

Maximizing Business Availability with IBM System Recovery Boost



Impact of downtime

In today's digital era, enterprises need mission-critical applications available 24 hours a day, seven days a week. High availability is essential for the growth and reputation of their business. According to Information Technology Intelligence Consulting (ITIC), 85% of corporations require a minimum of 99.99% uptime (52.56 minutes per server/per annum unplanned downtime).¹ IT downtime can result in financial loss and can negatively impact an organization's business operations and revenue opportunity.

Systems outages, whether planned or unplanned, impact business productivity until service is restored to a stable state. In an ITIC survey (Figure 1) 88% of organizations estimated that downtime costs exceed \$300,000/hour.²

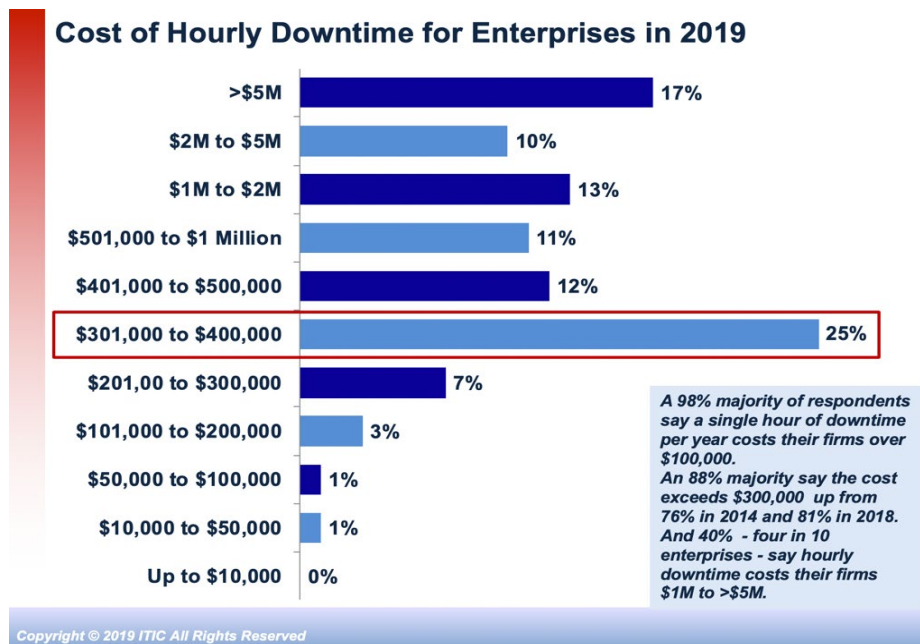


Figure 1: ITIC 2019 Global Server Hardware, Server OS Reliability Survey, September 2019

According to ITIC, only IBM Z[®] has had zero reported unplanned outages for greater than four hours (Figure 2) and has the highest availability ranking of all servers with just 0.74 minutes (less than one minute) of unplanned system outage per year.³

¹ ITIC, <https://en.resources.lenovo.com/analyst-reports/itic-2019-global-server-hardware-server-os-reliability-report>

