CA ADS™
Application Development

Cal Domingue
CA Technologies

IUA/CA IDMS™ Technical Conference
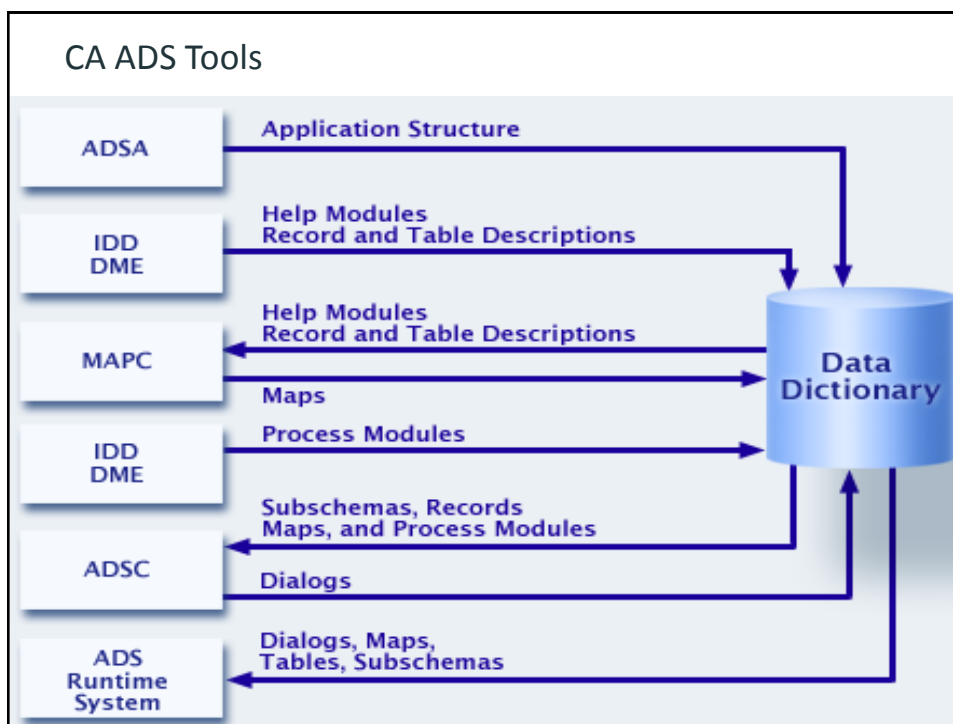May 16-20, 2016

Abstract

- CA ADS™ for CA IDMS™ is a group of application development tools originally designed to develop 3270 applications; the tool set is also 3270 based. The tools can also be used today to develop SQL procedures that can be initiated via client-based or web-based applications. This session can serve as either an introduction to CA ADS, or a refresher course for anyone needing to create or modify applications using the CA ADS family of tools.

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Agenda

- CA ADS Tools
- Creating or altering maps: MAPC
- Creating or altering dialogs: ADSC
- Creating or altering applications: ADSA
- Dialog Process Code in IDD

CA ADS Tools

- To build interface between users and data
- Expedite writing and testing of modular applications
- 4GL
- Runs in CA IDMS DC or via UCF from other TP monitors
- Develop prototypes parallel to detailed code
- Retrieve and update data in CA IDMS database
- Process, verify, and edit data
- Manage terminal input and output via maps

