```
long  entryNum;                                                 /* in  */
void  *value;                                                   /* out */

CDFstatus CDFattrCorrectScope (id, attrNum, attrScope)
CDFid id;                                                       /* in  */
long  attrNum;                                                  /* in  */
long  attrScope)                                                /* in  */

CDFstatus CDFvarCreate (id, varName, dataType, numElements,
                        recVariances, dimVariances, varNum)
CDFid id;                                                       /* in  */
char  *varName;                                                 /* in  */
long  dataType;                                                 /* in  */
long  numElements;                                              /* in  */
long  recVariance;                                              /* in  */
long  dimVariances[];                                           /* in  */
long  *varNum;                                                  /* out */

long CDFvarNum (id, varName)
CDFid id;                                                       /* in  */
char  *varName;                                                 /* in  */

CDFstatus CDFvarRename (id, varNum, varName)
CDFid id;                                                       /* in  */
long  varNum;                                                   /* in  */
char  *varName;                                                 /* in  */

CDFstatus CDFvarInquire (id, varNum, varName, dataType, numElements,
                         recVariance, dimVariances)
CDFid id;                                                       /* in  */
long  varNum;                                                   /* in  */
char  *varName;                                                 /* out */
long  *dataType;                                                /* out */
long  *numElements;                                             /* out */
long  *recVariance;                                             /* out */
long  dimVariances[CDF_MAX_DIMS];                               /* out */

CDFstatus CDFvarPut (id, varNum, recNum, indices, value)
CDFid id;                                                       /* in  */
long  varNum;                                                   /* in  */
long  recNum;                                                   /* in  */
long  indices[];                                                /* in  */
void  *value;                                                   /* in  */

CDFstatus CDFvarGet (id, varNum, recNum, indices, value)
CDFid id;                                                       /* in  */
long  varNum;                                                   /* in  */
long  recNum;                                                   /* in  */
long  indices[];                                                /* in  */
void  *value;                                                   /* out */
```

```
CDFstatus CDFvarHyperPut (id, varNum, recStart, recCount, recInterval,
                          indices, counts, intervals, buffer)
CDFid id;                                                       /* in  */
long  varNum;                                                   /* in  */
long  recStart;                                                 /* in  */
long  recCount;                                                 /* in  */
long  recInterval;                                              /* in  */
long  indices[];                                                /* in  */
long  counts[];                                                 /* in  */
long  intervals[];                                              /* in  */
void  *buffer;                                                  /* in  */

CDFstatus CDFvarHyperGet (id, varNum, recStart, recCount, recInterval,
                          indices, counts, intervals, buffer)
CDFid id;                                                       /* in  */
long  varNum;                                                   /* in  */
long  recStart;                                                 /* in  */
long  recCount;                                                 /* in  */
long  recInterval;                                              /* in  */
long  indices[];                                                /* in  */
long  counts[];                                                 /* in  */
long  intervals[];                                              /* in  */
void  *buffer;                                                  /* out */

CDFstatus CDFvarClose (id, varNum)
CDFid id;                                                       /* in  */
long  varNum;                                                   /* in  */
```

