Implementing CICS TS for VSE/ESA Shared Data Tables

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- System Definition
- Selective Loading of Records into Table
- Summary

Overview

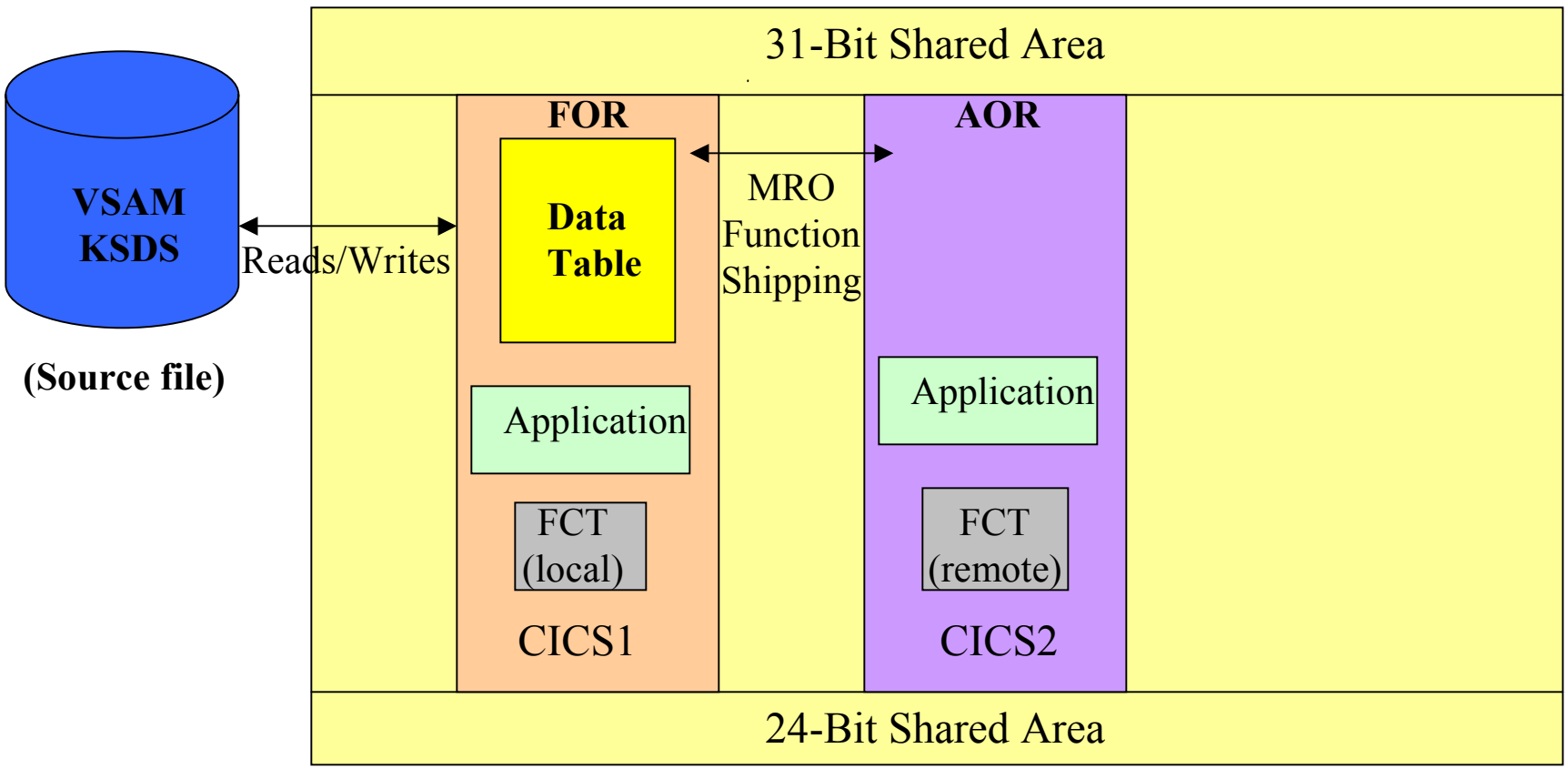
- Review: Data Tables in CICS/VSE
  - Data in memory option
    - Table built within the CICS/VSE partition
    - Stored in Partition 31-bit GETVIS Area
  - High performance file access for Reads
    - Full key non-update reads only
    - Other access tolerated but no performance benefit
  - Only KSDS files defined with LSR are eligible
  - Sharing only through MRO

Overview...

