2023-02-27_Parse_IDMS_schema_source_v2

March 1, 2023

1 Parsing IDMS schema syntax

1.1 General References

- Network Database, Relational DB, and Graph DB Compared
- IDMS is an implementation of the The CODASYL Network Model (contains info about Bachmann diagrams)

1.2 IDMS-specific information

- primer
- IDMS schema and subschema syntax
- CA IDMS Database Design Guide

1.3 syntax components

- areas
- records - table
- elements - field
- sets

1.4 Table of terms

2 Import libraries

[1]:
```
import pandas as pd
from pathlib import Path
import re
from collections import Counter
```

3 List of all the IDMS subschema files we were provided

[2]:
```
pwd
```

[2]:
```
'/Users/ccoletta/projects/gsa_coe/usda/copybooks'
```

3.1 Do a line count for each file we received

[3]:
```
!wc -l  IDMS_schema_source_ALL/*
```

```
   2375 IDMS_schema_source_ALL/EMPSCHM-V100-SCHEMA-020623.txt
  16234 IDMS_schema_source_ALL/FARMS-V1-SCHEMA-020623.formatted.txt
  16234 IDMS_schema_source_ALL/FARMS-V1-SCHEMA-020623.txt
  16642 IDMS_schema_source_ALL/FARMS-V10-SCHEMA-020623.formatted.txt
  16642 IDMS_schema_source_ALL/FARMS-V10-SCHEMA-020623.txt
  25112 IDMS_schema_source_ALL/MCMMF01-SCHEMA-020623.txt
     47 IDMS_schema_source_ALL/RDUSE01-SCHEMA-020623.txt
   1599 IDMS_schema_source_ALL/RMS-SCHEMA-020623.formatted.txt
   1599 IDMS_schema_source_ALL/RMS-SCHEMA-020623.txt
   3387 IDMS_schema_source_ALL/SCHEMA-LISTING-020623.zip
   1779 IDMS_schema_source_ALL/SCMAC01-SCHEMA-020623.txt
     50 IDMS_schema_source_ALL/SCMACCT-SCHEMA-020623.txt
   1538 IDMS_schema_source_ALL/SCMFA01-SCHEMA-020623.txt
    263 IDMS_schema_source_ALL/SCMHN01-SCHEMA-020623.txt
  26281 IDMS_schema_source_ALL/SCMMF01-SCHEMA-020623.formatted.txt
  26281 IDMS_schema_source_ALL/SCMMF01-SCHEMA-020623.txt
  26039 IDMS_schema_source_ALL/SCMMF01L-SCHEMA-0206023.txt
  26041 IDMS_schema_source_ALL/SCMMF01M-SCHEMA-020623.txt
  26177 IDMS_schema_source_ALL/SCMMF01P-SCHEMA-020623.txt
  25988 IDMS_schema_source_ALL/SCMMF02-SCHEMA-020623.txt
    924 IDMS_schema_source_ALL/SCMQA01-SCHEMA-020623.formatted.txt
    924 IDMS_schema_source_ALL/SCMQA01-SCHEMA-020623.txt
  23935 IDMS_schema_source_ALL/SCMTEST-SCHEMA-020623.formatted.txt
  23935 IDMS_schema_source_ALL/SCMTEST-SCHEMA-020623.txt
   2020 IDMS_schema_source_ALL/SCMTL01-SCHEMA-020623.txt
   1924 IDMS_schema_source_ALL/SCMUA01-SCHEMA-020623.formatted.txt
   1924 IDMS_schema_source_ALL/SCMUA01-SCHEMA-020623.txt
    196 IDMS_schema_source_ALL/SCMXREF-SCHEMA-020623.txt
  16590 IDMS_schema_source_ALL/XARMS-SCHEMA-020623.txt
  23992 IDMS_schema_source_ALL/XCMMF01-SCHEMA-020623.txt
  26179 IDMS_schema_source_ALL/XSCMMF01-SCHEMA-020623.txt
 382851 total
```

4 Examine the contents of one of the subschema files

[4]:
```
!head -190 IDMS_schema_source_ALL/FARMS-V1-SCHEMA-020623.formatted.txt | tail␣
↪-100
```

```
ADD
AREA NAME IS GUAR-AREA
    ESTIMATED PAGES ARE 0
    .
ADD
AREA NAME IS LNDR-AREA
```

```
    ESTIMATED PAGES ARE 0
    .
ADD
RECORD NAME IS CLIENT
    SHARE STRUCTURE OF RECORD CLIENT VERSION 15
        SYNONYM OF PRIMARY RECORD FARMS-CLIENT VERSION 15
    RECORD ID IS 100
    LOCATION MODE IS CALC USING ( CASE-NBR )
        DUPLICATES ARE NOT ALLOWED
    WITHIN AREA RCVB-AREA OFFSET 0 PERCENT FOR 100 PERCENT
    OWNER OF SET CLIENT-VARBL
        NEXT DBKEY POSITION IS 6
        PRIOR DBKEY POSITION IS 7
    OWNER OF SET CLIENT-ACCOUNTS
        NEXT DBKEY POSITION IS 4
        PRIOR DBKEY POSITION IS 5
    OWNER OF SET CLIENT-CLIENT
        NEXT DBKEY POSITION IS 3
    OWNER OF SET CLIENT-EQUITY
        NEXT DBKEY POSITION IS 1
    MEMBER OF SET IX-NME-OBLR
        INDEX DBKEY POSITION IS 8
    MEMBER OF SET IX-ID-NBR-OBLR
        INDEX DBKEY POSITION IS 9
    MEMBER OF SET IX-MLGOFC-CLIENT
        INDEX DBKEY POSITION IS 2
    MEMBER OF SET IX-MLGOFC-FSA
        INDEX DBKEY POSITION IS 10
    .
05 CASE-NBR
    USAGE IS DISPLAY
    ELEMENT LENGTH IS 15
    POSITION IS 1
    .
    10 ST-CDE-OBLR
        PICTURE IS  9(2)
        USAGE IS DISPLAY
        ELEMENT LENGTH IS 2
        POSITION IS 1
        .
    10 CTY-CDE-OBLR
        PICTURE IS  9(3)
        USAGE IS DISPLAY
        ELEMENT LENGTH IS 3
        POSITION IS 3
        .
    10 ID-NBR-OBLR
        PICTURE IS  9(10)
```

```
        USAGE IS DISPLAY
        ELEMENT LENGTH IS 10
        POSITION IS 6
        .
05 CASE-NBR-OBLR
    REDEFINES CASE-NBR
    USAGE IS DISPLAY
    ELEMENT LENGTH IS 15
    POSITION IS 1
    .
    10 ST-CTY-OBLR
        PICTURE IS  9(5)
        USAGE IS DISPLAY
        ELEMENT LENGTH IS 5
        POSITION IS 1
        .
    10 FILLER
        PICTURE IS  X(0010)
        USAGE IS DISPLAY
        ELEMENT LENGTH IS 10
        POSITION IS 6
        .
05 MAILG-OFC-CLIENT
    USAGE IS DISPLAY
    ELEMENT LENGTH IS 6
    POSITION IS 16
    .
    10 MAILG-LVL-CLIENT
        PICTURE IS  X(1)
        USAGE IS DISPLAY
        ELEMENT LENGTH IS 1
        POSITION IS 16
        .
                88 ST-MAILG-LVL-CLIENT
                    USAGE IS CONDITION-NAME
                    POSITION IS 16
                    VALUE IS ( 'S' )
                    .
                88 DST-MAILG-LVL-CLIENT
                    USAGE IS CONDITION-NAME
                    POSITION IS 16
                    VALUE IS ( 'D' )
                    .
                88 CTY-MAILG-LVL-CLIENT
                    USAGE IS CONDITION-NAME
                    POSITION IS 16
```