D.2 Internal Interface

```
CDFstatus CDFlib (op, ...)
long  op;                                                       /* in  */

   CREATE_    CDF_                    char *CDFpath             /* in  */
                                      long numDims              /* in  */
                                      long dimSizes[]           /* in  */
                                      CDFid *id                 /* out */
              rVAR_                   char *varName             /* in  */
                                      long dataType             /* in  */
                                      long numElements          /* in  */
                                      long recVary              /* in  */
                                      long dimVarys             /* in  */
                                      long *varNum              /* out */
              zVAR_                   char *varName             /* in  */
                                      long dataType             /* in  */
                                      long numElements          /* in  */
                                      long numDims              /* in  */
                                      long dimSizes[]           /* in  */
                                      long recVary              /* in  */
```

```
                                long dimVarys                   /* in  */
                                long *varNum                    /* out */
            ATTR_               char *attrName                  /* in  */
                                long scope                      /* in  */
                                long *attrNum                   /* out */

OPEN_       CDF_                char *CDFpath                   /* in  */
                                CDFid *id                       /* out */

DELETE_     CDF_

CLOSE_      CDF_
            rVAR_
            zVAR_

SELECT_     CDF_                CDFid id                        /* in  */
            CDF_STATUS_         CDFstatus status                /* in  */
            CDF_READONLY_MODE_  long mode                       /* in  */
            CDF_zMODE_          long mode                       /* in  */
            CDF_NEGtoPOSfp0_MODE_ long mode                     /* in  */
            CDF_DECODING_       long decoding                   /* in  */
            CDF_CACHESIZE_      long numBuffers                 /* in  */
            rVAR_               long varNum                     /* in  */
            rVAR_NAME_          char *varName                   /* in  */
            rVARs_RECNUMBER_    long recNum                     /* in  */
            rVARs_RECCOUNT_     long recCount                   /* in  */
            rVARs_RECINTERVAL_  long recInterval                /* in  */
            rVARs_DIMINDICES_   long indices[]                  /* in  */
            rVARs_DIMCOUNTS_    long counts[]                   /* in  */
            rVARs_DIMINTERVALS_ long intervals[]                /* in  */
            rVAR_SEQPOS_        long recNum                     /* in  */
                                long indices[]                  /* in  */
            rVAR_CACHESIZE_     long numBuffers                 /* in  */
            rVARs_CACHESIZE_    long numBuffers                 /* in  */
            zVAR_               long varNum                     /* in  */
            zVAR_NAME_          char *varName                   /* in  */
            zVAR_RECNUMBER_     long recNum                     /* in  */
            zVAR_RECCOUNT_      long recCount                   /* in  */
            zVAR_RECINTERVAL_   long recInterval                /* in  */
            zVAR_DIMINDICES_    long indices[]                  /* in  */
            zVAR_DIMCOUNTS_     long counts[]                   /* in  */
            zVAR_DIMINTERVALS_  long intervals[]                /* in  */
            zVAR_SEQPOS_        long recNum                     /* in  */
                                long indices[]                  /* in  */
            zVAR_CACHESIZE_     long numBuffers                 /* in  */
            zVARs_CACHESIZE_    long numBuffers                 /* in  */
            ATTR_               long attrNum                    /* in  */
            ATTR_NAME_          char *attrName                  /* in  */
            gENTRY_             long entryNum                   /* in  */
            rENTRY_             long entryNum                   /* in  */
            rENTRY_NAME_        char *varName                   /* in  */
```

```
            zENTRY_                 long entryNum               /* in  */
            zENTRY_NAME_            char *varName               /* in  */

CONFIRM_    CDF_NAME_               char *CDFpath               /* out */
            CDF_READONLY_MODE_      long *mode                  /* out */
            CDF_zMODE_              long *mode                  /* out */
            CDF_NEGtoPOSfp0_MODE_   long *mode                  /* out */
            CDF_DECODING_           long *decoding              /* out */
            CDF_CACHESIZE_          long *numBuffers            /* out */
            rVAR_                   long *varNum                /* out */
            rVAR_EXISTENCE_         char *varName               /* in  */
            rVARs_RECNUMBER_        long *recNum                /* out */
            rVARs_RECCOUNT_         long *recCount              /* out */
            rVARs_RECINTERVAL_      long *recInterval           /* out */
            rVARs_DIMINDICES_       long indices[]              /* out */
            rVARs_DIMCOUNTS_        long counts[]               /* out */
            rVARs_DIMINTERVALS_     long intervals[]            /* out */
            rVAR_SEQPOS_            long *recNum                /* out */
                                    long indices[]              /* out */
            rVAR_CACHESIZE_         long *numBuffers            /* out */
            zVAR_                   long *varNum                /* out */
            zVAR_EXISTENCE_         char *varName               /* in  */
            zVAR_RECNUMBER_         long *recNum                /* out */
            zVAR_RECCOUNT_          long *recCount              /* out */
            zVAR_RECINTERVAL_       long *recInterval           /* out */
            zVAR_DIMINDICES_        long indices[]              /* out */
            zVAR_DIMCOUNTS_         long counts[]               /* out */
            zVAR_DIMINTERVALS_      long intervals[]            /* out */
            zVAR_SEQPOS_            long *recNum                /* out */
                                    long indices[]              /* out */
            zVAR_CACHESIZE_         long *numBuffers            /* out */
            ATTR_                   long *attrNum               /* out */
            ATTR_EXISTENCE_         char *attrName              /* in  */
            gENTRY_                 long *entryNum              /* out */
            rENTRY_                 long *entryNum              /* out */
            zENTRY_                 long *entryNum              /* out */
            gENTRY_EXISTENCE_       long entryNum               /* in  */
            rENTRY_EXISTENCE_       long entryNum               /* in  */
            zENTRY_EXISTENCE_       long entryNum               /* in  */

PUT_        CDF_ENCODING_           long encoding               /* in  */
            CDF_MAJORITY_           long majority               /* in  */
            CDF_FORMAT_             long format                 /* in  */
            rVAR_NAME_              char *varName               /* in  */
            rVAR_DATASPEC_          long dataType               /* in  */
                                    long numElements            /* in  */
