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Evaluating the Cost Dynamics of Serverless and Serverful Cloud Solutions: A Comparative Analysis

Introduction

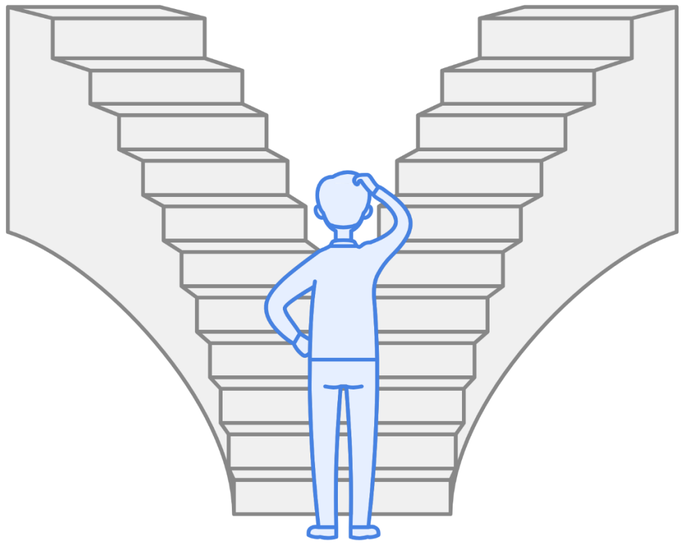
Which architecture model to choose for cloud-native apps?

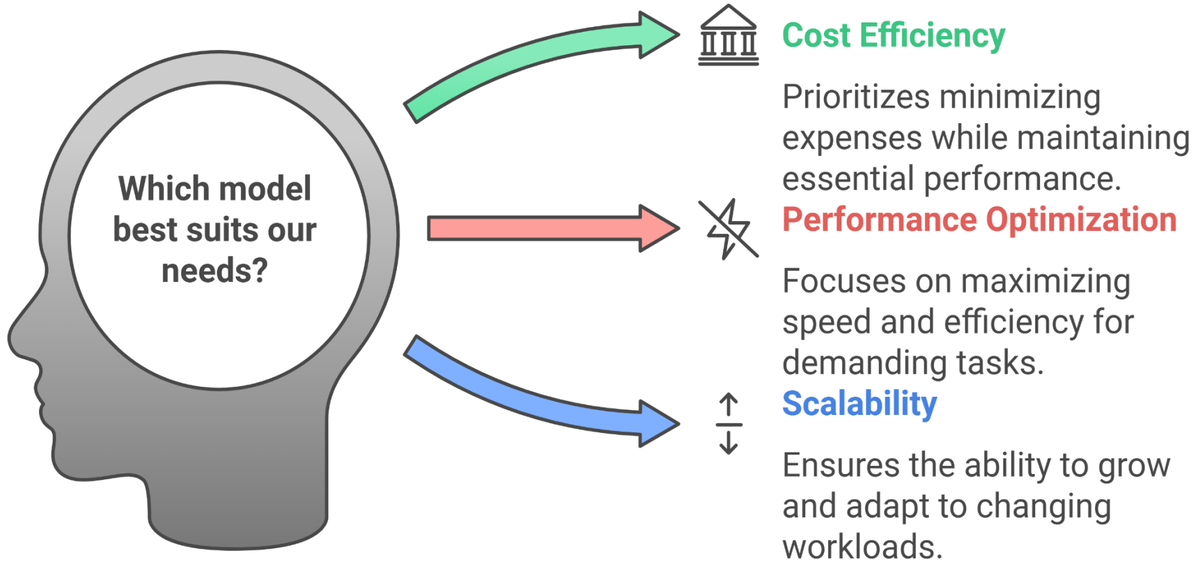
Serverless Architecture

Offers auto-scaling and pay-per-use pricing, ideal for dynamic workloads.

