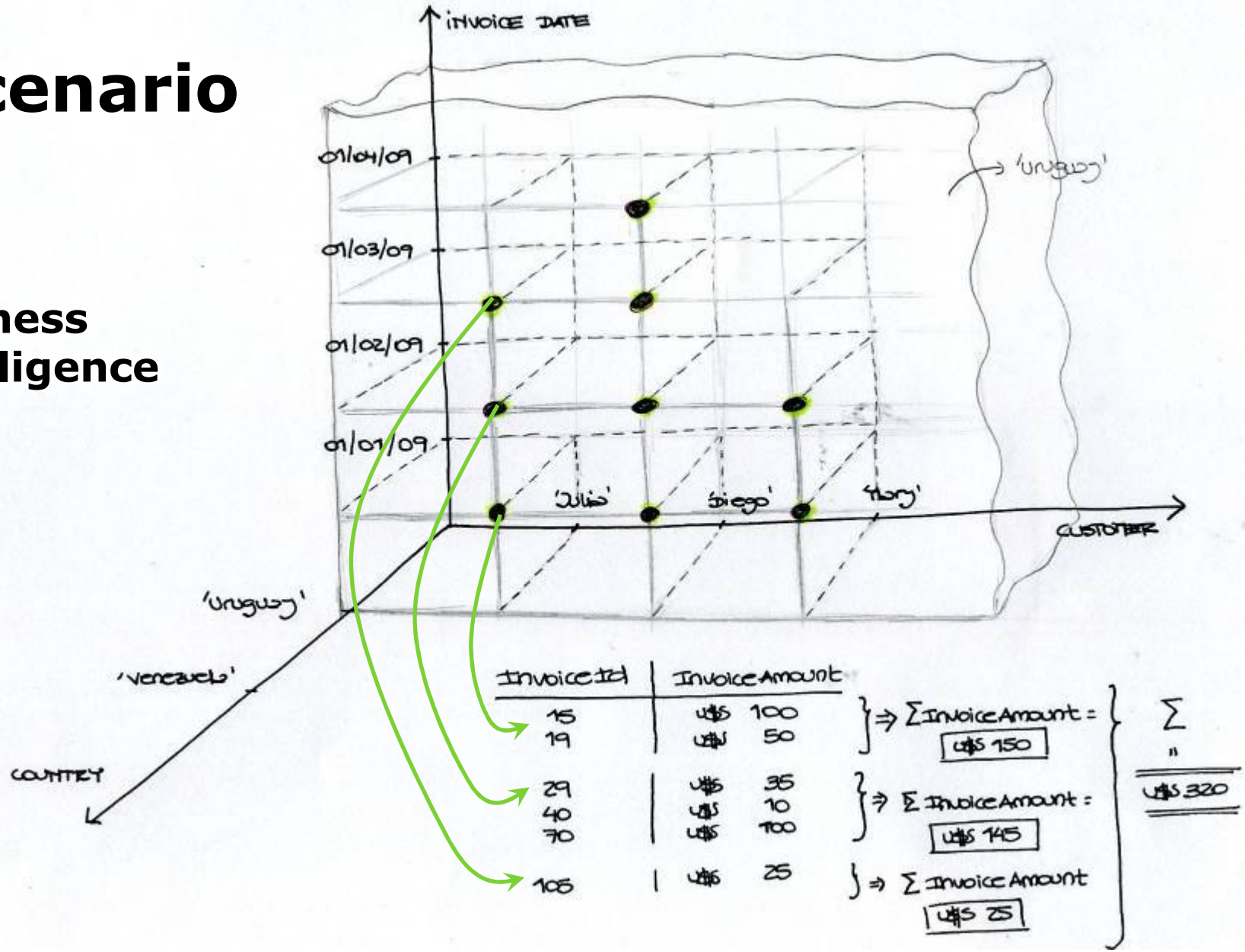
GeneXus
Grow thru knowledge

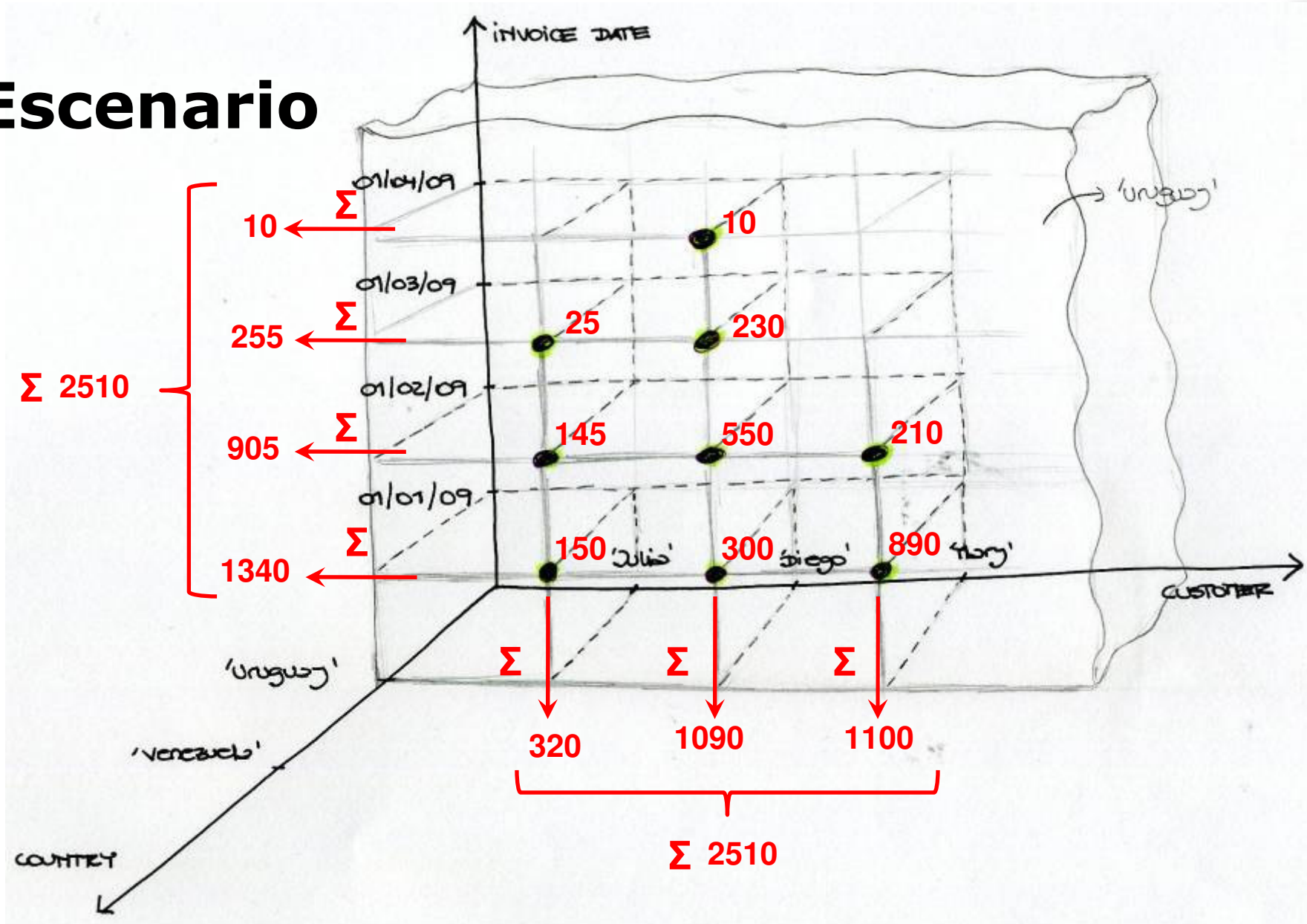
Objeto Query

Escenario

Business Intelligence



Escenario


INVOICE DATE
01/04/09
01/03/09
01/02/09
01/01/09
10
255
905
1340
Σ 2510
10
25
230
145
550
210
150
300
890
'Julia'
'Diego'
'Mary'
'Uruguay'
CUSTOMER
'Uruguay'
'Venezuela'
COUNTRY
320
1090
1100
Σ 2510

Tablas dinámicas

Country	Customer	Invoice Date	Sum (Invoice Amount)
Uruguay	Diego	01/01/09	300.00
		01/02/09	550.00
		01/03/09	230.00
		01/04/09	10.00
	Total of 'Diego'		**1090.00**
	Julia	01/01/09	150.00
		01/02/09	145.00
		01/03/09	25.00
	Total of 'Julia'		**320.00**
	Mary	01/01/09	890.00
		01/02/09	210.00
	Total of 'Mary'		**1100.00**
Total of 'Uruguay'			**2510.00**
Grand Total			**2510.00**

Country	Invoice Date	Customer	Sum (Invoice Amount)
Uruguay	01/01/09	Diego	300.00
		Julia	150.00
		Mary	890.00
	Total of '01/01/09'		**1340.00**
	01/02/09	Diego	550.00
		Julia	145.00
		Mary	210.00
	Total of '01/02/09'		**905.00**
	01/03/09	Diego	230.00
		Julia	25.00
	Total of '01/03/09'		**255.00**
	01/04/09	Diego	10.00
	Total of '01/04/09'		**10.00**
Total of 'Uruguay'			**2510.00**
Grand Total			**2510.00**

