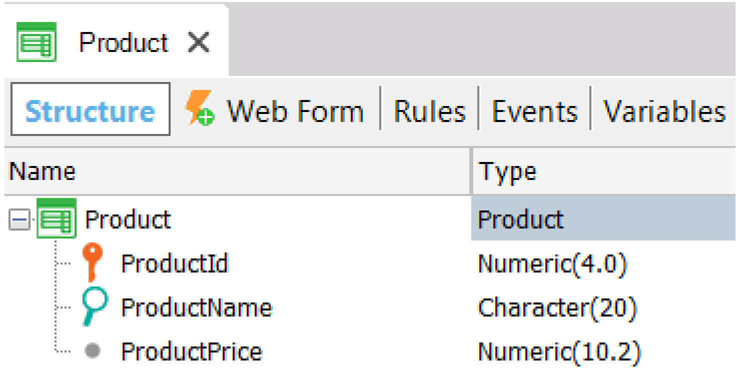
GeneXus Course

Conceptual Summary

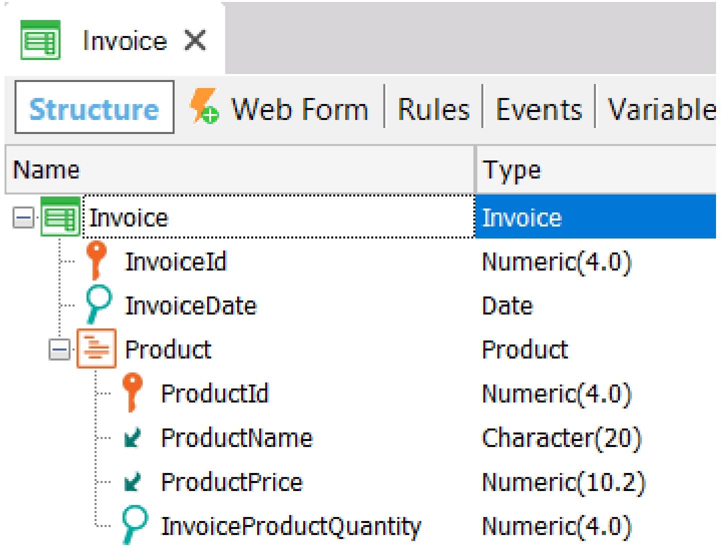
GeneXus™ 16

Transactions

What attribute names do we use?



Name	Type
Product	Product
ProductId	Numeric(4.0)
ProductName	Character(20)
ProductPrice	Numeric(10.2)



Name	Type
Invoice	Invoice
InvoiceId	Numeric(4.0)
InvoiceDate	Date
Product	Product
ProductId	Numeric(4.0)
ProductName	Character(20)
ProductPrice	Numeric(10.2)
InvoiceProductQuantity	Numeric(4.0)

GIK Naming convention

Entity + Category [+ Qualifier]

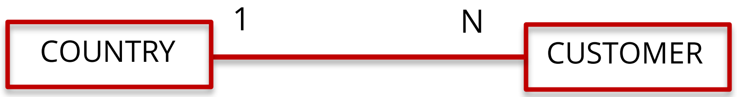
```
Product
{
    ProductId*  (PK)
    ProductName (S)
    ProductPrice (S)
}
```

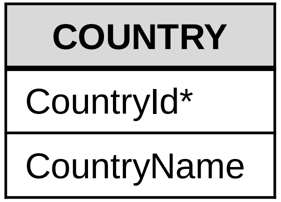
```
Invoice
{
    InvoiceId* (PK)
    InvoiceDate (S)
    -----
    Product
    {
        ProductId* (PK, FK)
        ProductName  (I)
        ProductPrice  (I)
        InvoiceProductQuantity  (S)
        --------
    }
}
```

Transaction Design

Strong 1 – N

Each customer belongs to a country and a country has many customers

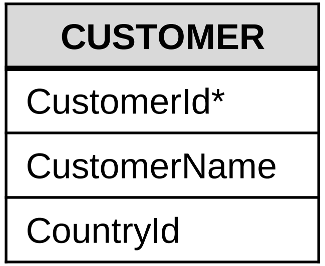




COUNTRY
CountryId*
CountryName

```
Country
{
    CountryId*   (PK)
    CountryName
}
```

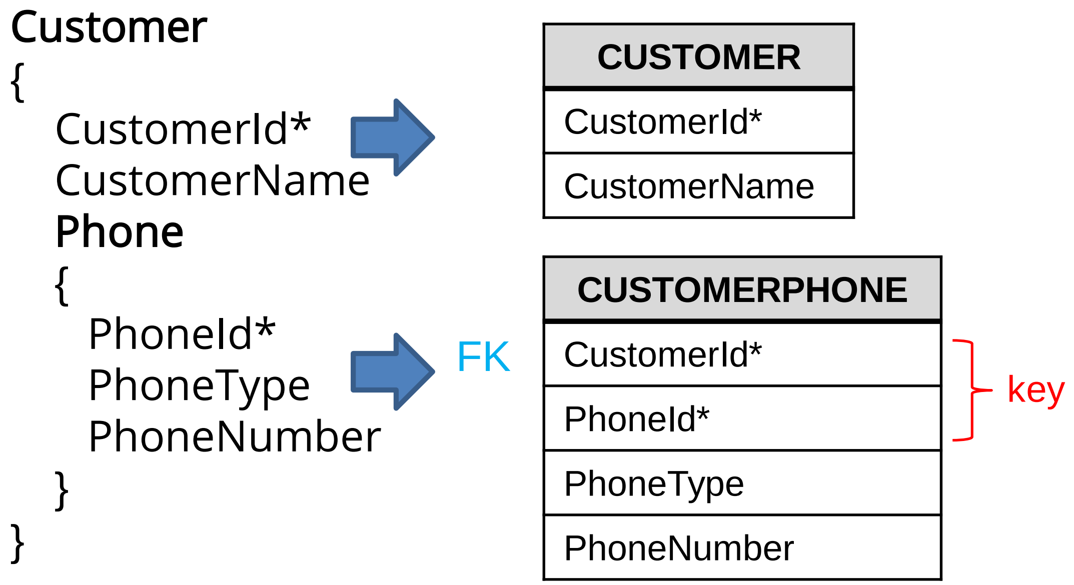
```
Customer
{
    CustomerId*
    CustomerName
    CountryId   (FK)
    CountryName
}
```



CUSTOMER
CustomerId*
CustomerName
CountryId

Weak 1 – N

Each customer has many phones, and each phone belongs to a single customer



```
Customer
{
   CustomerId*
   CustomerName
   Phone
   {
      PhoneId*
      PhoneType
      PhoneNumber
   }
}
```

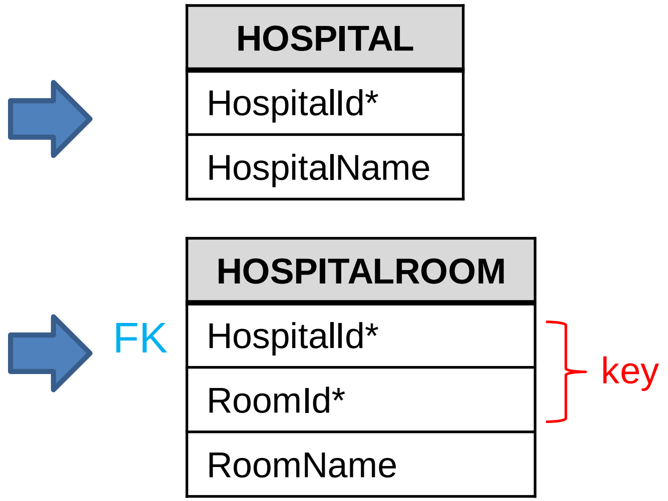
CUSTOMER
CustomerId*
CustomerName

CUSTOMERPHONE
CustomerId*
PhoneId*
PhoneType
PhoneNumber

Weak 1 – N

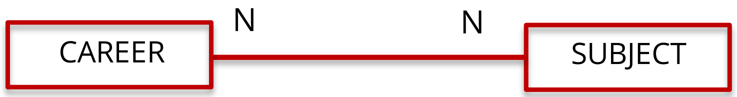
Each hospital has many rooms and each room belongs to a single hospital

```
Hospital
{
   HospitalId*
   HospitalName
   Room
   {
      RoomId*
      RoomName
   }
}
```



N – N (M)

Each degree program has many subjects and each subject can be included in many degree programs



N – N: Option 1 of 4

Each degree program has many subjects and each subject can be included in many degree programs

CAREER
CareerId*
CareerName

```
Career
{
    CareerId*
    CareerName
}
```

```
Subject
{
    SubjectId*
    SubjectName
}
```

SUBJECT
SubjectId*
SubjectName

CAREERSUBJECT
CareerId*
SubjectId*

```
CareerSubject
{
    CareerId*
    SubjectId*
}
```

N – N: Option 1 – Generated tables

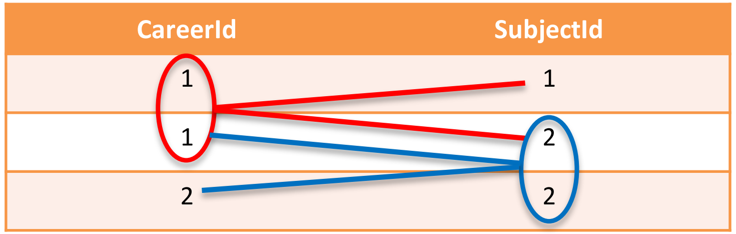
CAREER

CareerId	CareerName
1	Computer Science
2	Data Science for Health

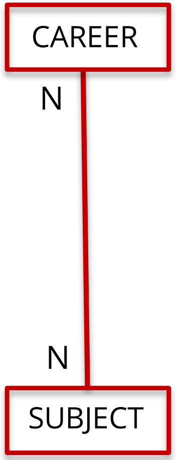
SUBJECT

SubjectId	SubjectName
1	Computer Logic
2	Programming Fundamentals

CAREERSUBJECT

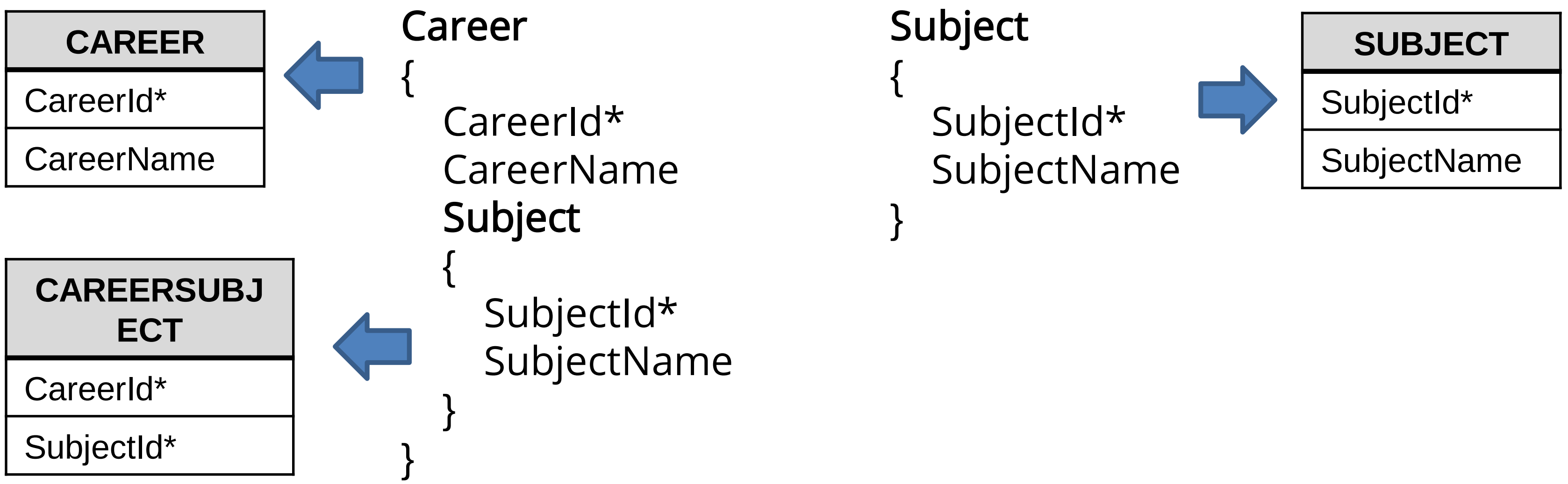


CareerId	SubjectId
1	1
1	2
2	2



N – N: Option 2 of 4

Each degree program has many subjects and each subject can be included in many degree programs



CAREER
CareerId*
CareerName

CAREERSUBJECT
CareerId*
SubjectId*

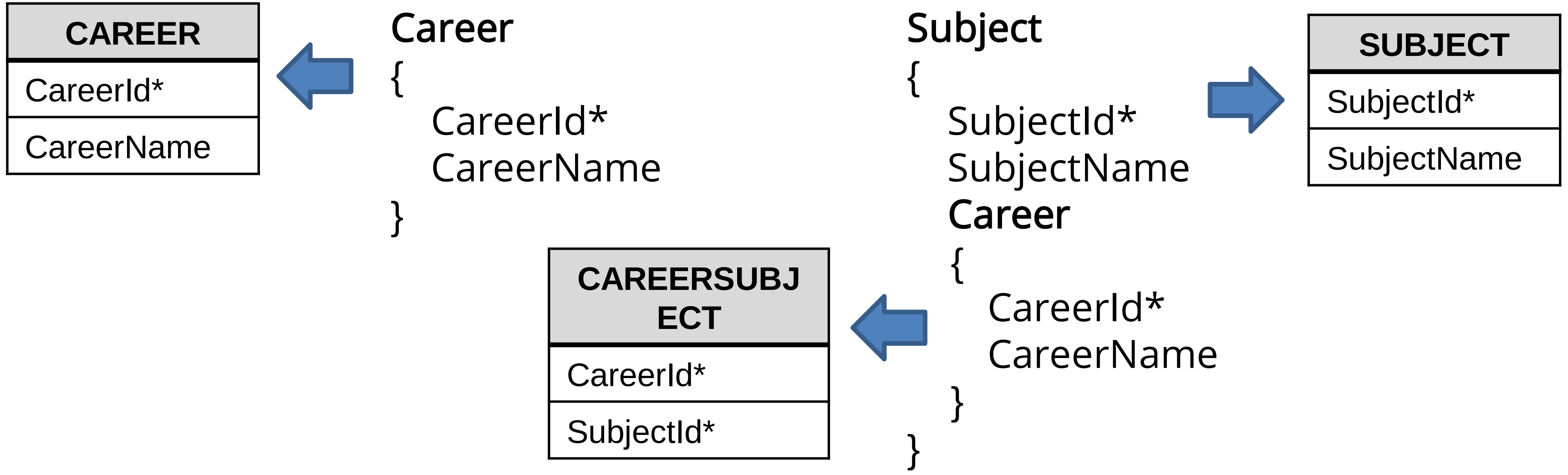
```
Career
{
    CareerId*
    CareerName
    Subject
    {
        SubjectId*
        SubjectName
    }
}
```

```
Subject
{
    SubjectId*
    SubjectName
}
```

SUBJECT
SubjectId*
SubjectName

N – N: Option 3 of 4

Each degree program has many subjects and each subject can be included in many degree programs



CAREER
CareerId*
CareerName

```
Career
{
    CareerId*
    CareerName
}
```

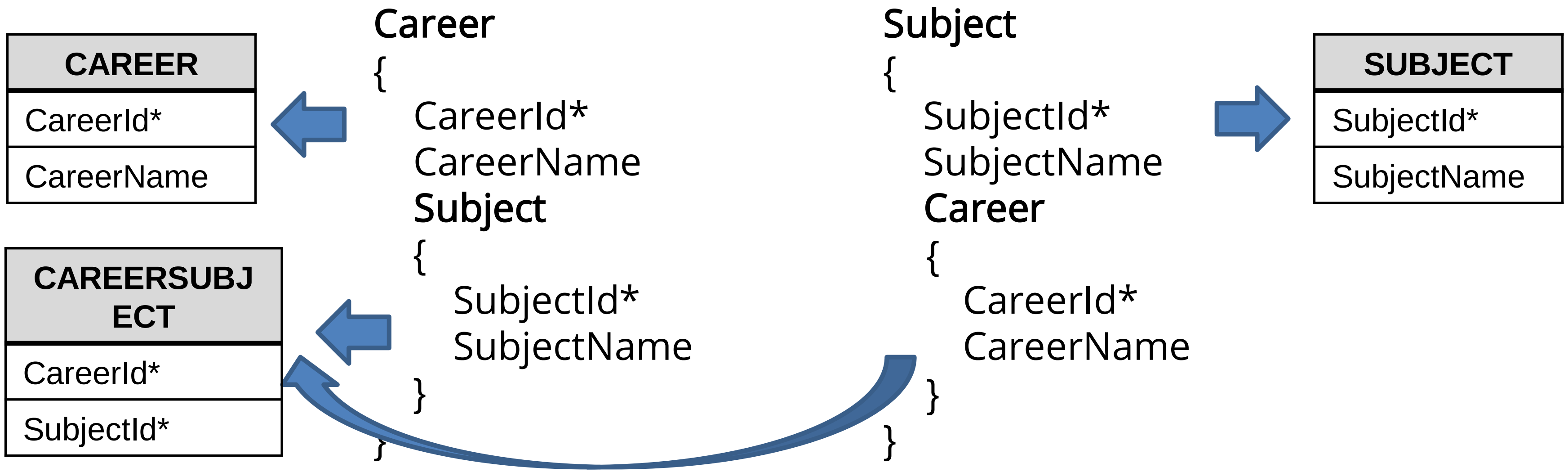
```
Subject
{
    SubjectId*
    SubjectName
    Career
    {
        CareerId*
        CareerName
    }
}
```

SUBJECT
SubjectId*
SubjectName

CAREERSUBJECT
CareerId*
SubjectId*

N – N: Option 4 of 4

Each degree program has many subjects and each subject can be included in many degree programs

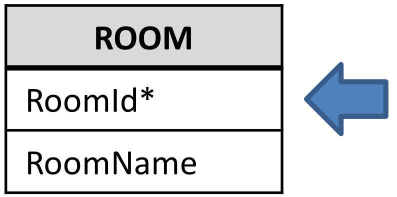


```
Career
{
    CareerId*
    CareerName
    Subject
    {
        SubjectId*
        SubjectName
    }
}
```

```
Subject
{
    SubjectId*
    SubjectName
    Career
    {
        CareerId*
        CareerName
    }
}
```

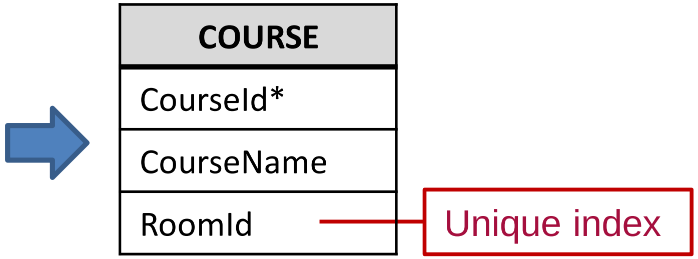
1 - 1

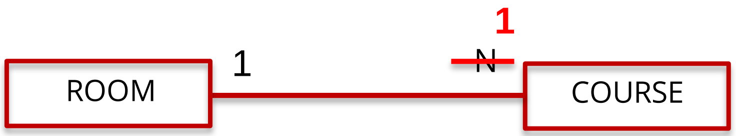
Each course is taught in a classroom, and this classroom can only be used to teach this course



```
Room
{
    RoomId*
    RoomName
}
```

```
Course
{
    CourseId*
    CourseName
    RoomId
    RoomName
}
```

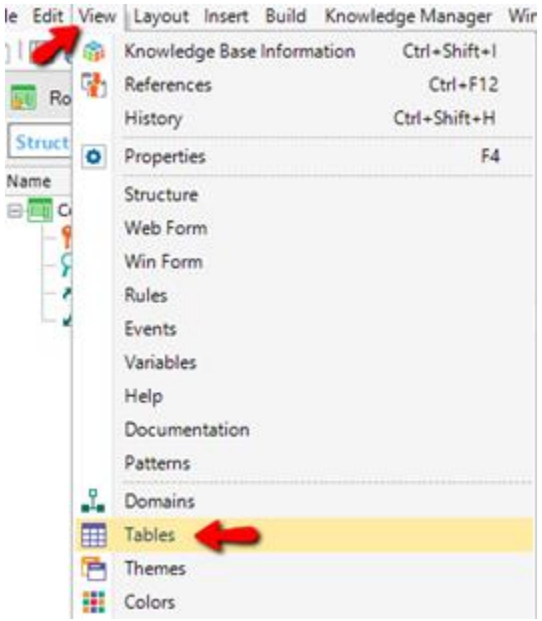




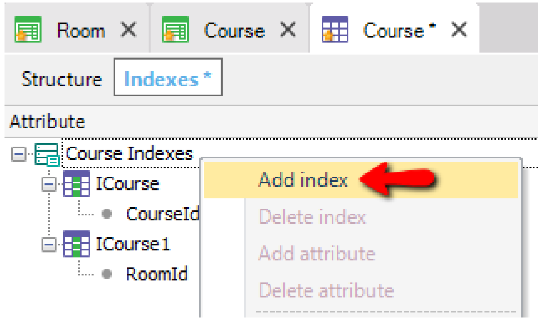
GeneXus

Creating an index

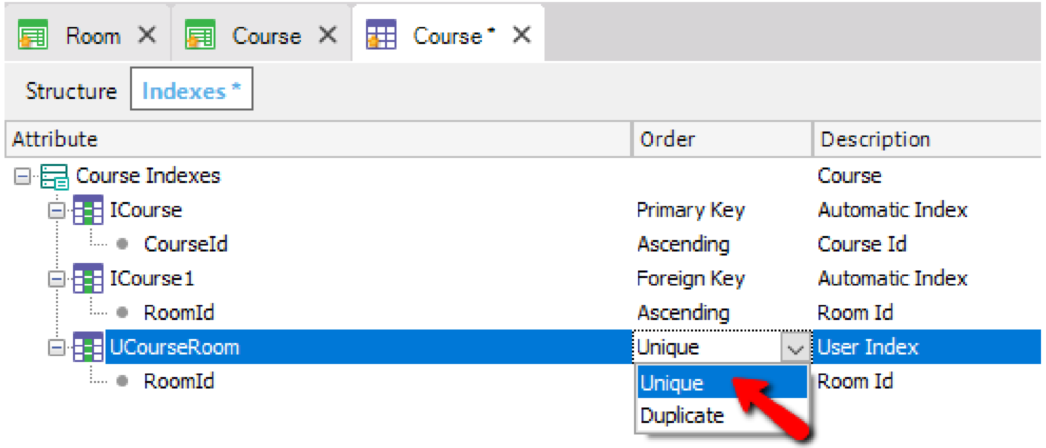
1



2



3



Attribute	Order	Description
Course Indexes		Course
ICourse	Primary Key	Automatic Index
CourseId	Ascending	Course Id
ICourse1	Foreign Key	Automatic Index
RoomId	Ascending	Room Id
UCourseRoom	Unique	User Index
RoomId		Room Id

Normalization

GeneXus normalize tables in Third Normal Form (3NF)

- Inferred attributes in a transaction, are not included in the generated table

Continent

```
{
    ContinentId*   (PK)
    ContinentName
}
```

Country

```
{
    CountryId*   (PK)
    CountryName
    ContinentId  (FK)
    ContinentName  (INF)

}
```

Customer

```
{
    CustomerId* (PK)
    CustomerName
    CountryId    (FK)
    CountryName  (INF)
    ContinentId  (INF)
    ContinentName  (INF)
}
```

CONTINENT
ContinentId*
ContinentName

COUNTRY
CountryId*
CountryName
ContinentId

CUSTOMER
CustomerId*
CustomerName
CountryId

Referential Integrity

Referential Integrity

```
Country
{
   CountryId*   (PK)
   CountryName
}
```

```
Customer
{
   CustomerId*
   CustomerName
   CountryId    (FK)
   CountryName
}
```

CountryId	CountryName
1	URUGUAY
2	ARGENTINA

CustomerId	CustomerName	CountryId	
1	ANA	1	✓
2	PEDRO	2	✓
3	LUIS	2	✓
4	JOSE	3	✗

The record is not inserted ⇐

Referential Integrity

```
Country
{
   CountryId*   (PK)
   CountryName
}
```

```
Customer
{
   CustomerId*
   CustomerName
   CountryId   (FK)
   CountryName
}
```

CountryId	CountryName
1	URUGUAY ✗
2	ARGENTINA

The register is not deleted

CustomerId	CustomerName	CountryId
1	ANA	$\boxed{1}$
2	PEDRO	2
3	LUIS	2
4	JOSE	3

Base Table and Extended Table

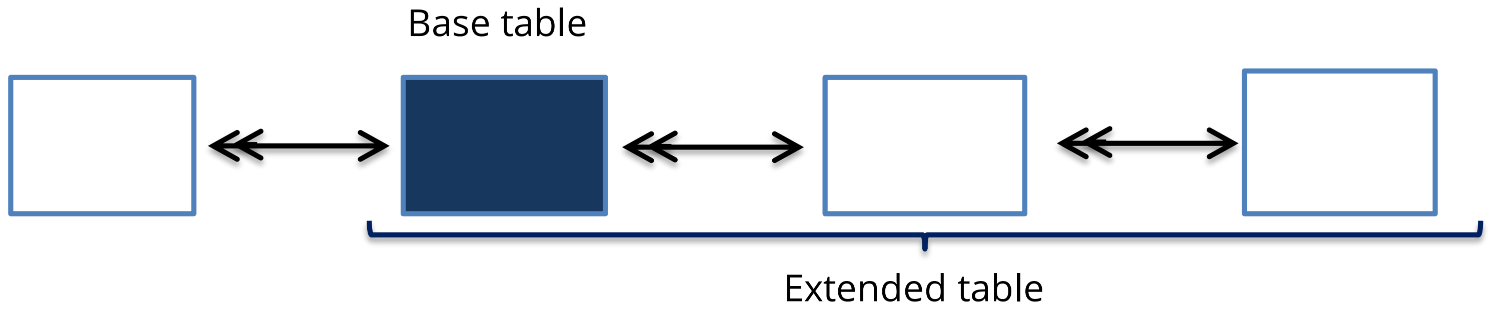
- **Base table**

  Any table in the database where we may be working at a given moment.

- **Extended table**

  For a given table, its extended table is a concept that allows us to consider all the information that we can access from it, using its foreign keys.

  It is the set of attributes of the table itself **+** all the attributes of the tables with which it has an N to 1 relation, either directly or indirectly.

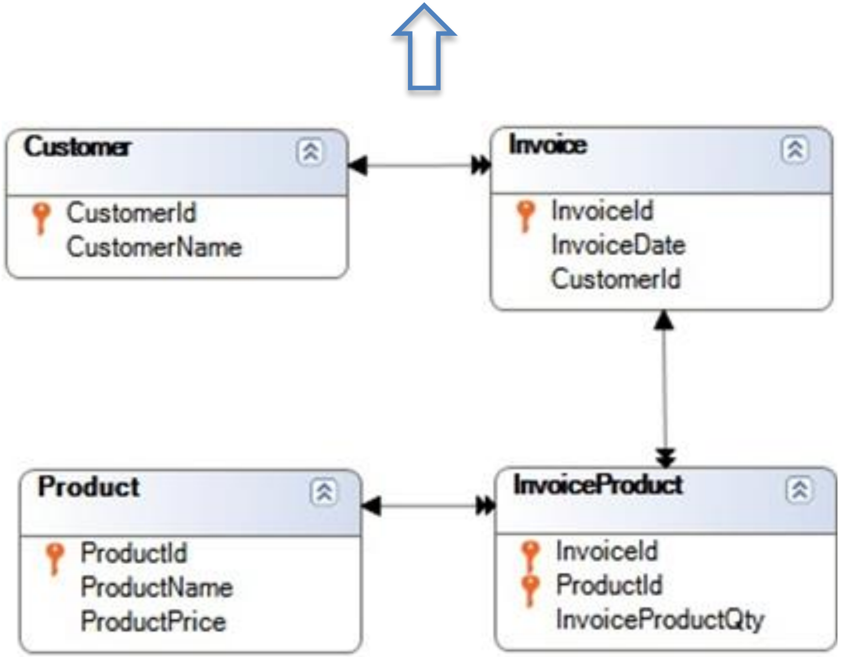


Example

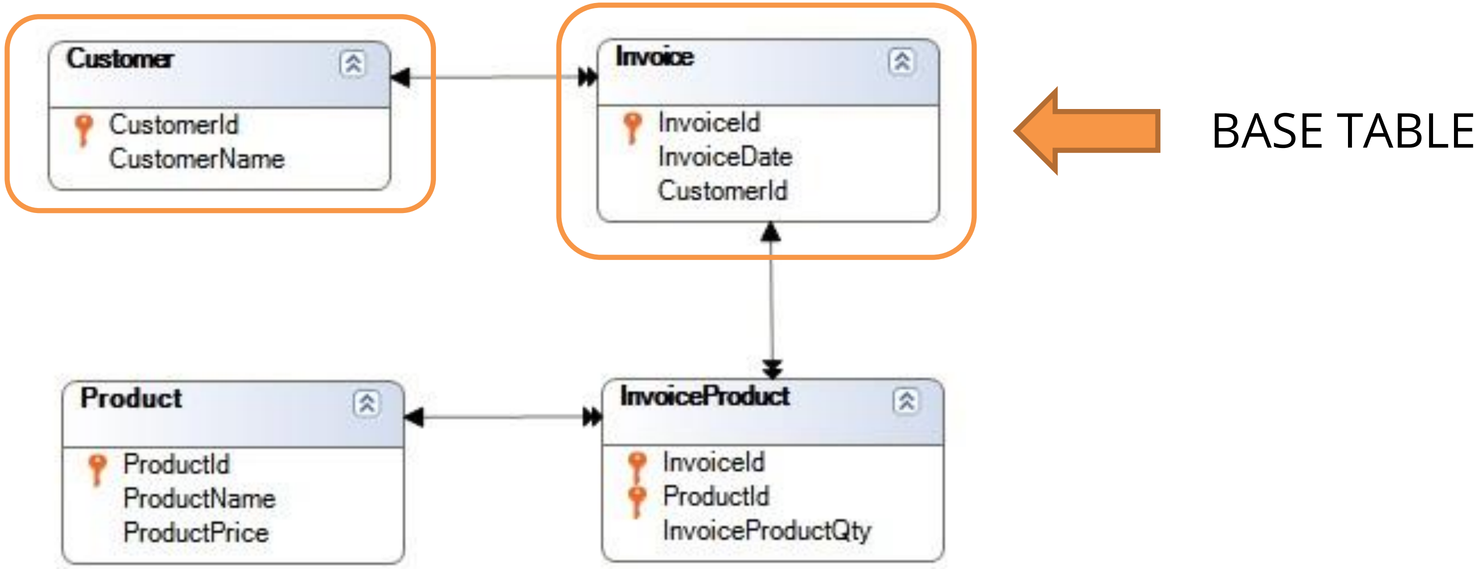
```
Customer
{
    CustomerId*
    CustomerName
}

Product
{
    ProductId*
    ProductName
    ProductPrice
}
```

```
Invoice
{
    InvoiceId*
    InvoiceDate
    CustomerId
    CustomerName
    Product
    {
        ProductId*
        ProductName
        ProductPrice
        InvoiceProductQuantity
        --------
    }
}
```

Table diagram
(Bachman diagram)

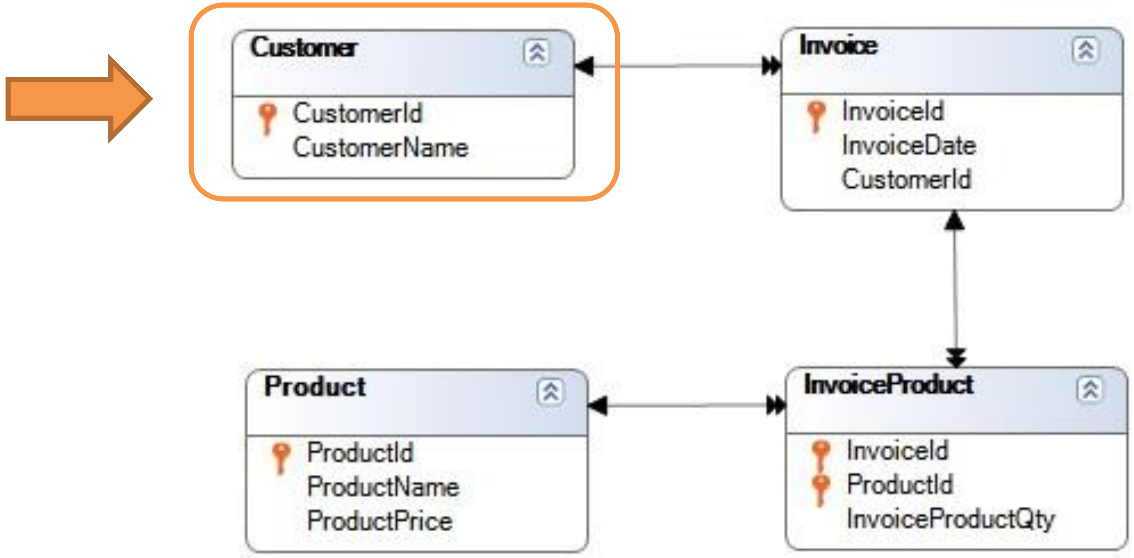


Example: Invoice Extended Table

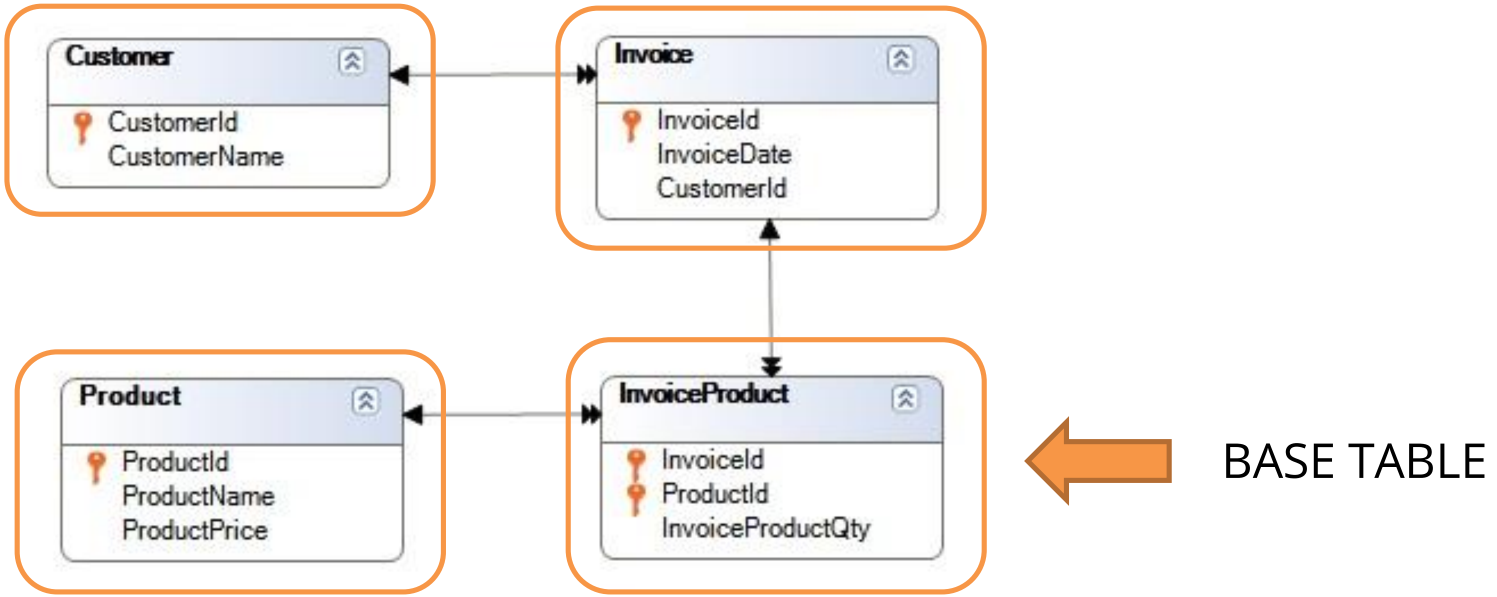


Example: Customer Extended Table

BASE TABLE

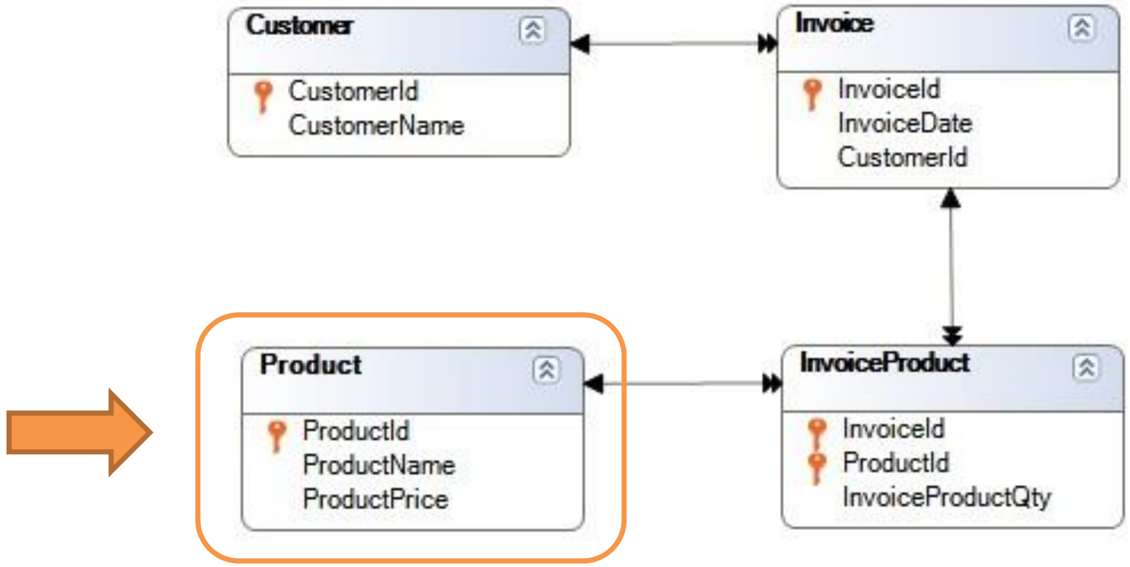


Example: InvoiceProduct Extended Table



Example: Product Extended Table

BASE TABLE



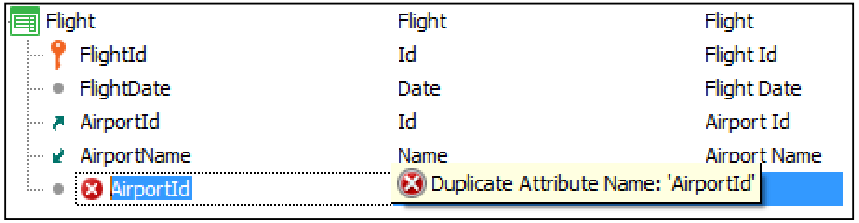
Subtypes

Multiple references:
For every flight, the departure and arrival airports must be saved

```
Airport
{
    AirportId*
    AirportName
}
```

```
Flight
{
    FlightId*
    FlightDate
    AirportId
    AirportName
    AirportId
    AirportName
}
```

