The Forrester Wave™: Streaming Analytics, Q2 2021

The 14 Providers That Matter Most And How They Stack Up

by Mike Gualtieri

June 7, 2021 | Updated: June 16, 2021

Why Read This Report

In our 22-criterion evaluation of streaming analytics providers, we identified the 14 most significant ones — Amazon Web Services, Cloudera, Confluent, EsperTech, Google, Hazelcast, IBM, Impetus, KX, Microsoft, Oracle, SAS, TIBCO Software, and Ververica (Alibaba) — and researched, analyzed, and scored them. This report shows how each provider measures up and helps application development and delivery professionals select the right one for their needs.

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The 14 Providers That Matter Most And How They Stack Up

by Mike Gualtieri
with Gene Leganza and Robert Perdoni

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Ease Of Development And Scalability Matter Most

What happened yesterday happened yesterday. It's too late. Streaming analytics allows enterprises to understand what is happening now, in real time, by analyzing streaming data from multiple real-time data sources. Enterprise customers have great options for choosing a streaming analytics platform from tried-and-true vendors, public cloud service providers, open source, and startups. The common theme in all of these vendors is a focus on development tools, scalability, and adding ever-richer analytics capabilities.

As a result of these trends, streaming analytics customers should look for providers that provide:

- **Richness of analytics.** The defining characteristic of streaming analytics is the ability to maintain an arbitrarily simple or complex set of calculations and/or detect a pattern within a defined window of time. For example, a simple streaming analytic could be to continuously calculate the average number of online shoppers navigating boating safety products within the most recent 10-minute time period. Enterprise buyers should understand the breadth and depth of aggregates, pattern detection, and any advanced differentiated analytics (such as anomaly detection and continuous machine learning algorithms) offered by vendors.
- **Development tool options.** The great news about the streaming analytics market is that vendors have simplified the development of streaming analytics by some or all of the following: APIs, SQL statements, and GUI (no-code) streaming data analytics pipeline tools. The almost universal availability of streaming analytics platforms in cloud service providers also makes it fast to spin up projects. Enterprise buyers should match developer skill sets to a vendor's development tool offering.
- **Near-effortless scalability.** The nature of streaming data is such that it can beat rock steady and then suddenly, without warning, thrash metal. Streaming analytics platform architectures must scale to handle a maximum throughput of data and concurrency of analytics, all while supporting high-availability features. Prior generations of these platforms handled expected spikes in streaming data by having enterprise customers maximize cluster sizes. Today's vendors offer managed cloud services and/or Kubernetes orchestration that make it easier to provision and deprovision

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infrastructure resources. The ultimate, however, is a streaming analytics platform that self-monitors and then scales up and down by automatically provisioning and deprovisioning resources to meet the load. Few vendors support this level of autoscaling, but most have it on their roadmap. Enterprise buyers should anticipate whether their streaming analytics use cases will encounter frequent lulls and spikes and then understand a streaming analytics vendor's scaling capabilities.

Evaluation Summary

The Forrester Wave™ evaluation highlights Leaders, Strong Performers, Contenders, and Challengers. It's an assessment of the top vendors in the market and does not represent the entire vendor landscape. You'll find more information about this market in our reports on streaming data platforms.

We intend this evaluation to be a starting point only and encourage clients to view product evaluations and adapt criteria weightings using the Excel-based vendor comparison tool (see Figure 1 and see Figure 2). Click the link at the beginning of this report on Forrester.com to download the tool.

