

# **Memory Machine™** Cloud Edition

**Memory Machine Cloud Edition (CE)** is enterprise software that provides automated resource management, job scheduling, and workload mobility for cloud computing.

Memory Machine CE includes **AppCapsule**, MemVerge’s in-memory checkpoint/restore technology that enables users to run batch programs on Spot instances — virtual machines (VMs) offered at deep discounts by Cloud Service Providers (CSPs) to monetize excess capacity. Users achieve order-of-magnitude savings on cloud costs. With Memory Machine CE, users enjoy Spot instance economics (more powerful VMs, lower cost) without jeopardizing results (or missing deadlines) if a Spot instance is reclaimed with minimal notice by the CSP.

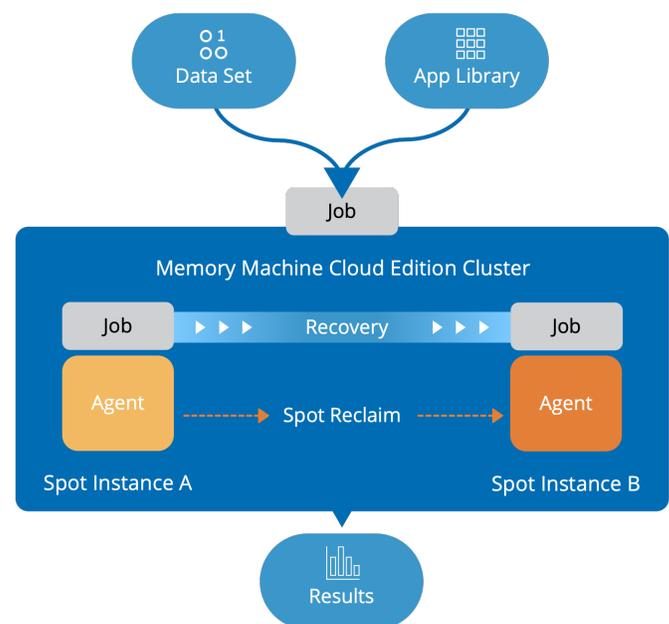
## Key Features:

- Supports continuous operation of batch jobs running on Spot instances, protecting against Spot instance interruptions.
- Automates the management of cloud resources, alleviating the burden associated with managing cloud infrastructure.
- Provides an application library, reducing the overhead of deploying and installing containerized applications.

## Memory Machine Operation

After obtaining a Memory Machine CE virtual machine image from the CSP’s Marketplace, the MemVerge customer instantiates the Memory Machine CE Operations Center (OpCenter). Then, users simply choose their applications from the application library and submit computation jobs to the OpCenter. The OpCenter automatically manages everything required to complete the jobs in the cloud, handling job migration if Spot instances are reclaimed. The OpCenter provides an interface familiar to users of popular job schedulers (like Slurm), so there is little learning curve, allowing users to execute containerized applications at scale with minimum cost.

If a Spot instance is reclaimed, Memory Machine CE intercepts the notification from the CSP and automatically saves all in-memory state and relevant files into an AppCapsule stored in persistent storage in the cloud. The AppCapsule is restored on a new Spot instance, resuming job execution without losing any interim results.



## Who Is Memory Machine CE Designed For?

It's for customers who want to lower the cost of running batch workloads in the cloud or who want more powerful VMs without increasing IT budgets: users who need high-performance computing, such as bioinformaticians or quantitative analysts, who want access to cloud computing power without draining their budgets, and who want IT overhead minimized.

