



Arcati Mainframe Yearbook

20 24

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Welcome to the Arcati Mainframe Yearbook 2024

Greetings to all! As we embark on another year of technological advancements and professional growth, I present the Arcati Mainframe Yearbook 2024, now a part of the Planet Mainframe family.

In an exciting development just a few short weeks ago, Planet Mainframe and iTech-Ed Ltd. have officially merged, pooling their resources and expertise to further enhance mainframe education and community support. With the Arcati Mainframe Yearbook, Trevor Eddolls has given our community a lasting gift and we are proud to honor his efforts and this great resource by hosting the Arcati Mainframe Yearbook on Planet Mainframe's website.

The past year has seen continuous evolution in the mainframe world. After several (shall we say uncertain?) years, we are now firmly in the swing of things. Meetings are happening, conferences are *in real life*, and we have seen a banner year for our industry.

In 2024, I'm excited for what lies ahead and we're punching the accelerator at Planet Mainframe. There's so much to discover as we uncover the true power of the z16 mainframe and the impact that AI and machine learning will undoubtedly have on every aspect of our work and our lives.

This year we'll tackle new and growing challenges like data security. Last year was marred with some of the most significant breaches of our time—and there were 78% more breaches than the previous year. Already in the first few weeks of 2024, we've seen the “mother of all breaches” representing more than 26 billion leaked data records.

As we look to 2024 ahead, we are guided by trends and forecasts that suggest a focus on resilience, informed decision-making, and environmental responsibility. The mainframe industry continues to be a dynamic and vital field—essential to the operations of global businesses.

And with the Planet Mainframe / iTech-Ed merger, our commitment to providing mainframe professionals with comprehensive resources, educational tools, and a platform for global networking and collaboration has only strengthened.

I hope you enjoy this year's edition of the Arcati Mainframe Yearbook as we continue our tradition of sharing insights, trends, and expert opinions that shape the mainframe industry and continue to develop it further—making it the most read mainframe resource each year..

We thank our contributors, sponsors, and advertisers for their invaluable support and look forward to another year of excellence in security, performance, and reliability in the mainframe world.

Here's to a year filled with opportunities, innovation, and continued professional growth in the ever-evolving landscape of technology!

Warm regards,

Amanda Hendley

Managing Editor, *Planet Mainframe*

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Mainframe is a Part of Your Cloud Strategy.

Now What?

Three Ways to Include Mainframe Workloads in Your Hybrid Cloud

Matt Hogstrom

Distinguished Engineer, AIOps Automation & Cloud Integration, Mainframe Software Division
Broadcom Inc

If Mainframe were an athlete, it would have multiple MVP titles. So would Cloud. Now, this sounds like the beginning of a championship team. But, just as great players alone don't bring home the pennant (or trophy, depending on your sport), neither do great technologies. You've got to bring those "players" on your IT roster together and integrate them into a cohesive unit that allows each one to shine. That's what makes a championship team.

Now, in sports, players get an off-season and time to rest. In the world of business—and the technology that runs it—there is no off-season. Your IT stack needs to be ready 24x7x365. That means every one of the platforms on your IT roster needs to know its position and be able to perform at its best and work seamlessly with the rest of the squad.

Many companies want the flexibility that Cloud offers, yet business-critical workloads that depend on the Mainframe aren't going anywhere. In fact, there's great value in what the Mainframe delivers for business and operations. Activating the Mainframe as part of your Cloud strategy means opening up access to a rich data source—a wellspring of modern insights and applications that transforms your ability to build business innovations and IT resiliency. So the question is not so much should you include the Mainframe in your Cloud strategy, but how?

Go Hybrid, Go Mainframe

When creating a successful hybrid environment with the Cloud and Mainframe, it's important to understand that you are modernizing the infrastructure, not individual applications. A Cloud strategy alone only modernizes infrastructure for Cloud-like workloads. The Hybrid approach takes capabilities on the Mainframe that have proven value to your business and delivers them to all applications on the Cloud.

In general, a Hybrid Cloud architecture enables teams to:

- Consolidate and share IT resources
- Orchestrate processes with the help of automation
- Connect multiple systems through a network
- Scale and quickly provision new resources
- Incorporate a single, unified management layer
- Move workloads between environments

The Mainframe is the fastest and most secure platform on the planet and constantly expands based on evolving technologies and business needs. Combining the strengths of Mainframe with Hybrid architectures allows organizations to continue to leverage proven value and critical capabilities. The challenge is to select the best approach for your business and current IT stack.

Start by evaluating your current tech landscape against your business needs. This knowledge will enable you to identify value and differentiate which applications run best on the Cloud and which are better suited for the Mainframe. It's a winning lineup that helps you capitalize on the strengths of both.

Here are three proven ways to successfully integrate and benefit from Mainframe workloads in your Hybrid Cloud.



#1

Enable Cloud Access to Mainframe Data

The Mainframe hosts a trove of critical business records and data—offering impactful insights on everything from operations to customer experience. This data is a source of incredible value that Cloud apps can, and should, leverage to gain advantage in the market.

Traditionally, it could be challenging to access Mainframe data from outside the host. Modern applications such as online shopping and banking are primarily API-based and Mainframe is not. These incompatible formats can result in application projects that require Mainframe data taking a long time.

Today, businesses are using APIs to access Mainframe data with very positive results. APIs enable secure and managed access to the Mainframe and help abstract incompatible formats so that Cloud-native applications, such as a mobile banking app, can easily leverage valuable Mainframe data. Opening up the Mainframe with APIs means that businesses can combine the power of the Cloud and Mainframe to develop modern solutions with more agility and faster time to market. In addition, standard data integration technologies such as RESTful APIs, virtualization, or GraphQL make it easy for businesses to support flexible development.

#2

Enable Cloud Access to Mainframe Services

Using RESTful APIs, businesses can make accessing Mainframe services and capabilities look the same as they would on any Cloud service. This familiarity is quite handy. For example, Mainframe services usually come with business logic, policies, or processes around using or updating the associated data. These are part of standard business services required to comply with regulations or compliance criteria. Incorporating these services into applications from outside the host can be a challenge. However, now you can leverage the existing policies and logic with a RESTful interface.

A RESTful interface, synonymous with RESTful APIs, is how businesses operate digitally and manage interoperability between services and developers. In essence, RESTful APIs make accessing Mainframe services and capabilities operate just like they would for any Cloud service. Enabling Cloud access to Mainframe services in this way means you can more easily modernize and accelerate the delivery of Mainframe apps. For example, creating new customer-facing interaction logic to function in applications in real-time.

#3

Host Cloud Workloads on the Mainframe

The promise of Hybrid is mainly in portability and optimization—provisioning workloads where they make the most sense and moving workloads between platforms as needed. Modernizing your Mainframe infrastructure to run newer, Cloud-native workloads means gaining the ability to make those new languages and runtimes available on the Mainframe for developers to exploit.

Many newer workloads are non-traditional, as in not COBOL or PLI running in CICS or IMS. They include new databases and runtimes found on Linux (or Linux on z), new languages like JavaScript, Ruby, or Python, and new technologies like containers and Kubernetes. Hosting new runtime technologies on the Mainframe, like containers in zCX or Linux on z, makes it easier for developers to stay current with workload runtimes in a shorter time.

Hybrid Cloud with the Mainframe FTW

Season after season, organizations make a substantial investment in services, business logic, governance, and compliance on the Mainframe. Leveraging that investment doesn't mean reengineering the existing assets. It means modernizing access to those resources using the language of the Cloud.

Given the Mainframe's "triple threat" of unique strengths—scalability, security, and reliability—businesses need to consider integrating it into the Cloud a necessity.

There are multiple ways to integrate the Mainframe based on your business' priorities. Assessing your business and operational needs will guide you toward the best one(s). Whichever way you choose, embracing and exploiting Mainframe strengths in your Cloud strategy will expand the value of your IT investment and set your business up to win with a game plan to innovate, grow, and offer extraordinary customer experiences.

A video thumbnail showing a stylized illustration of a classical building with columns, set against a teal background with clouds. The text "A FEW GOOD MAINFRAMERS" is overlaid in large, white, serif capital letters.

A FEW GOOD MAINFRAMERS

[Click Here to Watch the Video](#)

The IBM Mainframe is Still the Real Deal

Keith Allingham

DataKinetics' CEO Allan Zander's article appeared on the [Planet Mainframe blog in 2021](#), and it made some waves in the distributed systems world—see [Hacker News discussion](#). The IT folks without much knowledge of IBM mainframe architecture refuse to believe the numbers in the article, while others lambaste the article for being old. Some of the comments are fair, but as AWS, Google, et al, provide more powerful cloud/distributed solutions, IBM does the same with its mainframe platform.

About 12 months ago, I had a conversation with an IBM tech in their computing costs group responsible for analysis and cost comparison between existing IBM Z installations against proposed cloud replacement proposals given to IBM customers by cloud business organizations (AWS, Google, Microsoft, etc.). He was interested in the Planet Mainframe article because it closely mirrored the results that he and his team were seeing in the 2020-2021 time frame, as they researched and compared an IBM Z installation vs an AWS proposal.

As you can see, this article cites data that is now more than 5 years old, but the comparison is still generally accepted as valid. Until a new article with new data is available, here is the Planet Mainframe article that started all the fuss:

The IBM Mainframe: The most powerful and cost-effective computing platform for business

Allan Zander, CEO, DataKinetics

Many of we mainframe pundits have written about the robustness, power, perseverance, capacity and more importantly, the cost-effectiveness of the mainframe ([Allingham](#), [Sun](#), [Peleg](#)), including [myself](#). But what about showing the superiority of the mainframe using real numbers, comparing it to other platforms? That requires a lot more work. [Schroder](#) and [Olders](#) show us some real-world numbers, but how about showing the ugly details? That’s even more work, and fortunately, a couple of people have done that as well.

Michael Benson’s Enterprise Executive article in 2016 did that—since then, distributed servers have come a long way (AWS, Google and a host of other cloud service providers), but so has the mainframe. In 2015, the top-of-the-line mainframe was the z13, an outstanding business machine; since then, successive machines, z14 through z16 (and counting) outperform it considerably on many levels –speed, transaction throughput, security, flexibility, and more. A main argument then, as now, is cost; and that’s a losing argument right from the get-go.

Comparing Platform Costs

“Other platforms are cheaper...” This is the basic claim for most people interested in dumping mainframe systems in favor of commodity servers. The argument is simple: “Google, Amazon and Microsoft don’t use mainframe systems at their back end, so why should anyone?” Fair question, but let’s look at the premise first—are server farms less costly than the mainframe? Recently, Michael Benson did a study for Enterprise Executive magazine in an article called CIOs: Are You Really Paying Less by Using x86 Platforms? In it, he configured two similar performing platforms—one mainframe-based, using an IBM z13 mainframe system, and the other, a bank of HP servers. Table 1 shows the system specifications.

He explains that running Linux on the mainframe is no different than running it on x86 servers. The only real difference is the cost, and the belief is that x86 platforms do it for less. But do they? The hardware costs for these configurations run in at \$2,299,451.00 for the server farm solution, and \$2,793,371.00 for the mainframe solution. However, due to licensing costs, the software cost for the server farms comes in at \$1,807,406.00, with the mainframe running at only \$416,883.00.

So yes, the hardware is cheaper, but there is not quite as much difference as you might expect. The real surprise is the difference in software cost. When you also consider maintenance costs, the pattern continues. Maintenance

ATTRIBUTE	HP PROLIANT BL460 GEN9	IBM Z13 2964 N30
Total Servers	12	1
Processors	24	30
Cores/processor	12	1
Cores/server	24	30
Total cores	288	30
# VMs	1000	1000
Memory	2 TB	2 TB
Hypervisor	VMware vSphere 4	IBM z/VM
Cloud Mgmt	VMware vRealize	IBM Wave
OS	Red Hat Enterprise Linux	Red Hat Enterprise Linux
Web server	Apache HTTP	Apache HTTP
Application server	IBM Websphere	IBM Websphere
Messaging	MQ	MQ
Database	Oracle EE	Oracle EE

ANNUAL LABOR	HP PROLIANT BL460 GEN9 (QUANTITY=12)	IBM Z13 2964 N30 (QUANTITY=1)
Server admin	\$580,160	\$430,000
Net admin	\$384,000	\$76,800
Total	\$964,160	\$506,800

costs for the server farm come in at \$390,327.00, with the mainframe at \$269,767.00. Labor costs are also part of the picture.

At the end of the day, what really matters is the ongoing operational costs of the two platform solutions. Table 3 shows a considerable gap in favor of mainframe computing.

Over a five year period, operating costs compound, and the picture looks much worse for the server farm, \$9,052,749.00 vs \$6,979,693.00 in for the mainframe setup. The shocking conclusion therefore, is that it is cheaper to run the mainframe system than it is to run the server farm.

OPEX	HP PROLIANT BL460 GEN9	IBM Z13 2964 N30
Hardware mtce	\$9,544	n/a
Software mtce	\$390,327	\$269,767
Admin	\$964,160	\$505,800
Other (power, etc.)	\$31,505	\$68,355
Total	\$1,395,536	\$844,922

When doing cost comparisons, it is good practice to look at all contributing costs, and to look at long term cost of ownership. This comparison would have looked a lot different if we stuck to just the hardware acquisition cost, or even if we hid the personnel costs in a general employee pool rather than in the TCO calculations.

Technology Economics

Cost is one thing—often a very misunderstood thing, as Michael Benson pointed out. But acquisition and ongoing cost represent only one dimension in a complicated cost-comparison between platforms. What about environments that run a mix of mainframe and distributed systems? And what about comparing not just cost between platforms, but real costs in specific industries? Well, that’s where Dr. Howard A. Rubin of *Rubin Worldwide*, a technology economics research firm, comes in.

In his paper, *The Surprising Technology Economics of Mainframe vs. Distributed Servers*, Dr. Rubin explains that understanding computing platforms and their economic relevance in the context of their contributions to business performance is critical. This context provides a transparency that goes far beyond the basic economics of the costs of hardware and software acquisition or a TCO calculation. This is especially important when we consider that technology costs are a rising part of ongoing business operations expense.

It is good practice to look at all contributing costs, and to look at long term cost of ownership.

IT costs vs business revenue and cost

Technology costs relative to business revenue and operating costs vary considerably from one industry vertical to another. For example, in banking and finance, IT expense represents about 6% of revenue and just over 7% of business operating expense; compared to the retail sector, where IT expense represents just under 1.5% of revenue and just over 1.5% of business operating expense.

Cost of platform choice

Businesses have choices on how they will handle their processing needs and this typically comes down to the mainframe and server farms. The cloud is part of the latter solution. The reality is that any business that runs mainframe systems also runs server farms, so it is fair to characterize them as running “mainframe-heavy” datacenters, while those without mainframe run “server-heavy” datacenters. It is also useful to consider new metrics for these datacenters—MIPS per \$1M of revenue and physical servers per \$1M of revenue. These aren’t equivalent in any way, but they serve to represent the economics of their computing choices in measurable economic terms.

When comparing businesses within the same industry vertical, the “heaviness” of their IT deployment strategies result in a significant differences. For example, for financial services businesses:

- Mainframe-heavy shops consume:
- While the server-heavy shops consume:
- 3.1 MIPS per \$1M of revenue
 - 0.22 servers per \$1M of revenue
- 1.75 MIPS per \$1M of revenue
 - 1.2 servers per \$1M of revenue

BUSINESS	AVERAGE COST	MAINFRAME-HEAVY COST	SERVER-HEAVY COST
Distribution	\$4,255,273	\$3,936,728	\$6,809,818
Communications	\$4,979,371	\$4,306,000	\$8,295,000
General business	\$4,832,000	\$4,414,000	\$7,846,000
Computer Services	\$6,093,958	\$5,644,350	\$7,619,000
Industrial	\$9,270,513	\$9,082,000	\$11,181,000
Financial Services	\$12,627,002	\$12,742,000	\$16,445,000
Government	\$15,161,129	\$14,148,000	\$15,981,703
Average	\$8,174,178	\$7,753,297	\$10,596,789

When these figures are mapped to the total cost of mainframe and server farm costs within various industry verticals, the economic differences that can be attributed to their deployment strategies become apparent—(Table 4). The inescapable conclusion is that mainframe-heavy computational costs to support a \$1B organization on average may be 30% lower than a server-heavy deployment.

Cost of Goods

While the cost of technology yields interesting conclusions, the actual costs of platform choice are also surprising, and support the former. The next step is to link the technology costs to business costs.

A good way to do that is to use a cost-of-goods metric. Ask the question: “What is the IT cost contribution to the business cost of goods?” And follow that up with: “How does technology deployment affect the measure of impact on the business?” Table 5 itemizes the cost of goods for five business types—finance, industrial, communications, general business and insurance.

This data implies that where appropriate, effective use of mainframe resources results in a 29% cost advantage over distributed server-heavy deployments.

Looking closely at the insurance data, we see that the average IT cost of processing an insurance claim in a mainframe-heavy environment is approximately \$56, which is \$36 less than the processing cost in a server-heavy environment. What does that mean to an insurance business? For an insurer that processes 100,000 claims per year, the savings could be \$3.6 million per year by leveraging mainframe technology.

Similarly, a bank with 4500 ATMs would be paying over \$1000 per ATM using a server-heavy datacenter, as compared to less than \$600 using the mainframe-heavy scenario. Such a bank could save more than \$2 million per year by leveraging mainframe technology. To be fair of course, ATM costs are only one small part of a bank's IT cost concerns.

Competitive advantage

Any large company interested in maximizing computing power AND controlling costs will clearly enjoy a competitive advantage over a similar company that just seeks to avoid mainframe technology in favor of server farms. This advantage translates directly to the bottom line, shareholders and investors. And for a company considering a mainframe migration project as a means for cutting costs, this information could be seen as "found money."

PROCESSING COST PER:	AVERAGE COST	MAINFRAME-HEAVY COST	SERVER-HEAVY COST	RATIO, MF VS SERVER
ATM	\$928.00	\$572.00	\$1,021.00	56%
SKU	\$227.27	\$184.09	\$252.27	73%
Mobile subscriber	\$23.26	\$18.26	\$26.12	70%
Patent	\$390.83	\$372.00	\$401.00	93%
Claim	\$78.00	\$56.00	\$92.00	61%
Average				71%

Conclusions

The facts support the notion that the mainframe is the most powerful and cost-effective computing platform for large businesses with a need for high-intensity transaction processing. Claims to the contrary are typically either as a result of simple lack of knowledge on the subject, or a biased unwillingness to look objectively at the facts.

But if the mainframe is so great, then why is it not being used by the newest and latest concerns (Amazon, eBay, etc.)? The reason is bias. Whether intentional or through ignorance, there is a great deal of bias against the mainframe. We hear it all the time – and saw it in the comments to the original publication of the article. People say "It's too expensive!" (It clearly is not.) "It's old and dusty!" (Obviously not.) "It's hopelessly outdated!" (Not even close.) "I don't know very much about it!" (Ahhhh . Now we're getting somewhere.)

The last part is the key to the puzzle of why the mainframe generally has a difficult time displacing server farms in environments where it could make a positive impact. The truth is, organizations that could benefit from the mainframe, but don't, are leaving money on the table.

So, What's the Strategy?

We've told you what IBM already knows, what many IBM customers already know, what some "mainframe replacement" vendors secretly know, and even what today's big cloud vendors know. So, what's the strategy moving forward?

What about mainframe shops having trouble keeping up with growing workloads on their "most powerful and cost-effective" mainframes? Should they be upgrading? Shifting workloads off-platform? As you might guess, there are options. There are a couple of organizations that are helping mainframe shops to optimize what they have now—to increase workload throughput of the systems they're currently running. No upgrade needed; no changes to application logic, no changes to the Db/2 (or whatever) database being used. This is possible using high-performance in-memory technology.

And both IBM and DataKinetics are offering these solutions right now. Talk to people who actually know something about the platforms under evaluation.



[Click Here to Watch the Video](#)

Micro-Segmentation Keeps Sensitive Mainframe Data in Compliance

Provided by: *Vertali*

Executive Summary

Mainframes hold an organization's most critical and sensitive business data, making it crucial to ensure that data is secure and meets the strictest privacy regulations.

Controlling access through network micro-segmentation is an effective way to protect sensitive data on mainframes by isolating applications or devices. Such isolation is required in heavily regulated industries with compliance standards such as the Payment Card Industry Data Security Standard (PCI DSS), Health Insurance Portability and Accountability Act (HIPAA), and General Data Protection Regulation (GDPR).

Micro-segmentation is an important step toward achieving Zero Trust security. Micro-segmentation can isolate each application into its own network segment. That gives organizations the ability to limit application access to specific network segments or specific devices, providing an additional layer of security beyond user authentication.

Isolating card payment processing applications to specific network segments can greatly reduce the scope, cost, and time of PCI DSS compliance assessments. Although segmenting the cardholder data

environment (CDE) from the rest of an organization's network is not a PCI DSS requirement, it is highly recommended by the PCI Security Standards Council. By consolidating data into fewer locations that have more control over that data, segmentation reduces the risk to an organization's payment account data.

The PCI Security Standards Council says that any assets that store, process, or transmit payment card data are "in scope"—meaning they must be assessed for PCI compliance. Thus, the entire network is in scope without proper segmentation. The wider the scope, the longer and more costly the PCI compliance problem becomes.

Network segmentation that isolates the card handling applications reduces the PCI review to that specific area rather than an entire network, which can span hundreds of thousands of devices. Reducing the scope of the PCI DSS assessment also reduces the cost and difficulty of implementing PCI DSS controls. It also mitigates risk to an organization by consolidating cardholder data into fewer locations with greater control.

Benefits and Challenges of Micro-segmentation

Segmentation divides a network into segments to make them easier to secure and manage.

Micro-segmentation goes beyond that, carving out a segment for each application, isolating and containing the traffic within that micro segment.

The benefits of micro-segmentation include:

- Improves network access control to protect systems by limiting application access to a specific network segment or device.
- Happens at the application level (unlike firewalls) and can protect specific applications.
- Detects new or unsuspected network activity to and from a mainframe computer and blocks unauthorized users from connecting to an application. This approach ensures access only for authorized users and denies everyone else, a zero trust mandate.
- Reduces the potential risk should a network exposure occur.

Inherent mainframe characteristics make these goals difficult to achieve, however.

Traffic in and out of the z/OS mainframe uses Transmission Control Protocol/Internet Protocol (TCP/IP), which was designed to allow any-to-any connectivity with minimal configuration. This setup conflicts with security policies aimed at limiting connectivity to authorized users. The z/OS Communications Server includes controls in the System Authorization Facility (SAF), but the default for many sites is to allow all connections. TCP ports can be protected by SAF so that only permitted applications can open them, but furthermore complex controls are required to secure access to and from remote devices. Controlling tens of thousands of connection combinations can become an impossible task.

Controlling tens of thousands of connection combinations can become an impossible task.



Many mainframe sites lack an up-to-date and accurate picture of real-life network activity, such as which network devices are connected to specific applications and what is encrypted.

Most security mechanisms look at inbound TCP connections, but few look at controlling outbound connections. Any user can often initiate an outbound connection to a remote system, and hackers use outbound connections as a backdoor to mainframe services. User Datagram Protocol (UDP) activity is typically unsecured and unmanaged.

There are tools built into z/OS, but they can be difficult to configure and manage at large scale:

- IBM Policy Agent, part of Communications Server inside z/OS, can filter mainframe packets at the application level to provide segmentation but the process can be complicated, especially for organizations with thousands of connections.
- IBM z/OS Management Facility (z/OSMF) provides a graphical user interface (UI) that can be used to define policy agent filtering rules, but this requires time consuming manual data entry and knowledge of IP addresses and port numbers to add filters. As with Policy Agent, IBM z/OSMF does not easily scale for large organizations.

As a result, there is often a lack of understanding of what needs to be configured because application owners, network administrators, and security teams do not always have a complete picture. Among these groups, there can also be confusion over who is responsible for compliance such as PCI/DSS.

Dozens of applications running card data across hundreds of logical partitions (LPARs) could result in tens of thousands of network devices. All those devices become part of the PCI assessment scope unless card data applications can be segmented.

Solving these problems often requires a third-party tool that helps organizations understand what to configure, makes the configuration easy, and assigns configurations to the right group.

Vertali zTrust Manages Micro-Segmentation

Vertali zTrust for Networks manages micro-segmentation using IBM z/OS tools. Based on zTrust's network discovery capabilities, zTrust provides an understanding of network and traffic patterns, building a complete map of network connections to facilitate the micro-segmentation process. It works alongside controls managed by IBM z/OS such as user access, multifactor authentication (MFA) and encryption, providing a valuable additional layer of security.

zTrust gives security teams the ability to control access by permitting network segments to access applications through standard SAF controls and commands. It can detect new or unexpected network activity to and from the mainframe and confirm that the micro-segmentation settings are correct and working. zTrust automatically generates policy agent access control lists (ACLs) directly from SAF resources managed by standard External Security Manager (ESM) commands such as those provided with RACF, Access Control Facility 2 (ACF2) or Top Secret Security (TSS).

zTrust detects all traffic on an LPAR and builds a knowledge base of every mainframe connection. The first time zTrust detects an IP address connecting to an application, it records that in the knowledge base, together with the encryption status of that connection.

zTrust uses the knowledge base to build a complete set of External Security Manager (ESM) resources and access lists based on current network traffic. Security teams can review access lists to ensure only permitted network segments and devices are accessing key applications and access controls can limit access to encrypted network connections.

After analyzing the ESM profiles, zTrust builds IBM Policy Agent profiles that permit or block network traffic. zTrust makes segmentation simpler by managing ESM resources by name rather than IP addresses and port levels. It continuously monitors network activity to ensure the ESM policies defined are correctly implemented and to highlight any network changes that may require additional policies.

Over a short period of time, the knowledge base will provide a complete map of network activity by recording every unique connection. zTrust generates an alert when it detects an IP address connected to an application on the network for the first time. Filtering options are provided to whitelist resources to reduce alert volumes. zTrust alerts can be routed to offboard security information and event management (SIEM) solutions such as QRadar or Splunk via the Syslog Daemon.

zTrust documents all activity in audit logs and can generate periodic reports that confirm network micro-segmentation policies are implemented and a valuable resource to prove micro-segmentation is indeed in place and working.

zTrust also ensures connections are encrypted by differentiating between clear and encrypted network connections. It identifies applications that are permanently or temporarily accepting inbound non-encrypted or inbound encrypted connections and applications that are making outbound non-encrypted or outbound encrypted connections.

5 Stages of zTrust Software:

Stage 1

Network Discovery: A unique tool to build your network knowledge base and continuously monitor for new network activity.

Stage 2

ESM Resource Generation: Automatically generate ESM resource definitions and access lists for RACF, TSS or ACF2.

Stage 3

Build Security Profiles: Build policy agent profiles from ESM resources

Stage 4

Managed implementation of new policies with rollback option

Stage 5

Monitor and Manage Complexity: Monitor network activity and alert on policy violations

At any stage, reports can be produced to provide details on the SAF resources defined, permitted access lists for each application, the network connection maps and the live filters currently loaded into TCPIP.

Conclusion

Micro-segmentation makes it possible to logically divide networks into separate security segments at the level of specific workloads. By allowing organizations to define security controls and restrict access to each segment, micro-segmentation is an important step toward achieving Zero Trust. This security is crucial for financial institutions and others that hold sensitive customer information, often on mainframe computers.

Although micro-segmentation adds to the security of mainframe data, it is difficult to accomplish at scale. Large companies with thousands of network devices and applications might struggle to isolate all their resources without helpful third-party tools.

Vertali zTrust works by using standard IBM mainframe tools and interfaces. It adds management, implementation, and monitoring controls to isolate systems with different security needs. This approach reduces the number of systems in PCI DSS compliance scope and empowers the Cyber/Security teams to implement segmentation via their ESM. It also saves organizations time and money from performing these tasks manually.

zTrust blocks unwanted traffic and puts mainframe security where it belongs—in the hands of an organization's security team. It controls access by permitting network segments to access specific applications through standard SAF controls and commands. That provides micro-segmentation rather than blocking or enabling access to the entire mainframe.

Author Byline: This paper was written in partnership with The Futurum Group, an independent research, analysis, and advisory firm, focused on digital innovation and market-disrupting technologies and trends. Every day Futurum's analysts, researchers, and advisors help business leaders from around the world anticipate tectonic shifts in their industries and leverage disruptive innovation to either gain or maintain a competitive advantage in their markets.



Is your mainframe network
really secure?

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2024

Mainframe User Survey

An analysis of the profile, plans, and priorities of mainframe users.

Many thanks to all those who took part.

This year marks the first for the Arcati Mainframe User Survey on its new home —on the Planet Mainframe site. As usual, the annual mainframe survey provides a snapshot of the IBM Z user community's existing 2023 hardware and software configuration, as well as their plans and concerns for 2024.

This year we have continued to track the growth of mainframe integration with cloud computing, and other areas, as well as gauging the extent to which the IT and business analytics and IT security are really impacting on the mainframe world. As in previous years, we have continued to explore relative costs, asking respondents how they see growth trends relating to their mainframe and cloud infrastructures.

Profile of respondents

The mainframe user survey was completed in Q4 of 2023. Survey respondents journeyed to the survey on different paths. In addition to the Planet Mainframe website and mailing list, invitations to participate were also distributed through iTech-Ed and the Mainframe Virtual User Groups (for [CICS](#), [Db2](#) and [IMS](#)). Responses from multiple entries from different people at the same site were excluded from the survey, as were largely incomplete responses.

The distribution of all respondents is shown in Figure 1. For the first time since we started the yearly survey, we had more respondents from Europe than we did from North America —42% to 36%—likely due to our increased reach in the UK, and our presence at four mainframe trade shows in just over a year. Fourteen percent were from the Asia/Pacific region, while South America and Middle East/Africa came in at 5% and 2.5%, both lower than in previous years.

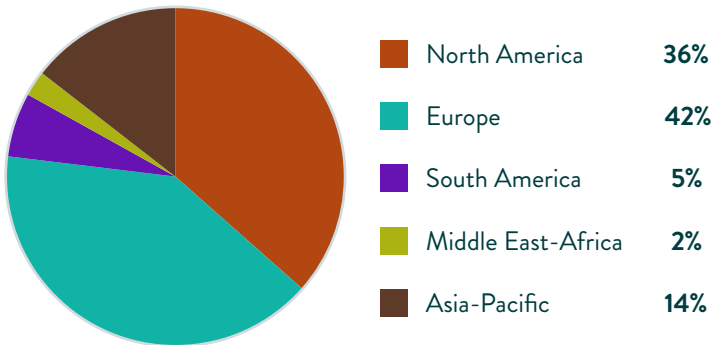


Figure 1: Profile of respondents

As usual, a wide range of industry types are represented in our sample (Figure 2), with IT making up over 70 percent of respondents—which can be interpreted in many ways as, in one sense, all mainframe personnel are considered IT, but in another, service provider personnel can be considered part of an “IT company.” This may skew the results somewhat. For non-IT sector respondents, Banking made up almost 20 percent, while Insurance came in at almost 15 percent. Government, Retail and Healthcare (a specific type of Insurance), as well as the industries that did not fit any of the categories offered, each made up just over 15 percent of sites responding.

