



## **Flexibility & Security for SAP HANA** **Why Infrastructure Matters**

**Brett Murphy**

A blue-tinted photograph of a city skyline at night, featuring several illuminated skyscrapers and a prominent tower with a glowing spherical top. The scene is viewed from a distance across a parking lot with some cars.

**July**  
**28**  
**2023**

## Trusted Advisor

**Brett Murphy**  
Client Executive



[brett.murphy@cleartechnologies.net](mailto:brett.murphy@cleartechnologies.net)  
317-496-7591





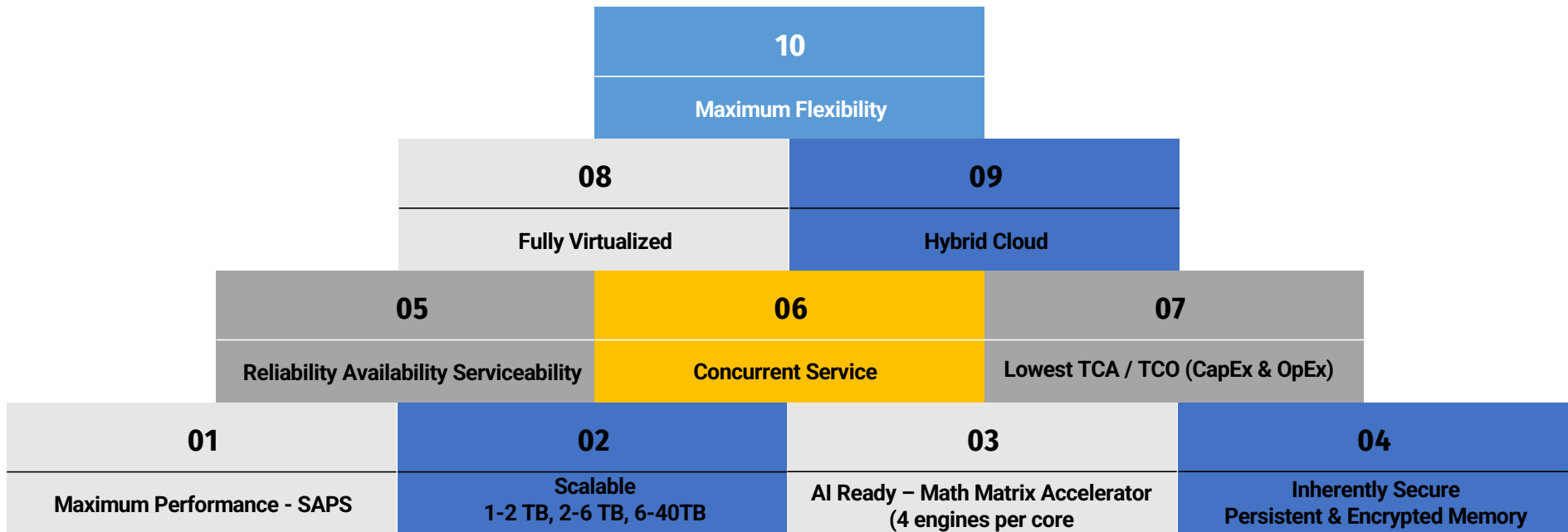
<https://www.cleartechnologies.net/sap/>

Passionate evangelist for Enterprise Compute, Storage & Software technologies. Recognized specialist in software cost reduction and competitive selling. Focus over the past 12 years has been on Architecture & Solution Design for clients running large, complex ERP environments.

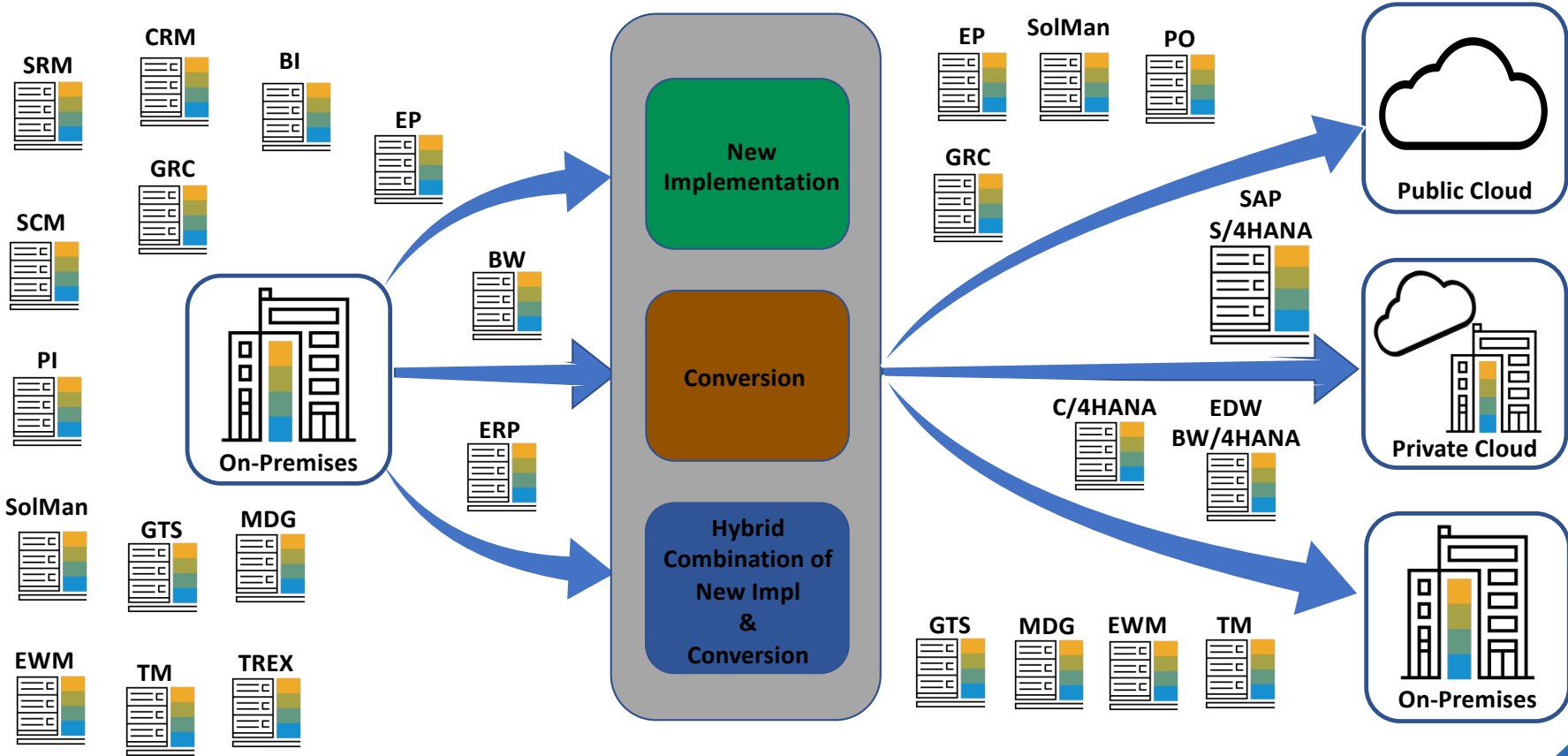
<https://www.linkedin.com/in/murphy-brett/>



