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The Forrester Wave™: Streaming Analytics, Q3 2019

The 11 Providers That Matter Most And How They Stack Up

by Mike Gualtieri
September 23, 2019 | Updated: January 10, 2020

Why Read This Report

In our 26-criterion evaluation of streaming analytics providers, we identified the 11 most significant ones — Alibaba, Amazon Web Services, Cloudera, EsperTech, Google, IBM, Impetus, Microsoft, SAS, Software AG, and TIBCO Software — and researched, analyzed, and scored them. This report shows how each provider measures up and helps application development and delivery (AD&D) professionals select the right one for their needs.

Key Takeaways

Software AG, IBM, Microsoft, Google, And TIBCO Software Lead The Pack
Forrester's research uncovered a market in which Software AG, IBM, Microsoft, Google, and TIBCO Software are Leaders; Cloudera, SAS, Amazon Web Services, and Impetus are Strong Performers; and EsperTech and Alibaba are Contenders.

Analytics Prowess, Scalability, And Deployment Freedom Are Key Differentiators
Depth and breadth of analytics types on streaming data are critical. But that is all for naught if streaming analytics vendors cannot also scale to handle potentially huge volumes of streaming data. Also, it's critical that streaming analytics can be deployed where it is most needed, such as on-premises, in the cloud, and/ or at the edge.

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The 11 Providers That Matter Most And How They Stack Up

by Mike Gualtieri

with Srividya Sridharan and Robert Perdoni

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Enterprises Must Take A Streaming-First Approach To Analytics

Successful enterprises must learn from the past, act in the present, and prepare for the future. Descriptive analytics analyzes the past. Streaming analytics analyzes the present. Predictive analytics analyzes the future. Unfortunately, most enterprise business insights teams focus primarily on analyzing the past through dashboards, stunning Tufte-like charts that they slice and dice ad infinitum to rationalize often failed business strategies. The problem: Most business insights pros equate "analytics" and "insights" with the skills they are vested in — traditional, historical, backward-looking analysis. Fortunately, that's changing! Many leading enterprises realize that real-time analytics — the analytics of the present — is an incredible competitive advantage because they can act *now* to serve fickle customers, fix operational problems, power internet-of-things (IoT) apps, and respond decisively to competitors.[1] That's what streaming analytics delivers.

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

› **Analytics rigor.** Streaming is a loaded word. It can mean watching "Money Heist" on Netflix. It can also mean capturing database transactions and transporting a copy to a data warehouse using Apache Kafka. Streaming analytics is not about moving bits. It is about analyzing bits as they move. Streaming analytics is categorically about analytics: specifically, analytics on data in motion, where time and trends are not defined in the past but instead defined right now. Enterprises should look for streaming analytics vendors that have both a breadth of built-in real-time analytics and extensibility capabilities to use externally created analytics such as machine learning models.

› **Spike-proof scalability and availability.** Streaming analytics implementations are not meant to produce nice-to-have reports that executives and managers review in update or status meetings. Rather, streaming analytics is the real-time brain of business that must maintain consciousness. The time frame of the insight-to-action cycle is right now! Streaming analytics is mission-critical analytics that is the signal for enterprises' actions, both human and automated. That means enterprises should look for streaming analytics vendors that are fault-tolerant and can scale quickly to handle spikes in data caused by customer, operational, and market activity.

› **Deployment freedom.** Enterprises are spread thin, but not in a bad way. Applications and data increasingly span on-premises (or managed) data centers, multiple public clouds, and the edge (to support IoT applications).[2] That will be the reality for enterprises for the foreseeable future and for good reason. Compelling value propositions exist for SaaS, PaaS, and IaaS cloud applications and services.[3] Streaming analytics must span an enterprise's portfolio of applications and data wherever they may be deployed. That doesn't necessarily mean that a streaming analytics platform must be deployed where data and applications exist, because data can be streamed to the platform for analysis. The key question for enterprises is: Where do I need to perform the analytics? The answer depends on the latency tolerance and connectivity of the insight. Enterprises should look for a streaming analytics vendor that can perform real-time analytics with enough time to act on the real-time insights.

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.

