

API TESTING MARKET

GLOBAL FORECAST TO 2022

BY COMPONENT (API TESTING TOOLS/SOFTWARE AND API TESTING SERVICES), DEPLOYMENT TYPE (ON-PREMISES AND CLOUD), SERVICE TYPE (MANAGED AND PROFESSIONAL SERVICES), VERTICAL, AND REGION

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1 EXECUTIVE SUMMARY

The advent of IT solutions and services has revolutionized the software testing marketplace for various industries and organizations. These testing solutions and services assist organizations in finding out potential bugs and vulnerabilities in their IT infrastructure, comprising network, applications, and devices, so that organizations can deliver high-quality solutions and services to their customers. API testing is a type of software testing in which APIs are tested on various parameter testings, such as functional testing, performance/load testing, and security testing. An API has a set of protocols, standards, and codes that transfer the data from an application to the web and other APIs. The APIs carry critical data that needs to be transferred in a secured manner, to avoid any bug or error in it. Therefore, it has become a critical mission to test these APIs for transferring the secured data in a defined time frame. API and its integrations are tested on software tools to observe their behavior under different testing conditions before implementing them.

The evolution of software testing started back in the 1950s. In 1950, the developer's main aim was to debug the codes. However, in the 1970s, debugging was separated from the testing concept. The concept of testing with explanations was introduced to find the loopholes and threats in the system. From 1990 to 2000, bug tracking, version control tools, and Continuous Quality Improvement (CQI) methods gained traction. Since 2000, there has been a significant growth in the number of APIs and IT architectures. Due to growth in the use of APIs, the need for testing APIs has also evolved, as APIs are involved in carrying critical data. Considering the need of continuous delivery within the digital businesses, which is increasing with the adoption of Agile and DevOps practices for the software development, the API testing tools and services vendors offer a wide range of solutions for a shift-left development approach.

Nowadays, API testing services and tools have been widely adopted by IT enterprises. The major factors driving the growth of the API testing are the adoption of Agile and DevOps practices for software development, and open API strategies adopted by businesses. However, lack of awareness, pertaining to API testing, acts as a restraint in the API testing market. The major business opportunities that fascinate the solution providers are advancements in IoT; AI; and machine-learning technologies, and government directives for open API strategies in the banking industry. However, data security concerns in the API testing implementation may act as a major challenge for the API testing market.

In the regional market landscape, North America is expected to have the largest market share in the API testing market, owing to the high adoption of API testing by DevOps enterprises. The US has been a pioneer in using software development and testing solutions and services from the last 2 decades. APAC is expected to show the highest growth rate during the forecast period due to the presence of both developed and emerging economies, such as China, Japan, and India, which are continuously increasing their spending on the digitization of businesses. Japan is the frontrunner in the APAC region in adopting testing and quality assurance solutions across various industries. India is expected to grow at the highest rate in the API testing market, as India is considered to be a favorable outsourcing destination for IT solutions development and testing services. This is mainly due to the availability of highly skilled personnel with comparatively lower costs. The MEA and Latin American regions have been in the nascent phases of adopting API testing tools and services.

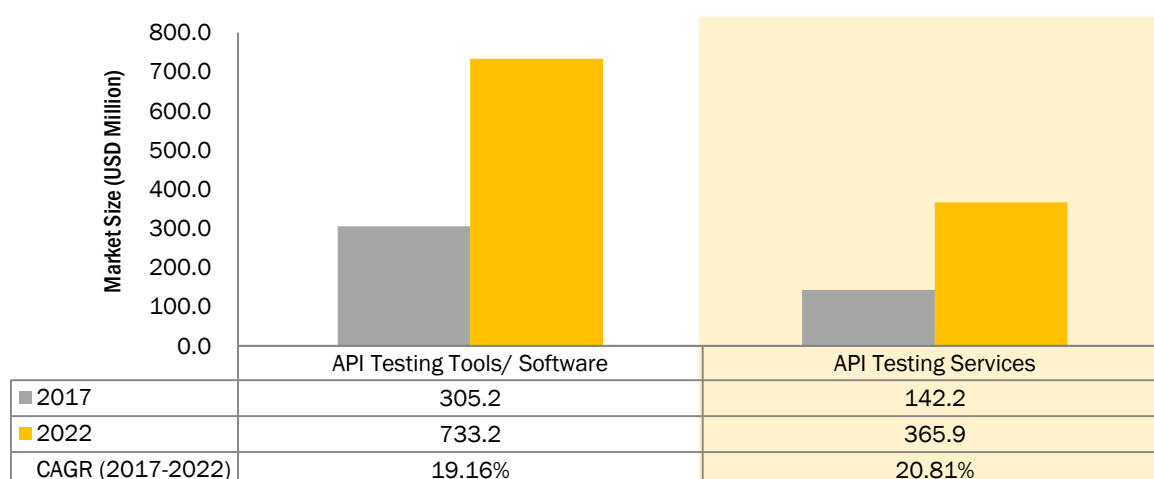
The overall API testing market has been segmented by component, deployment type, vertical, and region. By component, the API testing market is segmented into API testing tools/software and API testing services. The API testing tools/software is also subsegmented into on-premises and cloud-based. The API testing services segment is further subsegmented into managed and professional services. By vertical, the market is segmented into IT and Telecommunication, BFSI, retail and eCommerce, media and entertainment, healthcare, manufacturing, government, and others (transportation and logistics, energy and power, and education), and by region into North America, Europe, APAC, MEA, and Latin America.

Major players in this market are Micro Focus (Formerly HPE), IBM, Parasoft Corporation, SmartBear Software Inc., Tricentis GmbH, Astegic, Inc., Axway, Inc., Bleum, Inc., Cigniti Technologies Limited, Cygnet Infotech Pvt. Ltd., Load Impact AB, SendGrid, Inc., Inflectra Corporation, Infosys Limited, LogiGear Corporation, Nevatech, Inc., Oracle Corporation, QSG Technologies Pvt Ltd, QualityLogic, Runscope Inc., Trantor Inc., Sybrant Technologies, and Vector Software, Inc. As per industry experts, the overall API testing market is expected to grow at a healthy growth rate during the forecast period 2017–2022. Companies such as IBM, Parasoft, SmartBear Software, and Tricentis have dominated the API testing marketplace with their cloud and on-premises solution offerings.

Moreover, the market is dominated by the inorganic growth strategies adopted by the vendors. The API testing tools and services vendors collaborate with each other to offer effective QA services to their customers with a vision to help companies improve the quality of the software being delivered. For instance, Cigniti, a QA service vendor, partners with the leading software testing tool vendors, to offer a variety of testing solutions to its clients. It partnered with SmartBear, which offers best-in-class testing tools, to offer successful API testing capabilities to its customers. Outsourcing their API testing functions to these QA service vendors enables the software development teams of the businesses to focus on software product innovation.

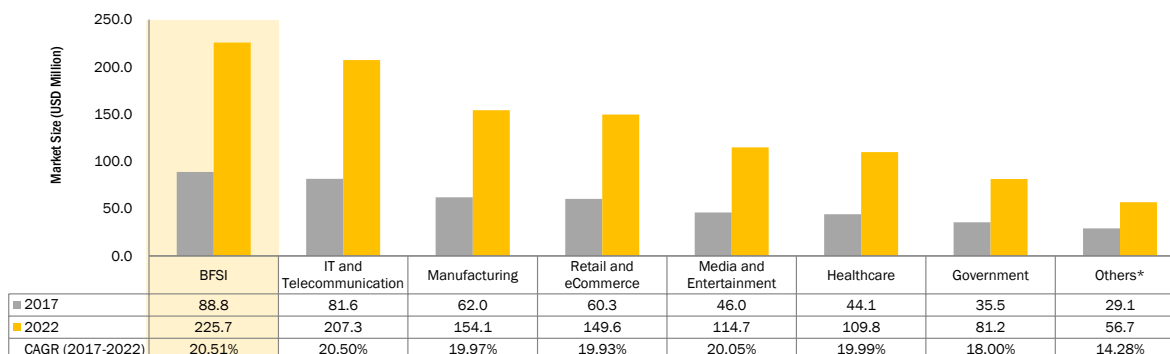
The global API testing market is expected to grow from USD 447.4 million in 2017 to USD 1,099.1 million by 2022, at a CAGR of 19.69% from 2017 to 2022.

FIGURE 1 API TESTING SERVICES SEGMENT IS EXPECTED TO GROW AT A HIGHER CAGR DURING THE FORECAST PERIOD



Source: Secondary Literature, Expert Interviews, and MarketsandMarkets Analysis

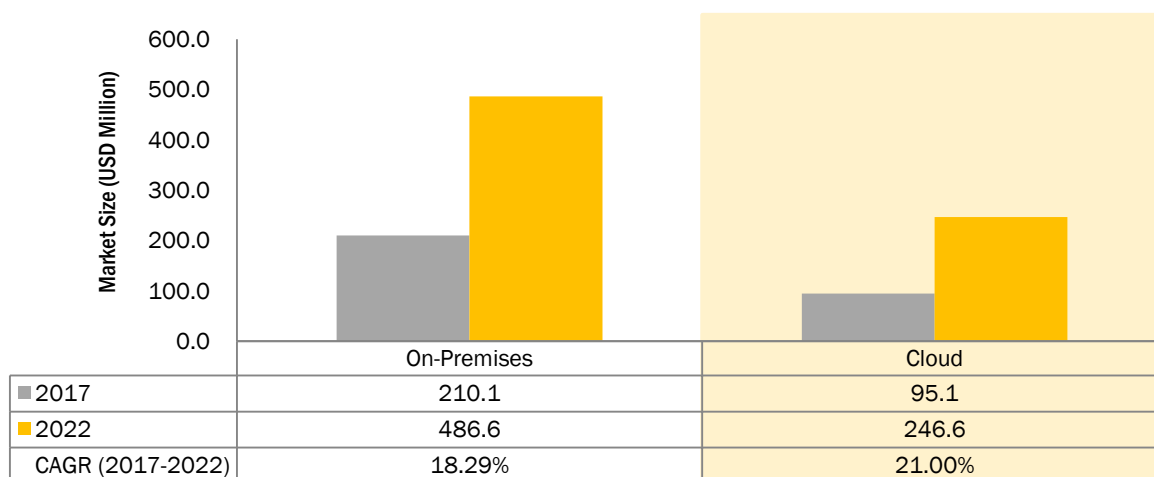
FIGURE 2 BANKING, FINANCIAL SERVICES, AND INSURANCE VERTICAL IS EXPECTED TO GROW AT THE HIGHEST CAGR DURING THE FORECAST PERIOD