- Review: Data Tables in CICS/VSE...
  - Two types of data tables
    - CICS-Maintained Table (CMT)
      - Normal CICS API, data integrity, and recovery
      - KSDS remains open and is updated by CICS as needed
    - User-Maintained Table (UMT)
      - Limited API, data integrity and recovery user responsibility
      - KSDS is closed after table is loaded
  - Table loaded when file is opened
    - Initial, first reference, CEMT, EXEC CICS command
  - User exits can control data stored in table

Overview...

CICS/VSE Support - CMT



Overview...

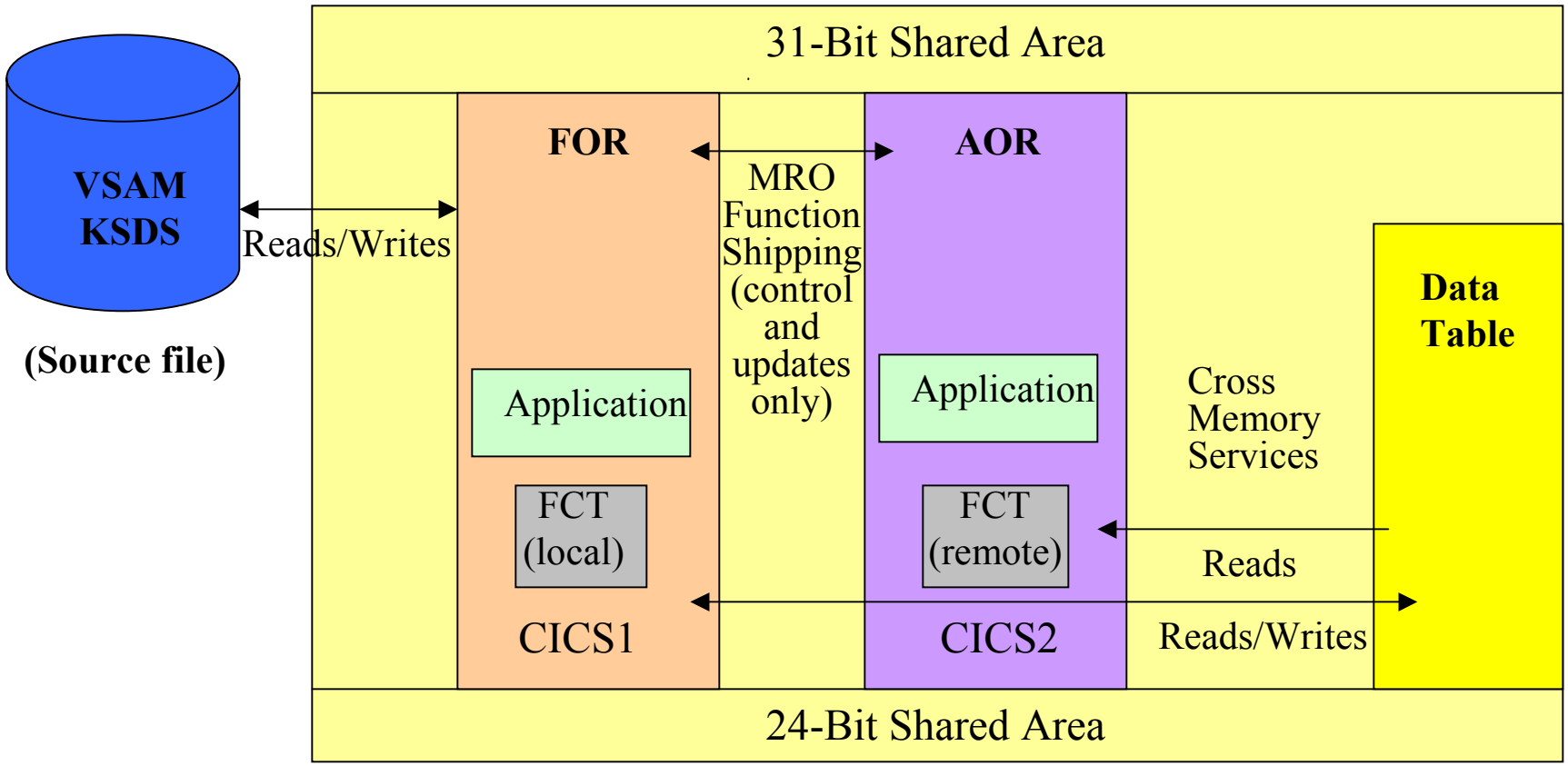
- Shared Data Tables in CICS TS
  - Extends previous support
    - Still KSDS files with LSR only
  - Data Table now in VSE Data Space
    - Data Space owned by CICS TS partition (FOR)
      - One data space for all data tables owned by single CICS partition
      - Space acquired in 2MB increments
    - Be sure SYSDEF DSPACE and VSIZE definitions are adequate

