Case Study on

PERFORMANCE TESTING OF A LOAN APPLICATION

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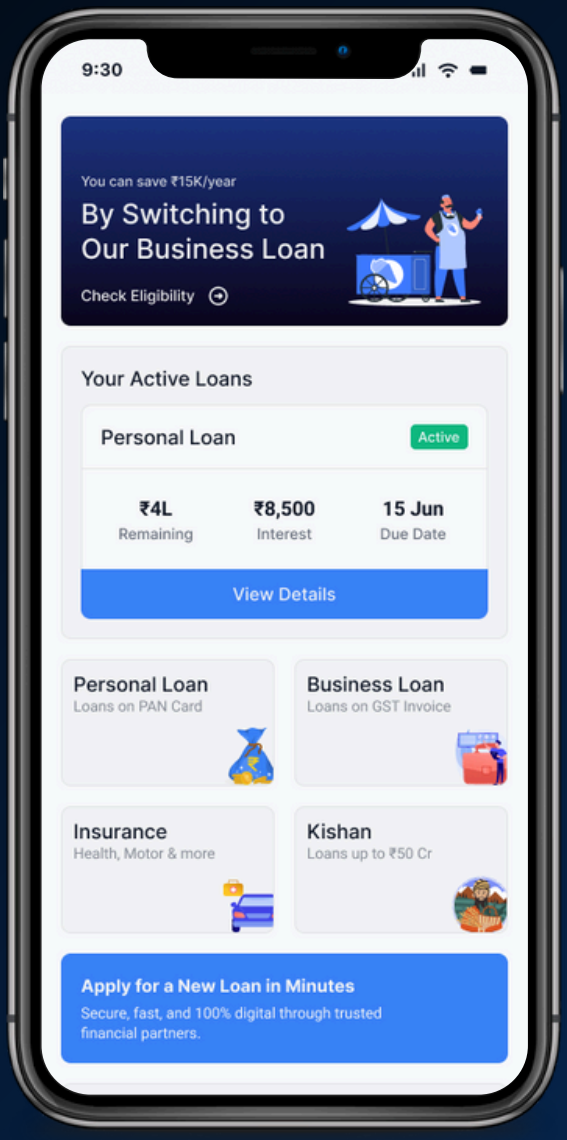
OVERVIEW

Our client is a fintech startup entering the financial technology domain with the objective of building a scalable, secure, and user-friendly digital lending platform. Their goal is to simplify access to credit through a fully digital process, catering to both salaried professionals and business owners by leveraging financial and identity data for faster loan approvals. To ensure seamless performance during peak usage, such as loan disbursal periods and financial year-end cycles, a detailed performance testing strategy using JMeter was implemented to validate the system's stability, responsiveness, and scalability across all critical user flows.



CLIENT DETAILS

- Name: Confidential
- Location: India
- Industry: Finance

TOOLS USED

- Apache JMeter (5.5)
- JMeter Plugins Manager for graphs and advanced visualizations
- Grafana + InfluxDB for real-time monitoring
- Postman for initial API validation and
- CSV Data Set Config for data-driven testing

PROJECT OVERVIEW

Our team has successfully developed a robust and user-friendly web and mobile-based loan application platform designed to streamline the process of applying for both personal loans and GST-based business loans. This end-to-end solution caters to both individual and small business borrowers, ensuring a seamless digital experience.

1

User Authentication:
Secure login and user account management with multi-factor authentication support.

2

Set clear marketing objectives:
A guided, step-by-step form that collects essential applicant information, income details, and supporting documents, enabling quick eligibility checks and application submission.

3

Conduct market research
Gather information about your industry, competitors, and customers.

4

Develop your marketing tactics:
Determine the most effective marketing channels and tactics to reach your target audience.

5

GST-Based Business Loan Application:
Implement tracking mechanisms to monitor the performance of your marketing campaigns.

The system is built with a scalable architecture, secure data handling practices, and an intuitive UI, ensuring accessibility across devices and smooth onboarding for first-time users. It also integrates seamlessly with third-party APIs for KYC verification, credit scoring, and document validation.

