



> Repetitive /
Complex
Development Tasks
Automation and
Reporting with the
Gen API

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CA Optimization Services

ca

EDGE EMEA 2009

Abstract

- > For QA or other kind of reporting or automation / simplification of development or coordination tasks, the Gen API is a widely underused but extremely powerful tool. A number of solutions built using the API will be presented (technology migration assistance reports, migration assistance, window design alterations etc.) Such developments using the native API are quite complex, however, and that complexity restricts its use. The GenSDK Workbench has been developed around the API to drastically reduce the complexity, and make such developments easily feasible and affordable.

Agenda

- > Presentation
- > Some (common) problems / questions
- > CA Gen API
- > CA Optimization Services GenSDK
- > GenSDK answers
- > Summary



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Presentation



CA Optimization Services

- > Technical services offering
 - Tailored for demanding customers
 - For business-critical applications
- > Established on customers' demand in 2001
- > Working at EMEA level (... mostly)
- > Currently proposed for CA Gen
- > The team
 - Experienced senior staff
 - Experts in all major platforms and programming languages
 - Serves customers in 6 languages



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CA Optimization Services

FSS offering

- > GenSDK Workbench
- > GenReports
- > GenControl
- > HTMLProtect
- > ConnectionMonitor
- > Java Action Block proxy
- > ...



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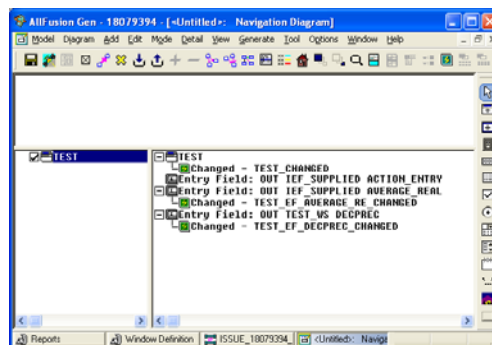
Some (common)
problems / questions



Question 1

> Where do I have Procedure Steps with *Changed* events?

Procedure step: 21 (TEST), event: 398 (TEST_EF_DECPREC_CHANGED)
 Procedure step: 21 (TEST), event: 65934 (TEST_EF_AVERAGE_RE_CHANGED)
 Procedure step: 21 (TEST), event: 131470 (TEST_CHANGED)



Question 2

> Where do I have Procedure Steps with *Changed* events on Decimal Precision fields?

Procedure step: 21 (TEST), event: 398 (TEST_EF_DECPREC_CHANGED)



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Question 3

> How are my procedure steps packaged?

Load module: 11889402 (SMVDLVDP), type: class com.ca.optsv.gen.sdk.GenOLTRANObject
10988892 (SMV_DELIVER_DUPLICATE_PLATE)
Load module: 11902540 (SMVREMP), type: class com.ca.optsv.gen.sdk.GenOLTRANObject
10973623 (SMV_REMAKE_PLATE)
Load module: 11904382 (SMVREVER), type: class com.ca.optsv.gen.sdk.GenOLTRANObject
11901975 (SMV_READ_VEHICLE_FOR_REGISTRATIO)
Load module: 11909140 (BMVINFRX), type: class com.ca.optsv.gen.sdk.GenOLTRANObject
11832345 (BMV_LOAD_INFORMEX_INFO11832345)
Load module: 6754507 (WBIG), type: class com.ca.optsv.gen.sdk.GenWNUNITObject
6820127 (C_ENTITY_ENTITY_LABEL_BIG)
6767490 (S_ENTITY_ENTITY_LBL_BIG_ID_LIST)
6842863 (S_ENTITY_ENTITY_LABEL_LBL_LIST)
6842551 (S_ENTITY_ENTITY_LABEL_READ)
6842503 (S_ENTITY_ENTITY_LABEL_CREATE)
6842695 (S_ENTITY_ENTITY_LABEL_UPDATE)
6842623 (S_ENTITY_ENTITY_LABEL_DELETE)
6835921 (S_ENTITY_ENTITY_LBL_BIG_LBL_LIST)
Load module: 6757615 (WLANG), type: class com.ca.optsv.gen.sdk.GenWNUNITObject
6790917 (S_LANGUAGE)



