IDMS for the New DBA

Gary Cherlet

Background

This training for the DBA who is new to IDMS evolved from a need to pass IDMS skills on to DBA's who were a long way from any available formal training by either CA or by 3rd party vendors. The question became one of how to do the training within the following constraints:

- The trainee usually has day-to-day work which he/she must be able to keep with so that
- Training sessions must be flexible so that the trainee can do what needs to be done when the time is available, and
- Costs are kept to a minimum

What we developed was the following "course" which is "mentor led" training with alternating reading assignments for the trainee, followed by question and answer and discussion, and leading to hands on assignments.

The advantage of the reading assignments means that the mentor only needs to spend time on the concepts and technology specific issues which the trainee is not able to grasp from the manual or from existing knowledge – so in effect the training builds on existing knowledge the trainee may have from experiences as an IDMS developer or as a DBA with other products.

Another major advantage of the reading is that the DBA becomes familiar with the extensive CA-IDMS documentation set, one of the most complete documentation sets for any product in the CA stable of products. On completion of the training the new DBA will know where to find answers to questions, and where to look for confirmation of facts or look up specific details required for the task at hand.

The contents of this "mentor led" training take the participants (contractor, manager, and trainee) from the training proposal, through the course content, right through to the "project" conclusion report to the site manager who approved the training.

Enjoy – cheers – Gary

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Contents

1. Training Proposal from Contractor to DBA Trainee Manager

From: Cherlet, Gary

To: DBA Trainee's Manager
Subject: DBA Training

Mr Manager - as promised here's an outline for 1-on-1 DBA training. Let me know if this is of interest to ABC Co and we can discuss at some stage over a quiet drink somewhere. I have previously run this for several organisations for one person at a time, and on occasion for 2 new people at once.

If we go ahead and you want more than one person to sit in on some sessions - that's fine within reason of course (for example - I don't want to run an Intro to IDD course for 5 people for the price of one).

Anyway - have a think - this is a very informal proposal with all the flexibility you want to change as per you requirements. I hope that this helps.

Cheers - Gary

"IDD" and "Defining and Implementing a Database" both have some hands on content, other than that there's not too much I can do other than theory - except for Oper and Perf Mon to examine some of the things that we talk about.

I would expect that you shouldn't have any trouble finding hands on things for the DBA to do in one of the CV's sites that you support. We can discuss what would be reasonable, giving consideration to the material covered up to any given point in time.

The training is conducted on-site at ABC in a series of 2-3hour sessions. My rate for this type of work is $nnn/hour (before tax). I've provided an outline of the content and order in which the material might be covered, and an approximate timing for each area of interest. Depending on the questions asked and the level of detail some topics might be pursued to, the estimate of 25 hours could vary - so we would need to set an upper time limit for this sort of consultancy. As I indicated previously, if you wanted to have others sit in on some of the topics I am happy to have more than one person from time to time.

> IDD - Integrated Data Dictionary 3 hours
> structure
> relationship to compilers
> common syntax (entity occ security, comments, etc)
> create RECord structures (demo database)
> use of OLQ to explore

> Defining and Implementing a Database 10 hours
> Implement the Demo Database under a CV
> Utilities

> CV/DC/UCF Overview 5 hours
> Architecture
> System generation
> Storage and Program Pools
> Monitoring

> DB Performance and Monitoring 2 hours
> Analysers
> Print Space
> Buffer pools
> What to watch for
> Run Unit Stats

> Problem Solving 5 hours
> PerfMon, OPER, DCMT
> OLP
> Look at "live" systems

Oh, by the way, because of the nature of the training it really helps if the manuals are available in hard copy form. If they aren't available on-site at ABC Co - I can probably bring some of the manuals that we need with me.

The “read, discuss and do” type of training has the added benefit of familiarising the trainee with the CA-IDMS documentation set – thus providing the added value that when it is cold and dark in the middle of the night and there is nobody around to ask for help – the new DBA will know where to look so that he/she can find the required information and get on with the job!

Cheers - Gary

Gary Cherlet
Contractor

Note: the database that will be implemented is the “Employee Demo Database” which is part of the CA-IDMS software distribution, and which is also documented in a number of CA-IDMS manuals. This material is copyright protected by CA.

We have included copies of the IDD Record and IDMS Schema definitions in sections 15 through 17 of this document for the convenience of the trainee.

The Employee Demo Database is Copyright Protected material from CA

2. First Reading Assignment

From: Cherlet, Gary

To: DBA Trainee
Subject: DBA Training

Michael - here's you first reading assignment. Our first session involves taking a look at the IDD Dictionary Network. We'll put some element and record definitions into the dictionary - then we'll explore their representation in the dictionary with OLQ. Reading:

- Dictionary Structure Reference - Section 2 and a quick look at Section 1
- DDDL Reference - Section 3 - first 20 pages only - Section 4 ELEment and REC ord only

Questions - just give me a call - contact number in signature block - or e-mail. I'm at Origin tomorrow morning to give the ADSALIVE training - if you want we can have our first lesson after that (about 11:30) for an hour or so. Please let me know if this suits - or if another time would be better.

Cheers - Gary

Gary Cherlet
Contractor

3. Logical Database Definition

3.1 Record Definition Assignment

From: Cherlet, Gary
To: DBA Trainee
Subject: DBA Training

Attachments: EMPRECSO.TXT

Michael - here's the reading assignment pertaining to Schema/Subschema definition (translating the Physical Structure Diagram into syntax). The "Database Administration" manual is divided up into 2 large parts - Part I is Definition, Part II is Maintenance. For now we want Volume 1 - Database Definition, read:

Section 1 The CA-IDMS/DB Environment (all - mostly for review / overview)

Part 4 Logical Database Definition using non-SQL statements
Section 8 these sections if looking at the CD -
8.1 - all
8.2 - all
8.3 - all
8.4 - 8.4.1 to 8.4.4 (skip LRF and Path Groups) and 8.4.7
(approximate page numbers in hard copy 12.x manuals are 8.1 to 8.8, 8.12 to 8.19, 8.21 to 8.22)

Sections 13+14 - just a quick browse as an introduction (check out the syntax trees and "skip read" thru items that catch your eye).

