

## SQL Server Reporting Services for Developers

Paul Litwin  
Deep Training &  
Fred Hutchinson Cancer Research  
Center

pauLL@deepttraining.com

### Paul Litwin

- **Developer**
  - ? Focus: ASP.NET, ASP, VB, C#, SQL Server, ...
  - ? MCSD
  - ? Microsoft MVP
  - ? Programming Mngr with Fred Hutchinson Cancer Research Center
- **Co-Founder and Senior Trainer**
  - ? Deep Training
    - [www.deepttraining.com](http://www.deepttraining.com)
- **Conference Chair/Speaker**
  - ? Chair, Microsoft ASP.NET Connections
  - ? Member INETA Speakers Bureau
- **Author**
  - ? Author/co-author of a dozen books, including...
    - *ASP.NET for Developers*
    - *Access Cookbook, 2<sup>nd</sup> edition*
    - *Access 2002 Desktop/Enterprise Dev Handbook*

## Slides & Samples Download

- You will find them on conference CD
- Also, you can download them from:  
? [www.deeptraining.com/litwin](http://www.deeptraining.com/litwin)

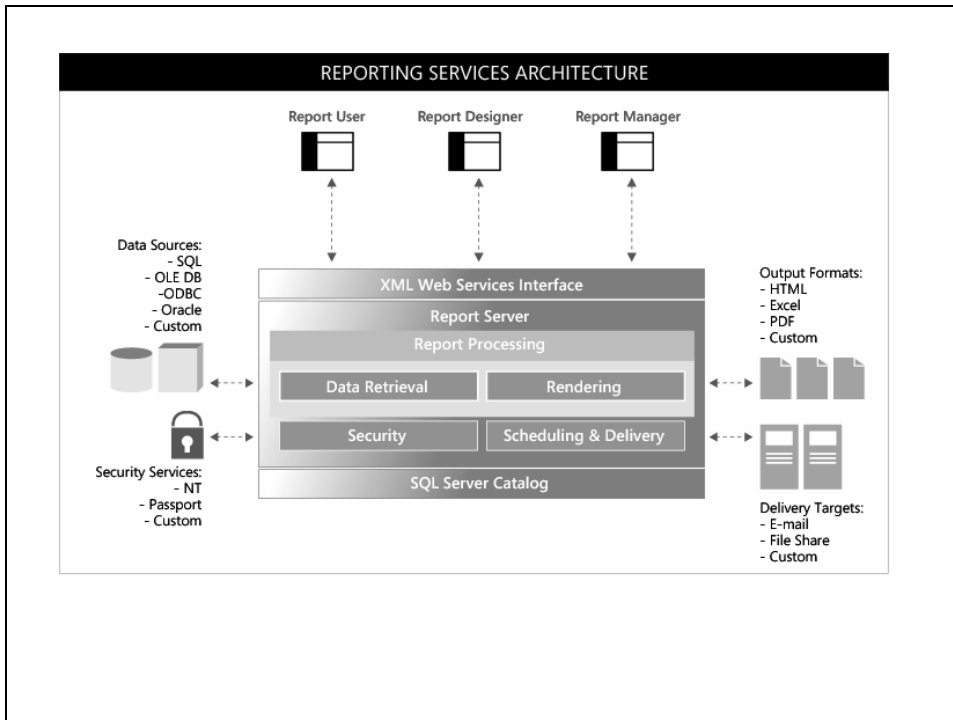
## Agenda

- Reporting Services Architecture
- Creating Tabular Reports
- Calculations & Formatting
- Grouping & Sorting
- Parameters
- Matrix Reports & Charts
- Security & Deployment
- Integrating Reporting Services into Apps

## SQL Server 2000 Reporting Services Architecture

### Getting Reporting Services

- Licensed for FREE to SQL Server 2000 owners
  - Part of MSDN Universal
  - Costs \$5. for others (media fulfillment charge)
- Info on how to obtain a copy
  - ? <http://www.microsoft.com/sql/reporting/howtobuy/default.asp>
- Don't forget SP2
  - ? Download from <http://www.microsoft.com/sql/reporting/downloads/default.asp>



