

BIRT: The Eclipse Reporting Framework

Jason Weathersby, BIRT PMC

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Agenda

- What is BIRT?
- BIRT Features and Report Gallery
- Scripting BIRT
- Deploying BIRT Reports
- BIRT APIs
- Extension Points



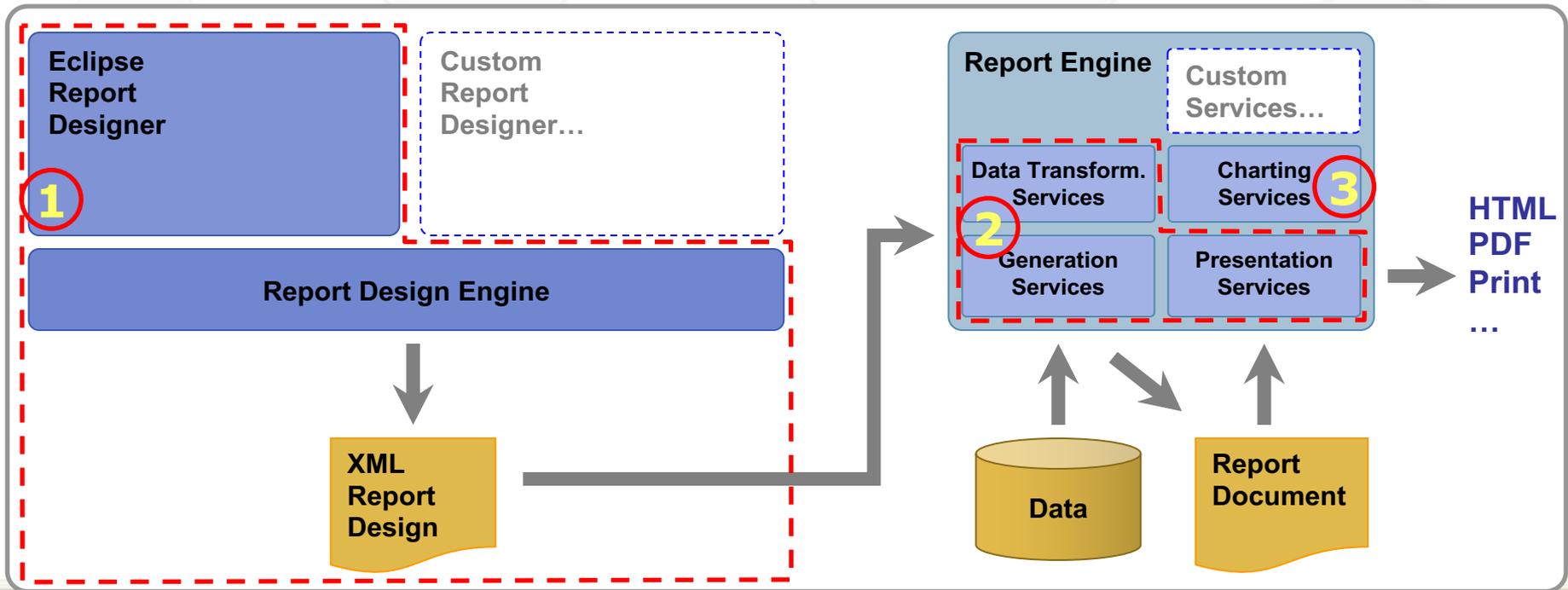
What Is BIRT?

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What is the BIRT Project?

- Business Intelligence and Reporting Tools based on Eclipse
- Initially focused on embedded reporting for Java developers
- Three initial components as part of BIRT project