            rVAR_RECVARY_           long recVary                /* in  */
            rVAR_DIMVARYS_          long dimVarys[]             /* in  */
            rVAR_PADVALUE_          void *value                 /* in  */
            rVAR_INITIALRECS_       long NinitialRecs           /* in  */
            rVAR_EXTENDRECS_        long NextendRecs            /* in  */
```

```
            rVAR_DATA_              void *value                 /* in  */
            rVAR_HYPERDATA_         void *buffer                /* in  */
            rVAR_SEQDATA_           void *value                 /* in  */
            rVARs_RECDATA_          void *buffer                /* in  */
            zVAR_NAME_              char *varName               /* in  */
            zVAR_DATASPEC_          long dataType               /* in  */
                                    long numElements            /* in  */
            zVAR_RECVARY_           long recVary                /* in  */
            zVAR_DIMVARYS_          long dimVarys[]             /* in  */
            zVAR_PADVALUE_          void *value                 /* in  */
            zVAR_INITIALRECS_       long NinitialRecs           /* in  */
            zVAR_EXTENDRECS_        long NextendRecs            /* in  */
            zVAR_DATA_              void *value                 /* in  */
            zVAR_HYPERDATA_         void *buffer                /* in  */
            zVAR_SEQDATA_           void *value                 /* in  */
            zVARs_RECDATA_          void *buffer                /* in  */
            ATTR_SCOPE_             long scope                  /* in  */
            ATTR_NAME_              char *attrName              /* in  */
            gENTRY_DATASPEC_        long dataType               /* in  */
                                    long numElements            /* in  */
            rENTRY_DATASPEC_        long dataType               /* in  */
                                    long numElements            /* in  */
            zENTRY_DATASPEC_        long dataType               /* in  */
                                    long numElements            /* in  */
            gENTRY_DATA_            long dataType               /* in  */
                                    long numElements            /* in  */
                                    void *value                 /* in  */
            rENTRY_DATA_            long dataType               /* in  */
                                    long numElements            /* in  */
                                    void *value                 /* in  */
            zENTRY_DATA_            long dataType               /* in  */
                                    long numElements            /* in  */
                                    void *value                 /* in  */

GET_        rVARs_NUMDIMS_          long *numDims               /* out */
            rVARs_DIMSIZES_         long dimSizes[]             /* out */
            zVAR_NUMDIMS_           long *numDims               /* out */
            zVAR_DIMSIZES_          long dimSizes[]             /* out */
            CDF_ENCODING_           long *encoding              /* out */
            CDF_MAJORITY_           long *majority              /* out */
            CDF_FORMAT_             long *format                /* out */
            CDF_COPYRIGHT_          char *copyRight             /* out */
            LIB_COPYRIGHT_          char *copyRight             /* out */
            CDF_NUMrVARS_           long *numVars               /* out */
            CDF_NUMzVARS_           long *numVars               /* out */
            CDF_NUMATTRS_           long *numAttrs              /* out */
            CDF_NUMgATTRS_          long *numAttrs              /* out */
            CDF_NUMvATTRS_          long *numAttrs              /* out */
            rVARs_MAXREC_           long *maxRec                /* out */
            zVARs_MAXREC_           long *maxRec                /* out */
            CDF_VERSION_            long *version               /* out */
```

```
CDF_RELEASE_            long *release               /* out */
CDF_INCREMENT_          long *increment             /* out */
LIB_VERSION_            long *version               /* out */
LIB_RELEASE_            long *release               /* out */
LIB_INCREMENT_          long *increment             /* out */
LIB_subINCREMENT_       char *subincrement          /* out */
rVAR_NAME_              char *varName               /* out */
rVAR_DATATYPE_          long *dataType              /* out */
rVAR_NUMELEMS_          long *numElements           /* out */
rVAR_RECVARY_           long *recVary               /* out */
rVAR_DIMVARYS_          long dimVarys[]             /* out */
rVAR_NUMBER_            char *varName               /* in  */
                        long *varNum                /* out */
rVAR_PADVALUE_          void *value                 /* out */
rVAR_EXTENDRECS_        long *NextendRecs           /* out */
rVAR_MAXREC_            long *maxRec                /* out */
rVAR_MAXallocREC_       long *maxRec                /* out */
rVAR_nINDEXRECORDS_     long *numRecords            /* out */
rVAR_nINDEXENTRIES_     long *numEntries            /* out */
rVAR_DATA_              void *value                 /* out */
rVAR_HYPERDATA_         void *buffer                /* out */
rVAR_SEQDATA_           void *value                 /* out */
rVARs_RECDATA_          void *buffer                /* out */
zVAR_NAME_              char *varName               /* out */
zVAR_DATATYPE_          long *dataType              /* out */
zVAR_NUMELEMS_          long *numElements           /* out */
zVAR_RECVARY_           long *recVary               /* out */
zVAR_DIMVARYS_          long dimVarys[]             /* out */
zVAR_NUMBER_            char *varName               /* in  */
                        long *varNum                /* out */
zVAR_PADVALUE_          void *value                 /* out */
zVAR_EXTENDRECS_        long *NextendRecs           /* out */
zVAR_MAXREC_            long *maxRec                /* out */
zVAR_MAXallocREC_       long *maxRec                /* out */
zVAR_nINDEXRECORDS_     long *numRecords            /* out */
zVAR_nINDEXENTRIES_     long *numEntries            /* out */
zVAR_DATA_              void *value                 /* out */
zVAR_HYPERDATA_         void *buffer                /* out */
zVAR_SEQDATA_           void *value                 /* out */
zVARs_RECDATA_          void *buffer                /* out */
ATTR_SCOPE_             long *scope                 /* out */
ATTR_NAME_              char *attrName              /* out */
ATTR_NUMBER_            char *attrName              /* in  */
                        long *attrNum               /* out */
ATTR_MAXgENTRY_         long *maxEntry              /* out */
ATTR_NUMgENTRIES_       long *numEntries            /* out */
ATTR_MAXrENTRY_         long *maxEntry              /* out */
ATTR_NUMrENTRIES_       long *numEntries            /* out */
ATTR_MAXzENTRY_         long *maxEntry              /* out */
ATTR_NUMzENTRIES_       long *numEntries            /* out */
gENTRY_DATATYPE_        long *dataType              /* out */
```

```
gENTRY_NUMELEMS_        long *numElements           /* out */
gENTRY_DATA_            void *value                 /* out */
rENTRY_DATATYPE_        long *dataType              /* out */
rENTRY_NUMELEMS_        long *numElements           /* out */
rENTRY_DATA_            void *value                 /* out */
zENTRY_DATATYPE_        long *dataType              /* out */
zENTRY_NUMELEMS_        long *numElements           /* out */
zENTRY_DATA_            void *value                 /* out */
STATUS_TEXT_            char *text                  /* out */
```