5 Create some regular expressions to help us parse schema text

[6]:
```
#print( record_components[0] )
```

[7]:
```
IS_pat = re.compile( r' IS ' )
```

6 Define parsing functions

[8]:
```
def DescriptorsSplitter( raw_descriptor_string : str ) -> pd.Series:
    """This function parses the descriptors after one single data element,
    including PICTURE, USAGE, ELEMENT LENGTH, POSITION, etc. Returns a single
    row's worth of element descriptors."""

    descriptors = [ _.strip() for _ in raw_descriptor_string.split( '\n' ) ]

    key_value_pairs = [ IS_pat.split( _ ) for _ in descriptors ]
    try:
        index, values = zip( *key_value_pairs )
    except:
        # empty series
        print( "\t\tproblem splitting these characteristics" )
        print( key_value_pairs )
        retval = pd.Series( dtype='object')
    else:
        retval = pd.Series( values, index=index )
    #print( retval )
    return retval
```

[10]:
```
redefines_pattern = re.compile( r'REDEFINES' )
occurs_pattern = re.compile( r' OCCURS ' )
```

[11]:
```
column_names = [ 'indent', 'data_level', 'element_name',␣
 ↪'raw_element_descriptors' ]
element_search_pat = re.compile( r'^(\s+)?(\d\d) (\S+)\n\s+(.*?)\n\s+\.',␣
 ↪flags=re.MULTILINE | re.DOTALL )
```

[12]:
```
RECORD_METADATA_pat = re.compile(
    r'RECORD NAME IS (\S+)\s+(.*)\.',
    flags=re.MULTILINE | re.DOTALL
)
```

[13]:
```
RECORD_ID_pat = re.compile( r'RECORD ID IS (\S+)' )
WITHIN_AREA_pat = re.compile( r'WITHIN AREA (\S+) OFFSET (.*?) FOR (.*)' )
LOCATION_MODE_pat = re.compile( r'LOCATION MODE IS (.*?) USING \( (.*) \)' )
LOCATION_MODE_VIA_SET_pat = re.compile( r'LOCATION MODE IS VIA (.*?) SET' )
```

[14]:
```
def FormatRecord( component_text : str, debug=False ) -> pd.DataFrame:
    """Takes the raw text of one record's worth of schema definition
    and parses all data elements from it."""

    if debug:
        print( "*" * 50 )

    # Process record metadata
    record_name, record_metadata_rawtext = \
        RECORD_METADATA_pat.match( component_text ).groups()
    record_id =                                \
        RECORD_ID_pat.search( record_metadata_rawtext ).group(1)
    area, offset, offset_extent =              \
        WITHIN_AREA_pat.search( record_metadata_rawtext ).groups()

    location_mode = None
    primary_key_name = None
    location_mode_set = ""

    m = LOCATION_MODE_pat.search( record_metadata_rawtext )
    if m:
        location_mode, primary_key_name =  m.groups()
    m = LOCATION_MODE_VIA_SET_pat.search( record_metadata_rawtext )
    if m:
        location_mode_set = m.group(1)

    # For some reason: the schema appends the record id to the primary key␣
↪indicator
    if primary_key_name:
        remove_this = f'-{record_id}'
        primary_key_name = primary_key_name.replace( remove_this, "" )

    # Process record elements/fields/columns
    data_elements = element_search_pat.findall( component_text )

    data_elements = pd.DataFrame( data_elements, columns = column_names )
    data_elements['record'] = record_name
    data_elements['data_step'] = [ (1+int(_)) * 100 for _ in data_elements.
↪index ]
    data_elements['indent'] = data_elements['indent'].apply( len )

    # Here, we add in an "IS" to REDEFINES and OCCURS descriptors to allow for
    # DescriptorSplitter() to work in a uniform way across all descriptors that
    # already use the "IS", e.g., "PICTURE", "ELEMENT LENGTH" etc.
    data_elements['raw_element_descriptors'] = \
        data_elements['raw_element_descriptors'].str.replace(␣
↪redefines_pattern, 'REDEFINES IS' )
```

```
    data_elements['raw_element_descriptors'] = \
        data_elements['raw_element_descriptors'].str.replace( occurs_pattern, '␣
↪OCCURS IS ' )

    modifiers_df = data_elements['raw_element_descriptors'].apply(␣
↪DescriptorsSplitter )

    data_elements = pd.concat( (data_elements, modifiers_df), axis=1 )
    data_elements = data_elements.set_index( 'record', append=True )

    data_elements['PRIMARY_KEY'] = ""
    if primary_key_name:
        data_elements.loc[ data_elements['element_name'] == primary_key_name,␣
↪'PRIMARY_KEY'] = 'PRIMARY KEY'

    data_elements['record_meta_IDMS_record_id'] = record_id
    data_elements['record_meta_WITHIN_AREA'] = area
    data_elements['record_meta_AREA_OFFSET'] = offset
    data_elements['record_meta_AREA_OFFSET_extent'] = offset_extent
    data_elements['record_meta_PK_in_SET'] = location_mode_set

    if debug:
        print( "record", record_name, "has", len( data_elements ), "elements." ,
             f'PRIMARY KEY="{primary_key_name}"' if primary_key_name else "" )

    return data_elements
```

