Monitoring API Developer's Guide

Altibase 7.3

Altibase® Application Development

Altibase Application Development Monitoring API Developer's Guide
Release 7.3

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Preface

About This Manual

This manual describes how to use the Monitoring API Developer.

Audience

This manual has been prepared for the following users of Altibase:

- Database administrators
- Performance administrators
- Database users
- Application developers
- Technical Supporters

It is recommended for those reading this manual possess the following background knowledge:

- Basic knowledge in the use of computers, operating systems, and operating system utilities
- Experience in using relational database and an understanding of database concepts
- Computer programming experience
- Experience in database server management, operating system management, or network administration
- Knowledge related to the storage, management and processing of data in distributed environments

Organization

This manual is organized as follows:

- Chapter 1: Introduction
  This chapter discusses Altibase Monitoring API and its features.
- Chapter 2: Data Types
  This chapter discusses data types that can be used with Altibase Monitoring API.
- Chapter 3: Functions
  This chapter discusses Altibase Monitoring API functions.
- Chapter 4: Sample Programs
  This chapter provides examples of C programs written using the Monitoring API.

Documentation Conventions

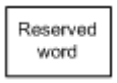
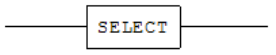
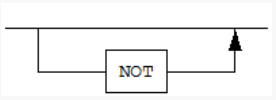
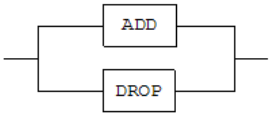
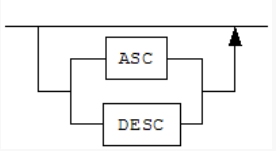
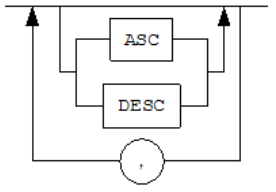
This section describes the conventions used in this manual. Understanding these conventions will make it easier to find information in this manual and in the other manuals in the series.

There are two sets of conventions:

- Syntax diagram convetions
- Sample code conventions

Syntax Diagram Conventions

This manual describes command syntax using diagrams composed of the following elements:

Elements	Meaning
	Indicates the start of a command. If a syntactic element starts with an arrow, it is not a complete command.
	Indicates that the command continues to the next line. If a syntactic element ends with this symbol, it is not a complete command.
	Indicates taht the command continues from the previous line. If a syntactic element starts witht his symbol, it is not a complete command.
	Indicates the end of a statement.
	Indicates a manatory element.
	Indicates an optional element.
	Indicates a mandatory element comprised of options. One, and only one, option must be specified.
	Indicates an optional element comprised of options.
	Indicates an optional element in which multiple elements may be specified. A comman must precede all but the first element.

Sample Code Conventions

The code examples explain SQL statements, stored procedures, iSQL statements, and other command line syntax.

The following table describes the printing conventions used in the code examples.

Rules	Meaning	Example
[ ]	Indicates an optional item	VARCHAR [(*size*)] [[FIXED |] VARIABLE]
{ }	Indicates a mandatory field for which one or more items must be selected.	{ ENABLE | DISABLE | COMPILE }
|	A delimiter between optional or mandatory arguments.	{ ENABLE | DISABLE | COMPILE } [ENABLE | DISABLE | COMPILE]

Rules	Meaning	Example
. . .	Indicates that the previous argument is repeated, or that sample code has been omitted.	SQL> SELECT ename FROM employee; ENAME ---------- SWNO HJNO HSCHOI . . . 20 rows selected.
Other Symbols	Symbols other than those shown above are part of the actual code.	EXEC :p1 := 1; acc NUMBER(11,2)
Italics	Statement elements in italics indicate variables and special values specified by the user.	SELECT * FROM *table_name*; CONNECT *userID*/*password*;
Lower case words	Indicate program elements set by the user, such as table names, column names, file names, etc.	SELECT ename FROM employee;
Upper case words	Keywords and all elements provided by the system appear in upper case.	DESC SYSTEM.*SYS_INDICES*;

Related Documentations

For more detailed information, please refer to the following documents.

- Installation Guide
- Administrator’s Manual
- Replication Manual
- CLI User's Manual
- iSQL User’s Manual
- Utilities Manual
- Error Message Reference

Altibase Welcomes Your Comments and Feedbacks

Please let us know what you like or dislike about our manuals. To help us with better future versions of our manuals, please tell us if there is any corrections or classifications that you would find useful.

Include the following information:

- The name and version of the manual that you are using
- Any comments about the manual
- Your name, address, and phone number

If you need immediate assistance regarding any errors, omissions, and other technical issues, please contact Altibase's Support Portal.

Thank you. We always welcome your feedbacks and suggestions.

1. Introduction

This chapter describes Altibase Monitoring API and its features.

What is Altibase Monitoring API?

Altibase Monitoring API is an application programming interface that lets users monitor Altibase from an application.

Usage

Altibase Monitoring API is an interface provided for remote monitoring tool developers and allows developers to easily create monitoring tools. You can also collect monitoring data by directly selecting a performance view on Altibase.

By default, it is not provided for users using other interfaces for database access such as ODBC and JDBC.

Features

Users can view the following data in an application with Altibase Monitoring API:

- Various statistics while Altibase is running
- The number of currently connected sessions
- The maximum number of clients that can connect to an Altibase server
- Session lock information
- Wait event information

Supported Altibase Versions

Altibase Monitoring API is supported for Altibase 5.5.1 or later.

Consideration

Please consider the following while writng and executing an application with Altibase Monitoring API:

- An Altibase Monitoring API application connects to an Altibase server using a Unix domain socket. Therefore, the application and Altibase need to run on the same server.
- Memory that is internally allocated by an Altibase Monitoring API function or library is shared by Altibase Monitoring API functions and is not thread-safe. Accordingly, multiple threads should be prevented from concurrently accessing shared memory by synchronization using mutexes. For more detailed information, please refer to Chapter 4: sample_7.c.

Building an Application

This section discusses the necessary header files and library files for building an Altibase Monitoring API application and how to compile them.

Header File

The header file that must be included when writing the Monitoring API application and referenced at compile time is altibaseMonitor.h. This file is located in the \ $ ALTIBASE_HDB_HOME / include directory.

To compile, use the following command-line option.

```
-I$ALTIBASE_HDB_HOME/include
```

Library Files

To build an Altibase Monitoring API application, you need to link the compiled object file to the Altibase Monitoring API library, ODBC library and several other system libraries.

- Monitoring API library: libaltibaseMonitor.a, libaltibaseMonitor_sl.so
- ODBC library: libodbccli.a
- System library: libpthread.a, libdl.a

The Altibase Monitoring API library and ODBC library are located in the $ALTIBASE_HDB_HOME/lib directory.

Compiling

The following is a sample Makefile that compiles the sample.c source file with the $(ALTIBASE_HOME)/install/altibase_env.mk file that is created when the Altibase package is installed.

```
include $(ALTIBASE_HOME)/install/altibase_env.mk
sample: sample.o
    $(LD) $(LDOUT)sample sample.o $(LFLAGS) -laltibaseMonitor -lodbccli $(LIBS)
```

The following example compiles the sample.c source file using the gcc and g++ compilers on the console window.

```
% gcc -c -I$ALTIBASE_HOME/include -o sample.o sample.c
% g++ -o sample sample.o -L$ALTIBASE_HOME/lib -laltibaseMonitor -lodbccli -ldl -
lpthread -lcrypt -lrt
```

2. Data Types

This chapter discusses data types that can be used with Altibase Monitoring API.

Data Structures

This section describes the data structures used as arguments when calling functions of the Monitoring API.

ABIVSession

This data structure stores the results of SELECT operations on the V$SESSION performance view.