Here are the records - be careful as they are all here, including the ones I've asked you to do manually. If you do a SET OPT DEFAULT ON. and put the whole lot through the batch IDD compiler you will end up "replacing" the ones of already done - that's fine if that works for you.

Cheers - Gary

MPRECSO.TXT (16 KB)

See 15 EMPRECSO EMPRECSO

Gary Cherlet

Contractor

4. Physical Database Definition

4.1 Segment/File/Area Definition Assignment

From: Cherlet, Gary
To: DBA Trainee
Subject: DBA Training

Attachments: EMPSCHM.TXT; EMPSS01.TXT
Michael - after you've finished the current "hands on" - here's the reading to do before the next time we get together (currently scheduled for 9:00am Wednesday - unless you reschedule it):

Volume I Database Administration - **ALL** (ha ha - just kidding!)
Chapter 2 - Defining Physical Databases - all
Chapter 3 - Segments Files and Areas - all
Chapter 6 - Physical Database DDL Statements - briefly look at syntax (tree) - and anything that catches your eye - for:

- Segment 6-80 (approx location)
- File 6-69 (approx location)
- Area 6-16 (approx location)

Here's the schema syntax for "cheat mode". Once again - watch out - the records and sets I've asked you to do are included - so either edit them out or else load up the whole lot into a different schema than the one you have/are created/creating. Have also included the "global" subschema - you won't need that until after next get together.

Happy DBA'ing - have a good long weekend - cheers – Gary

Hands on:
Manual Mode:
Create schema
Add in all required areas.
Add Employee, HEALTH-COVERAGE and STRUCTURE records.
Add EMP-NAME-NDX, REPORTS-TO, MANAGES and EMP-COVERAGE sets.
Cheat mode:
Use attachment to add in the rest!


EMPSCHM.TXT (8 KB)


EMPSS01.TXT (4 KB)

See 16 EMPSCHM EMPSCHM **See 17 EMPSS01** EMPSS01

Gary Cherlet
Contractor

5. Physical Database Definition

5.1 Buffer/DBNAME/DBTABLE/DMCL Definition Assignment

From: Cherlet, Gary

To: DBA Trainee
Subject: RE: DBA Training - Exercise #3 and Reading Assignment #4

Attachments: EMPSEG.TXT; EMPDBTB.TXT; EMPDMCL.TXT
Guys - after you've finished the current "hands on" - here's the reading to do before the next time we get together (please let me know when you feel you're ready):

Hands on:
Before you start - look at solution (as an example in this case) and:
Decide on physical area characteristics (block size, number of pages)
Decide on physical area to file mappings (one file, 3 files, 4 or 5 files?)
Be prepared to discuss your decisions on logical areas (particularly decisions on system owned indexes)
Be prepared to discuss how you chose the file/area mappings (sketch/draw somehow document your solution so we can discuss)
I've changed my mind - I think we will put up 3 empschm databases under DEV - sooooo .....
..... think about page groups for your segments - or are you going to use the same segments and different page ranges - or what??????

Manual Mode:
Create subschema EMPSS01
Create segment - EMPSEGnn (where nn=10,20,30) - use OCF online or IDMSBCF in batch
Create Physical Areas and Files (for your solution) - - use OCF online or IDMSBCF in batch

Cheat mode:
Use attachment where it looks like it will help!

Reading:

Volume I Database Administration

Chapter 6 - Physical Database DDL Statements: look at syntax (tree) - and anything that catches your eye - for:

- Buffer (approx 6-34)
- DBNAME (around 6-41) - see attachment
- DBTABLE (around 6-47) - see attachment

- DMCL - see attachment

Look at the DISK, ARCHIVE and TAPE JOURNAL stuff - if you must/want to.

Here's the segment syntax for "cheat mode".
Happy DBA'ing - cheers - Gary

:MPSEG.TXT (5 KB

EMPDBTB.TXT (4 KB)

See 18 EMPSEG EMPSEG **See 19 EMPDBTB EMPDBTB**

EMPDMCL.TXT (4 KB)

See 20 EMPDMCL EMPDMCL

Gary Cherlet
Contractor

6. Database Utilities Reading Assignment

From: Cherlet, Gary

To: DBA Trainee
Subject: RE: Work done – Reading

I want to get stuck into the utilities next - so you will need the CA-IDMS Utilities manual. Read the following:

Part I - General Information
Chapter 1 - Overview
Chapter 2 - Utility Operations

Part II - Utility Statements
Read the "description" of each utility - take a quick look at the syntax tree - but don't bother with the parameters at this stage - I just want you to get a feel for what the utilities are - which are SQL and which are non-SQL (skip the SQL only utilities)

Part III - Utility Programs
Same as for Part II

How are you situated for tomorrow afternoon - 1:30-3:30 sort of time frame? If you're available then I'll come over and we'll do a "walk through" of Database Administration Vol II - Maintaining a Database (we're finished with Vol I - Defining a Database), and the utilities manual (you use the two books together - I'll show you tomorrow).

Cheers - Gary

-----Original Message-----
From: DBA Trainee
To: Cherlet.Gary
Subject: Work done
Gary, I have done the stuff you left for me, and I now have three areas in update.
DBA Trainee

7. Maintaining A Database

7.1 Restructure Record Assignment

From: Cherlet, Gary

To: DBA Trainee
Subject: Exercise #4

Just to re-iterate today's hands on assignment:

- Create version n+1 of your empschm schema
- Create a new version of the employee record - insert SALARY pic s9(7)v99 comp-3 after the NAME group field
- Modify the new schema to "share structure of" the new employee record
- Add an index on the new DEPT-ID field of EMPLOYEE
- Do a restructure compare - put the output thru an assembly + link - also print the generated restructure macros

Let me know when you've got to this point

Cheers - Gary

8. Guaranteeing Database Integrity – Backup, Recovery, Journaling

From: Cherlet, Gary

To: DBA Trainee
Subject: Here's a few "odds and sodds" to keep you busy

1) Find out about the Backup + Journaling procedures for Origin's Production and Development system
- audit/log of backups?
- audit/log of journals created since last backup?
- location of rollforward/rollback JCL - set up to use SORTEXIT? When last used

2) Read up on different types of database recoveries in VOL II of DBA Manual - Maintaining a Database

3) Any local mode updating? When? Why? Backups before and after OR local mode journalling?