[15]:
```
def ScrapeRecordsAndElements( schema_source_path : Path, debug : bool = False )␣
↪-> pd.DataFrame:
    """Takes the path of one schema source file, parses out its component parts
    including SCHEMA, AREA, RECORD, and SET, and parses each record. Output is
    a PANDAS dataframe containing parsed info."""

    if debug:
        print( "=" * 50 )
    lines_df = pd.read_csv( schema_source_path, header=None )
    lines_df.columns = [ 'raw_line' ]
    lines_df[ 'stripped' ] = lines_df[ 'raw_line' ].str.slice( start = 5 )
    lines_df[ 'stripped' ] = lines_df[ 'stripped' ].str.rstrip()

    stripped_whitespace_file = Path( schema_source_path ).with_suffix( ".
↪formatted.txt" )
    if debug:
        print( "writing", f'"{ str(stripped_whitespace_file) }"' )
    lines_df[ 'stripped' ].to_csv( stripped_whitespace_file, header=False,␣
↪index=False )
```

```
    raw_text = stripped_whitespace_file.read_text()

    add_pat = re.compile( r'\nADD\n' )
    components = add_pat.split( raw_text )

    #len( components )
    # remove the initial ADD
    components[0] = components[0][4:]

    schema_name_ver_pat = re.compile( r'SCHEMA NAME IS (\S+) VERSION IS (\d+)' )
    schema_info = schema_name_ver_pat.search( components[0] ).groups()
    schema_name, schema_version = schema_info

    first_word_pat = re.compile( r'^(\S+)' )
    component_categories = [ first_word_pat.match( _ ).group(1) for _ in␣
↪components ]
    c = Counter( component_categories )

    print( schema_info, "\n", c.most_common() )

    # Analyze Record components

    record_components = [ c for t, c in zip( component_categories, components )␣
↪if t == "RECORD" ]

    pivoted_record_data = pd.concat( [ FormatRecord( _, debug=debug ) for _ in␣
↪record_components ] )
    pivoted_record_data = pivoted_record_data.swaplevel().sort_index()
    return pivoted_record_data
```

