IRIX 5.2.x and 5.3.x

SGI Integration Guide

For Exabyte Products

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General Exabyte Product Integration Guidelines

Exabyte products have been slowly incorporated into the SGI operating system. Initially, support was supplied for the EXB-8200, then the EXB-8200 and EXB-8500. Use of any other Exabyte tape drive or library product requires modification of the kernel. Thus, it is advisable to verify those Exabyte products currently supported by SGI by referring to SGI documentation sent with its respective system. If an Exabyte product is not listed, you must modify the kernel.

Modifying the Kernel

To modify the kernel, use the **ed**, **vi**, or **jot** editor to change the appropriate files. The density settings, drive capabilities, and inquiry string fields are the primary areas to be changed.

Table 1 lists the major directories used in the UNIX environment, with those containing files to be modified shown in bold. Figure 1 on the following page shows the location of the files to be modified, followed by a description of the files.

Table 1. *Directory Definitions*

Acronym	Full Directory Name
/etc/*	Administrative directory
/dev/*	**Device directory**
/var/*	**Variable directory**
/bin/*	System executable binary directory
/usr/*	**User directory**
/usr/bin/*	Application executable binary directory
/tmp/*	Temporary file directory

MAKEDEV: A script used during boot to identify devices to be made for the tps list.
scsi: A SCSI driver file which defines device capabilities.
tpsc.h: SCSI device header file tapped during boot.
invent.h: Inventory header file tapped during boot.

Each file will have entries which must be modified to accomodate the drive type you wish to integrate. Examine the table below to identify which entries you will modify.

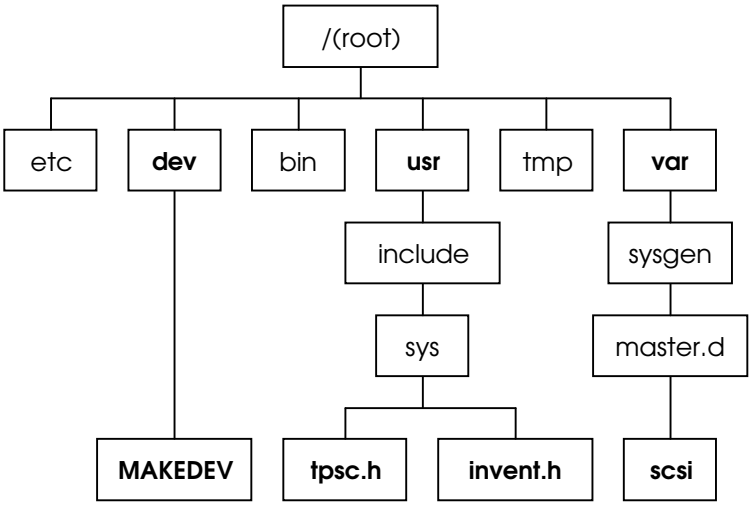
Table 1. *Kernel Entry to be Changed by Drive Type*

Drive type	Current Kernel Entry to be Modified
EXB-8500c and EXB-8505	EXB-8500
EXB-8205	EXB-8200
EXB-4200 and EXB-4200c	Archive Python

If you are using one type of tape drive only, modify the entry listed in Table 2 above. If you are using more than one type of tape drive, copy the entry you would have modified and add it below the last line of the entry you copied.

Figure 1 indicates the location of these files.

Figure 1. *Hierarchical Location of Peripheral Files*



> **IMPORTANT:** Always create a copy of the file you wish to modify; if an error occurs, there is recourse!

Follow these steps to modify the kernel:

1. Login as root and become the super user.
2. Go to the /dev directory.

   ```
   cd /dev
   ```

3. Make a backup copy of the original MAKEDEV file.

   ```
   cp MAKEDEV Makedev_bak
   ```

4. Edit the MAKEDEV file.

   ```
   vi MAKEDEV
   ```

5. Save changes to the file.

   ```
   :w!
   ```

6. Change directory to master.d.

   ```
   cd /var/sysgen/master.d
   ```

7. Make a backup copy of the original scsi file.

   ```
   cp scsi scsi_bak
   ```

8. Edit the scsi file.

   ```
   vi scsi
   ```

9. Save changes to the file.

   ```
   :w!
   ```

10. Go to /etc directory.

    ```
    cd /etc
    ```

11. Issue autoconfig to reconfigure kernel.

    ```
    /etc/autoconfig -f start
    ```

12. Reboot system to utilize modified kernel.
13. Change to /dev directory.

    ```
    cd /dev
    ```

14. Perform a status on the drive.

    ```
    mt stat
    ```

    The "mt stat" command should indicate the correct drive type. If it indicates the drive type is unknown, you must go back and check your entries, since the system is not recognizing the drive's configuration, and it will not work properly.