D.3 EPOCH Utility Routines

```
double computeEPOCH (year, month, day, hour, minute, second, msec)
long year;                                                  /* in  */
long month;                                                 /* in  */
long day;                                                   /* in  */
long hour;                                                  /* in  */
long minute;                                                /* in  */
long second;                                                /* in  */
long msec;                                                  /* in  */

void EPOCHbreakdown (epoch, year, month, day, hour, minute, second, msec)
double epoch;                                               /* in  */
long *year;                                                 /* out */
long *month;                                                /* out */
long *day;                                                  /* out */
long *hour;                                                 /* out */
long *minute;                                               /* out */
long *second;                                               /* out */
long *msec;                                                 /* out */

double parseEPOCH (epString)
char epString[EPOCH_STRING_LEN+1];                          /* in  */

void encodeEPOCH (epoch, epString)
double epoch;                                               /* in  */
char epString[EPOCH_STRING_LEN+1];                          /* out */

void encodeEPOCH1 (epoch, epString)
double epoch;                                               /* in  */
char epString[EPOCH1_STRING_LEN+1];                         /* out */

void encodeEPOCH2 (epoch, epString)
double epoch;                                               /* in  */
char epString[EPOCH2_STRING_LEN+1];                         /* out */
```

Appendix E

Fortran Programming Summary

E.1 Standard Interface

```
SUBROUTINE CDF_create (CDF_path, num_dims, dim_sizes, encoding, majority,
1                      id, status)
CHARACTER CDF_path                                                  ! in
INTEGER*4 num_dims                                                  ! in
INTEGER*4 dim_sizes(*)                                              ! in
INTEGER*4 encoding                                                  ! in
INTEGER*4 majority                                                  ! in
INTEGER*4 id                                                        ! out
INTEGER*4 status                                                    ! out

SUBROUTINE CDF_open (CDF_path, id, status)
CHARACTER CDF_path*(*)                                              ! in
INTEGER*4 id                                                        ! out
INTEGER*4 status                                                    ! out

SUBROUTINE CDF_doc (id, version, release, text, status)
INTEGER*4 id                                                        ! in
INTEGER*4 version                                                   ! out
INTEGER*4 release                                                   ! out
CHARACTER text*(CDF_DOCUMENT_LEN)                                   ! out
INTEGER*4 status                                                    ! out

SUBROUTINE CDF_inquire (id, num_dims, dim_sizes, encoding, majority,
1                       max_rec, num_vars, num_attrs, status)
INTEGER*4 id                                                        ! in
INTEGER*4 num_dims                                                  ! out
INTEGER*4 dim_sizes(CDF_MAX_DIMS)                                   ! out
INTEGER*4 encoding                                                  ! out
INTEGER*4 majority                                                  ! out
INTEGER*4 max_rec                                                   ! out
```

```
INTEGER*4 num_vars                                                  ! out
INTEGER*4 num_attrs                                                 ! out
INTEGER*4 status                                                    ! out

SUBROUTINE CDF_close (id, status)
INTEGER*4 id                                                        ! in
INTEGER*4 status                                                    ! out

SUBROUTINE CDF_delete (id, status)
INTEGER*4 id                                                        ! in
INTEGER*4 status                                                    ! out

SUBROUTINE CDF_error (status, text)
INTEGER*4 status                                                    ! in
CHARACTER text*(CDF_STATUSTEXT_LEN)                                 ! out

SUBROUTINE CDF_attr_create (id, attr_name, attr_scope, attr_num, status)
INTEGER*4 id                                                        ! in
CHARACTER attr_name*(*)                                             ! in
INTEGER*4 attr_scope                                                ! in
INTEGER*4 attr_num                                                  ! out
INTEGER*4 status                                                    ! out

INTEGER*4 CDF_attr_num (id, attr_name)
INTEGER*4 id                                                        ! in
CHARACTER attr_name*(*)                                             ! in

SUBROUTINE CDF_attr_rename (id, attr_num, attr_name, status)
INTEGER*4 id                                                        ! in
INTEGER*4 attr_num                                                  ! in
CHARACTER attr_name*(*)                                             ! in
INTEGER*4 status                                                    ! out

SUBROUTINE CDF_attr_inquire (id, attr_num, attr_name, attr_scope, max_entry,
1                            status)
INTEGER*4 id                                                        ! in
INTEGER*4 attr_num                                                  ! in
CHARACTER attr_name*(CDF_ATTR_NAME_LEN)                             ! out
INTEGER*4 attr_scope                                                ! out
INTEGER*4 max_entry                                                 ! out
INTEGER*4 status                                                    ! out

SUBROUTINE CDF_attr_entry_inquire (id, attr_num, entry_num, data_type,
1                                  num_elements, status)
INTEGER*4 id                                                        ! in
INTEGER*4 attr_num                                                  ! in
INTEGER*4 entry_num                                                 ! in
INTEGER*4 data_type                                                 ! out
INTEGER*4 num_elements                                              ! out
INTEGER*4 status                                                    ! out
```

```
SUBROUTINE CDF_attr_put (id, attr_num, entry_num, data_type, num_elements,
1                        value, status)
INTEGER*4 id                                                          ! in
INTEGER*4 attr_num                                                    ! in
INTEGER*4 entry_num                                                   ! in
INTEGER*4 data_type                                                   ! in
INTEGER*4 num_elements                                                ! in
<type>    value                                                       ! in
INTEGER*4 status                                                      ! out

SUBROUTINE CDF_attr_get (id, attr_num, entry_num, value, status)
INTEGER*4 id                                                          ! in
INTEGER*4 attr_num                                                    ! in
INTEGER*4 entry_num                                                   ! in
<type>    value                                                       ! out
INTEGER*4 status                                                      ! out

SUBROUTINE CDF_attr_correct_scope (id, attr_num, attr_scope, status)
INTEGER*4 id                                                          ! in
INTEGER*4 attr_num                                                    ! in
INTEGER*4 attr_scope                                                  ! in
INTEGER*4 status                                                      ! out

SUBROUTINE CDF_var_create (id, var_name, data_type, num_elements,
1                          rec_variance, dim_variances, var_num, status)
INTEGER*4 id                                                          ! in
CHARACTER var_name                                                    ! in
INTEGER*4 data_type                                                   ! in
INTEGER*4 num_elements                                                ! in
INTEGER*4 rec_variance                                                ! in
INTEGER*4 dim_variances(*)                                            ! in
INTEGER*4 var_num                                                     ! out
INTEGER*4 status                                                      ! out

INTEGER*4 FUNCTION CDF_var_num (id, var_name)
INTEGER*4 id                                                          ! in
CHARACTER var_name*(*)                                                ! in

SUBROUTINE CDF_var_rename (id, var_num, var_name, status)
INTEGER*4 id                                                          ! in
INTEGER*4 var_num                                                     ! in
CHARACTER var_name*(*)                                                ! in
INTEGER*4 status                                                      ! out

SUBROUTINE CDF_var_inquire (id, var_num, var_name, data_type, num_elements,
1                           rec_variance, dim_variances, status)
INTEGER*4 id                                                          ! in
INTEGER*4 var_num                                                     ! in
CHARACTER var_name*(CDF_VAR_NAME_LEN)                                 ! out
INTEGER*4 data_type                                                   ! out
INTEGER*4 num_elements                                                ! out
```

```
INTEGER*4 rec_variance                                          ! out
INTEGER*4 dim_variances(CDF_MAX_DIMS)                           ! out
INTEGER*4 status                                                ! out

SUBROUTINE CDF_var_put (id, var_num, rec_num, indices, value, status)
INTEGER*4 id                                                    ! in
INTEGER*4 var_num                                               ! in
INTEGER*4 rec_num                                               ! in
INTEGER*4 indices(*)                                            ! in
<type>    value                                                 ! in
INTEGER*4 status                                                ! out

SUBROUTINE CDF_var_get (id, var_num, rec_num, indices, value, status)
INTEGER*4 id                                                    ! in
INTEGER*4 var_num                                               ! in
INTEGER*4 rec_num                                               ! in
INTEGER*4 indices(*)                                            ! in
<type>    value                                                 ! out
INTEGER*4 status                                                ! out

SUBROUTINE CDF_var_hyper_put (id, var_num, rec_start, rec_count, rec_interval,
1                             indices, counts, intervals, buffer, status)
INTEGER*4 id                                                    ! in
INTEGER*4 var_num                                               ! in
INTEGER*4 rec_start                                             ! in
INTEGER*4 rec_count                                             ! in
INTEGER*4 rec_interval                                          ! in
INTEGER*4 indices(*)                                            ! in
INTEGER*4 counts(*)                                             ! in
INTEGER*4 intervals(*)                                          ! in
<type>    buffer                                                ! in
INTEGER*4 status                                                ! out

SUBROUTINE CDF_var_hyper_get (id, var_num, rec_start, rec_count, rec_interval,
1                             indices, counts, intervals, buffer, status)
INTEGER*4 id                                                    ! in
INTEGER*4 var_num                                               ! in
INTEGER*4 rec_start                                             ! in
INTEGER*4 rec_count                                             ! in
INTEGER*4 rec_interval                                          ! in
INTEGER*4 indices(*)                                            ! in
INTEGER*4 counts(*)                                             ! in
INTEGER*4 intervals(*)                                          ! in
<type>    buffer                                                ! out
INTEGER*4 status                                                ! out

SUBROUTINE CDF_var_close (id, var_num)
INTEGER*4 id                                                    ! in
INTEGER*4 var_num                                               ! in
```

