How ArcelorMittal Analyzes Custom ABAP and Prepares for an SAP S/4HANA Migration

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About the Speaker

Andy Bent

- SAP Basis and HANA manager

About AM/NS Calvert

- World's most advanced steel finishing facility
- Largest newly built facility in the U.S. in 40 years

- 5.3Mt production capacity
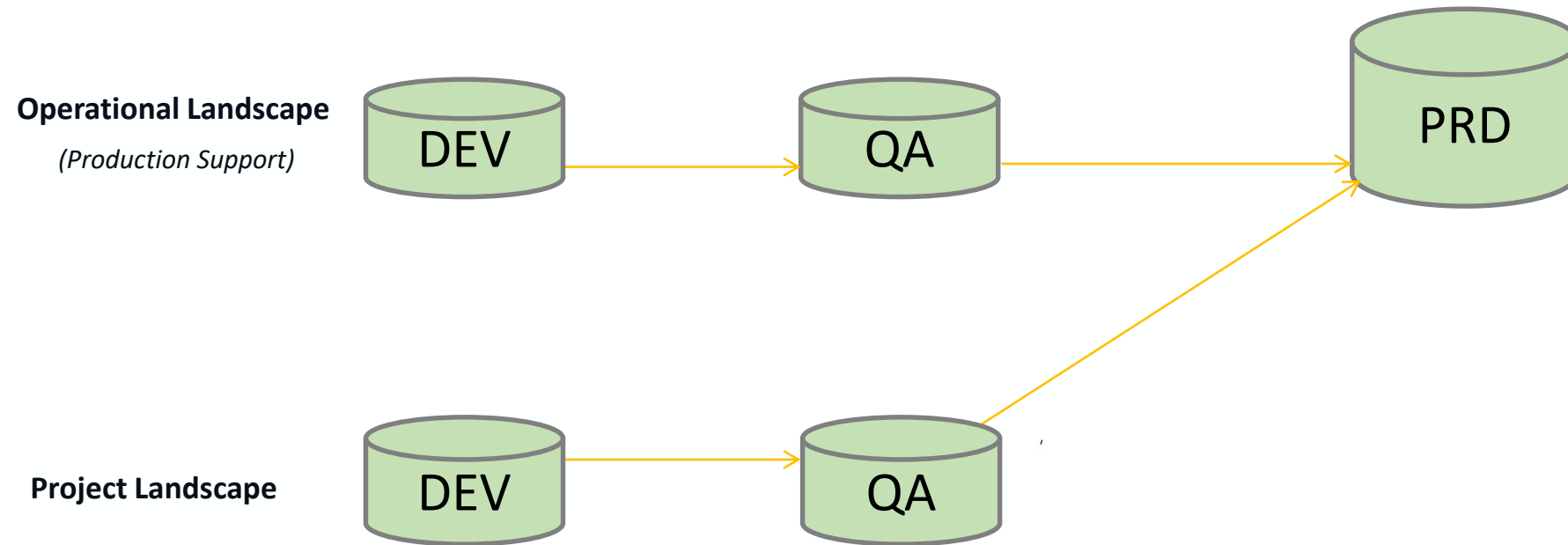- 1,550 team members (includes technical experts from both parent companies)

Agenda

- Dual Landscape
- Custom Code
- SAP S/4HANA

Dual Landscape

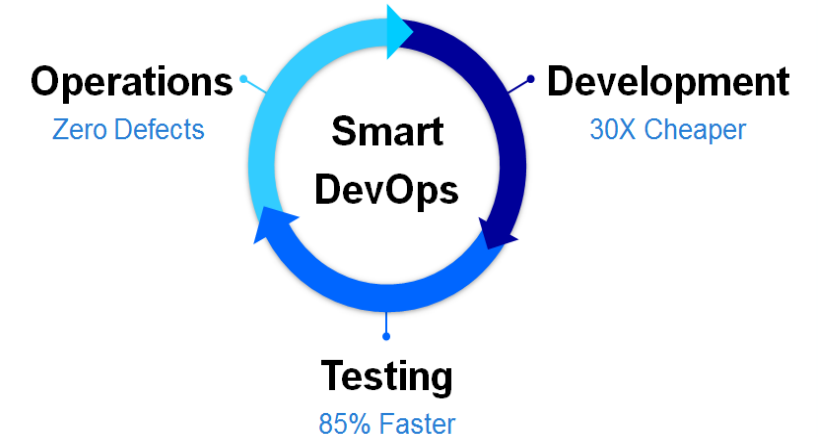**Operational Landscape**

(Production Support)

