Inter-Client Exchange Library

X Consortium Standard

Ralph Mor, X Consortium

Inter-Client Exchange Library: X Consortium Standard

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Chapter 1. Overview of ICE

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Chapter 2. The ICE Library - C Language Interface to ICE

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Chapter 3. Intended Audience

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Chapter 4. Header Files and Library Name

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Chapter 5. Note on Prefixes

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Chapter 6. Protocol Registration

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/ IceRegisterForProtocolSetup %! & ! $ & $ % &
ProtocolSetup

```
int IceRegisterForProtocolSetup( *protocol_name, *vendor, *release,
version_count, *version_recs, auth_count, **auth_names, *auth_procs,
io_error_proc);
```

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/ IceIOErrorProc & &D 0 D $ % 7 2 & & ! @ & $
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/ IceRegisterForProtocolReply %! & ! $ & $ % &
$ ProtocolSetup' ProtocolReply

Bool **IceRegisterForProtocolReply**(**protocol_name*, **vendor*, **release*, *version_count*, **version_recs*, *auth_count*, ***auth_names*, **auth_procs*, *host_based_auth_proc*, *protocol_setup_proc*, *protocol_activate_proc*, *io_error_proc*);

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```
Bool HostBasedAuthProc( *host_name);
```

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& ProtocolSetup

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ProtocolReply;! !$:9== % & J& 0 J & % $
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Status **ProtocolSetupProc**(*ice_conn*, *major_version*, *minor_version*, **vendor*, **release*, **client_data_ret*, ***failure_reason_ret*);

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/ IceProtocolActivateProc & &D $% $ % '.

void **ProtocolActivateProc**(*ice_conn*, *client_data*);

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/ & $ IceProtocolSetupProc & &D

/ IceIOErrorProc & &D 0D$ % 72 & & ! @ & $
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Callbacks for Processing Messages

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PoProcessMsgProc & &D 0D$

void **PoProcessMsgProc**(*ice_conn*, *client_data*, *opcode*, *length*, *swap*, **reply_wait*, **reply_ready_ret*);

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void **IcePaProcessMsgProc**(*ice_conn*, *client_data*, *opcode*, *length*, *swap*);

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IceReplyWaitInfo & "- ," & $ $ F! & !" %
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Authentication Methods

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&

IcePoAuthStatus **IcePoAuthStatus** (*ice_conn*, *client_data*, *opcode*);

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I IcePoAuthHaveReply 0

I IcePoAuthRejected ! & - & $

I IcePoAuthFailed ! & % $

I IcePoAuthDoneCleanup $ & !

IcePaAuthProc & &D 0 D $ % & & 0 $ ProtocolSet-
up

IcePoAuthStatus **PoAuthStatus** (*ice_conn*, **auth_state_ptr*, *swap*, *auth_datalen*, *auth_data*, **reply_datalen_ret*, **reply_data_ret*, ***error_string_ret*);

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I IcePaAuthFailed ! & % $

Chapter 7. ICE Connections

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Opening an ICE Connection

/ 72 & & ' & (' % & & +
! IceOpenConnection

```
IceConn IceOpenConnection( *network_ids_list, context,
must_authenticate, major_opcode_check, error_length,
*error_string_ret);
```

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Listening for ICE Connections

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IceListenForWellKnownConnections & % & & 6
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& & " $"D " 0 & %
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$ -& " *!& & " ! IceListenForWell-
KnownConnections &% " % -&

Status **IceListenForConnections**(*count_ret, **listen_objs_ret,
error_length, *error_string_ret);

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J !$

/ ! 0 ! % IceListenForConnections A % % ! $ 0
0 ! % !&&

Status **IceListenForWellKnownConnections**(*port_id, *count_ret,
**listen_objs_ret, error_length, *error_string_ret);

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/ & $ % - & ! IceFreeListenObjs

```
void IceFreeListenObjs( count,  *listen_objs);
```

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/ $ & ! IceGetListenConnectionNumber

```
int IceGetListenConnectionNumber( *listen_objs);
```

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ConnectionString

```
char IceGetListenConnectionString( listen_obj);
```

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% " & A $ IceOpenConnection ! IceComposeNetworkIdList

```
char IceComposeNetworkIdList( count,  *listen_objs);
```

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Host Based Authentication for ICE Connections

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IceSetHostBasedAuthProc %!&

```
void IceSetHostBasedAuthProc( listen_obj,  host_based_auth_proc);
```

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```
Bool HostBasedAuthProc( *host_name);
```

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Accepting ICE Connections

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72& & -&

```
IceConn IceAcceptConnection( listen_obj,  *status_ret);
```

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/ !J !" % % ' 0 !.