E.2 Internal Interface

```
INTEGER*4 FUNCTION CDF_lib (op, ..., status)
INTEGER*4 op                                                        ! in
.
.
.
INTEGER*4 status                                                    ! out

   CREATE_   CDF_                    CHARACTER CDF_path*(*)          ! in
                                     INTEGER*4 num_dims              ! in
                                     INTEGER*4 dim_sizes(*)          ! in
                                     INTEGER*4 id                    ! out
             rVAR_                   CHARACTER var_name*(*)          ! in
                                     INTEGER*4 data_type             ! in
                                     INTEGER*4 num_elements          ! in
                                     INTEGER*4 rec_vary              ! in
                                     INTEGER*4 dim_varys             ! in
                                     INTEGER*4 var_num               ! out
             zVAR_                   CHARACTER var_name*(*)          ! in
                                     INTEGER*4 data_type             ! in
                                     INTEGER*4 num_elements          ! in
                                     INTEGER*4 num_dims              ! in
                                     INTEGER*4 dim_sizes(*)          ! in
                                     INTEGER*4 rec_vary              ! in
                                     INTEGER*4 dim_varys             ! in
                                     INTEGER*4 var_num               ! out
             ATTR_                   CHARACTER attr_name*(*)         ! in
                                     INTEGER*4 scope                 ! in
                                     INTEGER*4 attr_num              ! out

   OPEN_     CDF_                    CHARACTER CDF_path*(*)          ! in
                                     INTEGER*4 id                    ! out

   DELETE_   CDF_

   CLOSE_    CDF_
             rVAR_
             zVAR_

   SELECT_   CDF_                    INTEGER*4 id                    ! in
             CDF_STATUS_             INTEGER*4 status                ! in
             CDF_READONLY_MODE_      INTEGER*4 mode                  ! in
             CDF_zMODE_              INTEGER*4 mode                  ! in
             CDF_NEGtoPOSfp0_MODE_   INTEGER*4 mode                  ! in
             CDF_DECODING_           INTEGER*4 decoding              ! in
             CDF_CACHESIZE_          INTEGER*4 num_buffers           ! in
             rVAR_                   INTEGER*4 var_num               ! in
             rVAR_NAME_              CHARACTER var_name*(*)          ! in
             rVARs_RECNUMBER_        INTEGER*4 rec_num               ! in
```

```
            rVARs_RECCOUNT_          INTEGER*4 rec_count              ! in
            rVARs_RECINTERVAL_       INTEGER*4 rec_interval           ! in
            rVARs_DIMINDICES_        INTEGER*4 indices(*)             ! in
            rVARs_DIMCOUNTS_         INTEGER*4 counts(*)              ! in
            rVARs_DIMINTERVALS_      INTEGER*4 intervals(*)           ! in
            rVAR_SEQPOS_             INTEGER*4 rec_num                ! in
                                     INTEGER*4 indices(*)             ! in
            rVAR_CACHESIZE_          INTEGER*4 num_buffers            ! in
            rVARs_CACHESIZE_         INTEGER*4 num_buffers            ! in
            zVAR_                    INTEGER*4 var_num                ! in
            zVAR_NAME_               CHARACTER var_name*(*)           ! in
            zVAR_RECNUMBER_          INTEGER*4 rec_num                ! in
            zVAR_RECCOUNT_           INTEGER*4 rec_count              ! in
            zVAR_RECINTERVAL_        INTEGER*4 rec_interval           ! in
            zVAR_DIMINDICES_         INTEGER*4 indices(*)             ! in
            zVAR_DIMCOUNTS_          INTEGER*4 counts(*)              ! in
            zVAR_DIMINTERVALS_       INTEGER*4 intervals(*)           ! in
            zVAR_SEQPOS_             INTEGER*4 rec_num                ! in
                                     INTEGER*4 indices(*)             ! in
            zVAR_CACHESIZE_          INTEGER*4 num_buffers            ! in
            zVARs_CACHESIZE_         INTEGER*4 num_buffers            ! in
            ATTR_                    INTEGER*4 attr_num               ! in
            ATTR_NAME_               CHARACTER attr_name*(*)          ! in
            gENTRY_                  INTEGER*4 entry_num              ! in
            rENTRY_                  INTEGER*4 entry_num              ! in
            rENTRY_NAME_             CHARACTER var_name*(*)           ! in
            zENTRY_                  INTEGER*4 entry_num              ! in
            zENTRY_NAME_             CHARACTER var_name*(*)           ! in

CONFIRM_    CDF_NAME_                CHARACTER CDF_path*(*)           ! out
            CDF_READONLY_MODE_       INTEGER*4 mode                   ! out
            CDF_zMODE_               INTEGER*4 mode                   ! out
            CDF_NEGtoPOSfp0_MODE_    INTEGER*4 mode                   ! out
            CDF_DECODING_            INTEGER*4 decoding               ! out
            CDF_CACHESIZE_           INTEGER*4 num_buffers            ! out
            rVAR_                    INTEGER*4 var_num                ! out
            rVAR_EXISTENCE_          CHARACTER var_name*(*)           ! in
            rVARs_RECNUMBER_         INTEGER*4 rec_num                ! out
            rVARs_RECCOUNT_          INTEGER*4 rec_count              ! out
            rVARs_RECINTERVAL_       INTEGER*4 rec_interval           ! out
            rVARs_DIMINDICES_        INTEGER*4 indices(*)             ! out
            rVARs_DIMCOUNTS_         INTEGER*4 counts(*)              ! out
            rVARs_DIMINTERVALS_      INTEGER*4 intervals(*)           ! out
            rVAR_SEQPOS_             INTEGER*4 rec_num                ! out
                                     INTEGER*4 indices(*)             ! out
            rVAR_CACHESIZE_          INTEGER*4 num_buffers            ! out
            zVAR_                    INTEGER*4 var_num                ! out
            zVAR_EXISTENCE_          CHARACTER var_name*(*)           ! in
            zVAR_RECNUMBER_          INTEGER*4 rec_num                ! out
            zVAR_RECCOUNT_           INTEGER*4 rec_count              ! out
            zVAR_RECINTERVAL_        INTEGER*4 rec_interval           ! out
```

```
            zVAR_DIMINDICES_        INTEGER*4 indices(*)              ! out
            zVAR_DIMCOUNTS_         INTEGER*4 counts(*)               ! out
            zVAR_DIMINTERVALS_      INTEGER*4 intervals(*)            ! out
            zVAR_SEQPOS_            INTEGER*4 rec_num                 ! out
                                    INTEGER*4 indices(*)              ! out
            zVAR_CACHESIZE_         INTEGER*4 num_buffers             ! out
            ATTR_                   INTEGER*4 attr_num                ! out
            ATTR_EXISTENCE_         CHARACTER attr_name*(*)           ! in
            gENTRY_                 INTEGER*4 entry_num               ! out
            rENTRY_                 INTEGER*4 entry_num               ! out
            zENTRY_                 INTEGER*4 entry_num               ! out
            gENTRY_EXISTENCE_       INTEGER*4 entry_num               ! in
            rENTRY_EXISTENCE_       INTEGER*4 entry_num               ! in
            zENTRY_EXISTENCE_       INTEGER*4 entry_num               ! in

PUT_        CDF_ENCODING_           INTEGER*4 encoding                ! in
            CDF_MAJORITY_           INTEGER*4 majority                ! in
            CDF_FORMAT_             INTEGER*4 format                  ! in
            rVAR_NAME_              CHARACTER var_name*(*)            ! in
            rVAR_DATASPEC_          INTEGER*4 data_type               ! in
                                    INTEGER*4 num_elements            ! in
            rVAR_RECVARY_           INTEGER*4 rec_vary                ! in
