

# Data Warehouse Report Framework

## Developer Guide

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# 1 Using the Data Warehouse Report Framework

A set of tables within the Data Warehouse provides the following mechanisms to ensure consistency among and reuse of reports that query DWH data:

- Dynamic levels of dropdown lists
- Fixed drop down parameter names
- Fixed field names and formats
- Default column names
- “Boilerplate” Stored Procedure building blocks

This document describes the Report Framework tables and Stored Procedure building blocks, and then provides instructions for using the tool that populates them.

Team Foundation Server still holds the report layouts in rdl files. However, query retrieval, data manipulation and calculations all reside in the `rp_sha_reportname.sql` Stored Procedure inside the SQL Server. DWH database

## 1.1 Definitions, Acronyms and Abbreviations

The following terms and acronyms apply to this project.

Term	Definition
DWH	Data Warehouse – A reads-only (transaction-less) repository of PBS&J Project data from Oracle and Vision. Enables business trending and what-if analysis.
SP	Stored Procedure
TFS	Team Foundation Server, repository for all Corporate Applications Development created software systems, including reports. Enterprise edition of Visual Studio 2008.
Uc	User Control
DCR	Division Certification Report

## 1.2 Specific User Roles

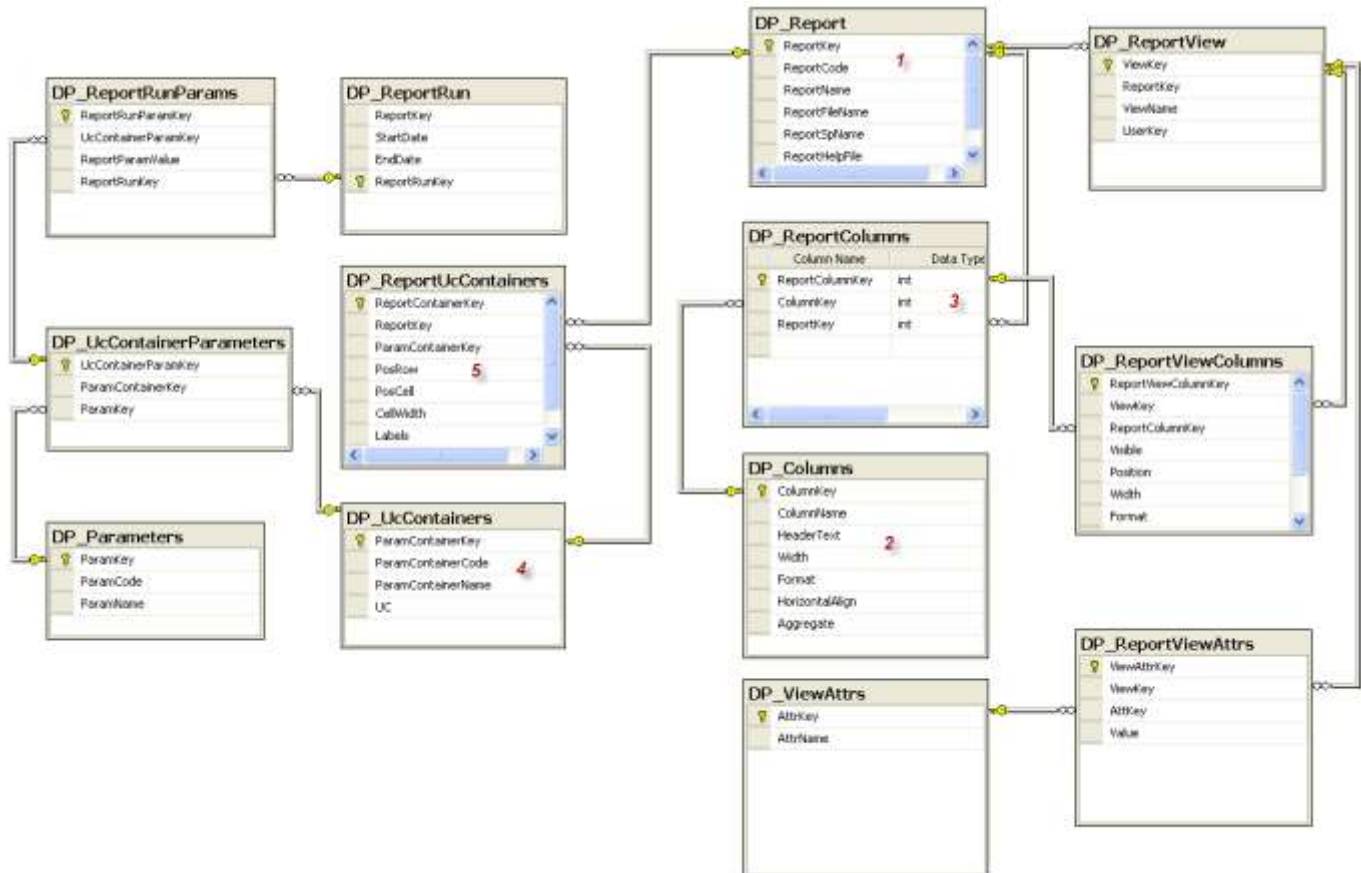
In this section, indicate roles defined in Active Directory or software authentication mechanism.

