rackspace technology

ACCELERATING FEATURE VELOCITY AND QUALITY

Tech Mahindra | rackspace technology | Webomates

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About Rackspace

Rackspace, a global leader in providing multi-cloud solutions across applications, data, and security, delivers innovative capabilities of the cloud to help customers build new revenue streams, increase efficiency and create incredible experiences.

It has grown into a multi-billion dollar company over the last 22 years, with annual revenues exceeding $2 billion.

Rackspace was honored to be one of the best places to work year after year by Forbes, Fortune, and Glassdoor. The company employs 6000+ professionals across four continents.

PROFILE

Name	Rackspace.com
URL	www.rackspace.com
Headquarter	San Antonio, Texas
URL	www.rackspace.com
Revenue	$2 billion
Employees	6000+
Founded	1988

Abstract

In this fast-paced and ever-advancing IT industry, organizations are looking to continually grow and focus on being both product and user centric. With a mission to continue to be one of the world's greatest managed cloud provider, Rackspace has carved out a place in the market by providing managed cloud to customers who don't want to manage their environments themselves and instead want to partner with a trusted provider with economies of expertise so they can focus on their core business. Julian Lopez, Rackspace's director of customer loyalty said, "Rackspace's founders made the decision to differentiate on an 'over the top' service model, what we call Fanatical Support."

Rackspace' development and testing teams manage, enhance and validate over 200+ applications in their IT applications portfolio in an Agile environment. The teams were involved in multiple areas, from developing new features to fixing bugs and architectural debt, managing **CI/CD** pipelines, handling code repositories, and maintaining infrastructure placing them under enormous pressure to stay focused on customer satisfaction and deliver the Fanatical experience they promise.

TechM wanted to enhance the quality and feature velocity across different mobile and web IT applications undergoing feature additions and modifications.

This paper highlights some of these major problems and discusses the practical implementation of **Webomates CQ** along with Webomates' **AI Defect Predictor** tool. Webomates pledges – through its CQ platform – that for a build with release notes, all committed test cases on all browser/smartphone/tablet will be executed in the committed time. This remains true regardless of software builds that modify features, defect fixes that modify test cases/scripts, and automation time-out errors. With this pledge, Webomates radically reduces the number of false positives and false negatives that plague traditional test case execution and distract QA and development teams.

Business Challenge

"One of the most important metrics to an organization's QA health is customer satisfaction. CSAT reflects on product quality, and knowing where your coverage falls short can help shape a strategy that improves QA, product, quality, and CSAT."

According to IBM, "a bug uncovered during the implementation stage proves to be six time costlier than discovering it during the design phase"

According to the 2019 QA Health Survey:

- 46% of respondents believe their QA process does not adequately align with development cycles
- 10% of respondents are "extremely confident" that their current test coverage will ensure a high-quality product
- In 2018, software defects in the US cost about $2.85 trillion.

1. Low Production Quality

Working on new feature developments in short sprinted Agile framework and releasing them to the end users with limited regression became a major challenge for Rackspace, which translated to False sense of Quality – leading to usability and customers' dissatisfaction.

2. Impact on Feature Velocity

Feature velocity gives an indication of how fast new features can be added to a product. Most organizations using agile approaches leverage story points to measure the team's current and expected deliveries, and teams end up balancing between multiple tasks over time, impacting the feature velocity

3. Increased defects due to limited testing

Rackspace's rapid new feature release process outpaced the regression test cycles as a result of which the customer reported defects increased.

4.Outdated Test Cases & Suite

The number of changes in the testing code is proportional to the changes made by the developer in the application. The major challenge for the testing teams is to align with the speed of the Agile development team when the need to update is as high as 20% to 30% of the total test cases per month.

Enter Webomates

To address these challenges, TechM collaborated with Webomates, a cloud-based testing platform powered by AI to carry out software feature and regression testing in guaranteed timeframes.

At Webomates, we're here to help you navigate and execute regression testing to lower the risks and costs, while maximizing business value. Webomates advanced humans assisted AI system creates hundreds or thousands of test scenarios, runs the tests and provides the user with pass/fail reports, triages the pass/fail results and identifies and creates defects for the user of the platform to review.

MEET THE TEAM

A team comprising of members from both TechM and Webomates led by TechM SVP & Head of Industrial Manufacturing, Sampath Saagi, Venkata, Tamara, Aseem and Ruchika - collaborated and worked towards a common goal. The team was focused to find the right solutions for the problems, drive real value and minimize complexity.