15. If you have difficulties getting all the proper tps listings in /dev/mt and /dev/rmt, have the MAKEDEV remake the tps listings. Be sure you are still in the /dev directory when you do this.

    ```
    ./ MAKEDEV tape  (5.2.x)          make tape  (5.3.x)
    ```

At this juncture, if you wish to make the new addition the default peripheral, you must create a link between the current /dev/mt file and the /dev/tape file. This is accomplished as follows:

1. Reboot system to utilize modified kernel.

   ```
   cp /dev/tape /dev/tape_bak
   ```

2. Link hinv# of device to default file.

   ```
   ln -s /dev/rmt/tps***n***d***n*** /dev/tape
   ```

Most Exabyte devices have more than one mode of operation, and modification of the kernel will allow you to specify the "default" mode. Table 3 lists each Exabyte product and its potential modes of operation, the default mode being listed first. Compression drives assume a 2:1 compression ratio.

Table 3. *Inquiry String and Density Code Matrix*

Product Name	**Inquiry String**	**Operational Mode (Density)**	**Density Hex Code**	**Max. Capacity**
8mm				
EXB-8200	EXB-8200	8200-single track, no compression	0x00	2.5 GB
EXB-8205	EXB-8205	8200c- single track, compression 8200	0x90 0x14	5.0 GB 2.5 GB
EXB-8500	EXB-8500	8500-dual track, no compression 8200	0x15 0x14	5.0 GB 2.5 GB
EXB-8500c	EXB8500c	8500c-dual track, compression 8500 8200c 8200	0x8C 0x15 0x90 0x14	10.0 GB 5.0 GB 5.0 GB 2.5 GB
EXB-8505	EXB-8505	8500c-dual track, compression 8500 8200c 8200	0x8C 0x15 0x90 0x14	10.0 GB 5.0 GB 5.0 GB 2.5 GB
4mm				
EXB-4200	EXB-4200	4200-DDS	0x00	2.0 GB
EXB-4200c	EXB4200c	4200c-DDS-DC 4200	0x43 0x63	4.0 GB 2.0 GB
EXB-4402	EXB-4402	4402-DDS-2	0x00	4.0 GB
EXB-4402c	EXB4402c	4402c-DDS-DC 4402	0x43 0x63	8.0 GB 4.0 GB

Specific Exabyte Product Integration Guidelines

Modifications for the 8205

/dev/MAKEDEV *Rev. 1.245 or 1.259**

*Rev. 1.245 contains the **rm -f $${prf}nr ;** \ line, Rev. 1.259 does not!

```
        *Drive?type:*DAT*|*Drive?type:*8mm?8200*) \
                rm -f $${prf}nr ; \
                set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ; \
                for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do \
                        mdev=`expr $$minor + $$add`; \
                        mknod $${prf}$$1 c ${C_TPS} $$mdev; \
                shift; \
>>>     done ;; \
```

Replace marked areas with:

```
        done ; \
```

And right below this line, add:

```
                for dens in 0 8 ; do \
                        case $$dens { \
                        0) kden=8200c;; \
                        8) kden=8200;; \
                        }; \
                set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ; \
                for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do \
                        mdev=`expr $$minor + $$add + $$dens`;\
                        mknod $${prf}$$1.$$kden c ${C_TPS} $$mdev;\
                        shift;\
                done; \
        done ;; \
```

/var/sysgen/master.d/scsi *Rev. 1.9*

Add just prior to the Exabyte 8500 entry:

```
        /* There are two densities available with the EXB-8205:  8200c and 8200 mode.*/
```

Copy the EXB-8500 entry and paste it just below the 8200 entry.

```
>>>{EXABYTE8500, TP8MM_8500, 7, 8, "EXABYTE", "EXB-8500", 6, "\40\4\16\0\200\7",
>>>{0x0, 0x14, 0x0, 0x0},
        MTCAN_BSF|MTCAN_BSR|MTCAN_PREV|MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|
        MTCAN_SILI|MTCAN_CHTYPEANY|MTCAN_SETDEN|MTCAN_SPEOD|MTCAN_SYNC|
        MTCAN_SEEK,
        80, 4*60, 25*60, 5*60, 1024, 128*1024},
```

Change the marked areas the match the lines below. Remark out the EXB-8200 entry.

```
        {EXABYTE8200, TP8MM_8200, 7, 8, "EXABYTE", "EXB-8205", 6, "\40\4\16\0\200\7",
        {0x90, 0x14, 0x0, 0x0},
```

Your other option is to change the current 8200 entry, leaving the density setting in the default compressed mode.

>>>{EXABYTE8200, TP8MM_8200, 7, 8, "EXABYTE", "EXB-8200", 1, "\16", {0, 0, 0, 0},
MTCAN_BSF|MTCAN_BSR|MTCAN_PREV|MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|
MTCAN_SILI|MTCAN_CHTYPEANY,
80, 4*60, 25*60, 5*60, 1024, 128*1024},

Change as follows.

