Practical update course

GeneXus™ 16

PART 3

April 2020

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OBJECTIVE

This practical course will address the topics of OData and Artificial Intelligence (AI) to develop state-of-the-art applications while improving integration with external services.

The instructions of these practice exercises have been updated according to upgrade 8 of GeneXus 16. If you do them with a later version, remember that there may be differences between what is shown here and what you see.

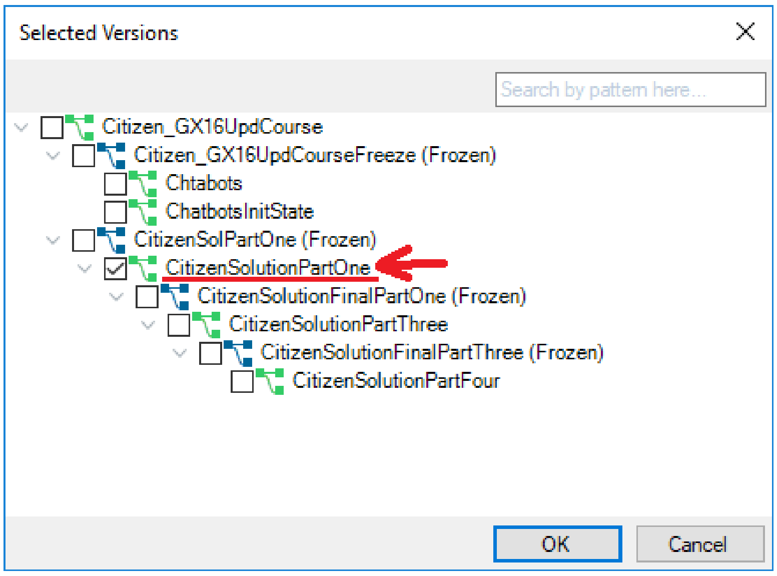
The application that you will work on is a simplification of an app for the municipality of a city, which offers a frontend (Web/SD) so that citizens, using their user ID, can make claims (for example, for fallen trees, traffic lights that do not work, improperly parked cars, etc.), or carry out formalities (for example, to obtain a driver's license, refinance a debt with the municipality, install advertising elements, etc.), booking a time to be assisted by municipal staff. The frontend also shows the various cultural activities offered by the city. In addition, a web backoffice is available for certain municipal officials to manage the data and view statistics.

To improve tourism from the city, integration will be made with TripPin services that will allow keeping a record of flights taken by users to different destinations.

In addition, the description of cultural activities can be translated into the language of the device and, to improve accessibility those descriptions can also be played back as audio.

GETTING STARTED

To get started, you will use the KB that you worked on in the Design Systems and UX practice exercises, as it was left at the end of the practice. If you've lost it or can't find it, create another from http://samples.genexusserver.com/v16 (KB called Citizen_GX16Course). Select the version called CitizenSolutionPartOne.



Selected Versions

Search by pattern here...

- [ ] Citizen_GX16UpdCourse
  - [ ] Citizen_GX16UpdCourseFreeze (Frozen)
    - [ ] Chtabots
    - [ ] ChatbotsInitState
  - [ ] CitizenSolPartOne (Frozen)
    - [x] CitizenSolutionPartOne
      - [ ] CitizenSolutionFinalPartOne (Frozen)
        - [ ] CitizenSolutionPartThree
          - [ ] CitizenSolutionFinalPartThree (Frozen)
            - [ ] CitizenSolutionPartFour

Note that in the KB Explorer the folder GeneXus/Web/Backend_ODATA has been added for you to place the objects you create for this part of the practical course. Also, a folder called AI has been added to create the procedures required to connect with the AI provider that will be indicated.

ODATA

You have to add two new features for the application backoffice, consuming OData from TripPin. The objective is to:

1. Keep track of outbound flights, managing flight, airport and airline information.
2. List all information related to flights to a certain airport.

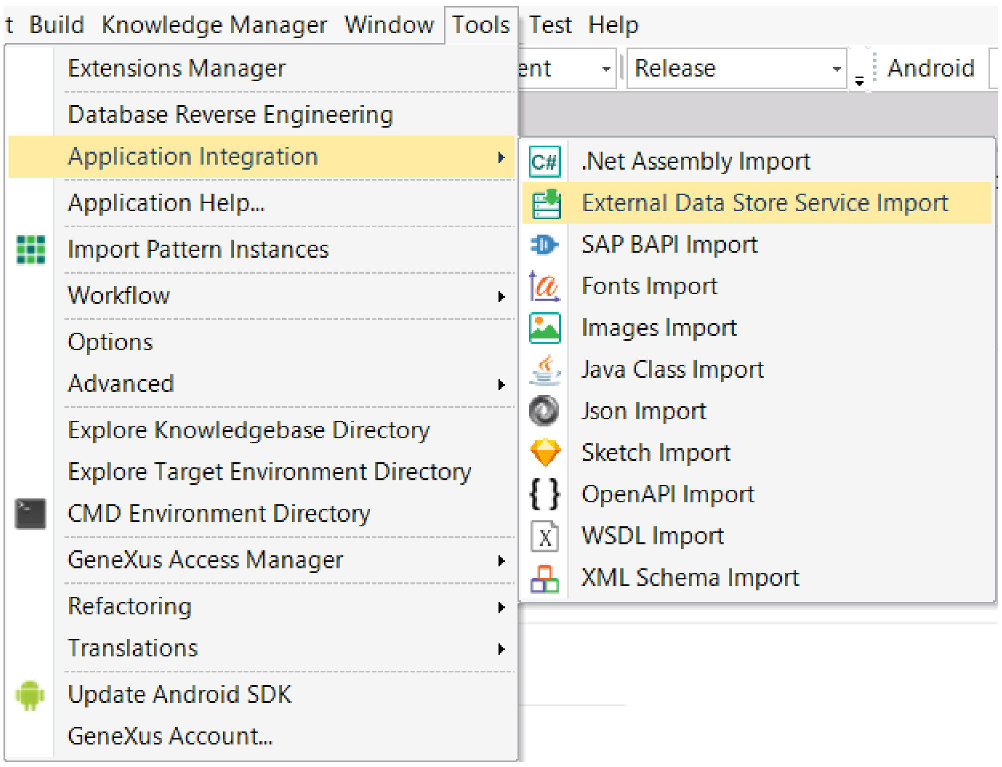
IMPORTING SERVICES

To implement the new features you will need to import some services from TripPin.

The entities whose implementation you need to use are Airlines and Airports. Flights will be an entity of your own KB, which you will have to create later.

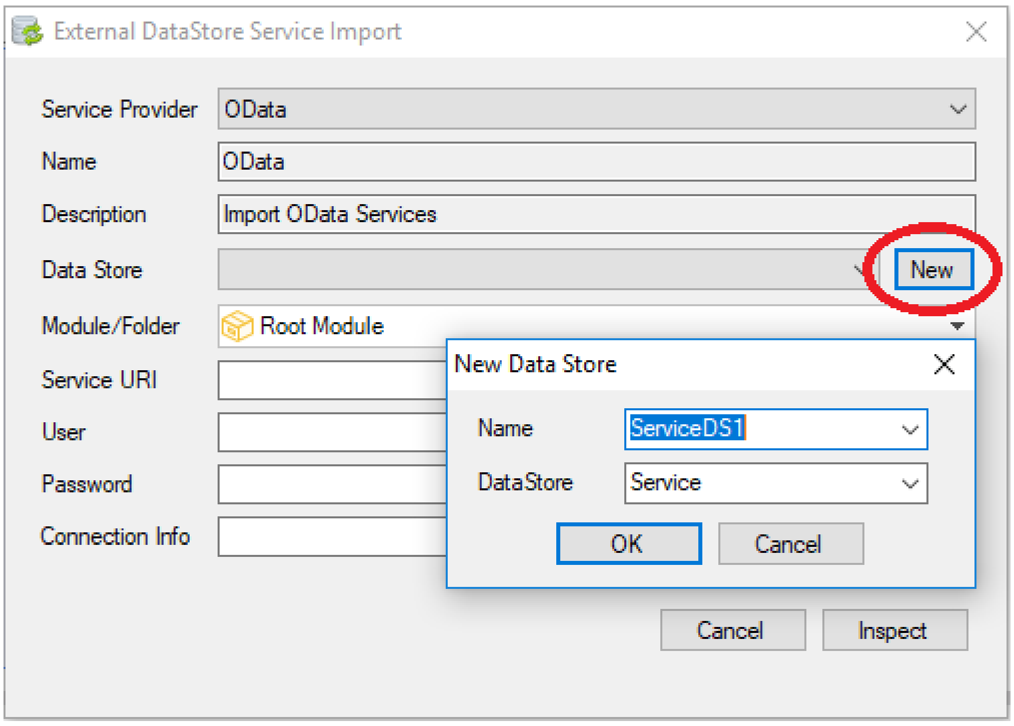
POSSIBLE SOLUTION

Import from TripPin what you need to implement the new features. To do so:



A new window will be opened to enter the data required to consume the service.