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, Q3 2019

THE FORRESTER WAVE™
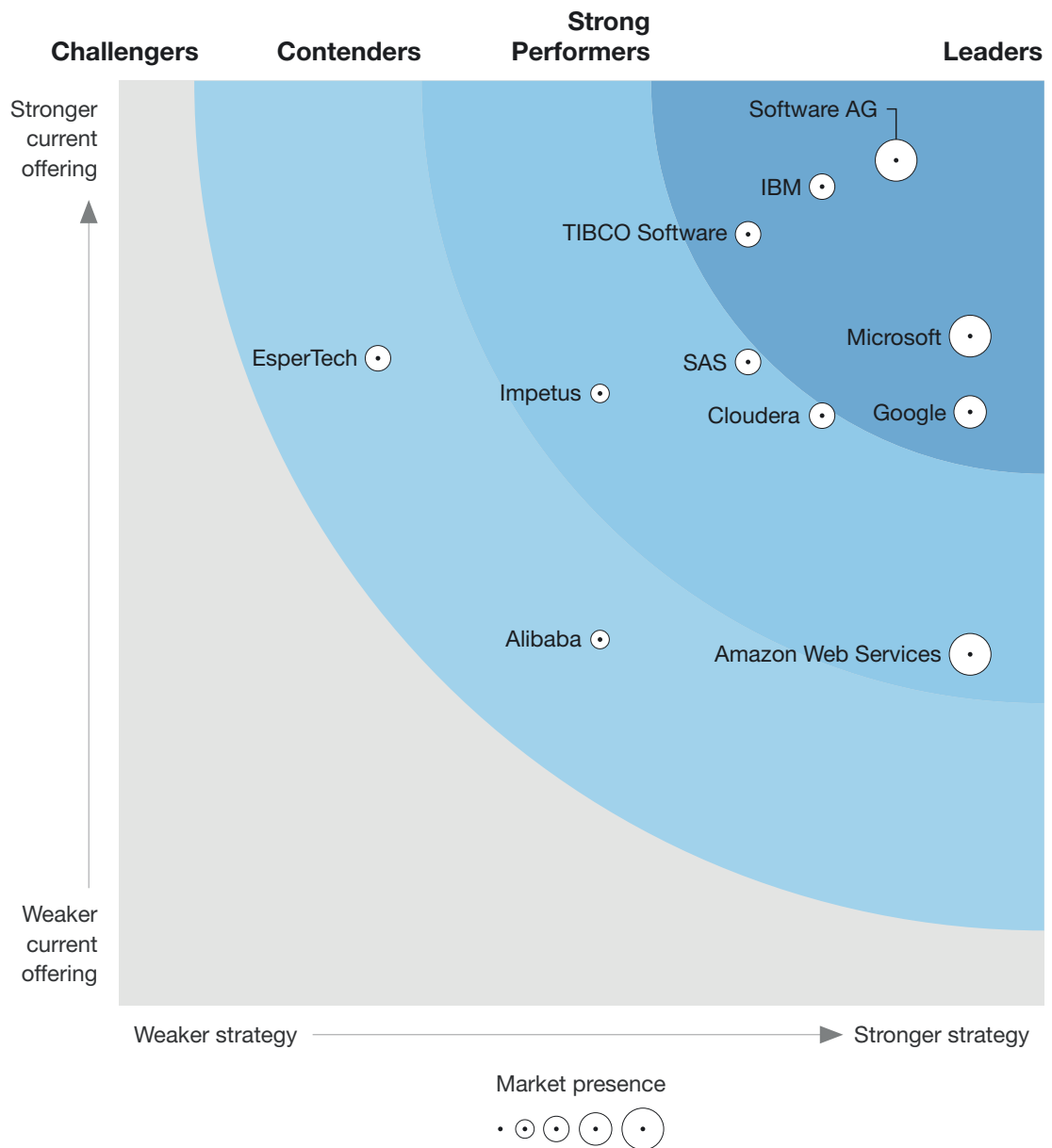
Streaming Analytics

Q3 2019

FIGURE 2 Forrester Wave™: Streaming Analytics Scorecard, Q3 2019

	Forrester's weighting	Alibaba	Amazon Web Services	Cloudera	EsperTech	Google	IBM	Impetus	Microsoft	SAS	Software AG	TIBCO Software
Current offering	50%	1.98	1.90	3.19	3.50	3.21	4.43	3.31	3.62	3.48	4.57	4.17
Architecture	14%	2.33	1.67	2.33	3.67	4.33	5.00	2.33	4.33	2.33	3.67	3.67
Ingestion	14%	1.00	1.00	1.67	3.00	1.67	3.67	3.00	2.33	1.67	5.00	5.00
Analytics	14%	2.50	2.00	1.00	4.50	2.50	4.00	3.50	2.00	3.00	5.00	2.50
Administration	14%	1.00	3.00	5.00	3.00	5.00	4.00	4.00	5.00	3.00	4.00	4.00
Development	14%	3.00	1.67	4.33	4.33	3.00	4.33	4.33	3.67	4.33	4.33	5.00
Deployment	14%	3.00	1.00	5.00	3.00	3.00	5.00	3.00	5.00	5.00	5.00	5.00
Integration	14%	1.00	3.00	3.00	3.00	3.00	5.00	3.00	3.00	5.00	5.00	4.00
Strategy	50%	2.60	4.60	3.80	1.40	4.60	3.80	2.60	4.60	3.40	4.20	3.40
Ability to execute	20%	3.00	5.00	3.00	1.00	5.00	5.00	3.00	5.00	5.00	5.00	5.00
Solution road map	20%	3.00	5.00	3.00	3.00	5.00	3.00	3.00	5.00	3.00	3.00	3.00
Customer support	20%	3.00	3.00	5.00	1.00	3.00	5.00	5.00	3.00	5.00	5.00	5.00
Partners	20%	1.00	5.00	3.00	1.00	5.00	3.00	1.00	5.00	3.00	5.00	3.00
Community	20%	3.00	5.00	5.00	1.00	5.00	3.00	1.00	5.00	1.00	3.00	1.00
Market presence	0%	1.67	4.33	3.00	2.33	3.67	3.00	1.67	4.33	3.00	4.33	3.00
Customer adoption	33%	3.00	5.00	3.00	3.00	5.00	3.00	1.00	5.00	3.00	5.00	3.00
Evaluated product revenue	33%	1.00	3.00	3.00	1.00	3.00	3.00	1.00	3.00	3.00	3.00	3.00
Market awareness	33%	1.00	5.00	3.00	3.00	3.00	3.00	3.00	5.00	3.00	5.00	3.00

