

PRODUCT SYNOPSIS :

Kuzzle is a disruptive backend technology that :

- reduces application development & time to market by 40%
- Industrialises data architecture
- removes tech dependencies with traditional hosting architectures

Kuzzle is at Release Candidate stage, V1.0 ready for mass deployment by dec 2016

CONTEXT :

- Digital categories : IOT / Productivity - Services

According to IDC, 50% of existing apps will be changed before end of 2017, there is an emergency to improve the carbon foot print of all the digital B2B, B2B2C and B2C occurrences of the UIC's railways members.

If over the 200 railways companies, all of them using our KUZZLE engine, it would be hundred of tones of carbon avoided and wasted to undertake all the digital challenges they would be facing today.

CONTENT :

Here are the product's technical specifications with the description of the

engineering qualities of our product, including the materials, components and processes used to fabricate the product, and how their qualities relate to the product's intended use.

After great clients experiences with RFF (2014) & Veolia Transport (2013-14) within the Kaliop Group, Kuzzle was subsequently engineered with sustainability in mind to better address transport industry issue.

Its eco design is also natively destined to propagate to the entire value chain of innovation, from new products to new services to new user experience. Kuzzle's unique capabilities and **carbon footprint improvements** are the result of a best of breed approach combining technological excellence with second to none design and engineering processes, as follows: Highly versatile technical specifications:

- Real-time messaging engine:
- Push notifications
- Allow users to listen to document events, real-time messages or connection/disconnection events
- Fine-grained filtering system, including geolocation filters, allowing users to be notified only to events of interest to them
- Low memory consumption (~100Mo idle, ~400Mo with 10.000 users listening to events, while bombarded by tens of thousands of real-time messages generating millions of notifications). This in turn reduces energy consumption and resources normally required to provide such performance
- Data persistency layer, based on Elastic search, supporting large volumes of data, and allowing fast and advanced searches including fuzzy queries, geolocation, language-based searches, and so on . in-memory database based on Redis for client applications
- Pivotal plugin system, allowing to extend the external API, supported network protocols, authentication strategies, business rules, data probes,
- Scalable, node recovery and master auto-election
- Highly modular architecture developed using an iterative process, which allow us to redefine it for better optimization and component replacement (e.g. we removed RabbitMQ from our technological stack when proven to be too slow)

State of the art engineering achievements:

Kuzzle's core development team follows strict coding guidelines to ensure code quality and maintainability.

These have been adopted to make Kuzzle an industrial-grade product while maintaining fast development pace and great performances.

Product Management and engineering:

- . Agile management: task prioritization (based on Kanban), collaborative teamwork and retrospectives, making sure we continuously improve our processes
 - . All major architecture decisions are made by the product team during collaborative workshops, ensuring we cover a large number of different issues while respecting the KISS principle
 - . Dogfooding principle: we use Kuzzle internally, allowing us to improve it and to make sure of its business value. We also organize internal coding challenges on a regular basis, stimulating creative process while testing Kuzzle in real life innovative contexts
 - . External components used are benchmarked against performance, stability and proposed features. Quality Assurance
 - . Code review: every change or new addition made is reviewed by at least 3 other team members, to ensure code quality
 - . Most of our code is open source, allowing anyone to scrutinize our code, to raise issues or even to contribute. . Automated unit tests and functional tests, to ensure no side-effect occurs when adding new functionalities (more than 2000 tests currently run automatically by our CI environments) . Automated code coverage: full coverage is part of the Definition of Done of a task . Strict code guidelines enforced by automated linter checks
- After 2 years of sound R&D as part of the incubation process within Kaliop Group, Kuzzle is ready to provide for a better digital industry and more specifically address satisfactorily all the major issues in the digital transformation processes of the transport industry. UIC Digital Awards is aimed at logically to provide its members with second to none and sustainable solutions.

Description of the product's aesthetic and design qualities, functions, and how they relate to user value.

In an overcrowded jungle of solutions, Kuzzle stands out and paves the way for developers and non developers alike with its liberating turnkey solution. This in turn reduces wastage of resources and fosters innovation by moving boundaries to benefit the end user journey digital experience. As experienced backend users and developers, we know that building rich applications usually involve heavy backend customization as well as the implementation of complex business rules. A backend lacking in features limits end user applications implementation.