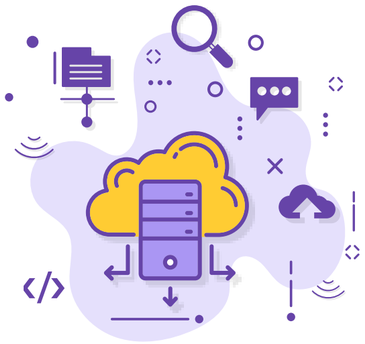
Serverful Architecture

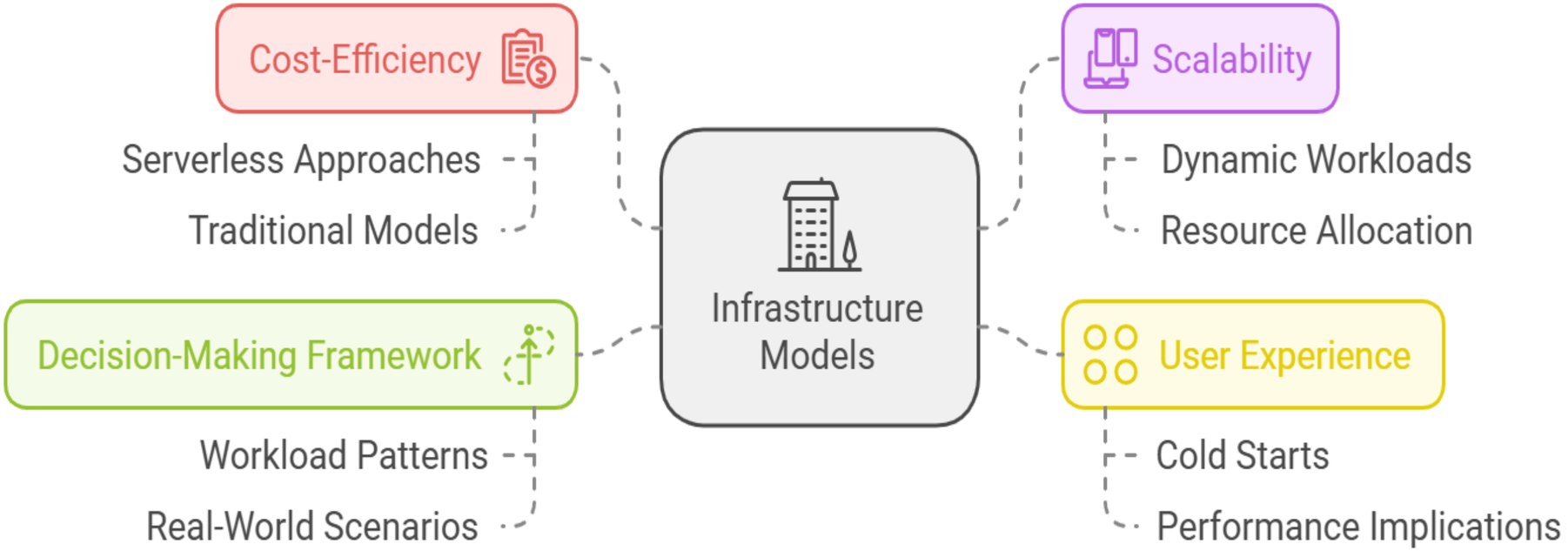
Provides control with fixed costs, suitable for stable, predictable workloads.