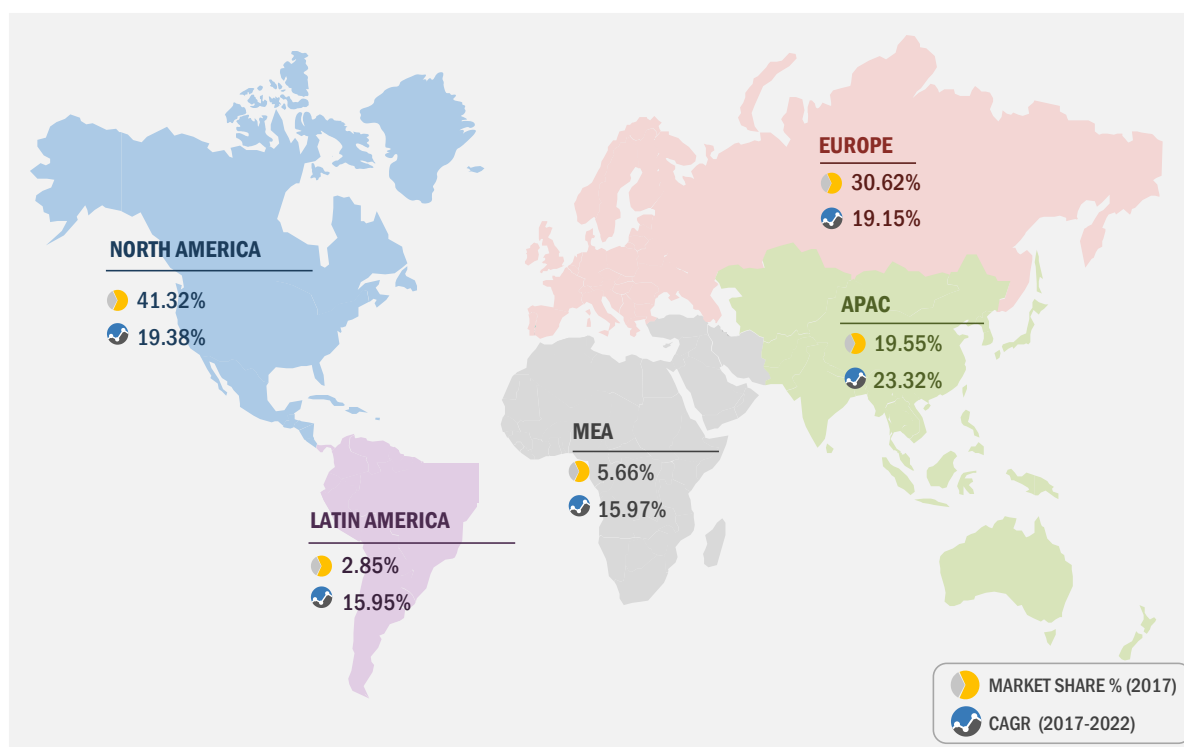
Note: *Others includes transportation and logistics, energy and power, and education

Source: Secondary Literature, Expert Interviews, and MarketsandMarkets Analysis

FIGURE 3 CLOUD DEPLOYMENT MODEL IS EXPECTED TO GROW AT A HIGHER CAGR DURING THE FORECAST PERIOD



Source: Secondary Literature, Expert Interviews, and MarketsandMarkets Analysis

FIGURE 4 NORTH AMERICA IS ESTIMATED TO HOLD THE LARGEST MARKET SHARE IN 2017

Source: Secondary Literature, Expert Interviews, and MarketsandMarkets Analysis

2 COMPETITIVE LANDSCAPE

2.1 MICROQUADRANT OVERVIEW

The vendors have been placed into 4 categories based on their performance in each criterion: visionary leaders, innovators, emerging, and dynamic. We have evaluated the top 25 vendors, including IBM, Micro Focus (Formerly HP Software), SmartBear Software, Parasoft, Tricentis, SendGrid, Inflectra Corporation, Cigniti, Oracle, CA Technologies, Infosys, Axway, QualityLogic, Trantor, Bleum, LogiGear Corporation, QASource, QSG Technologies, Sybrant Technologies, Vector Software, Load Impact, Nevatech, Runscope, Astegic, and Cygnet Infotech.

2.1.1 VISIONARY LEADERS

The visionary leaders receive high scores for most of the evaluation criteria. They have an established product portfolio and a very strong market presence. They provide mature and reputable API testing solutions and services. They also have strong business strategies. IBM, Micro Focus (Formerly HP Software), SmartBear Software, Parasoft, and Tricentis fall into this category.

2.1.2 INNOVATORS

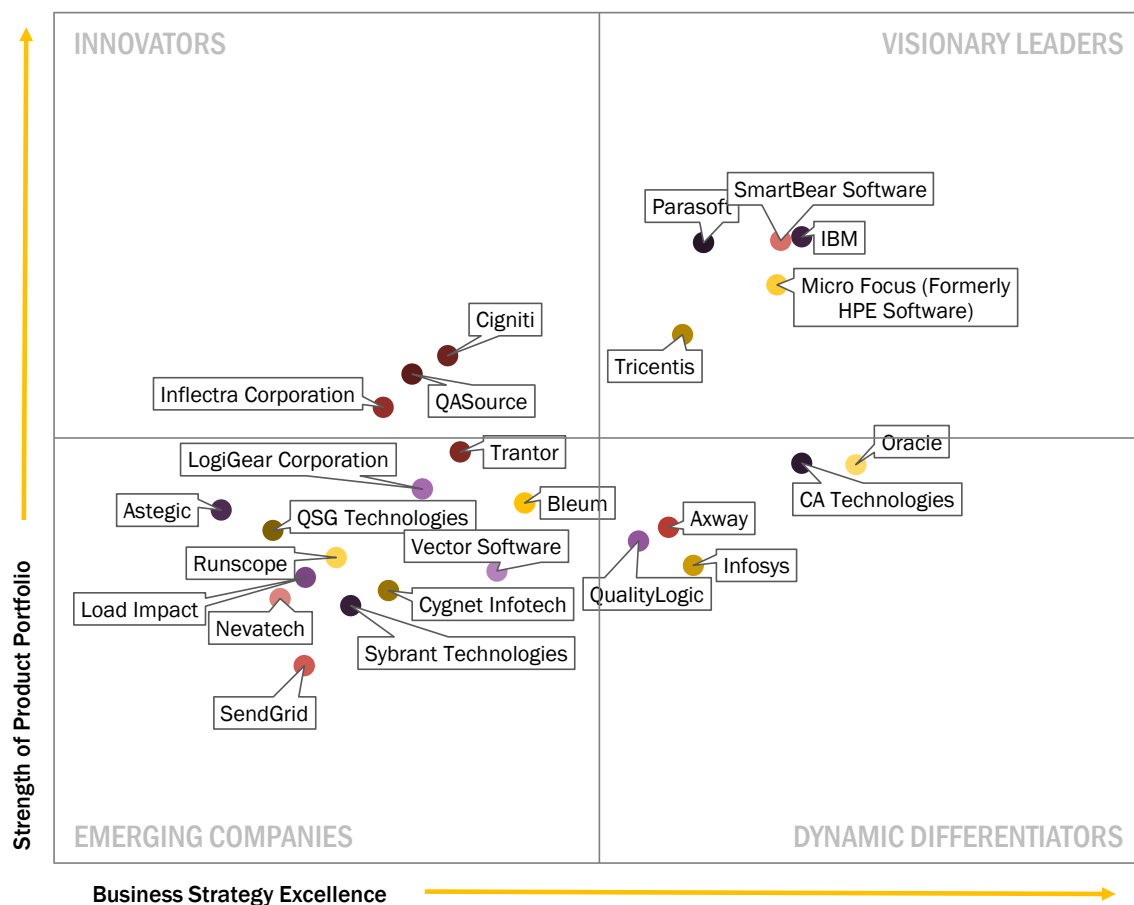
The innovators demonstrate substantial product innovations as compared to their competitors. They have a very focused product portfolio. However, they do not have very strong growth strategies for their overall business. Dynatrace, QASource, and Cigniti fall into this category.

2.1.3 DYNAMIC DIFFERENTIATORS

The dynamic differentiators are established vendors with very strong business strategies. However, they have a low product portfolio. They focus on a specific type of technology related to the product. Oracle, CA Technologies, Axway, QualityLogic, and Infosys fall into this category.

2.1.4 EMERGING COMPANIES

The emerging companies have niche product offerings and are starting to gain their position in the market. They do not have much strong business strategies as compared to other established vendors. They might be new entrants in the market and require some more time before getting significant traction in the market. Trantor, Bleum, LogiGear Corporation, QSG Technologies, Sybrant Technologies, Vector Software, Load Impact, Nevatech, Runscope, Astegic, and Cygnet Infotech fall into this category.

FIGURE 5 API TESTING MARKET (GLOBAL) COMPETITIVE LEADERSHIP MAPPING, 2017

Source: Press Releases, Expert Interviews, and MarketsandMarkets Analysis

TABLE 1 MARKET RANKING FOR THE API TESTING MARKET, 2017

Company	Ranking
IBM	1
SmartBear Software	2
Micro Focus (Formerly HP Software)	3
Parasoft	4
Tricentis	5

Note: The ranking has been estimated based on the respective company's market reach, market share revenue, and R&D-related investments in the API testing market. The secondary research, along with in-depth primary interviews conducted with key industry leaders, has contributed to this analysis.

Source: Annual Reports, Press Releases, Investor Presentations, Primary Interviews, and MarketsandMarkets analysis.

2.2 COMPETITIVE BENCHMARKING

2.2.1 STRENGTH OF PRODUCT PORTFOLIO IN THE API TESTING MARKET (25 PLAYERS)

Company Name	Breadth and Depth of Product Offering	Product Feature and Functionality	Product Differentiation and Impact on Customer Value	Product Quality and Reliability	Overall
Astegic	●●●●	●●●●	●●●●	●●●●	●●●●
Axway	●●●●	●●●●	●●●●	●●●●	●●●●
Bleum	●●●●	●●●●	●●●●	●●●●	●●●●
CA Technologies	●●●●	●●●●	●●●●	●●●●	●●●●
Cigniti	●●●●	●●●●	●●●●	●●●●	●●●●
Cygnit Infotech	●●●●	●●●●	●●●●	●●●●	●●●●
Load Impact	●●●●	●●●●	●●●●	●●●●	●●●●
SendGrid	●●●●	●●●●	●●●●	●●●●	●●●●
Micro Focus (Formerly HPE Software)	●●●●	●●●●	●●●●	●●●●	●●●●
IBM	●●●●	●●●●	●●●●	●●●●	●●●●
Inflectra Corporation	●●●●	●●●●	●●●●	●●●●	●●●●
Infosys	●●●●	●●●●	●●●●	●●●●	●●●●
LogiGear Corporation	●●●●	●●●●	●●●●	●●●●	●●●●
Nevatech	●●●●	●●●●	●●●●	●●●●	●●●●
Oracle	●●●●	●●●●	●●●●	●●●●	●●●●
Parasoft	●●●●	●●●●	●●●●	●●●●	●●●●
QASource	●●●●	●●●●	●●●●	●●●●	●●●●
QSG Technologies	●●●●	●●●●	●●●●	●●●●	●●●●
QualityLogic	●●●●	●●●●	●●●●	●●●●	●●●●
SmartBear Software	●●●●	●●●●	●●●●	●●●●	●●●●
Runscope	●●●●	●●●●	●●●●	●●●●	●●●●
Trantor	●●●●	●●●●	●●●●	●●●●	●●●●
Tricentis	●●●●	●●●●	●●●●	●●●●	●●●●
Sybrant Technologies	●●●●	●●●●	●●●●	●●●●	●●●●
Vector Software	●●●●	●●●●	●●●●	●●●●	●●●●
RATING	●●●●	●●●●	●●●●	●●●●	●●●●
	EXCELLENT	VERY GOOD	GOOD	POOR	NOT APPLICABLE

