How to Quickly Reduce Mainframe Costs and Increase Availability

Optimize your mainframe subsystem configuration with BMC Subsystem Optimizer for zEnterprise®
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Executive Summary

Digital business, the world economy, and consumers rely on the mainframe to meet growing demands while budgets are flat or shrinking. Mainframe monthly license charge (MLC) software costs represent 30 percent or more of the typical mainframe budget. Due to recurring increases from IBM of about 4 to 7 percent each year, the challenge of controlling MLC costs is not going away.

This white paper describes the MLC pricing model and how to safely and easily optimize subsystem placement to lower costs with no changes to applications. BMC Subsystem Optimizer for zEnterprise® (Subzero) can help organizations reduce MLC costs significantly and safely without disrupting the business by removing the requirement that IBM® CICS® and IBM® IMS® subsystems reside on the same logical partition (LPAR) as the database being accessed. Subzero can:

- Turn subsystems on or off based on requirements
- Increase availability by providing alternative data access routing capabilities
- Redirect data requests
REGIONING AND LPARS

The key to reducing MLC costs and maximizing availability is to be open to new options for subsystem placement optimization, such as regioning. The regioning concept involves isolating subsystems (such as IBM® z/OS®, IMS, or CICS) onto a single logical partition (LPAR). So, if a business considered putting Db2 or IMS DB anywhere in an environment, where would it be located? Although businesses may have been isolating subsystems for many years, with BMC Subsystem Optimizer for zEnterprise (Subzero), this can be done faster and at a greater level to save more money and increase availability. It’s like taking the “handcuffs” off of Db2, IMS, and CICS, and providing the opportunity to finish what businesses may have been working on for a long time.

By removing existing architectural restrictions that are inherent with the IBM® z/OS® subsystems, businesses can lower mainframe MLC costs. This requires thinking differently about where to place CICS, Db2, and IMS subsystems. Placement refers to not just where the subsystem resides, but also the ability to turn the subsystem on and off for a particular LPAR, and activate it on the LPAR that is the most cost effective. This approach is new and is removing some of the existing restrictions that organizations have dealt with for decades. Another way is to reduce the MIPS used by the MLC products on the system itself. This can be accomplished by consolidating instances or eliminating unneeded products.

Mainframe organizations that don’t optimize subsystems through regioning can overspend on mainframe MLC software because the software is based on a very complex pricing model. For example, a subsystem that is running on an LPAR, but is only used sparingly, is still charged according to the peak of the sums of all the work in a 4-hour window on the LPAR. See Figure 1.

Manual resource consumption adjustments to reduce costs can risk negatively impacting critical business services. In fact, some organizations have given up and are simply accepting that duplicate subsystems reside on all LPARs where transactions and applications run. As a result, they can be paying a higher MLC cost to IBM for total MSUs. However, with BMC Subzero, organizations have the flexibility to reduce MLC costs and have enhanced availability and workload balancing options. In fact, Subzero can help organizations save up to 20 percent or more on MLC costs because Subzero enables transactions and applications to access data across LPARs to benefit from placement optimization.

THE MLC PRICING MODEL AND BMC SUBSYSTEM OPTIMIZER

MLC costs need to be measured so that they can be managed. IBM’s Software Cost Reporting Tool (SCRT) is used by many organizations to determine MLC costs, but it is difficult to understand, does not provide cost information, and does not identify opportunities for savings.

BMC Cost Analyzer for zEnterprise can be used to measure MLC to provide insight into savings that can be achieved by using Subzero. Cost Analyzer reviews SMF records and creates an accurate model for providing insight and transparency into MLC costs. It produces cost information by product, Central Processor Complex (CPC), LPAR, average cost, incremental costs, which includes detailed MLC and 4-Hour Rolling Average (4HRA) reporting, and information about target workloads that are driving the peak 4HRA.