SAMPATH SAAGI

VENKATA TATA

TAMARA HUMMEL ELDER

ASEEM BAKSHI

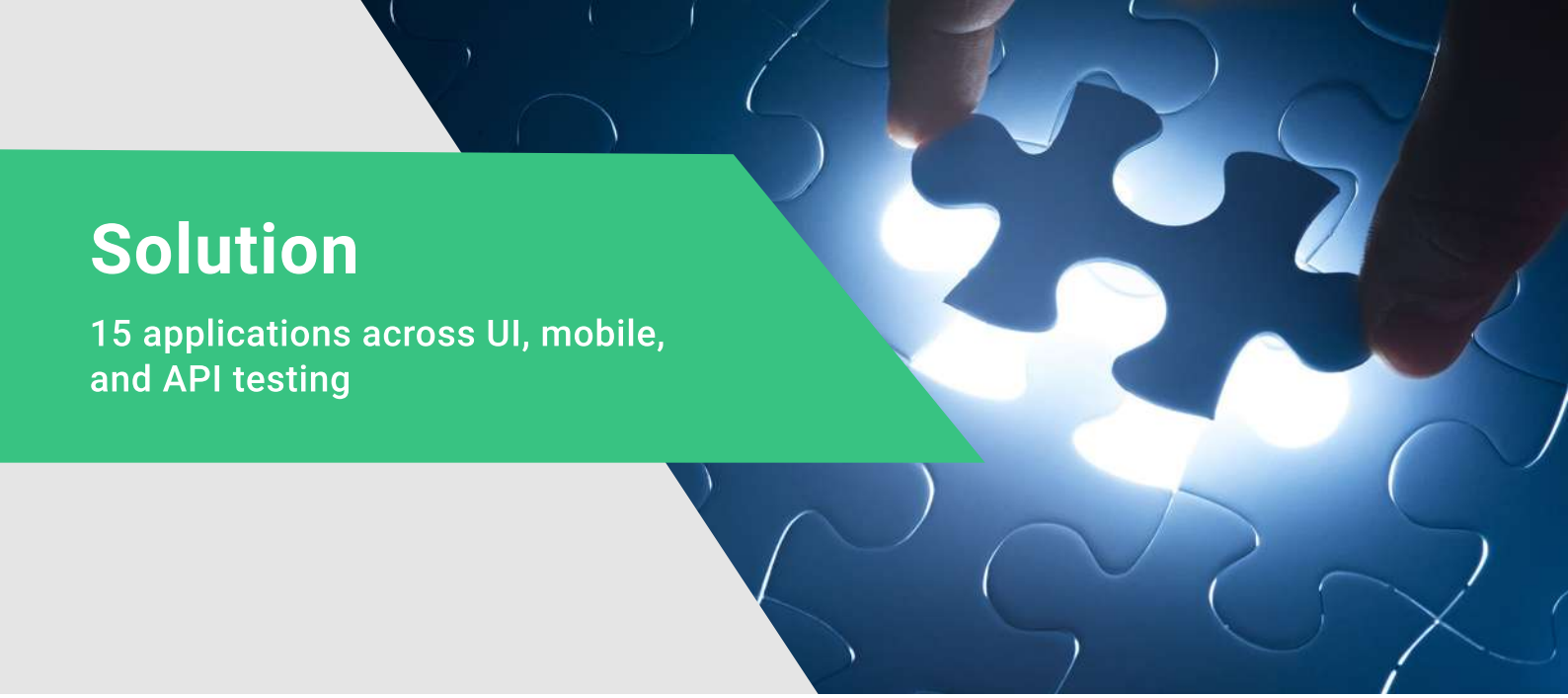
RUCHIKA GUPTA

TechM was working on over a 150+ applications for Rackspace. The application teams operated with a diverse set of development methodologies, tool sets, testable lower environments (integration, staging etc), development languages, deployment environments and end user platforms (Windows native, browser, mobile).

What did we do?

The Webomates CQ Testing, a service platform, is both language agnostic and deployment environment agnostic. The TechM team helped to identify the development methodology and presence or absence of a lower environment.

Fifteen applications were identified for Phase 1 in Dec 2019. Each application had different frequencies for regressions as well as different types of regressions.



Solution

15 applications across UI, mobile, and API testing

The Setup

The Webomates team generated 1,450 test cases in 4 weeks, from Jan 1 – Jan 31, 2020. The TechM team in conjunction with Rackspace diligently reviewed and approved these test cases with a greater than 90% acceptance rate of the first proposed test cases.

The Webomates CQ solution is unique in that the TechM and Rackspace team only had to review the test strategy and test cases while the Webomates CQ platform generated a package composed of:

1. *Test strategy for an application*
2. *Test case that is human readable*
3. *Test model that helps in regenerating cases for self-healing*
4. *Test script that can be executed on multiple automation systems*
5. *Test script that can be executed on multiple crowdsource systems*
6. *Test script that can be used by the Webomates AI assisted manual testing system*

The Execution

For each application, the Webomates and TechM team had to decide the frequency and types of regression required to be carried out. For an agile CI/CD team, all the Webomates options outlined below provided value. For a team that was operating under SDLC with 2 releases per year - only full regressions were needed.