Overview...

- Shared Data Tables in CICS TS..
  - Sharing supported between CICS TS partitions in *same* VSE system
    - VSE cross memory services used for
      - Full key reads
      - Imprecise key reads
      - Browse requests
    - MRO still required between CICS partitions for Function Shipping of
      - Control functions
      - File update requests

Overview...

CICS TS Support - CMT



Overview...

- CICS-Maintained Data Table (CMT)
  - Full integrity
    - Source file remains open and is updated by CICS
  - Full File Control API available
    - Insert, delete, rewrite, read, browse, etc.
  - Transparent to existing applications
  - All or part of source file loaded into table
    - Maximum number of records in file definition
    - Selection by user exit

Overview...

- CICS-Maintained Data Table...
  - Loading the table
    - Request for source file to be opened
    - Data Table initialized
    - Source file opened
    - CSSY task attached to load table
      - Source data set read sequentially
      - Records added to table (subject to user exit XDTRD)
      - Hash table built to enable fast access
      - Table load posted complete
      - Task terminates

Overview...

- User-Maintained Data Table (UMT)
  - Application responsible for data integrity and recoverability
    - Source file is closed after table is loaded
  - Subset of file control API available
    - Full key read, rewrite, selected write and delete
  - Record format can be different from source
    - User exit required to create
  - All or part of source file (or any data) in table
    - Maximum number of records in file definition
    - Selection by user exit

Overview...

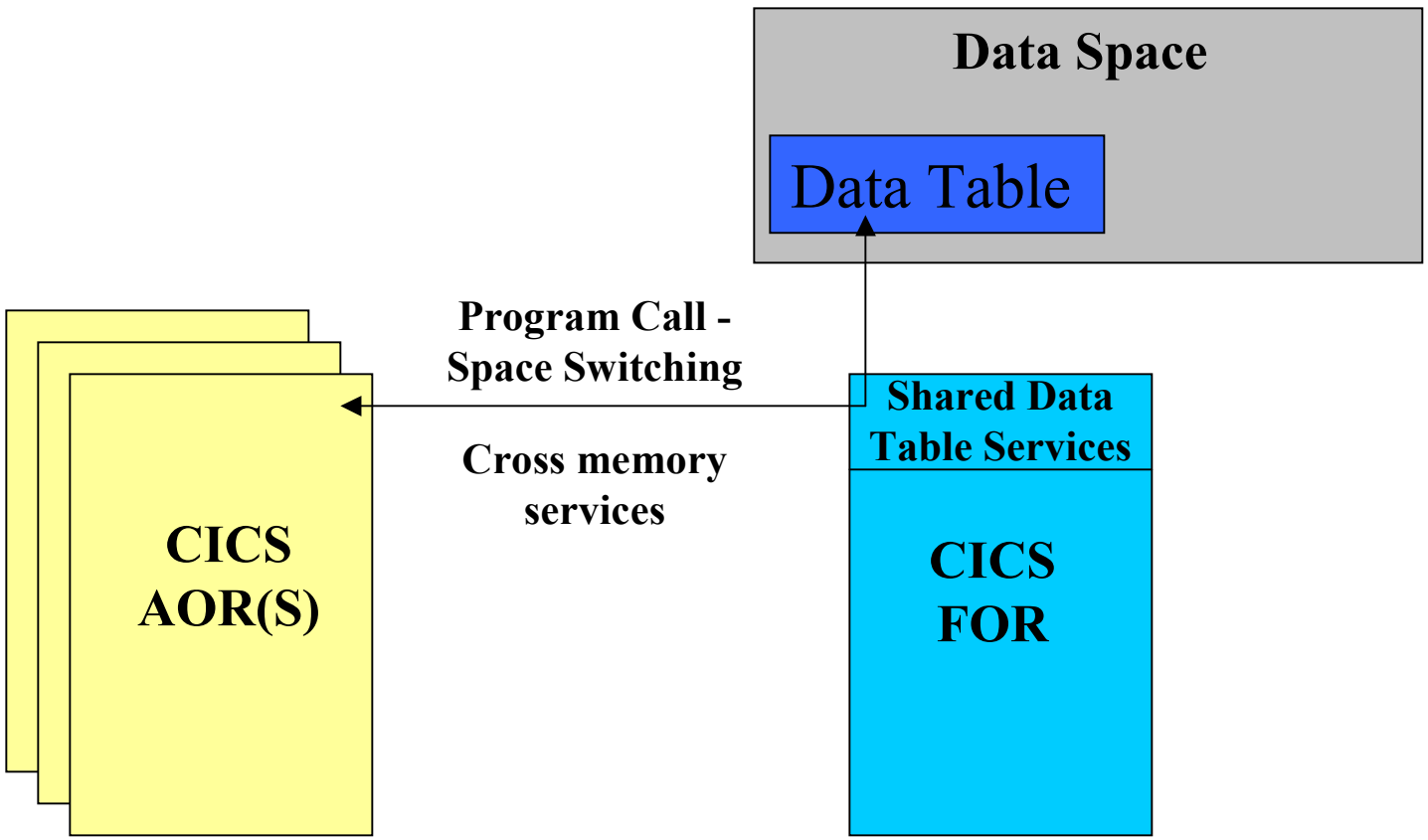
- User-Maintained Data Table...
  - Loading the table
    - Request for source file to be opened
    - Data table initialized
    - Source file opened
    - CSSY task attached to load table
      - Source data set read sequentially
      - Records added to table (subject to user exit XDTRD)
      - Hash table built to enable fast access
      - Table load posted complete
      - Task terminates
    - Source file closed