This data structure has the following members. For more detailed information about each column, please refer to the V$SESSION performance view in the *General Reference.*

Member	Type	Corresponding Column in V$SESSION
mID	int	ID
mTransID	long long	TRANS_ID
mTaskState[11+1]	char	TASK_STATE
mCommName[64+1]	char	COMM_NAME
mXASessionFlag	int	XA_SESSION_FLAG
mXAAssociateFlag	int	XA_ASSOCIATE_FLAG
mQueryTimeLimit	int	QUERY_TIME_LIMIT
mDdlTimeLimit	int	DDL_TIME_LIMIT
mFetchTimeLimit	int	FETCH_TIME_LIMIT
mUTransTimeLimit	int	UTRANS_TIME_LIMIT
mIdleTimeLimit	int	IDLE_TIME_LIMIT
mIdleStartTime	int	IDLE_START_TIME
mActiveFlag	int	ACTIVE_FLAG
mOpenedStmtCount	int	OPENED_STMT_COUNT
mClientPackageVersion[40+1]	char	CLIENT_PACKAGE_VERSION
mClientProtocolVersion[40+1]	char	CLIENT_PROTOCOL_VERSION
mClientPID	long long	CLIENT_PID
mClientType[40+1]	char	CLIENT_TYPE
mClientAppInfo[128+1]	char	CLIENT_APP_INFO
mClientNls[40+1]	char	CLIENT_NLS

Member	Type	Corresponding Column in V$SESSION
mDBUserName[40+1]	char	DB_USERNAME
mDBUserID	int	DB_USERID
mDefaultTbsID	long long	DEFAULT_TBSID
mDefaultTempTbsID	long long	DEFAULT_TEMP_TBSID
mSysDbaFlag	int	SYSDBA_FLAG
mAutoCommitFlag	int	AUTOCOMMIT_FLAG
mSessionState[13+1]	char	SESSION_STATE
mIsolationLevel	int	ISOLATION_LEVEL
mReplicationMode	int	REPLICATION_MODE
mTransactionMode	int	TRANSACTION_MODE
mCommitWriteWaitMode	int	COMMIT_WRITE_WAIT_MODE
mOptimizerMode	int	OPTIMIZER_MODE
mHeaderDisplayMode	int	HEADER_DISPLAY_MODE
mCurrentStmtID	int	CURRENT_STMT_ID
mStackSize	int	STACK_SIZE
mDefaultDateFormat[64+1]	char	DEFAULT_DATE_FORMAT
mTrxUpdateMaxLogSize	long long	TRX_UPDATE_MAX_LOGSIZE
mParallelDmlMode	int	PARALLEL_DML_MODE
mLoginTime	int	LOGIN_TIME
mFailOverSource[64+1]	char	FAILOVER_SOURCE

ABIVSysstat

This data structure stores the results of SELECT operations on the V$SYSSTAT performance view. This performance view displays statistics about the entire database system.

This data structure has the following members. For more detailed information about each column, please refer to the V$SYSSTAT performance view in the *General Reference.*

Member	Type	Corresponding Column in V$SYSSTAT
mValue	long long	VALUE

ABIVSesstat

This data structure stores the results of SELECT operations on the V$SESSTAT performance view. This performance view displays statistics about each session.

This data structure has the following members. For more detailed information about each column, please refer to the V$SESSTAT performance view in the *General Reference.*

Member	Type	Corresponding Column in V$SYSSTAT
mSID	int	SID
mValue	long long	VALUE

ABIStatName

This data structure stores the results of SELECT operations on the fixed columns of the V$SYSSTAT or V$SESSTAT performance view.

This data structure has the following members. For more detailed information about each column, please refer to the V$SYSSTAT and V$SESSTAT performance views in the *General Reference.*

Member	Type	Corresponding Column in V$SYSSTAT or V$SESSTAT
mSeqNum	int	SEQNUM
mName[128+1]	char	NAME

ABIVSystemEvent

This data structure stores the results of SELECT operations on the V$SYSTEM_EVENT performance view.

This data structure has the following members. For more detailed information about each column, please refer to the V$SYSTEM_EVENT performance view in the General Reference.

Member	Type	Corresponding Column in V$SYSTEM_EVENT
mTotalWaits	long long	TOTAL_WAITS
mTotalTimeOuts	long long	TOTAL_TIMEOUTS
mTimeWaited	long long	TIME_WAITED
mAverageWait	long long	AVERAGE_WAIT
mTimeWaitedMicro	long long	TIME_WAITED_MICRO

ABIVSessionEvent

This data structure stores the results of SELECT operations on the V$SESSION_EVENT performance view.

This data structure has the following members. For more detailed information about each column, please refer to the V$SESSION _EVENT performance view in the *General Reference.*.

Member	Type	Corresponding Column in V$SESSION_EVENT
mSID	int	SID
mTotalWaits	long long	TOTAL_WAITS
mTotalTimeOuts	long long	TOTAL_TIMEOUTS
mTimeWaited	long long	TIME_WAITED
mAverageWait	long long	AVERAGE_WAIT
mMaxWait	long long	MAX_WAIT
mTimeWaitedMicro	long long	TIME_WAITED_MICRO

ABIEventName

This data structure stores the results of SELECT operations on the fixed columns of the V$SYSTEM_EVENT or V$SESSION_EVENT performance view.

This data structure has the following members. For more detailed information about each column, please refer to the V$SYSTEM_EVENT and V$SESSION_EVENT performance views in the *General Reference.*

Member	Type	Corresponding Column in V$SYSTEM_EVENT or V$SESSION_EVENT
mEventID	int	EVENT_ID
mEvent[128+1]	char	EVENT
mWaitClassID	int	WAIT_CLASS_ID
mWaitClass[128+1]	char	WAIT_CLASS

ABIVSessionWait

This data structure stores the results of SELECT operations on the V$SESSION_WAIT performance view.

This data structure has the following members. For more detailed information about each column, please refer to the V$SESSION_WAIT performance view in the *General Reference.*

Member	Type	Corresponding Column in V$SESSION_WAIT
mSID	int	SID
mSeqNum	int	SEQNUM
mP1	long long	P1
mP2	long long	P2
mP3	long long	P3
mWaitClassID	int	WAIT_CLASS_ID

Member	Type	Corresponding Column in V$SESSION_WAIT
mWaitTime	long long	WAIT_TIME
mSecondInTime	long long	SECOND_IN_TIME

ABISqlText

This is a data structure used for viewing SQL statement text, the start time of a query and checking whether or not to execute a query.

This data structure has the following members shown in the table below.

Member	Type	Description
mSessID	int	Session ID
mStmtID	int	Statement ID
mSqlText	char *	Text of the SQL statement
mTextLength	int	Length of the string stored in mSqlText
mQueryStartTime	int	The start time of query
mExecuteFlag	int	Whether or not to execute a query 0: Executable 1: Non-executable
mParseTime	long	Parsing Time
mSoftPrepareTime	long	Plan search time in SQL Plan Cache during prepare
mLastQueryStartTime	int	Most recent query start time
mExecuteTime	long	Execution running time
mFetchTime	long	Fetch Time
mFetchStartTime	int	Current Fetch Start Time
mTotalTime	long	Total elapsed time
mValidateTime	long	Justification time
mOptimizeTime	long	Optimization turnaround time

ABILockPair

This data structure retrieves a session holding on to a lock and the session waiting to acquire that lock.

This data structure has the following members.

Member	Type	Description
mHolderSID	int	ID of the session holding on to the lock

Member	Type	Description
mWaiterSID	int	ID of the session that is waiting for another session (mHolderSID) to let go of the lock
mLockDesc[32+1]	char	Mode of the lock that the session (mWaiterSID) is waiting to obtain

ABIDBInfo

This data structure retrieves database names and database version numbers.

This data structure has the following members.

Member	Type	Description
mDBName[128+1]	char	Name of database
mDBVersion[128+1]	char	Version number of database

ABIReadCount

This data structure retrieves the number of data pages that were read from the Altibase server.