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

Vendor Offerings

Forrester included 11 vendors in this assessment: Alibaba, Amazon Web Services (AWS), Cloudera, EsperTech, Google, IBM, Impetus, Microsoft, SAS, Software AG, and TIBCO Software (see Figure 3).

FIGURE 3 Evaluated Vendors And Product Information

Vendor	Product evaluated	Version
Alibaba	Realtime Compute	
Amazon Web Services	Amazon Kinesis Data Analytics	
Cloudera	Cloudera DataFlow (CDF)	
EsperTech	Esper, Esper Enterprise Edition, EsperHA	8.2
Google	Google Cloud Dataflow	
IBM	IBM Streams	4.3
Impetus	StreamAnalytix	
Microsoft	Azure Stream Analytics	
SAS	SAS Event Stream Processing (ESP)	
Software AG	Software AG Apama Streaming Analytics Platform	
TIBCO Software	TIBCO Streaming	

Vendor Profiles

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

Leaders

› **Software AG sets the vision for real-time, industrial IoT.** Software AG's Apama is a full-featured streaming analytics platform that is well suited for any and all real-time applications, on-premises, in the cloud, and at the edge. It hails from the high-speed, unforgiving world of financial trading, so it's fast and it won't go down. Those properties make Apama an exceptional fit for real-time, industrial IoT applications in manufacturing, supply chain, and field operations, which are also unforgiving, mission-critical environments. Apama is included in Software AG's Cumulocity IoT cloud that simplifies device connectivity and management and now offers world-class real-time analytics. Software AG customers include ADAMOS, OCTO Telematics, and Telstra.

