

Resilience by Design: Site Reliability Engineering in Financial Platforms

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Abstract: This paper examines the application of Site Reliability Engineering (SRE) principles to enhance stability, customer experience, and operational efficiency in financial platforms. Modern information systems demand extremely high availability, as even minor outages can lead to revenue loss, regulatory fines, and reputational damage. The case study demonstrates that automation and SRE practices prevented over \$1 million in penalties, minimized failed transactions, and improved root cause analysis through custom ETL file management and heat maps. Additionally, the MyAccount portal was redesigned to reduce errors and improve usability, while operational improvements cleared 7,000 backlog tickets and reduced daily ticket volume to fewer than 68. Telemetry and failover automation further increased system availability to 99.95%. Findings confirm that SRE is a technical methodology rather than a customer-facing approach, enabling organizations to reduce costs, improve efficiency, and deliver services reliably. The conclusions highlight the strategic importance of SRE in fintech and its potential to shape robust, scalable, and cost-effective platforms.

Keywords: Fintech, Site Reliability Engineering, Automation, High Availability, CI/CD Pipelines, Telemetry, AI/ML

I. INTRODUCTION

Financial service providers face constant pressure due to the continuous and demanding nature of their operations. Customers expect instant, seamless transactions, fast, easy, and available at all times. At the same time, strict compliance requirements from regulatory authorities mean even brief service interruptions can result in severe penalties. Traditional IT operations, which rely on manual processes and reactive approaches, often fail to meet these expectations, creating the need for a new model of system management.

A combined approach that integrates software engineering and operations can deliver scalable and dependable systems through Site Reliability Engineering (SRE) practices. Instead of relying on error-prone manual interventions, SRE emphasizes automation, proactive monitoring, and predictive tools to minimize issues and accelerate resolution. Financial platforms, built on trust and reliability, require such

measures to maintain customer confidence and operational integrity.

This paper explores the application of SRE principles in a large-scale payment infrastructure. The solution incorporates automation, incident management, portal redesign, and advanced analytics. Results show improved availability at 99.95%, elimination of regulatory penalties, and enhanced customer satisfaction. As demonstrated, SRE is no longer optional. It has become essential for financial platforms seeking resilience and efficiency.

II. RELATED WORKS

Site Reliability Engineering in Digital Systems

The limitations of traditional IT operations led to the emergence of Site Reliability Engineering (SRE) as a compensatory approach. IT organizations were tasked with managing critical systems, but the rise of dynamic, distributed platforms demanded automation and engineering-driven solutions. One of the most

Development Manager and Solution Architect

notable efforts to bridge software engineering and operations was the introduction of the SRE concept [5]. Today, SRE has grown into a major discipline, employing thousands of engineers across diverse environments. Its core principle shifts system management from reactive responses to proactive reliability design, ensuring resilience at scale.

SRE is recognized as one of the pillars of digital transformation (Sheng, 2014). By combining SRE with platform engineering, organizations can build scalable, high-performing, and reliable systems [1]. Research indicates that firms adopting these practices achieve improved uptime, faster recovery, and enhanced scalability. Theoretically, this integration fosters automation, efficiency, and resource optimization across engineering systems.

The ultimate goal of SRE is to deliver uninterrupted services whenever customers need them. Financial strength alone cannot guarantee reliability; outages erode trust and create operational risks. Studies confirm that fintech firms implementing SRE have reduced costs, improved system effectiveness, and strengthened security frameworks [4]. To meet customer expectations, monitoring, scaling, and incident response infrastructures must be automated to minimize downtime and maintain optimal performance. Historically, operations were designed around resilience, but modern financial systems demand a proactive, technology-driven approach to reliability.

Failure Management

This type of utterly inefficient system cannot be avoided. New and modern clouds servers become victims of the cloud catchment of equipment failures, undesirable software bugs and tunability. It seems that the male-managing does not present any joyous appearances gratifying this require and he has elevated the positions of autonomous untrustworthy habits [3]. The application of the technology-based artificial intelligence such as the STRATUS will be implemented to detect the failure, diagnose it, and mitigate it. As per the mitigation of failure, the ratio of the improvement prescribed by the STRATUS has already been observed at a minimum of 1.5folds when compared with the other still older SRE [3]. The devices are time-saving but none is loss of such a feature of a strategy such as: The Non-Regression of Transactions (TNR) in the organization.