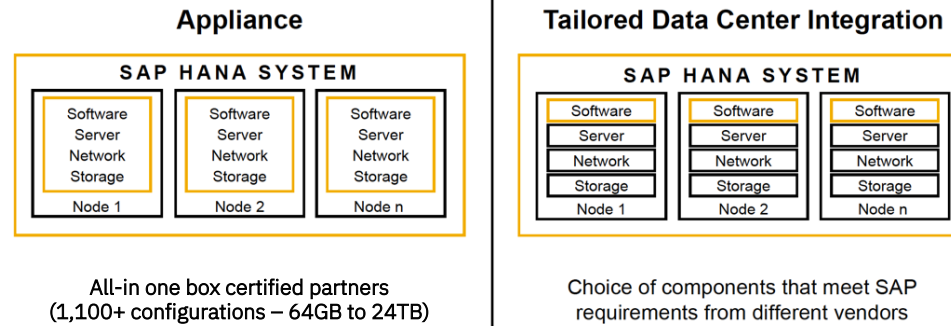
# What is a Desirable End State



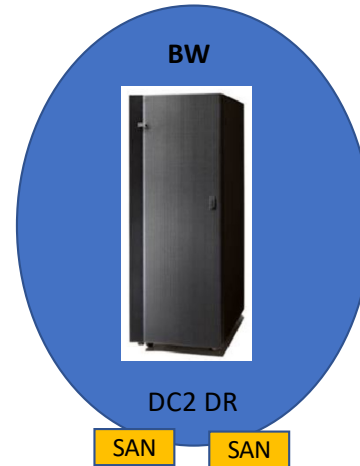
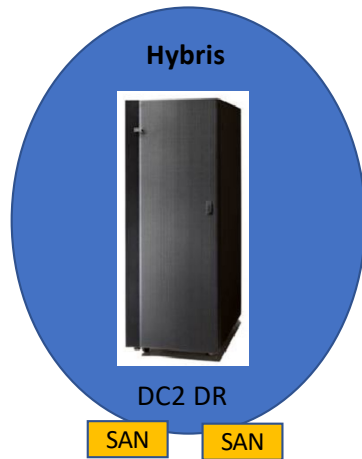
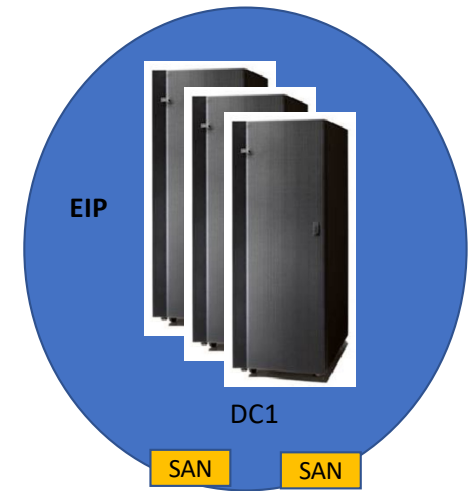
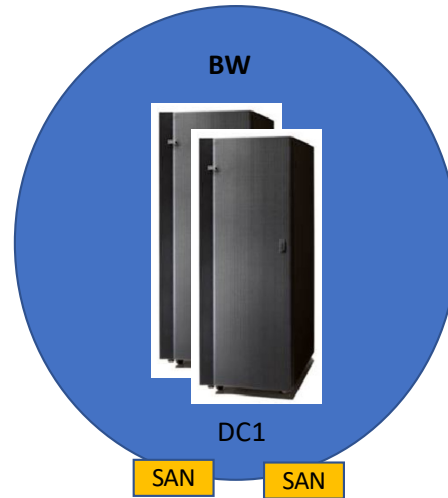
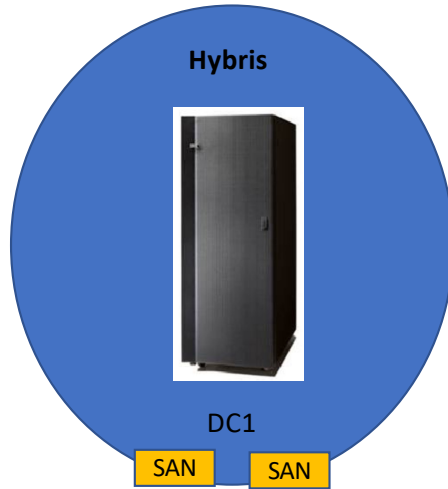
# SAP Big Picture