² ITIC, <https://itic-corp.com>

³ ITIC, <https://itic-corp.com>

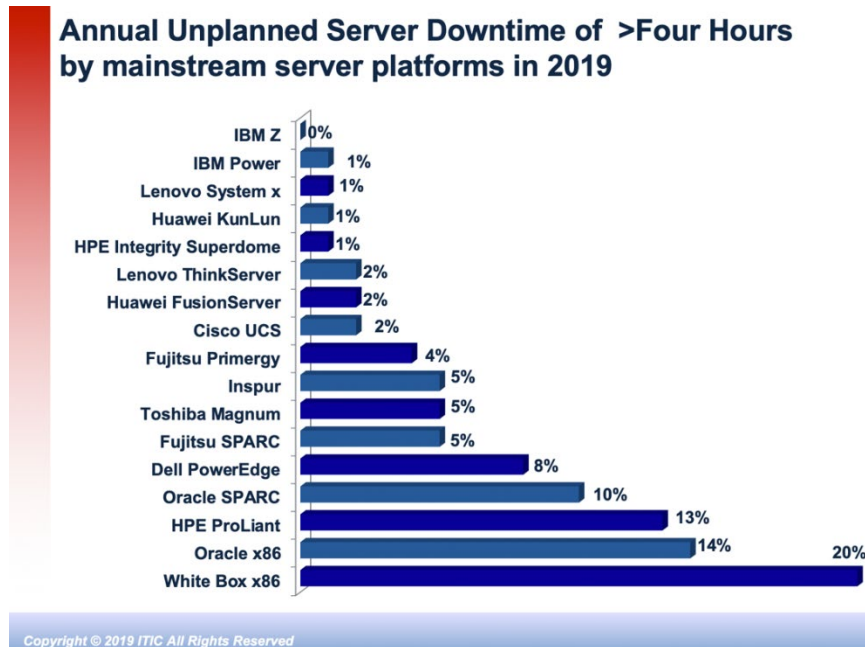


Figure 2: ITIC 2019 Global Server Hardware, Server OS Reliability Survey, September 2019

IBM Z Reliability

IBM Z is designed to be the most reliable computing environment available in the market and IBM z15™ solutions are designed to deliver 99.99999% availability.⁴ z15's commitment to 99.99999% (seven nines) availability (on average, only 3.2 seconds downtime per year) enables enterprises to deliver virtually uninterrupted business commerce.

IBM Z's reputation for almost zero downtime is the result of reliability features designed to deliver 24x7 availability:

- CPU Sparing
- Capacity on Demand (CoD)
- Memory Sparing
- Redundant Array of Independent Memory (RAIM)
- End-to-end scheduling with fault tolerance
- IBM Parallel Sysplex® with base clustering and HA capabilities
- GDPS® with disk replication and HyperSwap®
- IBM System Recovery Boost
- IBM z15 solutions are designed for 99.99999% availability

⁴ IBM z15 solutions are designed to deliver 99.99999% availability. Internal data based on measurements and projections was used in calculating the expected value. The z15 servers must be configured in a parallel sysplex using z/OS 2.3 or above; GDPS management of data and middleware recovery across Metro distance systems and storage, including GDPS Metro Multi-site Workload and GDPS Continuous Availability; and DS888X with IBM HyperSwap. Necessary resiliency technology must be enabled, such as System Managed CF Structure Duplexing, Sysplex failure management and Capacity Provisioning Manager. Other configurations may provide different availability characteristics.

IBM System Recovery Boost

IBM System Recovery Boost, a new capability introduced with z15, helps enterprises reduce the cost of downtime further and achieve service level agreements (SLA) by using unallocated IBM Z Integrated Information Processor (zIIP) capacity for an IBM Z Systems Recovery Boost eligible logical partitions (LPARs) running z/OS during shutdown, restart and return to steady state at little or no additional cost.

IBM System Recovery Boost expedites system shutdown time, system IPL, operating system, subsystems, middleware and application restart, and workload recovery. In an IBM test lab, services were restored significantly faster. With a target SLA of 24 million transactions per hour, IBM System Recovery Boost provides capacity to double the throughput and maintain the SLA during an hour that includes a 30-minute planned outage.⁵ This boost capacity is available for up to 30 minutes for system shutdown and 60 minutes for system initialization.

Minimizing the impact of planned outages

Even for IT environments in which the risk of an unplanned outage is minimized, planned outages are essential for software updates and system configuration changes. For many IBM Z systems Required Service Updates (RSU) are recommended quarterly. During an outage, workload backlog grows during the time the system is unavailable. In order to maintain the organization's SLAs, the system needs to return to its steady state with all backlog processed as soon as possible.

To assess the performance and financial impact of IBM System Recovery Boost for a planned service outage of 30 minutes, a high-volume transaction workload was measured with and without IBM System Recovery Boost. Testing found that the workload was restored in significantly less time and was achieved without additional IBM hardware or software costs with IBM System Recovery Boost enabled. On a z15 z/OS test system executing 24 million transactions per hour, IBM System Recovery Boost provided additional capacity to process a backlog twice as fast at no additional hardware or IBM software costs with an estimated savings of \$6.68 million over 3 years versus buying Capacity on Demand.⁶

This paper examines the capabilities of IBM System Recovery Boost and how organizations can reduce downtime at no charge to achieve greater savings and business productivity.

How does IBM System Recovery Boost work?

Figure 2 illustrates the phases of a planned outage involving system shut down, system reconfiguration and system restart. The orange line represents business impact duration during a system outage without IBM System Recovery Boost while the green line illustrates quicker system shutdown, startup and restoration of normal system processing with extra capacity.