This data structure has the following members.

Member	Type	Description
mLogicalReadCount	int	Number of data pages that were read in the memory buffer
mPhysicalReadCount	int	Number of data pages that were read on disk

ABIRepGap

This data structure queries the difference between the work log record of the replication sender and the most recently created log record that occurs on the Altibase server.

This data structure has the following members.

Member	Type	Description
mRepName[40+1]	char	Name of the replication object
mRepGap	long long	The difference between the number of the last log record sent (REP_LAST_SN) and the log record currently being sent (REP_SN)

ABIRepSentLogCount

This data structure inquires the number of logs sent by the replication sender in the Altibase server.

This data structure has the following members.

Member	Type	Description
mRepName[40+1]	char	Name of the replication object
mTableName[128+1]	char	Name of the table object
mInsertLogCount	int	Number of Insert logs
mDeleteLogCount	int	Number of delete logs
mUpdateLogCount	int	Number of update logs

Enumeration Types

The following enumeration types can be used with Altibase Monitoring API applications.

enum ABIPropType

This enumeration type is used with the ABISetProperty function to specify the user name and user password for connecting to an Altibase server.

This enumeration type has the following elements.

Element	Description
ABI_USER	Used to specify the user name
ABI_PASSWD	Used to specify the user password
ABI_LOGFILE	Used to specify the file that stores the error messages that occur in Altibase Monitoring API

Considerations

Almost all Altibase Monitoring API functions take the above data structures as arguments. This section discusses what you should consider when taking these data structures as arguments.

In an application, you need to declare a pointer variable to a data structure and pass this pointer's address value (a double pointer) to an Altibase Monitoring API function. The function allocates memory on heap to the pointer and sets it to the record fetched from the database, and then returns the result set to the application.

Because Altibase Monitoring API functions manage memory for data structures used with Altibase Monitoring API, the application should not directly allocate memory to a pointer in the data structure or deallocate memory returned as the result of a function.

As shown in the following sample code, a pointer in an ABIVSession data structure should be only declared and memory should not be allocated to sVSession. Moreover, if a result value is referenced from sVSession after a function has been executed, only as many array elements as the number of rows in the result set can be accessed.

```
ABIVSession *sVSession;
int sRowCount;

sRowCount = ABIGetVSession(  &sVSession, 0 );

/*  reference the results selected from sVSession */
for (int i=0; i<sRowCount; i++)
{
    /* sVSession[i].mID; */
    /* sVSession[i].mTransID; */
}
```

3. Functions

This chapter discusses Altibase Monitoring API functions. The following information is provided:

- Function Name
- Syntax: Function Prototype in C
- Arguments: Data Type, Input/Output, Description
- Return Values
- Description: Usage and Considerations
- Examples

ABIInitialize

Syntax

```
int ABIInitialize ( void );
```

Return Values

If successful, returns 0; otherwise, returns an error code.

Description

This function needs to be initially invoked to use Altibase Monitoring API. It performs initialization operations such as setting the connection to the Altibase server.

Example

```
if( ABIInitialize( ) != 0 )
{
    /* ... error handling ... */
}
```

ABIFinalize

Syntax

```
int ABIFinalize ( void );
```

Return Values

If successful, returns 0; otherwise, returns an error code.

Description

This function needs to be invoked to close Altibase Monitoring API. It performs operations such as freeing memory that has been allocated while using Altibase Monitoring API and disconnecting from the Altibase server.

Example

```
if( ABIFinalize( ) != 0 )
{
    /* ... error handling ... */
}
```

ABISetProperty

Syntax

```
int ABISetProperty (
    ABIPropType         aPropType,
    const char          *aPropValue );
```

Arguments

Data Type	Argument	In/Output	Description
ABIPropType	aPropType	Input	Specifies the name of the property to be set. One of the following can be used: ABI_USER, ABI_PASSWD, ABI_LOGFILE
const char *	aPropValue	Input	Value of the property to be set

Return Values

If successful, returns 0; otherwise, returns an error code.

Description

This function specifies the user name and user password to connect to the Altibase server, and the log file path. On omission, the default values are SYS, MANAGER, and altibaseMonitor.log, respectively.

Error messages that occur in Altibase Monitoring API are written to log files. If the path is omitted and only the file name is specified, a log file is created in the path wherein the application runs.

Example

```
if( ABISetProperty( ABI_USER, "SYS" ) != 0 )
{
    /* ... error handling ... */
}
```

ABICheckConnection

Syntax

```
int ABICheckConnection ( );
```

Return Values

If the connection status is normal, returns 0; otherwise, returns -1.

Description

This function checks the connection between the Altibase server and Altibase Monitoring API.

Example

```
if( ABICheckConnection( ) != -1 )
{
    /* Select performance view */
}
else
{
    /* ... error handling ... */
}
```

ABIGetVSession

Syntax

```
int ABIGetVSession (
    ABIVSession          **aHandle,
    unsigned int         aExecutingOnly );
```

Arguments

Data Type	Argument	In/Output	Description
ABIVSession**	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set
unsigned int	aExecutingOnly	Input	0: Select all session 1: Selects only active sessions

Return Values

If successful, returns the number of rows in the result set that *aHandle* points to; otherwise, returns an error code.

Description

This function selects the V$SESSION performance view. If this function executes successfully, the *aHandle* pointer (a pointer of the ABIVSession type that points to an array that stores the result set) is returned.

Example

Please refer to sample_1.c for an application related to this function.

```
ABIVSession *sVSession;
ABIVSession *sVSessionActiveOnly;
int sRowCount;
int sRowCountActiveOnly;

/* Select all sessions */
sRowCount = ABIGetVSession(  &sVSession, 0 );

/* Select only active sessions */
sRowCountActiveOnly = ABIGetVSession( &sVSessionActiveOnly, 1 );
```

ABIGetVSessionBySID

Syntax

```
int ABIGetVSessionBySID (
    ABIVSession          **aHandle,
    int                  aSessionID );
```

Arguments

Data Type	Argument	In/Output	Description
ABIVSession**	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set
int	aSessionID	Input	The session ID to be selected

Return Values

If successful, returns the number of rows in the result set that *aHandle* points to; otherwise, returns an error code.

Description

This function selects the V$SESSION performance view. If this function executes successfully, the *aHandle* pointer (a pointer of the ABIVSession type that points to an array that stores the result set) is returned.

Example

Please refer to sample_1.c for an application related to this function.

```
ABIVSession *sVSession;
int sRowCount;

sRowCount = ABIGetVSessionBySID(  &sVSession, 1 );
```

ABIGetVSysstat

Syntax

```
int ABIGetVSysstat (
    ABIVSysstat          **aHandle );
```

Argument

Data Type	Argument	In/Output	Description
ABIVSysstat **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set

Return Values

If successful, returns the number of rows in the result set that *aHandle* points to; otherwise, returns an error code.

Description

This function selects the V$SYSSTAT performance view. If this function executes successfully, the *aHandle* pointer (a pointer of the ABIVSysstat type that points to an array that stores the result set) is returned.

Example

Please refer to sample_3.c for an application related to this function.

```
ABIVSysstat *sVSysstat;
int sRowCount;

sRowCount = ABIGetVSysstat( &sVSysstat );
```

ABIGetVSesstat

Syntax

```
int ABIGetVSesstat (
    ABIVSesstat          **aHandle,
    unsigned int         aExecutingOnly );
```

Arguments

Data Type	Argument	In/Output	Description
ABIVSesstat **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set

Data Type	Argument	In/Output	Description
unsigned int	aExecutingOnly	Input	0: Selects all sessions 1: Selects only active sessions

Return Values

If successful, returns the number of rows in the result set that aHandle points to; otherwise, returns an error code.

Description

This function selects the V$SESSTAT performance view. If this function executes successfully, the *aHandle* pointer (a pointer of the ABIVSesstat type that points to an array that stores the result set) is returned.