4) Locate and examine the Archive Journal and Archive Log JCL - look at the utility statements. Check out the GDG's - tape/disk? Same/different volumes than the journals? Locate and examine the WTOEXIT program - see the relationship to the archive jobs and archive JCL - check out the IDMS-CV/DC startup JCL to see where the archive jobs come from and tie back to WTOEXIT.

5) Read Vol II of DBA Manual - sections 23 + 25

See you about 11:00am Friday morning - cheers - Gary

Gary Cherlet
Contractor

9. Maintaining the Database – Utilities Continued

From: Cherlet, Gary

To: DBA Trainee
Subject: More work

1) Locate and verify the accuracy of the Journal and Log archive procedures documentation. If there is no documentation then create a "process flowchart" that shows where the archive logs go to, where they get backed up to after initial offloading, and any post processing that may occur (such as extracting and collecting IDMS statistics from the log).

2) Plan an eXpand PAGe run for your newly created database (I told you to only create a few entries - not to fill the darned thing up) - locate some JCL to do this, get into an appropriate library and set it up. Work out the necessary DMCL changes, how and when they would be made relative to planned backups which may be required (think about this one a bit). Next week we'll review what you've set up.

3) Create a 2nd version of your schema - add some new fields into the employee record (say an e-mail address after the first+last name, and a "salary expectation" field at the end of the record - make it s9(7) comp-3) - add a mode is chained set between EMPLOYEE (member) and DEPARTMENT (owner) - locate some "restructure compare) jcl - set it up and run it. Print off the output so we can review it next week.

4) Is there a regular DBAN or DB-Analyser run to verify the integrity of the database pointers? What is the schedule (monthly, quarterly, never)? Is one or the other of these tools used after database maintenance to verify correctness at that time - rather than on a scheduled basis or as well as a scheduled basis?

5) Reading - I'll work out the reading assignment for you on Monday.

Have a good weekend - cheers - Gary

Gary Cherlet
Contractor

10. CV/DC/UCF System Generation Reading

From: Cherlet, Gary

To: DBA Trainee
Subject: Reading assignment

Here's some reading for you - can you please ley mw know when you're ready to get together again (Wednesday at 11:00 suit?):

CA-IDMS System Generation
Chapter 1 - all
Chapter 2 - all

CA-IDMS Dictionary Structure Reference (use the diagram as you read this bit)
Chapter 1 pages 33-36 (approx) - the bit about CA-IDMS/DC system generation compiler

See ya later - cheers - Gary

Gary Cherlet
Contractor

From: Cherlet, Gary

To: DBA Trainee
Subject: Some additional material

Attachments: IDMS Sytem Tuning Diary for PRO.rtf

Michael - print this off and we can then use it as we do SYSGEN stuff today - cheers - Gary

DMS Sytem Tuning Diary for PR...

See 2nd Attachment at CACommunities

Gary Cherlet
Contractor

11. CV/DC/UCF System Operations Reading

From: Cherlet, Gary

To: DBA Trainee
Subject: Assignment(s)

<<<<<<<<<<<<<<<<<< snip >>>>>>>>>>>>>>>>>>>>>>>

7) Reading: CA-IDMS System Operations
Chapter 1 - Introduction - ALL
Chapter 2 - System Start Up - How the system is built (about 2-46 to the end)
Chapter 3 - Setting Up Inter-partition Communication - 3-1 to 3-8 - then the MVS specifics to approx 3-18

See you later in the week - cheers - Gary

Gary Cherlet
Contractor

12. Completion Letter to DBAs Manager

From: Cherlet, Gary

To: DBA Trainee's Manager

Subject: RE: Confirmation of Quotation - completion of contracted training

Mr Manager,

Michael and I have now covered all of the topics that had been proposed for the one-on-one DBA training - completed in 25 hours as agreed. This training included reading assignments, hands on exercises and "structured" walkthroughs of the manuals that are most relevant to the DBA. We have also discussed general issues in the areas of managing the impact of change on end users and system availability when making database or system changes.

Michael appears to have absorbed a great deal of information and got through the hands on exercises in a timely manner - if he understands even a 1/2 of what we've covered (and he seems to have taken a lot "on board") - then he should be well positioned to become a productive member of the DBA team. Because of the way that the manuals formed a key part of the training - anything that Michael doesn't remember should be easy for him to find in the CA documentation. This training should of course be reinforced by "real" tasks that require Michael to use his newly gained knowledge.

Thanks for this opportunity to come on site and work with your people. Please don't hesitate to call again if you need assistance in any aspect pertaining to effective use of CA-IDMS or CA-ADS.

Cheers - Gary

13. Follow Up Contact with Trainee

From: Cherlet, Gary
To: Several DBA Trainees

Subject: Spontaneous Test Question

This post arrived on IDMS-L today - any of you know the correct answer - off the top of your head? After looking in the manual(s)? First one with the correct answer wins a genuine IUA badge!

Cheers - Gary

-----Original Message-----
From: CA Communities DBA
Sent: Thursday, 21 March 2002 4:55
Subject: Null Line as a rec type in Print Space Report

Hello,

This is a first for me. Could anyone tell me what the Null Line literal here represents from this Print Space report? Thanks.

DBA

Record Type	Length	Occurrences	Total Space Used	Total Used
Null Line	8	2,371	18,968	0.00
SR4	104	112,161	3,973,092	0.19
SR1013	44	798,003	35,112,132	1.71
SR1014	244	14,289,706	1,991,110,720	97.25

-----Original Message-----

From: DBA Trainee
To: Cherlet, Gary and other trainees
Subject: FW: Spontaneous Test Question

The null line entry corresponds to a line index entry (embedded among all the line indices) that is not being used.
It tells you how much space is being "wasted" among the line indexes.
It's not actually wasted, as it will be used when a record is stored on the page.

Successful response from DBA Trainee

14. Follow Up Contact with Trainee

-----Original Message-----

From: Database Designer

To: Cherlet, Gary
Subject: Use of comp and comp-3

Gary,
Are you able to offer any advice on when to use comp and comp-3 on numeric data elements. If not can you recommend somewhere which discusses these uses. We have looked in the online manuals, but these only say how the numbers are stored in each case.

