Introduction

XYZ Animal Clinic is part of a global Interactive Voice Response (IVR) contact center network. As one of the lines of business (LOB) within this network, XYZ Animal Clinic requires an IVR solution that is both scalable and adaptable.

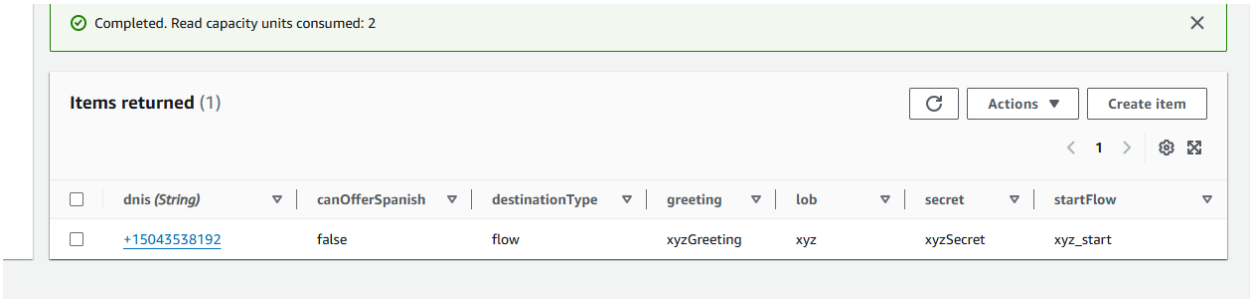
The global IVR system employs a modular design, enabling scalability and ease of implementation across various lines of business. This approach allows for seamless integration of additional features and customizations and enhances the customer experience.

Scope

This project focuses on developing and deploying the IVR system for XYZ Animal Clinic using the established modular framework. The goal is to create a scalable solution that enhances customer interaction and can be easily extended or integrated with future technologies as needed.

Modular design:

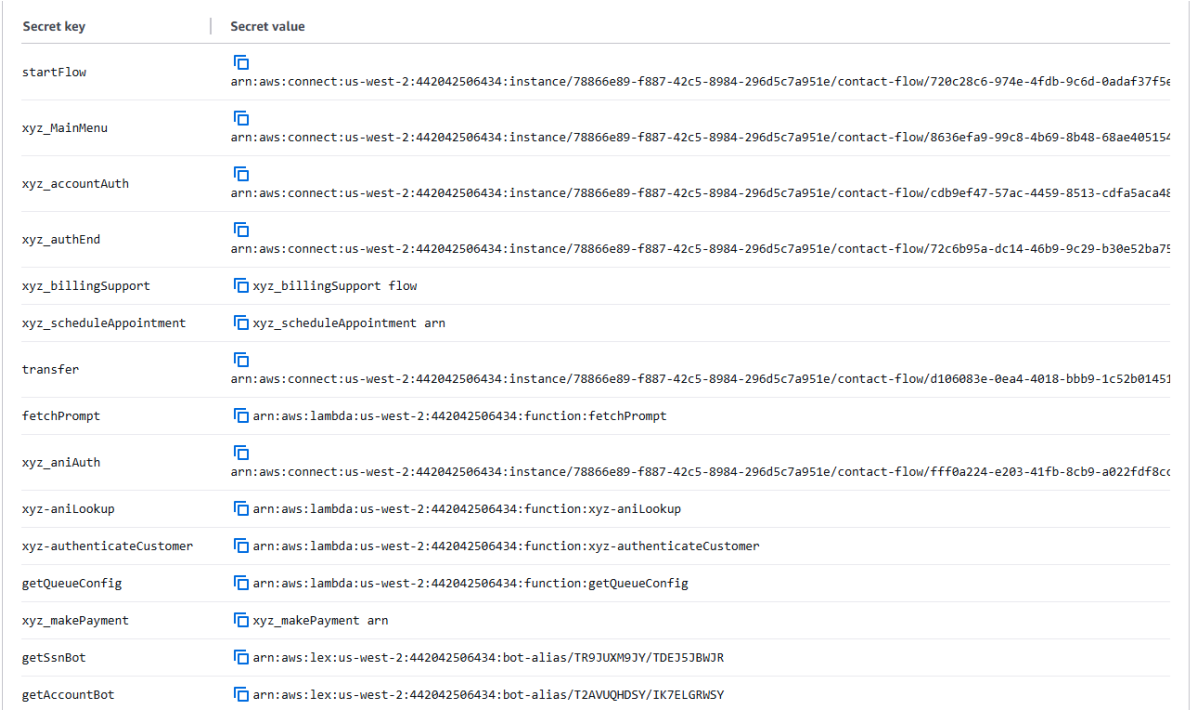
When first calling into IVR, the first flow is incomingCall. In this flow dnisConfiguration settings are retrieved from database and set in flow that determine routing and configuration. Here is what a sample dnis record looks like:



Next flow is globalMessages where there is a global placeholder message. This could be for emergency, maintenance, etc message. If there is not one present the IVR then plays the lob specific greeting.

Next flow is the start flow specified in the DNIS configurations. For XYZ IVR, this is the start flow. In this flow, the secret details are retrieved which contains all of the ARNS for bots, lambdas, contact flows, and can contain any other hardcoded values like DNIS/TFNS.

Here is XYZ secret for reference:



Secret key	Secret value
startFlow	arn:aws:connect:us-west-2:442042506434:instance/78866e89-f887-42c5-8984-296d5c7a951e/contact-flow/720c28c6-974e-4fdb-9c6d-0adaf37f5e
xyz_MainMenu	arn:aws:connect:us-west-2:442042506434:instance/78866e89-f887-42c5-8984-296d5c7a951e/contact-flow/8636efa9-99c8-4b69-8b48-68ae405154
xyz_accountAuth	arn:aws:connect:us-west-2:442042506434:instance/78866e89-f887-42c5-8984-296d5c7a951e/contact-flow/cdb9ef47-57ac-4459-8513-cdfa5aca48
xyz_authEnd	arn:aws:connect:us-west-2:442042506434:instance/78866e89-f887-42c5-8984-296d5c7a951e/contact-flow/72c6b95a-dc14-46b9-9c29-b30e52ba75
xyz_billingSupport	xyz_billingSupport flow
xyz_scheduleAppointment	xyz_scheduleAppointment arn
transfer	arn:aws:connect:us-west-2:442042506434:instance/78866e89-f887-42c5-8984-296d5c7a951e/contact-flow/d106083e-0ea4-4018-bbb9-1c52b0145J
fetchPrompt	arn:aws:lambda:us-west-2:442042506434:function:fetchPrompt
xyz_aniAuth	arn:aws:connect:us-west-2:442042506434:instance/78866e89-f887-42c5-8984-296d5c7a951e/contact-flow/fff0a224-e203-41fb-8cb9-a022fdf8cc
xyz-aniLookup	arn:aws:lambda:us-west-2:442042506434:function:xyz-aniLookup
xyz-authenticateCustomer	arn:aws:lambda:us-west-2:442042506434:function:xyz-authenticateCustomer
getQueueConfig	arn:aws:lambda:us-west-2:442042506434:function:getQueueConfig
xyz_makePayment	xyz_makePayment arn
getSsnBot	arn:aws:lex:us-west-2:442042506434:bot-alias/TR9JUXM9JY/TDEJ5JBWJR
getAccountBot	arn:aws:lex:us-west-2:442042506434:bot-alias/T2AVUQHDSY/IK7ELGRWSY

The purpose of this design is to enforce consistency and improve reliability of IVR. Best practice is to implement dynamic values rather than hardcoded values. Hardcoded values can be hard to maintain and can lead to issues. Also, some devops pipelines have issues when deploying hardcoded ARNS to different environments. It is much easier to manage all ARNS and hardcoded values in one central location. The global flows and values can be put in a global secret and can be retrieved in incomingCall or globalMessages.