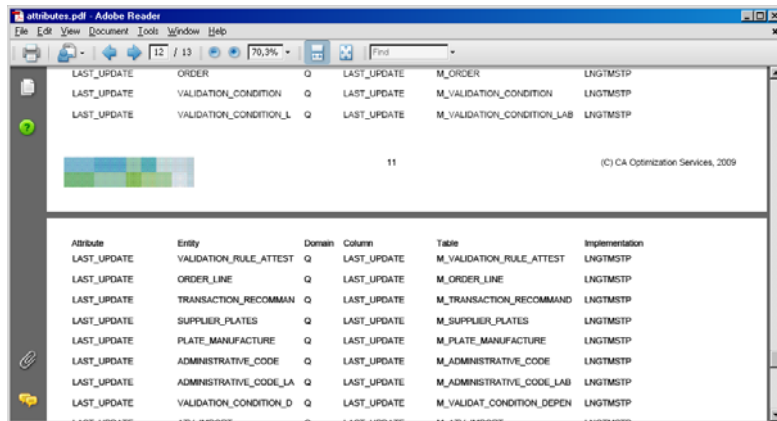
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Question 4

- > Do I have Timestamps attributes implemented as dates in Oracle?



Attribute	Entity	Domain	Column	Table	Implementation
LAST_UPDATE	ORDER	Q	LAST_UPDATE	M_ORDER	LNGTMSTP
LAST_UPDATE	VALIDATION_CONDITION	Q	LAST_UPDATE	M_VALIDATION_CONDITION	LNGTMSTP
LAST_UPDATE	VALIDATION_CONDITION_LL	Q	LAST_UPDATE	M_VALIDATION_CONDITION_LAB	LNGTMSTP
LAST_UPDATE	VALIDATION_RULE_ATTEST	Q	LAST_UPDATE	M_VALIDATION_RULE_ATTEST	LNGTMSTP
LAST_UPDATE	ORDER_LINE	Q	LAST_UPDATE	M_ORDER_LINE	LNGTMSTP
LAST_UPDATE	TRANSACTION_RECOMMEND	Q	LAST_UPDATE	M_TRANSACTION_RECOMMEND	LNGTMSTP
LAST_UPDATE	SUPPLIER_PLATES	Q	LAST_UPDATE	M_SUPPLIER_PLATES	LNGTMSTP
LAST_UPDATE	PLATE_MANUFACTURE	Q	LAST_UPDATE	M_PLATE_MANUFACTURE	LNGTMSTP
LAST_UPDATE	ADMINISTRATIVE_CODE	Q	LAST_UPDATE	M_ADMINISTRATIVE_CODE	LNGTMSTP
LAST_UPDATE	ADMINISTRATIVE_CODE_LA	Q	LAST_UPDATE	M_ADMINISTRATIVE_CODE_LAB	LNGTMSTP
LAST_UPDATE	VALIDATION_CONDITION_D	Q	LAST_UPDATE	M_VALIDATION_CONDITION_DEPEN	LNGTMSTP



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Question 5

- > Do I have Procedure Steps with views close to / above 31K limit?

Model: GEN SAMPLE MODEL R76, language: C
 EMPLOYEE_LIST: imports size: 2102
 EMPLOYEE_LIST: exports size: 7327
 MAINTAIN_DEPARTMENT: exports size: 1661
 SERVER_MAINTAIN_EMPLOYEE: exports size: 1772
 SERVER_MAINTAIN_DEPARTMENT: exports size: 1891



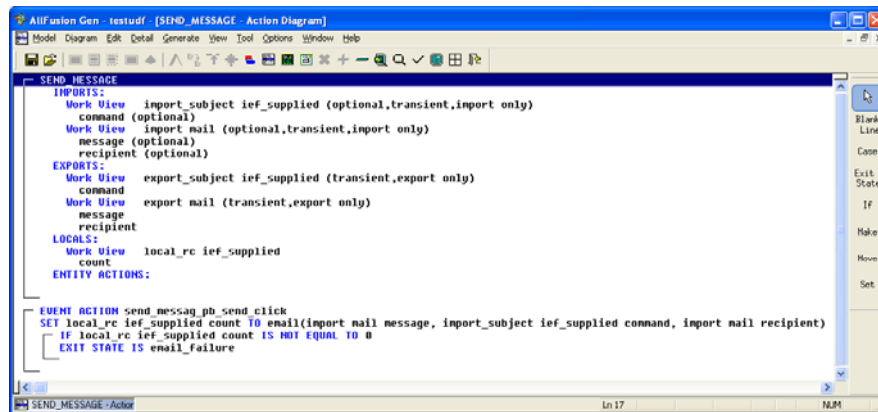
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Question 6

> How do I define a user-added function?



Question 7

> Where are potential divisions by 0 in my action diagrams?

A_CAB_K_ZF_ZAHL_B36_VON_DEZIMAL LCLST
 A_CAB_K_ZF_ZAHL_B36_VON_DEZIMAL LCLST

Question 8

> How do I simulate Tabs on the Web?



