# IBM® z/TPF Data Event (DEVT) Driver User's Guide

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# Data event driver overview

This document outlines the layout and use of a credit database that is created and accessed by the z/TPF data event driver (DEVT). This driver is a traditional z/TPFDF driver running on the z/TPF system, and is started by using the `ZTEST DEVT` command.

# Credit database

The credit card database has the following characteristics:

- Represented by 3 z/TPFDF files
  - DR11ED: Top-level index that references DR12ED and DR14ED
  - DR12ED: Detail file containing authorized users and credit card transactions for a given credit card
  - DR14ED: Detail file containing security information for a given credit card
- Variable length LRECs and Large logical records (LLRs)
- FARF6 addresses
- Subsystem user (SSU) common
- 4KB record sizes

## *Overview of the database*

The top most file (DR11ED) is a credit card number index file and is indexed by credit card number and brand. DR11ED is split into 3 partitions (0, 1, and 2) where each partition is used to represent a different credit card brand. Each logical record (LREC) contains a credit card number, credit limit, and two file address references.

The first file address references an authorized user/purchase history file (DR12ED) for that credit card. The purpose of DR12ED is to store all authorized users of that credit card, as well as a history of purchases. The other file address references a security file (DR14ED) for the credit card. The security file (DR14ED) contains security information about each authorized user in the DR12ED file. Security information can include a PIN number and photo.

The unique key facility (UKY) is used to associate users from the authorized user/purchase history file with entries in the security file. For example, if you have three people authorized to use the same credit card, use the UKY of person 1 to find the PIN or photo (or both) of person 1. Use the UKY of person 2 to find the same information for person 2, and so on. The UKY also is used to link users in the authorized user/purchase history file with LRECs that contain purchases by that particular user of the credit card.

## *Data events and the Credit database*

As part of this starter kit, event message data events are defined and enabled only for the DR12ED file. This means event message data events are automatically created by the z/TPF system when a subfile in the DR12ED file is created, updated, or deleted.

The credit database and the DR12ED file is an example of how data events may be used for z/TPFDF databases. For more information on the types of z/TPFDF files that can be enabled for event message data events, see “Data event processing for z/TPFDF” in the PUT 11 (or later) z/TPFDF product documentation.

## *Sample Credit database*

Credit card number index file (DR11ED)

| LRECID | Pointer to DR12ED (DR11FA1) | Pointer to DR14ED (DR11FA2) | creditCard (DR11CCN) | creditCard limit (DR11CCL) |
|---|---|---|---|---|
| 50 | fileddress1 | fileaddress2 | creditCard | limit |
| … | | | | |
| … | | | | |
| 50 | fileaddress1 | fileaddress2 | creditCard | limit |
| 50 | fileaddress1 | fileaddress2 | creditCard | limit |
| 50 | | | 1895472010006809 | 30000 |

Authorized user/purchase history detail file (DR12ED)

| LRECID | User name (DR12ND3) | Social security # (DR12SSN) | User address (DR12ADR) | Flags (DR12FL1) | Unique key (DR12KD3) |
|---|---|---|---|---|---|
| D3 | 2JOHNDOE | ssn1 | 1956 Haight Ave | B’01000000’ | uky1 |
| D3 | DOE3RD | ssn2 | College Road | B’00000000’ | uky2 |

| LRECID | User name (DR12ND7) | Vendor ID (DR12VID) | Date (DR12DAT) | Time (DR12TIM) | Amount (DR12AMT) | Unique key (DR12KD7) |
|---|---|---|---|---|---|---|
| D7 | DOE3RD | 023344455F | 2006JAN03 | 14:00 | 150.37 | uky2 |

Security detail file (DR14ED)

| LRECID | Unique key (DR14K56) / (DR14K5D) | Pin (DR14PIN) / photo (DR14PHO) |
|---|---|---|
| 56 | uky2 | 1239 (pin) |
| 5D | uky1 | photo1 |

The previous example shows a credit card 1895472010006809 in partition 00 with a spending limit of $30,000.00. Two authorized users are shown for that credit card and one purchase history LREC is shown. In addition, the authorized users each contain data in the security file. The first authorized user, 2JOHNDOE, has a photo. The second authorized user for the credit card, DOE3RD, has a PIN.

The following information describes examples of algorithms that you can use to access each of the files in the database:

- DR11ED (credit card number file)
  To access the credit card number subfile for brand (company code) 0, card number 1895472010006809,
  `ZUDFM ACC B211/ALG-|10006809|0000`

- DR12ED (authorized user/purchase history file)
  To access the user file and purchase history for brand (company code) 0, card number 1895472010006809
  `ZUDFM ACC B212/ALG-|10006809|0000|1895472010006809`

- DR14ED (security file)
  To access the security file for brand (company code) 0, card number 1895472010006809
  `ZUDFM ACC B214/ALG-|10006809|0000|1895472010006809`

The algorithm string to locate an LREC in the credit card number file is 18 bytes long. The first 16 bytes is the last 8 characters of the credit card number; the next 2 bytes is the partition (which the **`ZTEST DEVT`** commands refer to as **`BRAND`**). The partition is a 2-byte hexadecimal field (x'0000', x'0001', or x'0002') that is used to partition the database. The partition is used in conjunction with the last 8 bytes of the credit card number to locate the correct subfile in the credit card number file, *but the partition is not stored in the database as part of the data.* When the correct subfile is located, the appropriate LREC within that subfile is located by using the entire credit card number.

