May 2019

Tailored Fit Pricing for IBM Z Offers Cost Effective Workload Growth Compared to Three Public Cloud Examples

IBM **IT Economics Consulting & Economics**

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Fluctuating workload activity

In recent years we have seen enterprise workload patterns have shifted from steady or gradual growth to unpredictable peaks and troughs. While once batch activity prevailed, today's workloads tend to be primarily transaction-oriented. Real time analytics on data to gain insights, smart phone driven transactions and other market factors are driving workload volatility. This volatility impacts workload costs and has prompted the need for a pricing solution that aligns costs with actual resource usage.

Counter unpredictable costs

IBM Z® has introduced Tailored Fit Pricing for IBM Z[i] to help mitigate unpredictable costs whilst continuing to deliver optimal business outcomes in the world of Digital Transformation & Hybrid Cloud. Depending on the type of workload activity in your datacenter, a tailored pricing model may be far more competitive when compared to pay-as-you-go schemes that have been typical on many x86 based cloud implementations. Combining technology with cost competitive commercial models delivered through Tailored Fit Pricing strongly challenges the mindset that IT growth must be done on a public cloud in order to make economic sense.

Tailored Fit Pricing

Tailored Fit Pricing introduces two new pricing models for both new and existing workloads with the Enterprise Consumption Solution model where compute is measured on a per-MSU consumed basis, and tailored full-capacity licensing with Enterprise Capacity Solution to offer a heightened level of cost predictability. Both solutions remove the need for clients to focus on rolling average utilization windows.

The "cloud-like" Enterprise Consumption Solution model is designed to allow customers to:

- Take full advantage of all the hardware they own
- Peak and spike without usage "penalty"[1]
- Smooth seasonal variations over the entire year
- Grow at an attractive per MSU price

The "full-capacity" Enterprise Capacity Solution is designed to give customers:

- Price predictability for environments within their IBM Z environment
- Flexibility to fully utilize their IBM Z infrastructure as they wish

Potential Benefits of Tailored Fit Pricing

The Enterprise Consumption & Enterprise Capacity Solutions are designed to considerably reduce the need to cap or restrict the available amount of infrastructure. This paper examines Enterprise Consumption Solutions.

Flexibility in Managing Workloads

Customers who manage their workload activity to optimize a capacity-based license model often move their workloads to fit within existing licensed capacity. Enterprise Consumption Solution

[1] In this context penalty is considered by many users to be an increase in payment. Customers often constrain their workloads to avoid peaks so their four-hour rolling average (4HRA) remains below an established threshold. Allowing a workload to peak will increase the 4HRA, causing a higher payment.

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pricing is designed to offer an increased level of agility at a lower comparative price point which can facilitate alignment of enterprise costs with business revenue for future workload growth.

Increased Availability

The practice of moving workloads to fit within currently licensed capacity can drive unnecessary costs in personnel, and can introduce a risk of disruption to normal operations. The Enterprise Consumption Solution pricing model is designed to allow users to schedule workloads when needed, helping to reduce workload schedule administration and potential scheduling errors.

Easier Batch Window Management

Because Enterprise Consumption Solution pricing is designed to allow users to schedule workloads when needed, batch window management can become simpler. Programmers can schedule batch jobs according to business requirements rather than focusing on software license requirements. This means that batch workloads can be more aggressively run to complete within shortened batch windows.

Reduced System Programmer Labor

Moving workloads to fit within currently licensed capacity has often required significant planning and implementation by system programming personnel in our experience. Tailored Fit Pricing is designed so that this work effort can be minimized, freeing programming resources for more productive work.

Cost Advantages of Tailored Fit Pricing Over Cloud based pricing

The following comparison model illustrates the cost benefits of Tailored Fit Pricing that can be achieved over cloud-based pricing structures. The model examines four scenarios, a large-sized IBM Z environment and three comparable public cloud environments.

> Scenario 1 (IBM z14™): An IBM z14 environment with 2000 MSU capacity deployed in a Sysplex configuration with a mix of application (both batch and transactional) workloads comprised of a Db2® and IMS™, IBM MQ® message broker and CICS® on z/OS®. The Sysplex is configured with capacity backup (CBU) for disaster recovery (DR) at a different site. We assume workload growth (MSU growth) of 3% every year.
>
> Scenarios 2, 3 and 4 (Public Cloud Examples 1, 2 and 3): For each of Examples 1, 2 and 3, a software stack comprised of a commercial database, database and systems management tools, transaction manager, IBM MQ message broker, CICS emulator and development environment for COBOL is used on the cloud. The stack is licensed on a vCPU basis for the maximum hardware that would be provisioned on-demand. Sixty-four vCPU instances are sized to equate the capacity on IBM Z, both in terms of used capacity as well to account for HA and DR capacity. The number of instances is also increased every year to accommodate 3% growth. The MSU capacity on IBM Z is used every time as the reference for capacity growth. The public cloud scenarios also take into account the use of network-attached storage to enable optimum access.

