MAINFRAME RESURGENCE SPURS DEVOPS ADOPTION
A Global Survey of Mainframe Professionals

Introduction
This paper reviews key findings from global primary research surveys focused on understanding the current development, testing, and operational processes for mainframe applications. A total of 511 qualified participants completed the survey. All participants had direct mainframe responsibilities across all seniority levels.

The research also investigated the state of adoption of DevOps, CI/CD, and continuous testing for teams working with mainframe applications. The research focused on understanding the key hurdles companies experience when adopting DevOps for the mainframe, and which DevOps processes and toolsets were actually being used today in mainframe software development lifecycles.

Executive Summary
This research finds that nearly every business with a mainframe reports continued reliance (93%) on business critical applications running on their mainframe. But use is not stagnant, as 96% report mainframe data is changing and now serving web and mobile application needs. These new opportunities have nearly two-thirds of companies with mainframes increasing the use of their mainframe. However, all is not good news, as 96% report numerous challenges with operating mainframes, led by dwindling resources, different development processes, slow releases, and more.

To resolve this, companies are considering DevOps to deliver the significant benefits they have already been receiving for modern applications, only now on the mainframe. Participants expect improved efficiencies with automation, which can deliver higher quality applications with increased velocity. In fact, the data finds 74% are adopting DevOps for their mainframe SDLC, with 71% reporting release times have dropped by weeks or even months. But DevOps adoption for the mainframe is challenging as teams struggle with CI/CD and automated testing. In fact, less than half of companies are able to follow a typical DevOps release process, yielding the finding that 58% cannot consistently predict the downstream business effects when changes are made to the mainframe. 7 out of 10 organizations did share that using modern software development tools for mainframe applications is critical to their company’s mainframe usage. Yet only 40% use modern DevOps tools for all key phases of the mainframe SDLC. It is clear that the mainframe is resurging with new value for the business and needs to transition to DevOps utilizing modern tools. Companies know this, but are struggling on the road to get there, and a champion is much needed.
Key Findings

- **Reliance on the Mainframe is Growing to Deliver More Business Value**
  - 93% of businesses run business-critical applications on the mainframe
  - 96% report mainframe data is changing and getting more complex, with new uses for web and mobile apps
  - 65% state use of their mainframe is increasing
  - 96% report numerous mainframe challenges and struggle to find skilled staff

- **Companies Turning to DevOps to Deliver Mainframe Applications Significantly Faster**
  - DevOps for the mainframe delivers higher quality applications and new features faster
  - 74% report mainframe development is starting to adopt DevOps
  - 71% indicate DevOps speed mainframe application releases by months or weeks
  - Companies struggle with basic DevOps tenants such as CI/CD and automated testing

- **Companies Are Adopting DevOps and Modern Tools But Encountering Challenges**
  - 58% cannot consistently predict the business effects of mainframe changes
  - 70% report they want to use modern development tools for mainframe applications
  - Barely 40% of companies use DevOps tools for all key phases of mainframe SDLC
Detailed Findings
Mainframe Still Business Critical
For years companies have spoken about the retirement and replacement of mainframes and moving those key applications to more modern systems. However, the reality today is more than 9 out of 10 companies reported they continue to utilize mainframes to support mission critical applications and business processes.

Mainframe Use Growing with Support of Web and Mobile Applications
Common industry rhetoric would have us believe the mainframe is back in a corner, running the same applications and processes it has for years. But 94% of those surveyed say that data used by the mainframe is transforming. More than half (55%) state their data volumes are growing rapidly and nearly the same magnitude (49%) indicated it is getting more complex. Real-time transactions are also up, demonstrating the mainframe is supporting an increasing volume of business. Perhaps the most interesting finding is that mainframes are now supporting the most progressive and popular application types, web applications (47%) and mobile devices (41%). These are clearly new uses, driving new business value for the mainframe, which has 64% of mainframe experts reporting that the use of the mainframe is growing.

Is your company running business-critical applications on the mainframe?

Yes 93%
No 7%

How is the data used by your mainframe changing?