What industry sector are you in?

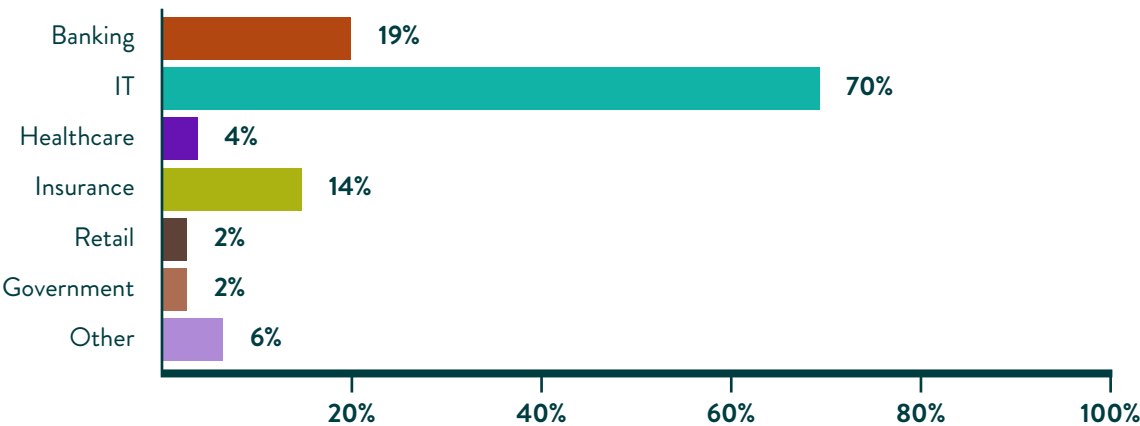


Figure 2: What industry sector are you in?

For the first time, we asked respondents to tell us about their positions within their organizations. As Figure 3 shows, a third of our respondents were collectively management, while more than 60 percent were Programmers, Engineers, DBAs, and other professionals. Students and interns accounted for just over 5 percent of the respondents.

What is your position in the organization?

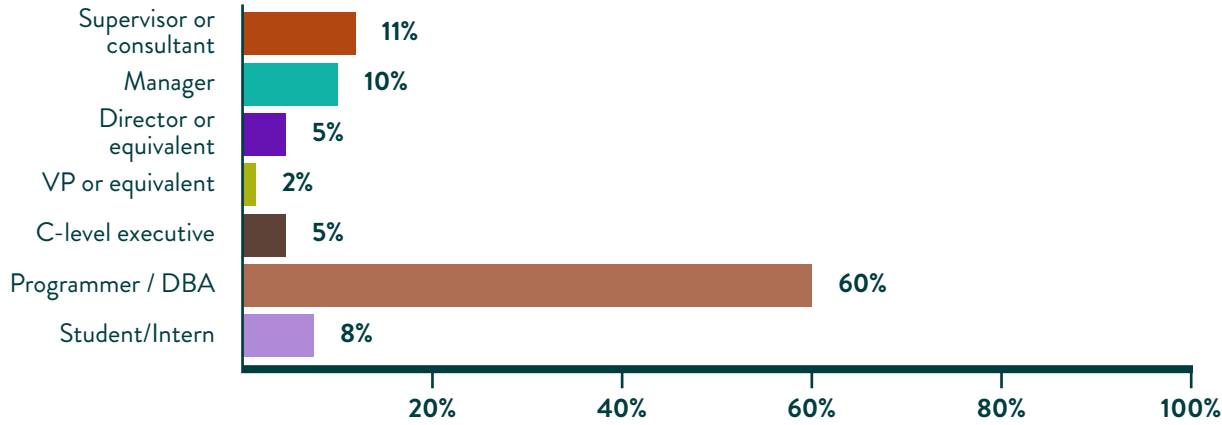


Figure 3: What is your position in the organization?

Training and background

Another first for the Mainframe Survey is a look at where our respondents received their education that prepared them for their careers as mainframers. About 40 percent of the respondents seem to have come directly from a college, university, or a technical school. Others came to the mainframe field indirectly, relying on on-the-job training, or were self-taught—these folks undoubtedly had previous education, but relied on other paths for their mainframe qualifications.

Another excellent way to keep pace with new technologies and trends in the mainframe business is to attend trade show events. Our survey respondents have confirmed this, as over 40 percent attend 1-2 events each year (Figure 4). Surprisingly, over 10% state that they attend 3-5 events per year. Of course, in most organizations, you need corporate approval to attend events; a quarter of respondents found it easy to obtain this approval, while nearly 60% found it at least somewhat of a challenge.

On average, how often do you attend mainframe-related events in person each year?

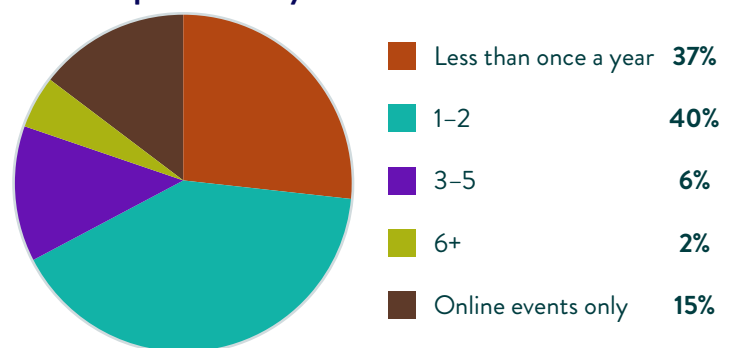


Figure 4: Number of events attended each year

Finance and business

This year, we wanted to dig deeper to quantify the importance of the mainframe in our respondents’ organizations business operations. About 20 percent of our respondents skipped this question because, not surprisingly, folks outside of management typically do not have access top that type of information. The results were still interesting, however, as more than half of the respondents indicated that over 50% of business revenue is generated by mainframe applications. The number may be higher, as some respondents may not realize that non-mainframe front-end systems often leverage mainframe applications for back-end processing.

Figure 6 shows that almost 20 percent of respondents indicate that most their organizations’ applications run on the mainframe. This is actually a shockingly large number, considering the strengths of mainframe applications (throughput, capacity, etc.) vs the strengths of non-mainframe applications (low cost, platform independence, less importance, etc.). It speaks to an exceptionally large number of mainframe applications, considering the lower computing requirements of general business applications (office applications, etc.). Even the lower end (0-25%) likely hints at a significant number of mainframe applications.

Overall IT budget

The mainframe’s weight in terms of organizations’ overall IT budget is heavy, as shown on Figure 7. These days most organizations have moved workloads that do not need to be on the mainframe to other platforms. What is left are business-critical workloads that must stay on the mainframe. Future surveys will probably not differ much from these results. (We shall see...)

What percentage of your company’s business revenue is handled by mainframe applications?

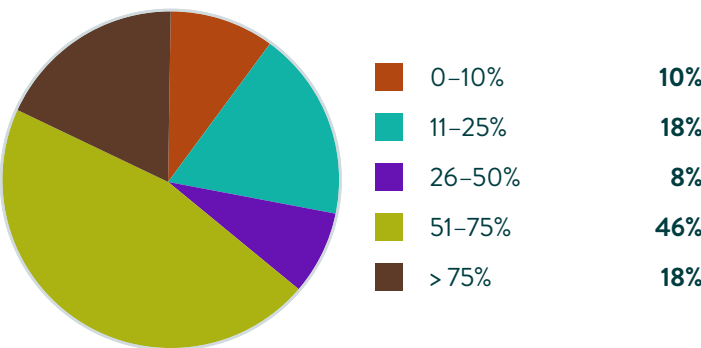


Figure 5: What percentage of your company’s business revenue is handled by mainframe applications?

What percentage of your company’s applications are running on the mainframe?

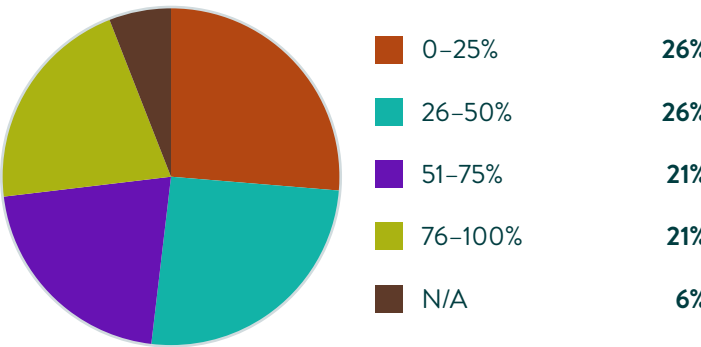


Figure 6: Percent of applications running on mainframe

What proportion of your Total IT Budget is spent on mainframe-related items vs. other platforms?

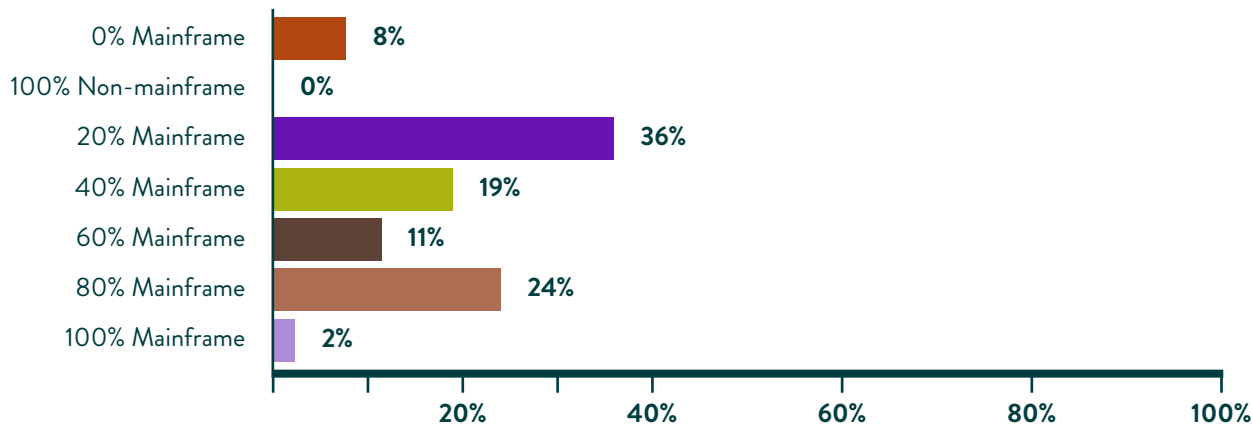


Figure 7: What proportion of your TOTAL IT BUDGET is spent on mainframe-related items vs. other platforms?

Mainframe-specific personnel costs are rising moderately over time (Figure 8), indicating a relatively stable workforce after inflation is taken into account.

My company's mainframe related personnel costs are:

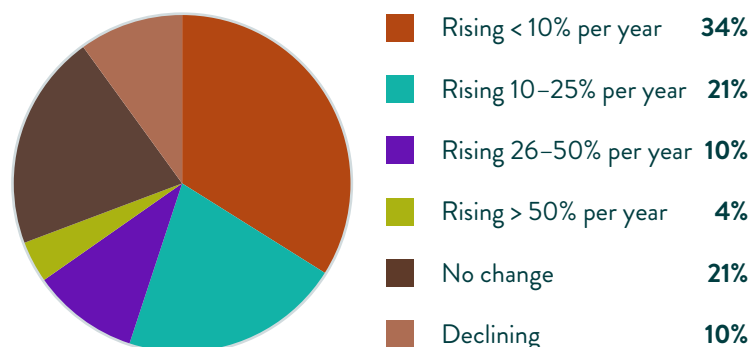


Figure 8: The company's mainframe related personnel costs

Mainframe upgrade approvals

We decided this year to investigate mainframe spending and personnel involved in mainframe upgrades. Half of the respondents “in the know” feel that getting required mainframe upgrades approved is a challenge. This should be no surprise, since, as we have seen, the costs can be significant to the company. As for the people involved in the approval process, the results were all over the map (see Figure 9). Senior executives held much sway —totalling more than 25% —but IT personnel were heavily involved as well, with consultants, architects and System Administrators combining for about 30%.

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Who typically plans mainframe processor/system/database upgrades?

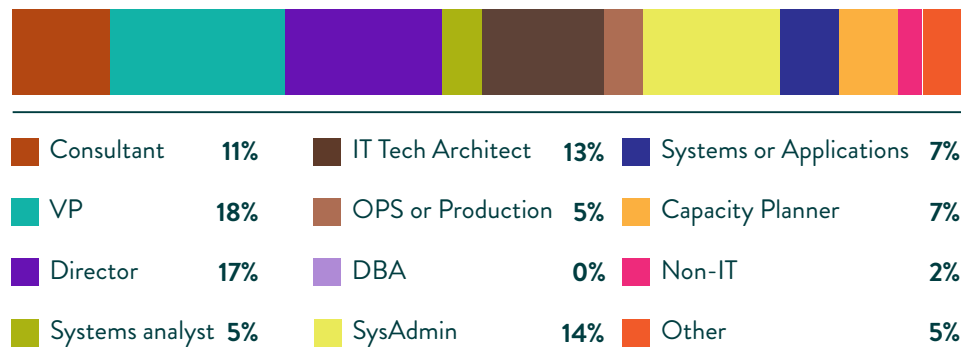


Figure 9: Who typically plans mainframe processor/system/database upgrades?

When we asked about the people involved in approvals specifically for mainframe processor, system, and database upgrades (Figure 10), senior executives were again at the forefront (according to respondents) at about 25%, but the Finance executives also held sway at over 20%. We were somewhat surprised at how little Capacity Planners were involved in these approval processes.

Who typically approves mainframe processor/system/database upgrades?

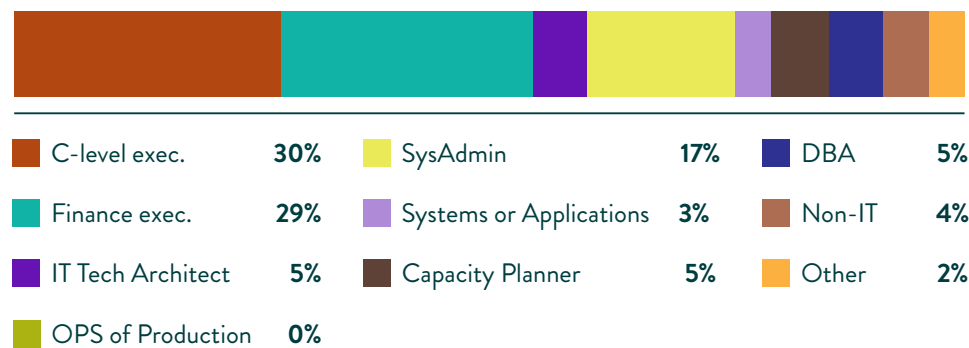


Figure 10: Who typically approves mainframe processor/system/database upgrades?

Mainframe workforce

We asked our participants about the hiring practices at their corresponding organizations—see the results in Figure 11. We can see that while companies are hiring mainframe personnel, they are hiring more Cloud personnel, and at a higher rate. Unfortunately, in terms of workforce reductions, the mainframe teams seem to be impacted more than any other personnel groups in the survey. The interpretation could lead us to believe that companies doing well financially are going to hire mainframers at a decent rate, but companies under financial pressure are going to discard mainframers before anyone else.

What are the hiring tendencies in your company for these talents/levels?

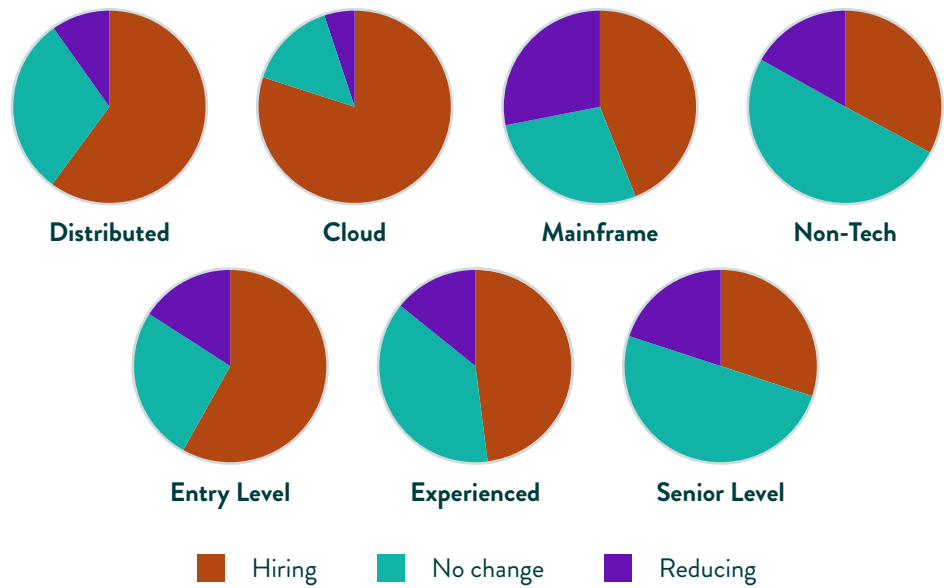


Figure 11: What are the hiring tendencies in your company for these talents/levels?

When looking at the number of application programmers working in today’s mainframe shops —see Figure 12 —we can see that the majority of respondents report teams in excess of 50 individuals. It would seem that large organizations employ large teams of programmers —this would include not just large financial services and insurance organizations, but likely includes programming consulting firms like IBM, and perhaps a number of smaller consulting firms specializing in mainframe programming outsourcing.

But respondents also indicated that companies with smaller teams represent a sizable portion of the total number of companies employing mainframe programmers. Presumably, this would include smaller financial services and insurance organizations that rely on mainframe processing, smaller outsourcing firms, as well as a number of smaller mainframe software product supplier firms.

How many mainframe application programmers work at your company?

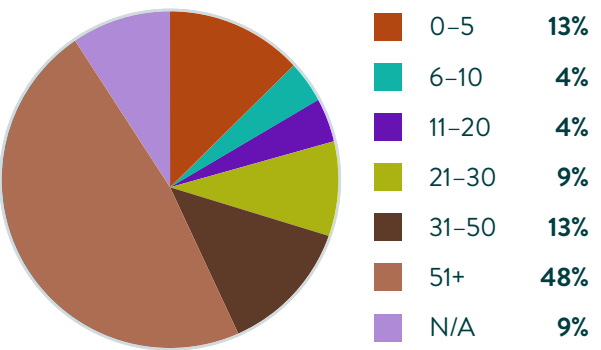


Figure 12: How many mainframe application programmers work at your company?

When comparing the number of mainframe programmers to cloud programmers —Figure 13 —we find that most companies employ many more cloud personnel than they do mainframers. This should not be a shock to anyone since many organizations leverage cloud resources for many purposes beyond transaction processing. Further to that, most folks understand that many mainframe applications are front-ended by cloud applications. It was interesting that almost 10% of respondents bucked that trend, reporting that the ratio of mainframe to cloud programmers within their organizations was 1:1. This group may represent mainframe outsourcing shops or mainframe-specific ISVs.

When asked about the stability of the mainframe teams within their organizations, respondents indicated that generally, an equal number of teams are growing versus shrinking, while the majority are unchanged over time.

What is the ratio of distributed/cloud programmers to mainframe programmers?

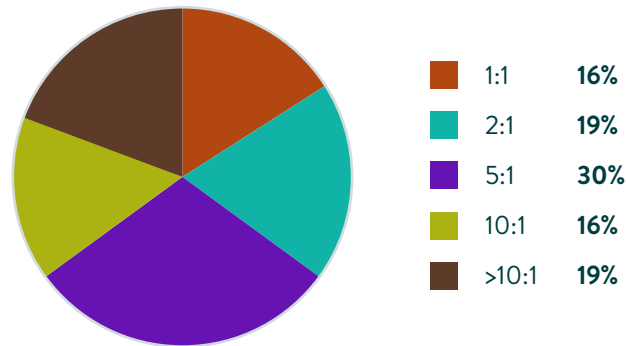


Figure 13: What is the ratio of distributed/cloud programmers to mainframe programmers?

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The mainframe environment

MIPS usage

As in previous surveys, we continue to use MIPS as the principal measure of size. We asked respondents (Figure 14) to indicate the total mainframe MIPS installed on their systems. Twenty percent of respondents had 501 to 1000 MIPS (down from last year’s figure of 36 percent). Forty percent had over 25,000 MIPS (significantly more than last year’s figure of 29 percent). It seems that most shops are ramping up on mainframe capacity; but the data could also indicate that some of the smaller shops are shutting down their mainframe operations. However, that could also mean that these smaller shops are growing, and no longer fit into the lower categories in terms of total MIPS usage.

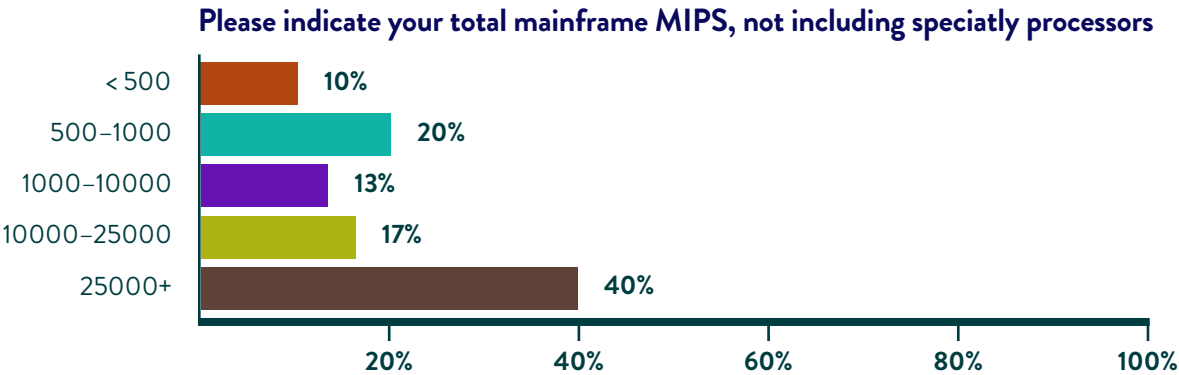


Figure 14: Total mainframe MIPS, not including specialty processors

Figure 15 shows that more than 80% of respondents’ organizations MIPS/MSU usage is growing in some way. Almost 10% have reported declining usage, while about 6% report no change. These numbers do not compare well to last year’s results, but (in hindsight) the spike in increased usage last year may have been a sharp recovery phase, as organizations corrected for Covid-related business slow-downs.

How fast is your mainframe MIPS capacity or MSU usage growing?

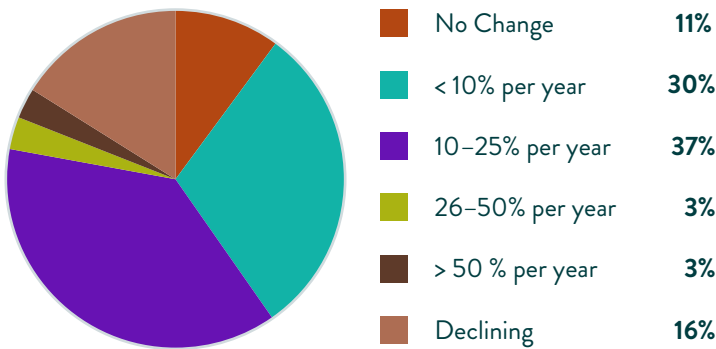


Figure 15: How fast is your mainframe MIPS capacity / MSU usage growing?

Db2 usage

According to our respondents, it looks like the majority of Db2 shops are running either Db2v12 or Db2v13 (the latest version) in their organizations' mainframe systems. In fact, Figure 16 shows that less than 5% of respondents indicated usage of a version older than Db2v12. This tells us that most mainframe shops (or at least those of our respondents) are serious about keeping up to date with their most important business-critical database. For those shops running Db2v12 or older, Figure 17 indicates that most are in the planning stages for an upgrade.

What version of Db2 is currently running on the mainframe system?

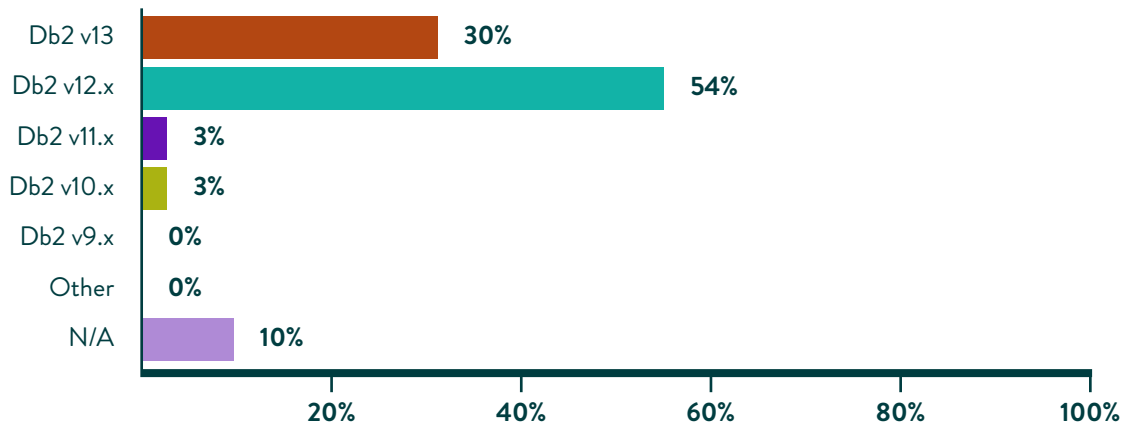


Figure 16: What version of Db2 is currently running on the mainframe systems?

Is your organization planning a Db2 upgrade?

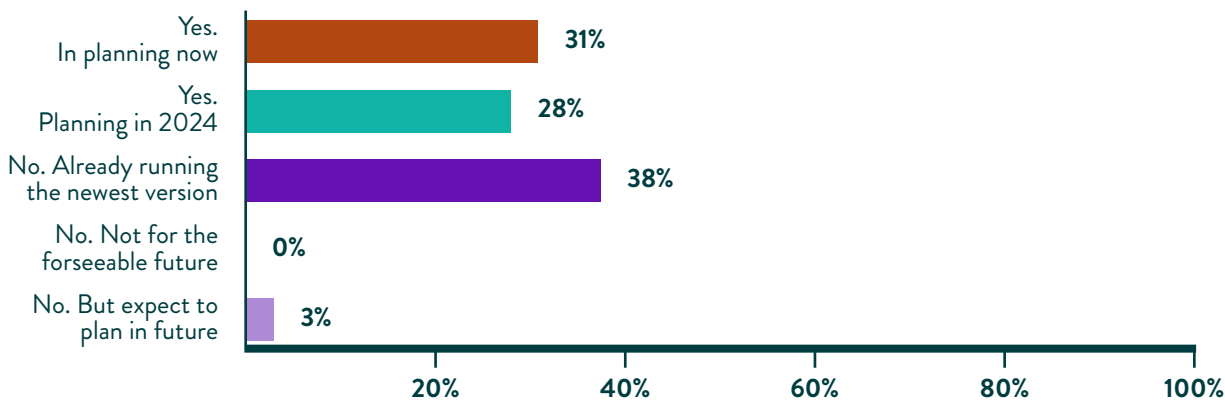


Figure 17: Is your organization planning a Db2 upgrade?

Outsourcing

Another first for this year’s survey —we were interested to know to what degree mainframe organizations are leveraging outsourcing in their mainframe operations. Our respondents indicated in Figure 18 that in about 60% of the cases, their organizations are managed entirely in-house. About 20% indicated that they invest at least partially in outsourcing, while less than 5% reported that their organizations were, in fact, outsourcing firms. This actually surprises no one considering that mainframe outsourcing agencies are sprouting up everywhere, especially offshore. We will investigate this trend in more detail in a future survey.

Are your company’s mainframe systems managed in-house or outsourced?

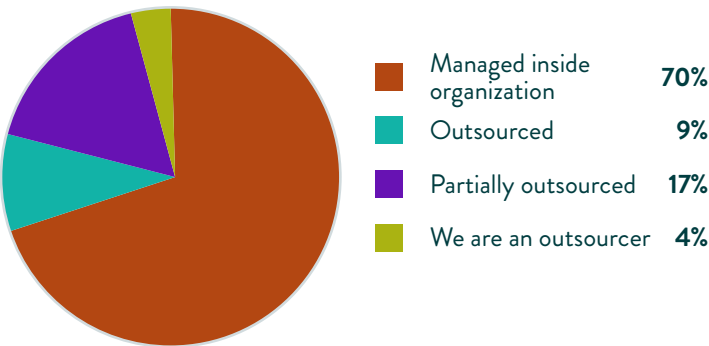


Figure 18: Are your company’s mainframe systems managed in-house or outsourced?

New and emerging technologies in the mainframe shop

According to our respondents, most of their employers are hip deep in the latest technologies within their IT organizations. More than 90% report that their companies are either using APIs today to speed up application development or are planning to do so. More specifically, 71% are already doing it. Linux adoption and Java-based applications are also immensely popular, both running at 88% either currently using or planning to do so (up significantly from last year, when Java adoption was reported at 61% adopted or planning). Splunk is now being used, or soon will be, in 69% of respondents’ organizations for IT analytics. DevOps (and/or DevSecOps) is working now in about two thirds of respondents’ organizations, with another 20%+ planning to do so. Containers and Dockers are making their mark in IT shops as well, with respondents indicating 83% and 79% current or planned penetration, respectively. These technologies have been around for about ten years, and their value is reflected in their wide-spread adoption - confirming that we are well past the early-adopters phase. RedHat OpenShift and IBM Cloud Paks are present in many shops as well, coming in at 78% and 65% current or planned penetration respectively (a quite significant increase over last year’s 12%). Even less-than-mainstream technologies are making their presence felt —RPA (Robotic Process Automation) is present in those companies whose respondents knew what it was —according to 45% of our respondents. A further 23% indicated their companies are planning to implement RPA (last year this was 14%). This is an impressive list of tech activity taking place in our respondents’ companies —but these products and toolsets are available for all platforms, not just z/OS platforms. For z/OS-specific items, respondents indicated that Zowe was either running now, or soon will be in 85% of their mainframe shops. Finally, IBM’s Tailor Fit Pricing is now running, or soon will be, in 68% of respondents’ mainframe shops.

Workload migration

We have known for years (decades, really) that workloads have been shifting from the mainframe platform to other platforms —distributed systems, and more recently, the Cloud. The truth is that many of these migrated workloads over the years were better served on non-platform systems. Workloads that don't require five-nines of reliability or transaction processing and throughput muscle —things like word processing, email handling, etc. —are obvious examples. However, by now most of these workloads have been migrated, so we were curious about today's workload migrations. Figure 19 gave us a couple of surprises. Our respondents indicated that their employers were still moving workloads off the mainframe —almost 60% indicated that this was the case. Why would this still be happening? A couple of reasons come to mind. There could be smaller, less visible, applications running on mainframe systems that are only discovered by deep analytic dives into mainframe resource usage. As candidates for migration are discovered, they are moved asap, to reduce unnecessary MIPS/MSU usage, with the hope of saving some monthly mainframe spend. This effort may or may not truly yield meaningful results, as in most cases, high-profile resource-intensive applications that don't need mainframe-type reliability, throughput, security and scalability have been migrated years ago. Today's efforts may be like preventing tears dripping into the ocean. At any rate, that is the hope. If there are IT executives out there on cost-savings missions with limited understanding of the strengths and weaknesses of platform suitability, there could be some unnecessary pain on the way. There have been hard lessons learned in the past (see <https://planetmainframe.com/2016/03/reboot-hill-revisited/>). It is our hope that decision makers are aware of appropriate platform usage (see <https://planetmainframe.com/2021/09/the-ibm-mainframe-the-most-powerful-and-cost-effective-computing-platform-for-business/>).

