

**Title of Project:** Improving maps & navigation application using serverless computing

**Advisors:** Wyatt Lloyd, Nicolaas Kaashoek

**Purpose of Funding:**

My project will implement a version of a real time maps and navigation application such as Google Maps on top of a serverless computing framework on an edge (Radical). Applications running at the edge have the benefit of being closer to the users and thus resulting in lower latencies. However, applications run at the edge lack many of the guarantees that are available at the data centers. Radical addresses this gap by leveraging the lower latencies available at the edge while maintaining the consistency guaranteed at the datacenter. My goal is to leverage the properties of Radical to either decrease the latency of routing algorithms

The funding is requested to cover the cost of AWS services needed for this project. These services are required to test and analyze the performance of distributed systems, particularly focusing on geographic latency variations, data replication, and storage for geographical and user data.

**Funding Period:**

09/2024 – 05/2025 (9 months)

**Estimated Monthly Costs:**

- **AWS DynamoDB:**
  - ~2.50\$/month for data storage. This assumes 10GB of data, the majority of which is allocated for geographical data, and a smaller portion for user data.
  - ~2\$/month for writes. Writes are inherently more costly than reads. This also includes additional costs for replication across multiple AWS Regions, since a singular write would result in additional writes to remaining replicas. Having multiple datacenters is important for my project as it simulates real-world latency differences between datacenter, edge, and client locations (e.g., cross-America, cross-Pacific).
  - ~0.50\$/month for reads.
  - Estimated Monthly Cost: ~\$5/month
  - **Total (9 months): \$45**
- **AWS RDS (Relational Database Service):**
  - ~\$25/month for Amazon RDS PostgreSQL instances. This assumes the smallest micro storage instance, Multi-AZ deployment and OnDemand pricing model.
  - ~\$20/month for AWS RDS Proxy.
  - ~\$5/month for storage.
  - Estimated Monthly Cost: ~\$50/month
  - **Total (9 months): \$450**
- **AWS EC2 (Elastic Compute Cloud):**

- ~\$3/month for the lowest-cost On Demand instance
- ~\$2/month for additional intra-region and outbound data transfer. This assumes 2GB per month.
- Estimated Monthly Cost: ~\$5/month
- **Total (9 months): \$45**

**Total Funding Requested:**

~\$500 for the 9-month period.