First, create a new Data Store of Service type from the New button located to the right of the DataStore option:


External DataStore Service Import

Service Provider	OData
Name	OData
Description	Import OData Services
Data Store	
Module/Folder	Root Module
Service URI	
User	
Password	
Connection Info	

New Data Store

Name	ServiceDS1
DataStore	Service

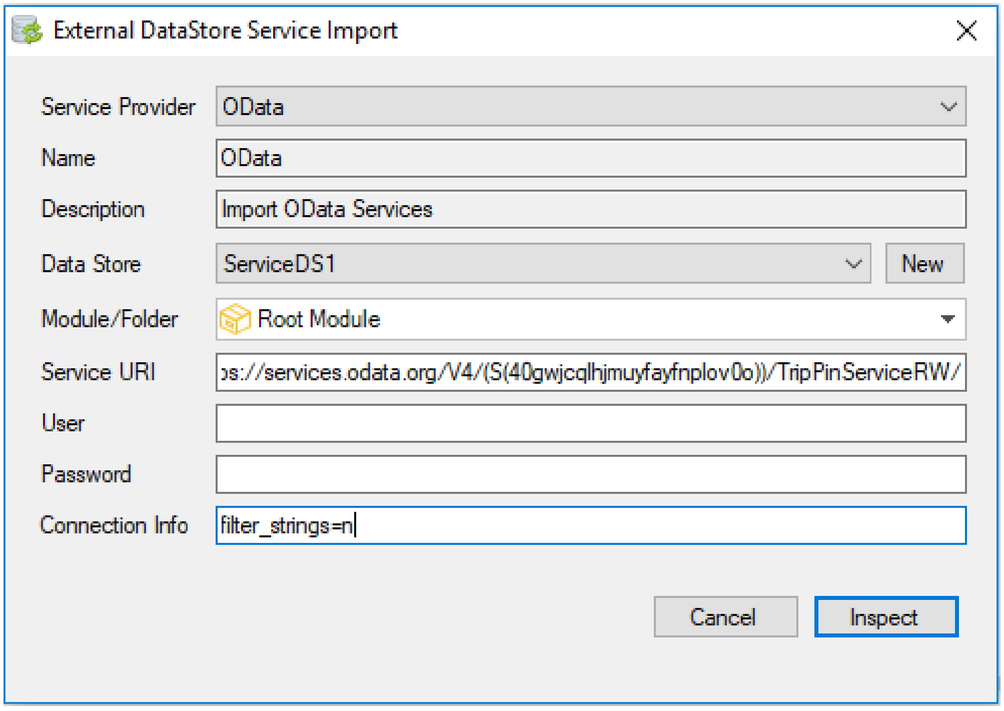
Next, complete the following fields:

- Service URI: Enter the address of the service to consume. In this case, use the TripPin service: https://services.odata.org/V4/(S(40gwjcqlhjmuyfayfnplov0o))/TripPinServiceRW/

- User: Enter the username, if necessary. In this case, it is not necessary so leave it empty.

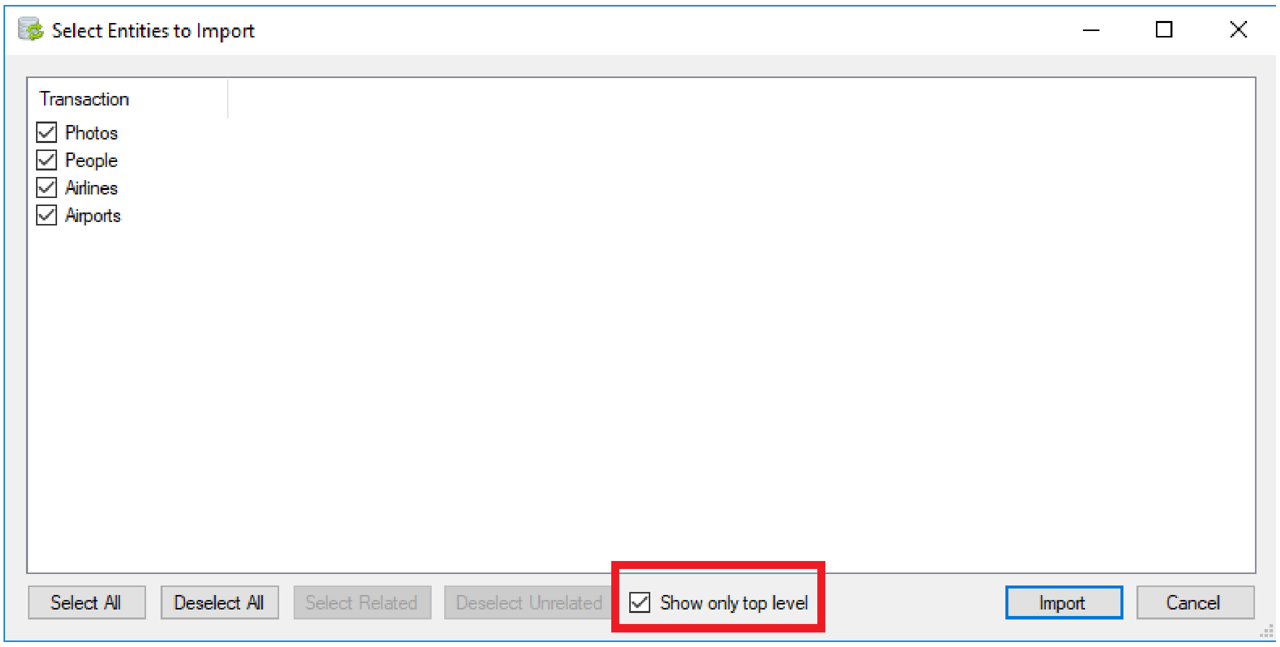
- Password: User's password. In this case, it is not necessary so leave it empty.

- Connection Info: Additional information for the connection. In this case it is necessary, so enter "filter_strings=n" to indicate that conditions such as <,>,<=,>= are not accepted with String type data.


External DataStore Service Import

Service Provider	OData
Name	OData
Description	Import OData Services
Data Store	ServiceDS1
Module/Folder	Root Module
Service URI	ps://services.odata.org/V4/(S(40gwjcqlhjmuyfayfnplov0o))/TripPinServiceRW/
User	
Password	
Connection Info	filter_strings=n

Once you complete the fields, click on Inspect. This will open a new window where the entities to be imported from the service will be displayed. You will only need Airports and Airlines. To this end, clear the checkbox "Show only top level":

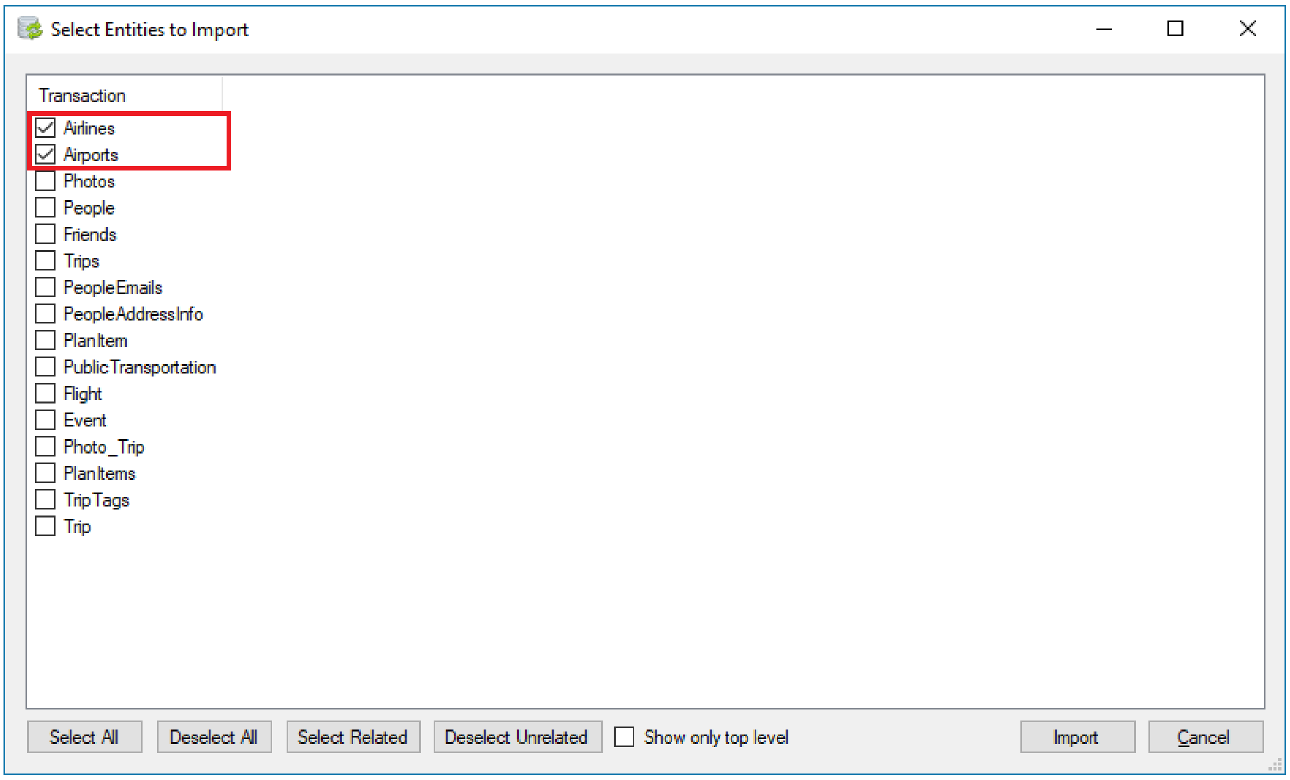

Select Entities to Import

Transaction

- [x] Photos
- [x] People
- [x] Airlines
- [x] Airports

Select All | Deselect All | Select Related | Deselect Unrelated | [x] Show only top level | Import | Cancel

And leave only the options Airlines and Airports selected.