Como columna

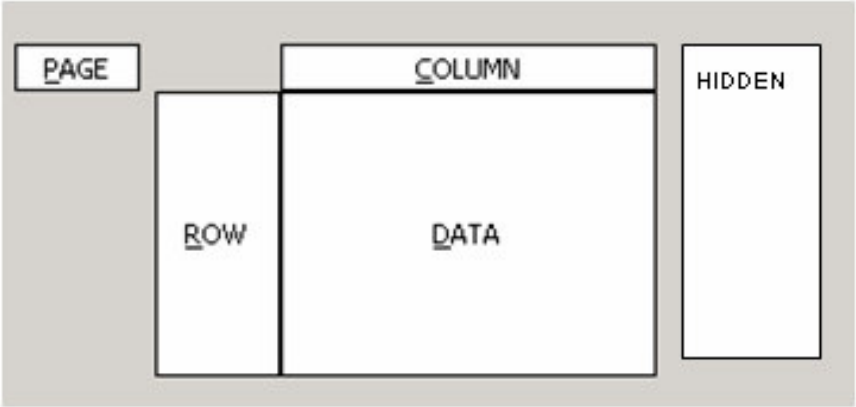
Country	Customer	Invoice Date				Grand Total
		01/01/09	01/02/09	01/03/09	01/04/09	
		Sum (Invoice Amount)	Sum (Invoice Amount)	Sum (Invoice Amount)	Sum (Invoice Amount)	**Sum (Invoice Amount)**
Uruguay	Diego	300.00	550.00	230.00	10.00	**1090.00**
	Julia	150.00	145.00	25.00		**320.00**
	Mary	890.00	210.00			**1100.00**
Total of 'Uruguay'		**1340.00**	**905.00**	**255.00**	**10.00**	**2510.00**
Grand Total		**1340.00**	**905.00**	**255.00**	**10.00**	**2510.00**

Tablas dinámicas

GeneXus
Grow thru knowledge

Invoice Date → Como página

Country	Customer	Sum (Invoice Amount)
Uruguay	Diego	1090.00
	Julia	320.00
	Mary	1100.00
Total of 'Uruguay'		**2510.00**
Grand Total		**2510.00**



Sum (Invoice Amount)

Invoice Date

- [x] 01/01/09
- [ ] 01/02/09
- [x] 01/03/09
- [ ] 01/04/09
- [x] TOTAL

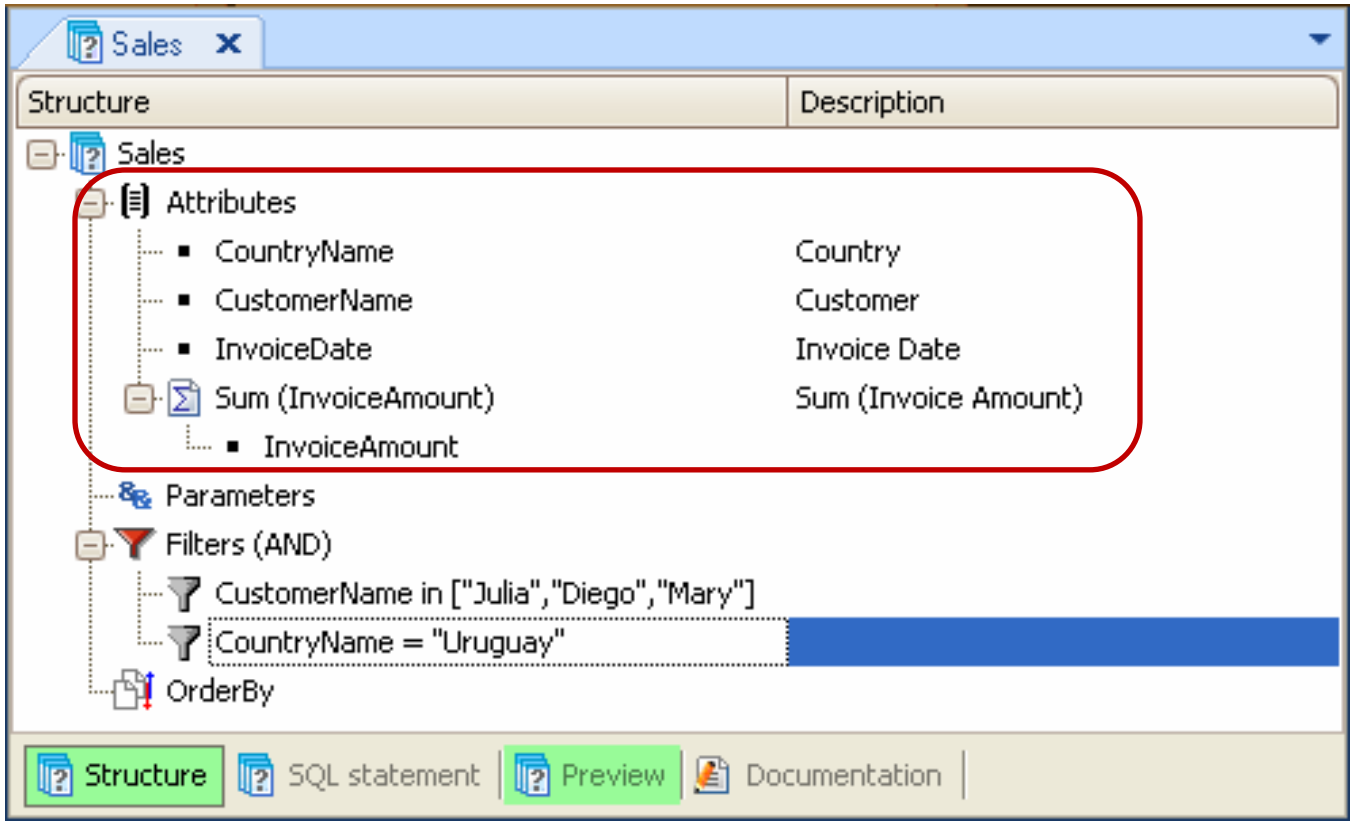
Sum (Invoice Amount)
1090.00
320.00
1100.00
2510.00
2510.00

Invoice Date

Country	Customer	Sum (Invoice Amount)
Uruguay	Diego	530.00
	Julia	175.00
	Mary	890.00
Total of 'Uruguay'		**1595.00**
Grand Total		**1595.00**

La consulta

Objeto Query



Análogo a un corte de control que corta primero por CountryName, luego por CustomerName y luego por InvoiceDate, y para los registros de este último grupo, sumariza InvoiceAmount.

Observación: se busca tabla extendida que contenga CountryName, CustomerName, InvoiceDate e InvoiceAmount.

Como reporte (objeto Procedure):

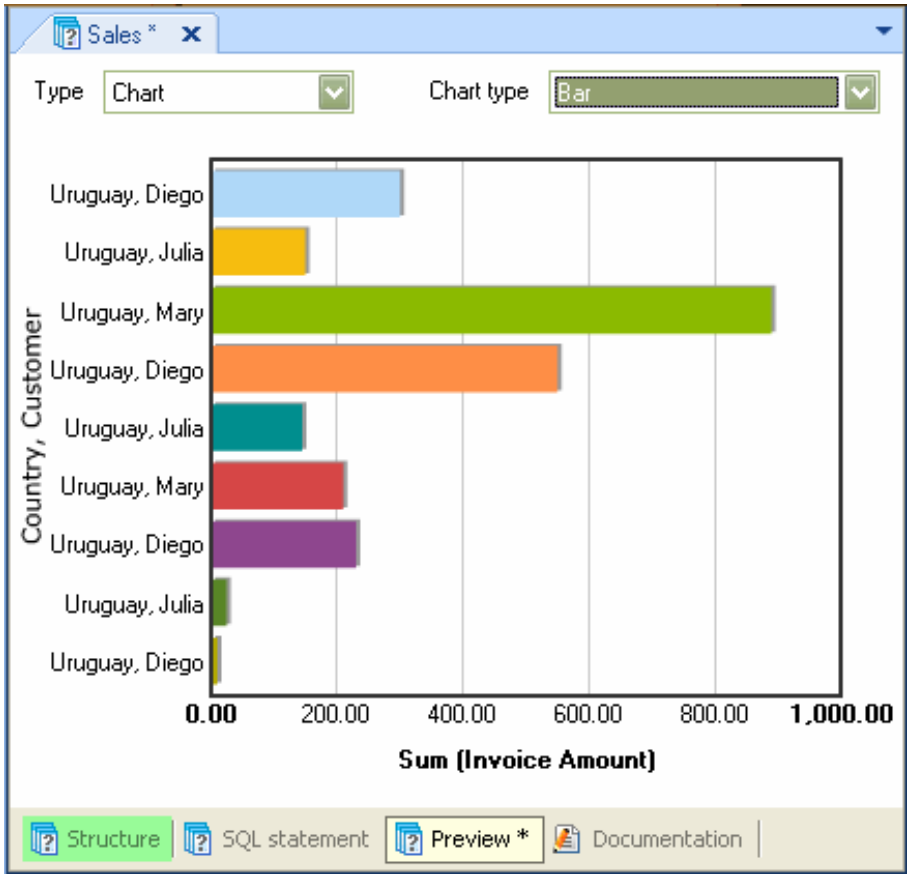
```
For each order CountryName
Defined by InvoiceDate
   print Country
   For each order CustomerName
      print Customer
      For each order InvoiceDate
         &sum = 0
         For each
               &sum += InvoiceAmount
         endfor
         Print DateWithSum
      endfor
   endfor
endfor
```