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Question 8

> How do I simulate Tabs on the Web?



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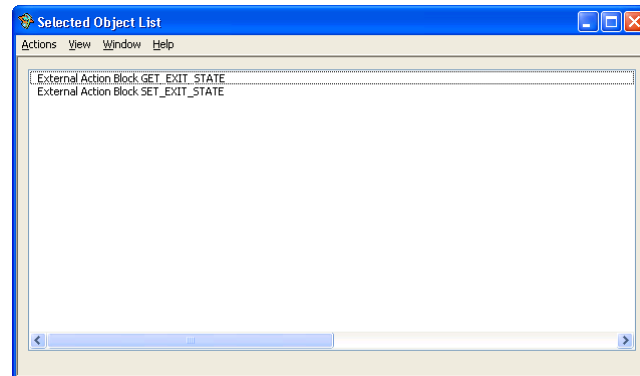
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Question 9

> How do I migrate an action block to another model?

Initial aggregate set



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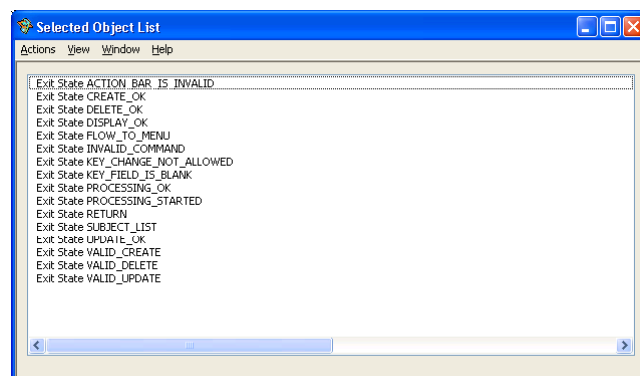
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Question 9

> How do I migrate an action block to another model?

Adoption aggregate set



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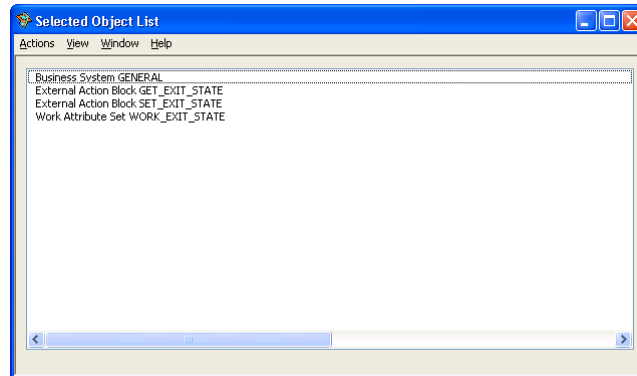
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Question 9

> How do I migrate an action block to another model?

Migration aggregate set



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CA Gen API



CA Gen API characteristics

> C API

- Set of functions to access or update model information

> 2 distinct capabilities

- Read-Only API → 51+ functions
- Read-Write (Update) API → 11 additional functions

> Delivered as

- DLLs on Windows,
- NCAL modules and DBRMs on z/OS

> Example functions

- EApiConnectToEncy()
- EApiFetchAllModelTypeObjects()
- EApiFetchCardManyAscWithObjInfo
- EApiAddObject()



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CA Gen API Features

> Common (read-only)

- Schema information
- Limited model information
- Objects / associations / properties information

> Common (update)

- Model lock management
- Commits / rollbacks of changes
- Objects / associations / properties changes

> CSE – HE encyclopedia-specific (read-only)

- Extended model information
- Encyclopedia information
- Multi-models access
- Subset information
- Checkout information
- Users & groups information
- Authorization information



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Toolset Automation Features

- > Objects / associations / properties information
- > Objects / associations / properties changes
- > (Very) limited toolset interactions