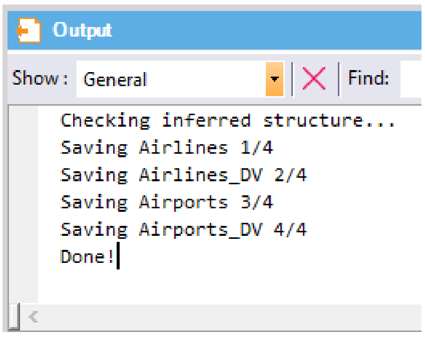

Select Entities to Import

Transaction

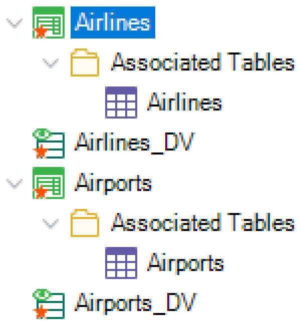
- [x] Airlines
- [x] Airports
- [ ] Photos
- [ ] People
- [ ] Friends
- [ ] Trips
- [ ] PeopleEmails
- [ ] PeopleAddressInfo
- [ ] PlanItem
- [ ] PublicTransportation
- [ ] Flight
- [ ] Event
- [ ] Photo_Trip
- [ ] PlanItems
- [ ] TripTags
- [ ] Trip

Select All | Deselect All | Select Related | Deselect Unrelated | [ ] Show only top level | Import | Cancel

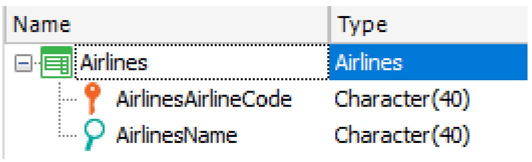
Next, click on Import. This will import the entities Airports and Airlines as transactions, with the associated data views:



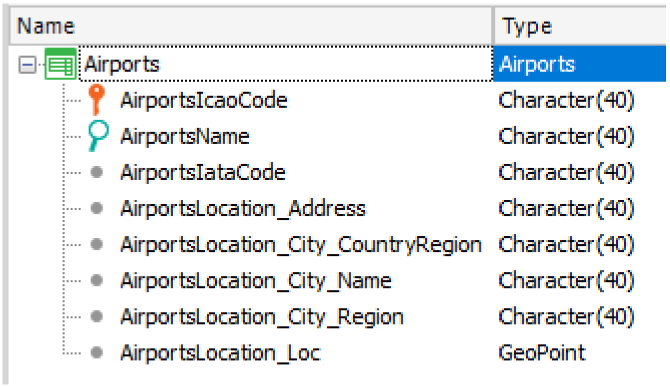
```
Checking inferred structure...
Saving Airlines 1/4
Saving Airlines_DV 2/4
Saving Airports 3/4
Saving Airports_DV 4/4
Done!
```



The transactions' structure is as follows:



Name	Type
Airlines	Airlines
AirlinesAirlineCode	Character(40)
AirlinesName	Character(40)



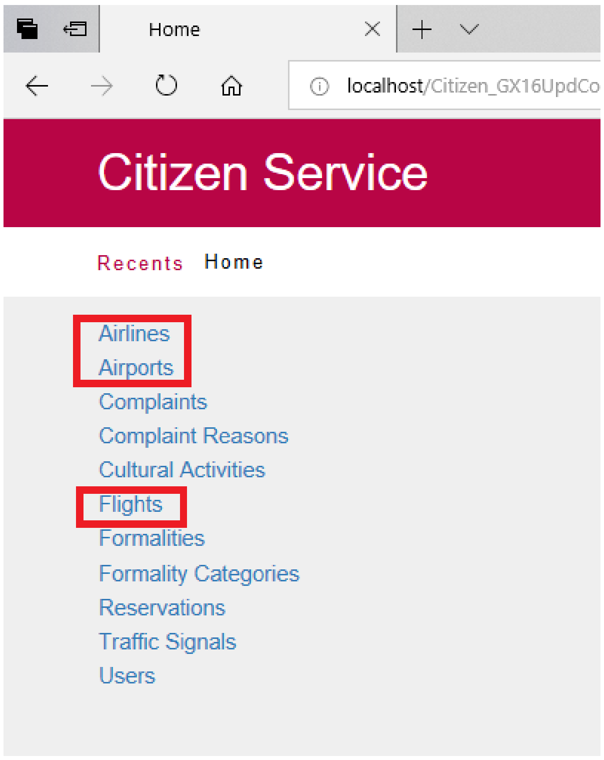
Name	Type
Airports	Airports
AirportsIcaoCode	Character(40)
AirportsName	Character(40)
AirportsIataCode	Character(40)
AirportsLocation_Address	Character(40)
AirportsLocation_City_CountryRegion	Character(40)
AirportsLocation_City_Name	Character(40)
AirportsLocation_City_Region	Character(40)
AirportsLocation_Loc	GeoPoint

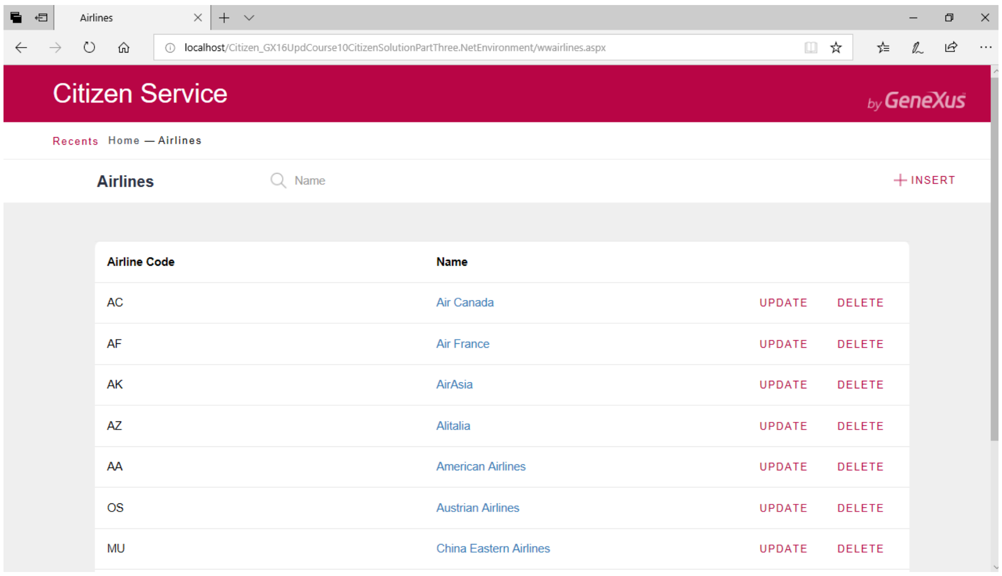
Moving the entities to the folder GeneXus/Web/Backend_ODATA is recommended.

USING THE IMPORTED SERVICES: FLIGHT, AIRLINE, AIRPORT MANAGEMENT

Once the data has been imported, use it to implement the functionalities requested.

First of all, you need to be able to manage (CRUD) airline and flight data, adding them to the backoffice.




Airlines
localhost/Citizen_GX16UpdCourse10CitizenSolutionPartThree.NetEnvironment/wwairlines.aspx
Citizen Service
by GeneXus
Recents Home — Airlines
Airlines
Name
+ INSERT

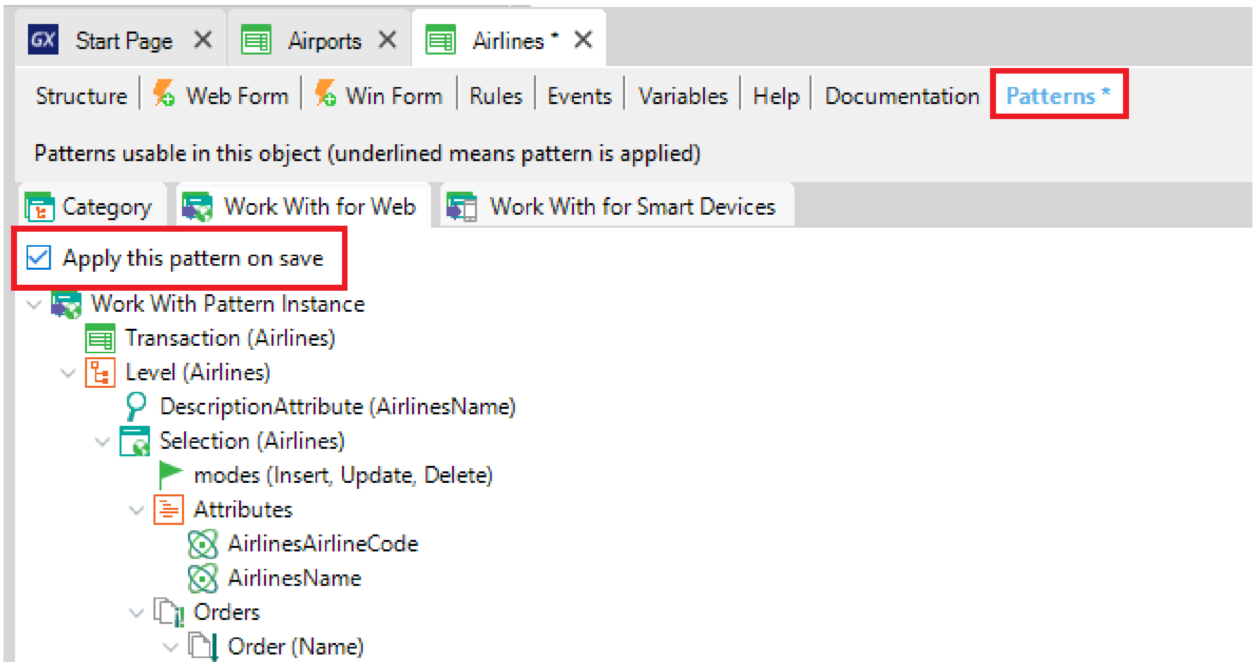
Airline Code	Name		
AC	Air Canada	UPDATE	DELETE
AF	Air France	UPDATE	DELETE
AK	AirAsia	UPDATE	DELETE
AZ	Alitalia	UPDATE	DELETE
AA	American Airlines	UPDATE	DELETE
OS	Austrian Airlines	UPDATE	DELETE
MU	China Eastern Airlines	UPDATE	DELETE