Project Landscape

Identifying missing changes in a parallel landscape can
be difficult and challenging

LiveCompare

- Replaces slow, inefficient and error prone manual analysis with automated analytics

- Increased awareness for fast action and improved collaboration

- Feeds your SAP team the information they need to facilitate Smart DevOps

- On-demand, smart data insights to enhance your DevOps process

Compare IMG

PRJ ← IMG Config Compare → **OPR**

Compare IMG configuration between systems

Comparison summary - 62 objects found & compared

Same	Different	Only in Sys1	Only in Sys2
48	14	0	0
		OPERATIONAL	PROJECT

General

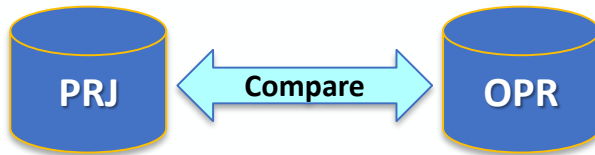| Property	Value(s)
Description	PM: Shop paper control by order type
RFC Destination 1	OPERATIONAL
RFC Destination 2	PROJECT

Row Counts

	Same	26
	Different	2
	Only in OPERATIONAL	0
	Only in PROJECT	1
	Total Read from OPERATIONAL	28
	Total Read from PROJECT	29
	Total Rows in T390_O on OPERATIONAL	28
	Total Rows in T390_O on PROJECT	29

Plant Maintenance and Customer Service
- Master Data in Plant Maintenance and Customer Service
- Maintenance Plans, Work Centers, Task Lists and PRTs
- Maintenance and Service Processing
  - Basic Settings
    - Maintain Authorizations for Processing
    - Planning of Background Jobs for PDC
    - Define Download Parameters for PDC
    - General Data
    - Print Control
    - General Order Settlement
    - Settings for Display of Costs
    - Quotation Creation and Billing for Service Orders
  - Maintenance and Service Notifications

Contents

Status	System	MANDT	PM_APPL	PM_DOC_TYP	WORKPAPER	PM_APTEXT	SELECTED	FLG_RMDB	FLG_RMDT
	PROJECT	100	N	ZC	5012		X		
	OPERATIONAL PROJECT	100	O	*	2010	Control card 1 as a suggestion (X)	X		
	OPERATIONAL PROJECT	100	O	*	2030	Operation card 1 (X)	X		

Compare Custom Objects

AM/NS CALVERT

PRJ ← Compare → OPR

Comparison summary - 2630 objects found & compared

Same	Different	Only in	Only in
2468	61	72	29
		PROJECT	OPERATIONAL

Custom object comparison between systems with a break down by object type

Development Class Results (Type Folder)

Object	Different	Same	Only in PROJECT	Only in OPERATIONAL	Not Compared	Cannot Compare	Not in PROJECT or OPERATIONAL	% Different
				Summary Counts				
ABAP Program	6	12	12	7				68
Business Add-In - Implementation			2					100
Class			2					67
Development Class		1						
DYNPRO	3		7	6				100
Function Group		12	4	2				34
Function Module	13		9	3				100
GUI Status	1			1				100
Include	27		29	9				100
Structure	5		4					100
Table Definition	6		3	1				100