Webomates' solution provided the following regression testing services:

- **Full Regression**: Every build went through a full regression for **24 hours** in staging or pre-production environment before release to production. For a particular application, ALL test cases were healed where necessary and then executed. Exploratory testing was carried out in tandem with test case-based testing. Regression frequency was aligned with the development build release cycle.
- **Overnight Regression**: Overnight regression was used to test specific module-level changes and integrations with results delivered in **8 hours** with a modified test package. Test cases that changed due to a defect fix or feature change were also validated. By using such targeted software regression, test defects were detected earlier in integration.
- **CI/CD Regression**: Webomates used CI/CD regression to test module based sub-set of test cases with results delivered in **15 minutes to 1 hour**. Using pure automation and the patented AI Defect predictor, defects were discovered even earlier in development.

The below figure depicts the various options that highlight the flexibility of the Webomates CQ system that allowed the TechM + Rackspace team to match the particular application team with the right combination and frequency of Webomates CQ services.

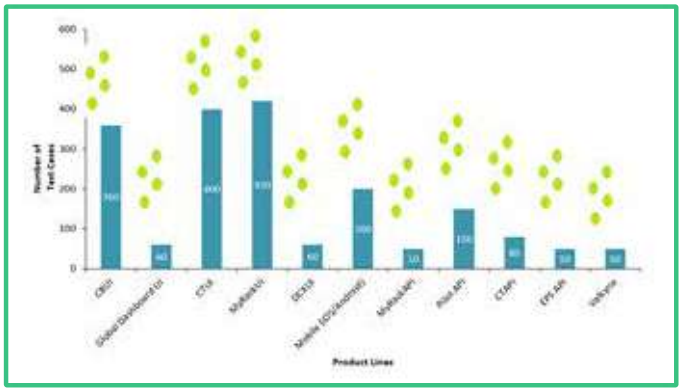
Product Line	Platform/Brower	Number of Test cases	Full Regressions/Year	Total Test Executions in FULL/Year	Total Cases in each Overnight Module	Overnight/Year	Total Test Execution in Overnight/Year	Total Test Execution in CI/CD Per Year	Total Executions/Year
CBUI	Chrome	300	24	8640	90	24	2160	3600	14400
	Firefox	60							
Global Dashboard UI	Chrome	50	24	1440	15	24	360	600	2400
	Firefox	10							
CTUI	Chrome	200	24	9600	60	24	1440	8400	19440
	Firefox	200							
MyRackUI	Chrome	350	24	10080	105	24	2520	8400	21000
	Firefox	70							
DCXUI	Chrome	50	24	1440	25	24	600	600	2640
	Firefox	10							
Mobile (iOS/Android)	Android	100	24	4800	30	24	720	1200	6720
	IOS	100							
MyRackAPI		50	24	1200	15	24	360	1080	2640
Pilot API		150	24	3600	45	24	1080		4680
CTAPI		80	24	1920	24	24	576	3240	5736
EPS API		50	2	100	15	12	180	8640	8920
Valkyrie		50	2	100	15	12	180	540	820

Webomates reduced the time to complete regression test cycles in pre-production, integration and development environments based on the TechM teams' support of all of these lower environments.

Using a combination of test case based testing and exploratory testing, the Webomates CQ platform was able to achieve the advantages of both the testing techniques.

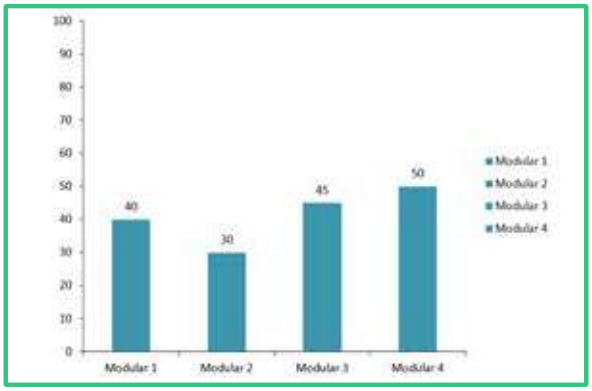
1. Test case-based testing provides a known set of functionality that is thoroughly tested and guaranteed to be covered.

2. Self Healing in the test case-based testing in both the Full Regression and Overnight Modular regression results in the test cases being updated with the new behavior of the software release based on the release notes that are provided by the TechM team. The below figure depicts the degree of change and update that was carried out on a per application basis from Jan 2020 to August 2020 with some applications having almost 100% of the test cases and underlying test scripts being updated.



3. Exploratory testing using a rotating vector-based approach pushes the envelope in each regression looking to find new defects in the software release that are outside of the defined test cases. Vectors can be an error prone area in the software under test or an area that is under active development.

4. As test case-based testing follows a predefined script, there are chances that a bug may not fall in the script's scope. To overcome this challenge, Webomates leveraged the strengths of exploratory testing on top of test cases in both full and overnight regression to expand the scope of the test and take the quality to the next level.



False failures are one of the biggest challenges in automation testing. In an average regression cycle, approximately 35% test cases fail to execute. At times, upto **100%** of the test cases have failed. More often than not, these failures are false positives. In fact, **93%** of the time, the failure is not a defect but it's a retest with an update to the test cases or test script being required.