I IceAcceptSuccess && !&& $$ $ %!& !
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I IceAcceptFailure && % $ $ %!& ! :9==

I IceAcceptBadMalloc "" & % $ $ %!& ! :9==

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```
new_ice_conn = IceAcceptConnection (listen_obj, &accept_status);
if (accept_status != IceAcceptSuccess)
{
     close the file descriptor and return
}

status = IceConnectionStatus (new_ice_conn);
time_start = time_now;

while (status == IceConnectPending)
{
     select() on {new_ice_conn, all open connections}

     for (each ice_conn in the list of open connections)
          if (data ready on ice_conn)
          {
               status = IceProcessMessages (ice_conn, NULL, NULL);
               if (status == IceProcessMessagesIOError)
                    IceCloseConnection(ice_conn);
          }
     if data ready on new_ice_conn
     {
          /*
          * IceProcessMessages is called until the connection
          * is non-pending.  Doing so handles the connection
          * setup request and any authentication requirements.
          */

          IceProcessMessages ( new_ice_conn, NULL, NULL);
          status = IceConnectionStatus (new_ice_conn);
     }
     else
     {
          if (time_now - time_start > MAX_WAIT_TIME)
               status = IceConnectRejected;
     }
```

```
}

if (status == IceConnectAccepted)
{
     Add new_ice_conn to the list of open connections
}
else
{
     IceCloseConnection
     new_ice_conn
}
```

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& $ & 0 ProtocolSetup(0$$ IceRegisterForProto-
colReply' & $+ $ ProtocolSetup(0$$ IceRegisterForPro-
tocolSetup' & $+

Closing ICE Connections

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tion! IceCloseConnection

IceCloseStatus **IceCloseConnection**(*ice_conn*);

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nection & $' $ IceProcessMessages/ ' & &
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! % IceProcessMessagesConnectionClosed

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I IceStartedShutdownNegotiation & & ' & $ "
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! % IceProcessMessagesConnectionClosed

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downNegotiation %!& !$ & $! %% !$' /
' 0 IceCloseConnection % "' D & &

void **IceSetShutdownNegotiation**(*ice_conn*, *negotiate*);

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7%False !$' ' ! $ %%

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downNegotiation

Bool **IceCheckShutdownNegotiation**(*ice_conn*);

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IceCheckShutdownNegotiation ! True % !$' ' D
& & & L ' ! False: $%! %
& & 7 & & $' IceSetShutdownNegotiation %!&

Connection Watch Procedures

/ $$ ' & &$! ' & $ & " 72 '& &
0 IceOpenConnection IceAcceptConnection & & & 0
IceCloseConnection! IceAddConnectionWatch

Status **IceAddConnectionWatch**(*watch_proc*, *client_data*);

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! ' & &$! " $' 72 : !"
!$ "$! $ % 0&

7% " 72& & ' $ & $ 72 "
' & &$! $ ' & &$! ' 0D$
% & % 72& & (' !" True

/ ' & &$! % IceWatchProc

void **WatchProc**(*ice_conn*, *client_data*, *opening*, **watch_data*);

/ $ & $72& & IceConnectionNumber
% $ & & $' & &

$ & % $ & IceAddConnectionWatch

7%True & & $ 7% False & &
& $

!$ 0 & $

7% True & !$ N' & J$ $ "
$ 0 ! & & & $ $ ' & &$! 0D$
' False

/ "0 ' & &$! ! IceRemoveConnectionWatch

void **IceRemoveConnectionWatch**(*watch_proc*, *client_data*);

/ ' & &$! ' $ IceAddConnectionWatch

/ & J$ ' $ IceAddConnectionWatch

Chapter 8. Protocol Setup and Shutdown

/ & 0 & 0 72& & ! IceProtocolSetup

IceProtocolSetupStatus **IceProtocolSetup**(*ice_conn*, *my_opcode*, *client_data*, *must_authenticate*, **major_version_ret*, **minor_version_ret*, ***vendor_ret*, ***release_ret*, *error_length*, **error_string_ret*);

60 $72& & -&

/ "- &$ % & ! ! $
IceRegisterForProtocolSetup

/ & $ $ ' $
IcePoProcessMsgProc& &D

7%True & " ! &

/ "- 0 % & ! $! $

/ " 0 % & ! $! $

/ 0 $ & % $ & &&

/ & % $ & &&

* & % % J J !" $

! ! " $ " % /
J J !" ! ! $""
: " J ! $

/ 0 $ J $ J !$ % $' free'
$ $

IceProtocolSetup ! % % ' 0 ! .

I IceProtocolSetupSuccess "- J0 J " J0 J
0 $ J J

I IceProtocolSetupFailure IceProtocolSetupIOError & &D
J J % % ! / "- J0 J " J0 J
0 $ J J

I IceProtocolAlreadyActive & $ & 0 & &
/ "- J0 J " J0 J 0 $ J J

/ % 72 ' 0 & ' ! $ 72
& & ! IceProtocolShutdown

Status **IceProtocolShutdown**(*ice_conn*, *major_opcode*);

60 $72& & -&

/ "- &$ % & !$'

/ ! 0 ! % IceProtocolShutdown A % % ! $ 0 0 !
% !&&

4 ! ' &&! % "- &$ ' 0 $3 & %
"- &$ ' 0 & 0 $ & & ? & 0 $ ' "
ProtocolSetup !&& $$ & & : 72$ $% '
& ! & & !$'

Chapter 9. Processing Messages

/ & &" " 72& & ! IceProcessMessages

IceProcessMessagesStatus **IceProcessMessages**(*ice_conn*, **reply_wait*, **reply_ready_ret*);

60 $72& & -&

7$& % ' $%

7% True ! $

IceProcessMessages !$ '' .

I 7 % & " " $ &D & IceProcessMes-
sages $!

I 7 & $ & & IceProcessMessages' J' :9==
select ' $ $ 72& & /
72 " & A " &" " : "
&D$% ' & $ 0D & &D

IceReplyWaitInfo& "-," &$ $ F! & !" %
" % '& ' $7 &
" % $ (& !$& IcePointer
+ 7 " & ' 0 " %@$ A $
& ' % ' 0 0$$!&! $
%@$ A $ 7% 0 $ '!$ @ & $
IcePoProcessMsgProc& &D' 0 & $$ "" $
(+ "" %@$ A !&! 7% $ 0
(% @" 0 + & ' %
'!$ -! %@$ A & $ $
IcePoProcessMsgProc& &D'!$ & $
7 % & & 0 % ! ""
& $ %

```
typedef struct {
     unsigned long sequence_of_request;
     int major_opcode_of_request;
     int minor_opcode_of_request;
     IcePointer reply;
} IceReplyWaitInfo;
```

7% J' :9== $ IceProcessMessages
! J' (& &D' $+
J $J !" ' True

7% J' :9== & " :9==% J $J $
! $ 0 !' $

IceProcessMessages ! % % ' 0 !.

I IceProcessMessagesSuccess &&! $

I IceProcessMessagesIOError 73 &&! $ $ & "! @ &
& & & & IceCloseConnection

I IceProcessMessagesConnectionClosed 72 & & & $
(& % & & ' $% $ &! % !$'
&! IceProcessMessages 0 ' A + 8 " &
& 72& & & % $

Chapter 10. Ping

/ $)#)" & $ % 72& & !
IcePing

```
Status IcePing( ice_conn, ping_reply_proc, client_data);
```

60 $72& & -&

/ & &D 0D ' # 0

/ ' $ IcePingReplyProc & &D

IcePing ! A % % ! $ 0 0 ! % !&&

5 IceProcessMessages & # ' 0D IcePingReplyProc & &D

```
void PingReplyProc( ice_conn, client_data);
```

60 $72& & -&

/ & $ &% $ & IcePing

Chapter 11. Using ICElib Informational Functions

```
IceConnectStatus IceConnectionStatus( ice_conn);

IceConnectionStatus !    ! % 72& & /    !
0 ! .

