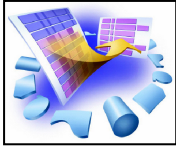# Hide in Plain Sight: Producing and Protecting Sensitive Test Data
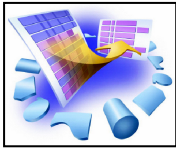
Using File Manager to Scramble Data
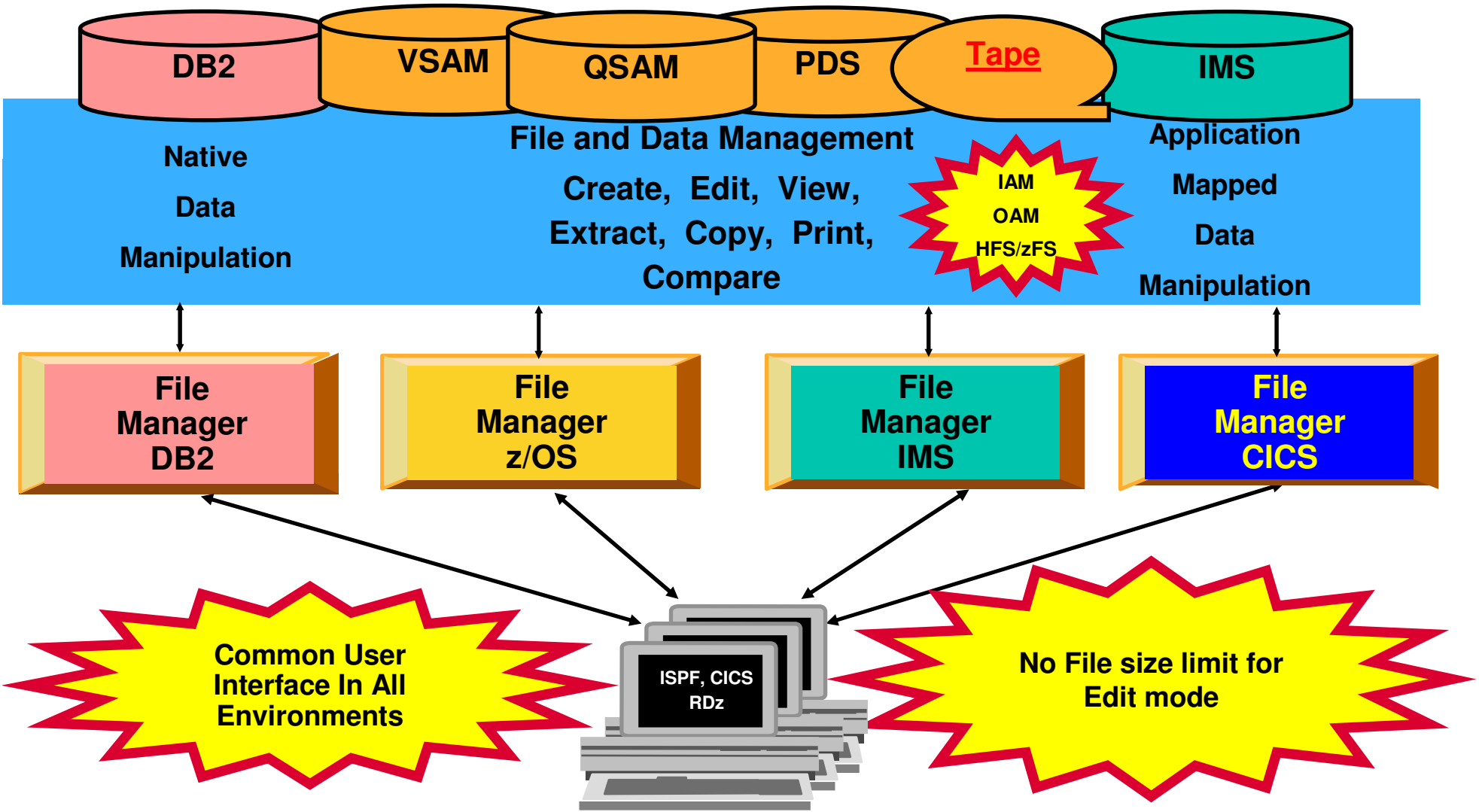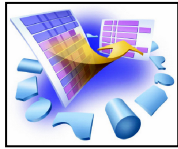
August 12, 2008

What are the issues?