{EXABYTE8200, TP8MM_8200, 7, 8, "EXABYTE", "EXB-8205", 1, "\16", {0, 0, 0, 0},

Modifications for an EXB-8500c

/dev/MAKEDEV *Rev. 1.245 or 1.259**

*Rev. 1.245 contains the **rm -f $${prf}nr ;** \ line, Rev. 1.259 does not!

```
        *Drive?type:*8mm?8500*) \
            rm -f $${prf}nr ; \
            set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ; \
            for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do \
                mdev=`expr $$minor + $$add`; \
                mknod $${prf}$$1 c ${C_TPS} $$mdev; \
                shift; \
            done; \
>>>         for dens in 0 8 ; do \
                case $$dens { \
>>>             0) kden=8500;; \
>>>             8) kden=8200;; \
                }; \
            set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ; \
            for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do \
                mdev=`expr $$minor + $$add + $$dens`;\
                mknod $${prf}$$1.$$kden c ${C_TPS} $$mdev;\
                shift;\
            done; \
        done ;; \
```

Replace marked areas with:

```
        for dens in     0 8 16 24; do \
            0) kden=8500c;; \
            8) kden=8500;; \
```

And right below this line, add:

```
            16) kden=8200c;; \
            24) kden=8200;; \
```

/var/sysgen/master.d/scsi *Rev. 1.9*

Add just prior to the Exabyte 8500 entry:

```
/* For the 8500c there are 4 available densities, 8500c, 8500, 8200c, and 8200 mode.*/

>>>{EXABYTE8500, TP8MM_8500, 7, 8, "EXABYTE", "EXB-8500", 6, "\40\4\16\0\200\7",
>>>{0x0, 0x14, 0x0, 0x0},
    MTCAN_BSF|MTCAN_BSR|MTCAN_PREV|MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|
    MTCAN_SILI|MTCAN_CHTYPEANY|MTCAN_SETDEN|MTCAN_SPEOD|MTCAN_SYNC|
    MTCAN_SEEK,
    80, 4*60, 25*60, 5*60, 1024, 128*1024},
```

For IRIX 5.2.x, change marked areas to:

```
{EXABYTE8500, TP8MM_8500, 7, 8, "EXABYTE", "EXB8500C", 6, "\40\4\16\0\200\7",
{0x8C, 0x15, 0x90, 0x14},
```

For IRIX 5.3.x, change marked areas to:

{EXABYTE8500, TP8MM_8500, 7, 3, "EXABYTE", "EXB", 6, "\40\4\16\0\200\7",
{0x8C, 0x15, 0x90, 0x14},

Modifications for an EXB-8505

/dev/MAKEDEV *Rev. 1.245 or 1.259**

*Rev. 1.245 contains the **rm -f $${prf}nr ;** \ line, Rev. 1.259 does not!

```
        *Drive?type:*8mm?8500*) \
            rm -f $${prf}nr ; \
            set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ; \
            for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do \
                mdev=`expr $$minor + $$add`; \
                mknod $${prf}$$1 c ${C_TPS} $$mdev; \
                shift; \
            done; \
>>>         for dens in 0 8 ; do \
                case $$dens { \
>>>             0) kden=8500;; \
>>>             8) kden=8200;; \
                }; \
            set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ; \
            for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do \
                mdev=`expr $$minor + $$add + $$dens`;\
                mknod $${prf}$$1.$$kden c ${C_TPS} $$mdev;\
                shift;\
            done; \
        done ;; \
```

Replace marked areas with:

```
        for dens in     0 8 16 24; do \
            0) kden=8500c;; \
            8) kden=8500;; \
```

And right below this line, add:

```
            16) kden=8200c;; \
            24) kden=8200;; \
```

/var/sysgen/master.d/scsi *Rev. 1.9*

Add just prior to the Exabyte 8500 entry:

```
/* For the 8505 there are 4 available densities, 8500c, 8500, 8200c, and 8200 mode. */

>>>{EXABYTE8500, TP8MM_8500, 7, 8, "EXABYTE", "EXB-8500", 6, "\40\4\16\0\200\7",
>>>{0x0, 0x14, 0x0, 0x0},
    MTCAN_BSF|MTCAN_BSR|MTCAN_PREV|MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|
    MTCAN_SILI|MTCAN_CHTYPEANY|MTCAN_SETDEN|MTCAN_SPEOD|MTCAN_SYNC|
    MTCAN_SEEK,
    80, 4*60, 25*60, 5*60, 1024, 128*1024},
```

Change marked areas to:

```
{EXABYTE8500, TP8MM_8500, 7, 8, "EXABYTE", "EXB-8505", 6, "\40\4\16\0\200\7",
{0x8C, 0x15, 0x90, 0x14},
```

Modifications for an EXB-4200

/dev/MAKEDEV *Rev 1.245 or 1.259*

No change necessary.