The following example shows the response to the **ZDUFM DISPLAY** command to access the B212 file:

```
ZUDFM ACC B212/ALG-|10006809|0001|1895472010006809
CSMP0097I 10.28.23 CPU-B SS-BSS  SSU-HPN  IS-01
UDFM0301I          FILE INFORMATION DISPLAY
FILE IDENTIFIER              B212
FILE ADDRESS               X 0000000018076C7F
FACE RECORD TYPE           D 000000000  X 00000000
FACE START ORDINAL         D 000000000  X 00000000
FACE END ORDINAL           D 000000000  X 00000000 _
CURRENT FACE ORDINAL       D 000000000  X 00000000
CURRENT RELATIVE ORDINAL   D 000000000  X 00000000
TPFDF ALGORITHM            D 000000255  X 000000FF
INITIAL NAB VALUE          D 000000066  X 00000042
TPFDF END ORDINAL          D 000000000  X 00000000
VARIABLE LOGICAL RECORDSIZE +

ZUDFM DISPLAY L
UDFM0001I          TPFDF LREC DISPLAY
F.A. 000000001804F426
F.A. 000000001804F426 0042 REC 00000001 SIZ 0050 KEY D3
LABEL                 DISP SIZ  VALUE
-----                 ---- ---  -----
DR12ND3               0003 0014  E V A N H U N T4040404040404040
                                 40404040 _
DR12SSN               0017 0009  7 1 0 2 3 0 8 8 9
DR12ADR               0020 000A  2 4 340 C H A R L E
   (DUPL)             002A 000A  S40 B L V D40404040
   (DUPL)             0034 000A 4040404040404040404040
   (DUPL)             003E 000A 4040404040404040404040
DR12FL1               0048 0001 00 _
DR12FL2               0049 0001 00
   (NO LABEL)         004A 0002 0000
DR12KD3               004C 0004 00000001
F.A. 000000001804F426 0092 REC 00000002 SIZ 0034 KEY D7
LABEL                 DISP SIZ  VALUE
-----                 ---- ---  -----
DR12ND7               0003 0014  E V A N H U N T4040404040404040 _
                                 40404040
DR12VID               0017 0005 023344455F
DR12DAT               001C 0009  2 0 0 7 A U G 2 1
DR12TIM               0025 0005  2 27A 2 3
   (NO LABEL)         002A 0002 0000
DR12AMT               002C 0004 41 F6666
DR12KD7               0030 0004 00000001 _
F.A. 000000001804F426 00C6 REC 00000003 SIZ 0034 KEY D7
LABEL                 DISP SIZ  VALUE
-----                 ---- ---  -----
DR12ND7               0003 0014  E V A N H U N T4040404040404040
                                 40404040
DR12VID               0017 0005 000888888F
DR12DAT               001C 0009  2 0 0 7 D E C 2 0 _
DR12TIM               0025 0005  1 37A 1 8
   (NO LABEL)         002A 0002 0000
DR12AMT               002C 0004 42055C29
DR12KD7               0030 0004 00000001
F.A. 000000001804F426 00FA REC 00000004 SIZ 0034 KEY D7
LABEL                 DISP SIZ  VALUE
-----                 ---- ---  ----- _
DR12ND7               0003 0014  E V A N H U N T4040404040404040
                                 40404040
DR12VID               0017 0005 000777777F
DR12DAT               001C 0009  2 0 0 7 A P R 1 0
DR12TIM               0025 0005  1 77A 1 1
   (NO LABEL)         002A 0002 0000
DR12AMT               002C 0004 43C08000 _
DR12KD7               0030 0004 00000001
** LAST LREC IN SUBFILE ** +
```

## Credit database initialization

Enter **ZTEST DEVT CREDIT BUILD** to populate the credit database.

```
>>---+- ZTEST DEVT CREDIT BUILD----------------------+-><
```

**Note:**

1. Ensure that you enter the **ZUDFM INIT B211** command to initialize the credit database before entering the build command.
2. There are no pilot tape updates needed for the credit database. The database will be initialized (cleared) and rebuilt with the **ZUDFM INIT B211** and **ZTEST DEVT CREDIT BUILD** commands.

# ZTEST DEVT command syntax

The following syntax shows the types of operations that you can perform on the credit card database:

```
>>-+--ZTEST--+- DEVT CRedit -+- ADD -+- CARD -| Add Card Parameters |-----------+---+-><
                             |       +- CHarge -| Add Charge Parameters |--------+   |
                             |       +- SECurity -| Add Security Parameters |----+   |
                             |       '- USer -| Add User Parameters| +-----------'   |
                             +- DELete -+- CARD -| Del Card Parameters |-------------+
                             |          +- CHarge -| Del Charge Parameters |------'  |
                             |          +- SECurity -| Del Security Parameters |--'  |
                             |          '- USer -| Del User Parameters |----------'  |
                             +- DISplay -+- CARD -| Disp Card Parameters |---------+-+
                             |           +- CHarge -| Disp Charge Parameters |-----+ |
                             |           +- SECurity -| Disp Security Parameters |-+ |
                             |           '- USer -| Disp User Parameters |---------' |
                             +- MODify -+- CARD -| Modify Card Parameters |-+--------+
                             |          '- USer -| Modify User Parameters |-|
                             |                                              |
                             +- BUILD --+--------------------------------------'
```