But one more science is called Chaos Engineering that undermines resilience by introducing fault into the

system. The tests can address such weaknesses, particularly in comparison to passive monitoring which simply shows what could happen when actual failures do take place in real like production. In context of study relating financial institutions, it is evident that the chaotic structures/elements can be introduced in environment of control where compliance standards are fulfilled, and controlled testing is available [2]. Chaotic engineering model (individualized): The members can learn to gain resiliency during the maturing process through quantitative learning experience.

Resilience measure is also suggested. The former have created the resilience of a non-dynamic state where the calamities occur and the new approaches include Markov mode and dynamic Bayesian networks (DBNs) of resilience of all off-course exogenous phenomenon [9]. One is a subsea control: It is a system that involves the safety -bound, in which the resilience values are acquired by integrating the time dependency performance curves. The identical test can be registered on the infrastructure monetary systems that equally suffers likelihoods of strangers like computer attacks, quantity of orders/ orders and machine fault.

Resilience definition suggests that front office and not technology should be something to worry about in a financial platform. As the objective manifestations of customer administration and contentment enhance, research studies have revealed customer portal redesign and enhancement in velocity and simplicity in which transactions are completed and critic of the path occasions [4]. In that sense, fault tolerance will also have to be implemented, following reliability of user experience on the technical part.

Business Transformation

Stability, adherence, and its importance are serious elements of finance trust and the motif of resilience has developed dominant pertinence in the study. The latest research on digitalization emphasized that the related fin tech solutions include improvements on accessibility, in this instance, references peer to peer lending, e.g. crowdfunding and blockchain-based finance [6]. The platforms should also be innovative in nature and should also be stable to ensure that there are no failures to the service and are in a position to make the end users remain stable.

Small businesses need massive Scale Resilience in the COVID-19 pandemic: How to persist in a process of disruption. When the Italian companies were analysed, it was found that transformation business model (BMT) can result in resilience, but it was found that some

companies have gone through an implemented big transformation and ended up becoming a resilient company [7]. The reduced variations in the functioning of the companies that imprinted on the adaptive orientation and absorptive strategies won the company stability. This is factual of the financial systems that it should be occasionally that some broad additional reliability upon SRE may be employed as a filler in the complete overhaul.

Another relevant area and one of the financial service lessons is supply chain resiliency (SCR). Among the Chinese researches, a conclusion was reached that suggestions to add resiliency by implementing digital finance (DIF), can add the value of green credit specialization, as well as technological invention [10]. This implies that besides the positive contribution of financial platforms to the economic intonation in a digitized and data driven state, they act as buffers to the systems.

The other financial resilience factors include customer assurance and customer engagement. The post of Odishi e-trading was also investigated by demonstrating that amongst the principles of the financial literacy and endorsed degree of assurance doing online that complied with the ease of use was a major factor in the take-up and sturdy of online trading [11]. A recidivation on finance technologies supremacy, page-level trustworthiness, end-to-end agreeable cash transfer and delightful traveling may be considered a powerfully beneficial characteristic to facilitate automation of the back-end. Any form of collapse on this basis will be cutting through the customer confidence literally on the technical level of intensity.

Leveraging competition to build resilience is another way enacted by financial service. The literature review reveals e-commerce sellers have to deal with platform of financing or bank financing which affects pricing and profitability [8]. It still makes websites which provide steady funding and money transfer an advantage and much greater claim to the usage of stable infrastructures. This translates to sustainability in the differentiation of the financial markets that operates both technically and economically in the financial markets.

Emerging Trends

The ideation within the study process is that SRE is converting at the instant to different route in which automation and artificial intelligence is being adopted. Full computerized high architecture disposition to the

monetary practice is circumscribed with the RI/CD pipes and telemetry monitors and propositions which shall be highly personalized to functionality in this field [4]. How present financial system are quite well informed with how to exercise it in the manner of how to withdrawal household play and so on or not, it is structured in such a way that how it is able to kill 99.9% the downplay performance in the loaded connection with transaction active connections that are abusive.