In addition, Cost Analyzer does “what if” analyses to identify the cost impact of MLC reduction activities, including:

- Workload increases, decreases, and moves
- Identifying LPARs that could benefit from capping
- Identifying the costs and benefits of IT actions for subsystem placement

![FIGURE 1: The monthly MLC bill for all subsystems is based on the peak of the sums for a 4-hour time interval, with 923 MSUs in this example.](image)
Even though MLC is supposed to be considered sub-capacity pricing, it really is not in most cases. The cost of an MLC product, such as CICS, Db2, or IMS, is made up of what each product uses, plus everything else that ran on the LPARs where the MLC products ran.

Subsystem placement optimization can reduce MLC costs while increasing availability. Duplicate subsystem copies raise costs. Therefore, every IMS, Db2, or CICS workload that requires an instance of transaction manager and database to be present on the same logical partition (LPAR) increases costs. If communication is set up between LPARs, the subsystem charges can be lowered dramatically.

The formula: IBM Monthly License Charge (MLC) costs are based on the 4-hour rolling average (4HRA), which is calculated every hour and is the average MSU consumption over the previous 4 hours. Businesses are charged based on the highest single reported 4HRA peak for the month. Even if certain subsystems, such as Db2 and IMS, only use a small portion of the peak MSUs, businesses are still charged the peak rate. Fortunately, with subsystem placement optimization, businesses can turn off MLC products on certain LPARs and turn them on in their own LPAR. Businesses can essentially “flip the switch” back and forth if needed, thus adding flexibility to optimization.

**Without subsystem placement optimization:**

If a CICS transaction wants to interact with IMS DB and if an IMS TM transaction wants to access Db2 data, all of those subsystems would have to be on the same LPAR. A business would pay the top usage for the month for everything running on that LPAR added together. When the consumption peaks, businesses get charged the peak rate for the entire month!

**With subsystem placement optimization:**

If a business can take Db2 off of that LPAR and put it on its own LPAR, then Db2 doesn’t contribute to the charges for subsystems on the original LPAR. It doesn’t get added to the cost of CICS processing, so the MLC bill is lower. Instead, Db2 is charged for consumption based on its own LPAR without CICS adding to the cost of Db2. With Subzero, the subsystems don’t need to be on the same LPAR to communicate with each other.

With Subzero, businesses can safely remove the requirement of transaction manager and database co-location and reduce MLC costs while increasing availability. CICS will think it is still talking to a local Db2, and Db2 will respond to the CICS request as if it is residing on the same LPAR. However, Subzero is actually transferring the data access request to another LPAR and getting the data back to CICS. Subzero allows everything to remain the same from the application’s perspective.
CICS will no longer need to be running on each LPAR where IMS DB or Db2 is executing with Subzero. By isolating the subsystems for MLC-specific pricing, Db2 or IMS DB usage would no longer be contributing to the 4HRA on LPAR 1. On LPAR 2, no CICS usage would be counted in the 4HRA for the database subsystem.

The result: Lowering the MSUs for each LPAR results in lower MLC charges.

Using Subzero with Cost Analyzer can help businesses model the impact of MLC costs and predict the savings that could be achieved, as shown in Figure 2.

FINDING THE USE CASE THAT BENEFITS YOUR ENVIRONMENT

The five use cases in the following sections show how Subzero, combined with Cost Analyzer, can help IT reduce MLC costs by taking a new approach to subsystem placement optimization while increasing availability and meeting performance requirements.

1. Use Case: CICS/Db2 Data Sharing

Figure 4 shows how CICS transactions running on one LPAR can now access data managed by a Db2 or IMS subsystem on a different LPAR using Subzero. This indicates an example of CICS/Db2 in a 4-way data-sharing environment. The aggregate peak 4HRA for the month is 1538 MSUs, so z/OS, Db2, and CICS are billed at that rate. The result is a monthly MLC bill of $336,822.