**Add User Parameters**

```
                                          .- LIMIt-10000 -.
|-- BRand-partition CARDNum-creditCardNumber -+---------------+->
                                          '- LIMIt-limit -'
                                                              .- PREFer-No --.
 >- NAme-'name' -- ADDRess-'address' --SSN-socialSecurityNumber --+--------------+--|
                                                              '- PREFer-Yes -'
```

**Add Card Parameters**

```
                                          .- LIMIt-10000 -.
|-- BRand-partition CARDNum-creditCardNumber -+---------------+-|
                                          '- LIMIt-limit -'
```

**Add Charge Parameters**

```
|-- BRand-partition CARDNum-creditCardNumber SSN-socialSecurityNumber -->

>-+- VENdor-vendorID DAte-yyyymmmdd TIme-time AMT-amount -|
```

**Add Security Parameters**

```
  .-------------------------------.      .---------------------------------------.
  V                               |(1)   V                                       |(1)
|---+- | Brand Search | --------+-+--------+- PHoto-'hfsForPhoto' -------------+-+-|
    +- | Card Number Search | --+         +- PIN-pin -------------------------+-'
    '- | SSN Search | ----------'
```

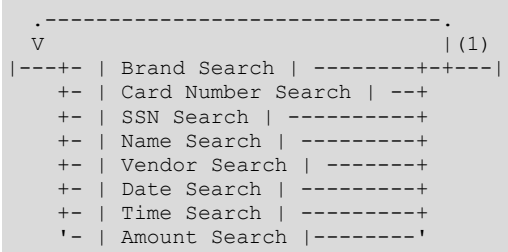
**Del Card Parameters**

```
  .-------------------------------.
  V                               |(1)
|---+- | Brand Search | --------+-+---|
    '- | Card Number Search | --'
```

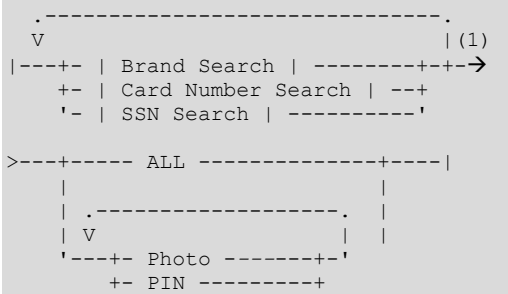
**Del User Parameters**

```
  .-------------------------------.
  V                               |(1)
|---+- | Brand Search | --------+-+-→
    +- | Card Number Search | --+
    '- | SSN Search | ----------'
```

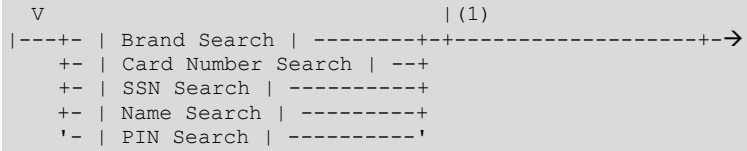
**Del Charge Parameters**



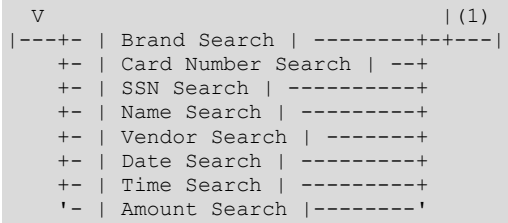

**Del Security Parameters**



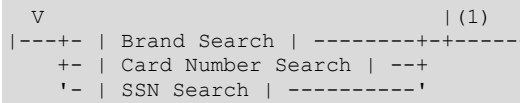

**Disp Card Parameters**



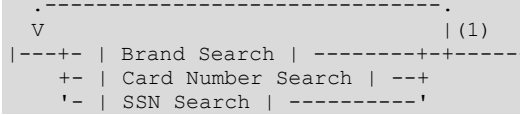

**Disp Charge Parameters**




**Disp Security Parameters**




**Disp User Parameters**



**Modify Card Parameters**

```
  .-------------------------------.
  V                               |(1)
|---+- | Brand Search | --------+-+--+- LIMAdd-value ----+-|
    '- | Card Number Search | --'    +- LIMDec-value ----+
                                      '- NEWLIMIt-limit  -'
```

**Modify User Parameters**

```
  .-------------------------------.
  V                               |(1)
|---+- | Brand Search | --------+-+-- SSN-socialSecurityNumber -->
    '- | Card Number Search | --'

  .---------------------------.
  V                           |
>--+- NEWADDRess-'address' -+-+-|
   '- NEWNAme-'name'--------'
```

**Name Search**

```
   .- NAme-'*'--------------------------------.
|--+-----------------------------------------+-|
   +- NAme-'partialName*'----------------------+
   '- NAme-'name'-+-----------------------+-- -'
                  '-| Comparison Operator |-'
```

**Brand Search**

```
   .- BRand-*         -.
|--+------------------+-|
   '- BRand-partition -'
```

**Card Number Search**

```
   .- CARDNum-* ------------------------------------------------.
|--+-----------------------------------------------------------+-|
   +- CARDNum-partialCreditCartNumber* ----------------------+
   '- CARDNum-creditCardNumber-+-------------------------+-- -'
                               '-| Comparison Operator |-'
```

