Cloud Computing and Big Data - Fall 2018
Homework Assignment 1

Assignment:

Customer Service is a core service for a lot of businesses around the world and it is getting disrupted at the moment by Natural Language Processing-powered applications.

In this first assignment you will implement a serverless, microservice-driven web application. This assignment is the first in a series of three assignments, that will have you build an AI Customer Service experience.

Outline:

This assignment has three main components *(see Annex 1 for the architecture)*:

- Frontend
    - **Implement a chat user interface**, where the user can write messages and get responses back. You can use open source libraries and frameworks that give you this UI and UX out of the box.
    - **Host your frontend in an AWS S3 bucket**
        - Set the bucket up for website hosting
        - https://docs.aws.amazon.com/AmazonS3/latest/dev/HostingWebsiteOnS3Setup.html

- Backend
    - **Use API Gateway to setup your API**
        - use the following API/Swagger specification for your API
            - https://github.com/001000001/aics-columbia-s2018/blob/master/aics-swagger.yaml
            - Use http://editor.swagger.io/ to visualize this file
            - You can **import the Swagger file into API Gateway**
                - https://docs.aws.amazon.com/apigateway/latest/developerguide/api-gateway-import-api.html
            - **Create a Lambda function** that performs the chat operation
                - Use the request/response model (interfaces) specified in the API specification above

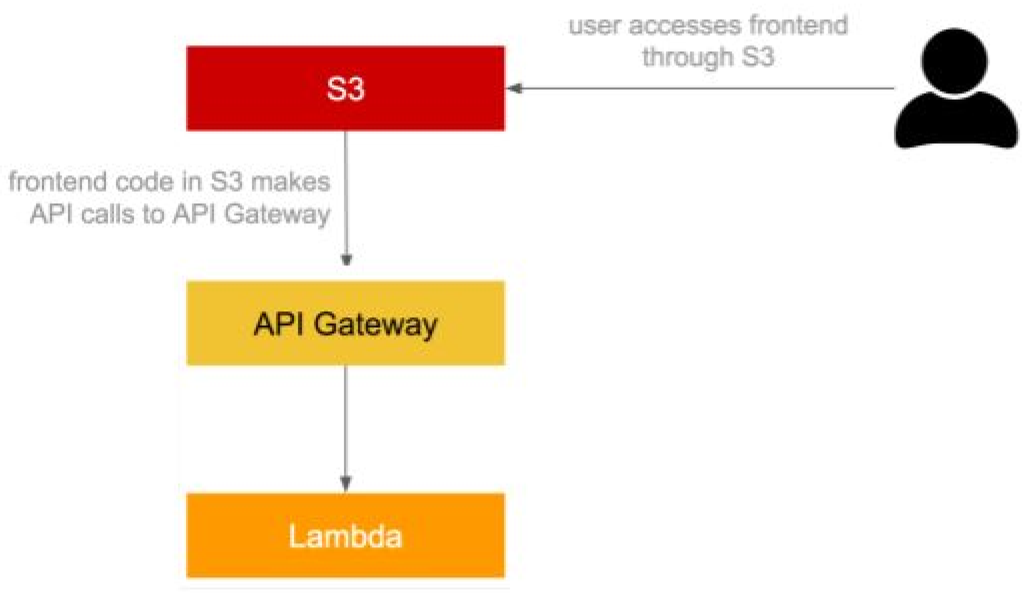
        - **Upon receiving a message from the user, respond with an appropriate response**
            - ex. User says: "Hello", Bot responds: "Hi there, how can I help?"
            - You should have a few simple examples for this interaction. In a later assignment we will be enhancing the bot's capabilities using NLP technology
    - Notes
        - You will need to **enable CORS on your API methods**
            - https://docs.aws.amazon.com/apigateway/latest/developerguide/how-to-cors.html
        - API Gateway can **generate an SDK for your API**, which you can use in your frontend. It will take care of calling your API, as well as session signing the API calls -- an important security feature
            - https://docs.aws.amazon.com/apigateway/latest/developerguide/how-to-generate-sdk-javascript.html
- Authentication
    - **Setup an API Key for the API**
        - https://docs.aws.amazon.com/apigateway/latest/developerguide/api-gateway-api-usage-plans.html
    - **Update the Frontend to call the API using the API key above**