Example

Please refer to sample_3.c for an applicaiton related to this function.

```
ABIVSesstat *sVSesstat;
int sRowCount;

sRowCount = ABIGetVSesstat( &sVSesstat );
```

ABIGetVSesstatBySID

Syntax

```
int ABIGetVSesstatBySID (
    ABIVSesstat          **aHandle,
    int                  aSessionID );
```

Arguments

Data Type	Argument	In/Output	Description
ABIVSesstat **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set
int	aSessionID	입력	The session ID to be selected

Return Values

If successful, returns the number of rows in the result set that aHandle points to; otherwise, returns an error code.

Description

This function selects statistics about a certain session from the V$SESSTAT performance view. If this function executes successfully, the *aHandle* pointer (a pointer of the ABIVSesstat type that points to an array that stores the result set) is returned.

Example

Please refer to sample_3.c for an application related to this function.

```
ABIVSesstat *sVSesstat;
int sRowCount;

/* Select session whose ID is 1 */
sRowCount = ABIGetVSesstatBySID ( &sVSesstat, 1 );
```

ABIGetStatName

Syntax

```
int ABIGetStatName (
    ABIStatName          **aHandle );
```

Argument

Data Type	Argument	In/Output	Description
ABIStatName **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set

Return Values

If successful, returns the number of rows in the result set that aHandle points to; otherwise, returns an error code.

Description

This function selects the values of the fixed columns, SEQNUM and NAME, from the V$SESSTAT or V$SYSSTAT performance view.

Example

Please refer to sample_3.c for an application related to this function.

```
ABIStatName *sStatName;
int sRowCount;

sRowCount = ABIGetStatName( &sStatName );
```

ABIGetVSystemEvent

Syntax

```
int ABIGetVSystemEvent (
    ABIVSystemEvent          **aHandle );
```

Argument

Data Type	Argument	In/Output	Description
ABIVSystemEvent **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set

Return Values

If successful, returns the number of rows in the result set that *aHandle* points to; otherwise, returns an error code.

Description

This function selects the V$SYSTEM_EVENT performance view. If this function executes successfully, the *aHandle* pointer (a pointer of the ABIVSystemEvent type that points to an array that stores the result set) is returned.

Example

Please refer to sample_4.c for an application related to this function.

```
ABIVSystemEvent *sVSystemEvent;
int sRowCount;

sRowCount = ABIGetVSystemEvent( &sVSystemEvent);
```

ABIGetVSessionEvent

Syntax

```
int ABIGetVSessionEvent (
    ABIVSessionEvent          **aHandle );
```

Argument

Data Type	Argument	In/Output	Description
ABIVSessionEvent **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set

Return Values

If successful, returns the number of rows in the result set that *aHandle* points to; otherwise, returns an error code.

Description

This function selects the V$SESSION_EVENT performance view. If this function executes successfully, the *aHandle* pointer (a pointer of the ABIVSessionEvent type that points to an array that stores the result set) is returned.

Example

Please refer to sample_4.c for an application related to this function.

```
ABIVSessionEvent *sVSessionEvent;
int sRowCount;

sRowCount = ABIGetVSessionEvent( &sVSessionEvent);
```

ABIGetVSessionEventBySID

Syntax

```
int ABIGetVSessionEventBySID (
    ABIVSessionEvent         **aHandle,
    int                      aSessionID );
```

Arguments

Data Type	Argument	In/Output	Description
ABIVSessionEvent **	aHandle	Output	The pointer which retrieves the memory address of the structure array that sotres the result set
int	aSessionID	Input	The session ID to be selected

Return Values

If successful, returns the number of rows in the result set that *aHandle* points to; otherwise, returns an error code.

Description

This function selects statistics about wait events for certain sessions from the V$SESSION_EVENT performance view. If this function executes successfully, the *aHandle* pointer (a pointer of the ABIVSessionEvent type that points to an array that stores the result set) is returned.

Example

Please refer to sample_4.c for an application related to this function.

```
ABIVSessionEvent *sVSessionEvent;
int sRowCount;

sRowCount = ABIGetVSessionEventBySID( &sVSessionEvent, 1);
```

ABIGetEventName

Syntax

```
int ABIGetEventName (
    ABIEventName          **aHandle );
```

Argument

Data Type	Argument	In/Output	Description
ABIEventName **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set

Return Values

If successful, returns the number of rows in the result set that *aHandle* points to; otherwise, returns an error code.

Description

This function selects the values of the fixed columns, EVENT_ID, EVENT, WAIT_CLASS_ID, and WAIT_CLASS, from the V$SYSTEM_EVENT or V$SESSION_EVENT performance view.

Example

Please refer to sample_4.c for an application related to this function.

```
ABIEventName *sEventName;
int sRowCount;

sRowCount = ABIGetEventName( &sEventName);
```

ABIGetVSessionWait

Syntax

```
int ABIGetVSessionWait (
    ABIVSessionWait          **aHandle );
```

Argument

Data Type	Argument	In/Output	Description
ABIVSessionWait **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set

Return Values

If successful, returns the number of rows in the result set that *aHandle* points to; otherwise, returns an error code.

Description

This function selects the V$SESSION_WAIT performance view. If this function executes successfully, the aHandle pointer (a pointer of the ABIVSessionWait type that points to an array that stores the result set) is returned.

Example

Please refer to sample_8.c for an application related to this function.

```
ABIVSessionWait *sVSessionWait;
int sRowCount;

sRowCount = ABIGetVSessionWait( &sVSessionWait);
```

ABIGetVSessionWaitBySID

Syntax

```
int ABIGetVSessionWaitBySID (
    ABIVSessionWait          **aHandle,
    int                      aSessionID );
```

Arguments

Data Type	Argument	In/Output	Description
ABIVSessionWait **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set
int	aSessionID	Input	The session ID to be selected

Return Values

If successful, returns the number of rows in the result set that *aHandle* points to; otherwise, returns an error code.

Description

This function selects information about wait events for certain sessions from the V$SESSION_WAIT performance view. If this function executes successfully, the aHandle pointer (a pointer of the ABIVSessionWait type that points to an array that stores the result set) is returned.

Example

Please refer to sample_8.c for an application related to this function.

```
ABIVSessionWait *sVSessionWait;
int sRowCount;

sRowCount = ABIGetVSessionWaitBySID( &sVSessionWait, 1);
```

ABIGetSqlText

Syntax

```
int ABIGetSqlText (
    ABISqlText          **aHandle,
    int                 astmtID );
```

Arguments

Data Type	Argument	In/Ouput	Description
ABISqlText **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set
int	astmtID	Input	The session ID to be selected If aStmtID is 0, all information of the currently active statement is returned.

Return Values

If the function succeeds, it returns 0. If unsuccessful, an error code is returned as a negative integer value.

Description

This is a function used for viewing SQL statement, the start time of a query, and checking whether or not to execute a query that a statement is executing through the statement identifier.

Example

Please refer to sample_5.c for an application related to this function.

```
ABISqlText *sSqlText;
int sRet;

/* Selects the SQL statement of the statement which ID is 2 */
sRet = ABIGetSqlText( &sSqlText, 2 );
```

ABIGetLockPairBetweenSessions

Syntax

```
int ABIGetLockPairBetweenSessions (
    ABILockPair          **aHandle );
```

Argument

Data Type	Argument	In/Output	Description
ABILockPair **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set

Return Values

If successful, returns the number of rows in the result set that *aHandle* points to; otherwise, returns an error code.

Description

This function selects the session that is holding a lock and the session that is waiting to acquire that lock. If this function executes successfully, the *aHandle* pointer (a pointer of the ABILockPair type that points to an array that stores the result set) is returned.