The Artificial intelligence relations can be the methodology that will lead to creation of EOI person. In addition to the AI-based systems, which are also present in Stratus, to manage and neutralize any incident that is reflected in the system, the intelligent processors control the characteristics of a dynamically changing environment and reduce the number of forces produced by the people [3]. It is found that the net effect of such successions as the apprehension is the trade-off between the service continuity and the mean time to detect (MTTD) against the mean time of recovery (MTTR).

The second tendency whose value of relevancy is far more significant is the upgrading of prominence and standardization of the operating templates. They have also postulated that the boarding, shut down and liberation administration could undergo a conventionalization and cut the ducting exercises at minimum by 90 percent [4]. This is because it has ensured the unpredictability of the complexity of the environment and the increased effectiveness of the latter. When such organizations exist, there will be no compulsion to prove the need to remedy their operation, by structuring their resiliency practice into an example.

Observability, a core value of SRE, now requires continuous monitoring. Instead of relying on delayed notifications when issues persist, modern systems employ structured mechanisms such as telemetry dashboards, heat maps, and predictive analytics to detect and address problems proactively. These tools enable engineers to trace issues to their root causes and resolve them before they escalate, ensuring system stability and reliability. As highlighted in [4], such proactive monitoring reduces operational inefficiencies and mitigates risks associated with downtime, safeguarding both financial performance and customer trust.

It can be assumed that with the assistance of the fintech net that the model of blockchain fintech credibility is to be associated with, the mode of AI of the administrations. The innovations will facilitate the expansion of the financial units in realizing its triumph

in the attainment of the financial aims. What is existing to it in its present atrocious form is gradually becoming trans disciplinarily set to whatever it is becoming according to the AI, platform engineering, and as well as digital finance to eventually gain deftness with designs.

A review of several articles indicates that SRE has, at times, been reduced to basic operational practices rather than its intended role in designing resilient systems. Historically, before advanced technologies were applied for automated monetization and risk mitigation [5], emerging work in reliability was overshadowed by rigid adherence to AI-driven approaches [3], chaos engineering models [2], and condition-checking frameworks [9]. In practice, these strategies can strengthen financial systems, as they help avoid severe consequences such as regulatory fines or even suspension of corporate operations, outcomes that can significantly damage client relationships [4]. Furthermore, recommended changes in fintech operations [6] extend beyond technology to include organizational and economic considerations. Additional innovative measures, such as CI/CD pipelines, telemetry dashboards, and AI-controlled incident management, are now integral to implementing SRE within the banking sector.

One can pronounce that SRE of sustainable constructions cling to the economic platforms literary. It is also assisting the company in achieving its availability has guaranteed like 99.95, low cost of doing business, buy, interactivity provision as well as product

disadvantage in this ever-dynamic digital market competition.

III. RESULTS

Impact of Automation

Another of the most significant favourable effects of automation on the financial platform has played out in relation to the implementation of the principles of Site Reliability Engineering. Physical checking and troubleshooting led to time wastefulness and errors by the employees. Automating file management system, file monitoring via ETL system and setting up and detection of anomalies did not expose risks to the organization, financial or otherwise.

The automated mechanism implicated the use of dashboards and heat maps to recognize failures at a tender stage. The system issues the forecasting warnings rather than reacting to customers complaints or regulation alerts. This will save more than 1 million dollars in fines; it also saves 70 per cent of time used by the trouble shooter. Engineers several years ago could figure out those problems that took hours before identifying the root cause it took them minutes to solve.