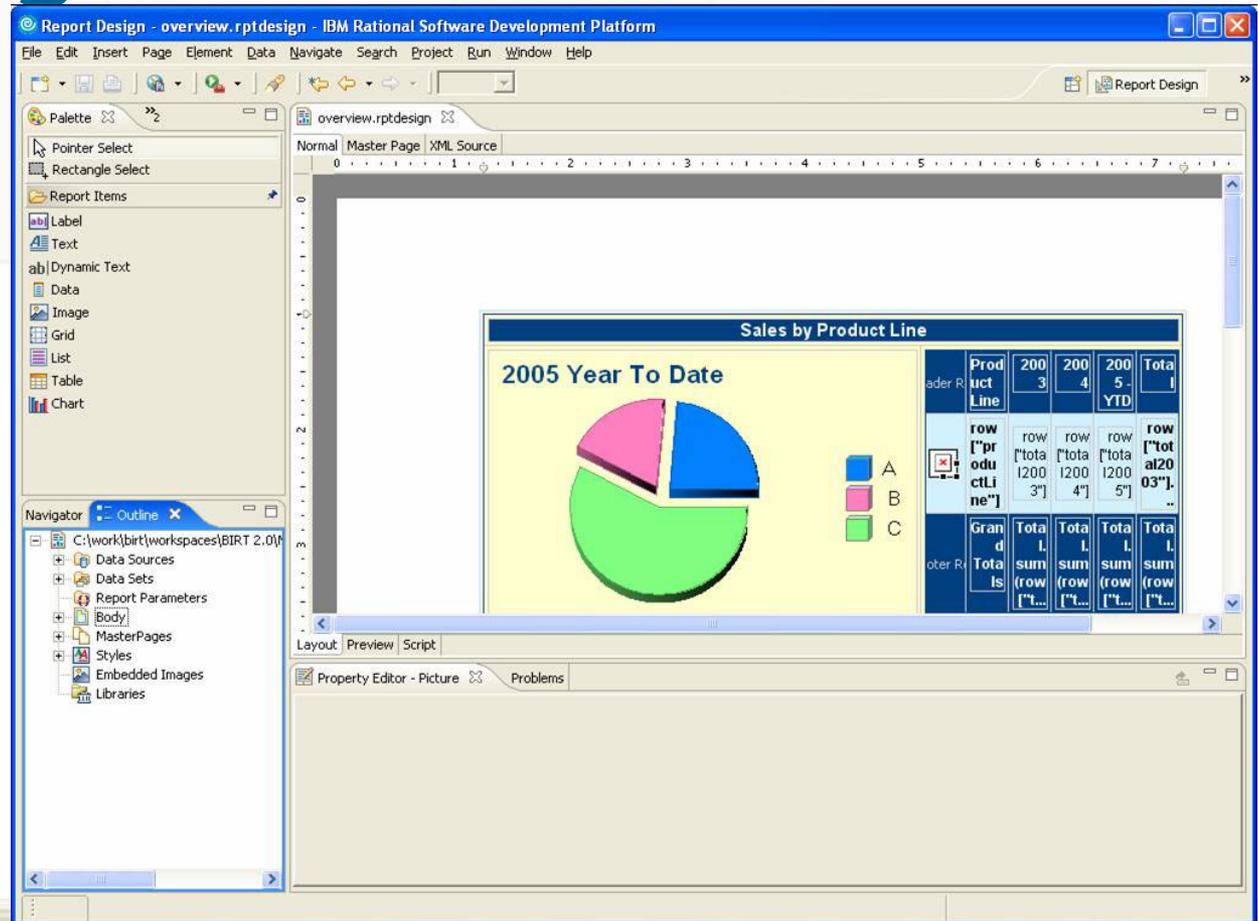
BIRT What is available

- **birt-report-designer-all-in-one-2_0_1**
 - BIRT Designer and most required plug-ins
- **birt-report-framework- 2_0_1**
 - BIRT Designer Eclipse plug-in
- **birt-rcp-report-designer- 2_0_1**
 - RCP Version of the BIRT Designer
- **birt-runtime- 2_0_1**
 - BIRT web application
 - report engine runtime and examples
 - chart engine runtime.
- **birt-charts- 2_0_1**
 - Stand alone chart engine plug-ins.
- **Samples**



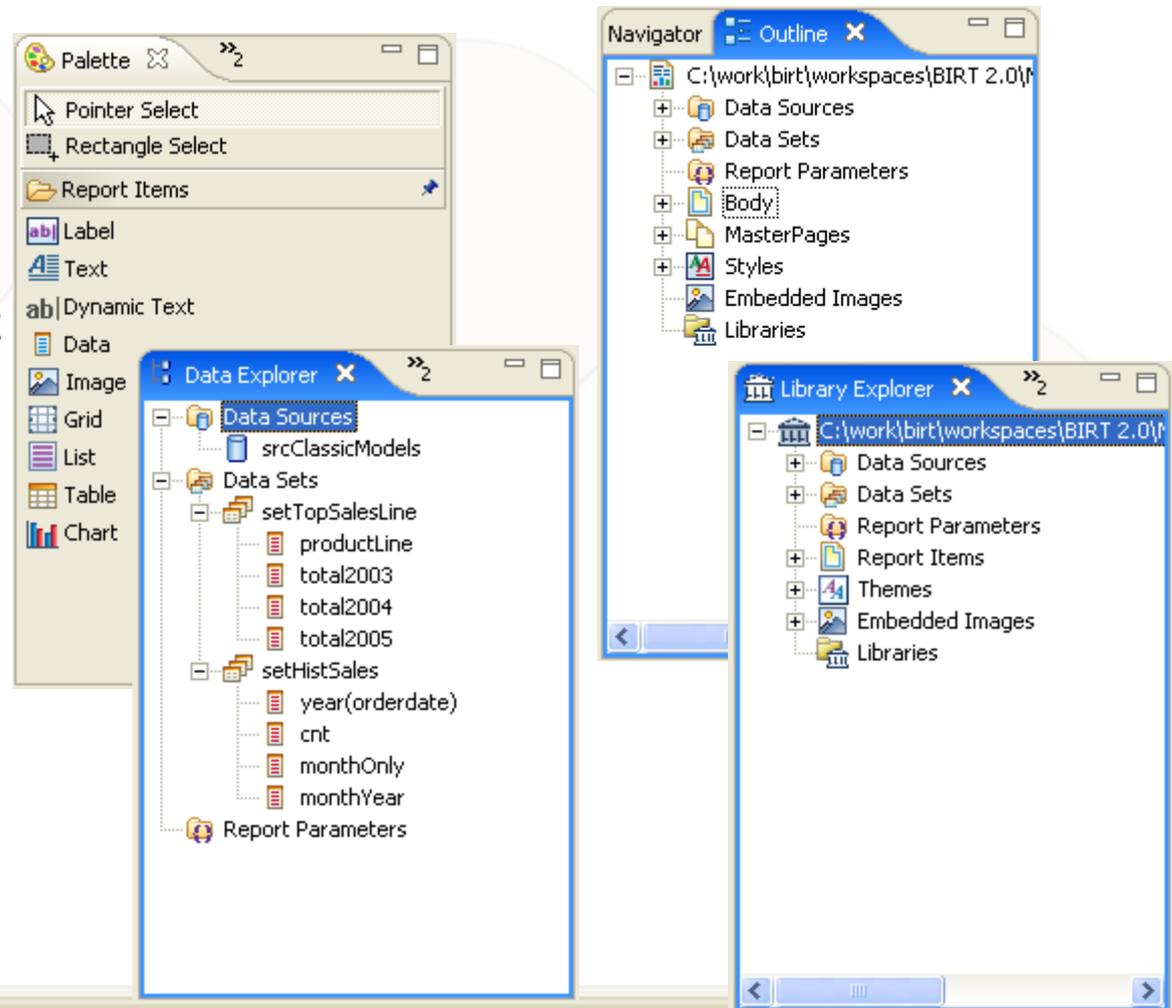
BIRT Designer

- WYSIWYG
- Drag and Drop



BIRT Views

- Extendable Palette
- Graphical outline of Report
- Multiple Data Sources
- Static and Dynamic parameters including cascaded
- Reuse work with Libraries and Templates
- Import Style sheets



BIRT Editor

- Layout and Scripting Views
- Quick access to graphical components or edit XML Directly

The screenshot shows the BIRT Editor interface with a report design titled "Sales by Product Line". The report is divided into two main sections: "2005 Year To Date" and "Historical Unit Sales".