Example

Please refer to sample_5.c for an application related to this function.

```
ABILockPair *sLockPair;
int sRowCount;

sRowCount = ABIGetLockPairBetweenSessions( &sLockPair );
```

ABIGetDBInfo

Syntax

```
int ABIGetDBInfo (
    ABIDBInfo          **aHandle );
```

Argument

Data Type	Argument	In/Output	Description
ABIDBInfo **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set

Return Values

If successful, returns 0; otherwise, returns an error code.

Description

This function selects the database name and its version number. If this function executes successfully, the *aHandle* pointer (a pointer of the ABIDBInfo type that points to an array that stores the result set) is returned.

Example

Please refer to sample_6.c for an application related to this function.

```
ABIDBInfo *sDBInfo;
int sRet;

sRet = ABIGetDBInfo( &sDBInfo );
```

ABIGetReadCount

Syntax

```
int ABIGetReadCount (
    ABIReadCount          **aHandle );
```

Argument

Data Type	Argument	In/Output	Description
ABIReadCount **	aHandle	Output	The pointer which retrieves the memory address of the structure array that stores the result set

Return Values

If successful, returns 0; otherwise, returns an error code.

Description

This function selects the number of times data pages were read on the Altibase server. If this function executes successfully, the aHandle pointer (a pointer of the ABIReadCount type that points to an array that stores the result set) is returned.

Example

Please refer to sample_6.c for an application related to this function.

```
ABIReadCount *sReadCount;
int sRet;

sRet = ABIGetReadCount( &sReadCount);
```

ABIGetSessionCount

Syntax

```
int ABIGetSessionCount (
    unsigned int          **aExecutingOnly );
```

Argument

Data Type	Argument	In/Output	Description
unsigned int	aExecutingOnly	Input	0: Selects all sessions 1: Selects only active sessions

Return Values

If successful, returns the total number of sessions in the Altibase server; otherwise, returns an error code.

Description

This function selects the total number of sessions currently existing in the Altibase server or the number of active sessions.

Example

Please refer to sample_2.c for an application related to this function.

```
int sSessionCount;
int sActiveSessionCount;

/* Selects the total number of sessions  */
sSessionCount = ABIGetSessionCount( 0 );
/* Selects the number of active sessions */
sActiveSessionCount  = ABIGetSessionCount( 1 );
```

ABIGetMaxClientCount

Syntax

```
int ABIGetMaxClientCount ( );
```

Return Values

If successful, returns the maximum number of clients allowed to connect to the Altibase server; otherwise, returns an error code.

Description

This function selects the maximum number of clients allowed to connect to the Altibase server. The selected value corresponds to the value set for the MAX_CLIENT property in the altibase.properties file for the Altibase server.

Example

Please refer to sample_2.c for an application related to this function.

```
int sMaxClientCount;

sMaxClientCount = ABIGetMaxClientCount( );
```

ABIGetLockWaitSessionCount

Syntax

```
int ABIGetLockWaitSessionCount ( );
```

Return Values

If successful, returns the number of sessions waiting to acquire locks; otherwise, returns an error code.

Description

This function selects the number of sessions waiting to acquire locks on the Altibase server.

Example

Please refer to sample_5.c for an application related to this function.

```
int sLockWaitSessionCount;

sLockWaitSessionCount = ABIGetLockWaitSessionCount( );
```

ABIGetRepGap

Syntax

```
int ABIGetRepGap(
   ABIRepGap **aHandle );
```

Return Values

If the function succeeds, the function returns the number of rows in the result set brought to aHandle. If it fails, an error code is returned as a negative integer.

Description

In the V \ $ REPGAP performance view, this function retrieves the difference between the last log record sent by the replication sender and the most recently created log record.

If the function succeeds, a pointer to an array of type ABIRepGap containing the result set in aHandle is returned.

Example

Please refer to sample_10.c for an application related to this function.

```
ABIRepGap *sRepGap;
int sRowCount;

sRowCount = ABIGetRepGap( &sRepGap );
```

ABIGetRepSentLogCount

Syntax

```
int ABIGetRepSentLogCount(
   ABIRepSentLogCount **aHandle );
```

Return Values

If the function succeeds, the number of rows in the result set brought to aHandle is returned. If unsuccessful, an error code is returned as a negative integer value.

Description

In the V \ $ REPSENDER_SENT_LOG_COUNT performance view, this function searches the number of rows by classifying logs sent by the redundant sender by DML type.

If the function succeeds, a pointer to an array of type ABIRepSentLogCount is stored, which contains the result set in aHandle.

Example

Please refer to sample_10.c for an application related to this function.

```
ABIRepSentLogCount *sRepSentLogCount;
int sRowCount;

sRowCount = ABIRepSentLogCount( &sRepSentLogCount );
```

ABIGetErrorMessage

Syntax

```
void ABIGetErrorMessage (
    int                 aErrCode,
    const char          *aErrMsg );
```

Arguments

Data Type	Argument	In/Output	Description
int	aErrCode	Input	Error code
const char *	aErrMsg	Output	The buffer pointer that retrieves the error message

Description

This function selects an error message by its error code. When a function of Monitoring API returns an error code, an error message corresponding to the error code can be inquired.

Example

Please refer to sample_9.c for an application related to this function.

```
ABIVSession *sVSession;
int          sErrCode;
const char  *sErrMsg;

sErrCode = ABIGetVSession( &sVSession, 1 );
if( sErrCode < 0 )
{
    ABIGetErrorMessage( sErrCode, &sErrMsg );
}
```

4. Sample Programs

This chapter provides sample programs in C that were written using Altibase Monitoring API.

Makefile

This is an example Makefile to compile the sample programs provided in this chapter. It uses the altibase_env.mk file included in the Altibase package.

```
include $(ALTIBASE_HOME)/install/altibase_env.mk
SRCS = $(wildcard *.c)
OBJS = $(SRCS:.c=.$(OBJEXT))
BINS = $(SRCS:.c=$(BINEXT))

all : $(BINS)

sample_1 : sample_1.$(OBJEXT)
    $(LD) $(LDOUT) $@ $^ $(LFLAGS) $(LIBOPT)altibaseMonitor$(LIBAFT)
$(LIBOPT)odbccli$(LIBAFT) $(LIBS)
sample_2 : sample_2.$(OBJEXT)
    $(LD) $(LDOUT) $@ $^ $(LFLAGS) $(LIBOPT)altibaseMonitor$(LIBAFT)
$(LIBOPT)odbccli$(LIBAFT) $(LIBS)
sample_3 : sample_3.$(OBJEXT)
    $(LD) $(LDOUT) $@ $^ $(LFLAGS) $(LIBOPT)altibaseMonitor$(LIBAFT)
$(LIBOPT)odbccli$(LIBAFT) $(LIBS)
sample_4 : sample_4.$(OBJEXT)
    $(LD) $(LDOUT) $@ $^ $(LFLAGS) $(LIBOPT)altibaseMonitor$(LIBAFT)
$(LIBOPT)odbccli$(LIBAFT) $(LIBS)
sample_5 : sample_5.$(OBJEXT)
    $(LD) $(LDOUT) $@ $^ $(LFLAGS) $(LIBOPT)altibaseMonitor$(LIBAFT)
$(LIBOPT)odbccli$(LIBAFT) $(LIBS)
sample_6 : sample_6.$(OBJEXT)
    $(LD) $(LDOUT) $@ $^ $(LFLAGS) $(LIBOPT)altibaseMonitor$(LIBAFT)
$(LIBOPT)odbccli$(LIBAFT) $(LIBS)
sample_7 : sample_7.$(OBJEXT)
    $(LD) $(LDOUT) $@ $^ $(LFLAGS) $(LIBOPT)altibaseMonitor$(LIBAFT)
$(LIBOPT)odbccli$(LIBAFT) $(LIBS)
sample_8 : sample_8.$(OBJEXT)
    $(LD) $(LDOUT) $@ $^ $(LFLAGS) $(LIBOPT)altibaseMonitor$(LIBAFT)
$(LIBOPT)odbccli$(LIBAFT) $(LIBS)
sample_9 : sample_9.$(OBJEXT)
    $(LD) $(LDOUT) $@ $^ $(LFLAGS) $(LIBOPT)altibaseMonitor$(LIBAFT)
$(LIBOPT)odbccli$(LIBAFT) $(LIBS)
sample_10 : sample_10.$(OBJEXT)
    $(LD) $(LDOUT) $@ $^ $(LFLAGS) $(LIBOPT)altibaseMonitor$(LIBAFT)
$(LIBOPT)odbccli$(LIBAFT) $(LIBS)
clean :
    $(RM) $(OBJS) $(BINS) *.log
```