To address the thousands of hours lost by **QA** professionals, Webomates created its patented **AI Defect Predictor** tool and shared true Pass and true Fail reports with the development team along with an in-depth analysis of automation failures. Real-time results were available on the **CQ** portal and were also shared via Slack and Email. This AI Defect Predictor is provided to the development and **QA** teams that use **CI/CD** service to help them reduce their triage time. For ***300*** test cases with a failure rate of **35%** (105 failed test cases), it took **12 hours** to triage the results and identify the false positives. Using the Defect Predictor, the time taken drastically reduced to **4 hours**.

Webomates thus, helped the team to overcome the challenge and deliver a higher quality release while saving thousands of hours removing a major roadblock and drag on productivity. With such detailed analysis provided, the team was able to focus on the higher priority story points and deliver an 11x increase in velocity.

Quick Setup

1450
TEST CASES

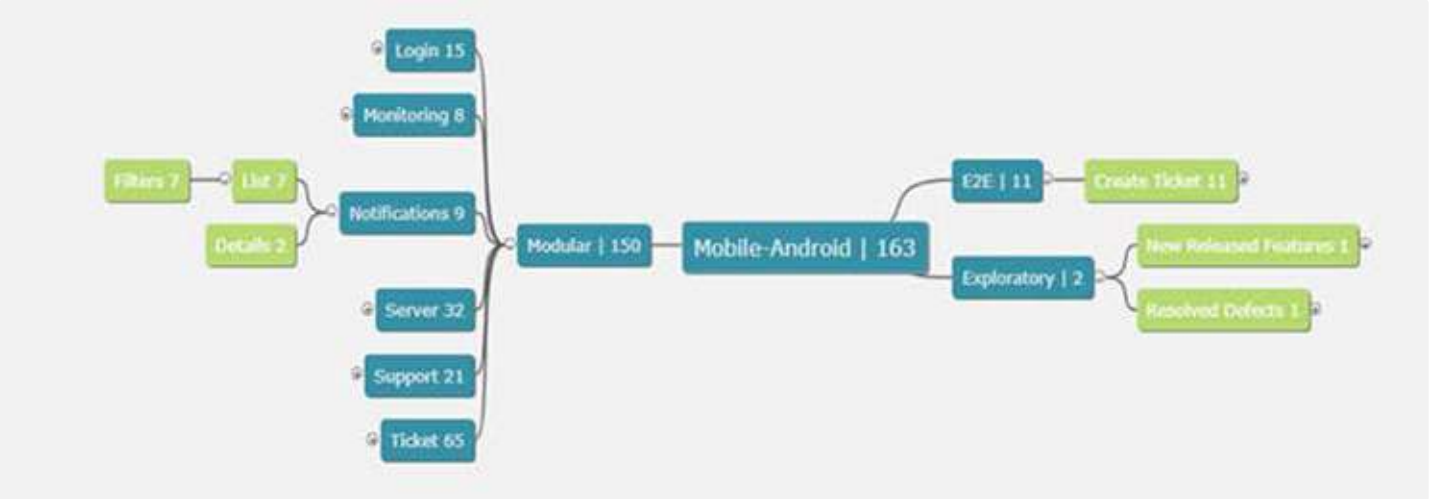
4
TIME (WEEKS)

20
CUSTOMER TIME (HRS)

Webomates used its patented **AI Test Strategy and Creator** tool to create the test cases and test scripts based on the input in a matter of minutes. Overall, 1450 test cases (and associated test packages) were generated and reviewed in 4 weeks.

Test Strategy

The test strategy provided an overview of the distribution of test cases per modular area and the depth of the coverage and was the basis for the area and focus for the creation of the test cases.



TEST CASES

Webomates Testing as a service patented AI testing platform is designed to reduce test cycle duration and mission critical defects by more than 50% by applying Machine Learning and Artificial Intelligence to software testing. The testing is optimized by combining the patented AI testing platform using multiple channels of execution like Automation and AI with crowdsourcing and manual testing.

Webomates CQ Human assisted platform goes through the application to generate the baseline test cases. Using its advanced AI, it creates up to 2,000 test cases in 4 weeks that are relevant, appropriate for the existing release and will be relevant for the new release and software version.