2005 Year To Date

This section features a 3D pie chart with three segments: blue (A), pink (B), and green (C). To the right of the chart is a legend with three colored squares corresponding to the segments: blue for A, pink for B, and green for C.

Historical Unit Sales

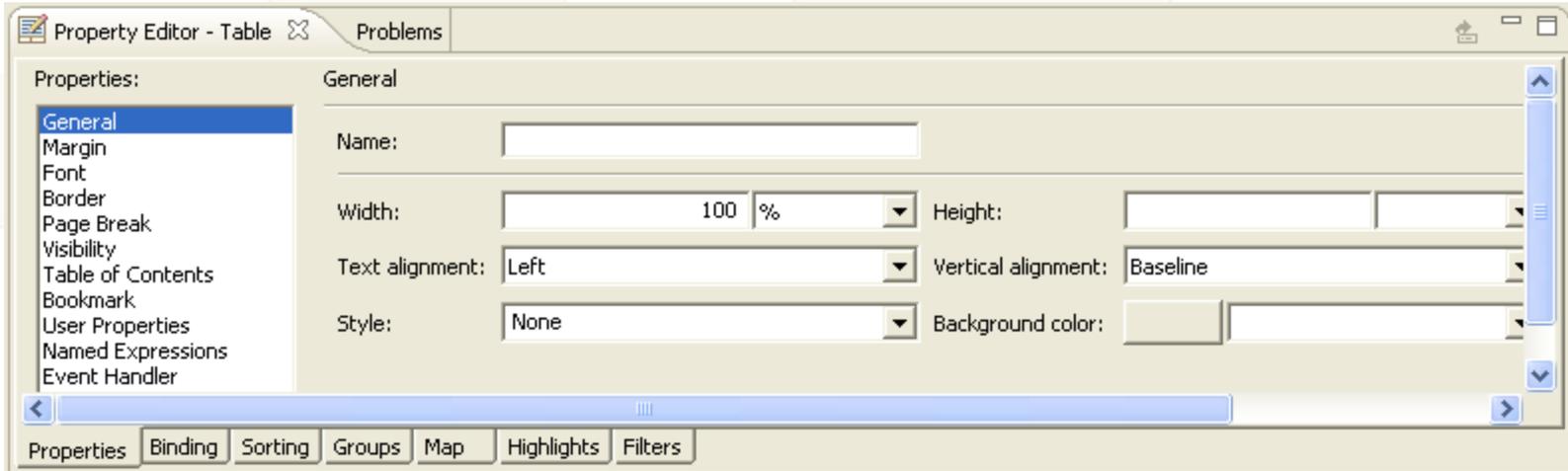
This section contains a table with two columns: "Date" and "Units". The "Date" column has a header "Date" and a data row with the expression `row["monthOnly"]`. The "Units" column has a header "Units" and a data row with the expression `Total.sum(row["c..."])`.

The report also includes a table with the following data:

Product Line	2003	2004	2005 - YTD	Total
row["productLine"]	row["total2003"]	row["total2004"]	row["total2005"]	row["total2003"]
Grand Totals	Total.sum(row["t..."])	Total.sum(row["t..."])	Total.sum(row["t..."])	Total.sum(row["t..."])



Property Editor View



- Simple Property Editor
- Mapping and Highlighting
- Sorting and Filters



Previewing BIRT Reports

- Preview Reports while building
- View Data in HTML or PDF
- Cached Data

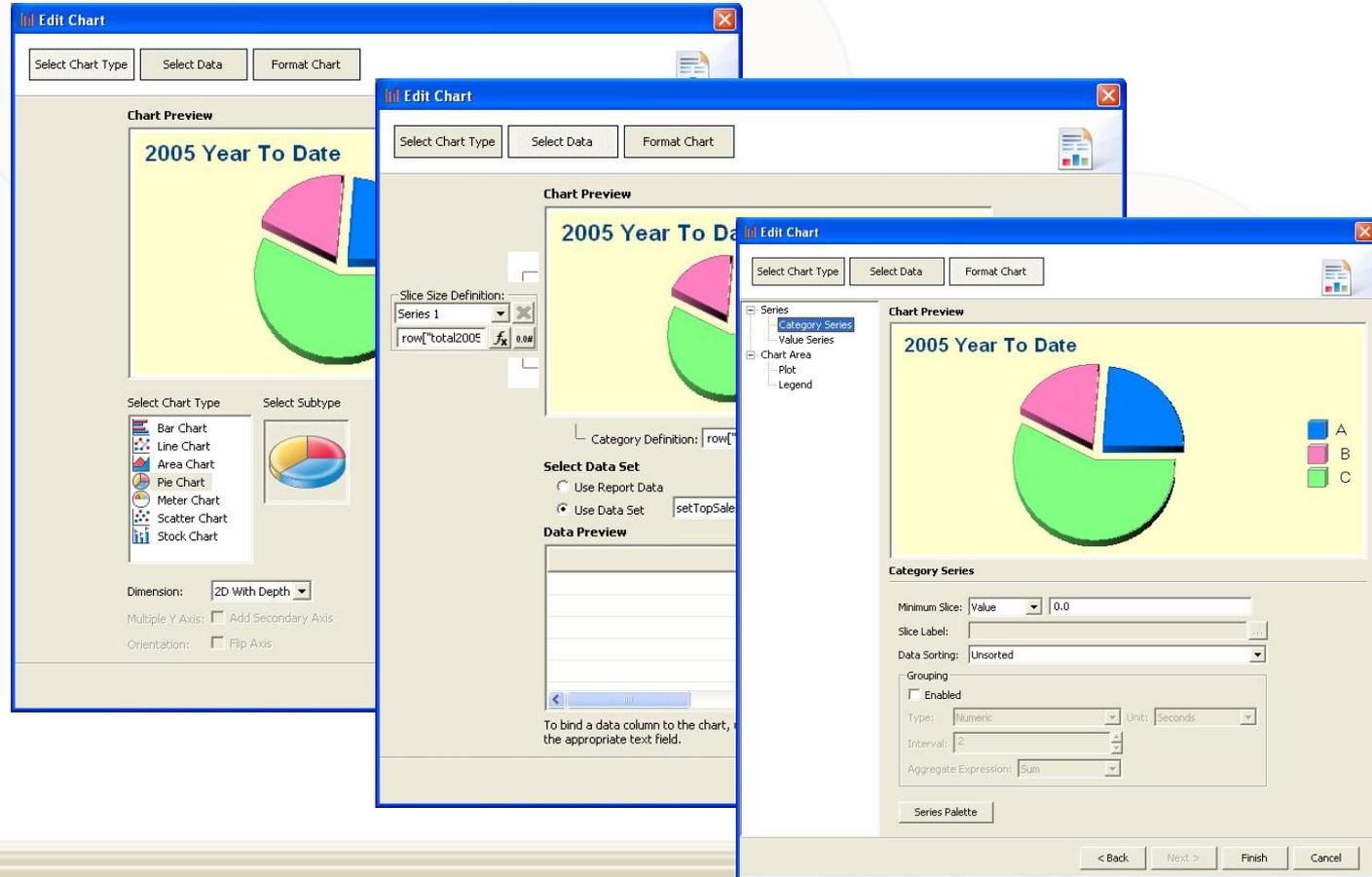
The screenshot shows the IBM Rational Software Development Platform interface. The main window displays a report preview titled "Sales by Product Line". The report includes a pie chart for "2005 Year To Date" and a table with the following data:

Product Line	2003	2004	2005 - YTD	Total
Classic Cars	\$1,514,407	\$1,838,275	\$738,738	\$4,091,420
Motorcycles	\$397,220	\$590,580	\$286,325	\$1,274,125
Planes	\$347,755	\$528,928	\$200,074	\$1,076,757
Ships	\$244,821	\$375,672	\$128,178	\$748,671
Trains	\$72,802	\$124,750	\$36,917	\$234,469
Trucks and Buses	\$420,430	\$531,976	\$201,875	\$1,154,281
Vintage Cars	\$679,949	\$997,560	\$388,718	\$2,066,226

The interface also shows a Library Explorer on the left, a Navigator pane at the bottom left, and a Property Editor at the bottom right.

Chart Builder

- Simple Wizard
- Seven Chart types
- Many Sub types
- SVG
- PNG
- GIF
- JPG
- BMP
- Filtering



BIRT Features and Report Gallery

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BIRT Features

- Palette of report components - Text (CLOB's, HTML), data, images (BLOBs), tables, grids, lists, labels
- Sorting, grouping, filtering, conditional highlighting, mapping
- Scripting in JavaScript/Java
- Cascading & dynamic report parameters
- Hyperlinking, bookmarks
- TOC, Paging
- Direct XML source editor for report design
- Multi-pass processing (top N/bottom N)
- Data sources: POJO's, JDBC, CSV, XML
- WYSIWYG Editor
- Integrated Chart Wizard
- Report Component Libraries
- Report Templates
- Styles, import CSS, themes
- Wizards for guided development
- Report outline
- Preview within report designer for iterative development
- Context pass through to data source
- Call stored procedure



BIRT Designer Demo



Sales Invoice Report

Embedded images
(including BLOBS)

	Classic Models, Inc. 701 Gateway Boulevard, San Francisco, CA 94107 Sales Invoice
---	--

Customer Details
Online Diecast Creations Co. Dorothy Young 2304 Long Airport Avenue Boston, NH 62005 USA

Invoice Details
Customer Number: 363
Order Number: 10100
Order Date: Jan 6, 2003
Ship Date: Jan 10, 2003
Office: Boston
Sales Representative: Steve Patterson

Layout flexibility

Rich formatting control
(Including conditional
formatting)

Code	Description	Quantity	MSRP (\$)	Discount	Unit Price (\$)	Total (\$)
S18_1749	1917 Grand Touring Sedan	30	170.00	20.00%	136.00	4,080.00
S18_2248	1911 Ford Town Car	50	60.54	9.00%	55.09	2,754.50
S18_4409	1932 Alfa Romeo 8C2300 Spider Sport	22	92.03	18.00%	75.46	1,660.12
S24_3969	1936 Mercedes Benz 500k Roadster	49	41.03	13.99%	35.29	1,729.21
TOTAL \$						10,223.83

Computed column

Comprehensive aggregation
functions



Stock Price & Volume Report

Classic Models Corp.

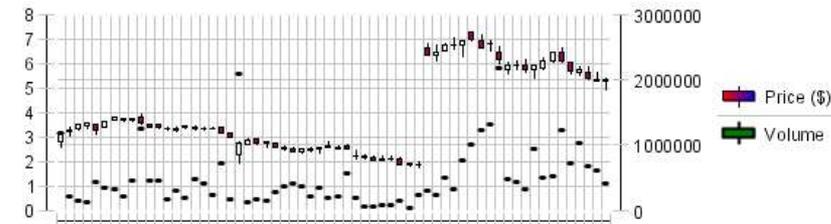
From: 1/2/02 12:00 AM

To: 12/31/04 12:00 AM

2002

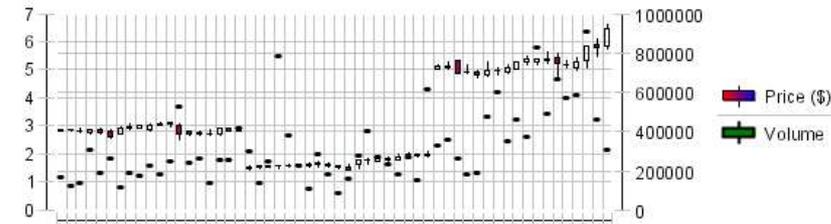
January

High:	7.25	Low:	4.91
Avg. Open:	6.158	Avg. Close:	6.185
Max. Vol:	2,183,700	Min. Vol:	235,500



February

High:	6.6	Low:	4.7
Avg. Open:	5.279	Avg. Close:	5.203
Max. Vol:	904,700	Min. Vol:	180,000



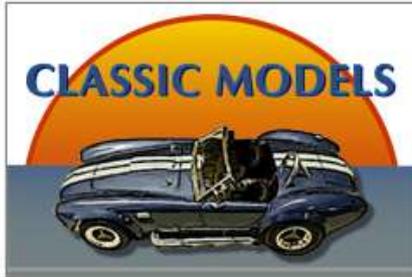
Grouping & sorting

Parent table

Integrated Charting
as a child of parent table



Organization Report



Classic Models, Inc.

