Asset Performance Management in the Cloud

Gain agility, adaptability and security
Why enterprises are moving to the cloud now

Cloud users enjoy the benefits of agility, adaptability, and security. If you’ve been held back by concerns about implementation or protecting proprietary data, take a fresh look at the benefits of cloud.

Many industrial enterprises that have long relied on on-premise (on-prem) solutions are now beginning to migrate to SaaS (Software as a Service) driven by cost outs, data center consolidation or end of life (EOL) for hardware and software – as well as by the growth of remote work and need for on-demand access to Operations & Maintenance (O&M) data and processes.

Why cloud?

- Always on latest release: implement security patches, new features, and more in near real-time
- Performance and availability: increased availability of applications with faster data aggregation
- Faster deployment: eliminate commissioning required with on-prem software and realize time-to-value faster
- Total cost of ownership (TCO) decreases: minimize infrastructure and data costs
- Agility & technical flexibility
- Security: prevent, detect, respond, and remediate data loss or theft
- Data protection and backup: feel confident knowing your data will be there
- Leverage highly skilled cloud IT Talent: eliminates risk with attracting and retaining IT talent and prioritizes your team to do higher-value and more productive work

### Use a Benefits Worksheet to Facilitate Cloud Ideation Activities

<table>
<thead>
<tr>
<th>Benefit Groups</th>
<th>Example Benefits</th>
<th>Benefit Impact Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost Benefits</strong></td>
<td>Increase ROI by Decreasing Labor and Infrastructure Costs</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Lower Capital Expenditures</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Lessen Budget Risk</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Increased Operational and Organizational Agility</strong></td>
<td>Eliminate the Lag Between Business and IT</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Ensure Organizational Agility</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Instantaneously Scale Up or Down in Line With Consumption</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Avoid Costly Upgrades, Wait Times and Capacity Constraints</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Innovation</strong></td>
<td>Outsource Non-Key Areas</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Focus on Core Competencies to Maximize Competitive Advantage</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Source: Gartner 728606_C

2022, Gartner, How Executive Leaders Should Justify Moving to the Cloud

Public cloud services grew 21.7% to reach $482 Billion in 2022 – making up 45% of all Enterprise IT spending.

Gartner® Press Release, Gartner Says Four Trends Are Shaping the Future of Public Cloud, August 2, 2021

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A deep dive into cloud benefits

Complex applications, including Asset Performance Management (APM) software, are ideal candidates for migration to the cloud or for a cloud-first model. Cloud-first strategies provide essential business flexibility and speed needed to fully support critical and expensive assets, which also drive business growth.

On latest releases
Assure you always run on the latest version of not just application software but underlying supporting software. By doing so, you can significantly reduce the cost of upgrading APM applications. It additionally eliminates the risk – and cost – of being on older versions on which access to new innovations are not possible until an upgrade is made. Transitioning APM to the cloud can minimize upgrade efforts when new versions come out, as most upgrades are embedded and often automatically done without the resources of IT staff. The latest security patch and any necessary hotfixes are applied immediately.

Performance and availability
Among the hallmarks of cloud computing is its scalability, reliability, fail-over and aggressive compute power applied and shared among customers. Most large cloud companies have uptime exceeding 99.5, and similarly, it’s difficult to beat the level of performance and speed they can provide. Network performance can be an issue whether apps are delivered from the cloud or on-prem; however, if you have a distributed workforce – and especially for remote employees – often applications in the cloud will have better application performance than those on prem.

Ease of migration
GE has helped several customers migrate and can evaluate your specific situation to develop a plan. For example, we have data loader export/import tools, can actively participate in data migration to the cloud, upgrade data to new database versions in the cloud, work with customer APM configurations, including business rules, and migrate to new versions in the cloud. With translation and migration scripts, GE Digital can make migrating to the cloud more efficient, less costly and less risky.

Top Outcomes Achieved by Adopting Cloud
First Choice and Sum of Top 3 Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>First Choice</th>
<th>Sum of Top 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Modernization</td>
<td>17%</td>
<td>40%</td>
</tr>
<tr>
<td>Improved Efficiency</td>
<td>12%</td>
<td>39%</td>
</tr>
<tr>
<td>Increased Data Security</td>
<td>11%</td>
<td>30%</td>
</tr>
<tr>
<td>Improved Productivity</td>
<td>10%</td>
<td>29%</td>
</tr>
<tr>
<td>Increased Agility and Innovation</td>
<td>6%</td>
<td>24%</td>
</tr>
<tr>
<td>Cost Savings</td>
<td>8%</td>
<td>21%</td>
</tr>
<tr>
<td>Enabled Digital Business Strategy</td>
<td>7%</td>
<td>21%</td>
</tr>
<tr>
<td>Application and Workload Modernization</td>
<td>6%</td>
<td>19%</td>
</tr>
<tr>
<td>Cost Optimization</td>
<td>5%</td>
<td>17%</td>
</tr>
<tr>
<td>Data Center Consolidation</td>
<td>5%</td>
<td>16%</td>
</tr>
<tr>
<td>Business Transformation Elasticity</td>
<td>4%</td>
<td>14%</td>
</tr>
<tr>
<td>Increased Organizational Transparency</td>
<td>4%</td>
<td>13%</td>
</tr>
<tr>
<td>Grew the Business</td>
<td>4%</td>
<td>12%</td>
</tr>
</tbody>
</table>