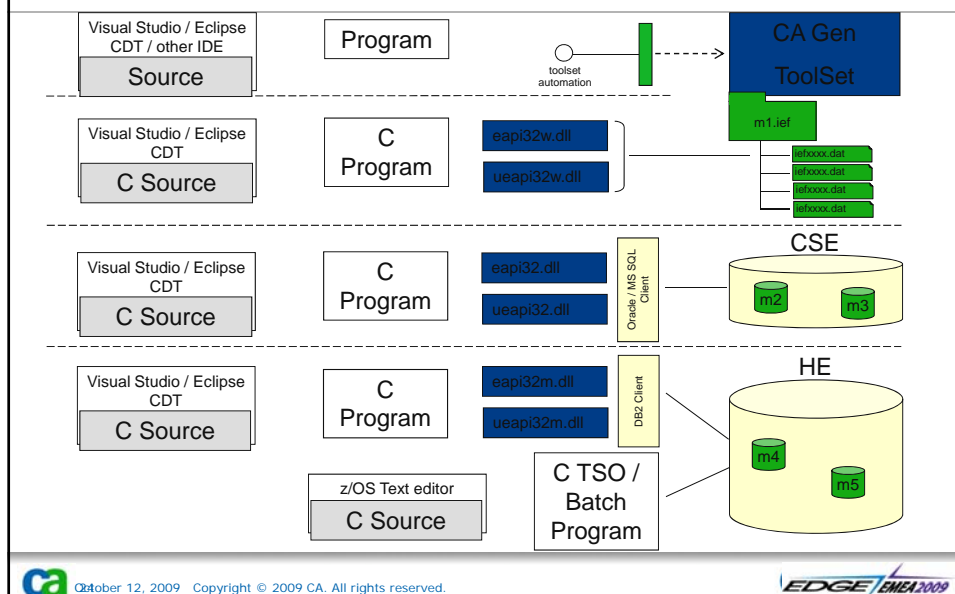
- > Plug-in integration



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Standard CA Gen API Architecture



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Standard CA Gen API Issues

- > C programming
 - Procedural programming
 - Availability of skillset
- > Metamodel knowledge for working with enumerations
 - Codes
 - Object Type codes
 - Property Type codes – Which property type is valid for which object type?
 - Association Type codes – Which association type is valid between which types of objects?
 - Readability
- > Memory management
 - Strings
 - Result sets – C uses fixed array lengths – How many objects exist for a specific object type? How many objects are associated to a given object for a specific association type?
- > Error handling
- > Reusability



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Standard CA Gen API Example

```
EAPIRC EApiFetchCardManyAscWithObjInfo(
```

```
  OBJID nObjectId,
```

Right Code?

```
  ASCTYPECODE nAscTypeCode,
```

```
  PLCOUNT plCount,
```

Use a counting function for # of result objects first!

```
  POBJID plArrayObjectIds,
```

```
  POBJTYPECODE pnArrayObjTypeCodes,
```

```
  POBJID pnArrayOrgObjIds);
```

Information about the same object is received in separate data structures!

Dynamically create an array of the correct size first!
And don't forget to reclaim the memory afterwards!



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CA Optimization Services GenSDK



CA Gen GenSDK Features

> OO front-end to the standard CA Gen API

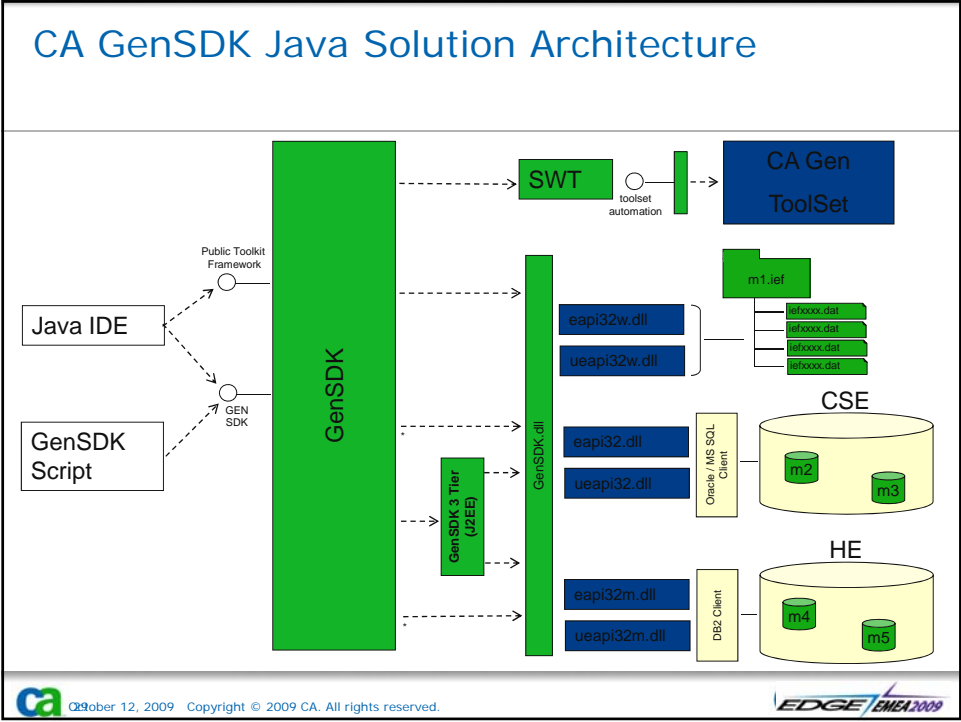
- Set of classes that represent:
 - Encyclopediae
 - Models & Subsets
 - The full hierarchy of modeling objects inside CA Gen models
- Hides the actual model store whether it is local, toolset automation, CSE or HE model
=> *Write once, run everywhere*
- Comes in various flavours Java, C#, C++