ABAP Program : Z_MONITOR1

General | Header | Cross Ref | Code

```
1592 -    SAKTO
1593 -    KOKRS
1594 -       FROM AUFM INTO CORRESPONDING FIELDS OF TABLE WAUFM
1595         WHERE CHARG EQ WAH-COIL_ID.
1596   LOOP AT WAUFM.
1597     WRITE:/04 WAUFM-CHARG,WAUFM-MATNR,WAUFM-MENGE,WAUFM-MEINS,WAUFM-BWART COLOR COL_GROUP,
1598         WAUFM-AUFNR.
1599     IF WAUFM-AUFNR NE WAH-PRODUCTION_ORDER.
1600       CONTINUE.
1601     ENDIF.
1602   ENDLOOP.
1603     WRITE:/01 '-------------------------------------------------'.
1604   ENDLOOP.
1605   CLEAR WACOMP[].
1606 -  SELECT
1607 -    MANDT
1608 -    ZLOG_NO
1609 -    ITEM_NO
1610 -    MATERIAL_NUM_SAP
1611 -    WEIGHT
1612 -    COIL_ID
1613 -    EXIT_MAT_CON_IND
1614 -      FROM ZI015_COMP INTO TABLE WACOMP
1615         WHERE ZLOG_NO EQ SELECT1-WAJ1.
1616   LOOP AT WACOMP.
```

```
1384              WHERE CHARG EQ WAH-COIL_ID.
1385   LOOP AT WAUFM.
1386     WRITE:/04 WAUFM-CHARG,WAUFM-MATNR,WAUFM-MENGE,WAUFM-MEINS,WAUFM-BWART COLOR COL_GROUP,
1387         WAUFM-AUFNR.
1388     IF WAUFM-AUFNR NE WAH-PRODUCTION_ORDER.
1389       CONTINUE.
1390     ENDIF.
1391   ENDLOOP.
1392     WRITE:/01 '-------------------------------------------------'.
1393   ENDLOOP.
1394   CLEAR WACOMP[].
1395 +  SELECT * FROM ZI015_COMP INTO TABLE WACOMP



1396              WHERE ZLOG_NO EQ SELECT1-WAJ1.
1397   LOOP AT WACOMP.
```
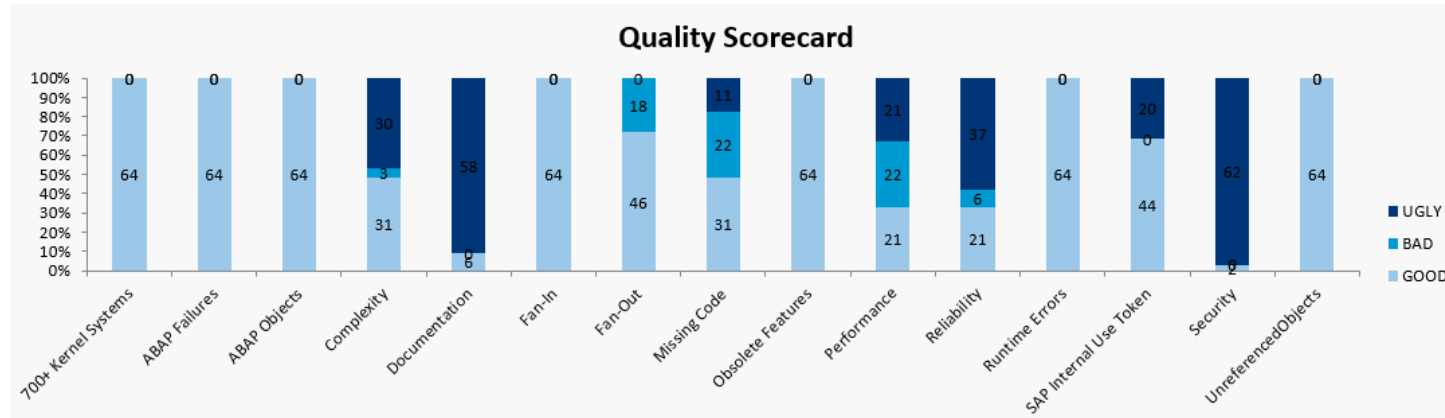
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Custom Code Development

Quality Scorecard

Chart categories: 700+ Kernel Systems, ABAP Failures, ABAP Objects, Complexity, Documentation, Fan-In, Fan-Out, Missing Code, Obsolete Features, Performance, Reliability, Runtime Errors, SAP Internal Use Token, Security, UnreferencedObjects

Legend: UGLY, BAD, GOOD

Review code changes in development and decide if any rework is required before transporting to QA.