n = 848 Total Respondents, Excluding “Don’t Know/Not Sure”
Q. Please rank the top 3 outcomes your organization has achieved so far by adopting cloud.
Source: 2020 Gartner Cloud End-User Buying Behavior Survey 739912_C

2022 Gartner, Avoid Wasting Time and Money by Assessing Your Portfolio Before Migrating Applications to the Cloud
Faster deployment, less effort

New customers especially may want to consider deploying APM in the cloud. Generally, cloud-first APM customers find faster time to value, less effort involved and less cost due to applications already being in the cloud. While help with customizations and configurations may still be necessary, the crux of the building blocks will already be there for use. For customers migrating from on-prem to the cloud, successive deployments or changes will be that much faster and less costly.

APM in the cloud yields significant flexibility, both from an IT and a business perspective. Looking at it as a business, cloud helps facilitate merger and acquisition activity and due diligence. It also is an accelerator to consolidating plants and the overall fleet and can significantly aid in achieving robust financial performance. Also business expansion plans can be accelerated and more quickly adopted with APM in the cloud.

Technical flexibility

Migrating to cloud offloads the responsibility for the configuration and operation of servers, storage, the network and data centers. IT leaders can use the time they gain back to build the infrastructure-as-code delivery model and modernize applications and services.

Security

Major cloud service providers spend billions on security because of changing cybersecurity landscapes and defensive threat countermeasures – many enterprises can’t handle that expenditure on their own. Though cloud security failures happen, these breaches are often noted as having “misconfigured databases” or “third-party mismanagement” caused by customers themselves or IT vendors helping customers. In fact, 99% of cloud security failures through 2025 will be the customer’s fault.

Being on the latest versions, patches and hot-fixes for operating systems, applications, databases and other core software and tools can significantly help to minimize threat posture, as well as hasten the speed to repair breaches. Plus users benefit from the latest security software and authentication tools cloud providers use to minimize risk.

Perhaps the most important benefit is the cost benefit from potential eliminated security incidents. The costs to clean up, plug and repair security incidents can be substantial not to mention the opportunity cost of taking your IT staff away from running your business.

Reduced risk of data loss

Successful APM relies on large quantities of APM data. Among the many benefits of a cloud strategy for APM is reduced risk of data loss. When considering APM data, it’s this data durability which helps enterprises achieve optimized asset management strategies. Without it, expensive assets are at risk of over-maintaining, under-maintaining or costly break-fix incidents. Cloud data storage includes back up, archiving, timely restore protocols, just in time capacity and performant storage that can grow with your needs.

Agility

A hallmark of cloud, agility generally refers to rapid, same day or in mere minutes provisioning of computing resources. This nimbleness facilitates business change and quick response to changing opportunities or conditions as business becomes more IT-infused and differentiated with IT assets.

Another type of agility hides under the surface. How quickly can your team and your internal IT staff adapt and adopt next generation software and hardware? Speed affects your ability to take advantage of innovation, keep business and asset data secure, and test systems and processes. It’s clear that cloud computing in all its forms aid in helping business and IT agility.

Cloud computing isn’t all or nothing

Many enterprises have taken a hybrid cloud strategy approach, in which some applications and storage are hosted on premise, some are kept on prem on a private cloud, some have been transitioned wholly to the cloud and some are further hybridized where portions are both on prem and in the cloud.
GE Digital’s APM in Cloud

With a cloud deployment of GE Digital’s APM solution, you’ll gain richer functions and capabilities that are only available on the cloud, as well as experience the general agility, cost-savings and security benefits of running applications on the cloud.

- **Customer-specific analytics** – By using APM on the cloud, you can store and easily access predictive analytics for your equipment created by your data science team that complement the Digital Twin blueprints for over 340 assets that GE Digital supports.
- **Cases and alerts** – When a deviation in the data for an asset is identified or a component is predicted to fail, an alert is sent to a monitoring/reliability engineer to create a case to review the data and then send to a maintenance engineer if action is needed.
- **Edge device connectivity** – Sensor data from assets or asset components comes into the cloud via secure protocols where it is stored and accessible to facilitate proactive O&M decision-making.
- **Timeseries integration / ingestion** – Timeseries data is pumped directly to and stored on APM on the cloud, so it can be integrated with your asset maintenance processes.
- **Automatic upgrades** – Gain the value of continual innovation of APM software from GE Digital deployed real-time. Product enhancements are automatic and generally don’t require IT resources to manage the upgrade, so your IT team can focus on more high-value activities for the enterprise.