> Implementation of meta-model level

- => Objects know which properties they have and which associations they can have with other objects
- => No possibility for property and/or association type mismatches

> Cross-encyclopediae

> Easily and safely extensible



CA Gen GenSDK Example

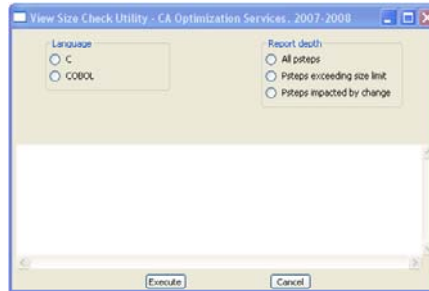
```
public class GenBUSSYSObject
implements com.ca.optsv.gen.sdk.GenNamedObject
```

Method Summary	
void	createCONTAINSAssociation (com.ca.optsv.gen.sdk.GenObject genObject) Creation of object(s) association through CONTAINS with object
com.ca.optsv.gen.sdk.GenObject[]	getCONTAINSObjects () Retrieval of object(s) associated through CONTAINS with object
java.lang.String	getDESC () Retrieval of DESC property of object
java.lang.String	getName () Retrieval of naming property of object
void	setDESC (java.lang.String value) Setting of DESC property of object
void	setName (java.lang.String value) Setting of NAME property of object

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Public Toolkit Framework

- > UI Framework, allows for a simple front-end to the developed utility
- > Takes care of opening a model whether it is toolset automation, local model, CSE model or HE model
- > Greatly simplifies user interface design
- > Greatly simplifies application deployment



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Components for Solution Delivery

- > Janel
 - Java launcher
 - Open Source
 - Gives
 - Plug-in capabilities for Java-based developments
 - Easy configuration
 - Write once run everywhere
- > NSIS
 - Installation Wizard creator
 - Open Source
 - Public Toolkit-based utilities
 - -> Minimal creation effort
 - -> Minimal NSIS knowledge skills



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GenSDKScript

- > Uses Public Toolkit Framework
- > Interactive Java
- > Can be used as
 - Stand-alone utility for local model, CSE, HE
 - Toolset plugin (works on local model)
- > XPath model access (see later)



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XPath access to the Model

- > Navigate model content as an XML DOM tree
- > Examples:
 - Listboxes with length greater than 100 occurrences
/STNDLST[CNTRL/GRP/VW/@EXPMAX>100]
 - Procedure Steps with Change Events
/GUI EVTUS[@EVENTTYPE='Changed']/RUNS/EVNTHDLR/EVENTF
OR
 - Listbox Event action types
/STNDLST/TRIGGERS/GUI EVTUS/@EVENTTYPE
 - Screens with nested repeating group views
/SCREEN[CONTAINS/SCRPOCC/CONTAINO]

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New features

- > GenSDK 3 Tier
- > Eclipse RCP Optimization Workbench framework (beta)
- > Integrated JasperReport reporting
- > Support for API subsetting functions (in test)



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Custom Solution



Question 1

> Where do I have Procedure Steps with *Changed* events?

```
events = xmodel.get("/GUI EVTUS[@EVENTTYPE='Changed']/RUNS/EVNT HDLR");
for (count = 0; count < events.length; count++) {
    System.out.println("Procedure step: " + ((GenEVNT HDLRObject)
events[count]).getEVENTFORObject() + ", event: " + events[count]);
}
```

Procedure step: 21 (TEST), event: 398 (TEST_EF_DEC PREC_CHANGED)
 Procedure step: 21 (TEST), event: 65934 (TEST_EF_AVERAGE_RE_CHANGED)
 Procedure step: 21 (TEST), event: 131470 (TEST_CHANGED)



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Question 2

> Where do I have Procedure Steps with *Changed* events on Decimal Precision fields?

```
events = xmodel.get(
"/GUI EVTUS[@EVENTTYPE='Changed']/[TRGGRDBY/ENTRYFLD/MAPPEDBY/MAPPING" +
"/POUTPUTS/PRDVW/SEES/ATTRUSR/@SRCTYPE='Y']/RUNS/EVNT HDLR");
for (count = 0; count < events.length; count++) {
    System.out.println("Procedure step: " + ((GenEVNT HDLRObject)
events[count]).getEVENTFORObject() + ", event: " + events[count]);
}
```