In my company, workloads are...

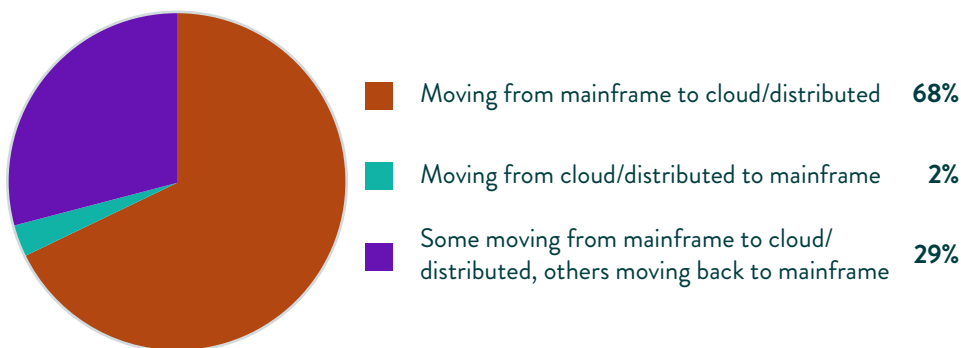


Figure 19: Workload movement

These concerns aside, 40% of our respondents also indicated that there was workload migration in BOTH directions —from mainframe to other, AND from other back to the mainframe. For the most part, these non-mainframe-to-mainframe migrations could well be corrections for earlier unsuccessful migrations off the mainframe. Are lessons still being learned?

Rules processing

One of the most important parts of a transaction processing system is rules processing — which applies to almost all transaction processing systems. The big mainframe users — banks, credit card processors, insurers, and retailers all run rules processing continuously. We were looking for details on where and how this is done. According to our respondents, 60% of their organizations run rules processing on the mainframe, while 28% offload this activity to one or more other platforms. Fishing for more detail, our respondents tell us that 17% either run rules processing from Db2 tables or embedded in their code. The first is easy to update but runs slower; the second runs extremely fast but can be time-consuming and risky to update. Twenty-one percent indicated a dedicated rules processing application — there are a variety of ways to do this including Db2 (or other database) applications, and high-performance in-memory APIs. The latter combines speed (almost as fast as embedded code) and ease of updates. Only about 8% offload this part of their mainframe processing to other platforms. This solution is the best for rules management (updates, new rules, etc.), but the delay encountered going off platform makes it impractical for real-time rules processing. See Figure 20. We will be looking more closely at this in a future survey.

Are your company's mainframe systems managed in-house or outsourced?

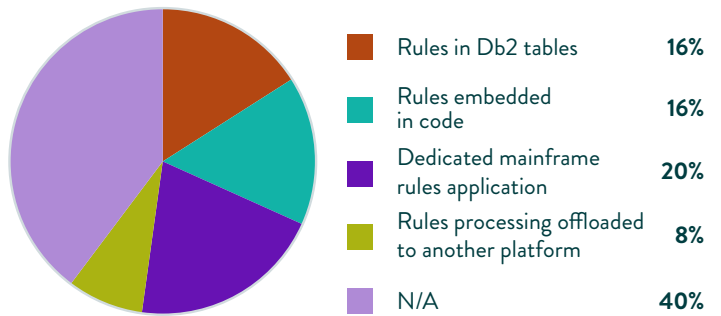


Figure 20: What techniques do you use for mainframe rules processing

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Mainframe strategy

Priorities in 2024

This year, we thought it would be interesting to ask about the top priorities for 2024 from the perspective of our respondents. Figure 21 shows that systems or application modernization was first collectively, placing in the top three priorities for the organization for about 60% of respondents. Modernization can mean different things to different folks —the term has been virtually hijacked by vendors specializing in solutions for migrating applications off the mainframe and landing them (often recreating them) on other “modern” platforms. This type of rhetoric has worked in the past, but is less effective today, as most IT professionals know which platforms are appropriate for specific types of workloads. Fortunately, the term “modernization” today has a more grounded and less marketing-ish meaning —techniques to modernize existing mainframe applications, like attaching APIs for sharing data with other platforms, etc.

What are your organizations top THREE IT priorities for next year?

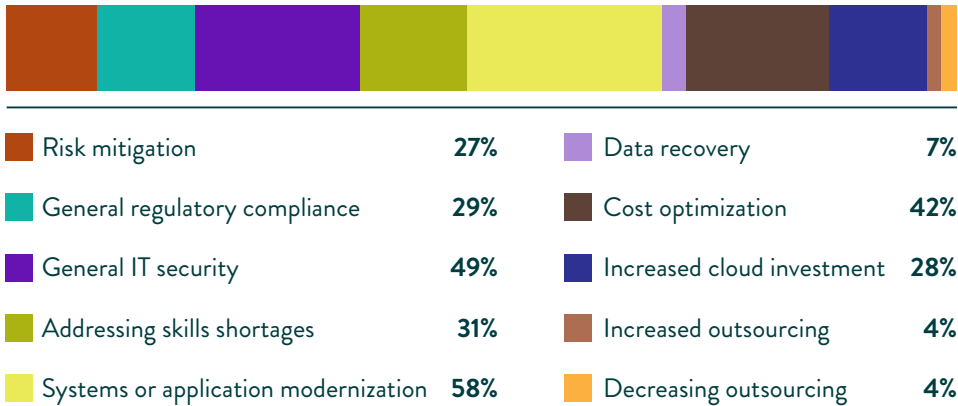


Figure 21: What are your organization’s top THREE IT priorities for next year?

The second most popular priority was General IT security, coming in at almost 50% on respondents’ top three for this year; this should surprise no one. Coming in third at just over 40% was cost optimization of the mainframe. This will not surprise many either as most mainframe shops employ capacity planners and other skilled personnel whose jobs are at least, in part, to look at this attribute. Our only hope is that there are also folks looking at cost optimization for all platforms, and for all aspects of IT. Of course, many are doing this, and we will look at this more closely in 2024.

Coming in at number four, over 30% of respondents told us that another top employer priority for this year was addressing skills shortages. For IT organizations, outside of business concerns, this can be the most crucial priority, as difficulty in replacing departing expertise can grind an important project to a halt. With baby-boomers currently retiring in droves, organizations need to change and develop new ways to accommodate an aging workforce, all while enticing younger employees and graduates. Doing both simultaneously can be a significant challenge.

Almost 30% of respondents indicated that increased Cloud investment was a top-three priority for this calendar year. This would be true for most organizations, as they strive to control general IT costs. This covers all aspects of IT —not just offloading mainframe workloads to the Cloud—but everything from offloading email servers from local datacenters to Cloud servers, to migrating local corporate HR and finance databases from on-site servers to Cloud servers.

Also in at about 30% was general regulatory compliance —this should be as important as security to all organizations, as a company can be made to suffer equally by being negligent on either matter. A notable example is Google's 2.6 billion dollar fine assessed by Europe's top court this past year.

Risk mitigation came in at over 25% of respondents indicating it is a top-three priority for this year. This can be a pretty wide-ranging topic, which could include both IT security as well as regulatory compliance, but also includes financial department concerns —e.g., looking at things like financial costs associated with not upgrading older software, opening the company up to copyright violation exposure, and assessing risks associated with engaging with offshore development consulting firms.

These were the top seven priorities, as indicated by our survey respondents. The last three on our included data recovery, increasing outsourcing, and decreasing outsourcing resulted in being a top-three priority for only about 7%, 4.44%, 4.44% respectively. The last two are of particular interest, as the temptation of lower IT personnel costs seems at odds with the actual experience of going down this road.

Mainframe use

Again this year, we asked in the survey what people thought were the main arguments against continued use of the mainframe within the enterprise. The good news was that more than a third of our respondents indicated that there were no arguments against mainframe use —this was up from only 10% last year. There were reasons why people think otherwise, however. The biggest obstacle was that mainframe operations were too expensive —over 40% of respondents cited cost as the single biggest obstacle against continued mainframe usage, which was down considerably from the 70% figure from last year, and the 55% from the year before. This type of trend is difficult to gauge but can be explained by the Covid and post-Covid financial perspectives prevalent in those years, and the more normalized perspectives as we distance ourselves from that time.

About 40% of our respondents indicated that supporting mainframe applications was a negative concern about mainframe usage; the same percentage felt that the difficulty in retaining the necessary skills was a big negative —slightly down from the 45% last year. For the last two years, 50 percent of respondents thought the cultural barrier between mainframe and other IT professionals was an obstacle; this year that dropped to less than 25% perhaps indicating that the modernization projects we talked about earlier are leading to greater cross-departmental collaboration (and understanding).

Mainframe application disposition

This year our survey also asked what people expected to happen to their legacy applications on IBM Z over the next three years and most respondents —about 60% —indicated that their apps would be maintained and actively integrated with new apps (see Figure 22). Almost 30% expected legacy apps to be enhanced with new apps, and just under 15% thought that they would be maintained but not integrated with new apps. Meanwhile, a full 20% expected that legacy apps would be ported to Unix/Linux. We were a bit surprised about that last one however it is consistent with responses to some of the other questions. That being said, the good news is that this feeling is in the distinct minority.

What do you expect to happen to your legacy applications on IBM Z over the next three years?

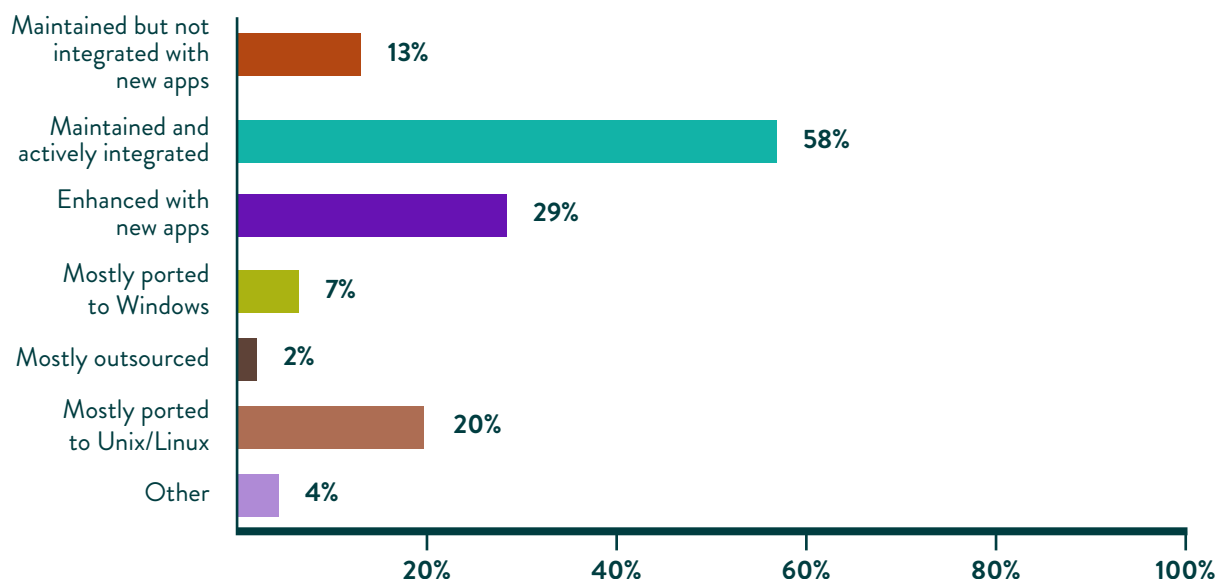


Figure 22: What do you expect to happen to your legacy applications on IBM Z over the next three years?

Modernization

We have asked about modernization in past editions of the survey, but considering the real meaning of the word, as per our Priorities discussion above, we decided to introduce some clarity in the answers this year. When asked if mainframe application modernization a priority for respondents' organizations, 18% indicated that it was not a priority. About 55% indicated that it was a priority (as in modernizing existing applications) while just over 25% indicated that it was a priority (as in replacing or off-loading applications to other platforms). While revealing a good-news-bad-news result, the reality is that of those 25% intending a migration, a good number of them will learn that just migrating the applications will be more costly than they ever imagined (in some cases necessitating a complete recoding of many thousands of lines of code), will take many years of development to replace something that already works well, and/or will never perform as well. That is the reality of large-scale migration projects.

Data archiving strategy

Most mainframers are aware of the many and varied national, state, provincial and even regional regulations dictating the length of time that ElectronicallyStored Information (ESI) needs to be retained. With this in mind, we followed up with the same question we’ve asked previously to determine whether respondents had a data archiving strategy in place that was compliant with the latest regulations. This year, 67% of respondents indicated that their data archiving strategy is fully compliant, up from last year’s figure of 44% and the previous year’s 33% (see Figure 23). Another 23% indicated that they were almost fully compliant, which is down slightly from previous years, while 10% indicated that they were not compliant, but are implementing a compliance strategy, down considerably from previous years. Clearly, compliance remains a prominent issue, and organizations are continuing to take the matter seriously.

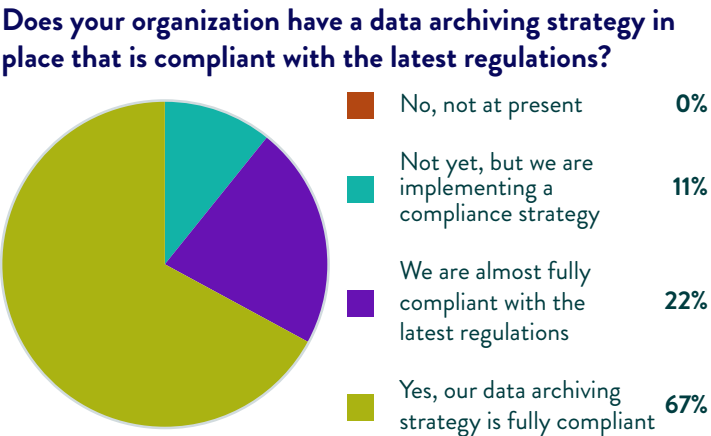


Figure 23: Does your organization have a data archiving strategy in place that is compliant with the latest regulations?

Web services/SOA

Again this year, we asked respondents whether their z/OS systems participate in Web services and SOA environments, and the results are shown in Figure 24. Fifty-six percent of respondents indicated that their mainframe systems participate partly in Web services, well up from the 33% last year. Only 24% indicated that their mainframe participates fully in Web services, which is down from last year, while last year 34% indicated their systems did not participate at all, that number was down to only 8% this year.

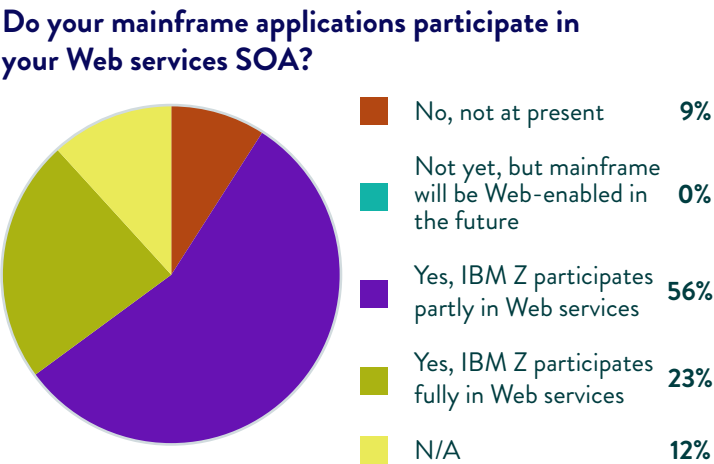


Figure 24: Do your mainframe applications participate in your Web services SOA?

Eighty-one percent of organizations said that they are web-enabling CICS (Figure 25), up from last year's value of 80% and 75% the previous year. Seventy-three percent of sites are web-enabling Db2, which is an increase on last year's 65% and the previous year's 50%. Fifty-four percent of sites are web-enabling IMS, which is up from the previous years' levels of 45%. Fifty-eight percent indicate that their shops are web-enabling WebSphere Application Server, up from 50% last year and 30% the previous year. Sixteen percent of respondents are web-enabling SAP (up from 10% last year), and 27% are web-enabling Siebel and other software, way up from last year's 5%. No surprise in these numbers for the most part; continued increases in web-enablement, as expected.

Which IBM Z middleware has your organization enabled, or plan to enable, with Web services?

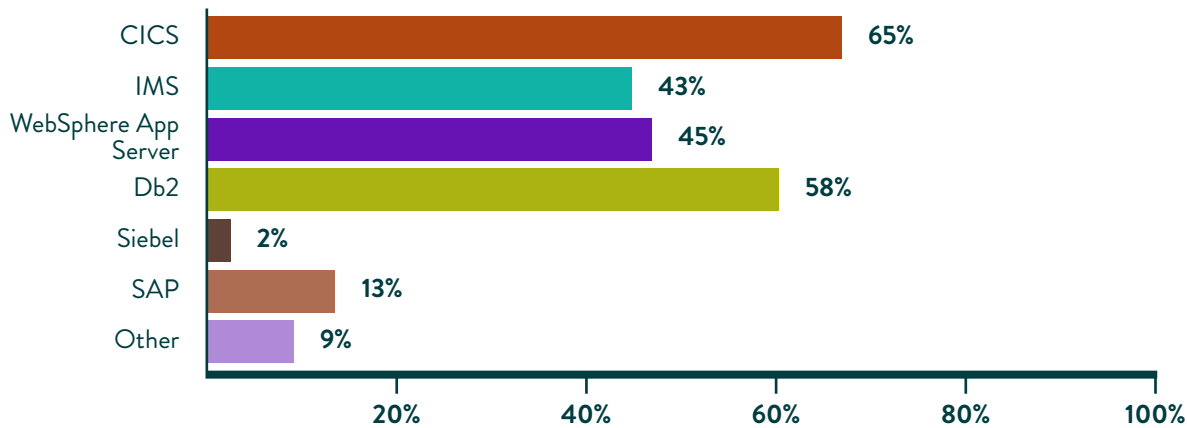


Figure 25: Which IBM Z middleware has your organization enabled, or plan to enable, with Web services?

AI/Machine learning

This year we decided to ask if anyone is implementing AI/machine learning models on their mainframe systems to integrate with current mainframe applications —the responses were surprising —see Figure 26. Nine percent of respondents indicated that they were already implementing AI/machine learning models, while another 21% indicated that they were in progress. Another 50% indicated that they were in the planning stages.

Is your organization implementing AI/machine learning models on your mainframe to integrate with your current mainframe applications?

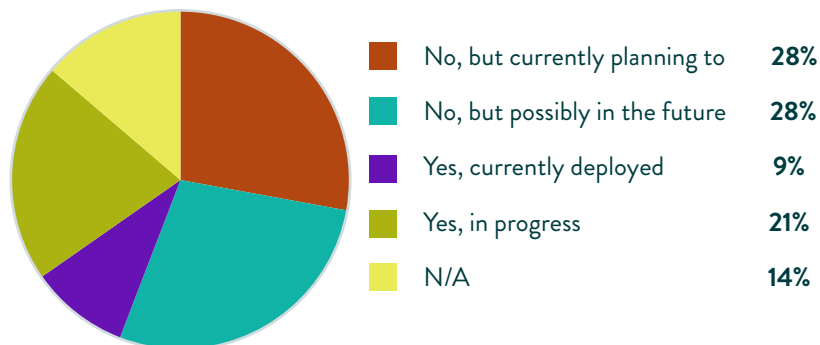


Figure 26: Is your organization implementing AI/machine learning models on your mainframe to integrate with your current mainframe applications?

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COBOL to JAVA

Previous questions in our survey have established the popularity of Java apps in our respondents' organizations, but we wanted to know if anyone out there was looking at moving their existing applications from COBOL to JAVA. Respondents came back with a resounding 60% having no interest in doing that. There was some interest however as 35% indicated that they were deploying, or planning/considering moving existing COBOL applications to Java. When asked what was motivating this potential move, many did not have an opinion, but of those who did, almost 30% indicated projected cost savings, another 30% indicated that they wanted to facilitate the skillsets of new programmers. Almost 40% indicated that they saw it as a way to get off the mainframe, while another 5% indicated that it was just a new business strategy.

Mainframe in-memory techniques

We asked survey participants about their use of third-party mainframe in-memory technology, and what, if any they have deployed. Twenty-five percent of respondents indicated that their organizations were running 3rd-party in-memory solutions, while 40% indicated that they were not, relying solely on Db2 and other buffering techniques. Another 35% indicated that they were using no third-party in-memory technology. It would seem that up to 75% of mainframe shops may not be getting the performance they could be getting out of their mainframe systems. IBM and a small number of ISVs provide enhanced in-memory technology (Is this the best kept secret in the mainframe world?)

Mainframe ISVs

We all know that most mainframe shops have invested a fair amount in non-IBM software for their z/OS mainframe systems, but we wanted to quantify it, so we included a couple of ISV-related queries in the survey. When we asked about budget balance between IBM software vs ISV software, we got some interesting results. Not surprisingly, about 75% of respondents indicated a heavy preference for IBM software (about the same as last year). However, of these, a full 50% indicated that the ratio was 60% IBM vs 40% ISV! Even more interesting, about 25% indicated a majority of ISV products —more than IBM products. Ten percent indicated a heavy reliance on ISV software! See Figure 27.

How much of your organization's mainframe software budget is spent on IBM software vs. independent software vendors?

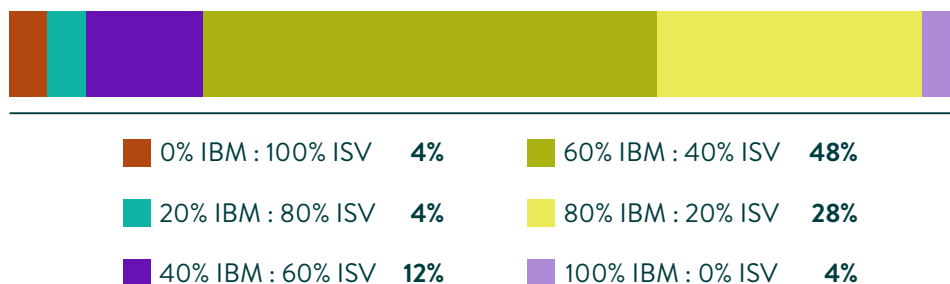


Figure 27: How much of your organization's mainframe software budget is spent on IBM software vs. independent software vendors (ISVs)?

When asked about the reasons for software product replacement, more than 50% of respondents indicated cost reduction was the biggest reason (typically moving from IBM or larger ISV products to products from smaller ISVs. Only slightly more than 10% indicated that increased product functionality was the reason —it would seem that price matters is the take-away from these two data points. About 15% indicated that improved vendor service was the mitigating factor —a lesson to be learned there. Finally, more than 15% indicated that software replacement comes down simply as an effort to reduce the total number of vendors involved in their mainframe environments —that would seem to be good news for IBM, and bad news for smaller ISVs.

Cloud integration in mainframe shops

With flexibility, responsiveness, and cost, fuelling the journey to the Cloud, we asked several questions about Cloud adoption within organizations that run mainframe systems. Regarding whether or not companies operate hybrid cloud environments, 67% of the respondents indicated that their organizations did (up from 42% last year and 21% the previous year). About 15% reported that they did not (down sharply from last year’s 40%), while another 15% indicated that they were in the planning stages to set up hybrid cloud environments (about the same as last year). It should be noted that hybrid environments are specific Cloud implementations —while almost all companies leverage the Cloud in some way, a hybrid environment is a very specific Cloud implementation in mainframe shops.

Cloud data capacity in mainframe shops

When asked about the growth of Cloud data capacity within their IT environments, just under 50% of survey respondents reported a growth of 10-25% per year. About 20% reported less growth, while another 25% reported more growth. No respondents reported declining Cloud data capacity. Expectations last year were a little lower —30% expected no growth, and 40% expected growth between 11 and 25%.

When asked about the proportion of enterprise data residing on the mainframe vs the Cloud, survey respondents were all over the map (see Figure 28), but the largest group (30% of respondents) reported that their organizations’ ratios were 80% on the mainframe and 20% in the Cloud. In general, mainframe shops seem to remain somewhat risk-averse when it comes to their valuable data.

What proportion of enterprise data resides on the mainframe vs the cloud?

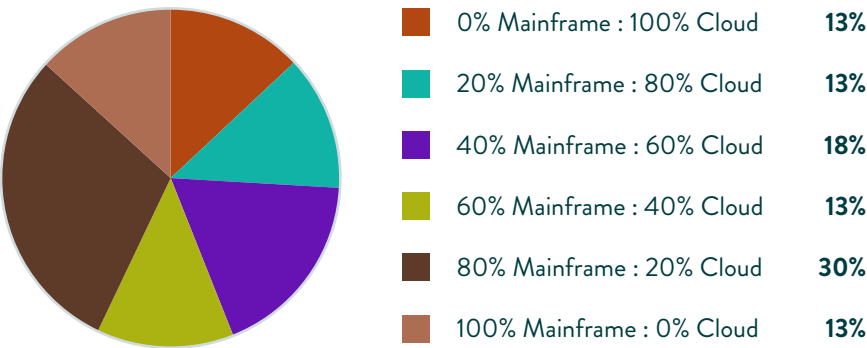


Figure 28: What proportion of enterprise data resides on the mainframe vs the cloud?

When it comes to which Cloud providers, respondents' organizations leveraged, they indicated AWS at about 70% - up from 35% last year, followed by Azure at 60% - up from 25% last year —see Figure 29. Google came it at about 30% - up from less than 15% last year. Last year 30% of respondents indicated that their organizations were not using the Cloud at all —that number was only about 10% this year. Clearly, many shops are using multiple Cloud vendors, which should not be a surprise considering the likelihood that organizations may tend to leverage one vendor for Cloud data storage and another vendor for DevOps, etc.

Which of the following cloud providers does your organization use?

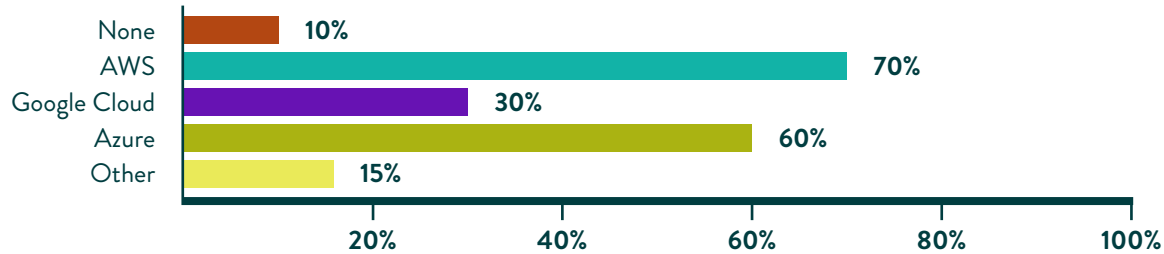


Figure 29: Which of the following cloud providers does your organization use?

When asked if respondents thought that their company's mainframe systems may one day be replaced entirely with the Cloud, only about 10% thought that would happen (see Figure 30). Most respondents said no, but just under 30% thought that mainframe usage would decrease over time, 25% indicated that mainframe computing would be maintained, while over 30% said that mainframe capacity would likely grow over time.

Do you see the mainframe eventually being replaced entirely by the cloud?

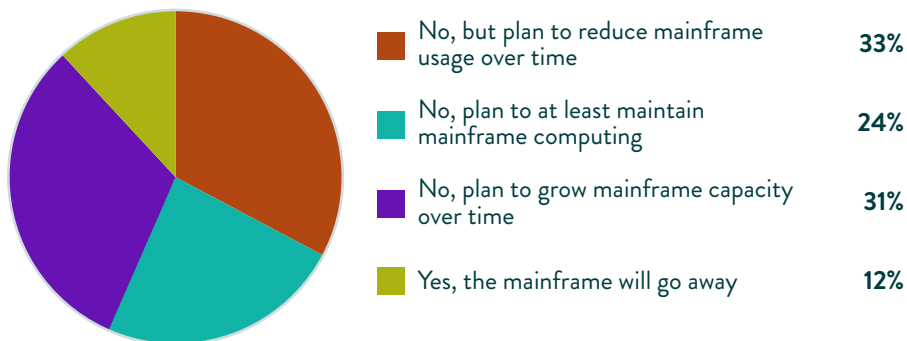


Figure 30: Do you see the mainframe eventually being replaced entirely by the cloud?

Analytics in mainframe shops

If you have spent any time on the IBM website over the last two years or more, you will be aware that analytics is a major focus for them both in general, and within the context of the mainframe. This year we decided to try to get a clearer picture of analytics penetration into our survey participants mainframe shops. When asked about which products applicable organizations are using, two-thirds indicated IBM analytics products, while 23% indicated third-party analytics tools, while another 10% indicated both IBM and third-party tools.

Query types

When asked if respondents' organizations are running both long queries (analytics) and short queries (transaction processing) on their Db2 databases, 65% indicated yes, and 12% indicated no. The takeaway is that most mainframe shops are running analytics on their mainframe systems.

Query optimization

When asked if their Db2 queries were being optimized, 22% of respondents indicated that they were optimizing their long queries, while less than 5% were optimizing short queries. Interestingly 60% said that they were optimizing both. The take-away from this could be that many shops are “optimizing” long and short queries using the same toolsets. The problem is that any tool intended for optimizing long (analytics) queries will do little or nothing to do any real optimization of short queries. (The reverse is also true.) On the plus side, most companies may be doing a good job at optimizing their analytics queries —and it is almost always needed. The bad news is that it is entirely possible that most mainframe shops are not optimizing their short (transaction processing) queries properly, or at all. And what do most companies use their mainframe systems for, primarily? You guessed it —transaction processing.

Analytics usage

We asked our survey participants about whether their organizations are using mainframe analytics for chargeback or cost allocation. Over 40% of respondents indicated that they did not; about 30% said that they did. The truth is that not all companies leverage chargeback techniques between corporate departmental borders. The unfortunate thing about this is that if companies are using analytics on both sides of their IT organizations —the distributed & Cloud side AND within the mainframe silo —companies would have real financial data about the cost-effectiveness of their various platforms. Once that becomes apparent, the real value of mainframe computing comes to light. This should eventually be in favor of the mainframe, as once the bean-counters dig into dollar-focused analytics, nothing will stop them. Good news ahead for the mainframe?

Finally, when asked how their organizations use analytics, more than 40% of respondents indicated that the purpose is to identify application resource consumption (Figure 31). About 40% also indicated their goals included combining capacity and performance data with business volume data. Another 40% of respondents were using analytics to broaden visibility of mainframe and server data outside the IT operational department. This is a good start, but until similar data points can be compared between platforms —necessitating tools that can be applied to multiple platforms, some important comparisons will be difficult/impossible. The good news is that there are some third-party tools out there right now that do decent job of it.