## Reporting Services Terminology

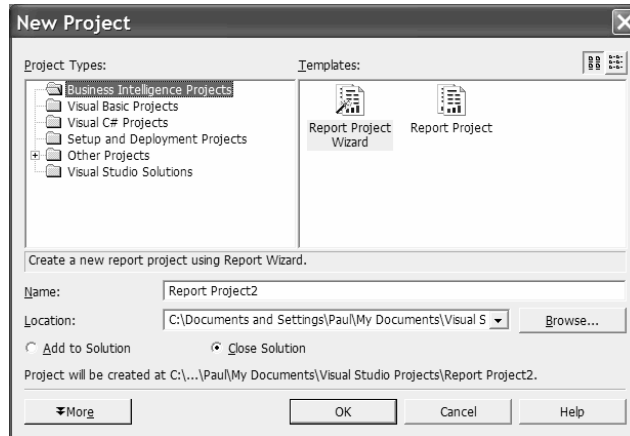
- Data Source – a database
- Dataset – a query against a data source
- Data Region – an item that displays repeated rows of data

## **Types of Data Regions**

- Table – a banded, tabular report
- Matrix – a cross-tab (or pivot table) report
- List – data arranged in free-form fashion
- Chart – a graph

## **Creating Tabular Reports**

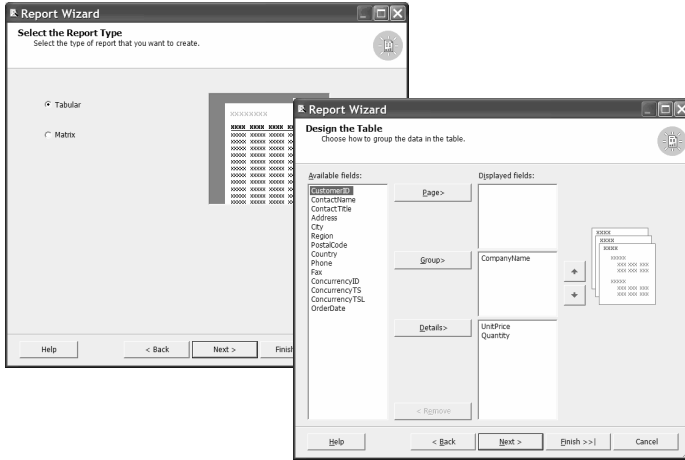
## Creating a Reporting Services Project



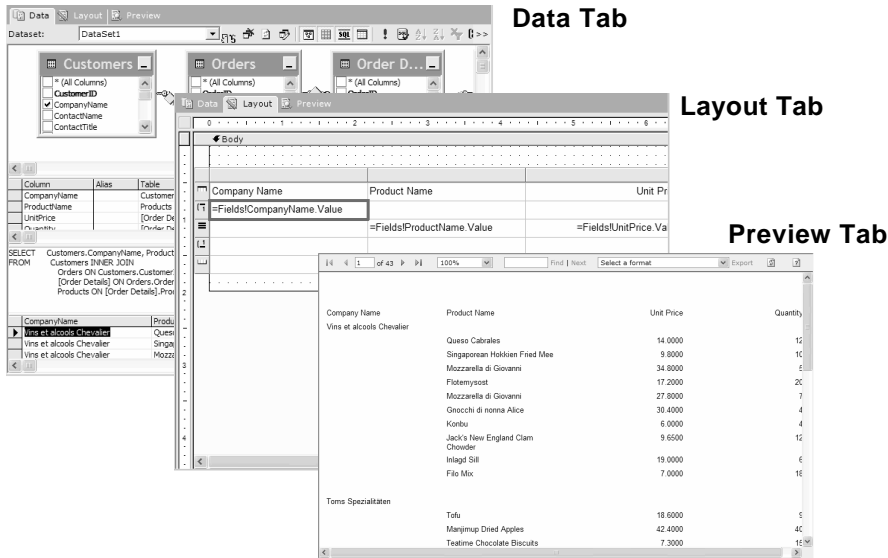
## Creating a Report

- A number of ways to create a new report, including
  - ? Right click on the Reports node in Solution Explorer and select
    - Add New Report – starts report wizard
    - Add|Add New Item – to create a blank report
    - Import Reports – to import all of the reports from an Access database

# Creating a Report using the Wizard



# Demo – Creating a Blank Report



## Creating Simple Tabular Report (1 of 3)

### Data View

1. Select <New Dataset...> from dropdown
2. Name Dataset and either choose an existing shared Data source or create a new one
3. Select Command type and click Ok
4. Enter query into query designer and test by clicking on ! icon