TYPE	NAME	CATEGORY	CLASS	RULE	DETECTIONS
CLAS	ZCL_TOLERANCE_LIMITS	Reliability	Error	Avoid unchecked return code	26
CLAS	ZCL_TOLERANCE_LIMITS	Performance	Error	Inefficient select in loop	4
FUNC	Z_FORMULA_READ	Reliability	Error	Avoid unchecked return code	8
FUNC	Z_FORMULA_READ	Reliability	Error	Avoid unchecked return code READ TABLE	12
FUNC	Z_EDG_TYPE_READ	Performance	Error	Inefficient append in select	2
FUNC	Z_PO_UPDATE	Performance	Error	Inefficient insert in loop	6
FUNC	Z_PO_UPDATE	Performance	Error	Inefficient select in loop	7
FUNC	Z_PR_UPDATE	Reliability	Error	Avoid unchecked return code	8
FUNC	Z_PR_UPDATE	Performance	Error	Inefficient insert in loop	2
FUNC	Z_PR_UPDATE	Performance	Error	Inefficient select in loop	2

TYPE	NAME	INCLUDE	CLASS_TYPE	CLASS_NAME	METHOD	CATEGORY	CLASS	RULE	TOKEN	LINE_NUMBER	SOURCE
CLAS	ZCL_TOLERANCE_LIMITS	ZCL_TOLERANCE_LIMITS=====CM002			POST_PO	Performance	Error	Inefficient select in loop	SELECT	191	SELECT SINGLE AFKO~AUFNR AFVC~VORNR AFVC
CLAS	ZCL_TOLERANCE_LIMITS	ZCL_TOLERANCE_LIMITS=====CM002			POST_PO	Performance	Error	Inefficient select in loop	SELECT	255	SELECT SINGLE * FROM EBKN INTO LS_EBKN WHE

Prioritize Testing

Have the most at risk tcodes been tested? Prioritize testing based on object usage in the production system.

TYPE	NAME	DESCRIPTION	USAGE	USERS	TOP_USER	DEPTH	CHILD_TYPE	CHILD_NAME	DATE	CHANGES	CHANGE_ID
TCOD	ZSP_MONITOR	Monitor Dashboard	134,566	66	gsmith	2	INCL	ZSP_MONITOR_DATA	2018-07-26	2	ECCK900259
TCOD	ZSP_MONITOR	Monitor Dashboard	134,566	66	gsmith	2	INCL	ZSP_MONITOR_FORM	2018-08-01	2	ECCK900259
TCOD	Z_SOMONITOR	Sales Order Monitor	513,746	87	ajohnson	5	FUNC	Z_TYPE_READ	2018-06-04	31	ECCK900202
TCOD	Z_SOMONITOR	Sales Order Monitor	513,746	87	ajohnson	5	FUNC	Z_FORMULA_READ	2018-06-14	31	ECCK900798
TCOD	Z_SOMONITOR	Sales Order Monitor	513,746	87	ajohnson	5	FUNC	Z_FORMULA_READ	2018-06-06	31	ECCK900722
TCOD	Z_SOMONITOR	Sales Order Monitor	513,746	87	ajohnson	5	FUNC	Z_FORMULA_READ	2018-06-06	31	ECCK900716
TCOD	Z_PO_STATIC	Purchase Order Static	481,809	2	brobinson	2	INCL	Z_PO_STATIC_FORM	2018-06-29	1	ECCK900928
TCOD	Z_PR_STATIC	Purchase Requisition Static	291,313	3	gwilson	2	INCL	Z_PR_STATIC_FORM	2018-06-29	1	ECCK900928
TCOD	Z_PR_STATIC	Purchase Requisition Static	291,313	3	gwilson	2	INCL	Z_PR_STATIC_SEL	2018-06-29	1	ECCK900928
TCOD	Z_PASS	Shipping Doc.	121,123	153	croberts	1	PROG	Z_PASS1	2018-08-27	2	ECCK900267
TCOD	Z_COIL	Coil label	270,510	96	jbanks	2	INCL	Z_COIL_LABEL_FORM	2018-07-31	3	ECCK900308