FIGURE 1 Forrester Wave™: Streaming Analytics, Q2 2021

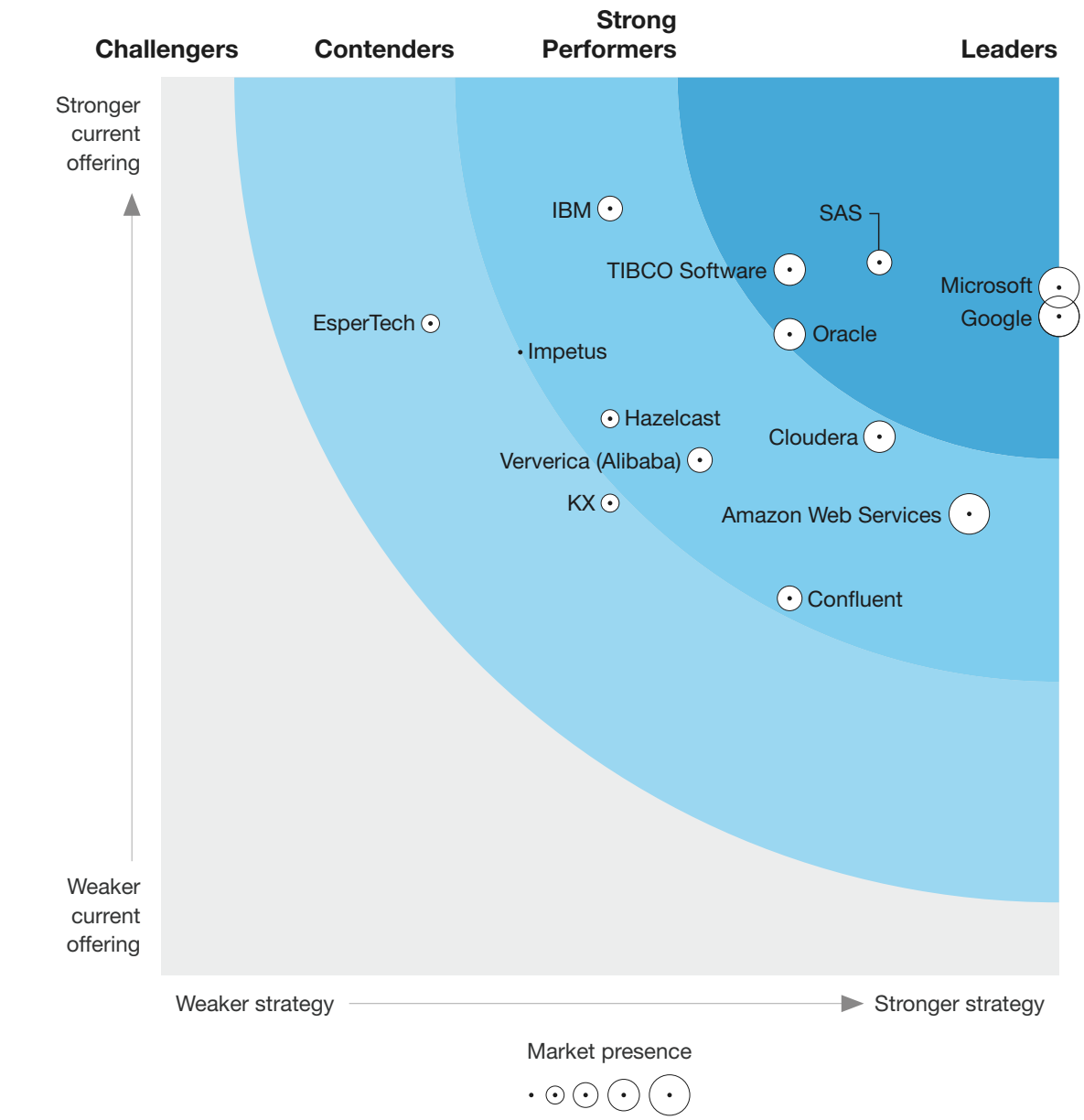

FIGURE 2 Forrester Wave™: Streaming Analytics Scorecard, Q2 2021

	Forrester's weighting	Amazon Web Services	Cloudera	Confluent	EsperTech	Google	Hazelcast	IBM	Impetus	KX	Microsoft
Current offering	50%	2.57	3.00	2.10	3.63	3.67	3.10	4.27	3.47	2.63	3.83
Data	20%	3.00	3.00	3.00	3.00	3.67	3.00	3.67	3.00	1.67	3.00
Analytics	20%	3.50	3.00	1.50	4.50	4.00	1.50	5.00	4.00	2.50	4.50
Development	20%	1.67	3.67	1.67	4.33	3.67	3.00	5.00	5.00	3.67	3.00
Performance	20%	3.00	3.00	2.00	4.00	4.00	5.00	4.00	3.00	3.00	5.00
Deployment	20%	1.67	2.33	2.33	2.33	3.00	3.00	3.67	2.33	2.33	3.67
Strategy	50%	4.50	4.00	3.50	1.50	5.00	2.50	2.50	2.00	2.50	5.00
Ability to execute	25%	5.00	3.00	3.00	1.00	5.00	3.00	1.00	1.00	3.00	5.00
Solution roadmap	25%	3.00	5.00	3.00	3.00	5.00	3.00	3.00	1.00	3.00	5.00
Enablement	25%	5.00	5.00	3.00	1.00	5.00	3.00	5.00	5.00	3.00	5.00
Partners	25%	5.00	3.00	5.00	1.00	5.00	1.00	1.00	1.00	1.00	5.00
Market presence	0%	4.67	3.33	3.00	2.00	4.67	1.33	3.00	1.00	1.67	4.67
Customer adoption	33%	5.00	3.00	2.00	2.00	5.00	1.00	3.00	1.00	1.00	5.00
Evaluated product revenue	33%	4.00	3.00	2.00	1.00	4.00	1.00	3.00	1.00	2.00	4.00
Market awareness	33%	5.00	4.00	5.00	3.00	5.00	2.00	3.00	1.00	2.00	5.00

All scores are based on a scale of 0 (weak) to 5 (strong).

FIGURE 2 Forrester Wave™: Streaming Analytics Scorecard, Q2 2021 (Cont.)

	Forrester's weighting	Oracle	SAS	TIBCO Software	Ververica (Alibaba)
Current offering	50%	3.57	3.97	3.93	2.87
Data	20%	3.67	3.00	3.67	2.33
Analytics	20%	4.50	4.50	4.00	3.00
Development	20%	4.33	3.67	5.00	3.00
Performance	20%	3.00	5.00	4.00	3.00
Deployment	20%	2.33	3.67	3.00	3.00
Strategy	50%	3.50	4.00	3.50	3.00
Ability to execute	25%	3.00	3.00	3.00	3.00
Solution roadmap	25%	3.00	3.00	3.00	3.00
Enablement	25%	5.00	5.00	5.00	3.00
Partners	25%	3.00	5.00	3.00	3.00
Market presence	0%	3.33	2.67	3.33	2.33
Customer adoption	33%	3.00	2.00	3.00	3.00
Evaluated product revenue	33%	3.00	2.00	2.00	2.00