sample_1.c

This sample program uses the ABIGetVSession and ABIGetVSessionBySID functions to select the V$SESSION performance view.

```
#include <stdio.h>
#include <stdlib.h>
#include <altibaseMonitor.h>

void printVSession( ABIVSession *aVSession, int aRowCount );
void errorHandling( int aErrCode );

int main()
{
    ABIVSession *sVSession = NULL, *sVSessionBySID = NULL;
    int          sRc = 0;

    // Test ABIInitialize
    sRc = ABIInitialize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    // Test ABICheckConnection
    if( ABICheckConnection() != -1 )
    {
        /*
           IF the second argument sets to
           0 - Return all session information.
           1 - Return executing session information only.
         */
        // Test ABIGetVSession
        sRc = ABIGetVSession( &sVSession, 0 );
        if( sRc >= 0 )
        {
            printf( "*******************************\n" );
            printf( "*          V$Session          *\n" );
            printf( "*******************************\n" );
            printVSession( sVSession, sRc );

            sVSession = NULL;
            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetVSession [ Active Only ]
        sRc = ABIGetVSession( &sVSession, 1 );
        if( sRc >= 0 )
        {
```

```
            printf( "************************************************\n" );
            printf( "*          V$Session [ Active Only ]          *\n" );
            printf( "************************************************\n" );
            printVSession( sVSession, sRc );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetVSessionBySID
        sRc = ABIGetVSessionBySID( &sVSessionBySID, sVSession[0].mID );
        if( sRc >= 0 )
        {
            printf( "************************************************\n" );
            printf( "*          V$Session [ specified SID ]         *\n" );
            printf( "************************************************\n" );
            printVSession( sVSessionBySID, sRc );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }
    }
    else
    {
        // Exception handling
    }

    // Test ABIFinalize
    sRc = ABIFinalize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    return 0;
}

void printVSession( ABIVSession *aVSession, int aRowCount )
{
    int sI;

    for( sI = 0; sI < aRowCount; sI++ )
    {
        printf( "ID : %d\n", aVSession[sI].mID );
        printf( "TRANS_ID : %lld\n", aVSession[sI].mTransID );
        printf( "TASK_STATE : %s\n", aVSession[sI].mTaskState );
        printf( "COMM_NAME : %s\n", aVSession[sI].mCommName );
```

```
        printf( "XA_SESSION_FLAG : %d\n", aVSession[sI].mXASessionFlag );
        printf( "XA_ASSOCIATE_FLAG : %d\n", aVSession[sI].mXAAssociateFlag );
        printf( "QUERY_TIME_LIMIT : %d\n", aVSession[sI].mQueryTimeLimit );
        printf( "DDL_TIME_LIMIT : %d\n", aVSession[sI].mDdlTimeLimit );
        printf( "FETCH_TIME_LIMIT : %d\n", aVSession[sI].mFetchTimeLimit );
        printf( "UTRANS_TIME_LIMIT : %d\n", aVSession[sI].mUTransTimeLimit );
        printf( "IDLE_TIME_LIMIT : %d\n", aVSession[sI].mIdleTimeLimit );
        printf( "IDLE_START_TIME : %d\n", aVSession[sI].mIdleStartTime );
        printf( "ACTIVE_FLAG : %d\n", aVSession[sI].mActiveFlag );
        printf( "OPENED_STMT_COUNT : %d\n", aVSession[sI].mOpenedStmtCount );
        printf( "CLIENT_PACKAGE_VERSION : %s\n",
aVSession[sI].mClientPackageVersion );
        printf( "CLIENT_PROTOCOL_VERSION : %s\n",
aVSession[sI].mClientProtocolVersion );
        printf( "CLIENT_PID : %lld\n", aVSession[sI].mClientPID );
        printf( "CLIENT_TYPE : %s\n", aVSession[sI].mClientType );
        printf( "CLIENT_APP_INFO : %s\n", aVSession[sI].mClientAppInfo );
        printf( "CLIENT_NLS : %s\n", aVSession[sI].mClientNls );
        printf( "DB_USERNAME : %s\n", aVSession[sI].mDBUserName );
        printf( "DB_USERID : %d\n", aVSession[sI].mDBUserID );
        printf( "DEFAULT_TBSID : %lld\n", aVSession[sI].mDefaultTbsID );
        printf( "DEFAULT_TEMP_TBSID : %lld\n", aVSession[sI].mDefaultTempTbsID );
        printf( "SYSDBA_FLAG : %d\n", aVSession[sI].mSysDbaFlag );
        printf( "AUTOCOMMIT_FLAG : %d\n", aVSession[sI]. mAutoCommitFlag );
        printf( "SESSION_STATE : %s\n", aVSession[sI].mSessionState );
        printf( "ISOLATION_LEVEL : %d\n", aVSession[sI].mIsolationLevel );
        printf( "REPLICATION_MODE : %d\n", aVSession[sI].mReplicationMode );
        printf( "TRANSACTION_MODE : %d\n", aVSession[sI].mTransactionMode );
        printf( "COMMIT_WRITE_WAIT_MODE : %d\n",
aVSession[sI].mCommitWriteWaitMode );
        printf( "OPTIMIZER_MODE : %d\n", aVSession[sI].mOptimizerMode );
        printf( "HEADER_DISPLAY_MODE : %d\n", aVSession[sI].mHeaderDisplayMode );
        printf( "CURRENT_STMT_ID : %d\n", aVSession[sI].mCurrentStmtID );
        printf( "STACK_SIZE : %d\n", aVSession[sI].mStackSize );
        printf( "DEFAULT_DATE_FORMAT : %s\n", aVSession[sI].mDefaultDateFormat );
        printf( "TRX_UPDATE_MAX_LOGSIZE : %lld\n",
aVSession[sI].mTrxUpdateMaxLogSize );
        printf( "PARALLEL_DML_MODE : %d\n", aVSession[sI].mParallelDmlMode );
        printf( "LOGIN_TIME : %d\n", aVSession[sI].mLoginTime );
        printf( "FAILOVER_SOURCE : %s\n\n", aVSession[sI].mFailoverSource );
    }
    printf( "\n" );
}

void errorHandling( int aErrCode )
{
    const char *sErrMsg = NULL;

    ABIGetErrorMessage( aErrCode, &sErrMsg );
    printf( "%s\n\n\n", sErrMsg );
    exit(1);
}
```