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How does your organization use IT analytics?

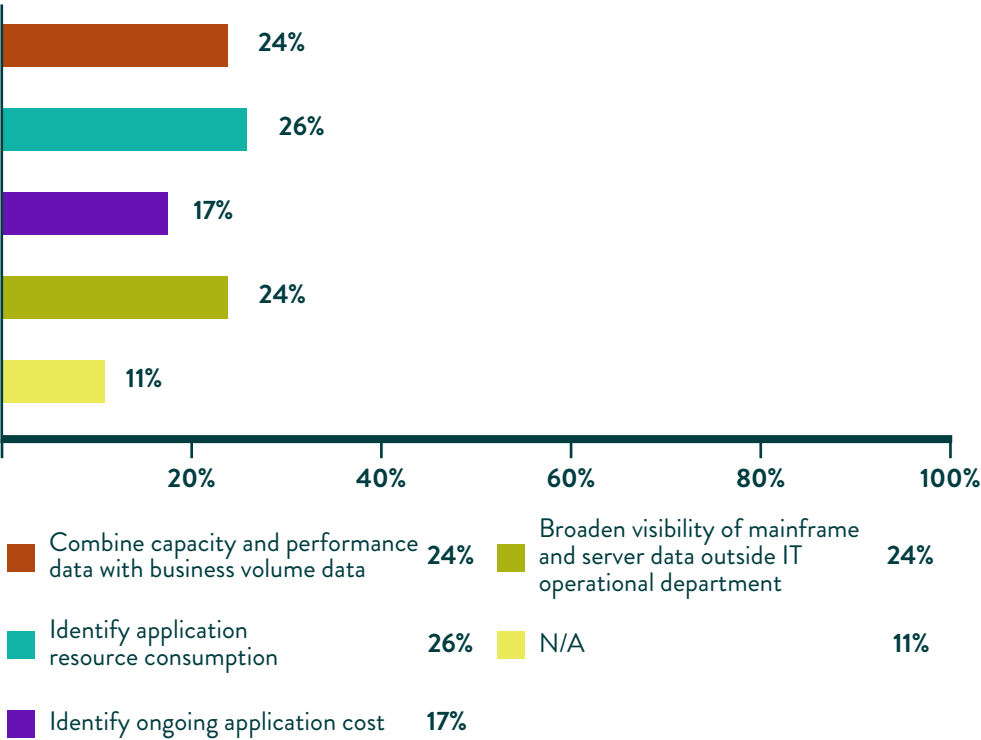


Figure 31: How does your organization use IT analytics?

Security in mainframe shops

We’ve made enquiries about security in mainframe shops in past years —this year we decided to dig a little deeper. We think that shops are realizing is that security by obscurity is no longer valid, and mainframe shops are much more cognisant of threats, and much more active in preventative measures.

Pervasive encryption

The IBM mainframe now boasts a pervasive encryption feature (starting with the z14 version), and we wondered how many shops out there are using it. Our survey respondents indicated that about 50% of their organizations were currently implementing pervasive encryption on their mainframe systems (see Figure 32). Another 15% indicated that they were actively deploying it, and another 25% indicated that they were planning to deploy it in the future. Slightly more than 10% indicated that they had no plans for pervasive encryption deployment.

Does your mainframe shop use pervasive encryption?

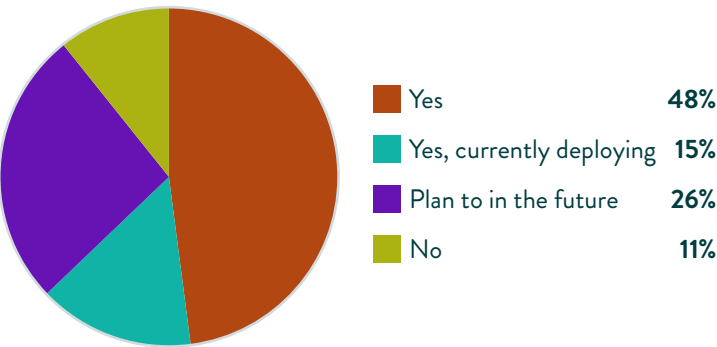


Figure 32: Does your mainframe shop use pervasive encryption?

When asked if the offering of pervasive encryption was an influence on an upgrade decision by their organization, half of the respondents indicated that it was, and half indicated that it was not. Perhaps some are worried that using the feature might slow systems down.

Security audits

One can measure how serious an organization is about security by looking at how much security testing they perform —both internal and external testing. When we asked our survey participants if their organizations have their mainframe systems penetration-tested by internal or external mainframe security experts, about 30% indicated that internal testing had been done. More than 20% indicated that their organizations had done penetration testing by external auditors, while more than 30% reported that they had done both internal and external testing. Almost 15% admitted that they had done no penetration testing at all.

When asked if their organizations had found vulnerable mainframe user accounts in a security audit, 30% admitted that they had, while 70% indicated that they had not. When asked if their organizations had discovered unauthorized techniques used to access the mainframe, 25% indicated that they had, while 75% said that they had not.

Finally, we asked our participants if their organizations had implemented a hardened zero-trust security stance on their mainframe systems, our respondents indicated that 60% had, and 40% had not. At the end of the day, it is worth noting that our security questions had the highest rates for “I don’t know” answers and unanswered.

Conclusions

As always, it was an interesting survey this year. Some respondents indicated that the survey was too long —we are listening —and we plan to offer smaller, more focused surveys in the future. We always appreciate your feedback.

New technologies

What was once new, is new again. Technology uptake continues on the mainframe side of the datacenter, as growth has been seen in almost every way. After starting on distributed systems and continuing on the Cloud, technologies like Splunk, DevOps (and DevSecOps), and APIs (to speed up application development) have penetrated the mainframe space over the last number of years and continue to grow their presence at an accelerated rate. The same goes for products like Liberty, Containers/Dockers, Red Hat OpenShift, Java-based applications, IBM Cloud Paks, and even Robotic Process Automation continuously growing usage on the mainframe side. Mainframe-specific technologies like Zowe and Tailored Fit Pricing are being adopted at an increasing rate as well.

Follow the data, follow the money.

We took a close look this year at the mainframe’s place within the corporate IT departments, and its visibility and perceived value to the corporation (as understood by survey participants).

We have seen that the majority of a corporation's enterprise data resides on the mainframe —Figure 28 gives us an idea of how much data. While the numbers don't lie, it is likely, since the mainframe is being used primarily for transaction processing, with most or even all of a corporation's most valuable data residing on the mainframe. While this data may be shared with other platforms —Cloud and local distributed systems —its primary residence is the mainframe. The mainframe very probably houses less valuable corporate data as well, however the ratio of very-important-data to less-important data on the mainframe is almost certainly very high. This is highly likely not the case for non-mainframe platforms, as they house most of a corporation's non-transactional data —user file backup, email systems, HR data and everything else under the sun. To be fair, all of a corporation's data is important, no matter which platform is used. However, the ratio of very-important-data to less-important data on these systems is considerably lower than that of the mainframe.

Conversely, Figure 7 indicated quite clearly that the majority of an organization's total IT budget is consumed by their non-mainframe system and related costs. Additionally, the platform handling the organization's most valuable enterprise data —the mainframe —also handles most of the revenue generation for the organization, as shown in Figure 5. This disparity may not be as egregious as it might seem at face value, as the cited article (<https://planetmainframe.com/2021/09/the-ibm-mainframe-the-most-powerful-and-cost-effective-computing-platform-for-business/>) explains, these other platforms are just more costly to run when all aspects of computing costs are taken into account. Even so, these non-mainframe systems play important roles in corporate IT —the different platform types just have different strengths.

Having said that, the mainframe has been under siege for a long time, and it continues to this day, albeit to a slightly lesser extent, as workload migration is getting harder to justify. (There is just no way for Cloud and distributed systems can compete on cost with the mainframe for high-value, high-intensity transaction processing workloads.) Figure 22 illustrates this —the majority of mainframers, at least think that the mainframe and its business-critical applications will be around for a while yet.

In the end, we believe the mainframe will (and should) maintain its place in large corporate datacenters. We believe that IT (and business) analytics are a new and powerful ally for the mainframe. Some of the analytics solutions available today are starting to measure like data from multiple platforms. Because analytics gives business analysts a better picture of what's actually happening in the datacenter, analysts are going to get a more clear picture of the business value of different platforms, and eventually, which platforms are most cost effective (without technical bias). And that can only be good news for the mainframe.

To risk a cliché, the mainframe is still alive, and it isn't going anywhere.

Arcati Mainframe Vendor Directory

21CS
 ABIS
 adesso Transformer Deutschland GmbH
 Advanced Software Products Group Inc (ASPG)
 Applied Performance Technologies, Inc
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 Baer Consulting, Inc
 Black Hill Software
 Bsecure
 Can Do Systems, Inc.
 Cartagena Software Limited
 CPT Global
 CSE
 DataKinetics
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 SecuriTeam Software Ltd.
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 Systementwicklung
 The Source Recovery Company Inc
 TONE Software Corporation
 Trident Services
 Vertali
 zdevops

21CS

Product/Service Information:

Product families developed by 21CS experts lie in the areas of data and storage management, resiliency, analytics, and system and operational tools.

Since 1992, 21CS has been developing solutions for foundational disk and tape migration solutions, as well as providing migration services with thousands of successful migration engagements completed.

In June 2021, 21CS entered an Agreement to License z/VSE Operating System and Middleware Stack from IBM, releasing its first version of the operating system in 2022. 21CS is prepared to effectively maintain and improve upon the OS and middleware stack well into the future.

Activity: Software vendor

Specialist areas: System management, Data management, Storage management, Asset and change management, Cloud/mainframe modernization

Mainframe platforms supported: z/OS, VM/VSE

Non-mainframe platforms: Linux, Windows

Software pricing options: One-time charge, Monthly/annual license charge, Processor/capacity-based pricing, Workload/usage-based pricing

Address: 940 W Valley Rd Suite 1604 Wayne, PA 19087 USA

Phone: +1 800-555-6845

Email: info@21cs.com

Website: www.21cs.com

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ABIS

Company profile:

ABIS Training & Consulting provides technological ICT services, mainly for large and medium-sized enterprises.

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Product/Service Information:

- z/OS-based technologies: z/OS, USS, Db2, IMS/DM, TSO, CICS/TS, IMS/TM, COBOL, PL/I, REXX, and also IBM Developer for System z (IDz)
- Linux and UNIX
- Databases and Big Data Infrastructure: DB2, Oracle, MySQL & MariaDB
- Websphere Application Server
- IBM MQ
- Networking and Internet Security
- ITIL
- Artificial Intelligence (AI) and Machine Learning (ML)
- Programming: COBOL, PL/I, Java, Python

Activity: Education/research

Specialist areas: System management, Data management, Programming/testing, Web integration and legacy reengineering tools

Mainframe platforms supported: z/OS, Linux on IBM Z

Non-mainframe platforms: Power Systems, AIX, Other Unix, Linux, Windows, Cloud

Address: Diestsevest 32/4B, 3000 Leuven, Belgium

Phone: +32-16-245610

Email: training@abis.be

Website: www.abis.be

Region: Europe / Middle East / Africa

adesso Transformer Deutschland GmbH

Company profile:

adesso Transformer stands for economic and tailor-made application modernization of Mainframe Legacy Applications. The success of our approach is based on a hybrid modernization mix consisting of automatic code transformation, replacement by standard software, reengineering and replatforming. Our range of services includes consulting, conception and implementation of the best fitting migration and modernization strategy for the customer.

Product/Service Information:

We support your company in modernizing your legacy applications - from the first analysis to migration, implementation and maintenance. Together we select the best possible modernization option for your company. Our adesso Transformer Tool Suite enables us to transform your legacy applications fast and inexpensive into modern architectures and programming languages.

Activity: Systems integrator / VAR

Specialist areas: Web integration and legacy reengineering tools

Mainframe platforms supported: z/OS

Non-mainframe platforms: Linux

Software pricing options: Other

Address: Adessoplatz 1, 44269 Dortmund Germany

Phone: +49 231 7000 7000

Email: office@adesso-transformer.com

Website: https://www.adesso.de/de/adesso-transformer/

Region: Europe / Middle East / Africa

Advanced Software Products Group Inc (ASPG)

Company profile:

Headquartered in Naples, Florida, Advanced Software Products Group, Inc. has provided the IT community with cutting-edge software solutions, support, and services since 1986. With a worldwide network of support, including active roles as an IBM Partner in Development and Microsoft Certified Partner, ASPG remains a leader in the optimization of data center performance. ASPG offers innovative software solutions for Data Security, Storage Administration, Capacity Planning, System Productivity, and CICS Productivity. Data centers worldwide have made ASPG software solutions their products of choice.

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- Mainframe Data Encryption [MegaCryption]
- IDMS Data Encryption [MegaCryption IDMS]
- IMS Data Encryption [MegaCryption IMS]
- Password Reset & Synchronization [ReACT]
- RACF Administration & Reporting [ERQ]
- DB2 Encryption [MegaCryption DB2]
- Cryptography Management [CryptoZ]
- SMF Data Management [SMFUTIL]
- ICF Catalog Management [CIM]
- On-line CICS Help [Help/Key]
- RACF Auditing & Reporting [ERA]
- User Provisioning [ProACT]
- Offline Access Recovery [OAR].



Activity: Software vendor

Specialist areas: System management; storage management; security; other

Mainframe platforms supported: z/OS

Software pricing options: Monthly/annual license charge

Non-mainframe platforms supported: IBM i, AIX, Other Unix, Linux, Windows, Other

Pricing options: Monthly/annual license, other

Address: 3185 Horseshoe Drive, South Naples, FL 34104, USA

Phone: 239 649 1548 or (800) 662-6090

Email: aspgsales@aspg.com

Website: www.aspg.com

Applied Performance Technologies, Inc

Company profile:

Applied Performance Technologies, Inc. is a 21st-century IT Capacity and Performance Management company offering solutions designed for busy, cost-conscious IT professionals who want maximum value and performance.

Product/Service Information:

PerfTechPro's zAnalytics® is a software solution to provide automated data collection, analysis, reporting and modeling. It is a Capacity Planning and Performance Measurement tool specifically designed for the cost conscious and savvy 21st Century data center. zAnalytics is the next evolution in Mainframe Capacity Planning tools.

Activity: Software vendor

Specialist areas: System management

Mainframe platforms supported: z/OS

Software pricing options: Monthly/annual license charge

Address: 4071 Heather Ct. Northampton, PA 18067-9572 USA

Phone: 855.737.3832

Email: info@perfttechpro.com

Website: www.perfttechpro.com

Region: USA / Canada / South America

Atos

Company profile:

Atos is a global leader in digital transformation with 110,000 employees and annual revenue of c. € 11 billion. European number one in cybersecurity, cloud and high-performance computing, the Group provides tailored end-to-end solutions for all industries in 69 countries. A pioneer in decarbonization services and products, Atos is committed to a secure and decarbonized digital for its clients. Atos is a SE (Societas Europaea), listed on Euronext Paris.

Product/Service Information:

Wherever our clients are on their digital journey, we'll help them manage, optimize, integrate and future-proof mainframe in today's hybrid technology world. We'll reduce risk, increase efficiency, and empower them to modernize and innovate at the pace and scale that's right for them.

Our services:

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We help our clients unleashing the full potential of the mainframe by connecting the platform to the cloud.

Mainframe modernization to AWS cloud

Our CloudCatalyst for AWS solution accelerates mainframe transformation journeys to public cloud to support new business processes, migrating critical workload and applications to AWS cloud.

Activity: Outsourcing/mainframe hosting services

Specialist areas: System management, Data management, Storage management, Asset and change management, Security, Cloud/mainframe modernization

Mainframe platforms supported: z/OS, VM/VSE, Linux on IBM Z

Non-mainframe platforms supported: Power Systems, IBM i, i5/OS, and OS/400, Power Systems, AIX, Other Unix, Linux, Windows, Cloud, Other

Software pricing options available: Monthly/annual license charge, Processor/capacity-based pricing, Workload/usage-based pricing, Other

Address: 80 Quai Voltaire, 95877 Bezons, Paris, France.

Phone: + 33 1 73 26 00 00

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Website: https://atos.net/mainframe

Region: USA / Canada / South America, Europe / Middle East / Africa, Asia Pacific

Baer Consulting, Inc

Company profile:

Founded in 1982, Baer Consulting Inc. (BCI) is a Managed Solutions Provider of IBM Mainframe services and support. BCI helps mainframe decision makers avoid the hassle and complexity of planning, managing, and deploying On-Premise / Off-Premise Private Cloud services to meet today's business demands. We deliver solutions that provide greater security of a private cloud with reduced investment cost and faster time-to-value from a public cloud.

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Product/service information

zManaged Mainframe Services

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- zSystems Maintenance, Upgrades
- SW /HW License Support
- Multi-Vendor ISV Support
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Mainframe Hosting

BCI's Mainframe Hosting Services is designed to help you better align IT services to business priorities by helping speed the digital transformation process while reducing management risk and the overhead expenses of maintaining your own Enterprise Server on-premise.

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Activity: Mainframe Managed Services Provider, Consulting

Specialty Areas: Systems Management, Mainframe Hosting, Modernization, Outsourcing, Disaster Recovery

Platforms supported: z/OS, z/VM, z/VSE, Linux on Z, IBM I, Linux, Unix, AIX, Linux, Windows

Address: 28154 Meadow Trail, Conifer, CO 80433

Phone: 303-838-3374

Website: www.Baer-Consulting.com

Sales contacts:

America: +1.303.838.3374x140

zSystems Disaster Recovery

Baer Consulting, Inc. (BCI) has developed a method to produce immediate results and then refocus the issues of Mainframe Disaster Recovery back to the user community where the responsibility remains. The BCI technical and management team conducts offsite Mainframe Disaster Recovery tests for our contracted support clients semi-annually. Expertise and familiarization with the major offsite testing, disaster recovery (hot-site) facilities, and processes enable us to meet and/or exceed auditing expectations. BCI's success at disaster recovery situations is largely attributed to the ability to build and activate an entire system within the first day, allowing more time for user testing. Once the Mainframe Disaster Recovery test has been completed, the client will receive comprehensive reports and documentation of the recovery process, including known and unknown recovery requirements. With these documented results, a technical staff will be better prepared for future recovery support.

Black Hill Software

Company profile:

Black Hill Software is based in Australia and has been developing and selling the EasySMF family of tools since 2010.

Product/Service Information:

The EasySMF tools simplify and modernize SMF processing. The original EasySMF Windows Software provides a suite of SMF reports designed to help Systems Programmers manage z/OS systems and investigate problems.

Several Java based tools are also available. EasySMF:JE provides Java classes to map SMF records for custom or ad-hoc reporting. SMF records and reports can be converted to JSON for further processing by other tools. EasySMF:RTI connects to the z/OS SMF Real Time Interface and allows real time SMF reporting using Java. EasySMF:Events connects to the SMF Real Time Interface and forwards event data from SMF to Splunk.

The Java reporting tools can run on z/OS using zIIP processors, or on other Java platforms.

Activity: Software vendor

Specialist areas: System management, Storage management, Cloud/mainframe modernization

Mainframe platforms supported: z/OS

Software pricing options: Monthly/annual license charge

Address: 28 University Drive, Mt Helen VIC 3350, AUSTRALIA

Phone: +61 3 5331 8201

Email: info@blackhillsoftware.com

Website: www.blackhillsoftware.com

Region: Asia Pacific

Broadcom Mainframe Software Division

Company profile:

Broadcom Mainframe Software Division empowers enterprises to amplify the value of their Mainframe investments in ways that drive their business forward. Our market-leading DevOps, AIOps, Cybersecurity & Compliance, Data Management, and Foundational & Open Software solutions enable clients to adopt common tools using industry standards and integrate mainframe as part of their hybrid cloud. Our commitment to partnership extends beyond software, where we invest to deliver ever-greater value, and features Beyond Code programs that give customers the power to achieve greater business success with the platform.

Product/Service Information:

Broadcom continuously invests in people, skills, and technologies to deliver ever-greater value to customers. We also partner in ways that go far beyond software so enterprises can amplify the value of their mainframe and achieve greater overall success with the platform. This includes a broad collection of no-cost offerings to provide unique support where and when you need it in areas such as skills-building, workforce cultivation, flexible licensing, no-fee rationalization, knowledge sharing, white-glove support for change events, and more.

Operational Analytics & Management: Combine big data, machine learning and AI with mainframe expertise to deliver meaningful and actionable insights to augment and automate day-to-day operations and deliver exceptional customer experiences.

Automation: Reduce manual effort by enabling customers to proactively optimize resources and orchestrate automation across enterprise applications and systems.

Databases & Database Management: Store, organize, and manage mainframe data to ensure optimal performance, efficient administration, and reliability of critical systems.

Application Development & Testing: Accelerate software delivery while increasing code quality. Our open-first strategy helps customers modernize their mainframe environment through open source and open application programming technologies.

Identity & Access Management: Manage and elevate mainframe access with modern practices such as multi-factor authentication and managing access for privileged users.

Compliance & Data Protection: Locate and protect sensitive mainframe data to ensure compliance, identify risk and proactively respond to bad actors.



Activity: Software vendor.

Specialist areas: System management; data management; storage management; cybersecurity and compliance; AIOps; DevOps; foundational and open solutions; asset and change management; programming/testing; network performance/management;

Mainframe platforms supported: z/OS, VM/VSE, Non-mainframe platforms supported: IBM i, AIX, Unix, Linux, Windows

Pricing options: Monthly/annual license, processor/capacity-based, workload/usage based, other

Address: 1320 Ridder Park Drive, San Jose, CA US 95131, USA.

Phone: +1 408-433-8000

Web: mainframe.broadcom.com/

Sales contacts:

America: +1 408-433-8000

EMEA: +49 6085 98713-21

AsiaPac: + 86-10-8477 6300

Security Insights Platform: Ensure a trusted environment for customers and their employees by quickly interpreting and assessing mainframe security posture and developing remediation steps.

Bsecure

Company profile:

Bsecure - The Mainframe & Security Company, is one of the major players in Security, auditing, and compliance in z/OS mainframe environments.

We have the only course in the world through the internet to train members of the red team, IT risk departments and IT auditors: VA-080

With more than 30 years of experience, we help our customers to cover the lack of experience and knowledge in security and audit environments for

infrastructures based on Mainframe, protect sensitive data of your company, and comply with the most demanding international regulations: DORA NIS 2, DISA STIG, ISO 27001, NIST, GDPR.

We have developed a new infrastructure called Bsecure DataPASS Hub to help the main MSSPs, and large consulting firms worldwide produce auditing and treat hunting services in z/OS mainframe environments without hiring professionals with dozens of years of experience.

Activity: Consultant

Specialist areas: System management, Security

Mainframe platforms supported: z/OS

Non-mainframe platforms: Other Unix

Software pricing options: Monthly/annual license charge

Address: Paseo de la Castellana, 200 - 28760 - Madrid Spain

Phone: +34910053089

Email: angel.gomez@go2bsecure.com

Website: www.go2bsecure.com

Region: Europe / Middle East / Africa

Product/Service Information:

With Bsecure DataPASS service, we provide the services listed above to our own clients.

What can Bsecure DataPASS do for Mainframe customers?

- Reduces the Civil Liability of the Board of Directors.
- The output data of each cycle is sufficient to cover the most demanding audits of DORA, NIS2, PCI, SOX, GDPR, BASEL, SOLVENCY, ISO27001, etc...
- More than three hundred technological controls are based on the industry's Best Practices of Security and auditing. CALCULATED OUTSIDE THE MAINFRAME ENVIRONMENT.
- Risk assessment, audit of security controls, and level of compliance with the leading international regulations.
- Dashboard generation to follow the evolution of fundamental risk and security parameters for security managers (CISO, CIO, CTO, Compliance Manager, Data Privacy Manager...).
- Checking and correlating millions of information entities (Files, DB2 Tables, and USS) by applying all the access rules defined in RACF.
- Detection of "excessive" authorized access to critical and confidential data (White Lists).
- Service data NEVER leaves the customer's IT environment. Everything is done through remote connections to your infrastructure.
- Mapping user roles vs. real access rules to information (PROFILING).
- Detection and alarm of ransomware installation, open doors, and unauthorized modifications to system components (FIM).
- Detection and alarm of hacking actions in VTAM/SNA environments through the generation of connection activity information.
- Detection and alarm of abnormal user behavior.
- Integrity control of critical files of the system architecture through our FIM (File Integration Management) functionality.
- Framework for continuous security improvement and early detection of security incidents.
- There is no need to license any software product, just services.

Can Do Systems, Inc.

Company profile:

Can Do Systems develops top-notch software products for IBM's z/OS operating system. The first Y2K software testing solution in the world, TICTOC, our date and time simulation product, was developed by Can Do back in 1992.

Can Do Systems' staff consists of people who have been in the z/OS, and MVS systems software development field for a combined total of more than fifty years. We've kept up with the times, though, and are committed to using the latest technologies to provide our customers with products that support the latest z/OS hardware and software."

Product/Service Information:

TICTOC for z/OS® and CICS® is date and time simulation software for IBM Z™. It helps software development teams ensure that their software performs as intended with virtual date and time testing. It may also be used to simulate multiple time zones and to trigger date and time sensitive applications in both test and production program environments. TICTOC's date and time simulation supports numerous IBM and vendor products, including DB2, LE, IMS, and many other software products.

Activity: Software vendor

Specialist areas: Programming/testing, Other

Mainframe platforms supported: z/OS

Software pricing option: One-time charge, Monthly/annual license charge, Other

Address: 3 Germay Drive, Suite 4 # 1292 Wilmington DE 19804 USA

Phone: +1 646 340 9144

Email: sales@candosys.com

Website: www.candosys.com

Regions: USA / Canada / South America, Europe / Middle East / Africa, Asia Pacific

Cartagena Software Limited

Company profile:

Founded in 1991, Cartagena Software develops and delivers targetted solutions to reduce risk and exploit new technologies, which are easy-to-use, flexible, and efficient. We continue the legacy of experience in storage (StorageTek), automation (Cybermation), and security (Rubin services). Cartagena is a member of IBM PartnerWorld, exhibits at SHARE, and participates in IBM's z Systems Technical Disclosure Meetings. We are partners with EMC, Fujitsu, IBM, and Oracle.

Service partners include Kofill (Asia), 4Bears and StorageD (Brazil), GlassHouse Systems and Eclipsys Solutions (Canada), Rubin (Germany), SoftPlex (Japan), Trident Services (USA).

Our head office is in the Greater Toronto Area, Canada.

Product/Service Information:

zTrustfer Cloud storage file transfer: Reduce storage costs with our new zTrustfer server running on z/OS, providing hardware-independent backup and restore using Cloud object storage. Interfaces include built-in web-server, and batch client. Backups are compressed and encrypted, and tracked using built-in SQL database management system or external MySQL. zTrustfer authenticates users and protects cloud credentials via SAF/RACF and secure certificates, not passwords. The server is multi-threaded, exploits zIIP, and provides graphical reports.

Prevent file damage with Immutable copies. Contact us for evolving capabilities!

Tape migration: TelTape z/OS migrated millions of volumes since 1998. TelTape's high speed copy engines non-disruptively move data between Dell EMC, Fujitsu, IBM, Luminex, Optica, and Oracle libraries, supporting all tape management systems, plus USERTMS, "No TMS". "Clone" volumes to same volume serial, load balancing, automatic comparison, statistics spreadsheet. Backup VTL: TelTape's 30+ selection criteria to regularly backup virtual tape data. Media Refresh: TelTape stacking consolidates 64K datasets per volume, continues stacking to active volumes.

zFS Security Administration: Superuser, a powerful tool for zFS file systems of Unix System Services, enabling system programmers to make small to large file permission changes, in ISPF/RACF terms. Automatically generates UNIX change commands, run in ISPF/batch. Change objects in a directory plus all related subdirectories.

Activity: Software vendor

Specialist areas: System management, Storage management, Security

Mainframe platforms supported: z/OS

Software pricing option: One-time charge Monthly/annual license charge Processor/capacity-based pricing

Address: 101 Drawbridge Drive, Markham, Ontario L6C 2N5 Canada

Phone: +1 905-887-0755

Email: info@cartagena.com

Website: https://cartagena.com

Supports Access Control Lists. Pre-defined and user-created reports. Automation: Co-Pilot z/OS replaces expensive console automation, consolidates controls to table-driven tool. Responds to console messages, date, time, enforcing rules to issue commands, submit jobs, execute REXX. Restart applications. Customize console message attributes. Report management: Speedview z/OS replaces expensive products. Automatically extract from SPOOL, filing based on output group, dataset, or job into VSAM database.

Reports indexed by folders, view and manage in ISPF. E-Mail reports to distribution lists. Archive/delete expired reports. Print Management: Speedview z/OS routes reports to TCP/IP printers, can control e.g. restart.

CPT Global

Company profile:

CPT Global is an independent IT consulting firm with a strong focus on mainframe and emerging technologies. For over 30 years, the company has helped 80% of the world's largest banks and many other Fortune 500 companies maximize their IT investments and enhance their mainframe capabilities.

Our consulting services span three main areas: Modernization, Optimization, and Assurance.

For enterprises that depend on mainframes, CPT Global leverages its specialist team to identify undiscovered savings, risks, and opportunities in our clients' mainframe technology to deliver a more cost-efficient, better-performing mainframe.

Product/Service Information:

CPT Global stands out from the competition through our tailored services and extensive expertise in Mainframe Modernization and Performance Tuning & Engineering.

For Mainframe Modernization, we offer a wide array of services. These include strategic advice, DevOps for mainframes, rationalizing licenses, upgrading legacy COBOL, migrating to the cloud, switching to alternative technologies, and providing off-mainframe testing environments. We focus on solving client challenges like increased digital transactions, resilience risks, and diminishing mainframe specialists.

What sets us apart is our global experience and strong partnerships with industry leaders. We've successfully served various industries worldwide, using our partnerships to deliver the best solutions to our clients.

In Performance Tuning & Engineering, we work to ensure systems perform at their best. We identify and fix system inefficiencies, make improvements, and monitor performance to ensure optimal operation.

We don't believe in one-size-fits-all solutions. Instead, we tailor our services to each client's specific needs. This personalized approach, combined with our deep mainframe knowledge, distinguishes us in the market.

Activity: Consultant

Specialist areas: System management, Data management, Storage management, Programming/testing, Cloud/mainframe modernization

Mainframe platforms supported: z/OS, Linux on IBM Z

Non-mainframe platforms: Power Systems, IBM i, i5/OS, and OS/400, Power Systems, AIX, Other Unix, Linux, Windows, Cloud

Software pricing options: One-time charge, Monthly/annual license charge, Other

Address: Level 3, 818 Bourke Street, Docklands, Melbourne, Australia

Phone: +61 3 9684 7900

Email: contact@cptglobal.com

Website: <https://cptglobal.com/>

Region: Asia Pacific

CSE

Company profile:

Through the excellence of its range of services and with its role as aggregator and facilitator, CSE allows Client Banks to govern change and align themselves with the inevitable and competitive dynamics of transformation, both process and market.

