

VANTIQ White Paper

12/28/2017

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White Paper: VANTIQ Competitive Landscape

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Introduction

We believe that VANTIQ has “leap-frogged” or jumped ahead of all current players in the market with about a 2½ year head start. The market VANTIQ targets is event-driven and real-time application development and deployment for businesses. Gartner predicts that 50% of new business applications developed will be event-driven by 2020 (report written on May 24, 2017). The major advantages VANTIQ has are around system architecture which is the most difficult for competitors to copy. VANTIQ benefitted by starting with a “clean slate” in 2014. Prior to that, industry thinking was primarily around: (a) request-response type systems as opposed to event-driven, (b) server based logic (3-tier using cloud) as opposed to software wherever it makes sense, (c) automation only as opposed to keeping humans intimately involved, (d) ML (Machine Learning) algorithms running in the cloud rather than at the *edge* of a network. After more than two years of development, VANTIQ’s real-time, event-driven application platform became available in January 2017 and continues to progress rapidly.

aPaaS (application Platform as a Service) PLAYERS

Players in this market are Appian, Mendix and OutSystems among others. They are all based on a conventional 3-tier architecture:

- Data tier – Data is persisted and accessed via a database (e.g., RDBMS or Postgres) or APIs to legacy applications data. They have schemas upon which logic can be built for the middle level or server.
- Logic tier - They use an app server such as Tomcat to run application logic.
- Presentation tier - For user interface front ends, they use native windows, browser, or mobile.

These companies were started in the early to mid 2000’s. The reason for this timeframe was the rise of the cloud and cloud-connected mobile devices. These companies realized that the cloud is where applications could be built with their products (aPaaS) and run (SaaS); and, similar to what Salesforce or Workday did to their competitors, these players took advantage of cloud computing but for application development and deployment.

They developed visual front end GUI (Graphical User Interface) builders and visual logic design tools. This is relatively easy to accomplish if there is an RDBMS with accessible schemas and relatively simple data manipulation logic. (Note: Prior to VANTIQ and the cloud, VANTIQs employees built numerous 3-tier products similar to these. For example, VANTIQ founders Marty Sprinzen and Paul Butterworth founded Forte Software in the 90s. Forte was a highly successful public company whose products built 3-tier internet applications with workflow and integration options. Forte was purchased by Sun Microsystems for \$1.2 billion in 2000).

Typical applications built with these products are: (1) an HR onboarding application, (2) a location and space management application, and (3) a utility asset management and maintenance scheduling application. These applications are built on an existing database and utilize an existing *app server*. They do enable basic user events and limited IoT input.

VANTIQ enables applications to be built that are far more advanced to meet today's major business challenges by building true event-driven, real-time applications. The "BY COMPARISON" section below explains this in detail and focuses on the areas where VANTIQ offers much more than the current aPaaS players listed above. In short, the three-tier architecture applications just cannot handle the reality of real-time events that need to be processed in today's world. VANTIQ was purpose built to handle exactly that challenge.

BY COMPARISON

VANTIQ enables companies to rapidly and easily *digitize their business*. VANTIQ applications are:

1. **Event-based.** Built from the ground up to support the next generation of business applications that are event-driven. Events are derived from new sources (e.g. sensors, social, geospatial etc.), existing systems, and human interactions. For example, real-time events can be generated by legacy systems (new employee hired, order shipped), IoT (pressure and temperature sensor readings from a compressor), location tracking of assets or people (e.g., GPS, RFIDs or beacons), social (streams from Twitter or Facebook), AI systems (algorithms to suggest options to offer a customer in a retail outlet) or other real-time data from APIs or messaging protocols (e.g., REST or MQTT). VANTIQ is built implementing a modern Reactive programming architecture. Reactive programming gained popularity beginning in the early 2010's in order to provide massive

scalability and resilience; it is entirely asynchronous and non-blocking. To achieve Web scale and true real-time, the aPaaS products mentioned above will need to be re-written to use the Reactive model. Reactive programming is very complex as it is fully asynchronous, yet VANTIQ gives developers the power of Reactive programming with the simplicity of a low-code, model-driven platform. Additionally, for event-driven applications, VANTIQ has numerous built in high-level capabilities (sensor readings can be calculated as a moving average for, say, the last 60 minutes, readings from multiple edge computers can be logically “joined” etc.). VANTIQ was designed from the beginning for event-driven and real-time application development.