- With Subzero, IT can move the Db2 subsystems on LPAR 1 and LPAR 4 to LPAR3 and LPAR 2 respectively (or consolidate the two Db2 subsystems into the Db2s on those LPARs) and remove the Db2 subsystems from LPAR 1 and LPAR 4, reducing the monthly MLC bill by 11 percent to $299,887—for an annual savings of $443,220.
**Annual savings $443,220**

### Improve performance and maximize availability

In this scenario, Subzero directs SQL requests on LPAR 1 to Db2 on LPAR 3 and directs SQL calls on LPAR 4 to Db2 on LPAR 2. While Subzero is available on each LPAR, the local access of CICS on LPAR 2 and 3 is maintained directly and Subzero is not activated. This could provide the critical business transactions with the best possible performance while transactions from CICS on LPAR 1 and 4 can have data access requests passed by Subzero to LPAR 3 and 2 respectively.

In this example, z/OS is still charged across all four LPARs. CICS is charged across all four LPARs. However, because Db2 is running on LPAR 2 and LPAR 3, Db2 will only be charged for running on LPAR 2 and LPAR 3. The aggregate peak 4HRA for LPAR 2 and LPAR 3 is $447 + $511 = $958 MSUs.

**Before Subzero:** Db2 is charged at 1538 MSUs

**Net result after subsystem optimization:** Db2 cost reduction of approximately $37,000 per month

**Annual savings:** $443,220

**Note:** The cost of z/OS and CICS actually went up, but that was offset by the decrease in Db2 cost. The increase in z/OS and CICS cost was driven by the added MSU demand from running Subzero (about 3 percent) based on BMC testing.

When CICS MSUs are changed because of Db2 or IMS work that will move to the Db2 LPARs, this could cause the Db2 peak to change. Cost Analyzer should be used to accurately model the savings.

### 2. Use Case: LPAR Isolation

In Figure 5, there is no CICS or Db2 consolidation, but there are still 4 CICS systems and 4 Db2 systems. Subzero still offers a significant reduction in MLC costs because it allows IT to move CICS systems to their own LPARs and to move the Db2 systems to their own LPARs. Essentially, CICS usage no longer contributes to the cost of Db2 and Db2 usage no longer contributes to the cost of CICS, as shown in Figure 5.

**FIGURE 5: LPAR Isolation**

### Subzero Use Case – LPAR Isolation

<table>
<thead>
<tr>
<th>Without Subzero</th>
<th>With Subzero</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LPAR 1</strong></td>
<td>284</td>
</tr>
<tr>
<td><strong>LPAR 2</strong></td>
<td>447</td>
</tr>
<tr>
<td><strong>LPAR 3</strong></td>
<td>511</td>
</tr>
<tr>
<td><strong>LPAR 4</strong></td>
<td>296</td>
</tr>
<tr>
<td>Add 3% for Subzero overhead</td>
<td>46</td>
</tr>
<tr>
<td>Aggregate monthly peak R4</td>
<td>1584</td>
</tr>
<tr>
<td>z/OS @ $72/MSU</td>
<td>$110,022</td>
</tr>
<tr>
<td>DB2 @ $75/MSU</td>
<td>$71,843</td>
</tr>
<tr>
<td>CICS @ $72/MSU</td>
<td>$114,022</td>
</tr>
<tr>
<td>Monthly MLC fee</td>
<td>$299,887</td>
</tr>
<tr>
<td></td>
<td>-11%</td>
</tr>
</tbody>
</table>
3. Use Case: Isolating IMS

Figure 6 represents a migration from IMS to Db2. However, there remains some IMS workload with isolated IMS instances on LPAR 1 and LPAR 2—the only LPARs capable of running IMS DL/I workload. The assumption is that the relative MSU consumption by IMS is small when compared to Db2 and CICS.