Note: It is not possible to insert or delete airports, because the service provided doesn't allow it.

Once this has been implemented, try changing the name of an airport, for example, and enter flights.

POSSIBLE SOLUTION

Apply the Work With for Web pattern to the Airports and Airlines transaction.


Start Page | Airports | Airlines *

Structure | Web Form | Win Form | Rules | Events | Variables | Help | Documentation | Patterns *

Patterns usable in this object (underlined means pattern is applied)

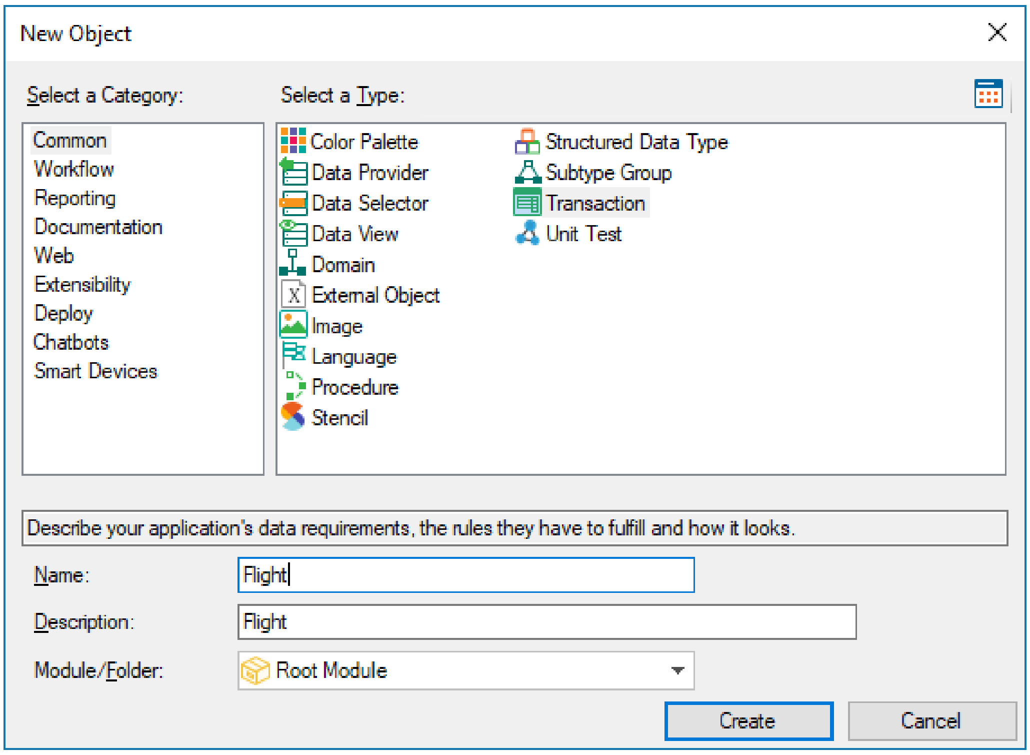
Category | Work With for Web | Work With for Smart Devices

☑ Apply this pattern on save

```
Work With Pattern Instance
    Transaction (Airlines)
    Level (Airlines)
        DescriptionAttribute (AirlinesName)
        Selection (Airlines)
            modes (Insert, Update, Delete)
            Attributes
                AirlinesAirlineCode
                AirlinesName
            Orders
                Order (Name)
```

In this way, they will be automatically added to the backoffice.

Next, create a Flight transaction that will keep a record of flights and communicate with Airports and Airlines:


New Object

Select a Category: Common, Workflow, Reporting, Documentation, Web, Extensibility, Deploy, Chatbots, Smart Devices

Select a Type: Color Palette, Data Provider, Data Selector, Data View, Domain, External Object, Image, Language, Procedure, Stencil, Structured Data Type, Subtype Group, Transaction, Unit Test

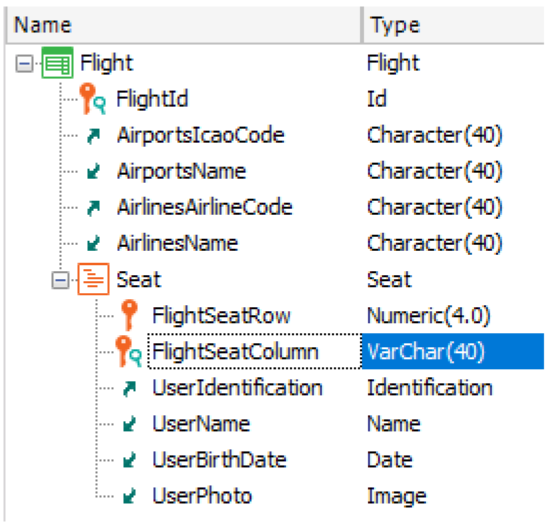
Describe your application's data requirements, the rules they have to fulfill and how it looks.

Name: Flight

Description: Flight

Module/Folder: Root Module

The structure of this transaction will be as follows:



Name	Type
Flight	Flight
FlightId	Id
AirportsIcaoCode	Character(40)
AirportsName	Character(40)
AirlinesAirlineCode	Character(40)
AirlinesName	Character(40)
Seat	Seat
FlightSeatRow	Numeric(4.0)
FlightSeatColumn	VarChar(40)
UserIdentification	Identification
UserName	Name
UserBirthDate	Date
UserPhoto	Image

Also, apply the Work With Web pattern to this transaction.

You have already implemented the flight management feature.

Run and view the data to enter more information. If you wish, you can use the following sample data.

Flight 1:

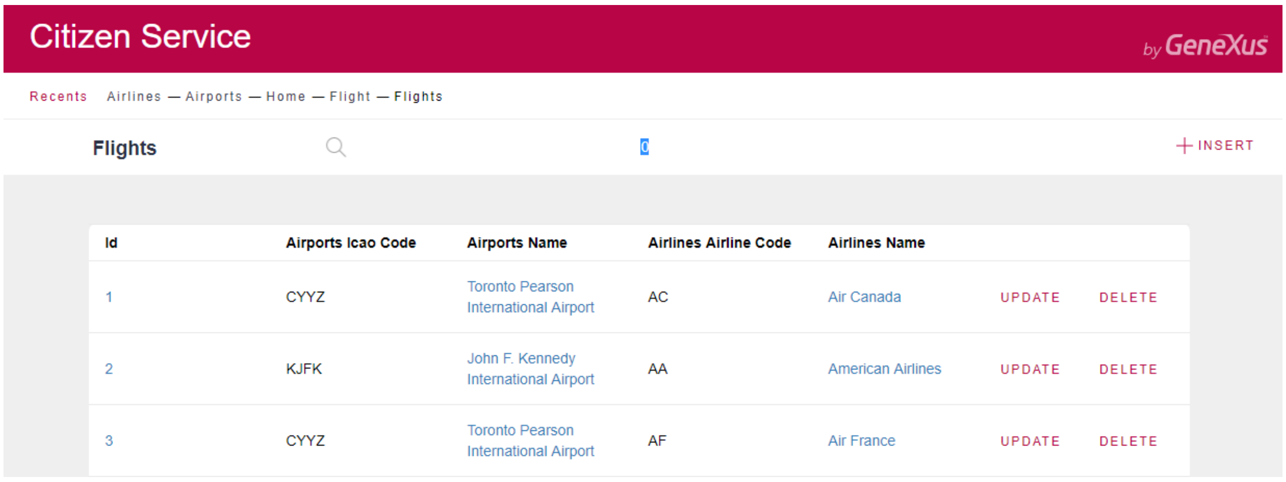
FlightId	1
Airport	Toronto Pearson International Airport
Airline	Air Canada
Seat Row 1 Column A	User Luciano Silveira
Seat Row 1 Column B	User Mary Smith
Seat Row 2 Column A	User Martin Torad
Seat Row 2 Column B	User Ann Bert

Flight 2:

FlightId	2
Airport	John F. Kennedy International Airport
Airline	American Airlines
Seat Row 1 Column A	User Rudolph Roball
Seat Row 1 Column B	User Cecilia Lemos
Seat Row 2 Column A	User Jessica Loyarte

Flight 3:

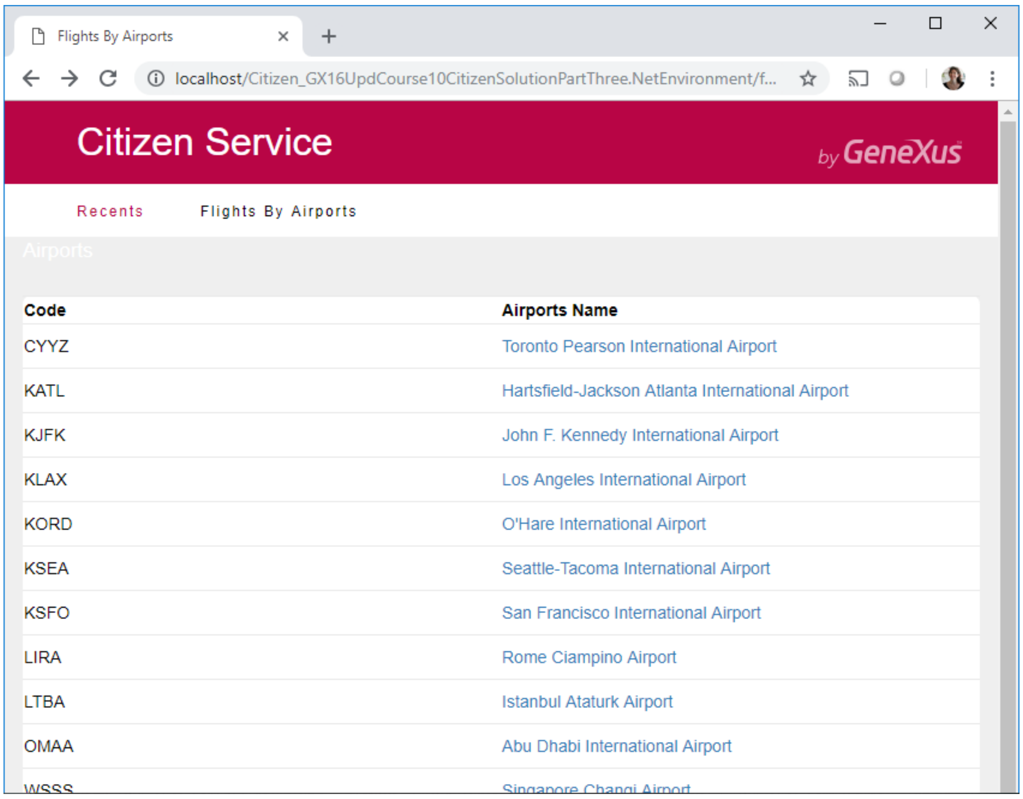
FlightId	3
Airport	Toronto Pearson International Airport
Airline	Air France
Seat Row 1 Column A	User Brian Goals
Seat Row 1 Column B	User John Peters
Seat Row 2 Column A	User Eleonor Johnson
Seat Row 2 Column B	User Valerie Molins



Id	Airports Icao Code	Airports Name	Airlines Airline Code	Airlines Name		
1	CYYZ	Toronto Pearson International Airport	AC	Air Canada	UPDATE	DELETE
2	KJFK	John F. Kennedy International Airport	AA	American Airlines	UPDATE	DELETE
3	CYYZ	Toronto Pearson International Airport	AF	Air France	UPDATE	DELETE

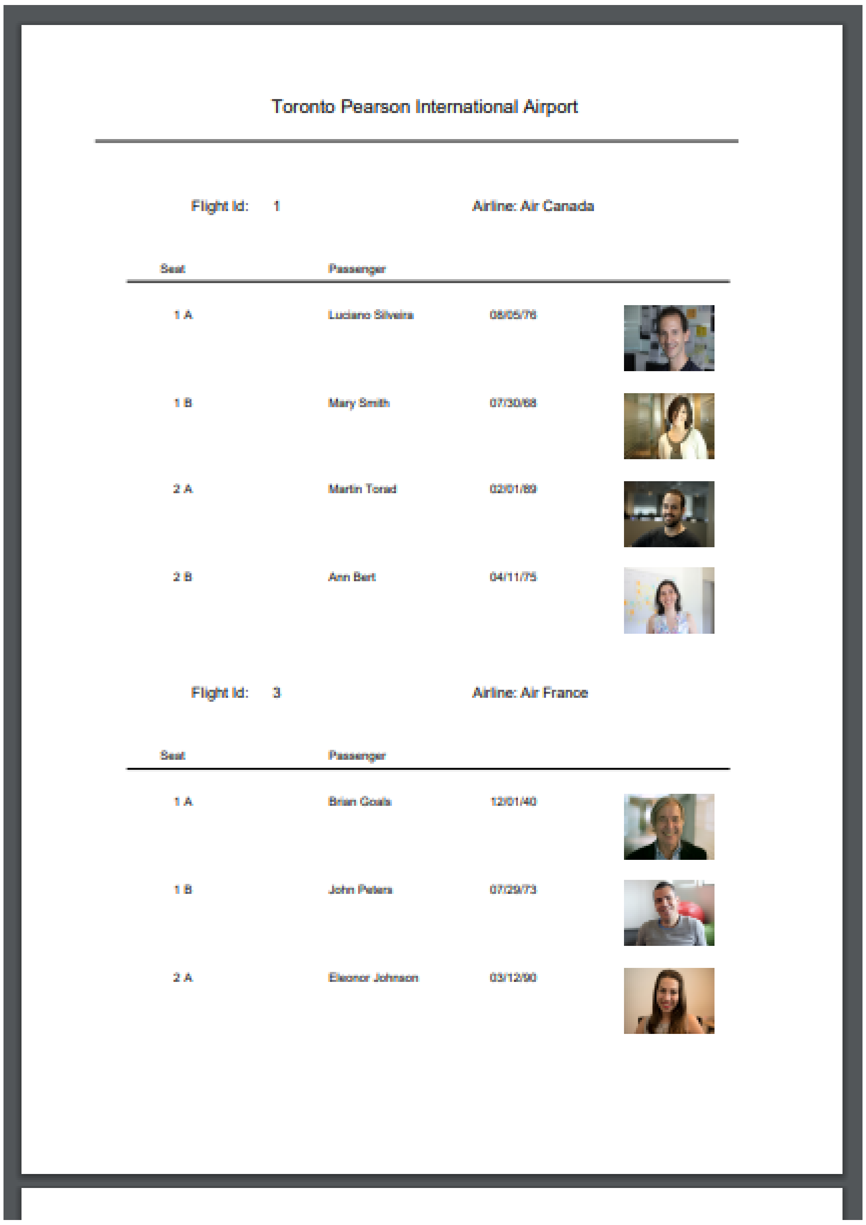
USING THE IMPORTED SERVICES: LIST OF FLIGHTS

You need to show in a panel all the possible destination airports:



Code	Airports Name
CYYZ	Toronto Pearson International Airport
KATL	Hartsfield-Jackson Atlanta International Airport
KJFK	John F. Kennedy International Airport
KLAX	Los Angeles International Airport
KORD	O'Hare International Airport
KSEA	Seattle-Tacoma International Airport
KSFO	San Francisco International Airport
LIRA	Rome Ciampino Airport
LTBA	Istanbul Ataturk Airport
OMAA	Abu Dhabi International Airport
WSSS	Singapore Changi Airport

And, after selecting one airport, issue a PDF file containing all the flights to that airport. For each flight you want to list passenger information (Citizen users):



Toronto Pearson International Airport

Flight Id: 1 Airline: Air Canada

Seat	Passenger		
1 A	Luciano Silveira	08/05/76	
1 B	Mary Smith	07/30/68	
2 A	Martin Torad	02/01/89	
2 B	Ann Bert	04/11/75	

Flight Id: 3 Airline: Air France

Seat	Passenger		
1 A	Brian Goals	12/01/40	
1 B	John Peters	07/29/73	
2 A	Eleonor Johnson	03/12/90	

The FlightsByAirports web panel and ListAirportFlight procedure have already been created for you to change what you need and save time. You can find them in the folder GeneXus/Web/Backend_ODATA.

SOLUTION:

Use a procedure (it is already created and called ListAirportFlight) to implement the list, which will receive as parameter the airport identifier, in order to list the flights to it.

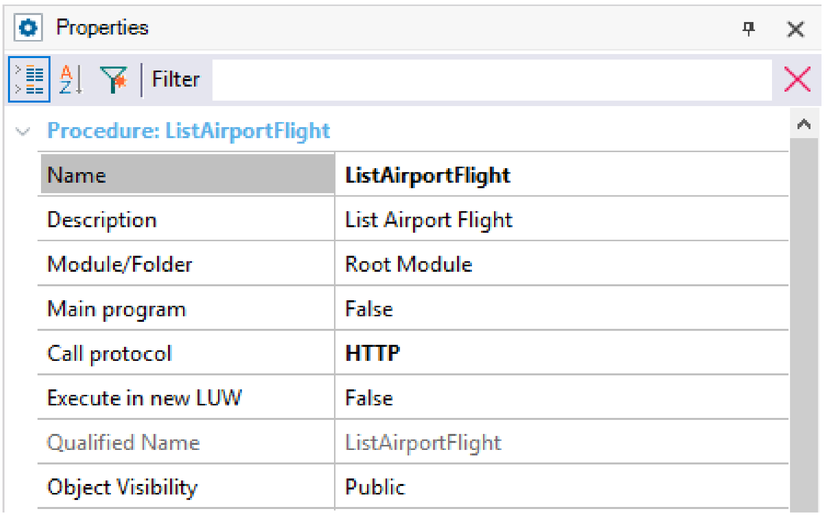
In the Rules section you will find:

```
parm(in: &AirportCode);
```

```
Output_file("AirportFlightsList.pdf","pdf");
```

Where `&AirportCode` is a variable based on the data type of the attribute AirlinesAirlineCode (Character(40)). Remember that `Output_file` is used to define the list output (in this case, a PDF document).