- Data volume is growing rapidly: 55%
- Data is getting more complex: 49%
- Increasing real-time transaction requests (CICS, IMS, etc.): 47%
- Growing web application access to mainframe data: 47%
- Increasing mobile access to mainframe data: 41%
- Our mainframe data is not changing: 4%
Mainframes Continue to Present Challenges to Companies

While the resurgence of business value from the mainframe is occurring, it is being met with stiff challenges, reported 96% of those surveyed. The oft-reported challenge of finding mainframe skilled resources (55%) is true, often led by the retirement of knowledgeable practitioners. 46% report that siloed processes and practices of mainframe software development are an issue. In fact, 43% point out specifically that mainframe development is not part of their company’s DevOps initiative and that it is a problem for their company. Another key mainframe challenge is poor agility and sluggish release velocity. In a DevOps and Agile world, mainframe application development is too slow to build new applications (44%), release new features (37%), and perform testing (45%).
Mainframe’s Development Handicapped by Lack of DevOps Advantages

Given the preceding finding about mainframes being siloed and not part of a DevOps process, the research investigated the exact causes. The traditional development process, typically a waterfall methodology, directly results in slower release (53%). But again, as many organizations have adopted Agile and DevOps for their other application development processes, it creates process and team inefficiencies having two different application development processes (51%) which is contributing to the orphaned nature of the mainframe (43%). Manual processes takes the third highest drawback at 47% and likely leads to the slow releases reported. But the lack of use of modern DevOps processes for the mainframe may also directly contribute to difficulty in obtaining newer talent (45%), when likely candidates do not want to be stuck and left behind by archaic development methodologies.

<table>
<thead>
<tr>
<th>Drawback</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slower releases (features, applications, updates, etc.)</td>
<td>53%</td>
</tr>
<tr>
<td>Two different applications development processes (mainframe and modern applications)</td>
<td>51%</td>
</tr>
<tr>
<td>Manual processes</td>
<td>47%</td>
</tr>
<tr>
<td>Inability to attract new mainframe resources (developers, DBAs, etc.)</td>
<td>45%</td>
</tr>
<tr>
<td>Team remains siloed</td>
<td>43%</td>
</tr>
<tr>
<td>Brittle applications</td>
<td>29%</td>
</tr>
<tr>
<td>There are no drawbacks to traditional mainframe development</td>
<td>2%</td>
</tr>
</tbody>
</table>

BMC Mainframe Solutions

BMC enables organizations to extract more value from the mainframe by making it as adaptive as any other platform – meaning no need to re-write or re-platform.

BMC Compuware empowers the next generation of developers with freedom of choice to leverage modern development tools that increase both velocity and quality so the business can be more competitive.

With unparalleled agile application development, testing and delivery, BMC AMI and BMC Compuware provide a complete mainframe-inclusive DevOps toolchain that accelerates innovation.

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DevOps for Mainframe Offers Organizational, Speed and Quality Benefits

Perhaps not surprisingly, 98% of companies report the benefits of DevOps can directly apply to mainframes. Following the previous findings, organizational benefits top the list with improved efficiencies and increased team productivity both at 48%. Next are the benefits most commonly associated with DevOps, better software (45%) delivered faster (46%). Also, nearly one third said that adopting DevOps will help recruit new developers to work on mainframes, helping to combat a key challenge.

![Survey Results Chart]

In your experience, what are the benefits of using a DevOps process for mainframes?

- Improved efficiencies (application development for mainframe and modern applications follow the same process): 48%
- Increased team productivity: 48%
- Faster development of new applications: 46%
- Higher quality applications: 45%
- Increased speed of releases (new features, updates, etc.): 45%
- Automation of repetitive tasks: 38%
- Improved innovation: 34%
- Breaks down silos between teams (developers, testers, DBAs, etc.): 34%
- Ability to attract new developers to mainframe team: 30%
- There is no benefit to using a DevOps process for mainframes: 2%
DevOps Delivers Applications Months and Weeks Faster

With all the potential benefits of DevOps, it is not surprising that 74% indicate they are starting to apply DevOps processes to the mainframe software development application lifecycle (SDLC). Earlier findings in this report indicated increased release velocity for mainframe applications are a result of DevOps adoption. The research sought to quantify it and 71% stated that mainframe applications released months or weeks faster than the historical release process.

At your company, does the development of mainframe applications follow any of the same DevOps processes used for modern applications?

Yes 74%
No 26%

On average, how much faster are mainframe application releases when using a DevOps process compared to a traditional mainframe process?

- Months: 71%
- Weeks: 49%
- Days: 21%
- Hours: 6%
- Mainframe DevOps processes do not yield faster releases: 2%
Tall Hurdles for Those Adopting Mainframe DevOps

However, the road to DevOps for the mainframe is littered with obstacles as 95% of those surveyed reported adoption challenges. Applying continuous integration took the top spot closely followed by a shortage of expertise. Access to tools and the inability to automate tied for the third spot. The last of the top 5 issues was the inability to determine the cause of performance issues, likely compounded by missing tools and manual processes.

![Bar chart showing challenges to mainframe DevOps adoption](chart.png)
Automating Mainframe Processes Is the Most Challenging

The research also sought to learn which core DevOps processes created the largest challenges for the mainframe SDLC. The top three challenges centered around automation, with Continuous Deployment (CD) (38%) taking the top spot, followed by Continuous Integration (CI) (37%), and automating testing (36%). Given the new applications driven by web application and mobile devices, 35% reported that mainframe monitoring is failing to keep up. And furthermore, 30% stated infrastructure monitoring is also an issue. New use models and data types are likely driving the rising need of SQL performance tuning (32%).