Operational efficiency, flexibility and investments in resources, technology and research represent the reference principles of the CSE philosophy.

Specialist areas: System management, Storage management, Asset and change management, Security

Mainframe platforms supported: z/OS

Non-mainframe platforms: Linux, Windows

Software pricing options : Processor/capacity-based pricing

Address: Via Emilia, 272, 40068 San Lazzaro di Savena BO Italy

Phone: +399408008693

Email: massimiliano.guerra75@gmail.com

Region: Europe / Middle East / Africa

DataKinetics

Company profile:

As the global leader in Mainframe Performance and Optimization Solutions, DataKinetics is relied upon by the world's largest banks, credit card, brokerage, insurance, healthcare, retail and telecommunication organizations to dramatically improve their mainframe data throughput and processing. Fortune 500 companies trust DataKinetics. With over 45 years of experience in the field of Mainframe Performance and Optimization, we continually help our clients leverage existing systems, resolving issues through optimization that hold them back, and enabling plans to propel them forward. Leveraging the experience and success of working with our global clients, we deliver proven solutions with worldwide success.

Product/service information

This is pure high-performance in-memory technology for mainframes that can solve batch processing, throughput capacity, mobile traffic, resource usage, rules processing and other challenges IT organizations face in their mainframe datacenters. tableBASE accelerates Db2 applications, improves mainframe application performance, makes Db2 data more accessible, reduces CPU and MSU usage, and helps to reduce operational expense. All this without the need to make changes to your Db2 database or your application logic. Preparing for IBM's Tailored Fit

Pricing (TFP): TFP brings cost certainty to mainframe shops interested in controlling their yearly mainframe spend. By first lowering your R4HA usage baseline with tableBASE, you can get the most out of TFP. Using tableBASE will lower the resource usage baseline—allowing you to benefit more from future growth pricing (which comes at a sharply reduced rate; much lower than your committed MSU rate). Combining tableBASE and TFP is a sure-fire way to control costs, and to find more capacity for your growing workloads.



Activity: Software vendor.

Specialist areas: Data management

Mainframe platforms supported: z/OS, VM/VSE, Linux

Non-mainframe platforms supported: Linux, Windows,

Pricing options: One-time charge; monthly/annual license; processor/capacity-based

Address: 50 Hines Rd, Ottawa, K2K-2M5, Canada.

Phone: 613-523-5500

Email: info@dkl.com

Web: <https://dkl.com>.

Sales contacts: America +1-800-267-0730

DINO-Software Corporation

Company profile:

Dino-Software Corporation (DINO) develops enterprise-wide solutions for the management, analysis, protection, and repair of complex z/OS mainframe environments. DINO has long been acknowledged for its superiority in ICF catalog management and technical support, helping organizations ensure their business-critical assets remain online and recoverable in a disaster. Their flagship product, T-REX, incorporates over two decades of experience gained from the original Softworks® developers who devised the Mechanic® and later Catalog Solution®, and it rapidly became the fastest-selling ICF catalog management and recovery tool ever released. This formula of producing superior products, at a reasonable cost, all backed up by first-class support from industry experts, has allowed DINO to enjoy unprecedented growth and rapidly establish DINO technology as the gold standard in enterprise-wide z/OS management solutions.

Product/service information:

T-REX is the fastest and most comprehensive ICF catalog management product available to analyze, diagnose, report, backup, repair, reorganize, recover, and assist with the overall maintenance and ensure continuous operational capabilities of the ICF catalog environment. T-REX prevents downtime, improves throughput, automates recovery & repair in record speed, REORGs catalogs while OPEN, and pays for itself with just one broken object. GUI optionally available.

Universal Data Manager (UDM) is a z/OS-based solution providing a consolidated global view via a GUI of the Enterprise storage environment, extending Automation, Auditing, Monitoring, Reporting and Control Functions of data and related storage objects with a mouse click. No distributed servers required. Simple and superior alternative to legacy tools such as CA Vantage, IBM Omegamon, BMC Mainview.

TERADON delivers Fast REPRO Mergecat for closed or open Datasets.

Activity: Software vendor

Specialist areas: System management; data management; storage management; other

Mainframe platforms supported: z/OS

Non-mainframe platforms supported: Windows

Software pricing options : Monthly/annual license, processor/ capacity-based, other

Address: P.O. Box 7105, Alexandria, VA 22307, USA

Phone: +1 703 768 2610

Email: sales@dino-software.com

Website: <https://dino-software.com>

VELOCI-Raptor (VR) reduces application overhead by continuously and dynamically optimizing the VSAM batch buffering strategy, eliminating redundant requests and increasing throughput.

HSM Adminisaurus (HSA) is a consolidated management tool providing extensive reporting, fast & comprehensive auditing, in-depth processing analysis, and simplified administrative functions to help establish and maintain a healthy HSM environment.

XTINCT provides permanent DASD and Tape data erasure and meets federal and international regulatory requirements.

Realtime Defrag—24x7 nondisruptive DASD optimization for zOS & Db2—Defrag, Combine, Release without downtime.

Direct Computer Resources

Company profile:

During a period where more people than ever are working from home, Direct Computer Resources' mainframe software products allow you to mask, edit, and manage your data safely, efficiently and affordably. DataVantage software products create production-like data for non-production uses such as DevOps, testing, analyses, and more. Data Masking functionality protects sensitive information enabling compliance with corporate policies and government regulations including GDPR, HIPAA, and CCPA (among others) while reducing the risks of data breaches.

Product/Service Information:

- DataVantage® for Db2 for z/OS & DataVantage® for IMS DataVantage® software for z/OS provides data management capabilities including browsing, editing and copying. Data masking functionality creates productionlike data for non-production uses such as DevOps, training, testing, and more, while enabling compliance with corporate policies and government privacy regulations.

Features:

- Data Masking masking protects sensitive information
- Logical compare highlights differences between two database tables
- Creates smaller test databases that reflect production conditions to explore multiple logic paths
- Provides easy before-and-after testing reports for internal audits
- Multiple reloads enable customization of test databases
- DataVantage for IMS 5.1 users get free upgrade to 7.2 with support

Activity: Software vendor

Specialist areas: Data management, Security

Mainframe platforms supported: z/OS

Software pricing options available: Monthly/annual license charge, Processor/capacity-based pricing

Address: 21 Valley Drive, Huntington Bay, NY 11743, USA

Phone: 1 877-704-0077

Email: wwitiello@datavantage.com

Website: www.datavantage.com

Region: USA / Canada / South America

- DataVantage® Data Masking Express™ is an affordable z/OS data masking-only software that creates production-like data for nonproduction uses, enabling compliance with corporate policies and government regulations. It runs alongside current data management software, and installs as an application program in less than four hours. A single installation can mask any one or all combinations of z/OS data such as Db2 or IMS, or Db2 plus IMS, VSAM, and Sequential files. Competitively-priced subscriptions are CPU-based regardless of processing capacity.

Features:

- Buy only data masking
- Affordable annual subscription with no upgrade fees
- Multiple data masking methods

Diversified Ventures LLC

Company profile:

Research on cost of defect mitigation and error prevention

Activity: Education/research

Specialist areas: System management

Mainframe platforms supported: z/OS, VM/VSE

Software pricing options: Other

Address: 1130 S. Michigan Avenue, Suite 4009, USA

Phone: 312 291-0700

Email: dabradley@obsventures.com

Website: www.obsventures.com

Region: USA / Canada / South America

DTS Software

Company profile:

DTS Software is recognized worldwide as the leader in enterprise storage management software. Our integrated suite of software products helps our customers to monitor, manage, and control their storage subsystems. We specialize in storage software tools and solutions developed for the IBM z/OS, Hitachi VOS3, and Fujitsu MSP operating systems.

DTS Software provides superior function and features that allow managers and users to more effectively utilize their investment in storage systems. Our software is designed to solve many of the problems encountered by storage administrators and operations staff – allowing a limited number of administrators to manage a rapidly expanding storage environment. DTS Software was founded in 1991, is headquartered in Raleigh, North Carolina, and has more than a thousand customers in the US, Canada, Europe, and Asia.

Product/Service Information:

STORAGE is one of the fastest-growing items in most installations' budgets, yet a large percentage of this critical resource is often wasted. Inadequate standards enforcement, poor JCL practices, and system limitations often result in misdirected data and underutilized resources.

DTS Software's STORAGE CONTROL CENTER family of products is an integrated suite of storage management programs that allows users to get the most out of their storage dollars. The Storage Control Center products improve disk space utilization, prevent storage-related errors, allow installations to monitor the storage subsystem in real time, and proactively control the use of storage space.

Complete and total satisfaction is of paramount importance to us. All our efforts at DTS Software are driven by attentiveness to customer needs and responsiveness to the demands of the market. DTS Software is committed to providing products that will let you effectively and reliably manage your storage subsystem, now and well into the future.

Activity: Software vendor

Specialist areas: Storage management

Mainframe platforms supported: z/OS

Software pricing options: Monthly/annual license charge

Address: 4350 Lassiter at North Hills Ave Suite 230 Raleigh, NC 27609 USA

Phone: 1-919-833-8426

Email: info@dtssoftware.com

Website: https://www.dtssoftware.com/

Enterprise Systems Associates, Inc. (ESAI)

Company profile:

Enterprise Systems Associates Inc. (ESAI) has tools for database productivity, enterprise-wide test data management, data masking, performance, audit and security for mainframe and distributed systems. Our mission is to help IT get the job done, efficiently, on-time and under budget. Thus maintaining service-level agreements and realizing operational savings. Qualified database and IT staff resources are in short supply, and workloads are increasing. Our innovative solutions help you meet challenges through automation optimizing workloads, and reducing cost, machine and staff efforts. We distribute for European authors including SPR, UBSHainer, GmbH. Contact us to learn about these quality solutions.

Product/Service Information:

DBARS™ access recording services for Db2® can record all accesses to the sensitive Db2 tables selected - read, write and data definition. The product provides database audit and protection (DAP) and database activity monitoring (DAM) in one solution. DBARS unique intercept technology does not depend on Db2 tracing or log records. Efficient, flexible recording and auditing is now possible with optional alerting and blocking to protect against corporate data breaches.

XDM™ is an enterprise-wide Test Data Management (TDM) tool that enables staff to find and order the data that fits their needs, manage data across different environments and automatically deliver data where it's needed. This comprehensive TDM solution facilitates data refresh, PII data masking/encryption, cloning and highly efficient data provisioning. It supports Db2 LUW, Oracle, MS-SQL, PostgreSQL, Db2 z/OS, VSAM, IMS, Cloud, DevOps and more. The XDM suite enables developers, DBAs, test/QA and general IT staff to tackle daily challenges with flexible, repeatable, error-free processes.

BCV5™ is a high speed copy/migrate/clone tool that automates copies/refreshes of Db2 z/OS® objects and environments. This highly regarded product delivers source to target refreshes in a fraction of the effort, time and CPU required by other solutions. The Masking Tool™ option adds powerful masking of sensitive data during the copy or simply mask in-place. Get fast, repeatable, error free migrations and refreshes with BCV5.

BCV4™ is a leading Db2® and/or IMS® subsystem cloning tool that reduces cloning from hours/days down to minutes. Db2, SAP and PeopleSoft users can have clones and system copies in record time.

BPA4DB2™ is a buffer pool tuning product that replaces old, dated vendor solutions with a new level of expert analysis. It identifies, recommends, and performs ongoing monitoring and health alerts to ensure optimum performance of your Db2 systems. BPA4DB2 saves on staff tuning efforts and transferring volumes of trace data required by other solutions.

SQLQC™ easily identifies, analyzes and provides automated alerts on problem SQL from mainframe or distributed systems. It offers actions for improvements, simulation and overall performance advice. SQLQC's quality control technology helps shops with increasingly complex workloads maintain performance and service levels.

ULT4DB2™ is a log tracker/analyzer for Db2 answers the question "Why is a good, reasonably priced log analyzer so hard to find?" Functions include Undo/Redo, identify, and data propagate. A faster, better, more economical alternative.

ICPU™ gives programmers the ability to easily identify code causing CICS® application performance problems. Its very low overhead allows use in production or test environments.



Activity: Software vendor, distributor

Specialist areas: System performance, test data management, sensitive data masking, database auditing and protection as well as automated Db2 cloning and data provisioning

Mainframe platforms supported: z/OS, VM/VSE, Linux on Z

Non-mainframe platforms: Unix, Linux, Windows, Cloud

Pricing options: One-time charge, monthly/annual license, processor/capacity-based, workload/usage based

Address: 1340 Tuskawilla Rd, Suite 106, Winter Springs, FL 32708, USA

Phone: +1-866-GO-4-ESAI

Email: sales@esaigroup.com

Website: www.ESAIGroup.com

ESP

Company profile:

Established in 1999, SecuriTeam Software is an IBM legacy infrastructure consulting and software development. We are concentrating in security assessment automation with our flagship product IronSphere Inspector

Product/Service Information:

We have two products under the IronSphere brand:

IronSphere Inspector to continuously perform security assessment and manage finding life cycle (documentation, alerting, accepting, etc.). The product has agents installed on z/os, z/vm and AS/400 that reports to an on perm virtual appliance. Reporting and management is done using a browser.

IronSphere BreakingLines is a security code review that scans all source code such as Cobol and JCL and report weaknesses to the IronSphere virtual appliance. the solution can be tailored to a change management product such as CA-Endevor and even run on a single program by the programmer under ISPF edit session.

Activity: Software vendor

Specialist areas: Security

Mainframe platforms supported: z/OS, VM/VSE

Non-mainframe platforms: Power Systems, IBM i, i5/OS, and OS/400

Software pricing options: Monthly/annual license charge

Address: 30 rue des vallées 91800 France

Phone: 0760158501

Email: raymond_le_roux@yahoo.fr

Region: Europe / Middle East / Africa

Fischer International Corporation

Company profile:

For more than 40 years, Fischer's vision for software development has been to provide innovative solutions designed to leverage and enhance the mainframe's place in the enterprise. Accelerate time to productivity with Fischer solutions for the mainframe. Interactive Output Facility (IOF), provides value with a strategic diagnostic ability and bottom-line problem resolution. Additionally, Fischer's strategic partnership with LogOn provides maintenance and support for various IBM products including QuickSelect for Db2 and Netview FTP.

Product/Service Information:

Better IOF JES2 Management tools, better function.

Complete JES2 Management with a powerful toolset: IOF includes the ultimate job summary screen with online help on each display panel for easy access to better function. IOFSend, a popular tool, delivers batch job information in HTML form directly to a designated and authorized email. IOF training includes a functionality site available to access IOF tips and tricks with training videos. Very functional and user friendly, use commands from other JES2 management products to start using IOF with a minimal learning curve. IOF is the user's choice for JES2 management in many Fortune 500 data centers.

Through a partnership with LogOn Software, Fischer offers QuickSelect for Db2 for plug and play performance gains, no JCL or Db2 changes required. Minimize static SQL: Email: information@fischerinternational.com to learn of all the IBM products maintained and supported through out partnership.

Enterprise Software:

The principles of Zero Trust are the foundation for Fischer's full suite identity solution. When you can control all aspects of identity, you will have a more secure business. We offer automated provisioning, identity governance, password management, and access management.

Activity: Software vendor.

Specialist areas: System management; data management; storage management; security; other

Mainframe platforms supported: z/OS, VM/VSE

Non-mainframe platforms supported: Windows

Pricing options: One-time charge, monthly/annual license, other

Address: 3520 Kraft Road, Suite 100, Naples, FL 34105, USA

Phone: 239-436-1500

Email: Information@FischerInternational.com

Website: www.FISC.com

Fujitsu Germany GmbH

Company profile:

Fujitsu in Germany, Austria and Switzerland

Fujitsu is a leading full-service information and telecommunications provider that supports its customers in all aspects of digital transformation. The company combines IT services and products with future-oriented digital technologies - such as artificial intelligence (AI), the Internet of Things (IoT), Analytics, Digital Annealing, Container Technology as well as Multicloud-, SAP-, ServiceNow- and Security-Solutions - and creates new values together with its customers and partners. The range of products and services can be tailored to individual needs - from conception to implementation, operation, and orchestration of digital ecosystems. In Germany, Austria and Switzerland, Fujitsu has more than 4,000 employees and has with over 10,000 channel partners in these three countries one of the most powerful partner networks in the industry.

Product/Service Information:

The BS2000 SE Infrastructure combines standard mainframe technology with the technology of the open world. This makes the SE Series the optimal platform for running business-critical applications both on /390 and x86 technology. Customers can select the ideal platform for each application and will thus get the most out of their mainframe investments. With its comprehensive set of functions, the BS2000 mainframe operating system provides the best possible support for existing and new IT infrastructures, enabling the integration of latest technologies, as e.g. Cloud Computing, AI, Edge Computing, Blockchain and DCMA. With its open interfaces it offers future-proof integration into modern application architectures. The extensive scalability of the BS2000 platform reaches into the very highest performance bands. BS2000 services offer uncompromising availability

and operational security for BS2000 systems with utmost profitability and cost transparency. Your IT infrastructure is designed more efficiently and becomes more sustainable for the future as we design and implement intelligent solutions in partnership with you. Fujitsu's Third-Party Mainframe Services is specialized in providing a Mainframe Managed Service offering positioned around the support of IBM Enterprise z and i platforms to customers across North West Europe and North America. We are a key provider in the provision of Third-Party IBM Mainframe Managed Services and provide end-to-end PaaS, in addition to tailored mainframe professional services designed around client TCO improvements.

We support customer requests for digital transformation!



Activity: Hardware vendor

Specialist areas: System management, Data management, Storage management, Asset and change management, Security, Web integration and legacy reengineering tools, Network performance/management, Cloud/mainframe modernization, Other

Mainframe platforms supported: z/OS, VM/VSE, Linux on IBM Z

Non-mainframe platforms supported: Power Systems, IBM i, i5/OS, and OS/400, Power Systems, AIX

Software pricing options: One-time charge, Monthly/annual license charge, Processor/capacity-based pricing, Workload/usage-based pricing

Address: Mies-van-der-Rohe-Str. 8, 80807 Munich, Germany

Phone: +49 (89) 62060-0

Email: bs2000services@fujitsu.com

Website: <https://www.fujitsu.com/de/products/computing/servers/mainframe/bs2000/>

Region: Europe / Middle East / Africa

IBA Group

Company profile:

At IBA Group, we're revolutionizing mainframe development by seamlessly integrating DevOps and open-source technologies, including Zowe. With a robust partnership with IBM since 1993 and a dedicated team of over 250 experts, we specialize in delivering future-proof solutions compatible with modern IDEs. Our services encompass end-to-end application development, support, and cutting-edge Mainframe DevOps solutions, leveraging a comprehensive tech stack featuring Jenkins, Git, Docker, and the Zowe ecosystem. This approach not only enhances efficiency and agility but also accelerates the delivery of high-quality software solutions. Embracing these innovations, IBA Group is committed to maximizing the potential of mainframes, empowering teams, and shaping the future of mainframe development. Discover more at ibagroupit.com/services/mainframe.

Information Systems Asset Management, Inc.

Company profile:

Founded in 1996, ISAM specializes in helping procurement, vendor management, and data center managers manage software expenses and license compliance risk. ISAM's GreenBook is the software industry's largest and most comprehensive database which contains more than 100 million software cost, product usage and categorization data points from over 900 software vendors across 1,000 data centers worldwide.

Armed with the knowledge of industry software benchmarks, GreenBook provides the backbone for numerous applications to guide data centers to best in class software licensing and costs.

Product/Service Information:

Mainframe Advisory, SAM Advisory, SAM Maturity, Compliance Mgmt, Audit Defense, Benchmark, Negotiation Support, License Optimization, ISAMaaS.

Activity: Consultant

Specialist areas: Asset and change management, Cloud/mainframe modernization, Advisory services around all aspects of Software Asset Management

Address: 4152 North River Run, Savage, MN 55378 USA

Phone: 651-337-2496

Email: balzen@isamgroup.com

Website: www.isamgroup.com

Region: USA / Canada / South America

IntelliMagic

Company profile:

IntelliMagic is the worldwide leader in replacing status quo RMF/CMF and SMF performance and capacity reporting solutions. No other solution derives better intelligence for more root cause metrics across a broader scope of the z/OS infrastructure.

Our solutions enable your team to deliver higher application availability at a lower cost and in less time from your z/OS infrastructure.

Detect anomalies, quantify infrastructure risk to predict and avoid problems, understand and solve issues more quickly, and augment both deep experts and new staff with Artificial Intelligence that quickly identifies what is most important and why.

Through our partnership with Watson & Walker, Watson & Walker uses IntelliMagic Vision for z/OS with their consulting efforts when helping customers and generating reports.

Product/Service Information:

IntelliMagic Vision for z/OS

IntelliMagic Vision's AI-driven analytics enables z/OS experts to proactively monitor and manage their end-to-end z/OS environment, prevent disruptions, optimize performance, improve support for new applications, reduce software costs, eliminate unnecessary hardware purchases, and preserve the reliability and availability that mainframes are known for.

IntelliMagic Vision enhances the RMF and SMF data and applies its built-in knowledge to understand how the z/OS architecture handles workloads. This helps to tune z/OS to improve performance and protect availability, and can also help tuning the processor configuration to increase the MIPS of the mainframe hardware.

Supported Areas Include:

- CICS
- Db2
- Disk & Replication
- Systems & MLC
- MQ
- TCP/IP & zERT
- Virtual Tape
- WebSphere
- z/OS Connect
- More through our Data Warehouse

Activity: Software vendor

Specialist areas: System management

Mainframe platforms supported: z/OS

Software pricing options: One-time charge, Monthly/annual license charge

Address: Lokhorststraat 16 2311 TA Leiden The Netherlands

Phone: +31 (0) 71 5796000

Email: info@intellimagic.com

Website: https://www.intellimagic.com/

Region: USA / Canada / South America

IntelliMagic Vision for z/OS Features

- Predictive Analytics
- MLC Cost Optimizer
- Rated Metrics and Prioritized Issues in a Single Frame
- Intuitive Graphical User Interface with Easy Drilldowns
- Dynamic Thresholds

Interskill Learning

Company profile:

Interskill is the mainframe industry's most delivered, most awarded, most IBM credentialed mainframe training! Interskill works closely with IBM, Broadcom, BMC and the industry's leading vendors to ensure our massive mainframe training resource covers the broad range of topics needed by the modern mainframe workforce. Interskill's mainframe training is so widely used that over 80% of all IBM digital credentials awarded globally for mainframe training are powered by Interskill training!

Product/Service Information:

Interskill's massive, mainframe training resource of over 400 online courses, videos, assessments, hands-on labs, coaching/mentoring tools, reporting and analytics, forms the low-cost, year-round, on-demand core of mainframe workforce training programs worldwide! IBM digital badges benchmark mainframe skills and drive mainframe personnel to seek and complete more training, delivering superior training ROI and optimal mainframe skills across all mainframe job roles! This is how the mainframe industry trains!

Activity: Education/research

Specialist areas: System management, Data management, Storage management, Asset and change management, Security, Programming/testing, Network performance/management, Cloud/mainframe modernization

Mainframe platforms supported: z/OS, VM/VSE, Linux on IBM Z

Non-mainframe platforms supported: Power Systems, IBM i, i5/OS, and OS/400, Power Systems, AIX, Other Unix, Linux

Software pricing options: Monthly/annual license charge

Address: 11770 Haynes Bridge Road Suite 205 PMB 526 Alpharetta, GA 30009 USA

Phone: 770-872-4278

Email: learn@interskill.com

Website: https://interskill.com/

Region: USA / Canada / South America, Europe / Middle East / Africa, Asia Pacific

Macro 4 Limited

Company profile:

With over fifty years' experience in mainframe software development, Macro 4 helps IBM mainframe users to:

- Deliver fast, seamless and secure web and mobile access to mainframe and non-mainframe applications
- Analyse and fix failures in mission-critical applications, quickly and efficiently
- Develop software troubleshoot problems and resolve program errors with unprecedented speed
- Create a secure testing and debugging environment using accurate test data
- Measure and report on application performance, quickly identifying opportunities for performance improvement
- Assure printing and digital delivery of business documents to support key business processes

Product/Service Information:

Macro 4 is a developer of software solutions that increase operational efficiency in IBM's mainframe environments and enable rapid modernization of mainframe applications and development processes.

Modernization, analytics, AI, integrated user authentication:

- UNICOM Universal Gateway (UNIGW®) - cross-platform systems access, mobile enablement and digital transformation

Fault analysis:

- DumpMaster - high performance fault diagnosis of mainframe application failures
- TraceMaster - source level interactive program testing and debugging
- TraceMaster CodeTrack - CICS code path analysis and pre-emptive storage violation detection

Data Manipulation:

- InSync - simplified data management and secure test data creation

Today, these solutions are delivering significant cost savings as well as assuring the reliability of core applications in thousands of IT departments globally. Eclipse, browser and 3270 interfaces meet the access needs of every user.

Application performance management:

- FreezeFrame - comprehensive, yet easy-to-use application performance measurement
- ExpeTune - performance tuning for z/OS applications and subsystems
- ExpeTune DB - DB2 performance management, with a strong focus on dynamic DB2 workloads

Session Management:

- Tubes - secure access to multiple mainframe, IBM i and UNIX VT220 applications from a single menu, with optional web enablement of any application

Enterprise Information Management:

- Columbus suite—content management, multi-channel customer communications and document workflow.

Activity: Software vendor

Specialist areas: System management, Data management, Asset and change management, Security, Programming/testing, Web integration and legacy reengineering tools, Cloud/mainframe modernization, Open-first DevOps

Mainframe platforms supported: z/OS, VM/VSE

Non-mainframe platforms supported: Power Systems, IBM i, i5/OS, and OS/400, Power Systems, AIX, Other Unix, Linux, Windows, Cloud
Software pricing options available: One-time charge, Monthly/annual license charge, Processor/capacity-based pricing, Workload/usage-based pricing

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Phone: +44 1293 872000

Email: market@macro4.com

Website: www.macro4.com

Region: Europe / Middle East / Africa

Mullins Consulting Inc

Company profile:

Mullins Consulting focuses on delivering services that improve application and database performance, deliver higher availability, and better protect and secure your vital corporate data. Services include consulting, writing, education, speaking, and more

Product/service information:

Craig S. Mullins, principal consultant of Mullins Consulting, has been working with IBM mainframes his entire career; and with Db2 since Version 1. The primary focus of service delivery is to improve and optimize the performance and management of Db2 for z/OS systems.

Activity: Consultant

Specialist areas: System management; data management

Mainframe platforms supported: z/OS

Non-mainframe platforms supported: Other

Pricing options: Other

Address: 15 Coventry Court, Sugar Land, TX 77479, USA

Phone: +1-281-494-6153

Email: craig@craigsmullins.com

Website: mullinsconsulting.com

Oh7FoxEasy LLC

Company profile:

Oh7FoxEasy has taken over where The Edge Information Group left off by enhancing the EPA product to support the most recent mainframe compilers.

Product/Service Information:

EPA2, the Executable Portfolio Analyzer, analyzes executable libraries (PDS or PDSE) and provides a wealth of detailed information about each executable to assist application developers with the complicated task of knowing all of the intricacies of the overall application.

Activity: Software vendor

Specialist areas: Asset and change management, Programming/testing

Mainframe platforms supported: z/OS

Software pricing options: One-time charge

Address: 1070 Applecross Drive, Roswell, GA 30075 USA

Phone: 770 712-9887

Email: jimr@oh7foxeasy.com

Website: www.oh7foxeasy.com

Region: USA / Canada / South America

QMSI-Quintessential Mailing Software Incorporated

Company profile:

QMSI's charter is to significantly reduce the cost of postal processing for mainframe mailers. QMSI software is exclusively IBM Mainframe. QMSI's principals, developers - and customers - are accessible to anyone who sees the value in - and wants to learn about - lowering CPU overhead, I/O resource utilization and overall processing time ... with the guarantee of saving money! Our customers will tell you "QMSI prices are not based on MIPS or MSUs and QMSI never increases costs for licensed CPUs; so there is no renegotiating - ever!" Adding a CPU is easy and inexpensive.

Armed with the knowledge of industry software benchmarks, GreenBook provides the backbone for numerous applications to guide data centers to best in class software licensing and costs.

Product/Service Information:

QCODE is the only modern USPS CASS-Certified software that takes full advantage of IBM's zSystem hardware and software. QCODE can run on a zIIP (eliminating IBM's MSU charges!) and QCODE's unique DataSpaceDataBase (DSDB) is a significant reason for QCODE's great performance. Placing your page data sets on SSD (Solid State DASD) devices, makes QCODE's performance "amazing!" All while utilizing less CPU and I/O resources, and running faster than all other CASS products. QSORT is the only single-purpose presort for First Class Mail (cards, letters and flats) that does not contain all the extra code and overhead found in other multi-purpose products. It's the perfect complement to QCODE and ready for the USPS Full Service requirements. QVIEW is a sub-second response time, online query tool for USPS Zip4 database look-ups. It is a complementary component of QCODE, and runs under CICS, IMS or CA's IDMS.

Together or individually, these products provide the most cost-effective, resource-efficient Postal Processing software available on IBM Mainframes. How is this possible? Because this entire software application suite was designed by system-level software architects.

QMOVE is coming soon!



Activity: Software vendor.

Specialist areas: Other

Mainframe platforms supported: z/OS

Pricing options: Monthly/annual license

Address: 5800 Ager Beswick Road, Montague, CA 96064-9423, USA

Phone: +1.866.284.1001

Email: info@qmsi.software

Website: www.qmsi.software

RSH Consulting

Company profile:

RSH Consulting, Inc. is a professional services firm established in 1992 and dedicated to helping clients strengthen their IBM z/OS mainframe cybersecurity by fully exploiting the capabilities and latest innovations in RACF. RSH staff is comprised entirely of exceptionally experienced technicians led by a recognized RACF expert. Our finely honed processes and extensive software toolset enable us to deliver the highest quality services efficiently and cost-effectively. For your next RACF project, contact RSH.

Product/Service Information:

RACF Security Reviews: RSH reviews pinpoint even the most obscure security exposures and identify opportunities for improving RACF administration and performance. We scrutinize all RACF controls to ensure critical system resources are protected. RSH looks beyond RACF to examine mainframe security policies, standards, and procedures, and to inspect RACF-interface configuration options in other system software. This holistic approach provides a more insightful picture of the overall mainframe security posture. Knowing your security exposures is essential to prioritizing remediation. **RACF Implementation Services:** RSH can tackle almost any RACF implementation, enhancement, or remediation task, whether large or

small and no matter how intricate. Our services are customized to meet specific client needs and budgets and range from occasional advisor to ad hoc assistance to complete hands-on implementation. RSH staff can work independently or as teammates alongside client staff. We provide clear explanations of what was done and why so that clients can properly maintain controls going forward. **RACF Training:** RSH is at the forefront of training the next generation of RACF administrators, technicians, and auditors. Our course series, ranging from basic administration to advanced technical topics, offers the ideal pathway for expanding your staff's RACF skills.