## Creating Simple Tabular Report (2 of 3)

### Layout View

1. Drag Table control from toolbox onto report body
2. Drag and drop fields from Field list to cells in Detail row of table; SRS will automatically add field name to table header row
3. Select Report|Page Header or Report|Page Footer to display these sections
4. Drop textboxes onto the header/footer if desired

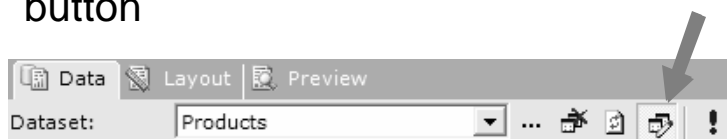
## Creating Simple Tabular Report (3 of 3)

### Previewing reports

- Click on Preview tab to preview the report
- -or- Right-click on report name in solution explorer and select Run

## Tip: What Happened to the Query Designer?

- When creating a report from scratch, Data view defaults to using the ***generic query designer***
- You can switch to the ***graphical query designer*** by toggling the query designer button



## Calculations & Formatting

### Displaying Data on a Report

- When you drag a field onto a section of a report, SRS places it within a TextBox
- TextBoxes can be bound to a field or to a member of a global collection

## Expressions Can Use Global Collections

- Fields
  - ? *to access values from current row*
  - ? e.g. =Fields!LastName.Value
- Globals
  - ? *to access global report data*
  - ? e.g.,
    - =Globals!PageNumber
    - =Globals!TotalPages
    - =Globals!ExecutionTime, etc.
- User
  - ? *to access info about authenticated user running the report*
  - ? e.g.,
    - =User!UserID
    - =User!Language
- Parameters
  - ? *to access value of input parameters*
  - ? e.g., =Parameters!Country.Value
- ReportItems
  - ? *to access values from other sections of report; useful for calculating percentages*
  - ? e.g., =Sum(Fields!Cost.Value)/ReportItems!txtTotalCost.Value

## Expressions

- Reporting Services uses VB-like expressions
- You can use standard +, -, \*, /, mod operators
- String concatenation with &
- Aggregate functions:
  - ? Sum, Count, Avg, Min, Max, First, Last, etc.
- Also supported:
  - ? IIf(), Len(), Switch()

## Tip: How to Handle Null Values

- Don't have to!
- Textboxes are *never* Null
- They automatically convert Nulls to empty strings (for strings, integers, etc.)
- How to test:
  - ? `Len(Fields!fieldname.Value)=0`
  - ? Example:  
`=If(Len(Fields!Title.Value)=0,"Nobody",Fields!Title.Value)`

## Using Custom Code

- You can write your own VB functions and include them in the Code tab of the Report|Report Properties dialog
- Visual Basic is the only language supported by SRS in the code window
- You can also develop custom assemblies that you can call from reports
  - ? Assemblies can be developed in *any* .NET language
  - ? You have to follow a number of steps to reference, deploy, and access your assemblies

## Custom Code Example rptEmployeeSales report

```
Public Function TitleSub(ByVal strValue As String) As  
String  
Dim strRet As String  
  
If Len(strValue) = 0 Then  
    strRet = "Employee"  
Elseif strValue = "Owner" Then  
    strRet = "President"  
Else  
    strRet = strValue  
End If  
  
Return strRet  
End Function
```

Code

```
=Code.TitleSub(Fields!Title.Value)
```

Expression

## Formatting Fields

- Formatting Numbers/Dates
  - ? Right-click on textbox and select Properties
  - ? Select from Standard formats or select custom and enter a custom .NET formatting string
- Styles (Font, FontSize, Color, etc.)
  - ? Use property sheet

## Conditional Formatting

- Use If, Switch, or a custom function as value for property in property sheet
  - ? You can do this for textboxes and table rows (sections of a report)

## Conditional Formatting Example rptEmployeeSales report

- Need to display sales over \$1,000 bolded and in red

```
=If(Fields!Cost.Value>1000,"Red","Black")
```

Color Property

```
=If(Fields!Cost.Value>1000,"Bold","Normal")
```

FontWeight Property

## **What's Missing?**

- Unlike many report writers, SRS has no support for events
- You can use functions and conditional formatting to do much of what you might use events in some other reporting tools