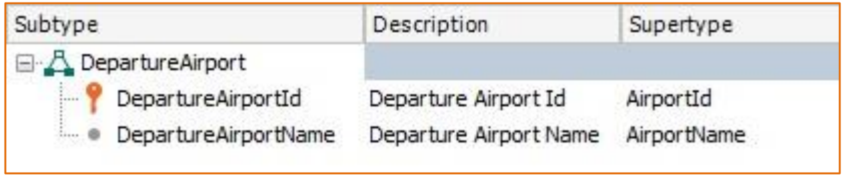
Error due to duplicated attribute names



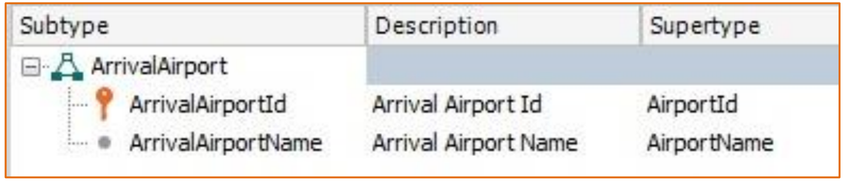
```
Flight              Flight     Flight
    FlightId        Id         Flight Id
    FlightDate      Date       Flight Date
    AirportId       Id         Airport Id
    AirportName     Name       Airport Name
    AirportId       Duplicate Attribute Name: 'AirportId'
```

Solution 1 of 3: create two subtype groups, one for the departure airport and another for the arrival airport

```
Airport                    Flight
{                          {
    AirportId*                 FlightId*
    AirportName                FlightDate
}                              DepartureAirportId     } Subtype group: DepartureAirport
                               DepartureAirportName   }
                               ArrivalAirportId     } Subtype group: ArrivalAirport
                               ArrivalAirportName   }
                           }
```



Subtype	Description	Supertype
DepartureAirport		
DepartureAirportId	Departure Airport Id	AirportId
DepartureAirportName	Departure Airport Name	AirportName

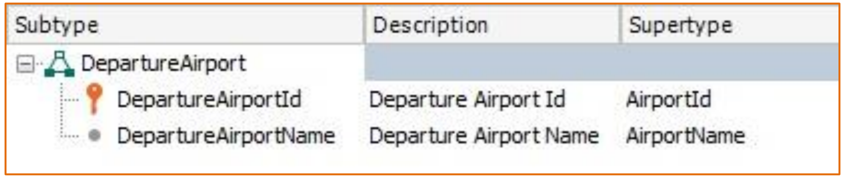


Subtype	Description	Supertype
ArrivalAirport		
ArrivalAirportId	Arrival Airport Id	AirportId
ArrivalAirportName	Arrival Airport Name	AirportName

Solution 2 of 3: create one subtype group for the departure airport only

```
Airport
{
    AirportId*
    AirportName
}
```

```
Flight
{
    FlightId*
    FlightDate
    DepartureAirportId      } Subtype group: DepartureAirport
    DepartureAirportName    }
    AirportId
    AirportName
}
```



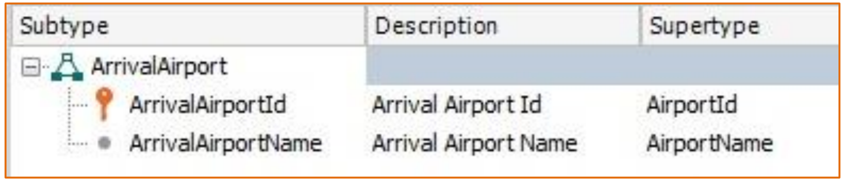
Subtype	Description	Supertype
DepartureAirport		
DepartureAirportId	Departure Airport Id	AirportId
DepartureAirportName	Departure Airport Name	AirportName

Solution 3 of 3: create one subtype group for the arrival airport only

Airport
```
{
    AirportId*
    AirportName
}
```

Flight
```
{
    FlightId*
    FlightDate
    AirportId
    AirportName
    ArrivalAirportId
    ArrivalAirportName
}
```

$\left.\begin{array}{l}\textit{ArrivalAirportId}\\ \textit{ArrivalAirportName}\end{array}\right\}$ Subtype group: ArrivalAirport

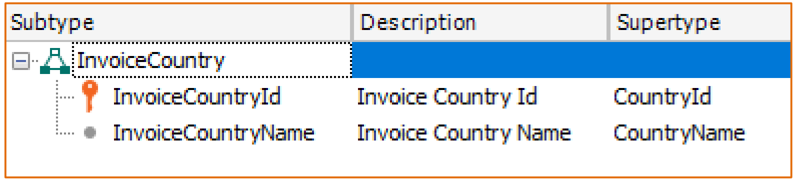


Subtype	Description	Supertype
ArrivalAirport		
ArrivalAirportId	Arrival Airport Id	AirportId
ArrivalAirportName	Arrival Airport Name	AirportName

Multiple references:
In addition to the customer's country, the country where the invoice was issued must also be saved

```
Country
{
   CountryId*
   CountryName
}

Customer
{
   CustomerId*
   CustomerName
   CountryId
   CountryName
}
```

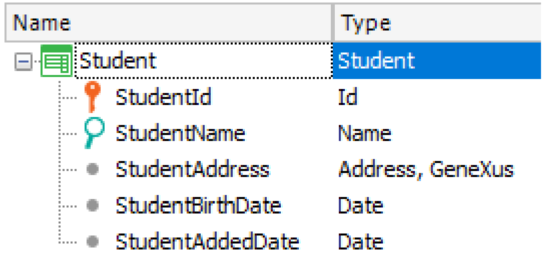
```
Invoice
{
   InvoiceId*
   InvoiceDate
   CustomerId
   CustomerName        - - - 
   CountryId           - - -   Inferred attributes
   CountryName         - - - 
   InvoiceCountryId    }
   InvoiceCountryName  }  Subtype group: InvoiceCountry
}
```



Subtype	Description	Supertype
InvoiceCountry		
InvoiceCountryId	Invoice Country Id	CountryId
InvoiceCountryName	Invoice Country Name	CountryName

Rules

Rules



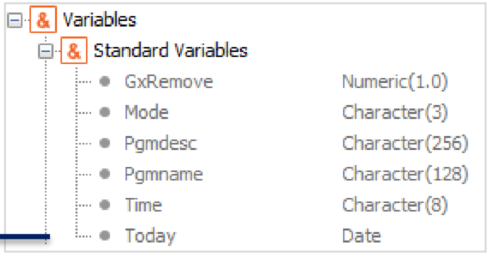
Name	Type
Student	Student
StudentId	Id
StudentName	Name
StudentAddress	Address, GeneXus
StudentBirthDate	Date
StudentAddedDate	Date

Error("Enter the student name") if StudentName.isEmpty();

Msg("The address is empty") if StudentAddress.isEmpty();

Default(StudentAddedDate, &Today);

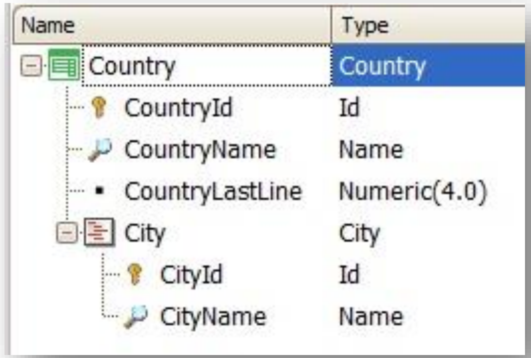
Noaccept(StudentAddedDate);



Variables
Standard Variables

GxRemove	Numeric(1.0)
Mode	Character(3)
Pgmdesc	Character(256)
Pgmname	Character(128)
Time	Character(8)
Today	Date

Rules



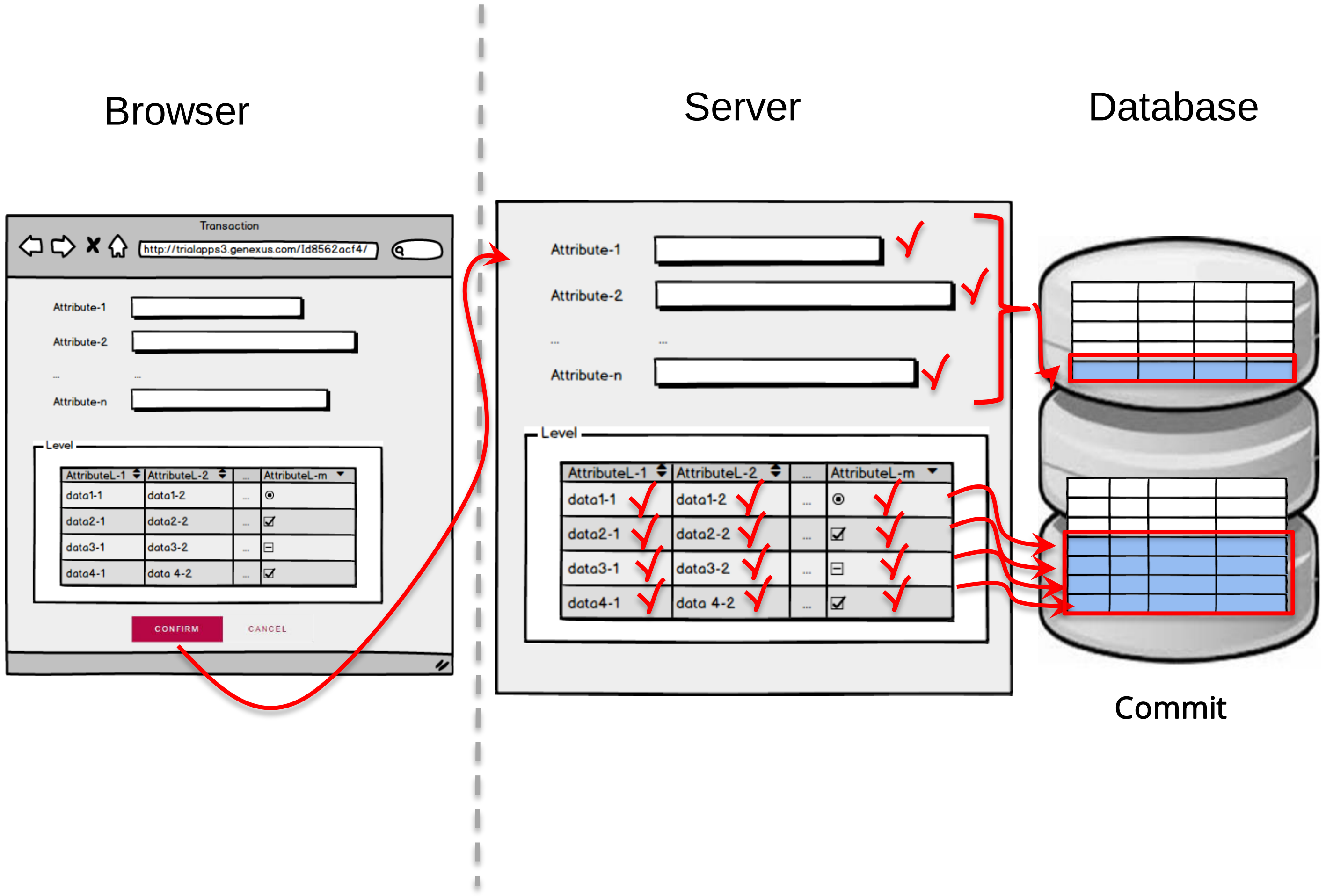
Name	Type
Country	Country
CountryId	Id
CountryName	Name
CountryLastLine	Numeric(4.0)
City	City
CityId	Id
CityName	Name

Serial(CityId, CountryLastLine, 1);

Parm(attribute1, &variable1, ….);

Variable: Space in memory that has a name and data type it can save. It is referenced using “&.”

Triggering Moments


Browser
Server
Database
Transaction
http://trialapps3.genexus.com/Id8562acf4/
Attribute-1
Attribute-2
Attribute-n
Level
AttributeL-1
AttributeL-2
AttributeL-m
data1-1
data1-2
data2-1
data2-2
data3-1
data3-2
data4-1
data 4-2
CONFIRM
CANCEL
Commit

Rule triggering moments

In the server, after pressing Confirm

In single-level transactions:

On BeforeValidate
VALIDATION
On AfterValidate
On BeforeInsert/BeforeUpdate/ BeforeDelete
SAVING
On AfterInsert/AfterUpdate/ AfterDelete

On BeforeComplete
COMMIT
On AfterComplete

In two-level transactions:

On BeforeValidate
VALIDATION of the header
On AfterValidate
On BeforeInsert/BeforeUpdate/BeforeDelete
SAVING the header
On AfterInsert/AfterUpdate/AfterDelete

For each line:

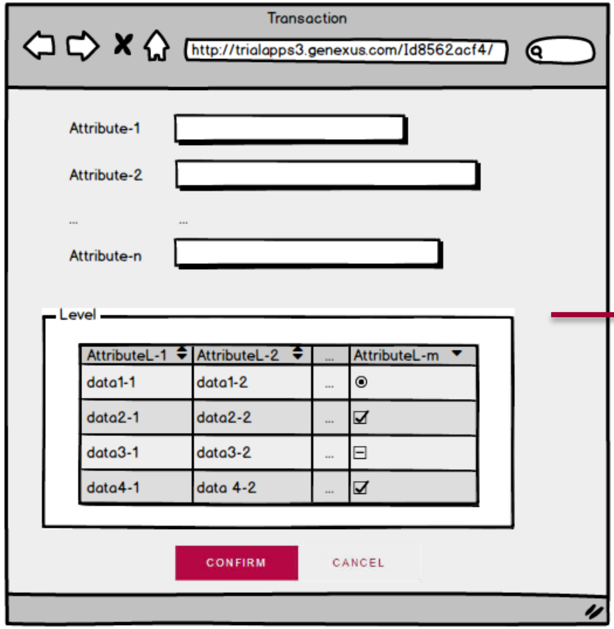
- On BeforeValidate
- VALIDATION of the line
- On AfterValidate
- OnBeforeInsert/BeforeUpdate/BeforeDelete
- SAVING the line
- On AfterInsert/AfterUpdate/AfterDelete

On AferLevel Level Line attribute
On BeforeComplete
COMMIT
On AfterComplete

Rule triggering moments

PrintCustomer(CustomerId) on AfterInsert, AfterUpdate;

Is it correct or not? ✓ It is correct!



AttributeL-1	AttributeL-2	...	AttributeL-m
data1-1	data1-2	...	◉
data2-1	data2-2	...	☑
data3-1	data3-2	...	⊟
data4-1	data 4-2	...	☑

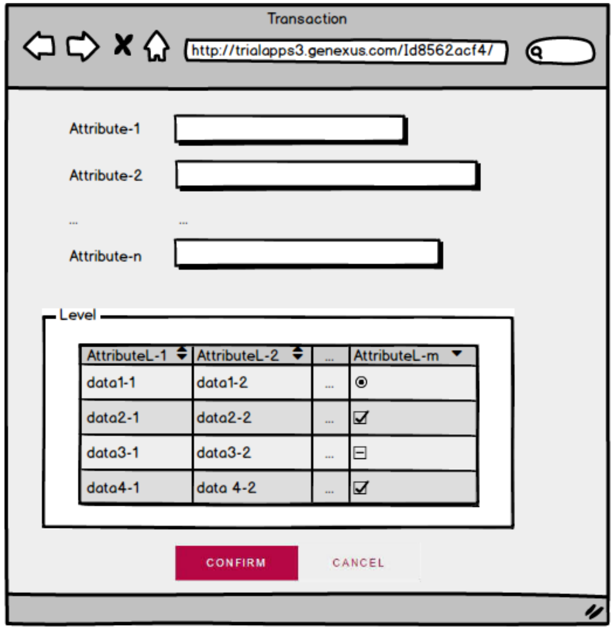
VALIDATION
On Aftervalidate

SAVING
On AfterInsert / On AfterUpdate / On AfterDelete

Rule triggering moments

PrintCustomer(CustomerId) on AfterDelete; Is it correct or not? ✗

It is not correct because it is invoked AFTER the deletion and the customer will not be found with that ID in the table.



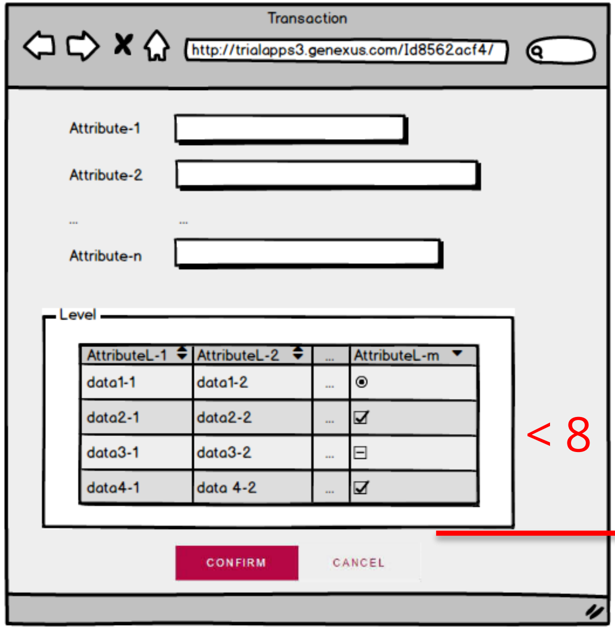
AttributeL-1	AttributeL-2	...	AttributeL-m
data1-1	data1-2	...	●
data2-1	data2-2	...	☑
data3-1	data3-2	...	⊟
data4-1	data 4-2	...	☑

VALIDATION
On Aftervalidate

SAVING
On AfterInsert / On AfterUpdate / On AfterDelete

Rule triggering moments

```
Error('The seat quantity should be equal or greather than 8') if FlightCapacity<8
    on AfterLevel
    Level FlightSeatChar;
```



< 8

In two-level transactions:

On BeforeValidate
VALIDATION of the header
On AfterValidate
On BeforeInsert/BeforeUpdate/BeforeDelete
SAVING the header
On AfterInsert/AfterUpdate/AfterDelete

For each line:
- On BeforeValidate
- VALIDATION of the line
- On AfterValidate
- OnBeforeInsert/BeforeUpdate/BeforeDelete
- SAVING the line
- On AfterInsert/AfterUpdate/AfterDelete

On AferLevel Level Line attribute
On BeforeComplete
COMMIT
On AfterComplete

Rule triggering moments

```
PrintFlight(FlightId) on AfterComplete;
```

✓on AfterComplete: Right after **Commit** is performed in the database.

In two-level transactions:

On BeforeValidate
VALIDATION of the header
On AfterValidate
On BeforeInsert/BeforeUpdate/BeforeDelete
SAVING the header
On AfterInsert/AfterUpdate/AfterDelete

For each lin e
- On BeforeValidate
- **VALIDATION of the line**
- On AfterValidate
- OnBeforeInsert/BeforeUpdate/BeforeDelete
- **SAVING the line**
- On AfterInsert/AfterUpdate/AfterDelete

On AfterLevel Level Line attribute
On BeforeComplete
COMMIT
On AfterComplete

Examples

```
Invoice
{
   InvoiceId*
   InvoiceDate
   -------
   Product
   {
      ProductId*
      ProductName
      ProductPrice
      InvoiceProductQuantity
      --------
   }
}
```

Determine if is it correct or not:

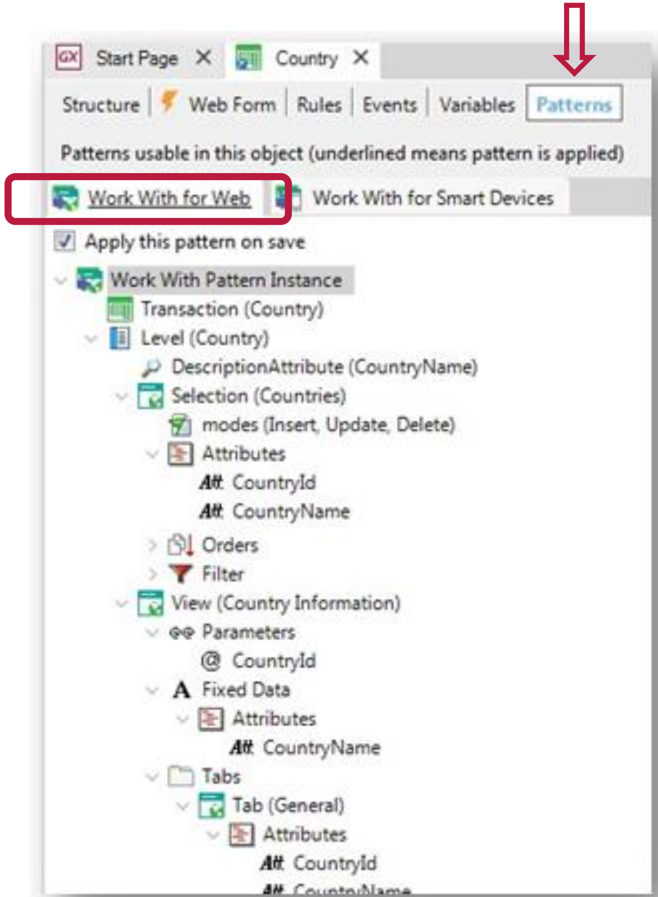
PrintInvoiceDetail(InvoiceId) on **AfterComplete;** ✓

ProductControl(ProductId) **on BeforeInsert;** ✗

ProductControl(ProductId) **on AfterComplete;** ✗

Can I assign a value to an attribute on AfterInsert? ⇨ NO

Patterns



Start Page | Country

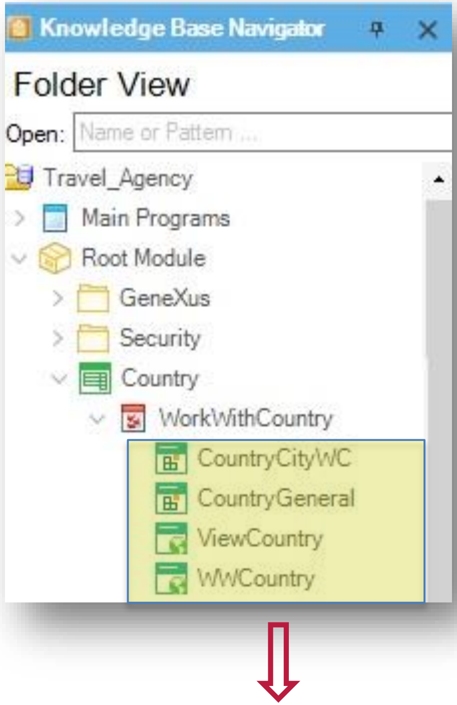
Structure | Web Form | Rules | Events | Variables | Patterns

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

Work With for Web | Work With for Smart Devices

☑ Apply this pattern on save

```
Work With Pattern Instance
    Transaction (Country)
    Level (Country)
        DescriptionAttribute (CountryName)
        Selection (Countries)
            modes (Insert, Update, Delete)
            Attributes
                CountryId
                CountryName
            Orders
            Filter
        View (Country Information)
            Parameters
                CountryId
            Fixed Data
                Attributes
                    CountryName
            Tabs
                Tab (General)
                    Attributes
                        CountryId
```



Knowledge Base Navigator

Folder View

Open: Name or Pattern ...

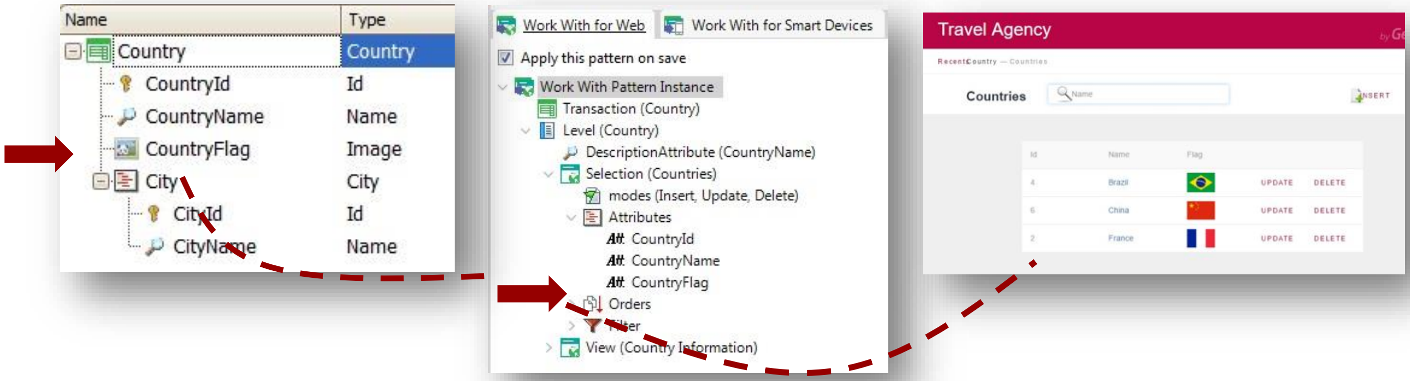
```
Travel_Agency
    Main Programs
    Root Module
        GeneXus
        Security
        Country
            WorkWithCountry
                CountryCityWC
                CountryGeneral
                ViewCountry
                WWCountry
```

Automatically generated by GeneXus

Dynamics

$$\begin{tikzcd}\boxed{\text{Transaction structure}} \arrow[r] & \boxed{\text{Pattern instance}} \arrow[r] & \boxed{\text{Generated objects}}\end{tikzcd}$$

<u>Example</u>: New attribute CountryFlag



Name	Type
Country	Country
CountryId	Id
CountryName	Name
CountryFlag	Image
City	City
CityId	Id
CityName	Name

```
Work With for Web    Work With for Smart Devices
[✓] Apply this pattern on save
Work With Pattern Instance
  Transaction (Country)
  Level (Country)
    DescriptionAttribute (CountryName)
    Selection (Countries)
      modes (Insert, Update, Delete)
      Attributes
        Att CountryId
        Att CountryName
        Att CountryFlag
      Orders
      Filter
    View (Country Information)
```

Travel Agency

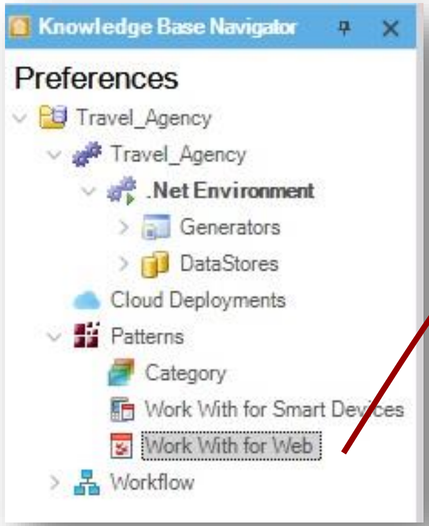
RecentCountry — Countries

Countries [Name] INSERT

Id	Name	Flag		
4	Brazil	🇧🇷	UPDATE	DELETE
6	China	🇨🇳	UPDATE	DELETE
2	France	🇫🇷	UPDATE	DELETE

General Settings

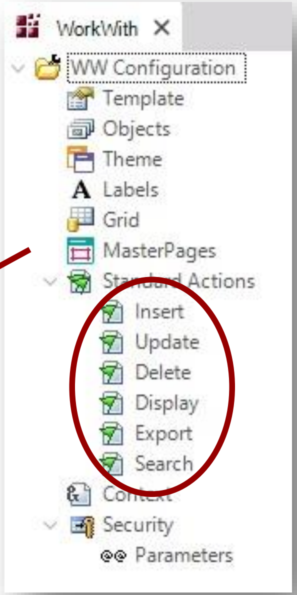
How are all instances initialized?



Knowledge Base Navigator

Preferences

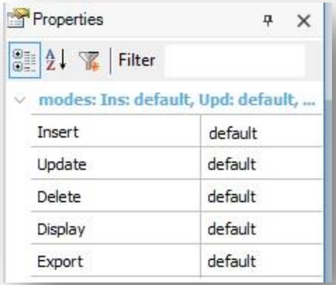
- Travel_Agency
  - Travel_Agency
    - .Net Environment
      - Generators
      - DataStores
    - Cloud Deployments
    - Patterns
      - Category
      - Work With for Smart Devices
      - Work With for Web
    - Workflow



WorkWith

- WW Configuration
  - Template
  - Objects
  - Theme
  - Labels
  - Grid
  - MasterPages
  - Standard Actions
    - Insert
    - Update
    - Delete
    - Display
    - Export
    - Search
  - Context
  - Security
    - Parameters

In Country...



Properties

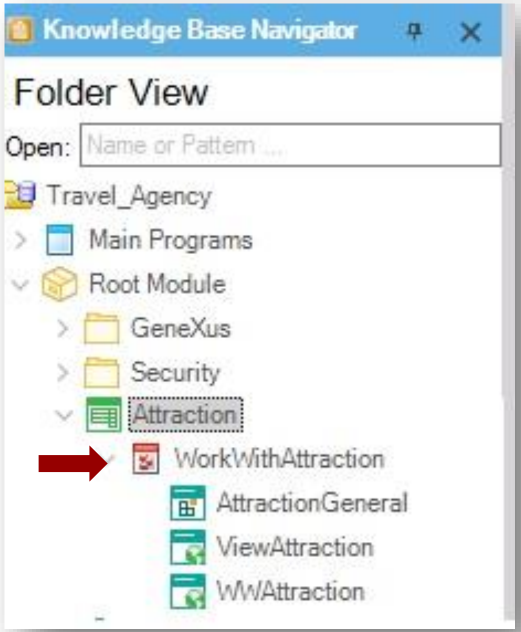
Filter

modes: Ins: default, Upd: default, ...

Insert	default
Update	default
Delete	default
Display	default
Export	default

Deleting the pattern

Delete



Knowledge Base Navigator

Folder View

Open: Name or Pattern ...

- Travel_Agency
  - Main Programs
  - Root Module
    - GeneXus
    - Security
    - Attraction
      - WorkWithAttraction
        - AttractionGeneral
        - ViewAttraction
        - WWAttraction

Formulas

Global Formulas

⇩

- It’s a calculation associated with an attribute in a transaction
- They are known throughout the KB

```
Product
{
    ProductId*
    ProductName
    ProductPrice
}
```

```
Invoice
{
    InvoiceId*
    InvoiceDate
    InvoiceAmount
    Product
    {
        ProductId*
        ProductName
        ProductPrice
        InvoiceProductQuantity
        InvoiceLineAmount
    }
}
```

InvoiceAmount → Sum(InvoiceProductAmount)

“Virtual” attributes (not saved in the DB)

InvoiceLineAmount:

```
ProductPrice*InvoiceProductQuantity*0.9 if ProductId = 1;
ProductPrice*InvoiceProductQuantity*0.8 if ProductId = 3;
ProductPrice*InvoiceProductQuantity otherwise;
```

```
Country
{
   CountryId*
   CountryName
   CountryCustomersQuantity
}
```

```
Customer
{
   CustomerId*
   CustomerName
   CountryId
   CountryName
}
```

↓

```
Count(CustomerName)
```

Will this formula count the customers by country or the total number of customers?

It will count the customers by country because GeneXus applies an <u>automatic filter</u> by the common attribute (*CountryId*).

```
Customer
{
   CustomerId*
   CustomerName
   CustomerTotal
}
```

```
Invoice
{
   InvoiceId*
   InvoiceDate
   InvoiceType
   CustomerId
   CustomerName
   InvoiceAmount
}
```

Domain that provides two Enum Values

credit

cash

Calculation condition

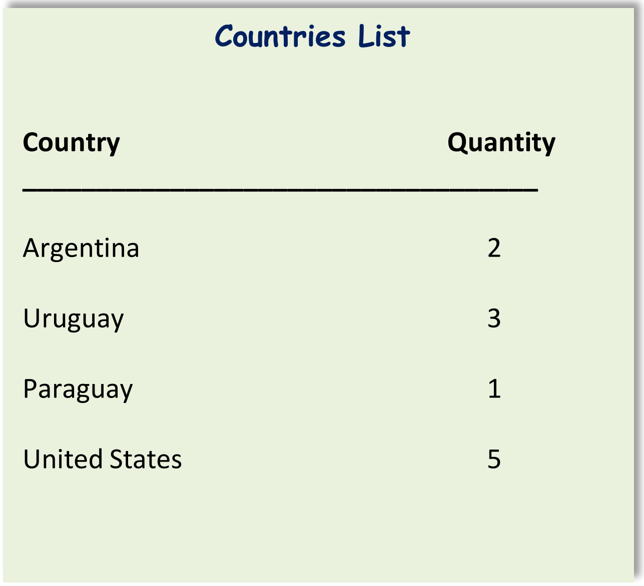
Sum(InvoiceAmount, InvoiceType=InvoiceType.Credit)

If CustomerId = 3 → Triggering condition

Inline Formulas

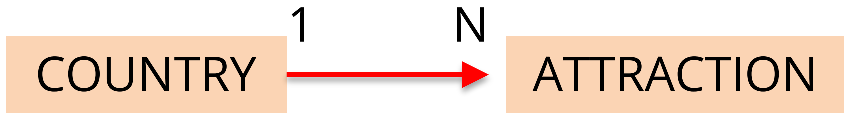
- They are formulas defined in the code section of an object
- They are only known in the object in which they have been defined

Requirement: A list of countries with the number of attractions in each one of them



Countries List

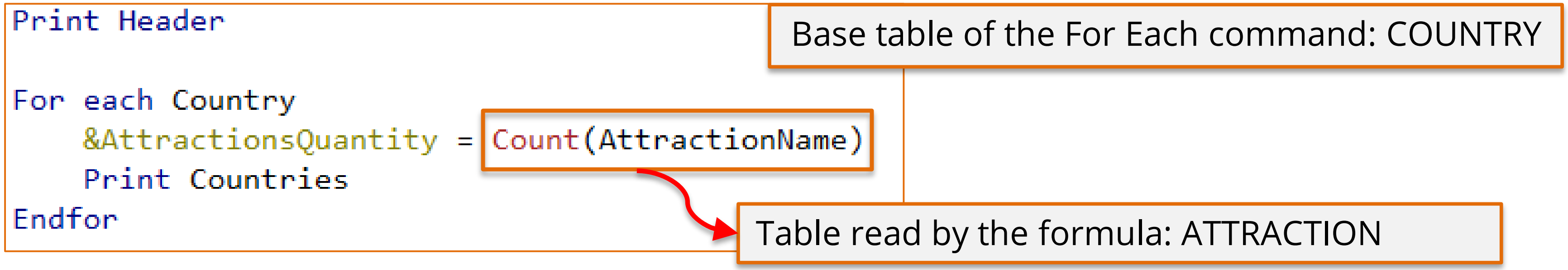
Country	Quantity
Argentina	2
Uruguay	3
Paraguay	1
United States	5



```
Country
{
   CountryId*
   CountryName
}
```

```
Attraction
{
   AttractionId*
   AttractionName
   CountryId
   CountryName
}
```

Inline Formula in the code of a Procedure object



```
Print Header

For each Country
    &AttractionsQuantity = Count(AttractionName)
    Print Countries
Endfor
```

Base table of the For Each command: COUNTRY
Table read by the formula: ATTRACTION

Will this formula count the attractions by country or the total number of attractions?