⁵ This claim is based on IBM internal tests. Results may vary. The use case for this test is an enterprise running a transactional workload on z/OS with a service level agreement (SLA) of 24 million CICS transactions per hour. A 30-minute planned outage results in a backlog of 12 million transactions. The system is running z/OS on a z15 and configured to use 3 general processors (GPs) and 1 IBM z Systems Integrated Information Processor (zIIP). During IBM System Recovery Boost, the system uses 3 GPs and 8 zIIPs, including 7 additional zIIPs taken from the zIIP processor pool.

⁶ This claim is based on IBM internal tests. Results may vary. The use case for this test is an enterprise running a transactional workload on z/OS with a service level agreement (SLA) of 24 million CICS transactions per hour. A 30-minute planned outage results in a backlog of 12 million transactions. The system is running z/OS on a z15 and configured to use 3 general processors (GPs) and 1 IBM z Systems Integrated Information Processor (zIIP). During IBM System Recovery Boost, the system uses 3 GPs and 8 zIIPs, including 7 additional zIIPs taken from the zIIP processor pool. Hardware costs are extrapolated based on the list price of Capacity on Demand (CoD), and software costs are based on a typical software acquisition bill of \$500/MIPS. Software costs are taken from IT Economics observations made during customer engagements. These are blended values and do not represent any particular circumstance.

Sequence of System Events for a Planned Outage with and without IBM System Recovery Boost

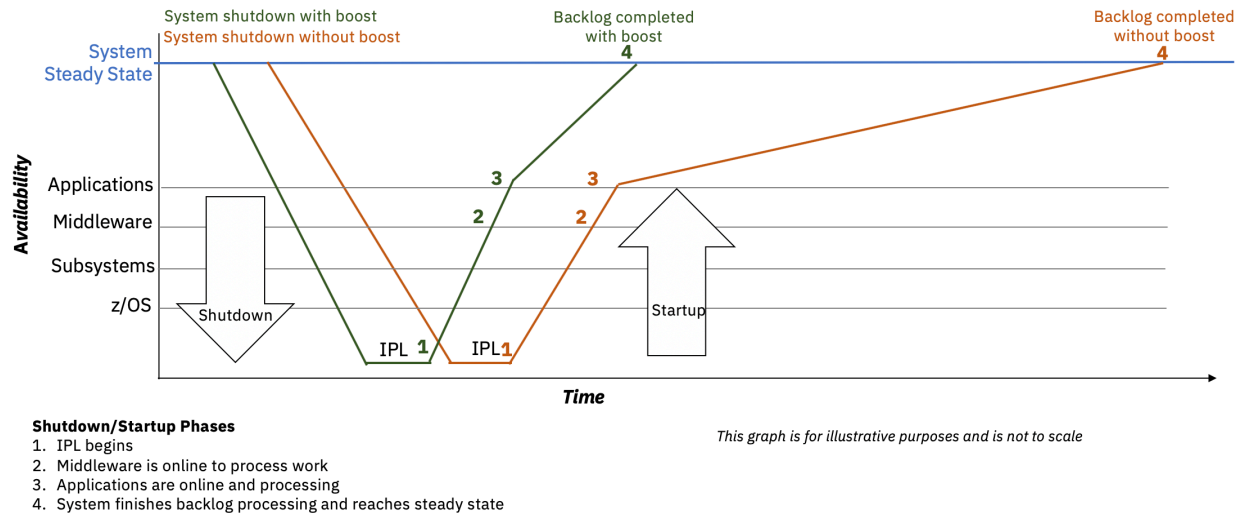


Figure 3: Sequence of system phases for a planned outage with and without IBM System Recovery Boost

IBM System Recovery Boost on z15 for z/OS consists of different types of boosts:

Speed Boost

On sub-capacity machine models, speed boost temporarily increases the processor speed to its full capacity. IBM System Recovery Boost provides the general processor (GP) temporary capacity and thread speed boost for boosting images (LPARs) only.

zIIP Boost

zIIP boost removes any restrictions on the types of work zIIPs can process. zIIP boost enables additional compute power to process workloads not normally processed by zIIPs. If existing resources are not sufficient in the inventory, a subscription for the IBM Z System Recovery Upgrade Offering can be purchased so that additional zIIPs can be activated and utilized.

GDPS Performance

IBM System Recovery Boost enhances GDPS driven hardware and software configuration activities for disaster recovery and site switching by expediting recovery orchestration activities.