## Two deployment options to choose from



Previous Compute Islands

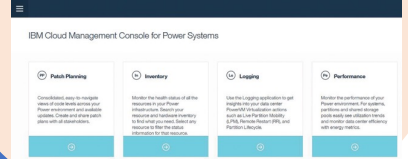


# HANA Private Cloud

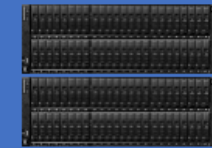
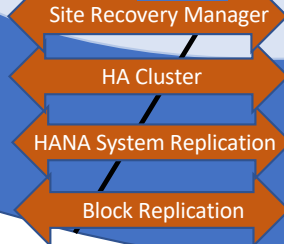
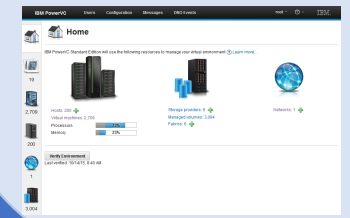
DC1

DC2

## Cloud Management Console



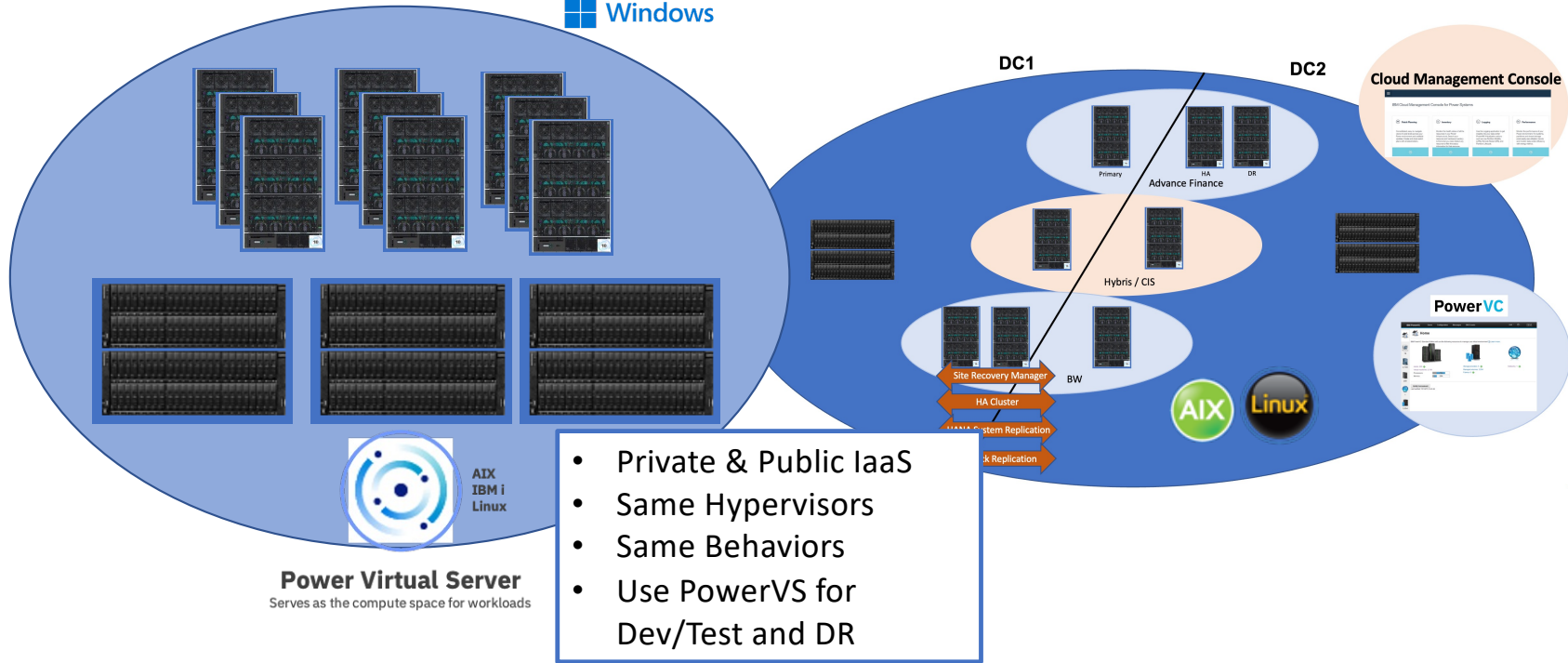
## PowerVC



- Cap-Ex & Op-Ex
- 100% virtualized
- Default PMEM & Encrypted Memory
- 99.999+%
- Highly Redundant & Resilient
- Easy Button role-swap & DR Rehearsals



# Hybrid Cloud Flexibility





## What's Different

Reliability – Enhanced availability through redundancy and enterprise memory

Scalability – Support up to 40TB memory in a single instance

Flexibility – Adjust sizing on the fly with no downtime

Performance – World record benchmarks and 2X+ > SAPS & memory bandwidth

Virtualization – Always on and fully supported on Power with no performance impact

Security – Built-in Security extends to Storage

## What's The Same

SAP Itself – SAP Code does not change across platforms

Operating System – RedHat or SUSE

Management Tools – Chef, Ansible, OpenStack, and more!