Source: Press Releases, Investor Presentations, Expert Interviews, and MarketsandMarkets Analysis

2.2.2 BUSINESS STRATEGY EXCELLENCE ADOPTED IN THE API TESTING MARKET (25 PLAYERS)

Company Name	Geographic Footprint	Effectiveness of Organic Growth Strategy	Breadth of Application/Verticals Served	Mergers and Acquisitions Strategy	Overall
Astegic	●●●●	●●●●	●●●●	●●●●	●●●●
Axway	●●●●	●●●●	●●●●	●●●●	●●●●
Bleum	●●●●	●●●●	●●●●	●●●●	●●●●
CA Technologies	●●●●	●●●●	●●●●	●●●●	●●●●
Cigniti	●●●●	●●●●	●●●●	●●●●	●●●●
Cygnit Infotech	●●●●	●●●●	●●●●	●●●●	●●●●
Load Impact	●●●●	●●●●	●●●●	●●●●	●●●●
SendGrid	●●●●	●●●●	●●●●	●●●●	●●●●
Micro Focus(Formerly HPE Software)	●●●●	●●●●	●●●●	●●●●	●●●●
IBM	●●●●	●●●●	●●●●	●●●●	●●●●
Inflectra Corporation	●●●●	●●●●	●●●●	●●●●	●●●●
Infosys	●●●●	●●●●	●●●●	●●●●	●●●●
LogiGear Corporation	●●●●	●●●●	●●●●	●●●●	●●●●
Nevatech	●●●●	●●●●	●●●●	●●●●	●●●●
Oracle	●●●●	●●●●	●●●●	●●●●	●●●●
Parasoft	●●●●	●●●●	●●●●	●●●●	●●●●
QASource	●●●●	●●●●	●●●●	●●●●	●●●●
QSG Technologies	●●●●	●●●●	●●●●	●●●●	●●●●
QualityLogic	●●●●	●●●●	●●●●	●●●●	●●●●
SmartBear Software	●●●●	●●●●	●●●●	●●●●	●●●●
Runscope	●●●●	●●●●	●●●●	●●●●	●●●●
Trantor	●●●●	●●●●	●●●●	●●●●	●●●●
Tricentis	●●●●	●●●●	●●●●	●●●●	●●●●
Sybrant Technologies	●●●●	●●●●	●●●●	●●●●	●●●●
Vector Software	●●●●	●●●●	●●●●	●●●●	●●●●
RATING	●●●●	●●●●	●●●●	●●●●	●●●●
	EXCELLENT	VERY GOOD	GOOD	POOR	NOT APPLICABLE

Source: Press Releases, Investor Presentations, Expert Interviews, and MarketsandMarkets Analysis

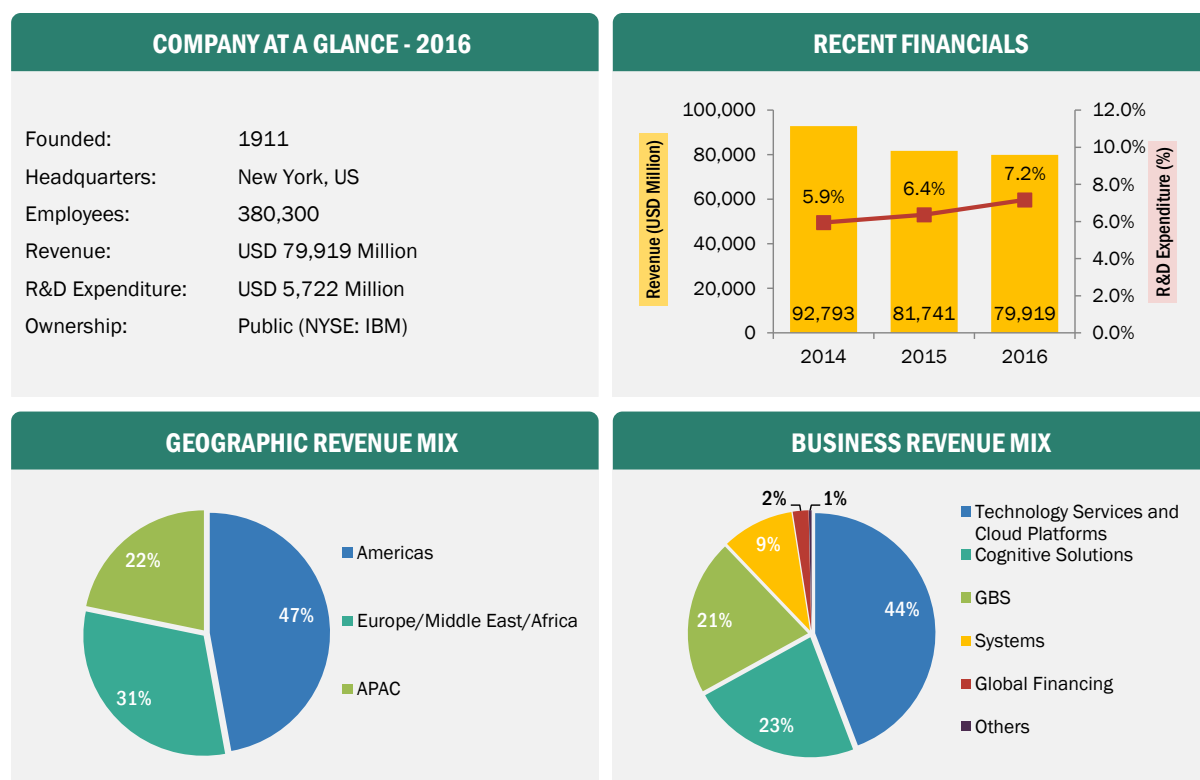
3 COMPANY PROFILES

3.1 IBM

3.1.1 OVERVIEW

Founded in 1911 and headquartered in New York, US, IBM is a global technology and consulting company. IBM's major operations consist of 5 business segments: Global Technology Services (GTS), Global Business Services (GBS), Software, Systems Hardware, and Global Financing. IBM offers a wide range of technology and consulting services to various industry verticals, such as government and defense; BFSI; healthcare; retail; IT and telecom; energy and utilities; automotive, and media and entertainment. With an employee size of 380,000, the company focuses on its R&D investments that are increasing Y-o-Y, and the R&D expenses for 2016 is said to be USD 5.7 billion. The company has a global presence and operates in more than 170 countries across North America, Europe, APAC, MEA, and Latin America.

FIGURE 6 IBM: COMPANY SNAPSHOT



Source: Annual Reports, SEC Filings, Press Releases, Investor Presentations, and MarketsandMarkets Analysis

3.1.2 STRENGTH OF PRODUCT PORTFOLIO

IBM provides several DevOps tools to carry out the API testing. Rational Integration Tester Starter edition is one such tool that provides tools for recording and testing the APIs, which are used on a regular basis.

The API Connect Developer Portal is also one of the features in IBM's API testing platform that permits consumers to test the APIs directly from the website. This feature may be enabled or disabled per-API basis.

IBM's API Manager UI tool has an integrated test tool. The tool helps in making a plan out of the testing process with its various test tool stages. The test tool then calls for the API and displays the result of that call.

Rational Integration Tester Starter Edition 9.1.0.1a is an innovation from IBM, along with other tools that provide server-based web application with a central repository for virtualized services. The IBM Rational Test Control Panel permits to make use of virtual services published with the IBM Rational Integration Tester to create, share, and deploy virtualized test environments in the IBM Rational Test Virtualization Server.

The combination of IBM Rational Test Virtualization Server and IBM Rational Integration Tester provides automated testing, resulting in continuous software testing to support the DevOps approach.

PARTICULARS	RATING
Breadth and Depth of Product Offering	● ● ● ●
Product Feature and Functionality	● ● ● ●
Product Differentiation and Impact on Customer Value	● ● ● ●
Product Quality and Reliability	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

3.1.3 BUSINESS STRATEGY EXCELLENCE

IBM has made significant strides in service virtualization as well as the API testing platform, since the first release of IBM Rational Test Workbench and IBM Rational Test Virtualization Server. IBM has been recognized as a leader in this field. The company empowers its customers to leverage on its flexible platform and gain momentum on their testing strategies. Looking forward to its organic growth strategy, the company has launched rational test workbench family tools in March 2016, in order to provide integration testing, functional testing, performance testing, and service virtualization to all of its customers. For a continued long-term growth, IBM enables teams to automate the testing of integration in complex application environments as well. IBM has a strong global presence in over 175 countries, enabling client relationships through a dedicated management focus for local clients and by addressing the new market opportunities.

Further, the company has expanded its geographical presence in order to enter into key markets and serve its global clientele efficiently.

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

3.1.4 RECENT DEVELOPMENTS

New Product Developments

Date	Segment	Product
March 2016	New Product Development	The Rational Test Workbench family tools provide integration testing, functional testing, performance testing, and service virtualization

Source: Press Releases

3.2 MICRO FOCUS (FORMERLY HPE SOFTWARE)

3.2.1 OVERVIEW

On September 1, 2017, Micro Focus announced the completion of its merger with Hewlett Packard Enterprise's (HPE) software business to create the seventh largest pure-play enterprise software company in the world (by revenue). Micro Focus (HPE Software), based in Newbury, UK., is a global enterprise software company focused on enabling customers to extend existing investments while embracing new technologies in a world of Hybrid IT.

COMPANY AT A GLANCE

Founded:	1976
Headquarters:	Berkshire, UK
Ownership:	Public

Note: This is a privately held company. Hence, no financial information is available in the public domain.

Source: Company Website

3.2.2 STRENGTH OF PRODUCT PORTFOLIO

Micro Focus has a wide range of product portfolio, catering to various verticals, such as financial, health and life sciences, manufacturing, Telecommunication, and media and entertainment. One of its industry leading products in the API testing market is Unified Functional Testing (UFT), which can be used for API automation, including REST and SOAP. UFT has the ability to functional test the UI for Quality Assurance (QA) professionals. API and web services testing, along with UI testing is possible with this single solution. Complex testing activities can be properly run with UFT with ease.

In the UFT 12.52 version of automated testing software, an innovation named API Test Generator was launched by HPE in order to enable users to test APIs. The API Test Generator Wizard helps create an API test rapidly from a Web Service Defined Language (WSDL) file that has network service descriptions, which may be document-oriented or procedure-oriented.

UFT's API testing features tests non-GUI applications and other API processes as well. Its broad features for creating a test represents the activities that the application performs and uses checkpoints to assess the success or failure of the test. UFT allows working on API, GUI, and business process tests from within a single application. This software supports a wide range of technologies, including the plug-in for the Jenkins and Hudson CI systems. Application Lifecycle Management provides an overall management for tests, requirements, and defects, while also giving visibility to all the stakeholders. UFT provides a common user interface that combines both products and features at the front end and merges separate tools. UFT also allows integrating the steps from GUI, API, and LoadRunner into 1 test script.