Overview...

- Communication between CICS TS partitions
  - LOGON (by FOR)
    - Whenever first "owned" data table is opened
    - FOR registers as a Shared Data Table server
    - All other CICS TS MRO-connected partitions notified
  - CONNECT (by AOR)
    - READ request or START BROWSE request in AOR
  - Cross memory services activated and used
    - READ and BROWSE only

Overview...

Cross Memory Services



Overview…

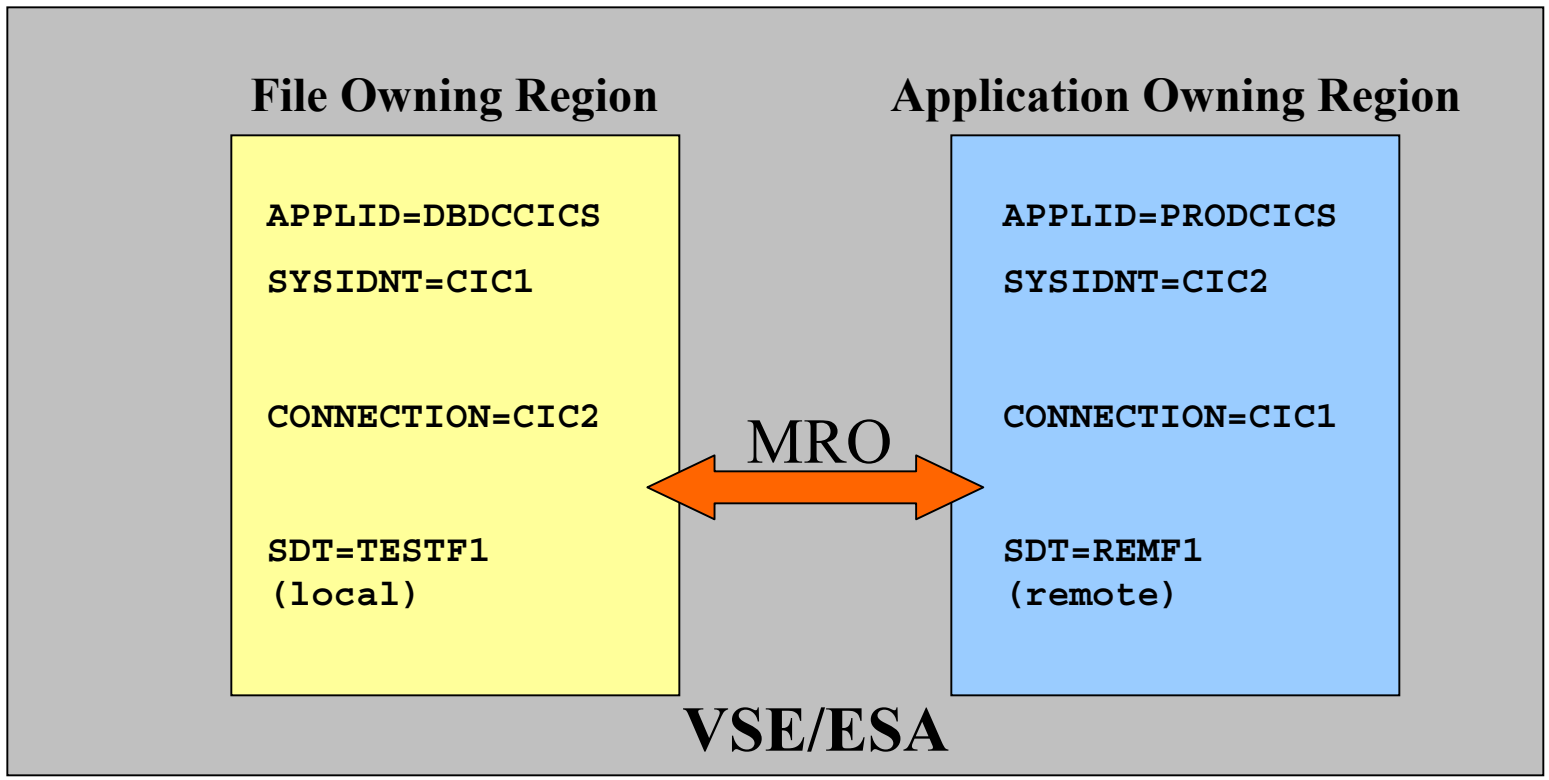
- Good candidates for data tables
  - Small files
    - Can use record limit or user exit to select subset of records from large file
  - Read only files (or very high read/write ratio)
    - Updates actually cause slight extra overhead
  - High activity
    - Why improve performance on low-use files?
- Recommendation - use CMT only (at least first)

System Definition

- Multiple Region Option (MRO) required if table is shared between CICS TS partitions
  - Control and updating across MRO link
    - LOGON, CONNECT, etc.
    - Function shipping for adds, delete, updates, etc.
  - Read/Browse requests satisfied using cross-memory services

System Definition...

Example: Defining a Shared Data Table Environment



System Definition...