Role name	Privileges
Business User	Analyze client report specifications or layout, create use case plan. Initialize report shell in the Framework, Setup layout rdl in TFS. Connect Help file. Test Report View layout on screen, data from query and links to other reports, Test Data View
Administrators	Specify report numbers, add new columns as DWH expands, deploy reports
End User	Tests report, verifies data , layout, totals

## 2 Framework Architecture

### 2.1 Report Framework Schema

All DWH Framework tables have names that begin with DP\_. Together they function as an integrated metadata network within the DWH.



### 2.2 Report Setup

This section introduces the tables of the Framework and your report entries in those tables.

#### 2.2.1 Procedure Summary

1. Add your report to DP-Report
2. Choose your fields from DP-Columns
3. Add your report columns to DP\_ReportColumns
4. Choose your dropdowns from DP-UcContainers
5. Position your report dropdown in DP-ReportUcContainers
6. Choose your parameters from DP-Attributes
7. Assemble the Stored Procedure

All the other tables collect information each time the report runs.

Note: Create a report mockup or Use Case before you attempt to apply these tables or create the report definition layout (rdl) in TFS.

## 2.2.2 DP-Report

Figure 1: Entering New framework report

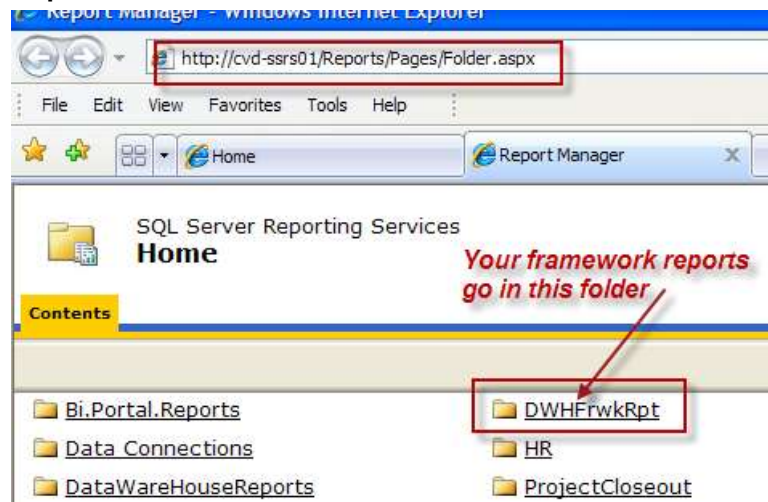
ReportKey	ReportCode	ReportName	ReportFileName	ReportSpName
50	931	Project Status Detail	/DWHFrwkRpt/RP_SHA_DET_ProjectStatusDetail_Monthly	rp_sha_ProjectStatusDetail
51	932	PM Project Cost Summary	/DWHFrwkRpt/RP_SHA_DET_ProjectCostSummary_Monthly	rp_sha_ProjectCostSummary_Main
52	933	Organization Project Status Summary	/DWHFrwkRpt/RP_SHA_DET_ProjectStatusSummary	rp_sha_ProjectStatusSummary_Main
53	934	Project Status Summary	/DWHFrwkRpt/RP_SHA_DET_ProjectStatusSummary	rp_sha_ProjectStatusSummary_Main
54	935	PM Project Cost Detail	/DWHFrwkRpt/RP_SHA_DET_ProjectCostDetail_Monthly	rp_sha_ProjectCostDetail_Main
56	936	Task Status Summary	/DWHFrwkRpt/RP_PRO_SUM_TaskStatusSummary_Mixed	rp_sha_TaskStatusSummary
57	937	<i>your report name</i>	<i>/DWHFrwkRpt/your rdl</i> <i>-on cvd-srs01/Reports/Pages/Folder.aspx</i>	<i>your query Stored Procedure on SQL Server</i>