CA ADS Tools

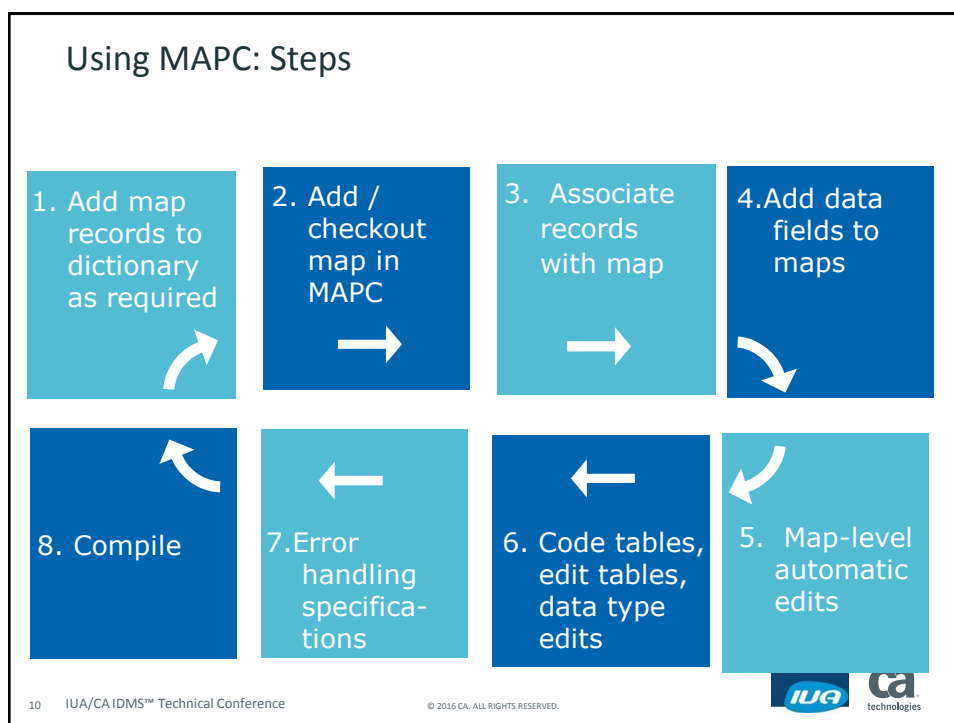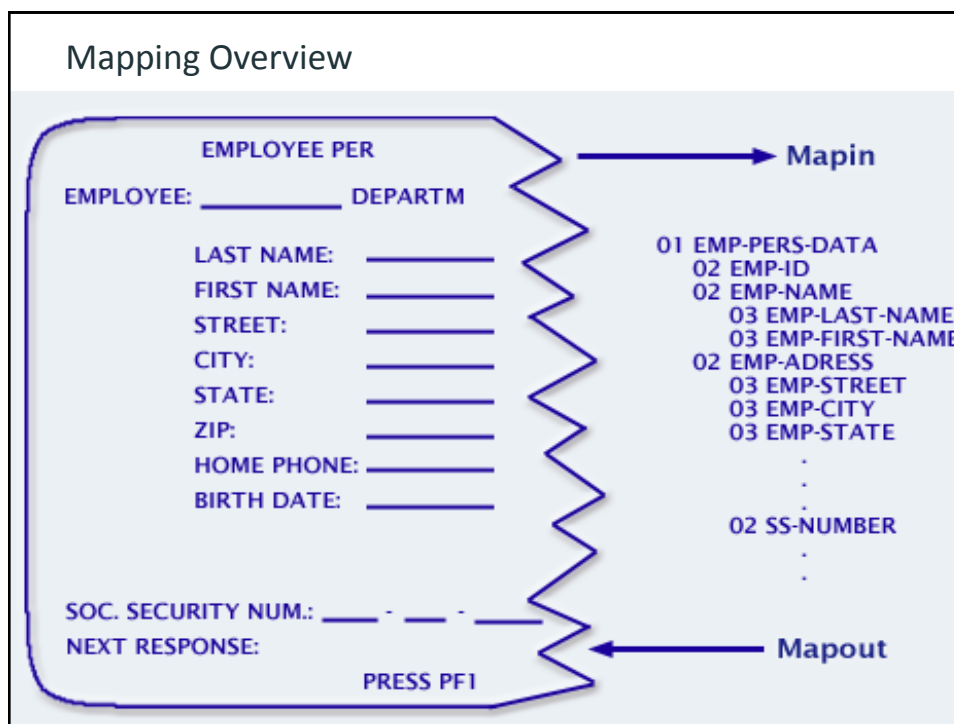|	
ADSA	**Application Structure** →
IDD DME	**Help Modules** **Record and Table Descriptions** →
MAPC	← **Help Modules** **Record and Table Descriptions** **Maps** →
IDD DME	**Process Modules** →
ADSC	← **Subschemas, Records** **Maps, and Process Modules** **Dialogs** →
ADS Runtime System	← **Dialogs, Maps,** **Tables, Subschemas**

Data Dictionary

Tools and Environments

- 3270 (Mainframe)-only impact
  - MAPC
  - ADSA

- Mainframe and web-based or client-based applications
  - ADSC
  - Dialog process code written in IDD

- SQL procedures as mapless dialogs
  - Leverage existing code by cloning it
  - Create new code to access existing data

MAPC: Create or Alter Maps Functions, Steps, and Screens

Develop / Modify Maps: MAPC

- Map
  - Specially formatted screens
  - Transmit data between terminal operator and program storage

- MAPC
  - Define map and its layout
  - Uses commands or screen prompts to simplify map design
  - Implement consistent procedures to establish fields on maps
  - Predefine characteristics of data transmitted
  - Specify links between a map and records
  - Generate an automatic screen layout from a record

Mapping Overview

```
        EMPLOYEE PER                          ➤ Mapin
EMPLOYEE: _____ DEPARTM

        LAST NAME:   _____          01 EMP-PERS-DATA
        FIRST NAME:  _____          02 EMP-ID
        STREET:      _____          02 EMP-NAME
        CITY:        _____             03 EMP-LAST-NAME
        STATE:       _____             03 EMP-FIRST-NAME
        ZIP:         _____          02 EMP-ADRESS
        HOME PHONE:  _____             03 EMP-STREET
        BIRTH DATE:  _____             03 EMP-CITY
                                        03 EMP-STATE
                                           .
                                           .
                                           .
                                        02 SS-NUMBER
                                           .
        SOC. SECURITY NUM.: ___ - __ - ___   .
        NEXT RESPONSE:
                    PRESS PF1         ◄ Mapout
```

Using MAPC: Steps

1. Add map records to dictionary as required ↱	2. Add / checkout map in MAPC →	3. Associate records with map →	4. Add data fields to maps ↘
8. Compile ↰	7. Error handling specifica-tions ←	6. Code tables, edit tables, data type edits ←	5. Map-level automatic edits ↗

MAPC: Main Menu – Add / Modify

```
   Add   Modify   Compile   Delete   Display   Switch
 .----------------------------------------------------------------------
                      CA-IDMS Online Map Compiler

                 Computer Associates International, Inc.


    Map name . . . . . . . .     ID310M2A
    Map version . . . . . . :         1
    Dictionary name . . . . :    SYSDICT
    Dictionary node . . . .      _____

    Screen . . . . . . . . .     1    1. General options
                                      2. Map-Level help text definition
                                      3. Associated records
                                      4. Layout
                                      5. Field definition

 DC366154 Map ID310M2A ver    1 has been checked out

 Command ===>
 Enter  F1=Help  F3=Exit  F10=Action
```