Software AG offers strengths in core streaming analytics, low-latency performance, data connectors, event sequencing, development, deployment, and integration. Developers can create streaming analytics using simple recipes that are available in Cumulocity or use Apama no-code visual tools, event processing language (EPL), or traditional programming languages to create full-featured real-time applications. Subject matter experts, such as machine operators, can use Apama in their IoT projects through a no-code, drag-and-drop interface that enables them to create streaming analytics applications.

› **IBM offers a world-class, run-anywhere streaming analytics solution.** Born from IBM Research more than a decade ago, IBM Streams continues to adapt to deployment models and excel at core functionality. IBM Streams is offered as a managed service in IBM Cloud and is integrated in IBM Cloud Pak for Data. IBM has also developed IBM Streams Runner for Apache Beam, which allows developers to define stream applications using the Apache Beam SDK to run on the formidable IBM Streams engine while also offering portability to those who desire it.[4] Both new capabilities will make it much easier for a broader audience to learn about and use IBM Streams. IBM Streams customers include Celcom Axiata, Medtronic, and Verizon.

IBM has strengths in architecture, low-latency performance, management, development, deployment, and integration. IBM Streams is ideal for enterprises with complex, high-scale, real-time applications that need maximum architectural flexibility. However, now that Streams is also available in IBM Cloud Pak for Data, making it an embedded, easy-to-use element of IBM's cloud data management platform, its adoption is set to take off.

› **Microsoft makes streaming analytics a staple for Azure developers.** Microsoft's Azure Stream Analytics is based on Microsoft Research's Trill — a high-performance, in-memory streaming analytics engine. Developers can use Stream Analytics Query Language (based on SQL) to define streaming analytics and can extend the functionality with custom code written in JavaScript or C#. Developers can also easily build and deploy Azure Stream Analytics applications in the cloud as well as on devices running Azure IoT Edge runtime using the same language. Microsoft Azure Stream Analytics customers include Real Madrid, Roche Diagnostics, and thyssenkrupp Elevator.

Microsoft Azure Stream Analytics has strengths in scalability, high availability, deployment, and applications. Azure Stream Analytics is an easy on-ramp for developers who already know SQL. Zero-code integration with over 15 other Azure services makes it easy to try and therefore adopt, making the product the real-time backbone for enterprises needing real-time streaming applications on the Azure cloud. Additionally, through integration with IoT Hub and Azure Functions, it offers seamless interoperability with thousands of devices and business applications.

› **Google unifies streaming analytics and batch processing the way it should be.** No compromises. That must be the goal when software architects create a unified streaming and batch solution that must scale elastically, perform complex operations, and have the resiliency of Rocky Balboa. Google's Cloud Dataflow is that solution for Google Cloud Platform (GCP). Developers

create Dataflow applications using a programmatic interface, but Google plans to include Dataflow in its code-free visual interface, Google Cloud Data Fusion, within the next 12 months. Google Cloud Dataflow customers include AirAsia, Scotiabank, and Spotify.

Google Cloud Dataflow has strengths in scalability, management, and security. Google Cloud Dataflow is a managed service that is only available on GCP. However, and importantly, developers of Dataflow applications use Apache Beam SDK to create streaming analytics and batch applications. Since Apache Beam is open source, anyone is free to develop an Apache Beam "runner" to support applications written in the Apache Beam SDK. That means that applications are portable to other streaming engines that support Apache Beam. To date, Apache Beam runners exist for Apache Spark, Apache Flink, Apache Samza, and more.

› **TIBCO Software augments human intelligence with real-time intelligence.** TIBCO aims to augment human intelligence by interconnecting everything. It achieves this by combining TIBCO Streaming for real-time streaming analytics with TIBCO Spotfire for visual analytics, with the Spotfire Data Streams add-on. 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 is also behind Flogo, an open source edge computing framework to extend streaming analytics applications to IoT devices. Integration with TIBCO Data Science injects machine learning models into autonomous, real-time intelligent applications. TIBCO Spotfire Data Streams customers include the Mercedes-AMG Petronas Motorsport team.

TIBCO has strengths in connectors, data enrichment, development, deployment, and integration. TIBCO Streaming can handle complex real-time applications, such as energy field operations. Its 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 made significant investments to make all platforms cloud-capable, so enterprises can choose on-premises and/or cloud deployments.