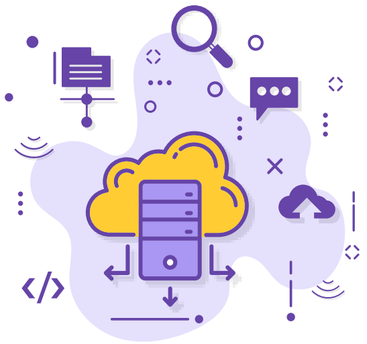


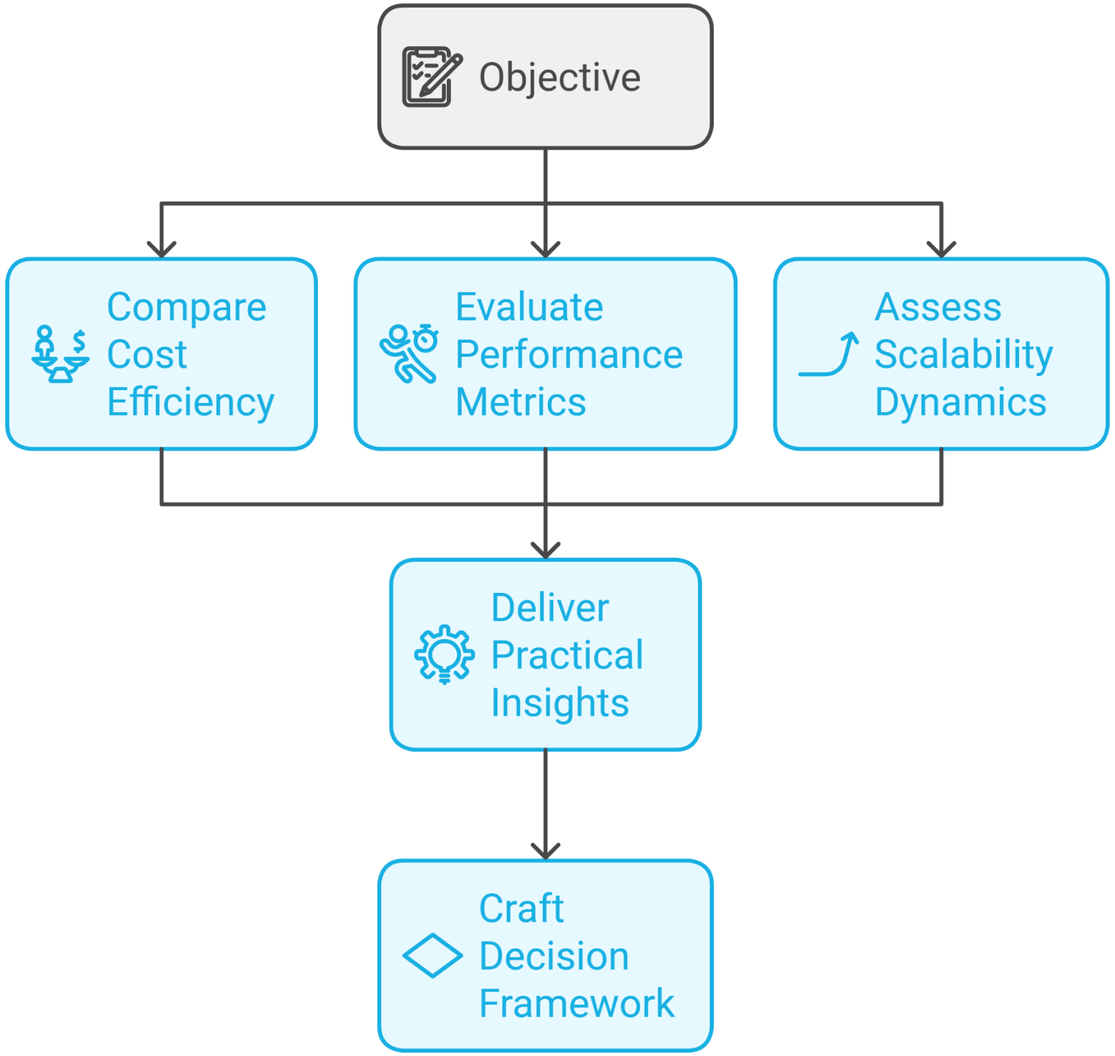
Motivation



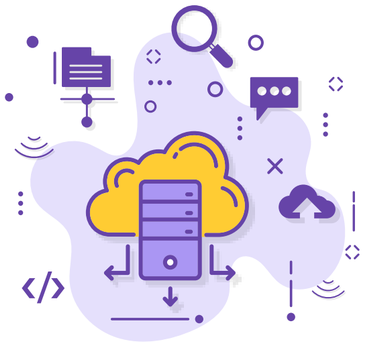

Cost-Efficiency
Serverless Approaches
Traditional Models
Decision-Making Framework
Workload Patterns
Real-World Scenarios
Infrastructure Models
Scalability
Dynamic Workloads
Resource Allocation
User Experience
Cold Starts
Performance Implications

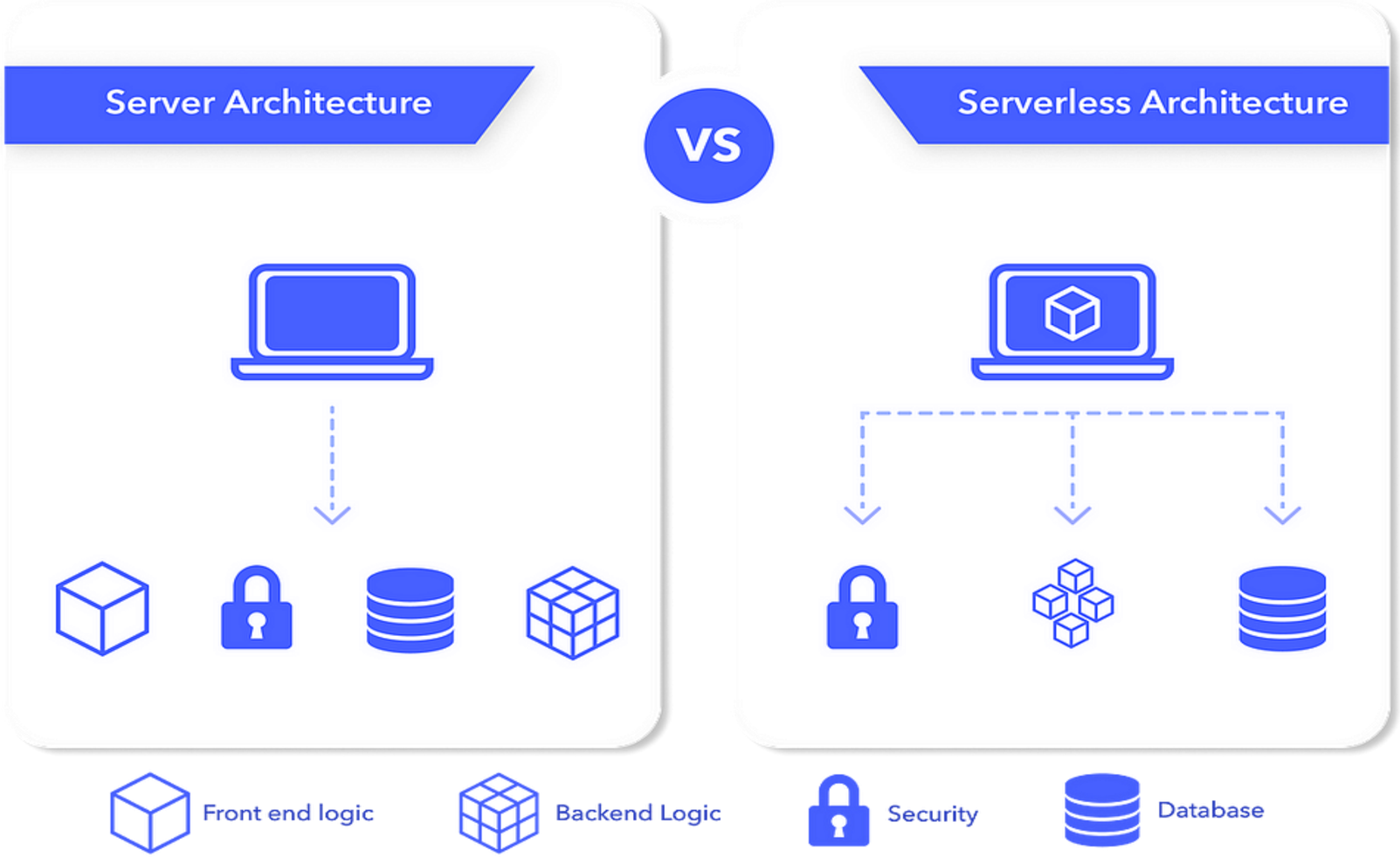
Objectives




Objective
Compare Cost Efficiency
Evaluate Performance Metrics
Assess Scalability Dynamics
Deliver Practical Insights
Craft Decision Framework