The authentication flows are modular as well. Before any authentication module starts, a '**nextFlow'** attribute is set. This is flow to route to if auth is successful. Each auth flow has a different authentication method. At beginning of each flow, there is check to see if authenticationStatus = true. If it is true the customer is authenticated, and can skip all other auth methods and route to authEnd flow which will always be the last auth flow. This flow will transfer to '**nextFlow'** attribute in the case that authenticationStatus = true.

This design allows for a very important piece of the design that has not been implemented yet. This design supports a predictive intent module, which leverages customer's data and anticipates why the caller is calling into IVR. If the confidence score is above a certain threshold and requirements are met, the IVR will ask customer if they are calling to do

some functionality. If the client says yes, then the **nextFlow** attribute is set and the client is directly routed to that flow saving them time and enhancing their customer experience.

Another modular feature is a global transfer flow. There is a transferFlag attribute that is set among flows that retrieves the appropriate queue sets queue treatment configs in the transfer flow.

IVR features:

Modular design

Designed to improve containment rate, reduce transfer rate, and improve authentication rate

Tags for all items

Journeys to enhance troubleshooting issues

Lambdas:

xyz-fetchARN

purpose:

global function that retrieves secret. Secret values are lambda arns, lex bot arns, contact flow arns, and any other hardcoded values like DID/TFNs

Implementation details:

Secret name is passed in parameter via amazon connect. Secret contains lob details and is set in dnis configurations

getQueueConfig

purpose:

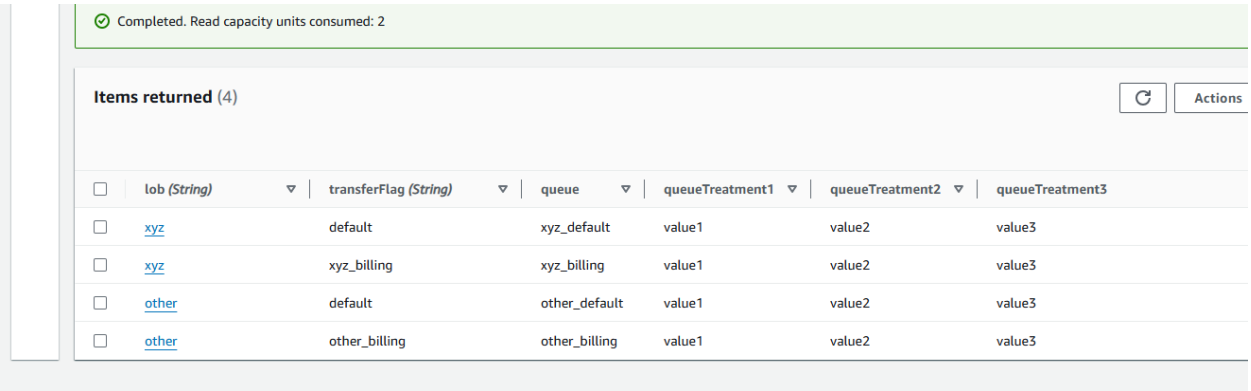
queries getQueueConfig to get queue and queue treatment

implementation details:

global function. queueTreatment dynamodb table is set in environment variable. Lambda queries this table via lob and transferFlag parameters. transferFlag is optional parameter

that may be set in different scenarios. For example, if a customer traverses the payment flow and they opt out to agent, the transferFlag would be set to xyz_billing so they would route to appropriate queue. If no transferFlag is passed in lambda argument the default queue will be returned according to lob.

Records from queueTreatment dynamodb table:



xyz-authenticateCustomer

purpose:

queries customerDatabase table to authenticate customer

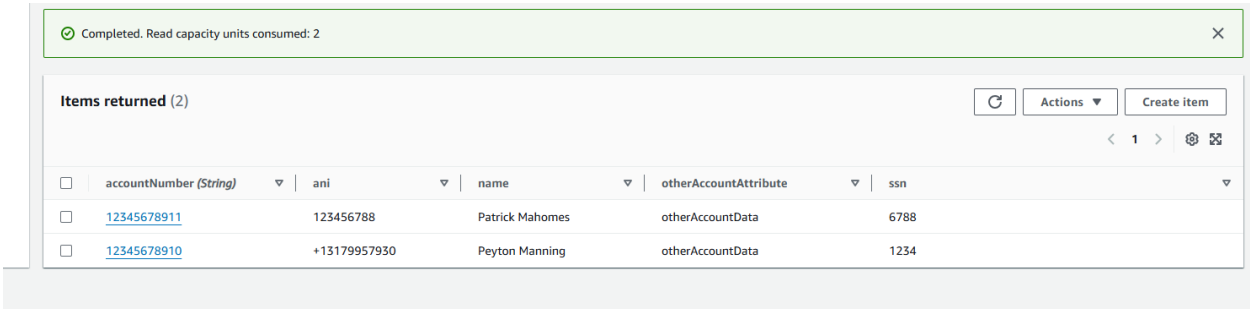
implementation details:

allows customer to authenticate via ani + ssn, or account number + ssn

customerDatabase is set in environment variable.

GSI set on table for ani attribute

customerDatabase entries:



fetchPrompt

purpose:

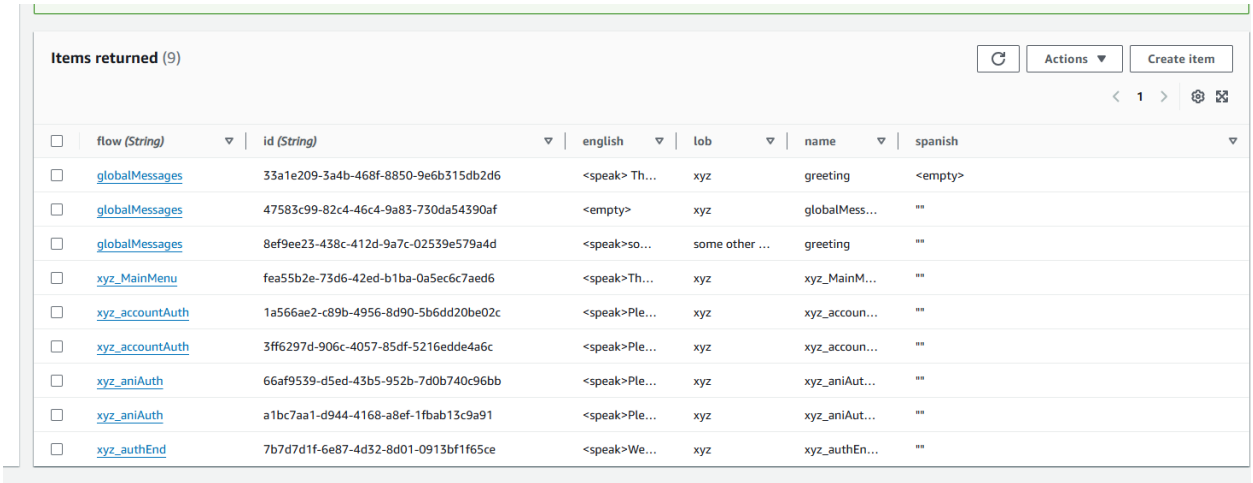
queries prompts table to get all prompts

implementation details:

if flow is global table than optional lob parameter is passed to lambda customerDatabase is set in environment variable.

Plan was to implement Spanish as well so will return English/Spanish depending on which language parameter is passed

prompts entries:



Items returned (9)

Actions | Create item

1

flow (String)	id (String)	english	lob	name	spanish
globalMessages	33a1e209-3a4b-468f-8850-9e6b315db2d6	<speak> Th...	xyz	greeting	<empty>
globalMessages	47583c99-82c4-46c4-9a83-730da54390af	<empty>	xyz	globalMess...	""
globalMessages	8ef9ee23-438c-412d-9a7c-02539e579a4d	<speak>so...	some other ...	greeting	""
xyz_MainMenu	fea55b2e-73d6-42ed-b1ba-0a5ec6c7aed6	<speak>Th...	xyz	xyz_MainM...	""
xyz_accountAuth	1a566ae2-c89b-4956-8d90-5b6dd20be02c	<speak>Ple...	xyz	xyz_accoun...	""
xyz_accountAuth	3ff6297d-906c-4057-85df-5216edde4a6c	<speak>Ple...	xyz	xyz_accoun...	""
xyz_aniAuth	66af9539-d5ed-43b5-952b-7d0b740c96bb	<speak>Ple...	xyz	xyz_aniAut...	""
xyz_aniAuth	a1bc7aa1-d944-4168-a8ef-1fbab13c9a91	<speak>Ple...	xyz	xyz_aniAut...	""
xyz_authEnd	7b7d7d1f-6e87-4d32-8d01-0913bf1f65ce	<speak>We...	xyz	xyz_authEn...	""