701 Gateway Boulevard,
San Francisco, CA 94107

Employee Report

Office Code: 1		Office Code: 4	
Diane Murphy	President	Mary Patterson	VP Sales
Mary Patterson	VP Sales	Gerard Bondur	Sale Manager (EMEA)
Jeff Firrelli	VP Marketing	Gerard Bondur	Sale Manager (EMEA)
Mary Patterson	VP Sales	Loui Bondur	Sales Rep
Anthony Bow	Sales Manager (NA)	Gerard Hernandez	Sales Rep
Anthony Bow	Sales Manager (NA)	Pamela Castillo	Sales Rep
Leslie Jennings	Sales Rep	Martin Gerard	Sales Rep
Leslie Thompson	Sales Rep		

Table level filter for
Office Code 1

Parallel layout

Table level filter for
Office Code 4



Orders Summary

Classic Models, Inc.
701 Gateway Boulevard,
San Francisco, CA 94107

Orders Summary

Order Number	Status
10100	Shipped
10101	Shipped
10102	Shipped
10103	Shipped
10104	Shipped
10105	Shipped
10106	Shipped
10107	Shipped
10108	Shipped
10109	Shipped
10110	Shipped
10111	Shipped
10112	Shipped
10113	Shipped
10114	Shipped
10115	Shipped
10116	Shipped
10117	Shipped
10118	Shipped
10119	Shipped
10120	Shipped
10121	Shipped

Classic Models, Inc.
701 Gateway Boulevard,
San Francisco, CA 94107

Order Detail

Order Number: 10101

Prod. Code	Qty	Price Per	Line Total
S18_2795	26	167.06	\$4,343.56
S24_2022	46	44.35	\$2,040.10
S24_1937	45	32.53	\$1,463.85
S18_2325	25	108.06	\$2,701.50
Order Total			10,549.01

Jan 1, 2000 10:49 AM

Drill through
from Orders
Summary

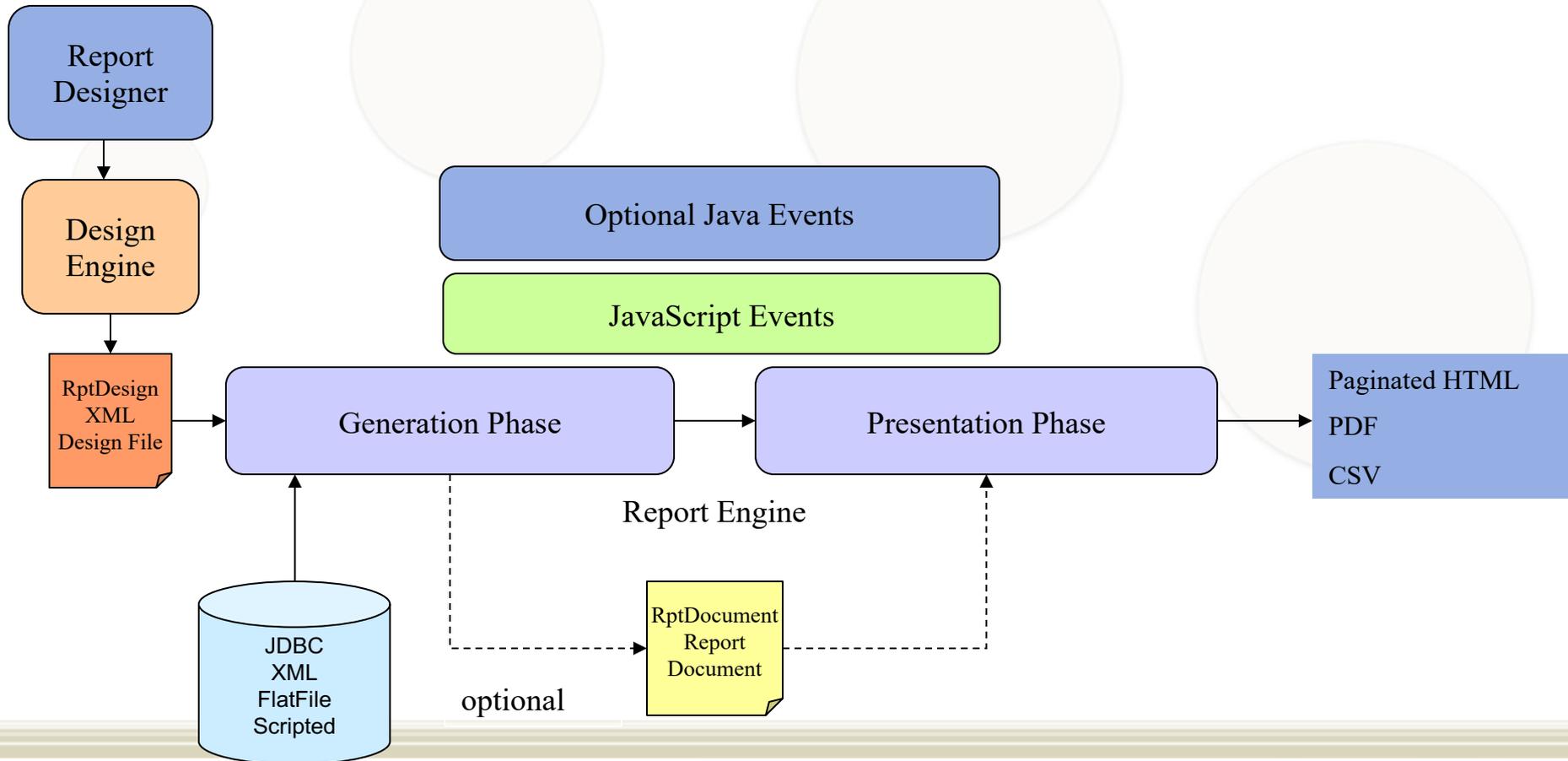
Order details report for
specific Order Number

Scripting BIRT

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BIRT Pipeline



Scripting

- BIRT JavaScript
 - Based on Mozilla Rhino
 - This is Server Side Scripting not Browser Based Scripting
 - Two types of Scripting
 - Expression Scripts - Scripts that return a data value. Available in the Expression Builder.
 - Element Scripts - JavaScript methods that are called on events. Customize the behavior of the Report. Available in the Script view. Context of when the event occurs is important.