I IceConnectPending & &    0 $ (    ! &    D
    & + /    0  & &  &  $                    IceAcceptConnection

I IceConnectAccepted  & &    && $ /    0
  & &  &  $        IceAcceptConnection

I IceConnectRejected  & &  $  - & $ (    ! &
  % $+ /    0  & &  &  $                  IceAcceptConnection

I IceConnectIOError  73    &&! $  & &

char *IceVendor( ice_conn);

IceVendor !  72   0 $ $ % &  %     $ %
& &  /    !$ % $'  &                  free'     $ $

char *IceRelease( ice_conn);

IceRelease !     $ % &  %  72        $
%  & &  /    !$ % $'  &                    free'
 $ $

int IceProtocolVersion( ice_conn);

IceProtocolVersion !  "- 0  %  72  &    &
 &

int IceProtocolRevision( ice_conn);

IceProtocolRevision !  "  0  %  72  &    &
 &

int IceConnectionNumber( ice_conn);

IceConnectionNumber !  % $ &  %  72& &

char *IceConnectionString( ice_conn);

IceConnectionString !   ' D 78 %  &    && $  &
 &  /    !$ % $'  &                  free'     $ $

unsigned long IceLastSentSequenceNumber( ice_conn);

IceLastSentSequenceNumber !   F! & !"  %    "
    72& &

unsigned long IceLastReceivedSequenceNumber( ice_conn);
```

IceLastReceivedSequenceNumber ! F!& !" % "
&0$ 72& &

```
Bool IceSwapping( ice_conn);
```

IceSwapping ! True % ' & ' $ "
72& &

```
IcePointer IceGetContext( ice_conn);
```

IceGetContext ! & @ & $' & & & $
IceOpenConnection

Chapter 12. ICE Messages

6 72" 0 $$E $ / 72 "& $ $
' " % ' " & 0 % " $.

