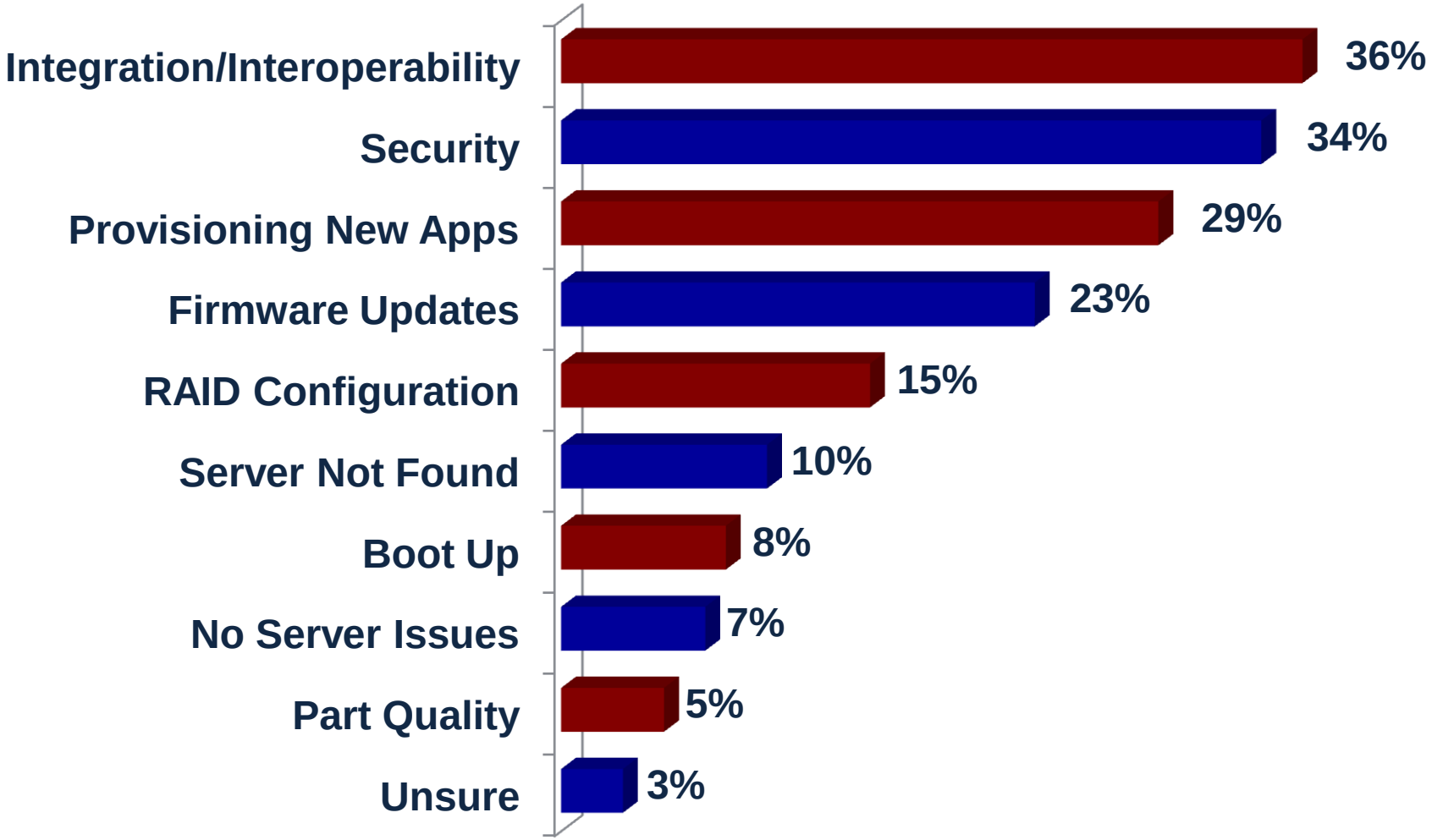
Minimum Reliability	Banking/ Finance	Govt/Education	Food/Hotel	Healthcare	Manufacturing	Media	Retail	Transportation	Utilities
99%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99.9%	0%	0%	0%	0%	0%	0%	0%	0%	0%
99.99%	14%	79%	68%	72%	76%	31%	67%	47%	66%
99.999%	59%	19%	25%	21%	20%	56%	30%	51%	29%
99.999% +	27%	2%	8%	7%	4%	13%	3%	2%	5%

A 79% majority of businesses of all sizes – from SMBs to the largest enterprises – now require a minimum of 99.99% reliability/uptime. This is the equivalent of 52 minutes of ***unplanned per server/per annum downtime,*** or just 4.33 minutes per server every month. The requirements are even more stringent for corporations in the top vertical market segments which are highly regulated and bound by strict compliance laws.