It will count the attractions by country because it is applied an automatic filter by the common attribute *CountryId* (both tables are related).

For Each command

Base Transaction

```
Flight
{
   FlightId*
   FlightDate
   -----
   Seat
   {
     FlightSeatId*
     FlightSeatChar
   }
}
```

```
For each Flight
     ---------
Endfor
```

```
For each Flight.Seat
     ---------
Endfor
```

Base Transaction

Name of the transaction whose associated physical table is to be run through

Order

```
Customer
{
   CustomerId*
   CustomerName
   ------
}
```

Requirement: A list of all customers in alphabetical order by name.

```
For each Customer order CustomerName
   -------
Endfor
```

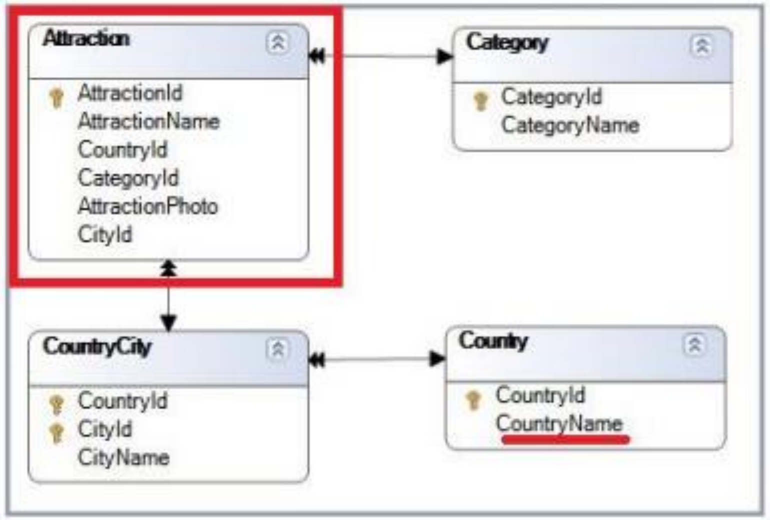
Requirement: A list of all customers in descending order by name.

```
For each Customer  order (CustomerName)
   -------
Endfor
```

Order

GeneXus allows ordering by the value of an attribute not included in the table being run through, but in its extended table.

```
Print Header
For each Attraction order CountryName
    Print Attractions
Endfor
```



Filters

```
Flight
{
   FlightId*
   FlightDate
   -----
   Seat
   {
     FlightSeatId*
     FlightSeatChar
   }
}
```

```
For each Flight
     Where FlightDate = Today()
          ---------
Endfor
```

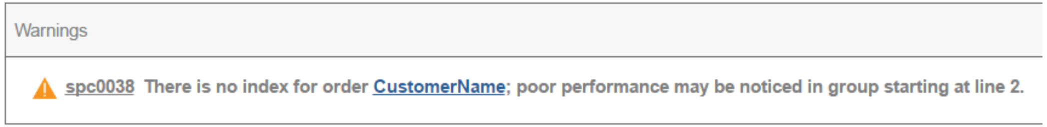
```
For each Flight.Seat
     Where FlightId = 1
          --------
Endfor
```

Filters

```
Customer
{
   CustomerId*
   CustomerName
   CustomerAddress
}
```

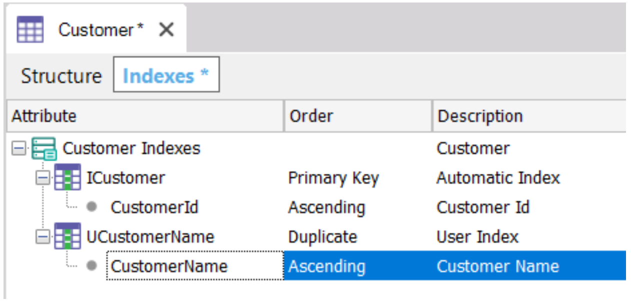
Index

```
For each Customer order CustomerName
    Where CustomerName >= &NameFrom
          ---------
Endfor
```



Warnings

spc0038 There is no index for order CustomerName; poor performance may be noticed in group starting at line 2.



Customer *

Structure | Indexes *

Attribute	Order	Description
Customer Indexes		Customer
ICustomer	Primary Key	Automatic Index
CustomerId	Ascending	Customer Id
UCustomerName	Duplicate	User Index
CustomerName	Ascending	Customer Name

The query has been optimized! ✓

Nested For Each commands + Different base table + Tables NOT related = CARTESIAN PRODUCT

```
Country
{
   CountryId*
   CountryName
}


Room
{
   RoomId*
   RoomName
}
```

Cartesian Product

```
For each Country
      Print Country

    For each Room
        Print Room
    Endfor

Endfor
```

```
1 - Brazil
            RoomA
            RoomB
            RoomC
2 -Uruguay
            RoomA
            RoomB
            RoomC
3 - Argentina
            RoomA
            RoomB
            RoomC
4 - United States
            RoomA
            RoomB
            RoomC
```

Nested For Each commands + Different base table + Related tables = JOIN

```
Country
{
   CountryId*
   CountryName
}
```

$$\begin{tikzcd} \arrow[d, "1", "N"'] \\ \end{tikzcd}$$

```
Customer
{
   CustomerId*
   CustomerName
   CountryId
   CountryName
}
```

Join

```
For each Country
      Print Country

   For each Customer
         Print Customer
   Endfor

Endfor
```

```
1 - Brazil
                LUIS
                JORGE

2 - Uruguay


3 - Argentina


4 - United States
                ANA
```

Nested For each commands + Same base table + Related tables = CONTROL BREAK

```
Country
{
   CountryId*
   CountryName
}


Customer
{
   CustomerId*
   CustomerName
   CountryId
   CountryName
}
```

Control Break

```
For each Customer order CountryId
      Print Country

    For each Customer
        Print Customer
    Endfor

Endfor
```

```
1 - Brazil
              LUIS
              JORGE

4 - United States
              ANA
```

Summary

Cartesian Product

```
For each Country
    Print Country

    For each Room
        Print Room
    Endfor

Endfor
```

Different tables, with no relation between them

Join

```
For each Country
    Print Country

    For each Customer
        Print Customer
    Endfor

Endfor
```

Different tables which are related

Control Break

```
For each Customer order CountryId
    Print Country

    For each Customer
        Print Customer
    Endfor

Endfor
```

Same table, grouped with order

Summary

Cartesian Product	Join	Control Break

Cartesian Product

```
1 - Brazil
              RoomA
              RoomB
              RoomC
2 -Uruguay
              RoomA
              RoomB
              RoomC
3 - Argentina
              RoomA
              RoomB
              RoomC
```

"Both entities are not related; show all possibilities for each country"

Join

```
1 - Brazil
              LUIS
              JORGE

2 - Uruguay


3 - Argentina


4 - United States
              ANA
```

"All countries and their customers, regardless if they have customers or not"

Control Break

```
1 - Brazil
              LUIS
              JORGE

4 - United States
              ANA
```

"Only those countries that have customers"

Communication between objects

Example: sending parameters

```
Country
{
   CountryId*
   CountryName
}

Customer
{
   CustomerId*
   CustomerName
   CountryId
   CountryName
}
```

For example, in the Rules of the Country trn:

```
CustomerList(CountryId) on AfterComplete;
```

```
CustomerList

Parm(in: &CountryId);

For each Customer
   Where CountryId = &CountryId
      ---------
Endfor
```

Variable

Explicit filter

Example: sending parameters

```
Country
{
    CountryId*
    CountryName
}

Customer
{
    CustomerId*
    CustomerName
    CountryId
    CountryName
}
```

For example, in the Rules of the Country trn :

```
CustomerList(CountryId) on AfterComplete;
```

```
CustomerList
Parm(in: CountryId);

For each Customer
   ~~Where CountryId = &CountryId~~
      ---------
Endfor
```

Attribute
Implicit filter

Example: returning a value

```
Country
(
   CountryId*
   CountryName
)
```

```
Customer
(
   CustomerId*
   CustomerName
   CountryId
   CountryName
)
```

For example, in the Rules of the Customer trn:

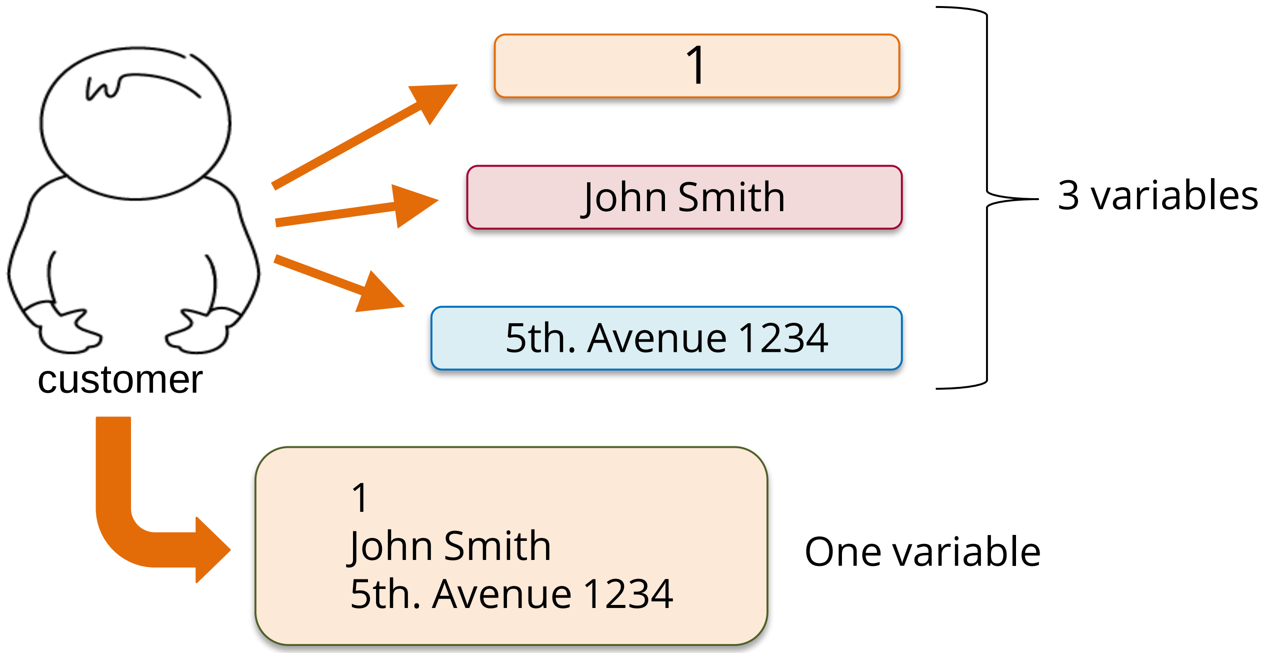
```
&Control = CustomerControl(CustomerId);
```

CustomerControl

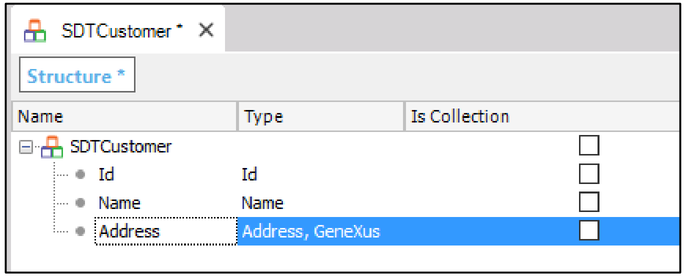
```
Parm(in: &CustomerId, out: &Control);

For each Customer
   Where CustomerId = &CustomerId
      ---------
      &Control = True
Endfor
```

Structured Data Types

Concept


customer
1
John Smith
5th. Avenue 1234
3 variables
1
John Smith
5th. Avenue 1234
One variable

Definition


SDTCustomer *

Structure *

Name	Type	Is Collection
SDTCustomer		☐
Id	Id	☐
Name	Name	☐
Address	Address, GeneXus	☐

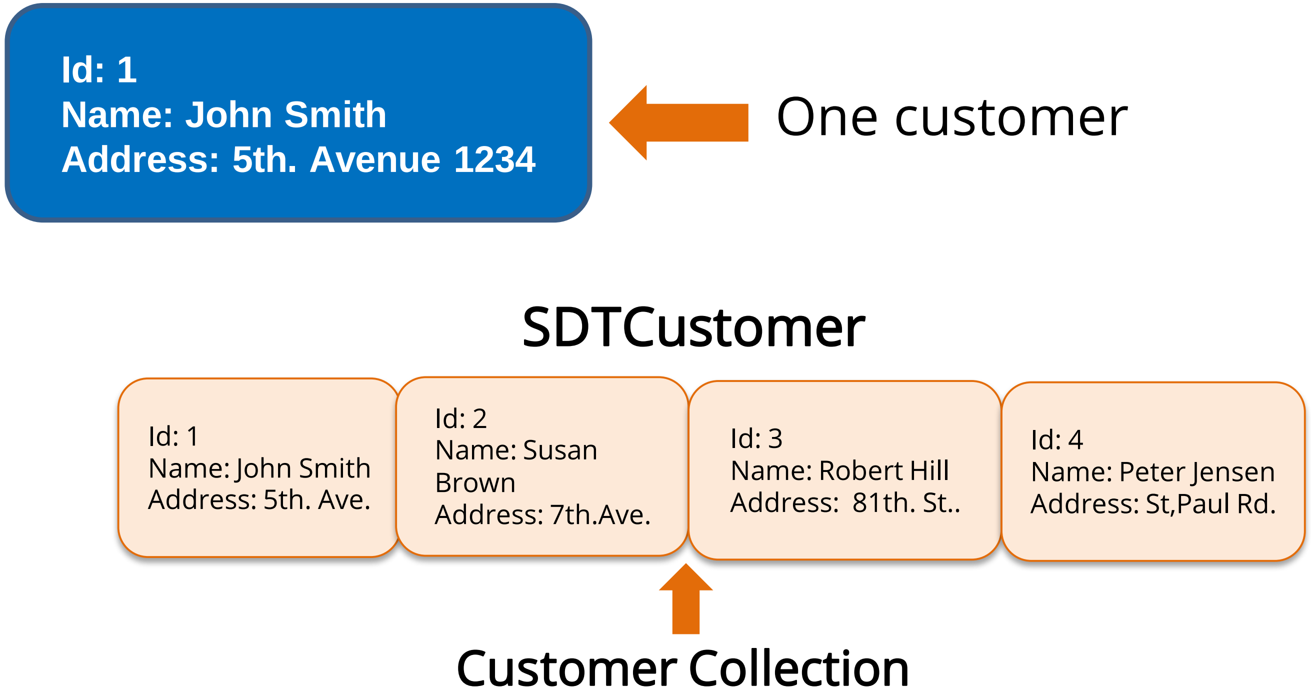
Structured Data Type object

customer

&OneCustomer: SDTCustomer

```
&OneCustomer.Id = 1
&OneCustomer.Name = 'John Smith'
&OneCustomer.Address = '5th. Avenue 1234'
```

Data Providers



Id: 1
Name: John Smith
Address: 5th. Avenue 1234

One customer

SDTCustomer

Id: 1
Name: John Smith
Address: 5th. Ave.

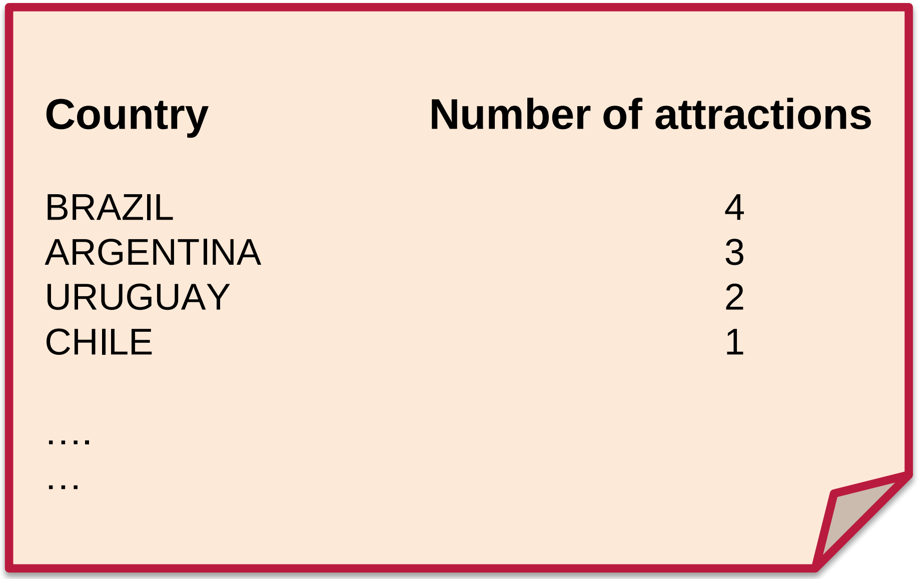
Id: 2
Name: Susan Brown
Address: 7th.Ave.

Id: 3
Name: Robert Hill
Address: 81th. St..

Id: 4
Name: Peter Jensen
Address: St,Paul Rd.

Customer Collection

Example: Ranking of attractions per country

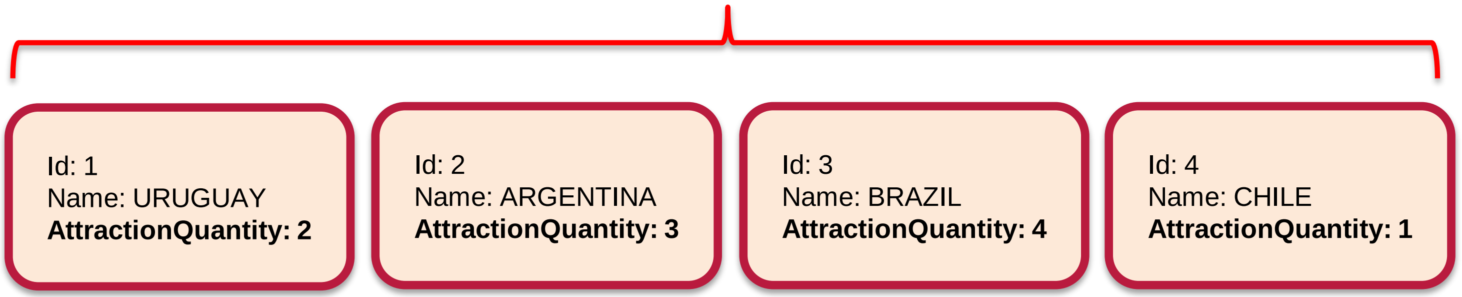


Country	Number of attractions
BRAZIL	4
ARGENTINA	3
URUGUAY	2
CHILE	1
….	
…	

Example: Ranking of attractions per country

SDTCountries

A collection of countries



Id: 1
Name: URUGUAY
AttractionQuantity: 2

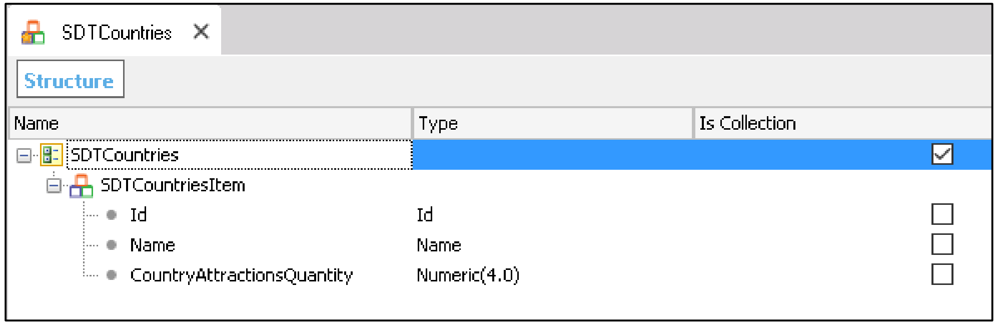
Id: 2
Name: ARGENTINA
AttractionQuantity: 3

Id: 3
Name: BRAZIL
AttractionQuantity: 4

Id: 4
Name: CHILE
AttractionQuantity: 1

Example: Ranking of attractions per country

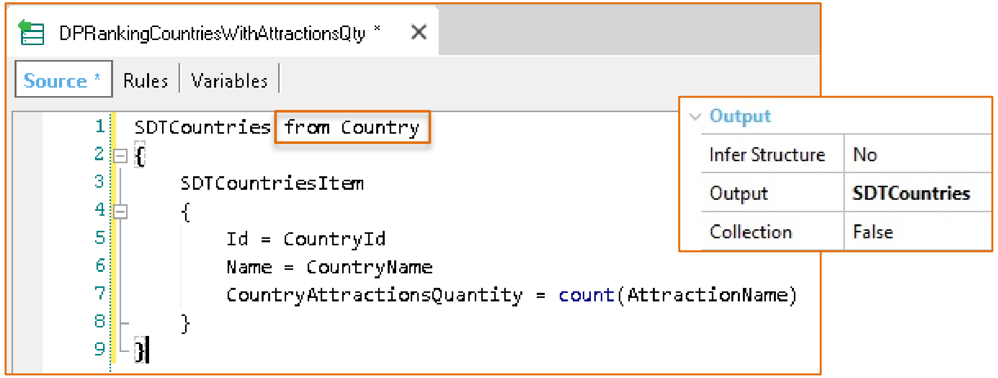
```
Country
{
   CountryId*
   CountryName
}

Attraction
{
   AttractionId*
   AttractionName
   CountryId
   CountryName
}
```



SDTCountries

Structure

Name	Type	Is Collection
SDTCountries		☑
SDTCountriesItem		
Id	Id	☐
Name	Name	☐
CountryAttractionsQuantity	Numeric(4.0)	☐



DPRankingCountriesWithAttractionsQty *

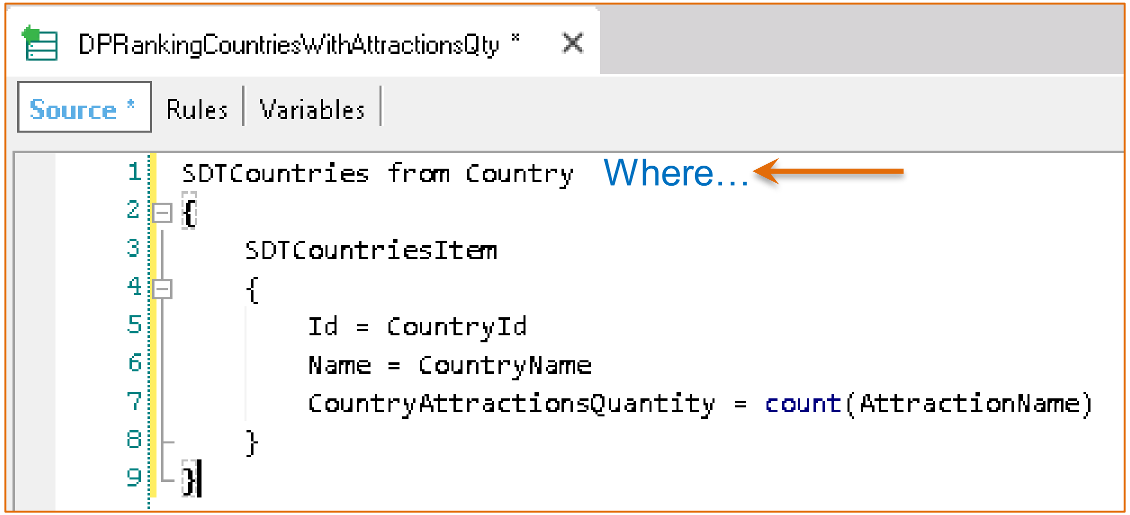
Source * | Rules | Variables

```
SDTCountries from Country
{
    SDTCountriesItem
    {
        Id = CountryId
        Name = CountryName
        CountryAttractionsQuantity = count(AttractionName)
    }
}
```

Output

Infer Structure	No
Output	SDTCountries
Collection	False

Example: Ranking of attractions per country

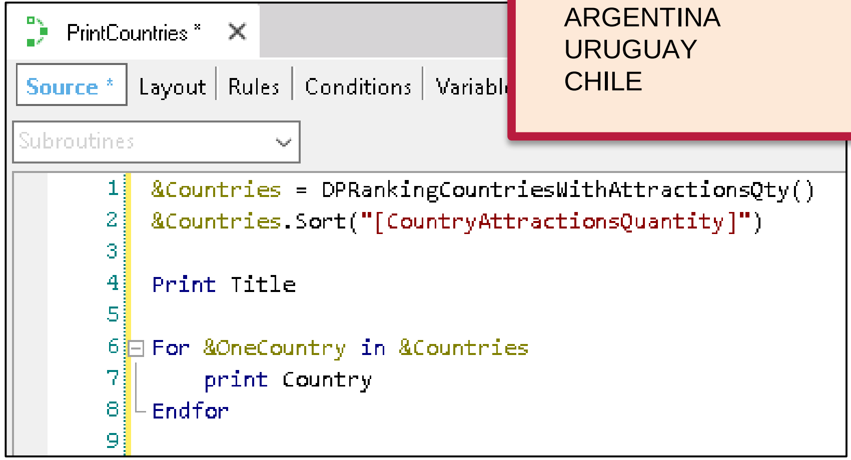


```
SDTCountries from Country
{
	SDTCountriesItem
	{
		Id = CountryId
		Name = CountryName
		CountryAttractionsQuantity = count(AttractionName)
	}
}
```

GeneXus

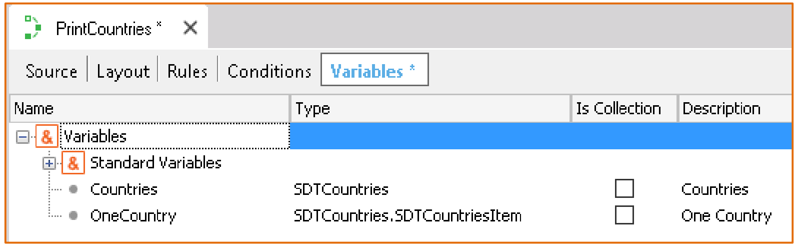
Example: Ranking of attractions per country

```
Country
{
   CountryId*
   CountryName
}

Attraction
{
   AttractionId*
   AttractionName
   CountryId
   CountryName
}
```



```
&Countries = DPRankingCountriesWithAttractionsQty()
&Countries.Sort("[CountryAttractionsQuantity]")

Print Title

For &OneCountry in &Countries
    print Country
Endfor
```

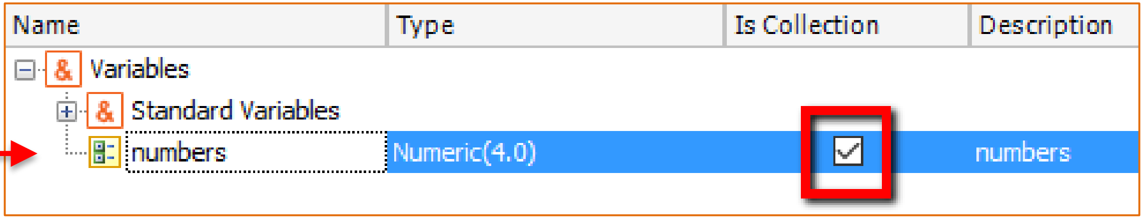
Country	Number of attractions
BRAZIL	4
ARGENTINA	3
URUGUAY	2
CHILE	1



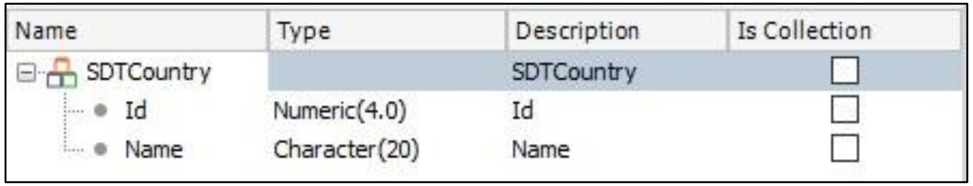
Name	Type	Is Collection	Description
Variables			
Standard Variables			
Countries	SDTCountries	☐	Countries
OneCountry	SDTCountries.SDTCountriesItem	☐	One Country

Collection Variables

&numbers

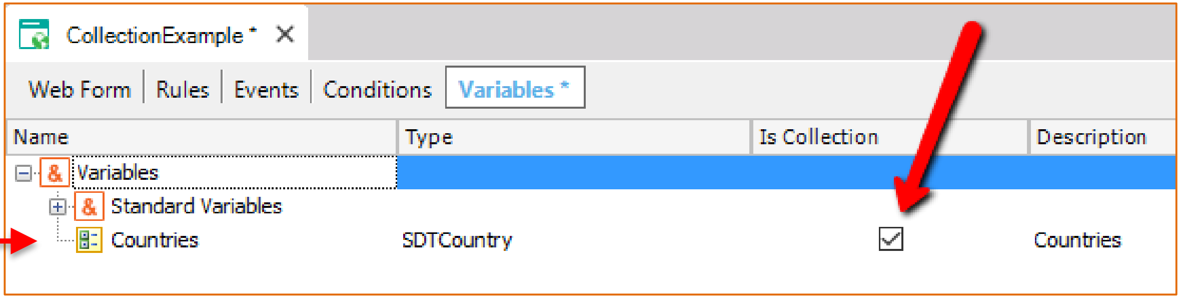


Name	Type	Is Collection	Description
Variables			
Standard Variables			
numbers	Numeric(4.0)	✓	numbers



Name	Type	Description	Is Collection
SDTCountry		SDTCountry	☐
Id	Numeric(4.0)	Id	☐
Name	Character(20)	Name	☐

&Countries



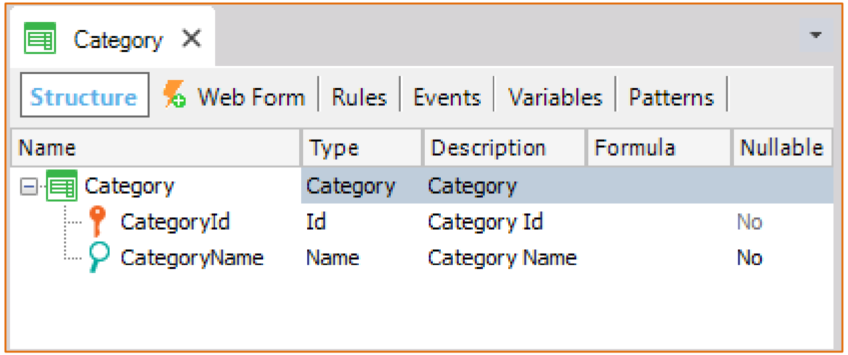
CollectionExample *

Web Form | Rules | Events | Conditions | Variables *

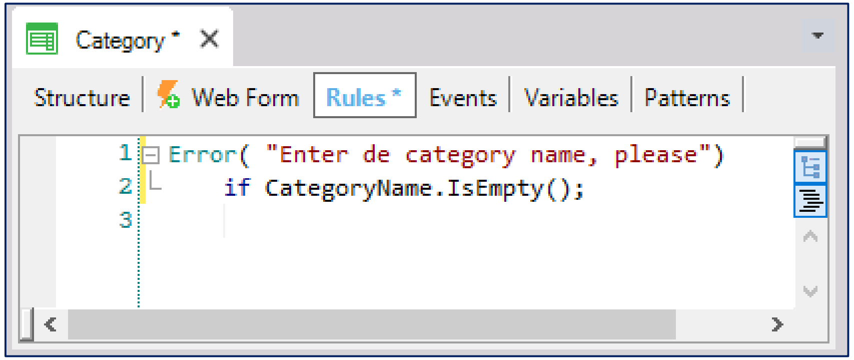
Name	Type	Is Collection	Description
Variables			
Standard Variables			
Countries	SDTCountry	✓	Countries

Business Components

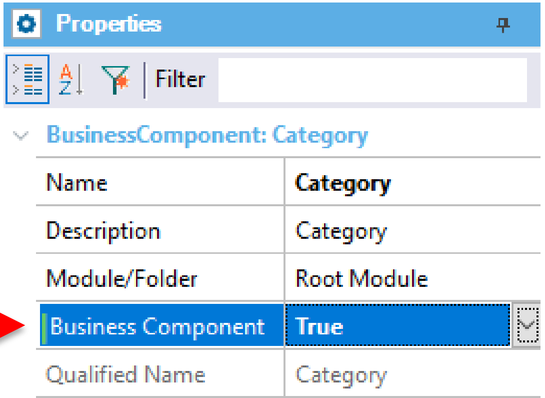
Concept: special data type based on a transaction



Name	Type	Description	Formula	Nullable
Category	Category	Category		
CategoryId	Id	Category Id		No
CategoryName	Name	Category Name		No



```
Error( "Enter de category name, please")
    if CategoryName.IsEmpty();
```

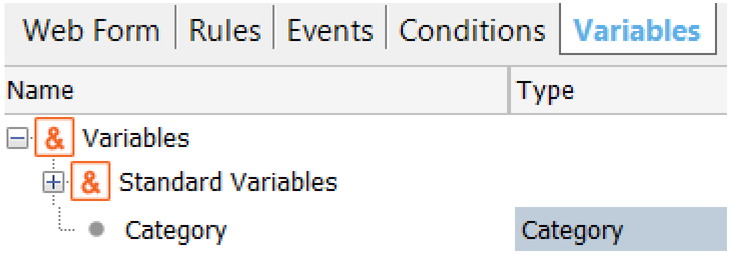


BusinessComponent: Category

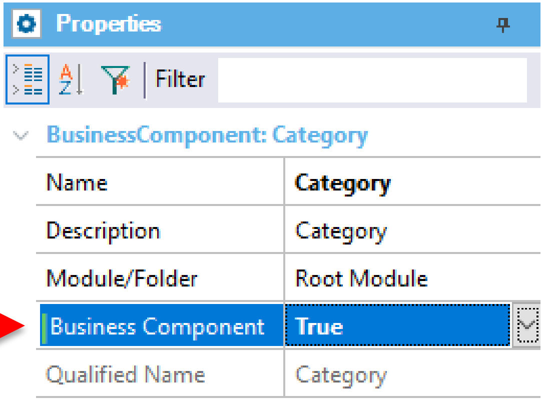
Name	Category
Description	Category
Module/Folder	Root Module
Business Component	True
Qualified Name	Category

GeneXus™

Concept: special data type based on a transaction

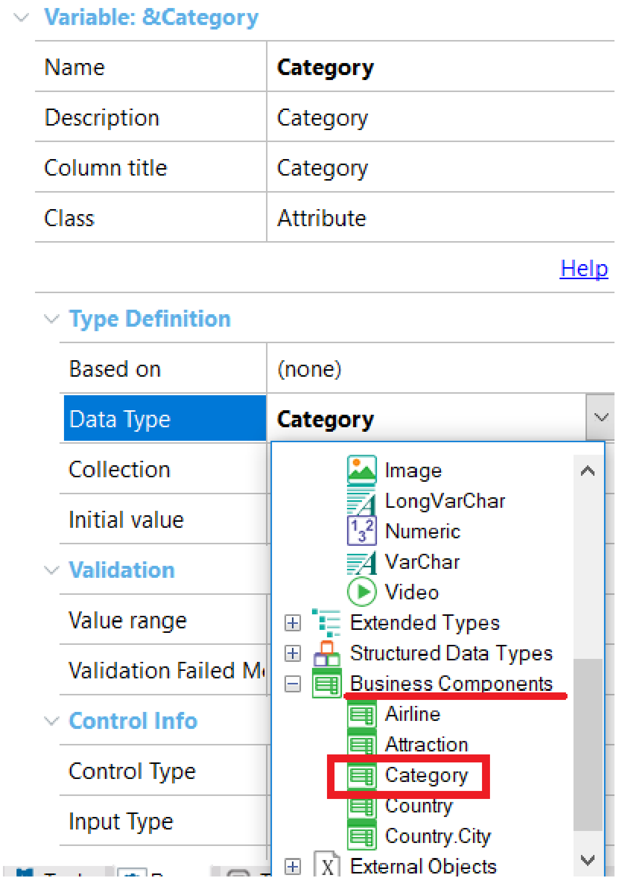


Name	Type
Variables	
Standard Variables	
Category	Category



BusinessComponent: Category

Name	**Category**
Description	Category
Module/Folder	Root Module
Business Component	**True**
Qualified Name	Category