Start here. Use Figure 1 to help you fill in the following

1. Report Code- Scroll down at the last number assigned and enter the next available
2. Report Name – The name your users will see
3. Report file name- Include folder name /DWHFrwkRpt/.(Figure 2) followed by the rdl name. Apply the [DWH Reporting Naming Conventions](#) to choose the rdl name.
4. Report SP Name – the SQL Server stored procedure for your report query

You do not enter the help file information at this time. SQL Server will place a Null in that column. When the Technical Writer uploads the help document and sends you a link, return to this table to enter the help URL..

Figure 2: Report File location



## 2.2.3 DP-Columns

This table contains a row for every text and numeric DWH field.

Figure 3: Sample DP-Columns entries

ColumnKey	ColumnName	HeaderText	Width	Format	HorizontalAlign	Aggregate
2	PbsjName	Group Name	250	NULL	Left	None
11	BudgeRevenue	BAC Revenue	115	{0:#,##0}	Right	Sum
27	LastActivityDate	Last Proj Act.	115	{0:MMM/dd/yyyy}	Right	None
33	phy_per_compl	Phy. % Compl	115	{0:#,##0.00}	Right	None
236	BACAvgLaborCostRate	BAC Avg Labor Cost Rate	115	{0:#,##0.00}	Right	Avg

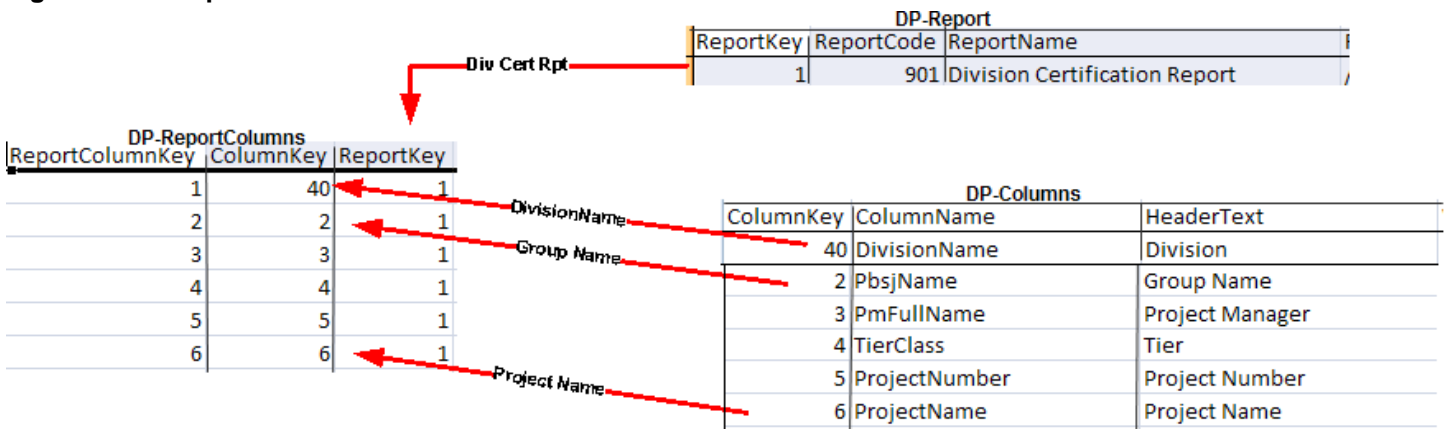
1. Look for each field you need in your report. Note the numeric ColumnKey. You will need it in DP-ReportColumns.
2. In your stored procedure, use the exact ColumnName spelling from DP-Columns.
3. If possible, use the default DP-Columns HeaderText value as each column head. Using default headers maintains consistency among reports.
4. Plan for the default width of each field needed in your report layout. Allow extra width for large sum aggregates.