7 INPUT THE SCHEMA FILE YOU WANT TO PARSE HERE:

[16]:
```
retval = ScrapeRecordsAndElements( 'IDMS_schema_source_ALL/
↪FARMS-V1-SCHEMA-020623.txt', debug=True )
```

```
================================================
writing "IDMS_schema_source_ALL/FARMS-V1-SCHEMA-020623.formatted.txt"
('FARMS', '1')
 [('RECORD', 113), ('SET', 85), ('AREA', 20), ('SCHEMA', 1)]
************************************************
record CLIENT has 76 elements. PRIMARY KEY="CASE-NBR"
************************************************
record CLIENT-SFSI has 16 elements.
************************************************
record EQUITY has 34 elements.
************************************************
record INVSTR-INFO has 24 elements. PRIMARY KEY="ID-NBR-INVSTR"
```

```
************************************************
record INVSTR-INFO-MISC has 3 elements.
************************************************
record PRTLSALE has 14 elements.
************************************************
record EQTYRVRS has 13 elements.
************************************************
record RENTL-CNTRL has 14 elements. PRIMARY KEY="GEOG-ST-CDE-RENTL-CNTRL"
************************************************
record RENTL-TTL has 10 elements.
************************************************
record LESSEE has 15 elements. PRIMARY KEY="CASE-NBR-LSEE"
************************************************
record CTY-LOOKUP has 16 elements. PRIMARY KEY="CTY-CDE-FMHA"
************************************************
record LOCTN-LOOKUP has 67 elements. PRIMARY KEY="LOCTN-KEY"
************************************************
record SITE-LOOKUP has 21 elements.
************************************************
record ORGZTN-LOOKUP has 21 elements.
************************************************
record ST-LOOKUP has 8 elements. PRIMARY KEY="ST-CDE-FMHA"
************************************************
record SRCFDS has 2 elements. PRIMARY KEY="SRC-FDS-CDE"
************************************************
record CRRATE has 8 elements.
************************************************
record FDCDE has 4 elements. PRIMARY KEY="FD-2-KIND-CDE"
************************************************
record COHORT has 2 elements. PRIMARY KEY="COHORT-CDE"
************************************************
record SUBSRC has 3 elements.
************************************************
record CDESTR has 24 elements. PRIMARY KEY="SRC-FDS-TYP-ASSTNC-CDE"
************************************************
record LNRATE has 5 elements.
************************************************
record TRSTR has 6 elements. PRIMARY KEY="TRSRY-CALC-KEY"
************************************************
record TRRATE has 5 elements. PRIMARY KEY="TRSRY-RATE-KEY"
************************************************
record APROPTN-LOOKUP has 10 elements. PRIMARY KEY="APROPTN-LOOKUP-KEY"
************************************************
record CDEJUNC has 4 elements.
************************************************
record DTEREC has 7 elements.
************************************************
record PLEREP has 63 elements.
```

```
************************************************
record STAT has 9 elements.
************************************************
record AID has 16 elements.
************************************************
record ACQD-PROP has 114 elements.
************************************************
record EASMNT has 20 elements.
************************************************
record LSE-INFO has 32 elements.
************************************************
record JURDCTN has 4 elements. PRIMARY KEY="JURDCTN-CDE"
************************************************
record ORDERS has 6 elements.
************************************************
record ADPS-CNTRL has 5 elements. PRIMARY KEY="ADPS-CNTRL-KEY"
************************************************
record USERS has 13 elements. PRIMARY KEY="USER-ID"
************************************************
record USER-DOMAIN has 6 elements.
************************************************
record USER-STATCS has 14 elements.
************************************************
record USER-AUTHY has 4 elements. PRIMARY KEY="TRNSCTN-AUTHY-CDE"
************************************************
record CASE has 6 elements. PRIMARY KEY="CASE-ID"
************************************************
record DISCRP has 48 elements.
************************************************
record OVFLO has 9 elements.
************************************************
record TRNSCTN-CNTRL has 2 elements. PRIMARY KEY="TRNSCTN-CNTRL-KEY"
************************************************
record DISCRP-MISC has 6 elements.
************************************************
record ACCT-DATA has 29 elements.
************************************************
record IMCASE has 6 elements. PRIMARY KEY="CASE-ID"
************************************************
record INITMAN has 39 elements.
************************************************
record CRCLAIMS has 59 elements. PRIMARY KEY="CRC-CLM-NBR"
************************************************
record ALTMT has 5 elements. PRIMARY KEY="ALTMT-KEY"
************************************************
record MALLOT has 16 elements.
************************************************
record MALLOT-OTH has 1 elements.
```

```
************************************************
record DALLOT has 8 elements.
************************************************
record DALLOT-OTH has 1 elements.
************************************************
record DALLOT-DTL has 28 elements. PRIMARY KEY="DALLOT-DTL-KEY"
************************************************
record FD-SIDE has 6 elements.
************************************************
record INSRNC-AUTHY has 15 elements.
************************************************
record MALLOT-OBLGN has 9 elements.
************************************************
record MSTR-RATE has 11 elements. PRIMARY KEY="MSTR-KEY"
************************************************
record DTL-RATE has 12 elements. PRIMARY KEY="DTL-KEY"
************************************************
record DALLOT-OBLGN has 9 elements.
************************************************
record ALTMADJ-NEW has 37 elements. PRIMARY KEY="AGCY-VOU-NBR"
************************************************
record JOB-RESTART has 4 elements. PRIMARY KEY="PROG-ID"
************************************************
record PROG-SAVE has 1 elements.
************************************************
record DAPROC has 3 elements.
************************************************
record REJECT-TRNSCTN has 4 elements.
************************************************
record NOTIFY-CNTRL has 3 elements. PRIMARY KEY="RCRD-TYP"
************************************************
record CK-CNTRL has 8 elements. PRIMARY KEY="RCRD-TYP"
************************************************
record NOTIFY has 33 elements.
************************************************
record LOAN has 45 elements.
************************************************
record CRBUR has 32 elements.
************************************************
record DSTR-SETASD has 39 elements.
************************************************
record INVSTR-DTL has 29 elements.
************************************************
record LOAN-OTC has 12 elements.
************************************************
record LOAN-DRE has 5 elements.
************************************************
record LN-AID has 13 elements.
```

```
************************************************
record RESCHEDULE has 4 elements.
************************************************
record ASSOC-PRIN-BOND has 7 elements.
************************************************
record INSURANCE has 5 elements.
************************************************
record ASSISTANCE has 12 elements.
************************************************
record JDGMT-3RD-PARTY has 9 elements.
************************************************
record INSTALLMENT has 6 elements.
************************************************
record PD-ACCT-RVRSL has 41 elements.
************************************************
record TRNSCTN-RVRSL has 28 elements.
************************************************
record SUBSIDY has 21 elements.
************************************************
record LOAN-SFSI has 8 elements.
************************************************
record LN-NO-INT has 4 elements.
************************************************
record RH-DFRL has 22 elements.
************************************************
record ADVANCE has 6 elements.
************************************************
record AMORTD-CST has 7 elements.
************************************************
record RENTL-DTL has 23 elements.
************************************************
record RENTL-FY-UNIT has 3 elements.
************************************************
record CK-INFO has 28 elements.
************************************************
record CK-INFO-FRADS has 28 elements.
************************************************
record STOPPER has 1 elements.
************************************************
record OBLGN has 48 elements.
************************************************
record CHECKS has 9 elements.
************************************************
record INT-ASSTNC has 7 elements.
************************************************
record INT-BDWN has 16 elements.
************************************************
record GLLNDR has 121 elements. PRIMARY KEY="LNDR-KEY"
```

```
************************************************
record GLBORR has 233 elements. PRIMARY KEY="BORR-KEY"
************************************************
record RDA-ALTMT has 5 elements. PRIMARY KEY="ALTMT-KEY"
************************************************
record RDA-MALLOT has 19 elements. PRIMARY KEY="RDA-MALLOT-KEY"
************************************************
record RDA-RGN-DTL has 14 elements. PRIMARY KEY="RDA-RGN-DTL-KEY"
************************************************
record RDA-FD-SIDE has 6 elements.
************************************************
record RDA-INSRNC-AUTHY has 16 elements.
************************************************
record RDA-RGN-OBLGN has 16 elements.
************************************************
record RDA-DALLOT-DTL has 24 elements. PRIMARY KEY="RDA-DALLOT-DTL-KEY"
************************************************
record RDA-AREA-DALLOT has 24 elements. PRIMARY KEY="RDA-AREA-DALLOT-KEY"
************************************************
record RDA-MALLOT-OBLGN has 10 elements.
************************************************
record RDA-DALLOT-OBLGN has 10 elements.
************************************************
record RDA-AREA-OBLGN has 10 elements.
************************************************
record ALTMADJ has 36 elements. PRIMARY KEY="VOU-NBR"
```

[17]:
```
retval.info()
```

```
<class 'pandas.core.frame.DataFrame'>
MultiIndex: 2218 entries, ('ACCT-DATA', 0) to ('USERS', 12)
Data columns (total 18 columns):
 #   Column                          Non-Null Count  Dtype
---  ------                          --------------  -----
 0   indent                          2218 non-null   int64
 1   data_level                      2218 non-null   object
 2   element_name                    2218 non-null   object
 3   raw_element_descriptors         2218 non-null   object
 4   data_step                       2218 non-null   int64
 5   USAGE                           2218 non-null   object
 6   ELEMENT LENGTH                  2154 non-null   object
 7   POSITION                        2218 non-null   object
 8   PICTURE                         1961 non-null   object
 9   REDEFINES                       23 non-null     object
 10  VALUE                           66 non-null     object
 11  PRIMARY_KEY                     2218 non-null   object
 12  record_meta_IDMS_record_id      2218 non-null   object
 13  record_meta_WITHIN_AREA         2218 non-null   object
```

```
 14  record_meta_AREA_OFFSET          2218 non-null   object
 15  record_meta_AREA_OFFSET_extent   2218 non-null   object
 16  record_meta_PK_in_SET            2218 non-null   object
 17  OCCURS                           31 non-null     object
dtypes: int64(2), object(16)
memory usage: 333.3+ KB
```