Variable: &Category

Name	**Category**
Description	Category
Column title	Category
Class	Attribute

Help

Type Definition

Based on	(none)
Data Type	**Category**
Collection	
Initial value	

Validation

Value range	
Validation Failed M	

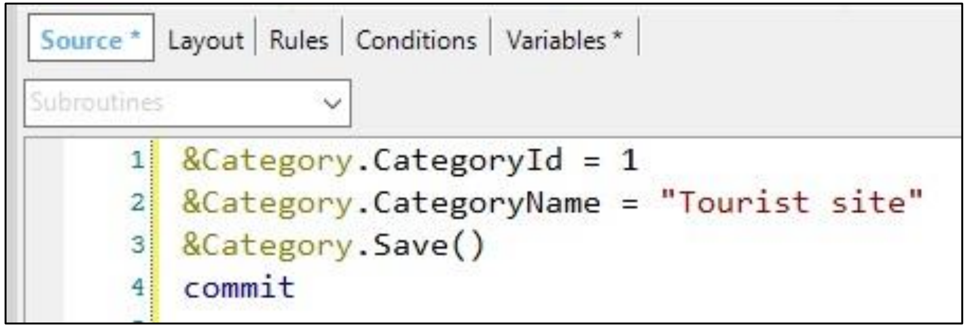
Control Info

Control Type	
Input Type	

Examples: insertion and modification

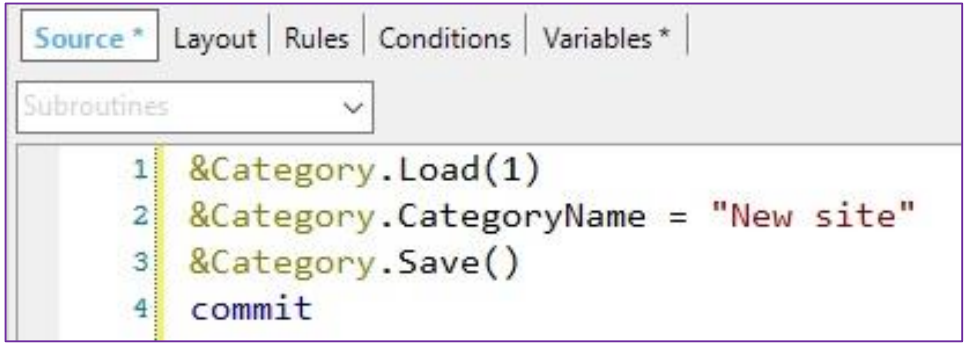
Category
{
  CategoryId*
  CategoryName
}

Insert



```
&Category.CategoryId = 1
&Category.CategoryName = "Tourist site"
&Category.Save()
commit
```

Update

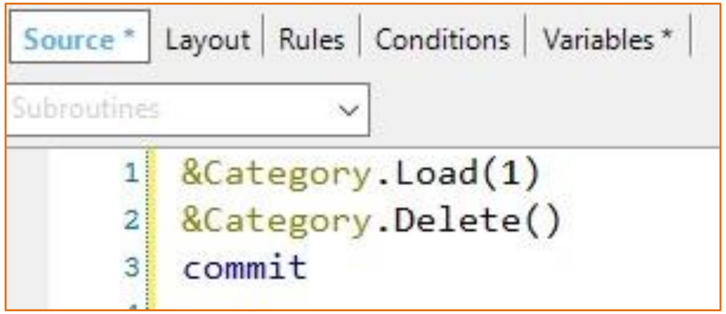


```
&Category.Load(1)
&Category.CategoryName = "New site"
&Category.Save()
commit
```

Example: deletion

Category
{
  CategoryId*
  CategoryName
}

Delete

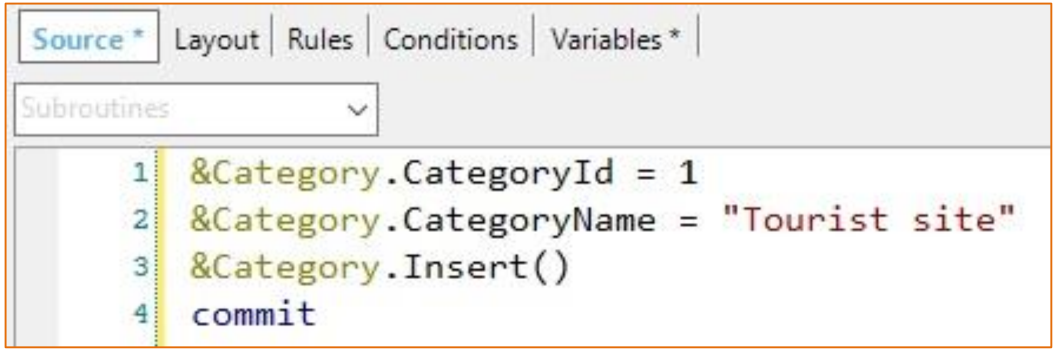


```
&Category.Load(1)
&Category.Delete()
commit
```

Insert and Update Methods

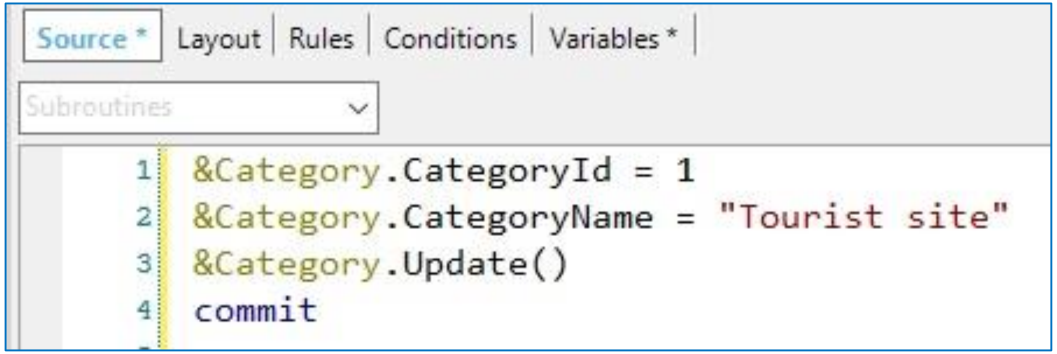
```
Category
{
  CategoryId*
  CategoryName
}
```

Insert



```
&Category.CategoryId = 1
&Category.CategoryName = "Tourist site"
&Category.Insert()
commit
```

Update

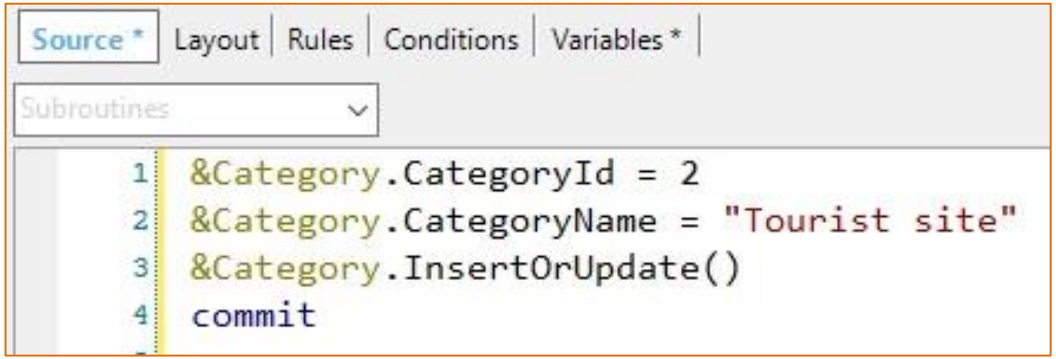


```
&Category.CategoryId = 1
&Category.CategoryName = "Tourist site"
&Category.Update()
commit
```

InsertOrUpdate Method

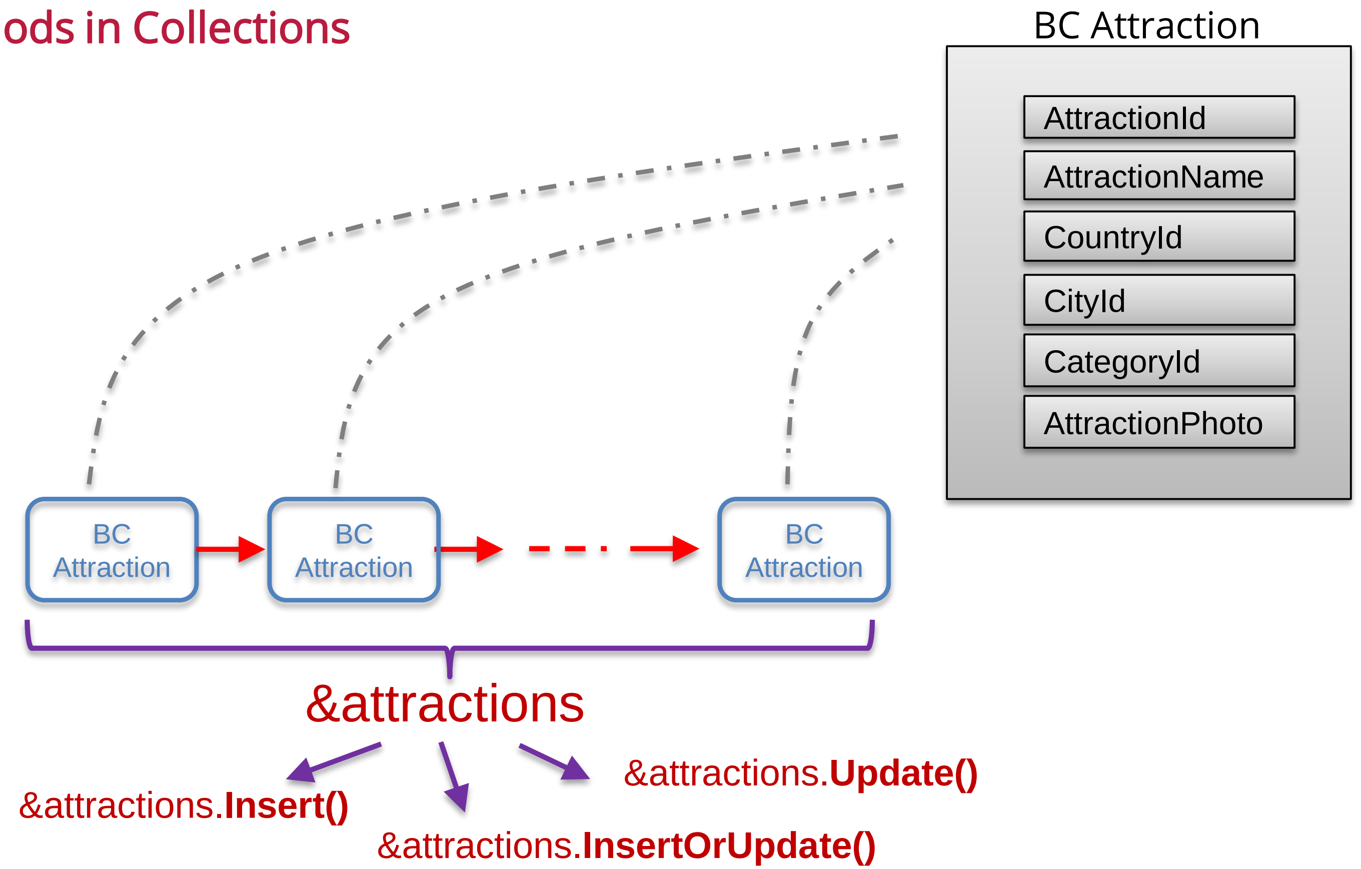
Category
{
  CategoryId*
  CategoryName
}

InsertOrUpdate



```
&Category.CategoryId = 2
&Category.CategoryName = "Tourist site"
&Category.InsertOrUpdate()
commit
```

Methods in Collections



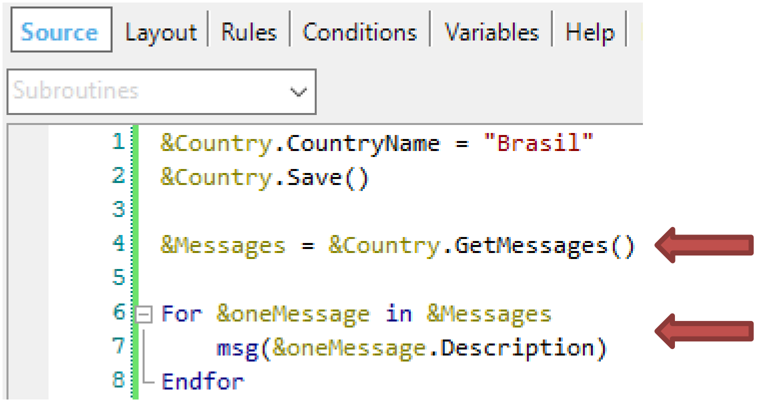
Insert / Update / InsertOrUpdate

Using the methods *Insert*, *Update* and *InsertOrUpdate* is recommended because:

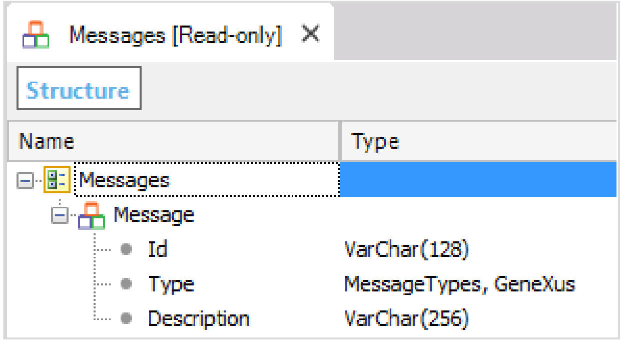
- When the *Load* and *Save* methods are used to make changes, the database is accessed twice, which reduces performance. With the *Update* or *InsertOrUpdate* methods, the database is accessed only once.
- The names of these new methods are self-explanatory about their purpose.

Error handling working with BC

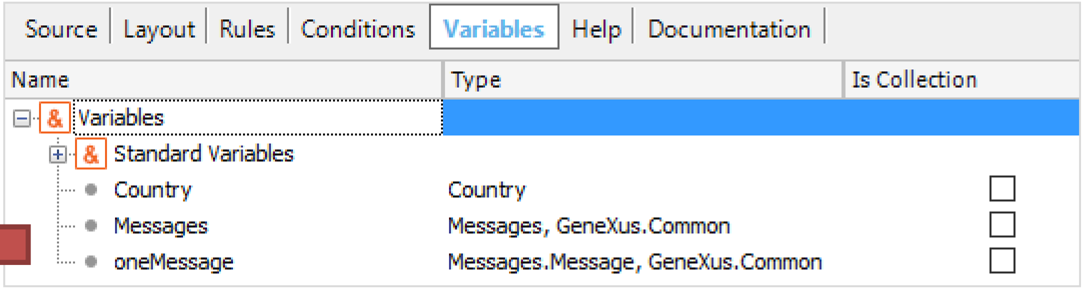
For each Business Component variable, a collection is loaded in memory with all the warning or error messages resulting from operations.



```
&Country.CountryName = "Brasil"
&Country.Save()

&Messages = &Country.GetMessages()

For &oneMessage in &Messages
    msg(&oneMessage.Description)
Endfor
```



Name	Type
Messages	
Message	
Id	VarChar(128)
Type	MessageTypes, GeneXus
Description	VarChar(256)



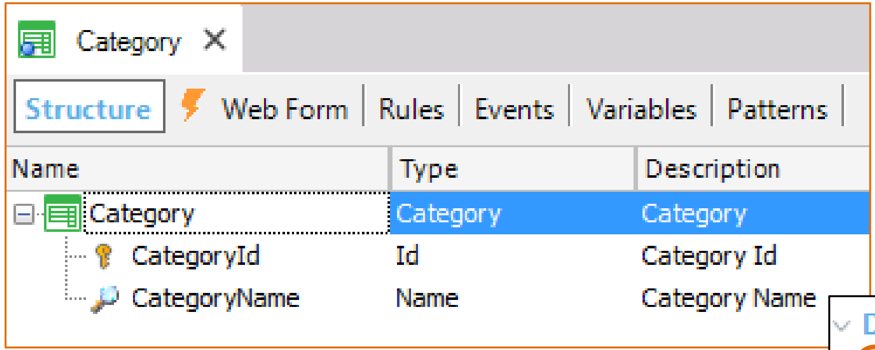
Name	Type	Is Collection
Variables		
Standard Variables		
Country	Country	☐
Messages	Messages, GeneXus.Common	☐
oneMessage	Messages.Message, GeneXus.Common	☐

Data Population

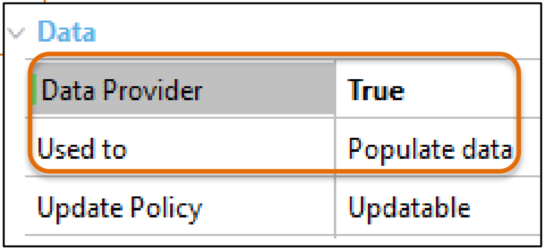
Transaction

Initializing data automatically

GeneXus makes it easy to define the data used to populate the physical tables that are created associated with transactions, so as to avoid resorting to other means to load data.



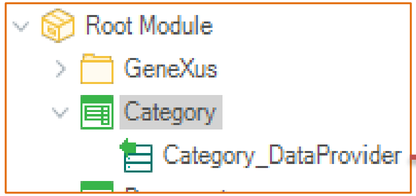
Name	Type	Description
Category	Category	Category
CategoryId	Id	Category Id
CategoryName	Name	Category Name

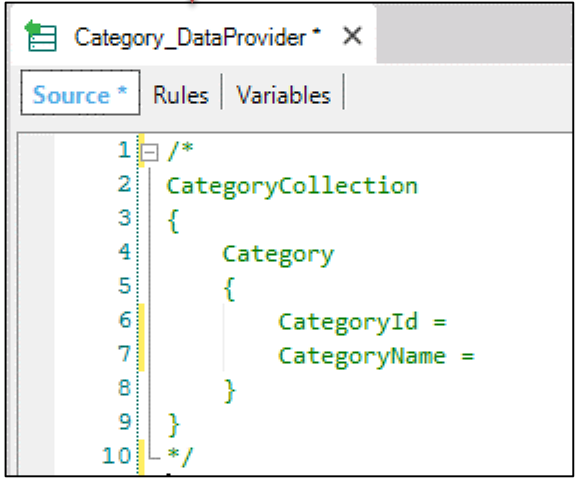


Data

Data Provider	True
Used to	Populate data
Update Policy	Updatable

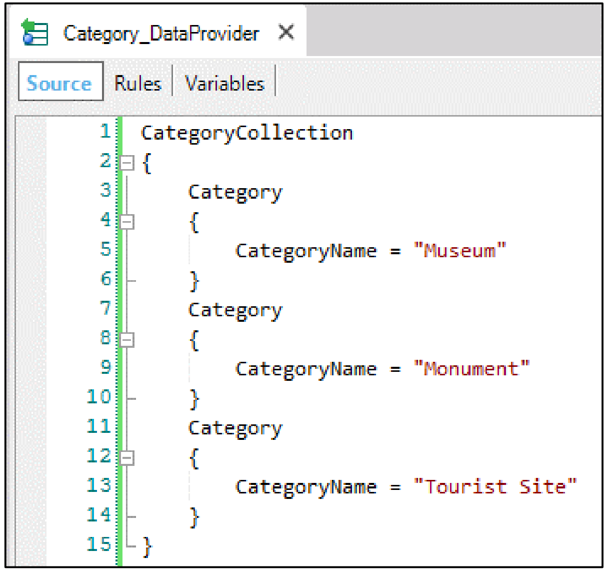
Initializing data





```
/*
CategoryCollection
{
    Category
    {
        CategoryId =
        CategoryName =
    }
}
*/
```

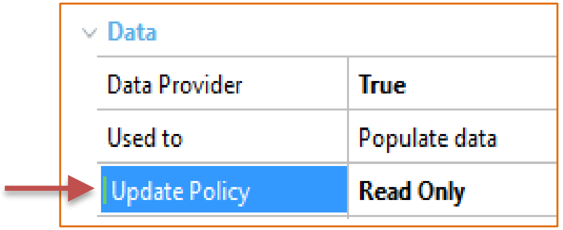
The CategoryId is not loaded
because it has been set as autonumbered



```
CategoryCollection
{
    Category
    {
        CategoryName = "Museum"
    }
    Category
    {
        CategoryName = "Monument"
    }
    Category
    {
        CategoryName = "Tourist Site"
    }
}
```

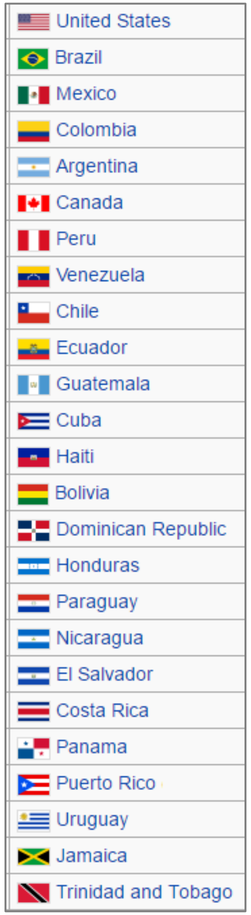
Initializing data: Read-only

Country
{
  CountryId*
  CountryName
}



Data

Data Provider	True
Used to	Populate data
Update Policy	Read Only



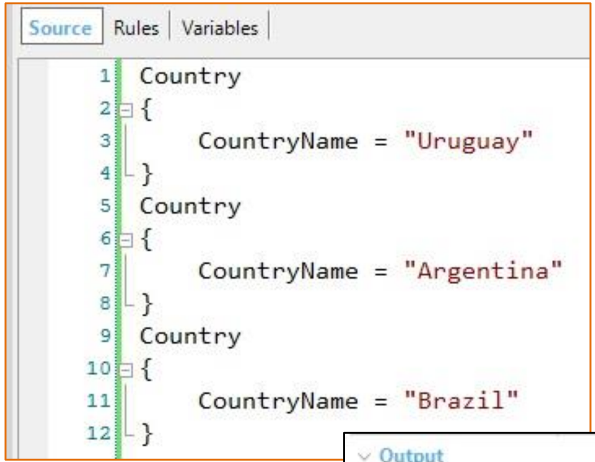
United States
Brazil
Mexico
Colombia
Argentina
Canada
Peru
Venezuela
Chile
Ecuador
Guatemala
Cuba
Haiti
Bolivia
Dominican Republic
Honduras
Paraguay
Nicaragua
El Salvador
Costa Rica
Panama
Puerto Rico
Uruguay
Jamaica
Trinidad and Tobago

Data Population

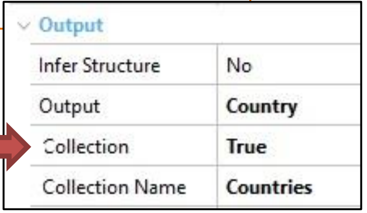
Business Components and Data Providers

Example

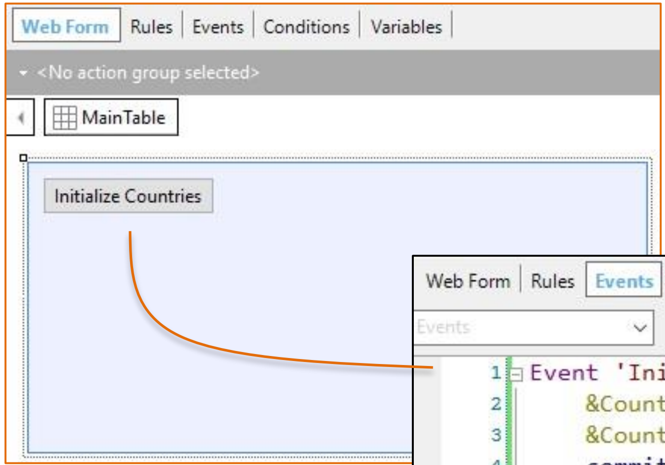
Country
{
  CountryId* ← Autonumber = True
  CountryName
}

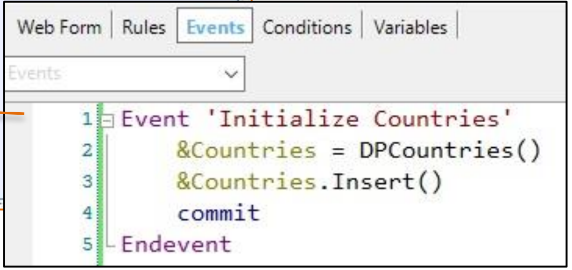


```
Country
{
        CountryName = "Uruguay"
}
Country
{
        CountryName = "Argentina"
}
Country
{
        CountryName = "Brazil"
}
```

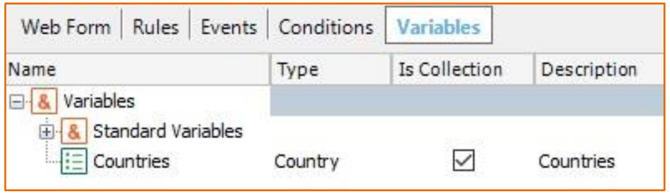


Infer Structure	No
Output	**Country**
Collection	**True**
Collection Name	**Countries**





```
Event 'Initialize Countries'
    &Countries = DPCountries()
    &Countries.Insert()
    commit
Endevent
```

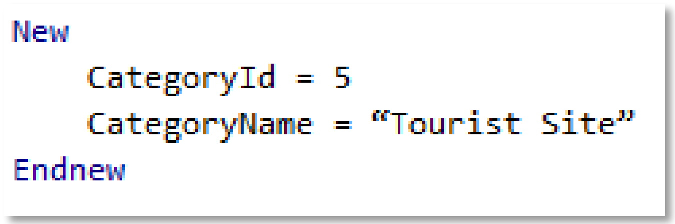


Name	Type	Is Collection	Description
Variables			
Standard Variables			
Countries	Country	☑	Countries

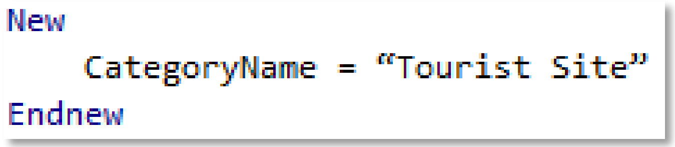
Data Population with Procedures
New / For Each / Delete Commands

Insertion – NEW Command

Category
{
  CategoryId*
  CategoryName
}



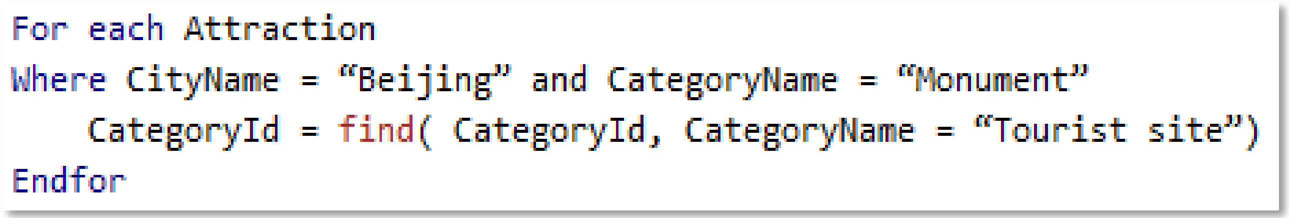
```
New
    CategoryId = 5
    CategoryName = "Tourist Site"
Endnew
```



```
New
    CategoryName = "Tourist Site"
Endnew
```

If the attribute is autonumbered it doesn't have to be inserted

Modification / FOR EACH Command



```
For each Attraction
Where CityName = "Beijing" and CategoryName = "Monument"
    CategoryId = find( CategoryId, CategoryName = "Tourist site")
Endfor
```

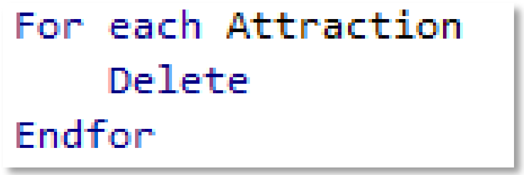
```
Category
{
  CategoryId*
  CategoryName
}
```

```
Country
{
  CountryId*
  CountryName
  City
  {
     CityId*
     CityName
  }
}
```

```
Attraction
{
  AttractionId*
  AttractionName
  CategoryId
  CategoryName
  CountryId
  CountryName
  CityId
  CitlyName
}
```

Deletion – DELETE Command

```
Attraction
{
   AttractionId*
   AttractionName
   CategoryId
   CategoryName
   CountryId
   CountryName
   CityId
   CitlyName
}
```



```
For each Attraction
    Delete
Endfor
```

Notes

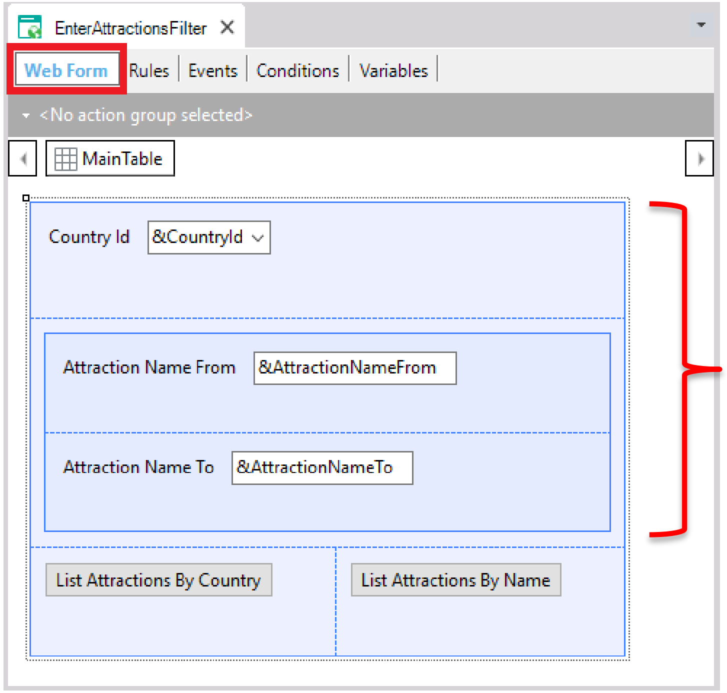
The commands New / For Each / Delete allow inserting, updating and deleting data from the database, but only can be used in Procedures

Even though the following commands allow inserting, updating and deleting data from the database, using a Business Component is recommended because they:

- Control referential integrity
- Trigger the rules declared in the transaction

Web Panels

Web Panel without a grid, with variables in the form



Country Id &CountryId

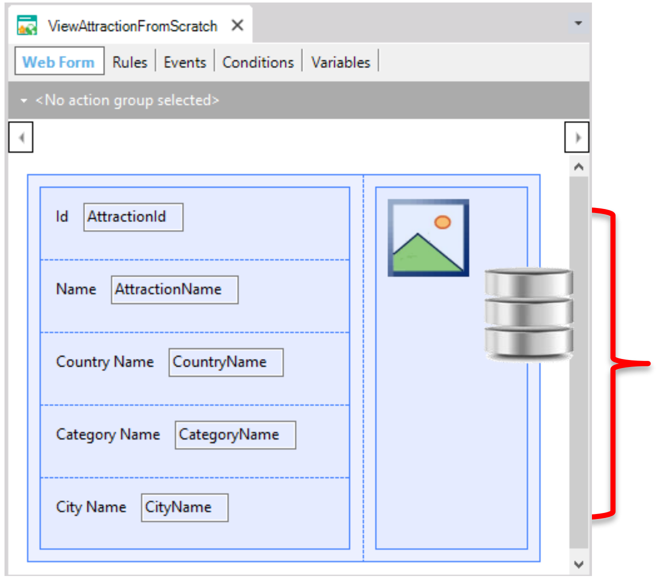
Attraction Name From &AttractionNameFrom

Attraction Name To &AttractionNameTo

Variables: **input**
(not read-only)

Web Panel without a grid, with attributes in the form

Parm(in: **AttractionId**);

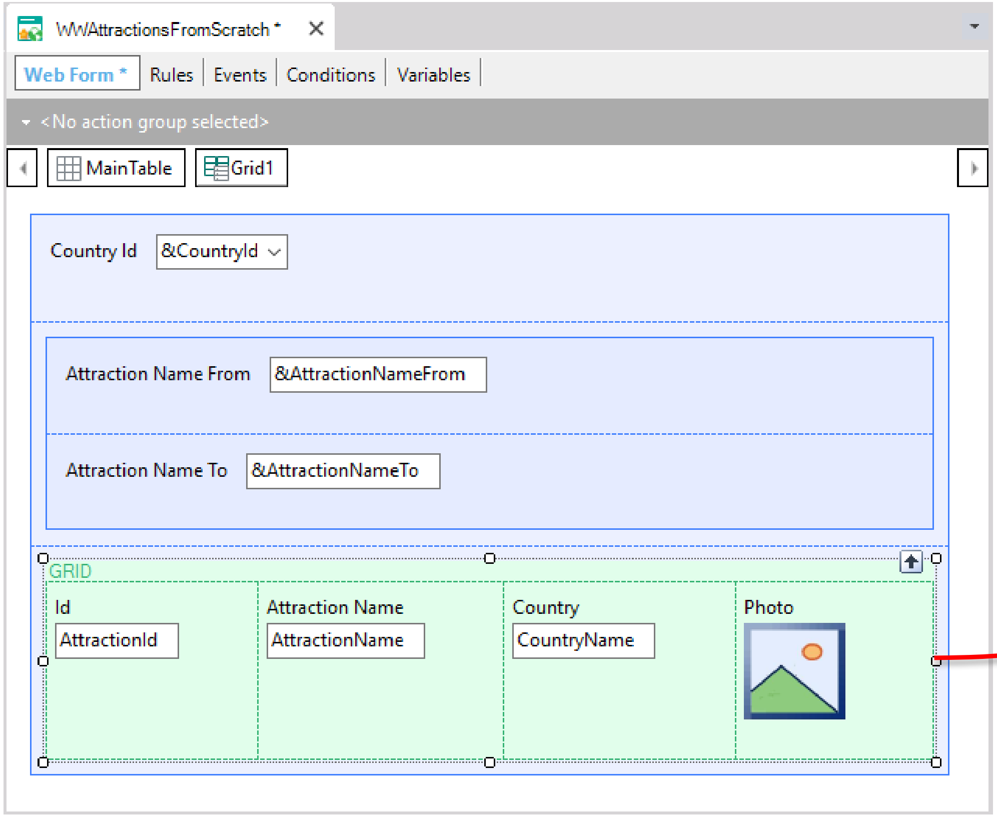


Id	AttractionId
Name	AttractionName
Country Name	CountryName
Category Name	CategoryName
City Name	CityName

Only **one** record is loaded

GeneXus

Grid: WITH BASE TABLE



WWAttractionsFromScratch *

Web Form * | Rules | Events | Conditions | Variables

<No action group selected>

MainTable | Grid1

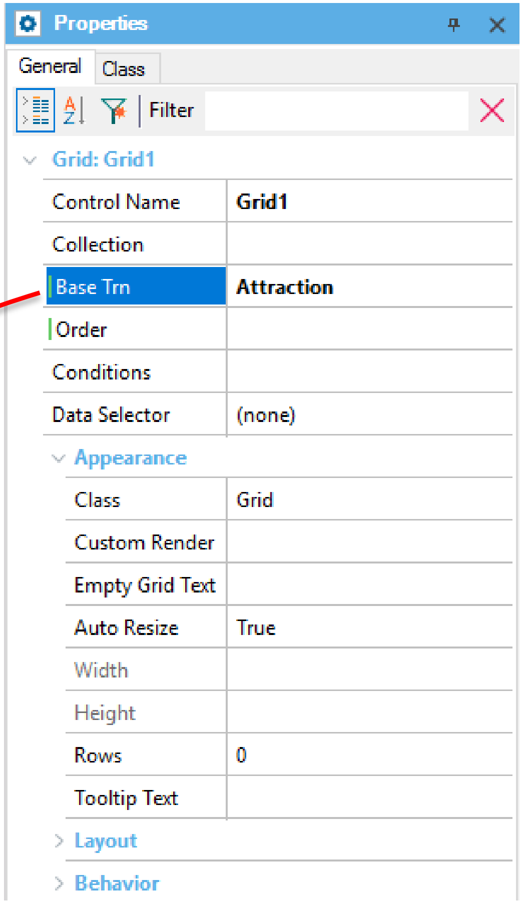
Country Id &CountryId

Attraction Name From &AttractionNameFrom

Attraction Name To &AttractionNameTo

GRID

Id	Attraction Name	Country	Photo
AttractionId	AttractionName	CountryName	



Properties

General | Class

Filter

Grid: Grid1

Control Name	Grid1
Collection	
Base Trn	Attraction
Order	
Conditions	
Data Selector	(none)