Activity: Consulting

Specialist areas: Security

Mainframe platforms supported: z/OS

Address: 177 Huron Ave, Cambridge, MA 02138, USA

Phone: +1 617-969-9050

Email: info@rshconsulting.com

Website: https://www.rshconsulting.com

RSM Technology Ltd

Company profile:

First founded in London in 1980 to serve the UK, RSM now provides its services worldwide, either directly or via selected partner organisations.

Product/Service Information:

RSM provides technical education and training via open-enrolment (public) courses and as exclusive, one-company presentations. These can be live, over the Internet via RSM's Virtual Classroom Environment service or on-site at customers' locations. RSM's courses are suitable for all personnel working in the IBM mainframe computing environment, including software developers/programmers, systems programmers, DBAs, operations personnel, and managers.

Activity: Technical education and training

Specialist areas: IBM Z systems mainframes, including z/OS and all its subsystems

Address: West Barn, Brightwell Farm, Brightwell Baldwin, Oxfordshire, OX49 5NP

Phone: +44 (0)1494 45 13 13

Email: courses@wdr.co.uk

Website: www.rsm.co.uk

SecuriTeam Software Ltd.

Company profile:

SecuriTeam Software is a software development company concentrates in IBM legacy system's security. Our aim is to develop a solution for each security vertical exist on these platforms. We started with Security assessment automations and documentation and will release an "on z"n code review product under our brand IronSphere.

Product/Service Information:

Our products are branded as IronSphere. Our flagship product is IronSphere Inspector. A solution to continuously monitor security controls on Z & I and perform DISA STIG based security assessments. The product can monitor hundreds of Lpars of any kind, since each agent installed on an Lpar reports to an on-prem virtual appliance. The end-user is using a browser to ao authenticate and access findings and documents. IronSphere Inspector is fully automated and is installed on some of the largest organizations in the world.

Activity: Software vendor

Specialist areas: Security

Mainframe platforms supported: z/OS, VM/VSE

Non-mainframe platforms supported: Power Systems, IBM i, i5/OS, and OS/400

Software pricing options: One-time charge, Other

Address: HaEshel St 1/Building B Caesarea, Israel

Phone: +972 52 2986404

Email: i_mugzach@securiteam.co.il

Website: www.ironsphere.co.il

Region: Asia Pacific

Software AG

Company profile:

Software AG helps you create effortlessly connected experiences for your customers, employees and partners with an enterprise iPaaS that integrates anything, anywhere, any way you want. By bringing together applications, data, B2B with APIs and events in the same AI-enabled integration platform, you can run a high-performing enterprise and constantly improve it based on data.

Get end-to-end visibility and governance across geographies, IT environments, and complex business ecosystems, with hybrid multi-cloud connectivity, and enterprise-grade security relied on by the most powerful banks, governments, and corporations in the world.

Trusted by the world's best brands for more than 50 years, Software AG is a pioneer in software innovation and understands the value of enterprise software. Businesses and governments around the world rely on mission-critical applications built on the Adabas & Natural development platform. Our proven application modernization capabilities can connect mainframe applications, data and people to the cloud, new technologies, channels, and services so you can build on your strengths and become part of a truly connected world.

Product/Service Information:

Adabas

Adabas is a high-performance database that supports large-scale transaction processing of data on IBM z/OS, Linux and the cloud. Adabas can store multiple data relationships in the same table, eliminating data redundancies found in RDBMS. You can easily access Adabas data with SQL and replicate data to the cloud, data lakes and BI platforms.

Natural

Natural is the programming language used by the world's largest companies and governments to create modern enterprise applications on IBM z/OS, Linux and the cloud. It is so easy to learn that developers can be productive in a matter of days. With the NaturalONE Eclipse®-based IDE, you can increase developer productivity, accelerate modernization, and participate in DevOps lifecycle and toolchains.



Activity: Software vendor

Specialist areas: Data management, Storage management, Security, Programming/testing, Web integration and legacy reengineering tools, Cloud/mainframe modernization, Other

Mainframe platforms supported: z/OS, Linux on Z

Non-mainframe platforms supported: Linux, Cloud, Other

Software pricing options: Monthly/annual license charge, Processor/capacity-based pricing, Workload/usage-based pricing, Other

Address: Uhlandstrasse 12, 64297 Darmstadt, Germany

Phone: +49 6151 92 0 (Germany)

Email: adabas.natural@softwareag.com

Website: www.softwareag.com

CONNEX Data Integration

Connect, replicate and migrate mainframe data from Adabas, Db2®, flat files, IMS™, QSAM and VSAM™ to cloud and on-premises environments. CONNX can unlock native database architectures and transform data into a format that allows it to be used in data warehouse, business intelligence, cloud and IoT projects.

User Experience Modernization

Connect your users with a better experience—transform green screens into modern web interfaces, redesign user workflows and use APIs to extend capabilities to new channels and applications.

Systementwicklung

Product/Service Information:

Product families developed by 21CS experts lie in the areas of data and storage management, resiliency, analytics, and system and operational tools.

Since 1992, 21CS has been developing solutions for foundational disk and tape migration solutions, as well as providing migration services with thousands of successful migration engagements completed.

In June 2021, 21CS entered an Agreement to License z/VSE Operating System and Middleware Stack from IBM, releasing its first version of the operating system in 2022. 21CS is prepared to effectively maintain and improve upon the OS and middleware stack well into the future.

Activity: Consultant

Specialist areas: System management, Data management, Asset and change management, Programming/testing, Web integration and legacy reengineering tools, Cloud/mainframe modernization

Mainframe platforms supported: z/OS, VM/VSE, Linux on IBM Z

Non-mainframe platforms: Linux, Cloud

Address: 55116 Mainz, Martinsstraße 5 Deutschland

Phone: 00496131224634

Email: Peter.Kawa@gmx.de

Region: Europe / Middle East / Africa

The Source Recovery Company Inc

Company profile:

Source Recovery started in 1994 when reverse engineering source from a load module was thought to be impossible. Over the past 29 years, we've recovered over 10,000 programs using our patented ReSource technology.

Product/Service Information:

We recover COBOL and Assembler source code directly from the mainframe executable. Our results are guaranteed to be 100% functionally equivalent to the original executable.

Activity: Software vendor

Specialist areas: Asset and change management, Programming/testing, Web integration and legacy reengineering tools, Cloud/mainframe modernization

Mainframe platforms supported: z/OS

Software pricing options: One-time charge

Address: 1070 Applecross Drive, Roswell, GA 30075 USA

Phone: 770.712.9887

Email: jrahm@source-recovery.com

Website: www.source-recovery.com

Region: USA / Canada / South America

TONE Software Corporation

Company profile:

Tone Software develops and markets business software to increase z/OS mainframe efficiency and modernize host operations, reduce z/OS support costs, and increase the productivity of z/OS IT teams responsible for critical business applications.

Based in Anaheim, California, TONE is a privately owned company that answers to customers, not shareholders. Leveraging more than 40 years of extensive mainframe expertise, TONE is committed to delivering quality z/OS software and exceptional support and service to every client.

TONE products are marketed and supported throughout North America, Europe, and Australia through the Anaheim headquarters and international agents. Tone's solutions include:

- OMC-FLASH JES2, JES3, and JES3plus SPOOL viewing and management
- JES2Mail, JES2FTP, Mail2ZOS and CICS2PDF z/OS output transformation and electronic delivery solutions
- OMC-PRINT and OMC-TCP/IP host VTAM and TCP/IP output routing and printing
- DYNA-STEP dynamic STEPLIB and ISPF library management
- TRX TSO resource and performance management

TONE's mainframe solutions modernize host operations, enabling users to manage and control the z/OS, TSO, JES2, JES3, JES3plus and VTAM infrastructure. Tone's solutions reduce system resource consumption, increase host productivity, and lower operational costs. A summary of Tone's mainframe solutions follows:

- OMC-FLASH JES spool management users can view and control jobs, datasets, output, devices, operations, resources, and workflow across the JES2, JES3 and JES3plus environment, all with one seamless solution.
- JES2Mail, JES2FTP, Mail2ZOS and CICS2PDF transform z/OS output into customized PDF, HTML or CSV, then securely delivers the output via Email, FTP, RSS, or the cloud, all with few or no host changes.
- OMC-PRINT and OMC-TCP/IP host output management solutions route and print z/OS output directly from JES to VTAM and TCP/IP printers, and provide full control of enterprise-wide print activity.
- DYNA-STEP Dynamic STEPLIB allocation and ISPF library management saves time and resources, reduces overhead, speeds user logons, reduces LOGON PROC maintenance, and expedites migrations from test to production. DYNA-STEP replaces unsupported STEPLIB tools and shareware with no re-coding.
- TRX TSO performance management solution reduces TSO resource consumption, improves response times, reduces system overhead, and improves TSO user productivity.



Activity: Software vendor

Specialist areas: System management

Mainframe platforms supported: z/OS

Software pricing options: One-time charge, monthly/annual license, processor/capacity-based, workload/usage-based

Non-mainframe platforms supported: Cloud

Pricing options: Monthly/annual license, processor/capacity-based, workload/usage-based

Address: 1735 South Brookhurst Street, Anaheim, CA 92804, USA

Phone: +1 714 991 9460

Email: info@tonesoft.com

Website: www.tonesoft.com/mainframe

Sales contacts:

America: sales@tonesoft.com

EMEA: sales@tonesoft.com

AsiaPac: sales@tonesoft.com

Trident Services

Company profile:

Trident Services has provided z/OS solutions and systems consulting services since 1978. Trident has established a solid reputation for the excellence of its software and the expertise of its consulting staff while continuing to keep pace with industry changes, emerging technologies and client needs.

Product/Service Information:

Our flagship software, zOSEM (zOperating System Environment Manager), is one solution for total system management of z/OS. Trident's zOSEM simplifies and modernizes z/OS management by implementing dynamic controls of functions, delivers improved system throughput, better control of JCL standards, optimizes HSM, and includes resource routing functions to significantly reduce ISV footprint, helping you reduce ISV and MLC charges. The latest release of zOSEM introduces step-level routing, which allows for further reduction of software license footprints by routing only the job step to a penalty box or LPAR.

Activity: Software vendor

Specialist areas: System management; data management; storage management

Mainframe platforms supported: z/OS

Software pricing options: One-time charge, monthly/annual license, processor/capacity-based

Address: 1260 41st Ave Suite K, Capitola CA 95010, USA.

Phone: +1 831 465 7661

Email: sales@triserv.com

Website: www.triserv.com

Sales contacts:

America: 800-887-4336

EMEA: 800-887-4336

AsiaPac: 800-887-4336

Vertali

Company profile:

Headquartered in the UK, Vertali provides expert IBM mainframe skills, resources and software to organizations around the world. We know IBM Z technology inside out so you benefit from more experience, expertise, and insights than anyone else can offer. Working with world-leading organizations in finance, retail, utilities, governments, and 100% focused on IBM mainframe infrastructure, we help you secure and optimize your mainframe operations, reducing costs and increasing ROI.

Vertali offers:

- A large pool of IBM Z skills and resources
- Senior mainframe professionals vetted for their experience, integrity and communications skills
- Specialist expertise in cyber resiliency
- Mainframe software, including mainframe migration and network analysis software tools
- A solid track record in delivering on time and within budget

Product/Service Information:

Vertali provides world-class mainframe infrastructure and security services plus software that help our clients around the world to navigate and profit from change, mitigate risk, and achieve their technology and business objectives. We help you to plan, deliver, maintain, and update your mainframe strategy.

Mainframe Consultancy Services:

- Mainframe Infrastructure Services
- Project Delivery
- Software Migrations

Mainframe Security Services:

- Assessment/Audit Remediation
- Cyber Resiliency
- Mainframe Penetration Testing
- Application Penetration Testing
- Product Penetration Testing
- Mainframe Security Assessment
- Security as a Service

Activity: Consultant

Specialist areas: System management, Data management, Storage management, Asset and change management, Security, Programming/testing, Network performance/management

Mainframe platforms supported: z/OS

Software pricing options: Other

Address: Unit 13, Buntsford Drive, The Courtyard, Bromsgrove B60 3DJ, UK

Phone: +44(0)1527868380

Email: info@vertali.com

Website: www.vertali.com

Region: Europe / Middle East / Africa

Mainframe Software

- zTrust easy-to-use browser-based mainframe software
- Network forensic discovery
- Network Micro-segmentation.



zdevops

Company profile:

It's all about having a passion for your job and being proud of all the awesome things you do.

Product/Service Information:

Support tools. Output management, Mattermost integration, USS/Splunk Interfacing

Activity: Consultant

Specialist areas: system management, Data management, Storage management, Asset and change management, Security, Programming/testing, Web integration and legacy reengineering tools, Network performance/management, Cloud/mainframe modernization, Tailor Fit Solutions

Mainframe platforms supported: z/OS

Software pricing options: Processor/capacity-based pricing, Other

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Phone: +31 6 392 1957 4

Email: hi@zdevops.com

Website: https://zdevops.com

Region: Europe / Middle East / Africa

Glossary of Terminology

Definitions of some mainframe-related terms

This glossary is intended as an aide memoire for experienced mainframers and a useful reference for those new to the z/OS world.

#

3270

IBM's family of dumb, block-mode synchronous screen and printer terminals, which became the standard for terminal/mainframe connectivity.

3270 data stream

Format used by 3270 devices for communication, and much used for emulation to make PCs look like dumb terminals.

5250

Terminal standard for the iSeries/400, System/3x etc.

A

ABARS

Aggregate Backup And Recovery Support. A disaster recovery feature within DFSMSHsm for automatically creating files containing back-ups of critical data. The main use of ABARS is to group all the datasets relating to a particular application together.

Abend

ABnormal ENDing. IBM speak for an unexpected termination to a program run, eg a crash.

Above the line

In z/OS, z/VM, and VSE/ESA, above the line refers to virtual/real memory locations with an address greater than 16MB. The 16MB limit resulted from earlier operating systems supporting 24-bit addressing.

ACB

Access Control Block. The control block used to tie an application program to a VSAM dataset.

Access control

Enforcing rules governing use of computer resources by restricting both the use and type of use to authorized individuals and the computer resources they are responsible for.

Access method

IBM-specific jargon for software that moves data between main storage and I/O devices.

ACF/VTAM

Advanced Communications Function / Virtual Telecommunications Access Method is IBM's proprietary telecommunications software.

ACID

This acronym describes the properties of a transaction. Atomicity refers to a transaction's changes to the state—either it all happens or nothing happens. Consistency refers to the state of a transaction. It must not violate any of the integrity constraints associated with the state. Isolation refers to the transaction not being affected by others. Durability refers to the survival of changes to state after a transaction completes.

ACL (1)

Access Control Lists specify which users are permitted to access a file or program function. The ACL format is determined by the External Security Manager (ESM). RSH

ACL (2)

Automated Cartridge Library. Synonymous with ATL (Automated Tape Library).

ACO

Automated Console Operations. Automated procedures that replace or reduce the number of actions an operator takes from a console in response to system or network activities.

ADA

Programming language much loved by the military (ADA is a US government standard), which uses it for writing systems for controlling guided missiles and the like. Withdrawn August 1994.

Address Resolution Protocol

The Internet Protocol (IP) used to dynamically map IP addresses to physical hardware Media Access Control (MAC) addresses.

Address space

The virtual storage allocated to an executing task in a mainframe. Generally used within z/OS to mean the space used by one of batch job, system task, or TSO user.

Agile

A modern alternative to waterfall models of project development in which requirements and solutions emerge through collaborative working between developers and users. It results in rapid changes and innovative solutions to problems.

AI

Artificial Intelligence is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using rules to reach approximate or definite conclusions), and selfcorrection.

AIOps

Originally, Algorithmic IT Operations, although sometimes thought of as artificial intelligence for IT operations, it refers to software that uses machine learning to help IT teams evaluate and act faster and more accurately.

AIX

Advanced Interactive eXecutive. IBM's version of Unix for mid-range systems (System p). It is one of four commercial operating systems that are certified to The Open Group's UNIX 03 standard. It is currently supported on IBM Power Systems alongside IBM i and Linux.

AJAX

Asynchronous Javascript And XML is a way of creating interactive Web applications using a group of technologies together. These technologies include XHTML (or HTML) and CSS; the Document Object Model; and the XMLHttpRequest object.

AMASPZAP

z/OS batch utility to apply a fix directly to object code in situ. Often protected against unauthorized use because of its additional ability to make direct changes to disk.

AMODE

Addressing MODE. Attribute of z/OS programs indicating the length (in bits) of the addresses used in the program. Introduced in MVS/XA to differentiate between the then new 31-bit addressing that expanded the addressable space from 16MB (24 bit) to 2GB. z/OS introduced 64-bit addressing.

AMS

Access Method Services. z/OS and VSE subsystem for performing various data-related actions on VSAM and ICF catalogs, including defining VSAM datasets, and deleting and copying most dataset types. In short, a multi-purpose utility. Also known as IDCAMS because that is the program name.

Analytics

Extracting hidden value from the massive volumes of data.

Ansible

This popular open-source software is a provisioning, configuration management, and application-deployment tool enabling infrastructure as code.

APAR

Authorized Program Analysis Report. An official report of a software error to IBM. Also used to refer to the patch supplied by IBM to fix the error (PTF is the correct term).

API

Application Program(ming) Interface. Documented programming procedures to access a given piece of software; typically an entry point name and parameter list. The re-use of APIs can speed up application development.

APL

A Programming Language, conceived within IBM by K E Iverson, and popular on the mainframe in the late '70s and early '80s to support end-user activities.

APM

Application Performance Management monitors and manages the performance and availability of software applications in order to meet business needs.

App

This usually refers to a mobile application found on Android and Apple smartphones and tablets.

Applet

A small application program written in the Java that can be retrieved from a Web server and executed in a browser.

APPN

Advanced Peer-to-Peer Networking architecture is an enhancement to SNA architecture. It can handle dynamic multipath routing.

ARM

Automatic Restart Management is a sysplex-wide integrated restart mechanism that can restart MVS subsystems after an abend, restart workloads on another MVS image after an MVS failure, and restart a failed MVS image.

AS/400

Application System/400. IBM's mid-range processor, announced in June 1988. It was replaced by the IBM Power Systems in April 2008. Now called IBM i.

ASCII

American Standard Code for Information Interchange. A modification of the international code which has become a de facto standard (except for IBM which also uses the EBCDIC code) for transmitting data. Uses seven bits plus a parity bit, and includes alphanumeric and control characters. ASCII must be converted to EBCDIC for uploading to IBM mainframes.

ASM

Auxiliary Storage Manager. The part of z/OS that looks after the I/O operations relating to paging—specifically the pages and page slots on external storage (typically DASD).

Assembler

Programming language that allows the user to get close to the hardware on IBM mainframes. Assembler statements correspond one-to-one with mainframe, machine-level instructions.

ATL

Automated Tape Library (also known as Automated Cartridge System—ACS, tape silo, or silo). Type of mass storage system (MSS) in which industry standard tapes are loaded by a robotic arm.

Augmented reality

Using a device, such as a smartphone or tablet, to view an object, such as server, and see on that device additional information about the object—such as performance information.

Auxiliary storage

All storage needing a channel I/O to access it (basically cache, SSD, disk, tape, mass storage).

AWLC

Advanced Workload License Charges is a new monthly licence pricing metric from IBM and applies to z196s.

B

BaaS

Blockchain as a Service—like Software as a Service (SaaS)—is where cloud-based solutions are consumed to build, host, and operate blockchains while the cloudbased service provider keeps the infrastructure agile and operational.

Backout

A process that removes all database updates performed by an application that has abended (qv). BAL Basic Assembler Language. The machine language on the original S/360 from which the modern Assembler languages are derived.

Bandwidth

A measure of how fast a network can transfer information, originally measured in Hertz (Hz), but now used for any measure of network throughput. The more precise definition: frequency range within a radiation band required to transmit a particular signal. Measures the difference between the highest and lowest signal frequencies in millions of cycles per second.

BASIC

Beginners All-purpose Symbolic Instruction Code. Universal interactive programming language.

Batch

An accumulation of data brought together for processing or transmission, usually unattended. Less formally, the processing of such data, as opposed to online processing where a user is present to respond interactively.

BCD

Binary-Coded Decimal. A binary-coded notation in which each of the decimal digits is represented by a binary numeral. This differs from the pure binary notation, where the entire number is represented as a single binary numeral.

BCS

The Basic Catalog Structure and the VVDS are the two parts of the ICF catalog. The BCS contains dataset and alias names and volume serial numbers.

BCU

A Balanced Configuration Unit comprises processor memory, I/O, storage, and DB2 resources. It is the smallest combination of these that work together efficiently. As more work is added to the system, so more BCUs can be added. This avoids any one component being too big in terms of the others.

BDAM

Basic Direct Access Method allows programmers to access specific blocks of data on DASD.

Benchmark

An agreed workload used as a standard against which to compare the performance of different hardware/software. For a benchmark to be useful it needs to be a public standard.

Big Data

The SNA/APPN command used to activate an LU-LU session following the successful completion of the SNA/APPN session initiation processing.

Big SQL

This allows users to access Hadoop-based data using familiar SQL statements. It utilizes InfoSphere BigInsights.

Bimodal IT

Gartner's management of IT model where one strand is very conservative and unwilling to change and the other strand embraces rapid application development and is tightly linked to business needs.

BIND

The SNA/APPN command used to activate an LU-LU session following the successful completion of the SNA/APPN session initiation processing.

BIOS

Basic Input/Output System. The I/O component of a simple operating system defining the interface between the operating system and the outside world.

Bitcoins

Bitcoins originated in a 2008 concept paper by Satoshi Nakamoto. Bitcoins are a virtual currency that are 'mined' by solving complex algorithms and are usually stored in a digital wallet. Bitcoin exchanges are completely private, which makes them popular with criminals! Many legitimate companies offer products for sale using bitcoins.

BLOB

Binary Large Object. A generic term for a file containing some kind of binary data (text, image, document, sound, etc). Typically, BLOBs can be transferred and manipulated across a wide range of platforms.

Block

A string of data elements, such as characters, words, or physical records, that are recorded or transmitted as a unit.

Blockchain

A blockchain is a distributed database that maintains a continuously growing list of ordered records. Blockchains are secure by design and an example of a distributed computing system. Once recorded, the data in a block cannot be altered retroactively.

Bluemix

Bluemix is an open-standards, cloud-based platform for building, managing, and running all types of apps, for Web, mobile, big data, and smart devices. It includes Java, mobile back-end development, and application monitoring, all provided as-a-service in the cloud.

BMS

Basic Mapping Support. An interface between CICS and an application to control the movement and presentation of datastreams to and from a dumb terminal. BMS allows data to be displayed without allowing for display-dependent formatting characters.

Boolean

An operation that follows the rules of Boolean algebra.

Boot

To prepare a computer system for operation by loading an operating system.

BPAM

Basic Partitioned Access Method is a low-level access method used to access Partitioned DataSets (PDSs).

Breach

This is where a cyberattack has gained access to a network and the mainframe, giving unauthorised access to data and backups to hackers.

BSAM

Basic Sequential Access Method, along with QSAM, is an access method used to access sequential datasets.

Bus

Generic term in data communications to describe a wiring topology (such as that used in Ethernet) in which devices are connected along a single linear medium.

BYOD

Bring your own device is the policy many companies are adopting to allow employees to bring their own mobile devices (laptops, tablets, and smartphones) to their workplace, and to use those devices to access privileged company information and applications.

BYOI

Bring Your Own Identity is the growing practice of taking a validated identity with you and so not needing to remember different user-ids and passwords for different environments. There are security issues.

Byte

A string of 8 bits that represents one EBCDIC character. The IBM mainframe architecture is organized around the concept of the byte.

C

C

A programming language developed at Bell Labs in 1972, so named because its predecessor was named B. Unix was written in C.

C/C++

An optional, separately priced feature of z/OS, available with or without Debug Tool. The C/C++ IBM Open Class Library is included with z/OS, but is only enabled when C/C++ is licensed.

Cache

High-speed buffer between a fast device and a slow device. In large IBM systems caching may take place in the CPU (in main or expanded storage), the controller, device head-of-string, or the device itself (eg in a track buffer). It is used to reduce access time.

Capacity on Demand

Processors can be purchased with extra capacity already on-board but not functioning. When extra capacity is required at a site, it is turned on. This is non-disruptive and customers don't pay for the extra capacity until they start using it.

Catalog

A dataset that contains information about other datasets, eg type, location, size, format. The z/OS master catalog usually also contains entries for user catalogs.

CCL

Communication Controller for Linux (CCL) on zSeries runs the Network Control Program (NCP) software product in Linux, enabling users to get rid of their legacy 3745 communication controllers running NCP-based SNA workloads to zSeries servers.

CDS

Configuration DataSet.

CGI

Common Gateway Interface. A mechanism used by HTTP servers to invoke arbitrary programs for additional processing of certain requests; typically, those involving database access.

Change management

The methodology for planning and controlling software changes.

Channel

A specialized computer used in the IBM mainframe architecture to control transfers between devices and the processor unit. The channel offloads some of the processing associated with I/O from the main CPU.

Channel adapter

Hardware unit to attach a channel to a processor.

Channel attached

Devices that are directly attached to the processor by cable rather than over a communications link.

Channels

CICS TS 3.1 introduced a replacement for sizelimited COMMAREAs—they are channels and containers. Any number of containers can be passed between programs and they are grouped together in channels.

CHPID

CHannel Path IDentifier. A single byte binary value used to uniquely identify each channel path on an eServer zSeries and previous mainframe systems.

CICS

Customer Information Control System. General purpose TP monitor for terminal-oriented and intersystem transaction processing in z/OS and VSE/ESA environments. Now with added SOA.

CICS Explorer

This is a system management tool for CICS systems that's based on the Eclipse platform.

CICSplex

A CICS complex (CICSplex) is a group of intercommunicating CICS systems.

CICSplex System Manager (CPSM)

This provides system management as well as automation and workload management.

CKD

Count Key Data is a way to format disk drive using cylinder number, track number, and physical record.

Client/server

Generic term for systems (also known as server/ requester) in which one machine provides a range of services to one or more other machines.

CLIST

Control language used to manage interactive applications in the z/OS TSO environment. Largely superseded by REXX.

Cloud computing

A new name for something similar to client/server computing. A user launches a browser and clicks a link. Somewhere else an application launches and work is done. The mainframe seems to have always worked in this way. Organizations like Microsoft, Amazon, and Google are trying to become big players in this 'new' paradigm.

Cloud Paks

IBM Cloud Paks are AI-powered software that come with pre-integrated data, automation, and security capabilities. They help create hybrid cloud platforms.

CMOS

Complementary Metal Oxide Semiconductor. A chip technology used widely by IBM in its processors, superseding the water-cooled ECL chips on the mainframe.

CMS

Conversational (originally Cambridge—the lab where it was built) Monitor System. Operating system running under VM, and providing timesharing and program development facilities.

COBOL

Programming language, very widely used for commercial applications on the mainframe. Some sources suggest that CICS and COBOL account for 85% of all transactions processed.

Communication Server

IBM's all inclusive, multi-platform, software bundle that provides a plethora of terminal emulation, Web-to-host, and networking capabilities.

Compile

The translation of a high-level programming language (source program) into a machine language program (an executable program).

Compiler

A program that translates high-level programming languages into machine language programs

Composite applications

A composite application is an application built by combining multiple services. This tends to mean taking part of a really useful mainframe application and combining it with some other code so that the mainframe application becomes available over the Web

Compression

Generic term for a method of reducing the amount of space needed to store data, by encoding the data. This is achieved through the elimination of empty fields, gaps, redundancies, and unnecessary data to shorten the length of records or blocks.

Connector

One way of integrating CICS applications as Web services is to use connectors on the mainframe and use native interfaces to permit tight integration with the target application.

Containers

CICS TS 3.1 introduced a replacement for sizelimited COMMAREAs—they are channels and containers. Any number of containers can be passed between programs and they are grouped together in channels. Channels are deleted when no programs are using them.

Control Point

SNA/APPN/HPR functionality that performs authorization, directory services and configuration management.

CORBA

Common Object Request Broker Architecture. Set of standards for distributed object management from the Object Management Group (OMG).

Coupling

Generic term used to mean connecting of processors together into a more or less tightly-knit computing complex. Used specifically by IBM to mean the connection of multiple eServer zSeries processors in a Sysplex. Coupling Facility Hardware from IBM, where common tables can be shared in a Sysplex, for high-speed cacheing, update locking of shared data, list processing and workload balancing between multiple processors.

CPC

Central Processor Complex.

CPU

Central Processing Unit. Processor. The part of a computer that executes instructions.

CRM

Customer Relationship Management refers to the way organizations manage their relationships with customers—including finding, marketing to, selling to, and servicing these customers.

CTG

CICS Transaction Gateway provides J2EE standardsbased access to CICS applications, which means it's an easy way to make existing CICS applications part of a Service-Oriented Architecture (SOA).

CTC

Channel-To-Channel connections would link two mainframes and provide high-speed communication.

Cyberattack

Bad actors trying to and often successfully gaining access to a network and the mainframe, then exfiltrating often confidential data.

CyberSecurity Mesh Architecture (CSMA)

An integrated approach to securing IT assets regardless of their location. It redefines the perimeters of cybersecurity to the identity of a person or a thing. Gartner predicts that this will reduce the financial implications of cyber incidents by 90% in less than two years.

Cylinder

The tracks, in an assembly of magnetic disks, that can be accessed without repositioning the access mechanism.

D

DASD

Direct Access Storage Device. IBM'speak for disk.

DAT

Dynamic Address Translation. The process by which virtual addresses are converted into real addresses during instruction execution.

Data dictionary

A data dictionary (DD) is a database containing information about the way items of data are used. Typically a DD contains details of data names, data usage, data structures, data models, and so on.

Data lake

A data lake is a repository of data stored in its natural format. This could be in a Hadoop-based repository.

Data mining

The practice of using a data warehouse for highly complex, ad hoc queries.

Data Privacy Passports

These were introduced with the z15 mainframe. They enable users to protect and provision data, and revoke access to that data at any time. They not only work in the z15 environment, but also across an enterprise's hybrid multi-cloud environment.

Data sewer

What happens to a data lake as more and more records are added.

Data warehouse

General term for a collection of database, middleware, and query tools that allow fast, flexible access to nearoperational corporate data.

DataOps

This is an automated, process-oriented methodology, that's used to improve the quality and reduce the cycle time of data analytics.

DataPower

IBM WebSphere DataPower SOA Appliances is a family of pre-built, pre-configured rack mountable network devices that accelerate Web services deployments while extending SOA infrastructure.

Dataset

A unit of data storage and retrieval consisting of one or more data records. Outside of the IBM mainframe environment, people call them files.

DB2

Database/2. Relational database management system first announced for mainframe environments in 1983. Originally promoted as an end-user tool, but is now IBM's preferred DBMS for just about everything and runs on all platforms.

Db2ZAI

IBM Db2 AI for z/OS empowers the optimizer in the Db2 for z/OS engine to determine the best-performing query access paths, based on a site's workload characteristics.

Debug

The human problem determination process for software. Literally, to remove bugs.

