



## CITY OF TACOMA

University of Washington Tacoma

Institute of Technology

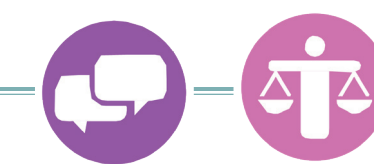
TINFO 498/492: Undergraduate Research

Instructor: D.C. Grant

City of Tacoma Project Lead: MK Larson

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# CITY SERVICES ARTIFICIAL INTELLIGENCE



## Introduction

Students in TINFO 499 developed a Tacoma FIRST 311 Alexa Customized Skill in order to improve access to Tacoma's city services. Our goal was to develop a new tool to provide a better user experience to Tacoma residents and make it more convenient to acquire information from the City of Tacoma government.

The Alexa Voice Service (AVS) is Amazon's intelligent voice recognition and natural language understanding service that allows you to voice-enable any connected device that has a microphone and speaker. Alexa runs on Amazon Echo, Dot or Tap, Amazon Fire TV and smart home devices and third-party devices.

Currently, residents can call 311, use the Tacoma FIRST 311 mobile app, or visit the City's website. This tool offers another way for citizens to access services from the City of Tacoma and keep pace with resident expectations for service delivery.

Every Alexa device can be used to serve Tacoma residents by enabling an Alexa Customized Skill. Instead of making phone calls or Googling city services, residents can obtain information by simply asking.

## Methods & Approach

Students used several development tools to build this new product for the City of Tacoma. At the planning stage of this project, we found out that Alexa was easier for university students like us to code for Alexa Skills. Thus, we decided to do a deep dive into coding for Alexa. We used the Alexa Software Development Kit (SDK) for Node.js and Amazon Web Service (AWS) SDK as our development kits. We ran backend code in AWS Lambda, a server-less computing service that runs code without managing underlying computer resources like system security and performance. Thus, AWS Voice User Interface gave us the opportunity to just focus on the application logic.

The Other AWS services used in this project include Amazon Simple Email Service, Simple Notification Service, Cloud Watch, and Identity and Access Management. Our reference data was from the Tacoma 311 official website.



An Amazon echo we were using for this project

Photo Credit: Richard Yang



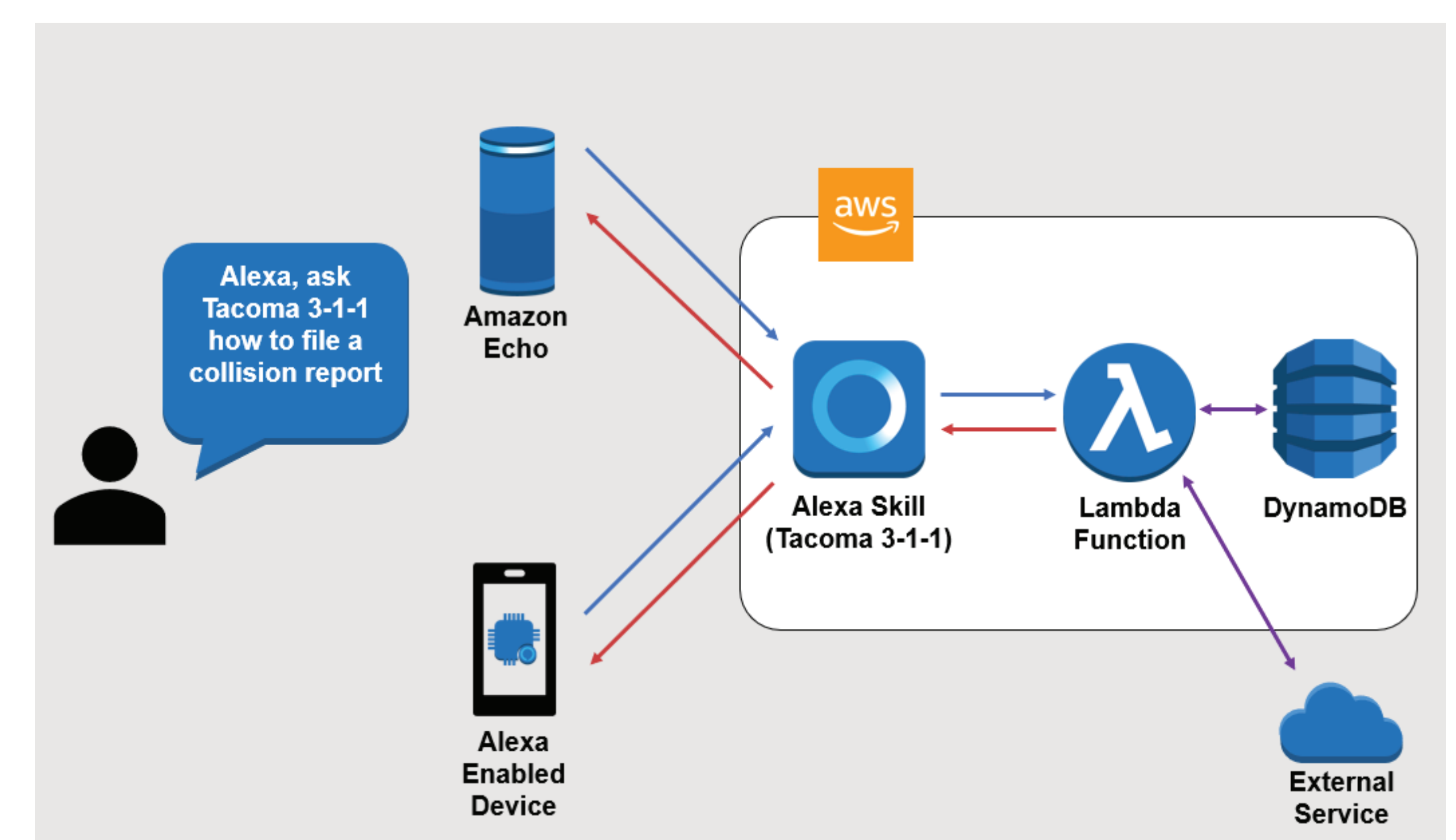
Following the stakeholders and department leaders demo presentation, the student team from left to right: DC Grant, Zhou Lu, Wen Shu, Zhihao (Richard) Yang, Zebin Zhou.

Photo Credit: Richard Yang

## Findings

As we were looking through the project list, this project caught our attention. 20 or 30 years ago, people were using applications by interacting with primarily text-based user interfaces; as technology has developed, people started building graphic user interfaces for most applications because it is easier for user interaction. Nowadays, a lot of companies use automated voice systems for their customer services or surveys. We realized that we could apply those voice user interfaces on the Alexa Smart Home system to benefit city services.

Getting familiar with Amazon AWS console user interface was a great and useful learning experience for us. After we gave a demo to the stakeholders and department leaders, they were very interested in our project and want to move to the next stage. The next step on this project is to connect our Alexa Customized Skill with the City of Tacoma's web application programming interface (API).



A diagram explaining how the Alexa device communicates with AWS to give response to user's questions.

Credit: Student Team