SCOPE FOR PERFORMANCE TESTING

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1

Login API Load Validation:
Assess and ensure that the Auth API can handle a high volume of concurrent login attempts efficiently, without delays and no timeouts.

2

Concurrent Loan Submission Testing:
Validate loan APIs' robustness by ensuring they handle multiple simultaneous submissions for both personal and GST-based business loans.

3

Response Time and Throughput Analysis:
Measure response times, API throughput, and server rates under baseline, stress, and spike tests to simulate realistic and extreme loads.

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SCOPE OF HIGH LEVEL MODULES

Module	Type	Description	Module
Login	Authentication flow	Login with credentialsTokens returned	Login
Personal loan	Business logicAPI	Submit KYCLoan details	Personal loan
GST based loan	Business logicAPI	Submit GST, Business PAN, Loan details	GST based loan
Dashboard	Readonly API	Fetch user loan data and other details	Dashboard
Module	Type	Description	Module

JMeter Configuration

Thread Groups: Used separate thread groups for Login, Personal Loan, GST Loan modules etc.

- HTTP Header Manager: Configured to pass Authorization tokens dynamically.
- CSV Data Set Config: Used for dynamic test data (user credentials, PAN, Aadhaar, GSTIN).
- Assertions: Added response code and response time assertions.
- Timers: Added Constant and Uniform Random Timers to simulate real-world delays.
- Listeners: Summary Report, Aggregate Report, Response Time Graph, and Backend Listener (for Grafana dashboard).

KEY PERFORMANCE METRICS

METRIC	DESCRIPTION	LOGIN API	PERSONAL LOAN API	GST LOAN API
Average Response Time (ms)	The average time taken to respond to a request	180 ms	520 ms	670 ms
90th Percentile Response Time	90% of requests completed within this time	250 ms	740 ms	880 ms
95th Percentile Response Time	Upper-bound user experience under load	300 ms	850 ms	960 ms
Max Response Time (ms)	Longest recorded response time	580 ms	1220 ms	1400 ms
Throughput (requests/sec)	Number of requests handled per second	75	45	32
Error Rate (%)	Percentage of failed requests	a	1.2%	1.8%
Success Rate (%)	Percentage of successful requests	99.5%	98.8%	98.2%
CPU Utilization (Peak %)	Max CPU usage on backend server	70%	82%	85%
Memory Usage (Peak MB)	Max memory used during the test	1.2 GB	1.8 GB	2.1 GB
DB Query Response Time (avg)	Average database query response time	90 ms	210 ms	320 ms

TEST SCENARIOS

01. CONCURRENT LOGIN TEST

- 500 virtual users logging in within 2 minutes.
- Validate token generation time and server response.

02. PERSONAL LOAN APPLICATION LOAD TEST

- 200 users are submitting personal loan forms every minute for 10 minutes.
- Payload includes Aadhaar, PAN, Employment, and Salary details.

03. GST LOAN SUBMISSION TEST

- 100 business users per minute applying for loans using GST numbers.
- Payload includes GSTIN, business turnover, and bank details.

04. SOAK TEST

- Continuous traffic (100 users/min) for 1 hour.
- Aim: Identify memory leaks, response time degradation over time.

05. SPIKE TEST

- Sudden jump from 100 to 1000 users in 30 seconds.
- Measure application recovery and performance stability.