- Creating data that can be used for properly testing new or modified applications

- Protecting private/sensitive data from being viewed or modified

File Manager Base V7 Evaluation Training.   zSeries AD Tools

File Manager - Manage a variety of enterprise data file structures

DB2 | **VSAM** | **QSAM** | **PDS** | **Tape** | **IMS**

Native Data Manipulation

File and Data Management

Create, Edit, View, Extract, Copy, Print, Compare

IAM OAM HFS/zFS

Application Mapped Data Manipulation

File Manager DB2

File Manager z/OS

File Manager IMS

File Manager CICS

Common User Interface In All Environments

ISPF, CICS RDz

No File size limit for Edit mode

Using Copy to Scramble Data

```
 Process      Options      Help
 _____

 File Manager                    Primary Option Menu
 Command ===> 3

 0   Settings        Set processing options        User ID . : ALLANS2
 1   View            View data                      System ID : STLABF2
 2   Edit            Edit data                      Appl ID . : ISR
 3   Utilities       Perform utility functions      Version . : 8.1.0
 4   Tapes           Tape specific functions        Terminal. : 3278A
 5   Disk/VSAM       Disk track and VSAM CI functions  Screen. . : 1
 6   OAM             Work with OAM objects          Date. . . : 2007/09/19
 7   Templates       Template and copybook utilities  Time. . . : 07:44
 8   HFS             Access Hierarchical File System
 X   Exit            Terminate File Manager
```
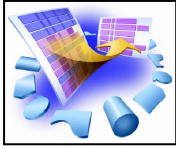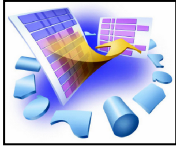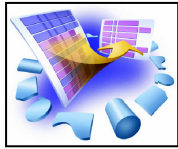
Utilities - Copying Data

- You can copy data between files regardless of file format

- You can use COBOL or PL1 record layouts to map fields

- You can reformat fields, changing field definitions and lengths

- Your "TO" dataset does not need to be pre-allocated

- **Sensitive data can be scrambled**

FM is enhanced to provide a 'scrambling' algorithm which modifies data in a field while maintaining its system data type. Scrambling is intended to de-identify (disguise) personal information in different ways for different data types. Repeatable scrambling's goal is that application relationships based on equality tests can be maintained if desired, even after the data is scrambled. The following are supported:

- An algorithm which modifies strings and numeric values.

- Options to control whether the scrambling is random or repeatable.

- A lookup function which allows replacement of one value with a corresponding value in a lookup table.

- The ability to write a user exit to scramble data as desired by the user.
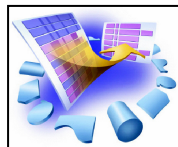
Utilities - Copying Data

IBM

```
Process    Options    Help

File Manager                    Utility Functions
Command ===> 3

0   DBCS          Set DBCS data format for print
1   Create        Create data
2   Print         Print data
3   Copy          Copy data
4   Dslist        Catalog services
5   VTOC          Work with VTOC
6   Find/Change   Search for and change data
7   AFP           Browse AFP data
8   Storage       Browse user storage
9   Printdsn      Browse File Manager print data set
10  Loadlib       View load module information
11  Compare       Compare data
12  Audit trail   Print audit trail report
13  Copybook      View and Print
```

File Manager Base V7 Evaluation Training.   zSeries AD Tools

Utilities – Copy Data - Scramble Field Value

```
 Process    Options    Help
 ──────────────────────────────────────────────────────────────────
 File Manager                      Copy Utility
 Command ===> _____

 From Partitioned, Sequential or VSAM Data Set, or HFS file:
    Data set/path name . . . 'ALLANS2.FMDEMO.VSAM'                    +
    Member . . . . . . . . . _____     (Blank or pattern for member list)
    Volume serial . . . . . _____       (If not cataloged)
    Start key . . . . . . . _____ key or slot
    Skip count . . . . . . 0_____       number of records to be skipped
    Copy count . . . . . . ALL_____       number of records to be copied
 From Copybook or Template:
    Data set name . . . . . 'ALLANS2.FMDEMO.TEMPLATE'
    Member . . . . . . . . . DEMODATA      (Blank or pattern for member list)
 Processing Options:
    Copybook/template    Enter "/" to select option
    1  1. Above          _  Batch execution        _  Advanced member selection
       2. None           _  Use proc _____      _  Skip member name list
       3. Create dynamic _  Ignore length mismatch _  REXX member selection: P
    _  Edit template     _  JCL Source format      _  Directory integrity
    _  Type (1,2,S)      _  Export mode            _  Report PDS record counts
                                                   _  Binary mode, reclen _____
```