## **Grouping & Sorting**

## Creating a Group

- Right-click on left margin of table and select Insert Group
- Select a field to group on or enter an expression
- Select any options (page break at start, page break at end, etc.) and click OK to create group
- SRS doesn't automatically add the group field to the group header (the wizard does, though) but you can add it easily enough

## Groups

- You can use Sorting tab of Grouping and Sorting Properties dialog to sort groups and detail with groups
- To edit group, right-click on left-hand margin of group header or footer and select Edit Group
- Groups can be nested many deep

## Grouping Example

### rptEmployeeSales2 report

- First group
  - =Fields!LastName.Value & ", " & Fields!FirstName.Value
- Second group
  - =Fields!ProductName.Value

## Group Calculations

### rptEmployeeSales2 report

- You can use standard aggregate functions
  - ? Sum, Count, Avg, Min, Max, etc.
  - ? e.g.
    - =Sum(Fields!Cost.Value)
- Calculating Percentages
  - ? Trick is to give the textbox containing the denominator a name (e.g., txtTotalCost) and use it in expression, referencing it using ReportItems collection
  - ? e.g.,
    - =Sum(Fields!Cost.Value)/ReportItems!txtTotalCost.Value

## Creating Interactive Reports

- Drill Down Reports (rptCustomerHierarchy2)
  - ? Using the Visibility properties of TableRows you can create an interactive drill-down effect
  - ? Printed output will always show the fully-expanded data
- Document Maps (rptCustomerHierarchy3)
  - ? Use the Document map label property of Grouping and Sorting Properties dialog
  - ? Converts to PDF Bookmarks

## Parameters

## Creating a Report based on a Parameterized Stored Procedure

1. From Dataset dialog, set CommandType to StoredProcedure; don't enter sproc name at this time
2. From query designer, select sproc from drop-down
3. Click Run (!) icon to run sproc; you will be prompted for parameters; enter a sample set of parameters
4. Make sure correct query is returned
5. Select Report|Report Parameters; SRS will populate dialog with parameters from sproc
  - From this dialog you can change the order of parameters, the prompt text, etc.

## Creating a Drop-Down Parameter

- Create an additional Dataset for each drop-down source
- Select Report|Report Parameters
  - ? Under Available values, select From query
  - ? Enter Dataset, Value and Label fields

Available values:

Non-queried

From query

Dataset: Regions

Value field: Region

Label field:

# Matrix Reports & Charts

## Matrix Reports

## Layout

The screenshot shows the 'Layout' view of a matrix report. It displays a table structure with columns for years and a 'Total' column. The formulas for the cells are visible, such as '=Fields!OrderYear.Value' for the year columns and '=Sum(Fields!Cost.Value)' for the total row.

## Preview

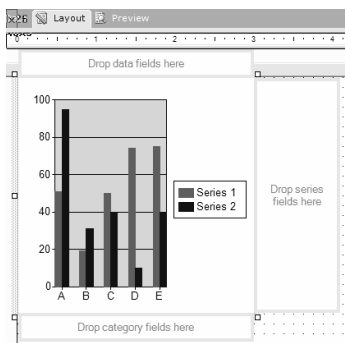
The screenshot shows the 'Preview' view of the matrix report. It displays a data table with columns for the years 1996, 1997, and 1998, and a 'Total' column. The rows list employee names and their corresponding values for each year and the total.

	1996	1997	1998	Total
Buchanan, Steven	\$18,383.92	\$30,716.47	\$19,691.89	\$68,792.28
Callahan, Laura	\$22,240.12	\$56,032.62	\$48,589.54	\$126,862.28
Davolio, Steve	\$35,764.51	\$93,148.08	\$63,195.01	\$192,107.60
Dodsworth, Anne	\$9,894.52	\$26,310.39	\$41,103.16	\$77,308.07
Fuller, Andrew	\$21,757.06	\$70,444.14	\$74,336.56	\$166,537.75
King, Robert	\$15,232.16	\$60,471.20	\$48,864.88	\$124,568.24
Leverling, Janet	\$18,223.96	\$108,026.16	\$76,562.73	\$202,812.84
Peacock, Margaret	\$49,945.11	\$128,809.79	\$54,135.94	\$232,890.85
Suyama, Michael	\$16,642.60	\$43,126.37	\$14,144.15	\$73,913.13
<b>Total</b>	<b>\$208,083.97</b>	<b>\$617,085.20</b>	<b>\$440,623.87</b>	<b>\$1,265,793.04</b>