System Architecture





Road Map of our Research (Methodology)

Deploy Web App

Set up dynamic web app using serverless and serverfull solutions

Record Data

Collect data based on workload for both solutions

Analyze Data

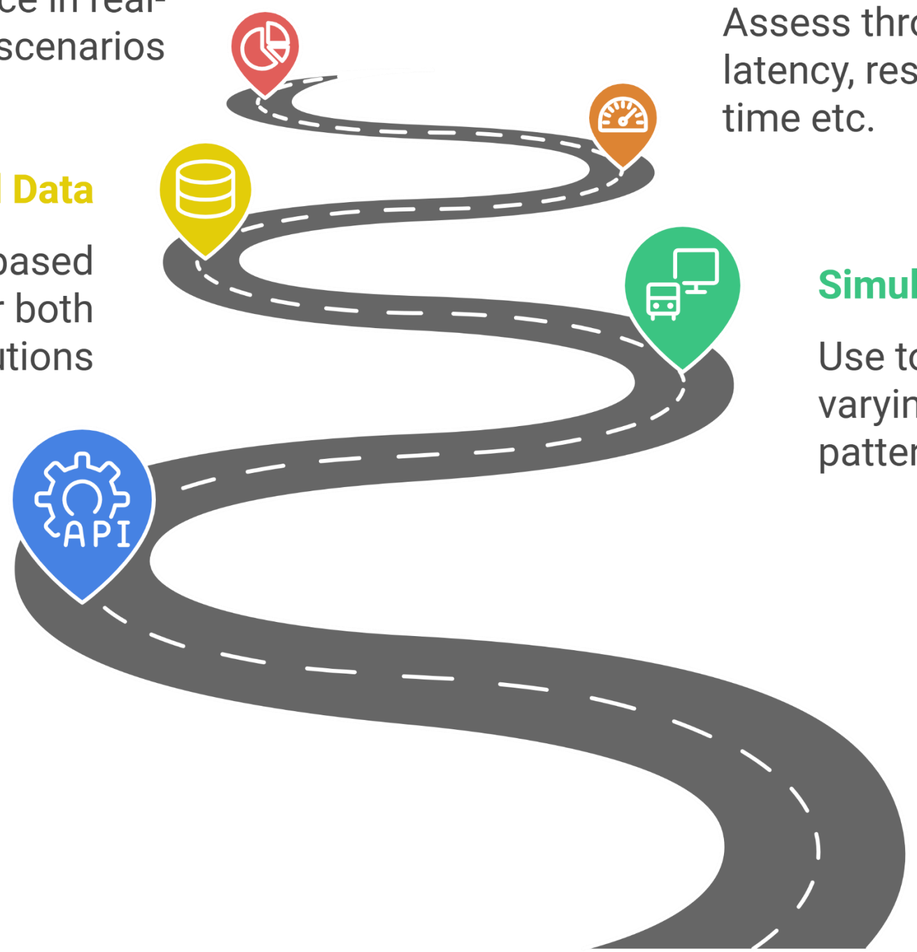
Compare cost and performance in real-world scenarios

Simulate Workloads

Use tools to create varying traffic patterns

Measure Necessary Metrics

Assess throughput, latency, response time etc.