2. **Distributed.** Although built as a single "logical" application, VANTIQ applications components can be physically distributed to run on the edge as well as in the cloud(s). VANTIQ applications can shift workload dynamically (cloud to edge, peer to peer, mesh etc.) to support changing business requirements. This is becoming more of a requirement as IoT and other real-time data sources are generating massive data streams that could easily overload Clouds and Networks. This is also a requirement when network latency becomes an issue and near real-time actions must occur (e.g., safety issue on an oil rig). Industry analysts and key industry players like Cisco believe that edge computing will grow dramatically, just as cloud computing did in the early 2000’s. Most alternative solutions were never designed to support the distribution and federation of real-time, event-driven applications.
3. **Collaborative.** As systems get more complex (become a company’s nervous system), humans need to be involved to address unknown situations or resolve conflicts utilizing their experience and intuition. VANTIQ has innovated in this area by building collaboration capabilities into the product like no one else in the market. For example: (a) VANTIQ provides a visual developer interface (VANTIQ Modelo) to easily design and create collaborations via both web and mobile interfaces, (b) VANTIQ includes high level abstractions for true collaboration (assignment, location tracking, recommendations, communication, escalations and more). The amount of code that would be required in low level languages is at least an order of magnitude greater.
4. **AI and ML Execution.** AI/ML technology advances are powerful and rapidly growing in capability. VANTIQ can easily integrate with existing

AI/ML services like Microsoft ML Studios to provide a higher level of intelligence.

5. **Dynamic.** Anything in a VANTIQ application can be changed dynamically including data sources and logic locations. This enables agile development with no downtime during updates, which is a requirement for applications to become a company's nervous system.

IoT PLAYERS

There are literally hundreds of IoT platform players in the market. They typically interface to IoT devices for provisioning, data access and control. They push application logic either directly to the devices if the devices are IP enabled or to edge computers connected to devices. This logic may be able to aggregate and/or filter data at the edge. The IoT platforms typically move data to the cloud leveraging Big Data for analysis by data scientists and to create ML (Machine Learning) algorithms. Predix from GE is an example of such a player. Foghorn is an example of an IoT player that runs at the edge or even in a PLC (it is programmed in C for performance). These players most commonly operate in the Industrial IoT where systems determine predictive maintenance actions and improve overall asset performance. They are event driven at the edge.

They are not full application development environments for business applications. In fact, VANTIQ interfaces easily with them by using open standards like MQTT, REST, AMQP. Of the four requirements mentioned above, they meet the first (1) event-driven and sometimes the fourth (4) AI and ML. They also do some things VANTIQ does not: provision sensors and gateways, and run on intelligent sensors. The market they address is different from VANTIQ. VANTIQ allows for development of applications driven by any data stream, including IoT, and can easily consume data from IoT platforms. VANTIQ is actively partnering with many IoT players including Dell, EdgeX Foundry, ThingWorx, Kepware, and PTC.