Expression Scripting

Expression Builder

Type an expression in the Expression field. Browse the lists of available objects and

```
1 if(((row["total2005"]/5) / (row["total2004"]/12)) >= .95 )
2   "up.gif"
3 else if(((row["total2005"]/5) / (row["total2004"]/12)) <= .85 )
4   "down.gif"
5 else
6   "even.gif"
```

Operators: + - * / ! = < > & | ()

Category: Available Data Sets, Report parameters, Native JavaScript Functions, BIRT Functions, Operators

Sub-Category:

Expression Builder

Type an expression in the Expression field. Browse the lists of available objects and double-click to copy into your expression.

```
1 if ( params["Production"] ){
2   "jdbc:mysql://localhost/production";
3 } else {
4   "jdbc:mysql://localhost/qa";
5 }
```

Operators: + - * / ! = < > & | ()

Category: Report parameters, Native JavaScript Functions, BIRT Functions, Operators

Sub-Category:

Double Click to insert:

OK
Cancel



Expression Scripting - Locations

- Creating the display value for a report item
- Creating a computed field in Data Explorer
- Specifying a filter condition
- Specifying a data series for a chart
- Specifying a map condition
- Specifying a highlight condition
- Specifying a group key
- Specifying a hyperlink
- Specifying the URI for an image
- Specifying dynamic data in a text control



BIRT Event Model

Optional Java Event Handlers

JavaScript Event Handlers

Generation Phase

Presentation Phase

Report Level
Initialize
beforeFactory
afterFactory

Data Source/Set
beforeOpen
afterOpen
onFetch
beforeClose
afterClose

Report Level
Initialize
beforeRender
afterRender

Report Element
onRender

Report Element
onPrepare
onCreate



Element Scripting

The screenshot displays two Eclipse IDE windows showing report design scripts. The top window, titled 'ValueScriptCreditLimit.rptdesign', shows a script for the 'onCreate' event of a 'Row' element. The script checks if the 'row[CREDITLIMIT]' value is greater than 80000 and sets the background color to 'red' if true.

```
if (this.rowData.getExpressionValue("row[CREDITLIMIT]") > 80000 ) {  
  
    this.getStyle().backgroundColor = "red";  
  
}
```

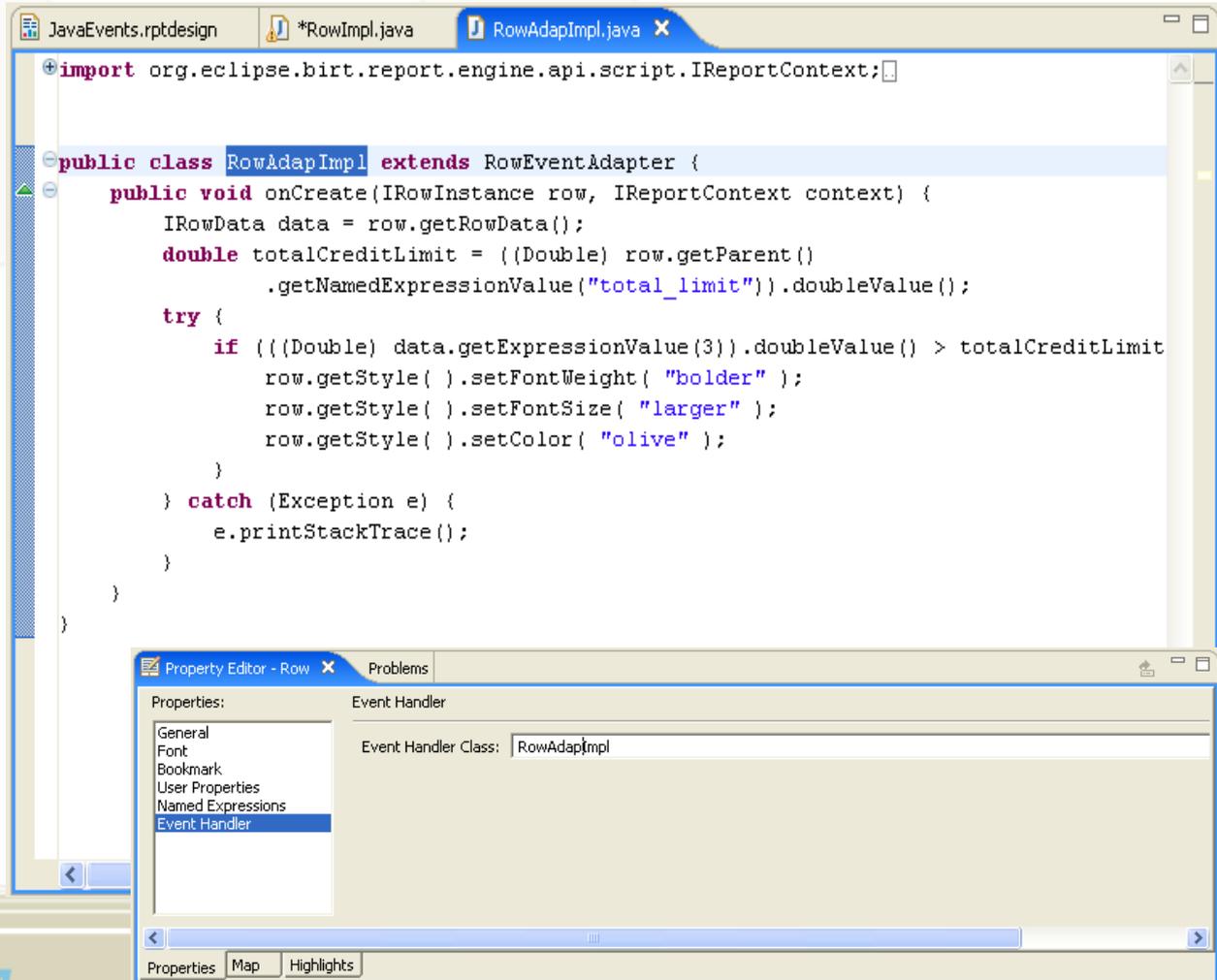
The bottom window, titled '*ChangePasswordSc...', shows a script for the 'beforeOpen' event of a 'Data Source' element. The script initializes a data source class, sets the password, and then defines a 'fetch' event script. The 'fetch' script checks if the current row is greater than or equal to the total rows, returning false if so. Otherwise, it retrieves a row of favorites and sets the 'Customer', 'Favorite', and 'Color' fields of the current row. It then increments the current row counter and returns true.

```
beforeOpen  
Reset Method | Data Source  
gbltest2 = this.getExtensionProperty("odaPassword");  
  
DataSourceClass = new Packages.GetLogin();  
this.setExtensionProperty("odaPassword", DataSourceClass.getPassword());  
  
fetch  
Reset Method  
if( currentrow >= totalrows ) {  
    return( false );  
}  
var favrow = favorites.get(currentrow);  
  
var Customer = favrow[0];  
var Favorite = favrow[1];  
var Color = favrow[2];  
  
row["Customer"]=Customer;  
row["Favorite"]=Favorite;  
row["Color"]=Color  
currentrow = currentrow + 1;  
return ( true );
```