CICS TS Initialization Parameters

FOR

```
         .
APPLID=DBDCCICS,        CICS APPLICATION NAME           *
IRCSTRT=YES,            START IRC DURING INITIALIZATION*
ISC=YES,                INTERSYSTEM COMMUNICATION       *
SYSIDNT=CIC1            IDENTIFIER OF THIS CICS         *
         .
```

AOR

```
         .
APPLID=PRODCICS,        CICS APPLICATION NAME           *
IRCSTRT=YES,            START IRC DURING INITIALIZATION*
ISC=YES,                INTERSYSTEM COMMUNICATION       *
SYSIDNT=CIC2            IDENTIFIER OF THIS CICS         *
         .
```

System Definition...

CICS TS CONNECTION Definition (FOR)

```
CEDA  View Connection( CIC2 )
 Connection      : CIC2
 Group           : LSDTGRP
 DEscription     :
CONNECTION IDENTIFIERS
 Netname         : PRODCICS
 INDsys          :
REMOTE ATTRIBUTES
 REMOTESYSTem    :
 REMOTEName      :
 REMOTESYSNet    :
CONNECTION PROPERTIES
 ACcessmethod    : IRc           Vtam | IRc | INdirect
 PRotocol        :               Appc | Lu61 | Exci
 Conntype        :               Generic | Specific
 SInglesess      : No            No | Yes
 DAtastream      : User          User | 3270 | SCs | STrfield | Lms
 RECordformat    : U             U | Vb
```