PARTICULARS	RATING
Breadth and Depth of Product Offering	● ● ● ● ●
Product Feature and Functionality	● ● ● ● ●
Product Differentiation and Impact on Customer Value	● ● ● ● ●
Product Quality and Reliability	● ● ● ● ●
Overall	● ● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

3.2.3 BUSINESS STRATEGY EXCELLENCE

Micro Focus has merged with HPE's software segment in September 2017. Micro Focus has its footprint globally and generates maximum revenue from the regions of the US and the UK. The company caters to various verticals, with its offerings to the public sector industries, service providers, and SMEs. The company has been following the strategy of forming partnerships, collaborations, and strategic alliances with various industry leaders, which has enabled it to expand the scope of its market coverage. In April 2016, HPE partnered with Restlet, a provider of API Platform as a Service (PaaS). This partnership brought in a new API testing feature to enable the API developers to test any RESTful API with a few clicks, which may include testing query parameters, security, and response codes. Any test created with DHC by Restlet can be saved in order to be reused, automated, or included in a broader functional test scenario, with the integration with HPE Systinet (one of the products of HPE used to manage the lifecycle of services).

The company's R&D activities are carried out as a part of its corporate investments segment. This includes designing and developing new technologies, products, and solutions to meet the changing needs of the customers in accordance with the emerging technological trends. Micro Focus spent about USD 180 Million in R&D activities to support and enhance its competitive position in the market. To accelerate the business goals, HPE's partner program includes solution providers, technology partners, service providers, and Original Equipment Manufacturers (OEMs).

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

3.2.4 RECENT DEVELOPMENTS

Partnerships

Date	Nature of Agreement	Company 1	Company 2	Synergy
April 2016	Partnership	Micro Focus (formerly HPE)	Restlet	HPE partnered with Restlet, a provider of API PaaS. This partnership was formed in order to integrate HPE Systinet, the leading API management software, and DHC by Restlet, a web-based testing tool for REST APIs, which enabled testing and validating the web APIs.
December 2015	Partnership	Micro Focus (formerly HPE)	Zerto	HPE partnered with Zerto to provide fully automatic disaster recovery failover testing by integrating Zerto Automated Failover Testing with HPE Operations Orchestration studio.

Source: Press Releases

3.3 SMARTBEAR SOFTWARE

3.3.1 OVERVIEW

SmartBear Software was founded in 1999 and is headquartered in Massachusetts, US. The company is one of the prominent leaders in QA tools and related services for IT teams, globally. The company's diverse application testing product portfolio helps application development teams to rapidly accelerate their coding processes. The company offers its diverse product range for API testing, UI testing, code review, and performance monitoring across mobile, web, and desktop applications to SMEs as well as large enterprises. The company's flagship platform offers unified monitoring capabilities for web applications, mobile application monitoring, transaction monitoring, and API monitoring.

COMPANY AT A GLANCE

Founded:	1999
Headquarters:	Massachusetts, US
Ownership:	Private

Note: This is a privately held company. Hence, no financial information is available in the public domain.

Source: Company Website

SmartBear is a privately held enterprise and has more than 350 employees. The company offers its solutions to various industries, such as BFSI, IT, healthcare, and education. Around 22,000 organizations across 194 countries use SmartBear products for QA and testing purpose.

3.3.2 STRENGTH OF PRODUCT PORTFOLIO

SmartBear Software offers a wide range of API testing products and solutions. SoapUI Pro is an API functional testing tool, which tests the functional capabilities of APIs. It is an automated API testing tool and provides command-line interfaces, so that API tests can run on a set schedule. SoapUI removes the barriers of writing the scripting code for testing APIs, as it features the point and click capabilities. It also features advanced security testing capabilities, which provides security scans while executing functional testing.

LoadUI Pro is an API load testing solution, which tests APIs on performance parameters. The performance parameters consist the traffic load that an API can handle. LoadUI Pro measures and gains insights into how much load an API can handle.

ServiceV Pro is a service virtualization solution, which enables the process of parallel development and testing that results in the faster development and testing. It also features the load testing feature without hampering the other services.

TestServer is another server-based API testing tool, which enables API testing in code. It provides the flexibility to write an API in the Integrated Development Environment (IDE), test the API in the code itself, and run it.

PARTICULARS	RATING
Breadth and Depth of Product Offering	● ● ● ●
Product Feature and Functionality	● ● ● ●
Product Differentiation and Impact on Customer Value	● ● ● ●
Product Quality and Reliability	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

3.3.3 BUSINESS STRATEGY EXCELLENCE

SmartBear Software is the one of the leading testing and QA solution providers, which excels in API testing, and monitoring solutions and services. The company has a large clientele, which includes governments, SMEs, and large enterprises, across the globe. The company receives its revenue by offering testing and QA products and services, including API testing, software testing, and monitoring. The company has a global reach with its offices set up in North America, Europe, and APAC.

It focuses on increasing its geographical reach, for which, it has involved into various partnerships as well as opened new offices globally. For instance, SmartBear recently opened a new APAC headquarters in Melbourne, Australia and also expanded its EMEA headquarters in Galway. SmartBear has partnered with companies, such as Revolution IT, Sogeti Switzerland, TechArcis Solutions, and Performance Lab, to strengthen its market position by increasing its geographical reach. Focusing on its inorganic growth strategy, the company has acquired CrossBrowserTesting, an automated cloud testing platform. The acquisition would enhance the offerings of SmartBear by adding the cloud testing platform to its product portfolio. Moreover, the company signed a partnership with Cigniti to jointly launch a software testing lab in Cigniti's headquarter in India. Cigniti would also focus on the distribution of SmartBear's testing and QA solutions, including the API Readiness platform across the US, the UK, India, Australia, and Canada.

Furthermore, SmartBear is highly focused on its organic growth strategies. Recently, the company constantly launched news testing solutions and updates to its solutions. The launch of new products and the focus on product enhancements have made SmartBear highly competitive in the API testing market.

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent
 ● ● ● ● = Very Good
 ● ● ● ● = Good
 ● ● ● ● = Average
 ● ● ● ● = Below Average

3.3.4 RECENT DEVELOPMENTS

New Version Launches, New Updates, and New Product Launches

Date	Segment	Product
May 2017	New Version Launch	SmartBear released a new version ServiceV Pro 2.0. The new version includes Java Database Connectivity (JDBC) Virtualization, which helps in speeding up the development and testing, and reduces the dependencies on the relational database.
October 2016	New Update	SmartBear released an update to Ready! API to overcome the security issue of APIs.
July 2016	New Version Launch	SmartBear released a new version of the API-Ready platform that enables Visual Studio developers to develop quality APIs directly in their workspaces.
March 2016	New Product Launch	SmartBear released Ready! API TestServer, an automated API testing solution that enables developers to quickly discover bugs and errors, and speed up the delivery quality of APIs.

Source: Press Releases

Partnerships/Acquisitions

Date	Nature of Agreement	Company 1	Company 2	Synergy
December 2016	Partnership	SmartBear Software	Wipro Limited	SmartBear Software entered into a partnership with Wipro, an IT, consulting, and business process services company. As per this partnership, Wipro would distribute SmartBear's testing tools and integrate the SmartBear technology into AssureNXT, which is a Wipro's next-generation managed services QA delivery platform.
June 2016	Partnership	SmartBear Software	Revolution IT	SmartBear Software entered into a partnership with Revolution IT to expand its presence in Australia. Revolution IT would deliver SmartBear's test solutions in Australia.

May 2016	Acquisition	SmartBear Software	CrossBrowserTesting	SmartBear acquired CrossBrowserTesting, an automated cloud testing platform. The acquisition would enhance the offerings of SmartBear by adding the cloud testing platform to its product portfolio.
February 2016	Partnership	SmartBear Software	Cigniti Technologies	SmartBear and Cigniti Technologies entered into a partnership for setting up a joint software testing lab in India.
January 2016	Partnership	SmartBear Software	TechArcis Solutions	SmartBear Software entered into a partnership with TechArcis Solutions, a QA and testing solutions provider, to globally distribute SmartBear's testing and QA solutions.
December 2015	Partnership	SmartBear Software	Performance Lab	SmartBear Software entered into a partnership with Performance Lab, a software testing company, to increase the reach of SmartBear's testing and QA solutions in North America and Russia.
December 2015	Partnership	SmartBear Software	Sogeti Switzerland	SmartBear signed a partnership with Sogeti Switzerland, a provider of technology and software testing solutions, to increase the distribution of SmartBear's API-Readiness and software testing solutions in Switzerland.
March 2015	Acquisition	SmartBear Software	Swagger API Open Source Project	SmartBear Software acquired Swagger API Open Source Project from Reverb Technologies. It is an API description format, used by developers to design and deliver APIs

Source: Press Releases

3.4 PARASOFT

3.4.1 OVERVIEW

Parasoft was founded in 1987 and is headquartered in California, US. The company is a global provider of automated testing tools that perform comprehensive testing and analytical tasks. Parasoft has a diverse clientele base, which ranges from medium-sized businesses and customers to enterprises with a presence in all the major industry verticals, such as aerospace, automotive, communications, energy and utilities, finance, healthcare, industrial automation, medical devices, and the public sector. The company provides its customers with professional services, which includes training services to integrate the testing solutions into an organization's workflow. The company has more than 10,000 customers worldwide, which includes Bank of America, Boeing, Cisco, Disney, HP, IBM, and AT&T.

COMPANY AT A GLANCE

Founded:	1987
Headquarters:	California, US
Ownership:	Private

Note: This is a privately held company. Hence, no financial information is available in the public domain.

Source: Company Website

3.4.2 STRENGTH OF PRODUCT PORTFOLIO

Parasoft's API testing solution includes functional, load, security testing, and test data management. Parasoft's core API testing solution integrates with service virtualization and test environment management via Parasoft Virtualize, and reporting and analytics via Parasoft Development Testing Platform (DTP). With these solutions, Parasoft has a strong presence in the API testing market, facilitating various scenarios for testing APIs on different parameters, such as security, load, performance, and web UI.

Parasoft SOAtest is the company's enterprise solution for API testing and API integrity. The solution has a user-friendly interface and can test composite applications to perform automated end-to-end testing. Its API security testing tests APIs at the message layer and the web UI level. It performs penetration testing to check the risks and vulnerabilities in an API. Parasoft also provides runtime error detection and service virtualization tools for testing the API in a realistic test environment.

PARTICULARS	RATING
Breadth and Depth of Product Offering	● ● ● ●
Product Feature and Functionality	● ● ● ●
Product Differentiation and Impact on Customer Value	● ● ● ●
Product Quality and Reliability	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

3.4.3 BUSINESS STRATEGY EXCELLENCE

A recognized leader in testing solutions, Parasoft has a global presence across software development and IT companies. The company empowers its customers through its innovative testing solutions that help in automating time-consuming tasks.