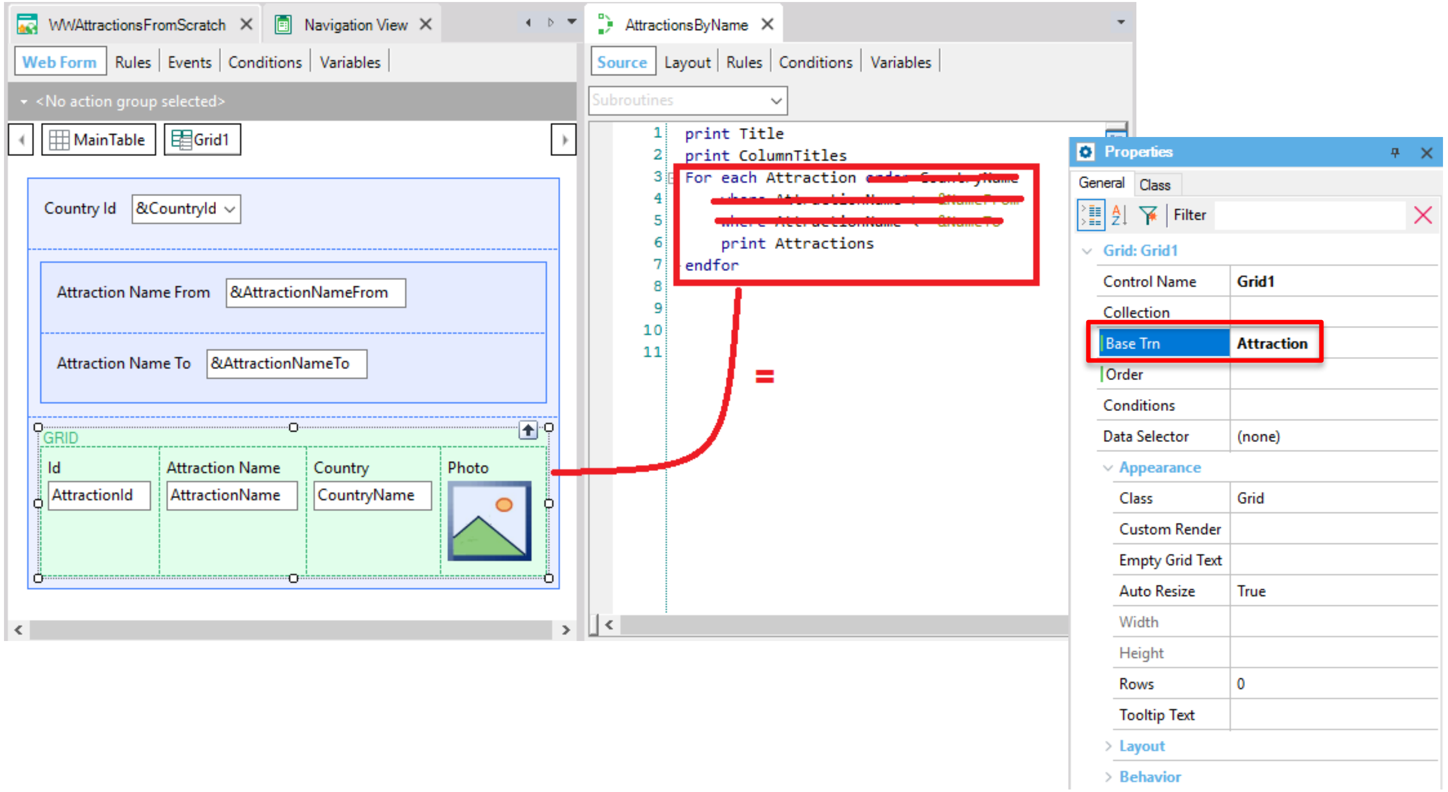
Appearance

Class	Grid
Custom Render	
Empty Grid Text	
Auto Resize	True
Width	
Height	
Rows	0
Tooltip Text	

Layout

Behavior

Base Transaction



Country Id &CountryId

Attraction Name From &AttractionNameFrom

Attraction Name To &AttractionNameTo

GRID

Id	Attraction Name	Country	Photo
AttractionId	AttractionName	CountryName	

```
print Title
print ColumnTitles
For each Attraction ~~order CountryName~~
    ~~where AttractionName >= &NameFrom~~
    ~~where AttractionName <= &NameTo~~
    print Attractions
endfor
```

Grid: Grid1

Control Name	Grid1
Collection	
Base Trn	Attraction
Order	
Conditions	
Data Selector	(none)

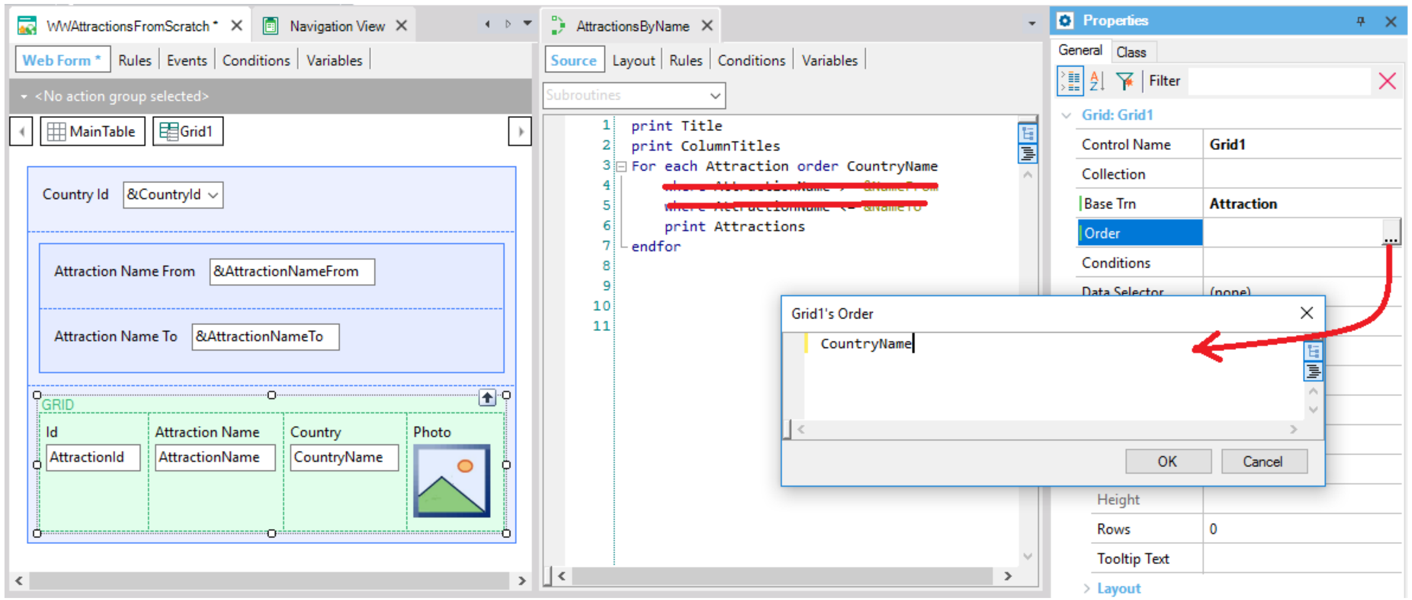
Appearance

Class	Grid
Custom Render	
Empty Grid Text	
Auto Resize	True
Width	
Height	
Rows	0
Tooltip Text	

Layout

Behavior

Order



Country Id &CountryId

Attraction Name From &AttractionNameFrom

Attraction Name To &AttractionNameTo

GRID

Id	Attraction Name	Country	Photo
AttractionId	AttractionName	CountryName	

```
print Title
print ColumnTitles
For each Attraction order CountryName
    ~~where AttractionName >= &NameFrom~~
    ~~where AttractionName <= &NameTo~~
    print Attractions
endfor
```

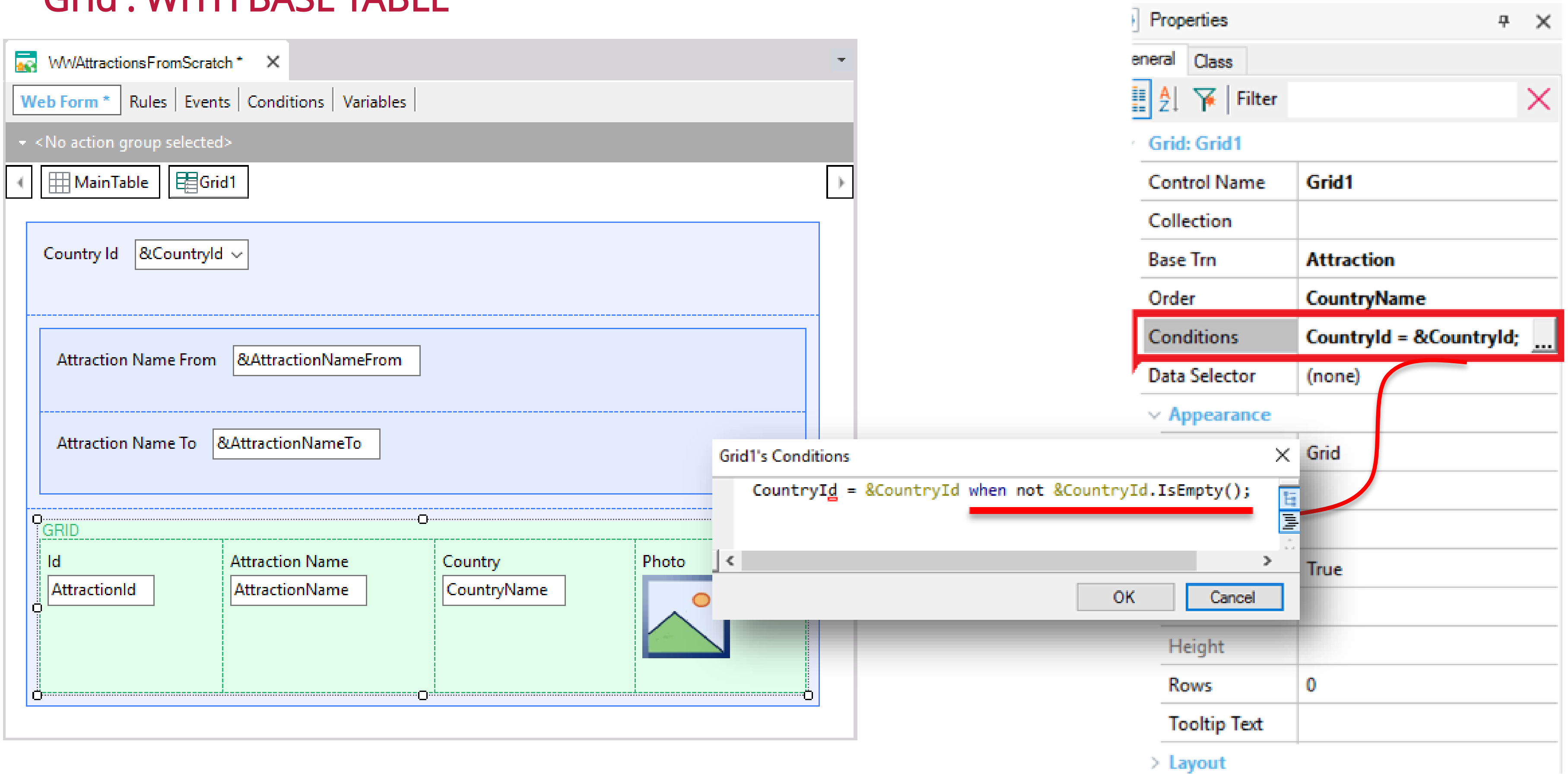
Grid: Grid1

Control Name	Grid1
Collection	
Base Trn	Attraction
Order	
Conditions	
Data Selector	(none)
Height	
Rows	0
Tooltip Text	

Grid1's Order

```
CountryName
```

Grid : WITH BASE TABLE



WWAttractionsFromScratch *

Web Form * | Rules | Events | Conditions | Variables

<No action group selected>

MainTable | Grid1

Country Id &CountryId

Attraction Name From &AttractionNameFrom

Attraction Name To &AttractionNameTo

GRID

Id	Attraction Name	Country	Photo
AttractionId	AttractionName	CountryName	

Properties

General | Class

Filter

Grid: Grid1

Control Name	Grid1
Collection	
Base Trn	Attraction
Order	CountryName
Conditions	CountryId = &CountryId;
Data Selector	(none)

Appearance

Grid

True

Height

Rows 0

Tooltip Text

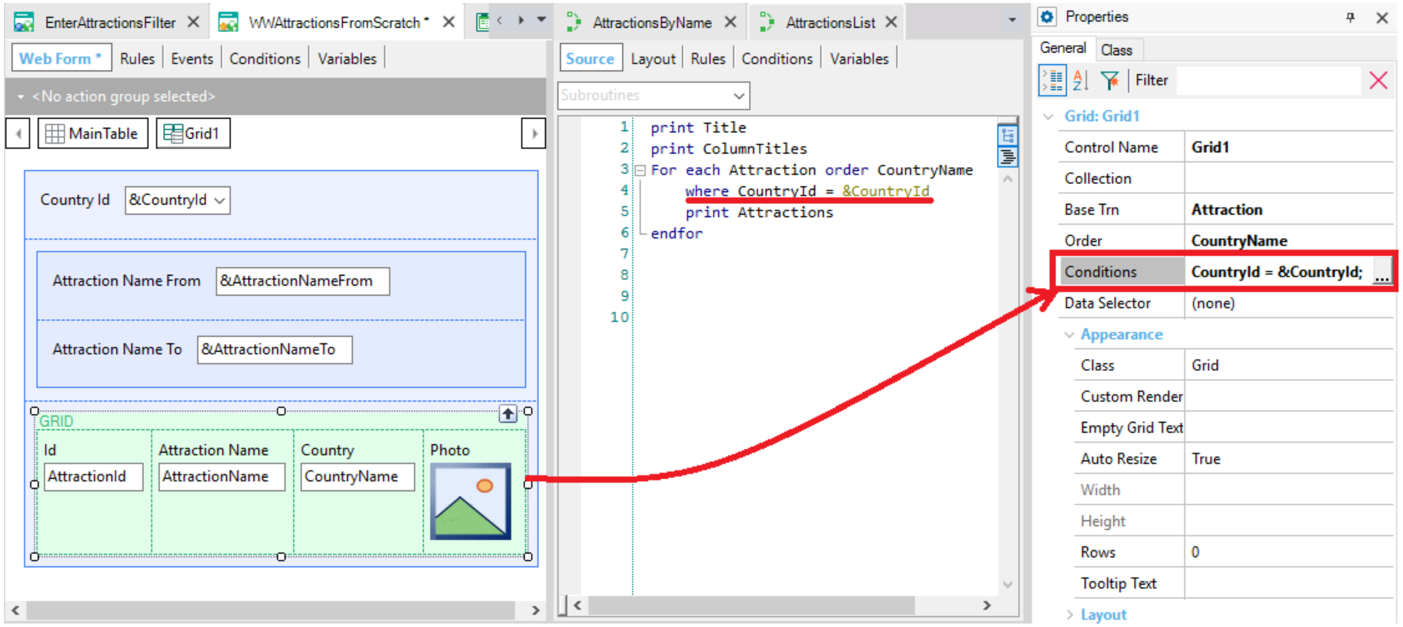
Layout

Grid1's Conditions

```
CountryId = &CountryId when not &CountryId.IsEmpty();
```

OK | Cancel

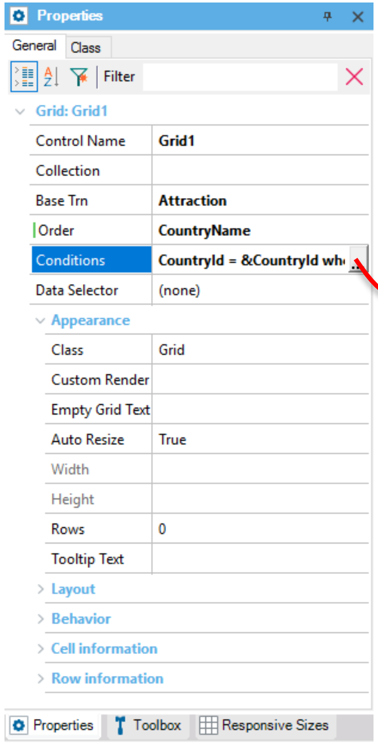
Filter conditions



```
print Title
print ColumnTitles
For each Attraction order CountryName
    where CountryId = &CountryId
    print Attractions
endfor
```

Grid: Grid1	
Control Name	Grid1
Collection	
Base Trn	Attraction
Order	CountryName
Conditions	CountryId = &CountryId;
Data Selector	(none)
Appearance	
Class	Grid
Custom Render	
Empty Grid Text	
Auto Resize	True
Width	
Height	
Rows	0
Tooltip Text	
Layout	

Many conditions



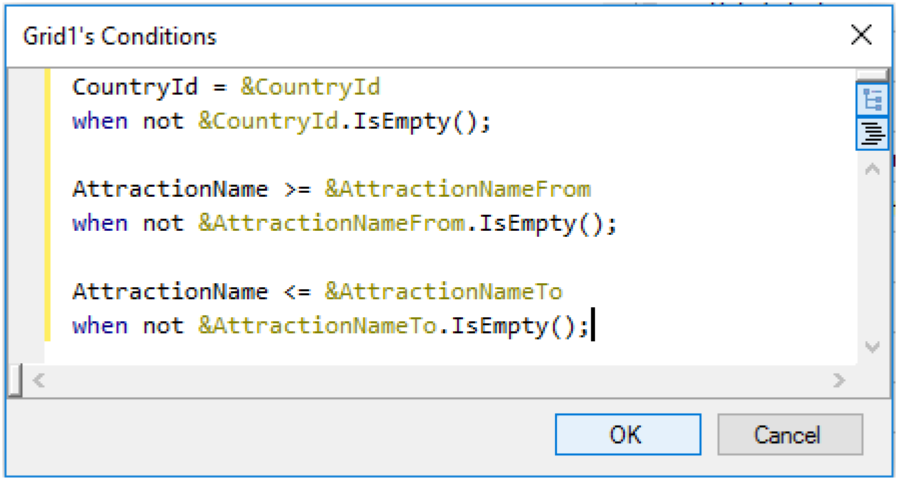
Grid: Grid1

Control Name	Grid1
Collection	
Base Trn	Attraction
Order	CountryName
Conditions	CountryId = &CountryId wh
Data Selector	(none)

Appearance

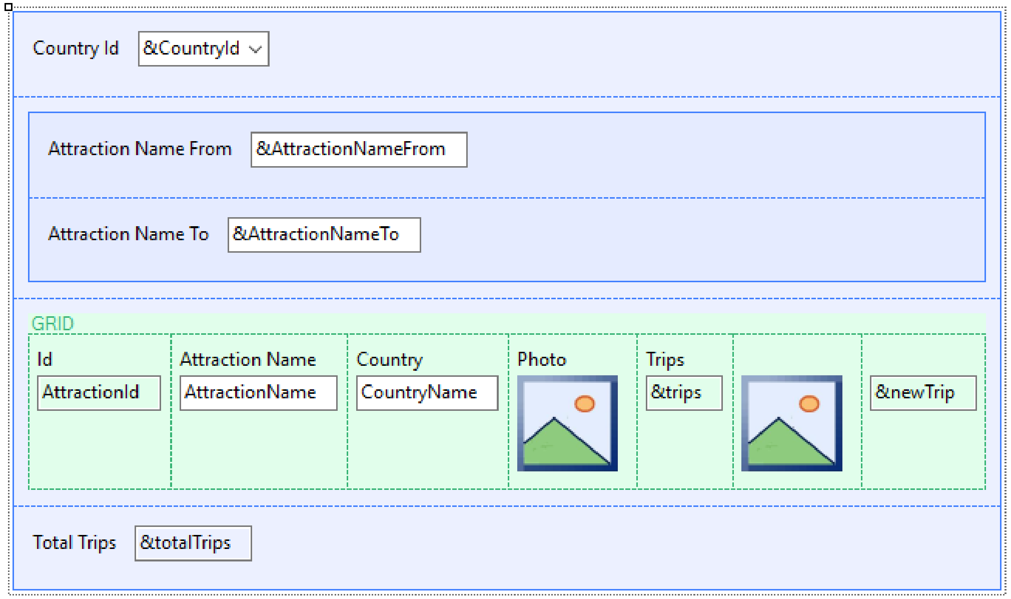
Class	Grid
Custom Render	
Empty Grid Text	
Auto Resize	True
Width	
Height	
Rows	0
Tooltip Text	

Layout
Behavior
Cell information
Row information


Grid1's Conditions

```
CountryId = &CountryId
when not &CountryId.IsEmpty();

AttractionName >= &AttractionNameFrom
when not &AttractionNameFrom.IsEmpty();

AttractionName <= &AttractionNameTo
when not &AttractionNameTo.IsEmpty();
```

Events



First time

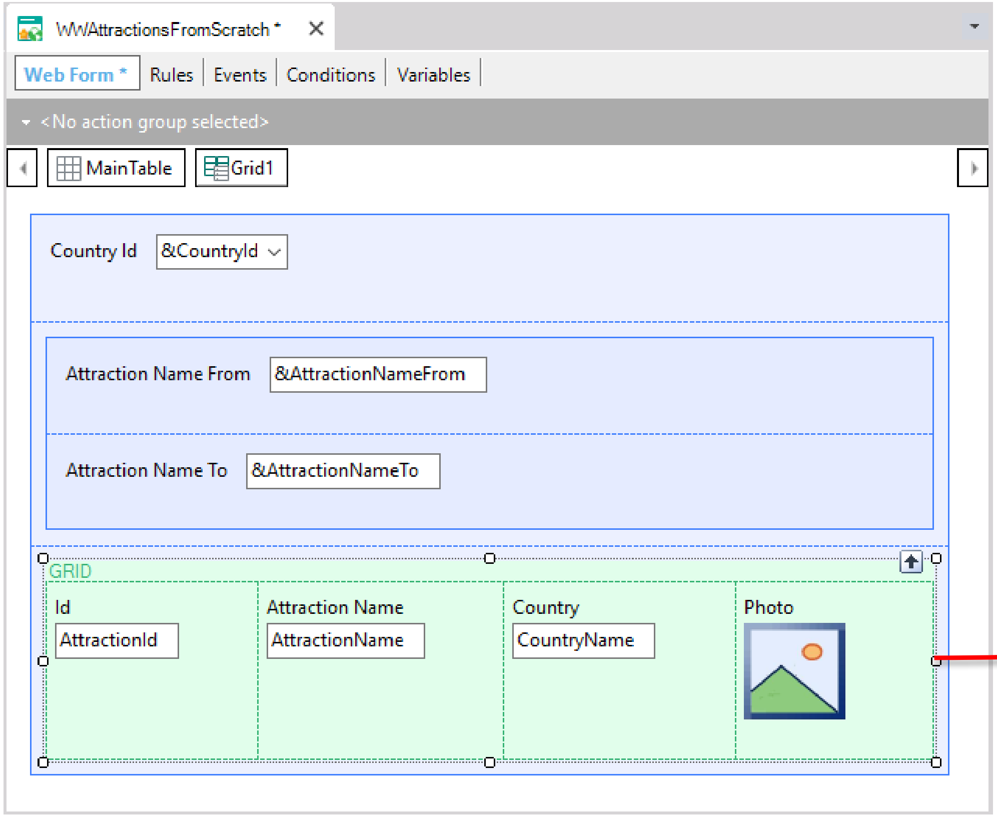
Start

Refresh

Load

User / Control Event

Load event in Web Panel WITH base table



Country Id &CountryId

Attraction Name From &AttractionNameFrom

Attraction Name To &AttractionNameTo

Id	Attraction Name	Country	Photo
AttractionId	AttractionName	CountryName	

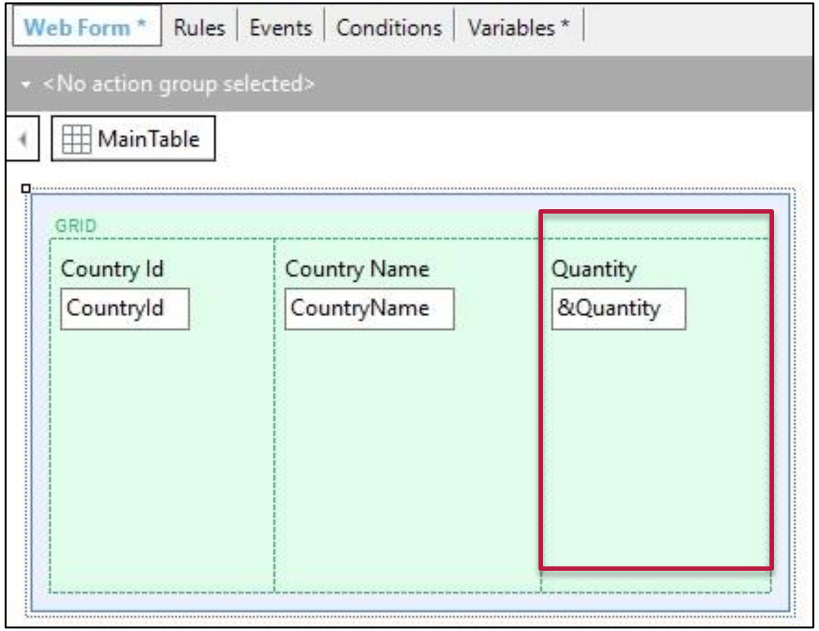
LOAD Event

“N times, as many as records existing in the table run through.”

Another example

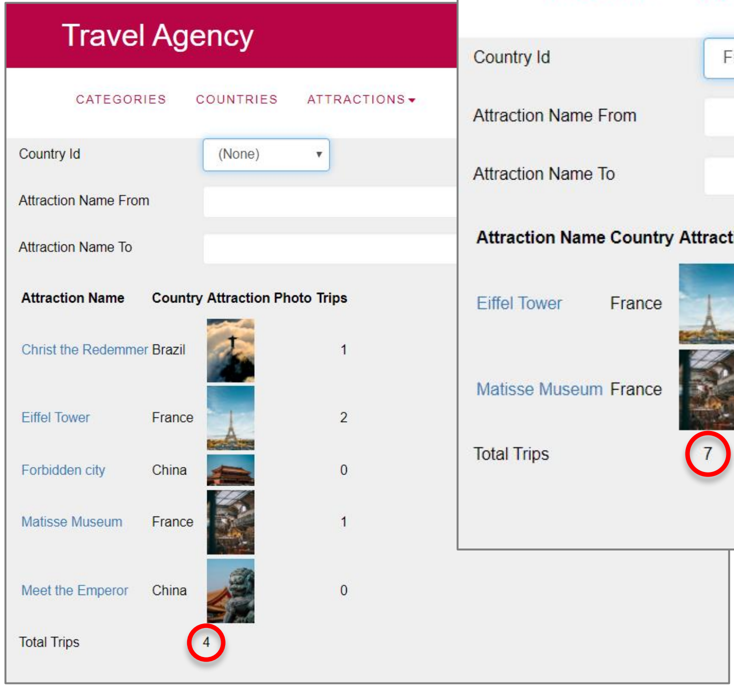
```
Country
{
  CountryId*
  CountryName
}
```

```
Attraction
{
  AttractionId*
  AttractionName
  CountryId
  CountryName
}
```



```
Event Load
    &Quantity = Count(AttractionName)
endevent
```

Refresh event



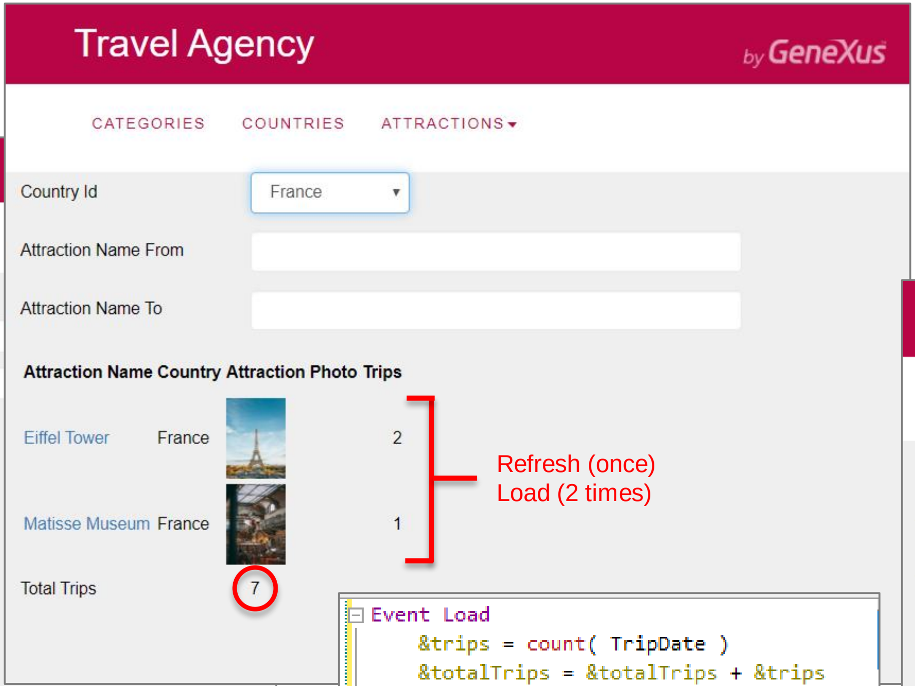
Travel Agency

CATEGORIES COUNTRIES ATTRACTIONS

Country Id	(None)
Attraction Name From	
Attraction Name To	

Attraction Name	Country	Attraction Photo	Trips
Christ the Redemmer	Brazil		1
Eiffel Tower	France		2
Forbidden city	China		0
Matisse Museum	France		1
Meet the Emperor	China		0

Total Trips 4



Travel Agency by GeneXus

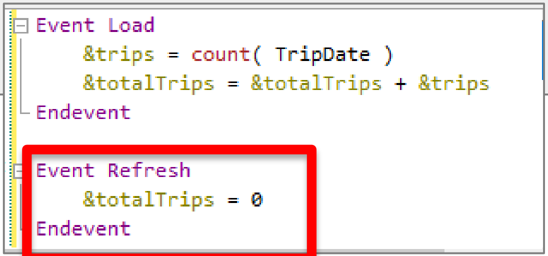
CATEGORIES COUNTRIES ATTRACTIONS

Country Id	France
Attraction Name From	
Attraction Name To	

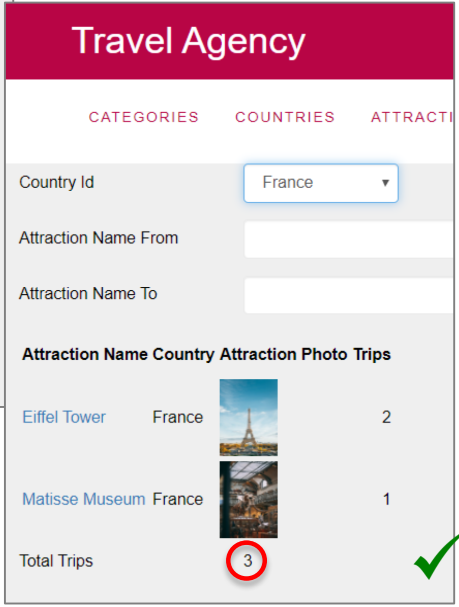
Attraction Name	Country	Attraction Photo	Trips
Eiffel Tower	France		2
Matisse Museum	France		1

Total Trips 7

Refresh (once)
Load (2 times)



```
Event Load
    &trips = count( TripDate )
    &totalTrips = &totalTrips + &trips
Endevent

Event Refresh
    &totalTrips = 0
Endevent
```



Travel Agency

CATEGORIES COUNTRIES ATTRACTI

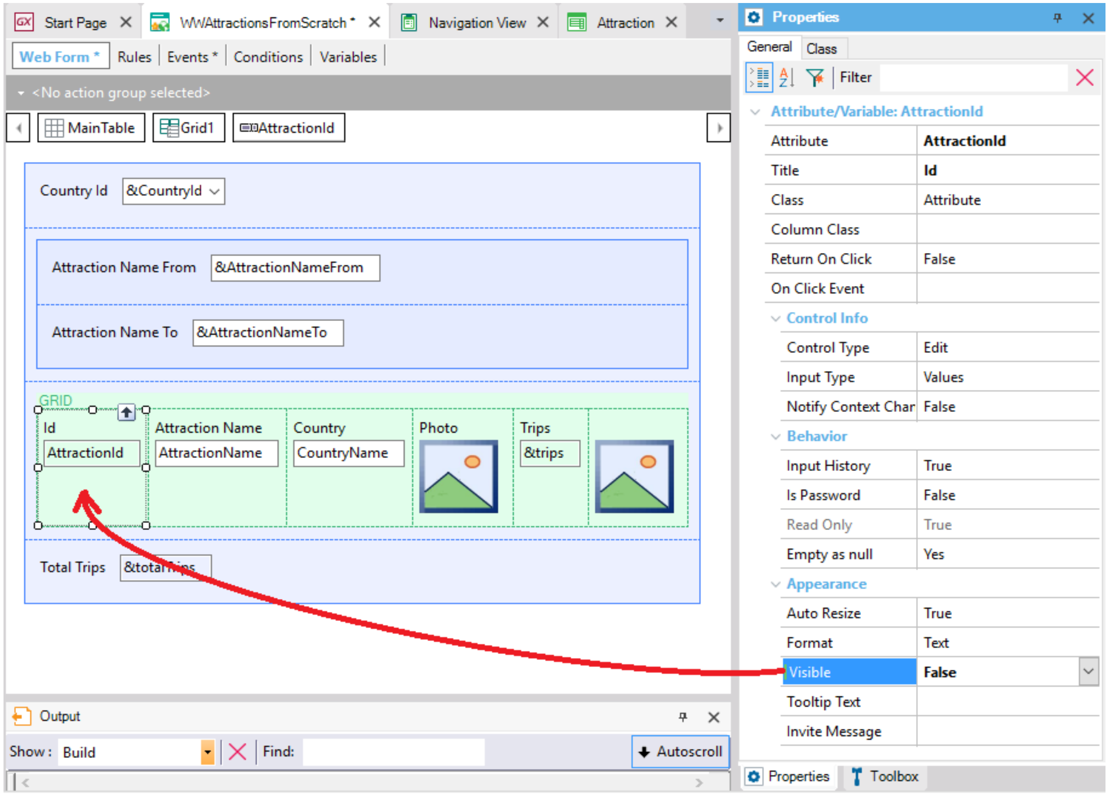
Country Id	France
Attraction Name From	
Attraction Name To	

Attraction Name	Country	Attraction Photo	Trips
Eiffel Tower	France		2
Matisse Museum	France		1

Total Trips 3

✓

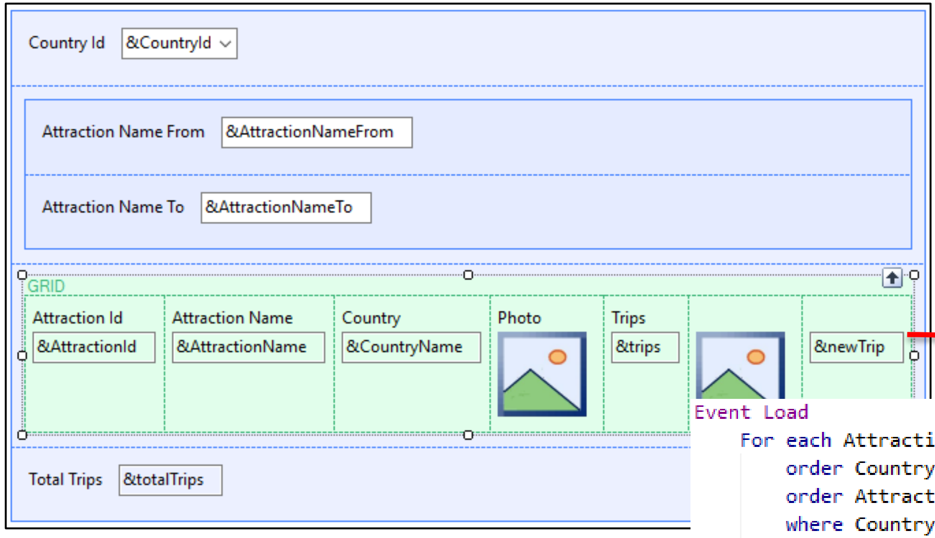
Attributes in the Grid



Attribute/Variable: AttractionId	
Attribute	**AttractionId**
Title	**Id**
Class	Attribute
Column Class	
Return On Click	False
On Click Event	
Control Info	
Control Type	Edit
Input Type	Values
Notify Context Char	False
Behavior	
Input History	True
Is Password	False
Read Only	True
Empty as null	Yes
Appearance	
Auto Resize	True
Format	Text
Visible	**False**
Tooltip Text	
Invite Message	

Web Panels
without Base Table

Web Panels WITHOUT BASE TABLE

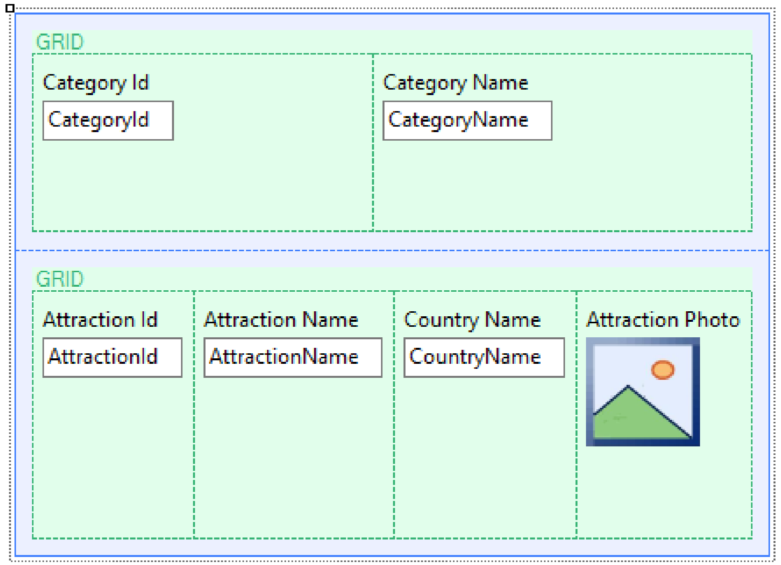


LOAD Event
"Once"

```
Event Load
    For each Attraction
        order CountryId, AttractionName when not &CountryId.IsEmpty()
        order AttractionName
        where CountryId = &CountryId when not &CountryId.IsEmpty()
        where AttractionName >= &AttractionNameFrom when not &AttractionNameFrom.IsEmpty()
        where AttractionName <= &AttractionNameTo when not &AttractionNameTo.IsEmpty()
        &AttractionId = AttractionId
        &AttractionName = AttractionName
        &CountryName = CountryName
        &AttractionPhoto = AttractionPhoto
        &trips = count( TripDate )
        Load
        &totalTrips = &totalTrips + &trips
    endfor
Endevent
```

Web Panels
Multiple Grids

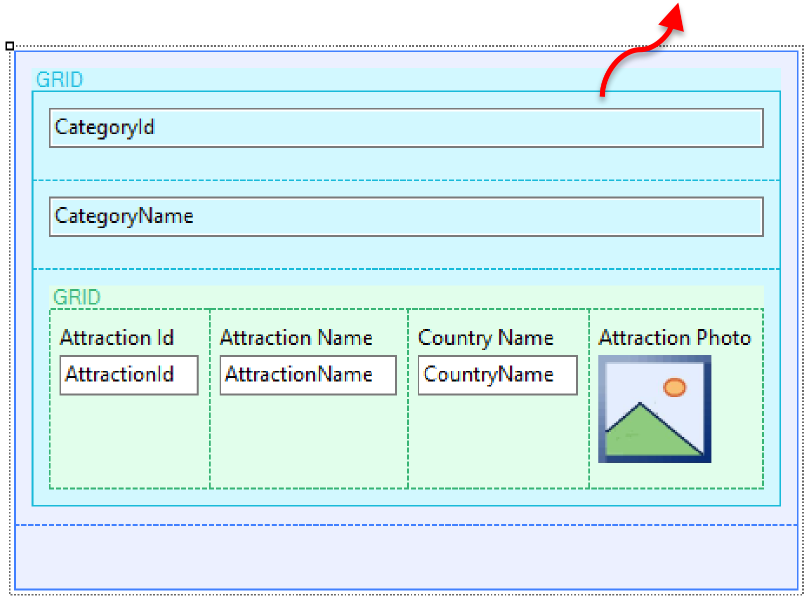
Multiple grids



PARALLEL

Independent navigation

FreeStyleGrid



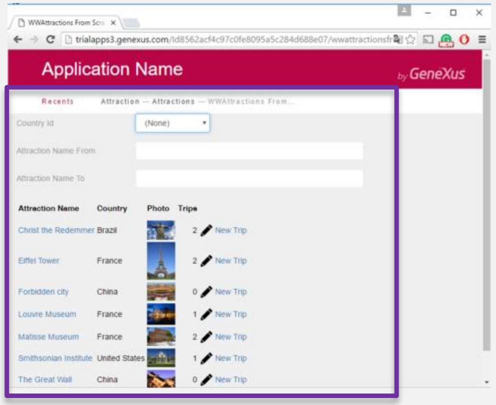
NESTED

Navigation of related tables

Types of Web Panels

Types of Web Panels

Web page (default)



WWAttractions From Scr

trialapps3.genexus.com/Id8562acf4c97c0fe8095a5c284d688e07/wwattractionsfr

Application Name by GeneXus

Recents Attraction — Attractions — WWAttractions From...