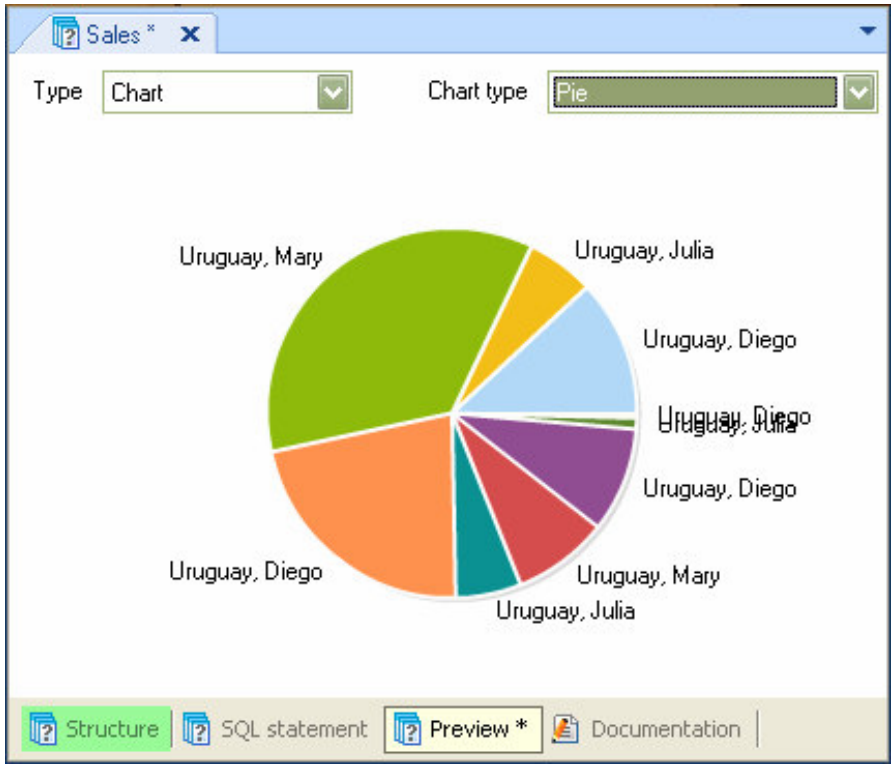
Pero el usuario no tiene la libertad de cortar la información “pivoteando” (en distinto orden), ni de mostrarla de diferentes formas…

En cambio con un objeto Query…

Conditions: CustomerName in [“Julia”, “Diego”, “Mary”]
CountryName = “Uruguay”

Salida: Gráfica





Salida: Tabla plana

Sales *

Type: Table Chart type: Pie

Country	Customer	Invoice Date	Sum (Invoice Amount)
Uruguay	Diego	01/01/09	300.00
Uruguay	Julia	01/01/09	150.00
Uruguay	Mary	01/01/09	890.00
Uruguay	Diego	01/02/09	550.00
Uruguay	Julia	01/02/09	145.00
Uruguay	Mary	01/02/09	210.00
Uruguay	Diego	01/03/09	230.00
Uruguay	Julia	01/03/09	25.00
Uruguay	Diego	01/04/09	10.00

Structure | SQL statement | Preview * | Documentation

Salida: Tabla dinámica

Sales *

Type: PivotTable Chart type: Pie

Sum (Invoice Amount)

Country	Customer	Invoice Date	Sum (Invoice Amount)
Uruguay	Diego	01/01/09	300.00
		01/02/09	550.00
		01/03/09	230.00
		01/04/09	10.00
	Total of 'Diego'		**1090.00**
	Julia	01/01/09	150.00
		01/02/09	145.00
		01/03/09	25.00
	Total of 'Julia'		**320.00**
	Mary	01/01/09	890.00
		01/02/09	210.00
	Total of 'Mary'		**1100.00**
Total of 'Uruguay'			**2510.00**
Grand Total			**2510.00**

Structure | SQL statement | Preview * | Documentation

Manipulable:

Country	Invoice Date	Customer	Sum (Invoice Amount)
Uruguay	01/01/09	Diego	300.00
		Julia	150.00
		Mary	890.00
	Total of '01/01/09'		**1340.00**
	01/02/09	Diego	550.00
		Julia	145.00
		Mary	210.00
	Total of '01/02/09'		**905.00**
	01/03/09	Diego	230.00
		Julia	25.00
	Total of '01/03/09'		**255.00**
	01/04/09	Diego	10.00
	Total of '01/04/09'		**10.00**
Total of 'Uruguay'			**2510.00**
Grand Total			**2510.00**

Country	Customer	Invoice Date				Grand Total
		01/01/09	01/02/09	01/03/09	01/04/09	
		Sum (Invoice Amount)	Sum (Invoice Amount)	Sum (Invoice Amount)	Sum (Invoice Amount)	**Sum (Invoice Amount)**
Uruguay	Diego	300.00	550.00	230.00	10.00	**1090.00**
	Julia	150.00	145.00	25.00		**320.00**
	Mary	890.00	210.00			**1100.00**
Total of 'Uruguay'		**1340.00**	**905.00**	**255.00**	**10.00**	**2510.00**
Grand Total		**1340.00**	**905.00**	**255.00**	**10.00**	**2510.00**

Business Intelligence
Reporting

- Sustitución de reportes por consultas dinámicas.
  - Independencia del analista para nuevos reportes.
  - Rapidez en satisfacer requerimientos de nuevos reportes.
  - Potencia en la manipulación de datos.

Objeto Query

Secciones

GeneXus
Grow thru knowledge

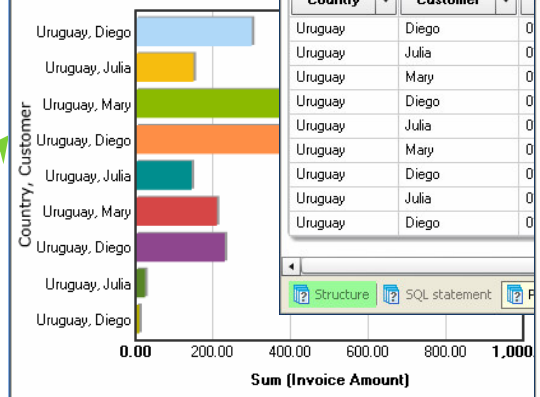
Sales

Structure	Description
Sales	
Attributes	
CountryName	Country
CustomerName	Customer Name
InvoiceDate	Invoice Date
Sum (InvoiceAmount)	Sum (Invoice Amount)
Parameters	
Filters (AND)	
OrderBy	

Structure | SQL statement | Preview | Documentation

Prototipación

Sales * — Type: Chart



Structure | SQL statement | Preview * | Documentation

Sales * — Type: Table

Country	Customer	
Uruguay	Diego	0
Uruguay	Julia	0
Uruguay	Mary	0
Uruguay	Diego	0
Uruguay	Julia	0
Uruguay	Mary	0
Uruguay	Diego	0
Uruguay	Julia	0
Uruguay	Diego	0

Structure | SQL statement

Sales * — Type: PivotTable — Chart type: Pie

Sum (Invoice Amount)

Country	Customer	Invoice Date	Sum (Invoice Amount)
Uruguay	Diego	01/01/09	300.00
		01/02/09	550.00
		01/03/09	230.00
		01/04/09	10.00
	Total of 'Diego'		1090.00
	Julia	01/01/09	150.00
		01/02/09	145.00
		01/03/09	25.00
	Total of 'Julia'		320.00
	Mary	01/01/09	890.00
		01/02/09	210.00
	Total of 'Mary'		1100.00
Total of 'Uruguay'			2510.00
Grand Total			2510.00

Structure | SQL statement | Preview * | Documentation

Sales

```
SELECT    Country,
          "Customer Name",
          "Invoice Date",
          Sum("iSum (Invoice Amount)") AS "Sum (Invoice Amount)"
FROM      (SELECT T3.[CountryName]                AS Country,
                  T2.[CustomerName]               AS "Customer Name",
                  CASE
                    WHEN T1.[InvoiceDate] <= Convert(DATETIME,'17530
                    THEN NULL
                    ELSE T1.[InvoiceDate]
                  END AS "Invoice Date",
                  Coalesce(T4.[InvoiceAmount],0) AS "iSum (Invoice Ar
           FROM   ((([Invoice] T1 WITH (NOLOCK)
```