            rVAR_DIMVARYS_          INTEGER*4 dim_varys(*)            ! in
            rVAR_PADVALUE_          <type> value                      ! in
            rVAR_INITIALRECS_       INTEGER*4 n_initial_recs          ! in
            rVAR_EXTENDRECS_        INTEGER*4 _nextend_recs           ! in
            rVAR_DATA_              <type> value                      ! in
            rVAR_HYPERDATA_         <type> buffer                     ! in
            rVAR_SEQDATA_           <type> value                      ! in
            rVARs_RECDATA_          <type> buffer                     ! in
            zVAR_NAME_              CHARACTER var_name*(*)            ! in
            zVAR_DATASPEC_          INTEGER*4 data_type               ! in
                                    INTEGER*4 num_elements            ! in
            zVAR_RECVARY_           INTEGER*4 rec_vary                ! in
            zVAR_DIMVARYS_          INTEGER*4 dim_varys(*)            ! in
            zVAR_PADVALUE_          <type> value                      ! in
            zVAR_INITIALRECS_       INTEGER*4 n_initial_recs          ! in
            zVAR_EXTENDRECS_        INTEGER*4 _nextend_recs           ! in
            zVAR_DATA_              <type> value                      ! in
            zVAR_HYPERDATA_         <type> buffer                     ! in
            zVAR_SEQDATA_           <type> value                      ! in
            zVARs_RECDATA_          <type> buffer                     ! in
            ATTR_SCOPE_             INTEGER*4 scope                   ! in
            ATTR_NAME_              CHARACTER attr_name*(*)           ! in
            gENTRY_DATASPEC_        INTEGER*4 data_type               ! in
                                    INTEGER*4 num_elements            ! in
            rENTRY_DATASPEC_        INTEGER*4 data_type               ! in
                                    INTEGER*4 num_elements            ! in
            zENTRY_DATASPEC_        INTEGER*4 data_type               ! in
                                    INTEGER*4 num_elements            ! in
            gENTRY_DATA_            INTEGER*4 data_type               ! in
```

```
                                INTEGER*4 num_elements              ! in
                                <type> value                        ! in
            rENTRY_DATA_        INTEGER*4 data_type                 ! in
                                INTEGER*4 num_elements              ! in
                                <type> value                        ! in
            zENTRY_DATA_        INTEGER*4 data_type                 ! in
                                INTEGER*4 num_elements              ! in
                                <type> value                        ! in

GET_        rVARs_NUMDIMS_      INTEGER*4 num_dims                  ! out
            rVARs_DIMSIZES_     INTEGER*4 dim_sizes(*)              ! out
            zVAR_NUMDIMS_       INTEGER*4 num_dims                  ! out
            zVAR_DIMSIZES_      INTEGER*4 dim_sizes(*)              ! out
            CDF_ENCODING_       INTEGER*4 encoding                  ! out
            CDF_MAJORITY_       INTEGER*4 majority                  ! out
            CDF_FORMAT_         INTEGER*4 format                    ! out
            CDF_COPYRIGHT_      CHARACTER copy_right*(*)            ! out
            LIB_COPYRIGHT_      CHARACTER copy_right*(*)            ! out
            CDF_NUMrVARS_       INTEGER*4 num_vars                  ! out
            CDF_NUMzVARS_       INTEGER*4 num_vars                  ! out
            CDF_NUMATTRS_       INTEGER*4 num_attrs                 ! out
            CDF_NUMgATTRS_      INTEGER*4 num_attrs                 ! out
            CDF_NUMvATTRS_      INTEGER*4 num_attrs                 ! out
            rVARs_MAXREC_       INTEGER*4 max_rec                   ! out
            zVARs_MAXREC_       INTEGER*4 max_rec                   ! out
            CDF_VERSION_        INTEGER*4 version                   ! out
            CDF_RELEASE_        INTEGER*4 release                   ! out
            CDF_INCREMENT_      INTEGER*4 increment                 ! out
            LIB_VERSION_        INTEGER*4 version                   ! out
            LIB_RELEASE_        INTEGER*4 release                   ! out
            LIB_INCREMENT_      INTEGER*4 increment                 ! out
            LIB_subINCREMENT_   CHARACTER subincrement*1            ! out
            rVAR_NAME_          CHARACTER var_name*(*)              ! out
            rVAR_DATATYPE_      INTEGER*4 data_type                 ! out
            rVAR_NUMELEMS_      INTEGER*4 num_elements              ! out
            rVAR_RECVARY_       INTEGER*4 rec_vary                  ! out
            rVAR_DIMVARYS_      INTEGER*4 dim_varys(*)              ! out
            rVAR_NUMBER_        CHARACTER var_name*(*)              ! in
                                INTEGER*4 var_num                   ! out
            rVAR_PADVALUE_      <type> value                        ! out
            rVAR_EXTENDRECS_    INTEGER*4 n_extend_recs             ! out
            rVAR_MAXREC_        INTEGER*4 max_rec                   ! out
            rVAR_MAXallocREC_   INTEGER*4 max_rec                   ! out
            rVAR_nINDEXRECORDS_ INTEGER*4 num_records               ! out
            rVAR_nINDEXENTRIES_ INTEGER*4 num_entries               ! out
            rVAR_DATA_          <type> value                        ! out
            rVAR_HYPERDATA_     <type> buffer                       ! out
            rVAR_SEQDATA_       <type> value                        ! out
            rVARs_RECDATA_      <type> buffer                       ! out
            zVAR_NAME_          CHARACTER var_name*(*)              ! out
            zVAR_DATATYPE_      INTEGER*4 data_type                 ! out
```

```
zVAR_NUMELEMS_          INTEGER*4 num_elements          ! out
zVAR_RECVARY_           INTEGER*4 rec_vary              ! out
zVAR_DIMVARYS_          INTEGER*4 dim_varys(*)          ! out
zVAR_NUMBER_            CHARACTER var_name*(*)          ! in
                        INTEGER*4 var_num               ! out
zVAR_PADVALUE_          <type> value                    ! out
zVAR_EXTENDRECS_        INTEGER*4 n_extend_recs         ! out
zVAR_MAXREC_            INTEGER*4 max_rec               ! out
zVAR_MAXallocREC_       INTEGER*4 max_rec               ! out
zVAR_nINDEXRECORDS_     INTEGER*4 num_records           ! out
zVAR_nINDEXENTRIES_     INTEGER*4 num_entries           ! out
zVAR_DATA_              <type> value                    ! out
zVAR_HYPERDATA_         <type> buffer                   ! out
zVAR_SEQDATA_           <type> value                    ! out
zVARs_RECDATA_          <type> buffer                   ! out
ATTR_SCOPE_             INTEGER*4 scope                 ! out
ATTR_NAME_              CHARACTER attr_name*(*)         ! out
ATTR_NUMBER_            CHARACTER attr_name*(*)         ! in
                        INTEGER*4 attr_num              ! out
ATTR_MAXgENTRY_         INTEGER*4 max_entry             ! out
ATTR_NUMgENTRIES_       INTEGER*4 num_entries           ! out
ATTR_MAXrENTRY_         INTEGER*4 max_entry             ! out
ATTR_NUMrENTRIES_       INTEGER*4 num_entries           ! out
ATTR_MAXzENTRY_         INTEGER*4 max_entry             ! out
ATTR_NUMzENTRIES_       INTEGER*4 num_entries           ! out
gENTRY_DATATYPE_        INTEGER*4 data_type             ! out
gENTRY_NUMELEMS_        INTEGER*4 num_elements          ! out
gENTRY_DATA_            <type> value                    ! out
rENTRY_DATATYPE_        INTEGER*4 data_type             ! out
rENTRY_NUMELEMS_        INTEGER*4 num_elements          ! out
rENTRY_DATA_            <type> value                    ! out
zENTRY_DATATYPE_        INTEGER*4 data_type             ! out
zENTRY_NUMELEMS_        INTEGER*4 num_elements          ! out
zENTRY_DATA_            <type> value                    ! out
STATUS_TEXT_            CHARACTER text*(*)              ! out
```

