MICHIGAN STATE UNIVERSITY

Project Plan Presentation

AWSome Availability Zones

The Capstone Experience

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From Students…
…to Professionals

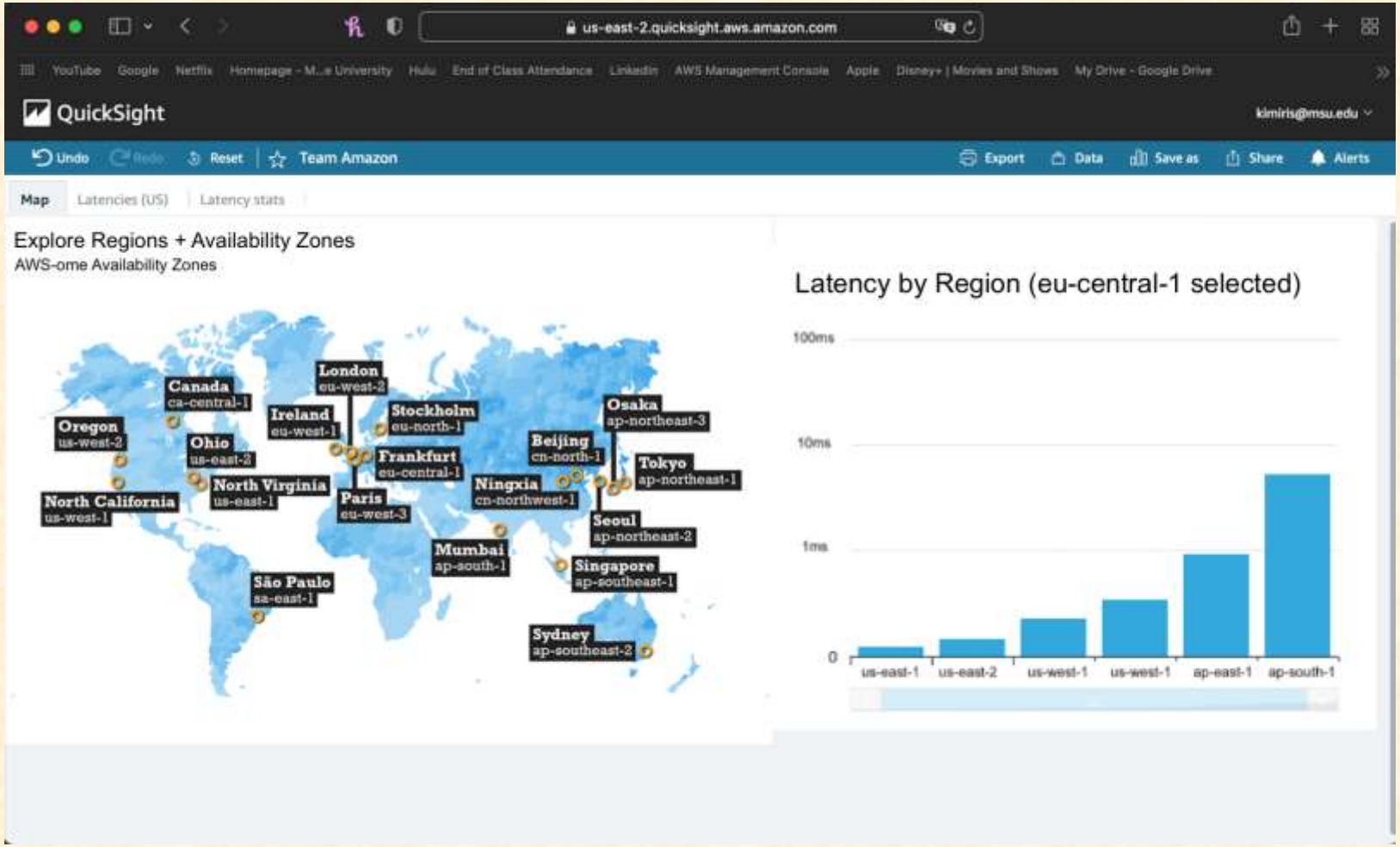
Functional Specifications

- Gather information on network latency between Availability Zones (i.e., data centers)
- Assist users with optimizing network latency in their applications by suggesting AZ pairs
- Interact with data through easy-to-use UI
- Filter through results based on region-based requirements (ex. no AZs in Europe, one must be in Western US, etc.)