1. **The test cases were manually reviewed to verify their readiness based on:**

    - Readability
    - Scope
    - Coverage
        - o Happy day scenarios tests
        - o Negative scenario tests
        - o Permutations and combinations

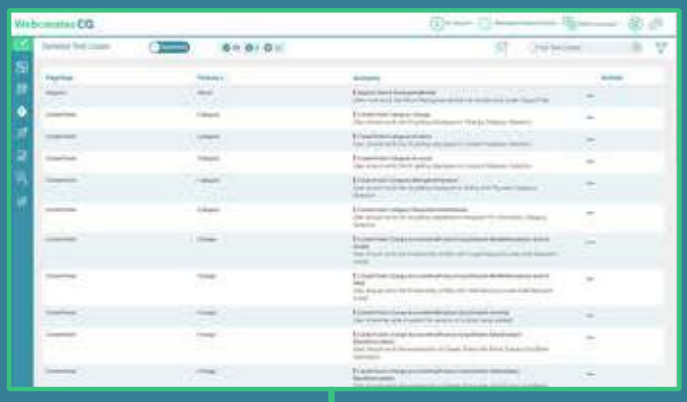
2. **Post internal review, the test cases were shared with TechM and Rackspace teams for their review and approval.**

3. **Simplicity and better readability of the test cases helped Webomates secure Rackspace' approvals within approximately 20 customer hours which included reviewing the test cases and streamlining process for regression as per the development schedule.**

VALUE ADD

Rackspace had the flexibility to review the test cases with the following two modes.

Summary View
Summary View provides a high level summary of all the scenarios.



1

Detailed View
Detailed view presents the test cases along with all the test steps and expected results.

2

Key Performance Indicators

Quick Setup

Ramped up from 0 to 1450 test cases within a month

Improved Production Quality

Every build goes through full regression within 24 hours in staging or preproduction

Improved Feature Velocity

Increased from 294 in January 2020 to 3234 in June 2020

Up-to-date test suites & analytics

Realtime up to date test suites and result analysis in CQ portal

01. Improved Production Quality

The regression testing was carried out with Webomates CQ which helped in identifying and fixing the defects in the staging environment itself. This gave an immense boost of confidence to the developers to deploy the changes into the production environment.

Webomates and TechM ensured that the customer reported defects found in production dropped significantly over time and that improved the overall quality of production.

CQ triaged video defects helped the developers in getting the details of each defect based on the priority level and helped in replicating them easily. The reduction in defects found in production led to freeing the developers from exhaustive QA and giving them more time to deliver customer-facing, high-impact and high priority features (story point velocity).

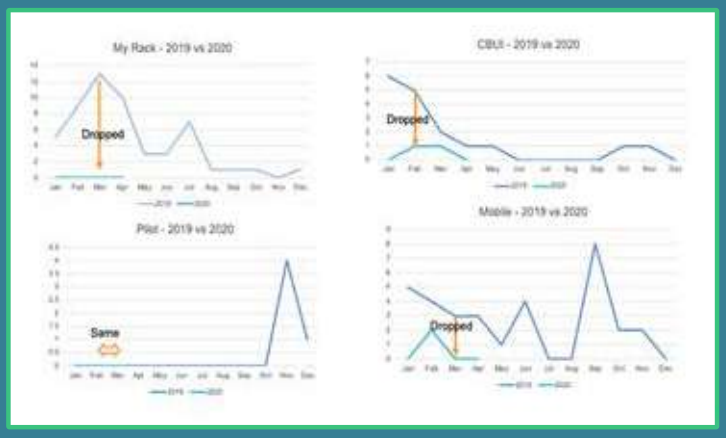
Defects Reported Within Three Months: Webomates reported ***173 defects*** including 23 business impacting Priority 1 defects

Total Defects: As of August 2020, Webomates reported ***329 defects*** in total since the regression was initiated including 35 business impacting Priority 1 defects

As depicted in the below graph, customer reported defects for ALL applications continue to drop since Webomates CQ was introduced in Dec 2019.

Achieved 90% reduction in customer reported defects

As depicted in the below graph, the defects found by Rackspace end customers in 2019 vs 2020 dropped by 200% on an average on the 4 applications.



By August 2020, Webomates had executed 53,000+ test case executions and found 329 defects before production release to help improve the quality of the build deployed in production which not only led to happier customers but improved branding.