Structure | SQL statement | Preview | Documentation

Output — Show: General — Autoscroll

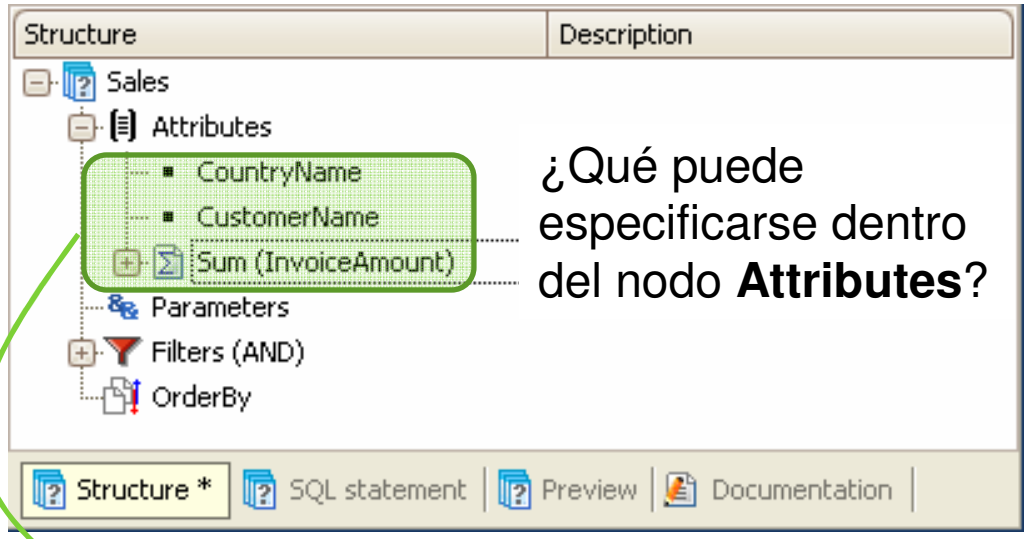
```
========== SQL statement generation started ==========
Generating Sales ...
SQL statement generation Success
```

Output — Show: General — Autoscroll

```
========== SQL statement generation started ==========
Generating NewQuery ...
SQL statement generation Failed
error: No relationship found among attributes. (Query 'NewQuery', Structure)
error: Unexpected error calculating SQL statement
```

Objeto Query: Estructura

Attributes



¿Qué puede especificarse dentro del nodo **Attributes**?

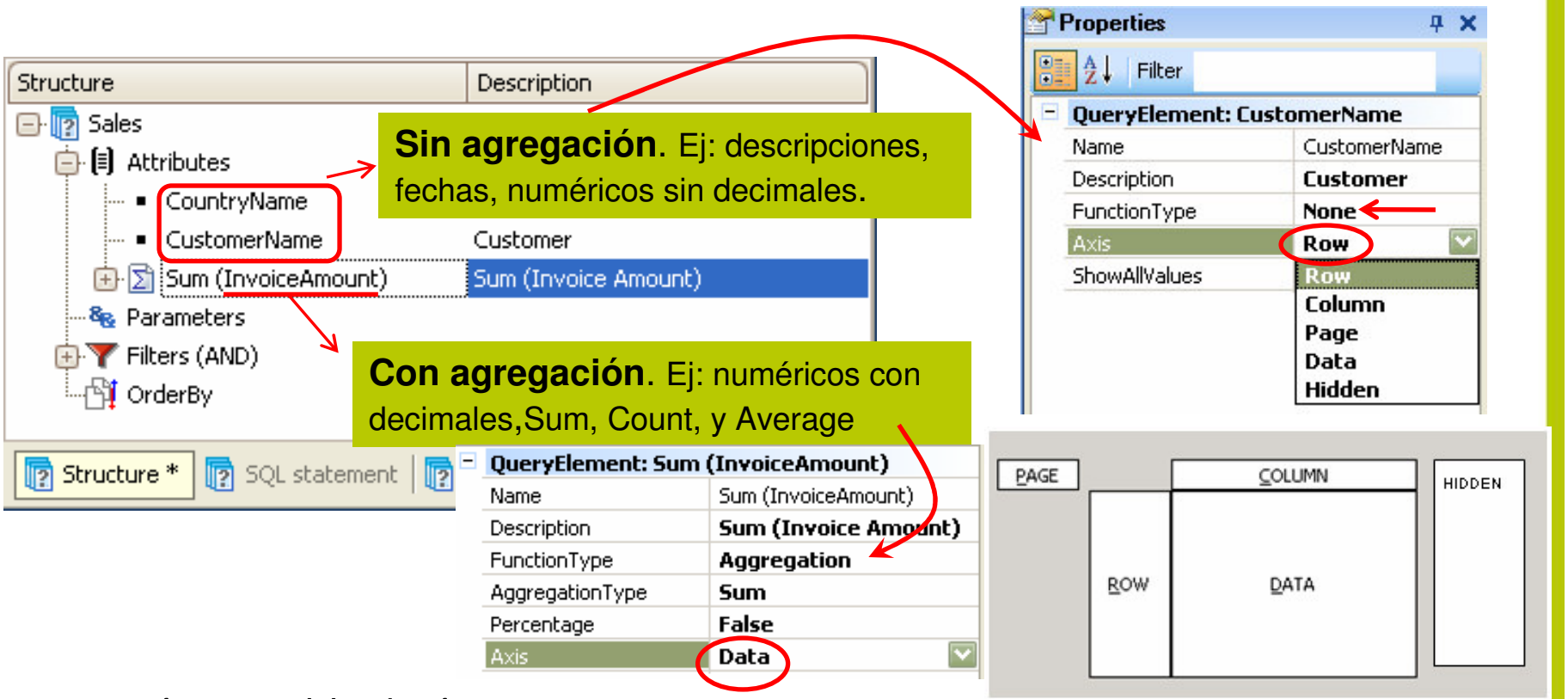
Los atributos (simples, agregados o en expresiones) que compongan la consulta que desea realizarse.

- Atributos
- Funciones de agregación
  - Simples (Sum, Count, Average)
  - Condicionadas
- Expresiones

Lectura opcional

Objeto Query: Estructura

Attributes



- Posición en tabla dinámica:
  - Área de ejes: se elige Fila, Columna, Página u oculto.
  - Área de datos: se sumarizan según los ejes.

Lectura opcional

Objeto Query: Estructura

Attributes: Funciones de agregación

- Especifican los **datos** a obtener: **Sum**, **Count**, **Average**.

Sales

Structure	Description
Sales	
Attributes	
CountryName	Country
CustomerName	Customer
Sum (InvoiceAmount)	Sum (Invoice Amount)
Count (InvoiceId)	Count (Invoice Id)
Average (InvoiceAmount) By (InvoiceDate)	Average (Invoice Amount) By (InvoiceDate)
Parameters	
Filters (AND)	
OrderBy	

Structure | SQL statement | Preview | Documentation

Suma de las ventas del cliente

Cantidad de facturas del cliente

Promedio diario de facturación por cliente

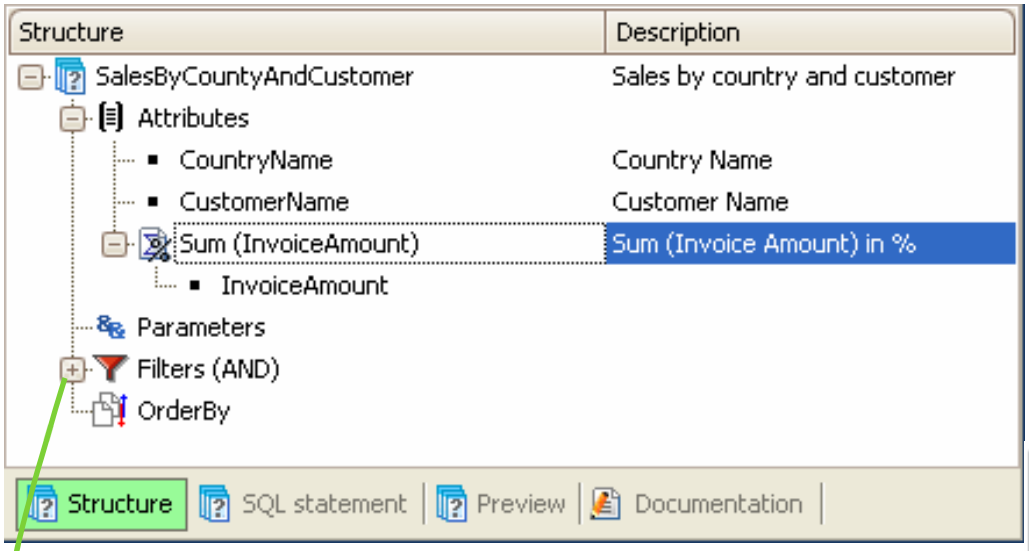
- Se pueden anidar agregaciones. Ej: `Average(Count(InvoiceId)`

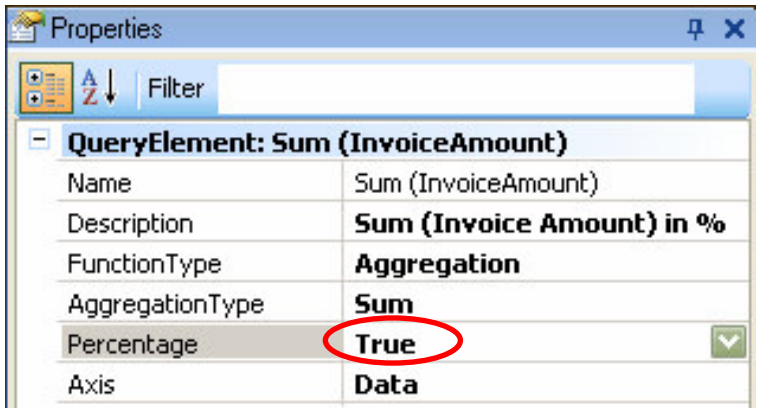
Lectura opcional

Objeto Query: Estructura

Attributes: Funciones de agregación

- **Aggregate en percentage:** Los resultados de cualquier función de agregación pueden mostrarse como porcentaje.