```
CARD8 major_opcode;
CARD8 minor_opcode;
CARD8 data[2];
CARD32 length B32;
```

/ $ $ % " $ & ! $ $$ /
% $ &% $! %E

Sending ICE Messages

/ 72 " ! ! !%% ! $ % " # &
$ % 72" & & " $ %!
! ! !%% "

7% 73 &&! $ 72 & & ' '
$ 4 %! % "

/ A % 72 ! ! !%% ! IceGetOutBufSize

int **IceGetOutBufSize**(*ice_conn*);

60 $72& & -&

/ %! 72 ! ! !%% ! IceFlush

int **IceFlush**(*ice_conn*);

60 $72& & -&

: ! ! !%% " " & %! $ % !%% & &
"

/ % ' "& & ! $ 72" .

IceGetHeader(*ice_conn*, *major_opcode*, *minor_opcode*, *header_size*, **pmsg*);

60 $72& & -&

/ "- &$ % "

/ " &$ % "

' / A % " $ (+

() * / &! $ % " $

/ " $ 6% "& & $
& $ " $

IceGetHeader ! $! " $ 72 & & 7
"- $" & $ % " $ A " O
% $ 7% $$ 0 $ % ' " O
% $!$!$ $

IceGetHeaderExtra(*ice_conn*, *major_opcode*, *minor_opcode*, *header_size*, *extra*, **pmsg*, **pdata*);

60 $72& & -&

/ "- &$ % "

/ " &$ % "

' / A % " $ (+

! / A % @ $ $ $ (E ! +

() * / &! $ % " $

/ " $ 6% "& & $
& $ " $

! 72 ! ! !%% ""$
% " $ / 0 $!$
$ 7% ' ! " 72 ! ! !%%
$:9==

IceGetHeaderExtra ! $ " ' % @ $ ($ 0
" + "! % 0 $ / &" " "! % 72
! ! !%%

IceSimpleMessage(*ice_conn*, *major_opcode*, *minor_opcode*);

60 $72& & -&

/ "- &$ % "

/ " &$ % "

IceSimpleMessage ! $ " $ & A
72 $ " $ $$ $

IceErrorHeader(*ice_conn*, *offending_major_opcode*, *offending_minor_opcode*, *offending_sequence_num*, *severity*, *error_class*, *data_length*);

60 $72& & -&

/ "- &$ % & '& '
$ & $

/ " &$ % & '& '
$ & $

+ / F! & !" % " &! $

IceCanContinue IceFatalToProtocol IceFatalTo-
Connection

/ &

= %$ (E ! + ' %
$

IceErrorHeader ! " $

: ' & & & $ 72" ! $%% "- &$
% 0 & / %% $ J"- J &$ $ "& "-
&$ % & % & $ "

> & ' & &"" & 0 &
@E @4444 * ") ! $$% " $

7&?$ @E

7&?$* @E

7&?$= @E B

7&?$! @E

& 0 & @ @%%%

/' $ 72& & ! IceWriteData"& 7% $ %
72!! !%% & $ 3 ' 72!! !%%
%! $ $ $ $ &

/ "& !$ & -!& ' IceGetHeader $ IceErrorHeader

IceWriteData(*ice_conn*, *bytes*, **data*);

60 $72& & -&

/ !" % '

/ $ '

/' $ F! ! IceWriteData16

IceWriteData16(*ice_conn*, *bytes*, **data*);

60 $72& & -&

/ !" % '

/ $ '

/' $ B F! ! IceWriteData32

IceWriteData32(*ice_conn*, *bytes*, **data*);

60 $72& & -&

/ !" % '

/ $ '

/' $ B F! ! IceWriteData32

/ & $ 72!! !%% ! IceSendData $ & $
$ 0 'D& & 7% & 72!! !%% % %! $

IceSendData(*ice_conn*, *bytes*, **data*);

60 $72& & -&

/ !" % $

/ $ $

/% & B " ! IceWritePad 6"@"!" % $
& &% $

IceWritePad(*ice_conn*, *bytes*, **data*);

60 $72& & -&

/ !" % '

/ !" % $ '

Reading ICE Messages

/ 72 " ! !%% !$% $ " 7% 72
& % " &D $(" " $ $ +
% 0 $ "D A " &" " "
$! !%% 6 ! % % "& $ & $
& $" &! $ ' &&! & &
% $ $! !%%

/ A % 72 ! !%% ! IceGetInBufSize