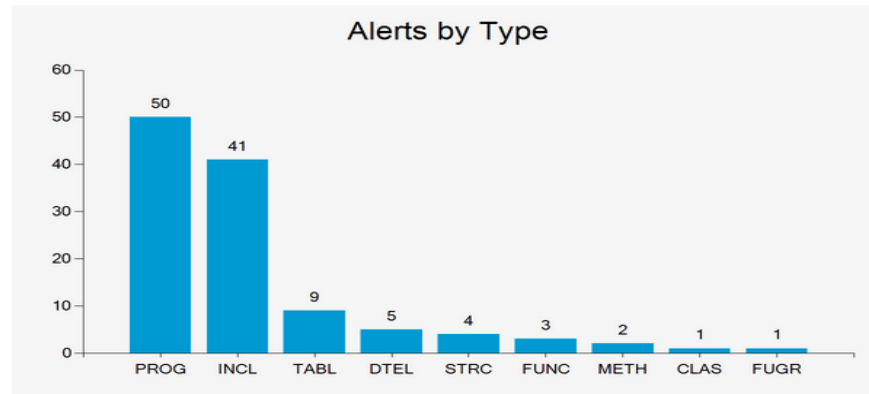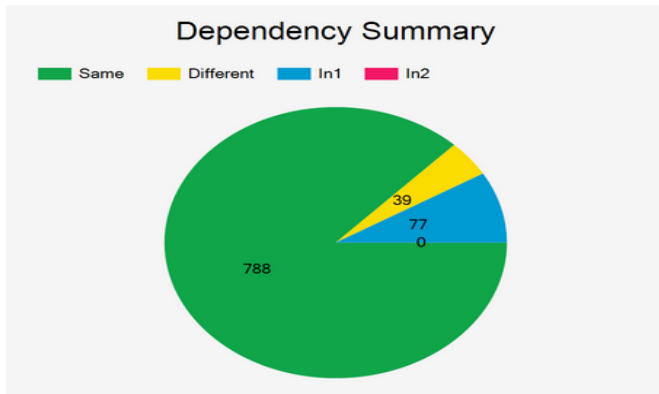**INCL : ZSP_MONITOR_DATA**

```
541 - TYPES: BEGIN OF TY_PODATA2,
542   MATNR TYPE MATNR,
543   WERKS TYPE WERKS_D,
544   RESWK TYPE RESWK,
545   BSART TYPE ESART,
546   AEDAT TYPE PAEDT,
547   EBELN TYPE EBELN,
548   EBELP TYPE EBELP,
549 - CHARG TYPE CHARG_D,
550 - MATNR_COMP TYPE MATNR,
551 - END OF TY_PODATA2.
552 - TYPES: TYPE_PODATA2 TYPE STANDARD TABLE OF TY_PODATA2.
```

```
541 + TYPES: BEGIN OF TY_PODATA,
542   MATNR TYPE MATNR,
543   WERKS TYPE WERKS_D,
544   RESWK TYPE RESWK,
545   BSART TYPE ESART,
546   AEDAT TYPE PAEDT,
547   EBELN TYPE EBELN,
548   EBELP TYPE EBELP,
549 + END OF TY_PODATA.
550 + TYPES: TYPE_PODATA TYPE STANDARD TABLE OF TY_PODATA.
```

Release to Production

Source Transports	Source Objects	Total Dependent Objects	Dependency Alerts
32	**97**	**904**	**116**
From DEV to PRD			Different or Missing Objects

Dependency Summary

Legend: Same (green), Different (yellow), In1 (blue), In2 (pink)