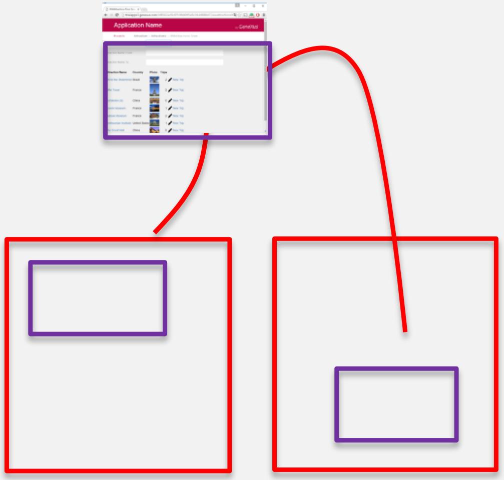
Country Id (None)

Attraction Name From

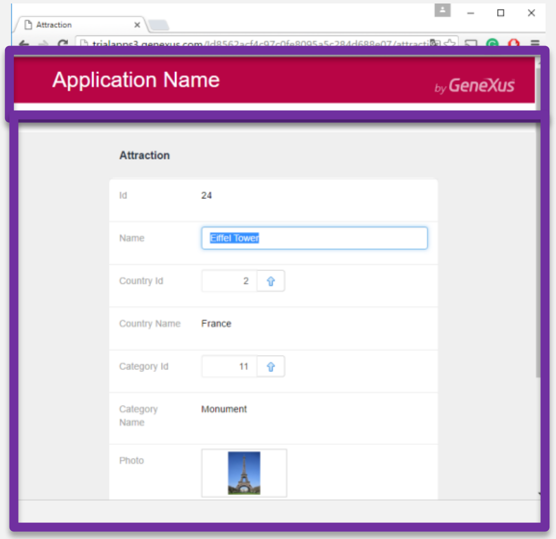
Attraction Name To

Attraction Name	Country	Photo	Trips	
Christ the Redemmer	Brazil		2	New Trip
Eiffel Tower	France		2	New Trip
Forbidden city	China		0	New Trip
Louvre Museum	France		1	New Trip
Matisse Museum	France		2	New Trip
Smithsonian Institute	United States		1	New Trip
The Great Wall	China		0	New Trip

Component



Master page



Attraction

trialapps3.genexus.com/Id8562acf4c97c0fe8095a5c284d688e07/attracti

Application Name by GeneXus

Attraction

Id	24
Name	Eiffel Tower
Country Id	2
Country Name	France
Category Id	11
Category Name	Monument
Photo	

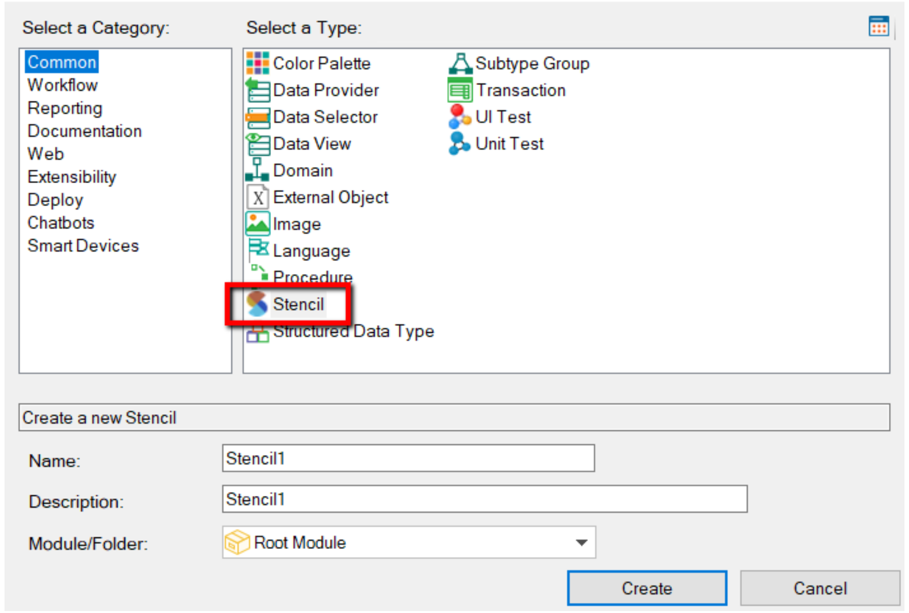
Design Systems

Design Systems

Elements that give consistency and coherence to the UX

Master Page	e.g. Header / footer	
Theme	Classes	**RWD**
Responsive sizes	Responsive tables	
Controls	User control objects	
Base styles	CSS libraries	
Stencils	Design components	
Patterns	Design / behaviour	

Stencils



Select a Category:

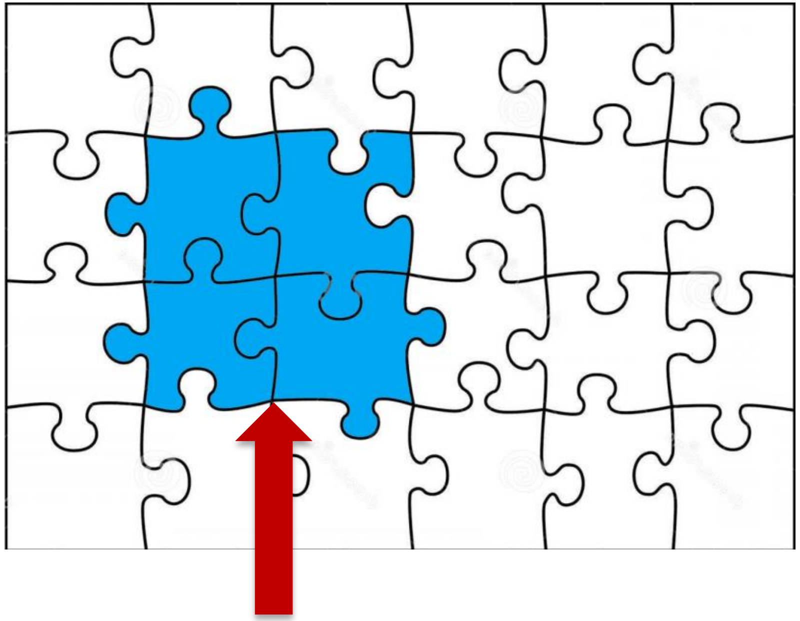
- Common
- Workflow
- Reporting
- Documentation
- Web
- Extensibility
- Deploy
- Chatbots
- Smart Devices

Select a Type:

- Color Palette
- Data Provider
- Data Selector
- Data View
- Domain
- External Object
- Image
- Language
- Procedure
- Stencil
- Structured Data Type
- Subtype Group
- Transaction
- UI Test
- Unit Test

Create a new Stencil

Name:	Stencil1
Description:	Stencil1
Module/Folder:	Root Module

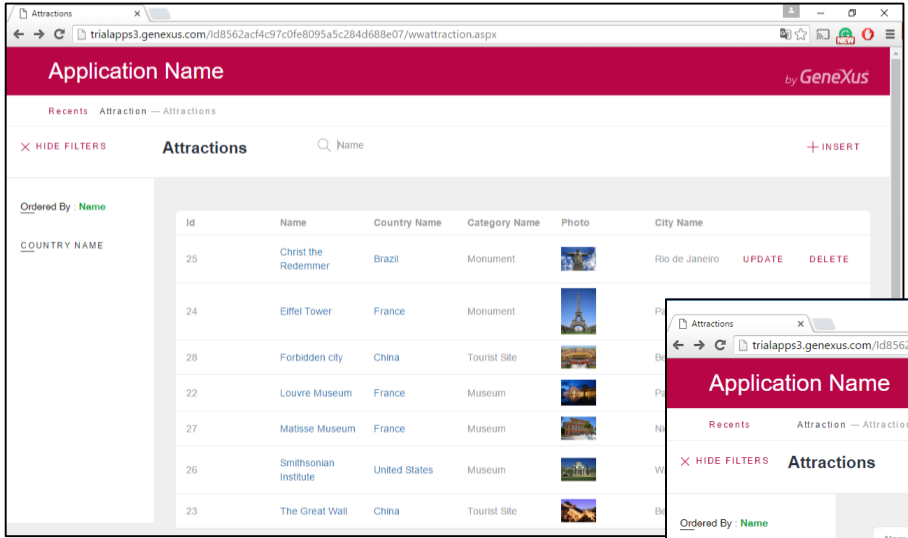


Design component

Object that allows repeating the design of the same portion of the screen (a set of controls), in many screens

Responsive Design

Responsive Web design



Attractions

trialapps3.genexus.com/Id8562acf4c97c0fe8095a5c284d688e07/wwattraction.aspx

Application Name *by GeneXus*

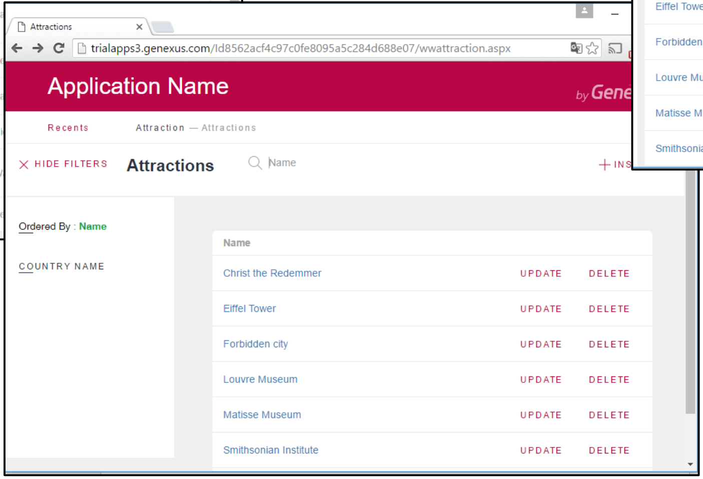
Recents Attraction — Attractions

HIDE FILTERS **Attractions** Name + INSERT

Ordered By : Name

COUNTRY NAME

Id	Name	Country Name	Category Name	Photo	City Name		
25	Christ the Redemmer	Brazil	Monument		Rio de Janeiro	UPDATE	DELETE
24	Eiffel Tower	France	Monument		Pa		
28	Forbidden city	China	Tourist Site		Be		
22	Louvre Museum	France	Museum		Pa		
27	Matisse Museum	France	Museum		Ni		
26	Smithsonian Institute	United States	Museum		W		
23	The Great Wall	China	Tourist Site		Be		



Attractions

trialapps3.genexus.com/Id8562acf4c97c0fe8095a5c284d688e07/wwattraction.aspx

Application Name *by Gene*

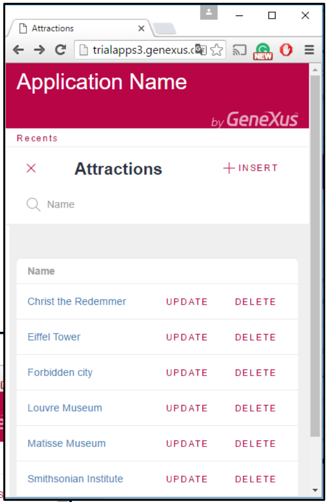
Recents Attraction — Attractions

HIDE FILTERS **Attractions** Name + INS

Ordered By : Name

COUNTRY NAME

Name		
Christ the Redemmer	UPDATE	DELETE
Eiffel Tower	UPDATE	DELETE
Forbidden city	UPDATE	DELETE
Louvre Museum	UPDATE	DELETE
Matisse Museum	UPDATE	DELETE
Smithsonian Institute	UPDATE	DELETE



Attractions

trialapps3.genexus.c

Application Name *by GeneXus*

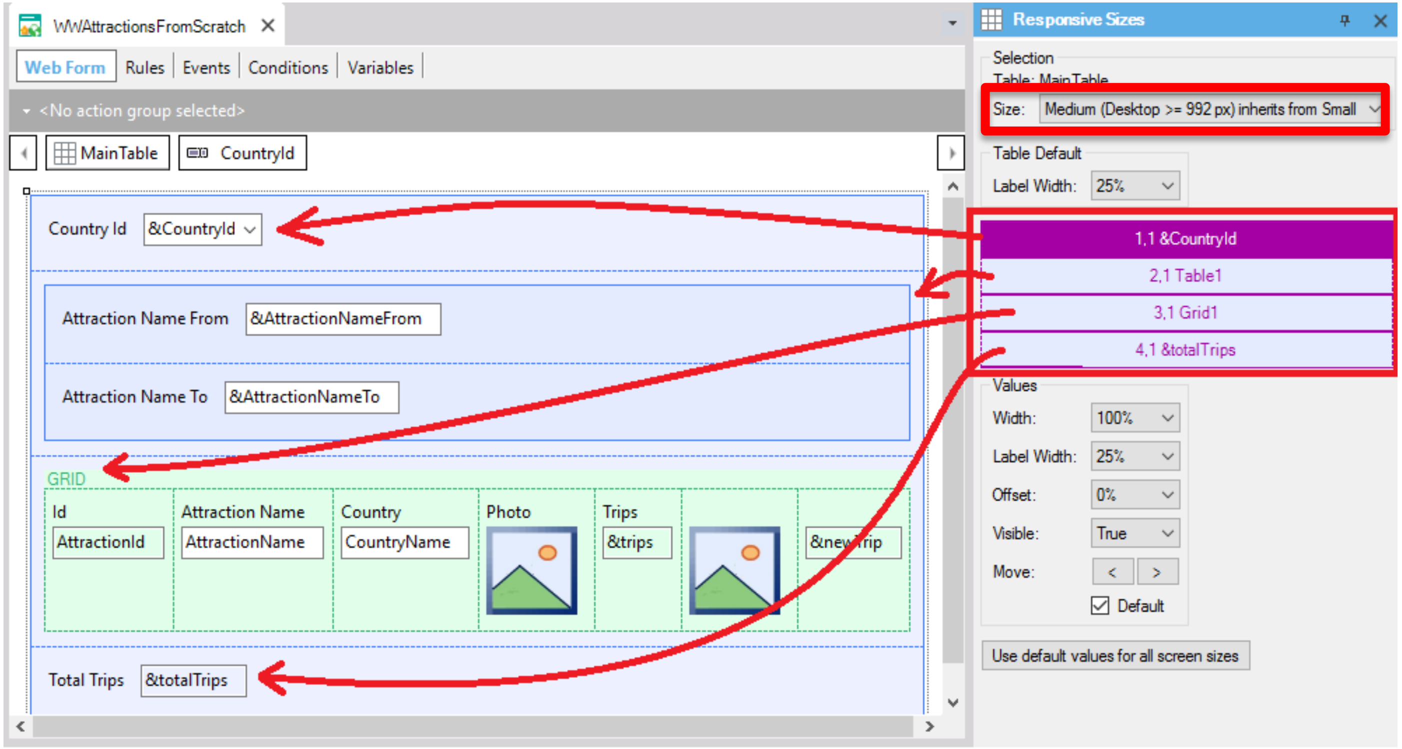
Recents

Attractions + INSERT

Name

Name		
Christ the Redemmer	UPDATE	DELETE
Eiffel Tower	UPDATE	DELETE
Forbidden city	UPDATE	DELETE
Louvre Museum	UPDATE	DELETE
Matisse Museum	UPDATE	DELETE
Smithsonian Institute	UPDATE	DELETE

Responsive Web design



WWAttractionsFromScratch

Web Form | Rules | Events | Conditions | Variables

<No action group selected>

MainTable | CountryId

Country Id &CountryId

Attraction Name From &AttractionNameFrom

Attraction Name To &AttractionNameTo

GRID

Id	Attraction Name	Country	Photo	Trips		
AttractionId	AttractionName	CountryName		&trips		&newTrip

Total Trips &totalTrips

Responsive Sizes

Selection
Table: MainTable
Size: Medium (Desktop >= 992 px) inherits from Small

Table Default
Label Width: 25%

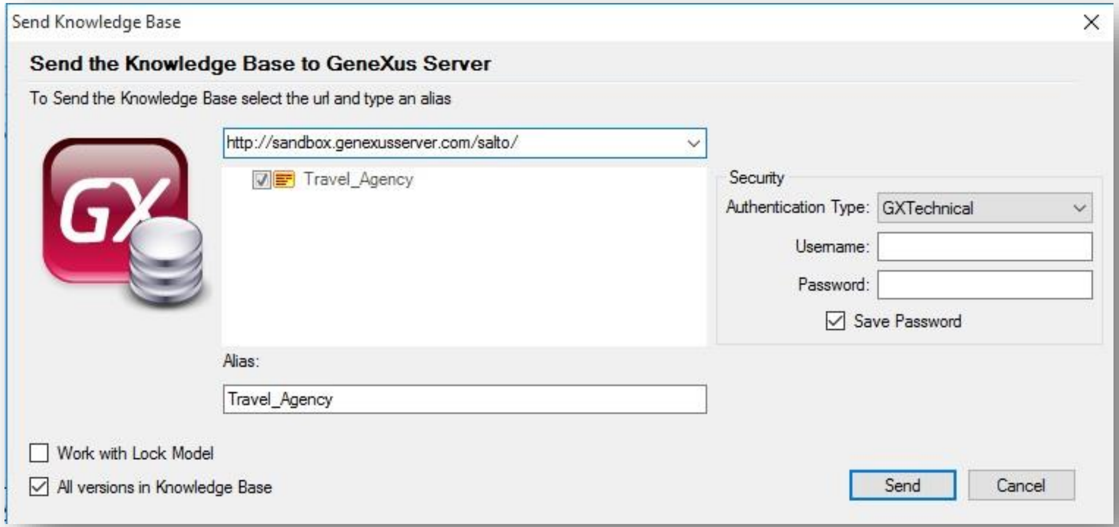
1,1 &CountryId
2,1 Table1
3,1 Grid1
4,1 &totalTrips

Values
Width: 100%
Label Width: 25%
Offset: 0%
Visible: True
Move: < >
☑ Default

Use default values for all screen sizes

GeneXus Server

Send Knowledge Base to GeneXus Server



Send Knowledge Base

Send the Knowledge Base to GeneXus Server

To Send the Knowledge Base select the url and type an alias

http://sandbox.genexusserver.com/salto/

☑ Travel_Agency

Alias: Travel_Agency

Security

Authentication Type: GXTechnical

Username:

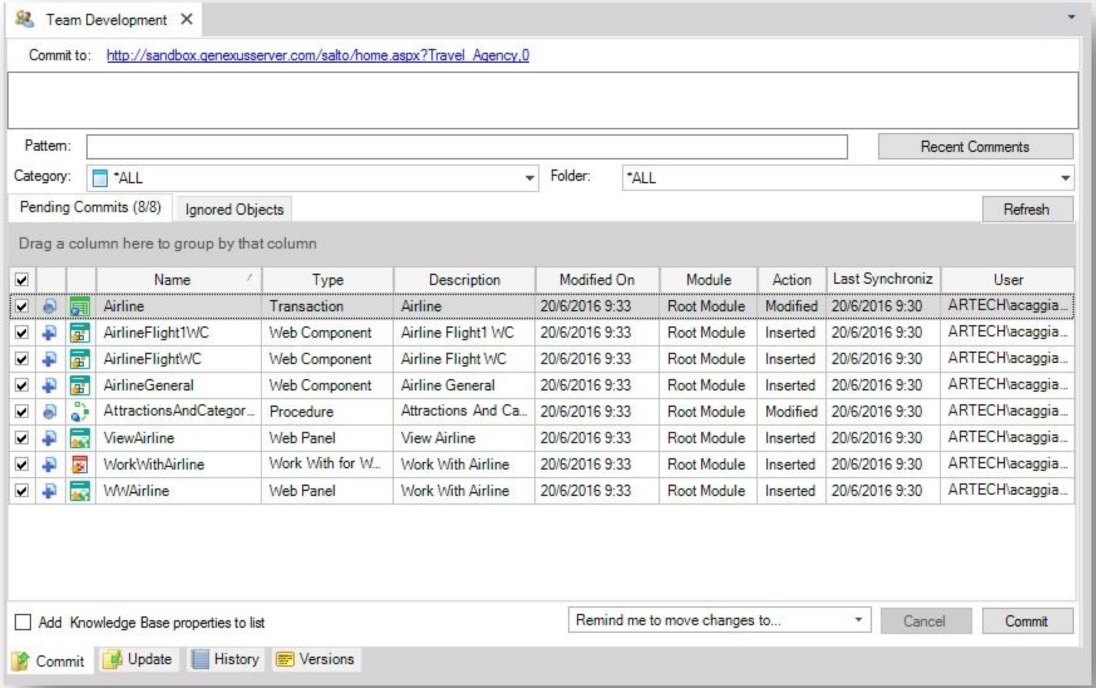
Password:

☑ Save Password

☐ Work with Lock Model

☑ All versions in Knowledge Base

Team Development


Team Development

Commit to: http://sandbox.genexusserver.com/salto/home.aspx?Travel_Agency,0

Pattern:

Category: *ALL

Folder: *ALL

Pending Commits (8/8)

Drag a column here to group by that column

✓			Name	Type	Description	Modified On	Module	Action	Last Synchroniz	User
✓			Airline	Transaction	Airline	20/6/2016 9:33	Root Module	Modified	20/6/2016 9:30	ARTECH\acaggia...
✓			AirlineFlight1WC	Web Component	Airline Flight1 WC	20/6/2016 9:33	Root Module	Inserted	20/6/2016 9:30	ARTECH\acaggia...
✓			AirlineFlightWC	Web Component	Airline Flight WC	20/6/2016 9:33	Root Module	Inserted	20/6/2016 9:30	ARTECH\acaggia...
✓			AirlineGeneral	Web Component	Airline General	20/6/2016 9:33	Root Module	Inserted	20/6/2016 9:30	ARTECH\acaggia...
✓			AttractionsAndCategor...	Procedure	Attractions And Ca...	20/6/2016 9:33	Root Module	Modified	20/6/2016 9:30	ARTECH\acaggia...
✓			ViewAirline	Web Panel	View Airline	20/6/2016 9:33	Root Module	Inserted	20/6/2016 9:30	ARTECH\acaggia...
✓			WorkWithAirline	Work With for W...	Work With Airline	20/6/2016 9:33	Root Module	Inserted	20/6/2016 9:30	ARTECH\acaggia...
✓			WWAirline	Web Panel	Work With Airline	20/6/2016 9:33	Root Module	Inserted	20/6/2016 9:30	ARTECH\acaggia...

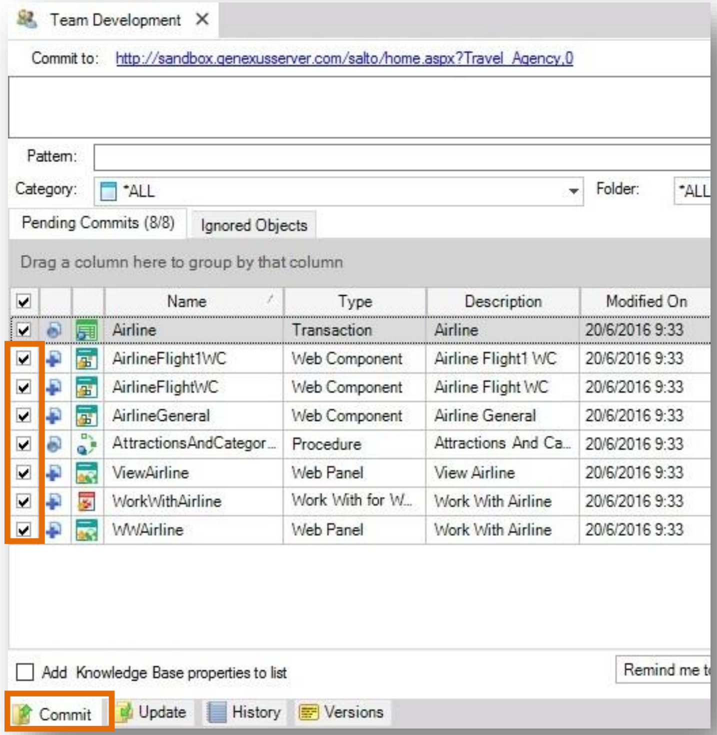
☐ Add Knowledge Base properties to list

Remind me to move changes to...

Commit

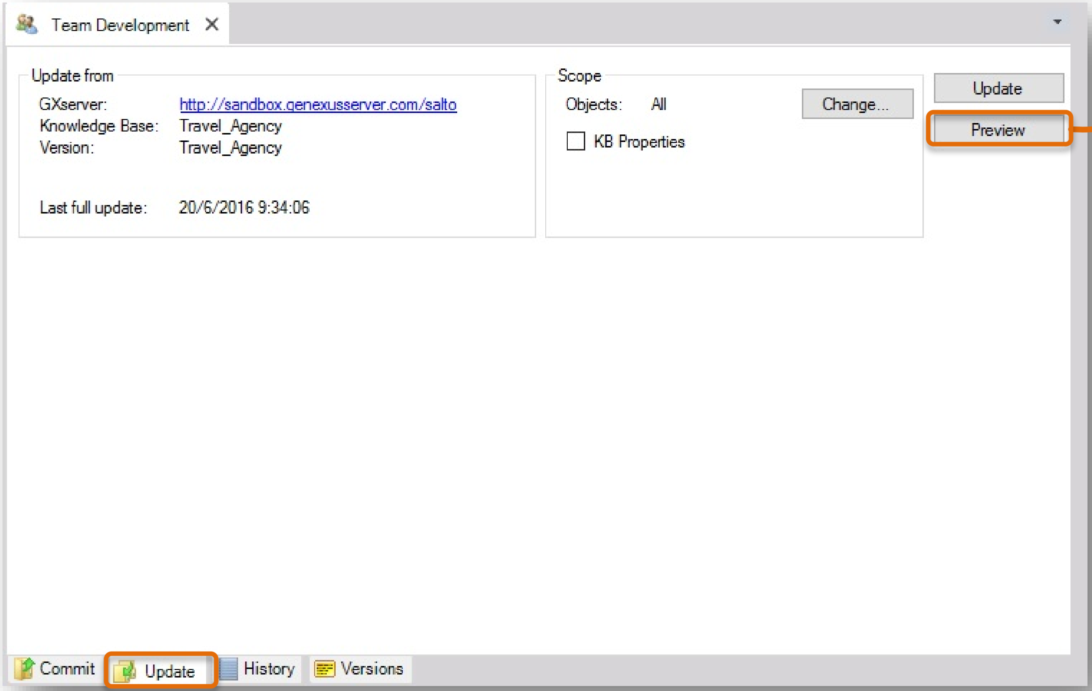
Knowledge Manager / Team Development

Partial commit


Team Development
Commit to: http://sandbox.genexusserver.com/salto/home.aspx?Travel_Agency,0
Pattern:
Category: *ALL
Folder: *ALL
Pending Commits (8/8)
Ignored Objects
Drag a column here to group by that column

✓	Name	Type	Description	Modified On
✓	Airline	Transaction	Airline	20/6/2016 9:33
✓	AirlineFlight1WC	Web Component	Airline Flight1 WC	20/6/2016 9:33
✓	AirlineFlightWC	Web Component	Airline Flight WC	20/6/2016 9:33
✓	AirlineGeneral	Web Component	Airline General	20/6/2016 9:33
✓	AttractionsAndCategor...	Procedure	Attractions And Ca...	20/6/2016 9:33
✓	ViewAirline	Web Panel	View Airline	20/6/2016 9:33
✓	WorkWithAirline	Work With for W...	Work With Airline	20/6/2016 9:33
✓	WWAirline	Web Panel	Work With Airline	20/6/2016 9:33

Update


Team Development

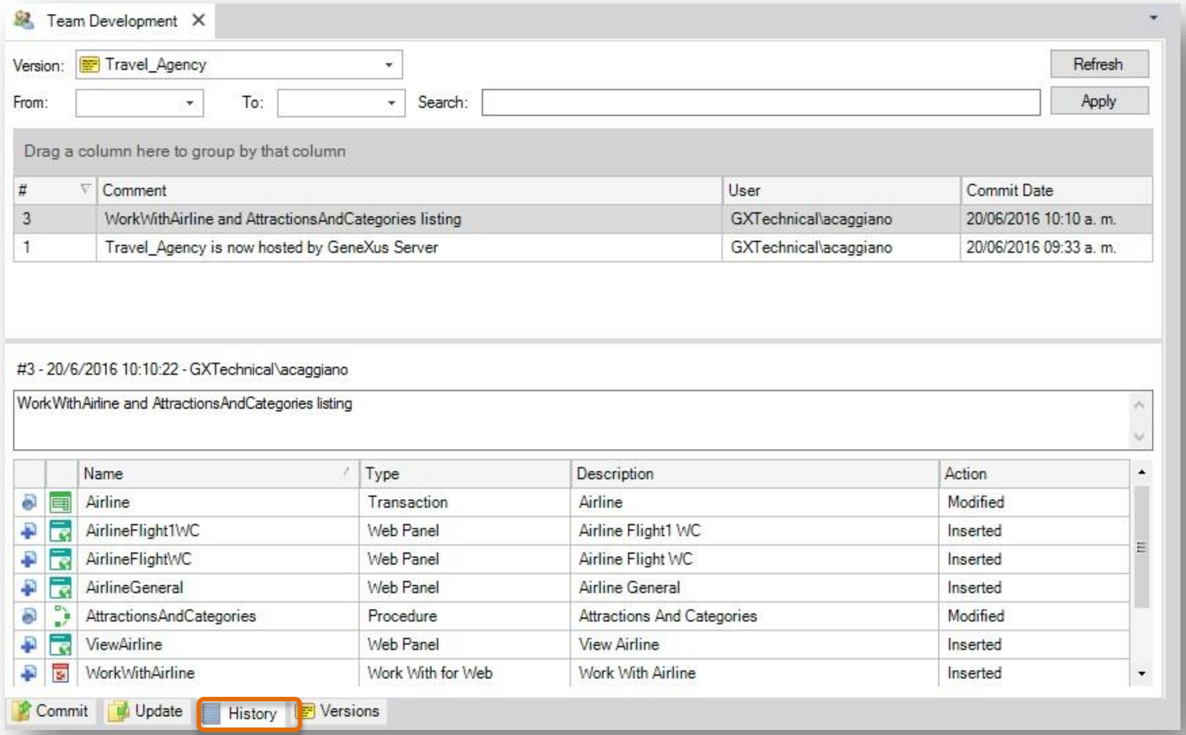
Update from
GXserver: http://sandbox.genexusserver.com/salto
Knowledge Base: Travel_Agency
Version: Travel_Agency

Last full update: 20/6/2016 9:34:06

Scope
Objects: All
[ ] KB Properties

Partial selection

History



Team Development

Version: Travel_Agency

From: To: Search:

Refresh

Apply

Drag a column here to group by that column

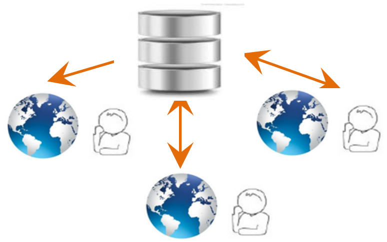
#	Comment	User	Commit Date
3	WorkWithAirline and AttractionsAndCategories listing	GXTechnical\acaggiano	20/06/2016 10:10 a. m.
1	Travel_Agency is now hosted by GeneXus Server	GXTechnical\acaggiano	20/06/2016 09:33 a. m.