Country Name	Customer Name	Sum (Invoice Amount) in %
Uruguay	Diego	43.43%
	Julia	12.75%
	Mary	43.82%
Total of 'Uruguay'		**100.00%**
Grand Total		**100.00%**

Nota: Se está filtrando por Uruguay, por eso es el 100%

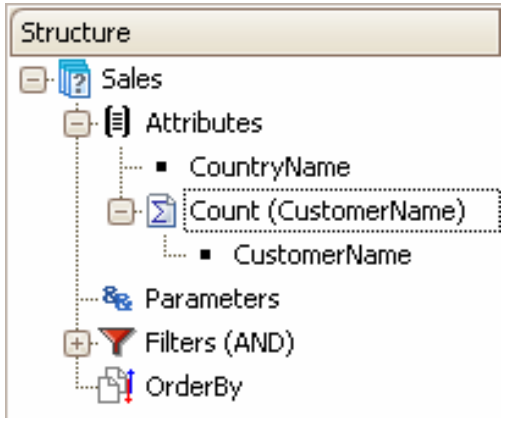
Lectura opcional

Objeto Query: Estructura

Attributes: Funciones de agregación

- **Count**

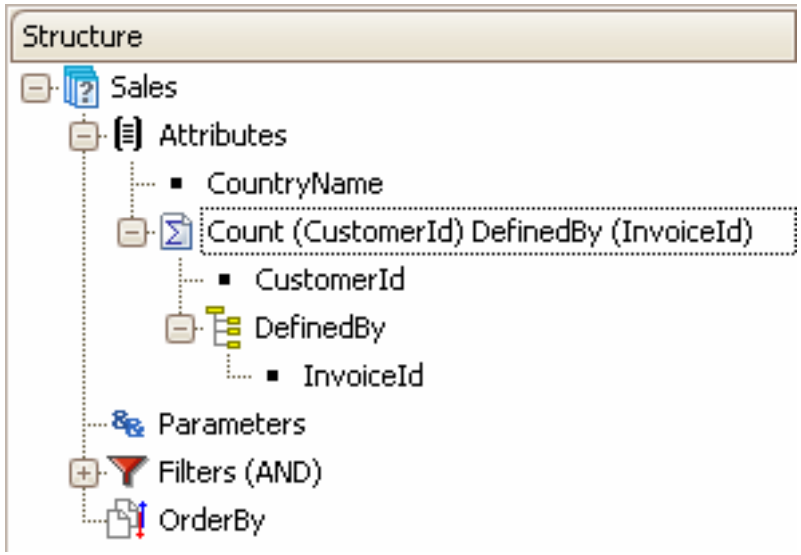
  Cantidad de clientes por país.



- **Count avanzado**

  Cantidad de clientes que compraron, por país.

  El count avanzado cuenta las ocurrencias distintas del atributo involucrado. Por esta razón colocamos *CustomerId* y no *CustomerName*.
  Estamos pidiendo que cuente los distintos *CustomerId* que tienen facturas.



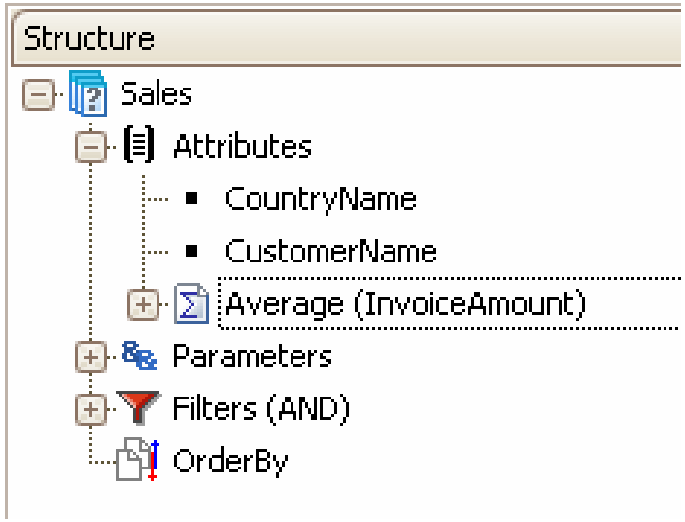
Lectura opcional

Objeto Query: Estructura

Attributes: Funciones de agregación

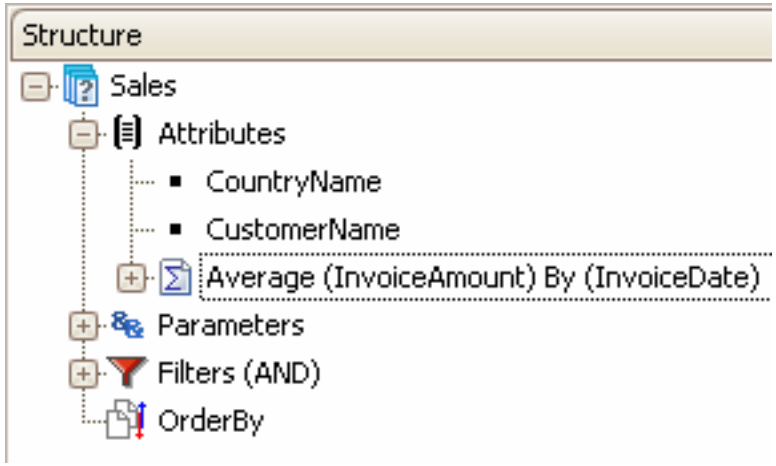
- **Average**

Monto promedio de lo que gasta cada vez que compra



- **Average by**

Monto promedio de lo que gasta diariamente



Lectura opcional

Objeto Query: Estructura

Attributes: Funciones de agregación condicionadas

Structure | Description

- Sales
  - Attributes
    - CountryName — Country
    - CustomerName — Customer Name
    - Sum (InvoiceAmount) where (InvoicePendingFlag = true) — Sum (Invoice Amount)
      - InvoiceAmount
      - Filters (AND)
        - InvoicePendingFlag = true
    - Sum (InvoiceAmount) where (InvoicePendingFlag = false) — Sum (Invoice Amount) (2)
  - Parameters
  - Filters (AND)
  - OrderBy

Se pueden **condicionar** los datos a consultar.

Structure | SQL statement | Preview

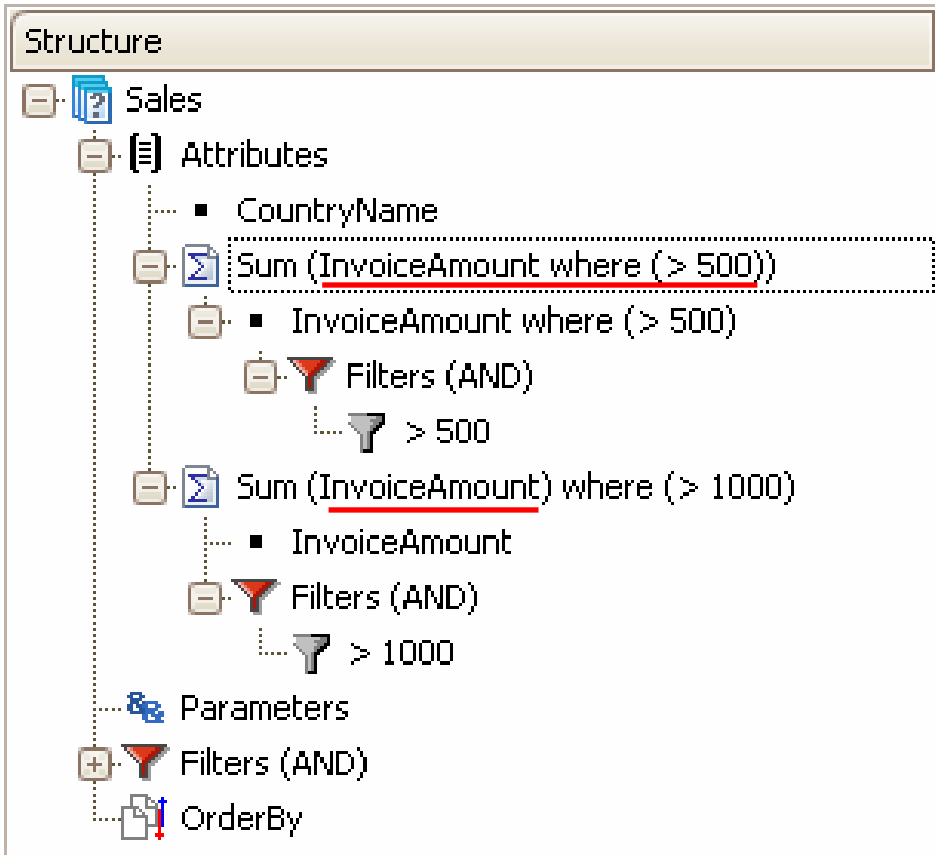
Country	Customer Name	Sum (Invoice Amount)	Sum (Invoice Amount) (2)
Uruguay	Diego	1080.00	10.00
	Julia	295.00	25.00
	Mary	210.00	890.00
Total of 'Uruguay'		**1585.00**	**925.00**
Grand Total		**1585.00**	**925.00**

Pueden definirse filtros de los mismos tipos que los del nodo Filters (general)

Lectura opcional

Objeto Query: Estructura

Attributes: Funciones de agregación condicionadas



Se puede realizar el filtro antes o después de la agregación…

Se suman únicamente las facturas (del país) cuyo *InvoiceAmount* supera los U$S 500.