sample_2.c

This sample program uses the ABIGetSessionCount function to select the total number of existing sessions and active sessions on the Altibase server. In addition, it retrieves the maximum number of clients that can connect to Altibase server using ABIGetMaxClientCount.

```
#include <stdio.h>
#include <stdlib.h>
#include <altibaseMonitor.h>

void errorHandling( int aErrCode );

int main()
{
    int         sRc = 0;

    // Test ABIInitialize
    sRc = ABIInitialize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    // Test ABICheckConnection
    if( ABICheckConnection() != -1 )
    {
        /*
           IF the argument sets to
           0 - Return all session count.
           1 - Return executing session count only.
         */
        // Test ABIGetSessionCount
        sRc = ABIGetSessionCount( 0 );
        if( sRc >= 0 )
        {
            printf( "************************************\n" );
            printf( "*          Session Count           *\n" );
            printf( "************************************\n" );
            printf( "Session Count : %d\n\n\n", sRc );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetSessionCount [ Active Only ]
        sRc = ABIGetSessionCount( 1 );
        if( sRc >= 0 )
        {
            printf( "*************************************************\n" );
            printf( "*          Session Count [ Active Only ]          *\n" );
```

```
            printf( "*****************************************************\n" );
            printf( "Session Count : %d\n\n\n", sRc );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetMaxClientCount
        sRc = ABIGetMaxClientCount();
        if( sRc >= 0 )
        {
            printf( "*************************************\n" );
            printf( "*          Max Client Count          *\n" );
            printf( "*************************************\n" );
            printf( "Max Client Count : %d\n\n\n", sRc );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }
    }
    else
    {
        // Exception handling
    }

    // Test ABIFinalize
    sRc = ABIFinalize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    return 0;
}

void errorHandling( int aErrCode )
{
    const char *sErrMsg = NULL;

    ABIGetErrorMessage( aErrCode, &sErrMsg );
    printf( "%s\n\n\n", sErrMsg );
    exit(1);
}
```

sample_3.c

This sample program uses the ABIGetStatName, ABIGetVSysstat, ABIGetVSesstat, and ABIGetVSesstatBySID functions to select statistics on the Altibase system and its sessions.

```
#include <stdio.h>
#include <stdlib.h>
#include <altibaseMonitor.h>

void printVSysstat( ABIVSysstat *aVSysstat, int aRowCount, ABIStatName *aStatName
);
void printVSesstat( ABIVSesstat *aVSesstat, int aRowCount, ABIStatName
*aStatName, int aStatNameRowCount );
void printStatName( ABIStatName *aStatName, int aStatNameRowCount );
void errorHandling( int aErrCode );

int main()
{
    ABIVSysstat *sVSysstat = NULL;
    ABIVSesstat *sVSesstat = NULL;
    ABIStatName *sStatName = NULL;
    int          sStatNameRowCount = 0;
    int          sRc = 0;

    // Test ABIInitialize
    sRc = ABIInitialize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    // Test ABICheckConnection
    if( ABICheckConnection() != -1 )
    {
        // Test ABIGetStatName
        sStatNameRowCount = ABIGetStatName( &sStatName );
        if( sStatNameRowCount >= 0 )
        {
            printf( "******************************\n" );
            printf( "*          StatName          *\n" );
            printf( "******************************\n" );
            printStatName( sStatName, sStatNameRowCount );
        }
        else
        {
            // Error handling
            errorHandling( sStatNameRowCount );
        }

        // Test ABIGetVSysstat
        sRc = ABIGetVSysstat( &sVSysstat );
        if( sRc >= 0 )
        {
            printf( "******************************\n" );
```

```
            printf( "*          V$Sysstat          *\n" );
            printf( "*******************************\n" );
            printVSysstat( sVSysstat, sRc, sStatName );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetVSesstat
        sRc = ABIGetVSesstat( &sVSesstat, 0 );
        if( sRc >= 0 )
        {
            printf( "*******************************\n" );
            printf( "*          V$Sesstat          *\n" );
            printf( "*******************************\n" );
            printVSesstat( sVSesstat, sRc, sStatName, sStatNameRowCount );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetVSesstatBySID
        sRc = ABIGetVSesstatBySID( &sVSesstat, sVSesstat[0].mSID );
        if( sRc >= 0 )
        {
            printf( "************************************************\n" );
            printf( "*          V$Sesstat [ specified SID ]          *\n" );
            printf( "************************************************\n" );
            printVSesstat( sVSesstat, sRc, sStatName, sStatNameRowCount );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }
    }
    else
    {
        // Exception handling
    }

    // Test ABIFinalize
    sRc = ABIFinalize();
    if( sRc < 0 )
    {
        // Error handling
```

```
        errorHandling( sRc );
    }

    return 0;
}

void printVSysstat( ABIVSysstat *aVSysstat, int aRowCount, ABIStatName *aStatName
)
{
    int sI;

    for( sI = 0; sI < aRowCount; sI++ )
    {
        printf( "SEQNUM : %d\n", aStatName[sI].mSeqNum );
        printf( "NAME : %s\n", aStatName[sI].mName );
        printf( "VALUE : %lld\n\n", aVSysstat[sI].mValue );
    }
    printf( "\n" );
}

void printVSesstat( ABIVSesstat *aVSesstat, int aRowCount, ABIStatName
*aStatName, int aStatNameRowCount )
{
    int sI, sJ;

    for( sI = 0; sI < aRowCount; sI++ )
    {
        sJ = sI % aStatNameRowCount;

        printf( "SID : %d\n", aVSesstat[sI].mSID );
        printf( "SEQNUM : %d\n", aStatName[sJ].mSeqNum );
        printf( "NAME : %s\n", aStatName[sJ].mName );
        printf( "VALUE : %lld\n\n", aVSesstat[sI].mValue );
    }
    printf( "\n" );
}

void printStatName( ABIStatName *aStatName, int aStatNameRowCount )
{
    int sI;

    for( sI = 0; sI < aStatNameRowCount; sI++ )
    {
        printf( "SEQNUM : %d\n", aStatName[sI].mSeqNum );
        printf( "NAME : %s\n\n", aStatName[sI].mName );
    }
    printf( "\n" );
}

void errorHandling( int aErrCode )
{
    const char *sErrMsg = NULL;

    ABIGetErrorMessage( aErrCode, &sErrMsg );
    printf( "%s\n\n\n", sErrMsg );
    exit(1);
```

```
}
```