Thank you
Database Designer

From: Cherlet, Gary
To: Database Designer
Subject: RE: Use of comp and comp-3

The trade offs are:

1) You can get really big numbers into fewer bytes with COMP. In an entity with a small number of occurrences - who cares? If the field occurs millions of times - then it all adds up to increased DASD costs.

2) COMP-3 is faster to get into a DISPlay format (fewer machine instructions). With today's CPU speeds I don't think too many people worry about this much any longer.

3) COMP-3 also has a shorter path length when simple arithmetic is being performed. When performing a series of computations that initial overhead is negligible as the register arithmetic for the COMP items will always win out over decimal arithmetic with the COMP-3 items.

4) In the old flat file days DISPLAY and COMP-3 were popular with developers as it made it easier for them to "browse" the file contents - but since this is no longer possible with databases it's not so much of an issue any longer. That is of course except for straight extracts which go to a file rather than a report - COMP items in the extract file will be harder to read for the average developer unless they have a different record layout than the DB record. I don't think that's reason enough to override the trade-offs in 1, 2 and 3.

I don't think that's there's much more to it than that. HTH - cheers – Gary

15. EMPRECSO

```
ADD  RECORD NAME IS SKILL VERSION 1
         RECORD NAME SYNONYM IS SKILL VERSION 1 PREFIX SKILL-
         .
     02 ID
         PICTURE IS  9(4)
         USAGE IS DISPLAY
         .
     02 NAME
         PICTURE IS  X(12)
         USAGE IS DISPLAY
         .
     02 DESCRIPTION
         PICTURE IS  X(60)
         USAGE IS DISPLAY
         .
ADD  RECORD NAME IS OFFICE VERSION 1
         RECORD NAME SYNONYM IS OFFICE VERSION 1 PREFIX OFFICE-
         .
     02 CODE
         PICTURE IS  X(3)
         USAGE IS DISPLAY
         .
     02 ADDRESS
         PICTURE IS  X(46)
         USAGE IS DISPLAY
         .
     02 SPEED-DIAL
         PICTURE IS  X(3)
         USAGE IS DISPLAY
         .
     02 AREA-CODE
         PICTURE IS  9(3)
         USAGE IS DISPLAY
         .
     02 PHONE
         PICTURE IS  9(7)
         USAGE IS DISPLAY
         OCCURS 3 TIMES
         .
ADD  RECORD NAME IS EXPERTISE VERSION 1
         RECORD NAME SYNONYM IS EXPERTISE VERSION 1 PREFIX EXP-
         .
     02  EMP-ID
         PICTURE IS  X(4)
         USAGE IS DISPLAY
         .
     02  SKILL-ID
         PICTURE IS  X(4)
         USAGE IS DISPLAY
         .
     02  SKILL-LVL
         PICTURE IS  X(2)
         USAGE IS DISPLAY
         .
     02  DATE-ACQ
         PICTURE IS  9(8)
         USAGE IS DISPLAY
         .
ADD  RECORD NAME IS DEPARTMENT VERSION 1
         RECORD NAME SYNONYM IS DEPARTMENT VERSION 1 PREFIX DEPT-
         .
     02  ID
         PICTURE IS  X(4)
         USAGE IS DISPLAY
         .
     02  NAME
         PICTURE IS  X(45)
         USAGE IS DISPLAY
```

```
        .
     02  EMP-ID
         PICTURE IS  X(4)
         USAGE IS DISPLAY
         .
ADD  RECORD NAME IS STRUCTURE VERSION 1
         RECORD NAME SYNONYM IS STRUCTURE VERSION 1 PREFIX STR-
         .
     02  PROJ-CODE
         PICTURE IS  X(2)
         USAGE IS DISPLAY
         .
     02  PROJ-DESC
         PICTURE IS  X(120)
         USAGE IS DISPLAY
         .
     02  START-DATE
         PICTURE IS  9(8)
         USAGE IS DISPLAY
         .
     02  END-DATE
         PICTURE IS  9(8)
         USAGE IS DISPLAY
         .
     02 FILLER
         PICTURE IS  X(2)
         USAGE IS DISPLAY
         .
ADD  RECORD NAME IS EMPLOYEE VERSION 1
         RECORD NAME SYNONYM IS EMPLOYEE VERSION 1  PREFIX EMP-
         .
     02  ID
         PICTURE IS  X(4)
         USAGE IS DISPLAY
         .
     02  NAME
         USAGE IS DISPLAY
         .
         03  FIRST-NAME
             PICTURE IS  X(10)
             USAGE IS DISPLAY
             .
         03  LAST-NAME
             PICTURE IS  X(20)
             USAGE IS DISPLAY
             .
     02  SS-NUM
         PICTURE IS  9(9)
         USAGE IS DISPLAY
         .
     02  ADDRESS
         PICTURE IS  X(46)
         USAGE IS DISPLAY
         .
     02  HOME-PHONE
         PICTURE IS  9(10)
         USAGE IS DISPLAY
         .
     02  DATE-OF-BIRTH
         PICTURE IS  9(8)
         USAGE IS DISPLAY
         .
     02  DATE-OF-HIRE
         PICTURE IS  9(8)
         USAGE IS DISPLAY
         .
     02  DATE-OF-TERM
         PICTURE IS  9(8)
         USAGE IS DISPLAY
         .
     02  STATUS
```

```
          PICTURE IS  X(2)
          USAGE IS DISPLAY
          .
      02  DEPT-ID
          PICTURE IS  X(4)
          USAGE IS DISPLAY
          .
      02  OFFICE-CODE
          PICTURE IS  X(3)
          USAGE IS DISPLAY
          .
      02  LIFE-PLAN-CODE
          PICTURE IS  X(4)
          USAGE IS DISPLAY
          .
      02 FILLER
          PICTURE IS  X(2)
          USAGE IS DISPLAY
          .
ADD   RECORD NAME IS EMPOSITION VERSION 1
          RECORD NAME SYNONYM IS EMPOSITION VERSION 1 PREFIX POS-
          .
      02  EMP-ID
          PICTURE IS  X(4)
          USAGE IS DISPLAY
          .
      02  JOB-ID
          PICTURE IS  X(4)
          USAGE IS DISPLAY
          .
      02  SAL-GRADE
          PICTURE IS  X(2)
          USAGE IS DISPLAY
          .
      02  SAL
          PICTURE IS  9(9)
          USAGE IS DISPLAY
          .
      02  OT-RATE
          PICTURE IS  9(3)
          USAGE IS DISPLAY
          .
      02  COMM-PCT
          PICTURE IS  9(3)
          USAGE IS DISPLAY
          .
      02  BONUS-PCT
          PICTURE IS  9(3)
          USAGE IS DISPLAY
          .
      02  START-DATE
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02  TERM-DATE
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
ADD   RECORD NAME IS JOB VERSION 1
          RECORD NAME SYNONYM IS JOB VERSION 1  PREFIX JOB-
          .
      02  ID
          PICTURE IS  X(4)
          USAGE IS DISPLAY
          .
      02  TITLE
          PICTURE IS  X(20)
          USAGE IS DISPLAY
          .
      02  DESC
          PICTURE IS  X(120)
```

```
          USAGE IS DISPLAY
          .
      02  REQ
          PICTURE IS  X(60)
          USAGE IS DISPLAY
          .
      02  MIN-SAL
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02  MAX-SAL
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02  NUM-OF-POS
          PICTURE IS  9(3)
          USAGE IS DISPLAY
          .
      02  SAL-GRADE
          PICTURE IS  X(2)
          USAGE IS DISPLAY
          OCCURS 3 TIMES
          .
      02  GRADE-MIN-SAL
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          OCCURS 3 TIMES
          .
      02  GRADE-MAX-SAL
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          OCCURS 3 TIMES
          .
      02 FILLER
          PICTURE IS  X(3)