Reduced Recovery Time

In order to examine the savings of IBM System Recovery Boost on z15, system shutdown/restarts were compared, with and without IBM System Recovery Boost enabled, using a target SLA of 24 million transactions per hour.

For the shutdown/restart tests, a CICS workload was measured that consumed 4,074 MIPS in its steady state using 3 GPs and 1 zIIP capped at 74% usage. With an assumed outage of 30 minutes, a backlog of 12 million transactions would be generated, requiring the system to process 24 million transactions in just thirty minutes to maintain the SLA target for that hour. Test results showed that an additional 6,822 MIPS of capacity would be required to process the backlog of work.

Without IBM System Recovery Boost, capacity remained capped with 3 GPs and 1 zIIP at 74% usage and processed the 24 million transactions in 55 minutes, exceeding the SLA time frame (see the NoBoost TPS test in Figure 4).

With IBM System Recovery Boost enabled, CICS was able to process its normal workload of 24 million transactions in 25 minutes by leveraging an additional 7 IIPs for the boost period and temporarily removing the cap on the permanently assigned zIIP (see the Boost TPS test in Figure 4).

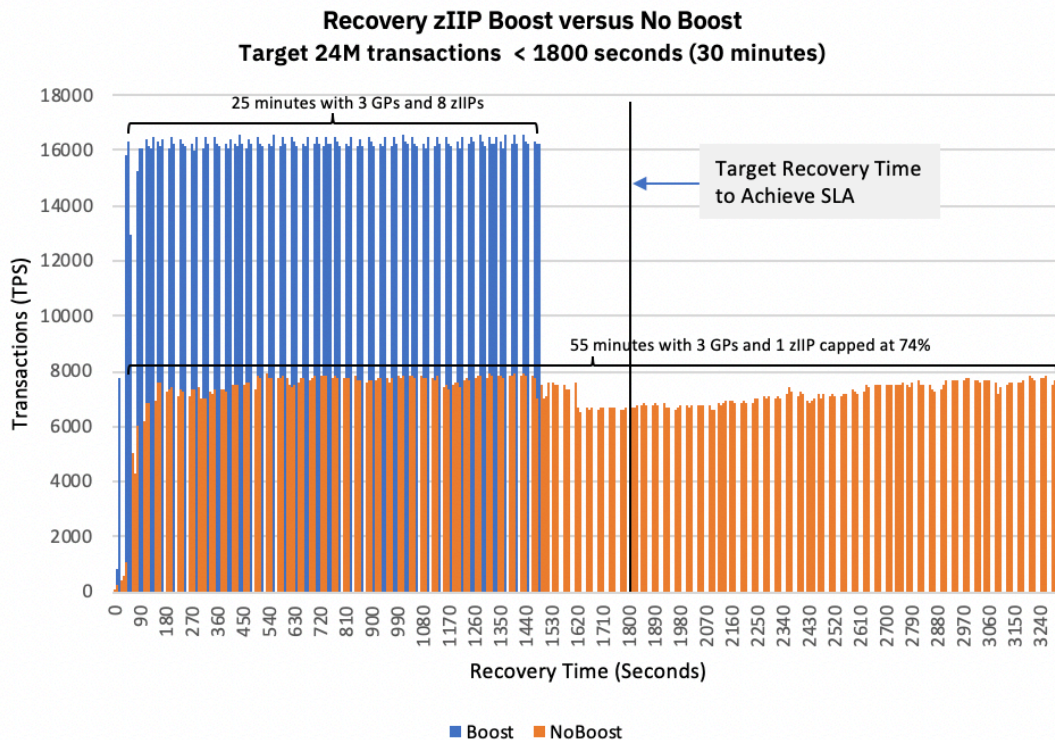


Figure 4: Time to process targeted SLA transactions during a planned outage with and without IBM System Recovery Boost

Reduced Capacity Cost

Use of temporary capacity avoids significant incremental hardware activation and associated software licensing costs that would otherwise be incurred to achieve the SLA target without IBM System Recovery Boost during a service outage. Using the MIPS numbers from the shutdown/restart tests, the cost of incremental capacity was calculated for a system without IBM System Recovery Boost.

Incremental hardware licensed for 6,822 MIPS of CoD at approximately \$40/MIPS (1/30th list price) would cost \$273K for one CoD activation and would cost \$1.09M per year for quarterly activations.