#3 - 20/6/2016 10:10:22 - GXTechnical\acaggiano

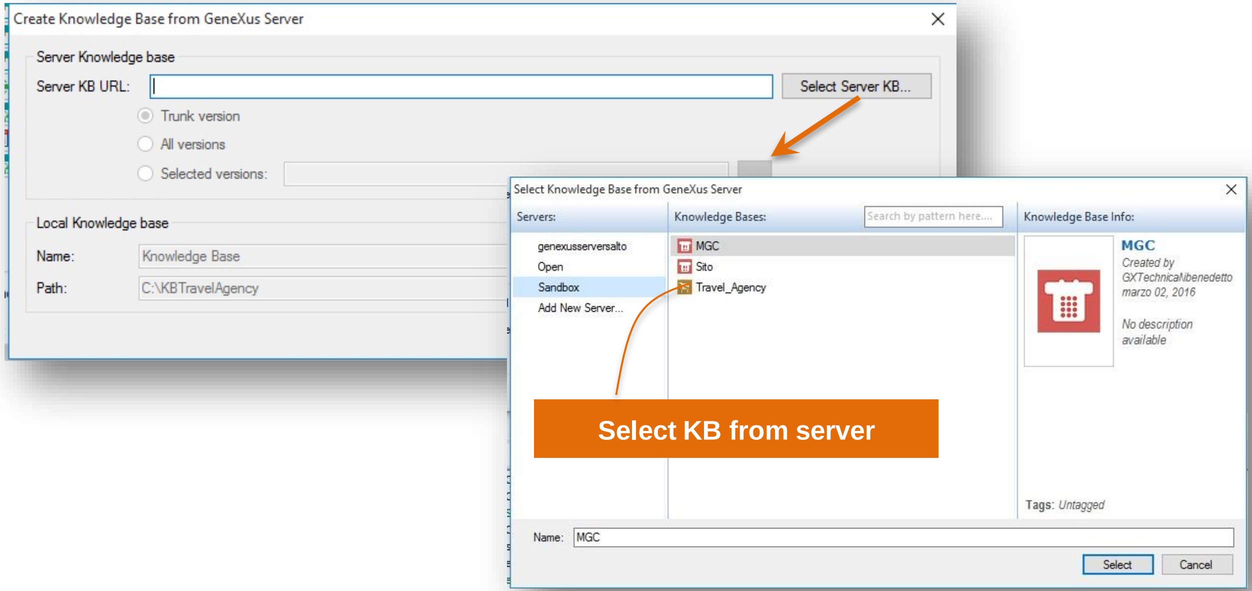
WorkWithAirline and AttractionsAndCategories listing

Name	Type	Description	Action
Airline	Transaction	Airline	Modified
AirlineFlight1WC	Web Panel	Airline Flight1 WC	Inserted
AirlineFlightWC	Web Panel	Airline Flight WC	Inserted
AirlineGeneral	Web Panel	Airline General	Inserted
AttractionsAndCategories	Procedure	Attractions And Categories	Modified
ViewAirline	Web Panel	View Airline	Inserted
WorkWithAirline	Work With for Web	Work With Airline	Inserted

Create KB from GeneXus Server



File / New / Knowledge Base from Server



Create Knowledge Base from GeneXus Server

Server Knowledge base

Server KB URL: [ ] Select Server KB...

(●) Trunk version
( ) All versions
( ) Selected versions:

Local Knowledge base

Name: Knowledge Base

Path: C:\KBTravelAgency

Select Knowledge Base from GeneXus Server

Servers: genexusserversalto, Open, Sandbox, Add New Server...

Knowledge Bases: MGC, Sito, Travel_Agency

Search by pattern here....

Knowledge Base Info:

MGC
Created by GXTechnica\Nbenedetto
marzo 02, 2016

No description available

Tags: Untagged

Name: MGC

Select Cancel

Select KB from server

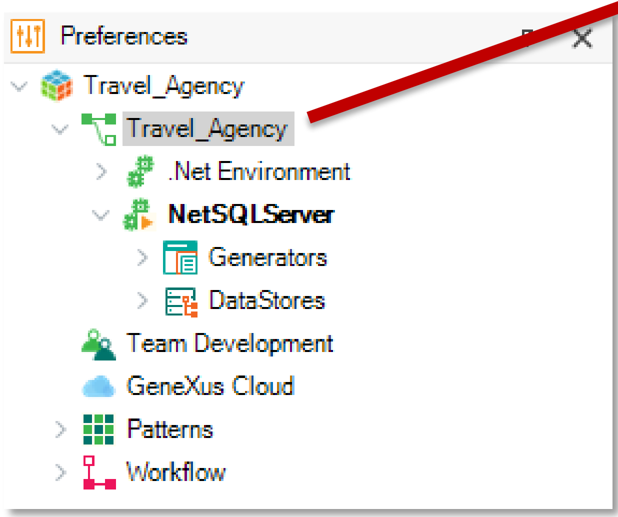
Security with GAM

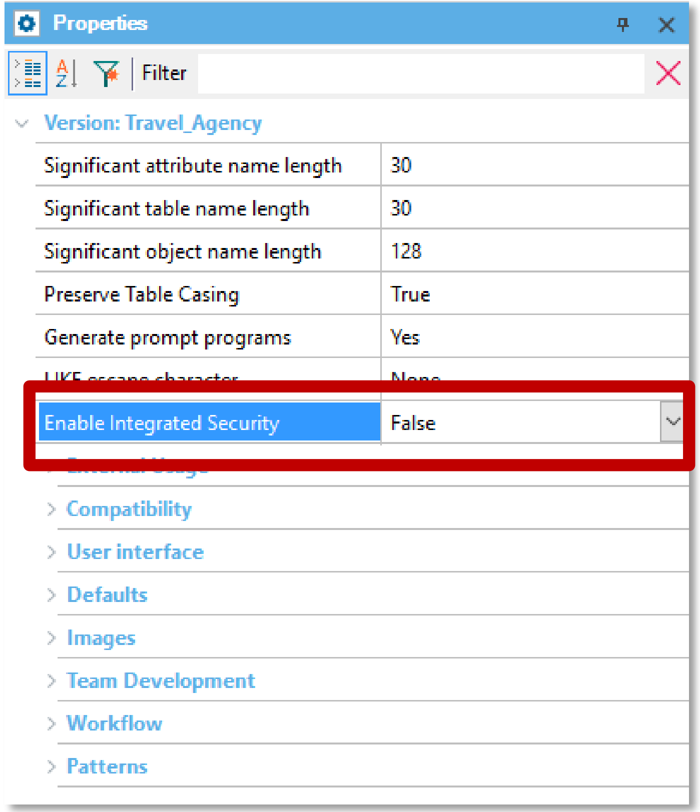
AUTHENTICATION

AUTHORIZATION

GeneXus™
ACCESS MANAGER

Enabling the GeneXus Access Manager

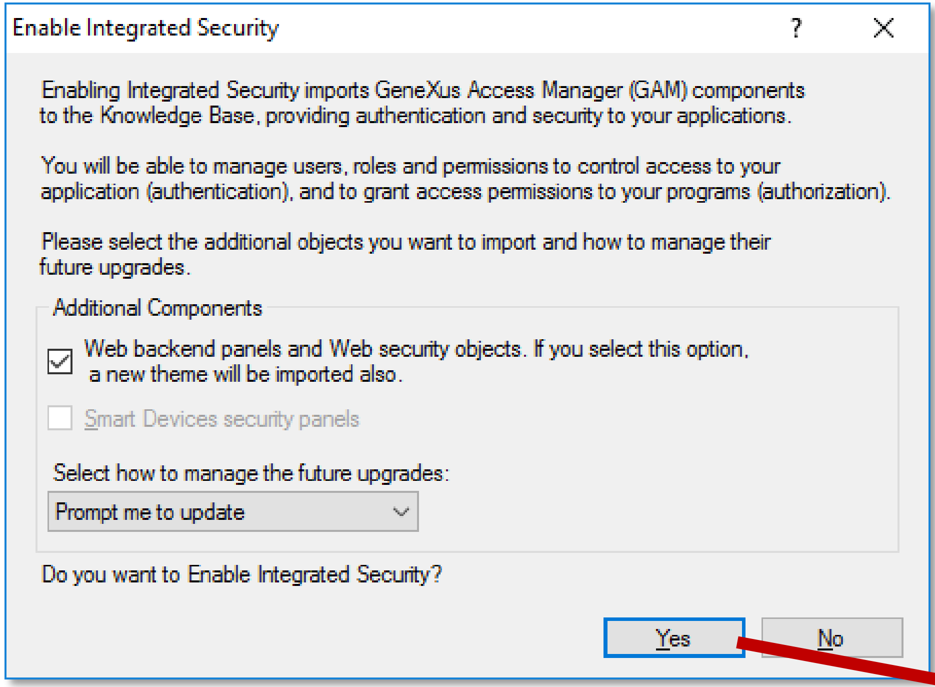

Preferences
Travel_Agency
Travel_Agency
.Net Environment
NetSQLServer
Generators
DataStores
Team Development
GeneXus Cloud
Patterns
Workflow


Properties
Filter
Version: Travel_Agency

Significant attribute name length	30
Significant table name length	30
Significant object name length	128
Preserve Table Casing	True
Generate prompt programs	Yes
LIKE escape character	None
Enable Integrated Security	False

Compatibility
User interface
Defaults
Images
Team Development
Workflow
Patterns

Importing objects from GAM



Enable Integrated Security

Enabling Integrated Security imports GeneXus Access Manager (GAM) components to the Knowledge Base, providing authentication and security to your applications.

You will be able to manage users, roles and permissions to control access to your application (authentication), and to grant access permissions to your programs (authorization).

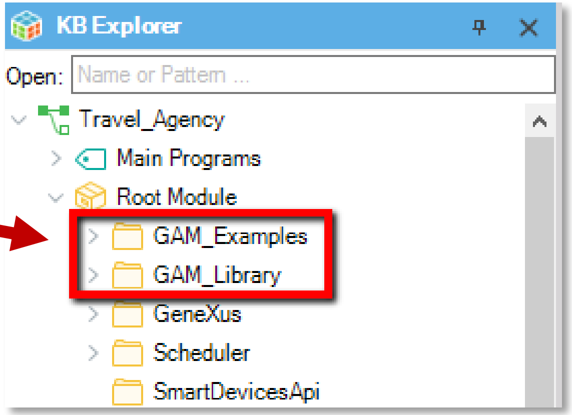
Please select the additional objects you want to import and how to manage their future upgrades.

Additional Components

- [✓] Web backend panels and Web security objects. If you select this option, a new theme will be imported also.
- [ ] Smart Devices security panels

Select how to manage the future upgrades: Prompt me to update

Do you want to Enable Integrated Security?

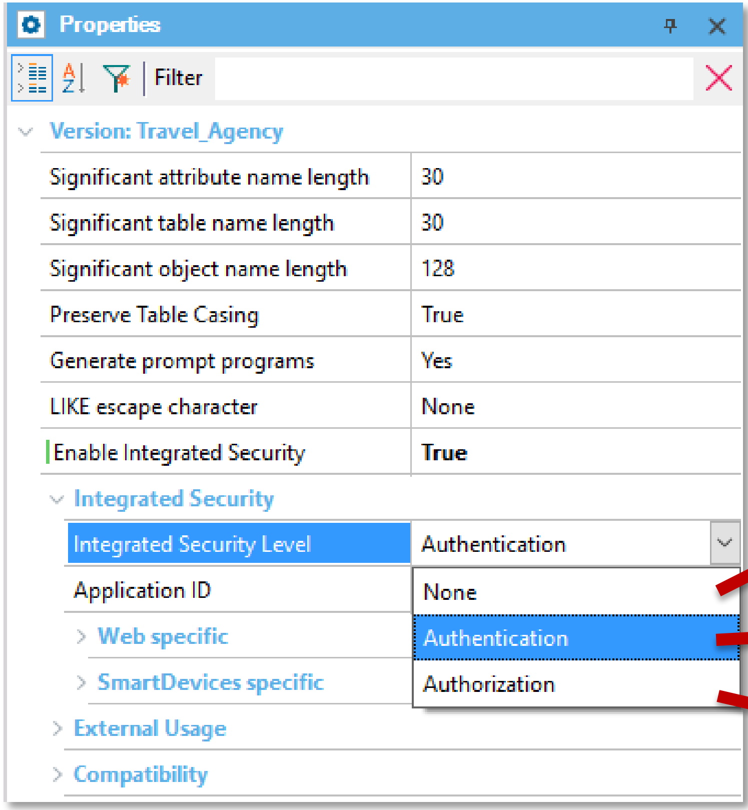


KB Explorer

Open: Name or Pattern ...

```
Travel_Agency
  Main Programs
  Root Module
    GAM_Examples
    GAM_Library
    GeneXus
    Scheduler
    SmartDevicesApi
```

Selecting integretind security level



Properties

Filter

Version: Travel_Agency

Significant attribute name length	30
Significant table name length	30
Significant object name length	128
Preserve Table Casing	True
Generate prompt programs	Yes
LIKE escape character	None
Enable Integrated Security	**True**

Integrated Security

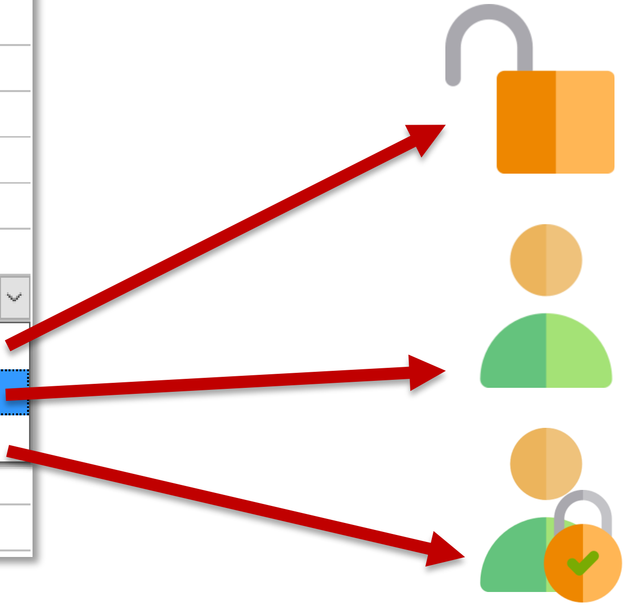
Integrated Security Level	Authentication
Application ID	

Web specific

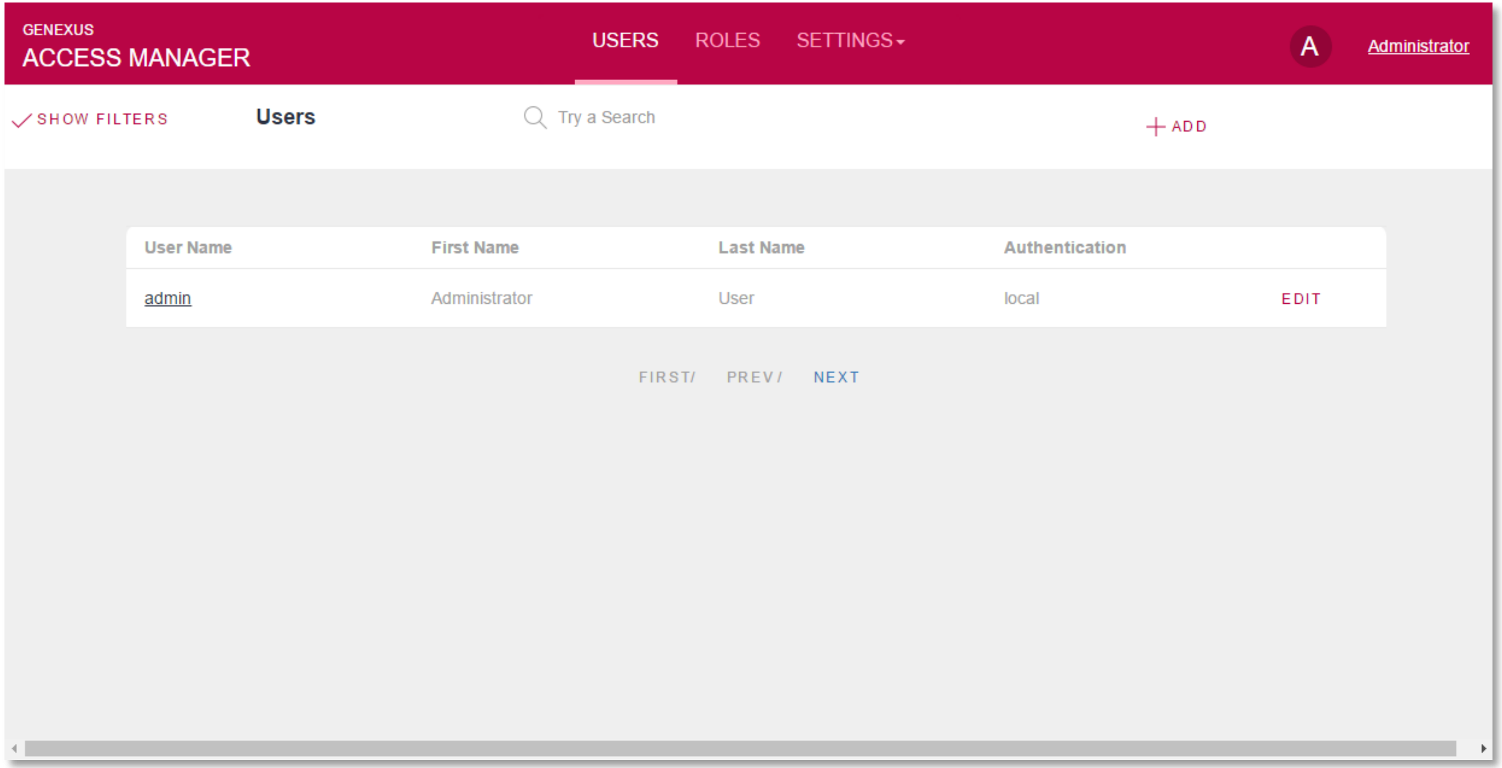
SmartDevices specific

External Usage

Compatibility



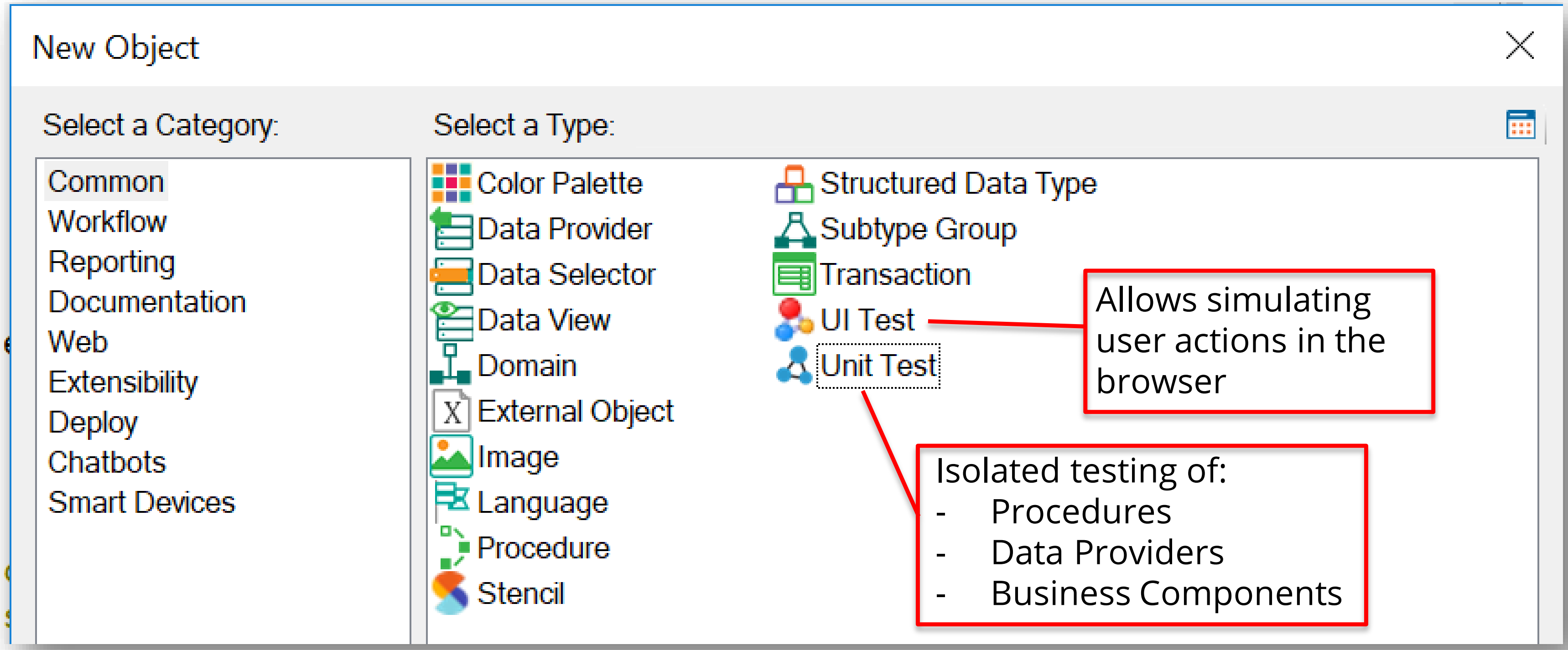
Accesing to GAM backend (GAM Home object)



User Name	First Name	Last Name	Authentication	
admin	Administrator	User	local	EDIT

Testing

Objects to generate unit tests and interface tests


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
UI Test
Unit Test

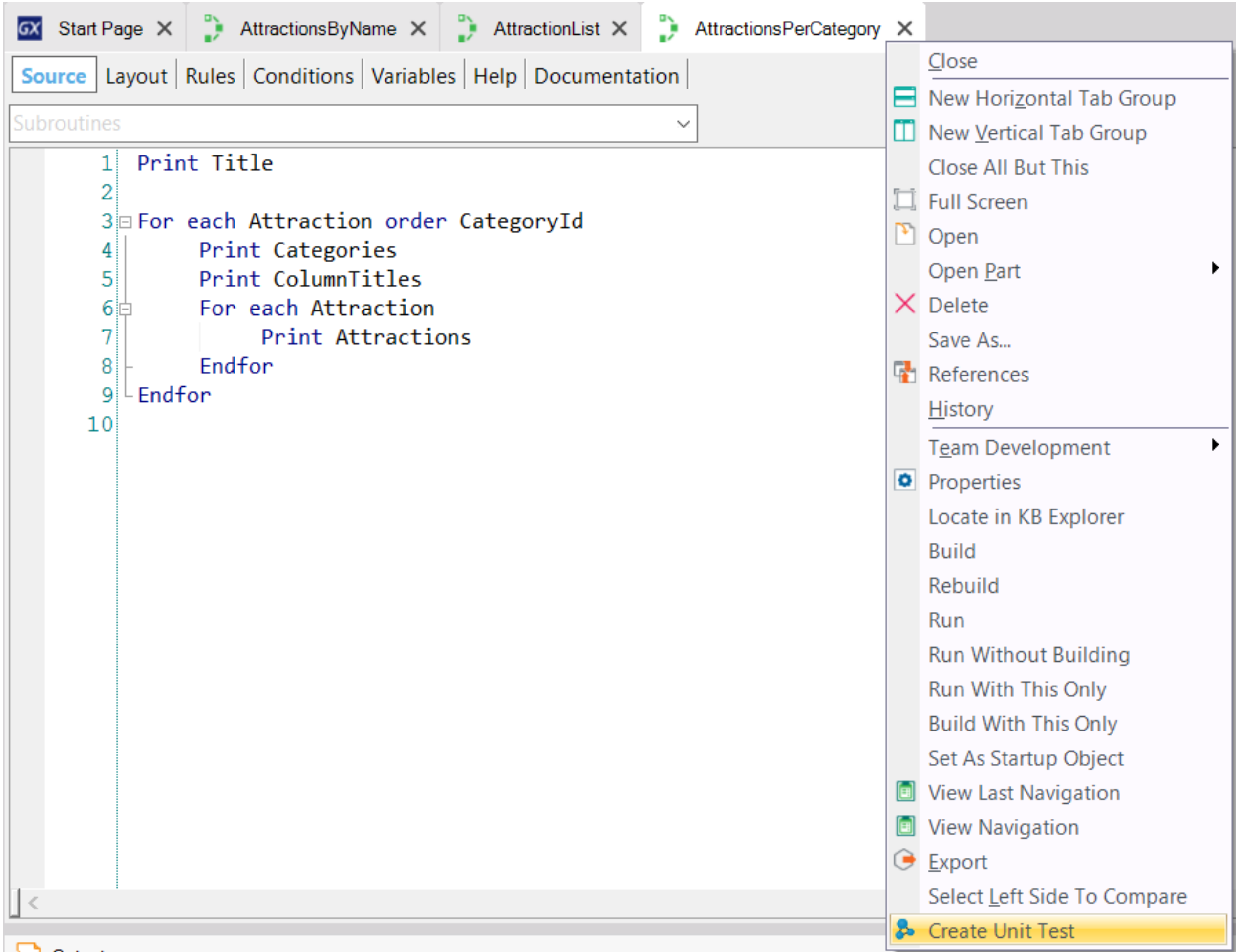
Allows simulating user actions in the browser

Isolated testing of:
- Procedures
- Data Providers
- Business Components

Unit Test

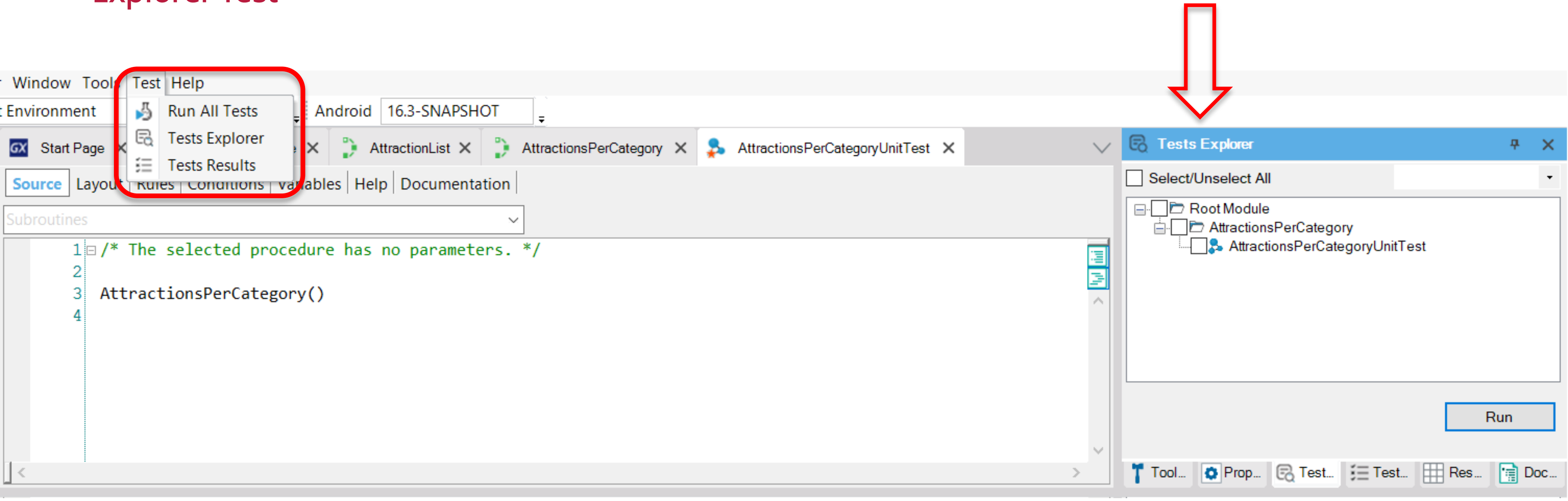
These objects are created:

- <ObjectName>UnitTest
- <ObjectName>UnitTestSDT
- <ObjectName>UnitTestData



```
Print Title

For each Attraction order CategoryId
      Print Categories
      Print ColumnTitles
      For each Attraction
            Print Attractions
      Endfor
Endfor
```

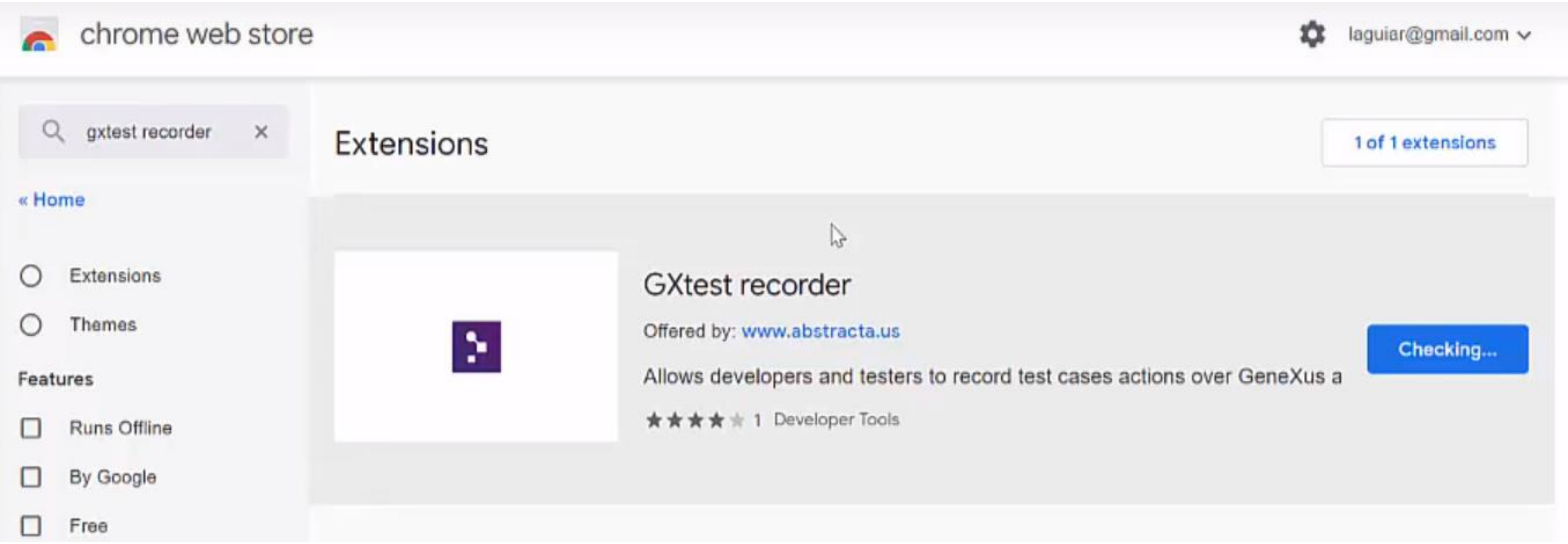
Explorer Test



```
/* The selected procedure has no parameters. */

AttractionsPerCategory()

```

GeneXus™

Interface Test: GXTest



chrome web store

laguiar@gmail.com

gxtest recorder

Extensions

1 of 1 extensions

« Home

Extensions

Themes

Features

Runs Offline

By Google

Free

GXtest recorder

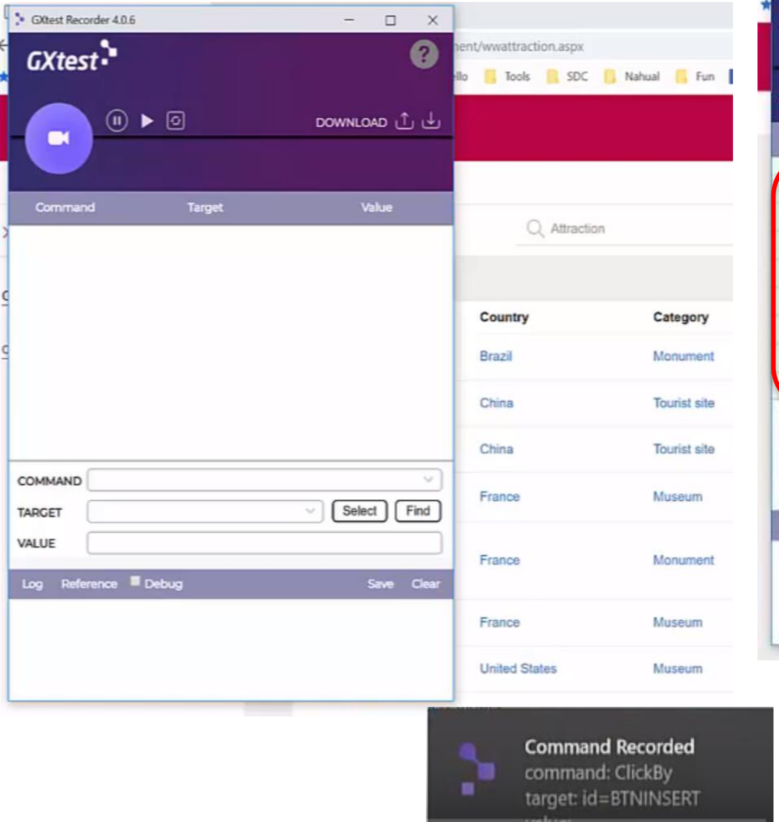
Offered by: www.abstracta.us

Allows developers and testers to record test cases actions over GeneXus a

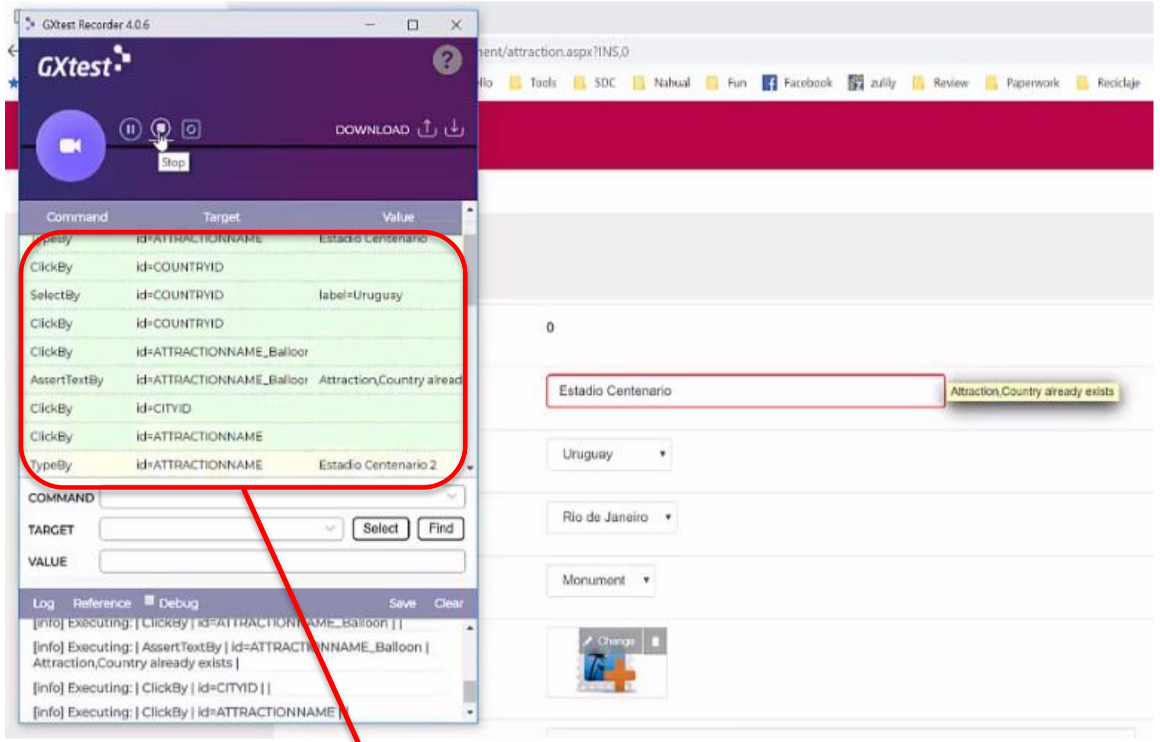
★★★★☆ 1 Developer Tools

Checking...