The company focuses on strengthening its expertise in the API testing market for targeted industries. To do so, Parasoft has launched various new testing solutions. In June 2017, the company launched a new release of API testing and Service Virtualization solution for the Microsoft Visual Studio Enterprise Subscribers. In February 2017, the company enhanced its product portfolio with the launch of continuous testing solutions for the IoT. The company focuses on expanding its presence in the key markets to serve its global clientele. The company has offices in Poland, Germany, the Netherlands, Sweden, the UK, China, India, and Singapore. In line with its strategy of focusing on targeted industries and engaging stakeholders, it has offices across the globe to deliver automated testing solutions to its clients present worldwide.

The company's global partnership program, the Parasoft Partner Program, includes various leading IT organizations that use Parasoft testing solutions and its technological support. The partnership program has helped Parasoft provide automated testing and analytics solutions for its clients and customers.

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

Source: MarketsandMarkets Analysis

3.4.4 RECENT DEVELOPMENTS

New Product Launches

Date	Segment	Product
March 2017	New Product Launch	Parasoft launched Parasoft Virtualize/SOAtest Professional Desktop for Visual Studio 2017 Enterprise. The product enables software developers and testers to carry out API testing and virtualization, which in turn would enhance Microsoft's testing tool portfolio.
February 2017	New Product Launch	Parasoft launched a free new Service Virtualization Community Edition for its customers. This edition creates the environment to test the messaging and behavior of the dependent multi-tiered systems.

Source: Press Releases

3.5 TRICENTIS

3.5.1 OVERVIEW

Founded in 2007 and headquartered in Vienna, Austria, Tricentis is a provider of continuous testing software tools for enterprises. The company provides automated software testing solutions for enterprises applications, such as APIs, UI, data, and mobile. The company has a global presence and caters to industries, such as BFSI, public services and government, IT, manufacturing, media and entertainment, energy and utilities, and retail.

COMPANY AT A GLANCE

Founded:	2007
Headquarters:	Vienna, Austria
Ownership:	Private

Note: This is a privately held company. Hence, no financial information is available in the public domain.

Source: Company Website

3.5.2 STRENGTH OF PRODUCT PORTFOLIO

Tricentis has marked its presence in the software automation testing tools and services domain, with its core testing solution, Tricentis Tosca. Tricentis Tosca is a continuous testing platform that provides automated testing support for various enterprise applications, such as APIs, mobile, Business Intelligence (BI) and big data, SAP, and UI. Tricentis Tosca enables software testers to test their APIs without any scripting language. It helps in define API tests in a business-readable interface. It also supports SOAP and RESTful APIs. The solution helps in optimizing API tests as well as risk-based testing in providing information about the critical tests.

Tricentis Tosca allows testers to use the previously build SoapUI tests into it. The resulting API test cases have the flexibility to be used across multi-channel for end-to-end tests. Tosca supports a wide range of different definition languages, transport protocols, and message formats and standards for API testing.

Tricentis also provides multi-stage training services that help in implementing the Tricentis Tosca test suite. The company provides its customers with comprehensive implementation services, which include creating test cases, process optimization, and test automation.

PARTICULARS	RATING
Breadth and Depth of Product Offering	●●●●
Product Feature and Functionality	●●●●
Product Differentiation and Impact on Customer Value	●●●●
Product Quality and Reliability	●●●●
Overall	●●●●

PENETRATION RATING :

●●●● = Excellent ●●●● = Very Good ●●●● = Good ●●●● = Average ●●●● = Below Average

3.5.3 BUSINESS STRATEGY EXCELLENCE

Tricentis focuses on strengthening its expertise in the API testing market for targeted industries, and to do so, it continues to make acquisitions, partnerships, and collaborations with significant industry players, as well as, IT organizations. The company has its presence in North America, EMEA, and APAC. In August 2016, the company opened a new office in Pune, India, to strengthen its presence in the APAC region.

Tricentis has adopted inorganic growth strategies, such as partnerships, acquisitions, and mergers to strengthen its market presence and enhance its product, Tricentis Tosca. Recently, in July 2017, the company acquired Flood IO for enhancing its load testing and performance testing portfolio. With the help of the partnership strategy, the company tries to increase its customer base. It caters to various industry verticals, such as BFSI, public services and government, IT, manufacturing, media and entertainment, energy and utilities, and retail.

PARTICULARS	RATING
Geographic Footprint	●●●●●
Effectiveness of Organic Growth Strategy	●●●●●
Breadth of Application/Vertical Served	●●●●●
Merger and Acquisition Strategy	●●●●●
Overall	●●●●●

PENETRATION RATING :

●●●●● = Excellent ●●●●● = Very Good ●●●●● = Good ●●●●● = Average ●●●●● = Below Average

3.5.4 RECENT DEVELOPMENTS

Partnerships/Acquisitions

Date	Nature of Agreement	Company 1	Company 2	Synergy
July 2017	Acquisition	Tricentis	Flood IO	Tricentis acquired Flood IO, an open source load testing platform for DevOps. The acquisition helps Tricentis in enhancing its load testing and performance testing portfolio.
November 2016	Partnership	Tricentis	Cognizant	Tricentis partnered with Cognizant, a leading software company. This partnership enabled both the companies to deliver Tosca to their commercial clients.
June 2016	Partnership	Tricentis	SEED Infotech	Tricentis partnered with SEED Infotech, a solution provider in IT training services. This partnership aimed at developing next-generation automation testers.
September 2015	Partnership	Tricentis	TCS	Tricentis partnered with TCS, a leading IT services, consulting, and business solutions organization, to provide both their customers with high-quality testing solutions for their enterprises.

July 2015	Partnership	Tricentis	Electric Cloud	Tricentis partnered with Electric Cloud, a continuous delivery and DevOps automation company. This partnership aimed at developing a product integration that continuously improves the delivery of software development using automated testing
March 2015	Partnership	Tricentis	Infosys	Tricentis and Infosys entered into a partnership. This partnership resulted in developing automated QA and testing solutions and benefited both the companies.

Source: Press Releases

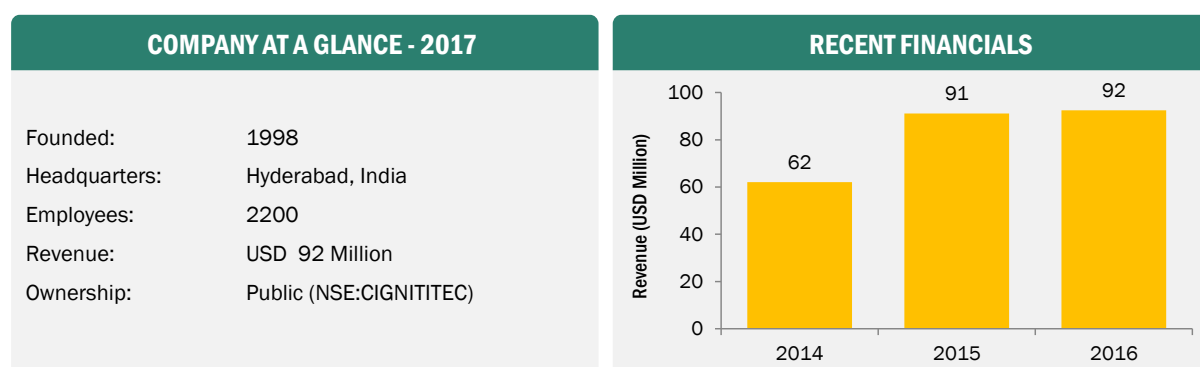
3.6 CIGNITI

3.6.1 OVERVIEW

Founded in 1998 and headquartered at Hyderabad, India, Cigniti Technologies Limited is the one of the leading independent software testing services provider. As of March 2017, the company has more than 2,200 employees. Cigniti is a public company listed in NSE with ticker symbol CIGNITITEC.

The company comprises of more than 350 clients which are present in about 13 countries across the globe. Cigniti's testing and QA services which caters to SMEs to large scale enterprises spanning industry verticals such as airlines, BSFI, communications energy and utilities, and retail.

FIGURE 7 CIGNITI: COMPANY SNAPSHOT



Source: Annual Reports, SEC Filings, Press Releases, Investor Presentations, and MarketsandMarkets Analysis

3.6.2 STRENGTH OF PRODUCT PORTFOLIO

Cigniti Technologies is an independent software testing service provider. It offers various different type of testing services such as functional testing, performance testing, compatibility testing, regression testing, security testing, ERP testing, and selenium testing. In quality engineering aspect, the company provides agile testing, DevOps testing, service virtualization and test data management.

Cigniti's API testing and service virtualization services enable developers to lower down their overall IT cost and ensure proper utilization of resources. Service virtualization services help the enterprises to simulate and manage the test environment. Service Virtualization roadmap starts with conducting the proof of value (POV) which includes Return on Investment (ROI) analysis, challenges assessment, tool evaluation, and development of service virtualization and acceptance of the testing approach.

PARTICULARS	RATING
Breadth and Depth of Product Offering	● ● ● ●
Product Feature and Functionality	● ● ● ●
Product Differentiation and Impact on Customer Value	● ● ● ●
Product Quality and Reliability	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

3.6.3 BUSINESS STRATEGY EXCELLENCE

Cigniti Technologies has its presence in the North America, Europe, MEA, and APAC and it has been categorically focusing on expanding its foothold in the emerging markets, by enabling its services availability through regional distributors, channel partners, resellers, service partners, and technology partners. The company caters to various verticals, such as BFSI, healthcare, retail, utilities, IT and telecommunications, travel & hospitality, education, and government industries. The company focuses on both organic as well as inorganic growth strategies as a part of its core development strategy in the API testing market. The company has very strong team of R&D which continuously work to competitive advantage of its software testing service business.

With its vision to help companies improve the quality of the software being delivered Cigniti focuses on both organic as well as inorganic growth strategies as a part of its core development strategy in the API testing market. During the financial year, 2016, the company entered into strategic partnership with 10 leading tool vendors. These partnerships would strengthen Cigniti's service offerings portfolio to cater to the diverse needs and challenges of the customers. For instance, in February 2016, Cigniti partnered with SmartBear Software for setting up of joint software testing lab in India. Cigniti works very closely with the leading API & Service Virtualization tool vendors like CA, Smartbear, Parasoft, HP, Tricentis to help the clients achieve their digital transformation initiatives to succeed and make a mark in the API Economy. For instance, Cigniti has helped Europe's first Digital only bank to successfully launch their services within 18 months time of acquiring banking licences, by ensuring a high quality mobile & web applications through Cigniti's testing services including API Testing, Test Automation and Performance Testing. For a very large operator in consumer financing in US, Cigniti implemented Service Virtualization and have contributed to their product releases across various states with a quick turnaround time.

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent
 ● ● ● ● = Very Good
 ● ● ● ● = Good
 ● ● ● ● = Average
 ● ● ● ● = Below Average

3.6.4 RECENT DEVELOPMENTS

Partnerships

Date	Nature of Agreement	Company 1	Company 2	Synergy
February 2016	Partnership	Cigniti Technologies	SmartBear Software	Cigniti Technologies and SmartBear entered into a strategic partnership for setting up of joint software testing lab in India.
March 2015	Partnership	Cigniti Technologies	Tricentis	Cigniti Technologies partnered with Tricentis, a continuous testing software solution provider. Through this partnership, Cigniti benefited from Tricentis Tosca, an end-to-end continuous testing suite that helped in reducing cost and increased efficiency in quality assurance.