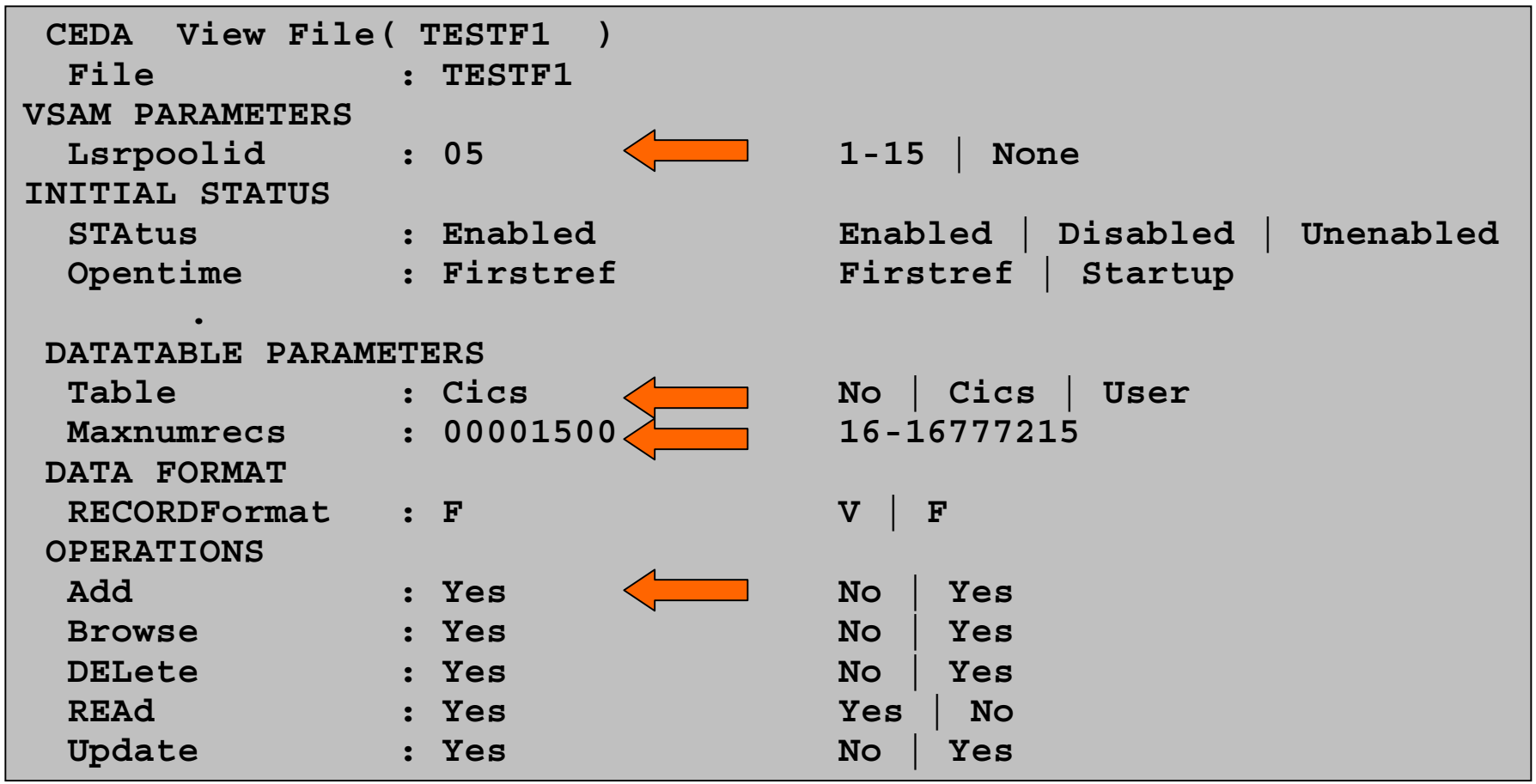
System Definition...

CICS TS SESSIONS Definition (FOR)

```
CEDA  View Sessions( CICS2DT  )
 Sessions        : CICS2DT
 Group           : LSDTGRP
 DEscription     :
SESSION IDENTIFIERS
 Connection      : CIC2
 SESSName        :
 NETnameq        :
 MOdename        :
SESSION PROPERTIES
 Protocol        : Lu61          Appc | Lu61 | Exci
 MAximum         : 000 , 000     0-999
 RECEIVEPfx      : <
 RECEIVECount    : 005           1-999
 SENDPfx         : >
 SENDCount       : 005           1-999
 SENDSize        : 04096         1-30720
 RECEIVESize     : 04096         1-30720
```

System Definition...