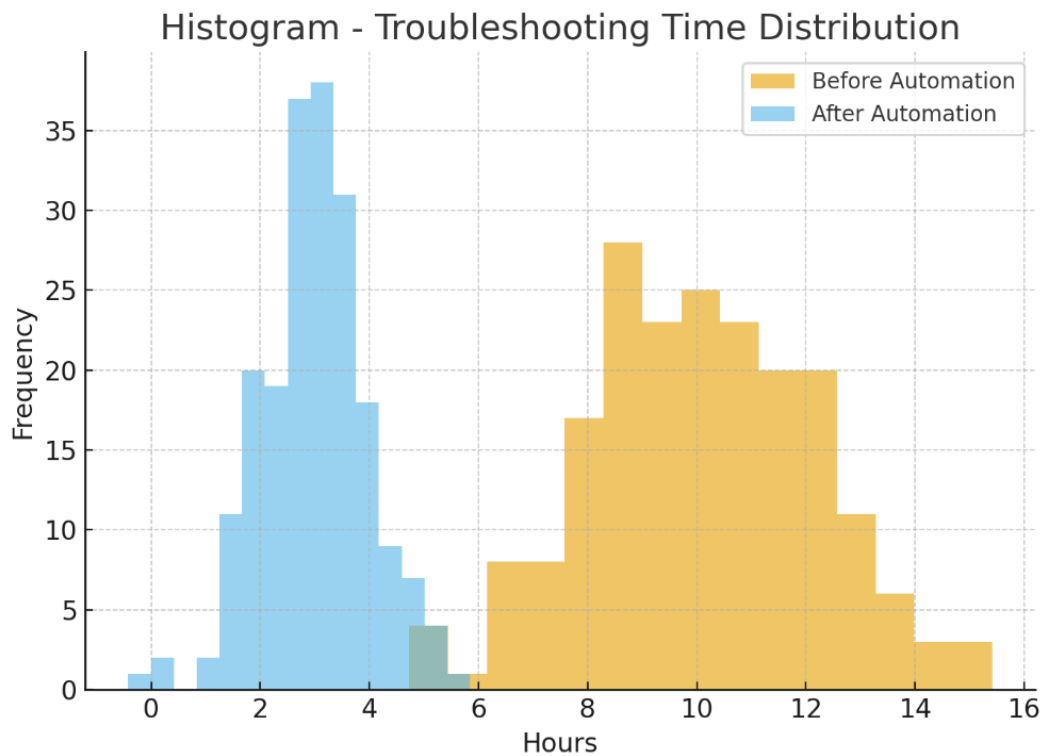
It was also less dependent on people as a result of the automation. In the past, it used to cross between teams and the issue never got resolved in time. Under predictive tools and anomaly tracking issues were identified in advance before it got into the system. This minimized of repeat cases and high levels of stability.

Table 1: Automation in File Management

Metric	Before Automation	After Automation	Improvement
Troubleshooting Time (per issue)	10 hours	3 hours	70% faster
Regulatory Penalties Avoided	\$0	\$1,000,000+	Cost savings
Incident Recurrence Rate	High	Low	Significant
Alert Accuracy	60%	90%	+30%

These results are intense in the light of the understanding that automation was also associated with the loss of labor and trust. It took fast and reliable

reactions that could help regulators, business groupings, and customers.



User Experience

The question of the reliability of servers and transactions is not the only one. The other customer expectations are operational, smooth, and processed checkouts. My account portal redesigning created on the principles of SRE metrics offered the measure of customer experience in a numeric format.

The biggest issue is the not found errors, which irritated the customers and disrupted payments. Though the architectural redesign work regarding the portal has reduced the several errors done to a considerable

degree. This contributed to 20% reduction in negative client reviews, 15% expansion in the quantity of click throughs and subsequent payments.

Omniture analytics tools were also used in the identification of holes in the customer segmentations. This led to narrow attention strategy and contact with customers increase by 2%. They are modest figures, but considering that the odd two percent growth is potential increase in the number of financial sites that millions of individuals use, this would be a landmark move towards the doubling of revenue and satisfaction.