**SSN Search**

```
   .- SSN-* ---------------------------------------------------.
|--+-----------------------------------------------------------+-|
   +- SSN-partialSocialSecurityNumber* ----------------------+
   '- SSN-socialSecurityNumber-+-------------------------+-- -'
                               '-| Comparison Operator |-'
```

**PIN Search**

```
   .- PIN-* ---------------------------------.
|--+-----------------------------------------+-|
   '- PIN-pin-+-------------------------+-- -'
              '-| Comparison Operator |-'
```

**Vendor Search**

```
   .- VENdor-* -------------------------------------.
|--+-------------------------------------------------+-|
   '- VENdor-vendorID-+-------------------------+-- -'
                      '-| Comparison Operator |-'
```

```
Date Search

   .- DAte-* ---------------------------------------.
|--+-----------------------------------------------+-|
   +- DATE-partialDate* ----------------------------+
   '- DAte-yyyymmmdd -+-------------------------+-- -'
                      '-| Comparison Operator |-'


Time Search

   .- TIme-* ---------------------------------.
|--+-----------------------------------------+-|
   '- TIme-time-+-------------------------+-- -'
                '-| Comparison Operator |-'


Amount Search

   .- AMT-* ----------------------------------.
|--+----------------------------------------+-|
   '- AMT-amount-+-------------------------+-- -'
                 '-| Comparison Operator |-'


Comparison Operator

   .-;EQ -.
---+-------+
   +-;NE -+
   +-;LT -+
   +-;LE -+
   +-;GT -+
   '-;GE -'

(1) Note: You must enter at least 1 of these search parameters explicitly!!
```

**Notes:** In the search operations, you can search for elements that match specific criteria in one of the following ways:

- Search for any value for a specific field (*****)
- Use a comparison operators to find elements with specified field contents that match the following criteria:
    - The field contents are equal to a specified value (**;EQ**);
    - The field contents are not equal to a specified value (**;NE**);
    - The field contents are less than a specified value (**;LT**);
    - The field contents are less than or equal to a specified value (**;LE**);
    - The field contents are greater than a specified value (**;GT**);
    - The field contents are greater than or equal to a specified value (**;GE**).

## ZTEST

Prefix the command by **ZTEST** when you enter your request on the z/TPF system. When you enter the command on the z/TPF system, the driver uses traditional z/TPFDF APIs to access the database.

**ADD User**

Adds an authorized user to a specified credit card. If the credit card specified already exists, the authorized user is added for that credit card. If the credit card that is specified does not already exist, the card is created and the authorized user added to it.

**Note:** When you add users to the database from the z/TPF system, the social security number (SSN) that is specified **must** be an odd number; only odd numbers from dfuky (DBUKY) will be used as a UKY field for that user.

When a user is added to the CREDIT database, the z/TPF system can work with that user (for example, add security information, display, delete, modify) whether the SSN for that user is even or odd.

**ADD CARD**

Creates a credit card in the database in the appropriate partition.

**ADD CHarge**

Adds a charge to a specified credit card.

**ADD SECurity**

Adds security information to a specified set of credit cards.

**DELete CARD**

Deletes credit cards from the database. This deletes all of the authorized user information, security data, and charges for the credit card.

**DELete CHarge**

Deletes charges for cards in the database.

**DELete SECurity**

Deletes security information for authorized users.

**DELete User**

Deletes authorized users from the specified credit cards.

**DISplay CARD**

Displays one or more credit card entries in the credit file.

**DISplay CHarge**

Displays charge information (stored as purchase history LRECs in the authorized user/purchase history file).

**DISplay SECurity**

Displays authorized user security information (from the security file).

**DISplay USer**

Displays authorized user information.

**MODify CARD**

Modifies information about credit cards.

**MODify USer**

Modifies information about authorized users.

**BRand-*partition***

Specifies the partition in the database for which the command is being entered. Values must be 0, 1, or 2.

**CARDNum-*creditCardNumber***

**CARDNum-*creditCardNumber*[;EQ|;NE|;LT|;LE|;GT|;GE]**

Specifies a 16-digit decimal numerical credit card number, where valid credit card numbers range from 0000000000000000 to 9999999999999999. Must be 16 characters long when adding a credit card.

**Note:** Within a particular partition (**BRAND**), the credit card number must be unique.

**CARDNum-*partialCreditCardNumber****

On a display, delete, or modify command, you can specify a credit card string that is shorter than 16 decimal digits but ends in a wildcard (*) so that the operation is done for any credit card beginning with that string. For example, to display all credit cards with a number that begins with 998, specify **`CARDNUM-998*`**.

**LIMIt-*limit***

Specifies the maximum value for any particular purchase on the card. Specify a value in the range 0 - 9999999. If you specify a value of 0, any outstanding charges are left on the card but no future purchases can be made until the limit is sufficiently increased.

**Note:** For simplicity purposes, the specified limit is treated as a limit on each purchase, not as a limit on the total number of purchases allowed on the card.

**NEWLIMIt-*limit***

Specifies the new limit for future purchases on a credit card which is being modified. Specify a value in the range 0 - 9999999.