A backend needing applications to be adapted to it fails at speeding up the development process. So we set one main goal with Kuzzle: to create a rich yet easy to comprehend product, adaptable to any kind of need, no matter how challenging it might be. To achieve this goal, Kuzzle embeds the following features:

- . fast, lightweight and already feature-rich product in itself
- . an extensible, documented and complete API. Adding new API features takes

minutes

- . easy to use plugin system, allowing to quickly add new features to Kuzzle, such as new network protocols support, business rules, custom or proprietary code, data probes, authentication strategies, and so on
- . complete rights management system, allowing to administrate users through fine-grained rules, while keeping the ability to handle large volumes of users
- . complete and object-oriented SDK specifications. All implemented SDK must strictly follow these specifications, ensuring consistency across all implemented languages
- . a first set of SDK is already available: NodeJS, Javascript, Android, iOS and PHP. A SDK written in C is planned, using libuv, allowing us to make Kuzzle available to the following languages using SWIG: C, C++, C#, Java, Python, Ruby, R, Ocaml.
- . complete, easy-to-read and detailed online documentation, describing all aspects of Kuzzle, from its installation to the use of SDKs
- . Web-based, responsive back-office interface using modern web technologies (Vue.js, webpack, ES2016). The backoffice has been built with the user in mind, focusing on the UX to make the workflows as easy as possible. The UX workshops have been curated by Gradientz, a specialized web agency based in Montpellier.
- . Microservices architecture allows fast and easy deployment on cloud providers or on private networks. Manual installation procedures are also available if containers cannot be used. Thanks to Kuzzle's core eco friendly design qualities, all 'Kuzzle inside' applications allow end users to enjoy today the reality of a sustainable contribution.

Description of how our product's design, aesthetics, materials, components and processes relate to environmental impact and ecological responsibility, emissions reduction, sustainability and smart resource management, energy conservation, and/or other ecologically impactful functions.

We also include details about how the product is transported to market, and/or recycled at end of life, when applicable.

«Kuzzle inside » stands for : . open source: community sourcing of experts, therefore less wastage of resources to match market needs. . Easy to deploy, use, and run: less hardware, energy consumption and computing resources are used during the development stages

. Lightweight: Kuzzle has been built to be as lightweight as possible. If CPU power consumption depends largely on the pressure put on Kuzzle, memory consumption is kept low at all times. In fact, Kuzzle can withstand thousands of users on a mere laptop. This allows using only developers stations as test environments, or only small servers for collaborative work, limiting the power consumption and the hardware needed.

This also reduces the need of powerful server hardware on a production environment, limiting the environmental cost, as standard machines mutualizing other applications can be used to power up Kuzzle. This also reduces the need of powerful server hardware on a production environment, limiting the environmental cost, as standard machines mutualizing other applications can be used to power up Kuzzle. Lastly, Kuzzle is able to handle multiple applications at once, rationalizing the needs for server hardware even more.

. Pooled resources: having multiple projects use the same product mutualizes the necessary development and maintenance costs . Kuzzle is brought to the market via a purely digital communication strategy, reducing the amount of paper and plastic involved in the process. As result, Kuzzle has a direct impact on reducing toxic components recycling and wastage of non renewable natural resources.

The Kuzzle technology is is currently being implemented with great success for test runs in some strategic government accounts that are carbon footprint sensitive and selected clients promoting eco responsibility. It now needs to be deployed for mass commercialisation worldwide starting in the USA where a new Kuzzle subsidiary will be created before end of 2016 in a major city in the USA along with a strategic development in Asia (Singapore, Hong Kong, Mainland China & Japan to start).

Description of why our product deserves a UIC Digital Award, including specifics regarding our product's unique and/or novel features and why consumers will find our product attractive.

Having been 2 years in the making, Kuzzle truly transcends our core values: it is open, smart and agile.

Sharing and open mindedness are in our DNA. Kuzzle was conceived and developed not only for our peers but also with the intention to empower anyone to become a master in innovation. In a world where application development is more often than none the privilege of an expert few, Kuzzle makes it accessible to anyone. We pride ourselves to be pioneers in the B2B2C consumer technology industry with a second to none value proposition.

As a matter of fact it is a mature industry where very few are still looking into a double digit performance improvement ; whereas our R&D work has now come to fruition, we can claim a unique achievement to it is a mature industry where very few are still looking into a double digit performance improvement ; whereas our R&D work has now come to fruition, we can claim a unique achievement to reduce by 30% to 40% the time and resources required for the execution of the back-end solution ; this in turn improves the carbon footprint of our industry and contributes to increased sustainability of the digital industry. We are positionned

very favorably vs the following competitors mapping :

- 1st Tier : Big players: Firebase, IBM API Connect, RedHat Mobile application platform, Hybris, Salesforce

- 2nd Tier : Mid-size players meedle: BackendLess, Deeptstreamhub

- 3rd Tier : small size players (LiLle players) :Appspanel, Usergrid, Telepat If Real-time solutions already exist like Firebase, Pusher or Pubnub, there is no solution seamlessly integrated with complex distributed data storing; With scalability and portability, from very small embarked systems to large worldwide clusters or private cloud, data distribution and authentication processes are also dealt with along with the capability to cover very large volume of social network users.