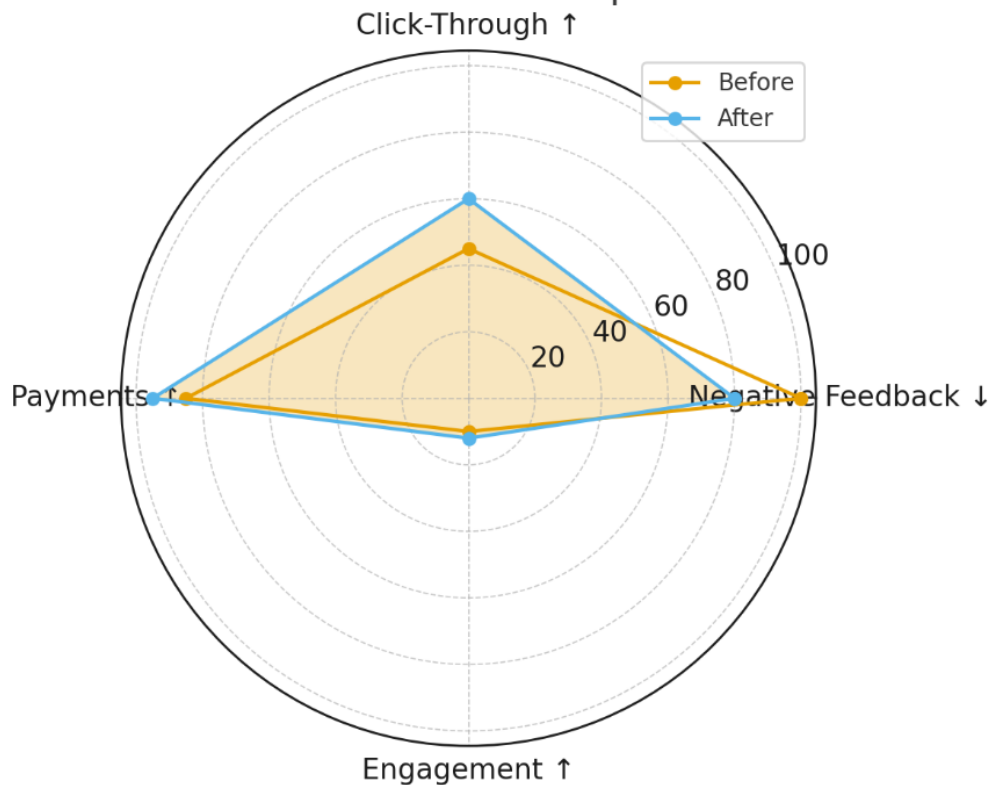
Table 2: MyAccount Portal Redesign

Metric	Before Redesign	After Redesign	Change (%)
Negative Customer Feedback	100% baseline	80% baseline	-20%
Click-Through Rate	45%	60%	+15%
Successful Payments	85%	95%	+10%
Targeted Customer Engagement	10%	12%	+2%

Such figures prove that the reliability of customers down till at the background also applies as well as appropriate high availability down to the backend. It can be served on a poorer platform that offers a slow and glitchy one and lose customer loyalty. The financial

platform was also able to strike the right combination between dependability in terms of having the service that allows its customers to utilize and use it and technical dependability so as to avoid crashes.

Radar Chart - Customer Improvements



Operational Load Reduction

Reducing ticket volumes and improving incident management was identified as the second major priority. The system had accumulated a backlog of 7,000 unresolved customer care tickets, including recurring issues that had not been addressed. To tackle this challenge, the SWAT team implemented a combination of fishbone analysis, predictive triage, and SRE-based automation tools within the framework.