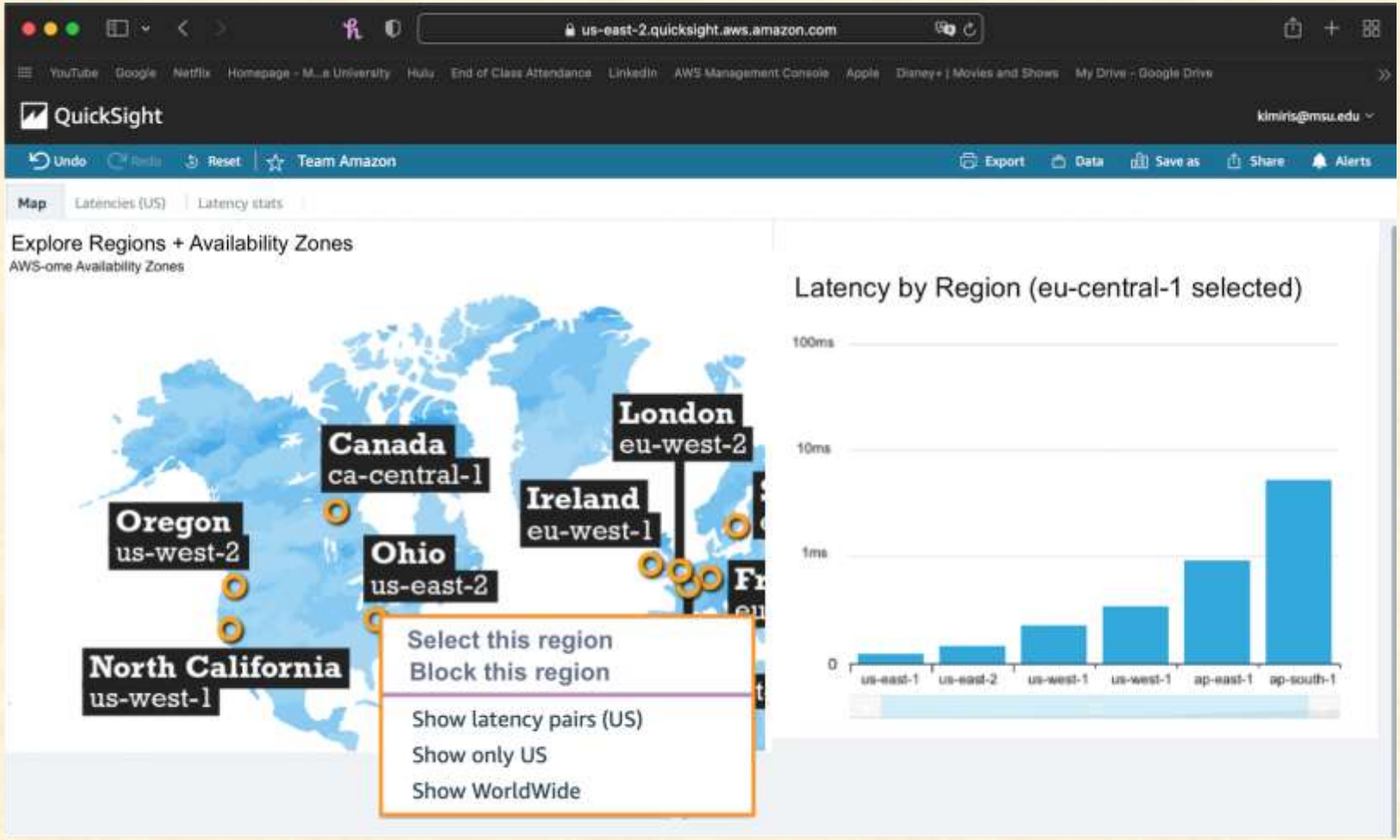
Design Specifications

- User friendly + interactive map showing all Regions in the world. Each Region is clickable and will show more details about each Availability Zone it contains
- Filtering system where users can add, edit, and remove Region-based requirements for AZ placement
- Once a Region is selected, all other Regions are colored on main map webpage based on average network latency
- Statistics webpage for any pair of Availability Zones showing a graph of network latency tests and highlighting important features like average latency, 95^{th}, 99^{th}, and 99.9^{th} percentiles