Market awareness	33%	4.00	4.00	5.00	2.00

All scores are based on a scale of 0 (weak) to 5 (strong).

Vendor Offerings

Forrester included 14 vendors in this assessment: Amazon Web Services, Cloudera, Confluent, EsperTech, Google, Hazelcast, IBM, Impetus, KX, Microsoft, Oracle, SAS, TIBCO Software, and Ververica (Alibaba) (see Figure 3).

FIGURE 3 Evaluated Vendors And Product Information

Vendor	Product evaluated	Product version evaluated
Amazon Web Services	Amazon Kinesis Data Analytics	
Cloudera	Cloudera DataFlow	
Confluent	Confluent Cloud and Confluent Platform	6.1
EsperTech	Esper; NEsper; EsperHA High Availability; Esper Enterprise Edition	Esper 8.7.0; NEsper 8.5.0; Esper HA High Availability 8.7.0; Esper Enterprise Edition 8.7.0
Google	Google Cloud Dataflow	
Hazelcast	Hazelcast In-Memory Computing Platform (IMCP)	4.4
IBM	IBM Streams on Cloud Pak for Data	3.5
Impetus	StreamAnalytix	4.6
KX	KX Streaming Analytics; KX Insights	4.5; 1.0
Microsoft	Azure Stream Analytics	
Oracle	GoldenGate Stream Analytics (GGSA)	19.1.0.0.6
SAS	SAS Event Stream Processing	SAS ESP 2020.1.4
TIBCO Software	TIBCO Streams	
Ververica (Alibaba)	Ververica Platforms (VVP)	2.4

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Vendor Profiles

Our analysis uncovered the following strengths and weaknesses of individual vendors.

Leaders

- **Microsoft makes world-class streaming analytics easy to use on cloud and edge.** Azure Streaming Analytics lets developers use SQL to define a rich set of streaming analytics queries. Behind the scenes of these streaming analytics queries, the Azure Streaming Analytics service optimizes the underlying resources to maximize throughput and latency. Notable and unique for a cloud service provider is that streaming analytics queries can run on both the cloud and the edge using Azure IoT Edge. Azure Stream Analytics is priced by the number of streaming units provisioned, which is combination of memory and compute. Azure IoT Edge is priced per device per month.