DEDB

Data Entry DataBases are one of two types of IMS fast path database. These databases do not have indexes and are stored in VSAM files.

Defragmentation

The use of a software utility to improve access and retrieval time by rewriting fragmented data to contiguous sectors of a computer storage medium.

Denial of Service

An insidious, carefully-orchestrated attack on computer systems or networks to overload their resources with a barrage of requests in the hope of discovering overloadinduced vulnerabilities within the targets or to just disrupt the mission-critical activities of an enterprise.

DeOS

No longer is DDoS (Distributed Denial of Service) our only worry, we need to think about Destruction Of Service attacks.

Device

Any computer peripheral, such as tape or DASD, or any object that appears to be a peripheral.

DevOps

Part DEvelopment and part OPerations, DevOps is a philosophy emphasizing the collaboration and communication between software developers and other IT people, so that building, testing, and releasing software, can happen rapidly, frequently, and more reliably.

DevSecOps

DevSecOps is DevOps with security consideration introduced earlier in the life cycle of application development in an attempt to minimize vulnerabilities.

DFSMS

Data Facility Storage Management Subsystem. An element of z/OS and also available for z/VM, as DFSMS/VM. The idea is that you simply tell the system about your storage, back-up, performance, and other requirements of the data, and the system does the rest for you. Of course, it's not really that simple.

DFSMSdfp

DFSMS Data Facility Product. A component of DFSMS that provides functions for storage, data, program, and device management, in conjunction with distributed data access. Enables the definition of the services to be assigned to new datasets. Handles catalog management and access methods.

DFSMSdss

DFSMS DataSet Services. An optional, separately priced feature of DFSMS that handles device migration, copy, space management, and dump/restore. It also converts existing data between non-SMS and SMS volumes, and provides an interface for storage administrators (ISMF).

DFSMShsm

DFSMS Hierarchical Storage Manager. An optional, separately priced feature of DFSMS. It is a sophisticated automated system for both back-up and hierarchical storage management. It includes an ISPF interface for end users who wish to migrate, recall, back-up, or recover individual datasets, or to override the default migration and/or back-up parameters.

DFSMSrmm

DFSMS Removable Media Manager. Its goal was to integrate the system managed storage principles of DFSMS into all removable media, most notably tape and optical.

Digital reinvention

Successful digital reinvention follows a fundamental rethink or reimagining of how an organization operates and how it engages with its environment and customers.

Digital Transformation (DX)

Another way of describing the inevitable change in technology that occurs in businesses that plan to stay in business.

Disruptive technology

Henry Ford said: "If I had asked people what they wanted, they would have said faster horses". That's an example of a disruptive technology—something that changes the way people do things.

DL/I

Data Language/I. The I is the Roman numeral One. The data manipulation language within IMS DB. DL/I is also the product name for IBM's VSE/ESA implementation of IMS DB.

DLSw

Widely-used SNA/APPN(/NetBIOS)-over-TCP/IP transport mechanism which, however, unlike EE, does not support SNA COS or routing.

DMZ

A De-Militarized Zone is used in the on-going war against viruses and malware etc. Typically, one computer accepts incoming data and send outgoing data. Behind it is a firewall, and behind that is the protected LAN.

E

Docker

Docker is a software container platform. Everything you need to make the software work is packaged into this container. It includes libraries and settings to run on any platform. This way, you get an efficient, lightweight, self-contained system, plus the assurance that the software will always run the same, no matter where it's deployed. IBM has Docker Enterprise Edition for IBM Cloud.

Domino

Web server technology from Lotus (June 1996), which allows browsers to interact with Notes and access Notes databases. Now closely integrated with WebSphere.

DRaaS

Disaster Recovery as a Service is the replication and hosting of physical or virtual servers by a third-party to provide failover in the event of a catastrophe.

EBCDIC

Extended Binary Coded Decimal Interchange Code. Coded 8-bit character set (giving 256 characters) used by IBM mainframes.

e-business

Used to refer to business transactions that use the Internet.

ECI

The External Call Interface is used by CICS to allow non-CICS programs to invoke programs under CICS.

Eclipse

Eclipse is an Open Source IDE. IBM's version is sold as WebSphere Studio Workbench. The Eclipse platform comprises the platform run-time, the workspace, the workbench, the Standard Widget Toolkit (SWT), the Version and Configuration Management (VCM), and the help system. Eclipse comes with a large number of plug-ins. The user interface for Eclipse is known as the workbench.

Edge computing

Putting some computing power at the furthest reaches of the network to control IoT devices, for example.

EE

HSR-over-UDP/IP, created by committee and codified in RFC 2353 in 1998, which permits SNA/APPN networking, replete with native COS and routing, across IP networks.

EJB

Enterprise JavaBeans. A server-side, transaction-oriented extension to the JavaBeans component model specification published by Sun. EJB are JavaBeans, but have no user interface and are designed to run within a special EJB container. In principle, any properly coded EJB should run within any fully compliant EJB container.

Enqueue

The z/OS expression (often abbreviated to ENQ) for requesting resource serialization. ENQ can be used to put a user-named entry in the system resource queue in order to prevent another program using a serially usable resource.

Enterprise Content Management (ECM)

This refers to a way of organizing and storing an organization's documents, and other content, that relate to the organization's processes. Nowadays, ECM can be used when talking about strategies, methods, and tools used throughout the life-cycle of the content. ECM also covers the capture, search, and networking of documents with digital archiving, document management, and workflow.

Enterprise Extender

Enterprise Extender (EE) is a combination of SNA encapsulated in IP packets, so it can be thought of as a kind of protocol.

EPI

A CICS External Presentation Interface service is an implementation of a service that can be created from a 3270 terminal. EPI provides communication with 3270 terminal-based CICS applications.

ERP

Enterprise Resource Planning systems try to integrate all the data and processes that exist within an organization into a single unified system. Error log A dataset or file that contains a record of machine checks on device errors, which are stored for later analysis.

ESB

An Enterprise Service Bus is a software architecture construct that is standards-based and flexible. It is an attempt to separate the service being called and the required transport medium.

ESCON

Enterprise System Connectivity. The high-speed fibre-optic channel architecture (using a serial, packetswitched protocol) first available on ES/9000 and 3090Js and many peripherals. Replaced by FICON in May 1998, though still available.

ESDS

Entry Sequenced DataSet is a VSAM sequential dataset.

ESM

External Security Manager is a vendor software product that performs security authorization checking. RACF, ACF2, and Top Secret are ESMs. ESMs verify a user's identity, determine whether a user is permitted to access a dataset (ie file) or resource, log a user's activities, and decide whether a user can view or administer controls. RSH

ESS

The Total Storage Enterprise Storage Server, codenamed shark, is a high-speed data storage product.

EWLC

Entry Workload Licence Charges allow customers only pay for peak z/OS usage, not for full machine capacity.

F

FBA

Fixed Block Architecture is a way of formatting disk drives where space is allocated in fixed-length blocks rather than cylinders.

FDBR

Fast DataBase Recovery creates a separate IMS control region (the Fast Database Recovery region) to monitor an IMS subsystem. If it detects a failure, it will recover any database resources that are locked by the failed IMS, so they're available for other IMS subsystems.

FHE

Fully Homomorphic Encryption allows users to perform addition and multiplication operations on encrypted data, which, when decrypted, gives the same output as would have been produced using unencrypted data.

Fibre optic channel

Channel technology which replaced copper bus-andtag channel cables with fibre-optic links.

FICON

Fibre CONNECTION. Mainframe channel that implements the ANSI FCS transport. Each FICON channel can handle over 4,000 I/O operations per second, equivalent to eight ESCON(qv) channels. The FICON channel link speed is 100MB/sec full duplex, compared with 17MB/sec simplex with ESCON links.

Firewall

Specialized software designed to prevent unauthorized access to a computer system while permitting validated, non-harmful interactions to get through.

Flat file

Any file (dataset, mainframe parlance) stored in a file access method without an index which, of course, eliminates all relational DBMSs.

Floating point

One of several methods of storing numbers on an IBM mainframe and most other computers. Similar to scientific notation, such as 3.75 times 10 to the 25th power, only it is 2 or 16 that is taken to some power.

FLPA

The Fixed Link Pack Area is an area of storage containing modules loaded at IPL time.

FORTRAN

FORMula TRANslation. A programming language best suited for engineering, scientific, and mathematical applications.

Fragmentation

When an operating system writes data to disk or other storage media, and there is insufficient contiguous space, the data is then written to discontinuous sectors. The result is fragmented data. Fragmentation can cause increased data access times because the operating system must search different tracks for information.

FTP

File Transfer Protocol is an application layer protocol that uses TCP and Telnet services to transfer bulk data files between machines or hosts.

Fog computing or fog networking or fogging

This is an architecture that uses edge devices to carry out a substantial amount of computation, storage, and communication locally and routed over the Internet backbone.

FWLC

Flat Workload License Charge. A flat monthly charge for a software product, no matter what size of zSeries server it is being run on.

G

Gamification

A way of making using the software more fun—like in a game—and so people are more likely to do it. It has applications in mundane tasks such as updating a knowledgebase.

Gateway

One way of integrating CICS applications as Web services is to use gateways, which run off the mainframe on middle tier servers and may well use traditional methods, such as screen scraping.

GDG

Generation Data Group. Collection of (z/OS non-VSAM) datasets all with the same logical name (GDG Base Entry); the individual datasets are uniquely identified by the generation number which is stored as part of the dataset name.

GDPR

General Data Protection Regulation applies to any organization storing data about EU citizens.

GDPS

Geographically Dispersed Parallel Sysplex is an application to manage z/OS remote copy configuration and storage subsystems, to automate various tasks, and perform failure recovery for a sysplex located at two sites.

GTF

Generalized Trace Facility. An optional z/OS utility that records system events, which can be used for problem diagnosis.

GitHub

A Web-based Git version-control repository hosting service, which is available on mainframes.

GUIDE

Guidance for Users of Integrated Data processing Equipment. For many years, an international user group for users of large IBM equipment. Main GUIDE interests were in applications and the commercial world. Depending on the area of the world you live in, it either stepped aside for SHARE or merged with SHARE (now GUIDE/SHARE in Europe, for example).

H

Hackathon

A caffeine-rich events where teams use APIs to create customer-friendly applications quickly.

Hadoop

An open-source software framework for storage and large-scale processing of data-sets, ie Big Data. On a mainframe, it runs in a Linux partition (Linux on System z).

Hadoop Distributed File System (HDFS)

A filesystem used to store Big Data.

HALDB

High-Availability Large Databases are the newest (since V7) IMS databases. They are like souped-up very big full-function databases.

HBase

This is a non-relational, distributed database, written in Java that is used to store Big Data.

HCD

Hardware Configuration Definition is an interactive tool used to define the hardware configuration.

HDA

Head/Disk Assembly. The read/write head and associated bits and pieces that read data from disks. The implication is also of a sealed unit, at least from the customer perspective, as opposed to a removable disk pack.

HFS

Hierarchical File System comes with Linux and refers to the way files are stored.

HiperBatch

A way of running batch jobs in hyperspace, so there was far less I/O and things ran faster.

HMC

Hardware Management Console used to manage hardware.

Host

A computer system that is a server and/or serves attached terminals. Often used to refer to mainframe.

HPR

High-Performance Routing is an extension to APPN networking providing improved routing performance and reliability.

HSA

High-Speed Adapter is the name for subchannels on some servers.

HTML

HyperText Mark-up Language is a “mark-up language” for defining the structure of a document—eg Web pages.

HTTP

HyperText Transfer Protocol is the protocol used to request, transfer, and display hypertext documents.

Hub

A generic term for a device that has a single connection to the host and many connections for other devices to connect to it.

Hybrid cloud

Public and private cloud services can be integrated with on-premises infrastructure to produce a hybrid cloud environment with orchestration, management, and application portability across all three.

Hybrid working

Working from anywhere, including, but not restricted the office and home.

I/O

Input/output. Refers to the transmission of data into or out of a processor’s memory. This would include communication lines and peripherals such as disk drives.

ICETOOL

An enhanced DFSORT utility that includes the OUTFIL feature.

IBM i

An operating system running on IBM Power Systems. It was originally named OS/400 and ran on AS/400s.

IBM Z

IBM’s mainframe family of processors, eg z15, z14, etc.

ICF

Integrated Catalog Facility contains catalog information about datasets. It is made up BCS and VVDS. ICF Integrated Coupling Facility is a component of a Parallel Sysplex. It allows multiple processors to share, cache, update, and balance data access.

ICSF

Integrated Cryptographic Service Facility is part of MVS security, protecting data on the mainframe.

IDAA (IBM DB2 Analytics Accelerator)

This high-performance appliance integrates IBM Netezza and zEnterprise technologies, providing fast results for complex and data-intensive DB2 queries on data warehousing, business intelligence, and analytic workloads.

IDCAMS

Access Method Services. Multi-purpose batch VSAM utility program.

IDE

Integrated Development Environment. Salesmen say it stands for “It Does Everything”, and unlucky customers as “I Do Everything”! An IDE could be a glorified text editor right up to all-singing all-dancing software like Eclipse and Visual Studio.

IEBCOMPR

z/OS Compare Datasets utility does a logical compare of datasets. Replaced by SuperC in ISPF/PDF.

IEBCOPY

z/OS Library Copy utility for copying members of a partitioned dataset (PDS), unloading a PDS into a sequential dataset and back again. Unloading is especially useful for copying a PDS to tape.

IEBGENER

z/OS Sequential Copy/Generate Dataset utility. Replaced by ICEGENER in DFSORT and several non-IBM products.

IEBPTPCH

z/OS Print-Punch utility for producing a hard copy of datasets and library members. Replaced by ISPF/ PDF's hardcopy capabilities.

IEBUPDTE

z/OS Update Dataset utility. Can only be used for PDS members and sequential datasets with fixed-length records no greater than 80 bytes in length.

IEHLIST

z/OS List System Data utility for listing a VTOC or the directory of a PDS.

IEHMOVE

z/OS Move System Data utility for moving or copying logical collections of operating system data. Replaced by DFSMSdss.

IETF

Internet Engineering Task Force. An open community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet.

IFL

Integrated Facility for Linux. Dedicated Linux processor on the zSeries.

IIOP

Internet Inter-ORB Protocol is an object-oriented protocol that makes it possible for distributed programs written in different programming languages to communicate over the Internet.

IML

Initial Microcode (sometimes Machine) Load. The first step in starting up a mainframe, during which the firmware is automatically copied into the machine.

IMS

Information Management System. Vintage but extremely powerful system for transactional workloads, still underpinning many of the world's business-critical applications. Composed of two systems: Database Manager (IMS DB) and a Transaction Manager (IMS TM).

IMS catalog

The IMS catalog contains information about IMS program resources, database resources, and relevant application metadata that IMS controls.

IMS Connect

This is an integrated TCP/IP gateway for IMS, allowing user-written applications to access IMS data and transaction services from any TCP/IP client. It also supports callout from IMS applications to outside services.

IND\$FILE

Mainframe file transfer program.

Info/Man

IBM Information/Management. Software problem, change and configuration management software. Now called Tivoli Information Management for z/OS.

Integrity Monitoring

Integrity Monitoring (IM) software offers security features such as whitelisting; early warning of infrastructure (parmlib, system files) changes; unusual activity by users; and surgical restore jobs; as well as regular checking that changes to data and backups are not unauthorized; and sending alerts.

Internet of Things (IoT)

This refers to devices such as remote sensors, CCTV, weather satellites, etc that will be monitoring throughout the day, and producing data that can be captured and analysed.

IOCDs

Input/Output Configuration DataSet. The dataset specifying the I/O devices that can be connected to a mainframe.

IOCP

Input/Output Configuration Program. The program describing the I/O configuration to the channel subsystem.

Internet of Everything (IoE)

The concept originated at Cisco, who defines IoE as “the intelligent connection of people, process, data, and things”. With IoT, all communications are between machines, IoE adds machine-to-people (M2P), and technology-assisted people-to-people (P2P) interactions to machine-to-machine (M2M) communications.

IP

Internet Protocol. An Internet protocol that routes data through networks. IP acts as an intermediary between the higher protocol layers and the physical network. It does not provide error recovery or flow control.

IP address

The numerical Internet Protocol (IP) address of an Internet computer. Every computer has a unique numerical IP address. IPv6, which offers 64-bit addressing, is meant to replace IPv4, which only offers 32-bit addressing. One day, all the addresses available with 32-bit addressing are meant to be used up!

IPL

Initial Program Load. The first part of the process of loading an operating system into a machine.

IRC

Inter-Region Communication is a CICS facility providing communication between CICS regions using functions such as Multiregion Operation (MRO) and Distributed Program Link (DPL).

IRD

Intelligent Resource Director. z/OS feature for redistributing workloads on the fly.

ISHELL

ISHELL (ISPF Shell) is the name of the panel displayed after issuing the ISH command. It can be used to view files and directories.

ISPF

Interactive System Productivity Facility. Menu and screen management system.

ISPF/PDF

ISPF/Program Development Facility. ISPF facility providing access to application development services for end users and programmers. Incorporates C and REXX programming support, and some support for programmable workstations.

ISV

Independent Software Vendor. A software vendor which isn't part of and/or doesn't belong to a hardware manufacturer.

IT4IT

This Reference Architecture prescribes holistic management of the business of IT with continuous insight and control, enabling 'Boundaryless Information Flow' across the entire IT Value Chain. It provides prescriptive guidance on how to design, procure, and implement the functionality needed to run IT. The end-to-end, 'how to' emphasis of the IT Value Chain and IT4IT Reference Architecture also enables the state of services that IT delivers to be systematically tracked across the service life-cycle.

J

ITIL

Information Technology Infrastructure Library. ITIL provides a framework of best practice guidance for IT service managers. The actual ITIL publications cover areas such as service strategy, service design, service transition, service operation, and continual service improvement.

J2EE

Java 2 Platform, Enterprise Edition. The Java Software Development Kit (SDK) tools, APIs, and run-time (ie execution) environment targeted at Java developers building enterprise-class, server-side applications.

Java

An object-oriented programming environment developed by Sun towards the end of 1995. Java creates applets which can be downloaded across the Internet, and which will allow clients to interact with objects on the Web and intranet servers.

Java Virtual Machine

The facility allowing Java applets/source code to run on a computer.

JavaBeans

A platform-independent, software component technology for building reusable Java components called Beans. The JavaBeans component model specifies how to build reusable software components, how the resulting Beans describe their properties to visual rapid application development tools, and how they communicate with each other. Beans can be combined to create applications or applets.

JavaScript

An interpreted scripting language.

JCA

Java EE Connector Architecture can connect existing CICS applications to external Java applications using the CICS Transaction Gateway.

JCICS

The CICS Java class library (JCICS) can be used by Java applications to access CICS services. JCL Job Control Language. The language used on the mainframe to describe the steps of a batch job (files to be used, programs to be run, etc).

JDBC

Java DataBase Connectivity. An API that is designed for use by Java database applications, and has the same characteristics as Open Database Connectivity (ODBC).

JDK

Java Development Kit. Software development kit from Sun consisting of a Java compiler, a debugger, standard Java classes, and a Java run-time (ie JVM) for Unix.

Jenkins

A continuous integration tool used most often for software development

JES2 and JES3

Job Entry Subsystem 2. One of two batch processing subsystems available for z/OS, both developed in the 1960s and with a different heritage and different control statements. Each reads batch jobs in, schedules their execution and spools their output. JES2 is by far the more popular.

JMS

The Java Message Service is a Java API to messageoriented middleware (MOM). JNDI Java Naming and Directory Interface is really two APIs used to keep track of, and access, dispersed data.

K

JNI

The Java Native Interface is a programming interface for writing Java native methods and embedding the Java virtual machine into native applications.

JSON

JavaScript Object Notation is an open standard format using human-readable text to send data objects as an alternative to XML.

JSP

JavaServer Pages. Uses XML-like tags and scriptlets to encapsulate logic that fills out the dynamic content of HTML pages.

JVM

See Java Virtual Machine.

Kantara Initiative

This is an organization dedicated to advancing technical and legal innovation related to digital identity management. It isn't a standards body, but makes recommendations to standards bodies about digital identity management.

Kerberos

Security system for Unix environments derived from MIT's Project Athena. Uses a trusted server to ensure that there are no unwanted systems in the network.

Kernel

The core of an operating system that performs basic functions such as allocating hardware resources.

Kilobit

1024 bits, or 2 to the 10th power, when referring to processor storage, real and virtual storage, and channel volume. However, when referring to disk storage capacity it is 1000 bits. Abbreviated as Kb.

Kilobyte

1024 bytes, or 2 to the 10th power, when referring to processor storage, real and virtual storage, and channel volume. However, when referring to disk storage capacity it is 1000 bytes. Abbreviated as KB.

KSDS

Key Sequenced DataSet is a type of VSAM dataset in which the physical location of records is controlled by the key used.

Kubernetes

This is an open-source container-orchestration system for automating application deployment, scaling, and management. It was originally designed by Google.

KVM

Kernel-based Virtual Machine is a virtualization module in the Linux kernel that allows the kernel to function as a hypervisor.

Kyndryl

Once IBM's Managed Infrastructure Services business, in 2021 it became a separate company.

L

LAN

Local Area Network. A generic term for the transport mechanism for a local (eg site or building) network. The thing that makes current LANs special is their intimacy with the connected machines; effectively the LAN acts as an extension to the internal bus of the attached system, and allows a single system to be built from physically dispersed components.

Language Environment

LE provides a common run-time environment for major programming languages. The common library of runtime services includes message handling, condition handling, storage management routines and time/date functions.

Latency

A measure of response time. On a disk drive, how long it takes for the first bit of requested data to rotate under the head. In a network, the minimum elapsed time for a message to be transmitted, consisting of the aggregate delay contributed by the communications links and devices along the way.

LDAP

Lightweight Directory Access Protocol. An Internet directory management standard that provides a consistent way to manage user access to network resources, such as information, applications and systems.

LDS

Linear DataSet is a type of VSAM dataset that can be kept permanently in memory thus improving performance.

Legacy system

The description given to any system that's been around longer than the programmer who wants to change it. Some 'legacy systems' can be comparatively recent and, despite popular perceptions, they are certainly not exclusive to the mainframe.

Liberty profile

This is a cut down version of the WebSphere Liberty product. It provides a way for CICS, IMS, and DB2 users to easily allow their applications to link to apps running in mobile devices and the Internet of Things.

LIFO

Last In, First Out. A queuing technique where the most recent addition to the queue is processed first. Also known as a push-down stack.

Linear Dataset

A VSAM dataset type, similar to an ESDS, but which always has 4096 byte blocks, and which can be kept permanently in memory for enhanced performance.

Linux

An Open Source Unix variant that seems to run on everything from workstations (where Microsoft haters insist it will replace Windows) to mainframes (where IBM has spent bags of money making it run well).

Listener

An application that 'listens' for input on a line and then acts on it.

Load module

A program in a form that can be loaded into memory for immediate execution.

Logical Partitioning

A way of dividing up a processor's capacity under PR/ SM into physically separate areas (LPARs or Logical PARTitions) for resilience, performance or security reasons.

LPA

Link Pack Area. The z/OS area used for resident programs, eg those programs which are most frequently used and (usually for performance reasons) should not be loaded by each application program from libraries stored on disk.

LPAR

Logical PARTitioning is a way of dividing up a processor's capacity.

LSR

Local Shared Resources. A technique for improving CICS performance by the sharing of a common buffer pool for VSAM datasets.

LU

SNA's software interface (or 'port') through which end users gain access to the SNA network. LU 6.2 SNA's protocol suite for program-to-program communications.

LUW

Logical Unit of Work is the amount of work that will be backed out in the event of a failure. For example, a CICS transaction is processing away happily and then something goes wrong. The LUW defines how much of what has been processed will be backed out and how much that occurred previously can be left. Large LUWs are efficient providing that failures are rare. Small LUW use processing power, but are more efficient for recovery after a failure.

M

M2M

Machine-to-machine is used when talking about machines, devices, and equipment that can communicate with each other. And that communication can be wired or wireless.

MAC

Media Access Control. Generic term for the way in which workstations gain access to transmission media.

Macro

A preprocessor (precompiler), and the statements it processes, for Assembler. Generates Assembler instructions and machine instruction mnemonics as well as allowing assembly time conditional logic.

Mainframe

A high-performance computer serving many people at once and running many different applications concurrently.

Man-in-the-Middle

Data siphoning scheme where fraudulent software manages to insert itself, undetected, between two network partners by actively emulating the two partners being deceived.

MapReduce

A process used on Big Data at runtime that maps the data and reduces it.

Master catalog

The z/OS catalog where the search begins for a dataset.

MCM

The MultiChip Module (MCM) contains the Central Electronic Complex (CEC) of a S/390 system.

Measured usage

The method of charging for software based on the monthly usage. Same as Usage-based pricing.

Megabit

1,048,576 bits. Abbreviated as Mb.

Megabyte

Roughly one million bytes—actually 1,048,576 bytes. Abbreviated as MB.

MFLOPS

MegaFLOPS. One MFLOPS is one million floating point operations per second—a common measure of numerically intensive compute power.

MIB

Management Information Base. Generic term (often used specifically in relation to the SNMP management protocol) for the database of the objects managed in a network—usually a LAN.

Microcode

Although it can have very specific alternative meanings, its most common usage is as a synonym for firmware.

Microsecond

1/1,000,000 of a second.

Microsoft

The company that made the shrewd move of persuading IBM to use its DOS operating system for the IBM PC. The rest is history.

Middleware

Though it defies definition, its primary role is to provide connectivity and other shared services between platforms. There are numerous types.

MIME

Multipurpose Internet Mail Extensions. An encoding format allowing e-mail messages containing a variety of media forms (audio, video, image, and text) to be sent across the Internet.

MIPS

Million Instructions Per Second (or Meaningless Indicator of Processor Speed). A crude and not very meaningful way of expressing raw computer power, widely used for comparing the power of different mainframe models and for demonstrating the futility of comparing the mainframe with other platforms.

Mirroring

The technique of constantly maintaining a parallel copy of critical datasets, so that the duplicate data can be used if there is a problem with the main data.

MLPA

The Modified Link Pack Area is an area of storage used to contain re-enterable routines from APF-authorized libraries.

MobileFirst

MobileFirst is a set of mobile software, services, and solutions for businesses offered by IBM.

MOM

Message Oriented Middleware. For example, WebSphere MQ.

MongoSQL

This is an Open Source NoSQL database that uses JSON-like documents with dynamic schemas for speed.

MPF

Message Processing Facility. A utility in z/OS that controls message display and message processing, typically to suppress unnecessary system messages. A first step towards automated operations.

MQSeries

Messaging and Queueing Series—see WebSphere MQ.

MRO

Multi-Region Operation is a function of the CICS Inter- Region Communication facility enabling communication between CICS regions.

MSDBs

Main Storage DataBases are one of two types of IMS fast path database. These databases do not have indexes and are stored in VSAM files.

MSS

Mass Storage System is hardware for storing large amounts of archive data, typically involving the use of a jukebox mechanism to retrieve discrete data cartridges.

MSU

Millions of Service Units. Measure of mainframe compute power, used selectively by IBM as an alternative to MIPS. Opinions vary as to how the two metrics compare.

MTBF

Mean Time Between Failures. The average value of the length of time between consecutive failures under stated conditions of a system.

MTO

Master Terminal Operator. Software enabling a terminal to control a subsystem, eg CICS.

MTTR

Mean Time To Recovery or Repair. The average time required for corrective maintenance. See also MTBF.

Multiplexer

A generic device (also known as a mux) that combines data from two or more devices, transmits the data as a single datastream over a high-speed communications medium, and disentangles (de-multiplexes) the data at the other end.

Multi-point

Communications configuration in which a single primary node communicates with two or more secondary nodes (which cannot communicate with one another, except through the primary). Also known as multi-drop.

MVP

Minimum Viable Product is often created at hackathons.

MVS

Multiple Virtual Storage. In z/OS's long history, MVS has the honour of being its name for the longest period (about 20 years), and the operating system is still referred to as MVS by many mainframe technical specialists. Popularly believed to stand for Man Versus System.

N

Nabla containers

These are a new type of container designed for strong isolation on a host. Nabla replaces the typical VM hypervisor interface of hypercalls and vmexits with simple system calls (syscalls), and so reduces the attack surface.

Nanosecond

1/1,000,000,000 of a second.

NAS

Network Attached Storage.

.NET

.NET is a Microsoft strategy for creating Web services. In essence, a Windows user should be able to run applications locally or over the Web without noticing the difference. Visual Studio .NET is a development environment that is currently available.

NetView

SNA network management product. Announced mid-1986. Although it started off life as a rather halfhearted bundling of various mainframe-centric network management products (including NCCF, NLDM, NPDA, VNCA, and NMPPF), by mid-1995 it had turned into a fully-fledged distributed network management system, with a strong focus on distributed Unix boxes as network management workstations. Replaced by Tivoli NetView and other products.

NFS

Network File System. Set of Unix protocols (originally developed by Sun Microsystems) for file sharing across a LAN. Built on top of Ethernet and TCP/IP.

NJE

Network Job Entry. JES facility enabling multiple hosts to share job queues and system spools.

Node

In SNA, a total unit of network-attachable functionality, realized in software, that gets implemented within a device or runs on a computer.

NoSQL

NoSQL databases don't have to use SQL, but may. They are different from traditional relational databases.

Notes

Lotus groupware product that IBM took on in June '91.



OAuth

This is an open standard for authorization. It allows people to access third-party Web sites using their validated Facebook or Twitter IDs.

OCR

Optical Character Recognition. OCR software is used to convert scanned documents into machine-readable text files.

ODBC

Open DataBase Connectivity. An API created by Microsoft that allows Windows applications to access relational databases, such as DB2 and Oracle, and other data sources using SQL statements.

OEM

Original Equipment Manufacturer. An OEM is a manufacturer who makes a product and sells it to another company, which puts its own badge on it and sells it to the end user.

Office 365

A Cloud-based version of Microsoft's Office suite of enterprise-grade productivity applications. As well as Word and Excel, users get Outlook, SharePoint, Forms, and Team sites.

OLAP

On-Line Analytical Processing. A term coined by database guru Ted Codd and used to refer to multidimensional analysis and reporting applications of the EIS and Information Warehouse type.

OLE

Object Linking and Embedding. Microsoft-sponsored standard for moving and linking data and other objects between applications and systems in Windows.

OLTEP

On-Line Test and Execution Program. IBM engineer's tool for analysis of hardware problems.

OLTP

On-Line Transaction Processing. Generic term for highthroughput, very resilient transaction systems. OLTP tends to be used to refer to systems with some degree of fault tolerance.

OMG

Object Management Group. A group of vendors responsible for standards for object management and interoperability including CORBA, UML, MOF and CWM. IBM joined in 1991.

OMVS

The OMVS command is used to invoke the z/OS Unix shell. From here you can use shell commands or utilities requesting services from the system. You could also write shell scripts and run shell scripts or programs written in C.

Online Reorganization (OLR)

Using OLR with IMS HALDBs, the databases remain available to applications throughout the OLR reorganization process.