Se muestra el país en la salida, solamente si la suma de los *InvoiceAmount* de todas sus facturas, supera los U$S 1000.

Lectura opcional

Objeto Query: Estructura

Attributes: Expresiones

- Aritméticas:

  InvoiceSubTotal + InvoiceTaxTotal*2

- Aggregate:

  Sum(InvoiceSubTotal + InvoiceTaxTotal)

  Sum(InvoiceAmount) / Count(InvoiceId)

- Condicionadas:

  Sum (InvoiceAmount) where (InvoiceDate = #2009-01-01#) / Sum(InvoiceAmount) where (InvoiceDate = #2009-01-02#)

- Funciones:

  Upper(CustomerName)

  month(InvoiceDate)

Lectura opcional

Objeto Query: Estructura

Parámetros y Filtros

Structure
- Sales
  - Attributes
    - CountryName
    - CustomerName
    - Sum (InvoiceAmount)
      - InvoiceAmount
  - Parameters
    - CountryId
  - Filters (AND)
    - CountryId = &CountryId
    - CustomerName in ["Julia","Diego","Mary"]
    - CustomerAddress not like "Avenue"
    - InvoiceId in [1 to 1000]
    - InvoiceId not in [250,253,380]
    - InvoiceId <> 500
  - OrderBy

Name
- Supplier
  - SupplierId
  - SupplierName
  - Product
    - ProductId
    - ProductDescription
    - SupplierProductQuantity

Name
- Product
  - ProductId
  - ProductDescription
  - ProductStock
  - PriceList
    - ProductPriceListDate
    - ProductPriceListPrice

Structure
- SupplierQuery
  - Attributes
    - SupplierName
    - ProductDescription
  - Parameters
    - ProductId
  - Filters (AND)
    - SupplierId in [SupplierId where (ProductId = &ProductId)]
      - SupplierId
      - SupplierId where (ProductId = &ProductId)
        - Filters (AND)
          - ProductId = &ProductId
  - OrderBy

Rango con valores constantes

Lista de valores constantes

Operador Like

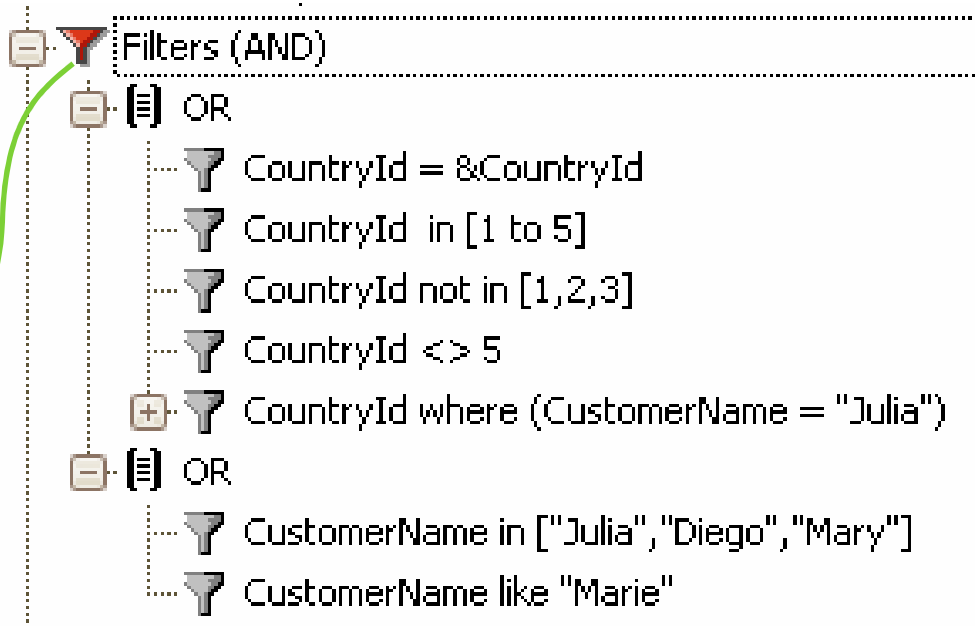
Rango o Lista de valores no constantes (**subconsulta**)

Lectura opcional

Objeto Query: Estructura

Filtros: grupos

- Un “filter group” se usa para poner paréntesis y juntar filtros con And y Or.



Sus elementos se unen con OR

Sus elementos se unen con OR

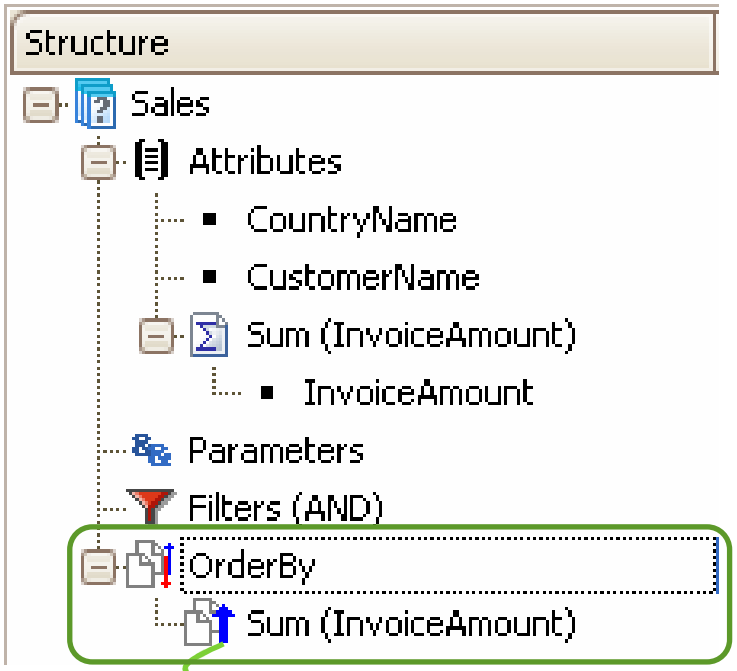
Luego se aplica el AND

Lectura opcional

Objeto Query: Estructura

Order by

- Declara el orden deseado de la salida de la información.



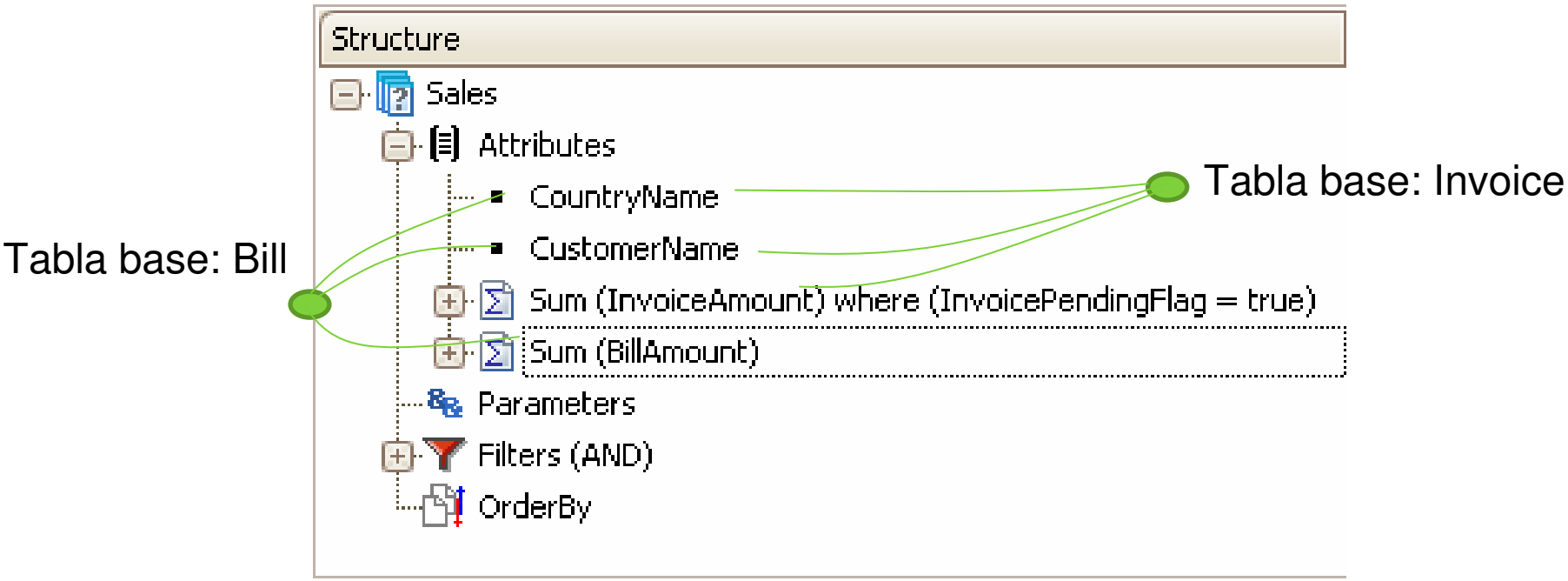
Country	Customer Name	Sum (Invoice Amount)
United States	Richard Jones	40.00
Uruguay	Julia	150.00
Uruguay	Diego	300.00
Uruguay	Mary	890.00
England	Susan Smith	1220.00
France	Pierre Gautier	1685.00
United States	Ann Smith	3100.00