  Microsoft has strengths in edge deployment options, advanced analytics, throughput, and performance. Developers who know SQL can quickly create streaming analytics jobs using the Azure Portal, Visual Studio, VS Code, or using APIs. Azure Streaming Analytics' sweet spot is for enterprises that need a cloud-scale streaming analytics capability and/or a combination of cloud-scale streaming analytics and edge streaming analytics.

- **Google offers enterprises streaming analytics at Google scale.** Google Cloud Dataflow is an elegant, cloud-native, and efficient data-in-motion processing power plant. The service offers world-class streaming analytics and is also capable of processing any arbitrarily simple or complex data pipeline. Developers can use Dataflow SQL and/or programming APIs to create streaming analytics. They can also use Apache Beam SDK to create streaming analytics and batch applications, making those applications portable to other underlying streaming engines such as Apache Flink.

  Google Cloud Dataflow has strengths in data sequencing, advanced analytics, performance, and high availability. Google Dataflow's sweet spot is for enterprises that have a preponderance of real-time data generated on Google Cloud Platform or wish to simplify all data processing by using a single platform that unifies both streaming and batch jobs. Google could make Dataflow applicable to edge use cases by extending a subset of streaming analytics capabilities to run on edge devices.

- **SAS packs the most analytics punch.** SAS Event Stream Processing (ESP) stands out in this evaluation as the platform with the most built-in analytics for machine learning and other advanced analytics. SAS ESP also has a mature edge analytics capability for internet-of-things (IoT) applications. Developers can create streaming analytics using either a programming interface or a GUI pipeline tool. Noteworthy is SAS ESP's ability to handle video and still-image data for image preprocessing preparation, object detection, and classification. Enterprises can deploy SAS ESP in any environment that support Kubernetes.

SAS has strengths in data connectors, advanced analytics, throughput, and edge deployment. The vendor's advanced analytics capabilities includes in-stream machine learning model training, whereas most vendors only can score/inference prebuilt models. SAS ESP's sweet spot is for enterprises that need a high-throughput streaming analytics capability that requires the most sophisticated analytics.

- **TIBCO Software analyzes streaming data to both automate and augment analytics.** TIBCO Streaming is designed for real-time insights, whether they're embedded in applications to automate decisions or surfaced in operational dashboards for business experts. Developers and business intelligence professionals alike can get up and running quickly with rich, no-code visual development tools. Developers can always drop to code when needed or desired. TIBCO Streaming's integration with TIBCO Spotfire visual analytics also makes it an ideal core technology to power real-time command centers of any flavor as well as busy analysts at their desks.

  TIBCO has strengths in connectors, advanced analytics, development tools, extensibility, usability, and high availability. TIBCO Streaming's sweet spot is for enterprises that want a low-code streaming analytics solution that can deliver real-time insights directly to TIBCO Spotfire users and/or embedded in real-time, automated decisioning processes. TIBCO Streaming supports Kubernetes to deploy on the cloud or any other infrastructure, public or private.

- **Oracle offers a golden gateway to Apache Spark-based streaming analytics.** Oracle GoldenGate Stream Analytics (GGSA) offers an Apache Spark-based streaming analytics engine combined with a GUI streaming analytics pipeline tool that provides developers with quick access to a large range of streaming analytics. Oracle GoldenGate is Oracle's smash-hit data replication platform that includes change-data-capture functionality as well as more general movement of data from sources to destinations. Oracle's streaming analytics capabilities are now grouped under GoldenGate because of the affinity of data in motion to be not only transported but also analyzed. Although the streaming analytics capabilities use Apache Spark as an engine, Oracle has added significant core streaming analytics features not found in the open source tool, including advanced analytics and performance improvements especially for low-latency analytics.

  Oracle has strengths in data connectors, analytics, developer tools, and usability. Developers can use the streaming analytics pipeline tool to create any arbitrary analytics on streaming data. And developers can use that same tool to create a data pipeline process that can operate on stored data. That means GGSA can be used for both streaming analytics and at-rest pipeline analytics. Oracle GGSA's sweet spot is for enterprises that already use GoldenGate for data replication and transport and wish to implement streaming analytics.