Utilities – Copy Data - Scramble Field Value

```
 Process    Options    Help
 _____

 Copy from ALLANS2.FMDEMO.VSAM
 Command ===> _____
                                                    More:      +
 To Partitioned, Sequential or VSAM Data Set, or HFS file:
    Data set/path name  . .  'ALLANS2.FMDEMO.SCRAMBLE'              +
    Member name (or mask) . _____    (Blank or pattern for member list)
    Volume serial . . . . . _____     (If not cataloged)


 To Copybook/Template From:  ALLANS2.FMDEMO.TEMPLATE(DEMODATA)
    Data set name . . . . . 'ALLANS2.FMDEMO.COPYBOOK'
    Member  . . . . . . . . SCRAMBLE    (Blank or pattern for member list)


 Processing Options:
    Copybook/template usage   Disposition       Enter "/" to select option
    1  1. Above               1  1. Old or Reuse  _  Replace members
       2. None                   2. Mod           /  Edit template mapping
       3. Create dynamic                          _  Edit template source
    ISPF Packing                                  _  Binary mode, reclen ____
    1  1. Asis                                    _  Stats Off
       2. Pack
       3. Unpack
       4. None
```

Utilities – Copy Data - Scramble Field Value

```
 Process    Options    Help

File Manager                    Record Type Mapping                 Line 1 of 2
Command ===> _____    Scroll PAGE

To          ALLANS2.FMDEMO.COPYBOOK(SCRAMBLE)
From        ALLANS2.FMDEMO.TEMPLATE(DEMODATA)

Cmd To Field Name                Len    From Field Name                    Ler
    ****  Top of data  ****
S_  REC-TYPE01                    80  │ REC-TYPE01                          8C
___ REC-TYPE02                    80  │ REC-TYPE02                          8C
    ****  End of data  ****
```

Utilities – Copy Data - Scramble Field Value

```
File Manager                    Field Mapping                    Line 1 of 8
Command ===> _____    Scroll PAGE

To          ALLANS2.FMDEMO.COPYBOOK(SCRAMBLE)
From        ALLANS2.FMDEMO.TEMPLATE(DEMODATA)

Cmd Lv To Field Name       Type  Len   Lv From Field Name          Type  Len
        ****  Top of data  ****
___    1 REC-TYPE01         AN    80   1 REC-TYPE01                  AN    80
___    2 REC-TYPE           AN     2   2 REC-TYPE                    AN     2
___    2 NAME               AN    20   2 NAME                        AN    20
E      2 EMPLOYEE-NO        BI     2   2 EMPLOYEE-NO                 BI     2
___    2 AGE                BI     2   2 AGE                         BI     2
___    2 SALARY             PD     4   2 SALARY                      PD     4
___    2 MONTH              BI     4   2 MONTH                       BI     4
___    2 FILLER             AN     2   2 FILLER                      AN     2
        ****  End of data  ****
```
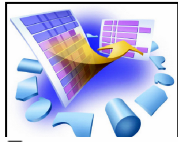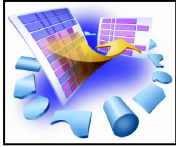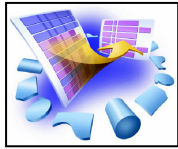
Utilities – Copy Data – Scrambling

- **An algorithm which modifies strings and numeric values.**

- **Options to control whether the scrambling is random or repeatable.**

- A lookup function which allows replacement of one value with a corresponding value in a lookup table.

- The ability to write a user exit to scramble data as desired by the user.