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The Average Operating Expense (Opex) chart (figure 1) shows the average Opex comparison of Tailored Fit Pricing on IBM z14 versus three non-IBM public cloud platforms (Public Cloud Example 1, Public Cloud Example 2 and Public Cloud Example 3) over a projected 4-year time frame. Opex, for the purpose of this comparison[2], is comprised of software, hardware, storage, floor space, networking, and energy starting in Year 2. The costs in the comparison also include incremental software acquisition costs on the cloud required for growth.

Note that the comparison covers years 2 to 5 and does not take into account either the initial investment in IBM Z hardware in scenario 1 or software acquisition costs on public cloud in scenarios 2, 3 and 4. The model found that average Opex is 38% lower on IBM z14 compared to Public Cloud Example 1, 29% lower on IBM z14 compared to Public Cloud Example 2 and 39% lower on IBM z14 compared to Public Cloud Example 3[2].

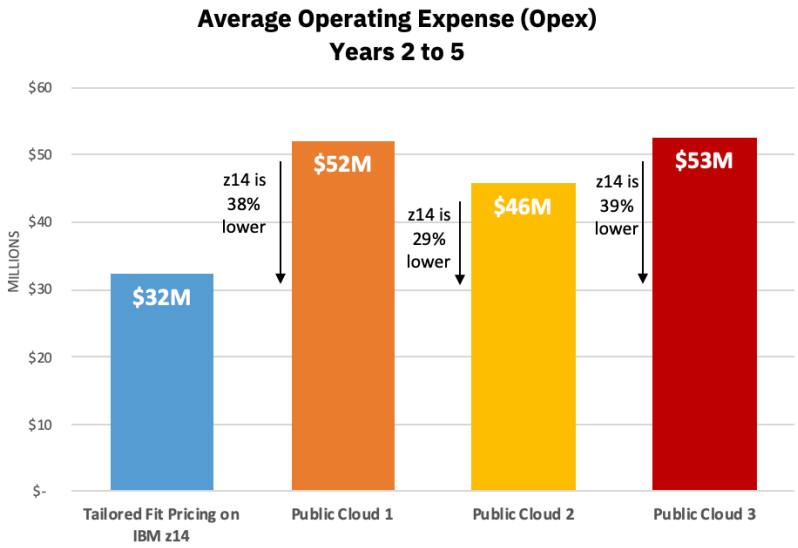

Figure 1: Average Operating Expense (Opex) for Years 2 to 5

The Accumulated TCO Cost Comparison chart (Figure 2) shows a cumulative cost comparison of Tailored Fit Pricing on IBM z14 versus the three public cloud examples over a projected 5-year time frame. Cumulative costs are computed by adding in the initial investment (Year 1) plus incremental annual expenses incurred each year for total cumulative cost (Year 5).

[2] Differences between growing workloads on IBM z14 with Tailored Fit Pricing and public cloud solutions are based on a client use case modeled by the IBM IT Economics team. The model compares hardware, software, labor, networking, floor space, energy, storage and disaster recovery environment costs for workloads undergoing growth over a five-year time period. The model analyzed initial investment costs in year one (4 IBM Z servers with 17,000 MIPS that grow to 19,708 MIPS in the 5th year and 1,472 vCPU's in year one for the public cloud scenarios to account for all functionality on Z, including HA and DR. Sixty-four vCPU capacity instances are used on the public cloud, 576 vCPU's used for database and tools in year 1, 597 vCPU's used for COBOL emulation in year 1, and 468 vCPU's used for IBM integration bus). Cloud storage was calculated at 4,800 TB (3x IBM Z capacity for comparable storage on cloud). Both IBM and ISV software was used in the model (IBM software - z/OS, IMS DB & TM, Db2, CICS, VSAM, JES2, IICSF, MQ, FTP, SCLM, OMEGAMON®, GDG, DFHSM, MFS.NET, and 3rd party software – a scheduling application and IMS utilities). Opex costs during years 2 to 5 were used to determine total cumulative costs for the different scenarios. For the comparison of operating expense (Opex) during years 2 to 5, the initial investment in IBM Z hardware in scenario 1 or software acquisition costs on public cloud in scenarios 2, 3 and 4 were excluded. Software used to calculate Opex charges on the cloud examples use list pricing for IBM Integration Bus and third-party applications for transaction management for CICS, a COBOL emulation server application, COBOL integrated development environments, a database, and a database with HA clustering capabilities. The average Opex model found that average Opex was 39% lower on IBM z14 compared to Public Cloud Example 1, 29% lower on IBM z14 compared to Public Cloud Example 2 and 39% lower on IBM z14 compared to Public Cloud Example 3. For additional information on the use case model, contact the IBM IT Economics Team at IT.Economics@us.ibm.