Result Analysis

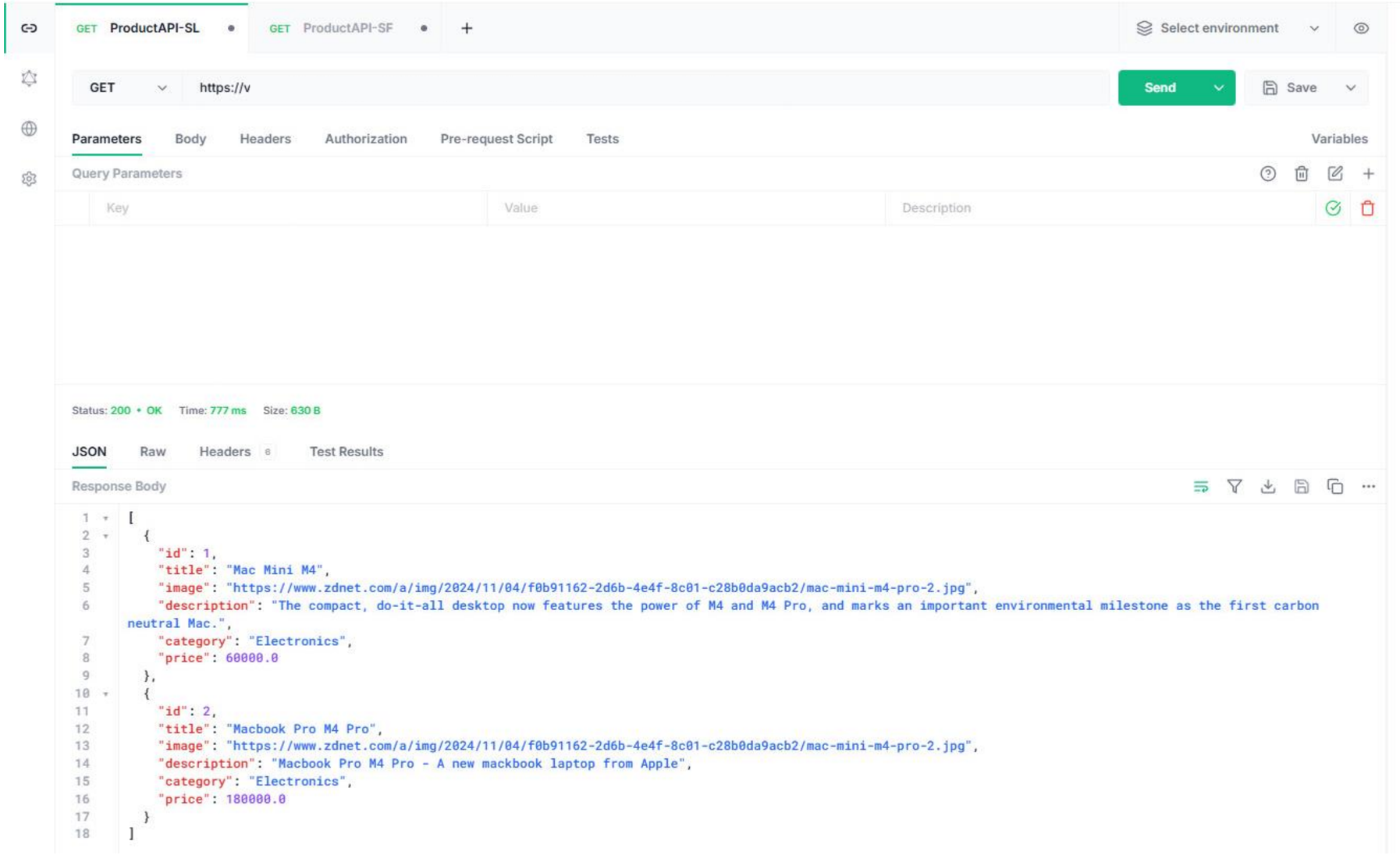


Fig: Initial Response of our API (Serverless)

Result Analysis (cont.)