File Manager Base V7 Evaluation Training. zSeries AD Tools

Utilities – Copy Data - Scramble Field Value

IBM

```
 Process    Options    Help
_____

File Manager                    Field Attributes
Command ===> _____
                                                          More:      +
Fixed Attributes:
            Field name  EMPLOYEE-NO
                  Type  BI
                 Start  23
                Length  2
Use Attributes:
               Heading  _____
          Output width  _____
         Leading zeros  NO              YES or NO
Create Attributes:
           Start value  _____
             End value  _____
             Increment  _____
                 Cycle  _____
Scrambling Options:
   Scramble Type        Values
   2  1. Random         1  1. Range        Min  7000         Max  7999
      2. Repeatable        2. Value   Column In  _____   Out  _____
      3. Translate  Dsn  _____
```
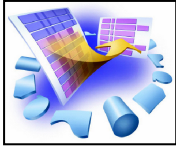
Utilities – Copy Data - Scramble Field Value

```
File Manager                  Field Mapping                    Line 1 of 8
Command ===> _____        Scroll PAGE


To          ALLANS2.FMDEMO.COPYBOOK(SCRAMBLE)
From        ALLANS2.FMDEMO.TEMPLATE(DEMODATA)


Cmd Lv To Field Name        Type  Len   Lv From Field Name          Type  Len
       ****  Top of data  ****
___    1 REC-TYPE01           AN    80    1 REC-TYPE01                AN    80
___    2 REC-TYPE             AN     2    2 REC-TYPE                  AN     2
___    2 NAME                 AN    20    2 NAME                      AN    20
___    2 EMPLOYEE-NO          BI     2    2 EMPLOYEE-NO               BI     2
___    2 AGE                  BI     2    2 AGE                       BI     2
___    2 SALARY               PD     4    2 SALARY                    PD     4
___    2 MONTH                BI     4    2 MONTH                     BI     4
___    2 FILLER               AN     2    2 FILLER                    AN     2
       ****  End of data  ****
```

Utilities – Copy Data - Scramble Field Value

Process   Options   Help

```
File Manager                    Copy Utility
Command ===> _____
62 record(s) copied: 0 truncated: 0 fields truncated
From Partitioned, Sequential or VSAM Data Set, or HFS file:
   Data set/path name  . . 'ALLANS2.FMDEMO.VSAM'                        +
   Member  . . . . . . . . _____      (Blank or pattern for member list)
   Volume serial . . . . . _____        (If not cataloged)
   Start key . . . . . . . _____ key or slot
   Skip count  . . . . . . 0             number of records to be skipped
   Copy count  . . . . . . ALL           number of records to be copied
From Copybook or Template:
   Data set name . . . . . 'ALLANS2.FMDEMO.TEMPLATE'_____
   Member  . . . . . . . . DEMODATA      (Blank or pattern for member list)
Processing Options:
   Copybook/template    Enter "/" to select option
   1  1. Above          _  Batch execution          _  Advanced member selection
      2. None           _  Use proc _____        _  Skip member name list
      3. Create dynamic _  Ignore length mismatch _  REXX member selection: P
   _  Edit template     _  JCL Source format          _  Directory integrity
   _  Type (1,2,S)      _  Export mode                _  Report PDS record counts
                                                      _  Binary mode, reclen _____
```
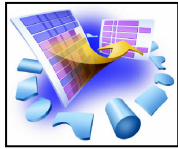
Utilities – Copy Data - Scramble Field Value

Source File

```
View                    ALLANS2.FMDEMO.VSAM
Command ===> _____

                          Type ESDS
      REC-TYPE NAME                 EMPLOYEE-NO
      #2       #3                            #4
      AN 1:2   AN 3:20               BI 23:2
      <>       <---+----1--->        <---+>
****** **** Top of data    ****
000001 01    Graham Purdy            5512
000002 01    Graham Purdy            5512
000003 01    Al Tortorice           3101
000004 01    Will Soper             4412
000005 01    Tyrone Dalais          3312
- - - - - - - - - - REC-TYPE02 - - - - - - -
000008 01    Silvano Prez           2161
000009 01    Liz Rushton            3349
- - - - - - - - - - REC-TYPE02 - - - - - - -
000012 01    John Nicholls          3349
000013 01    Anna Waghorn           7812
000014 01    Merrill Bani           7876
```
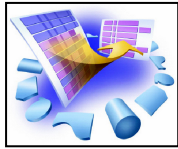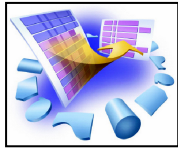
Target File

```
View                    ALLANS2.FMDEMO.SCRAMBLE
Command ===> _____

      REC-TYPE NAME                 EMPLOYEE-NO
      #2       #3                            #4
      AN 1:2   AN 3:20               BI 23:2
      <>       <---+----1--->        <---+>
****** **** Top of data    ****
000001 01    Graham Purdy            7869
000002 01    Graham Purdy            7869
000003 01    Al Tortorice           7891
000004 01    Will Soper             7077
000005 01    Tyrone Dalais          7927
- - - - - - - - - - REC-TYPE02 - - - - - - -
000008 01    Silvano Prez           7305
000009 01    Liz Rushton            7911
- - - - - - - - - - REC-TYPE02 - - - - - - -
000012 01    John Nicholls          7911
000013 01    Anna Waghorn           7900
000014 01    Merrill Bani           7089
```

Utilities – Copy Data – Scramble Using Lookup Table

•An algorithm which modifies strings and numeric values.