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The Accumulated TCO Cost Comparison chart illustrates growth on non-IBM public cloud platforms can be 164-180% more expensive than on IBM z14 using Tailored Fit Pricing. It also shows a significant cost difference between IBM z14 and cloud implementations in Year 1 (Figure 3) resulting from large upfront investment in software licenses in order to run the workloads in a public cloud. It can also be seen that investing in software licenses may not yield an eventual reduction in cost, since operational costs on the cloud in this analysis are higher than on IBM z14 (refer to section Cost drivers in a workload growth model and Figure 7).

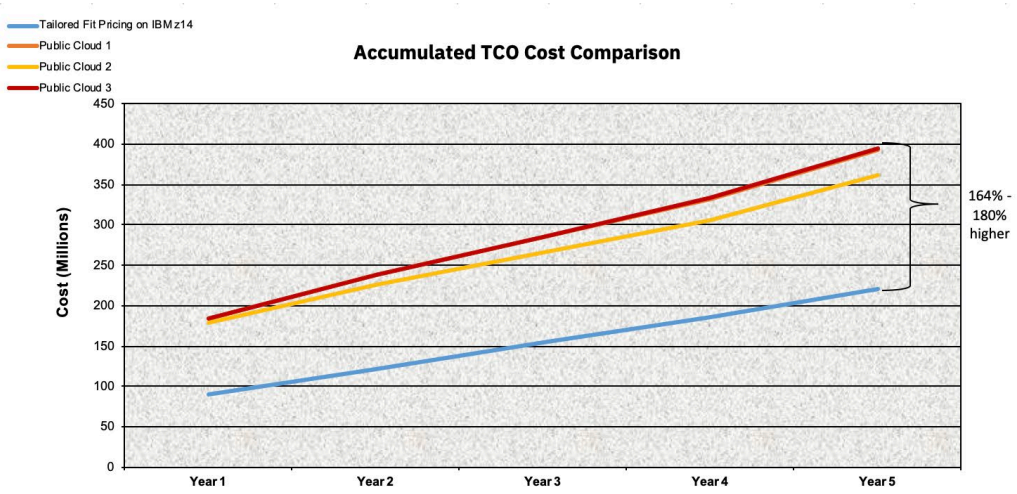

Figure 2: Accumulated TCO Cost Comparison
Public Cloud 1 and Public Cloud 3 costs are similar, causing the Public Cloud 3 graph line to overlap the Public Cloud 1 graph line.

Accumulative Ownership Costs	Year 1	Year 2	Year 3	Year 4	Year 5	**5 Year TCO Difference**	**%**
Tailored Fit Pricing on IBM z14	90,747,554	122,047,228	154,057,687	186,592,818	219,885,997		
Public Cloud 1	184,329,657	237,854,264	284,396,790	331,626,541	392,499,636	**172,613,639**	**179%**
Public Cloud 2	178,052,388	225,292,702	265,550,937	306,474,883	361,020,662	**141,134,665**	**164%**
Public Cloud 3	184,766,403	238,740,834	285,733,185	333,452,376	394,854,528	**174,968,532**	**180%**

Figure 3: Accumulative Ownership Costs by Year

To quantify the financial impact of workload growth over time in the different scenarios, the use case assumes an annual growth rate of 3% for all scenarios. The model found that if the growth rate increases by a further 1% (from 3% to 4% annually), the average Opex over years 2 to 5 grows by 4% on IBM z14 while Opex on the cloud grows by 5-6%.