**LIMAdd-*value***

When modifying elements in the credit card file, this parameter is used to specify a decimal integer value by which the current credit limit is to be incremented.

**LIMDec-*value***

When modifying elements in the credit card file, this parameter is used to specify a decimal integer value by which the current credit limit is to be decremented. When the limit becomes zero or negative, any outstanding charges are left on the card but no future purchases may be made until the limit is sufficiently increased.

**Note:** The **`LIMADD`** and **`LIMDEC`** parameters were added to exercise simple arithmetic operations on packed decimal numbers.

**SSN-*socialSecurityNumber***
**SSN-*socialSecurityNumber*[;EQ|;NE|;LT|;LE|;GT|;GE]**

Specifies the social security number for an authorized user. Specify a 9-digit decimal number in the range 000000000 - 999999999. The social security number is unique for each authorized user in a given partition. The same person can be an authorized user of different credit cards even in the same partition and even use a different name or address (or both) each time.

**Note:** When users are added to the database, the z/TPF version of the DEVT CREDIT driver requires the specified SSN to be odd. After a user is added to the CREDIT database, the z/TPF drivers can work with that user (for example, display, modify, delete, add security, and so on) by searching for the SSN whether the SSN is even or odd.

**SSN-*partialSocialSecurityNumber****

Specifies a partial social security number, followed by a wildcard (*), used for searching to satisfy display and update requests.

**VENdor-*vendorID***
**VENdor-*vendorID*[;EQ|;NE|;LT|;LE|;GT|;GE]**

Specifies a 9-digit decimal numerical vendor ID number, in the range 000000000 - 99999999.

**DAte-*yyyymmmdd***
**DAte-*yyyymmmdd*[;EQ|;NE|;LT|;LE|;GT|;GE]**

Specifies a date, where:

- ***yyyy* –** is a 4-digit year, such as 1999 or 2006
- ***mmm*** – is a month JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC
- ***dd* –** is the day of the month, 01 thru 31

Examples of valid dates include 2006JAN02, 1999DEC30, 2000OCT24.

**DAte-*partialDate****

For display, delete, and modify operations, you can search on a partial date followed by a wildcard (*). For example, to search on all charges in 2006, specify **`DATE-2006*`**. To search on all charges in March 2007, specify **`DATE-2007MAR*`**.

**TIme-*time***
**TIme-*time*[;EQ|;NE|;LT|;LE|;GT|;GE]**
Specifies a time in military format ***hh*:*mm***, ranging from 00:00 (midnight) to 23:59.

**AMT-*amount***
**AMT-*amount*[;EQ|;NE|;LT|;LE|;GT|;GE]**
Specifies an amount in US dollars, including cents. (The dollar sign, $, is omitted for simplicity.) For example, 143.57.

**NAme-'*name*'**
**NAme-'*name*[;EQ|;NE|;LT|;LE|;GT|;GE]'**
**NEWNAme-'*name*'**
Specifies the name of an authorized user. Specify a 1- to 20-character alphanumeric name. If you specify less than 20 characters, the name is padded with blanks. The name does not have to be all alphabetic characters; for example, you can specify names like 2JOHNOE and J2ALBERT3.

**NAme-'*partialName**'**
When searching on a name of an authorized user, you can specify a string that is less than 20 characters but ends in a wildcard (*) so that you can search for any name that begins with the string that was specified. For example, searches and operations on **`NAME-'J*'`** will apply only to those authorized users in the database whose name begins with J.

**ADDRess-'*address*'**
**NEWADDRess-'*address'***
Specifies a billing address. Specify as many as 40 alphanumeric characters with blanks, enclosed in single quotes.

**PREFer-No**
Indicates this user is not a member of the preferred user database on the z/TPF system.

**PREFer-Yes**
Indicates this user is to be a preferred user on the z/TPF system.

**Photo-'*hfsForPhoto*'**
Specifies a fully-qualified hierarchical file system (HFS) path in the file system where a photograph is located. The value must be enclosed in single quotes.

**Note:** There is no checking done on the size of the file that it used; it is up to the tester to provide a file of the appropriate length. The path must be all in lower case.

**PIN-*pin***
**PIN-*pin*[;EQ|;NE|;LT|;LE|;GT|;GE]**
Specifies a 4-digit personal identification code (PIN), in the range 0001 - 9999. The PIN does not have to be unique.

**PHoto**

Performs operations on the photo security data.

**PIN**

Performs operations on the PIN security data.

## *Command examples*

- Add a user (and new credit card) to the database. In this example, because the credit card did not previously exist, a new credit card was created.

```
ZTEST DEVT CREDIT ADD US BR-0 CARDN-1234567890123456 NA-Jackie ADDR-'2455 SOUTH ROAD' SSN-180651961
CSMP0097I 11.31.27 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0572I 11.31.27 USER ADDED TO CREDIT DATABASE.+
CSMP0097I 11.31.27 CPU-B SS-BSS  SSU-HPN  IS-01
CREDIT CARD CREATED CARDN-1234567890123456 LIMIT-10000+
```