5. Use the default format for all money and percentage data.
6. Typically, align numeric data right to allow room for aggregations. Where possible, use the default HorizontalAlign from DP-Columns for all other fields.
7. Aggregation for numbers either sums the column values or averages the values, 'None' in the Aggregate column applies to text fields and percentages

### 2.2.4 DP-ReportColumns

Cross-reference every column needed in your report in DP-ReportColumns.

Figure 4: DP-ReportColumns cross-references



1. Enter one row per column, including DWH columns used in report headers, such as Division Name in the Division Certification Report example shown in Figure 4 above.
2. Identify the report by the Report Key, not the three-digit Report Code.
3. Identify each column by its column key.

### 2.2.5 DP-UcContainers, DP-ReportUcContainers

Uc stands for User Control, which includes drop down lists, input fields, drill-down links and so forth. In this section, you set up the drop down User Controls.

Multiple drop-down list choices might appear at the top of your report.

- Your drop downs might not all fit on one row above a narrow report.
- The choices in one drop down might constrain the choices in a drop-down to the right of it. For example, choice of Division constrain the choices available in a Group or Project Manager drop down to members of the selected Division.

Use the tables in Figure 5 to identify your report, select this report's drop downs, and to specify their vertical position and horizontal order.

**Figure 5: Cross-referencing Report and Containers**

DP-Report			
ReportKey	ReportCode	ReportName	ReportSpName
1	901	Division Certification Report	/p_sha_DivisionCertificationReportExt_Grid

DP-UcContainers			
ParamContainerKey	ParamContainerCode	ParamContainerName	UC
1	UC_PERIOD	Period Name	UC_Period
2	UC_ORGANIZATION	Organization	UC_Organization
3	UC_DRILLDOWN	Drilldown	UC_DRILLDOWN
4	UC_TIER	Tier	UC_Tier

DP-Report UcContainers						
ReportContainerKey	ReportKey	ParamContainerKey	PosRow	PosCell	CellWidth	Labels
8	1	1	1	1	5%	NULL
32	1	2	1	2	80%	NULL
44	1	4	1	3	15%	NULL

**Figure 6: DP-UcContainers**

This table associates a unique key with each possible drop down container.

Notice that the ParamContainerName column assigns the screen Label that consistently displays above the drop-down control in every report that uses this drop down.

ParamContainerKey	ParamContainerCode	ParamContainerName	UC
1	UC_PERIOD	Period Name	UC_Period
2	UC_ORGANIZATION	Organization	UC_Organization
4	UC_TIER	Tier	UC_Tier

**Figure 7: DP-ReportUcContainer entries for DCR**

DP-Report UcContainers						
ReportContainerKey	ReportKey	ParamContainerKey	PosRow	PosCell	CellWidth	Labels
8	1	1	1	1	5%	NULL
32	1	2	1	2	80%	NULL
44	1	4	1	3	15%	NULL

In this example, the Report 1 (Division Certification Report) developer set up 3 dropdowns :

~~Period will display at left of top row of dropdowns and will consume 5% of the row.

~~Organization will display second from the left and is allotted 80% of drop down row.