MAPC: General Options

```
                      General Options                    Page  1 of  2
 Map name:  ID310M2A  Version:      1

   Description. . .  EMPLOYEE DETAIL

   Type . . . . . .  1  1. Standard   2. Pageable   3. Videotex

   Screen sizes (/)  / 24 by 80   / 32 by 80   / 43 by 80   _ 27 by 132

   Automatic editing (/) . . . . /
   Decimal point is comma (/) . . _
   Message prefix . . . . . . . . DC
   Display options   Unlock keyboard (/). . . . . . . . . /
                     Turn off MDT (/) . . . . . . . . . . /
   Alarm options     Sound alarm on mapout (/). . . . . . _
                     Sound alarm on edit error (/). . . . _
   Print options     Print screen when displayed (/). . . _
   (3820-type)       Line control  1 1. No formatting     3. 64 chars per line
                                     2. 40 chars per line  4. 80 chars per line

 DC366704 Select map options

 F1=Help  F3=Exit  F4=Prev  F5=Next  F6=Preview  F8=Fwd
```

MAPC: Associated Records

```
                        Associated Records                    Page  1 of  1
Map name:  ID310M2A  Version:     1

                  Record name          Version            Role name          Drop
                                                                              (/)
 1 WK-DEPARTMENT                           1    _____  _

 2 WK-MAP-ACTION                           1    _____  _

 3 WK-EMPLOYEE                             1    _____  _

 4 _____             _____  _

 5 _____             _____  _

 6 _____             _____  _

 7 _____             _____  _


DC366604 Specify the map records

F1=Help   F3=Exit  F4=Prev  F5=Next   F6=Preview  F7=Bkwd  F8=Fwd  F9=Autopaint
```

MAPC: Map layout

```
                   ;EMPLOYEE DETAIL INFORMATION
         ;EMP ID            ;____*                ;MNGR ID:      ;____*
         ;EMP NAME          ;_____;_____*
         ;ADDRESS           ;_____*
                            ;_____*
                            ;__*       ;_____*

         ;PHONE             ;_____*
         ;STATUS            ;_*                    ;SS-NUMBER     ;_____*
         ;START DATE        ;_____*
         ;TERMINATION DATE  ;_____*
         ;BIRTH DATE        ;_____*

         ;DEPT ID           ;____*
         ;DEPT NAME         ;_____*
;ACTION:     ;_*            ;S=SELECT    I=INSERT   U=UPDATE  E=ERASE          ;
_____


    ...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8
    Enter  F1=Help  F2=Select  F3=Exit  F4=Prev  F5=Next  F6=Preview  F8=Bottom
    F9=SetCursor  F10=Deselect  F11=AltKeys       Drop all selected fields: _
```

MAPC: Main Menu - Compile

```
  Add   Modify   Compile   Delete   Display   Switch
 ·----------------------------------------------------------------
                  |     1. Compile       | ne Map Compiler
                  |     2. View Messages  |
                  |---------------------- | s International, Inc.
                  | F3=Exit              |
                  |_____|

  Map name . . . . . . . .    ID310M2A
  Map version  . . . . . .        1
  Dictionary name  . . . .    SYSDICT
  Dictionary node  . . . .    _____

  Screen . . . . . . . . .    _   1. General options
                                  2. Map-Level help text definition
                                  3. Associated records
                                  4. Layout
                                  5. Field definition



Command ===>
Enter  F1=Help  F3=Exit  F10=Action
```

MAPC Screen Flow
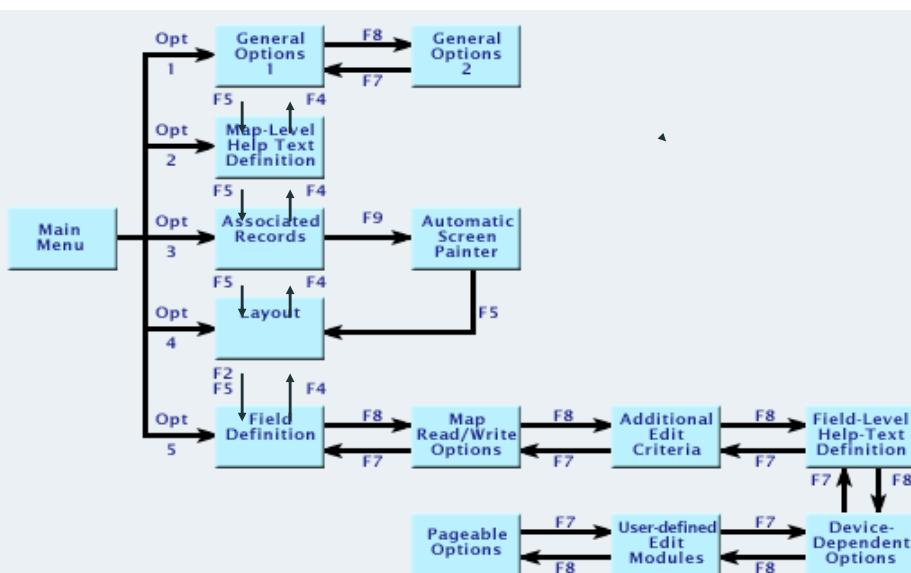
MAPC Batch Alternative

- Batch utility: RHDCMPUT
  - Uses entity occurrences stored in the data dictionary
  - Generates map load modules
  - Produces reports
  - Decompiles maps
  - Deletes map load modules