Infrastructure Type	Increase in Cost per 1% Increase in Capacity
Tailored Fit Pricing on IBM z14	4%
Public Cloud 1	5%
Public Cloud 2	6%
Public Cloud 3	5%

Figure 4: Increase in Cost per 1% Increase in Capacity

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Another way to look at the impact of workload growth is to look at the cost ratio of total cost of ownership over five years for workloads on cloud versus deployed MIPS. Based on IBM analysis of five workload environments based on different MIPS usage ranging from Very Small (2,125 MIPS), Small (4,250 MIPS), Medium (8,500 MIPS), Large (17,000 MIPS) and Very Large (34,000 MIPS), the TCO for the comparable workload volumes (from Figure 2) was found to be higher on the cloud in all five size scenarios. Additionally, as observed in the table and chart below (Figures 5 and 6), the cost ratio of total cost of ownership over five years for Public Cloud Example 1 and Public Cloud Example 2 compared to IBM z14 increases as the workload volumes grow[3].

Workload Environment	5 Year TCO $ Amount				TCO Cost Ratio		
	IBM z14	Public Cloud Example 1	Public Cloud Example 2	Public Cloud Example 3	IBM z14 versus Public Cloud Example 1	IBM z14 versus Public Cloud Example 2	IBM z14 versus Public Cloud Example 3
Extra Small (2,215 MIPS)	$68,788,246	$99,993,819	$70,849,479	$98,039,269	1.45	1.03	1.43
Small (4,250 MIPS)	$96,188,445	$141,799,366	$112,334,561	$140,437,163	1.47	1.17	1.46
Medium (8,500 MIPS)	$141,357,422	$225,768,829	$195,633,225	$225,645,151	1.60	1.38	1.60
Large (17,000 MIPS)	$219,885,997	$392,499,636	$361,020,662	$394,854,528	1.79	1.64	1.80
Extra Large (34,000)	$365,150,419	$725,230,979	$691,146,951	$732,395,348	1.99	1.89	2.01

Figure 5: TCO $ Amount and TCO Cost Ratio for different workload environment sizes on IBM z14 and Public Cloud Examples

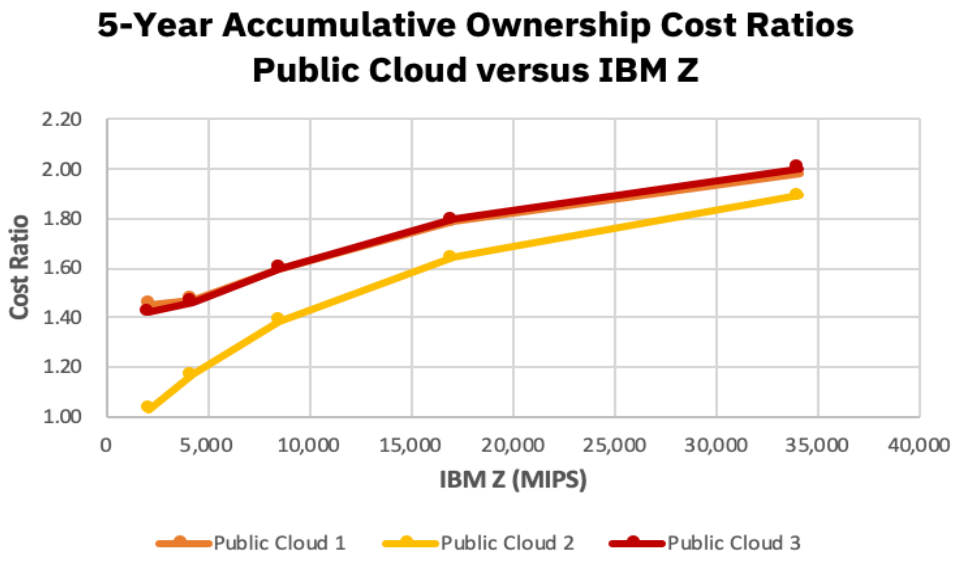

Figure 6: Cost Ratio of IBM Z versus Public Cloud 1 and Public Cloud 2 (Average)
Public Cloud 1 and Public Cloud 3 costs are similar, causing the Public Cloud 3 graph line to overlap the Public Cloud 1 graph line.

[3] The cost ratio is calculated by comparing the accumulated, total cost of ownership (TCO) over five years for IBM z14 and Public Cloud Example 1, Public Cloud Example 2 and Public Cloud 3 with five workload environment sizes based on different MIPS usage (Extra Small is 2,125 MIPS, Small is 4,250 MIPS, Medium is 8,500 MIPS, Large is 17,000 MIPS and Extra Large is 34,000 MIPS). The TCO for each of the workload environments in Public Cloud Examples 1, 2 and 3 is found to be higher in all five size scenarios. Additionally, as workload volumes increased, the cost ratio was found to increase for the public cloud scenarios (for instance, Extra Small for IBM z14 versus Public Cloud Example 1 has a TCO cost ratio of 1.45 and a TCO cost ratio of 1.99 for Extra Large).

