Event Ticket System

Cost Analysis and Scalability Plan

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Cost Breakdown

Monthly Cost Estimate

Based on 10,000 events/month and 100,000 registrations

Compute (AWS Lambda)

Function	Invocations/month	Duration (ms)	Memory (MB)	Cost
create_event_fn	10,000	500	512	$0.84
list_events_fn	150,000	300	512	$7.56
event_stats	200,000	400	512	$13.44
register_fn	100,000	2000	1024	$33.60
pay	100,000	300	512	$5.04
scan	50,000	200	256	$1.68
Total Lambda				**$62.16**

Database (DynamoDB)

Component	Usage	Cost
On-Demand Reads (10M reads)	10,000,000	$2.50
On-Demand Writes (500K writes)	500,000	$6.25
Storage (10 GB)	10 GB	$2.50
Total DynamoDB		**$11.25**

Storage (S3)

Component	Usage	Cost
Standard Storage (100 GB)	100 GB	$2.30
PUT Requests (100K)	100,000	$0.50
GET Requests (300K presigned URLs)	300,000	$0.12
Total S3		**$2.92**

CDN (CloudFront)

Component	Usage	Cost
Data Transfer Out (100 GB)	100 GB	$8.50
HTTP Requests (1M)	1,000,000	$1.00
Total CloudFront		**$9.50**

Authentication (Cognito)

Component	Usage	Cost
Monthly Active Users	50,000 MAU	$0.00 (free tier)
Total Cognito		**$0.00**

API Gateway

Component	Usage	Cost
HTTP API Requests (600K)	600,000	$0.60
Total API Gateway		**$0.60**

Payment Processing (Stripe)

Component	Usage	Cost
Transactions (100K × ■500)	■50,000,000	2.9% + ■2 per transaction
Total Stripe Fees		**~■1,450,200 (~$17,400)**

Total Monthly Cost Estimate

Category	Monthly Cost (USD)
AWS Services	$86.43
Stripe (passes to customer)	$17,400

Total Infrastructure	$86.43

Cost Optimization Tips

1. Use DynamoDB On-Demand: Pay only for actual reads/writes instead of provisioned capacity.

2. Optimize Lambda Memory: Right-size memory allocation to balance performance and cost.

3. S3 Lifecycle Policies: Move old tickets to Glacier after 90 days for significant storage savings.

4. CloudFront Caching: Increase TTL for static assets to reduce origin requests.

5. Reserved Capacity: If consistent load is observed, purchase reserved capacity for long-term savings.

6. API Gateway Caching: Reduce Lambda invocations for read-heavy endpoints by 70%.

Free Tier Benefits (First 12 months)

Lambda: 1M requests/month, 400,000 GB-seconds compute

DynamoDB: 25 GB storage, 25 WCU, 25 RCU

S3: 5 GB storage, 20,000 GET, 2,000 PUT

CloudFront: 50 GB data transfer out

Estimated Free Tier Savings: ~$30-40/month

Scalability Plan

Current Capacity

Component	Current Limit	Bottleneck Point
Lambda Concurrent Executions	1,000	Regional soft limit
DynamoDB Throughput	On-Demand (auto-scales)	None
API Gateway	10,000 RPS	Regional soft limit
S3	3,500 PUT, 5,500 GET/s	Per prefix
Cognito	25,000 MAU (free tier)	Pay above threshold

Scaling Strategies

Horizontal Scaling (0 - 1M events/year)

Current Implementation

• Serverless auto-scaling with no manual intervention required

• Pay-per-use pricing model ensures cost efficiency

• Supports up to 100,000 concurrent users

• Handles millions of API requests per day

• Unlimited storage growth capability

Performance Optimization (1M - 10M events/year)

Database Optimizations:

• **Add Caching Layer:** Implement ElastiCache (Redis) to cache frequently accessed events and statistics with 30-60 second TTL.

• **DynamoDB Enhancements:** Enable Auto Scaling, use DAX for read-heavy workloads, and implement conditional writes to prevent race conditions.

Lambda Optimizations:

• **Provisioned Concurrency:** Configure for frequently-used functions to eliminate cold starts and ensure predictable latency.

• **Function Optimization:** Increase memory to 1024 MB for register_fn, use Lambda Layers for shared dependencies, and implement connection pooling.

API Gateway Optimizations:

• **Enable Caching:** Cache GET /events for 60 seconds and event stats for 30 seconds to reduce Lambda invocations by 70%.

• **Request Throttling:** Implement rate limiting per user to protect against DDoS attacks.

Global Expansion (10M+ events/year)

Multi-Region Deployment:

• Primary Region: us-east-1 (N. Virginia)

• Secondary Region: eu-west-1 (Ireland)

• Tertiary Region: ap-south-1 (Mumbai)

Architecture Changes:

• **DynamoDB Global Tables:** Multi-region replication with local read/write in each region and automatic conflict resolution.

• **Route 53 Geo-Routing:** Route users to nearest region with latency-based routing and health checks with failover.

• **S3 Cross-Region Replication:** Replicate tickets to multiple regions for lower latency downloads and disaster recovery.

• **CloudFront Distribution:** Already global by default, configure custom origins per region and optimize cache behaviors.

Estimated Costs at Scale

Scale	Monthly Events	Infrastructure Cost	Notes
Small	10,000	$86	Current
Medium	100,000	$520	Add caching
Large	1,000,000	$3,800	Multi-region
Enterprise	10,000,000	$28,000	Full optimization

Monitoring & Alerting

CloudWatch Metrics:

• Lambda errors and duration

• DynamoDB throttling events

• API Gateway 4xx/5xx errors

CloudWatch Alarms:

• Lambda error rate > 1%

• DynamoDB consumed capacity > 80%

• S3 4xx errors > 5%

X-Ray Tracing:

• End-to-end request tracing

• Identify bottlenecks in the system

• Optimize critical paths for better performance

Dashboard:

• Custom CloudWatch dashboard with key metrics

• Visualization of system health and performance

• Real-time monitoring capabilities

Disaster Recovery

Recovery Objectives:

• RPO (Recovery Point Objective): < 5 minutes

• RTO (Recovery Time Objective): < 15 minutes

Backup Strategy:

• DynamoDB Point-in-Time Recovery enabled

• S3 versioning enabled for all buckets

• Daily snapshots to separate AWS account

• Cross-region replication for critical data

Failover Plan:

- Health checks on primary region
- Automatic Route 53 failover to secondary region
- Manual promotion of secondary region if needed