Strong Performers

› **Cloudera brings data management discipline to streaming analytics.** Cloudera DataFlow (CDF) is more than streaming analytics. It brings to streaming analytics such features as data provenance and other data management capabilities usually found only in batch-oriented big data and data warehouse platforms. The solution also includes edge management and two-way messaging technology needed to build and deploy IoT applications. CDF is composed completely of open source components, including Apache NiFi, Apache Storm, Apache Kafka, and many others. Cloudera customers include American Water, Clearsense, and Komatsu.

Cloudera offers strengths in streaming data platforms, management, security, development, extensibility, and deployment. CDF offers a no-code visual development and comprehensive platform management tool that abstracts away all the complexity of the many open source projects working to create real-time applications, including IoT. CDF is a natural fit for enterprises that also

use Cloudera Enterprise Data Hub, Data Warehouse, and/or Data Science Workbench, because data management capabilities are integrated and consistent. However, note that CDF can run independently of any prior Cloudera footprint as well. CDF is deployable on-premises and in the cloud, as well as within containers.

› **SAS makes the event-driven world smarter.** Enterprises are both process driven and event driven. Enterprises are already full of process-driven apps like ERP, CRM, HRM, accounting, and many more.[5] Yet, for enterprises to succeed today they must also detect and respond to myriad real-time events that portend threats or unveil opportunities. SAS Event Stream Processing (ESP) is designed not only to capture and respond to those events but also to learn from them. SAS stands out in this evaluation as the vendor with the most built-in analytics for machine learning and other advanced analytics. SAS ESP customers include SciSports, Siemens, and Ulbrich.

SAS ESP has strengths in low-latency performance, advanced analytics, deployment, and integration. SAS ESP can handle a broad range of use cases, from fraud detection to IoT. Developers can create streaming analytics applications using a coding interface. SAS ESP is available standalone or in the cloud. A lightweight engine is available for IoT device deployment.

› **AWS offers a real-time circulatory system for cloud applications.** AWS's Amazon Kinesis Data Analytics allows developers to use widely known SQL to develop streaming analytics queries. The solution also includes open source libraries based on Apache Flink that enable developers to use the Java programming language to create streaming analytics queries. For this Forrester Wave, we evaluated only AWS's SQL-based approach. We did not evaluate the Java-based approach because it is based on an entirely different development and runtime architecture.[6] AWS's Amazon Kinesis Data Analytics is tightly integrated with other services, including Amazon Kinesis Data Firehouse, Amazon Kinesis Video Streams, and Amazon Kinesis Data Streams. Together these services provide end-to-end capabilities to move and analyze real-time data. Amazon Kinesis Data Analytics customers include Autodesk, John Deere, and Zynga.

Amazon Kinesis Data Analytics offers strengths in scalability, development, and integration. Developers use SQL with streaming extensions to create streaming analytics applications. Amazon Kinesis Data Analytics also provides a no-code visual query builder for developers who are familiar with SQL syntax. AWS's streaming solution really shines in integration with AWS's many other services needed to create complete and comprehensive real-time applications. AWS's road map for Amazon Kinesis Analytics is ambitious and should propel the solution to new heights.

› **Impetus makes Apache Spark work for enterprises in real-time.** Impetus' StreamAnalytix fills in tooling and feature gaps for enterprises that wish to leverage Apache Spark as a streaming analytics engine and big data distributed processing engine. StreamAnalytix provides a beautiful and thoughtfully designed visual user interface for application development and management. Enterprises will also appreciate that StreamAnalytix is architecturally positioned to support other open source streaming analytics software in the future, such as Apache Flink.

Impetus offers strengths in development and management tools. Impetus StreamAnalytix's capabilities are governed by the capabilities of the underlying streaming analytics engine, which is Apache Spark Streaming. To add additional streaming analytics and complex event processing (CEP) capabilities, the company also embeds Esper from EsperTech. For enterprises wishing to adopt Apache Spark as their streaming engine, Impetus' StreamAnalytix is the ideal solution to democratize streaming analytics development and platform management with beautifully designed visual tools and the option to drop down to coding as desired.