Application / Database Skills



# IBM Power

Visit us: <https://www.ibm.com/it-infrastructure/power>

Watch ["The Legacy and Future of IBM POWER with IBM POWER10"](#)

## SAP HANA EXCELLENCE



Best SAP Performance

# 2.7x

Per core performance of 8-socket E1080 two-tier SAP SD benchmark compared to best x86 8-socket HPE Superdome Flex



Largest Customers

# 45

of America's top 50 largest revenue generating companies are active Power customers



Most Reliable

# >= 99.9999%

Availability rating in ITIC survey of 1,200 corporations across 28 vertical markets



SAP on Power

# 40TB

Largest certified Memory instance



SAP on Power

# > 4,500

SAP HANA on Power customers



Highly Secure

# < 0.013%

Security vulnerabilities in PowerVM hypervisor compared to VMware



SAP on Power

# 16 LPARs

Highest # of production virtual partitions



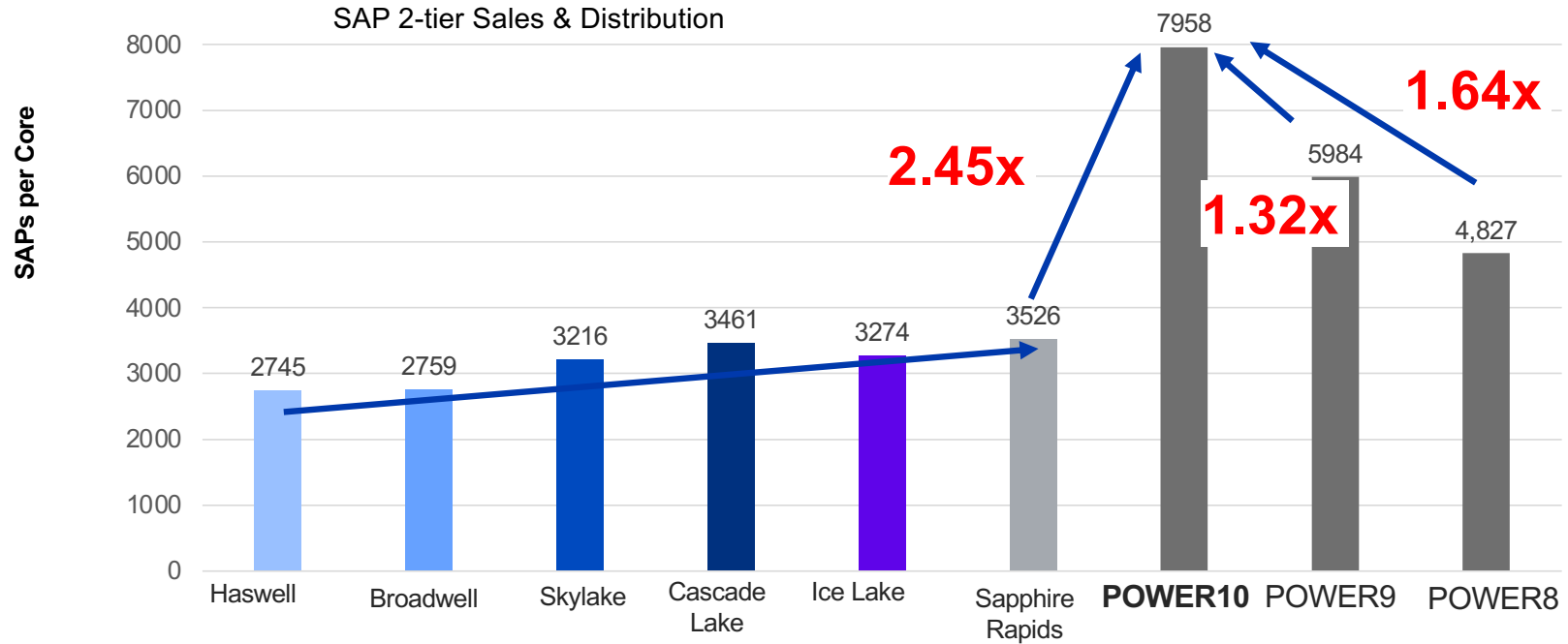
SAP on Power

# > 70

SAP HANA on Power Public References

## SAP SD Benchmarks

Power Systems continuously improves per core performance



- **World record 8-socket performance**
- **More performance per core**
  - **4X vs 16-socket Intel<sup>1</sup>**
  - **2.7X vs 8-socket Intel<sup>2</sup>**

Source: <https://www.sap.com/dmc/exp/2018-benchmark-directory/#/sd>

1. Google Cloud Platform; two-tier SAP SD standard application benchmark running SAP ERP 6.0 EHP5 (cloud); Intel Xeon Platinum 8280L 2.7 GHz, 16p/448c/896t, 157,000 SD benchmark users (892,270 SAPS), running Windows Server 2019 and Microsoft SQL Server 2017, Certification # 2021008.
2. HPE Superdome Flex; two-tier SAP SD standard application benchmark running SAP ERP 6.0 EHP5; Intel Xeon Platinum 8380H 2.9 GHz, 8p/224c/448t, 122,300 SD benchmark users (670,830 SAPS), Windows Server 2016 and Microsoft SQL Server 2012, Certification # 2021006.

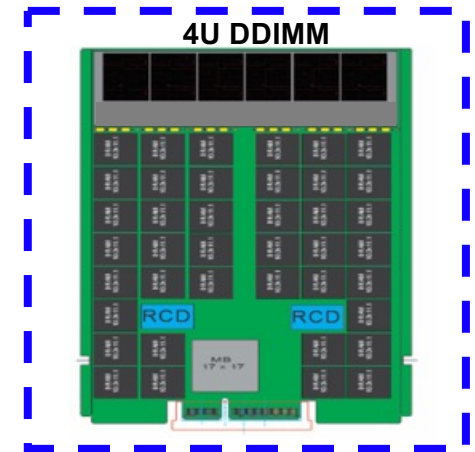
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## IBM Power Memory Performance

With SAP HANA being an in-memory database, system memory is crucially important in keeping your SAP application running 24x7