The following section is optional and it requires you to set up a more advanced authentication mechanism, using AWS Cognito and AWS IAM (see Annex 2 for the architecture):

- Authentication
  - **Setup AWS Cognito to manage your users**, using User Pools
    - https://docs.aws.amazon.com/cognito/latest/developerguide/cognito-user-identity-pools.html
  - **Create a Cognito-generated login page** to authenticate the users
    - https://docs.aws.amazon.com/cognito/latest/developerguide/cognito-user-pools-ux.html
  - **Create an Identity Pool** and configure **Cognito Identity Provider Manager** to provision temporary IAM credentials to your logged in users
    - https://docs.aws.amazon.com/cognito/latest/developerguide/cognito-identity.html

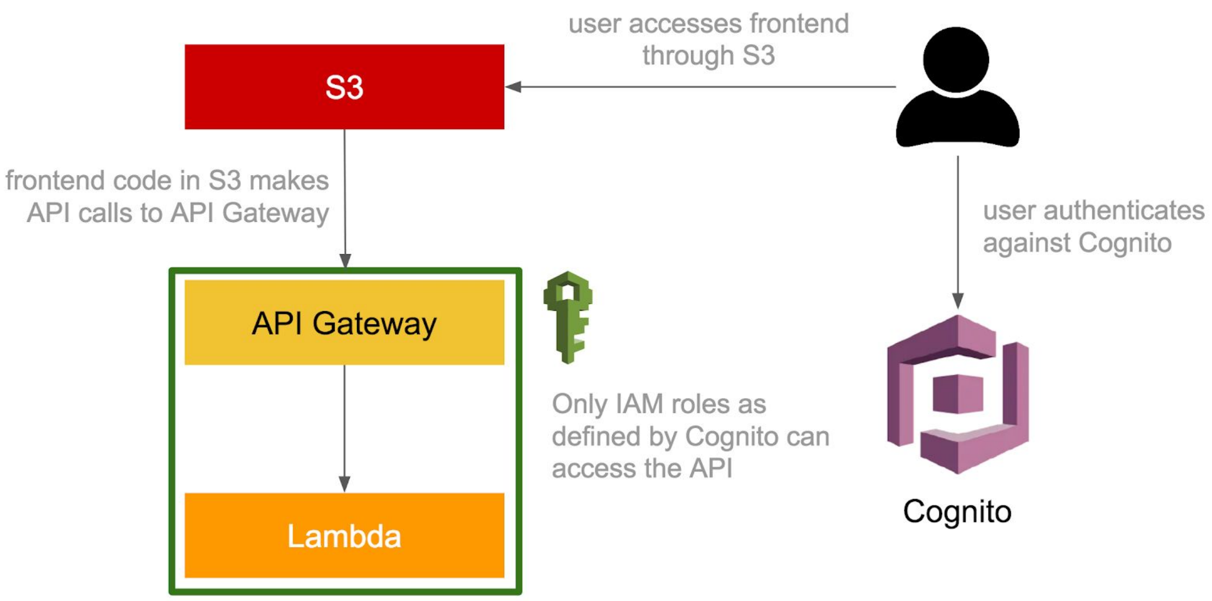
- Security
  - **Enable IAM Authentication on each API method** of your API Gateway API
    - Once you enable this, only authenticated users in your application should be able to access your API
  - **Add execute permissions to the Authenticated Cognito IAM role** to call your API
    - https://docs.aws.amazon.com/apigateway/latest/developerguide/api-gateway-iam-policy-examples-for-api-execution.html

ANNEX 1
Architecture Diagram


user accesses frontend through S3
S3
frontend code in S3 makes API calls to API Gateway
API Gateway
Lambda

ANNEX 2

Architecture Diagram


user accesses frontend through S3
S3
frontend code in S3 makes API calls to API Gateway
user authenticates against Cognito
API Gateway
Lambda
Only IAM roles as defined by Cognito can access the API
Cognito