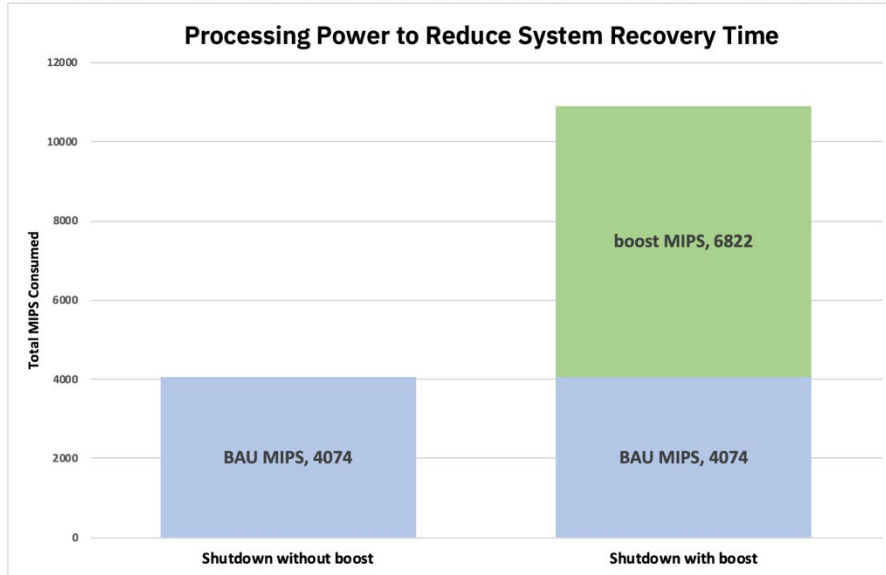


Figure 5: Processing Power (MIPS) for SLA shutdown/restart tests with and without IBM System Recovery Boost

Incremental software entitlements for a market basket⁷ of software products priced at \$500/MIPS would total a one-time cost of \$3.41M.

In Figure 6 the tested workload with a 4,074 MIPS environment without IBM System Recovery Boost would have cost \$6.68M over three years.

Additional Capacity Costs to Achieve SLA in Test Scenario

Workload shutdown and startup costs calculated for quarterly service outages over three years

Additional Capacity/Licensing for	Shutdown/Startup without IBM System Recovery Boost	Shutdown/Startup with IBM System Recovery Boost
6,822 MIPS of COD for 12 activations over 3 years	\$3,274,560	\$0
SW entitlements (one-time charge)	\$3,411,000	\$0
Total Cost	\$6,685,560	\$0

Figure 6: Summary of additional capacity costs for SLA shutdown/restart tests with and without IBM System Recovery Boost

For those systems requiring additional capacity during IBM System Recovery Boost, a subscription for the IBM Z System Recovery Upgrade Offering can be purchased for a \$150K per year so that additional zIIPs can be activated and utilized.

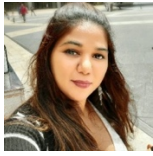
⁷ Market basket products include z/OS, Db2, CICS, COBOL, Db2 QMF and WAS MQ.

Maximizing system availability for business

IBM System Recovery Boost enables organizations to maximize business availability by providing temporary capacity boosts to expedite recovery processing at little or no additional cost. With IBM System Recovery Boost on z15 enterprises can perform planned service outages quickly, efficiently and inexpensively while focusing on their business needs.

If your organization is interested in knowing more about IBM System Recovery Boost and the benefits of z15, contact IT.Economics@us.ibm.com.

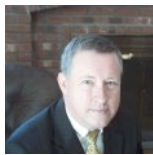
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Husnal Walia is an IBM Technical Support Specialist for the IBM IT Economics Consulting and Research team. She has more than 13 years of experience in finance and IT projects. Before joining IBM, she has worked with multi-national organizations across the globe. She has an under-grad degree in Bachelor of Commerce in Finance and Accounting and a grad degree in Master of Science in Information Systems with Web and Application Development. She also volunteers with non-profit organizations for society advancement.



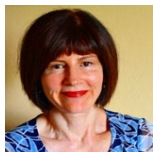
Vaughn Burton has worked at IBM for over 20 years in various capacities. His assignments include the Washington System Center, where he designed and taught numerous hands on technical workshops in the Linux on System Z, and z/VM areas. He has experience in working and testing z/OS systems and IBM middleware such as CICS, Db2, and WebSphere. Currently, he is working in the Competitive Projects Office doing research on IBM products and services and examining their competitive position in the marketplace.



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