![Bar Chart: Which of the following actions were the most difficult to get to work with mainframe application development?](chart.png)
Unable to Reliably Predict Downstream Effects from Mainframe Changes

Many of the challenges regarding poor tools, old processes, and lack of visibility led to 58% reporting they could not reliably predict the downstream business effects when changes are made to the mainframe applications. Mainframe code can be sprawling while supporting numerous different applications including newer web and mobile applications. This makes it challenging to know how many different applications are affected when a change is made. The inability to consistently know downstream effects puts the business and customers at risk. This highlights the need for highly capable tools for the mainframe SDLC.

Mainframe Use Reliant on Modern DevOps Tools

Many of the earlier challenges provide the context as to why 70% of mainframe professionals reported that using modern software development tools is key to their company’s continuing use of the mainframe. And 64% of the respondents said that adopting a DevOps process for the mainframe is nearly equally important. A clear majority indicated modern processes and tools are needed to help modernize the mainframe.
Few Companies Using Modern DevOps Tools for Mainframe Tasks

Given the momentum to adopt modern DevOps tools, the research then focused on exactly which key mainframe SDLC tasks were completed today using modern DevOps-oriented tools. These findings paint a bleak picture of barely 40% of tasks using DevOps tools and many far below that. For example, 60% of companies are not using DevOps tools for Continuous Deployment, nor are 61% DevOps tools for Continuous Integration, or 73% for version control. While this does help explain many of the challenges companies are experiencing with their mainframe, it also signals an opportunity.

<table>
<thead>
<tr>
<th>Task</th>
<th>Percentage Using DevOps Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze (feature request impact, existing code review, etc.)</td>
<td>42%</td>
</tr>
<tr>
<td>Monitoring</td>
<td>41%</td>
</tr>
<tr>
<td>Development (IDE)</td>
<td>41%</td>
</tr>
<tr>
<td>Continuous deployment (CD)</td>
<td>40%</td>
</tr>
<tr>
<td>Continuous integration (CI)</td>
<td>39%</td>
</tr>
<tr>
<td>Database schema changes</td>
<td>37%</td>
</tr>
<tr>
<td>Test</td>
<td>37%</td>
</tr>
<tr>
<td>Version control</td>
<td>36%</td>
</tr>
<tr>
<td>Setup test data</td>
<td>33%</td>
</tr>
<tr>
<td>Release</td>
<td>32%</td>
</tr>
<tr>
<td>Debug</td>
<td>29%</td>
</tr>
<tr>
<td>Edit (code changes)</td>
<td>26%</td>
</tr>
</tbody>
</table>

At your company, which of the following mainframe software development lifecycle tasks are accomplished using DevOps-oriented tools?
Conclusion

This research finds the reported demise of the mainframe is grossly inaccurate. In fact, companies have found new life for the mainframe facilitating new business opportunities. But this increased use is placing a strain on the team, the processes, and the tools, and the old ways of developing, testing, and deploying are not working at the speed the business needs.

The findings clearly point out that the siloed mainframe needs to be brought into the fold with the enterprise. It needs to follow the same development process the company uses for modern software. Mainframe professionals cited tremendous benefits from adoption of DevOps for the mainframe. The top benefits are organizational improvements by having all software developed using the same process whether it was for the mainframe or a modern application. It also increases the ability draw for modern developers to work on the mainframe. The other benefits of DevOps for the mainframe are the traditional DevOps advantages of an increased velocity of releases, new features, and updates with higher application quality.

But the adoption of DevOps for the mainframe is not easy, and clearly needs to utilize modern DevOps tools to enable the processes. Using the same modern tools not only enables the mainframe to follow DevOps processes but also improves visibility and management across the entire software and services chain to the end user.

Mainframes are known for having great processing power and speed which makes them ideal for handling massive numbers of transactions driven by legacy applications as well as new generation web, mobile, and IoT ones. Companies should be adopting DevOps with the right tools and seeking out expertise. Mainframe has been isolated for a while, perhaps in a corner, but the migration to DevOps should not be. Companies would benefit from a knowledgeable partner who can help them transition the old mainframe to the modern era.

Survey Methodology

Mainframe professionals of all seniority levels at medium companies to large enterprises were invited to participate in a survey on their company’s mainframe application use, development processes, and tool use.

A total of 511 qualified participants completed two surveys. The survey was administered electronically, and participants were offered a token compensation for their participation. Participants were global representing 5 continents.
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