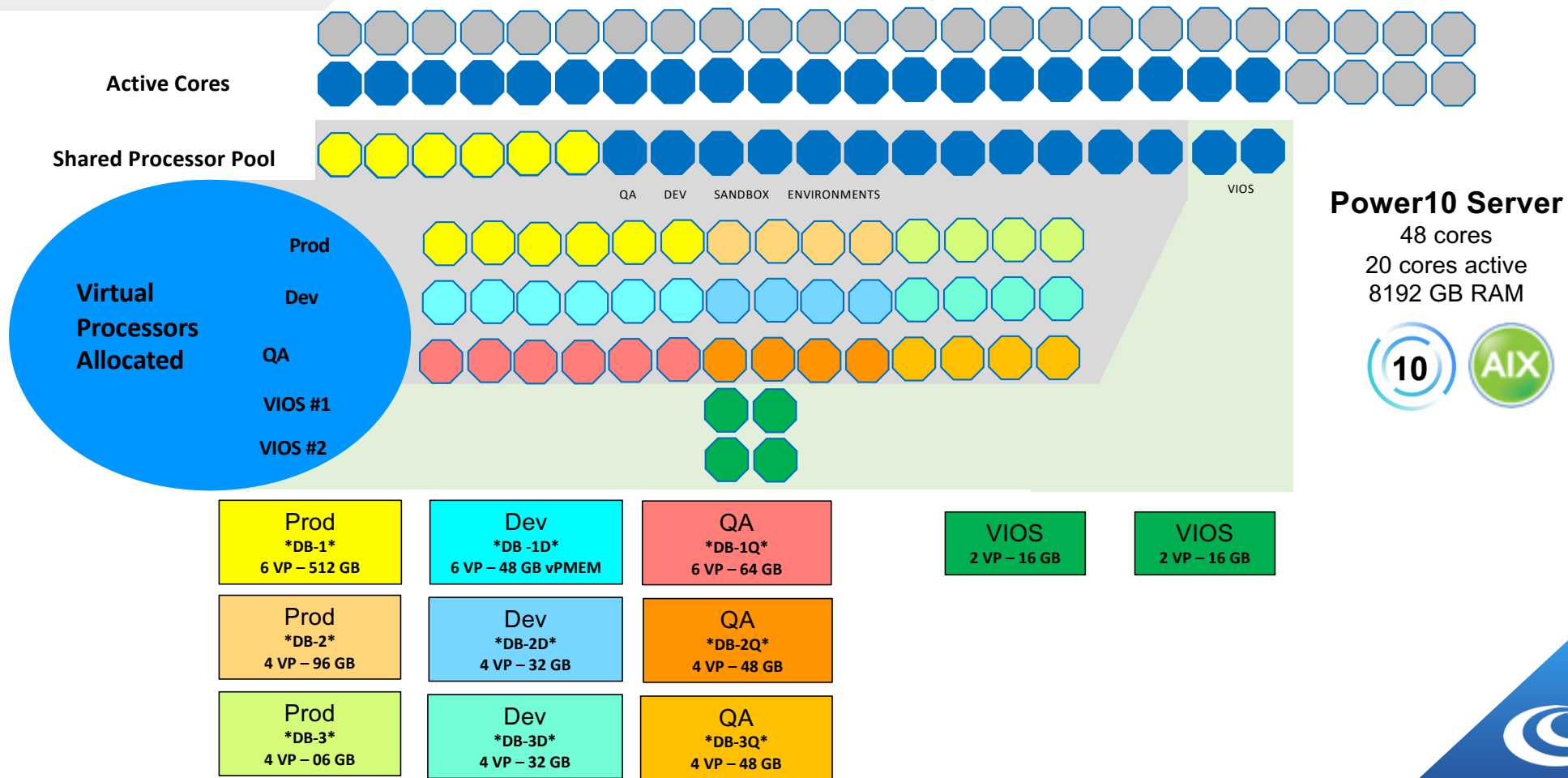
*Providing higher bandwidth and flexibility for future memory technologies*  
**Full memory encryption for added security**



- 2X better memory RAS than industry standard DIMMs<sup>1</sup>
- 2.4X higher memory bandwidth than scalable x86 processors
- DDR4 running at up to 3200 Mbps data rate provides 409 GB/s peak memory bandwidth per socket
- Transparent memory encryption with no additional management setup and no performance impact
- Chipkill technology with advanced ECC protects from memory chip failure - plus spare
- Active Memory Mirroring (AMM) feature supported - Mirrors hypervisor memory to provide resiliency from uncorrectable memory errors



# IBM Power Flexibility



## Infrastructure Granularity

LPAR	LPAR Details	Memory in GB	Cores
1	HANA OLAP L	22,528	78
2	HANA OLAP S	14,336	40
3	HANA OLAP S	1,200	5.0
4	HANA OLAP M	1,440	8.0
5	HANA OLTP1 High Priority	12,288	36
6	HANA OLTP2 Low Priority	960	4.0
7	App-Server 1	320	8.0
8	App-Server 2	320	8.0
9	App-Server 3	320	8.0
10	App-Server 4	320	8.0
11	test1	128	2.0
12	test2	512	2.0
13	test3	256	4.0
14	test4	128	4.0
15	demo	256	5.0
	<b>Total Resources Required</b>	<b>55,042</b>	<b>220</b>

*Acts the same ...  
Behaves the same ...  
On-Premises &  
Hybrid Cloud!*



## Memory Flexibility

Memory

Displays properties of the running logical partition that is using dedicated or shared memory. You can assign the required amount of dedicated or shared memory to the logical partition. [Learn More](#) →

Memory Mode: Dedicated

Installed Memory

Total : 48.0 GB  
Available : 3.25 GB

Memory Allocation

Maximum(GB) 12  
Allocated(GB) 11  
Minimum(GB)

Options

You can use the Force option to change the processor and memory value, or the physical I/O configuration for an AIX, Linux, or VIOS partition that are in running state and that does not have an RMC connection to the management console. Before saving the configuration, you must save the configuration and not a description for the current operation.