## Features and Benefits

Feature	Benefit
<p><b>High availability for Spot instances</b></p> <p>Hyperscale CSPs have hundreds of VM types to cover the range of workloads. Most of the time, CSPs have excess VM capacity, which they offer at varying discounts, sometimes as much as 90%, in the form of Spot instances. But any Spot instance can be reclaimed with only nominal warning (less than two minutes). The AppCapsule feature is triggered automatically when the CSP signals that it is reclaiming the Spot instance. The job continues running on a new Spot instance after a delay of only a few seconds.</p>	<p><b>Optimize cost and performance while controlling wall-clock time</b></p> <p>Some applications are stateful and long-running but lack robust checkpointing. Users of these applications avoid Spot instances because they risk losing all their work if the Spot instance is reclaimed. For these users, Memory Machine CE provides the guaranteed availability of an on-demand VM <i>and</i> the economic advantages of Spot pricing. Savings can be retained or put towards leasing more powerful VMs, reducing wall-clock time in a reproducible way.</p>

Feature	Benefit
<p><b>Streamlined cloud resource management</b></p> <p>Based on user-supplied policy, Memory Machine CE selects and instantiates cloud resources on behalf of the user. For example, to execute a bioinformatics pipeline, Memory Machine CE creates a fleet of memory-optimized VMs, each configured with the requisite virtual CPUs, memory, and storage.</p>	<p><b>Users focus on business impact, not IT</b></p> <p>Although the cloud is a compelling model for accessing compute resources, studies show that non-IT professionals, such as research scientists and data analysts, find the configuration tasks complicated and time-consuming. Non-optimal configurations result in cost overruns. Memory Machine CE removes this burden, allowing users to focus on analyzing results and gaining insight.</p>

Feature	Benefit
<p><b>Simplified job scheduling for containerized applications</b></p> <p>Container management tools automate the deployment and scaling of containers. Job schedulers, such as Slurm and AWS Batch, and workflow managers, such as Nextflow and Cromwell, are designed for batch workloads and resource optimization based on a queue of jobs. Memory Machine CE integrates seamlessly with these tools and also provides a built-in job scheduler for customers who have not deployed a container management environment.</p>	<p><b>Scalability and mobility of containers without the deployment complexity</b></p> <p>Deploying container management tools in the cloud is complex and error-prone, and typically requires experienced IT staff. Memory Machine CE simplifies the deployment of containerized applications, removing the administrative overhead and relieving customers of the burden.</p>

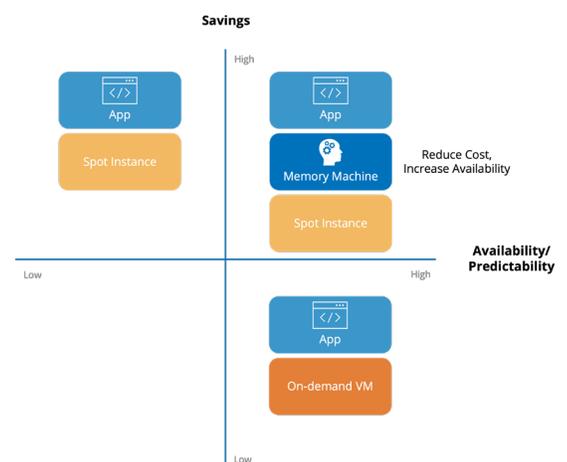
## Example Use Cases

### Single-cell RNA Sequencing

Modern sequencing machines generate FASTQ files (text files describing sequences of nucleotides or amino acids) at rates of hundreds of gigabytes per day. The pipelines to analyze these files are stateful and can run for days or even weeks. Over this period, the savings from using Spot instances are considerable.

### Financial Services

To stay competitive and comply with regulations, financial services organizations depend on tools that analyze large volumes of high-frequency data. AI applications detecting credit card fraud must respond in real-time. Risk analysis for compliance may run as a batch job overnight. The compute and memory requirements are always high. Spot instances are ideal because an optimally-sized VM can be obtained at much lower cost. But if deadlines are missed, the consequences are significant. With Memory Machine CE, you get high performance and cost savings from Spot instances combined with predictable timelines.



## How to get Memory Machine CE

Visit <https://memverge.com> or send email to [sales@memverge.com](mailto:sales@memverge.com).