Interface Test



Command Recorded
command: ClickBy
target: id=BTNINSERT



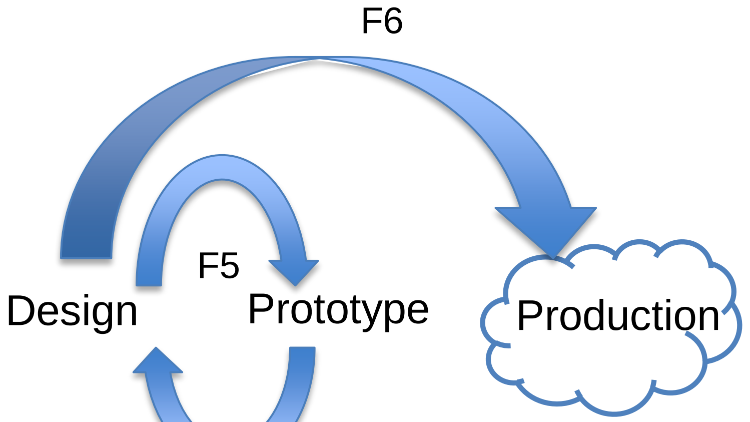
Command	Target	Value
TypeBy	id=ATTRACTIONNAME	Estadio Centenario
ClickBy	id=COUNTRYID	
SelectBy	id=COUNTRYID	label=Uruguay
ClickBy	id=COUNTRYID	
ClickBy	id=ATTRACTIONNAME_Balloon	
AssertTextBy	id=ATTRACTIONNAME_Balloon	Attraction,Country alread
ClickBy	id=CITYID	
ClickBy	id=ATTRACTIONNAME	
TypeBy	id=ATTRACTIONNAME	Estadio Centenario 2

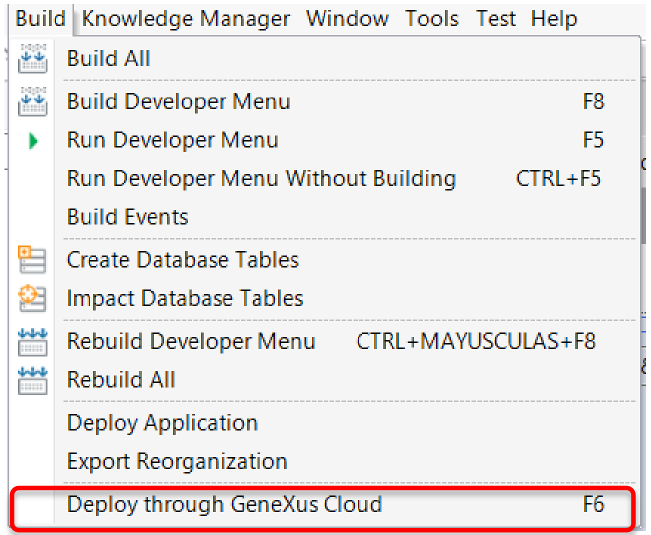
```
[info] Executing: | ClickBy | id=ATTRACTIONNAME_Balloon | |
[info] Executing: | AssertTextBy | id=ATTRACTIONNAME_Balloon |
Attraction,Country already exists |
[info] Executing: | ClickBy | id=CITYID | |
[info] Executing: | ClickBy | id=ATTRACTIONNAME | |
```

UI Test (GXTest license required)

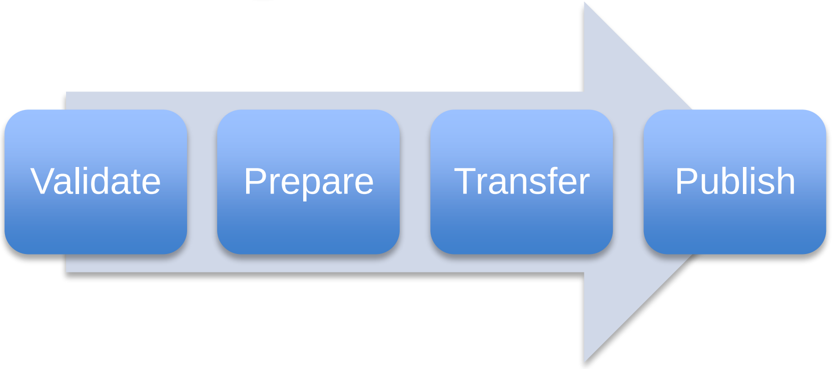
Deployment

Automatic deployment with F6

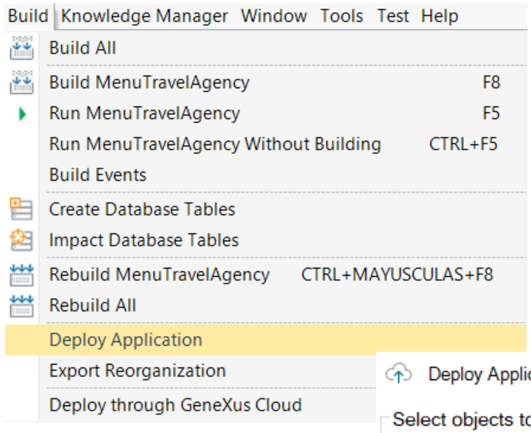



Build Knowledge Manager Window Tools Test Help

Build All	
Build Developer Menu	F8
Run Developer Menu	F5
Run Developer Menu Without Building	CTRL+F5
Build Events	
Create Database Tables	
Impact Database Tables	
Rebuild Developer Menu	CTRL+MAYUSCULAS+F8
Rebuild All	
Deploy Application	
Export Reorganization	
Deploy through GeneXus Cloud	F6

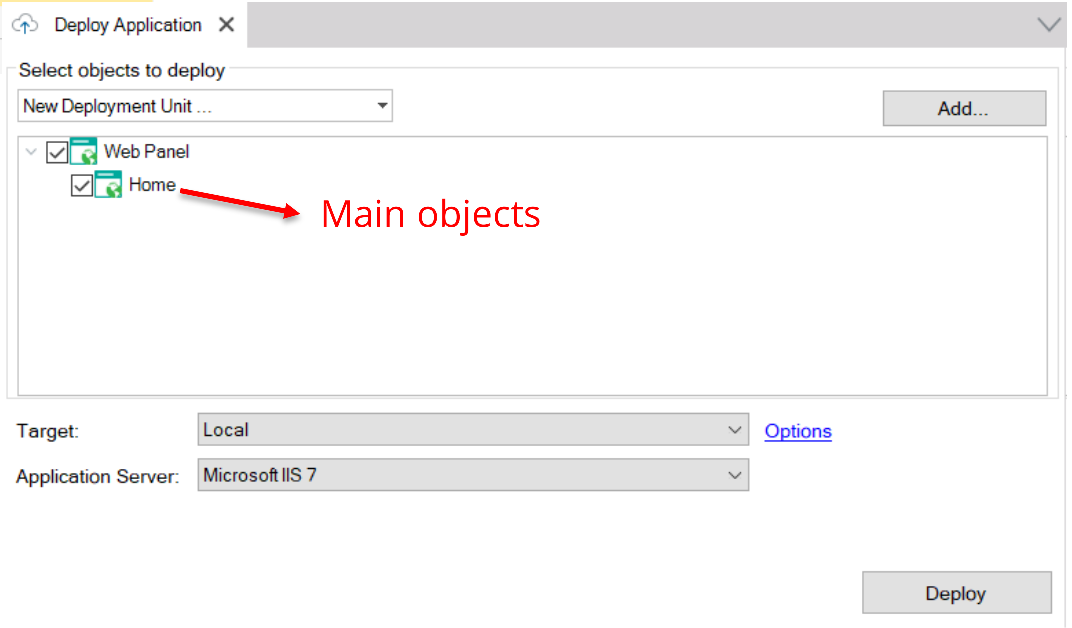


Application Deployment Tool



Build | Knowledge Manager Window Tools Test Help

Build All	
Build MenuTravelAgency	F8
Run MenuTravelAgency	F5
Run MenuTravelAgency Without Building	CTRL+F5
Build Events	
Create Database Tables	
Impact Database Tables	
Rebuild MenuTravelAgency	CTRL+MAYUSCULAS+F8
Rebuild All	
Deploy Application	
Export Reorganization	
Deploy through GeneXus Cloud	



Deploy Application

Select objects to deploy

New Deployment Unit ...

Add...

- [✓] Web Panel
  - [✓] Home

Main objects

Target: Local

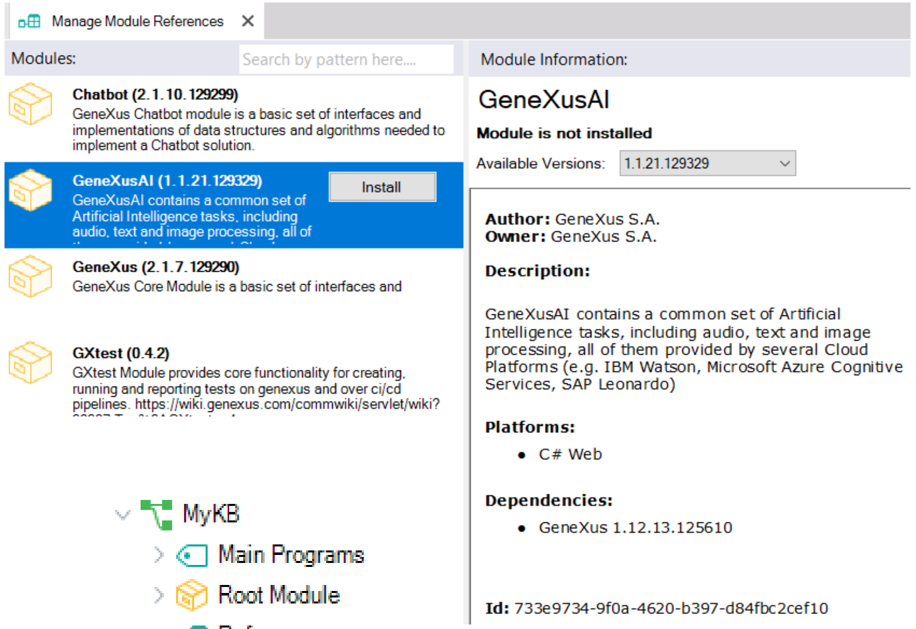
Options

Application Server: Microsoft IIS 7

Deploy

Integration

Artificial Intelligence Module



Manage Module References

Modules: Search by pattern here....

Chatbot (2.1.10.129299)
GeneXus Chatbot module is a basic set of interfaces and implementations of data structures and algorithms needed to implement a Chatbot solution.

GeneXusAI (1.1.21.129329) Install
GeneXusAI contains a common set of Artificial Intelligence tasks, including audio, text and image processing, all of

GeneXus (2.1.7.129290)
GeneXus Core Module is a basic set of interfaces and

GXtest (0.4.2)
GXtest Module provides core functionality for creating, running and reporting tests on genexus and over ci/cd pipelines. https://wiki.genexus.com/commwiki/servlet/wiki?

Module Information:

GeneXusAI

Module is not installed

Available Versions: 1.1.21.129329

Author: GeneXus S.A.
Owner: GeneXus S.A.

Description:

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

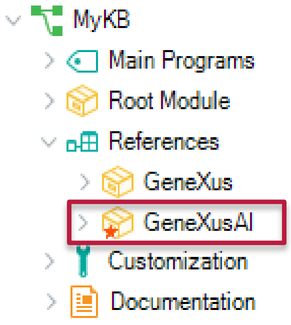
Platforms:

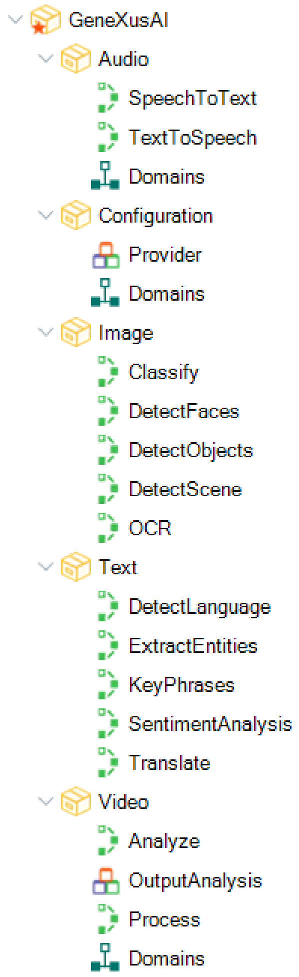
- C# Web

Dependencies:

- GeneXus 1.12.13.125610

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





IBM Watson

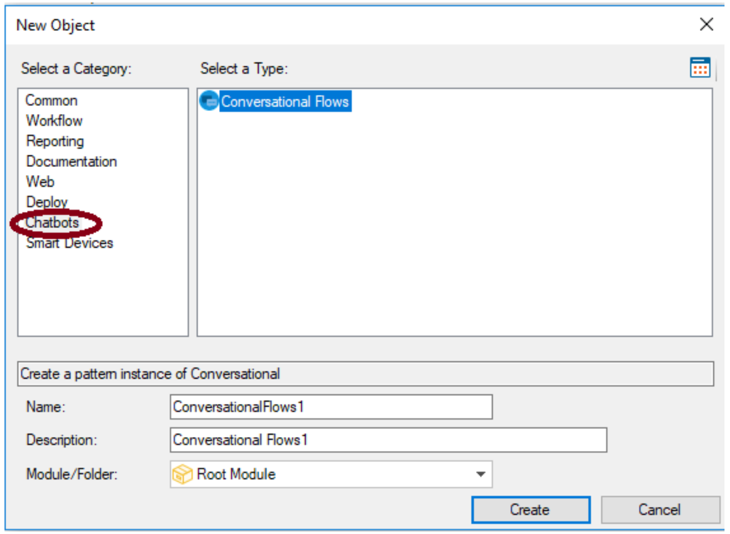
Microsoft Cognitive Services

SAP Leonardo

Google Cloud Services

Amazon Web Services

Chatbots: Conversational Flow object


New Object

Select a Category:

Common
Workflow
Reporting
Documentation
Web
Deploy
Chatbots
Smart Devices

Select a Type:

Conversational Flows

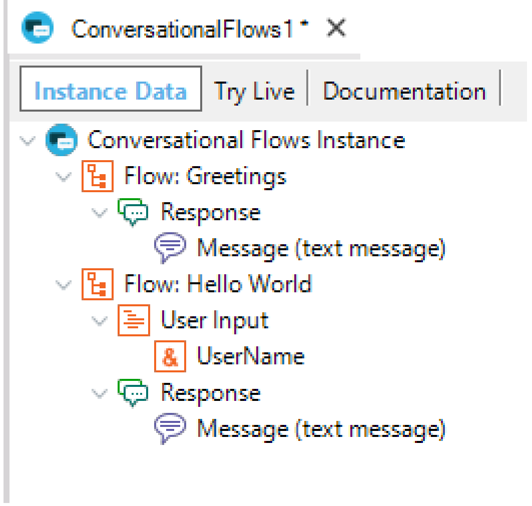
Create a pattern instance of Conversational

Name: ConversationalFlows1

Description: Conversational Flows1

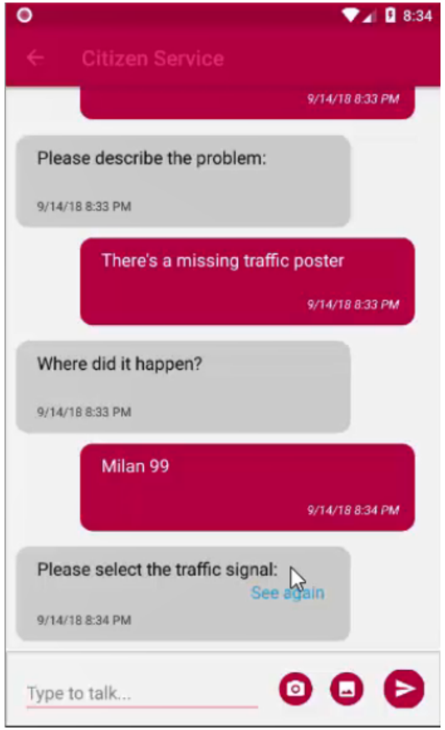
Module/Folder: Root Module

Create | Cancel


ConversationalFlows1 *

Instance Data | Try Live | Documentation

- Conversational Flows Instance
  - Flow: Greetings
    - Response
      - Message (text message)
  - Flow: Hello World
    - User Input
      - UserName
    - Response
      - Message (text message)


8:34

Citizen Service

9/14/18 8:33 PM

Please describe the problem:
9/14/18 8:33 PM

There's a missing traffic poster
9/14/18 8:33 PM

Where did it happen?
9/14/18 8:33 PM

Milan 99
9/14/18 8:34 PM

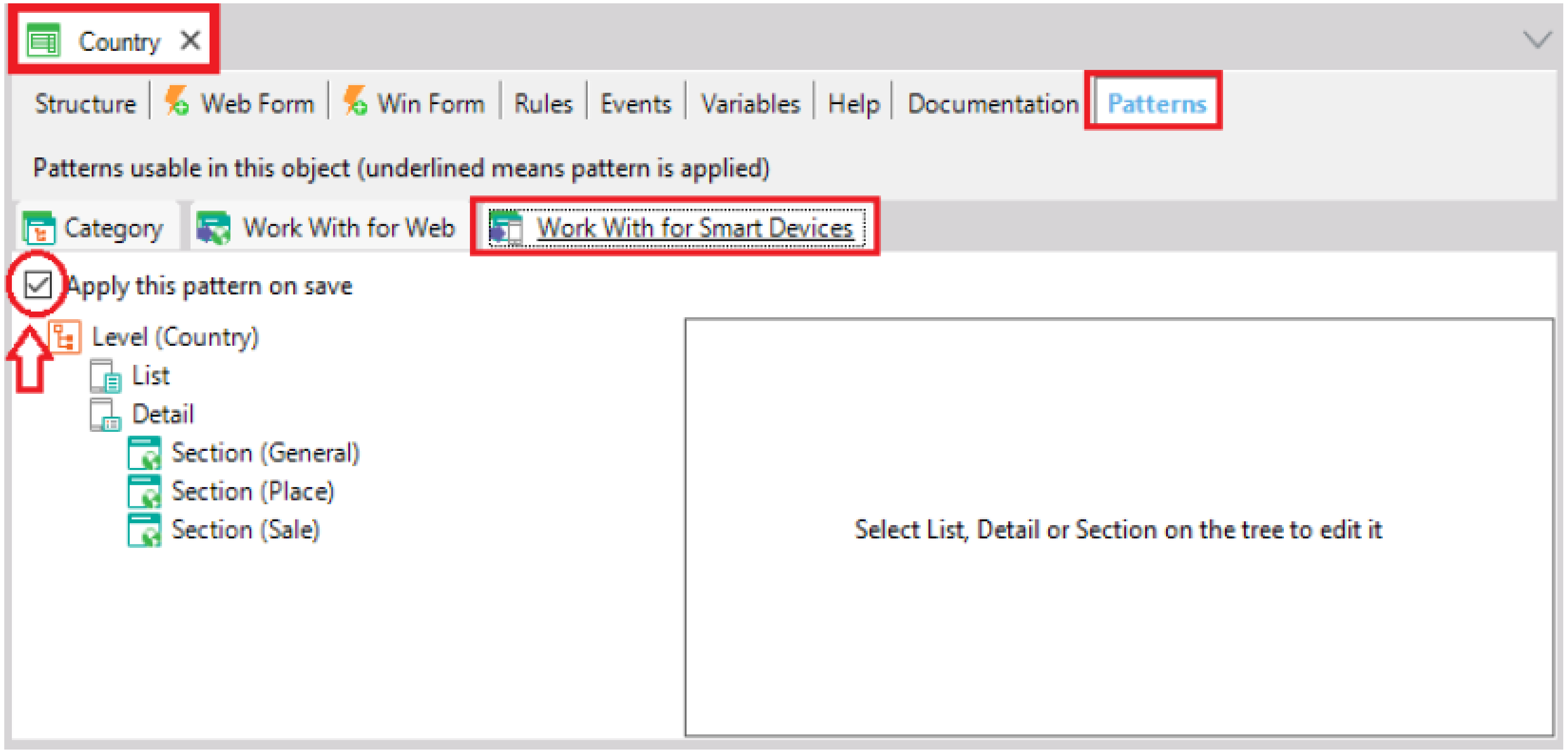
Please select the traffic signal:
See again
9/14/18 8:34 PM

Type to talk...

Smart Devices

GeneXus™

Applying a Pattern to a Transaction

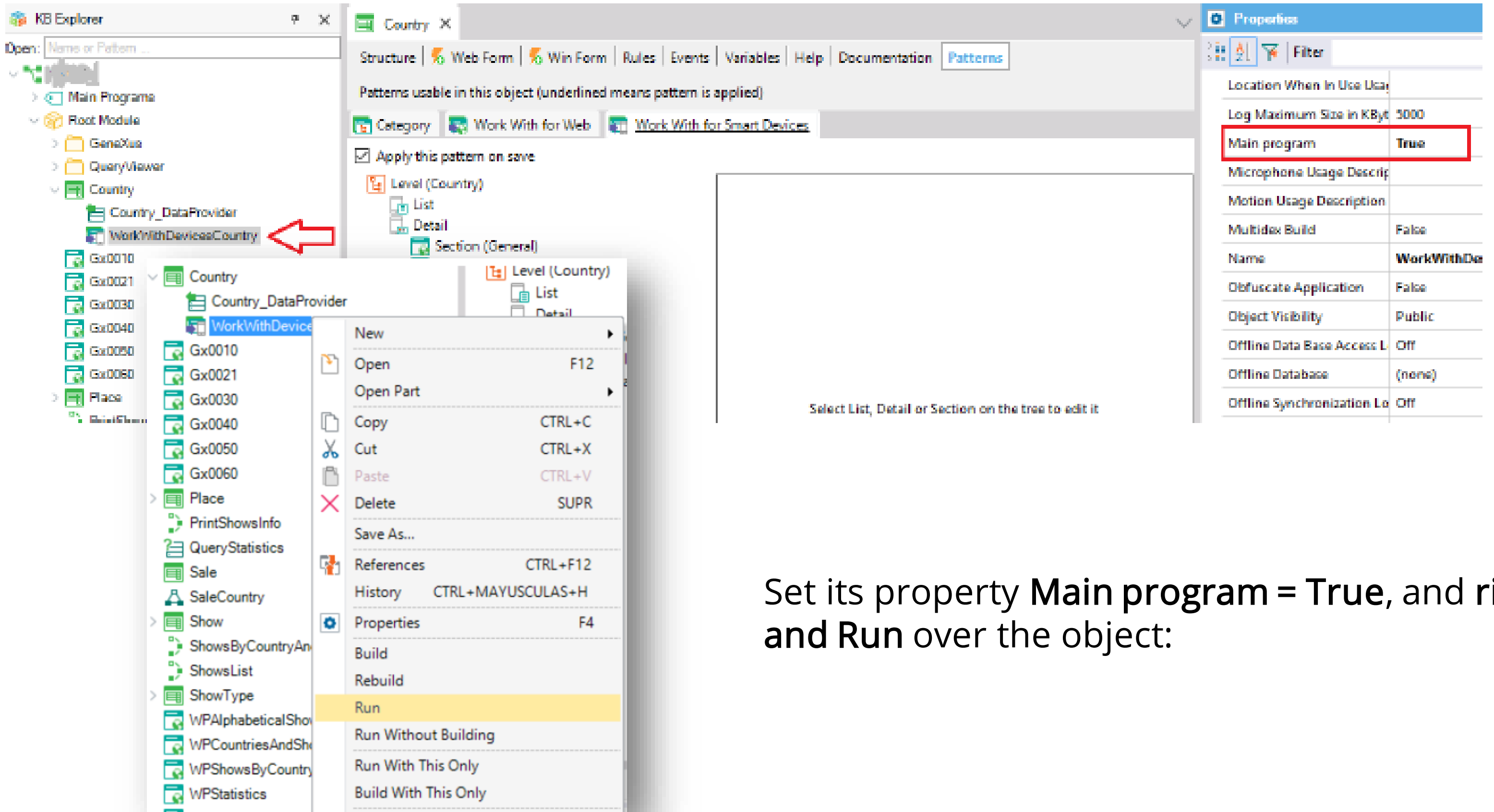


Patterns usable in this object (underlined means pattern is applied)

[✓] Apply this pattern on save

Select List, Detail or Section on the tree to edit it

Applying a Pattern to a Transaction

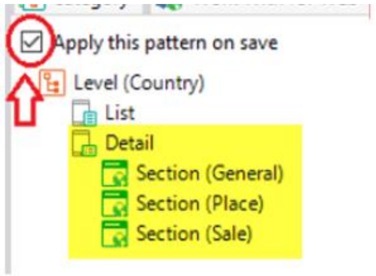


Location When In Use Usa	
Log Maximum Size in KByt	5000
Main program	True
Microphone Usage Descrip	
Motion Usage Description	
Multidex Build	False
Name	WorkWithDe
Obfuscate Application	False
Object Visibility	Public
Offline Data Base Access L	Off
Offline Database	(none)
Offline Synchronization Lo	Off

Set its property **Main program = True**, and **right-click and Run** over the object:

Applying a Pattern to a Transaction

Right-click and Run:



Apply this pattern on save

Level (Country)

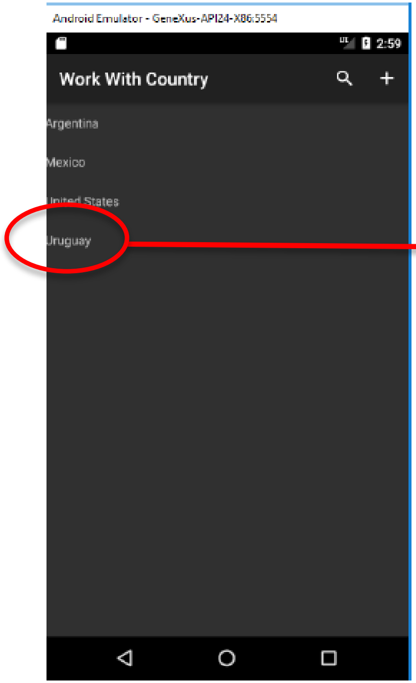
List

Detail

Section (General)

Section (Place)

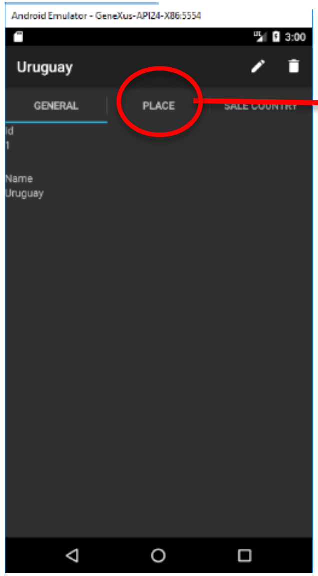
Section (Sale)



Android Emulator - GeneXus-API24-X86:5554

GENERAL

Select 1 country

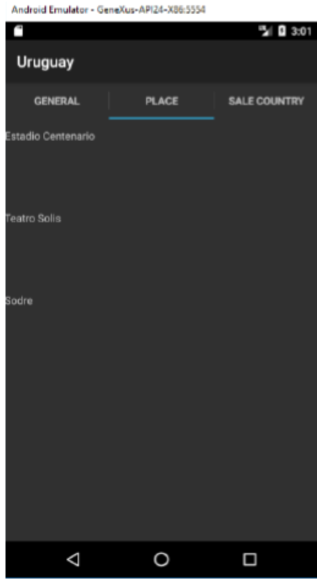


Android Emulator - GeneXus-API24-X86:5554

Id
1

Name
Uruguay

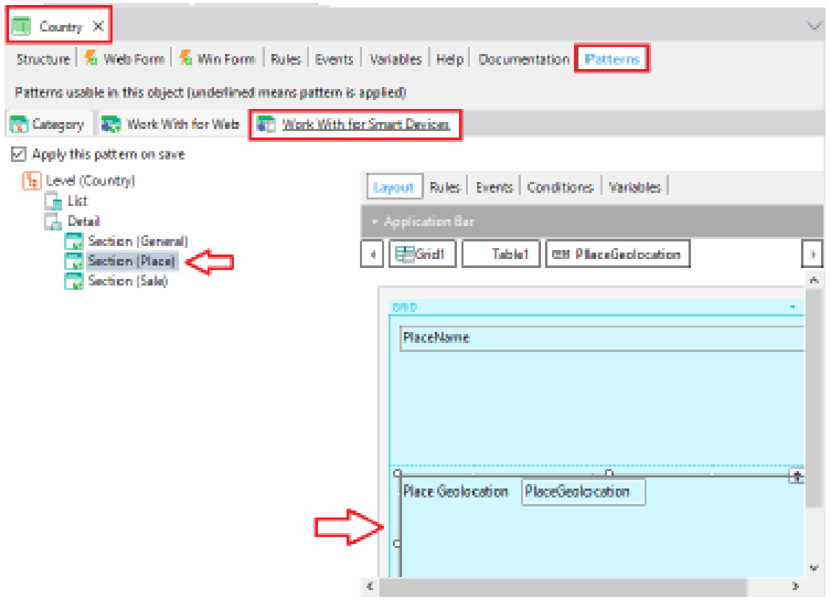
PLACE



Android Emulator - GeneXus-API24-X86:5554

Applying a Pattern to a Transaction

For each place, in addition to its name, we want to see its geolocation.

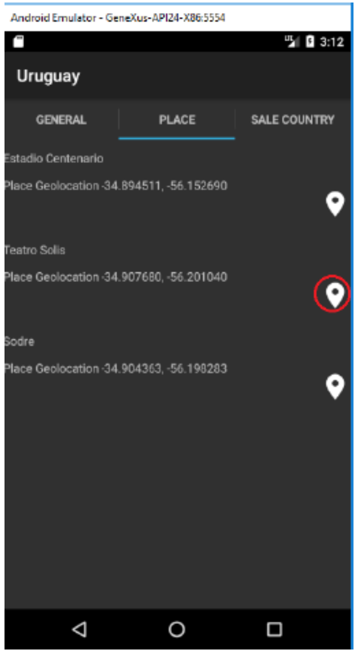


Country
Structure | Web Form | Win Form | Rules | Events | Variables | Help | Documentation | Patterns
Category | Work With for Web | Work With for Smart Devices
Layout | Rules | Events | Conditions | Variables
Application Bar
Grid1 | Table1 | PlaceGeolocation
GRID
PlaceName
Place Geolocation | PlaceGeolocation

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

☑ Apply this pattern on save

- Level (Country)
  - List
  - Detail
    - Section (General)
    - Section (Place)
    - Section (Sale)



Estadio Centenario
Place Geolocation -34.894511, -56.152690

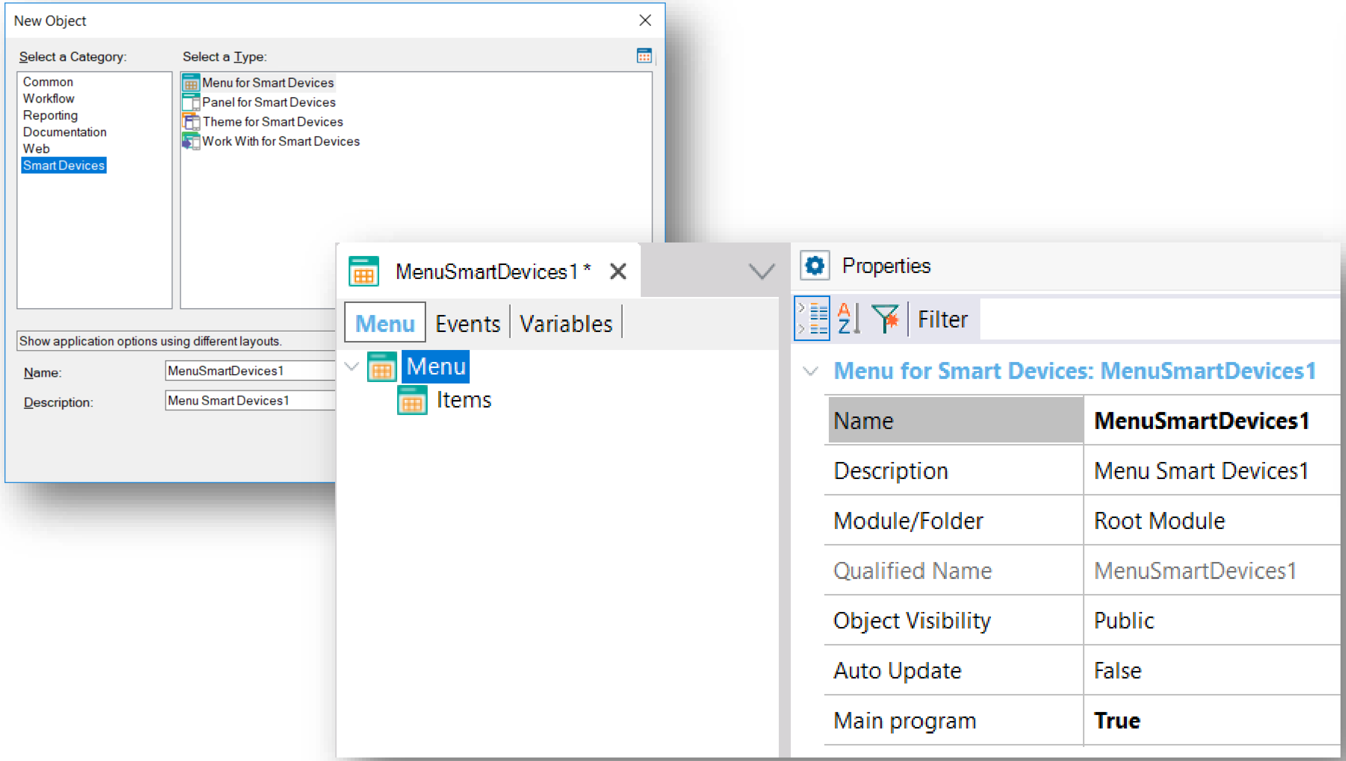
Teatro Solis
Place Geolocation -34.907680, -56.201040

Sodre
Place Geolocation -34.904363, -56.198283

GeneXus™

Access Menu: Menu for Smart Devices

Creation:


New Object

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

Select a Type: Menu for Smart Devices, Panel for Smart Devices, Theme for Smart Devices, Work With for Smart Devices

Show application options using different layouts.

Name: MenuSmartDevices1

Description: Menu Smart Devices1

MenuSmartDevices1 *

Menu | Events | Variables

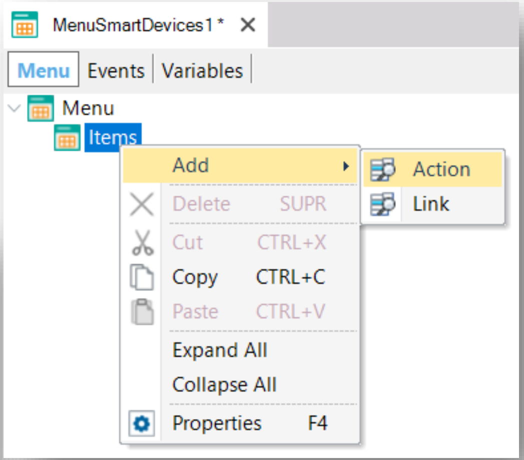
Menu
- Items

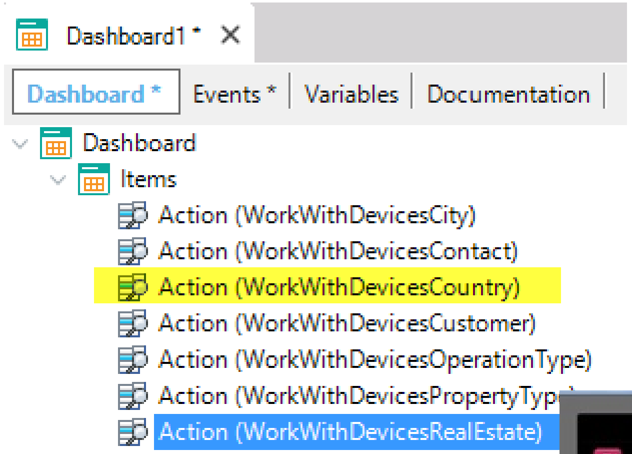
Properties

Menu for Smart Devices: MenuSmartDevices1

Name	**MenuSmartDevices1**
Description	Menu Smart Devices1
Module/Folder	Root Module
Qualified Name	MenuSmartDevices1
Object Visibility	Public
Auto Update	False
Main program	**True**

Add action…

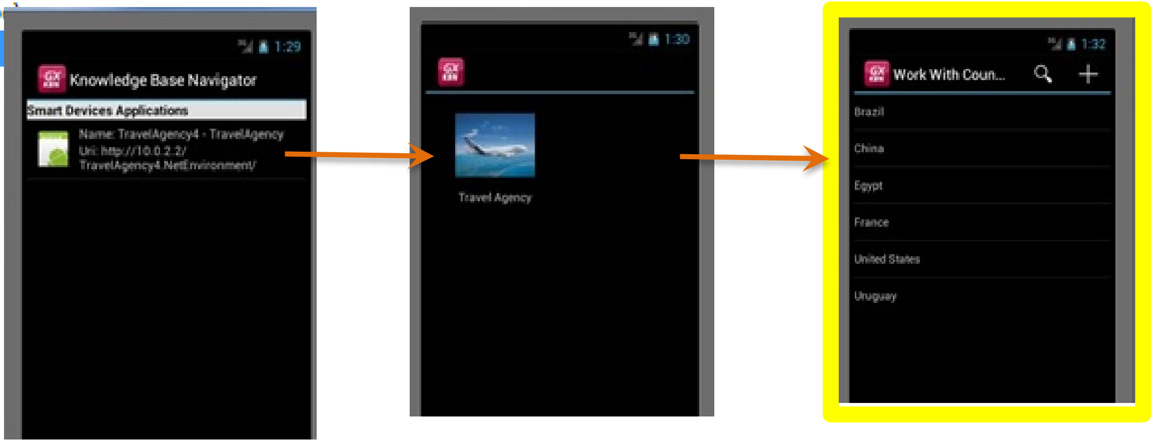



Dashboard1 *

Dashboard * | Events * | Variables | Documentation

- Dashboard
  - Items
    - Action (WorkWithDevicesCity)
    - Action (WorkWithDevicesContact)
    - Action (WorkWithDevicesCountry)
    - Action (WorkWithDevicesCustomer)
    - Action (WorkWithDevicesOperationType)
    - Action (WorkWithDevicesPropertyType)
    - Action (WorkWithDevicesRealEstate)

After pressing F5...


Knowledge Base Navigator

Smart Devices Applications

Name: TravelAgency4 - TravelAgency
Uri: http://10.0.2.2/TravelAgency4.NetEnvironment/

Travel Agency

Work With Coun...

Brazil
China
Egypt
France
United States
Uruguay

GeneXus™

Videos	training.genexus.com
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Certifications	training.genexus.com/certifications