/var/sysgen/master.d/scsi *Rev. 1.9*

>>>{DATTAPE, TPDAT, 7, 6, "ARCHIVE", "Python", 0,0, {0, 0, 0, 0},
MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|MTCAN_SETMK|MTCAN_PREV|
MTCAN_SYNC|MTCAN_SPEOD|MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|
MTCAN_SILI|MTCAN_AUDIO|MTCAN_SEEK|MTCAN_CHTYPEANY,
40,4*60,4*60,5*60,512,512*512},

Replace with:

{DATTAPE, TPDAT, 7, 8, “EXABYTE”, “EXB-4200”, 0,0, {0,0,0,0}

Modifications for an EXB-4200C

/dev/MAKEDEV *Rev. 1.245 or 1.259**

*Rev. 1.245 contains the **rm -f $${prf}nr ;** \ line, Rev. 1.259 does not!

```
        *Drive?type:*DAT*|*Drive?type:*8mm?8200*) \
                rm -f $${prf}nr ; \
                set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ; \
                for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do \
                        mdev=`expr $$minor + $$add`; \
                        mknod $${prf}$$1 c ${C_TPS} $$mdev; \
                shift; \
>>>     done ;; \
```

Replace marked areas with:

```
done ; \
```

And right below this line, add:

```
        for dens in 0 8 ; do \
                case $$dens { \
                0) kden=4200c;; \
                8) kden=4200;; \
                }; \
        set s nrs ns "" nrns nr sv nrsv nsv v nrnsv nrv ; \
        for add in 0 1 2 2 3 3 4 5 6 6 7 7 ; do \
                mdev=`expr $$minor + $$add + $$dens`;\
                mknod $${prf}$$1.$$kden c ${C_TPS} $$mdev;\
                shift;\
        done; \
done ;; \
```

/var/sysgen/master.d/scsi *Rev. 1.9*

>>>{DATTAPE, TPDAT, 7, 6, "ARCHIVE", "Python", 0,0, {0, 0, 0, 0},

MTCAN_BSF|MTCAN_BSR|MTCAN_APPEND|MTCAN_SETMK|MTCAN_PREV|
MTCAN_SYNC|MTCAN_SPEOD|MTCAN_CHKRDY|MTCAN_VAR|MTCAN_SETSZ|
MTCAN_SILI|MTCAN_AUDIO|MTCAN_SEEK|MTCAN_CHTYPEANY,
40,4*60,4*60,5*60,512,512*512},

Replace with:

{DATTAPE, TPDAT, 7, 8, “EXABYTE”, “EXB-4200c”, 0,0, {0X43,0X63,0,0}

/usr/include/sys/invent.h *Rev. 1.127 or 1.146*

```
/* sub types for type INV_SCSIQIC and INV_VSCSITAPE (in state) */
define      TPUNKNOWN      0      /* type not known */
#define     TPQIC24        1      /* QIC24 1/4" cartridge */
>>>#define  TPDAT          2      /* 4mm Digital Audio Tape cartridge */
#define     TPQIC150       3      /* QIC150 1/4" cartridge */
#define     TP9TRACK       4      /* 9 track reel */
#define     TP8MM_8200     5      /* 8 mm video tape cartridge */
#define     TP8MM_8500     6      /* 8 mm video tape cartridge */
#define     TPQIC1000      7      /* QIC1000 1/4" cartridge */
#define     TPQIC1350      8      /* QIC1350 1/4" cartridge */
#define     TP3480         9      /* 3480 compatible cartridge */
#define     TPDLT         10      /* DEC Digital Linear Tape cartridge */
#define     TPD2          11      /* D2 tape cartridge */
#define     TPDLTSTACKER  12      /* DEC Digital Linear Tape stacker */
```

Change to:

```
#define     TPDAT_4200C    2      /* 8 mm tape cartridge */
```

Appendix

Related files to review, based on modifications:

/dev/mt or /dev/rmt

tps1d4nrnsv.8200c

tps*n*	Indicates SCSI tape on the bus, followed by the controller ID
d*n*	Indicates actual tape drive and its ID on the bus
{v}	Variable block size device
{nr}	No Rewind on Close device
{ns}	Non-Byte Swapping device
{c}	Data Compression
{stat}	Status (special purpose: stores the drive inquiry string, which can be accessed via “the mt stat” command)

/dev/tape
/dev/nrtape
/dev/tapens
/dev/nrtapens
/dev/rmt/tps*
/dev/rmt/jag*
/usr/include/sys/param.h
/usr/include/sys/scsi.h
/etc/init.d/chkdev

tps1d4nrnsv.8200c