GLOBAL DIGITAL ENTERTAINMENT
CONTENT AND SERVICES PROVIDER
JESTA DIGITAL MIGRATES
TO THE ULTRAESB
Jesta Digital uses a Service Oriented Architecture for application development and deployment, and hosts a wide range of SOAP, REST and Hessian based services primarily over HTTP/S. The ESB is used to proxy calls to these services and perform header based routing, load balancing and fail-over as well as asynchronous statistics recording, logging, and error handling.

Internally, a custom built application is used to manage these services deployed on hundreds of server instances as well as the interactions between them. Due to very high time to market requirements software changes are continuously delivered and deployment changes happen frequently. Consequently the ESB routing configuration requires to be updated. The services process approximately 60 to 80 million requests a day, and require being available 24x7.

Jesta Digital is a leading global provider of next generation entertainment content and services for the digital consumer. A proven innovator for over 10 years, the company continues to develop and introduce exciting new products that deliver a seamless entertainment experience via web or wireless connection on a broad range of devices.

Jesta Digital is home to such groundbreaking services as Bitbop, the commercial-free wireless subscription service for TV and movies delivered on-demand to smartphones in the U.S. and across web, tablet and mobile devices in Germany. The company is also home to a number of well-known and established brands including Jamba and Jamster which deliver branded content, music, games and apps to millions of mobile consumers; iLove, a unique mobile networking service that helps people meet, interact and form relationships; and Mobizzo, a mobile subscription service that challenges members to take quizzes to earn money and prizes.
The free and open source UltraESB was launched in early 2010 by AdroitLogic, founded by the former architect of the Apache Synapse and WSO2 ESBs, Asankha Perera. In September 2011, Ruwan Linton who initially succeeded Asankha at WSO2 as its next ESB architect, also joined AdroitLogic as its Director of Engineering. "Asankha and Ruwan were well known to us for their outstanding production support and technical prowess. The underlying technological innovations of the UltraESB coupled with its focus on simplicity of use and management, made it a strong candidate against all other options" - Eric Hubert, Executive Director Strategy & Architecture, Jesta Digital.

An Open Source ESB had been in use for almost 3 years at Jesta Digital. However with time, a healthy open source community and active development around the underlying open source project reduced noticeably. New releases started getting delayed, while some open issues remained unresolved.

Persisting issues like missing native support for Hessian and REST (internally all messages were processed as SOAP) as well as side effects during frequently required configuration changes (reestablishment of persistent connections, unequal distribution across nodes, several connection errors) were unlikely to be addressed due to constraints inherent to the architecture and design based on top of an underlying web service engine.

Moreover the custom extension code developed over the ESB by Jesta Digital was becoming increasingly complex to write and maintain due to the absence of a clearly defined end-user level API.

The similarity of the core concepts, and the visibly reduced dependence on a large and complex family of third party libraries, and a cleanly separated end-user API as a separate Maven artifact simplified the migration. AdroitLogic heavily supported the whole migration process by delivering an initial cut of all custom mediation and configuration generation code ported to the UltraESB API free of charge. Additionally AdroitLogic supported the Jesta Digital team to load test the migrated solution using a customized version of the ESB Performance Benchmark (http://esbperformance.org). The performance testing independently proved the earlier benchmark results published by AdroitLogic. Stability tests executed over multiple days under heavy load, gave evidence of more efficient resource utilization and improved stability.
During the migration, many suggestions were proposed to make the ESB deployment and management even simpler and further improve the performance. Among these, the core features were the following:

**Ability to switch a configuration on a node or cluster-wide, with zero-downtime and without affecting the message flow at all even while under high traffic**

Previously, a configuration change required an ESB instance to be brought into a maintenance mode temporarily, by not accepting further requests. Consequently for single instance deployments (e.g. used in some testing environments) small downtimes during configuration switches could not be avoided.

Although downtimes could be avoided in live deployments using a number of ESB instances behind a load balancer and cycling through each node of the cluster using custom scripts invoking JMX operations, a small number of connection problems and a temporarily unbalanced distribution of persistent connections were unpleasant side-effects one had to live with.