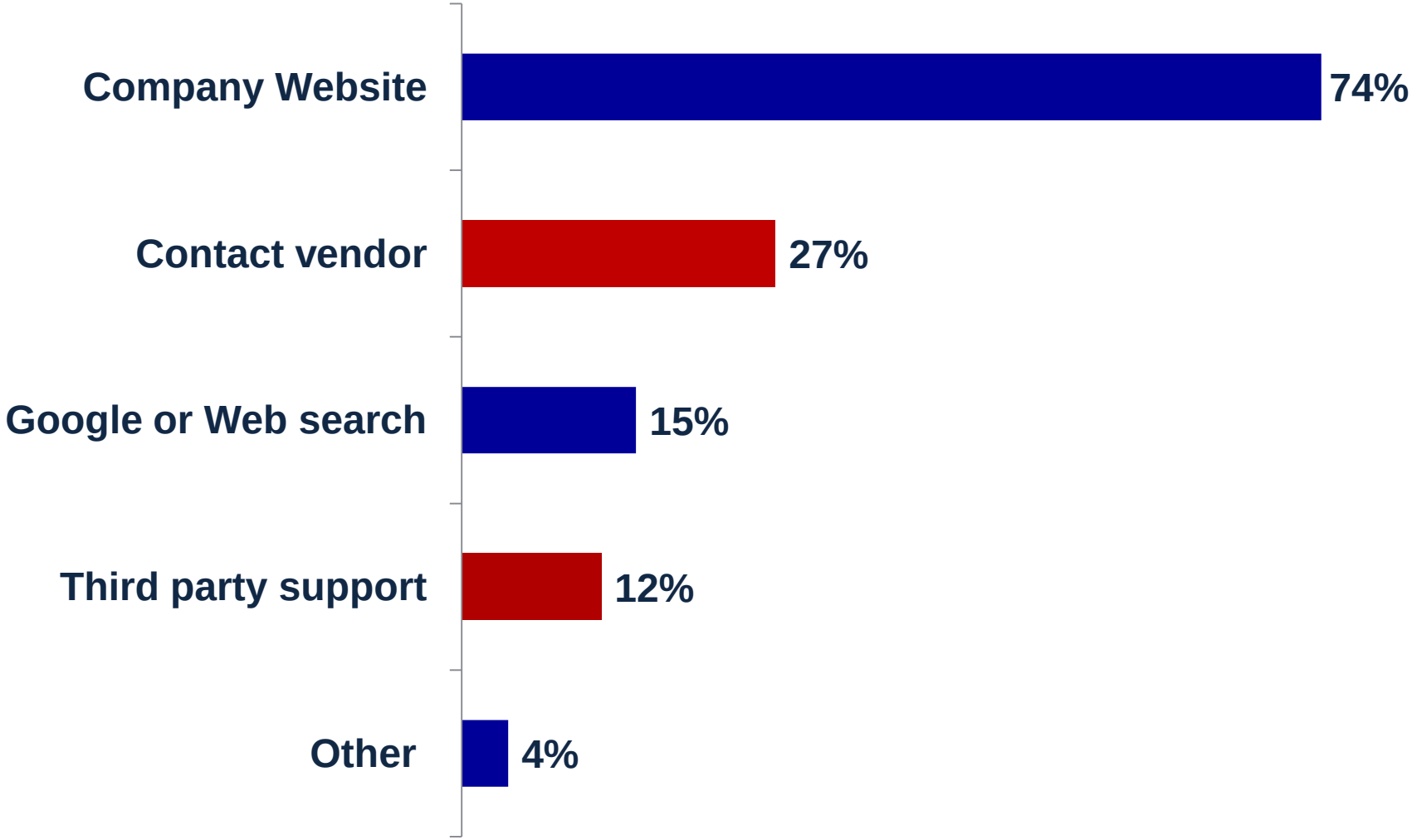
Rate your satisfaction with your server hardware vendor's products, service and support (2017 - 2018)



If Your Firm Experienced Server Setup Issues During the First 90 Days, Please Describe Them (Select ALL that Apply)



How Do You Find Technical Documentation? (Select ALL that Apply)



Questions ?

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