xyz-aniLookup

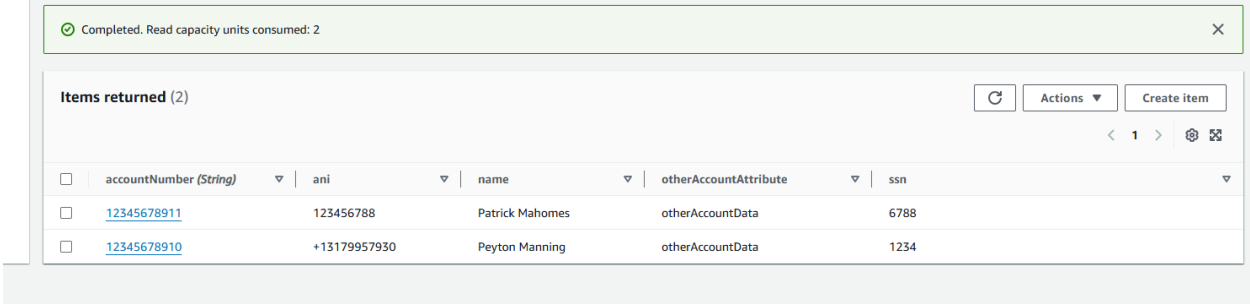
purpose:

queries customerDatabase table to see if there is an ani match

implementation details:

queries table via ani GSI and returns accountMatches

customerDatabase entries:



xyz-getDnisConfig

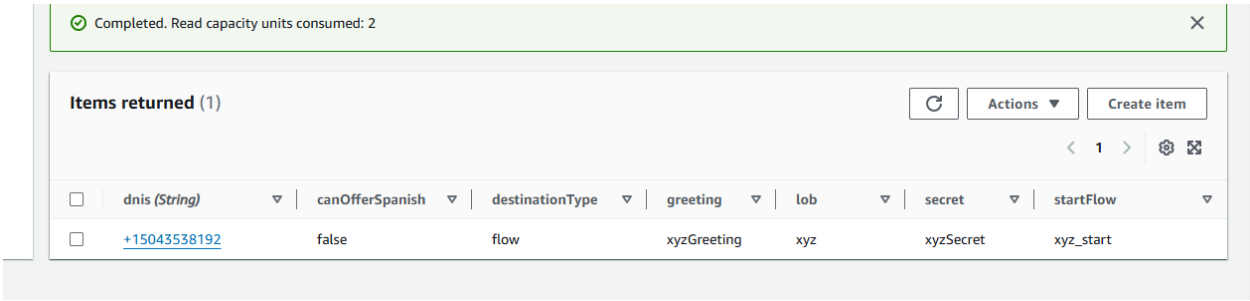
purpose:

gets dnis configurations retrieved from xyz-dnisConfiguration database

these configurations retrieve important lob details like routing to first flow, secret with lob details, initial greeting message, type of start flow (did not get change to implement yet, but I was planning on implementing option for direct to queue transfers for other dnis

queries table via ani GSI and returns accountMatches

dnisConfiguration entries:



To do enhancements:

Implement decrypt/encrypt lambdas to get and set user pii in userPII table and also to support future integrations

Build out menu and add functionality to ivr

Add dtmf only support

test all lambdas and bots

End to end testing, I have only tested happy paths as of now

Update roles with least permissive policies

Disable logging for pii data

offer multilingual support

Set up disaster recovery environment

Set up dashboard to monitor intent metrics, alarms, and any other significant analysis that may be of value to BL