Element Event Handlers using Java

- A set of Adapters are supplied that allow all event handlers to be built in Java.
- The class is a property of the element.
- Can be debugged with JDT using the BIRT Report Configuration.



```
import org.eclipse.birt.report.engine.api.script.IReportContext;

public class RowAdapImpl extends RowEventAdapter {
    public void onCreate(IRowInstance row, IReportContext context) {
        IRowData data = row.getRowData();
        double totalCreditLimit = ((Double) row.getParent()
            .getNamedExpressionValue("total_limit")).doubleValue();

        try {
            if (((Double) data.getExpressionValue(3)).doubleValue() > totalCreditLimit)
                row.getStyle().setFontWeight("bolder");
            row.getStyle().setFontSize("larger");
            row.getStyle().setColor("olive");
        }
        catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

The screenshot shows the Eclipse IDE with the following components:

- Editor:** Displays the Java code for `RowAdapImpl`, which extends `RowEventAdapter` and implements the `onCreate` method. The code checks if a value from an expression is greater than a total credit limit and applies styling (bold, larger font, olive color) to the row.
- Property Editor - Row:** Shows the configuration for the event handler. The "Event Handler Class" is set to `RowAdapImpl`.
- Properties:** A list of properties including General, Font, Bookmark, User Properties, Named Expressions, and Event Handler.
- Buttons:** Properties, Map, and Highlights.

BIRT Scripting Demo



Deploying BIRT Reports

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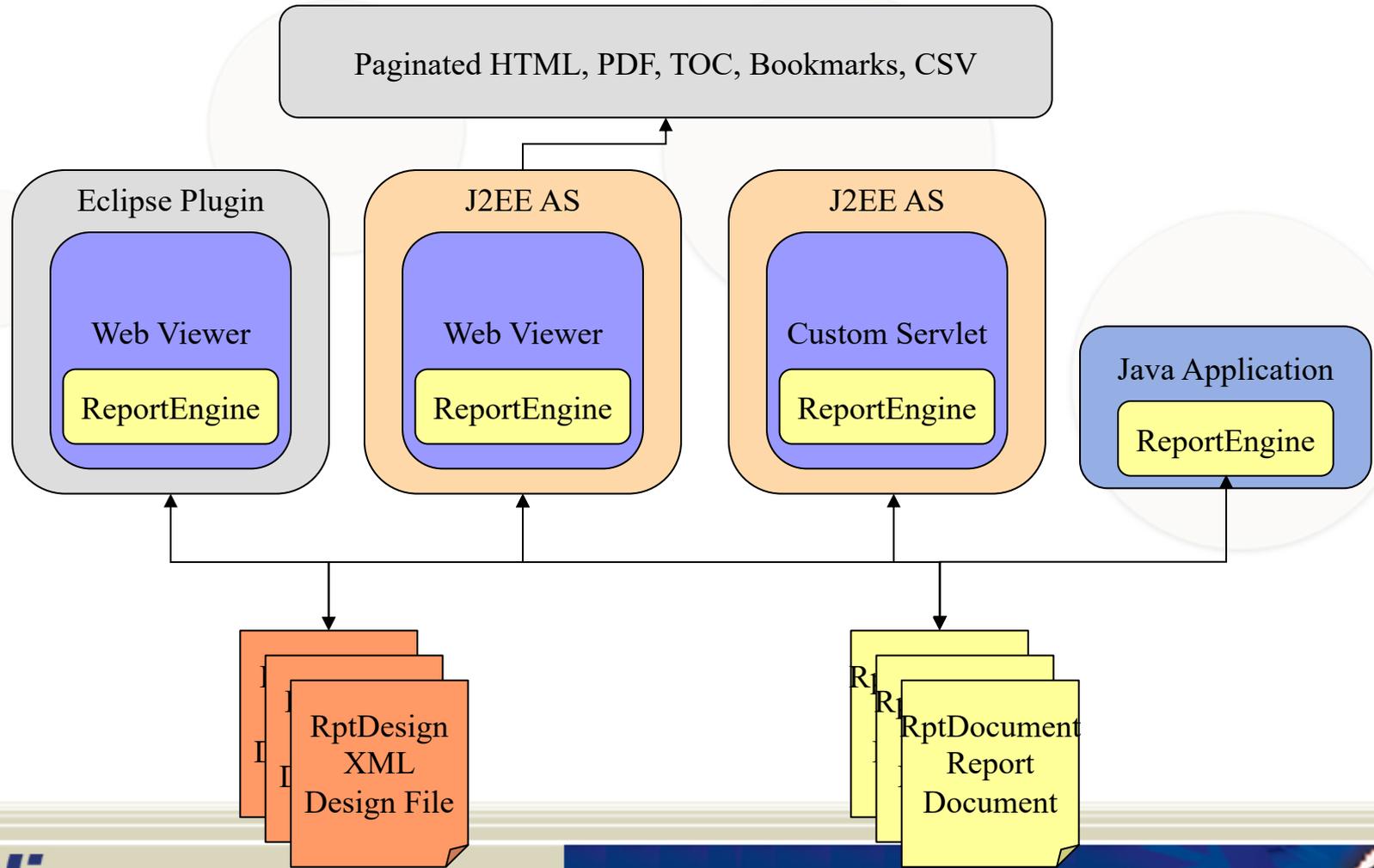


Deploying Options

- Deploy the Web Viewer Example
- Deploy BIRT Under an RCP application
- Build your own Servlet using the BIRT Engine
- Use the BIRT Engine in your own Java Application (Discussed in APIs)



Deploying BIRT Reports



BIRT Web Application

- Generate report and return as PDF or HTML.
- Supports Paginated HTML.
- Export to CSV.
- Retrieves Images and Chart Output.
- Supports TOC and Bookmark Functionality.
- Parameter Entry.



BIRT Viewer

The screenshot shows the BIRT Report Viewer interface. On the left, a tree view lists various reports such as 'AV Stores, Co.--187', 'Alpha Cognac--242', 'Amica Models &', 'Anna's Decorat...', 'Order: 1014...', 'Order: 1016...', 'Order: 1037...', 'Order: 1039...', 'Atelier graphiqu...', 'Australian Colle...', 'Australian Colle...', 'Australian Gift M...', 'Auto Associés 8...', 'Auto Canal+ Pe...', 'Auto-Moto Clas...', and 'Baane Mini Imp...'. The main area displays a report titled '2005 Year To Date' featuring a 3D pie chart. The legend for the pie chart includes: Classic Cars (blue), Motorcycles (pink), Planes (green), Ships (yellow), Trains (teal), Trucks and Buses (purple), and Vintage Cars (brown). Below the chart, a 'Historical' section shows 'Date' as '2005'. Navigation arrows (red down, yellow right) are visible on the right side of the report area.