~~Tier displays on the right of the same row and will span 15% of the row to allow for multiple tiers.

### 2.2.6 DP-Parameters,

Select the parameters your report needs to interpret drop down lists from DP\_Parameters. See Figure 6 below.

- For example, most reports need the value passed from the Period drop-down list.
- If the user might select multiple values in one drop down, the drop down container passes a list of selection values, separated by commas. Example: Project\_List might pass 100007867, 1000005858, 1000005472.

**Figure 8: Parameters you can pass to Stored Procedure**

ParamKey	ParamCode	ParamName
6	PERIOD_NAME	PeriodName
7	ORG_ID	OrgId
8	ORG_NAME	OrgName
9	ORG_LEVEL	OrgLevel
10	START_ORG_LEVEL	StartOrgLevel
11	END_ORG_LEVEL	EndOrgLevel
12	GL_ACCOUNT_NAME	GLAccountName
13	GL_ACCOUNT_TYPE	GLAccountType
14	GL_ACCOUNTING_GROUP_NAME	AccountingGroupName
15	REPORT_NAME	ReportName
16	ORG_ID_LIST	OrgIdList
17	DD_PAR1	DDPar1
18	DD_PAR2	DDPar2
19	DD_PAR3	DDPar3
20	TIER_LIST	TierList
21	AGREEMENT_MANAGER_LIST	AgreementManager
22	CONTRACTS_ADMINISTRATOR_LIST	ContractsAdministrator
23	PM_DELEGATE_LIST	PmDelegate
24	PROJECT_ANALYST_LIST	ProjectAnalyst
25	PROJECT_BILLER_LIST	ProjectBiller
26	PROJECT_MANAGER_LIST	ProjectManager
27	ACCOUNT_LIST	Account
28	ACCOUNT_TYPE	AccountType
29	TASK_MANAGER_LIST	TaskManager
30	KEY_MEMBERS_LIST	KeyMember
31	PROJECT_LIST	Project
32	PROJECT_MG_NAME_LIST	Project Manager Name
33	PM_NAME_LIST	Project Manager Name

**Figure 9: DP-UcContainerParameter**

cross-references every plausible combination of UcContainer and parameters affecting that container. For example, the Organization UcContainer can accommodate any of the following types of parameter

UcContainerParamKey	ParamContainerKey	ParamKey	
3	2	8	Organization-Name parameter
4	2	9	Organization Level parameter
5	2	10	Organization_Start_Level
6	2	11	Organization_End_Level
7	2	16	Organization ID list

Notes:

- Level choices include Company, Service, Sector, Division and Group.
- Start Level and End Level together specify a range of levels within the hierarchy.

## 2.2.7 Organization ID list passes a comma-delimited list of organizations that the SP parses. Lists and parsing discussed in Section 2.2.5 DP-UcContainers, DP-ReportUcContainers

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12	GL_ACCOUNT_NAME	GLAccountName
13	GL_ACCOUNT_TYPE	GLAccountType
14	GL_ACCOUNTING_GROUP_NAME	AccountingGroupName
15	REPORT_NAME	ReportName
16	ORG_ID_LIST	OrgIdList
17	DD_PAR1	DDPar1
18	DD_PAR2	DDPar2
19	DD_PAR3	DDPar3
20	TIER_LIST	TierList
21	AGREEMENT_MANAGER_LIST	AgreementManager
22	CONTRACTS_ADMINISTRATOR_LIST	ContractsAdministrator
23	PM_DELEGATE_LIST	PmDelegate
24	PROJECT_ANALYST_LIST	ProjectAnalyst
25	PROJECT_BILLER_LIST	ProjectBiller
26	PROJECT_MANAGER_LIST	ProjectManager
27	ACCOUNT_LIST	Account
28	ACCOUNT_TYPE	AccountType
29	TASK_MANAGER_LIST	TaskManager
30	KEY_MEMBERS_LIST	KeyMember
31	PROJECT_LIST	Project
32	PROJECT_MG_NAME_LIST	Project Manager Name
33	PM_NAME_LIST	Project Manager Name

## 2.2.9 URL Generated at Run Time

Every time a user runs a report or presses the Refresh button, the URL sends parameter choices to the Stored Procedure. The Framework environment generates the URL and SP parameter lists for you.. This section shows how they work.