Procedure step: 21 (TEST), event: 398 (TEST_EF_DEC PREC_CHANGED)



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Question 3

> How are my procedure steps packaged?

```

execunits = xmodel.get("/EXECUNIT");
for (count = 0; count < execunits.length; count++) {
    System.out.println("Load module: " + execunits[count] + ", type: " +
        execunits[count].getClass());
    pstepeus = ((GenEXECUNITObject) execunits[count]).getREFSObjects();
    for (count1 = 0; count1 < pstepeus.length; count1++) {
        System.out.println("  " + ((GenPSTEPEUObject) pstepeus[count1]).getUSEDINObject());
    }
}

```

Load module: 11909140 (BMVINFRX), type: class com.ca.optsv.gen.sdk.GenOLTRANObject
 11832345 (BMV_LOAD_INFORMEX_INFO11832345)
 Load module: 6754507 (WBIG), type: class com.ca.optsv.gen.sdk.GenWNUNITObject
 6820127 (C_ENTITY_ENTITY_LABEL_BIG)
 6767490 (S_ENTITY_ENTITY_LBL_BIG_ID_LIST)
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 6842551 (S_ENTITY_ENTITY_LABEL_READ)
 6842503 (S_ENTITY_ENTITY_LABEL_CREATE)
 6842695 (S_ENTITY_ENTITY_LABEL_UPDATE)
 6842623 (S_ENTITY_ENTITY_LABEL_DELETE)
 6835921 (S_ENTITY_ENTITY_LBL_BIG_LBL_LIST)



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Question 4

> Do I have Timestamps attributes implemented as dates in Oracle?

Attribute	Entity	Domain	Column	Table	Implementation
LAST_UPDATE	ORDER	Q	LAST_UPDATE	M_ORDER	LNGTMSTP
LAST_UPDATE	VALIDATION_CONDITION	Q	LAST_UPDATE	M_VALIDATION_CONDITION	LNGTMSTP
LAST_UPDATE	VALIDATION_CONDITION_LL	Q	LAST_UPDATE	M_VALIDATION_CONDITION_LAB	LNGTMSTP
LAST_UPDATE	VALIDATION_CONDITION_LL	Q	LAST_UPDATE	M_VALIDATION_CONDITION_LAB	LNGTMSTP
LAST_UPDATE	ORDER_LINE	Q	LAST_UPDATE	M_ORDER_LINE	LNGTMSTP
LAST_UPDATE	TRANSACTION_RECOMMENDATION	Q	LAST_UPDATE	M_TRANSACTION_RECOMMENDATION	LNGTMSTP
LAST_UPDATE	SUPPLIER_PLATES	Q	LAST_UPDATE	M_SUPPLIER_PLATES	LNGTMSTP
LAST_UPDATE	PLATE_MANUFACTURE	Q	LAST_UPDATE	M_PLATE_MANUFACTURE	LNGTMSTP
LAST_UPDATE	ADMINISTRATIVE_CODE	Q	LAST_UPDATE	M_ADMINISTRATIVE_CODE	LNGTMSTP
LAST_UPDATE	ADMINISTRATIVE_CODE_LAB	Q	LAST_UPDATE	M_ADMINISTRATIVE_CODE_LAB	LNGTMSTP
LAST_UPDATE	VALIDATION_CONDITION_D	Q	LAST_UPDATE	M_VALIDATION_CONDITION_DEPEN	LNGTMSTP