- Batch compiler: RHDCMAP1
  - Accepts, validates, and compiles mapping language statements
  - Populates data dictionary with entity occurrences
  - Provides input statement listings

ADSC: Create or Alter Dialogs
Functions, Steps, and Screens

Develop / Modify Dialogs: ADSC

- Dialog
  - Database retrieval and update, required processing
  - Batch dialogs for file input and output
  - Map management
  - Stand-alone run-time or serve as application function

- ADSC
  - Define dialogs for online and batch applications
  - Identifies map and records for use by application
  - Executed process code stored in IDD modules
  - COBOL-like language

Dialog Overview

Using ADSC: Steps
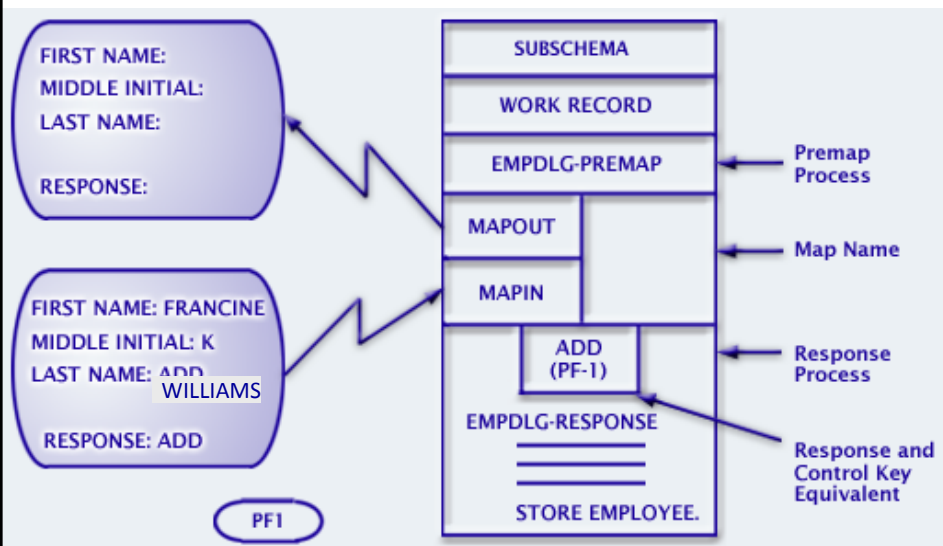
1. Add / Checkout dialog in ADSC ↱	2. Map Specifica-tion →	3.Database specification: Subschema, access module →	4.Specify records, tables ↘
8.Repeat as necessary ↖	7.View error messages, and correct code ←	6. Compile ←	5.Specify IDD process modules ↙
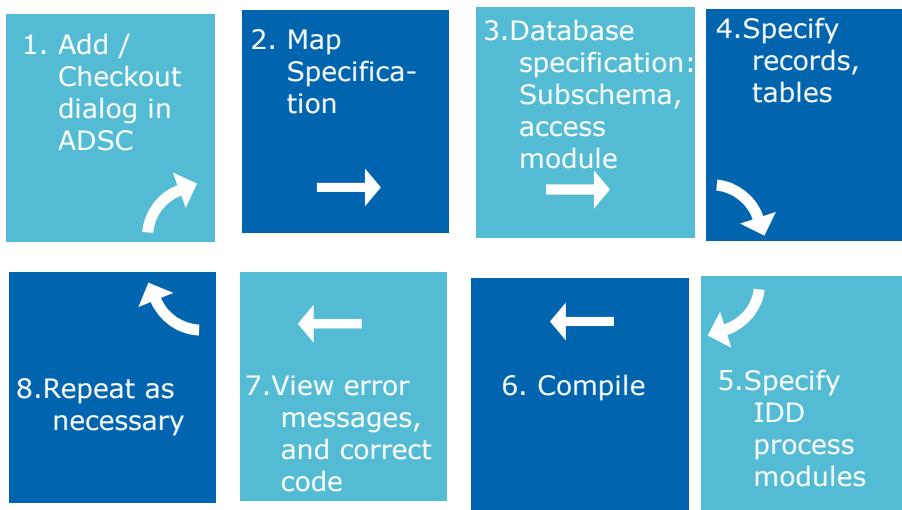
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ADSC: Main Menu – Add / Modify

```
    Add   Modify   Compile   Delete   Display   Switch
  '-----------------------------------------------------------------------
                        CA-ADS Online Dialog Compiler

                 Computer Associates International, Inc.


       Dialog name . . . . . . .     ID310D4A
       Dialog version  . . . . .        1
       Dictionary name . . . . .     SYSDICT
       Dictionary node . . . . .     _____

       Screen  . . . . . . . . .     1  1. General options
                                        2. Assign maps
                                        3. Assign database
                                        4. Assign records and tables
                                        5. Assign process modules

 DC498180 Dialog ID310D4A version    1 is reserved to you for modification.

  Command ===>
  Enter  F1=Help  F3=Exit   F10=Action
```