Also, remember that the Call protocol property had to be changed to HTTP:

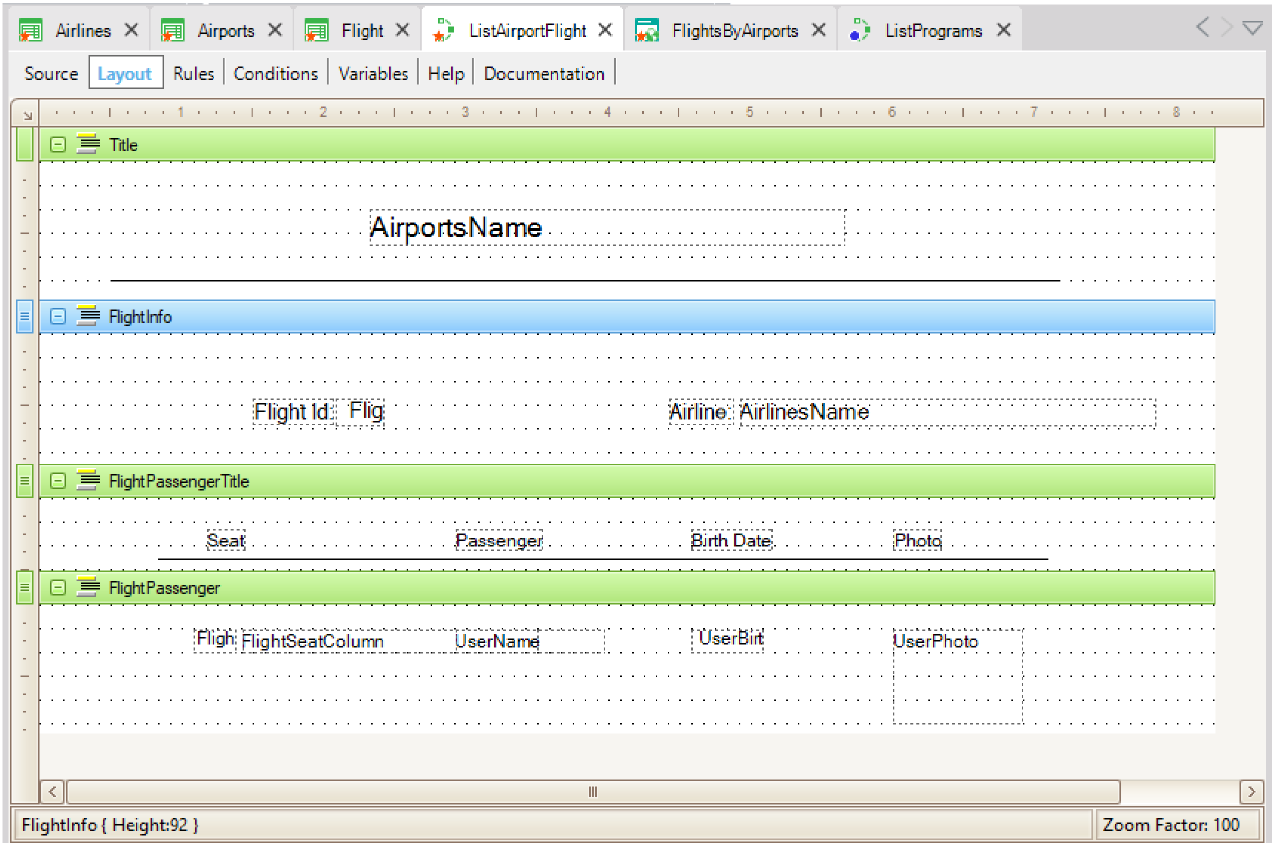


Properties

Procedure: ListAirportFlight

Name	**ListAirportFlight**
Description	List Airport Flight
Module/Folder	Root Module
Main program	False
Call protocol	**HTTP**
Execute in new LUW	False
Qualified Name	ListAirportFlight
Object Visibility	Public

The layout should look as shown below:



And the Source section should look as follows:

```
For each Airports
      where AirportsIcaoCode = &AirportCode
      print Title
      For each Flight
            print FlightInfo
            print FlightPassengerTitle
            For each Flight.Seat
                  print FlightPassenger
            endfor
      endfor

endfor
```

Invoke this procedure from the Web Panel FlightsByAirports, where you insert a Grid with the attributes AirportsIcaoCode and AirportsName.

In the Events section:

```
Event AirportsName.Click
      ListAirportFlight( AirportsIcaoCode )
endevent
```

To connect this panel to the backoffice (to the Home web panel), edit the ListPrograms procedure and add the following code:

```
&name = !"FlightsByAirports"
&description = "Flights By Airports"
&link = FlightsByAirports.Link()

Do 'AddProgram'
```

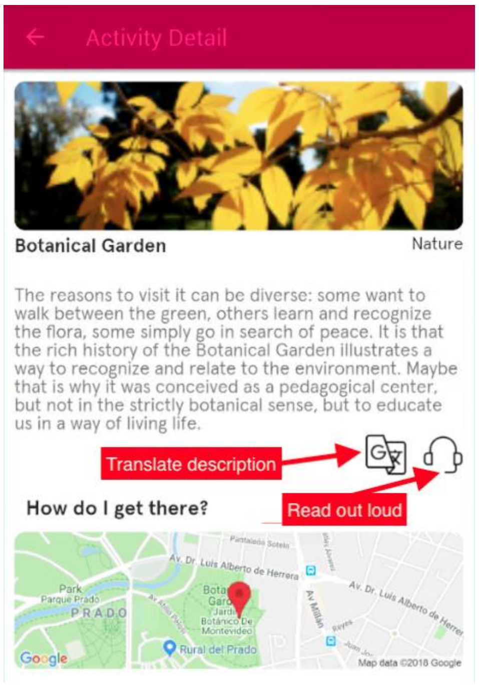
Run the application.

GENEXUS AI

You need to add two new functions to the application in order to:

1. Translate the description of a cultural activity to the language of the device, and
2. Have the application read this description out loud.

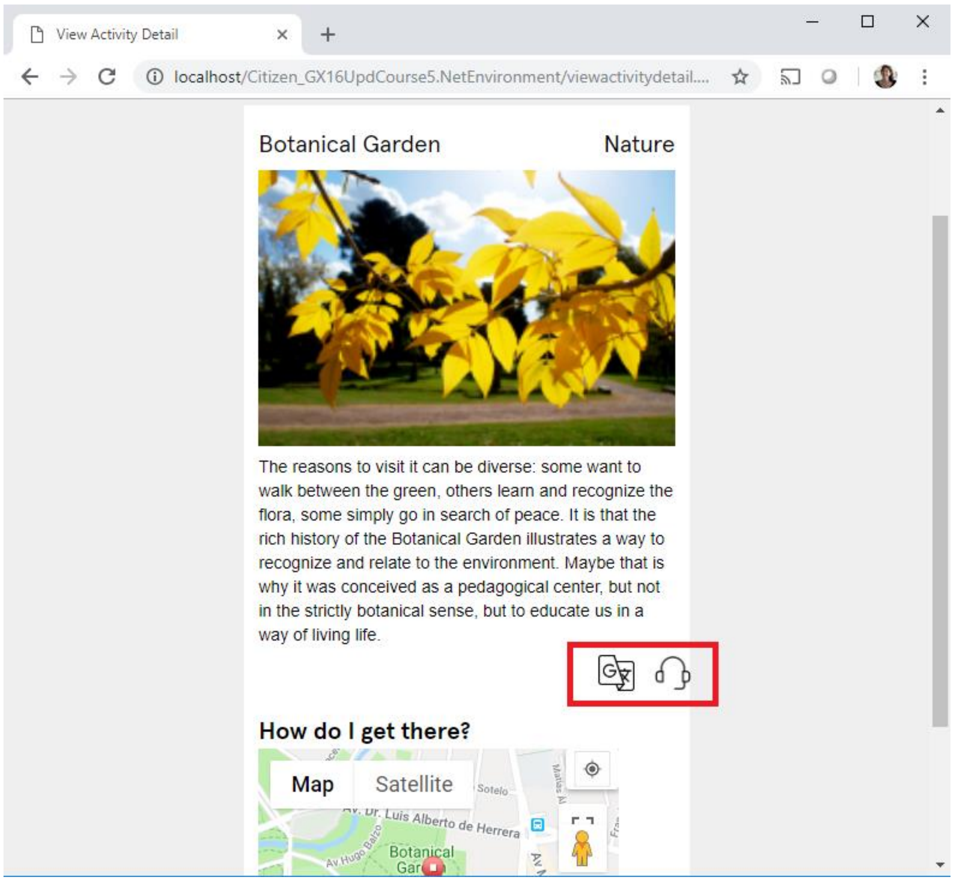
To do so, in the ActivityDetail panel of the SD frontend you have two buttons where the functionality will be added:



Botanical Garden
Nature

The reasons to visit it can be diverse: some want to walk between the green, others learn and recognize the flora, some simply go in search of peace. It is that the rich history of the Botanical Garden illustrates a way to recognize and relate to the environment. Maybe that is why it was conceived as a pedagogical center, but not in the strictly botanical sense, but to educate us in a way of living life.