          USAGE IS DISPLAY
          .
ADD   RECORD NAME IS HEALTH-COVERAGE VERSION 1
          RECORD NAME SYNONYM IS HEALTH-COVERAGE VERSION 1 PREFIX HCOV-
          .
      02  PLAN-CODE
          PICTURE IS  X(4)
          USAGE IS DISPLAY
          .
      02  TYPE
          PICTURE IS  X
          USAGE IS DISPLAY
          .
      02  SEL-DATE
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02  TERM-DATE
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02 FILLER
          PICTURE IS  X(2)
          USAGE IS DISPLAY
          .
ADD   RECORD NAME IS LIFE-INS-PLAN VERSION 1
          RECORD NAME SYNONYM IS LIFE-INS-PLAN VERSION 1 PREFIX LIFE-
          .
      02  PLAN-CODE
          PICTURE IS  X(4)
          USAGE IS DISPLAY
          .
      02  PLAN-DESC
          PICTURE IS  X(120)
          USAGE IS DISPLAY
          .
```

```
     02  GROUP-NUM
         PICTURE IS  9(6)
         USAGE IS DISPLAY
         .
     02  INSCO-NAME
         PICTURE IS  X(40)
         USAGE IS DISPLAY
         .
     02  INSCO-ADDRESS
         PICTURE IS  X(46)
         USAGE IS DISPLAY
         .
     02  INSCO-PHONE
         PICTURE IS  9(10)
         USAGE IS DISPLAY
         .
     02 FILLER
         PICTURE IS  X(2)
         USAGE IS DISPLAY
         .
ADD  RECORD NAME IS HEALTH-INS-PLAN VERSION 1
        RECORD NAME SYNONYM IS HEALTH-INS-PLAN VERSION 1 PREFIX HEALTH-
         .
     02  PLAN-CODE
         PICTURE IS  X(4)
         USAGE IS DISPLAY
         .
     02  PLAN-DESC
         PICTURE IS  X(120)
         USAGE IS DISPLAY
         .
     02  GROUP-NUM
         PICTURE IS  9(6)
         USAGE IS DISPLAY
         .
     02  INSCO-NAME
         PICTURE IS  X(40)
         USAGE IS DISPLAY
         .
     02  INSCO-ADDRESS
         PICTURE IS  X(46)
         USAGE IS DISPLAY
         .
     02  INSCO-PHONE
         PICTURE IS  9(10)
         USAGE IS DISPLAY
         .
     02 FILLER
         PICTURE IS  X(2)
         USAGE IS DISPLAY
         .
ADD  RECORD NAME IS NON-HOSP-CLAIM VERSION 1
         RECORD NAME SYNONYM IS NON-HOSP-CLAIM VERSION 1  PREFIX NHC-
         .
     02  CLAIM-ID
         PICTURE IS  X(6)
         USAGE IS DISPLAY
         .
     02  DATE-OF-CLAIM
         PICTURE IS  9(8)
         USAGE IS DISPLAY
         .
     02  EMP-ID
         PICTURE IS  X(4)
         USAGE IS DISPLAY
         .
     02  TOTAL-CHARGES
         PICTURE IS  9(6)
         USAGE IS DISPLAY
         .
     02  PHY-ID
```

```
          PICTURE IS  X(8)
          USAGE IS DISPLAY
          .
      02  PHY-NAME
          PICTURE IS  X(30)
          USAGE IS DISPLAY
          .
      02  PHY-ADDRESS
          PICTURE IS  X(46)
          USAGE IS DISPLAY
          .
      02  PHY-PHONE
          PICTURE IS  9(6)
          USAGE IS DISPLAY
          .
      02  PAT-ID
          PICTURE IS  X(5)
          USAGE IS DISPLAY
          .
      02  PAT-NAME
          PICTURE IS  X(30)
          USAGE IS DISPLAY
          .
      02  PAT-REL-TO-EMP
          PICTURE IS  X(4)
          USAGE IS DISPLAY
          .
      02  PAT-SEX
          PICTURE IS  X
          USAGE IS DISPLAY
          .
      02  PAT-DATE-OF-BITRTH
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02  PAT-ADDRESS
          PICTURE IS  X(46)
          USAGE IS DISPLAY
          .
      02  NUM-OF-PROC
          PICTURE IS  9(2)
          USAGE IS COMP
          .
      02 FILLER
          PICTURE IS  X(2)
          USAGE IS DISPLAY
          .
      02  PROCEDURE
          USAGE IS DISPLAY
          OCCURS 0 TO 10 TIMES DEPENDING ON NHC-NUM-OF-PROC
          .
          03  PROC-NUM
              PICTURE IS  9(6)
              USAGE IS DISPLAY
              .
          03  PROC-DESC
              PICTURE IS  X(60)
              USAGE IS DISPLAY
              .
          03  PROC-FEE
              PICTURE IS  9(6)
              USAGE IS DISPLAY
              .
ADD   RECORD NAME IS HOSP-CLAIM VERSION 1
          RECORD NAME SYNONYM IS HOSP-CLAIM VERSION 1  PREFIX HC-
          .
      02  CLAIM-ID
          PICTURE IS  X(6)
          USAGE IS DISPLAY
          .
      02  DATE-OF-CLAIM
```

```
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02  EMP-ID
          PICTURE IS  X(4)
          USAGE IS DISPLAY
          .
      02  TOTAL-CHARGES
          PICTURE IS  9(6)
          USAGE IS DISPLAY
          .
      02  ADMIT-DATE
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02  DISCH-DATE
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02  HOSP-NAME
          PICTURE IS  X(30)
          USAGE IS DISPLAY
          .
      02  HOSP-ADDRESS
          PICTURE IS  X(46)
          USAGE IS DISPLAY
          .
      02  HOSP-PHONE
          PICTURE IS  9(10)
          USAGE IS DISPLAY
          .
      02  PAT-ID
          PICTURE IS  X(5)
          USAGE IS DISPLAY
          .
      02  PAT-NAME
          PICTURE IS  X(30)
          USAGE IS DISPLAY
          .
      02  PAT-REL-TO-EMP
          PICTURE IS  X(4)
          USAGE IS DISPLAY
          .
      02  PAT-SEX
          PICTURE IS  X
          USAGE IS DISPLAY
          .
      02  PAT-DATE-OF-BITRTH
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02  PAT-ADDRESS
          PICTURE IS  X(46)
          USAGE IS DISPLAY
          .
      02 FILLER
          PICTURE IS  X(2)
          USAGE IS DISPLAY
          .
ADD   RECORD NAME IS DENTAL-CLAIM VERSION 1
          RECORD NAME SYNONYM IS DENTAL-CLAIM VERSION 1  PREFIX DC-
          .
      02  CLAIM-ID
          PICTURE IS  X(6)
          USAGE IS DISPLAY
          .
      02  DATE-OF-CLAIM
          PICTURE IS  9(8)
          USAGE IS DISPLAY
          .
      02  EMP-ID
```

```
    PICTURE IS  X(4)
    USAGE IS DISPLAY
    .
02  TOTAL-CHARGES
    PICTURE IS  9(6)
    USAGE IS DISPLAY
    .
02  DENT-LIC-NUM
    PICTURE IS  X(8)
    USAGE IS DISPLAY
    .
02  DENT-NAME
    PICTURE IS  X(30)
    USAGE IS DISPLAY
    .
02  DENT-ADDRESS
    PICTURE IS  X(46)
    USAGE IS DISPLAY
    .
02  DENT-PHONE
    PICTURE IS  9(6)
    USAGE IS DISPLAY
    .
02  PAT-ID
    PICTURE IS  X(5)
    USAGE IS DISPLAY
    .
02  PAT-NAME
    PICTURE IS  X(30)
    USAGE IS DISPLAY
    .
02  PAT-REL-TO-EMP
    PICTURE IS  X(4)
    USAGE IS DISPLAY
    .
02  PAT-SEX
    PICTURE IS  X
    USAGE IS DISPLAY
    .
02  PAT-DATE-OF-BITRTH
    PICTURE IS  9(8)
    USAGE IS DISPLAY
    .
02  PAT-ADDRESS
    PICTURE IS  X(46)
    USAGE IS DISPLAY
    .
02  NUM-OF-PROC
    PICTURE IS  9(2)
    USAGE IS COMP
    .
02 FILLER
    PICTURE IS  X(2)
    USAGE IS DISPLAY
    .
02  PROCEDURE
    USAGE IS DISPLAY
    OCCURS 0 TO 10 TIMES DEPENDING ON DC-NUM-OF-PROC
    .
    03  PROC-NUM
        PICTURE IS  9(6)
        USAGE IS DISPLAY
        .
    03  PROC-DESC
        PICTURE IS  X(60)
        USAGE IS DISPLAY
        .
    03  PROC-FEE
        PICTURE IS  9(6)
        USAGE IS DISPLAY
        .
```