[18]:
```
retval.head(30)
```

[18]:

		indent	data_level	element_name	\
record					
ACCT-DATA	0	0	05	LN-NBR	
	1	0	05	FD-CDE	
	2	4	10	FD-CDE-3	
	3	8	15	FD-CDE-2	
	4	8	15	FD-CDE-3RD	
	5	4	10	FD-CDE-4TH	
	6	0	05	KIND-CDE-LN	
	7	0	05	INT-RATE-NOTE	
	8	0	05	INT-RATE-NOTE-1ST	
	9	0	05	PYMT-TYP-CDE	
	10	0	05	DIR-PYMT-CDE	
	11	0	05	DTE-AMORTN-EFCTV	
	12	0	05	DSTR-DCLRD-CDE	
	13	4	10	DSTR-TYP-CDE	
	14	4	10	FY-DSTR-DCLRD	
	15	4	10	DSTR-DCLRD-NBR	
	16	0	05	MRG-CNTRL	
	17	0	05	DOCMT-TYP-CDE	
	18	0	05	DTE-OBLGN-LN	
	19	0	05	ASSTNC-TYP-CDE	
	20	0	05	LN-AMT-OBLGN	
	21	0	05	BEGNG-FRMR-RNCHR-CDE	
	22	0	05	COLLTL-CDE	
	23	0	05	CPN-PROCG-DTE	
	24	0	05	CASE-NBR-CHNG-CDE	
	25	0	05	PYMT-ASSTNC-METH-CDE	
	26	0	05	INT-RATE-PREV	
	27	0	05	INT-RATE-PREV-REDFND	
	28	0	05	FILLER	
ACQD-PROP	0	0	05	FD-CDE-ACQD-PROP	

		raw_element_descriptors	data_step	\
record				
ACCT-DATA	0	PICTURE IS 9(2)\n USAGE IS DISPLAY\n EL…	100	
	1	USAGE IS DISPLAY\n ELEMENT LENGTH IS 4\n …	200	
	2	USAGE IS DISPLAY\n ELEMENT LENGTH IS 3\…	300	

```
           3   PICTURE IS  9(2)\n            USAGE IS DISPLAY…        400
           4   PICTURE IS  9(1)\n            USAGE IS DISPLAY…        500
           5   PICTURE IS  9(1)\n        USAGE IS DISPLAY\n  …        600
           6   PICTURE IS  9(2)\n    USAGE IS DISPLAY\n    EL…        700
           7   PICTURE IS  9(2)V9(4)\n    USAGE IS DISPLAY\n …        800
           8   REDEFINES IS INT-RATE-NOTE\n    PICTURE IS  V9…        900
           9   PICTURE IS  9(1)\n    USAGE IS DISPLAY\n    EL…       1000
           10  PICTURE IS  9(1)\n    USAGE IS DISPLAY\n    EL…       1100
           11  PICTURE IS  9(06)\n    USAGE IS DISPLAY\n    E…       1200
           12  USAGE IS DISPLAY\n    ELEMENT LENGTH IS 5\n   …       1300
           13  PICTURE IS  9(1)\n        USAGE IS DISPLAY\n  …       1400
           14  PICTURE IS  9(1)\n        USAGE IS DISPLAY\n  …       1500
           15  PICTURE IS  9(3)\n        USAGE IS DISPLAY\n  …       1600
           16  PICTURE IS  9(2)\n    USAGE IS DISPLAY\n    EL…       1700
           17  PICTURE IS  X(1)\n    USAGE IS DISPLAY\n    EL…       1800
           18  PICTURE IS  9(06)\n    USAGE IS DISPLAY\n    E…       1900
           19  PICTURE IS  9(3)\n    USAGE IS DISPLAY\n    EL…       2000
           20  PICTURE IS  S9(8)V99\n    USAGE IS COMP-3\n   …       2100
           21  PICTURE IS  X(01)\n    USAGE IS DISPLAY\n    E…       2200
           22  PICTURE IS  9(1)\n    USAGE IS DISPLAY\n    EL…       2300
           23  PICTURE IS  9(6)\n    USAGE IS DISPLAY\n    EL…       2400
           24  PICTURE IS  9(01)\n    USAGE IS DISPLAY\n    E…       2500
           25  PICTURE IS  9(1)\n    USAGE IS DISPLAY\n    EL…       2600
           26  PICTURE IS  9(2)V9(4)\n    USAGE IS DISPLAY\n …       2700
           27  REDEFINES IS INT-RATE-PREV\n    PICTURE IS  V9…       2800
           28  PICTURE IS  X(0019)\n    USAGE IS DISPLAY\n   …       2900
ACQD-PROP  0   USAGE IS DISPLAY\n    ELEMENT LENGTH IS 4\n   …        100

                 USAGE ELEMENT LENGTH POSITION     PICTURE      REDEFINES  \
record
ACCT-DATA  0   DISPLAY              2        1        9(2)            NaN
           1   DISPLAY              4        3         NaN            NaN
           2   DISPLAY              3        3         NaN            NaN
           3   DISPLAY              2        3        9(2)            NaN
           4   DISPLAY              1        5        9(1)            NaN
           5   DISPLAY              1        6        9(1)            NaN
           6   DISPLAY              2        7        9(2)            NaN
           7   DISPLAY              6        9   9(2)V9(4)            NaN
           8   DISPLAY              6        9       V9(6)  INT-RATE-NOTE
           9   DISPLAY              1       15        9(1)            NaN
           10  DISPLAY              1       16        9(1)            NaN
           11  DISPLAY              6       17       9(06)            NaN
           12  DISPLAY              5       23         NaN            NaN
           13  DISPLAY              1       23        9(1)            NaN
           14  DISPLAY              1       24        9(1)            NaN
           15  DISPLAY              3       25        9(3)            NaN
           16  DISPLAY              2       28        9(2)            NaN
```

```
           17  DISPLAY              1       30        X(1)            NaN
           18  DISPLAY              6       31        9(06)           NaN
           19  DISPLAY              3       37        9(3)            NaN
           20   COMP-3              6       40     S9(8)V99           NaN
           21  DISPLAY              1       46        X(01)           NaN
           22  DISPLAY              1       47        9(1)            NaN
           23  DISPLAY              6       48        9(6)            NaN
           24  DISPLAY              1       54        9(01)           NaN
           25  DISPLAY              1       55        9(1)            NaN
           26  DISPLAY              6       56    9(2)V9(4)           NaN
           27  DISPLAY              6       56        V9(6)  INT-RATE-PREV
           28  DISPLAY             19       62      X(0019)           NaN
ACQD-PROP  0   DISPLAY              4        1         NaN            NaN

              VALUE PRIMARY_KEY record_meta_IDMS_record_id  \
record
ACCT-DATA  0     NaN                                   215
           1     NaN                                   215
           2     NaN                                   215
           3     NaN                                   215
           4     NaN                                   215
           5     NaN                                   215
           6     NaN                                   215
           7     NaN                                   215
           8     NaN                                   215
           9     NaN                                   215
           10    NaN                                   215
           11    NaN                                   215
           12    NaN                                   215
           13    NaN                                   215
           14    NaN                                   215
           15    NaN                                   215
           16    NaN                                   215
           17    NaN                                   215
           18    NaN                                   215
           19    NaN                                   215
           20    NaN                                   215
           21    NaN                                   215
           22    NaN                                   215
           23    NaN                                   215
           24    NaN                                   215
           25    NaN                                   215
           26    NaN                                   215
           27    NaN                                   215
           28    NaN                                   215
ACQD-PROP  0     NaN                                   190
```

```
             record_meta_WITHIN_AREA record_meta_AREA_OFFSET  \
record
ACCT-DATA 0                RCVB-AREA                0 PERCENT
          1                RCVB-AREA                0 PERCENT
          2                RCVB-AREA                0 PERCENT
          3                RCVB-AREA                0 PERCENT
          4                RCVB-AREA                0 PERCENT
          5                RCVB-AREA                0 PERCENT
          6                RCVB-AREA                0 PERCENT
          7                RCVB-AREA                0 PERCENT
          8                RCVB-AREA                0 PERCENT
          9                RCVB-AREA                0 PERCENT
          10               RCVB-AREA                0 PERCENT
          11               RCVB-AREA                0 PERCENT
          12               RCVB-AREA                0 PERCENT
          13               RCVB-AREA                0 PERCENT
          14               RCVB-AREA                0 PERCENT
          15               RCVB-AREA                0 PERCENT
          16               RCVB-AREA                0 PERCENT
          17               RCVB-AREA                0 PERCENT
          18               RCVB-AREA                0 PERCENT
          19               RCVB-AREA                0 PERCENT
          20               RCVB-AREA                0 PERCENT
          21               RCVB-AREA                0 PERCENT
          22               RCVB-AREA                0 PERCENT
          23               RCVB-AREA                0 PERCENT
          24               RCVB-AREA                0 PERCENT
          25               RCVB-AREA                0 PERCENT
          26               RCVB-AREA                0 PERCENT
          27               RCVB-AREA                0 PERCENT
          28               RCVB-AREA                0 PERCENT
ACQD-PROP 0                ACQD-AREA                0 PERCENT

             record_meta_AREA_OFFSET_extent record_meta_PK_in_SET OCCURS
record
ACCT-DATA 0                      100 PERCENT       CLIENT-ACCOUNTS    NaN
          1                      100 PERCENT       CLIENT-ACCOUNTS    NaN
          2                      100 PERCENT       CLIENT-ACCOUNTS    NaN
          3                      100 PERCENT       CLIENT-ACCOUNTS    NaN
          4                      100 PERCENT       CLIENT-ACCOUNTS    NaN
          5                      100 PERCENT       CLIENT-ACCOUNTS    NaN
          6                      100 PERCENT       CLIENT-ACCOUNTS    NaN
          7                      100 PERCENT       CLIENT-ACCOUNTS    NaN
          8                      100 PERCENT       CLIENT-ACCOUNTS    NaN
          9                      100 PERCENT       CLIENT-ACCOUNTS    NaN
          10                     100 PERCENT       CLIENT-ACCOUNTS    NaN
          11                     100 PERCENT       CLIENT-ACCOUNTS    NaN
```

```
            12                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            13                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            14                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            15                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            16                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            17                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            18                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            19                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            20                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            21                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            22                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            23                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            24                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            25                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            26                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            27                    100 PERCENT       CLIENT-ACCOUNTS    NaN
            28                    100 PERCENT       CLIENT-ACCOUNTS    NaN
ACQD-PROP   0                     100 PERCENT          CLIENT-VARBL    NaN
```