ParamKeys 6, 9, 16, and 10 in Figure 9 above determine the URL for a Division Certification Report. Figure 10 below shows the URL generated to run the report on staging.

**Figure 10: URL generated by Report Run or Refresh**

[http://dwhreportsstg/PBSJ.DWH.eReport/Report.aspx?&RC=901&PERIOD\\_NAME=OCT09&ORG\\_ID\\_LIST=1243&ORG\\_LEVEL=Division&START\\_ORG\\_LEVEL=Division](http://dwhreportsstg/PBSJ.DWH.eReport/Report.aspx?&RC=901&PERIOD_NAME=OCT09&ORG_ID_LIST=1243&ORG_LEVEL=Division&START_ORG_LEVEL=Division)

~~Parameter RC is the ReportCode from the *second* column of DP-Reports.

~~ ORG\_ID\_LIST needs only one member, the Division carried from the dashboard to the initial run of the report.

**2.2.10 Multiple Selection Example**

For this example, the user checked two Divisions in the Division drop down.

**Figure 11: Multiple Selection Division Drop Down**

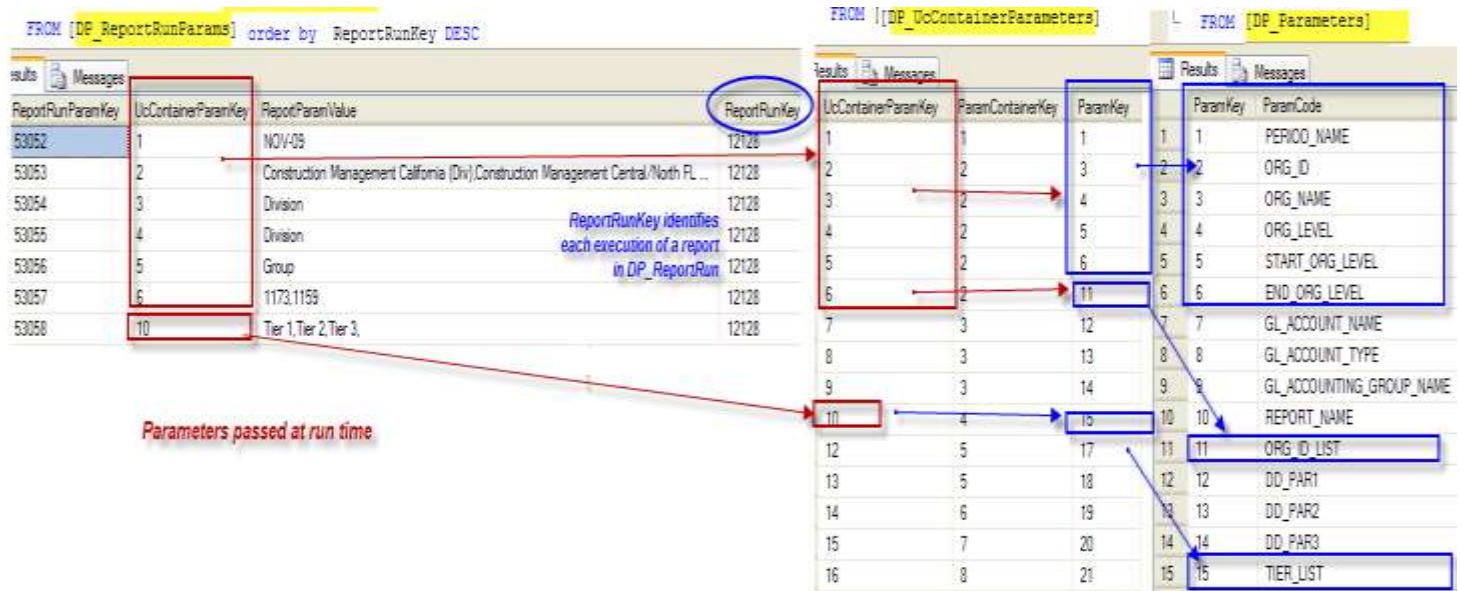
Division:

Multiple Selections

- All
- Architecture East (Div)
- Architecture Engineering - MEP (Div)
- Architecture Engineering - Structural (Div)
- Architecture West (Div)
- Asset Management (Div)
- ATG (Div)
- Aviation Construction Management (Div)
- Aviation East (Div)
- Aviation Management (Div)
- Aviation West (Div)
- Building and Facilities (Div)
- Buildings Management (Div)
- Central Sciences Management (Div)
- Chief Marketing Officer (Div)
- Coastal Engineering (Div)
- Construction Management California (Div)
- Construction Management Central/North FL (Div)
- Construction Management DFW (Div)

The user's selections from the drop down lists are stored in DP\_ReportRunParams, shown in Figure 12 below.

**Figure 12: How the Framework passes parameter values**



ORG\_ID\_LIST contains numbers of both Divisions selected for the report. ORGANIZATION\_ID contains the selected Division names.

## 2.3 Assembling the Stored Procedure

Your SP must explicitly retrieve its parameters from the Framework tables.

### 2.3.1 Get Parameter Values

Include a Declare statement in your stored Procedure for every parameter you expect. (See the example in Figure 13.) Each DECLARE invokes the GetParamValue function to receive every parameter it needs from DP\_ReportRunParams.

**Figure 13: Getting Parameter Values passed to the Division Certification Report**

```

DECLARE @p_PeriodName VARCHAR(10) = dbo.GetParamValue(@pRepRunId, 'PERIOD_NAME')
DECLARE @p_OrgIdList VARCHAR(8000) = dbo.GetParamValue(@pRepRunId, 'ORG_ID_LIST')
DECLARE @p_OrgLevel VARCHAR(50) = dbo.GetParamValue(@pRepRunId, 'ORG_LEVEL')
DECLARE @p_RepName VARCHAR(100) = dbo.GetReportName('901')
    
```

Note: The DCR also invokes GetParamValue to get Tier selection. Because only the DCR needs tier, this document does not detail Tier list parsing.

```

DECLARE @p_Tier VARCHAR(500) = dbo.GetParamValue(@pRepRunId, 'TIER_LIST')
    
```

### 2.3.2 Parse List

Your SP needs a chunk of code to extract each element in a parameter list. The example below breaks the comma-delimited ORG\_ID\_LIST into a temporary table of separate Division IDs.

```

CREATE TABLE #TempList
(
    OrgID int
)
DECLARE @OrgID varchar(10), @Pos int
SET @p_OrgIdList = LTRIM(RTRIM(@p_OrgIdList))+ ','
SET @Pos = CHARINDEX(',', @p_OrgIdList, 1)
IF REPLACE(@p_OrgIdList, ',', '') <> ''
BEGIN
    WHILE @Pos > 0
    
```

```
BEGIN
    SET @OrgID = LTRIM(RTRIM(LEFT(@p_OrgIdList, @Pos - 1)))
    IF @OrgID <> ''
    BEGIN
        INSERT INTO #TempList (OrgID) VALUES (CAST(@OrgID AS int))
    END
    SET @p_OrgIdList = RIGHT(@p_OrgIdList, LEN(@p_OrgIdList) - @Pos)
    SET @Pos = CHARINDEX(',', @p_OrgIdList, 1)
END
END
```

### 2.3.3 DP\_PL\_Project

A small number of tables and views gather all the data your reports will need—in particular DP\_PL\_Project and DP\_PL\_Project\_V. These tables and views are updated every night. You do not need to build complicated queries that search through Dim and Fact Tables.

Use the existing rp\_sha\_ Stored Procedures as examples of how to code your own SP.