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ADSC: Map Specification

```
                         Map Specifications

                  Dialog  ID310D4A  Version    1


    Map name  . . . .    ID310M2A   |   Input map . . . . .   _____
    Version . . . . .       1       |   Version . . . . . .   ____
                                    |   Label . . . . . . .   _____
    Paging options     _ 1. Wait    |
                         2. No Wait  |   Output map  . . . .   _____
                         3. Return   |   Version . . . . . .   ____
                                    |   Label . . . . . . .   _____
    Paging mode . . . _ Update       |
                      _ Backpage     |   Suspense file label   _____
                      _ Auto display |
                                    |



Enter  F1=Help  F3=Exit  F4=Prev  F5=Next  F6=Switch Protection
```

ADSC: Database Specification

```
                      Database Specifications

                  Dialog  ID310D4A  Version    1


     Subschema . . . . . . . . . . . . .    _____
     Schema  . . . . . . . . . . . . . .    _____
     Version . . . . . . . . . . . . . .    ____

     Access Module . . . . . . . . . .     ID310D4A

     SQL Compliance  . . . . . . . . .     _ 1. ANSI-standard SQL
                                             2. FIPS

     Date Default Format . . . . . . .     _ 1. ISO   2. USA   3. EUR   4. JIS
     Time Default Format . . . . . . .     _ 1. ISO   2. USA   3. EUR   4. JIS



Enter  F1=Help  F3=Exit  F4=Prev  F5=Next
```

ADSC: Records and Tables

```
                    Records and Tables           Page   1  of    1
                  Dialog ID310D4A  Version    1
      Name                            Version    Work  New copy  Drop
  1.  WK-DEPARTMENT                       1        /       _       _
  2.  WK-MAP-ACTION                       1        /       _       _
  3.  WK-EMPLOYEE                         1        /       _       _
  4.  REQ-WK                              1        /       _       _
  5.  ID31WK4A-WORK-FIELDS                1        /       _       _
  6.  _____  ____     _       _       _
  7.  _____  ____     _       _       _

DC498250 Record   1 is defined in the map.
DC498250 Record   2 is defined in the map.
DC498250 Record   3 is defined in the map.

 Enter  F1=Help  F3=Exit  F4=Prev  F5=Next  F7=Bkwd  F8=Fwd
```

ADSC: Process Modules

```
                    Process Modules              Page   1 of    1
                  Dialog ID310D4A    Version    1
 Name    ID310D4A-PREMAP                          2  Type
 Version    1                                     _  Execute on errors
 Key     _____    Value  _____     _  Drop

 Name    ID310D4A-ENTER                           3  Type
 Version    1                                     _  Execute on errors
 Key     ENTER    Value  _____     _  Drop

 Name    _____            _  Type
 Version ____                                     _  Execute on errors
 Key     _____    Value  _____     _  Drop

 Name    _____            _  Type
 Version ____                                     _  Execute on errors
 Key     _____    Value  _____     _  Drop

* Type : 1=Declaration  2=Premap  3=Response  4=Default Response


 Enter  F1=Help  F3=Exit  F4=Prev  F5=Next  F7=Bkwd  F8=Fwd
```

ADSC: Main Menu – Compile

```
 Add  Modify  Compile  Delete  Display  Switch
.-----------------------------------------------------------------------
              | _ 1. Compile   | Dialog Compiler
              |   2. View messages |
              |---------------------|es International, Inc.
              | F3=Exit             |
              |_____|

 Dialog name . . . . . . .    ID310D4A
 Dialog version : : : : :         1
 Dictionary name . . . . .    SYSDICT
 Dictionary node . . . . .    _____

 Screen  . . . . . . . . .    1  1. General options
                                 2. Assign maps
                                 3. Assign database
                                 4. Assign records and tables
                                 5. Assign process modules



 Command ===>
 Enter  F1=Help  F3=Exit  F10=Action
```

ADSC Screen Flow

* Previous/next step (F4/F5)
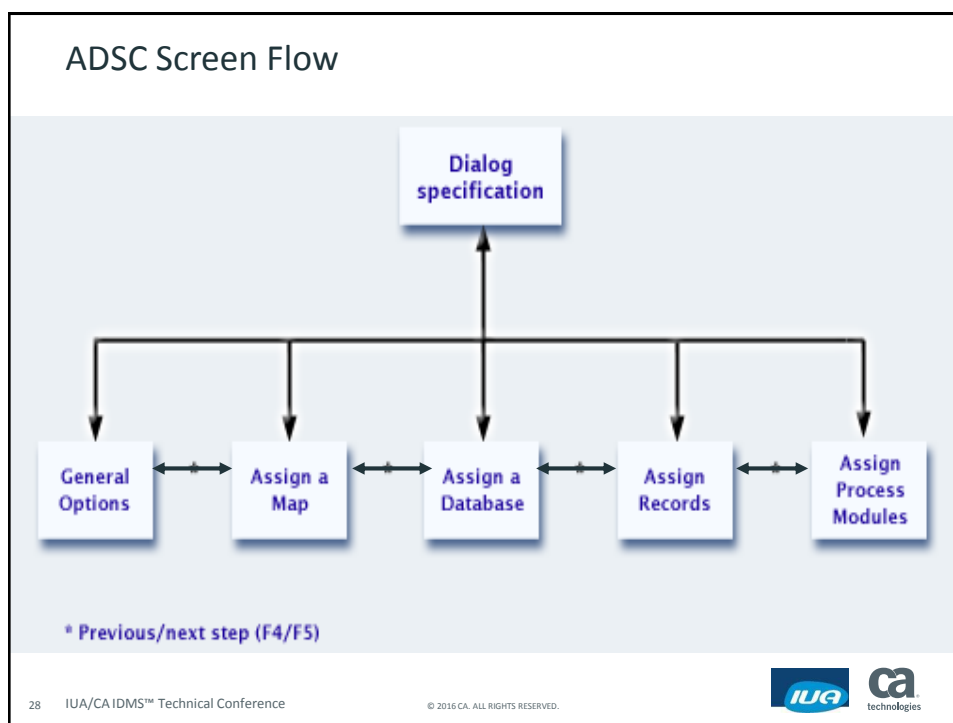
ADSC Batch alternatives