**Annual savings $1,300,416**

**Subzero Use Case – Isolating IMS**

**Without Subzero**

<table>
<thead>
<tr>
<th>LPAR 1 - CICS/DB2/IMS</th>
<th>405</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPAR 2 - CICS/DB2/IMS</td>
<td>320</td>
</tr>
<tr>
<td>LPAR 3 - CICS/DB2</td>
<td>390</td>
</tr>
<tr>
<td>LPAR 4 - CICS/DB2</td>
<td>423</td>
</tr>
</tbody>
</table>

Aggregate monthly peak R4 1538

<table>
<thead>
<tr>
<th>z/OS @ $72/MSU - 1538 MSUs</th>
<th>$110,736</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2 @ $75/MSU - 1538 MSUs</td>
<td>$115,350</td>
</tr>
<tr>
<td>CICS @ $72/MSU - 1538 MSUs</td>
<td>$110,736</td>
</tr>
<tr>
<td>IMS @ $132/MSU - 725 MSUs</td>
<td>$95,700</td>
</tr>
</tbody>
</table>

Monthly MLC fee $432,522

**With Subzero**

<table>
<thead>
<tr>
<th>LPAR 1 - CICS/DB2</th>
<th>294</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPAR 2 - CICS/DB2</td>
<td>256</td>
</tr>
<tr>
<td>LPAR 3 - CICS/DB2</td>
<td>390</td>
</tr>
<tr>
<td>LPAR 4 - CICS/DB2</td>
<td>423</td>
</tr>
<tr>
<td>LPAR 5 - IMS</td>
<td>145</td>
</tr>
</tbody>
</table>

Aggregate monthly peak R4 1584

<table>
<thead>
<tr>
<th>z/OS @ $72/MSU - 1584 MSUs</th>
<th>$114,058</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2 @ $75/MSU - 1393 MSUs</td>
<td>$104,475</td>
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<tr>
<td>CICS @ $72/MSU - 1393 MSUs</td>
<td>$100,296</td>
</tr>
<tr>
<td>IMS @ $132/MSU - 145 MSUs</td>
<td>$19,140</td>
</tr>
</tbody>
</table>

Monthly MLC fee $337,969

**Annual savings $1,134,636**
While IMS is using very few MSU resources, it is billed at the peak 4HRA across LPAR 1 and LPAR 2 405+320=725 MSUs. This results in an IMS monthly expense of $95,700. Because IMS is billed at an MSU rate for the LPARs where it runs, which includes CICS and Db2 usage, the costs of IMS go up.

Here’s what happens when IT moves IMS to its own LPAR with Subzero. CICS and Db2 MSU usage no longer contributes to the cost of IMS. **The result is a 22% reduction in overall MLC fees, saving more than $1.1 million per year.**

### 4. Use Case: Support Availability by Adding Database Redundancy

Figure 7 shows multiple CICS LPARS each connected to a local Db2 or IMS DB database. If the database instance goes down, that local CICS or IMS TM can no longer be used to process transactions until the database comes back up. This database outage could be due to maintenance, other scheduled actions, or an unscheduled outage. However, IT wants to continue to use the transaction processing capacity of CICS or IMS TM while the local database instance is unavailable.

By configuring Subzero to have two or more connection options, IT can have built-in redundancy for higher availability of transaction processing environments and lower the risk of losing the CICS or IMS TM processing capability due to a database outage.

As long as the local database is available, Subzero will step out of the way and let CICS or IMS TM talk to the local database instance. If that database becomes unavailable, Subzero will detect this and issue a message.
• **No application changes are needed.** Subzero dynamically activates redirection of the transaction manager data requests to a LPAR where the database is still active to increase availability for the transaction manager.

• **When the database on the local LPAR is restored and IT wants to start using it again, IT can tell CICS or IMS to stop or start the connection.** At that point, Subzero will go through the local versus remote logic and connect locally if the local database is up. This functionality is currently not available with IMS or CICS, but is available using Subzero.