53,000
Test Case Executions

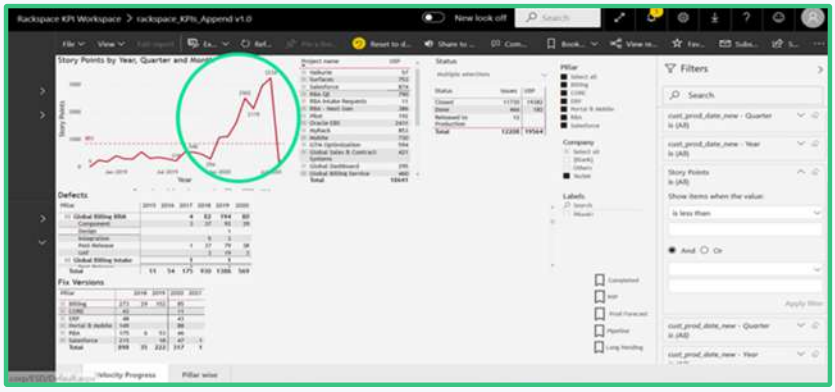
329
Defects

02. Increased Feature Velocity

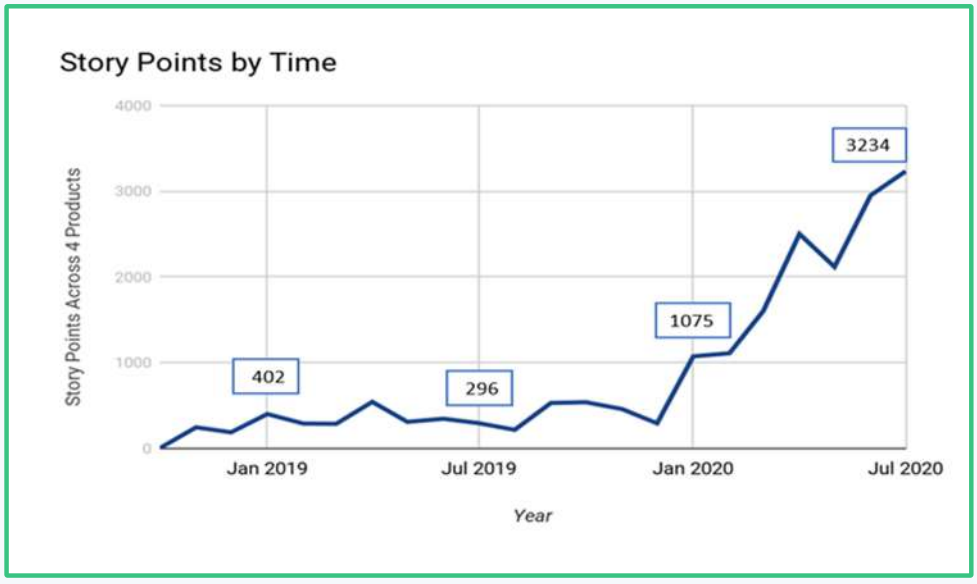
The development teams at TechM followed a rigorous process of tracking their feature velocity based on story points. Once a baseline was established, it was possible to quantitatively measure the improvements in feature velocity of the team as a function of time.

TechM used **Power BI**, a powerful data visualization tool, to measure feature velocity in terms of story points built on top of a defect management tool that gave a quantitative measure of a team's velocity.

It is evident from the below chart that the development team's velocity increased by 11X, from **294 story points in January 2020 to 3234 story points in June 2020**.



The below chart gives a clear idea on the velocity progress as the story points increased significantly starting from Jan 2020.



03. Rapid Analysis and Reporting

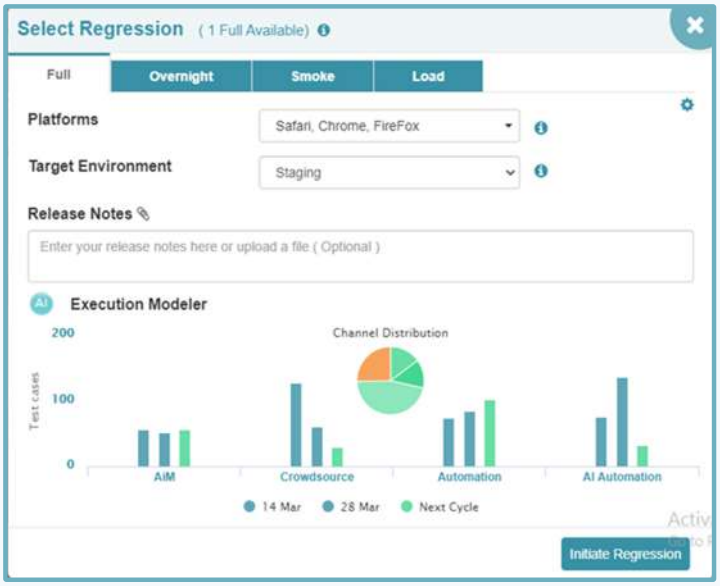
The Webomates results are based on the multi-channel patented approach which provides True Pass and True Fail reports. In case any test case is failed from one channel, then it is passed through multiple channels until a True Fail is found. Every True Fail report is linked to the defect associated, giving a clear understanding of the criticality of the defects based on recommended priority levels (P1, P2 & P3).

Three Minutes to Kick off Regression

Webomates CQ is really quick in initiating the regression in just 3 minutes based on the regression type, platforms, attaching the release notes and the target environment selected.

Webomates ensures that the following guarantees are met in a fixed interval of time:

1. Regression completes in that time interval
2. No false failures are present for test case execution results
3. Self healing of test cases during every regression run where modified test cases and test scripts have been updated and retested in the regression interval
4. Defects are proposed with priority and detailed information including a video, to help developers replicate those defects with ease