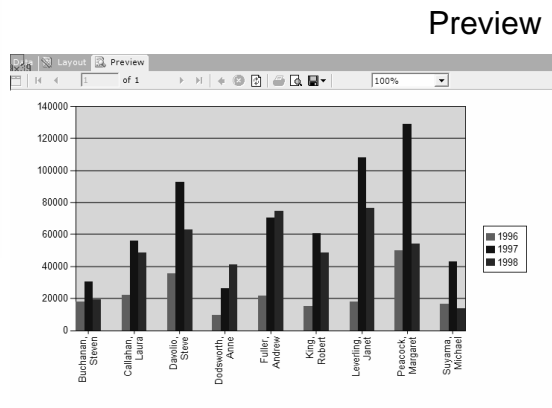
## Creating a Matrix Report

- Create new report
- Create Dataset
- Add Matrix to report layout
- Add Row, Column, and Data fields
- Optionally right-click on row or column and click on Subtotal to add a sub-total

## Charts



Layout



## **Creating a Chart**

- Create a new report
- Create Dataset
- Add Chart to report layout
- Drag and drop data and category fields to chart
- Optionally drag and drop a series field
- Size chart to liking
- Modify chart characteristics by right-clicking on chart and selecting Properties

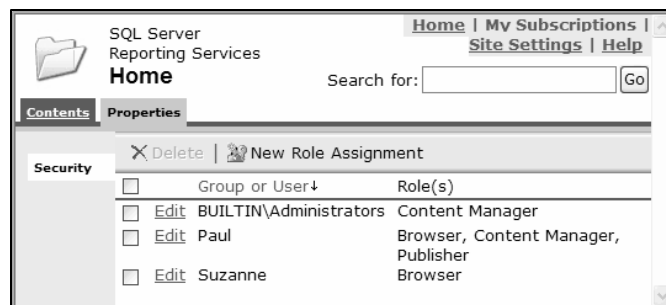
## **Security & Deployment**

## SQL Server Reporting Services Security

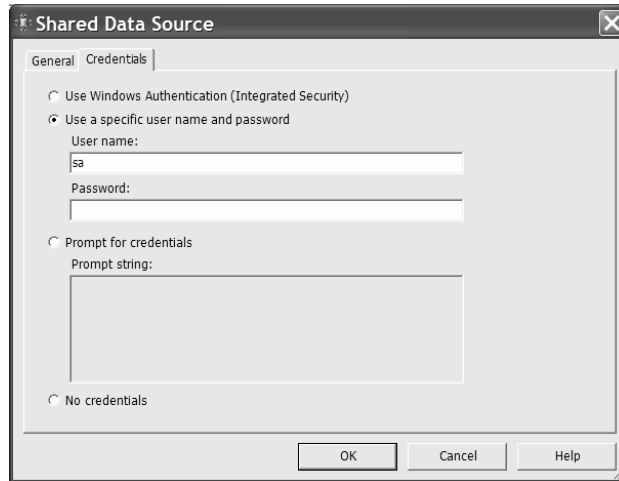
- Two parts to security
  1. How will you authenticate and authorize users to run and manage reports?
    - a) Out of the box, SRS only supports Windows authentication of users using roles
    - b) See <http://msdn.microsoft.com/library/?url=/library/en-us/dnsql2k/html/ufairs.asp> for info on how to use Forms authentication (requires Enterprise Edition of SQL Srvr)
  2. How will you authorize people to connect to SQL Server (or other data source) to provide data to report?
    - a) Integrated security (you may have one hop/security issues)
    - b) Fixed connection string (encrypted within SRS database)
    - c) Prompt user at run time

## Authorizing Users to Run/Manage Reports

- Use SRS Report Manager
  - <http://server/reports>
- Click on Properties tab



## Data Source Security



## Deployment to Report Server

1. Use Visual Studio
  - a) Set properties of VS project to point to the ReportServer URL
    - You can set the URL for both DebugLocal and Production configurations
  - b) Select Build|Deploy *projectname*
2. Use SRS Report Manager
  - a) Navigate to <http://server/reports>
  - b) Upload and manage reports

## Browser Support

Feature	Browser Support
Basic Reports	Most browsers (non-IE browsers will produce basic auth prompt and navigational toolbar will be non-functional) *
Interactive Reports with scripting	Most later browsers supporting scripting (non-IE browsers will produce basic auth prompt and nav toolbar will be non-functional)*
Report Manager	IE 5.5 or later

\*Only way to be sure is to test!