Contenders

› **EsperTech is a rich, performant, and embeddable streaming analytics solution.** EsperTech offers a free, downloadable version of Esper, its open source streaming analytics solution. The company also offers commercial, closed source versions, which 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 ISVs can use directly in other software. EsperTech could grow at an outsized clip if it chooses to invest in sales and marketing to both enterprises and other technology companies. EsperTech customers include E-Trade, Huawei Technologies, and S&P Global.

EsperTech offers strengths in core streaming analytics capabilities, low-latency performance, development tools, and deployment. Developers can use either visual tools or EPL that extends the SQL standard and enables rich expressions over events and time. The solution compiles EPL into byte code for quick execution and easy distribution to the streaming analytics engine. EsperTech does not provide a managed cloud service, so developers wishing to deploy EsperTech streaming analytics solutions in the cloud must do so themselves.

› **Alibaba leverages open source Apache Flink to enable the real-time cloud.** Alibaba's Realtime Compute is a managed cloud service that uses Apache Flink combined with other Alibaba Cloud services to create an engine that supports both streaming analytics and batch processing. Early in 2019, Alibaba acquired Berlin-based Data Artisans, the key contributing company to Apache Flink. Data Artisans, now known as Ververica, continues to focus on Apache Flink development and is developing its own Ververica platform. Alibaba's Realtime Compute customers include CCTV, VIPKid, and ZhongAn Insurance.

Alibaba's Realtime Compute has strengths in scalability and extensibility. Alibaba is the choice for customers who wish to use a managed streaming analytics based on Apache Flink and who have data and/or applications in Alibaba Cloud. Note that Apache Flink has an Apache Beam runner, which means applications written using the Apache Beam SDK can run on other Apache Beam engines, such as Google Cloud Dataflow and IBM Streams, and vice versa. That makes streaming

applications portable to streaming engines that support Apache Beam. Alibaba should benefit as both the Apache Flink and Apache Beam ecosystems expand with more adoption by enterprises and technology vendors building tooling, including Alibaba's own Ververica.

Evaluation Overview

We evaluated vendors against 26 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 architecture, ingestion, analytics, administration, development, deployment, and integration.

› **Strategy.** Placement on the horizontal axis indicates the strength of the vendors' strategies. We evaluated ability to execute, solution road map, customer support, partners, and community.

› **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 11 vendors in the assessment: Alibaba, Amazon Web Services, Cloudera, EsperTech, Google, IBM, Impetus, Microsoft, SAS, Software AG, and TIBCO Software. 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 temporal analytics on incoming data. If based on open source, the solution must include differentiated features attractive to large enterprises. The solution should also offer tools for developers to create applications and/or streaming analytics services and tools for operations professionals to manage the streaming analytics solution.

› **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 deems to be offered as an embedded capability in other applications may not be 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. The vendor provided Forrester with three customer references (which were not provided as references in prior streaming analytics Forrester Wave evaluations) that were willing to speak with us or fill out a survey. Included vendors must also have proven revenue generated by customer adoption of the vendor's 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, the vendor may, in Forrester's judgment, warrant inclusion or exclusion in this evaluation because of technology trends, market presence, or lack of client interest.

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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 July 12, 2019, 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™ 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.

Integrity Policy

We conduct all our research, including Forrester Wave evaluations, in accordance with the Integrity Policy posted on our website.

Endnotes

[1] Streaming analytics is used for IoT advanced analytics. See the Forrester report "The Forrester Tech Tide™: Internet Of Things, Q3 2019."

[2] The "edge" typically refers to computing devices that are in the field versus in a central data center or cloud. Edge devices are also often referred to as IoT devices.

[3] SaaS: software-as-a-service; PaaS: platform-as-a-service; IaaS: infrastructure-as-a-service.

[4] SDK: software development kit.

[5] ERP: enterprise resource planning; CRM: customer relationship management; HRM: human resource management.

[6] Because these two approaches are architecturally different, we have to choose which approach to score for each criterion. It would be inaccurate to score two distinct architectures as one solution. Streaming analytics vendors often offer multiple programming and/or development paradigms for streaming analytics queries. However, it is rare that the underlying execution architecture varies based on the programming paradigm.

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