A SOFTWARE ENHANCEMENT TO PRODUCE REPORT-QUALITY GRAPHICS FROM GIFTS

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ABSTRACT

The Oak Ridge National Laboratory (ORNL) maintains two versions of the GIFTS system structural analysis computer program modules, one for two DECsystem-10's located at Oak Ridge, Tennessee, the other for a Cray-1 located at Livermore, California. These computers are connected via high-band-width terrestial communications equipment. Presented herein are the local software enhancements for the ORNL version of GIFTS that permit creation of intermediate graphics files. These files may be postprocessed to produce report-quality display images on a variety of graphics devices at ORNL.

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1. INTRODUCTION

The Oak Ridge National Laboratory maintains two versions[1,2] of the GIFTS[3] system structural analysis computer program modules. At Oak Ridge, Tennessee identical copies of GIFTS are installed upon two KL-1Ø, DECsystem-1Ø computers. Because of our envolvement with the National Fusion Energy program, access is also available to a Cray-1 computer at Livermore, California. All of these computers are individually connected via high-band-width communications interfaces.

The subject of this report is a local software enhancement that permits creation of intermediate graphics files in order that report-quality drawings may be generated. Discussed here are the enhanced command set used to control creation of intermediate graphics files, the minor modifications necessary to the GIFTS source code to access these new commands, and the machine-dependent, Cray-1 version of the software that creates and updates the images in the intermediate graphics file.

2. ORNL GIFTS ENHANCED COMMAND SET

Eight commands have been added to the ORNL version of GIFTS. The following list of four commands only deal with user control over graphics output. (Since the other four commands do not directly relate to the subject of this paper, they are not discussed here. For a description of the other commands, see Ref. 1.)

ORNL Command	Function performed
TEKON	turns on the Tektronix screen so that subsequent plotting commands will generate a Tektronix display image. This is the default status of the ORNL version of GIFTS.
TEKOFF	is the opposite of TEKON. This command is useful if the user is LOGged ON to a non-Tektronix terminal and wishes to plot his model while creating an intermediate plot data file.

subsequent plotting commands will generate a display image in the XJOB.TKF file. The display images accumulate within this file and transcend execution of GIFTS modules; i.e., plots created by BULKM, EDITLB, and RESULT will automatically be appended into the XJOB.TKF file in the same order in which they were generated. The GIFTS unified data base (UDB) is not altered by the TKFON command. No images can be removed from the XJOB.TKF file. If the images within this file are no longer useful, the file should be deleted while at the monitor level.

TKFOFF is the opposite of the TKFON command. TKFOFF is the default status of the ORNL version of GIFTS.

3. GIFTS MODIFIED COMMAND SCANNERS

A method was chosen to implement the ORNL commands so that a minimum of work would be required every time the University of Arizona released an update to their version of the GIFTS software. In each interactive module where inclusion of the ORNL commands was deemed necessary, a call to subroutine URSCMD was inserted immediately after the first call to subroutine FREAD in the appropriate command handler subroutine of the particular GIFTS module. (The first call to subroutine FREAD in the GIFTS command scanners reads the user's command.)

The following list presents those GIFTS modules and their corresponding command scanner subprograms that were modified to include a call to subroutine USRCMD.

GIFTS Module	Modified Subroutine
BULKLB	COMA
BULKM	COMBM
EDITLB	COMEB
EDITM	COMEM
LOCAL	COML
RESULT	COMR

An example listing of the modified subroutine COMBM is presented in Ref. 1.

4. SUBROUTINE USRCMD

By modifing the GIFTS source as described in the previous section, every user command must first pass through subroutine USRCMD. Subroutine USRCMD intercepts the ORNL commands, performs the indicated operations, and then blanks out the command. Upon return to the calling GIFTS command scanner, no action is taken since GIFTS has been tricked into thinking a blank line has been typed. The following is a list of subroutine USRCMD.

Calling sequence:

CALL USRCMD (CMND1,CMND2)

Arguments:

CMND1 is the first word of the user's command.

CMND2 is the second word of the user's command.

