r/place

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Tech Stack

AWS Elasticache

As Redis to store MAP on server for quick reads and writes.

AWS DynamoDB

For storing user info and their last committed pixel timestamp,
The history of the map (who placed what pixel where and when, including geolocation for curiosity).

FingerprintJS2

Initially used to identify unique individuals based on browser fingerprint.

Node.js along with EJS (Embedded JavaScript template for HTML)

For server and front end communication.

AWS Application Load Balancer (ALB)

Used to scale up and down while maintaining high availability.

AWS CloudWatch

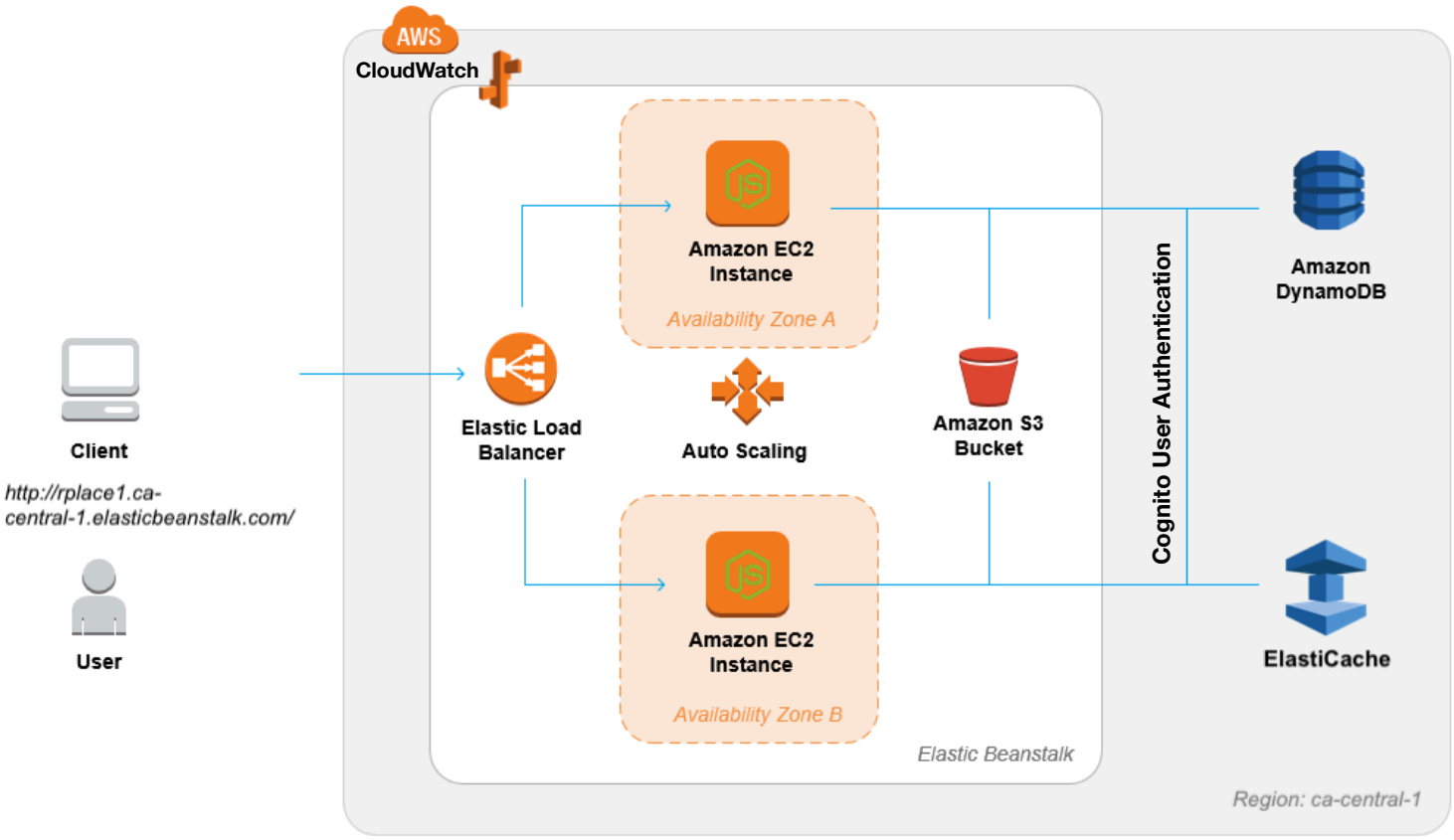
Used to monitor number of DynamoDB read and writes

AWS Cognito

Replaced FingerprintJS2 for a more secure way of accessing rights to update map.

Note: there were some tools we wanted to use such as AWS Neptune for data modelling and AWS Athena for DynamoDB data querying but due to Amazon-Canada limitations, we were not able to go down that path.

Architecture of our place



Sample Event Flow

1. User connects with r/place.
2. User prompted to log into Amazon account and redirected to Amazon login.
3. Once successfully logged in, they are redirected back to our website and able to view the r/place canvas.
4. User is able to set a pixel, and then a timer begins.
5. Once user is completed and wants to go study for other exams, s/he is able to log out of the account.

Quirky Features

- Use colour picker to select colour and auto-fill RGB section.
- Click board to auto-fill x, y coordinates.
- Timer (+ alert) to let user know when they can update another pixel.
- When registering new user, we've enabled email verification for another level of protection.

Architecture Strengths and Weaknesses

Strengths

+ AWS CloudWatch allows us to monitor all AWS Services.
+ Elasticache is memory efficient (saving us costs of storing a large canvas).
+ Elasticache supports horizontal scaling
+ DynamoDB is elastic meaning it autoscales (helping store more data on who uses the canvas and how they use it, every pixel change, & potentially millions of users info).
+ Lots of potential with DynamoDB and Lambdas for presenting real-time data usage.
+ Elastic Load Balancer helps with increasing availability of our service and provides automatic scaling depending on incoming traffic — with this comes increased fault tolerance.
+ Cognito provides user identification, which protects against browser attacks and provides a sense of security since the users are coming from Amazon accounts.
+ Built with love by Darshan and Raj \o/

Weaknesses

- We don't have any monitoring tools outside of AWS.
- If Amazon Login Service goes down, r/place will become unavailable for anyone wanting to join.
- DynamoDB backup is not free, well.. none of this is at a 'grand scale'.
- Another note on price, EC2 is expensive so with numerous requests, it's more efficient to implement these services on your own.
- We currently use a self-signed certificate — should be using a proper SSL certificate.
- Need to implement a more thorough input validation. Currently, it's simple value checks are between range, not null, etc.
- Web-sockets are not maximized to their full potential. May cause minor latency issues at a large scale that can be avoided.
+ Built under stress by Darshan and Raj …

Future Ideas

One of the key functions of how r/place became what it became was through community collaboration. With that, we need to add a chat section so that members can work together to create great content. Following this idea, we have partnered up with https://fargate.chat/ where members can chat and build amazing things using the individual chat rooms that Fargate provides.