Pie chart values: 788, 39, 77, 0

Alerts by Type

PROG 50, INCL 41, TABL 9, DTEL 5, STRC 4, FUNC 3, METH 2, CLAS 1, FUGR 1

Move to Production
with zero defects

Source_Transport	Source_Type	Source_Name	Dependent_Type	Dependent_Name	Relation	Dependent_Status	Transports
ECCK904202	FUNC	Z_EDG_TYPE_READ	FUNC	Z_SKNPAS_READ	Child	Different	24
ECCK904202	FUNC	Z_EDG_TYPE_READ	TABL	Z_TXEDIT	Child	Different	4
ECCK904879	INCL	ZXML17	FUNC	Z_ESLL_BAPI_BUFFER	Child	In1	11
ECCK904879	INCL	ZXML17	INCL	ZXMLUU10	Child	Different	5
ECCK904879	INCL	ZXML17	INCL	ZXM16	Child	In1	2
ECCK905228	INCL	ZXM01	INCL	ZXM02	Child	In1	1
ECCK905228	INCL	ZXM03	INCL	ZXM02	Child	In1	1
ECCK905259	INCL	Z_MONITOR_DATA	DTEL	ZQSTATUS	Child	Different	5
ECCK905317	DOMA	Z_DISPOS	STRC	ZC_BAT_S	Parent	Different	2

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SAP S/4HANA – TCODE Changes

Based on the comparison between ECC 6 (as-is) and SAP S/4HANA (to-be) changes can be identified ahead of time

Tcodes used in as-is system that are now obsolete or replaced in SAP S/4HANA.

OBS	REL	TCODE	PROGRAM	USAGE	DESCRIPTION	NEWTCODE	NEWDESC
R	Y	CL20	SAPMMCLF	2	Assign Object to Classes	CL20N	Object Assignments
R	Y	CN43	RCNPE000	145	Overview: WBS Elements	CN43N	Overview: WBS Elements
R	Y	CO11	SAPLCORU	328	Enter Time Ticket	CO11N	Single Screen Entry of Confirmations
R	Y	CO88	SAPLKO71	139	Act. Settlment: Prod./Process Orders	CO88H	Actual Settlement: Prod./Process Ord
R	Y	CS11	SAPMC29L	1,748	Display BOM Level by Level	CS11H	Display BOM level by level-SAP HANA
R	Y	CS12	SAPMC29L	704	Multilevel BOM	CS12H	Display multilevel BOM - SAP HANA
R	Y	CS13	SAPMC29L	21	Summarized BOM	CS13H	Display Summarized BOM - SAP HANA
R	Y	CV01	SAPMCDOK	573	Create Document Info Record	CV01N	Create Document
R	Y	CV03	SAPMCDOK	5	Display Document Info Record	CV03N	Display document
R	Y	F-02	SAPMF05A	140	Enter G/L Account Posting	FB50	G/L Account Posting: Single Screen Trans
O	N	F.06	SAPMS38M	4	Foreign Currency Valuation:G/L Assts		
R	Y	FAGLL03	FAGL_ACCOUNT_ITEMS_GL	5	G/L Account Line Items (New)	FAGLL03H	G/L Line Item Browser (G/L View)

Screens changed in SAP S/4HANA based on functional area and current usage

TCODE	PROGRAM	DESCRIPTION	USAGE	CHANGE	APPLDESC
IL05	RIIFLO20	Display Functional Location	4,656	100	Plant maintenance
IL07	RIIFLO30	Functional Location List (Multi-Level)	177	33	Plant maintenance
IP30	RISTRA20	Deadline Monitoring for Maintenance Plans (Batch Input IP10)	188	100	Plant maintenance
IQ03	SAPMIEQ0	Equipment	54	8	Plant maintenance
IQ09	RIEQUI21	Display Serial Numbers	98	100	Plant maintenance
IW13	RIMAT000	Material Where-Used List	2,991	100	Plant maintenance
IW30	RIQMEL10	Notification List (Multi-Level)	778	33	Plant maintenance
IW37	RIAFVC20	Display and Change Operations	676	100	Plant maintenance

Prepare Custom Code for SAP S/4HANA

Find and deactivate unused custom code. Removing the unused code will reduce the total list of objects to analyze