- Create a credit card for the first time, with no authorized users. (They must be added later if charges will be added to this card.) The first command fails because there is already a credit card with that number in the partition specified. The second command works.

```
ZTEST DEVT CREDIT ADD CARD BR-1 CARDN-9012345678123457 LIMI-30000
CSMP0097I 13.52.19 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0571E 13.52.19 ADD CARD FAILED - CARD ALREADY EXISTS.+
AAES0008I 00 ==> ZTEST Devt CREDIT ADD CARD BR-2 CARDN-9012345678123457 LIMI-30000
CSMP0097I 13.52.41 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0570I CREDIT CARD CREATED CARDN-9012345678123457 LIMIT-30000
```

- In the following example, all charges for user ROBD that were made on any credit card during the month of May 2006 are deleted.

```
ZTEST DEVT CREDIT DEL CHARGE NAME-ROBD DATE-2006MAY*
CSMP0097I 15.57.50 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0511I 15.57.50 CREDIT CHARGE DELETE COMPLETE.  FOLLOWING DELETED:+
CSMP0097I 15.57.50 CPU-B SS-BSS  SSU-HPN  IS-01
   CHG FOR BR-1 CARDN-1111111111111111 NAME-ROBD                 SSN-222222221
            VENDOR-222222225 DATE-2006MAY25 TIME-10:00 AMT-$1000.00
   CHG FOR BR-1 CARDN-1111111111111111 NAME-ROBD                 SSN-222222221 _
            VENDOR-222222224 DATE-2006MAY20 TIME-11:00 AMT-$800.90
   CHG FOR BR-1 CARDN-1111111111111111 NAME-ROBD                 SSN-222222221
            VENDOR-222222223 DATE-2006MAY15 TIME-12:00 AMT-$600.80
   CHG FOR BR-1 CARDN-1111111111111111 NAME-ROBD                 SSN-222222221 _
            VENDOR-222222222 DATE-2006MAY10 TIME-10:00 AMT-$500.50
   CHG FOR BR-1 CARDN-1111111111111111 NAME-ROBD                 SSN-222222221
            VENDOR-222222221 DATE-2006MAY01 TIME-08:00 AMT-$100.00
   CHG FOR BR-1 CARDN-1111111111111111 NAME-ROBD                 SSN-222222221
            VENDOR-222222225 DATE-2006MAY05 TIME-14:30 AMT-$300.12
   --- END OF CHARGES DELETED FOR CREDIT CARD
END OF DISPLAY+
```

- In the following example, all changes are deleted for a specified credit card.

```
ZTEST DEVT CREDIT DEL CHARGE BR-1 CARDN-1111111111111111
CSMP0097I 16.04.03 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0511I 16.04.03 CREDIT CHARGE DELETE COMPLETE.  FOLLOWING DELETED:+
CSMP0097I 16.04.03 CPU-B SS-BSS  SSU-HPN  IS-01
   CHG FOR BR-1 CARDN-1111111111111111 NAME-ROBD                 SSN-222222221
            VENDOR-222222226 DATE-2006DEC31 TIME-22:00 AMT-$999.99
   CHG FOR BR-1 CARDN-1111111111111111 NAME-ROBD                 SSN-222222221 _
            VENDOR-222222225 DATE-2006AUG01 TIME-23:00 AMT-$1000.00
   --- END OF CHARGES DELETED FOR CREDIT CARD
END OF DISPLAY+
```

- In the following examples, all security information is deleted for any authorized user with SSN=12450869.

```
ZTEST DEVT CREDIT DEL SECURITY SSN-12450869 ALL
DEVT5012I CREDIT SECURITY DELETE COMPLETE.  FOLLOWING DELETED:
   NUMBER OF FINGERPRINT RECORDS DELETED = 2
   NUMBER OF PHOTO RECORDS DELETED = 1
   NUMBER OF SIGNATURE RECORDS DELETED = 0
  WARNING !! 2 LINKS TO BIO RECORDS FOUND BUT CANNOT BE DELETED
END OF DISPLAY
```

- In the following example, all users with a social security number that begins with 9 is deleted from any credit card number beginning with 12345* in all brands.

```
ZTEST DEVT CREDIT DEL USER BR-* CARDN-1234* SSN-9*
DEVT5013I CREDIT USER DELETE COMPLETE.  FOLLOWING DELETED:
   NUMBER OF AUTHORIZED USERS DELETED = 8
   NUMBER OF SECURITY RECORDS DELETED = 24
   NUMBER OF PURCHASES DELETED = 25
   NUMBER USERS DELETE PENDING = 2
END OF DISPLAY
```

- In the following example, a list of all credit cards in brand 2 with at least one authorized user with a name that begins with CORNELL is displayed.

```
ZTEST DEVT CREDIT DISP CARD BR-2 CARDN-18954* NAME-CORNELL*
CSMP0097I 11.07.58 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0520I CREDIT CARD DISPLAY:
BR-2 CARDN-1895472010006809 LIMIT-10000 TOTAL CHARGES-$10980.00
BR-2 CARDN-1895472010006887 LIMIT-10000 TOTAL CHARGES-$13902.15
BR-2 CARDN-1895472010006874 LIMIT-10000 TOTAL CHARGES-$0.00
END OF DISPLAY+
```