Strong Performers

- **Amazon Web Services bases streaming analytics on popular open source.** Amazon Kinesis Data Analytics is part of the Amazon Kinesis family of services, which focuses on real-time data and also includes Kinesis Video Streams, Kinesis Data Streams, and Kinesis Data Firehose. Amazon Kinesis Data Analytics is based on the popular open source Apache Flink and thus inherits its key streaming analytics capabilities.

  Amazon Web Services has strengths in data connectors, extensibility, and availability. Developers can use the Apache Flink API or Flink SQL to create streaming analytics jobs. Amazon Kinesis Data Analytics also supports Apache Beam — an open source, unified model for defining batch and streaming data-parallel processing pipelines that provides a level of portability to run jobs created using Beam APIs in Apache Flink on other streaming data engines. Amazon Kinesis Data Streams' sweet spot is for enterprises that have a preponderance of real-time data generated on AWS or wish to create streaming analytics using Apache Flink.

- **Cloudera unifies streaming analytics with the full data lifecycle.** Cloudera DataFlow (CDF) not only offers streaming analytics; it's a comprehensive streaming data platform that also includes streaming flow and streaming data processing unified with Cloudera Data Platform. That means that anything that has to do with the movement, analysis, and processing of data can take place on a combination of CDF and Cloudera Data Platform. CDF also includes edge features such as two-way messaging technology needed to build and deploy IoT applications. CDF is composed completely of open source components, including Apache Flink, Apache NiFi, Apache Kafka, and many others.

  CDF offers GUI tools that abstract away all the complexity of the many open source projects working to create real-time applications, including IoT. CDF's sweet spot is for enterprises that also use Cloudera Enterprise Data Hub, Data Warehouse, or Data Science Workbench, because the data security and governance capabilities are consistently applied no matter the workload. CDF is deployable on-premises and as an elastic managed cloud service on AWS, Azure, and announced for Google Cloud Platform.

- **IBM offers any analytics at any scale, anywhere.** Born from IBM Research more than a decade ago, IBM Streams is chock-full of both streaming data analytics and data transformations built up over the last 10-plus years. IBM's GUI tools allow developers to visually create streaming analytics pipelines with access to hundreds of data transformation and analytical operators. Developers can designate any particular transformation or analytics operator in a streaming analytic as "parallel," and the underlying engine will automatically parallelize that operation. Combining IBM Streams with IBM Watson Studio, data scientists can collaboratively build models to apply to stream flows, analyzing massive amounts of data in real time.

IBM has strengths in development tools, extensibility, usability, and analytics. Deployable on IBM Cloud Pak for Data's hybrid multicloud platform, IBM Streams is built for enterprises with complex, high-scale, real-time applications that need maximum deployment flexibility. With comprehensive tooling, developers can easily build applications using GUI or programming APIs to create and deploy streaming analytics for use cases of any size and complexity.

- **Ververica is the founding force of Apache Flink.** Ververica is a Berlin-based company owned by Alibaba Cloud and originally formed by the creators of Apache Flink. The Ververica Platform is designed for enterprises that wish to use Apache Flink with enterprise features. Customers can start with the Ververica Platform Community Edition at no cost and add enterprise features by licensing the Ververica Platform Stream Edition. Apache Flink's reputation for real-time and elegant APIs has led to more enterprise adoption. Cloud service providers and data platforms including Alibaba, AWS, and Cloudera offer streaming analytics and streaming data processing services based on Apache Flink.

  Ververica offers strengths in performance, analytics, and deployment options. Developers can use the Apache Flink API in Java, Scala, and Python to create streaming analytics jobs. An even easier and faster way to use the platform is to use Flink SQL in the provided web-based SQL editor or in Jupyter notebooks. There's more. Apache Flink also implements Apache Beam — an open-source, unified model for defining batch and streaming data-parallel processing pipelines that provides portability to run jobs created using the Beam APIs in Apache Flink and other streaming data engines. Ververica's sweet spot is for enterprises that wish to tap into Apache Flink innovation for both streaming analytics and streaming data processing workloads, but with enterprise features and support.