- ADSOBSYS
  - Run whenever sysgen ADS parms are changed

- ADSOBCOM: batch dialog compiler
  - Add, Modify, Delete dialogs
  - Signon, Compile, Decompile
  - Can process one or many dialogs per job

- ADSORPTS: batch report utility
  - Reports on dialogs or applications
  - Can process one or many dialogs per job

ADSA: Create or Alter Applications Functions, Steps, and Screens

Develop / Modify Applications: ADSA

- Application
  - Framework composed of functions and responses
  - Determines execution path from function to function based on operator response

- ADSA
  - Design and prototype an application
  - Define structure and components of an application
    - Function: unit of work (dialog, program, menu)
    - Response: path options (control key, function to execute)
    - System Responses: services (e.g. exit, return to menu)
    - Task Codes
  - Generation of menu and help screens

Develop/Modify Application: ADSA

Application Structure Chart
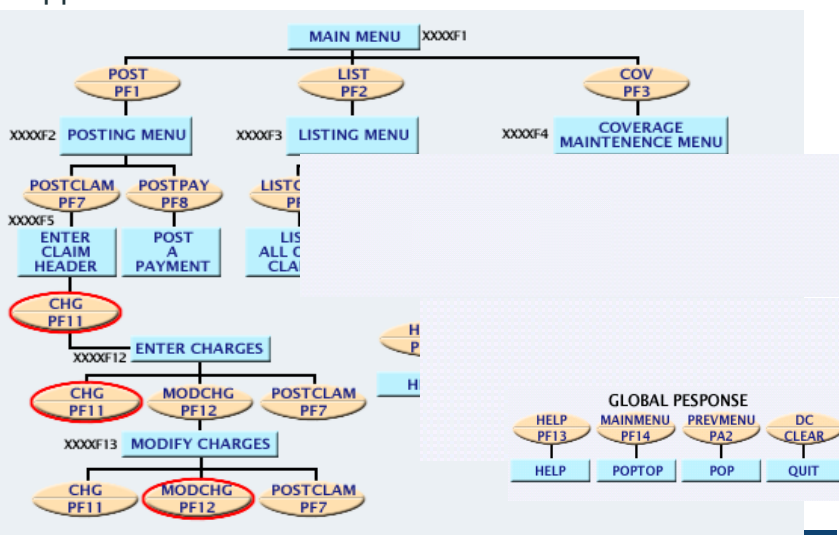
Using ADSA: Steps

1. Copy / Add / Checkout application in ADSA	2. Analyze business functions and define ➡	3. Build or alter menus for functions ➡	4. Define responses
8.Repeat as necessary	7.Test, and correct definition if necessary ⬅	6. View error messages, and correct code ⬅	5. Compile
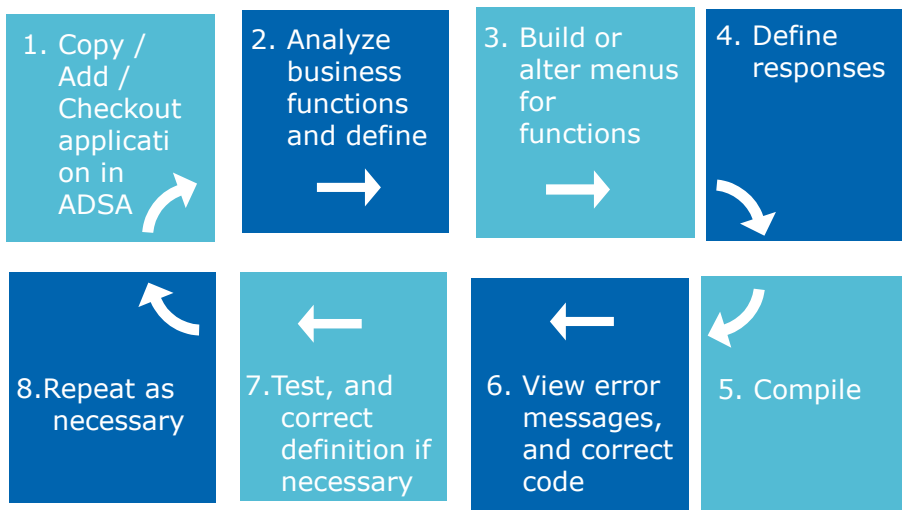
ADSA: Main Menu – Add / Modify

```
 Add  Modify  Compile  Delete  Display  Switch
.--------------------------------------------------------------------------
                      CA-ADS Application Compiler

             Computer Associates International, Inc.


    Application name . . . .    GWGAPP01
    Application version . .        1
    Dictionary name . . . .    _____
    Dictionary node . . . .    _____

    Screen . . . . . . . . .    _    1. General options
                                     2. Responses and Functions
                                     3. Global records
                                     4. Task codes


 DC450116 Application GWGAPP01 version    1 has been successfully checked out

 Command ===>
 Enter  F1=Help  F3=Exit  F10=Action
```
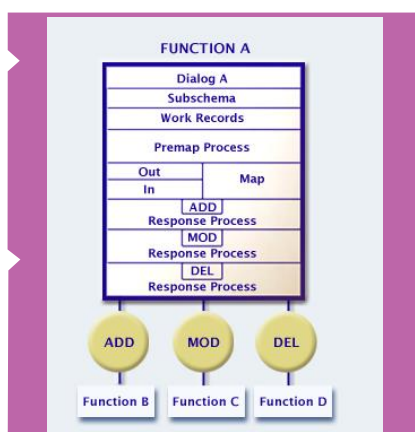
ADSA: Response / Function list

```
                        Response/Function List        Page   1 of   1

Application name:  GWGAPP01   Version:    1

Select     Response    Assigned    Select    Function           Program/
(/)        Name        Key         (/)       name/type(1,2,3)*   Dialog name

  _        HELP        PF13          _       HELP      / _       ---------

  _        SIGNON      PF02          _       SIGNON    / _       ---------

  _        RETURN      CLEAR         _       --------- / _       ---------

  /        GWGDIA01    PF03          /       GWGDIA01  / 1       GWGDIA01

  _        ---------   ------        _       MAINMENU  / 3       ---------

  _        ---------   ------        _       --------- / _       ---------

                                            * Type: 1. Dialog  2. Program  3. Menu


Enter  F1=Help  F3=Exit  F4=Prev  F5=Next  F6=Search  F7=Bkwd  F8=Fwd
```