Hence a feature to perform a live-update of the configuration was requested, in a manner which guarantees that one message flow will always use the same configuration version, irrespective of whether asynchronous responses maybe delayed in-between as the actual switch takes place.

The feature was implemented as a UTerm command, which can also execute the switch across the complete cluster utilizing the Apache ZooKeeper based clustering support.

**Automated registration of JMX based metrics against Zabbix (monitoring of items, alerting via triggers and charting using graphs)**

Jesta Digital, using the open source enterprise monitoring system Zabbix, had to create templates and update them frequently as the configuration changed on the ESB. Zabbix also introduced a new JSON based API for programmatic registration, and the UltraESB UConsole was enhanced to register elements of the ESB against Zabbix using a template based approach, where Jesta Digital could add or customize the pre-built templates according to their needs.

**Automatic node-by-node restart of a cluster for maintenance**

Previously the application of a patch or a cold restart required each node to be restarted manually. Hence the UltraESB was enhanced to restart a complete cluster of nodes, by automatically restarting just one single node at a time. Using the Apache ZooKeeper based clustering framework, the cluster restarts and cluster wide management tasks has been greatly simplified.

**Usage of a RAM-disk or tmpfs based file cache with overflow to a secondary location**

While jointly performing and evaluating extensive load tests the Jesta Digital and AdroitLogic teams identified potential bottlenecks and searched for ways to utilize the underlying hardware and operating system in the most efficient manner. In order to minimize disk access a file cache implementation with the capability to overflow to a secondary location (e.g. a hard disk) once the first location is full was requested and implemented. Depending on the availability of RAM and the performance of the IO subsystem this can greatly improve performance.
Jesta Digital runs two separate clusters of 3 nodes each, across three physical machines, and uses a hardware load balancer to distribute the load between the ESB nodes. The two clusters perform different tasks, and are independently managed. Configurations generated for routing are first checked into a version control system, and then tested in separate integration and staging systems. Once a change is approved and ready for live deployment, it is tagged in the version control system, promoted to the shared live storage and applied cluster-wide using a UTerm command to switch the configuration without any interruption at any node. The UTerm command line interface / scriptable client and the web based UConsole provide management and monitoring capabilities for the ESB clusters.

Each ESB instance reports its metrics via JMX, and a Zabbix server records this information for historical analysis/graphing, and to fire alert triggers on certain thresholds to notify system administrators. Message statistics are asynchronously reported to a statistics database and used by internal systems at Jesta Digital for reporting.

The main cluster of 3 nodes processes 60 to 80 million requests per day, with peaks of ~3,000 messages per second. The system operates with an extremely small memory footprint and thus has a very low garbage collection (GC) overhead due to its use of a RAM disk and Zero-Copy proxying for performance. The average heap memory size of ~300MB causes minor collections of around ~7ms using the CMS collector. The average CPU utilization is approximately ~5%, while mediation time within the ESB is about 200 micro seconds on average.

"We have a top notch technical team at Jesta Digital in Berlin and it was a great pleasure to work with subject-matter experts who combined first-hand knowledge, passionate work on their product and dedication to tackle the customer's challenges" - Eric Hubert, Executive Director Strategy & Architecture, Jesta Digital.
Jesta Digital has already embarked on moving more applications to the UltraESB, and is currently investigating the integration of a highly available messaging infrastructure with the UltraESB to support asynchronous and guaranteed message delivery. In addition, routing to auto-scaled service endpoints as well as improved API management are on the road map.

"In a very demanding and rapidly changing market it is of utmost importance to be able to quickly adjust the technical platform to support product innovation and change. The UltraESB was able to demonstrate to the Jesta Digital Technology team in Berlin that its simplicity, testability, extensibility and performance is made for a matching foundation" - Eric Hubert, Executive Director Strategy and Architecture, Jesta Digital

about adroitlogic

AdroitLogic Private Ltd. is a privately held, innovative technology company based in Singapore, that believes in, and proves, that better design and clever code yields much better software. AdroitLogic is driven by the personal dedication and commitment of its founders, who are personally involved with the design, development and support of its products.