int **IceGetInBufSize**(*ice_conn*);

60 $72& & -&

5 $ " & "! D & &D % 73 7% 73
&&! $ % " " !$ ' ! 6%
! % "& $ & $ '% $ " IceValidIO
"& & !$ & &D % 73 &&! $ & & 6% 73
&&! $ 72& & $ ' $ 4
%! % "

Bool **IceValidIO**(*ice_conn*);

60 $72& & -&

/% ' "& & !$ $72"

IceReadSimpleMessage(*ice_conn*, **pmsg*);

60 $72& & -&

() * / &! $ % " $

/ " $

IceReadSimpleMessage ! $ % " $ & A E
72 $! ! B $ & $ $$ $:
72 ' $ % E & "-
& $ % " IceReadSimpleMessage " !
E L $ &! $ $! !%%

4 " ' 0 $ '' % $ "
3 " $ 0 0 $ &" " ! IceRead-
CompleteMessage / & $ " $ 0 0 $ " $ (
" E 72 $ + $ 0
$ &!D (IceReadMessageHeader $ IceReadData

IceReadCompleteMessage(*ice_conn*, *header_size*, **pmsg*, **pdata*);

60 $72& & -&

' / A % " $ (+

() * / &! $ % " $

/ " $

/ 0 $ % "

7% 72 ! !%% !%% & & IceReadCompleteMessage' $
& " " 72 ! !%% 3 ' !%% ' & $
$ 0 $ 6% & $!" ! $ & &D $
:9== "D ! ' !%% & "" & !%%

6% & IceReadCompleteMessage $ & " IceDis-
poseCompleteMessage ! $ & $

IceDisposeCompleteMessage(*ice_conn*, **pdata*);

60 $72& & -&

/ 0 $! $ IceReadCom-
pleteMessage

7% !%% $ & $ $ 0 $ (&! $ $
% 72 ! !%% + % $ 72

IceReadMessageHeader(*ice_conn*, *header_size*, **pmsg*);

60 $72& & -&

' / A % " $ (+

() * / &! $ % " $

/ " $

IceReadMessageHeader $ -! " $ / % $! $
$' IceReadData % " % " & / " $ % $ "
! $! $' 0 $ "! $ &!D

/ $$ $ & ! ! $!%% ! IceReadData

IceReadData(*ice_conn*, *bytes*, **pdata*);

60 $72& & -&

/ !" % $

/ $ $! ! $!%%

/ $$ F! ! IceReadData16

IceReadData16(*ice_conn*, *swap*, *bytes*, **pdata*);

60 $72& & -&

7%True, 0 ! ' ' $

/ !" % $

/ $ $! ! $!%%

/ $$ B F! ! IceReadData32

IceReadData32(*ice_conn*, *swap*, *bytes*, **pdata*);

60 $72& & -&

7%True, 0 ! ' ' $

/ !" % $

/ $ $! ! $!%%

/ % & B " ! IceReadPad 6 " @ "!" % $
& & % $

IceReadPad(*ice_conn*, *bytes*);

60 $72& & -&

/ !" % $

Chapter 13. Error Handling

/ ' $ % ! $ 7 2 .

I 3 $ & % & $ (% @ " & & $ &!
"& & $+

I 3 $ 7 2 & % & &

/ $ & & $! ! $! % ! % !
' $ $ & & $ % ! D

/ 7 2 $! IceSetErrorHandler

IceSetErrorHandler(*ice_conn*, *bytes*);

/ 7 2 $;! !$:9== $ % !
$

IceSetErrorHandler ! 0 ! $

/ 7 2 $ 0 D $ ' ! @ & $ 7 2 & ("-
& $ + & ! $ / & % $ % ! $ @
" stderr $ % 0 % & exit ' A 0 ! 7%
@ !$ & !$ ' $

: & $" !$ $ $ & 0
(!$ 0 ' $ +

6 7 2 $ % IceErrorHandler

void **IceErrorHandler**(*ice_conn*, *swap*, *offending_minor_opcode*, *offending_sequence_num*, *error_class*, *severity*, *values*);

/ 7 2 & & -&

6 % $ & % 0 ! $ '

/ 7 2 " & $ % %% $ "

+ / F! & !" % %% $ "

/ & % %% $ "

IceCanContinue IceFatalToProtocol IceFatalTo-Connection

6 $$ 0 ! & % & " & $
$ &

/ % ' & $ % $ 7 2 0 .

IceBadMinor
IceBadState
IceBadLength