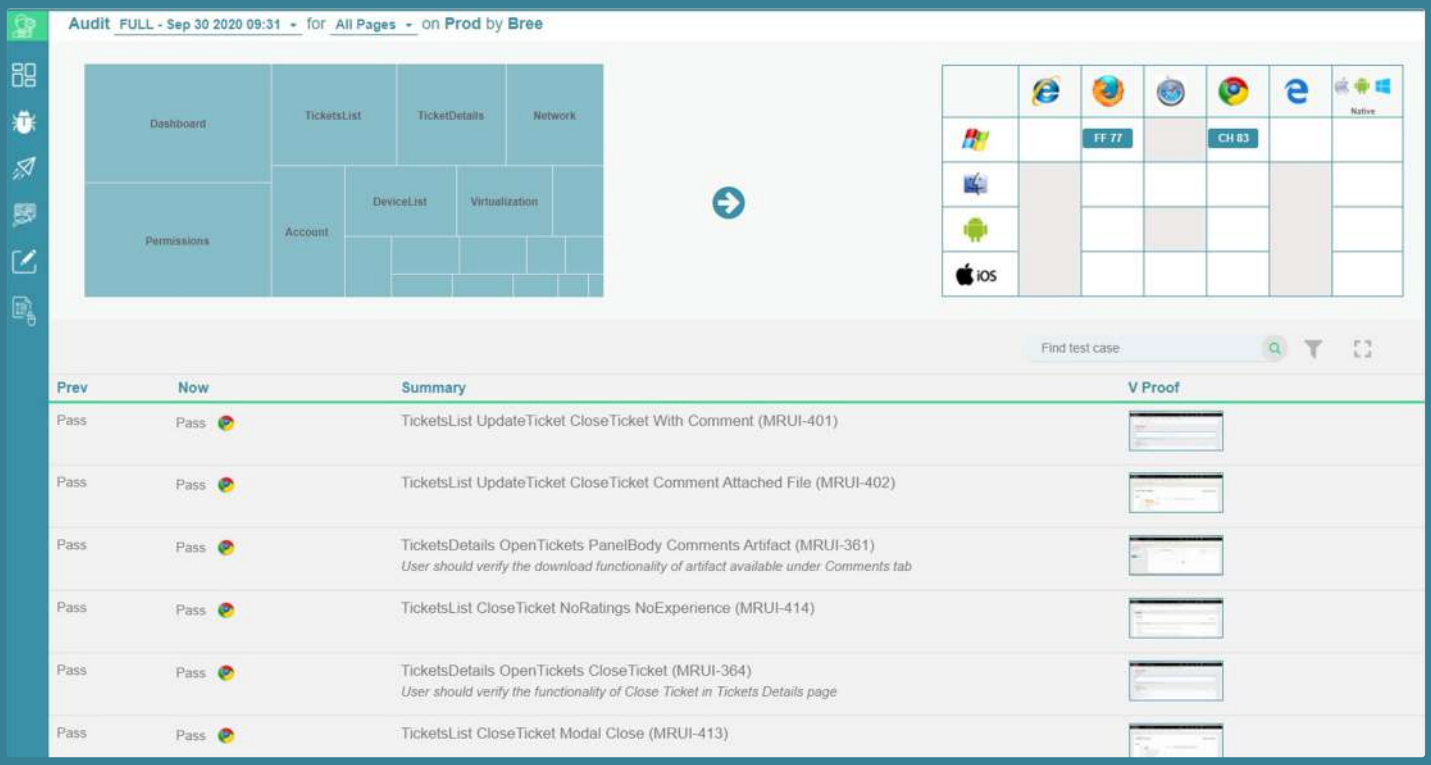
Triaged Defects

Defects are bound to be detected while boosting feature velocity, but the key is to find them early before production. The best way to achieve this is by setting up a proper tracking system that can identify defects at the right time (as early as possible), triage them, and report them to the concerned stakeholders to improve the quality process. Webomates successfully achieves this by its comprehensive defect triage mechanism.

Webomates shared a comprehensive triaged defect report with Rackspace that included defect summary, steps for replicating the defect, video of actual bug instances, priority suggestion, and test cases mapped with the defect. It helped Rackspace in focusing on the defects that needed immediate attention.

Real Time Test Result Analysis

Webomates shared real time test results for every regression cycle getting executed through the CQ portal. The results can be easily audited by the customer through the "Auditable Results" quadrant on the CQ dashboard.



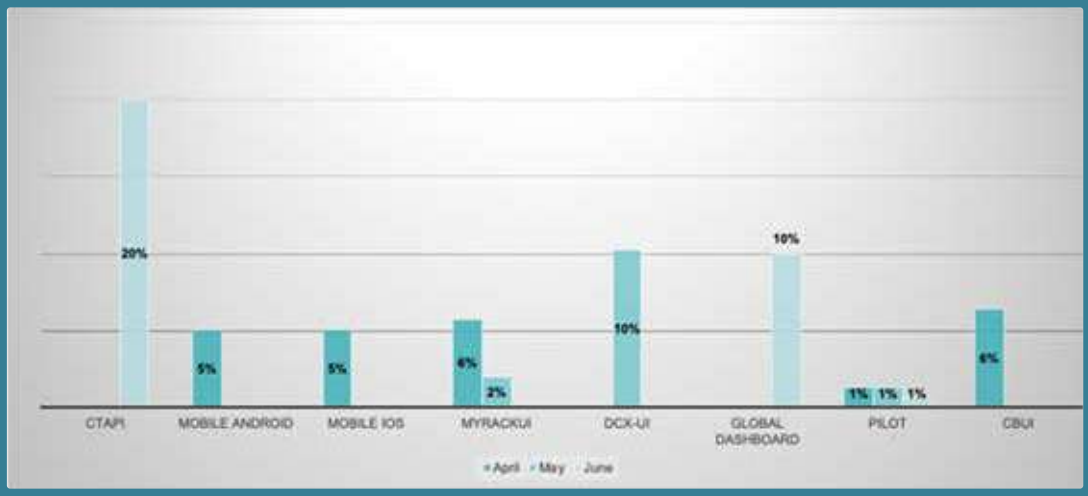
As the test results are available in the form of summary, screenshots, and videos, it helped save a lot of time. Time to review a defect is typically 20 seconds which is the time of each defect video that shows the setup and the defect occurring.