## Export Support

- SQL Server Reporting Services has wonderful support for exporting (rendering) to a variety of formats



## Integrating Reporting Services into Apps

### URL Access – Running Reports from your App

- Rendering report to default format (with toolbar)
  - ? `http://server/ReportServer?/folder/report`
  - ? e.g., `http://localhost/ReportServer?/nwrpts/rptEmpSales`
- Rendering report to non-default format
  - ? `http://server/ReportServer?/folder/report`  
`&rs:Command=Render&rs:Format=format`
  - ? e.g., `http://localhost/ReportServer?/nwrpts/rptEmpSales`  
`&rs:Command=Render&rs:Format=PDF`
- Rendering report with parameters
  - ? `http://server/ReportServer?/folder/report`  
`&Param1=value1&Param2=value2...`
  - ? e.g., `http://localhost/ReportServer?/nwrpts/rptEmpSales`  
`&rs:Command=Render&rs:Format=PDF&Country=USA`

## SRS Web Service

- Complete API for running and managing reports, report security, etc.
  - ? <http://server/ReportServer/reportservice.asmx>
- Using service from VS .NET project
  1. Set Web Reference to ReportService service
  2. Add using/Imports statement
  3. Instantiate Web Service
  4. Set web services Credentials property
  5. Call appropriate method of service

Note: project will have to use integrated security with impersonate turned on in order to call ReportService web service

## SRS Web Service Example Reports.aspx

```
string strReportsUrl = @"http://localhost/Reportserver?";
string strFolder = "/SQLReportingServices ";

ReportingService rs = new ReportingService();
rs.Credentials = System.Net.CredentialCache.DefaultCredentials;
CatalogItem[] itmReports = rs.ListChildren(strFolder, false);

foreach(CatalogItem itm in itmReports)
{
    if (itm.Type == ItemTypeEnum.Report) {
        HyperLink hlk = new HyperLink();
        hlk.NavigateUrl = strReportsUrl + strFolder + "/" + itm.Name;
        if (itm.Description != null && itm.Description.Length>0) {
            hlk.Text = itm.Description; }
        else {
            hlk.Text = itm.Name;}

        lblLinks.Controls.Add(hlk);
        lblLinks.Controls.Add(new LiteralControl("<br>"));
    }
}
```

**Time Permitting:  
SQL Server 2005 Reporting Services  
Key New Features**

**Key New Features (1 of 4)**

- HTML Viewer Improvements
  - ? Direct printing
  - ? User sorting of columns
  - ? Multi-valued parameters

## Key New Features (2 of 4)

- Report Designer
  - ? Ability to create reports in non-report projects
    - Can embed reports in Win Forms and ASP.NET projects
  - ? Developers without Visual Studio can install designer
  - ? Improved expression editor with IntelliSense!
  - ? Better support for Analysis Services

## Key New Features (3 of 4)

- Report Management
  - ? New Windows-based configuration utility built into SQL Server Management Studio
  - ? Report Manager also available
- SharePoint Support
  - ? New Report Viewer and Report Explorer Web Parts

## **Key New Features (4 of 4)**

- Report Viewer Controls
  - ? One for Windows client apps
  - ? One for ASP.NET apps
- End User Reporting
  - ? Report Builder app lets users build reports
    - ClickOnce Win Forms app

## **Conclusion**

## Conclusion

- SQL Server Reporting Services is a very capable Web-based reporting tool
- SRS supports tabular, matrix (cross-tabs), and chart reports
- SRS reports support parameters, groups, and formatting
- You can use SRS Report Manager and/or the ReportService Web service to manage reports and security
- Using URL access and the SRS Web service makes it easy to integrate reports into your apps
- SRS 2005 looks very exciting

## Resources—Books

- Hitchhiker's Guide to SQL Server 2000 Reporting Services  
by Blackburn and Vaughn  
? highly recommended

## Thank You!

- Please complete evaluation forms
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