

Problem Statement

Synaptics is a developer of human interface (HMI) hardware and software, which requires high-performance computing (HPC) clusters. Synaptics uses IBM Spectrum Load Sharing Facility (LSF) for workload management and IBM RTM as their operational dashboard.

The significant challenges Synaptics encountered was their ever-increasing hardware and EDA tools Licensing costs on the IBM LSF cluster. Due to a lack of deep insights into how the LSF was performing on various jobs, they were unable to perform any heuristics to definitively determine the cause of the degrading performance of the jobs on the LSF cluster.

Proposed Solution

Synaptics collaborated with Mactores and the AWS Solution Architects to identify how Axomo, a Mactores solution for EDA workloads, would help them with solving their challenges with their LSF cluster.

Axomo is an AWS Quick Start solution that connects with IBM Spectrum LSF, IBM RTM Database, and Telegraph Database to collect data. Once the data is available in S3, Axomo builds an operational Datalake to provide analytics and the machine learning environment to identify and mitigate configurational challenges in HPC clusters.

How AWS Services were used to solve this problem

wait time, execution time, queue consumption, recommended queue structure, and ways to optimize wait and execution times.

Axomo on AWS is available as a cost-effective, secure, AWS serverless architecture that includes Amazon Glue, Amazon Simple Storage Service (Amazon S3), Amazon SageMaker, and Amazon Athena. Axomo helps customers improve the efficiency of their resource allocation and mitigate opportunity costs from productivity loss.

Start Date – May 1, 2019

End Date – June 30, 2019



About Synaptics

Synaptics is a developer of human interface (HMI) hardware and software, including touchpads for computer laptops, touch, display driver, and fingerprint biometrics technology for smartphones; and touch, video, and far-field voice technology for smart home devices and automotive.

Outcomes & results

Synaptics was able to reduce job wait times by 90%, and job processing time was improved by 60%. In total, 800 Cores of capacity were freed up and available for other workloads. Due to the improvement in the job wait time and processing times; more licenses were available for consumption.

Lessons Learned

Skew in the Queue Configuration

Identified Problem: Synaptics team configured a single queue to manage 93% of the jobs. This metric was the epicenter of the problem of underutilized/underperforming clusters. At the same time, other queues and corresponding hosts were unused. As a result, queues were disproportionately utilized and created a skew of resources for the jobs.

Remediation: The resolution for this skew was to predict job execution time based on time series forecasting methods in Amazon Sagemaker and enqueueing the jobs in the queues with sufficient resource availability.

The disproportionate distribution of jobs

Identified Problem: About 61% of jobs took less than 5 minutes to execute; about 29% of the jobs took under an hour. While only 10% of the jobs took more than an hour to execute. The queues configuration was made such to allocate maximum cluster resources to jobs taking more than one hour of execution time, thus overloading 20% of the cluster with 90% of the jobs.

Remediation: Axomo recommended a new cluster configuration based on the classification of jobs. Multiple queues were recommended based on the estimated time to execution to allocate a fair share of the cluster resources. The new queuing mechanism ensured that jobs are processed faster and are more manageable while distributing computing resources for complex jobs in separate queues.

About Mactores Cognition Inc

Mactores quickly solves core business problems and drives disruptive change by applying the latest automation technologies in Data Analytics, AI/ML and DevOps. We design, deploy, integrate and manage rapid migration and transformation solutions to accelerate enterprise data platform migrations using automation developed over dozens of successful use cases.

The logo for Mactores Cognition Inc. It features the word "MACTORES" in a bold, sans-serif font. The letter "O" is stylized as a square with rounded corners, filled with a gradient of colors: blue on the left, green on the right, and a yellow-to-orange gradient at the bottom.