```
IceBadValue
IceBadMajor
IceNoAuth
IceNoVersion
IceSetupFailed
IceAuthRejected
IceAuthFailed
IceProtocolDuplicate
IceMajorOpcodeDuplicate
IceUnknownProtocol
```

4 %! % " ") ! $ $

/ $ % 7,3 ! IceSetIOErrorHandler

```
IceIOErrorHandler IceSetIOErrorHandler( handler);
```

/ 7,3 $;! !$:9== $ % !
$

IceSetIOErrorHandler ! 0 ! 73 $

6 7 2 7,3 $ % IceIOErrorHandler

```
void IceIOErrorHandler( ice_conn);
```

/ 7 2 & & - &

/ ' ' % $ 73 7 2 .

I 7 % 73 $ $ ' 0 & $
73 $! ! $ & IceCloseConnection / 7 2 &
& 0) $ 73) ! $ %! ! $ $' & &
$ / @ " IceProcessMessages & $ ' !
! % IceProcessMessagesIOError 6 " & !$ & IceCloseConnection

I 7 & $ 73 $ $ & IceCloseConnection $!
longjmp & &D & O " 0 / setjmp $
longjmp & " ' D % " $ & & "!
D 0 $ " " D / % & $ " $ $

? % & 7,3 $ 0 D $ & '
$ % $ % 7,3 ' 0 IceIOErrorProc $
0 D $ / $! & %! & (IceRegisterForProtocolSetup $ IceRegisterForProtocolReply $ & ! $! $
& ! & % & &