E.3 EPOCH Utility Routines

```
SUBROUTINE compute_EPOCH (year, month, day, hour, minute, second, msec, epoch)
INTEGER*4 year                                                          ! in
INTEGER*4 month                                                         ! in
INTEGER*4 day                                                           ! in
INTEGER*4 hour                                                          ! in
INTEGER*4 minute                                                        ! in
INTEGER*4 second                                                        ! in
INTEGER*4 msec                                                          ! in
REAL*8    epoch                                                         ! out

SUBROUTINE EPOCH_breakdown (epoch, year, month, day, hour, minute, second,
```

```
1                           msec)
REAL*8    epoch                                                 ! in
INTEGER*4 year                                                  ! out
INTEGER*4 month                                                 ! out
INTEGER*4 day                                                   ! out
INTEGER*4 hour                                                  ! out
INTEGER*4 minute                                                ! out
INTEGER*4 second                                                ! out
INTEGER*4 msec                                                  ! out

SUBROUTINE parse_EPOCH (ep_string, epoch)
CHARACTER ep_string*(EPOCH_STRING_LEN)                          ! in
REAL*8    epoch                                                 ! out

SUBROUTINE parse_EPOCH (ep_string, epoch)
CHARACTER ep_string*(EPOCH_STRING_LEN)                          ! in
REAL*8    epoch                                                 ! out

SUBROUTINE encode_EPOCH (epoch, ep_string)
REAL*8    epoch                                                 ! in
CHARACTER ep_string*(EPOCH_STRING_LEN)                          ! out

SUBROUTINE encode_EPOCH1 (epoch, ep_string)
REAL*8    epoch                                                 ! in
CHARACTER ep_string*(EPOCH1_STRING_LEN)                         ! out

SUBROUTINE encode_EPOCH2 (epoch, ep_string)
REAL*8    epoch                                                 ! in
CHARACTER ep_string*(EPOCH2_STRING_LEN)                         ! out
```