## SAP HANA now supports changing the memory size without restarting SAP HANA

DLPAR Memory **add** and **remove** on the HMC allows you to change the **memory** allocated to an LPAR **dynamically** in the range of Min and Max as defined in the LPAR profile without restarting the LPAR

See SAP Note [3114051](#) for more details

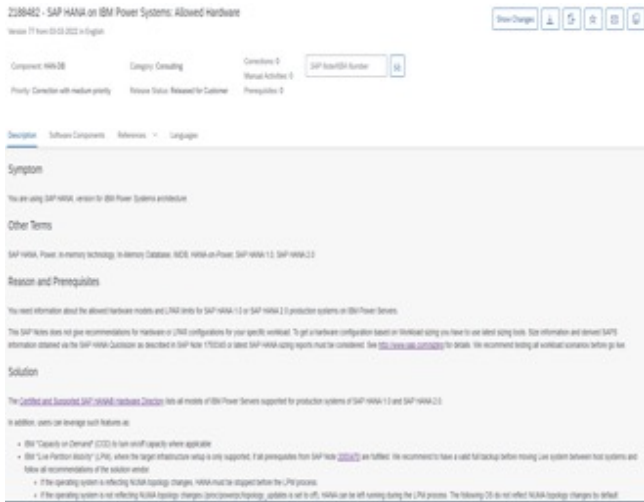
IBM "Dynamic LPAR" (DLPAR) operation to add memory to or remove memory from a running LPAR on POWER9

- LPARs must use HANA 2.0 SPS05 revision 52 (or newer) and SLES 15 SP2 or RHEL 8.3
- Use a DLPAR operation to adjust memory if you immediately need more memory to fulfill a critical business task, and shutting down the SAP HANA system is not possible.

- When adding or removing memory permanently to or from an LPAR it is required to verify the sizing of the target configuration to ensure it still satisfies the workload requirements for that LPAR. If the new configuration does not satisfy the workload demand, then corrective actions need to be taken.



## IBM Power HANA Support



The screenshot shows the 'SAP HANA on IBM Power Systems Allowed Hardware' page. It includes a search bar for 'SAP Instance Number', a 'Show/Change' button, and a list of supported hardware models. The page is organized into sections: Symptom, Other Terms, Reason and Prerequisites, and Solution. The Solution section lists supported models and provides additional information about hardware requirements and backup procedures.

**BW on HANA and BW/4HANA (OLAP Workloads):**  
**ScaleUp: 40 TB**

**ScaleOut: 16 x 32 TB = 512 TB**

**Suite on HANA and S/4HANA (OLTP & Mixed Workloads):**  
**ScaleUp: 32 TB**

**ScaleOut (S/4HANA only): Min. 2 x 6 TB up to 4 x 32 TB = 128 TB**



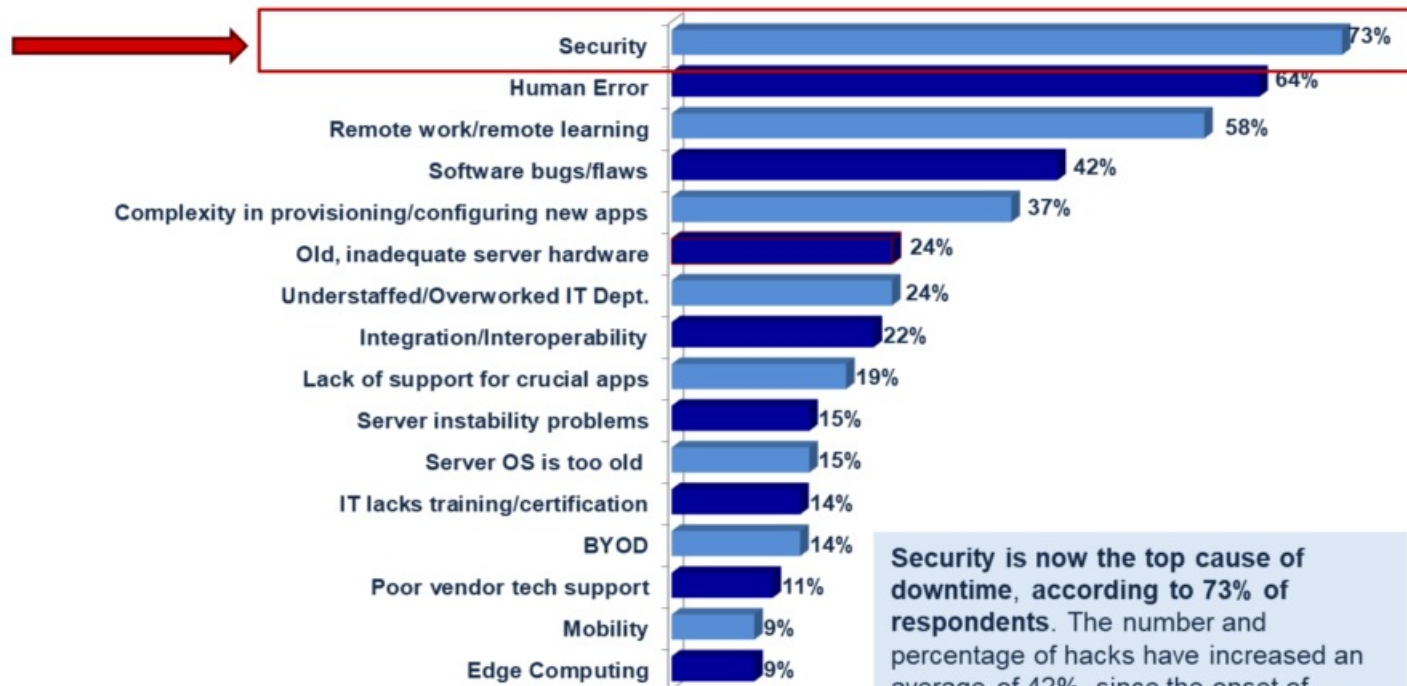
### 10 IBM Power models supported with production HANA

- E1080
  - Up to 240 cores, 40 TB OLAP & 32 TB OLTP
  - Up to 16 production LPARs
- E1050:
  - Up to 96 cores, 16 TB
  - Up to 8 production LPARs
- L/S1022, L/S1024:
  - Up to 48 cores – 8 TB
  - Up to 4 production LPARs





## What Issues Most Negatively Impact Reliability & Cause Downtime for Server hardware, Server OS in 2022? (Select all that apply)