The 'Export Data' dialog box is shown. It has a title bar with a close button. The main area is divided into two sections: 'Available result sets' and 'Available Columns'. Under 'Available result sets', a dropdown menu shows 'ELEMENT_22_1'. Under 'Available Columns', a list contains: 'row["productLine"]', 'row["total2003"]', 'row["total2004"]', 'row["total2005"]', and 'row["total2003"] + row["total2004"]'. There are arrow buttons between the two columns. The 'Selected Columns' section is currently empty. At the bottom, it says 'The data will'.

The 'Parameter' dialog box is shown. It has a title bar with a close button. The main area contains the text 'Parameters marked with * are required.' Below this is a 'CascadingParameterGroup' section. It contains two groups of parameters: 'Customer's Country: *' and 'Customer's City: *'. Each group has a radio button, a dropdown menu (with 'USA' and 'NYC' selected), and an empty text input field. At the bottom, there are 'Run Report' and 'Cancel' buttons.

BIRT Deployment Examples

Demo



BIRT APIs

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BIRT APIs

- Report Engine API - Loads and executes design files.
- Design Engine API - Creates and modifies report designs.
- Charting API - Builds and renders charts.



Report Engine API

- Used to integrate run-time portion of BIRT into your application.
- Used to discover and set parameters.
- Run a report and output PDF/HTML.
- Combine or Split Run and Render Task
- Save to Intermediate format.
- Extract data.
- Fetch an image or chart for a report.
- 2.0 Engine supports additional features for paging, cascaded and dynamic parameters, etc.
- Example in the runtime download.



Design Engine API

- Create and modify report designs.
- Create and delete report elements..
- Put report elements into slots.
- Retrieve metadata from report elements, properties and slots
- Undo/Redo.
- Semantic Checks on report designs.



BIRT Chart Engine API

- Stand Alone Chart Generator
- Does not require the use of the Chart User Interface
- Does not require the use of the Report Engine API
- Data is provided in a static data structure
 - When Charts render in Reports, Report Engine builds static structure from the specified ODA data and creates the static structure
 - Charts running stand-alone require a data feed
 - `org.eclipse.birt.chart.datafeed-Custom User Data Set Interface`
 - `org.eclipse.birt.chart.model.data-Interfaces` defines data structure
- JavaScript events support addition of custom business logic



Extension Points

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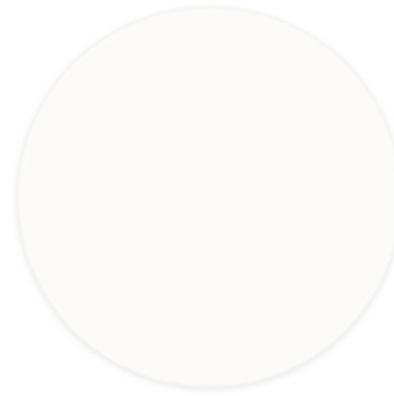


BIRT Extensions Points

- BIRT is not just a tool but a framework.
- Predominant Extension Points.
 - Emitter - Used to create additional output formats.
 - ODA - DTP - Used to add customized Data Source Drivers
 - Report Item - Used to extend the Palette with additional items.
 - Chart Types - Used to add or extend chart types



BIRT API Demo



More on BIRT

- www.eclipse.org/birt
- www.eclipse.org/newsportal/thread.php?group=eclipse.birt
- Source code for examples will be posted to the Eclipse site after the conference



Questions?