ADSA: Response Definition

```
                        Response Definition

Application name:    GWGAPP01   Version:     1
Response name:       GWGDIA01                        Drop response (/) _
Function invoked:    GWGDIA01
Description . . . .   GWGDIA01                        Security class:    0

Response type. . . . . . . 1   1. Global      2. Local

Response execution . . . . 2   1. Immediate   2. Deferred

Assigned key . . . . . . . PF03
Control command. . . . .   1    1. Transfer              2. Invoke
                                3. Link                  4. Return
                                5. Return continue       6. Return clear
                                7. Return continue clear 8. Transfer nofinish
                                9. Invoke nosave        10. Link nosave




Enter  F1=Help  F3=Exit  F4=Prev  F5=Next
```

ADSA: Function Definition

```
                    Function Definition (Dialog)        Page   1 of   1

Application name:  GWGAPP01   Version:    1
Function name:     GWGDIA01                        Drop function (/) _
Description . . .  GWGDIA01

Associated dialog . . . . . GWGDIA01      User exit dialog . . . . . _____
Default response . . . . . _____

Valid                                     Valid
response(/)  Response Key   Function      response(/)  Response Key   Function

    /        GWGDIA01 PF03  GWGDIA01          _        _____ _____ _____
    /        HELP     PF13  HELP              _        _____ _____ _____
    /        RETURN   CLEAR _____          _        _____ _____ _____
    _        SIGNON   PF02  SIGNON            _        _____ _____ _____
    _        _____ _____ _____          _        _____ _____ _____
    _        _____ _____ _____          _        _____ _____ _____




Enter  F1=Help  F3=Exit  F4=Prev  F5=Next  F7=Bkwd  F8=Fwd
```

ADSA: Main Menu – Compile

```
  Add  Modify  Compile  Delete  Display  Switch
 '----------------------------------------------------------------------
               |  _  1. Compile       | ation Compiler
               |     2. View Messages |
               |----------------------| s International, Inc.
               |  F3=Exit             |
               |_____|

   Application name . . . .    GWGAPP01
   Application version  . .      1
   Dictionary name  . . . :   _____
   Dictionary node  . . . :   _____

   Screen . . . . . . . . .    4   1. General options
                                   2. Responses and Functions
                                   3. Global records
                                   4. Task codes



Command ===>
Enter  F1=Help  F3=Exit  F10=Action
```