# Be Ready for ANYTHING

## IBM CYBER SECURITY

Predict attacks

Cyber attack prevention

Respond to Cyber Attacks

Integrated  
Simplified  
Automated

On Prem

Public Cloud

## IBM CYBER RESILIENCE

Business Recovery

Immutable Data

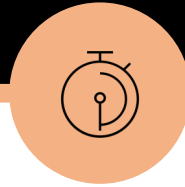
Accelerated Discovery

## Why Act Now?



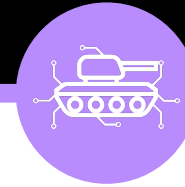
### CYBER ATTACKS

Ransomware attacks  
increased 95% in 2021



### RANSOMWARE

"time to ransom"  
dropping to a matter of  
hours

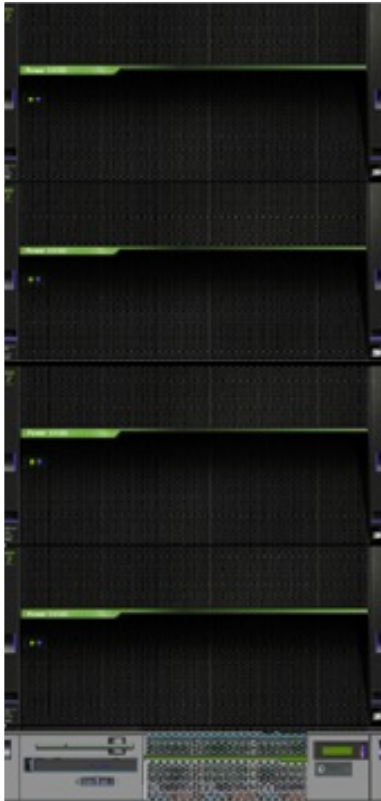


### CYBER WARFARE

Complete data wipe  
(production & backups)  
No ability to recover

**INCREASING THREATS**

## IBM Power Security



- ✓ Enhanced end-to-end security, co-optimized with PowerVM
- ✓ Built-in security features at all layers in the stack (i.e., processor, memory, systems, firmware, OS, and hypervisor).
- ✓ Default & no-cost transparent encryption on all Power10 systems
- ✓ PowerSC – Compliance & Drift Analysis, FIM, EDR, MFA, Patch Management, Trusted Boot/Firewall/Logging
- ✓ Cybersecurity (Transparent memory encryption, 4x crypto engines (in-core & on-chip), ready for quantum-safe cryptography)
- ✓ 100X fewer security vulnerabilities than VMware

Protect data from  
core to cloud

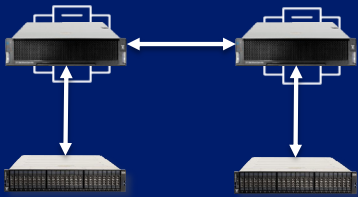
- On-chip & in-core crypto engines
- Support for Quantum safe cryptography and Fully Homomorphic Encryption
- AES/SHA/SHA2/SHA3 cryptography, on-chip NX (Nest Accelerator) unit
- Advanced protection for ROP attacks



Data Resilience



**Enhanced High-availability**  
Zero RPO/RTO



Multi-Platform Support

Pure HPE IBM  
Dell/EMC NetApp 500+ others...

**HyperSwap**  
Zero RPO/RTO



100% data availability guarantee

**Enterprise Disaster Recovery**  
>Zero RTO



2-site and 3-Site Options  
Can be combined with HyperSwap

Protection from failures and disasters

SafeGuarded Copy

CyberVault

AES encryption and in-line compression

50us Latency

# Protecting SAP HANA with the IBM Storage Portfolio

IBM recommends a comprehensive plan for protecting your SAP HANA databases



IBM Storage  
Defender



Advanced Threat Detection  
Automated Data Resilience  
Integrate w/ Existing Tools



IBM Storage  
Copy Data  
Management



Creates and manage  
primary storage  
hardware snapshots

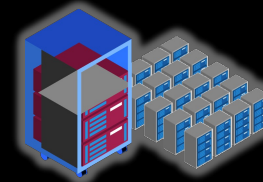


IBM Storage  
Sentinel for SAP  
HANA



Creates immutable  
snapshots and scans  
them for Ransomware

**SAP HANA**



Object / Cloud



Tape



Disk/Flash

# The real purpose behind Cyber Vault

1

## Immutable Copies of Data

Created with IBM Safeguarded Copy  
Can not be changed once created

2

## Proactive Monitoring

Early warning signs of attack with  
IBM Storage Insights  
Recommend integration with SIEM  
such as IBM QRadar

Cyber Vault



Blueprint  
Automation

The Pay Off...

Recovering from the  
primary array in just  
minutes or hours  
rather than days  
or weeks

4

## Test / Validation of Data Copies

Recover data copies to isolated environment  
to check they are corruption free  
Test recovery procedures  
Forensics & Diagnostics Services

3

# Take the Cyber Resilience Assessment Today

The Cyber Resiliency Assessment Template (CRAT) provides a way to evaluate the current data resilience of the organization, identifies strengths and weaknesses and provides recommendations to **build an effective cyber resilience plan.**

[IBM Cyber Resiliency Assessment](#)

## Storage Cyber Resiliency & Disaster Recovery Assessment Report

IBM Security & Resilience

January 5, 2021



**Overview**

IBM is pleased to present a report based on our findings from the IBM Storage Cyber Resiliency & Disaster Recovery Assessment workshop that took place with the [Customer] team on December 9<sup>th</sup>, 2019. It is understood that an effective cybersecurity resiliency program must be grounded in effective systems and processes that provide valuable insight into information and events that occur within an environment and provide the confidence for an orchestrated storage resiliency process in order to not disrupt [Customer]'s business continuity objectives. By evaluating the current cybersecurity and resiliency environment, the organization now has specific recommendations designed to help increase the value of the solution and services in its environment and meet RTO and RPO requirements.