Lectura opcional

Objeto Query: Selects

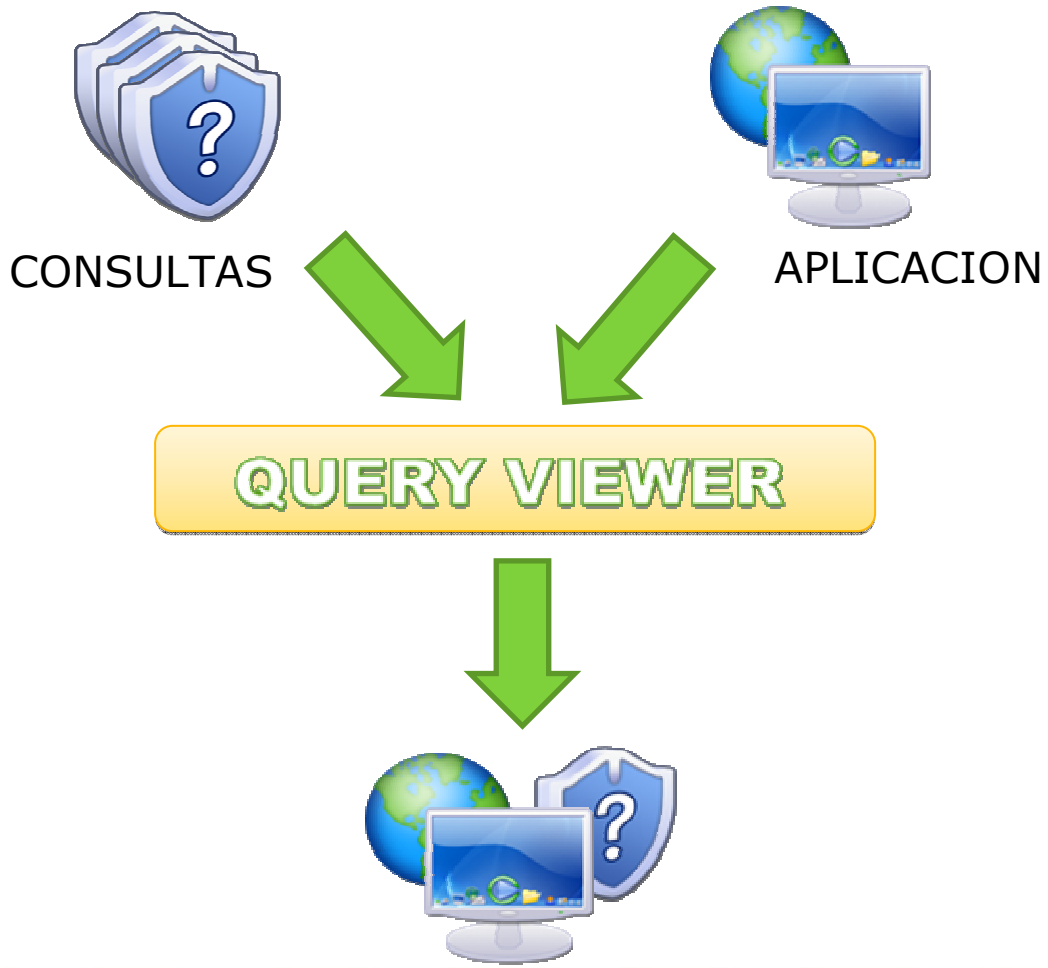
Tablas base

Ejemplo: Se resuelve con 2 consultas select de las que luego se hace full join:



Lectura opcional

Integración en la aplicación



Query Viewer

GeneXus
Grow thru knowledge

Start Page | Invoice | Sales | ViewSales *

Form | QueryViewer1

Rice
Wheat

Continent	Country	Rice	Wheat	Grain
Africa	Egypt	10.00	34.00	80.00
Total of 'Africa'		**10.00**	**34.00**	**80.00**
America	Uruguay	10.00	20.00	30.00
	USA	17.00	10.00	37.00
Total of 'America'		**27.00**	**30.00**	**67.00**
Asia	India	25.00	26.00	98.00
Total of 'Asia'		**25.00**	**26.00**	**98.00**
Australia	Australia	26.00	31.00	73.00
Total of 'Australia'		**26.00**	**31.00**	**73.00**
Europe	France	10.00	10.00	10.00
	Spain	18.00	19.00	69.00
Total of 'Europe'		**28.00**	**29.00**	**79.00**
Grand Total		**116.00**	**150.00**	**397.00**

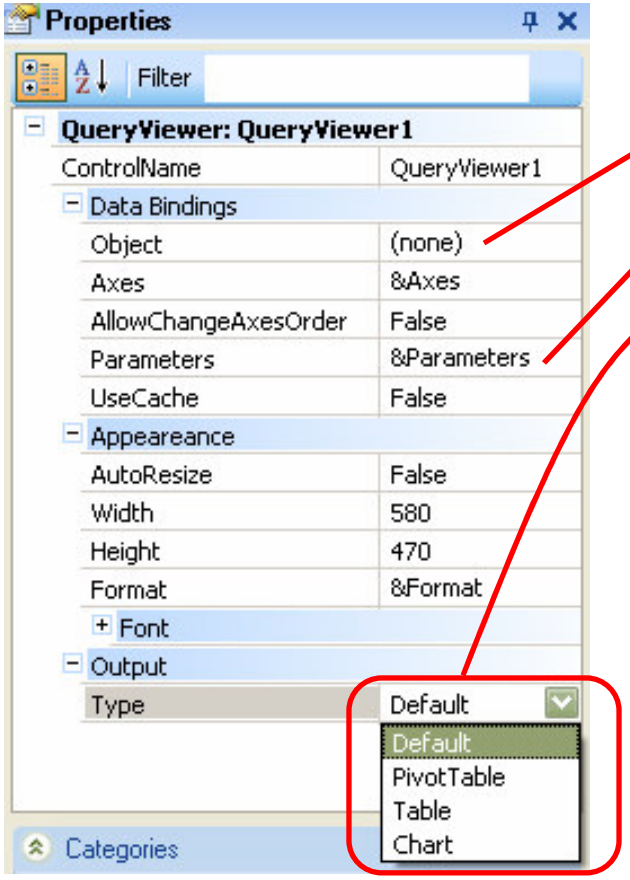
HTML
Design

Web Form * | Rules | Events | Conditions | Variables | Help | Documentation

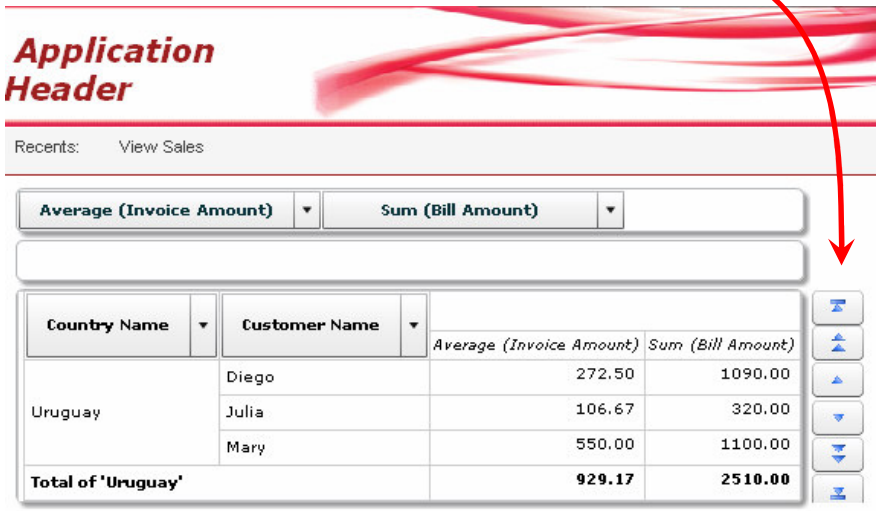
Toolbox
HyperLink
Image
Section
Table
Text Block
Web Component
Extended Controls
FBHoverPanel
GxChart
GXScheduler
HistoryManager
ImageGallery
Media Player
QueryViewer
Treeview
GXGoogle Visualization Library
Annotated Timeline
Charts (Bars, Columns, Pie, Lines)
Data Table
Gauge
GeoMap
Google Analytics
Google Gadget
GoogleFeed
Intensity Map
Properties | Toolbox