You want the same for the similar panel ViewActivityDetail, in the web frontend:


View Activity Detail
localhost/Citizen_GX16UpdCourse5.NetEnvironment/viewactivitydetail....
How do I get there?
Map
Satellite

Botanical Garden
Nature

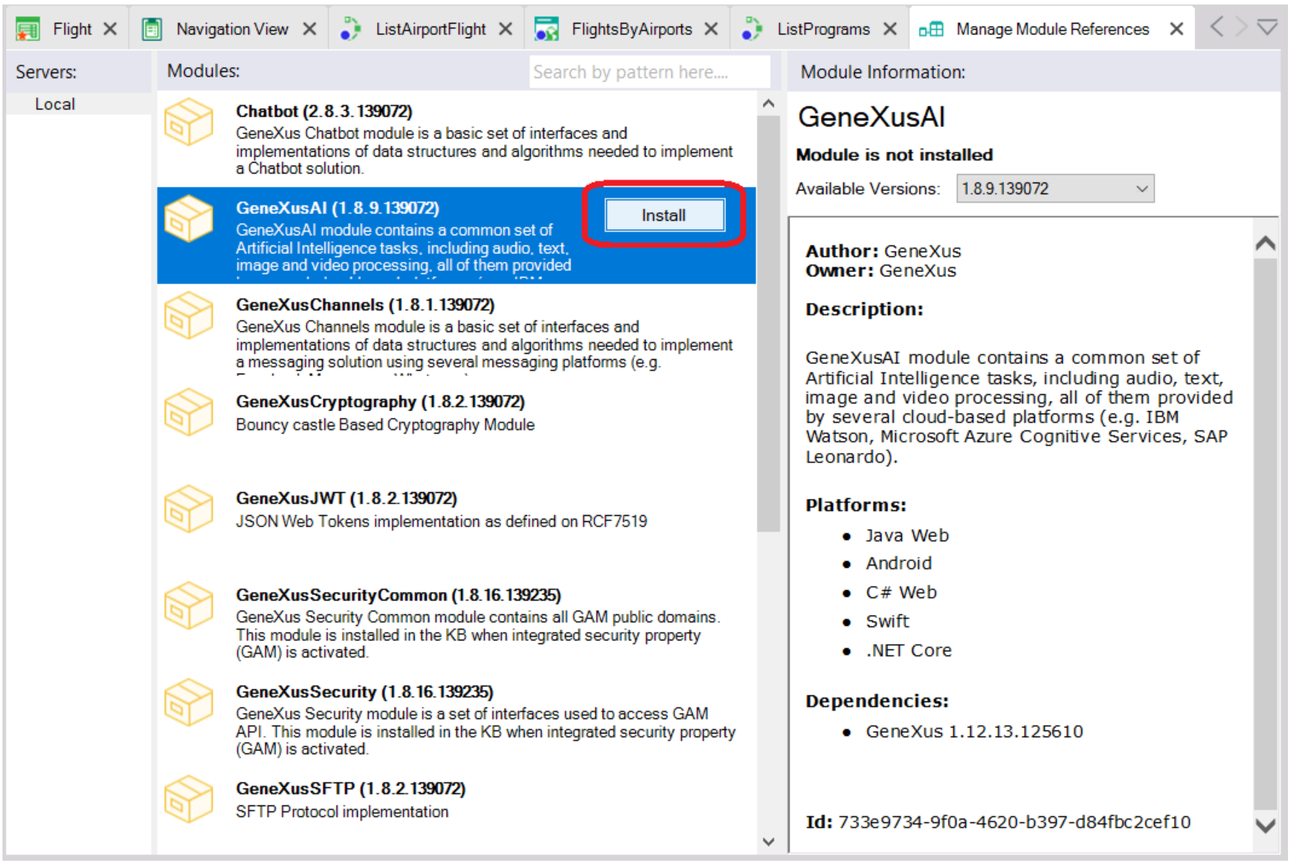
The reasons to visit it can be diverse: some want to walk between the green, others learn and recognize the flora, some simply go in search of peace. It is that the rich history of the Botanical Garden illustrates a way to recognize and relate to the environment. Maybe that is why it was conceived as a pedagogical center, but not in the strictly botanical sense, but to educate us in a way of living life.

PREVIOUS STEPS

ADDING A REFERENCE TO THE GENEXUSAI MODULE

Before you begin to add the functionality, you must add the reference to the GeneXusAI module.

Do this from the option Knowledge Manager > Manage Module References:



Chatbot (2.8.3.139072)
GeneXus Chatbot module is a basic set of interfaces and implementations of data structures and algorithms needed to implement a Chatbot solution.

GeneXusAI (1.8.9.139072)
GeneXusAI module contains a common set of Artificial Intelligence tasks, including audio, text, image and video processing, all of them provided

GeneXusChannels (1.8.1.139072)
GeneXus Channels module is a basic set of interfaces and implementations of data structures and algorithms needed to implement a messaging solution using several messaging platforms (e.g.

GeneXusCryptography (1.8.2.139072)
Bouncy castle Based Cryptography Module

GeneXusJWT (1.8.2.139072)
JSON Web Tokens implementation as defined on RCF7519

GeneXusSecurityCommon (1.8.16.139235)
GeneXus Security Common module contains all GAM public domains. This module is installed in the KB when integrated security property (GAM) is activated.

GeneXusSecurity (1.8.16.139235)
GeneXus Security module is a set of interfaces used to access GAM API. This module is installed in the KB when integrated security property (GAM) is activated.

GeneXusSFTP (1.8.2.139072)
SFTP Protocol implementation

GeneXusAI
Module is not installed
Available Versions: 1.8.9.139072

Author: GeneXus
Owner: GeneXus

Description:

GeneXusAI module contains a common set of Artificial Intelligence tasks, including audio, text, image and video processing, all of them provided by several cloud-based platforms (e.g. IBM Watson, Microsoft Azure Cognitive Services, SAP Leonardo).

Platforms:
- Java Web
- Android
- C# Web
- Swift
- .NET Core

Dependencies:
- GeneXus 1.12.13.125610

Id: 733e9734-9f0a-4620-b397-d84fbc2cef10

CHANGING THE LANGUAGE OF THE SIMULATOR

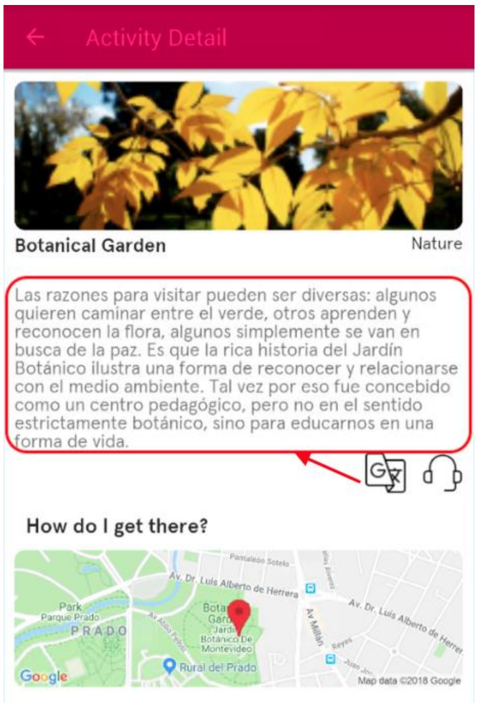
If the simulator is in English, change it to another language to run the tests.

Tip: To change the language of the Android simulator, go to Settings > System >Languages & input > tap on the Languages option. Add the new language, for example, Spanish (United States) and place it at the top of the list.

AUTOMATIC TEXT TRANSLATION

Implement the translation of the description in the SD panel ActivityDetail (you can later repeat it in the similar web panel ViewActivityDetail).