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Question 4

> Do I have Timestamps attributes implemented as dates in Oracle?

```
com.ca.optsv.gen.sdk.toolkit.xpath.GenSDKXPath xmodel = new
com.ca.optsv.gen.sdk.toolkit.xpath.GenSDKXPath(model);
// Data extraction
Object[] attributes = xmodel.get("/ATTRUSR[@DOMAN='D' or @DOMAN='Q']");
Arrays.sort(attributes);
// Report data preparation
String[] headers = {"Attribute", "Entity", "Domain", "Column", "Table", "Implementation"};
GenericReport report = new GenericReport(model.getName()) +
"- Date / Timestamps Attributes Implementation", headers);
Vector<GenericReportLine> lines = new Vector<GenericReportLine>();
for (int count = 0; count < attributes.length; count++) {
    GenFIELDObject[] implementations = ((GenATTRUSRObject)
    attributes[count]).getIMPLNTBYObjects();
    for (int count1 = 0; count1 < implementations.length; count1++) {
        Object[] data = new Object[headers.length];
        data[0] = (count1 == 0)? ((GenATTRUSRObject) attributes[count]).getName() : null;
        data[1] = (count1 == 0)? ((GenATTRUSRObject)
        attributes[count]).getDSCPObject().getName() : null;
        data[2] = null;
        if (count1 == 0) {
            switch (((GenATTRUSRObject) attributes[count]).getDOMAN()) {
                case 'D':
                    data[2] = "Date";
                    break;
                case 'Q':
                    data[2] = "Timestamp";
                    break;
            }
        }
        data[3] = (count1 == 0)? ((GenATTRUSRObject) attributes[count]).getDOMAN() : null;
        data[4] = implementations[count1].getName();
        data[5] = implementations[count1].getCONTNDINOObject().getName();
        // Search for implementation type
        data[5] = null;
        if (implementations[count1] instanceof GenFIELDELEObject) {
            // Generic implementation
            switch(((GenFIELDELEObject) implementations[count1]).getFORMAT()) {
                case 'D':
                    data[5] = "DATE";
                    break;
                case 'Q':
                    data[5] = "TIMESTAMP";
                    break;
                default:
                    data[5] = ((GenFIELDELEObject) implementations[count1]).getFORMAT();
                    break;
            }
        }
        // Oracle-specific implementation
        GenFIELDXObject[] specificImplementations = ((GenFIELDELEObject)
        implementations[count1]).getEXTENDSObjects();
        for (int count2 = 0; count2 < specificImplementations.length; count2++) {
            if (specificImplementations[count2] instanceof GenFIELDOObject) {
                switch(((GenFIELDOObject) specificImplementations[count2]).getFORMAT()) {
                    case 'D':
                        data[5] = "DATE";
                        break;
                    case 'Q':
                        data[5] = "TIMESTAMP";
                        break;
                    case 'R':
                        data[5] = "LNGTIMSTP";
                        break;
                    default:
                        data[5] = ((GenFIELDOObject) specificImplementations[count2]).getFORMAT();
                        break;
                }
            }
        }
        lines.add(new GenericReportLine(data));
    }
}
report.print("PDF", "attributesImplementation", "c:/temp/attributes.pdf", lines);
} catch (Exception e) {
    feedbackException(e, WARNING);
}
```



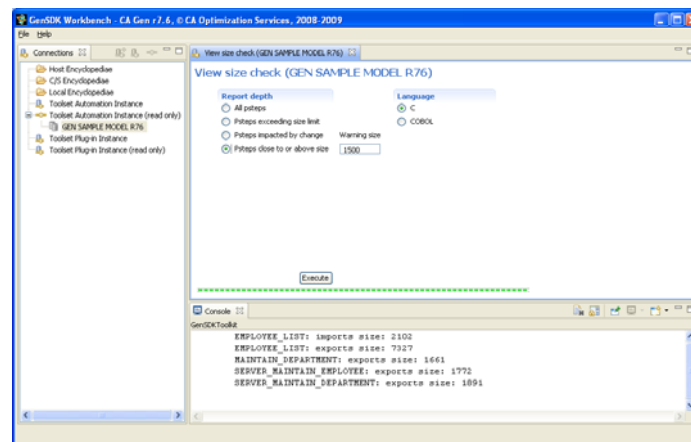
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Question 5

> Do I have Procedure Steps with views close to / above 31K limit?



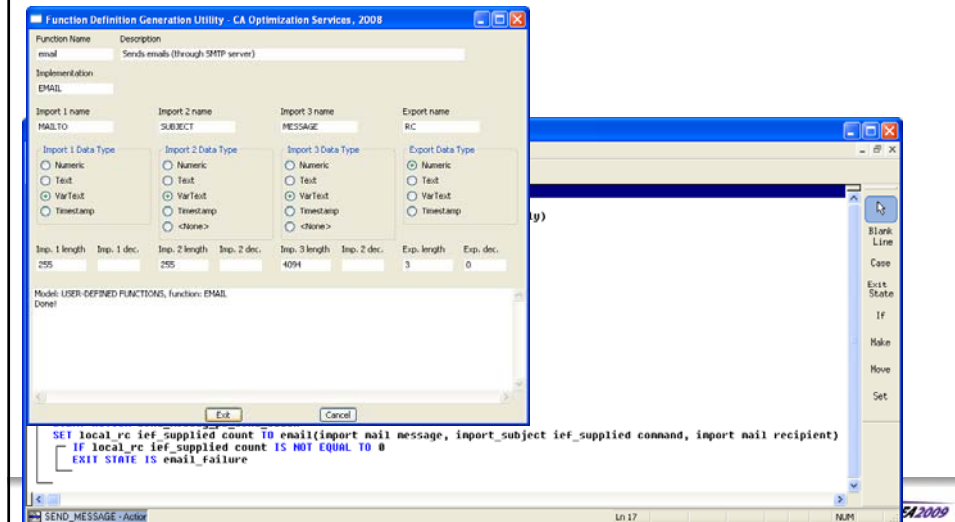
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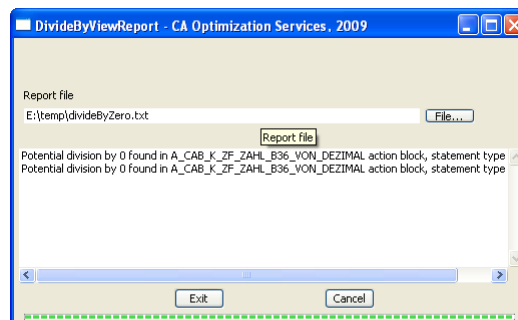
Question 5