- In the following example, a list of all credit cards in brand 1 that contain an authorized user with a PIN greater than or equal to 6000 is displayed.  (Note that a comparison operator is useful here because the PIN is *not* stored as character data, so a partial key search would not be appropriate.)

```
ZTEST DEVT CREDIT DISP CARD cardn-111122223333* PIN-6000;GE
CSMP0097I 12.00.41 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0520I CREDIT CARD DISPLAY:
BR-0 CARDN-1111222233335555 LIMIT-10000 TOTAL CHARGES-$3333.50
BR-0 CARDN-1111222233334444 LIMIT-10000 TOTAL CHARGES-$9010.50
BR-1 CARDN-1111222233335555 LIMIT-10000 TOTAL CHARGES-$4444.50 _
BR-1 CARDN-1111222233334444 LIMIT-10000 TOTAL CHARGES-$0.00
END OF DISPLAY+
```

- In the following example, all charges on a specific credit card are displayed.

```
ZTEST DEVT CREDIT DISP CHARGE BR-0 CARDN-1895472010006887
CSMP0097I 12.10.26 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0521I CREDIT CHARGE DISPLAY:
   CHG FOR BR-0 CARDN-1111222233334444 NAME-LISA                SSN-123456789
           VENDOR-222222224 DATE-2013APR04 TIME-04:14 AMT-$4004.50 _
   CHG FOR BR-0 CARDN-1111222233334444 NAME-LISA                SSN-123456789
           VENDOR-222222223 DATE-2013MAR03 TIME-13:23 AMT-$3003.50
   CHG FOR BR-0 CARDN-1111222233334444 NAME-LISA                SSN-123456789
           VENDOR-222222222 DATE-2013FEB28 TIME-12:12 AMT-$2002.50
   --- END OF CHARGES FOR CREDIT CARD _
END OF DISPLAY+
```

- The following example shows a charge display when there are no charges.

```
ZTEST DEVT CREDIT DISP CHARGE BR-1 CARDN-1111222233334444
CSMP0097I 12.15.19 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0521I CREDIT CHARGE DISPLAY:
   NO CHARGES
END OF DISPLAY+
```

- In the following example, there is no security data to be displayed.

```
ZTEST DEVT CREDIT DISP security BR-2 CARDN-1895472010006874
CSMP0097I 12.33.40 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0522I CREDIT SECURITY DISPLAY:
  SECURITY FOR BRAND-2 CARDNUM-1895472010006874
         NO MATCHING SECURITY INFORMATION
END OF DISPLAY+
```

- In the following example, a request is made to display the security information, but there are no credit cards that match the display criteria.

```
ZTEST DEVT CREDIT DISP SECURITY BR-* CARDN-999999999999999
CSMP0097I 12.35.39 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0522I CREDIT SECURITY DISPLAY:
  CREDIT CARD NUMBER NOT FOUND
END OF DISPLAY+
```

- In the following example, a specified credit card is modified by making its purchase limit 0. This does not affect current purchases on the card, but prevents future purchases from being made.

```
ZTEST DEVT CREDIT MOD CARD br-0 CARDN-111122223333* NEWLIMIT-0
CSMP0097I 14.24.00 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0540I 14.24.00 CREDIT ACTION CARD STARTED.
                   BR-0 CARDN-111122223333* NEWLIMIT-0 +
CSMP0097I 14.24.00 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0551I 14.24.00 CREDIT MODIFY CARD COMPLETED.
                   NUMBER OF CREDIT CARDS MODIFIED = 2 +
```

- In the following example, all cards are modified in a particular partition by decreasing the purchase limit by $100.00. The application can prevent the limit from going negative by setting any limit that is currently under 100 to 0, and errors or warnings do not need to be issued:

```
ZTEST Devt CREDIT MOD CARD BR-* CARDN-* LIMdec-100
CSMP0097I 17.26.26 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0540I 17.26.26 CREDIT ACTION CARD STARTED.
                   BR-* CARDN-* LIMITDECREASE-100 +
CSMP0097I 17.26.27 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0551I 17.26.27 CREDIT MODIFY CARD COMPLETED.
                   NUMBER OF CREDIT CARDS MODIFIED = 3
```

- In the following example, there was no credit card of the specified number in brand 1.

```
ZTEST Devt CREDIT MOD CARD BR-1 CARDN-5555555555555555 LIMADD-100
CSMP0097I 14.19.54 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0540I 14.19.54 CREDIT ACTION CARD STARTED.
                   BR-1 CARDN-5555555555555555 LIMITADD-100 +
CSMP0097I 14.19.54 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0551I 14.19.54 CREDIT MODIFY CARD COMPLETED.
                   NUMBER OF CREDIT CARDS MODIFIED = 0 +
```

- In the following example, the name for the authorized user with the specified SSN is changed throughout the database. This action changes only the occurrences of that user as authorized user entries in the authorized user/purchase history file; the purchase records are not changed. (So, when you display charges they will still show up with the person's name at the time the charge was made.)

```
ZTEST DEVT CREDIT MOD USER BR-* SSN-710231321 NEWNAME-marylee
CSMP0097I 15.21.29 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0560I 15.21.29 CREDIT MODIFY USER STARTED.
                   BR-* SSN-123456789 NEWNAME-MARYLEE              NEWADDRESS-
+
CSMP0097I 15.21.29 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0561I 15.21.29 CREDIT MODIFY USER COMPLETED.
                   NUMBER OF AUTHORIZED USERS MODIFIED = 1 +
```

  **Note:** Even though SSNs are unique in this database, and there are only 3 brands, 14 users were modified because a particular user can be authorized to use more than one credit card, even within the same brand.