Appendix F

CDF Release Notes

F.1 Introduction

This chapter should provide you with all of the information you need to know to begin using CDF V2.4 assuming that you are already familar with CDF V2.3. For additional information contact CDF User Support.

F.2 Supported Systems

CDF V2.4 is currently supported on the following computers/operating systems.

1. VAX (VMS)
2. Sun (SunOS & SOLARIS)
3. DECstation (ULTRIX)
4. Silicon Graphics Iris & Power Series (IRIX)
5. IBM RS6000 series (AIX)
6. HP 9000 series (HP-UX)
7. IBM PC (MS-DOS)
8. NeXT (Mach)
9. DEC Alpha (OSF/1 & OpenVMS)

Additional ports are planned for the future. They include Cray (UNICOS), Macintosh (MacOS & AUX), and a 32-bit distribution for the IBM PC (MS-DOS).

F.3 Changes for CDF V2.4

Several changes have been made to the CDF distribution for V2.4. CDF V2.4 differs from CDF V2.3 in the following ways.

1. The distribution has been ported to the DEC Alpha (OSF/1 & OpenVMS) and the Sun (SOLARIS). When OpenVMS is run on a DEC Alpha, both the `D_FLOAT` and `G_FLOAT` representations are supported for double-precision floating-point values. When the CDF distribution is built on a DEC Alpha running OpenVMS, an option exists to build the distribution with a default of `D_FLOAT` or `G_FLOAT` as the host encoding/decoding representation.

2. An open CDF may now be configured into zMode. This causes the rVariables of a CDF to appear as zVariables (already existing zVariables are not affected). This mode is provided to assist in the transition to zVariables. The toolkit programs have also been modified to allow CDFs to be placed into zMode. Section 2.1.2 describes zMode in detail.

3. Support for the Internal Interface (`CDFlib`) has been added to the IDL interface provided with the CDF distribution (the CDF/IDL interface). IDL has also added this support to their CDF interface (in a limited way). The EPOCH manipulation routines have also been added to the IDL interface provided with the CDF distribution. In addition, an on-line help file for the IDL interface provided with the CDF distribution is available.

4. It is now possible to request a decoding other than that of the host computer when attribute entry and variable values are passed out by the CDF library. For example, VAX encoded values may be requested while running on a Sun computer. This has been provided to assist in the development of client/server systems where the server running on one type of computer reads data values out of a CDF and then transfers those values to a client running on a different kind of computer. The server would request the host decoding of the client computer before reading the values. No conversions would be necessary by the client. Section 2.2.8 describes this option in more detail.

5. A new toolkit program, `CDFedit`, has been added to the distribution. `CDFedit` allows virtually all of the contents of a CDF to be displayed and/or modified.

6. When using the Internal Interface in a C/Fortran application, the need to select the current CDF in every call to `CDFlib`/`CDF_lib` has been eliminated. The current CDF is maintained by the CDF library from one call to the next of `CDFlib`/`CDF_lib`. In CDF's IDL interface, however, selecting the current CDF is still required in each call to the Internal Interface (`CDFlib`).

7. Support for the Internal Interface from Fortran applications (`CDF_lib`) on the IBM PC has been added. Its use requires an additional include file to be included by an application.

8. The ability to read/write a full-physical record from/to up to all of the rVariables/zVariables with a single call to the CDF library has been added to the distribution. This mode of access is referred to as multiple variable access and is described in Section 2.3.15.

9. An operation has been added to the Internal Interface that allows the current rEntry/zEntry numbers to be selected by rVariable/zVariable name.

10. An option has been added to the CDF library that allows an application program to specify the number of cache buffers to be used with an open file. Section 2.1.4 describes the caching scheme used by the CDF library.