•Options to control whether the scrambling is random or repeatable.

•**A lookup function which allows replacement of one value with a corresponding value in a lookup table.**

•The ability to write a user exit to scramble data as desired by the user.

Scramble Using a Lookup Table – Control File


```
 Process    Options    Help
_____

 View            DNET249.CHRYSLER.CONTROL                      Top of 10
 Command ===> █_____     Scroll  CSR
     Key _____    Type KSDS      RBA _____  Format TABL
         ACCOUNT-NO NAME                        SSN ADDR1            ADDR2
              #2 #3                             #4  #5               #6        +
              BI 1:4 AN 5:20                    BI 25:2 AN 27:20     AN 47:20
           <---+----1> <---+----1----+---->  <---+> <---+----1----+---->  <---+----
 ****** ****  Top of data  ****
 =LGTH        10 Grant Smith                  1234 22  Montrose St    Canning V
 =LGTH       160 Andrew Apple                 5678 44  Eagle Rise     Manning
 =LGTH       310 Graham Prestcott             6665 256 Hay St         South Per
 =LGTH       360 Bill Somers                  8447 84  Murchison Rd   North Per
 =LGTH       560 Roddy Armstrong              7775 184 Alexander Dve  Kenwick
 =LGTH       760 Cliff Roberts                4269 28  Bern Rd        Dianella
 =LGTH       810 James Browne                 3269 123 Wellington St  Fremantle
 =LGTH       860 Silvia Carrot                3269 48  Small Lane     East Cann
 =LGTH       910 Dan Peters                   7219 661 Ayton Way      Parkwood
 =LGTH      1010 Liz Childs                   9219 96  High Rd        Northwood
 ****** ****  End of data  ****
```

Note the name for account number 560
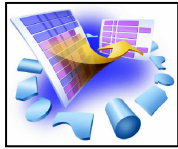
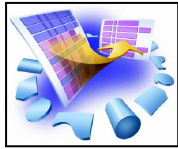# Scramble Using a Lookup Table – Input File

```
 Process    Options    Help

 View              DNET249.CHRYSLER.INPUT                     Top of 12
 Command ===>                                                 Scroll  CSR
                                          Record AT TOP     Format TABL
          ACCOUNT-NO NAME                      SSN      AGE    SALARY JOB-TITLE
                #2 #3                          #4       #5       #6 #7
                BI 1:4 AN 5:20                 BI 25:2 BI 27:2 PD 29:4 AN 33:14
                <---+----1> <---+----1----+---->  <---+> <---+> <---+--> <---+----1---
 ****** ****    Top of data  ****
 000001       10 Tony Peeler              3333        0         0 Programmer
 000002      160 Clive Boan               9999      100      2212 Manager
 000003      310 Merrill Lucky           16665       96     58000 Analyst
 000004      360 Angus Sing              18887       96      7712 Boss
 000005      410 Graham Prompt           21109       94     68000 Programmer
 000006      560 Freddy Sutherland       27775       77      8000 Developer
 000007      760 Don Billy               32219       55     63000 Architect
 000008      810 Silvano Prez            32219       50     60000 Tester
 000009      860 Mike Smith              32219       46     84000 Tea assistant
 000010      910 Keith Donnelly          32219       40     70000 Lead tester
 000011      960 John Stewart            32219       40     69000 Chief
 000012     1010 Bob McClam              32219       40     76000 Chef
 ****** ****    End of data  ****
```
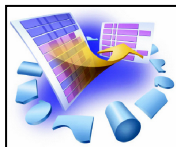
Let's watch account numbers 410 and 560