Shared Data Table Definition (FOR)



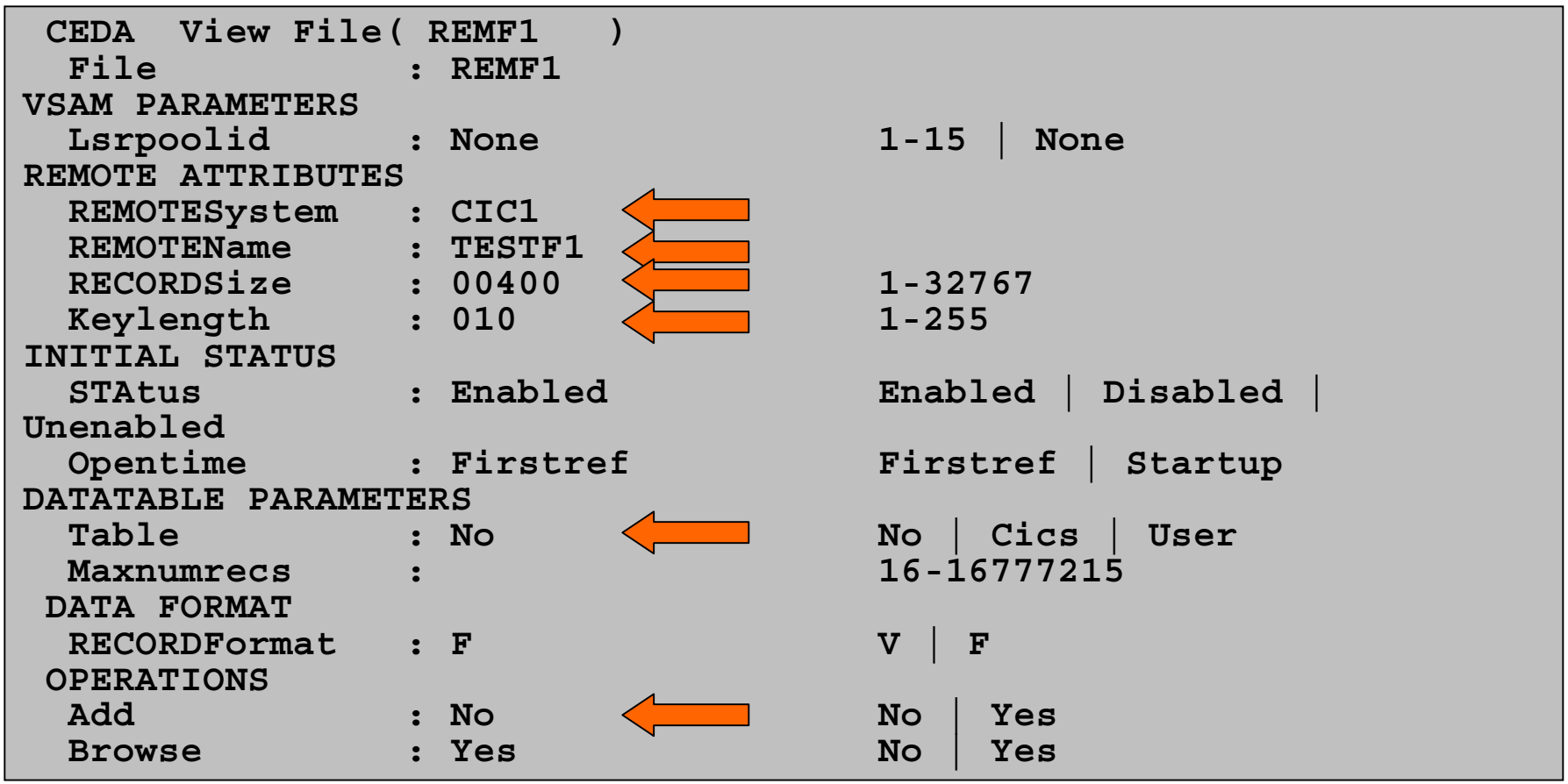
System Definition...