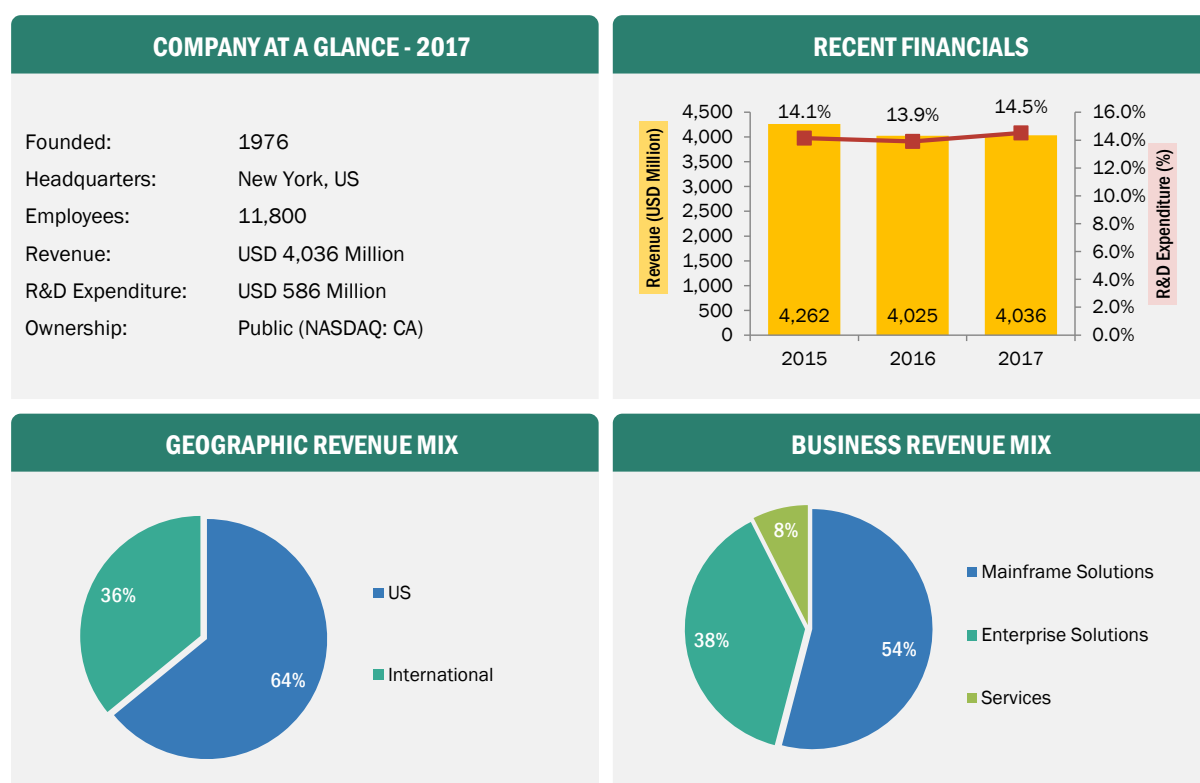
Source: Press Releases

3.7 CA TECHNOLOGIES

3.7.1 OVERVIEW

CA Technologies was founded in 1976 and is headquartered in New York, US. CA Technologies provides enterprise IT management software and solutions that help customers manage and secure complex IT environments. The company offers solutions across the service lifecycle, which ranges from portfolio planning and service modeling in pre-production to service assembly, assurance, automation, testing, and management in production. API testing is one such solution, which acts as an open platform that uses a proper workflow model and makes it easy to build tests for APIs. It caters to industry verticals, such as the finance and public sector, healthcare, telecom, insurance, and IT services. It is present in North America, Europe, APAC, MEA, and Latin America.

FIGURE 8 CA TECHNOLOGIES: COMPANY SNAPSHOT



Source: Annual Reports, SEC Filings, Press Releases, Investor Presentations, and MarketsandMarkets Analysis

3.7.2 STRENGTH OF PRODUCT PORTFOLIO

CA Technologies has registered its presence in the API testing market with its CA Application Test and CA Service Virtualization. CA delivers tools for developing, managing, and testing APIs simultaneously with automation and incorporation of API tests into a continuous delivery cycle. The tool can be used for generating functional, regression, and performance tests for APIs and applications. CA works on agile management, DevOps, and security solutions to build a common technology stack across several product lines. The company strides toward building new solutions with an approach to make it easier, faster, and more efficient for its end-users.

CA Service Virtualization is one of the parts in API testing, which solves access issues associated to third-party APIs and systems by capturing and modeling them as virtual services. CA's virtualized versions are low-cost and 24/7 alternatives that can be used for functional and performance testing. For customers, CA API service virtualization produces applications with better and faster quality, while also saving on the

development and testing costs for third-party APIs, systems, and services. The customers can conduct performance tests with each individual component, identify issues at the beginning of the lifecycle, and eliminate them. For developers, service virtualization helps in creating their own private environments for developing codes, which they can test for performance, without incurring higher costs from third-party partners. Each component can be tested individually instead of waiting for the complete assembly. Then after, regression testing takes place as soon as one component is tested. CA application testing integrated with CA Service Virtualization enables generating functional, regression, and on-the-process and performance tests for APIs and applications.

PARTICULARS	RATING
Breadth and Depth of Product Offering	●●●●
Product Feature and Functionality	●●●●
Product Differentiation and Impact on Customer Value	●●●●
Product Quality and Reliability	●●●●
Overall	●●●●

PENETRATION RATING :

●●●● = Excellent ●●●● = Very Good ●●●● = Good ●●●● = Average ●●●● = Below Average

3.7.3 BUSINESS STRATEGY EXCELLENCE

CA Technologies is a recognized leader in the API testing market and has its presence globally, among which, the US alone generates around 64% of its revenue. It caters to the verticals of financial services, healthcare, manufacturing and automotive, public sector, retail, service providers, and telecom. The company empowers its customers to leverage on its flexible platform and gain momentum on the testing services.

The company adheres to its organic growth strategy and the result has been quite effective; as of June 2016, the company launched an edition on Automation Continuous Delivery, which enabled development teams to automate virtual services and API tests that are needed to support the quick development of composite applications and micro services. CA focuses on strengthening its expertise in the API testing market with various partnerships and acquisitions. In August 2014, CA partnered with Wipro to leverage the expanded portfolio of CA Technologies, including service virtualization, release automation/continuous delivery, continuous validation, and continuous monitoring solutions, to enable customers to enhance their application development and delivery processes with a DevOps strategy. In October 2016, the company acquired BlazeMeter, a company that provides a platform to run sophisticated, large-scale performance, and load tests rapidly. This acquisition enabled CA Technologies to leverage its footprints in the API testing platform. With these partnerships and acquisitions, the company primarily focuses on API management, particularly in service virtualization, testing automation, and test data management. In July 2015, it partnered with SmartBear, a top leader in the API testing platform, which proved to be a great business strategy for CA, as this brought about the merging of Ready! API, a product of SmartBear, with CA's testing platform, leading to benefit the API providers and consumers, who use both the SOAP and REST APIs.

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

3.7.4 RECENT DEVELOPMENTS

New Product Launches and New Edition Launches

Date	Segment	Product
June 2016	New Edition Launch	The new edition, Automation Continuous Delivery enables the development teams to automatically create virtual services and API tests, which are needed to support the rapid development of composite applications and micro services.
February 2014	New Product Launch	CA Technologies' new product, Management Cloud for Mobility was launched to accelerate mobile application delivery, thereby resulting in easy building and testing of rich API-based mobile applications.

Source: Press Releases

Partnerships/Acquisitions

Date	Nature of Agreement	Company 1	Company 2	Synergy
March 2017	Partnership	CA Technologies	Perficient, Inc.	CA Technologies partnered with Perficient to provide industry leading services in order to manage enterprise scale APIs.
October 2016	Acquisition	CA Technologies	BlazeMeter	CA Technologies acquired BlazeMeter in order to leverage its DevOps portfolio. This acquisition improved CA's capability in performance and load testing, a part of the continuous delivery strategy.
May 2016	Partnership	CA Technologies	ZAP Technologies International, Inc.	CA Technologies entered into a partnership with ZAP. ZAPTEST, which is a new generation software test automation solution of ZAP, integrated with CA Agile Central, for agile software development on an enterprise-class SaaS platform
July 2015	Partnership	CA Technologies	SmartBear Software	CA Technologies partnered with SmartBear Software, a leader in software quality tools, in order to release a new plug-in for Ready! API. This new plug-in enables users to import APIs from developer portals, managed by CA Technologies, to test and virtualize RESTful and SOAP

services.

August
2014

Partnership

CA
Technologies

Wipro Limited

CA Technologies and Wipro, a leading global IT and consulting company, expanded their partnership to deliver next-generation DevOps solutions for testing jointly.

Source: Press Releases

3.8 INFOSYS

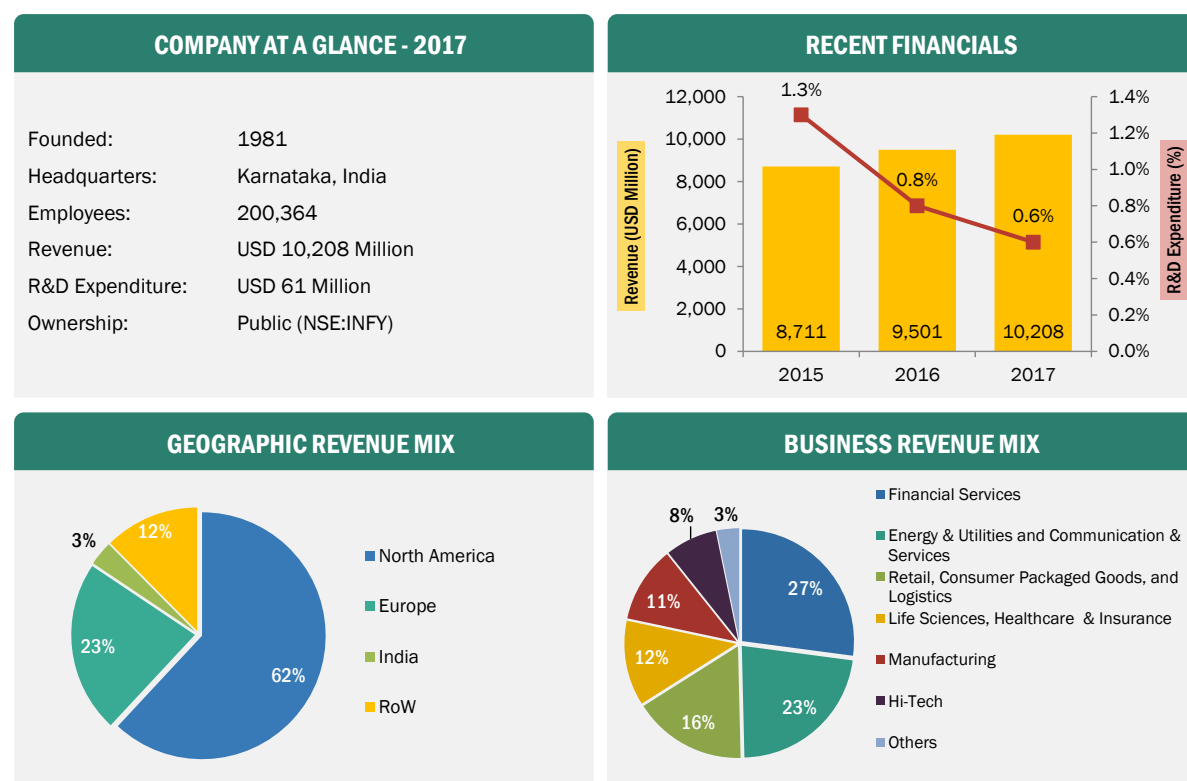
3.8.1 OVERVIEW

Infosys was founded in 1981 and is headquartered in Karnataka, India. Infosys is a global leader in technology services and consulting. As of March 31, 2017, the company had more than 2,00,364 employees, working in over 45 countries across the globe. The company is a public traded company, listed on the New York Stock Exchange, under the ticker symbol INFY.