Additionally, [Customer] will be able to help deliver faster return on investment and higher operational productivity by leveraging time-tested practices and updates to product features and resiliency functions. It will be able to help decrease errors and inconsistencies through the implementation of the incremental recommendations we have provided in this document.

**Executive summary**

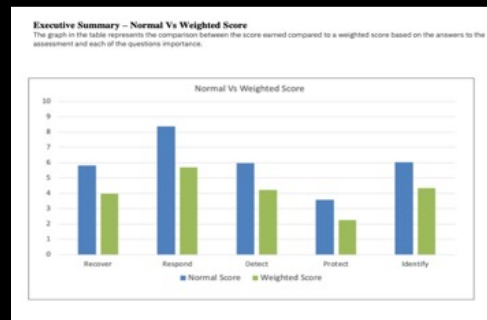
Based on the information gathered during our initial review within IBM during 4Q 2019 as well as the assessment workshop in Boston Harbor on December 9<sup>th</sup>, [Customer] has realized great value from its investment in cyber resilience and is generally on-par with other customers that IBM has worked with. However, there are several areas where [Customer] has exposure to risk resulting in unrecoverable data loss or corruption and where more value can be realized.

[Customer] has many IT service providers of which IBM is a significant partner. Of the many environments considered and reviewed for this assessment, we have taken an enterprise-wide performance in the environment is satisfactory, though [Customer] recognizes that the organization is one cyber breach away from severely impacting business continuity. [Customer] senior management must understand that risk is the new normal. Being a digital enterprise in 2020 means significant risk and Cyber-Resiliency (protection, data vaulting and recovery) is now an absolute part of the cost of doing business.

Additionally, IBM feels that [Customer] would benefit from the use of Spectrum Insights to measure different performance and capacity areas in order to drive them toward strong outcomes.

Cyber resiliency should be viewed as a dynamic and ever-evolving practice that requires continuous improvement and focus. With the continued expansion of the threat landscape and pace of technology change, it is imperative that organizations constantly take inventory of how they are doing and where they need to be evolving.

Please review the Recommendation Section for our roadmap, which, if followed, will improve functionality and increase the value realized from implementing resiliency and disaster recovery best practices and solutions. Establishing a mature cyber security and resiliency plan will enable a more proactive approach in detecting, identifying, and protecting their environments, as well as their ability to respond and recover quickly.

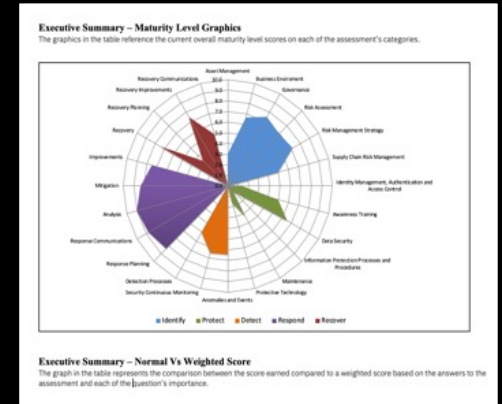



**Value summary dashboard**

**Executive Summary – Summary View**

The numbers in the table reference the current overall maturity level on each of the assessment's categories.

Category	Your score	Maturity Level
<b>Total score</b>	<b>5.96</b>	<b>Practicing</b>
<b>Identify</b>	<b>6.54</b>	<b>Practicing</b>
Asset Management	3	Developing
Business Environment	6.7	Practicing
Governance	7.5	Practicing
Risk Assessment	6.9	Defined
Risk Management Strategy	7.1	Defined
Supply Chain Risk Management	5	Developing
<b>Protect</b>	<b>5.58</b>	<b>Developing</b>
Identity Management, Authentication and Access Control	1.4	Initial
Awareness Training	6.0	Developing
Data Security	6.5	Practicing
Information Protection Processes and Procedures	0.7	Initial
Maintenance	3.3	Developing
Protective Technology	1.7	Initial
<b>Detect</b>	<b>6.68</b>	<b>Practicing</b>
Anomalies and Events	6.4	Practicing
Security Continuous Monitoring	6.5	Practicing
Detection Processes	6.6	Practicing
<b>Respond</b>	<b>6.39</b>	<b>Mature</b>
Response Planning	8.3	Mature
Response Communications	6.8	Mature
Mitigation	9.0	Mature
Analysis	6.3	Mature
Improvements	7.5	Practicing
<b>Recover</b>	<b>5.21</b>	<b>Practicing</b>
Recovery	7.5	Practicing
Recovery Planning	3.3	Developing
Recovery Improvements	7.5	Practicing
Recovery Communications	5.0	Developing





# **No-cost!**

**SAP HANA Readiness Assessment**

**Cyber Security Assessment**

**Storage & Capacity Planning Assessment**



**Clear Technologies**

<https://www.cleartechnologies.net/sap/>

**ITIC Security Survey Results**

<https://www.ibm.com/downloads/cas/BGARGJRZ>

**ITIC Reliability Survey Results**

<https://www.ibm.com/downloads/cas/VQ5B65Y>

**SAP Blog – SAP HANA on Power10**

<https://blogs.sap.com/2023/03/17/sap-hana-on-ibm-power10/>



Thank you

**Q&A**



## About Clear Technologies



- On-premises, Private Cloud and Public Cloud hosting & infrastructure reseller
- SAP Infrastructure Practice
- Managed services
- Hardware, Software & Services focused



- Cloud based storage reporting and analytics
- Heterogenous storage dashboard
- SaaS



## Partnership & Trusted Advisor

We are a single point of contact, committed to consistently delivering the solution and services that are the best fit for your business.

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- 30-year Value-Added Reseller
- Long history with Systems & Storage
- Strategic focus on SAP, and other innovative solutions
- Extraordinary Net Promotor Score
- Cognitive Leadership Program
- 3 IBM Champions