Query Viewer

- Propiedades configurables en diseño y en runtime




```
Event Start
    QueryViewer1.ObjectName = "Sales"
    &Parameter.Name = "CountryId"
    &Parameter.Value = "1"
    &Parameters.Add(&Parameter)
    QueryViewer1.Type = QueryViewerOutputType.PivotTable
    QueryViewer1.Paging = True
    QueryViewer1.PageSize = 4
EndEvent
```



Query Viewer

- Se crean: SDTs y otros tipos de datos automáticamente

Name	Type
QueryViewerAxes	
Axis	
Name	Character(20)
Title	Character(40)
Type	QueryViewerAxisType
AxisOrder	
Type	QueryViewerAxisOrderType
Values	
Value	Character(40)
Format	
Picture	Character(20)
Color	Numeric(8.0)

Name	Type
QueryViewerParameters	
Parameter	
Name	Character(20)
Value	Character(20)

Name	Type
QueryViewerFormat	
ChartValuesColors	
ValueColor	
Value	Character(20)
Color	Numeric(8.0)

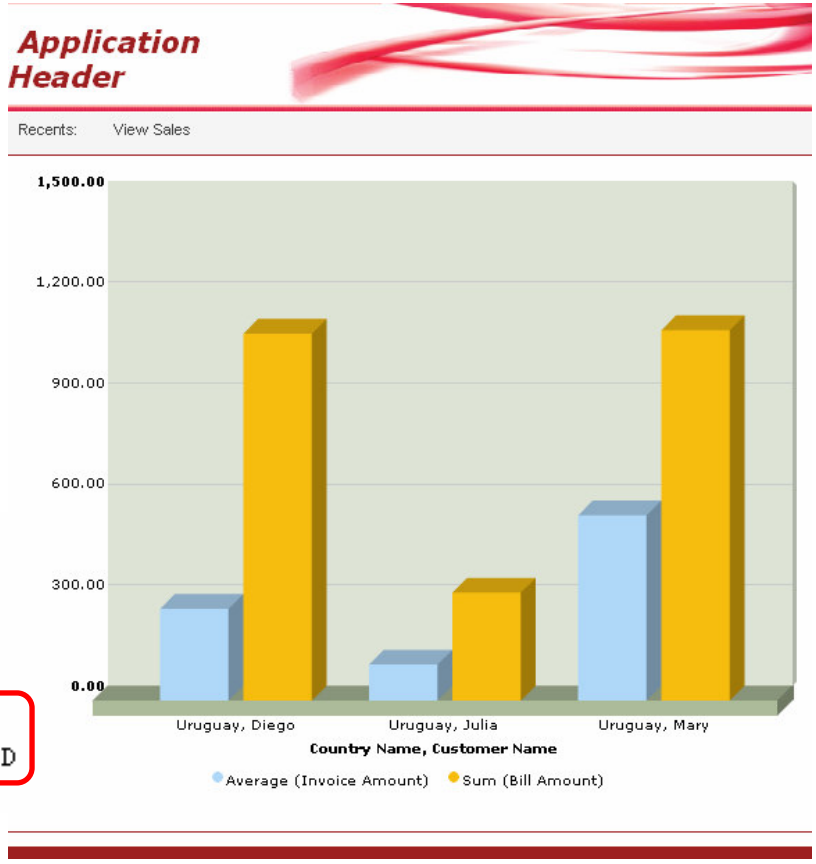
- QueryViewerAxisOrderType → {Ascending, Descending, Custom}
- QueryViewerAxisType → {Row, Column, Page, Data, NotShow}
- QueryViewerChartType
- QueryViewerObjectType → {DataProvider, Query}
- QueryViewerOutputType → {PivotTable, Table, Chart, Default}
- QueryViewerXAxisLabels

Query Viewer

- Propiedades configurables en diseño y en runtime

Output	
Type	Chart
ChartType	Column
XAxisLabels	Horizontally
ShowValues	True

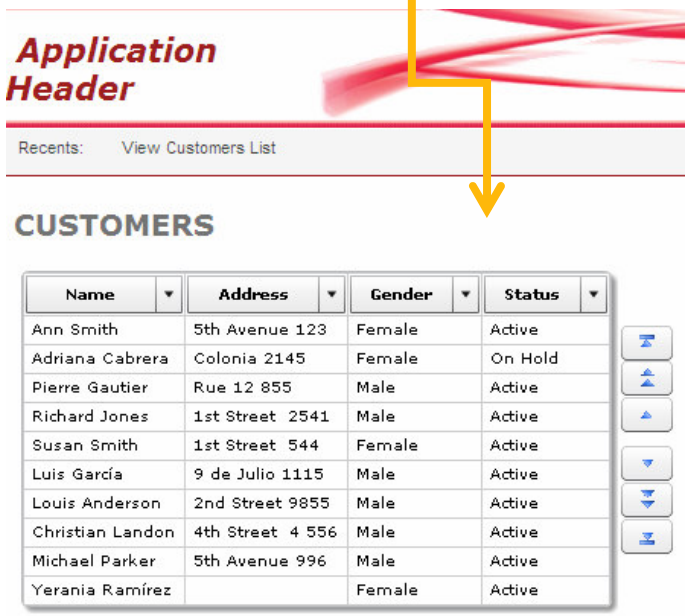
```
Event Start
    QueryViewer1.ObjectName = "Sales"
    &Parameter.Name = "CountryId"
    &Parameter.Value = "1"
    &Parameters.Add(&Parameter)
    QueryViewer1.Type = QueryViewerOutputType.Chart
    QueryViewer1.ChartType = QueryViewerChartType.Column3D
EndEvent
```

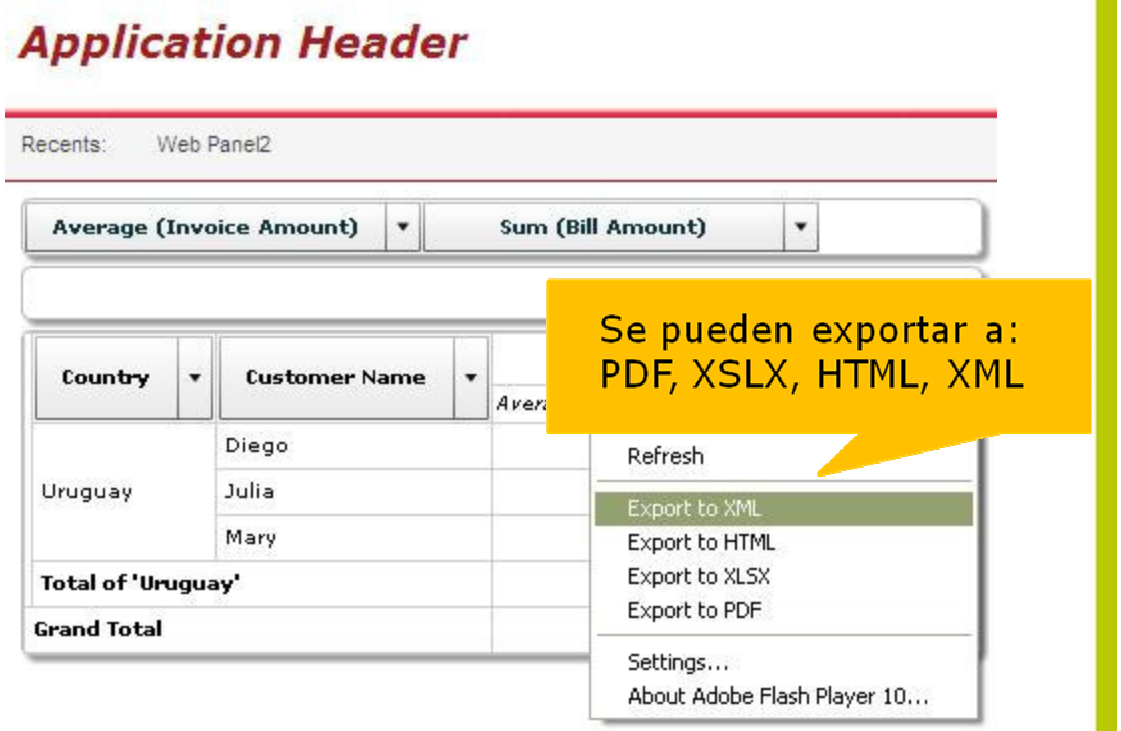


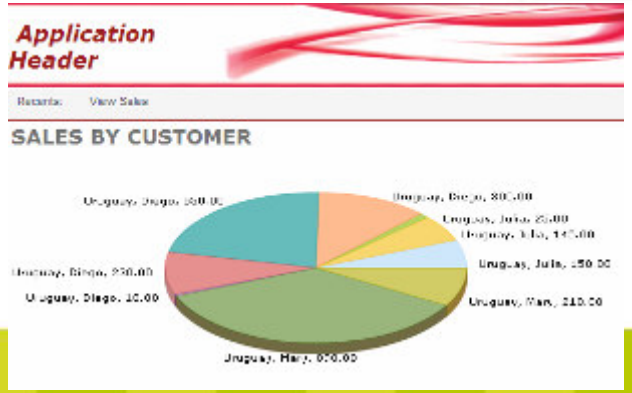
Query Viewer

Salida

- Pivot Table
- Tabla plana





Se pueden exportar a: PDF, XSLX, HTML, XML

- Gráficas