Once the event has been programmed, the translated text should be displayed as shown below:


Activity Detail

Botanical Garden

Nature

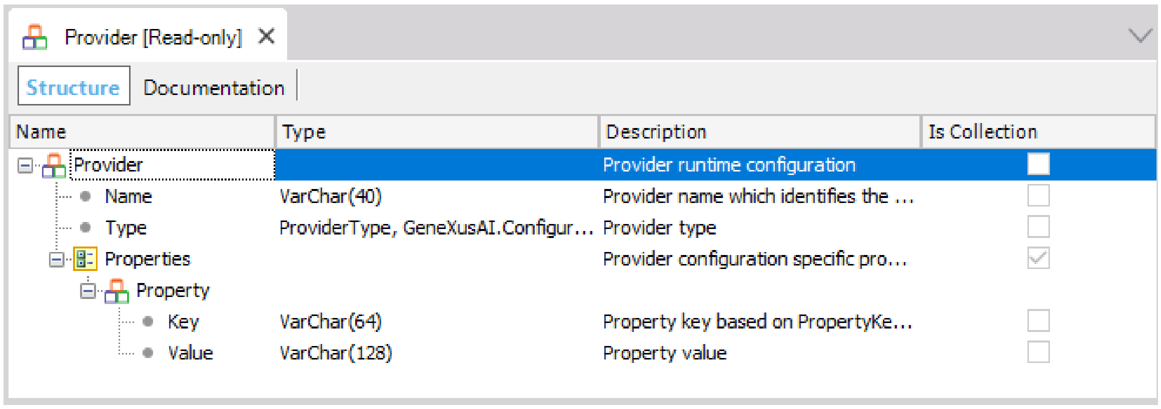
Las razones para visitar pueden ser diversas: algunos quieren caminar entre el verde, otros aprenden y reconocen la flora, algunos simplemente se van en busca de la paz. Es que la rica historia del Jardín Botánico ilustra una forma de reconocer y relacionarse con el medio ambiente. Tal vez por eso fue concebido como un centro pedagógico, pero no en el sentido estrictamente botánico, sino para educarnos en una forma de vida.

How do I get there?

The service that you will use for the translation is GeneXusAI.Text.Translate. To this end, set the Provider as Type = ProviderType.IBM and with the following key-value pair:

- Key: PropertyKey.Key; Value: euY0twBoSB4qs8jDj4gvuxVlWt9soLHOKu5O8lYv5o3p

Tip: Remember that this is done in a procedure. An AI folder has been created to this end. This is done based on the predefined SDT that is included inside the module GeneXusAI/Configuration:


Provider [Read-only]

Structure | Documentation

Name	Type	Description	Is Collection
Provider		Provider runtime configuration	☐
Name	VarChar(40)	Provider name which identifies the ...	☐
Type	ProviderType, GeneXusAI.Configur...	Provider type	☐
Properties		Provider configuration specific pro...	✓
Property			
Key	VarChar(64)	Property key based on PropertyKe...	☐
Value	VarChar(128)	Property value	☐

Tip: The source language will always be English. However, you may also incorporate the function GeneXusAI.Text.DetectLanguage.

Tip: The target language is that of the device, which can be obtained using ClientInformation.Language in SD (later it must be converted to the language codes used by GeneXusAI).

Note: On the Web it is more difficult to obtain the client language, so the target language can be left unchanged.

SOLUTION

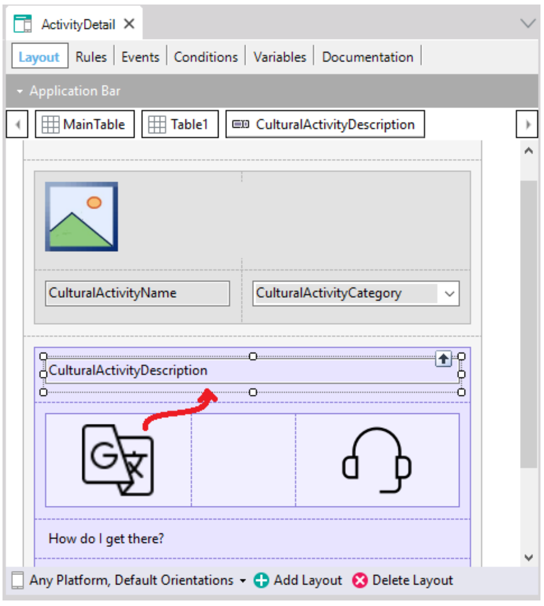
You will need a procedure called TranslationProvider to configure the provider.

```
// Rules
parm(out:&provider);

// Source
&provider.Name = !'translate'
&provider.Type = ProviderType.IBM
&prop = new()
&prop.Key = PropertyKey.Key
&prop.Value = !'euY0twBoSB4qs8jDj4gvuxVlWt9soLHOKu5O8lYv5o3p'
&provider.Properties.Add(&prop)

// Variables
&provider : Provider data type
&prop: Provider.Property data type
```

Next, go to the ActivityDetail panel:



First, change the `CulturalActivityDescription` attribute on screen for a variable (to be able to change it for the translated text) loaded in the `Refresh` event.

```
Event Refresh
      &CulturalActivityDescription = CulturalActivityDescription
EndEvent
```

For translating the text, program the event ImageTranslate.Tap:

```
Event ImageTranslate.Tap
```

```
	composite
		&provider = TranslationProvider()
		&languageStr = ClientInformation.Language
		&languageStr = substr(&languageStr, 1, 2)
		&language.FromString(&languageStr)
		&CulturalActivityDescription = Translate(&CulturalActivityDescription, 
Language.English, &language, &provider, &messages)
	endcomposite

Endevent
```

Where ClientInformation is the EO included by default in the GeneXus module, Client submodule. Note that the data type ClientInformation.Language is C(20); therefore, the data type of the &languageStr variable will have to be of that type.
The data type returned by the Translate procedure is Text; that of &language is Language and &messages is Messages.

READING TEXT OUT LOUD

Now you need to implement the translation of the cultural activity's description to audio, and play it on the device. Remember that to play audio you have the Audio EO.

The service that you will use in this part is GeneXusAI.Audio.TextToSpeech. To this end, set the Provider as Type = ProviderType.IBM and the following key-value pairs:

- Key: PropertyKey
- Value: request this value from the instructor

SOLUTION

To use the text to speech function, you need to implement the event `ImageSpeak.Tap`:

```
Event ImageSpeak.Tap
	composite
		&provider = TextToSpeechProvider()
		&localeStr = ClientInformation.Language
		&localeStr = substr(&localeStr, 1, 5)
		&locale.FromString(&localeStr)
		&audio = TextToSpeech(&CulturalActivityDescription, VoiceType.Female, 
&locale, &provider, &messages)
		Audio.PlayBackground(&audio)
	endcomposite

Endevent
```

Where `TextToSpeechProvider` is a Procedure with the following code:

```
// Rules
parm(out:&provider);
```

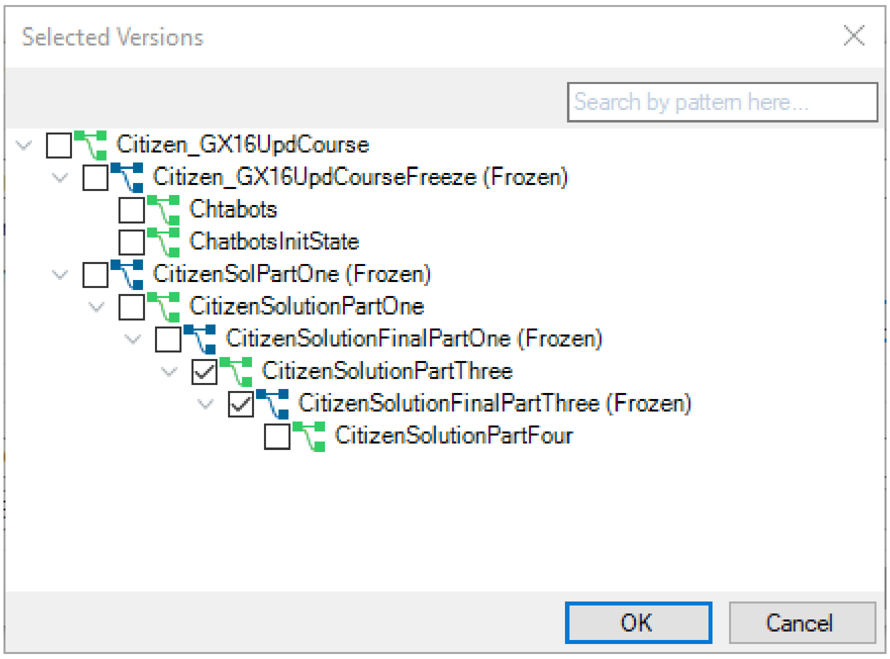
```
// Source
&provider.Name = !'textToSpeech'
&provider.Type = ProviderType.IBM

&prop = new()
&prop.Key = PropertyKey.Key
&prop.Value = !'ApiKey'
&provider.Properties.Add(&prop)
```

Where *ApiKey* has to be the key that the instructor gave you.

SOLUTION KB

You can download the KB containing the solution to these practice exercises from GeneXus Server to compare results. This KB is called CitizenSolutionPartThree.



- [ ] Citizen_GX16UpdCourse
  - [ ] Citizen_GX16UpdCourseFreeze (Frozen)
    - [ ] Chtabots
    - [ ] ChatbotsInitState
  - [ ] CitizenSolPartOne (Frozen)
    - [ ] CitizenSolutionPartOne
      - [ ] CitizenSolutionFinalPartOne (Frozen)
        - [✓] CitizenSolutionPartThree
          - [✓] CitizenSolutionFinalPartThree (Frozen)
            - [ ] CitizenSolutionPartFour

Confirm that in the Data Store “ServiceDS1 (Service)” the Server Name connection property is as follows: https://services.odata.org/V4/(S(40gwjcqlhjmuyfayfnplov0o))/TripPinServiceRW/

And that it is not empty. Otherwise, copy the previous value.

The “Data provider” property of the “Flight” transaction has been enabled to populate the table with initial data. In this way, you only have to run it to test the features.

You should update the GeneXusAI module before doing the build. Remember this is done through Knowledge Manager / Manage Module References.