Kuzzle adapts to the morphology of existing security systems and provides customized security regardless of the environment constraints ; Kuzzle offers the additional data security specific to B to B to C environments. Data security and data integrity are enhanced natively with our technology to be provided to worldwide brands needing to adapt to local market configuration.

We comply with the highest level of quality within our global industry; We have a unique and disruptive value proposition to satisfy the most demanding process & budget controls as well as the visionary scenarists of media content management to improve their end user journey.

Other comments we wish to add about our product:

The holding company Kaliop SAS was created in 2002 and has been extremely successful at developing large worldwide digital platforms. This provides us with a unique insight into the heart of business led innovation.

Kaliop Group has sales of 10 M€ at Dec 31st 2015 and has received 2,3 M\$ funding in 2015. Kuzzle is the code name of a 2 year R&D program, with dedicated Development and management team. The open source community is providing feedback and contributions to the open source codebase. The company is now preparing for mass commercialisation worldwide starting with the USA where a new Kuzzle's subsidiary will be created before end of 2016 in a major city in the USA with an objective to employ 50 staffs in the USA.

As part of the process, we are still fine tuning the name, logo and communication aspects of the product launch Kaliop SAS is currently implementing Kuzzle back-end technology for in some strategic government accounts and selected international client's projects with great success. Kuzzle has raised 1M\$ seed money for the R&D phase and will raise 3 M\$ during 2017 for commercial acceleration.

Kuzzle Division (the technology spinoff company with HQ in a major city in USA, Singapore for Asia).

Kuzzle Division is part of Kaliop Group and we already have a subsidiary in North America with Kaliop Canada inc. and Flagship clients of international coverages.

To give you a sense of the startup lifestyle here is the facebook page of Kuzzle <https://www.facebook.com/kuzzleio/> The twitter page of Kuzzle <https://twitter.com/kuzzleio?lang=fr>

France (the spinoff in France is done as of October and a USA Company is soon to come) : Kuzzle is the technology division of Kaliop Group based in France with autonomous management (15 staff are already fully engaged in Kuzzle as it is a 2 year period R&D program fully completed).

Developers, Universities: Open source Freemium edition Startups (<5 people):
Open source Freemium Plus edition including support Business: Enterprise edition from 25,000\$ licence fee including 1st year annual support plus 25% annual support fee

Product Technical Specifications

The competitive advantage of Kuzzle lies in the most agile combination of key features, scalable architecture & market positioning responding uniquely to a new generation of corporate digital and media needs dealing with the traction of IoT, M2M, Smart Cities within eco-design and sustainable technologies :

Software ecosystem: . Docker - Make Kuzzle available as an easily deployed software container

. Redis - Ultra fast, scalable in-memory database

. Elasticsearch - Distributed, scalable and highly available NoSQL database

. NodeJS - Blazing fast Javascript runtime, based on Google's V8 engine

. Passport - Authentication middleware, supporting more than 300 authentication strategies

. Vue.js - Reactive components for modern web interfaces. Used in Kuzzle's back-office Kuzzle global architecture:

cf Image

1 Kuzzle kernel architecture cf image

2 Development process

. Automated unit tests

. Automated functional tests

. Automated code coverage tests

. 3-pass (at least) code review process on every pull request

. Versioning process using GitFlow

. All the code is open source and hosted on GitHub Main features

. Real-time messaging with fine grained query DSL

- . Advanced searches on persisted data
 - . Volatile and ultra-fast in-memory storage
 - . Rich and extendable user authentication layer
 - . Fully extendable via the plugin system
 - . Ships with a full fledged ecosystem of SDK (JS, iOS, Android, PHP and more to come)
 - . Ships with a user friendly Back-Office for easier management
 - . Fully clusterable and scalable (Business Edition ships with a fine tailored Load Balancer)
 - . Business Edition ships with a powerful analytics system based on fine-grained data probes, interoperable with the best BI solutions
- Supported network protocols
Kuzzle natively exposes a REST API, automatically mapped to the data persisted by the user.

Other protocols are made available as protocol plugins. Default Kuzzle installations support the following protocols: . HTTP REST . WebSocket . [Socket.io](#) Optional network protocol currently available (need an explicit Kuzzle plugin install):

- . MQTT More protocol plugins (udp, tcp, amqp, stomp, et al.) are planned in the development pipeline.