- On delete requests, a warning is issued only if you try to delete the entire database.
  **Note:** If you try to delete all charges, all users, all security, but leave the credit cards, for now there will be no warning.

```
AAES0008I 00 ==> ZTEST DEVT CREDIT DEL CARD BR-*
CSMP0097I 15.27.16 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0510I 15.27.16 CREDIT CARD DELETE COMPLETE.  FOLLOWING DELETED:+
CSMP0097I 15.27.16 CPU-B SS-BSS  SSU-HPN  IS-01
   NUMBER OF CREDIT CARDS DELETED = 511+
CSMP0097I 15.27.16 CPU-B SS-BSS  SSU-HPN  IS-01
   NUMBER OF AUTHORIZED USERS DELETED = 753+
CSMP0097I 15.27.16 CPU-B SS-BSS  SSU-HPN  IS-01
   NUMBER OF SECURITY RECORDS
DELETED = 2309+
CSMP0097I 15.27.16 CPU-B SS-BSS  SSU-HPN  IS-01
   NUMBER OF BIOTXT POOLS RELEASED = 1374+
CSMP0097I 15.27.16 CPU-B SS-BSS  SSU-HPN  IS-01
   NUMBER OF PURCHASES DELETED = 1843+
CSMP0097I 15.27.16 CPU-B SS-BSS  SSU-HPN  IS-01
   NUMBER ENTRIES DELETED FROM PREFERRED USER DATABASE = 76+
CSMP0097I 15.27.16 CPU-B SS-BSS  SSU-HPN  IS-01
END OF DISPLAY+
```

## *Additional command examples*

The following scenario illustrates one way that you can use the DEVT driver. These commands build on each other and are meant to be entered in the order provided.

1. Check to see if credit card number 1111222233334444 exists. The following display shows that this card number does not exist.

```
ztest devt credit DISPLAY CARD brand-2
cardnum-1111222233334444
CSMP0097I 11.06.27 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0520I CREDIT CARD DISPLAY:
END OF DISPLAY+
```

2. Add credit card number 1111222233334444 with one user to brand 2.

```
ztest devt credit ADD USER br-2 cardn-1111222233334444
name-maryChen addr-456mainstreet ssn-777889999
CSMP0097I 11.06.36 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0572I 11.06.36 USER ADDED TO CREDIT DATABASE.+
CSMP0097I 11.06.36 CPU-B SS-BSS  SSU-HPN  IS-01
CREDIT CARD CREATED CARDN-1111222233334444 LIMIT-10000+
```

3. Display the credit card that you added. The following display shows that the credit card now exists with no security and 0 charges.

```
ztest devt credit DISPLAY CARD br-2 cardn-1111222233334444
CSMP0097I 11.07.01 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0520I CREDIT CARD DISPLAY:
BR-2 CARDN-1111222233334444 LIMIT-10000 TOTAL CHARGES-$0.00
END OF DISPLAY+

ztest devt credit DISPLAY SECURITY br-2
cardn-1111222233334444
CSMP0097I 11.07.13 CPU-B SS-BSS  SSU-HPN  IS-01
DEVT0522I CREDIT SECURITY DISPLAY:
  SECURITY FOR BRAND-2 CARDNUM-1111222233334444
         NO MATCHING SECURITY INFORMATION
END OF DISPLAY+
```

4. Add a PIN number to the credit card.

```
ztest devt credit ADD SECURITY brand-2
cardn-1111222233334444 pin-1234
DEVT0585I ADD SECURITY COMPLETE - 1 of 1 USER(S) UPDATED.+

ztest devt credit DISPLAY SECURITY br-2
cardn-1111222233334444
DEVT0522I CREDIT SECURITY DISPLAY:
  SECURITY FOR BRAND-2 CARDNUM-1111222233334444
         PIN-1234    USER SSN-777889999 USER NAME-MARYCHEN
END OF DISPLAY+
```

5. Add a charge and display that it is there.

```
ztest devt credit ADD CHARGE br-2 cardn-1111222233334444
ssn-777889999
vendor-000003333 date-2015Mar09 time-13:59 amt-45.97
DEVT0578I 12.07.59 CHARGE ADDED.+


ztest devt credit DISPLAY CARD br-2 cardn-1111222233334444
DEVT0520I CREDIT CARD DISPLAY:
BR-2 CARDN-1111222233334444 LIMIT-10000 TOTAL CHARGES-$45.97
END OF DISPLAY+
```

6. Remove the credit card (which includes the credit card number, user, security record and purchases).

```
ztest devt credit DELETE card br-2 cardn-1111222233334444
DEVT0510I 12.36.12 CREDIT CARD DELETE COMPLETE.  FOLLOWING DELETED:+
   NUMBER OF CREDIT CARDS DELETED = 1+
   NUMBER OF AUTHORIZED USERS DELETED = 1+
   NUMBER OF SECURITY RECORDS DELETED = 1+
   NUMBER OF BIOTXT POOLS RELEASED = 0+
   NUMBER OF PURCHASES DELETED = 1+
   NUMBER ENTRIES DELETED FROM PREFERRED USER DATABASE = 0+
END OF DISPLAY+
```