```
void IceIOErrorProc( ice_conn);
```

/ 7 2 & & - &

: 0 IceIOErrorProc & &D "! ! / F! $ & !
& & 0 & "! % $ % D & & $ &
73 $ "! 0 D $ % ' $

Chapter 14. Multi-Threading Support

/ $ & "! $ & ' ! 7 2 !
IceInitThreads

* ! 7& 7 / $ (+

/ IceInitThreads %! & "! % 7 2 %! & "! $ $
 " & 7 "! & " % 7 2 & " $ IceInitThreads
 ! A ! % $ % ' A $ &D
!&& %! 7 % & IceInitThreads " & ! $
 &D ' A $ &

& $ % 7 2 ' 0 &D & & & % & $
 && 7 2 & & (% @ " ' " + / &
' & " " $ " & 0 $ $.

void **IceLockConn**(*ice_conn*);

void **IceUnlockConn**(*ice_conn*);

/ 7 2 & & - &

/ D 7 2 & & &D $ & 0 7 2 & & !
IceAppLockConn $ IceAppUnlockConn

void **IceAppLockConn**(*ice_conn*);

/ 7 2 & & - &

/ IceAppLockConn %! & & " &D ! $! &
 & ! IceAppUnlockConn & $ 3 $ " ! 7 2
& & & ' &D 7% " 0 ! & $ IceInit-
Threads IceAppLockConn %% &

void **IceAppUnlockConn**(*ice_conn*);

/ 7 2 & & - &

/ IceAppUnlockConn %! & ' $ & " 7 2 &
 & & ' &D $ 0 ! & IceAppLockConn % "
 $ 7% " 0 ! & $ IceInitThreads IceAppUnlock-
Conn %% &

Chapter 15. Miscellaneous Functions

/ & & & & (% @" ' " ' 0
$ + ! IceAllocScratch2& 72& & & & & & $
' / & & & %% " $ ' $$ / &
% & & & ! $ 0$ % 72 %!&
& $

```
char *IceAllocScratch( ice_conn,  size);
```

/ 72& & -&

' / !" % F! $

: "" ! $ IceAllocScratch !$ % $
& / 72 ' % "" ' 72& & & $

Chapter 16. Acknowledgements

/ D ? *& % % ! %! ! $ % 7 2
/ D P $? ' = 8 0 0 4 *
> $ P %% < < * ! D 1 " *' &D
P " > $ $ D 5 @

Appendix A. Authentication Utility Functions

6 $ &! $ $ &!" " ' & ! & $ $
7 2 (% ConnectionSetup" ProtocolSetup" +
" " $ $ Q

/ $ @ $ & " ! %! & " ! 7 2 ! %
/ ! % & ! $! & $ ' &

/ & 7 2 ! % .

I > % "

I = &D

I 9 &D

I $

I 5

I * & %

/ % ' 0 $ @ & $ " D
) & !) ' ! $ @ $$ " 0 $ $ %

7 $! ! %! & G ,7 2,7 2! H $ % "!
& !$ $

6 7 2 ! % $ % $ % ' $!& ! .