Language: Cray FORTRAN

Subroutine listing:

```
      SUBROUTINE USRCMD(CMND1,CMND2)
C *** LAST UPDATED: 22JAN79 WHG
C
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\                                                            \/\
C \/\ THE ENCLOSED CODE IS DEPENDENT UPON THE COMPUTER SYSTEM BEING \/\
C \/\ USED.  THIS IS THE VERSION TO BE USED ON A CRAY-1 COMPUTER.   \/\
C \/\                                                            \/\
      PARAMETER        (NUMCMD = 9),
     1                 (NUMCD2 = 18)
C \/\                                                            \/\
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
      LOGICAL FILOPN,TKFOPN
C
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\                                                            \/\
C \/\ THE ENCLOSED CODE IS DEPENDENT UPON THE COMPUTER SYSTEM BEING \/\
C \/\ USED.  THIS IS THE VERSION TO BE USED ON A CRAY-1 COMPUTER.   \/\
C \/\                                                            \/\
      DIMENSION        VFL(NUMCD2) ,   TFNEW(2,NUMCMD) ,      XXJOB(2)
C \/\                                                            \/\
```

```
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C
        COMMON /CMDSLT/ ISLIN,ISLOUT,ISLTTY
        COMMON /JOB/ XJOB
C
        EQUIVALENCE (TFNEW,VFL)
C
        DATA FILOPN/.FALSE./,TKFOPN/.FALSE./
        DATA EXIT/4HQUIT/, STOP/4HQUIT/
C
C  DATA FOR THE COMMANDS TKFON , TKFOFF , CMDFL , AND TTY:
        DATA
     1   VFL(1),VFL(2)/4HTKFO,4HN    /
     2,  VFL(3),VFL(4)/4HTKFO,4HFF   /
     3,  VFL(5),VFL(6)/4HCMDF,4HL    /
     4,  VFL(7),VFL(8)/4HTTY:,4H     /
     5, VFL(9),VFL(1Ø)/4HEND ,4H     /
     6,VFL(11),VFL(12)/4HSTOP,4H     /
     7,VFL(13),VFL(14)/4HEXIT,4H     /
     8,VFL(15),VFL(16)/4HTEKO,4HN    /
     9,VFL(17),VFL(18)/4HTEKO,4HFF   /
C
C  PROCESS NEW COMMANDS FIRST
        DO 5 I=1,NUMCMD
        IF(CMND1.NE.TFNEW(1,I)) GO TO 5
        IF(CMND2.EQ.TFNEW(2,I)) GO TO 1Ø
5       CONTINUE
C
C  HERE IF NOT ONE OF MY COMMANDS.
        RETURN
C
C  IT IS ONE OF MY COMMANDS
1Ø      GO TO (15,16,2Ø,25,3Ø,7Ø,75,8Ø,85) ,I
C
C  HERE IF TKFON OR TKFOFF
15      CONTINUE
        CALL TKFON
        IF(TKFOPN) GO TO 17
        TKFOPN=.TRUE.
        CALL APNTKF
        XXJOB(1) = XJOB
        XXJOB(2) = 4H TKF
        CALL PERMN (XXJOB,TKFNAME)
        CALL OPNTKF (TKFNAME)
17      CONTINUE
        CMND1=4H
        CMND2=4H
        RETURN
16      CONTINUE
        CALL TKFOFF
        IF(TKFOPN) CALL CLSTKF
        TKFOPN=.FALSE.
        GO TO 17
```

```
20      CONTINUE
        FILOPN=.TRUE.
        CALL SLTASN(ISLIN)
        WRITE(ISLTTY,1000)
        READ(ISLTTY,1005) FILNME
        ASSIGN 21 TO IERR
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\                                                                 \/\
C \/\ THE ENCLOSED CODE IS DEPENDENT UPON THE COMPUTER SYSTEM BEING \/\
C \/\ USED.  THIS IS THE VERSION TO BE USED ON A CRAY-1 COMPUTER.   \/\
C \/\                                                                 \/\
        CALL OPEN (ISLIN,FILNME,0,LEN,IERR)
C \/\                                                                 \/\
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
        IF (LEN .EQ. -1) GO TO 21
        GO TO 17
21      CONTINUE
        WRITE(ISLTTY,1010) FILNME
25      CONTINUE
C
C  HERE IF TTY:
        IF(.NOT.FILOPN) RETURN
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\                                                                 \/\
C \/\ THE ENCLOSED CODE IS DEPENDENT UPON THE COMPUTER SYSTEM BEING \/\
C \/\ USED.  THIS IS THE VERSION TO BE USED ON A CRAY-1 COMPUTER.   \/\
C \/\                                                                 \/\
        CALL CLOSE (ISLIN)
C \/\                                                                 \/\
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
C \/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
        CALL FRESLT(ISLIN)
        ISLIN=ISLTTY
        FILOPN=.FALSE.
        GO TO 17
C
C  HERE IF END.  CHECK FOR COMMAND FILE
30      CONTINUE
        IF(.NOT.FILOPN) RETURN
C
C  IT IS OPEN TRANSFER TO TTY:
        GO TO 25
C
C  STOP COMMAND
70      CMND1=STOP
        RETURN
C
C  EXIT COMMAND
75      CMND1=EXIT
        RETURN
80      CONTINUE
```

```
        GO TO 17
85      CONTINUE
        CALL TEKOFF
        GO TO 17
C
1ØØØ    FORMAT('FILENAME ?'/' ')
1ØØ5    FORMAT(A8)
1Ø1Ø    FORMAT('%USRCMD/GIFTS - CANNOT FIND FILE - ',A8)
C
        END
```

Further considerations:

The calls to subroutines TKFON, TKFOFF, APNTKF, OPNTKF, CLSTKF, TEKON, and TEKOFF create, update, and control image display on the screen of a Tektronix and/or into an intermediate graphics file. These subroutines are the subject of the next section.