- **Confluent starts with Kafka to bring enterprise streaming analytics.** Confluent was founded by the creators of Apache Kafka. Enterprises that have data in motion, and all do, are turning to Kafka (and Confluent) in droves to deliver real-time data. However, Kafka does not provide streaming analytics functionality. Rather, it is a source of data for a streaming analytics capability. To provide customers with streaming analytics, Confluent offers ksqlDB, which both is a persistent database for streaming data and includes an SQL interface that supports streaming analytics. Confluent ksqlDB is built on the same underlying distributed architecture used by Confluent for scaling, performance, security, and other enterprise features.

  Confluent offers strengths in data connectors, aggregate analytics, throughput, and deployment options. Confluent ksqlDB is a relatively new streaming analytics capability, but the company is aggressively adding new features. Confluent ksqlDB's sweet spot is for enterprises that are using the Confluent Platform or Confluent Cloud for streaming data and wish to perform streaming analytics.

- **Hazelcast lets enterprises use data instantly.** Electrons move; data flows. That's Hazelcast's raison d'être — to make data durably usable by applications as close to that movement of electrons as possible. Best known for its in-memory data grid technology, Hazelcast builds on that architecture to offer Hazelcast Jet for streaming analytics. Hazelcast's in-memory data grid is an

intriguing combination with streaming analytics, since enrichment of a data stream from reference data is often critical to streaming analytics insights. Jet is an open source project with commercial extensions and enterprise-level support.

Hazelcast Jet has strengths in data enrichment, throughput, latency, and high availability. Its sweet spot is for enterprise use cases that require both streaming analytics and the benefits of a durable, scalable in-memory data store. A relatively new entry, Hazelcast plans to implement a richer set of analytics capabilities to handle more complex streaming analytics use cases.

Contenders

- **Impetus' StreamAnalytix makes Apache Spark easy peasy.** Impetus' StreamAnalytix offers rich GUI development and management tools for enterprises that wish to leverage Apache Spark but without the usual hassles of managing the environment and finding highly skilled Spark developers. StreamAnalytix is much, much more than "easy Apache Spark," though. Impetus has evolved StreamAnalytix into an end-to-end, unified data platform that handles ingestion, integration/ETL (extract, transform, load), streaming analytics, and machine learning.

  Impetus StreamAnalytix offers strengths in usability, data connectors, tools, and extensibility. Enterprises currently using or wishing to use Apache Spark for streaming analytics should strongly consider StreamAnalytix because it adds tooling and enterprise features that are starkly missing from the open source platform. Impetus' sweet spot is for enterprises that have mixed data processing workloads, including more general streaming data processing, and that wish to unify the development and management of those workloads under a common set of tools.

- **EsperTech is the premier embeddable streaming analytics solution.** EsperTech offers a free, downloadable version of Esper, its open source streaming analytics solution. The company also offers commercial versions that we evaluated in this report: Esper High Availability and Esper Enterprise Edition, which include advanced features such as high availability, distributed scale, security, and more. EsperTech is unique among the streaming analytics vendors in this evaluation because, in addition to its highly capable enterprise solution, it offers an embeddable version that both enterprises and independent software vendors (ISVs) can use directly in other software.

  EsperTech offers strengths in core streaming analytics capabilities, low-latency performance, development tools, and deployment. Developers can use either visual tools or event processing language (EPL) that extends the SQL standard and enables rich expressions over events and time. The solution compiles EPL into byte code for low-latency execution. EsperTech's sweet spot is for enterprises that need rich streaming analytics and complex event processing. For ISVs, EsperTech offers an unrivaled way to embed a streaming analytics capability in other platforms or applications. ISVs that offer IoT applications, financial applications, AI applications that use streaming data, and many other applications can benefit from using EsperTech.

- **KX brings the power of its world-class time-series database to streaming analytics.** KX Streaming Analytics is based on KX's time-series database (kdb+), which is used by quants at a who's who of the world's most demanding financial firms and now at automotive, manufacturing, telecom, and utilities firms as well. Streaming data originates in an instant, and then time ticks from there. As such, KX Streaming Analytics leverages its rich set of time-series analytics in a continuous fashion on streaming data. Developers can use the iconic kdb+ programming language "q," or SQL, or natively embed Python, C/C++, or R to create streaming analytics. KX Streaming Analytics is proven in the low-latency worlds of financial trading and fraud detection, and it can be applied to all other use cases, including IoT.