> How do I define a user-added function?



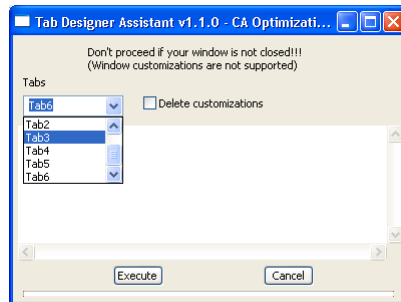
Question 7

> Where are potential divisions by 0 in my action diagrams?



Question 8

> How do I simulate Tabs on the Web?



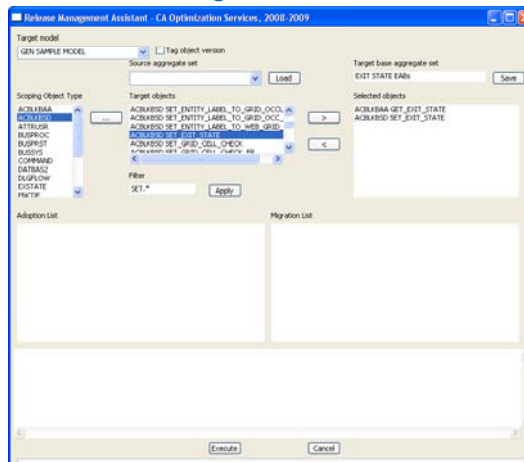
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Question 9

> How do I migrate an action block to another model?



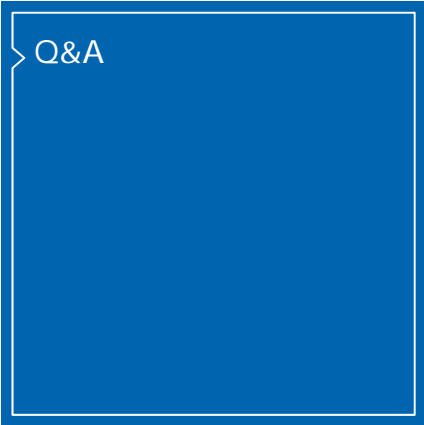
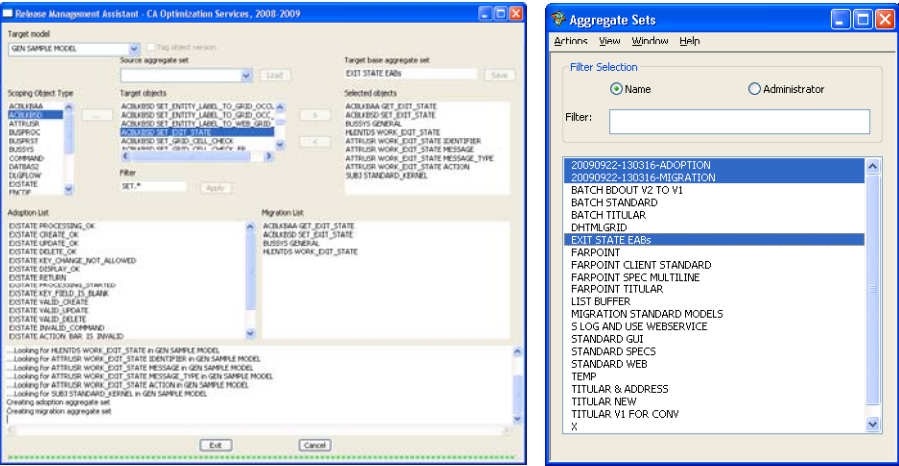
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Question 9

> How do I migrate an action block to another model?



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