Infosys provides its offerings to multiple verticals, such as Financial Services and Insurance (FSI); Manufacturing (MFG) and hi-tech; energy and utilities; Communication and Services (ECS), Retail, Consumer Packaged Goods, and Logistics (RCL); and Life Science and Healthcare (LSH). The service portfolio of the company includes business IT services, consulting and system integration, outsourcing, and next-generation testing services. The business IT services offered by the company comprises application development and maintenance, infrastructure management, engineering services, lifecycle solutions, and business process management. The consulting and system integration segment extends to enterprise solutions, system integration, and advanced technologies. The company's testing services offer edge testing, protocol and interoperability testing, security and privacy testing, network impact testing, performance and real-time testing, and end-user application testing for its extended clientele across the globe.

Infosys' product segment provides various solutions for verticals, such as aerospace and defense, airlines, automotive, communication services, industrial manufacturing, logistics and distribution, education, energy management, financial services, government, healthcare, and hospitality. The company has its presence across the regions of North America, APAC, MEA, Europe, and Latin America.

FIGURE 9 INFOSYS: COMPANY SNAPSHOT



Source: Annual Reports, SEC Filings, Press Releases, Investor Presentations, and MarketsandMarkets Analysis

3.8.2 STRENGTH OF PRODUCT PORTFOLIO

Infosys provides extensive solutions for the API testing market. It also provides a validation field that caters to functional and non-functional issues of API. The company addresses these issues with its customized processes, tools, and skilled personnel. The major component in Infosys' API testing and validation offering includes Infosys API Test Platform and the Service Virtualization solution.

Infosys API Test Platform is a scalable and customizable platform that facilitates automation in progression and regression testing. It is robust framework that can easily adopt changes with change in API technologies. The platform supports progressive functional automation and can be integrated with continuous integration tools. It supports common security standards in the API environment that makes it suitable for agile and DevOps models.

Its Service Virtualization solution provides a virtual environment to test the components that make the test environment simple when other tools are used with it.

Infosys provides technical support services in API testing with an API testing competency center. The API testing competency center consists of skilled professionals, who perform the testing with a combination of various technologies and tools.

PARTICULARS	RATING
Breadth and Depth of Product Offering	●●●●
Product Feature and Functionality	●●●●
Product Differentiation and Impact on Customer Value	●●●●
Product Quality and Reliability	●●●●
Overall	●●●●

PENETRATION RATING :

●●●● = Excellent ●●●● = Very Good ●●●● = Good ●●●● = Average ●●●● = Below Average

3.8.3 BUSINESS STRATEGY EXCELLENCE

Infosys is one of the recognized leaders in IT services and consulting. The company comprises a vast portfolio of validation solutions. The company has made a remarkable position in validation and testing solutions as well. For retaining its position in the API testing market, the company has adopted inorganic growth strategies, such as partnerships, alliances, and agreements with key industry players and technological organizations. Infosys has also undertaken alliances with various leading validation and testing service providers, such as CA Technologies, Dynatrace, HPE, Neotys, pCloudy, Perfecto, Preenos, Skytap, SmartBear, and Tricentis. In 2017, Infosys entered into a partnership with SmartBear, a leading API testing solutions provider. The partnership would help both the companies to develop a collaborative solution by utilizing their technical expertise. The resulting solution would help customers by providing a higher quality software. Another instance of the inorganic growth strategy is Infosys' partnership with Tricentis, a leading IT service and consulting provider.

It is believed that Infosys consistently spends a part of its revenue in R&D activities to develop innovative IT solutions and services. Such R&D activities help strengthen the product portfolio of the company, which enhances its position in the market.

Further, the company expands its geographical presence in order to enter into key markets and serve its global clientele efficiently. With the objective to engage its clients and partners effectively, Infosys opened an innovation center with Oracle in Oracle's headquarters. In alignment with the company's strategy to focus on targeted industries and engage its stakeholders effectively, the center develops innovative IT solutions and services.

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent
 ● ● ● ● = Very Good
 ● ● ● ● = Good
 ● ● ● ● = Average
 ● ● ● ● = Below Average

3.8.4 RECENT DEVELOPMENTS

Partnerships

Date	Nature of Agreement	Company 1	Company 2	Synergy
July 2017	Partnership	Infosys	SmartBear Software	Infosys entered into a partnership with SmartBear, a provider of software quality tools. The partnership aims at developing collaborative testing solutions with the integration of technical expertise of both the companies, to provide a higher quality software to customers.
March 2015	Partnership	Infosys	Tricentis	Infosys and Tricentis entered into a partnership to jointly develop automated QA and testing solutions.

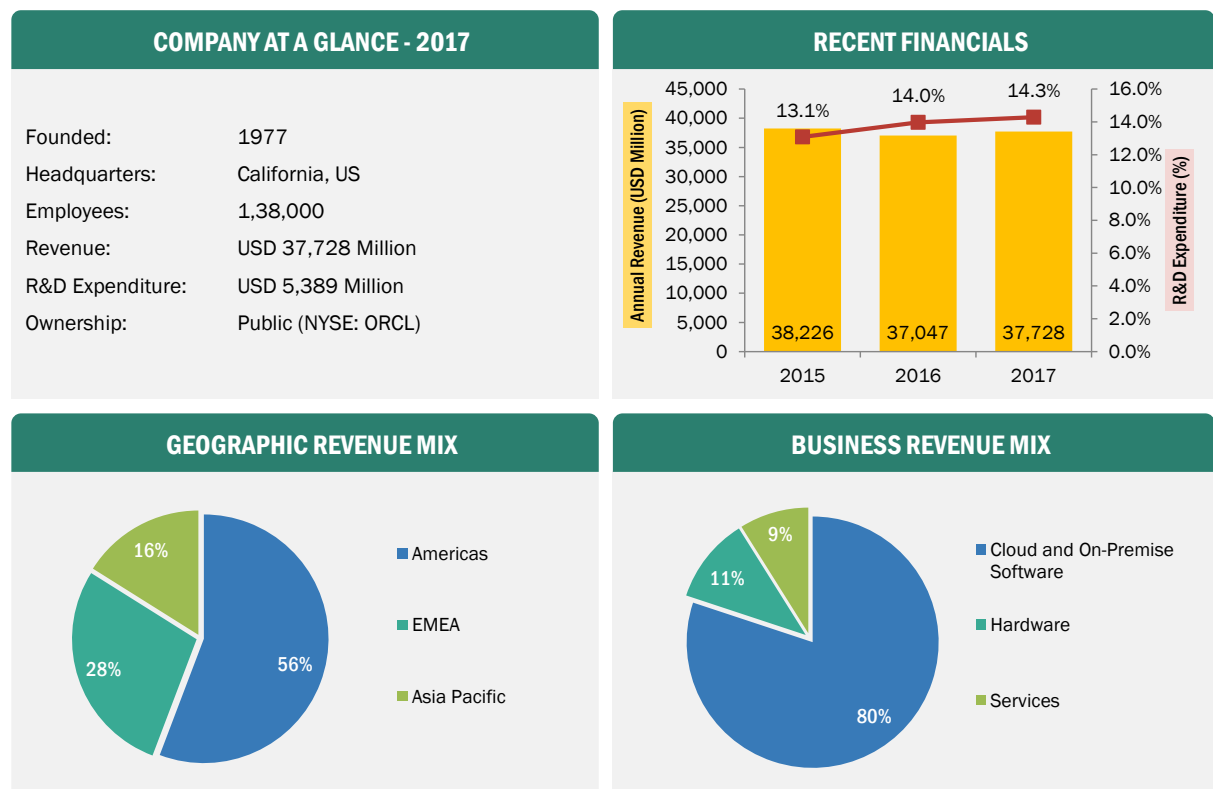
Source: Press Releases

3.9 ORACLE

3.9.1 OVERVIEW

Oracle was founded in 1977 and is headquartered in California, US. The company's major operating business segments include software and cloud, hardware systems, and services. In January 2017, Oracle acquired Apiary, an API design and collaboration company, in order to strengthen its API integration cloud. The acquisition enabled Oracle to play as the leader in API testing, while also being able to deliver the product segment of Apiary. Oracle serves a diverse clientele base, ranging from midsize businesses and customers to enterprises. It caters to major verticals, such as education, utilities, BFSI, healthcare, oil and gas, and retail. The company offers its solutions to its customers present across 145 countries, in the regions of Americas, APAC, and MEA.

FIGURE 10 ORACLE: COMPANY SNAPSHOT



Source: Annual Reports, SEC Filings, Press Releases, Investor Presentations, and MarketsandMarkets Analysis

3.9.2 STRENGTH OF PRODUCT PORTFOLIO

Oracle has been globally distinguished as a prominent vendor for its software and cloud service offerings. The company's wide range of product offerings empowers it to cater to a diverse set of industry verticals. With a better understanding of the evolving market trends in cloud, analytics, mobility, software, security, and testing, the company has been developing customized client-centric solutions, precisely pertaining to the demands of its customers. Oracle's focus continues to be on continually innovating products and services. The acquisition of Apiary in January 2017 enabled the company to widen its API testing platform offerings. Apiary's tool consists of automated testing, which is an important part of the API testing lifecycle. The tool inspects requests/responses and continuously integrates the post deployment testing of APIs, which makes it the most reliable for API consumers. Continuous API testing makes use of command line tools, such as API Blueprint and Dredd, which follow a step-by-step process to validate APIs. Apiary also provides a test reporter and continuous API testing tools that simplify the navigation and investigation of

the whole testing process. Oracle, in its enterprise manager cloud administration guide, provides a detailed architecture of testing as a service for the REST APIs. The company consists of a Java Database Connectivity (JDBC) API test suite, which is quite comprehensive and consists tests useful for testing a driver based on JDBC technology for its conformance to the requirements of the Java 2 Platform Enterprise Edition (J2EE).