File Manager Base V7 Evaluation Training.   zSeries AD Tools

Scramble Using a Lookup Table

```
 Process    Options    Help
───────────────────────────────────────────────────────────────────────────
 File Manager              Field Mapping                    Line 1 of 16
 Command ===> _____        Scroll  CSR

 To          DNET249.CHRYSLER.COPYLIB(CHRYSLER)
 From        DNET249.CHRYSLER.COPYLIB(CHRYSLER)


 Cmd Lv  To Field Name       Type  Len    Lv  From Field Name       Type  Len
         ****  Top of data  ****
 ___     1 ACC-REC            AN   142      1 ACC-REC               AN   142
 e       2 ACCOUNT-NO         BI     4      2 ACCOUNT-NO            BI     4
 e       2 NAME               AN    20      2 NAME                  AN    20
 e       2 SSN                BI     2      2 SSN                   BI     2
 ___     2 AGE                BI     2      2 AGE                   BI     2
 ___     2 SALARY             PD     4      2 SALARY                PD     4
 e       2 JOB-TITLE          AN    14      2 JOB-TITLE             AN    14
 e       2 ADDR1              AN    20      2 ADDR1                 AN    20
 e       2 ADDR2              AN    20      2 ADDR2                 AN    20
 e       2 CITY               AN    20      2 CITY                  AN    20
 e       2 STATE              AN    20      2 STATE                 AN    20
 e       2 POSTCODE           AN     4      2 POSTCODE              AN     4
 ___     2 TEL                AN    12
 e       3 AREA-CODE          ZD     2      3 AREA-CODE             ZD     2
```

　　File Manager Base V7 Evaluation Training.　　zSeries AD Tools　　© 2008 IBM Corporation
July 15, 2008

Scramble Using a Lookup Table

```
   Process    Options    Help
   _____

   File Manager                    Field Attributes
   Command ===> _____
                                                           More:      +
   Fixed Attributes:
           Field name   ACCOUNT-NO
                 Type   BI
                Start   1
               Length   4
   Use Attributes:
              Heading   _____
         Output width   _____
         Leading zeros  yes            YES or NO
   Create Attributes:
          Start value   10_____
            End value   _____
            Increment   50_____
                Cycle   _____
   Scrambling Options:
    Scramble Type         Values
    _  1. Random          _  1. Range      Min  _____    Max  _____
       2. Repeatable         2. Value      Column In  _____  Out  _____
       3. Translate  Dsn  _____
```
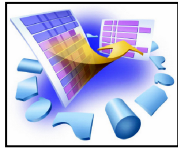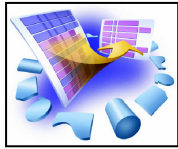
File Manager Base V7 Evaluation Training.   zSeries AD Tools

Scramble Using a Lookup Table – Scramble the NAME Field

IBM

```
 Process   Options   Help
_____

 File Manager                    Field Attributes
 Command ===>  _____
                                                    More:      +
 Fixed Attributes:
           Field name   NAME
                 Type   AN
                Start   5
               Length   20
 Use Attributes:
              Heading   _____
         Output width   _____

 Create Attributes:
               Filler   _____
               Action   FX
      Start character   _
              Pattern   'Bob Smith'_____
   Repeat user pattern  ___          YES or NO
 Scrambling Options:
  Scramble Type        Enter "/" to select option
  3  1. Random         /  Value    Column In  1_____   Out  5_____
     2. Repeatable Dsn 'DNET249.CHRYSLER.CONTROL'_____
_____
```

File Manager Base V7 Evaluation Training.   zSeries AD Tools

Scramble Using a Lookup Table – Scramble the NAME Field

```
Process    Options    Help
────────────────────────────────────────────────────────────────────
Edit              DNET249.CHRYSLER.OUTPUT                  Top of 12
Command ===>  █_____   Scroll  CSR
                                          Record  AT TOP     Format TABL
                                                    GE    SALARY JOB-TITLE
    Input Name              Disguised Name     #5       #6 #7
    ----------              --------------     :2  PD 29:4 AN 33:14
410 Graham Prompt           Bob Smith          +> <---+--> <---+----1---
560 Freddy Sutherland       Roddy Armstrong
*                                              0        0 Programmer
960 John Stewart            Bob Smith         00     2212 Manager
000003   00000310 Graham Prestcott     6665   96    58000 Analyst
000004   00000360 Bill Somers          8447   96     7712 Boss
000005   00000410 Bob Smith            3333   94    68000 Programmer
000006   00000560 Roddy Armstrong      7775   77     8000 Developer
000007   00000760 Cliff Roberts        4269   55    63000 Architect
000008   00000810 James Browne         3269   50    60000 Tester
000009   00000860 Silvia Carrot        3269   46    84000 Tea assistant
000010   00000910 Dan Peters           7219   40    70000 Lead tester
000011   00000960 Bob Smith            5555   40    69000 Chief
000012   00001010 Liz Childs           9219   40    76000 Chef
****** **** End of data ****
```
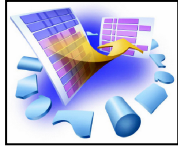
Utilities – Copy Data – Scramble Using an Exit