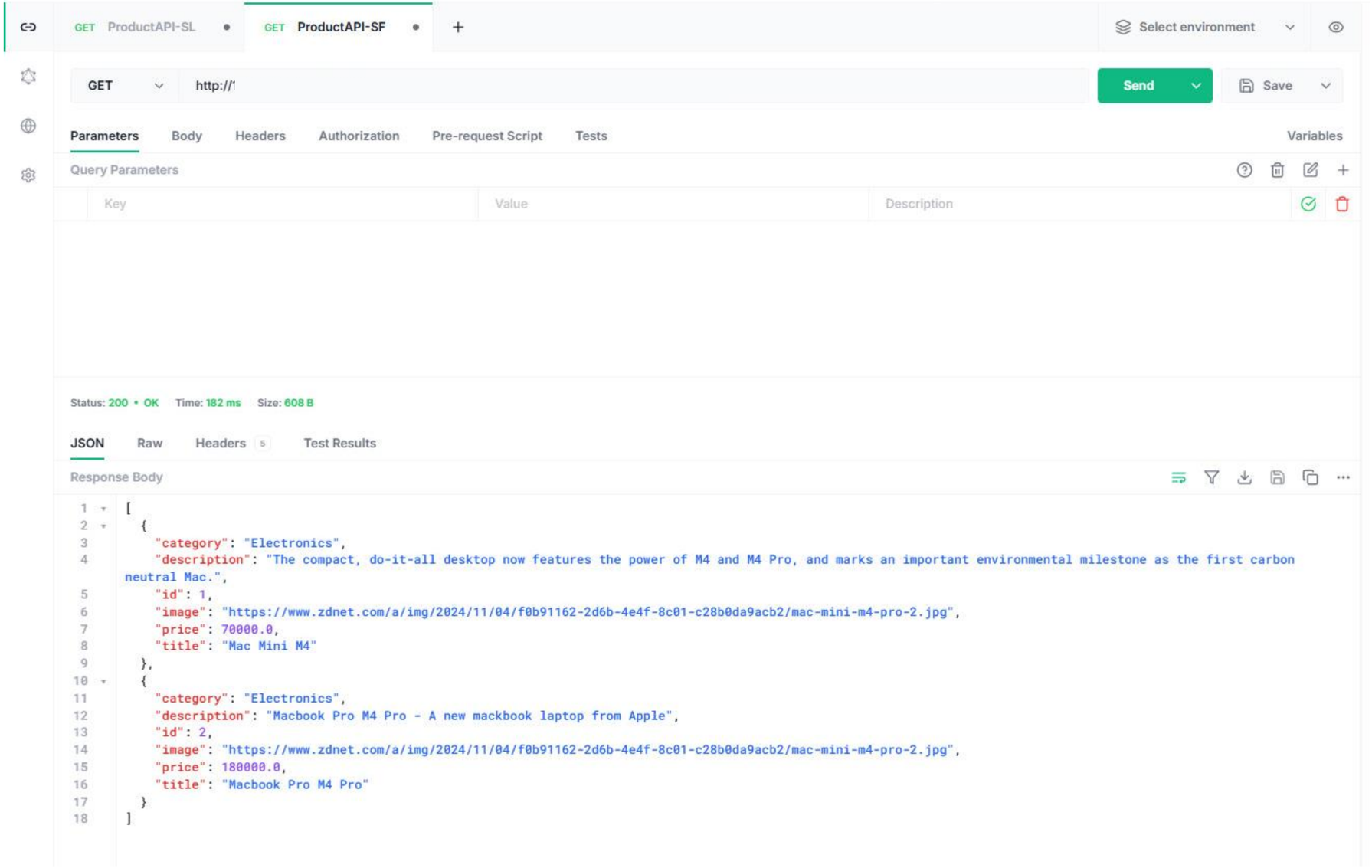


Fig: Initial Response of our API (Serverful)

Result Analysis

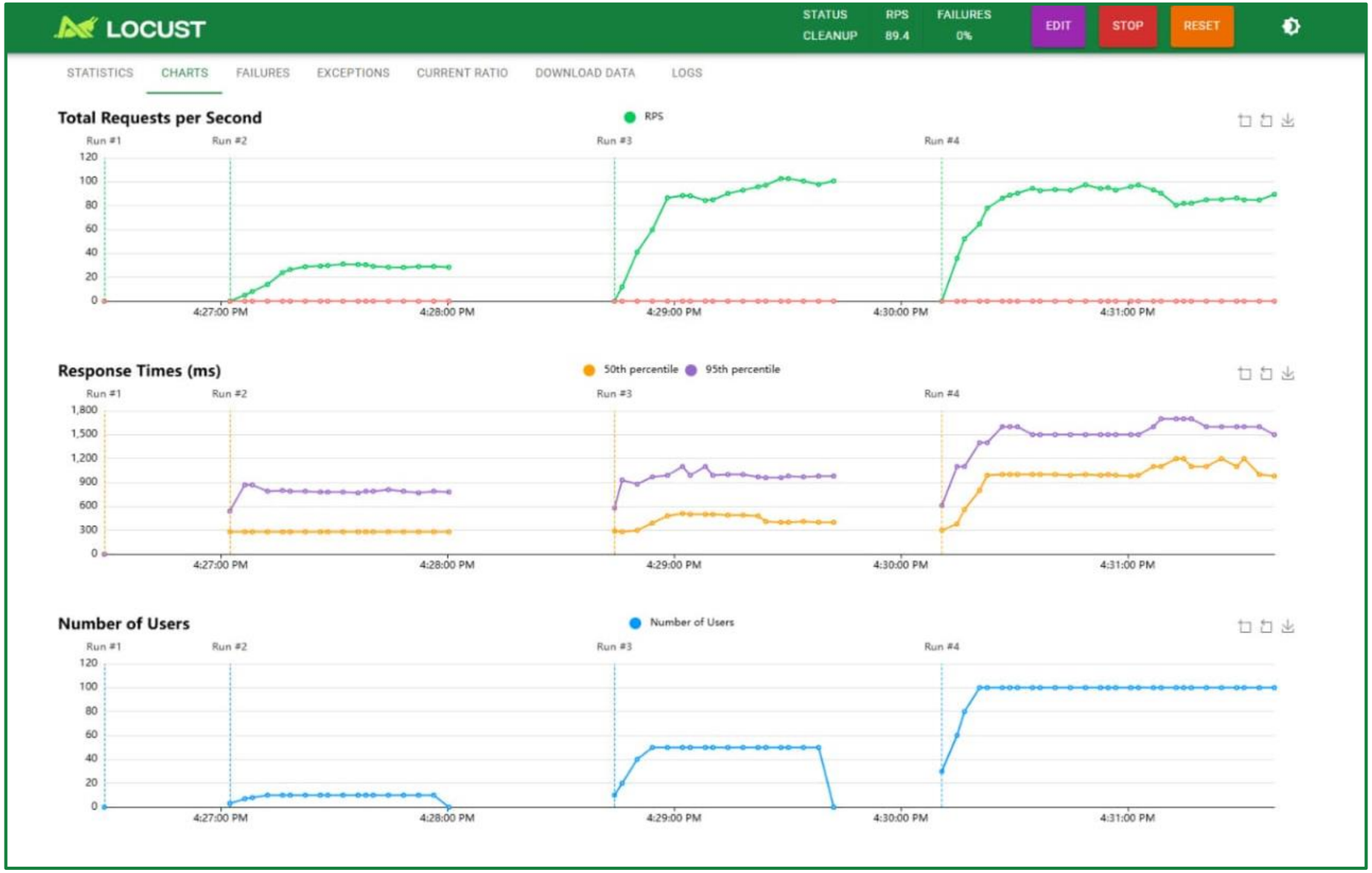


Fig: Visual Analysis 01 (Partial)

Result Analysis (cont.)