PARTICULARS	RATING
Breadth and Depth of Product Offering	●●●●
Product Feature and Functionality	●●●●
Product Differentiation and Impact on Customer Value	●●●●
Product Quality and Reliability	●●●●
Overall	●●●●

PENETRATION RATING :

●●●● = Excellent ●●●● = Very Good ●●●● = Good ●●●● = Average ●●●● = Below Average

3.9.3 BUSINESS STRATEGY EXCELLENCE

Oracle has been globally recognized as a distinguished provider of hardware, software, and services. The company has been competently catering to a diverse set of industry verticals for over 3 decades now. The company is said to have spent USD 5.3 billion in 2017 on its R&D, to comprehensively enhance its existing product portfolios and also develop newer offerings for the API testing market. Oracle has been categorically focusing on expanding its foothold to newer markets by enabling its product availability through regional distributors, channel partners, resellers, education providers, network integrators, and independent software vendors. Further, to increase its product outreach and extend its business portfolio to different markets, the company primarily follows the strategy of partnerships and acquisitions. For instance, it acquired Apiary in January 2017, thereby strengthening its API portfolio of products. The acquisition enabled Oracle to offer a suite of tools for the other companies to build web APIs quickly, along with testing and monitoring capabilities. Earlier, Oracle had acquired e-TEST suite products from Empirix. The acquisition of e-TEST suite strengthened the Oracle Enterprise Manager with the application load and functional testing technology, thereby providing a higher quality of applications at a reduced cost.

Oracle's focus continues to be on innovating new products and services, and on expanding its customer base. The new testing service expansion by Oracle (Apiary) in August 2015 is the first of its kind to provide a single source for continuous API testing in the development process, eliminating the manual generation of verification tests and decreasing the time and resources spent in managing the external testing applications.

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

3.9.4 RECENT DEVELOPMENTS

New Product Developments

Date	Segment	Product
May 2017	New Service Launch	API platform cloud service is a part of the Oracle Cloud platform, which has the capability of delivering end-to-end test, as well as, competencies for designing, documenting, prototyping, and testing for simple and critical APIs.

Source: Press Releases

Partnerships/Acquisitions/Product Expansions

Date	Nature of Agreement	Company 1	Company 2	Synergy
January 2017	Acquisition	Oracle	Apiary	Oracle acquired Apiary, an API design and documentation company, in order to strengthen its API integration cloud.
November 2016	Partnership	Apiary	API Fortress	Apiary partnered with API Fortress, a leading provider of API monitoring and test solutions. This partnership enabled their mutual customers with the ability to have an end-to-end testing throughout the API development lifecycle.
August 2015	Product Expansion	Apiary	NA	Apiary expanded its API development platform with a new API testing service (advanced API testing for continuous integration), which enabled developers to verify local code changes, alongside production implementation continuously.
August 2014	Partnership	Apiary	SmartBear Software	Apiary entered into a partnership with SmartBear to develop a new plug-in for SoapUI Pro that provides support for Apiary's API Blueprint service descriptions within the tool.

Source: Press Releases

3.10 QUALITYLOGIC

3.10.1 OVERVIEW

QualityLogic was found in 1986 and is headquartered in Idaho, US. The company provides QA products and services to various industries, such as retail and eCommerce, media and entertainment, social and dating, marketing and design, smart energy, utilities imaging and 3D printing, telecom, and education. It is a privately held enterprise, which has its geographic reach in North America, Europe, and APAC.

COMPANY AT A GLANCE

Founded:	1986
Headquarters:	Idaho, US
Ownership:	Private

Note: This is a privately held company. Hence, no financial information is available in the public domain.

Source: Company Website

3.10.2 STRENGTH OF PRODUCT PORTFOLIO

QualityLogic provides an extensive breadth of testing and QA services for mobile apps, web, eCommerce, Over-The-Top (OTT) and streaming media, analytics and telemetry, APIs, IoT, smart energy standards print systems, and fax and fax over IP. The company offers a full spectrum API testing services that are intended to check for API failures, which can impact the business revenue. To overcome the challenges in APIs, the company provides functional and performance/load testing services. QualityLogic supports a plethora of technologies, which include REST, Atom, GData, Rich Site Summary (RSS), eXtensible Markup Language (XML)-Remote Procedure Call (RPC), Keyhole Markup Language (KML), JavaScript Object Notation (JSON), KML-GeoRSS, OpenSearch, Resource Description Framework (RDF), Yet Another Markup Language (YAML). QualityLogic provides support, in which QA engineers work with the development team to fully validate and test APIs for finding bugs and fixing them.

PARTICULARS	RATING
Breadth and Depth of Product Offering	●●●●
Product Feature and Functionality	●●●●
Product Differentiation and Impact on Customer Value	●●●●
Product Quality and Reliability	●●●●
Overall	●●●●

PENETRATION RATING :

●●●● = Excellent ●●●● = Very Good ●●●● = Good ●●●● = Average ●●●● = Below Average

3.10.3 BUSINESS STRATEGY EXCELLENCE

QualityLogic serves as a key player in software testing tools and services. The company has a prominent presence in North America, with 3 offices. QualityLogic is present in Europe and APAC, along with its international authorized distributors. To strengthen its product portfolio and market presence, the company follows the inorganic growth strategy, for which it undertakes partnerships, and alliances and agreements with international distributors and resellers, and development partners. The company has been into

strategic alliance with various leading IT companies, such as SmartBear Software, Software Imaging, Microsoft, and Surf Communications Solutions.

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent
 ● ● ● ● = Very Good
 ● ● ● ● = Good
 ● ● ● ● = Average
 ● ● ● ● = Below Average

3.11 RUNSCOPE

3.11.1 OVERVIEW

Runscope was founded in 2013 and is headquartered in California, US. The company provides API performance monitoring, testing, and debugging tools. The company has a wide clientele, which consists of some leading global enterprises, such as Twilio, Samsung, Adobe, Microsoft, and Chater Communications. Runscope is a privately held enterprise.

COMPANY AT A GLANCE

Founded:	2013
Headquarters:	California, US
Ownership:	Private

Note: This is a privately held company. Hence, no financial information is available in the public domain.

Source: Company Website

3.11.2 PRODUCT OFFERING SCORECARD

Runscope provides API monitoring and testing solutions to check and prevent the errors in the APIs, so that it would not affect business-critical functions. Its API monitoring solution features uptime monitoring, data validation, live traffic alert, and collaboration. Uptime monitoring provides information to service providers about the downtime of API, so that corrective measures can be initiated. Data validation is a simple tool that tests the data, which the API is returning. It helps develop simple tests with dynamic data for complex use cases. Live traffic alert maintains logs for live API traffic and API transaction failures, and exceptions in near real time. Runscope offers API monitoring and testing solutions in 4 packages; small, medium, large, and customized, based on the number of API requests it can handle.

PARTICULARS	RATING
Breadth and Depth of Product Offering	●●●●
Product Feature and Functionality	●●●●
Product Differentiation and Impact on Customer Value	●●●●
Product Quality and Reliability	●●●●
Overall	●●●●

PENETRATION RATING :

●●●● = Excellent ●●●● = Very Good ●●●● = Good ●●●● = Average ●●●● = Below Average

3.11.3 BUSINESS STRATEGY SCORECARD

Runscope has customized solutions for API monitoring and testing. The company focuses on both on organic and inorganic growth strategies. The company provides innovative solutions in the API monitoring and testing domain, due to which it has bagged some of the renowned customers, such as Twilio, Samsung, Adobe, Microsoft, and Chater Communications. These companies have selected Runscope for its unique solutions.

Being a new vendor in the market, Runscope has also adopted inorganic growth strategies, such as partnerships, agreements, and collaborations. For instance, in July 2015, Runscope partnered with

Amazon Web Services (AWS). As a part of this partnership, AWS CodePipeline and Runscope API tests were integrated to detect bugs and regression in early the developmental stages.

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent ● ● ● ● = Very Good ● ● ● ● = Good ● ● ● ● = Average ● ● ● ● = Below Average

3.11.4 RECENT DEVELOPMENTS

New Solution Launches

Date	Segment	Product
October, 2015	New Solution Launch	Runscope released Live Traffic Alerts which is a real-time API production traffic and monitoring solution.

Partnerships

Date	Nature of Agreement	Company 1	Company 2	Synergy
July 2015	Partnership	Runscope	Amazon Web Services	Runscope partnered with AWS. As a part of the partnership, AWS CodePipeline and Runscope API tests were integrated to detect bugs and regression in the early developmental stages.

Source: Press Releases

3.12 BLEUM

3.12.1 OVERVIEW

Bleum was founded in 2001 and is headquartered in Shanghai, China. The company is an expert in performance tuning, security, and software testing. It provides API testing as a segment under software testing, in addition to functional testing, automated testing, mobile testing, security testing. Its services segment includes software development, offshore development center, QA consulting, and China Information Technology Outsourcing (ITO). Some of its solutions consist of warehouse robotics, AI and machine learning, DevOps, and market gateway solutions. It caters to various verticals, such as financial services, manufacturing and supply chain, retail and eCommerce, high-tech, and software. The company currently serves in China and the US, and has sales offices in the UK.

COMPANY AT A GLANCE

Founded:	2001
Headquarters:	Shanghai, China
Ownership:	Private

Note: This is a privately held company. Hence, no financial information is available in the public domain.

Source: Company Website

3.12.2 STRENGTH OF PRODUCT PORTFOLIO

Bleum is an expert in API testing, including tests, such as functional testing, performance testing, security testing, mobile testing and automation testing. The company provides a full suite of multi-platform testing frameworks that consist of proper skill sets, tools, and processes, to enable interface-based tests. It supports various testing technology types, such as REST, SOAP, OData, SWIFT, FIX, EDI, ISO8583, TCP/IP, RMI, and TIBCO. Bleum's unit testing consists of features, such as detecting and varying the functionality of individual system components at the earliest and performing a continuous testing throughout the development cycle. The company's solution follows an automated strategy that provides consistency in testing the large and complex code-base of the entire project. Web API testing is also one of the features that helps test RESTful APIs and SOAP web services over any protocol like Hypertext Transfer Protocol (HTTP), Hyper Text Transfer Protocol Secure (HTTPS), or Java Message Service (JMS). The company has worked with clients across a broad range of industries, such as BFSI, retail, software, and supply chain.

PARTICULARS	RATING
Breadth and Depth of Product Offering	●●●●
Product Feature and Functionality	●●●●
Product Differentiation and Impact on Customer Value	●●●●
Product Quality and Reliability	●●●●
Overall	●●●●

PENETRATION RATING :

●●●● = Excellent ●●●● = Very Good ●●●● = Good ●●●● = Average ●●●● = Below Average

3.12.3 BUSINESS STRATEGY EXCELLENCE

Bleum is well-established in the API testing market and supports testing types, such as performance testing, functional testing, security testing, automated testing, and mobile testing. It focuses on strengthening its expertise in the market for targeted industries. Though Bleum is an emerging player in this market, MnM predicts that the company needs to focus more on organic and inorganic growth strategies in order to become a leader.

PARTICULARS	RATING
Geographic Footprint	● ● ● ●
Effectiveness of Organic Growth Strategy	● ● ● ●
Breadth of Application/Vertical Served	● ● ● ●
Merger and Acquisition Strategy	● ● ● ●
Overall	● ● ● ●

PENETRATION RATING :

● ● ● ● = Excellent
 ● ● ● ● = Very Good
 ● ● ● ● = Good
 ● ● ● ● = Average
 ● ● ● ● = Below Average

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