16. EMPSCHM

```
SIGNON DICTNAME EDUDICT.
*   DEL SCHEMA NAME IS EMPSCHEM VERSION IS 1 .
ADD SCHEMA NAME IS EMPSCHEM VERSION IS 1
SCHEMA DESCRIPTION IS 'EDUCATION DATABASE'
ASSIGN RECORD IDS FROM 1001
PUBLIC ACCESS IS ALLOWED FOR ALL.

ADD AREA NAME IS ORG-COM-REG.
ADD AREA NAME IS EMP-COM-REG.
ADD AREA NAME IS INS-COM-REG.
ADD AREA NAME IS EMP-NDX-REG.

ADD RECORD NAME IS EMPLOYEE
SHARE STRUCTURE OF RECORD
EMPLOYEE VERSION 1
RECORD ID IS 1005
LOCATION MODE IS CALC USING (EMP-ID)
DUPLICATES ARE NOT ALLOWED
WITHIN AREA EMP-COM-REG.

ADD RECORD NAME IS STRUCTURE
SHARE STRUCTURE OF RECORD
STRUCTURE VERSION 1
RECORD ID IS 1008
LOCATION MODE IS VIA MANAGES
WITHIN AREA EMP-COM-REG
MINIMUM ROOT LENGTH IS 4 CHARACTERS
MINIMUM FRAGMENT LENGTH IS RECORD LENGTH
CALL IDMSCOMP BEFORE STORE
CALL IDMSCOMP BEFORE MODIFY
CALL IDMSDCOM AFTER  GET.
ADD RECORD NAME IS EMPOSITION
SHARE STRUCTURE OF RECORD
EMPOSITION VERSION 1
RECORD ID IS 1006
LOCATION MODE IS CALC USING (POS-EMP-ID)
DUPLICATES ARE FIRST
WITHIN AREA EMP-COM-REG.

ADD RECORD NAME IS JOB
SHARE STRUCTURE OF RECORD
JOB VERSION 1
RECORD ID IS 1003
LOCATION MODE IS CALC USING (JOB-ID)
DUPLICATES ARE NOT ALLOWED
WITHIN AREA ORG-COM-REG
MINIMUM ROOT LENGTH IS 4 CHARACTERS
MINIMUM FRAGMENT LENGTH IS RECORD LENGTH
CALL IDMSCOMP BEFORE STORE
CALL IDMSCOMP BEFORE MODIFY
CALL IDMSDCOM AFTER  GET.

ADD RECORD NAME IS HEALTH-COVERAGE
SHARE STRUCTURE OF RECORD
HEALTH-COVERAGE VERSION 1
```

```
RECORD ID IS 1011
LOCATION MODE IS VIA EMP-COVERAGE
WITHIN AREA INS-COM-REG.

ADD RECORD NAME IS NON-HOSP-CLAIM
SHARE STRUCTURE OF RECORD
NON-HOSP-CLAIM VERSION 1
RECORD ID IS 1014
LOCATION MODE IS VIA COVERAGE-CLAIMS
WITHIN AREA INS-COM-REG
MINIMUM ROOT LENGTH IS 4 CHARACTERS
MINIMUM FRAGMENT LENGTH IS RECORD LENGTH
CALL IDMSCOMP BEFORE STORE
CALL IDMSCOMP BEFORE MODIFY
CALL IDMSDCOM AFTER  GET.

ADD RECORD NAME IS HOSP-CLAIM
SHARE STRUCTURE OF RECORD
HOSP-CLAIM VERSION 1
RECORD ID IS 1013
LOCATION MODE IS VIA COVERAGE-CLAIMS
WITHIN AREA INS-COM-REG.

ADD RECORD NAME IS DENTAL-CLAIM
SHARE STRUCTURE OF RECORD
DENTAL-CLAIM VERSION 1
RECORD ID IS 1012
LOCATION MODE IS VIA COVERAGE-CLAIMS
WITHIN AREA INS-COM-REG
MINIMUM ROOT LENGTH IS 4 CHARACTERS
MINIMUM FRAGMENT LENGTH IS RECORD LENGTH
CALL IDMSCOMP BEFORE STORE
CALL IDMSCOMP BEFORE MODIFY
CALL IDMSDCOM AFTER  GET.

ADD SET NAME IS REPORTS-TO
ORDER IS NEXT MODE IS CHAIN
LINK TO PRIOR
OWNER IS EMPLOYEE
NEXT DBKEY POSITION IS AUTO
PRIOR DBKEY POSITION IS AUTO
MEMBER IS STRUCTURE
NEXT DBKEY POSITION IS AUTO
PRIOR DBKEY POSITION IS AUTO
LINK TO OWNER OWNER DBKEY POSITION IS AUTO
OPTIONAL MANUAL.

ADD SET NAME IS MANAGES
ORDER IS NEXT MODE IS CHAIN
LINK TO PRIOR
OWNER IS EMPLOYEE
NEXT DBKEY POSITION IS AUTO
PRIOR DBKEY POSITION IS AUTO
MEMBER IS STRUCTURE
NEXT DBKEY POSITION IS AUTO
PRIOR DBKEY POSITION IS AUTO
LINK TO OWNER OWNER DBKEY POSITION IS AUTO
MANDATORY AUTOMATIC.

ADD SET NAME IS EMP-NAME-NDX
ORDER IS SORTED MODE IS INDEX
USING EMP-NAME-NDX
```

```
OWNER IS SYSTEM
WITHIN AREA EMP-NDX-REG
MEMBER IS EMPLOYEE
INDEX DBKEY POSITION IS AUTO
MANDATORY AUTOMATIC
ASCENDING KEY IS (EMP-LAST-NAME EMP-FIRST-NAME)
UNCOMPRESSED DUPLICATES ARE LAST.

ADD SET NAME IS POSITION-NDX
ORDER IS SORTED MODE IS INDEX
USING POSITION-NDX
OWNER IS SYSTEM
WITHIN AREA EMP-NDX-REG
MEMBER IS EMPOSITION
INDEX DBKEY POSITION IS AUTO
MANDATORY AUTOMATIC
ASCENDING KEY IS (POS-EMP-ID POS-JOB-ID)
UNCOMPRESSED DUPLICATES ARE NOT ALLOWED.

ADD SET NAME IS POS-JOB-NDX
ORDER IS SORTED MODE IS INDEX
USING POS-JOB-NDX
OWNER IS SYSTEM
WITHIN AREA EMP-NDX-REG
MEMBER IS EMPOSITION
INDEX DBKEY POSITION IS AUTO
MANDATORY AUTOMATIC
ASCENDING KEY IS (POS-JOB-ID)
UNCOMPRESSED DUPLICATES ARE FIRST.

ADD SET NAME IS JOB-TITLE-NDX
ORDER IS SORTED MODE IS INDEX
BLOCK CONTAINS 5 KEYS
DISPLACEMENT IS 2 PAGES
OWNER IS SYSTEM
WITHIN AREA ORG-COM-REG
OFFSET 0 PERCENT FOR 100 PERCENT
MEMBER IS JOB
INDEX DBKEY POSITION IS AUTO
OPTIONAL AUTOMATIC
ASCENDING KEY IS (JOB-TITLE)
UNCOMPRESSED DUPLICATES ARE NOT ALLOWED.

ADD SET NAME IS EMP-COVERAGE
ORDER IS FIRST MODE IS CHAIN
OWNER IS EMPLOYEE
NEXT DBKEY POSITION IS AUTO
MEMBER IS HEALTH-COVERAGE
NEXT DBKEY POSITION IS AUTO
MANDATORY AUTOMATIC.

ADD SET NAME IS HCOV-PLAN-NDX
ORDER IS SORTED MODE IS INDEX
USING HCOV-PLAN-NDX
OWNER IS SYSTEM
WITHIN AREA EMP-NDX-REG
MEMBER IS HEALTH-COVERAGE
INDEX DBKEY POSITION IS AUTO
MANDATORY AUTOMATIC
ASCENDING KEY IS (HCOV-PLAN-CODE)
UNCOMPRESSED DUPLICATES ARE LAST.
```

```
ADD SET NAME IS COVERAGE-CLAIMS
ORDER IS LAST MODE IS CHAIN
LINK TO PRIOR
OWNER IS HEALTH-COVERAGE
NEXT DBKEY POSITION IS AUTO
PRIOR DBKEY POSITION IS AUTO
MEMBER IS NON-HOSP-CLAIM
NEXT DBKEY POSITION IS AUTO
PRIOR DBKEY POSITION IS AUTO
MANDATORY AUTOMATIC
MEMBER IS HOSP-CLAIM
NEXT DBKEY POSITION IS AUTO
PRIOR DBKEY POSITION IS AUTO
MANDATORY AUTOMATIC
MEMBER IS DENTAL-CLAIM
NEXT DBKEY POSITION IS AUTO
PRIOR DBKEY POSITION IS AUTO
MANDATORY AUTOMATIC.
```