  KX offers strengths in advanced analytics, development tools, low-latency performance, and deployment options. The sweet spot for KX Streaming Analytics is for enterprises that want a single platform that data analysts can use to explore data, discover patterns, and test hypotheses while at the same time operationalizes streaming analytics in real time.

Evaluation Overview

We evaluated vendors against 22 criteria, which we grouped into three high-level categories:

- **Current offering.** Each vendor's position on the vertical axis of the Forrester Wave graphic indicates the strength of its current offering. Key criteria for these solutions are data, analytics, development, performance, and deployment.
- **Strategy.** Placement on the horizontal axis indicates the strength of the vendors' strategies. We evaluated ability to execute, solution roadmap, enablement, and partners.
- **Market presence.** Represented by the size of the markers on the graphic, our market presence scores reflect each vendor's customer adoption, evaluated product revenue, and market awareness.

Vendor Inclusion Criteria

Forrester included 14 vendors in the assessment: Amazon Web Services, Cloudera, Confluent, EsperTech, Google, Hazelcast, IBM, Impetus, KX, Microsoft, Oracle, SAS, TIBCO Software, and Ververica (Alibaba). Each of these vendors has:

- **A comprehensive, differentiated streaming analytics solution.** Evaluated vendors must offer a software and/or cloud service that provides capabilities to connect to real-time data sources and provide real-time, temporal analytics on incoming data. We did not include vendor solutions that primarily focus on streaming data flow and/or streaming data processing use cases. The solution should also offer tools for developers and/or data-savvy professionals to create real-time, temporal analytical queries, applications, or services.

- **A standalone streaming analytics solution that supports multiple use cases.** Forrester included only solutions that are marketed toward enterprises and support multiple use cases and business solutions. For example, solutions that Forrester deemed to be offered as an embedded capability in other applications were not included in this evaluation.
- **Install base and revenue requirements.** The vendor must have at least 10 paying, named enterprise customers using the version of the streaming analytics solution that we evaluated. Included vendors must also have proven revenue generated by customer adoption of their streaming analytics solution.
- **Sparked client inquiries and/or has technologies that put it on Forrester's radar.** Forrester clients often discuss the vendors and products through inquiries; alternatively, vendors may, in Forrester's judgment, warrant inclusion or exclusion in this evaluation because of technology trends, market presence, or lack of client interest.

Supplemental Material

Online Resource

We publish all our Forrester Wave scores and weightings in an Excel file that provides detailed product evaluations and customizable rankings; download this tool by clicking the link at the beginning of this report on Forrester.com. We intend these scores and default weightings to serve only as a starting point and encourage readers to adapt the weightings to fit their individual needs.

The Forrester Wave Methodology

A Forrester Wave is a guide for buyers considering their purchasing options in a technology marketplace. To offer an equitable process for all participants, Forrester follows The Forrester Wave™ Methodology Guide to evaluate participating vendors.

In our review, we conduct primary research to develop a list of vendors to consider for the evaluation. From that initial pool of vendors, we narrow our final list based on the inclusion criteria. We then gather details of product and strategy through a detailed questionnaire, demos/briefings, and customer reference surveys/interviews. We use those inputs, along with the analyst's experience and expertise in the marketplace, to score vendors, using a relative rating system that compares each vendor against the others in the evaluation.

We include the Forrester Wave publishing date (quarter and year) clearly in the title of each Forrester Wave report. We evaluated the vendors participating in this Forrester Wave using materials they provided to us by March 25, 2021, and did not allow additional information after that point. We encourage readers to evaluate how the market and vendor offerings change over time.

In accordance with The Forrester Wave™ and New Wave™ Vendor Review Policy, Forrester asks vendors to review our findings prior to publishing to check for accuracy. Vendors marked as nonparticipating vendors in the Forrester Wave graphic met our defined inclusion criteria but declined to participate in or contributed only partially to the evaluation. We score these vendors in accordance with The Forrester Wave™ And The Forrester New Wave™ Nonparticipating And Incomplete Participation Vendor Policy and publish their positioning along with those of the participating vendors.

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