Digital Transformation and Operational Excellence Industry Awards

Category Submission: Best Achievement in an Enterprise Architecture program

1. Please enter a 250-word synopsis of the entry which may be used in Awards publicity material, this is in addition to the entry. This allows the judges to get a summary understanding of your entry and is a useful tool for you to guide them to the key components (i.e. significant results) within your entry. Please note the summary may be used by the organizers as publicity material, we reserve the right to edit prior to publication.

Response:

In 2017, regulations in Europe changed and required car manufacturers to produce less polluting vehicles. Car manufacturers are also required to calculate the CO2 emission of each configured car and failing to calculate and display the CO2 emission can lead to heavy fines. Customers, dealership staff, and partners use an online web configurator to build and price cars.

The technical challenge at one of Europe's largest car manufacturers was: the mainframe platform that hosts the car configurator had a maximum capacity of 200 requests per second, while they estimated actual demand would hit 3,000 requests per second. In addition, the mainframe response time was very slow, inadequate to support an online web experience.

In 2019, after attempting but failing to solve the challenge, the leading car manufacturer enlisted GigaSpaces and InsightEdge Smart Cache was implemented to resolve the bottleneck problem by offloading mainframe requests to its core in-memory data grid engine. After implementation of InsightEdge Smart Cache, over 95% of requests for CO2 calculations are served by the product; response time ranges between 15-19 milliseconds vs. 200-300 milliseconds; calculator capacity increased 15x without upgrading the mainframe platform; infrastructure footprint was reduced by a factor of 6X while workload scale was increased by 20X, and the solution was developed & deployed within 12 weeks from kickoff to go-live.

2. The strategic objectives and scope of the project - Ensure you link this to the organizational strategy, to show strategic relevance.

Response:

In 2017, the European Union replaced their old carbon emission testing system with WLTP Protocol (Worldwide Harmonised Light Vehicle Test Procedure), basing it on real-driving data rather than on theoretical driving. In parallel, the Clean Air For Europe Programme (CAFE) was established to constrain vehicle suppliers and manufacturers to produce less polluting vehicles by assigning them an average CO2 rate per kilometer emitted annually on all sold vehicles.

Business challenge:
With the new rule and system in place, this leading car manufacturer had to monitor its carbon dioxide emissions in all its vehicles for producing less polluting vehicles as failing to do so would result in heavy fines.

Technical Challenge:
Customers, dealership staff, and partners for this car company used an online web configurator to build and price cars. The mainframe platform that hosted the car configurator had a maximum capacity of 200 requests per second, while the estimated demand would hit 3000 requests per second, thus making the mainframe response time very slow and inadequate to support an online web experience.

The strategic objective behind implementing GigaSpaces Insight Edge in-memory platforms was to reduce the bottleneck by offloading mainframe requests to its core in-memory data grid engine. Other goals included:

- Ingesting, processing, and analyzing from any data source, including structured, unstructured, or semi-structured sources.
- To provide ultra-low latency, high-throughput transaction, stream, and analytical processing. Co-location of data, applications, and analytics eliminate the need to move data to act on time-sensitive data at milli and microsecond performance.
- Elastic linear scaling and handling of peak events without performance degradation supported by a distributed in-memory scale-out.
- Mature battle-tested platform for mission-critical businesses. High availability with up to 5 nines reliability and auto-healing. Geo-redundancy and fast data replication for disaster recovery.

3. The project implementation process and timeline

Response:

The project was implemented in 2019 and the solution was developed and implemented over a span of 12 weeks.

With the new WLP system, the calculations required less than 100 millisecond response time to deliver the expected user experience along with a high level of accuracy and reliability. The mainframe modernization solution also needed to be cloud-ready, scale elastically and ensure always-on functionality.