Features of GE Digital’s APM Platform in the cloud

- Built-in resiliency, security and compliance
- Scale across enterprise economically – Customers purchase Essentials once – with no need to purchase again whether supporting two or two hundred more sites
- Cloud platform data & analytics tools integration: build custom analytics leveraging APM data and execute custom analytics inside / outside of APM
- Ingest and store data once – use across APM Applications
- SSO across APM applications, plus extensibility to customer’s identity management
- Edge option for OT connectivity, data filtering, analytics, cloud forwarding
- GE operations center expertise

<table>
<thead>
<tr>
<th><strong>ANALYTICS CAPABILITIES</strong></th>
<th><strong>BUSINESS OUTCOMES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytics written in Python, Java and MATLAB</td>
<td>Recommendation systems that learn, retain &amp; operationalize expertise</td>
</tr>
<tr>
<td>Descriptive and AI/ML based predictive analytics</td>
<td>Asset performance optimization</td>
</tr>
<tr>
<td>Asset-centric, process-centric and hybrid analytics</td>
<td>Predictive maintenance</td>
</tr>
<tr>
<td>Configuration of analytics with a group of assets</td>
<td>Minimize unplanned downtime</td>
</tr>
<tr>
<td>Scheduling Options: recurring &amp; event-driven</td>
<td>Effective utilization of dispatch personnel</td>
</tr>
<tr>
<td>Analytic monitoring &amp; notifications</td>
<td></td>
</tr>
</tbody>
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Understanding Financial impact

In on-prem data centers, system hardware and software are assets usually owned by the organization and are therefore capital expenditures. Using public cloud infrastructure as a service (IaaS), the organization does not own the assets, shifting the expense type from a capital expenditure (capex) to an operating expenditure (opex). In this model, costs are measured according to service usage, like a utility. This usage model may not be a fit for Organizations that have investment and budgeting processes focused on capex rather than opex, such as manufacturing, energy and government organizations, may not prefer the service usage model. However, when evaluating the impact of cloud initiatives it’s important to understand the total cost of ownership (TCO) to see the clear long-term value of cloud.

Make an effective case for a cloud migration project by considering which of the following would resonate within your organization, based on culture and business priorities:

- Agility and scalability: If an application is designed properly, it is suitable to scale globally in a short period of time.

- Business innovation: Cloud enables lower barriers to entry for innovation and prototyping. It is expensive and time-consuming to build testing and development infrastructure in-house. The cloud provider may offer more-advanced functional capabilities in the areas of advanced data analysis and processing.

- Broader geographic distribution: The global distribution of cloud infrastructure and platform services (that is, IaaS and PaaS) enables applications to be deployed to other regions quickly and more cost-effectively.

- Cost optimization: The organization can better align IT costs to demand patterns by using pay-as-you-go pricing and cloud’s flexibility and agility.

On the other hand, building out your IT infrastructure on-prem to support APM can be a comparatively large capital expenditure, especially when factoring in continual maintenance costs, incremental and specialized IT resources and lack of server support. Also consider how much would it cost to achieve the redundancy equal to what you get in the cloud, as well as the cost benefits of enhanced security and privacy that would be difficult to achieve on your own.
GE Remote Monitoring Center:
The world’s largest monitoring center uses APM in cloud

At the GE Gas Power Monitoring & Diagnostics (M&D) Center in Atlanta, Georgia, a team of experts and engineers monitors thousands of power assets in real-time, 24/7, using GE Digital’s APM platform on the cloud. The M&D center is connected to nearly 1,000 power plants in 83 countries, helping them deliver reliable, resilient power to hundreds of millions of global citizens.

It represents one of the biggest implementations of Big Data IoT platform in the Power Generation industry, leveraging cloud-native services for scalability. The solution contains 20 years of historical operational technology (OT) data.

GE Digital Achieves AWS Energy Competency Status

This designation recognizes that GE Digital has demonstrated deep expertise leveraging AWS to build, implement, and integrate technology that transforms complex business and operational systems to help accelerate the energy transition. For more information: ge.com/news/press-releases/ge-digital-achieves-aws-energy-competency-status

About GE

GE Digital transforms how our customers solve their toughest challenges by putting industrial data to work. Our mission is to bring simplicity, speed, and scale to digital transformation activities, with industrial software that delivers breakthrough business outcomes. GE Digital’s product portfolio – including grid optimization and analytics, asset and operations performance management, and manufacturing operations and automation – helps industrial companies in the utility, power generation, oil & gas, aviation, and manufacturing sectors change the way industry works. For more information, visit ge.com/digital.

Gain speed and flexibility, reduce costs and strengthen security

Learn more about migrating to GE Digital APM in cloud