5. ORNL GIFTS GRAPHICS SOFTWARE

The LIB5 GIFTS software library makes use of the Tektronix PLOT 1Ø TCS[4] software library to display images on the screen of a Tektronix 4ØØØ series storage tube terminal. The ORNL version of GIFTS uses the standard level 3.3 version of the Tektronix PLOT 1Ø software with the local enhancements described in Ref. 5.

The ORNL version of GIFTS also uses a modified form of the TCSTKF[6] software library (the name TCSTKF refers to the enhanced TCS software library) to create intermediate .TKF plot data files. The format of a .TKF file is simply a duplicate image of the same ASCII decimal equivalent (ADE) characters used to control the display image on the screen of a Tektronix storage tube. The intermediate .TKF file can be postprocessed in a variety of ways. The monitor level PLOT command has been locally modified[7] by ORNL to permit access to any graphics device at ORNL. For example, to obtain a display image of the file HOLE.TKF on a system resident Versatec printer/plotter, the following command can be issued:

```
.PLOT VER:=HOLE.TKF
```

To obtain a microfilm copy of the same display image on ORNL's

given:

.PLOT FR8:=HOLE.TKF

The following is a description of the function, calling sequence, and argument list for the subprograms available in the TCSTKF software library. The listings of the currently executing Cray-1 and DECsystem-10 versions of these subroutines can be found in Refs. 1 and 2, respectively. ~~The listings are sufficiently commented to made flow charts unnecessary.~~

Subroutine ADEOUT:

Subprogram ADEOUT is a replacement for the similarily named subroutine in the TCS software library. The function of subprogram ADEOUT is to transmit ASCII characters to the user's terminal and/or to the user's .TKF disk file.

Calling sequence:

CALL ADEOUT (IADE,JADE)

Arguments:

IADE is the number of ASCII Decimal Equivalent (ADE) characters to be transmitted to the terminal and/or the .TKF file.

JADE is the array containing the right-justified ASCII characters.

Subroutine APNTKF:

A switch is set by calling subprogram APNTKF, which causes subsequent ADE characters to be appended to an existing .TKF file.

Calling sequence:

CALL APNTKF

Arguments: none

Subroutine CLSTKF:

Subprogram CLSTKF closes and releases the .TKF file.

Calling sequence:

CALL CLSTKF

Arguments: none

Subroutine FINITT:

Subprogram FINITT is a replacement for the similarily named subroutine in the TCS software library. The function of subprogram FINITT is to close and release the .TKF file.

Calling sequence:

CALL FINITT (IX,IY)

Arguments:

IX,IY is the final position of the alphanumeric cursor.

Logical function
~~Subroutine~~ OPNTKF:

The function of subprogram OPNTKF is to open the XJOB.TKF file in the user's disk area and to initialize the TCSTKF plotting software.

Calling sequence:

IF (.NOT. OPNTKF(FLNAME)) do something

Arguments:

FLNAME is the file name of the intermediate .TKF file.

Arguments: none

Subroutine TEKOFF:

The function of subprogram TEKOFF is to send the current TCS internal buffer to subroutine ADEOUT and then set a switch to prevent future plotting on the user's Tektronix terminal.

Calling sequence:

CALL TEKOFF

Arguments: none

Subroutine TEKON:

The function of subprogram TEKON is to send the current TCS internal buffer to subroutine ADEOUT and then set a switch to enable future plotting on the user's Tektronix terminal.

Calling sequence:

CALL TEKON

Arguments: none

Subroutine TKFOFF:

The function of subprogram TKFOFF is to send the current TCS internal buffer to subroutine ADEOUT and then set a switch to prevent future plotting on the user's .TKF file.

Calling sequence:

CALL TKFOFF

Arguments: none

Subroutine TKFON:

The function of subprogram TKFON is to send the current TCS internal buffer to subroutine ADEOUT and then set a switch to enable future plotting on the user's .TKF file.

Calling sequence:

CALL TKFON

Arguments: none

6. GIFTS MODIFIED STOP SUBROUTINES

In order to be sure that the intermediate plot data files (if any have been created) are closed properly, a call to the TCS subroutine FINITT has been added to the following GIFTS subprograms:

GIFTS Module	Modified Subroutine
BULKLB	STOPA
BULKM	STOPBM
EDITLB	STOPEB
EDITM	STOPEM
LOCAL	STOPL
RESULT	STOPR
TRANS	STOPTR

7. CONCLUSIONS

A technique for maintaining an enhanced command instruction set for GIFTS has been developed and is maintained with a minimum of effort. Among other functions, these added commands permit generation of report-quality graphics directly while using the GIFTS plotting capability. This software is used to maintain separate versions of GIFTS upon two different computers without external difference to the ORNL user.

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