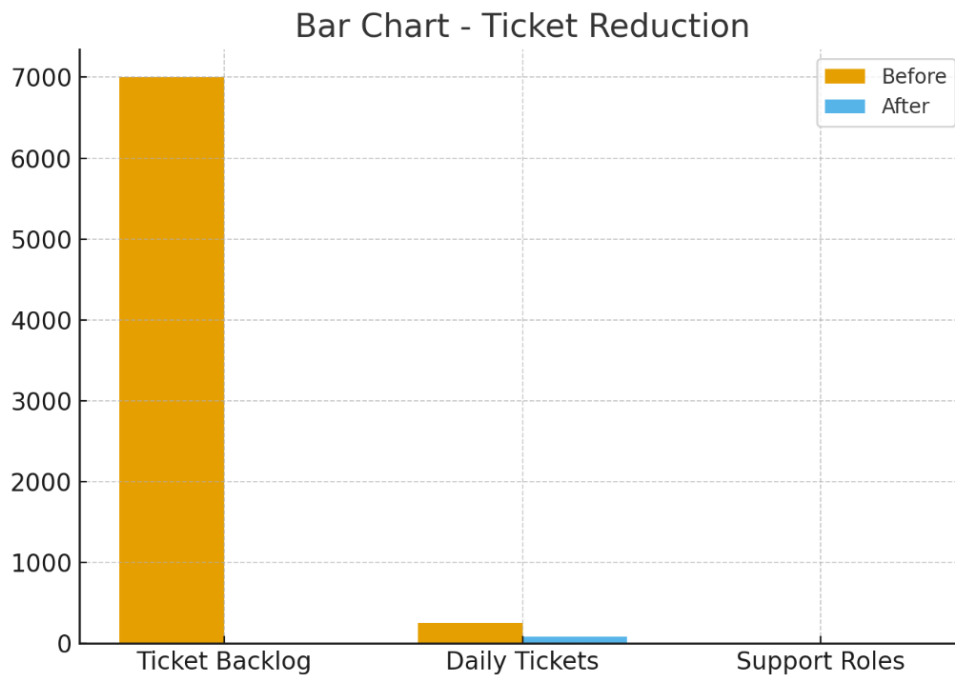
After 2 months backlog was cleared and the number of tickets received each day was cut down to 80. This was among the great economies of scale. Any decrease in the volumes of tickets would allow the customer care groups to focus in the convoluted tickets compared to the normal ones that were common place and repetitive. The two full-time support roles were also ended since much part of the work at least became partially automated.

Table 3: Ticket Backlog Resolution

Metric	Before SWAT Intervention	After SWAT Intervention	Improvement
Ticket Backlog	7,000	0	Cleared
Daily Incoming Tickets	250	80	-68%
Full-Time Support Roles	5	3	-40%
Resolution Speed	Slow	Fast	Major gain

These results suggest that resilience is neither associated with the uptime of any system but also with its capacity. Third, the organization was also in a

position to reduce its fees and optimists the experience of the customers, reduce its costs and invest in innovation.



Resilient Architecture

The final SRE is the high availability. The telemetry diagnostics and failures automation coupled with such practices as CI/CD pipeline resulted in the availability of the financial platform at 99.95. This made sure that the minimum possible time that could have been the case in going down a month had gone down to world industrial standard of less than 22 minutes in the fields of finance services.

One was that move on to new releases should always be carried out without putting existing release into new releases jeopardy. The telemetry receivers delivered

observability in real time to the engineers on the flows of the transactions, the server and customer activities. Another flawless service that the customers did not perceive when the service failed was a consequence of the decision to automate the raw part of the failing service.