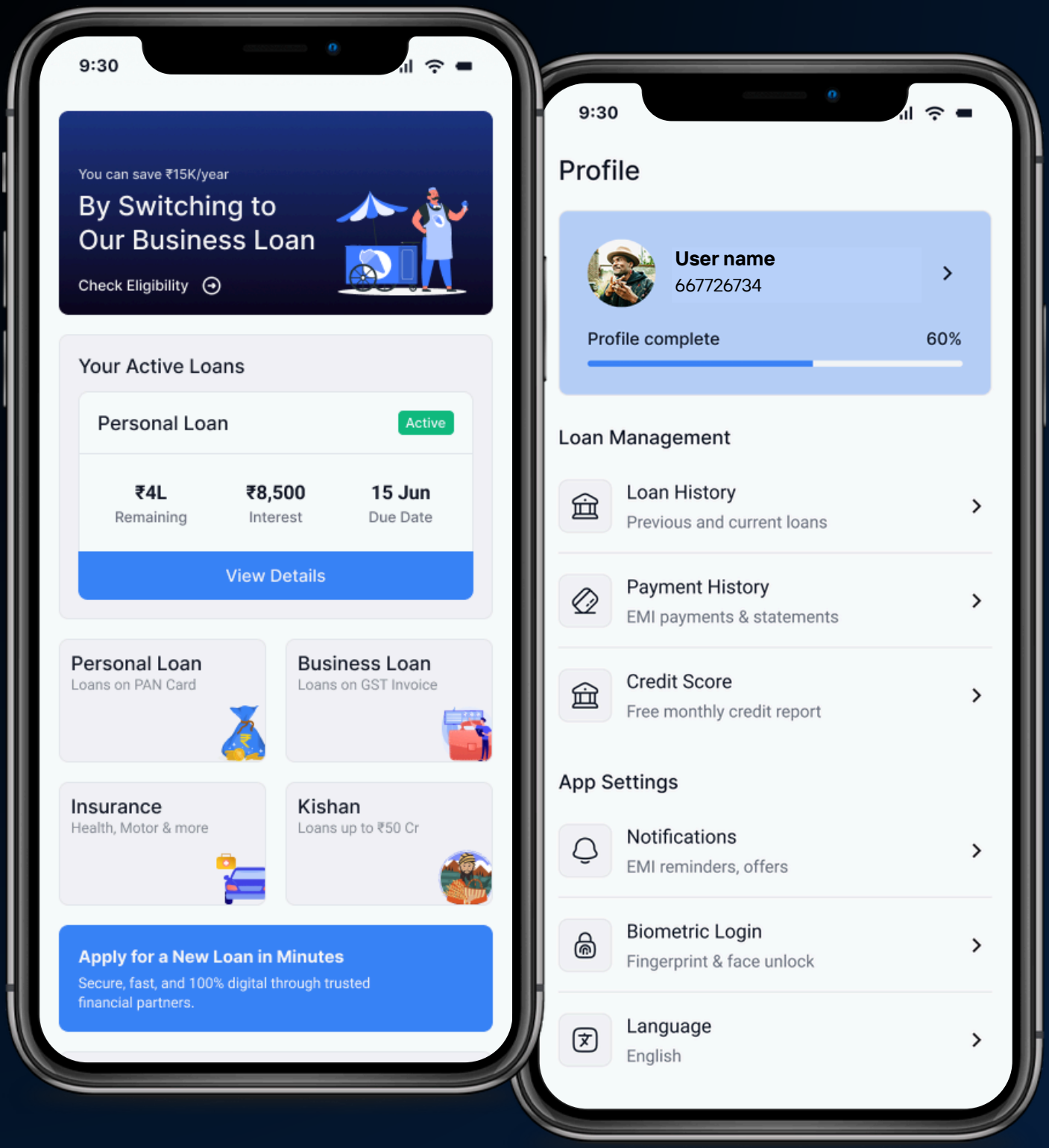
OBSERVATIONS

- Login API scaled well up to 1000 concurrent users with minimal latency.
- Personal Loan API performance degraded slightly under peak load, especially in payload-heavy submissions (with attachments).
- The GST Loan API was the most resource intensive due to backend verification layers.
- Occasional 500 server errors appeared during spike testing, indicating a potential thread pool saturation issue.
- Database CPU usage spiked to 85% during the soak test. We suggested the need for query optimization.

RECOMMENDATIONS

- Optimize SQL queries involved in GST-based loan validations.
- Implement connection pooling and asynchronous processing for heavy operations.
- Use caching for static verification data (e.g., employment types, business categories).
- Scale backend infrastructure horizontally during peak periods using autoscaling.
- Add rate limiting and retry mechanisms on the frontend to prevent cascading failures during spikes.

SCREENSHOTS



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