•An algorithm which modifies strings and numeric values.

•Options to control whether the scrambling is random or repeatable.

•A lookup function which allows replacement of one value with a corresponding value in a lookup table.

•**The ability to write a user exit to scramble data as desired by the user.**

Utilities – Copy Data – Scramble Using an Exit

Process   Options   Help

```
File Manager                    Field Attributes
Command ===> _____

                                                    More:    -
          Field name  EMPLOYEE-NO
                Type  BI
               Start  23
              Length  2
Use Attributes:
             Heading  _____
        Output width  _____
       Leading zeros  NO            YES or NO
Create Attributes:
         Start value  _____
           End value  _____
           Increment  _____
               Cycle  _____
Scrambling Options:
 Scramble Type         Values
 4  1. Random          _  1. Range      Min  _____      Max  _____
    2. Repeatable         2. Value   Column In  _____   Out  _____
    3. Translate   Dsn  'filemgr.v8r1.sfmnsam1(fmnscxec)'_____
    4. Exit
```

File Manager Base V7 Evaluation Training.   zSeries AD Tools

Utilities – Copy Data – Scramble Using an Exit

Menu   Utilities   Compilers   Help

```
BROWSE      FILEMGR.V8R1.SFMNSAM1(FMNSCXEC)          Line 00000090 Col 001 080
Command ===> _____      Scroll ===> CSR
            PERFORM VARYING I FROM 1 BY 1 UNTIL I > SCEXIT-ILEN        00020302
                EVALUATE TRUE                                          00020402
                    WHEN (SCEXIT-IAREA(I:1) >= 'A'                     00020502
                        AND SCEXIT-IAREA(I:1) <= 'Z')                  00020602
                        MOVE 'A' TO SCEXIT-OAREA(I:1)                  00020802
                    WHEN (SCEXIT-IAREA(I:1) >= 'a'                     00020902
                        AND SCEXIT-IAREA(I:1) <= 'z')                  00021002
                        MOVE 'a' TO SCEXIT-OAREA(I:1)                  00021202
                    WHEN (SCEXIT-IAREA(I:1) >= '0'                     00021302
                        AND SCEXIT-IAREA(I:1) <= '9')                  00021402
                        MOVE '1' TO SCEXIT-OAREA(I:1)                  00021602
                    WHEN OTHER                                         00021702
                        MOVE SCEXIT-IAREA(I:1) TO SCEXIT-OAREA(I:1)    00021802
                END-EVALUATE                                           00021902
            END-PERFORM                                                00022002
            MOVE SCEXIT-ILEN TO SCEXIT-OLEN                            00022202
            DISPLAY 'OUTPUT=' SCEXIT-OAREA(1:SCEXIT-OLEN)             00022403
            SET  SCEXIT-RC-OK TO TRUE                                  00022502
        ****************************************************************** 00022602
        *     TERMINATE                                                00022702
```
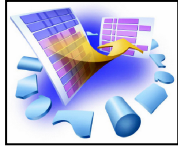
Utilities – Copy Data - Scramble Using an Exit

Samples are sent for the following languages:

FMNSCXEC   COBOL source

FMNSCXCO   JCL for COBOL compile/link

FMNSCXEA   Assembler source

FMNSCXHA   JCL for assembler compile/link

FMNSCXEP   PL/I source

FMNSCXPL   JCL for PL/I compile link
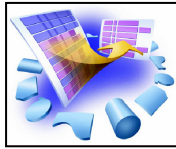
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Customization Guide	SC18-9650-01	2.3MB	0.4MB	May 06
User's Guide and Reference	SC18-9655-01	9.0MB	1.4MB	May 06
User's Guide and Reference for DB2 Data	SC18-9656-01	7.6MB	1.1MB	May 06
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