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Cost drivers in a workload growth model

In the distribution of cost chart (Figure 7) we examined the three most common cost drivers[4], software, storage and hardware. The leading cost driver in all four scenarios is software with 61% for SW on z14, 84% for SW on public cloud 1, 90% for SW on public cloud 2 and 84% for SW on public cloud 3.

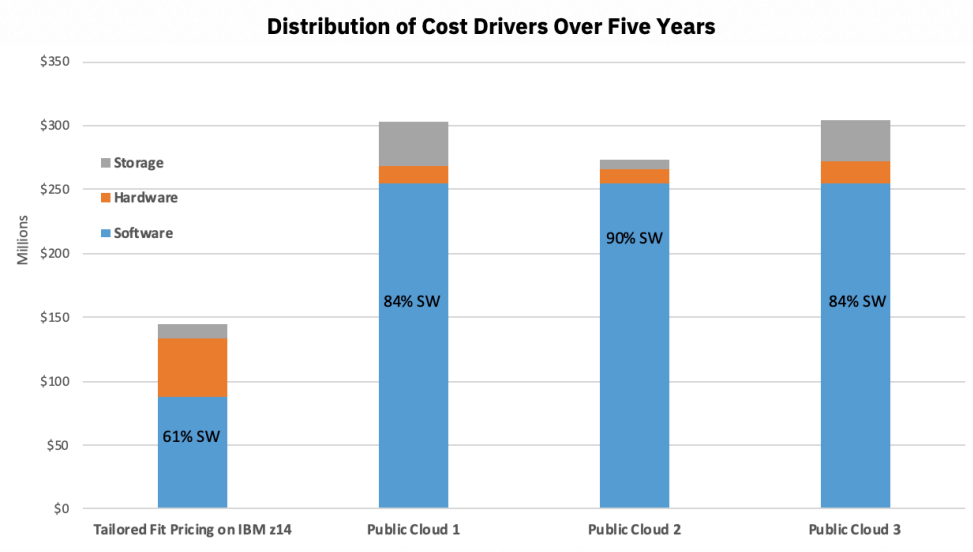

Figure 7: Distribution of storage, hardware and software costs over five years

To understand why software costs can be less expensive on IBM z14, we examined software costs in typical public cloud environments.

1. Core-based software license charges - In the three public cloud examples software costs[5] represent 84-90% of the total cost among the leading cost drivers of software, storage and hardware. This is primarily due to the maintenance cost of core-based software licenses on the cloud. Corresponding software accounts only for 61% of the costs in the IBM z14 scenario as Tailored Fit Pricing meters usage and charges for software based on usage rather than on the number of licensed cores.
2. High software acquisition costs – Growth of workloads can result in on-going acquisition of one-time acquisition costs for software. These one-time charges traditionally must be paid whether or not the software is used during off peak times.
3. Software license over-provisioning – While cloud hardware can be released during idle times software that is licensed on a per core basis cannot be released. This can result in a high cost of software maintenance whether it is used or not.

[4] Other costs, for example energy, floor space and others foot noted earlier, were excluded from the chart since they represented 1 or less percent.
[5] Software represents middleware like databases and applications like schedulers.

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Tailored Fit Pricing can help reduce IT costs

Tailored Fit Pricing for IBM Z is designed to deliver scheduling flexibility, transparency, and predictability of pricing, even in the constantly evolving era of hybrid cloud. A comparison of Tailored Fit Pricing versus the two Public Cloud Examples highlights the potential cost benefits of IBM z14. With Tailored Fit Pricing customers can potentially grow workload activity on IBM z14 at a lower cost than on public cloud. Tailored Fit Pricing can also allow customers to align their IT costs with IT usage and business revenue.

Find savings in your enterprise

While actual savings will vary according to types of workloads and IT environment specifics, we anticipate that most enterprises, in particular those anticipating workload growth, can potentially achieve cost efficiencies by opting for Tailored Fit Pricing. If your organization is interested in exploring pricing model comparisons, ask for an IT Economic assessment. This analysis is available at no-charge and can help identify cost savings and operations efficiencies for growing IT environments. Contact IT.Economics@us.ibm.com for information on a Tailored Fit Pricing assessment.

[1] Refer to these pages for more information on IBM Z and Tailored Fit Pricing for IBM Z
https://www.ibm.com/it-infrastructure/z
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