TCODE	PROGRAM	TCODEDESC	CREATEDON	LASTCHANGEDON
Z_CORRECT_OM	Z_CONV_CORRECTION	correction program	2017-10-11	2017-10-11
Z_SD0103	AQA0Z_SD=======Z_SD0103======	Sales Item Delivery	2011-03-28	2015-06-12
ZBATCH	Z_BATCH	Batch Creation	2010-02-08	2016-03-17
ZBLKINV	Z__BLKIV_WORKFLOW	Blocked Invoice Workflow	2017-11-28	2017-11-28
ZCDD	ZCIMPRBG	Edit Cluster Data Dictionary	2010-11-02	2010-11-02
Z_INTRFCE	Z_C_INTRFCE	Interface	2010-05-10	2011-06-21
Z_STATCHANGE	Z_TABLE_UPDATION	Error Status	2012-11-06	2012-11-06
Z_CCI	Z_CCI_PAPERWORK	Canada Custom Invoice Paperwork	2015-09-29	2015-09-29
Z_SHIP_ASN	Z_SHIP_WO_ASN	Shipments without ASN Reconciliation	2015-12-08	2015-12-08

TIP: Remove unused tcodes from user roles

Custom code that depends on SAP standard objects with significant differences between as-is and to-be systems.

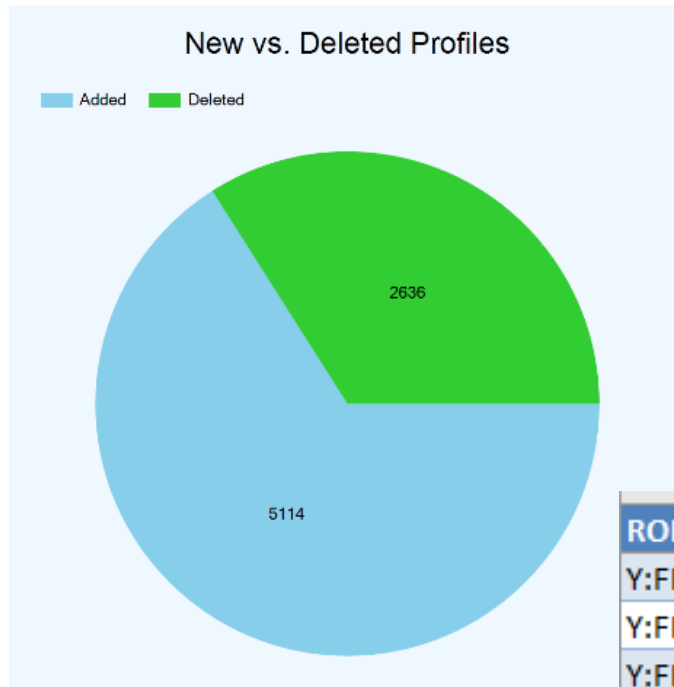| TCODE	PROGRAM	OBJECTTYPE	OBJECTNAME	OBJECTDESC	STATUS	APPLDESC
Z_CHECK_AL	Z_CHECK_ALFLAG	CLAS	CL_ABAP_CHAR_UTILITIES	Utilities for Processing Characters	Different	Human Resources Planning
Z_CHECK_AL	Z_CHECK_ALFLAG	CLAS	CL_CAM_ADDRESS_BCS	BCS: Represents a BAS Address	Different	Human Resources Planning
Z_DELAM	Z_DELETE_AM	CLAS	CL_GUI_ALV_GRID	ALV List Viewer	Different	Human resources
Z_DELAM	Z_DELETE_AM	CLAS	CL_GUI_DOCKING_CONTAINER	Docking Control Container	Different	Human resources
Z_O_INTEGRAT	Z_O_INTEGRATION	CLAS	CL_CAM_ADDRESS_BCS	BCS: Represents a BAS Address	Different	Human resources
Z_O_INTEGRAT	Z_O_INTEGRATION	CLAS	CL_DOCUMENT_BCS	Wrapper Class for Office Documents	Different	Human resources