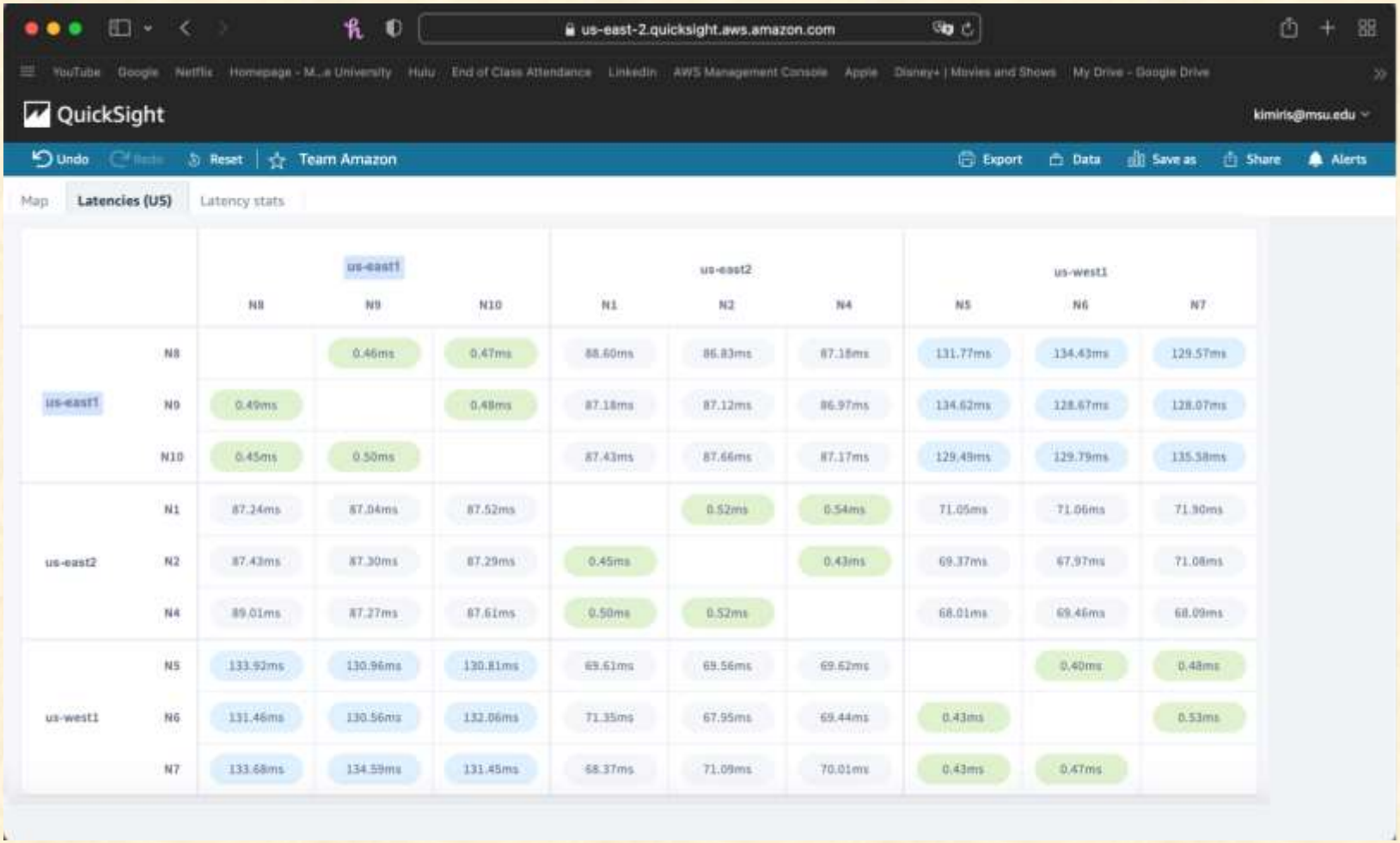
Screen Mockup: Interactive Map



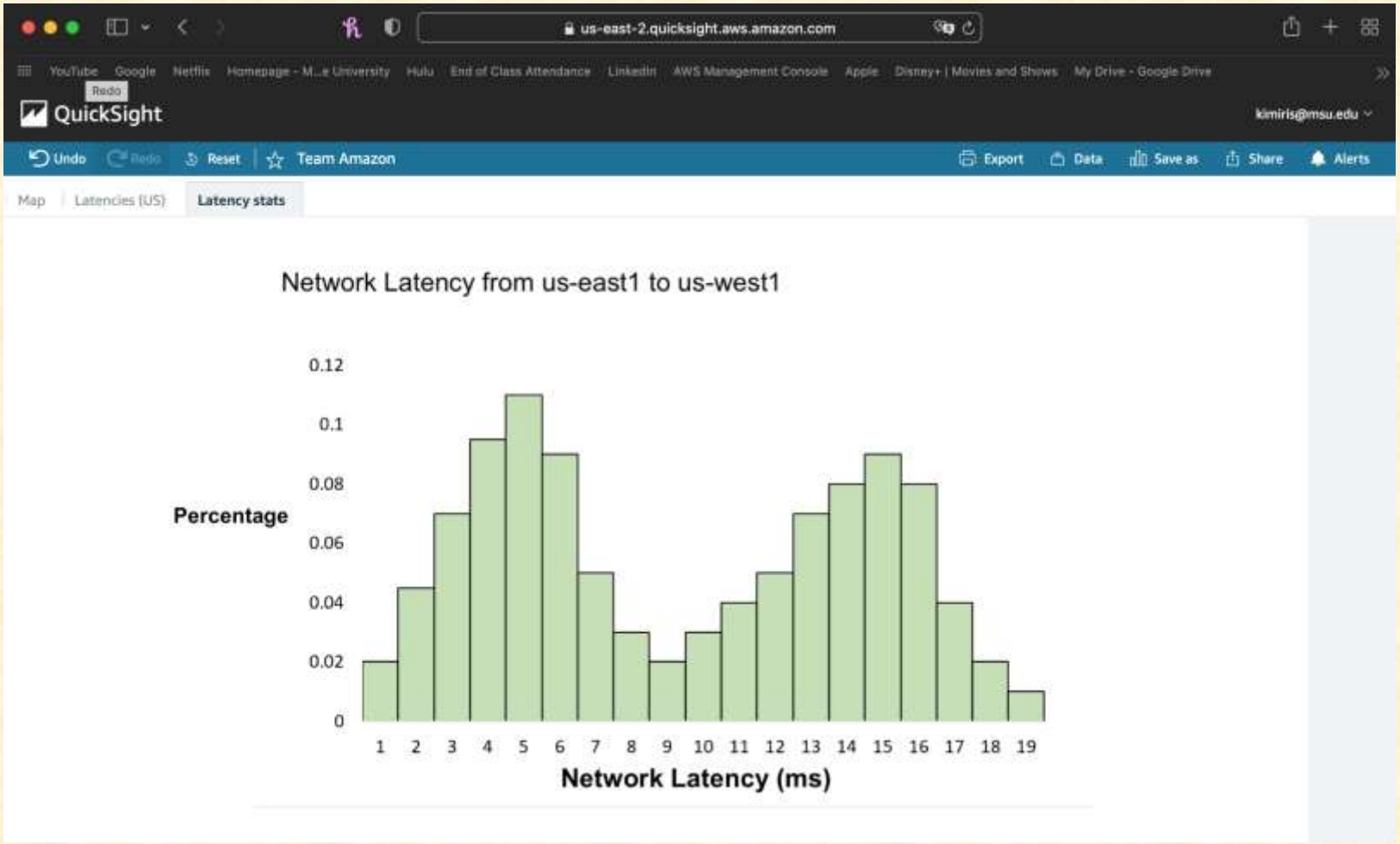
Screen Mockup: Select Region



Screen Mockup: Regional AZ Matchups Page



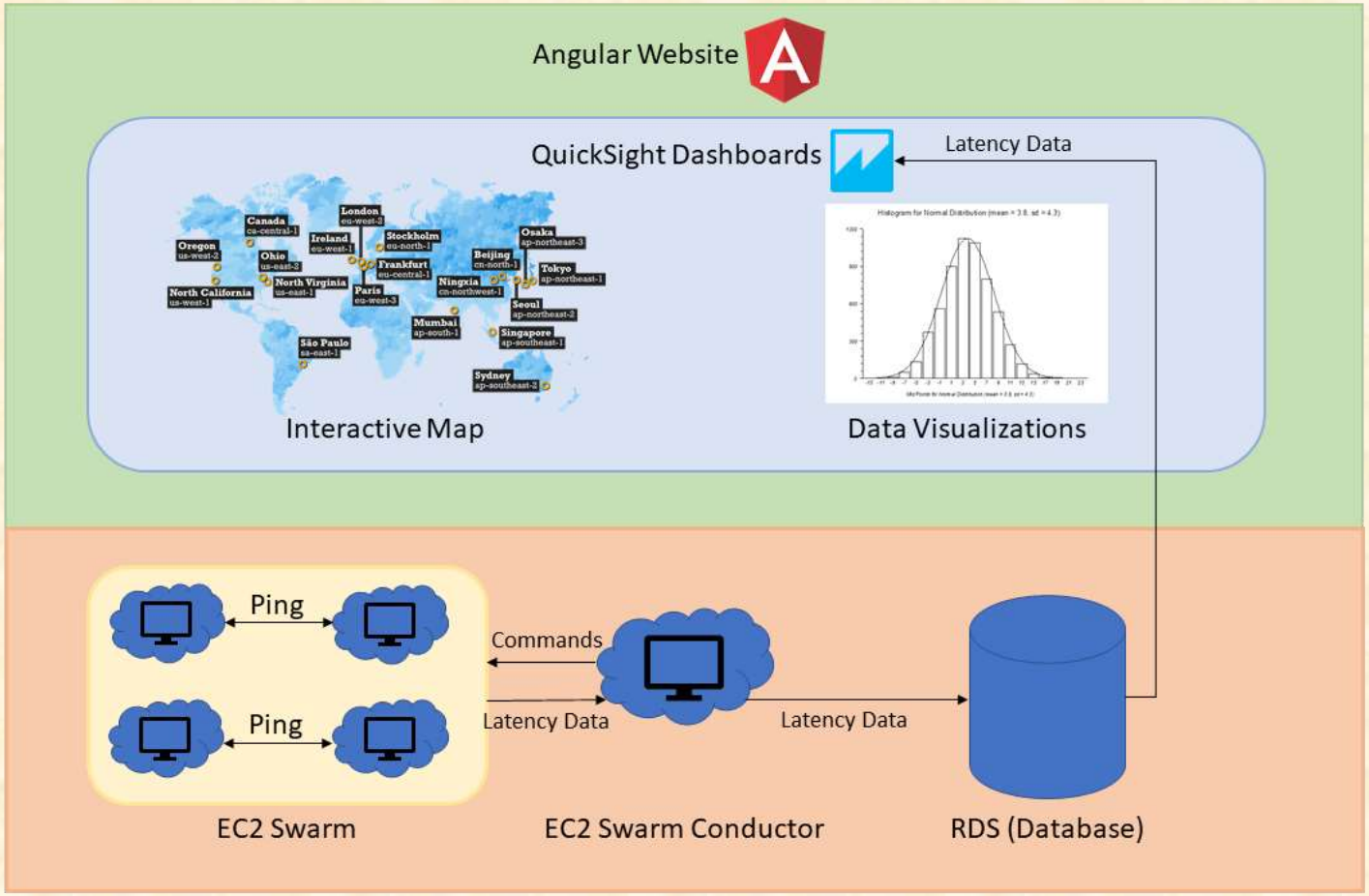
Screen Mockup: Specific AZ Pair Statistics Page



Technical Specifications

- Front End
  - QuickSight Dashboard
  - GitHub Pages
  - Angular web application
- Back End
  - AZ Matching Algorithm
  - ICMP vs. TCP
  - High Precision Timer
  - EC2 automatic deploy

System Architecture



System Components

- Hardware Platforms
  - N/A
- Software Platforms / Technologies
  - Front End
    - Angular, Angular Materials, GitHub Pages
    - AWS Services (IAM, Lambda, API Gateway, QuickSight)
  - Back End
    - AWS CDK, CLI, SDK
    - Amazon TimeSync
    - Chrony, C, TCP, DNS, HR Timer, NTP

Risks

- Back end/Front end Communication
  - The back end database is likely to change over time, and these changes will affect the front end
  - API interface between front and back to control when communication happens
- Timing methods and Precision
  - Latency between AZs is naturally low, so timing latency needs to be precise and consistent
  - Timing using clock ticks for precision, and consistency achieved with time
- IP Address Security
  - Deployment of our detection method requires knowledge of IP addresses, which may be inconsistent and a security risk
  - Deploy Swarm Conductor first
- Unknown QuickSight Functionalities
  - QuickSight might have/lack functionalities that will interfere with our planned display
  - Use and experiment with embedded versions on Angular to create workarounds

Questions?