8 Here are all the records that belong to IDMS "user" sets

[19]:
```
#retval.reset_index().groupby('record_meta_PK_in_SET')['record'].unique()
```

9 Here is a list of all the DB areas and the list of records associated with them

[20]:
```
retval.reset_index().groupby('record_meta_WITHIN_AREA')['record'].unique()
```

[20]:
```
record_meta_WITHIN_AREA
ACQD-AREA                                        [ACQD-PROP, EASMNT]
APROPTN-AREA     [ALTMADJ, ALTMADJ-NEW, ALTMT, DALLOT, DALLOT-D…
CNTRL-AREA                                    [RENTL-CNTRL, RENTL-TTL]
DISCRP-AREA      [ADPS-CNTRL, CASE, CRCLAIMS, DISCRP, DISCRP-MI…
GUAR-AREA                                                  [GLBORR]
INVSTR-AREA            [INVSTR-DTL, INVSTR-INFO, INVSTR-INFO-MISC]
JURDCTN-AREA                                    [JURDCTN, ORDERS]
LEASE-AREA                                     [LESSEE, LSE-INFO]
LNDR-AREA                                                  [GLLNDR]
LOOKUP-AREA      [APROPTN-LOOKUP, CDEJUNC, CDESTR, COHORT, CRRA…
OBLGN-AREA                  [CHECKS, INT-ASSTNC, INT-BDWN, OBLGN]
OUTPUT-AREA      [CK-CNTRL, CK-INFO, CK-INFO-FRADS, DAPROC, NOT…
PD-AREA                          [PD-ACCT-RVRSL, TRNSCTN-RVRSL]
PLEREP-AREA                                                [PLEREP]
RCVB-AREA        [ACCT-DATA, ADVANCE, AID, AMORTD-CST, ASSISTAN…
RENTL-AREA                            [RENTL-DTL, RENTL-FY-UNIT]
```

```
RESTART-AREA                                  [JOB-RESTART, PROG-SAVE]
USER-AREA           [USER-AUTHY, USER-DOMAIN, USER-STATCS, USERS]
Name: record, dtype: object
```

[21]:
```
# def RecordStats( grp ):
#     wanted_cols = ['record_meta_WITHIN_AREA', 'record', 'POSITION',␣
 ↪'record_meta_AREA_OFFSET', 'record_meta_AREA_OFFSET_extent' ]
#     return tuple( grp.loc[ grp.index[0], wanted_cols ].values )

# retval.reset_index().groupby( 'record' ).apply( RecordStats ).values
```