CLAS : CL_DOCUMENT_BCS

ABAP Changes for SAP S/4HANA

Easily determine ABAP code that does not conform to SAP HANA standards

TYPE	NAME	CATEGORY	CLASS	RULE	DETECTIONS
PROG	Z_CHECK_FLAG	HANA	Error	Obsolete ABAP variable declarations (LIKE).	4
PROG	Z_MONITORING	HANA	Error	Obsolete ABAP variable declarations (LIKE).	7
PROG	Z_MONITORING	HANA	Error	Search DB Operations in Pool/Cluster Tables	3
INCL	Z_DASHBOARD_FORM	HANA	Error	Search DB Operations in Pool/Cluster Tables	1
INCL	Z_COND_FORM	HANA	Error	DB Hints	5
INCL	Z_DATA_PROCESSING	HANA	Error	EXEC SQL	6
INCL	Z_DATA_PROCESSING	HANA	Error	Search DB Operations in Pool/Cluster Tables	1
INCL	Z_ITEM_INC	HANA	Error	Search DB Operations in Pool/Cluster Tables	3

TYPE	NAME	CATEGORY	CLASS	RULE	TOKEN	LINE_NUMBER	SOURCE
PROG	Z_MONITORING	HANA	Error	Obsolete ABAP variable declarations (LIKE)	LIKE	20	DATA TIME_0 LIKE EDIDC-UPDTIM VALU
PROG	Z_MONITORING	HANA	Error	Obsolete ABAP variable declarations (LIKE)	LIKE	21	DATA TIME_24 LIKE EDIDC-UPDTIM VALI
PROG	Z_MONITORING	HANA	Error	Obsolete ABAP variable declarations (LIKE)	LIKE	22	DATA T_Z_M LIKE STANDARD TABLE OF
PROG	Z_MONITORING	HANA	Error	Obsolete ABAP variable declarations (LIKE)	LIKE	23	DATA T_Z_M_SELECT LIKE STANDARD TA
PROG	Z_MONITORING	HANA	Error	Obsolete ABAP variable declarations (LIKE)	LIKE	59	DATA T_STAT_OK LIKE BDIDOCSTAT OC(
PROG	Z_MONITORING	HANA	Error	Obsolete ABAP variable declarations (LIKE)	LIKE	85	DATA OK_CODE LIKE SY-UCOMM
PROG	Z_MONITORING	HANA	Error	Obsolete ABAP variable declarations (LIKE)	LIKE	99	DATA GV_EMAIL LIKE ADR6-SMTP_ADDI
PROG	Z_MONITORING	HANA	Error	Search DB Operations in Pool/Cluster Tables	FROM	1153	SELECT * FROM EDID4 INTO TABLE T_IDC
PROG	Z_MONITORING	HANA	Error	Search DB Operations in Pool/Cluster Tables	FROM	1158	SELECT * FROM EDID4 INTO TABLE T_IDC
PROG	Z_MONITORING	HANA	Error	Search DB Operations in Pool/Cluster Tables	FROM	1173	SELECT * FROM EDID4 INTO TABLE T_EDI

Security Impact Analysis

New vs. Deleted Profiles

- Added
- Deleted

2636

5114

Review current roles against changes for SAP S/4HANA

ROLE	TCODE	OBJECT	STATUS
Y:FI_MGR_INV	MB51	M_MSEG_BMB	NEW
Y:FI_MGR_INV	MB51	S_ARCHIVE	REMOVED
Y:FI_MGR_INV	MB51	S_DATASET	REMOVED
Y:FI_MGR_INV	MB51	S_TCODE	REMOVED
Y:FI_MGR_INV	MB52	M_BEST_WRK	NEW
Y:FI_MGR_AP_AR	F.13	S_PROGNAM	NEW
Y:FI_MGR_AP_AR	F110	S_BTCH_ADM	REMOVED
Y:FI_MGR_AP_AR	FB1K	F_BKPF_BUP	NEW
Y:FI_MGR_AP_AR	FB1K	F_SKA1_BUK	REMOVED

Further Information

- Review custom development for performance and adherence to standards

- Start custom code analysis now for S/4HANA

- https://www.intellicorp.com/ - LiveCompare

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http://info.asug.com/2019-ac-slides

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Q&A

For questions after this session, contact me at
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