Open Systems

Computer systems that provide either interoperability, portability, of freedom from proprietary standards, depending on your perspective.

OpenEdition

'Open' version of MVS that was replaced by Unix System Services in z/OS and OpenEdition Shell and Utilities in z/VM.

OpenID

This provides a way for users to consolidate their digital identities by having a single OpenID when connecting to different Web sites.

ORB

Object Request Broker. A specialized object that allows other objects to communicate with each other to make and receive requests and responses. OS/390 Replacement for MVS, announced in 1995. Now superseded by z/OS, but still used in some mainframe sites.

OSA

Open Systems Adapter is an integrated hardware feature allowing zSeries 900 platforms to provide connectivity directly to clients on LANs.

OSA Express

Open Systems Adapter-Express are an IBM adapter family consisting of integrated hardware features that are designed to provide direct connection for zSeries and S/390 Parallel Enterprise Servers G5 and G6 to high speed routers and switches, to other high-speed servers, and to clients on LANs.

OSAM (Overflow Sequential Access Method)

This is an IMS-specific access method that optimizes the I/O channel program for IMS access patterns.

OTC

One Time Charge. An initial license charge. Caused a furore when the concept was introduced, but people seem to have got used to it now. At the beginning of 1999, OTC was dropped from any mainframe software product for which a monthly charge option was available.

OTE

Open Transaction Environment was introduced with CICS TS 1.3. Its aim is to open up the CICS application execution environment, allowing applications to be defined to execute under their own TCBs within CICS and allowing CICS to better exploit multiple processors.

OTMA (Open Transaction Manager Access)

This IMS facility is a transaction-based connectionless client/server protocol that functions as an interface for host-based communications servers accessing IMS TM applications using the Cross Systems Coupling Facility (XCF).

Outsourcing

The notion of contracting out part or all of your IS function to an outside organization. Used to be often used synonymously with facilities management, although strictly speaking facilities management involves delegating responsibility for the whole service rather than just part of it.

P

PaaS

Platform as a service provides a platform, allowing customers to develop, run, and manage Web applications without the complexity of building and maintaining the infrastructure typically associated with developing and launching an app.

Page

An essential process within virtual storage technology. Fixed sized blocks (typically 4096 bytes) of memory are freed up by writing their contents to a paging device until any virtual address within that block is referenced.

Parallel Sysplex

See Sysplex.

Parity bit

A binary digit check bit appended to a group of binary digits to make the sum of all the digits, including the appended binary digit, even or odd, depending on whether Even or Odd Parity is being used.

Parmlib

Parameter Library. A dataset in z/OS containing parameter settings. The most important is SYS1. PARMLIB which contains parameter settings for z/OS and many key subsystems.

Parse

The analysis of the operands entered with a command in addition to the creation of a parameter list for the command processor. It can also refer to the initial processing of source code by a compiler, when it divides up each program statement into its component parts, also known as tokens.

PASCAL

Programming language, mainly used in academia, though even there it is rarely seen these days.

Patch

A code modification to correct a reported problem that is sent to software product users after the release of a product.

PAV

Parallel Access Volumes are used to eliminate I/O supervisor queueing against DASD. Thus improving the performance of anything accessing the disk devices.

PCI

Peripheral Component Interconnect. Extremely popular PC bus standard originally promoted by Intel and soon supported by IBM, even though it meant dropping its beloved MCA.

PCMCIA

Personal Computer Memory Card International Association. Industry-standard interface (not just for memory, but for modems, network interfaces, etc) for laptop and notebook computers.

PDF

Portable Document Format. File definition format used by Adobe Acrobat.

PDS

Partitioned DataSet. A z/OS feature that is really made up of datasets within a dataset. Each PDS is made up of zero or more members. Each member has all the characteristics of a standard sequential dataset, though all members share the same attributes: those that were defined for the PDS when it was allocated. Each member has a one- to eight-character name that follows the same rules as a level of a standard z/OS dataset name (DSN). Each PDS has a directory of its members, which can also (optionally) contain other information, known as Statistics, which are maintained by software such as the ISPF/PDF editor.

PDSE

Partitioned DataSet Extended. Software which enables the space freed by expired or deleted PDSs to be reused. Introduced in 1989 in an attempt to address the limitations of the PDS.

Peer-to-peer

A form of distributed system in which all participating nodes can function as both client and server.

PERL

Practical Extraction and Reporting Language. A general-purpose Unix scripting language, which is popular for writing CGI programs. Its speed and flexibility make it well suited for form processing and on-the-fly page creation.

Pervasive encryption

Available with Z14s, it generally means the ability to encrypt everything everywhere without interfering with the user experience. The Z14 can “pervasively encrypt data associated with any application, cloud service, or database all the time”.

Petabyte

1024 terabytes (TB)—2 to the fiftieth power, or 1,125,899,906,842,624 bytes. Abbreviated as PB.

PF key

Program Function key. A single keystroke can be used to perform a specific command.

PGP

Pretty Good Privacy. Encryption technology which uses the public key approach. Messages are encrypted using a public key, but can only be decoded using a private key kept by the intended recipient of the message.

Phishing

A malicious scheme to obtain the credentials necessary to access a secure system by masquerading as that system and fooling people into entering the sought-after credentials.

Picosecond

1/1,000,000,000,000 of a second. A time span during which even <insert your least-liked company name here> would not be able to put up prices.

PING

Packet Internet Groper. A test of reachability in TCP/IP networks. A PING is a program used to test the ability to reach destinations by sending an echo request and waiting for a reply.

Pipeline

In Linux and other Unix-like operating systems, a pipeline is a set of processes chained together. Output from one process is then input for the next process until all the processes have executed.

PL/I

Programming Language/One. Language developed by IBM. A sort of love-child of COBOL and FORTRAN, it was widely used on the mainframe for many years but never quite achieved the 'universal standard' status that IBM had hoped.

Plain text

Data that is not encrypted. Typically refers to data while it is being transmitted across a network.

PLPA

Pageable Link Pack Area is part of memory containing system-level programs that may be run by multiple address spaces.

Polling

Generic name for a method for controlling devices (eg networked workstations or terminals), in which a computer calls (polls) each device in turn to see whether it wants to communicate.

POP

Principles of Operation. The name of the manual that defined the S/360 and subsequently the S/370 architecture.

Port

Generic noun and/or verb. As a noun, it means a point at which data can enter or leave a data network or individual device; as a verb it means to convert a piece of software written for one environment so that it runs in another.

POSIX

Portable Operating System Interface Standard. Operating system interface standard from the IEEE, designed as a procurement reference standard for ensuring source-level application code portability.

PostScript

Language/protocol cum page description language developed by Adobe Systems for driving high-resolution page printers.

Power Systems

Originally, IBM had the System i running IBM i (OS/400) and the System p series running AIX or Linux. In 2008, IBM merged the two lines of servers and workstations under the same name, Power Systems, with identical hardware and a choice of operating systems, software, and service contracts.

PPP

Purchasing Power Parity is Gustav Cassel's theory (1920) that, in an efficient market, identical goods must have only one price.

PR/SM

Processor Resource/Systems Manager. Logical partitioning hardware technology that makes a single system, even if it has only one processor, look like multiple systems each of which is a Logical PARTition (LPAR).

Private area

Area within z/OS which contains the user's own data/ programs.

Private key

A key known only to the sender or receiver of an encrypted message.

Problem State

A term used in performance measurement to indicate when the machine is performing end-user work. The opposite is Supervisor State, when the machine is spending time generally managing itself.

PROLOG

PROgramming in LOGic. Language mainly used for developing artificial intelligence and expert systems.

PROP

PRogrammable OPerator. A facility in z/VM that allows remote control of a virtual machine, enabling limited automation of routine operator activities.

Proprietary

Proprietary is used to refer to architectures and standards owned by a hardware or software vendor. The term is usually used in opposition to 'open'.

Proxy server

A server that receives and fulfils requests intended for another server.

PRPQ

Programming Request for Price Quotation. IBM terminology for a customer request for a price quotation on alterations or additions to the functional capabilities of system control programming or licensed programs.

PSLC

Parallel Sysplex License Charge, a monthly license charge designed to support the design of a Parallel Sysplex cluster. In a fully qualified Sysplex environment, PSLC software charges are based on the total MSU value for only those machines where the products execute.

PSW

Program Status Word. A hardware register (double word) in the mainframe. The PSW contains the address of the next instruction to be executed and, when an application or system software error occurs, why it happened and other status information.

PTF

Program Temporary Fix. An official IBM temporary patch to a program—often less temporary than IBM and its users would wish. PTFs are distributed on PUTs. Sometimes the term APAR is used instead of PTF.

Public key

A published key value used as one of the two keys in public key encryption.

PWFI

The pseudo wait-for-input option means an IMS MPP region can stay scheduled until another input message appears, avoiding additional application program termination and rescheduling.

Q

QMF

Query Management Facility. Query and report-writing system for DB2 with some analysis and graphics features.

QSAM

Queued Sequential Access Method is an access method for communicating with sequential datasets.

R

RACF

Resource Access Control Facility is IBM's External Security Manager (ESM) for z/OS and z/VM.

RAG

Red/Amber/Green status lights used to indicate in an easily interpretable way the status of a system, with red indicating poor system health.

RAID

Set of redundancy standards for disk subsystems (RAID 0-6), developed by the University of Berkeley and adopted by the RAID Advisory Board.

RAM

Random Access Memory, also known as system memory, is the amount of physical memory that is addressable by and directly accessible to the processor chips on the motherboard.

Ransomware

This is downloaded software that stops you using your PC. The software will usually ask for money before control of your computer is given back to you. Just running anti-virus and anti-malware software is not enough these days. Examples of ransomware include: Brolo, Crowti, FakeBsod, Krypterade, Reveton, and Tescrypt. The number of ransomware attacks is increasing all the time.

RAS

Reliability, Availability, and Serviceability—the three most desirable properties for IBM computers.

RDBMS

Relational DataBase Management System. Database system based on relational principles. DB2 is IBM's preferred RDBMS for just about every platform.

Read-only mode

A mode that does not allow updates to the data being read.

Real storage

The combination of central and expanded storage. Also known as processor storage.

Red teaming

This refers to the practice of viewing a problem from an adversary or competitor's perspective—and that usually means looking at issues with security.

Redbook

A more readable version of an IBM manual Relational database A type of database that allows information in one set of database tables to be connected to information in another set of tables without requiring duplication of information.

RESTful

REST (Representational State Transfer) is an architectural style used to build Web services that are lightweight, maintainable, and scalable. A service based on REST is called a RESTful service. It links mainframe applications with mobile and cloud apps.

REXX

Restructured EXtended eXecutor language. A widely used job control language, REXX has become a replacement for existing procedural languages such as CLIST. REXX is an effective programming language in its own right with powerful string processing facilities.

RJE

Remote Job Entry. Dedicated RJE terminals include 2780/3780 or 3770.

RMF

Resource Measurement Facility. On-line performance and resource monitor for z/OS. Also includes a formatter for printing performance reports. An optional, separately priced feature of z/OS.

RPA

Robotic process automation is a way to automate repetitive or routine tasks that are usually performed by knowledge workers. It uses metaphorical software robots. Employees are then free to perform highvalue work.

S

RPG

Report Program Generator. Programming language widely used on the eServer iSeries 400 and its predecessors, AS/400 and System/3x. As its name implies, originally used mostly for report generation and very strong sort/merge facilities, where it can be used completely non-procedurally.

RRDS

Relative Record DataSet is a type of VSAM file. Each record is accessed directly by its record number.

RSM

Real Storage Manager. The part of z/OS that controls real memory.

SAF

System Authorization Facility is the z/OS security API and is invoked by either the RACROUTE macro or z/OS Unix callable services. Resource Managers (eg CICS, TSO, JES) use RACROUTE to request security authorization checks. SAF passes the request to the External Security Manager (ESM) for a response.

SAML

Security Assertion Mark-up Language addresses the issue of Single Sign-On (SSO). The SAML specification defines three roles: the principal (typically a user), the identity provider (IdP), and the service provider (SP).

SAN

Storage Area Network.

SAP (System Assist Processor)

A System Assist Processor is a specialized processor that assists a central processor on a mainframe.

SASE

Secure Access Service Edge (pronounced “sassy”) is the combination of wide area networking (WAN), and network security services like CASB, FWaaS, and Zero Trust, into a single, cloud-delivered service model.

SCEM

Supply Chain Event Management examines all possible events and factors that might disrupt a supply chain.

SCM

Supply Chain Management applies to all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption. It is the process of planning, implementing, and controlling the operations of the supply chain as efficiently as possible.

Screen scraping

A programming technique for interacting with online host applications that generate text-only display output. The display output is read (scraped) right off a virtual screen by the workstation-based software and input generated on a virtual keyboard. What the user sees is quite different, and usually includes a GUI.

SDEPS (Sequential Dependents)

Sequential dependent segments (SDEPs) may be included in an IMS Data Entry Database (DEDB).

SDSF

System Display and Search Facility. Online tool for programmers and operators monitoring jobs awaiting execution in the JES2 input spool queues and, most commonly, viewing the printed output of batch jobs in the Held output spool queues, to save printing it on paper.

Serial number

Term used to denote the machine which you own today, which may be very different from the one you originally bought.

Server

A device providing database information, or Web pages, any other information. It usually has a number of clients or users of this data.

Service Level Agreement

Generic term for an agreement between a user and the people providing a computer service. The SLA specifies such things as response time, availability, etc.

Service Unit

The basic charging unit in usage-based pricing.

Servlet

A Java applet, without a user interface, that is executed on a Web server. Often used to replace CGI routines, because they support dynamic HTTP requests.

SFM

Sysplex Failure Manager is used when one of the systems in a parallel sysplex fails. It is responsible for recovery of the system and subsystem.

SGML

Standard Generalized Mark-up Language. The canonical mark-up language from which HTML and XML are derived.

Shift left

This is an approach to software testing and system testing in which testing is performed earlier in the lifecycle. That means it's moved to the left on the project timeline. Similarly, quality and security can be moved earlier in the software life-cycle. Although, I'm sure you've spotted the flaw in the thinking—if too much is shifted to the left, then everything is back where it started!

SIEM

Security Information and Event Management software products and services combine security information management and security event management. They provide real-time analysis of security alerts generated by applications and network hardware.

SIGP

SIGnal Processor.

Site Reliability Engineer (SRE)

An SRE will spend half their time on developing new features, scaling, and automation. The other half of their time will be spent on operator-type tasks. They will not only fix problems as they occur, but will also identify the root cause of the problem and create an action plan to address them—ensuring, as far as possible, that the incident doesn't happen again. Often, this will result in more automation.

Skeuomorphism

Is making one thing look like something else, eg making the digital interface look like a paper one—you often see it with calendar applications that look like desktop paper calendars. The GUI emulates real physical objects that the user will be familiar with. Including skeuomorphism in a UI design is a good idea because it makes an unfamiliar interface look like something familiar—and, therefore, its use becomes more intuitive.

SLA

A Service Level Agreement is a formally negotiated agreement between two parties (the IT department usually being one of them) where the level of service is formally defined.

SMF

System Management Facilities. Function within z/OS which collects data on all system activities for use in accounting, performance monitoring, capacity planning, etc. SMF creates log entries (SMF records) of this data.

SMP/E

System Modification Program / Extended is used to install most software products.

SMS

System Managed Storage. The philosophy of letting the computer system manage the storage of data rather than having it done by a human data administrator.

SMTP

Simple Mail Transfer Protocol. The protocol allowing the transmission of e-mail messages across the Internet.

SNA

Systems Network Architecture. IBM's extremely powerful but complex data communications architecture defining levels of protocols for communications between terminals and applications, and between programs. While SNA-only networks have all but disappeared, SNA applications are still very much in evidence in the large enterprise.

SNMP

Simple Network Management Protocol. Unix protocol originally developed for management of TCP/IP networks.

SOA

A Service-Oriented Architecture is a collection of services that communicate with each other. The services are self-contained and do not depend on the context or state of the other service. Mainframe applications become available to Web browsers and now mainframe applications can call other Web services.

SOAP

Simple Object Access Protocol. A lightweight form of middleware for accessing services, objects, and servers in a platform-independent manner.

Sockets

Software interfaces that allow two Unix application programs to talk to one another using TCP/IP protocols.

Solution Consumption License Charges

SCLC applies to a number of Monthly License Charge (MLC) software programs. It offers pay-as-you-go pricing for the actual consumption of CPU, or a 20% saving for a minimum monthly commitment.

Spark

A popular fast engine for large-scale data processing.

Spool

Simultaneous/Shared Peripheral Operation On-Line. DASD storage used as a temporary storage area between devices—eg printer and processor.

SQA

System Queue Area. Storage area in z/OS.

SQL

Structured Query Language. IBM and ANSI standard (they diverge and converge regularly with the passage of time) for access to relational databases.

SRB

Service Request Blocks are requests to execute a service routine and they are usually initiated by system code executing from one address space to perform an action affecting another address space.

SRM

System Resources Manager. Software which is meant to improve throughput by optimizing the use of system resources.

SSCP

SNA's System Services Control Point, in a hierarchical network, typically implemented on a mainframe within VTAM, that is responsible for directory services and configuration management. Now superseded by the peer-to-peer oriented functionality of APPN/HPR control points.

SSL

The Secure Sockets Layer is a much-used protocol for managing the security of messages sent over the Internet.

Stand-alone dump

A display of all used memory locations, typically stored on DASD or tape, created with a program that does not required the operating system to be functioning normally.

Superuser

A user ID with minimal security restrictions.

Supervisor State

A term used in performance measurement to indicate when the machine is spending time generally managing itself. The opposite is Problem State, when the machine is performing end-user work.

SupportPac

A SupportPac is supplied by IBM and contains complementary software, which may be new utilities, or class libraries, or things that IBM thinks will make the product more usable or work better.

SVC

SuperVisor Call. An interface to operating system functions that is used to protect the operating system from inappropriate user entry. It can also refer to the SVC Assembler mnemonic or machine language instruction it represents.

Swagger

A simple yet powerful representation of your RESTful API. With the largest ecosystem of API tooling on the planet, thousands of developers are supporting Swagger in almost every modern programming language and deployment environment. With a Swagger-enabled API, you get interactive documentation, client SDK generation, and discoverability.

Swapping

The process of transferring a complete program between main memory and auxiliary storage (usually disk).

Syncpoint

A point in a transaction's life when updates are committed. In a distributed environment, where the transactions may be across several databases, the syncpoint enables the commit to be delayed until all the participants can commit simultaneously.

SYSGEN

System Generation. The process of creating a customized version of an operating system. In the IBM environment this was a complex, error-prone and timeconsuming process.

System i

Formerly iSeries and now called just i—a later incarnation of the AS/400 family of hardware that runs on Power hardware.

System p

Formerly pSeries—this is the latest incarnation of the RS/6000 family of hardware.

System z

Formerly zSeries—this is the name for mainframes running z/OS and/or z/VM and/or other operating systems. Now called IBM Z.

T

SYSOUT

z/OS output intended for a printer. The name comes from the JCL DD parameter SYSOUT, where SYSOUT=A means send the output to the JESx Class A spool queue.

Sysplex

SYStem comPLEX. A processor complex which is formed by loosely coupling System/390 processors together into a single unit (using channel-to-channel adapters or ESCON/FICON fibre-optic links); the processors are synchronized using the Sysplex Timer, and can be managed as a single system image.

Tablet

For many executives, the must-have device is an iPad from Apple or an Android device from Samsung and other suppliers. As a consequence, these now need to be connected to corporate data, with all the concomitant security issues.

TCB

Task Control Blocks represent tasks executing within an address space. There are usually several TCBs associated with each address space, so more than one task could be running in any one address space at any one time.

TCBs are created when a program issues the ATTACH macro to initiate a new task.

TCP/IP

Transmission Control Protocol/Internet Protocol. Set of protocols for the network and transport layers of a packet-switched data network, most notably the Internet. Developed in the US for the Department of Defense ARPAnet system and has become the de facto standard for most forms of data communication.

telnet

The remote, or virtual, terminal protocol for the Internet. Allows users to log-in to their home machine from any other machine, or vice versa.

Telum processors

IBM's new 7-nanometer chip, which is designed to handle AI workloads faster, and improve security and fraud detection for mainframes used by financial services organizations such as banks and insurance companies.

Terabyte

1024 gigabytes or 1,099,511,627,776 bytes. Abbreviated as TB.

TeraFLOPS

1000 GigaFLOPS, a measure of supercomputer performance.

Third platform

This is meant to represent the next phase of the IT revolution. The first platform is the mainframe; the second is the PC; and the third comprises cloud services, mobile computing, social networking, and big data analytics.

Threadsafe

Originally introduced with CICS 3.2, threadsafe refers to the ability of an application to process multi-threaded programs at the same time safely.

tn

Refers to tn3270, tn3270e and tn5250 collectively or interchangeably.

tn3270

Specialized TCP/IP telnet protocol which provides compatibility with a 3270 datastream by emulation of the screen buffer. Used for mainframe host access across the Internet and internally within organizations to replace SNA terminal-to-host access with TCP/IP.

tn3270e

Improved version of tn3270 that supports colour, the 3270 System Request key and other capabilities not present in tn3270.

TPF

Transaction Processing Facility. Low-function but high performance mainframe TP monitor for very large communications systems. Derived from ACP (Airline Control Program), which was derived from PARS (Programmed Airline Reservation System).

TPIPE

IMS Connect communicates with IMS through logical connections called transaction pipes (TPIPEs).

Transport layer

The network layer responsible for quality of service and accurate delivery of information, ie error detection/correction occurs here.

TSO

Time Sharing Option. These days, everyone just says TSO when they mean TSO/E.

TSO/E

Time Sharing Option/Extensions. An element of z/OS that provides an on-line interactive environment for programmers and users. Best known for the ISPF/PDF environment that runs on TSO/E. Can also be used to test batch programs.

TXSeries

A merging of CICS, Encina and IBM Transaction Server.

U

UCB

Unit Control Block is used to control access to devices.

UDDI

Universal Description Discovery and Integration is a directory model for Web services. UDDI is a specification for maintaining standardized directories of information about Web services, recording their capabilities, location, and requirements.

Unified Resource Manager

The Unified Resource Manager is an integrated System z management facility responsible for platform management on z196s. This tool set enables clients to install, monitor, manage, optimize, diagnose, and service resources and workloads from a single point.

Unit of work

The statements executed between one commit point and the next—usually a group of SQL statements which would need to be rolled back as a group if any single statement in the group could not be executed. It's the basic recovery unit.

Unix

A misspelling of UNICS (UNiplexed Information and Computing Service). A hardware-independent operating system originally for minicomputers.

Unix System Services

A full function Unix implementation under z/OS that complies with the POSIX standard. Originally introduced as OpenEdition.

Usage pricing

The principle of charging for software on the basis of the amount of work done, eg the number of transactions or the amount of batch data processed.

V

User catalog

In z/OS, an ICF catalog created to reduce the number of entries in the Master Catalog, thereby improving performance.

VIO

Virtual I/O. Hyper-efficient z/OS paging technique. Simulates DASD using real storage and so avoids the overhead of channel activity.

VIPA (Virtual IP Addressing)

This frees hosts from depending on a particular physical network interface for communication with a TCP/IP stack.

Virtual storage

A technique for giving programs the illusion that they have massive quantities of main storage to themselves. The technique works by allowing programs to address lots of virtual memory, but making the operating system page the required data in and out of real main store and to and from a paging device at the appropriate time. The technique enables cheap DASD to be used instead of expensive main storage.

Virtualization

A way of dividing up a computer's components and sharing them in order to maximize their usefulness.

VM

Virtual Machine. Mainframe operating system which can act as a hypervisor, enabling users to run multiple OSs on a single machine. There are two components to VM—the hypervisor itself, which provides resources to the virtual machines; and CMS, which provides conversational and timesharing facilities. VM was on the way out when IBM discovered a new role for the software: z/VM can host hundreds (technically thousands) of Linux images on the mainframe at a fraction of the cost of distributed hardware.

VOLSER

Volume Serial Number. The key identifying a tape or other storage volume. Maximum six characters. Most installations use a six-digit VOLSER for in-house tapes to easily differentiate them from DASD volumes.

Volume

The unit of physical storage. Originally the volume equated to a single disk or tape, but logical volumes are more the norm today, especially with most current DASD devices emulating previous products and VTS doing volume stacking on tape.

VPA

A Virtual Personal Assistant is piece of AI (artificial intelligence) just for you. It can schedule meetings and tell you what the weather's like.

VSAM

Virtual Storage Access Method (aka Very Slow And Mysterious). IBM mainframe proprietary software for direct (by key or by record number) or sequential processing of fixed and variable length records on DASD.

VSE

Virtual Storage Extended. For many years, VSE was IBM's principal operating system for small to mediumsize mainframes. A few years back it looked as if VSE support would slowly be withdrawn, but customer support is strong and the re-dubbed z/VSE now looks set to continue for some time.

VTAM

Virtual Telecommunication Access Method. The main SNA subsystem resident in the mainframe, which manages session establishment and data flow between terminals and application programs, or between application programs.

W

VTOC

Volume Table Of Contents. The area of a disk used to store the directory of components, including datasets, held on that volume. Anything that takes DASD space is listed in the VTOC. For example, the index and data components of a VSAM KSDS file are listed in the VTOC, but not the cluster name, which is only listed in the catalog.

VVDS

The VSAM Volume DataSet along with the BCS make up the ICF catalog structure. The VVDS is a special type of ESDS. It is created automatically whenever a VSAM component (including a BCS) is allocated on a volume which does not yet have a VVDS. The VVDS is always called SYS1.VVDS.Vvolser.

VWLC

Variable Workload License Charge. IBM software pricing scheme that allows users to license a product for a capacity less than the total capacity of the system. Replaced by AWLC on zEnterprise mainframes.

WAS

WebSphere Application Server. IBM's Java application server. WAS for z/OS version 6.0.1 supports J2EE 1.4 and many mainframe-specific functions.

Watson Explorer

Watson Explorer combines content and data from different systems and presents it in a single view.

Web 2.0

A practically meaningless term in itself (the Web is not software with version and release numbers) that can be used as a way of highlighting some of the new technologies that are available over the Internet and identifying the companies that are using them, like Google Earth, Flickr, etc.

WebSphere

An IBM Internet-focused software platform that supports e-business applications and sits at the heart of IBM's middleware strategy. The foundational products are WebSphere Application Server and WebSphere MQ.

WebSphere Application Server (WAS) Liberty profile

This is a cut-down version of WAS containing only the features required by the applications used on the server.

WebSphere MQ (WMQ)

Originally MQSeries. IBM software/middleware that provides a message queuing infrastructure; it sits on various systems in a heterogeneous environment, providing integration between disparate systems and applications.

WebSphere Optimized Local Adapters (WOLA)

A part of WAS for z/OS that provides a low-overhead communication mechanisms for exchanging high volumes of messages.

Web service

Web services are essentially "mini" applications that include a description of what another application does, how to access it, and what data it requires. They are often utilized in integration projects where disparate systems may have difficulty interacting with each other without the use of the common standards.

WLM

Workload Manager. Feature within SRM for simplifying the management of system resources such as CPU and storage. eWLM reportedly adds the ability to define business performance objectives across disparate systems.

WMLz

IBM Watson Machine Learning for z/OS lets users build machine learning models using their IDE and platform of choice and then deploy scoring services within transactional applications and monitor them on IBM Z.

Workload License Charges

An IBM software licensing scheme which charges according to required software capacity, not hardware capacity.

WSAT

Web Services Atomic Transaction is now supported in CICS TS 3.1. Web services can be configured to take part in an extended or global unit of work. This is known as an atomic transaction. Recoverable updates are not committed or backed out until instructed to do so by the Web service.

WSDL

Web Services Description Language is the standard format for describing a Web service. A WSDL definition describes how to access a Web service and what operations it will perform. WSDL (along with SOAP and UDDI) is one of the three foundation standards of Web services.

WSRR

WebSphere Service Registry and Repository is used with WebSphere in SOA environments.

WTO

Write To Operator. A message sent to the mainframe operator console from JCL or an application program.

X

XML

eXtensible Mark-up Language is a W3C recommendation and provides a standard approach for describing, capturing, processing, and publishing information.

X-Terminal

A type of terminal developed in the Unix world that provides a GUI type environment (usually X-Windows) without the need for a programmable workstation.

Z

z/Architecture

IBM's latest architecture for mainframes and peripherals.

z/OS

The latest incarnation of MVS, the principal operating system for the IBM mainframe. Announced in October 2000, it brought with it support for 64-bit addressing and a broad range of technical innovations. As well as running on zSeries machines, it also runs on System/390 G5 and G6 processors and Multiprise 3000 systems.

z/OS Connect

z/OS Connect is built on IBM WAS Liberty profile running on z/OS, and is a gateway providing a way to consume data and services hosted on IBM Z from mobile, cloud, and Web applications.

z/OSMF

z/OS Management Facility allows users to manage various aspects of a z/OS system from a browser. It's intelligent, and helps users more easily manage and administer a mainframe system by simplifying day-to-day operations and administration of a z/OS system.

Z/TPF

The latest version of the Transaction Processing Facility, a low-function but high-performance TP monitor for very large data communications systems.

z/VM

The latest version of the much-loved Virtual Machine, a hypervisor that enabled users to run multiple operating systems on a single machine.

zAAP

A Java co-processor for the z890 and z990, which allows customers to offload Java application processing without paying software costs for the additional capacity.

Zap

Affectionate name for various utilities (AMASPZAP, aka SUPERZAP in z/OS), which can be used to apply a fix directly to object code in situ. Zapping is a bad thing—it creates programs in which the object code does not agree with the source, and which are hence totally unmaintainable.

zBX

The zEnterprise BladeCenter Extension (zBX) operates as a tightly-coupled extension to the z196 and z114 mainframes through a high-performance private network. Users then add POWER7 or System x blades to four racks.

zCX

z/OS Container Extensions let users run Linux on Z applications as Docker containers in a z/OS system to directly support z/OS workloads.

Zero day vulnerability

This is a hole in a piece of software that is unknown to the vendor.

zFS

zSeries File System is a Unix file system that can be used in addition to HFS.

zIIP

z9 Integrated Information Processor. A co-processor similar to zAAP (the idea is that you pronounce them ZIP and ZAP), but designed to off-load DB2 work and integrate data across the enterprise. Like zAAP, you pay for the hardware but do not incur IBM software charges for the additional capacity. Minimum requirement: z9- 109 with z/OS 1.6 or later and DB2 V8.

Zombie computers

These are used to spread e-mail spam and launch distributed denial-of-service (DDOS) attacks.

Zombie data

This is old forgotten data that you thought you'd deleted, but hadn't.

Zombie programs

These are the programs that hackers use to gain access to your computer. They are often called 'bots'.

Zoom

Video-conferencing software that now seems to be everywhere. Used for business meetings and family chats.

Zowe

Zowe is the first Open Source framework for IBM Z. It allows development and operations teams to securely manage, control, script, and develop on the mainframe like any other cloud platform. These new developers do not need to have previous mainframe experience!

ZTNA

Zero Trust Network Access is a way of working requiring the strict verification of every individual and device that attempts to access a network or other business resource.