17. EMPSS01

```
SIGNON DICTNAME EDUDICT.
ADD SUBSCHEMA NAME IS EMPSS01
OF SCHEMA NAME IS EMPSCHM VERSION 1.

ADD AREA NAME IS EMP-COM-REG.
ADD AREA NAME IS INS-COM-REG.
ADD AREA NAME IS EMP-NDX-REG.

ADD RECORD NAME IS SKILL.
ADD RECORD NAME IS OFFICE.
ADD RECORD NAME IS EXPERTISE.
ADD RECORD NAME IS DEPARTMENT.
ADD RECORD NAME IS STRUCTURE.
ADD RECORD NAME IS EMPLOYEE.
ADD RECORD NAME IS EMPOSITION.
ADD RECORD NAME IS JOB.
ADD RECORD NAME IS HEALTH-COVERAGE.
ADD RECORD NAME IS LIFE-INS-PLAN.
ADD RECORD NAME IS HEALTH-INS-PLAN.
ADD RECORD NAME IS NON-HOSP-CLAIM.
ADD RECORD NAME IS HOSP-CLAIM.
ADD RECORD NAME IS DENTAL-CLAIM.

ADD SET NAME IS SKILL-NAME-NDX.
ADD SET NAME IS EXP-NDX.
ADD SET NAME IS EXP-SKILL-NDX.
ADD SET NAME IS EMP-NAME-NDX.
ADD SET NAME IS POSITION-NDX.
ADD SET NAME IS POS-JOB-NDX.
ADD SET NAME IS JOB-TITLE-NDX.
ADD SET NAME IS EMP-COVERAGE.
ADD SET NAME IS HCOV-PLAN-NDX.
ADD SET NAME IS COVERAGE-CLAIMS.

GENERATE.
```