[22]:
```
#retval.reset_index().groupby('record_meta_record_id')['record'].unique().
 ↪apply( len ).unique()
```

10 Cleanup

10.1 Cleanup item 1: remove parentheses from valid values

[23]:
```
retval['VALUE'].value_counts()
```

[23]:
```
( 'S' )      10
( 'D' )      10
( 'C' )      10
( 'T' )       8
( 'U' )       8
( 'V' )       8
( '0' )       4
( '1' )       4
( SPACE )     2
( 'R' )       1
( 'A' )       1
Name: VALUE, dtype: int64
```

[24]:
```
retval['VALUE'] = retval['VALUE'].str.extract( r' (\S+) ' )
```

[25]:
```
retval['VALUE'].value_counts()
```

[25]:
```
'S'      10
'D'      10
'C'      10
'T'       8
'U'       8
'V'       8
'0'       4
'1'       4
SPACE     2
'R'       1
```

```
'A'       1
Name: VALUE, dtype: int64
```

10.2 Cleanup item 2: Reformat indents so copybooks look nice

[26]:
```
retval['data_level'].value_counts()
```

[26]:
```
05    1295
10     626
15     220
88      64
20      13
Name: data_level, dtype: int64
```

[27]:
```
retval['indent'].value_counts()
```

[27]:
```
0     1295
4      626
8      220
16      64
12      13
Name: indent, dtype: int64
```

[28]:
```
retval['indent'] = (retval['data_level'].astype(int) // 5 )
```

[29]:
```
retval.loc[ retval['indent'] >= 5, 'indent' ] = 5
```

[30]:
```
retval['indent'] = retval['indent'] * 2
```

[31]:
```
retval['indent'].value_counts()
```

[31]:
```
2     1295
4      626
6      220
10      64
8       13
Name: indent, dtype: int64
```

10.3 Cleanup item 3: remove leading spaces from PICTURE clause

[32]:
```
retval['PICTURE'].values
```

[32]:
```
array([' 9(2)', nan, nan, …, ' 9(1)', ' XX', ' X'], dtype=object)
```

[33]:
```
retval['PICTURE'] = retval['PICTURE'].str.strip()
```

11 Add data formatting to the csv output to get it ready for ingestion by CreateCopyBooks notebook/script

Here we are just changing the tablenames of the output spreadsheet and adding dummy columns so the next script can run unedited.

[34]:
```
table_index_dict = { table_name: i for i, table_name in enumerate( retval.index.
↪levels[0] ) }
```

[35]:
```
retval = retval.reset_index( 'record', drop=False )
```

[36]:
```
retval['table_index'] = \
    [ table_index_dict[n] for n in retval['record'].values ]
```

[37]:
```
retval['table_vers'] = 1
```

[38]:
```
retval.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 2218 entries, 0 to 12
Data columns (total 21 columns):
 #   Column                          Non-Null Count  Dtype
---  ------                          --------------  -----
 0   record                          2218 non-null   object
 1   indent                          2218 non-null   int64
 2   data_level                      2218 non-null   object
 3   element_name                    2218 non-null   object
 4   raw_element_descriptors         2218 non-null   object
 5   data_step                       2218 non-null   int64
 6   USAGE                           2218 non-null   object
 7   ELEMENT LENGTH                  2154 non-null   object
 8   POSITION                        2218 non-null   object
 9   PICTURE                         1961 non-null   object
 10  REDEFINES                       23 non-null     object
 11  VALUE                           66 non-null     object
 12  PRIMARY_KEY                     2218 non-null   object
 13  record_meta_IDMS_record_id      2218 non-null   object
 14  record_meta_WITHIN_AREA         2218 non-null   object
 15  record_meta_AREA_OFFSET         2218 non-null   object
 16  record_meta_AREA_OFFSET_extent  2218 non-null   object
 17  record_meta_PK_in_SET           2218 non-null   object
 18  OCCURS                          31 non-null     object
 19  table_index                     2218 non-null   int64
 20  table_vers                      2218 non-null   int64
dtypes: int64(4), object(17)
memory usage: 381.2+ KB
```

[39]:
```
retval.head()
```

[39]:
```
      record  indent data_level element_name  \
0  ACCT-DATA       2          05       LN-NBR
1  ACCT-DATA       2          05       FD-CDE
2  ACCT-DATA       4          10     FD-CDE-3
3  ACCT-DATA       6          15     FD-CDE-2
4  ACCT-DATA       6          15   FD-CDE-3RD

                            raw_element_descriptors  data_step    USAGE  \
0  PICTURE IS  9(2)\n    USAGE IS DISPLAY\n    EL…         100  DISPLAY
1  USAGE IS DISPLAY\n    ELEMENT LENGTH IS 4\n   …         200  DISPLAY
2  USAGE IS DISPLAY\n        ELEMENT LENGTH IS 3\…         300  DISPLAY
3  PICTURE IS  9(2)\n            USAGE IS DISPLAY…         400  DISPLAY
4  PICTURE IS  9(1)\n            USAGE IS DISPLAY…         500  DISPLAY

  ELEMENT LENGTH POSITION PICTURE  … VALUE PRIMARY_KEY  \
0              2        1    9(2)  …   NaN
1              4        3     NaN  …   NaN
2              3        3     NaN  …   NaN
3              2        3    9(2)  …   NaN
4              1        5    9(1)  …   NaN

  record_meta_IDMS_record_id record_meta_WITHIN_AREA record_meta_AREA_OFFSET  \
0                        215               RCVB-AREA                0 PERCENT
1                        215               RCVB-AREA                0 PERCENT
2                        215               RCVB-AREA                0 PERCENT
3                        215               RCVB-AREA                0 PERCENT
4                        215               RCVB-AREA                0 PERCENT

  record_meta_AREA_OFFSET_extent record_meta_PK_in_SET OCCURS table_index  \
0                    100 PERCENT       CLIENT-ACCOUNTS    NaN           0
1                    100 PERCENT       CLIENT-ACCOUNTS    NaN           0
2                    100 PERCENT       CLIENT-ACCOUNTS    NaN           0
3                    100 PERCENT       CLIENT-ACCOUNTS    NaN           0
4                    100 PERCENT       CLIENT-ACCOUNTS    NaN           0

   table_vers
0           1
1           1
2           1
3           1
4           1

[5 rows x 21 columns]
```