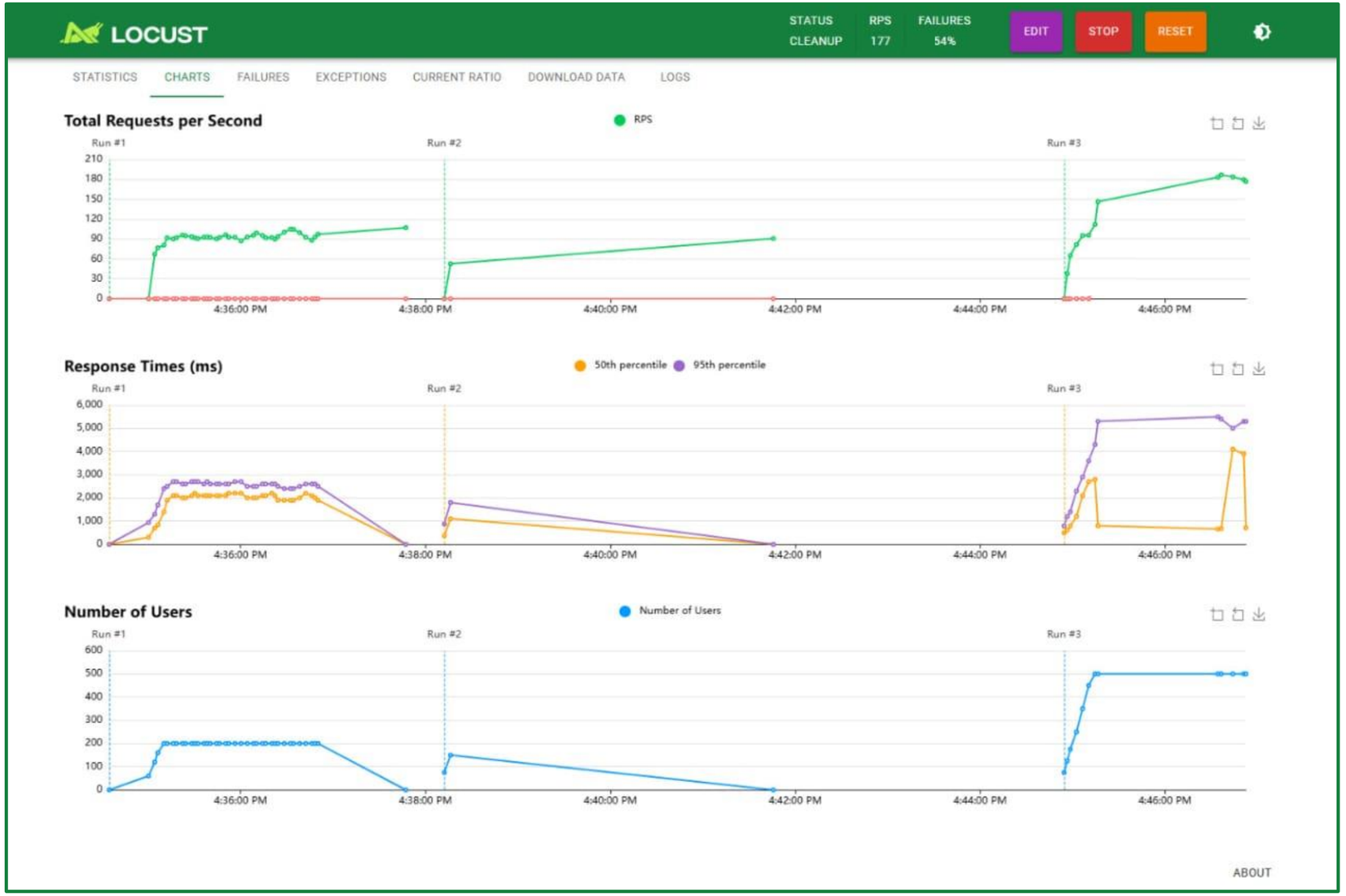


Fig: Visual Analysis 02 (Partial)

Result Analysis (cont.)

Traffic Load	Metric	Serverless (AWS Lamda)	Serverful (Traditional VPS)
Low Traffic	10 Requests per Second	$05.18/month	$0.017 RPM (Tier A VPS)
	Idle Period: 60%	$3.10/month	N/A (VM running constantly)
	Total Monthly Cost	**> 5 USD**	**5~7 USD**
Mid Traffic	200 Request per Second	$103.60/month	$0.011 RPM (Tier B VPS)
	Idle Period: 60%	$41.47/month	N/A
	Total Monthly Cost	**40~100 USD**	**12~15 USD**
High Traffic	500 Request per Second	$259.20/month	$0.013 RPM (Tier C VPS)
	Idle Period: 40%	$155.52/month	N/A
	Total Monthly Cost	**$250.00**	**20~30 USD**