18. EMPSEG

```
CONNECT TO SYSTEM;

DROP   SEGMENT EMPSEG;

CREATE SEGMENT EMPSEG
FOR NONSQL
PAGE GROUP 1;

CREATE FILE EMPSEG.EMPF01
ASSIGN TO EMPF01
DSNAME 'DBD.DEV.EMPF01'
DISP SHR;

CREATE FILE EMPSEG.EMPF02
ASSIGN TO EMPF02
DSNAME 'DBD.DEV.EMPF02'
DISP SHR;

CREATE AREA EMPSEG.EMP-COM-REG
PRIMARY SPACE 50 PAGES
FROM PAGE 200001
PAGE SIZE 4276 CHARACTERS
WITHIN FILE EMPF01 FROM 1 FOR 50;

CREATE AREA EMPSEG.INS-COM-REG
PRIMARY SPACE 25 PAGES
FROM PAGE 200101
PAGE SIZE 4276 CHARACTERS
WITHIN FILE EMPF01 FROM 51 FOR 25;

CREATE AREA EMPSEG.ORG-COM-REG
PRIMARY SPACE 25 PAGES
FROM PAGE 200201
PAGE SIZE 4276 CHARACTERS
WITHIN FILE EMPF01 FROM 76 FOR 25;

CREATE AREA EMPSEG.EMP-NDX-REG
PRIMARY SPACE 50 PAGES
FROM PAGE 200301
PAGE SIZE 4276 CHARACTERS
SYMBOLIC INDEX EMP-NAME-NDX
BLOCK CONTAINS 5 KEYS
DISPLACEMENT 2 PAGES
SYMBOLIC INDEX HCOV-PLAN-NDX
BLOCK CONTAINS 5 KEYS
DISPLACEMENT 2 PAGES
SYMBOLIC INDEX POSITION-NDX
BLOCK CONTAINS 5 KEYS
DISPLACEMENT 2 PAGES
SYMBOLIC INDEX POS-JOB-NDX
BLOCK CONTAINS 5 KEYS
DISPLACEMENT 2 PAGES
SYMBOLIC INDEX JOB-TITLE-NDX
BLOCK CONTAINS 5 KEYS
DISPLACEMENT 2 PAGES
WITHIN FILE EMPF02;
```

19. EMPDBTB

```
CONNECT TO SYSTEM;

CREATE DBNAME JISDBTB.EMPEDUnn
  INCLUDE SEGMENT EMPSEGnn;

GENERATE DBTABLE JISDBTB;
```

20. EMPDMCL

```
CONNECT TO SYSTEM;

ALTER DMCL IDMSDMCL
INCLUDE SEGMENT EMPSEGnn
DEFAULT BUFFER P4276-BUFFER
INCLUDE PHYSICAL AREA EMPSEG.EMP-COM-REG
ON STARTUP SET STATUS TO RETRIEVAL
INCLUDE PHYSICAL AREA EMPSEG.INS-COM-REG
ON STARTUP SET STATUS TO RETRIEVAL
INCLUDE PHYSICAL AREA EMPSEG.ORG-COM-REG
ON STARTUP SET STATUS TO RETRIEVAL
INCLUDE PHYSICAL AREA EMPSEG.EMP-NDX-REG
ON STARTUP SET STATUS TO RETRIEVAL;

GENERATE DMCL IDMSDMCL;
```