```
typedef struct {
     char *protocol_name;
     unsigned short protocol_data_length;
     char *protocol_data;
     char *network_id;
     char *auth_name;
     unsigned short auth_data_length;
     char *auth_data;
} IceAuthFileEntry;
```

/ & J " " ")7 2) % & & ! ! &
! & " !&) * #) 4 & & & % & $ &
& % $ & J$ " " / & ! $ & % $
$ " 0 $ % " %

/ ' DJ $ " " ' D 78 % & && ! &
(% @ " ' D 78 % " + 6 ' D 78 % '
% ".

/ !"O 7 2 " " !" & % 7 2 ! %

& ,
G "H.G !" H

$ &
,G "H..G - "H

S
& ,G "H.G H

/ ! J " " " " % ! & " $ / ! J$
" " & ! ! & $ $! J$ J " "
!" % $

/ $ % ! ! A % " ! IceAuthFileName

& N7& 6! 4 :"(+

7% 7 269/13 7/; 0 " 0 % 0 ! ! $ 3 '
$ % ! ! A % " R13 2, 7 2 ! / " &
& $ $! $ % $

/ & ! ! $! A % % "! &D $ ' &
IceLockAuthFile/ %! & D $0 % % & link "
& ' % % " % ' D $ @

int **IceLockAuthFile**(**file_name*, *retries*, *timeout*, *dead*);

/ ! A % &D

/ !" %

/ !" % & $ % &

7% &D $ @ & % $ $ $ & $ $
D 6 0 ! % A ! $! & $ D $ &D

3 % 0 ! ! $.

I IceAuthLockSuccess &D !&& $ $

I IceAuthLockError " &&! $ $ errno " 0 ! %!

I IceAuthLockTimeout & % $!" % % $

/ ! &D ! A % ! IceUnlockAuthFile

int **IceUnlockAuthFile**(**file_name*);

/ ! A % ! &D

/ $ @ ! A % ! IceReadAuthFileEntry

IceAuthFileEntry ***IceReadAuthFileEntry**(**auth_file*);

/ ! A %

: % & % % $ %
& %! & 7% & ! $ "
$:9== ! $

2 !$ % ' & IceFreeAuthFileEntry

/ ' ! A % ! IceWriteAuthFileEntry

```
Status IceWriteAuthFileEntry( *auth_file,  *entry);
```

/ ! A %

/ '

: % & % % ' %
& %! & / %! & ! A ! % '
!&& %!

/ & $ %! ! A % % " & 0
& J ", ' DJ $,! J " ! ! IceGetAuthFileEntry

```
IceAuthFileEntry *IceGetAuthFileEntry(protocol_name, network_id,
auth_name);
```

/ " % & &

/ ' D 78 &

/ ! & " $ &

7%IceGetAuthFileEntry % % $!& :9== ! $

/ % ! $ IceReadAuthFileEntry IceGetAuthFileEntry ! IceFreeAuthFileEntry

```
void IceFreeAuthFileEntry( *entry);
```

/ %

Appendix B. MIT-MAGIC-COOKIE-1 Authentication

/ !"O 7 2 " " ! " 7/ 6>7
33<72 ! & & " ! ! % ! $ & $ 6
$ @ 6

7 "$ & !& " " & & D
& IceGenerateMagicCookie $! O & 7 2 !
% & & & & & 7 $ ' " & & &
" " @ &! "& " !$! $ " & & D
! O 7 2 ! % " "&

7 $$ " & & D 7 2 ! % &
$ & IceSetPaAuthData %! & $ " & & D
"" 5 & " " % 7/ 6>7 33<72 ! & &
$! && - & & & ' & " " & & D $
F! " & & D ""

```
char *IceGenerateMagicCookie( length);
```

/ $ $ % " & & D

/ " & & D ! $' ! " $ 7% "" & & $
% " & & D %! & ' ! :9== 3 ' " & & D
!$ % $' & free

/ ! & $ "" ! IceSetPaAuthData !
%! & ! $ % 7/ 6>7 33<72 ! & ! " ! $
% $$! & " $ %! !

```
void IceSetPaAuthData( num_entries,  *entries);
```

/ !" % ! & $

/ % ! & $

2 & & $ ' & " (% @ ")7 2) % 7 2
& & ! ! &) * #) % " " ! & +
' D 78 %) &&) & ! & " (% @ "
7/ 6>7 33<72 + $! & $ / 7 2 ' "
' 0 ! $ (& J " ' DJ $
! J " + !

```
typedef struct {
 char *protocol_name;
 char *network_id;
 char *auth_name;
 unsigned short auth_data_length;
 char *auth_data;
} IceAuthDataEntry;
```