ADSA Screen Flow
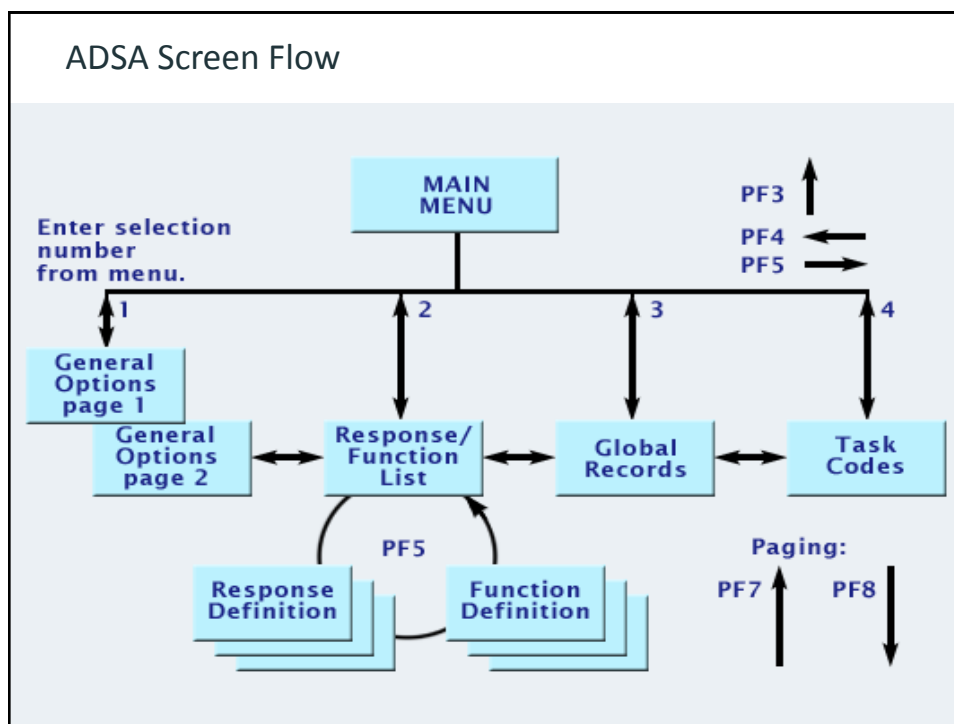
ADSA Batch Options

- No Batch definition or compile facility
- ADSORPTS: batch report utility

Dialog Components: Process Modules Command Types and Examples

Dialog Components

FUNCTION A
- Dialog A
- Subschema
- Work Records
- Premap Process
- Out / In / Map
- ADD Response Process
- MOD Response Process
- DEL Response Process

ADD → Function B
MOD → Function C
DEL → Function D

- Defined in ADSC
- Dialog as ADSA function
- Responses defined to ADSA
- Responses invoke function
- Responses defined in IDD process modules

Command Types in Process Modules

- Control Commands
  - Indicate flow of control
  - Display, Invoke, Link, Suspend Session, Call

- Conditional Commands
  - Testing specified Conditions
  - While / Repeat / End, If / Then / Else

- Database Access Commands
  - Prepares the database for access
  - Initialize (record buffer), Ready (area)

Command Types in Process Modules

- Database Access Commands
  - Navigate the database (network) or SQL DML
  - Find, Obtain, Erase, Select, Modify, Store
  - Check DML status: Error-Status or SQLSTATE

- Arithmetic and Assignment Commands
  - Computations and moves
  - Add, Subtract, Divide, Subtract, Compute, Move

- Map Modification Commands
  - Controlling the map display
  - Modify Map (Brighten, Protect), Get / Put Detail

Command Types in Process Modules

- Subroutine Control Commands
  - Embedded subroutine
  - Define Subroutine / End, Call

- Reserved Words
  - Map displays
  - $PAGE, $PAGE-READY, $FULLPAGE, $MDP, $Response, $Message

Process Module Example

```
! THIS PREMAP PRESENTS THE REQUESTED EMPLOYEE!
IF (NUMERIC(AGR-PASSED-ONE)) THEN
   DO.
     MOVE AGR-PASSED-ONE TO EMP-ID-0415.
     MOVE SPACES TO AGR-PASSED-ONE.
     OBTAIN CALC EMPLOYEE.
     IF DB-REC-NOT-FOUND THEN
         DO.
      INIT (ID320M3-RECORD).
           DISP TEXT
      'EMPLOYEE NOT FOUND - ENTER A VALID EMPLOYEE ID'.
         END.
```

Process Module Example (cont.)

```
OBTAIN OWNER WITHIN DEPT-EMPLOYEE.

OBTAIN OWNER WITHIN OFFICE-EMPLOYEE.

OBTAIN FIRST EMPOSITION WITHIN EMP-EMPOSITION.

IF DB-END-OF-SET
    MOVE ZEROS TO MAP3-SALARY-AMOUNT.
ELSE
     MOVE SALARY-AMOUNT-0420 TO MAP3-SALARY-AMOUNT.
OBTAIN OWNER WITHIN JOB-EMPOSITION.
IF DB-END-OF-SET THEN
    DO.
     MOVE SPACES TO MAP3-TITLE.
      MOVE ZEROS TO MAP3-JOB-ID.
     END.
```

Process Module Example (cont.)

```
MOVE EMP-ID-0415 TO MAP3-EMP-ID.
   MOVE EMP-LAST-NAME-0415 TO MAP3-EMP-LAST-
  NAME.
   MOVE EMP-FIRST-NAME-0415 TO MAP3-EMP-
  FIRST-NAME.
   MOVE SS-NUMBER-0415 TO MAP3-SS-NUMBER.
   MOVE STATUS-0415 TO MAP3-STATUS.
   MOVE OFFICE-CODE-0450 TO MAP3-OFFICE-CODE.
   MOVE OFFICE-CITY-0450 TO MAP3-OFFICE-CITY.
   MOVE DEPT-ID-0410 TO MAP3-DEPT-ID.
   MOVE DEPT-NAME-0410 TO MAP3-DEPT-NAME.
   DISPLAY TEXT
    'ENTER ANOTHER EMPLOYEE ID TO VIEW
  EMPLOYEE DATA'.
   END.
DISPLAY TEXT   'ENTER A VALID EMPLOYEE ID'.
```

Summary

- CA ADS for CA IDMS Tools: MAPC, ADSC, ADSA
  - Develop new applications
  - Maintain and expand existing 3270 applications
  - Develop new SQL procedures for ODBC / JDBC access

- Short learning curve

- Intuitive look and feel

- Extend existing investments in your data & applications

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Terms of this Presentation

Questions and Answers

Please Complete a Session Evaluation Form

- The number for this session is **A05**

- After completing your session evaluation form, place it in the envelope at the front of the room