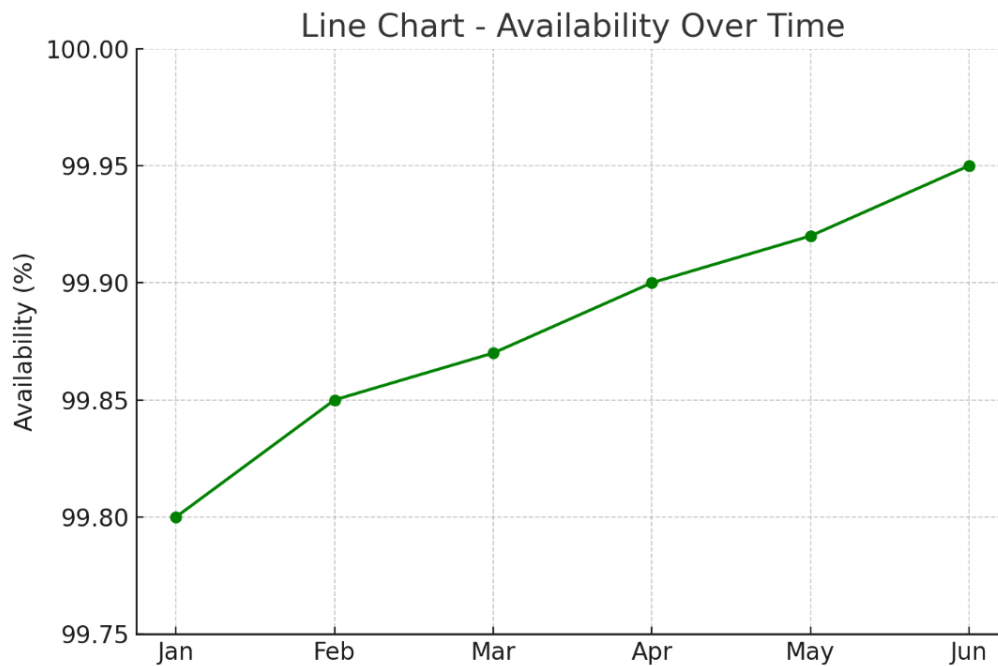
These impacts will built trust within and without the firm. The latter decreased the threat of regulation, offered additional team of organizational body a chance of earning even greater revenues, ensured that the customers lost no chance to utilize free services.

Table 4: Availability Improvements

Practice Applied	Measured Effect
CI/CD Pipelines	Faster
Telemetry Dashboards	Real-time alerts
Failover Automation	Seamless service
Stack AB Strategies	Reduced downtime
Overall Availability	Increased to 99.95%

The upgrades significantly enhanced the platform's resilience against technical failures and minimized customer-facing disruptions. Achieving an availability rate of 99.95% is considered exceptional and is

attainable within financial services, where even a few seconds of downtime can result in substantial revenue loss and reputational damage.



Summary of Results

The findings of the analysis show that SRE ideals dry realistic results in fiscal sites:

1. The automation proves the ETL tracking system more economical, avoids over 1M penalty as well as content at least 70 times faster than the last penalty bothering.
2. All-customer contact reliability also reduced bad comments to customers a fifth, and increased click-throughs fifteen to twenty percent, and successful-payments rate a tenth.
3. IC improved its capacity to operate by clearing 7000-ticket backlog, 68 percent of its daily tickets, and reducing its staffing relation requirements.
4. CI/CD pipelines, telemetry systems, and automated reliability mechanisms collectively enabled the platform to achieve a high availability rate of 99.95%.

The findings indicate that the resilient as a design can be achieved, provided the SRE practices concentration on the business and the technical level of the financial systems are entirely concentrated. This will not only bring in a stability in the system it will also make the customers trust in it which will further make it cost effective besides the set of rules which are to be observed.

IV. CONCLUSION

This study confirms that adopting Site Reliability Engineering (SRE) principles can fundamentally transform financial platforms into highly resilient, customer-focused ecosystems. By embedding automation, observability, and proactive incident management, organizations not only achieved technical stability but also strengthened compliance and customer trust. Automation of ETL processes and file management prevented over \$1 million in regulatory penalties and reduced troubleshooting time by 70%, demonstrating tangible cost savings and operational efficiency. The redesign of the MyAccount portal improved usability and reduced error rates, leading to measurable gains in customer engagement and satisfaction. Furthermore, clearing a backlog of 7,000 tickets and reducing daily ticket volumes by 68% highlights the scalability and efficiency benefits of SRE-driven operations.

On the infrastructure side, CI/CD pipelines, telemetry dashboards, and failover automation collectively elevated platform availability to 99.95%, aligning with global financial service standards. These improvements underscore that resilience extends beyond uptime—it encompasses the ability to maintain service continuity, optimize resources, and deliver consistent user experiences under dynamic conditions. At both national and global levels, SRE offers a strategic blueprint for fintech firms to remain competitive, cost-effective, and compliant in an increasingly digital economy. Looking ahead, integrating AI-driven predictive analytics, chaos engineering, and advanced

telemetry will further enhance resilience, enabling financial platforms to anticipate disruptions and adapt rapidly to evolving regulatory and market demands.

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