[40]:
```
reformatted_retval = retval.rename(
    columns={
        'record': 'table_name',
```

```
        'element_name' : 'field_name',
        'USAGE' : 'end',
        'PICTURE' : 'data_type',
        'indent' : 'indent_space_count',
        'data_step' : 'declaration_step'
    } )
```

[41]:
```
reformatted_retval['BLANK ON'] = ''
reformatted_retval['INDEXED BY'] = ''
reformatted_retval['OLQ'] = ''
```

[42]:
```
reformatted_retval = reformatted_retval.drop(␣
 ↪columns=['raw_element_descriptors'] )
```

[43]:
```
reformatted_retval.to_csv( '2023-02-24_FSA_FARMS_schema_from_source.csv' )
```

[44]:
```
#pd.set_option( 'display.max_rows', 100 )
```

[45]:
```
# Two Python/PANDAS syntactical ways to select one whole table for inspection,␣
 ↪if you want
#retval.loc[ 'ACCT-DATA' ]
#retval.loc[ ('ACCT-DATA', slice(None)), : ]
```

[46]:
```
!head -30 2023-02-24_FSA_FARMS_schema_from_source.csv
```

```
,table_name,indent_space_count,data_level,field_name,declaration_step,end,ELEMEN
T LENGTH,POSITION,data_type,REDEFINES,VALUE,PRIMARY_KEY,record_meta_IDMS_record_
id,record_meta_WITHIN_AREA,record_meta_AREA_OFFSET,record_meta_AREA_OFFSET_exten
t,record_meta_PK_in_SET,OCCURS,table_index,table_vers,BLANK ON,INDEXED BY,OLQ
0,ACCT-DATA,2,05,LN-NBR,100,DISPLAY,2,1,9(2),,,,215,RCVB-AREA,0 PERCENT,100
PERCENT,CLIENT-ACCOUNTS,,0,1,,,
1,ACCT-DATA,2,05,FD-CDE,200,DISPLAY,4,3,,,,,215,RCVB-AREA,0 PERCENT,100
PERCENT,CLIENT-ACCOUNTS,,0,1,,,
2,ACCT-DATA,4,10,FD-CDE-3,300,DISPLAY,3,3,,,,,215,RCVB-AREA,0 PERCENT,100
PERCENT,CLIENT-ACCOUNTS,,0,1,,,
3,ACCT-DATA,6,15,FD-CDE-2,400,DISPLAY,2,3,9(2),,,,215,RCVB-AREA,0 PERCENT,100
PERCENT,CLIENT-ACCOUNTS,,0,1,,,
4,ACCT-DATA,6,15,FD-CDE-3RD,500,DISPLAY,1,5,9(1),,,,215,RCVB-AREA,0 PERCENT,100
PERCENT,CLIENT-ACCOUNTS,,0,1,,,
5,ACCT-DATA,4,10,FD-CDE-4TH,600,DISPLAY,1,6,9(1),,,,215,RCVB-AREA,0 PERCENT,100
PERCENT,CLIENT-ACCOUNTS,,0,1,,,
6,ACCT-DATA,2,05,KIND-CDE-LN,700,DISPLAY,2,7,9(2),,,,215,RCVB-AREA,0 PERCENT,100
PERCENT,CLIENT-ACCOUNTS,,0,1,,,
7,ACCT-DATA,2,05,INT-RATE-NOTE,800,DISPLAY,6,9,9(2)V9(4),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
8,ACCT-DATA,2,05,INT-RATE-NOTE-1ST,900,DISPLAY,6,9,V9(6),INT-RATE-
NOTE,,,215,RCVB-AREA,0 PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
9,ACCT-DATA,2,05,PYMT-TYP-CDE,1000,DISPLAY,1,15,9(1),,,,215,RCVB-AREA,0
```

```
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
10,ACCT-DATA,2,05,DIR-PYMT-CDE,1100,DISPLAY,1,16,9(1),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
11,ACCT-DATA,2,05,DTE-AMORTN-EFCTV,1200,DISPLAY,6,17,9(06),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
12,ACCT-DATA,2,05,DSTR-DCLRD-CDE,1300,DISPLAY,5,23,,,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
13,ACCT-DATA,4,10,DSTR-TYP-CDE,1400,DISPLAY,1,23,9(1),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
14,ACCT-DATA,4,10,FY-DSTR-DCLRD,1500,DISPLAY,1,24,9(1),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
15,ACCT-DATA,4,10,DSTR-DCLRD-NBR,1600,DISPLAY,3,25,9(3),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
16,ACCT-DATA,2,05,MRG-CNTRL,1700,DISPLAY,2,28,9(2),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
17,ACCT-DATA,2,05,DOCMT-TYP-CDE,1800,DISPLAY,1,30,X(1),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
18,ACCT-DATA,2,05,DTE-OBLGN-LN,1900,DISPLAY,6,31,9(06),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
19,ACCT-DATA,2,05,ASSTNC-TYP-CDE,2000,DISPLAY,3,37,9(3),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
20,ACCT-DATA,2,05,LN-AMT-OBLGN,2100,COMP-3,6,40,S9(8)V99,,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
21,ACCT-DATA,2,05,BEGNG-FRMR-RNCHR-CDE,2200,DISPLAY,1,46,X(01),,,,215,RCVB-
AREA,0 PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
22,ACCT-DATA,2,05,COLLTL-CDE,2300,DISPLAY,1,47,9(1),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
23,ACCT-DATA,2,05,CPN-PROCG-DTE,2400,DISPLAY,6,48,9(6),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
24,ACCT-DATA,2,05,CASE-NBR-CHNG-CDE,2500,DISPLAY,1,54,9(01),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
25,ACCT-DATA,2,05,PYMT-ASSTNC-METH-CDE,2600,DISPLAY,1,55,9(1),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
26,ACCT-DATA,2,05,INT-RATE-PREV,2700,DISPLAY,6,56,9(2)V9(4),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
27,ACCT-DATA,2,05,INT-RATE-PREV-REDFND,2800,DISPLAY,6,56,V9(6),INT-RATE-
PREV,,,215,RCVB-AREA,0 PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
28,ACCT-DATA,2,05,FILLER,2900,DISPLAY,19,62,X(0019),,,,215,RCVB-AREA,0
PERCENT,100 PERCENT,CLIENT-ACCOUNTS,,0,1,,,
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