Supported authentication methods: Kuzzle bases its authentication layer on Passport.js, which natively supports local and OAuth v1 and v2 strategies.

This means that Kuzzle is able to authenticate users through a local database or any OAuth based provider (Facebook, Twitter, Google, Github, etc.) out-of-the-box.

Plugin Types: Protocol Plugin - Adds a new network protocol to communicate with the Kuzzle API from the external world. Usually this happens by making Kuzzle listen to an additional port.

Useful to integrate Kuzzle with a specific communication environment (e.g. IoT or any proprietary protocol) Controller Plugin - Exposes new endpoints to the Kuzzle API, which are then wired to specific functions that access the whole Kuzzle core context. Useful to add specific business logic to a Kuzzle server or make it interoperable with 3rd party services. Pipe plugin - Listens to data related events and intercepts the data flow with the ability to update, enrich or delete the data. Useful for validation cycles. Listener plugin - Listens to data-related events but has no ability to intercept the data flow.

Useful for data insights and notifications (e.g. logging or probing). Can be isolated in separated threads Authentication plugin - Adds new authentication strategies using one of the Passport.js readily available strategy (azure, kerberos, salesforce, and so on), or proprietary strategies using description files.

Kuzzle adopts a 'best of breed approach' to the market: its enterprise status provides the sustainability that is paramount to pushing and supporting a successful industrial strength technology, its open source edition places it in the spheres where new industry standards are made. A French Energy Star equivalent certification is under implementation and the entire 2 year R&D program was run along with the corporate lab and the CNRS LIRMM of Montpellier (Laboratory of Informatics Robotics & Micro-Electronics of Montpellier, France).

Product video URL:

<https://www.youtube.com/watch?v=3X4LYk2cuBM&feature=youtu.be>

Designer Company Profile

The Design Team/Designer is an employee of the manufacturing company.

Designing Company

Kuzzle Division of Kaliop

Design Company Contact Name

Pierre DENISET

Design Company Contact Email

Designing Company URL

URL of the Kaliop Group <http://www.kaliop.com>

Kaliop UK <http://www.kaliop.co.uk>

Kaliop France <http://www.kaliop.fr>

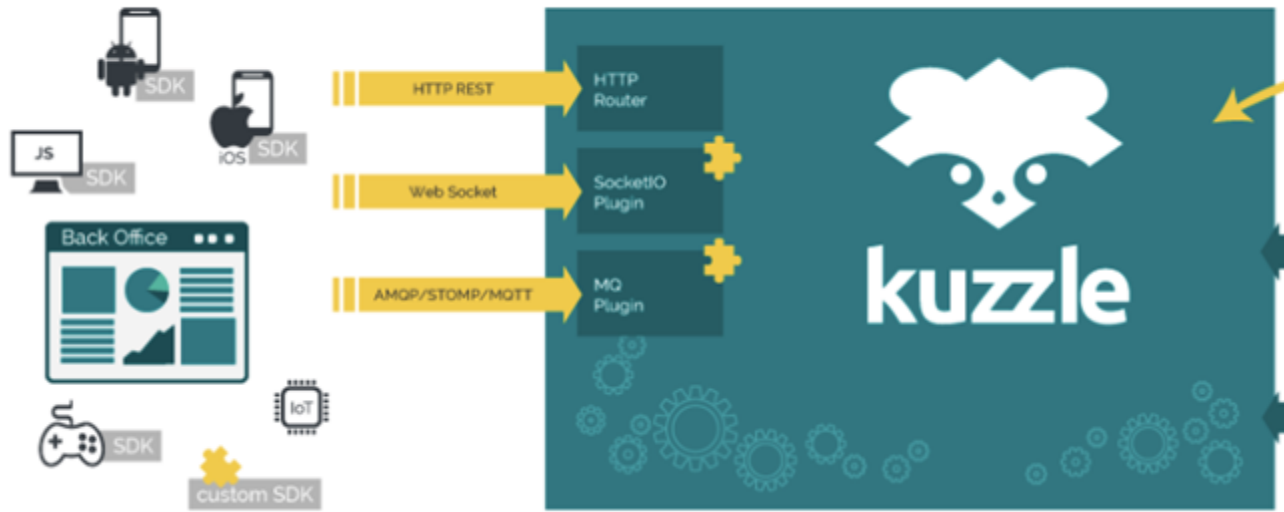
Kaliop Canada <http://www.kaliop.ca/fr>

Kaliop Poland <http://www.kaliop.pl>

Kuzzle Division <http://kuzzle.io>

Grandiantz Digital

Kuzzle global architecture:



Kuzzle kernel architecture