LSRPool Definition (FOR)

```
CEDA  View Lsrpool( LSR05    )
 Lsrpool          : LSR05
 Group            : LSDTGRP
 DEscription      :
 Lsrpoolid        : 05          <=      1-15
 Maxkeylength     : 010         <=      0-255
 SHarelimit       :                     1-100
 STrings          : 015         <=      1-255
DATA BUFFERS
 DATA512          :                     3-32767
 DATA1K           :                     3-32767
 DATA2K           :                     3-32767
 DATA4k           : 00004       <=      3-32767
        .
        .
INDEX BUFFERS
 INDEX512         : 00004       <=      3-32767
        .
        .
```

System Definition...

Shared Data Table Definitions (AOR)



Selective Loading of Records into a Data Table

- Use maximum number of records field to limit entries
  - Specified in file definition
    - 16 to 16 million records
    - Required entry even if using exit program
  - Loads first record in file up through limit
  - Generates error message on VSE console when limit reached

Selective Loading of Records into a Data Table...

- Use a Global User Exit (GLUE)
  - Exit points
    - XDTRD each record read from source data set
    - XDTLC when loading of table is complete
    - XDTAD each record added to source data set
  - Programming requirements for exit program
    - Assembler
    - AMODE 31 on entry and exit
    - RMODE ANY or 24
    - Fully reentrant (XPI)

Selective Loading of Records into a Data Table...

- Global User Exit (GLUE)...
  - Exit program must be *enabled* to exit point
    - Multiple programs can be enabled to an exit point at one time
      - Called in the sequence they were enabled
    - User program used to enable exit programs
      - Assembler, COBOL, PL/I, C/VSE
      - Automate activation using PLTPI *after* thorough testing
        - CICS Initialization Stage 2 (before DFHDELIM entry)
  - Details in *CICS TS Customization Guide*

Selective Loading of Records into a Data Table...

- General process using a user exit program
  - Enabling program (PROGA) executed from PLTPI

```
DFHPLT TYPE=ENTRY,PROGRAM=PROGA
DFHPLT TYPE=ENTRY,PROGRAM=DFHDELIM
```

  - PROGA enables exit program (PROGB) to specific exit point

```
EXEC CICS ENABLE PROGRAM('PROGB') EXIT('XDTRD')
                START NOHANDLE
```

Selective Loading of Records into a Data Table...

- General Process...
  - During table load PROGB called each time record is read from source file
    - File we want to process?
      - No, set appropriate return code
      - Return to CICS
    - Record we want loaded into table?
      - Set appropriate return code (yes/no/skip to)
      - Return to CICS

Selective Loading of Records into a Data Table...

"Standard" Exit Statements for PROGB

```
          DFHUEXIT TYPE=EP,ID=XDTRD  STANDARD UE PARAMETERS FOR XDTRD
          DFHUEXIT TYPE=XPIENV       EXIT PROGRAMMING INTERFACE (XPI)
          COPY  DFHXDTDS             ADDITIONAL DATA TABLE UE PARAMS
PROGB     CSECT
PROGB     AMODE 31
PROGB     RMODE ANY
          STM   R14,R12,12(R13)      SAVE CALLERS REGISTERS
          LR    R11,R15              SET UP BASE REGISTER
          USING PROGB,R11
          LR    R2,R1                ADDRESS STANDARD PARAMETERS
          USING DFHUEPAR,R2
          L     R6,UEPDTPL           ADDRESS DATA TABLE PARAMETERS
          USING DT_UE_PLIST,R6
          L     R8,UEPDTKA           KEY ADDRESS
          .
* USER CODE HERE TO SEE IF IT IS THE CORRECT FILE, RECORD WE WANT IN
* THE TABLE, ETC
          .
FINISH    DS    0H
          L     R13,UEPEPSA          STANDARD GLUE ENDING CODE
          L     R14,12(R13)
          LM    R0,R12,20(R13)
          BR    R14
```

Summary

- Shared access to a data table
  - Now stored in a data space
  - Cross memory access for read/browse
    - Fast and low overhead
- CMT versus UMT
  - Use CMT if at all possible
    - Transparent to applications
    - CICS responsible for data integrity
- Easy definition
  - RDO, DFHCSDUP, or FCT macro

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