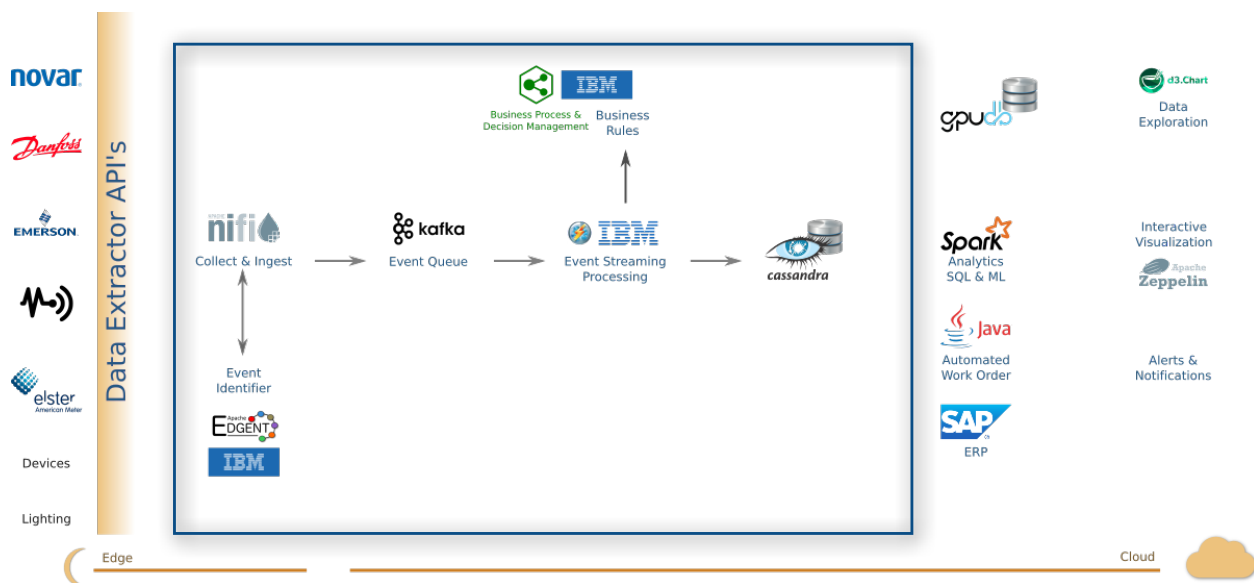
AI (ARTIFICIAL INTELLIGENCE) PLAYERS

AI players are friends of VANTIQ. VANTIQ can take their output and run it. The advances with AI and machine learning are impressive, impact most industries and will be used more and more as time goes on (retail, compliance, safety etc.). They generate analytical models (algorithms) that companies can be used. VANTIQ is a means by

which the algorithms can be deployed for competitive advantage. VANTIQ can call any AI/ML service and augment the business rules to react to events in real time.

RYO (ROLL YOUR OWN/CREATE FROM SCRATCH)

The current and most significant competition to VANTIQ for the development of event-driven applications are companies who are willing to put multiple products together (anywhere from 5 to 12 products) to create a software stack that can do what VANTIQ does. This can be accomplished by an Uber or Amazon who have hundreds or thousands of experienced developers who are experts in the numerous core technologies involved. See the example, below, of the technology stack built and used by a global retailer in its real-time, event-driven supply chain application.



This is a very costly and highly risky strategy for most firms. To create a distributed, collaborative, real-time, event-based system the challenges are great. IT and OT organizations are not experienced or trained in this. VANTIQ makes it easy by incorporating high level abstractions for events, distribution and collaboration as discussed above in “by comparison”).

SUMMARY

VANTIQ was started three years ago by a highly experience team of software professionals – many of whom had previously built multiple application development platforms and tools. VANTIQ realized, early on, that event-driven applications were the key to unlocking the power of digital transformation:

1. Event-driven: IT and OT applications will be event-driven. It was envisioned by the creators of Reactive programming technologies. From *The Reactive Manifesto*: “Today's demands are simply not met by yesterday’s software architectures” (available online). We agree. From the very beginning, VANTIQ was architected as event-driven by: (a) implementing a Reactive model for scalability, resilience, asynchronous events, and service based system, and (b) designing in advanced event handling capabilities for development and runtime. Now, others will try to catch up.
2. Distributed: Just a couple of years ago, the industry *thinking* was that all the data collected at the edge would be moved to the cloud for analysis or action. VANTIQ had a different perspective and architected a modern fully distributed system. Today, it is well accepted that processing will frequently happen close to the data at the edge and serverless architectures are state of the art. VANTIQ is built to create fully distributed applications.
3. Collaborative: VANTIQ is innovating with powerful human-to-machine collaboration by creating high-level abstractions for developing and running applications. H2M collaboration is only now starting to be discussed. The needs are obvious and it is clear that companies must create technologies to keep humans involved with software applications. VANTIQ is already there.

As stated above, VANTIQ is a product designed and *architected* for today’s market needs (real time, event-driven, distributed, collaborative, dynamic) unlike anything else in the market.

[Note: VANTIQ has many white papers that discuss VANTIQ’s capabilities in far more detail than discussed here. See www.vantiq.com or contact your VANTIQ representative for more.]