### 5. Use Case: Identifying If Db2 Batch Is Contributing to Peak 4HRA

In Figure 8, the Db2 batch job is separated from the Db2 database. Even though the batch job has a $0 MLC charge, the MSUs it uses are added into the 4HRA and raise the monthly charge of Db2. By isolating the batch work to a separate LPAR, the MSUs on the Db2 LPAR are reduced, lowering the overall MLC costs.

This example assumes that only 75% of the batch MSUs are moved to LPAR 3. The remaining 25% are attributed to LPAR 2, due to Subzero shipping some Db2 batch work back to that LPAR.
**HOW TO OPTIMIZE SAFELY**

Subsystem optimization is safe and can be done quickly and easily. As previously discussed, Subzero requires no application code changes and minimal subsystem definitional changes. Subzero also lowers business risk by enabling IT to redirect workloads upon a subsystem failure.

BMC offers the flexibility for applying regioning to optimize subsystems at any pace. Businesses can start out slowly and follow a carefully managed process—an approach that has been very successful for BMC customers.

1. Model the savings using SMF data and Cost Analyzer.
2. Verify that the prerequisite software levels for z/OS, CICS, Db2 and/or IMS required for Subzero are present. Work with organizations to plan installation activities and get the needed teams aligned. This may involve working with the security group, identifying the storage area for DASD space needs, working with the systems programmers who will do the actual installation, etc.
3. For the actual implementation of Subzero, begin by checking out the product in an environment used for testing new z/OS releases or other new software (i.e., the systems programmers’ “sandbox” environment) to avoid impacting other systems during testing.
4. Once it has been verified that Subzero does not interfere with transaction processing, IT can separate CICS and the database and have Subzero active.
5. Finally, IT can separate CICS and the database onto different LPARs. Run the tests again and verify that Subzero is redirecting the data requests and returning the information requested.

**Testing Subzero**

Once IT is satisfied that Subzero functions as expected in the environment, it is time to roll it out into a full test environment.

- Assemble the applications that will be used for the test. Run tests without Subzero to get a baseline for transaction response time, resources used, etc., to compare this baseline to what happens after activating Subzero.
- As with the sandbox, verify XCF is ready for Subzero. Make the needed CICS changes and activate Subzero and run the tests again to compare results to the baseline to determine that results are as expected.
- Once IT is satisfied with the results of running Subzero, then IT can run Subzero in the production environment, measure MLC savings, and compare them to projections created in the cost analyzer modeling done earlier.

A similar approach would be used if using Subzero to separate IMS TM and Db2.

**CONCLUSION**

Subzero removes the requirement of subsystem placement and provides options that were not available in the past for increasing availability and reducing MLC costs. This can be done easily, quickly, safely, and with no application changes. Subzero enables isolating CICS and Db2 and/or CICS and IMS DB on different LPARs and it also supports separating IMS TM and Db2. Regioning these subsystems reduces MLC costs because the peak MSUs on one LPAR do not contribute to the peak for the subsystem running on the other LPAR. The result is a lower MLC bill and increased availability.

Some of this technology for optimization is currently available, but it would require application code changes to most transaction programs. Instead, Subzero does the work to allow this data access with no required application changes. Subzero allows IT to better balance workloads because the subsystem co-location requirements can be lifted. It also provides additional redundancy capabilities that were not available before Subzero was introduced. By optimizing subsystem placement, IT can reduce MLC costs while increasing the availability needed to meet the demands of digital business.
BMC delivers software solutions that help IT transform digital enterprises for the ultimate competitive business advantage. We have worked with thousands of leading companies to create and deliver powerful IT management services. From mainframe to cloud to mobile, we pair high-speed digital innovation with robust IT industrialization—allowing our customers to provide amazing user experiences with optimized IT performance, cost, compliance, and productivity. We believe that technology is the heart of every business, and that IT drives business to the digital age. BMC – Bring IT to Life.

FOR MORE INFORMATION

To learn more about how your organization can reduce MLC costs with BMC Subzero, visit bmc.com/it-solutions/subsystem-optimizer