4. The size of the project challenge, use of creative tools, and any organizational development.

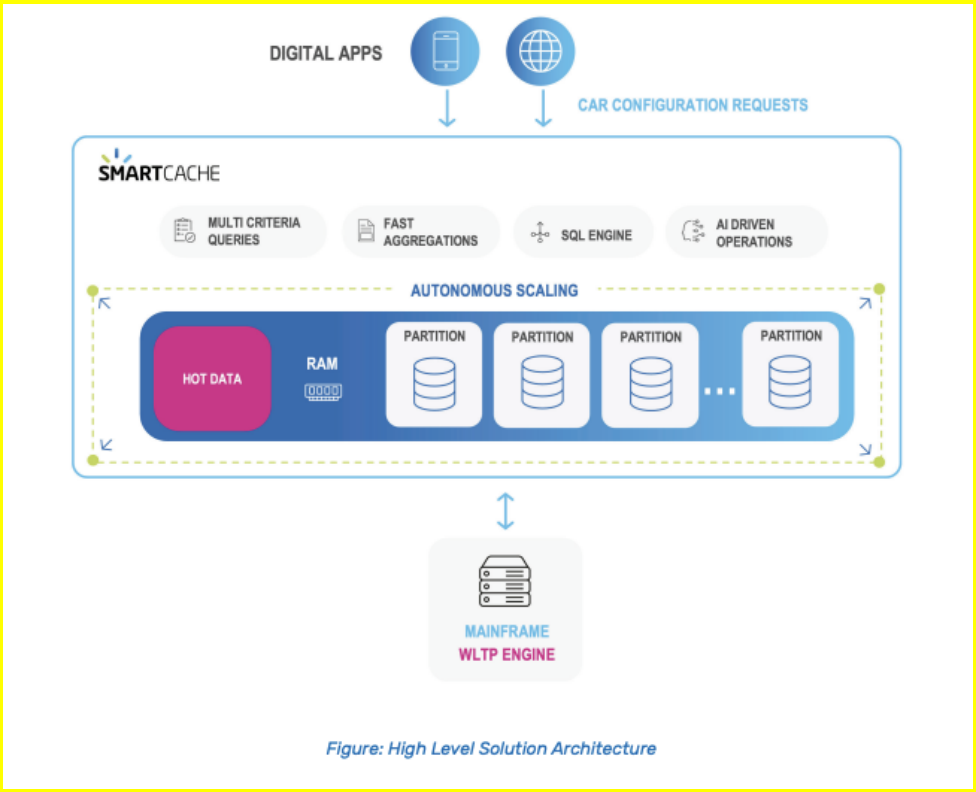

Figure: High Level Solution Architecture

5. The impact of the project - Detail the customer benefit and value generation.

Response:

GigaSpaces Insight Edge, Smart Cache was implemented to offload the mainframe requests to its core in-memory data grid engine. A mask was applied to the configuration options, eliminating many irrelevant carbon dioxide emission calculations. As a result, the number of configurations dropped significantly, allowing most of them to reside in the in-memory multi-model data fabric. This dramatically reduced the number of calculations that needed to be sent to the mainframe. Dynamic multi-criteria queries allowed for superfast access to the data without duplicating data per each possible combination of criteria. For high availability, the data is backed up automatically to a database, so the cache can be restored automatically from the database if a server fails.

After implementation of InsightEdge Smart Cache, over 95% of requests for CO2 calculations are served by the product; response time ranges between 15-19 milliseconds vs. 200-300 milliseconds; calculator capacity increased 15x without upgrading the mainframe platform; infrastructure footprint was reduced by a factor of 6X while workload scale was increased by 20X; and the solution was developed & deployed within 12 weeks from kickoff to go-live.

This potentially saved the car manufacturer since an extra gram of CO_2 emission per kilometer might mean a fine of €100 per vehicle, which can result in huge fines.

6. The business results of the project - All results must be shown in percentage terms, not absolute values. Where this is not appropriate, raw data will be accepted. There should be evidence of financial business results – earnings/ sales revenues/margins but the judges will also take into account the strategic relevance of the results achieved and the value generation.

Response:

GigSpaces Smart Cache increased the delivery and analytics response time to 15-19 milliseconds, having up to 95% of calculation requests without accessing the mainframe. A factor of 4-6x reduced the infrastructure footprint while the scale increased by 20x.