Fig: Cost Dynamics based on my testings

Conclusion

Scenario	Recommended Architecture	Rationale
Low Traffic with Sporadic Use	Serverless (AWS Lambda)	Cost-effective for sporadic, low-traffic use cases due to its pay-per-use model.
Low Traffic with Consistent Use	Serverful (Traditional VPS)	Offers marginally lower costs with flat pricing and consistent resource availability.
Mid Traffic with Fluctuations	Serverful (Traditional VPS)	Substantially cheaper for sustained workloads with predictable traffic patterns.
High Traffic, Predictable Loads	Serverful (Traditional VPS)	Significantly lower costs for large-scale, predictable workloads with no elasticity required.
High Traffic with Spikes	Hybrid Solution	Combine serverful for steady traffic and serverless to absorb unpredictable traffic spikes.
Rapid Scaling or Dynamic Workloads	Serverless (AWS Lambda)	Ideal for applications with unpredictable or short-term spikes due to instant scaling benefits.

Fig: Decision table based on my findings so far

Future Enhancements

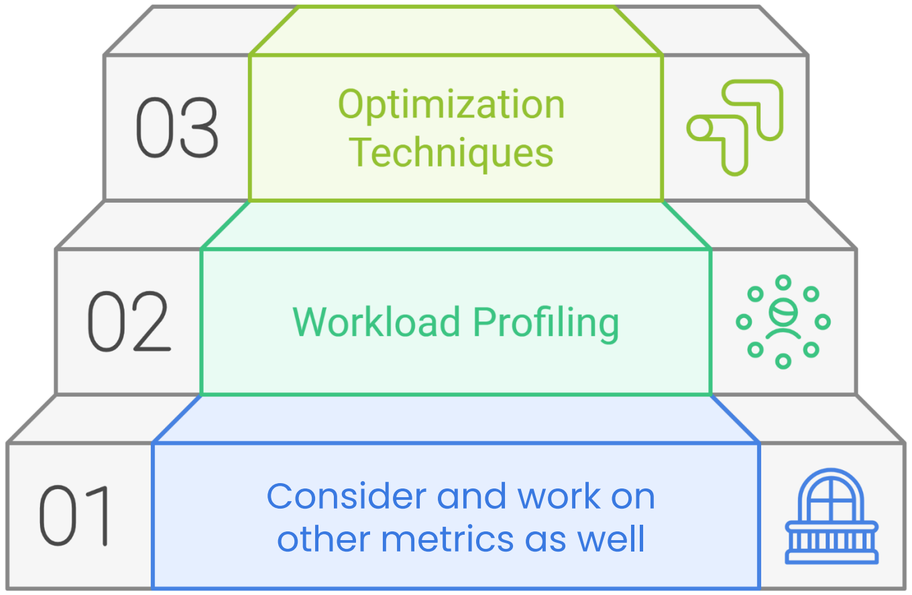


Fig: Probable Future Works

Challenges

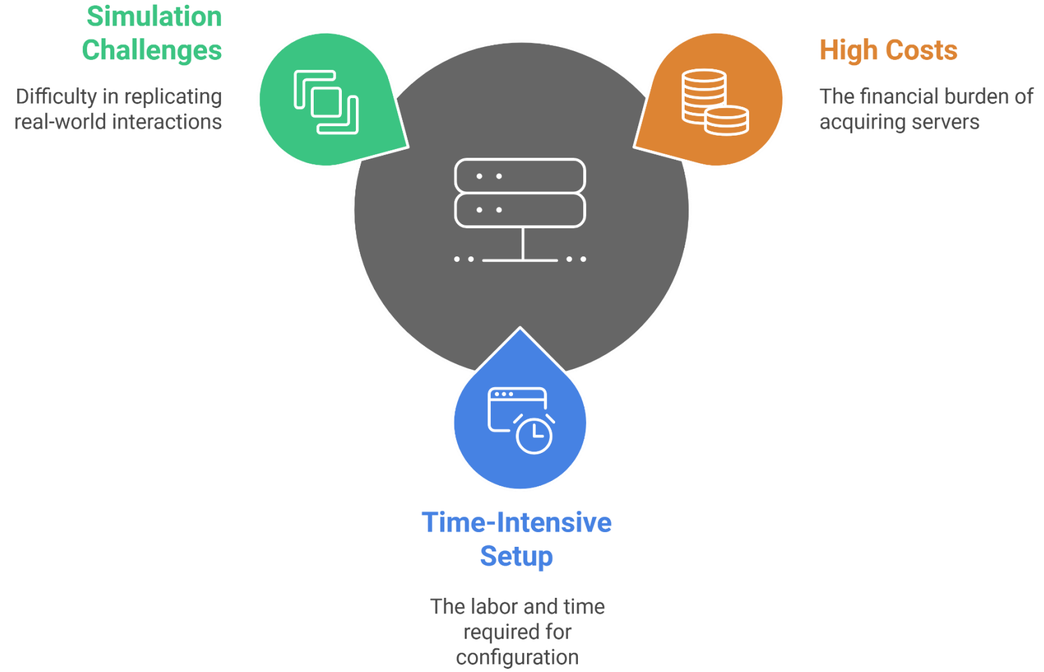


Fig: Limitations/Challenges

THANK YOU