4. Up to Date Test Cases & Suite

The AI-driven approach of Webomates helped to minimize the time and effort for the testers to modify tests and run them.

At Webomates, self-healing of the test cases is done with the help of human assisted AI algorithms that automatically updates and modifies the test package to reflect the new behavior that the development team has specified. Webomates CQ provides this unique self-healing value as the healing is carried out during the software regression cycle within the 24 hours or 8 hours window. These test case updates are triple verified – firstly in the Webomates CQ cycle, secondly by the customer if any defects are incorrect understanding of the feature (flagged by the Works As Designed flag) and finally in the post feature/regression by the customer approving the updated test cases.

The below graph depicts the percentage of test cases and associated test packages that have been modified/updated/healed across different applications in just the three months April, May and June 2020.



Customer Testimonials

The frequency of negative feedback from customers has dropped significantly after the removal of the business-impacting app defects. Also, Rackspace noticed a steep decline in the number of issues reported by its customers.

-Sreedhar S Nandi, Process Manager, Rackspace

Test coverage is really good and regression testing is contributing in improved quality as well as smoothing out the overall test process.

-Kamal Gill, Developer, Rackspace

Webomates team is covering all the application flows that needs to be taken care of during the testing.

-Bree Kristensen, QE, Rackspace

Conclusion

How Rackspace measures success

In the world of customer loyalty and customer satisfaction, there is no shortage of reports, metrics or analysis to be delivered, but true value comes from just listening and responding to your customers. Rackspace uses Net Promoter or Net Promoter Score (NPS), a management tool to accurately measure the approval and loyalty of a firm's customers.

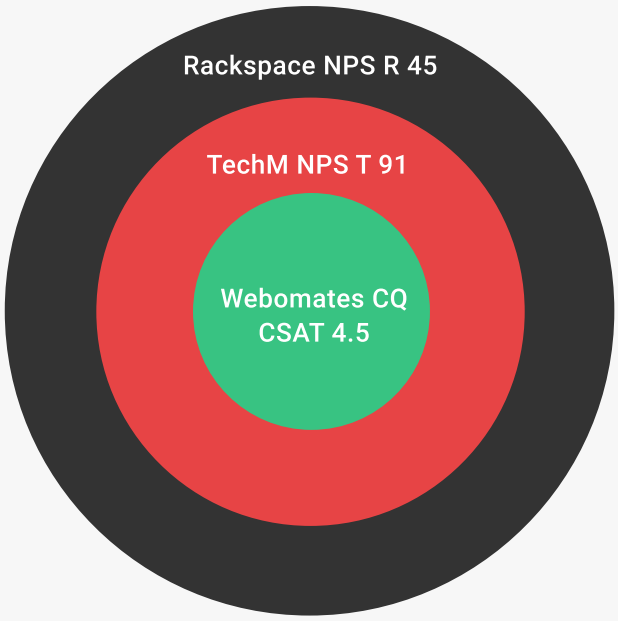
Julian Lopez, Rackspace's director of customer loyalty said, "Net Promoter is the method that we use to take Fanatical Support and operationalize it by constantly measuring ourselves by this standard: Are we delivering a product that our customers are proud of?"

How Webomates helped Rackspace radically improve its productivity

To improve development efficiency and achieve faster time to market, teams require a suite of appropriate testing solutions which fulfils all testing needs. Webomates is transforming software testing by providing comprehensive feature/regression testing solution – with focus on quick regressions, defect identification, prioritization and triage solutions.

Webomates applied AI/ML to test case creation/healing, execution and analysis of execution results to reduce overall software life cycle duration, increase feature velocity and reduce mission critical defects.

With a combination of Webomates' patented AI technology and internal resources' human-guided domain knowledge, only 4 weeks were required to set up the 1450 test cases, with minimal to no guidance needed from Rackspace.



Webomates can help you achieve 100% execution of test cases in every feature/regression. To learn more about how our testing services can help you reduce your organization's testing costs and improve productivity, visit us at Webomates.com

You can request a demo at Schedule Demo

You can also reach out to us at info@webomates.com