sample_4.c

This sample program uses the ABIGetEventName, ABIGetVSystemEvent, ABIGetVSessionEvent, and ABIGetVSessionEventBySID functions to select statistics on waits events of the Altibase system and its sessions.

```
#include <stdio.h>
#include <stdlib.h>
#include <altibaseMonitor.h>

void printVSystemEvent( ABIVSystemEvent *aVSystemEvent, int aRowCount,
ABIEventName *aEventName );
void printVSessionEvent( ABIVSessionEvent *aVSessionEvent, int aRowCount,
ABIEventName *aEventName, int aEventNameRowCount );
void printEventName( ABIEventName *aEventName, int aEventNameRowCount );
void errorHandling( int aErrCode );

int main()
{
    ABIVSystemEvent  *sVSystemEvent = NULL;
    ABIVSessionEvent *sVSessionEvent = NULL;
    ABIEventName     *sEventName = NULL;
    int               sEventNameRowCount = 0;
    int               sRc = 0;

    // Test ABIInitialize
    sRc = ABIInitialize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    // Test ABICheckConnection
    if( ABICheckConnection() != -1 )
    {
        // Test ABIGetEventName
        sEventNameRowCount = ABIGetEventName( &sEventName );
        if( sEventNameRowCount >= 0 )
        {
            printf( "*********************************\n" );
            printf( "*          Event Name           *\n" );
            printf( "*********************************\n" );
            printEventName( sEventName, sEventNameRowCount );
        }
        else
        {
            // Error handling
            errorHandling( sEventNameRowCount );
        }

        // Test ABIGetVSystemEvent
        sRc = ABIGetVSystemEvent( &sVSystemEvent );
```

```
        if( sRc >= 0 )
        {
            printf( "************************************\n" );
            printf( "*          V$System_Event          *\n" );
            printf( "************************************\n" );
            printVSystemEvent( sVSystemEvent, sRc, sEventName );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetVSessionEvent
        sRc = ABIGetVSessionEvent( &sVSessionEvent );
        if( sRc >= 0 )
        {
            printf( "************************************\n" );
            printf( "*          V$Session_Event          *\n" );
            printf( "************************************\n" );
            printVSessionEvent( sVSessionEvent, sRc, sEventName,
sEventNameRowCount );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetVSessionEventBySID
        sRc = ABIGetVSessionEventBySID( &sVSessionEvent, sVSessionEvent[0].mSID
);
        if( sRc >= 0 )
        {
            printf( "************************************************************\n"
);
            printf( "*          V$Session_Event [ specified SID ]          *\n"
);
            printf( "************************************************************\n"
);
            printVSessionEvent( sVSessionEvent, sRc, sEventName,
sEventNameRowCount );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }
    }
    else
```

```
    {
        // Exception handling
    }

    // Test ABIFinalize
    sRc = ABIFinalize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    return 0;
}

void printVSystemEvent( ABIVSystemEvent *aVSystemEvent, int aRowCount,
ABIEventName *aEventName )
{
    int sI;

    for( sI = 0; sI < aRowCount; sI++ )
    {
        printf( "EVENT : %s\n", aEventName[sI].mEvent );
        printf( "TOTAL_WAITS : %lld\n", aVSystemEvent[sI].mTotalWaits );
        printf( "TOTAL_TIMEOUTS : %lld\n", aVSystemEvent[sI].mTotalTimeOuts );
        printf( "TIME_WAITED : %lld\n", aVSystemEvent[sI].mTimeWaited );
        printf( "AVERAGE_WAIT : %lld\n", aVSystemEvent[sI].mAverageWait );
        printf( "TIME_WAITED_MICRO : %lld\n", aVSystemEvent[sI].mTimeWaitedMicro
);
        printf( "EVENT_ID : %d\n", aEventName[sI].mEventID );
        printf( "WAIT_CLASS_ID : %d\n", aEventName[sI].mWaitClassID );
        printf( "WAIT_CLASS : %s\n\n", aEventName[sI].mWaitClass );
    }
    printf( "\n" );
}

void printVSessionEvent( ABIVSessionEvent *aVSessionEvent, int aRowCount,
ABIEventName *aEventName, int aEventNameRowCount )
{
    int sI, sJ;

    for( sI = 0; sI < aRowCount; sI++ )
    {
        sJ = sI % aEventNameRowCount;

        printf( "SID : %d\n", aVSessionEvent[sI].mSID );
        printf( "EVENT : %s\n", aEventName[sJ].mEvent );
        printf( "TOTAL_WAITS : %lld\n", aVSessionEvent[sI].mTotalWaits );
        printf( "TOTAL_TIMEOUTS : %lld\n", aVSessionEvent[sI].mTotalTimeOuts );
        printf( "TIME_WAITED : %lld\n", aVSessionEvent[sI].mTimeWaited );
        printf( "AVERAGE_WAIT : %lld\n", aVSessionEvent[sI].mAverageWait );
        printf( "MAX_WAIT : %lld\n", aVSessionEvent[sI].mMaxWait );
        printf( "TIME_WAITED_MICRO : %lld\n", aVSessionEvent[sI].mTimeWaitedMicro
);
        printf( "EVENT_ID : %d\n", aEventName[sJ].mEventID );
        printf( "WAIT_CLASS_ID : %d\n", aEventName[sJ].mWaitClassID );
```

```
        printf( "WAIT_CLASS : %s\n\n", aEventName[sJ].mWaitClass );
    }
    printf( "\n" );
}

void printEventName( ABIEventName *aEventName, int aEventNameRowCount )
{
    int sI;

    for( sI = 0; sI < aEventNameRowCount; sI++ )
    {
        printf( "EVENT_ID : %d\n", aEventName[sI].mEventID );
        printf( "EVENT : %s\n", aEventName[sI].mEvent );
        printf( "WAIT_CLASS_ID : %d\n", aEventName[sI].mWaitClassID );
        printf( "WAIT_CLASS : %s\n\n", aEventName[sI].mWaitClass );
    }
    printf( "\n" );
}

void errorHandling( int aErrCode )
{
    const char *sErrMsg = NULL;

    ABIGetErrorMessage( aErrCode, &sErrMsg );
    printf( "%s\n\n\n", sErrMsg );
    exit(1);
}
```

sample_5.c

This sample program uses the ABIGetSqlText, ABIGetLockPairBetweenSessions, and ABIGetLockWaitSessionCount functions.

```
#include <stdio.h>
#include <stdlib.h>
#include <altibaseMonitor.h>

void printSqlText( ABISqlText *aSqlText );
void printLockPairBetweenSessions( ABILockPair *aLockPair, int aRowCount );
void errorHandling( int aErrCode );

int main()
{
    ABISqlText  *sSqlText = NULL;
    ABILockPair *sLockPair = NULL;
    int          sRc = 0;

    // Test ABIInitialize
    sRc = ABIInitialize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }
```

```
    // Test ABICheckConnection
    if( ABICheckConnection() != -1 )
    {
        // Test ABIGetSqlText
        sRc = ABIGetSqlText( &sSqlText, 2 );
        if( sRc >= 0 )
        {
            printf( "*****************************\n" );
            printf( "*          SQL Text          *\n" );
            printf( "*****************************\n" );
            printSqlText( sSqlText );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetLockPairBetweenSessions
        sRc = ABIGetLockPairBetweenSessions( &sLockPair );
        if( sRc >= 0 )
        {
            printf( "************************************************\n" );
            printf( "*          Lock Pair Between Sessions          *\n" );
            printf( "************************************************\n" );
            printLockPairBetweenSessions( sLockPair, sRc );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetLockWaitSessionCount
        sRc = ABIGetLockWaitSessionCount();
        if( sRc >= 0 )
        {
            printf( "*******************************************\n" );
            printf( "*          Lock Wait Session Count          *\n" );
            printf( "*******************************************\n" );
            printf( "Lock Wait Session Count : %d\n\n\n", sRc );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }
    }
    else
    {
```

```
        // Exception handling
    }

    // Test ABIFinalize
    sRc = ABIFinalize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    return 0;
}

void printSqlText( ABISqlText *aSqlText )
{
    printf( "SQL TEXT : %s\n", aSqlText->mSqlText );
    printf( "TEXT LENGTH : %d\n\n\n", aSqlText->mTextLength );
    printf( "QUERY START TIME : %d\n\n\n", aSqlText->mQueryStartTime );
    printf( "EXECUTE FLAG : %d\n\n\n", aSqlText->mExecuteFlag );
    printf( "PARSE TIME : %lld\n\n\n", aSqlText->mParseTime);
    printf( "SOFT PREPARE TIME : %lld\n\n\n", aSqlText->mSoftPrepareTime);
    printf( "LAST QUERY START TIME : %d\n\n\n", aSqlText->mLastQueryStartTime);
    printf( "EXECUTE TIME : %lld\n\n\n", aSqlText->mExecuteTime);
    printf( "FETCH TIME : %lld\n\n\n", aSqlText->mFetchTime);
    printf( "FETCH START TIME : %d\n\n\n", aSqlText->mFetchStartTime);
    printf( "TOTAL TIME : %lld\n\n\n", aSqlText->mTotalTime);
    printf( "VALIDATE TIME : %lld\n\n\n", aSqlText->mValidateTime);
    printf( "OPTIMIZE TIME : %lld\n\n\n", aSqlText->mOptimizeTime);
}

void printLockPairBetweenSessions( ABILockPair *aLockPair, int aRowCount )
{
    int sI;

    for( sI = 0; sI < aRowCount; sI++ )
    {
        printf( "HOLDER : %d,\t\tWAITER : %d\n", aLockPair[sI].mHolderSID,
aLockPair[sI].mWaiterSID );
    }
    printf( "\n\n" );
}

void errorHandling( int aErrCode )
{
    const char *sErrMsg = NULL;

    ABIGetErrorMessage( aErrCode, &sErrMsg );
    printf( "%s\n\n\n", sErrMsg );
    exit(1);
}
```

sample_6.c

This sample program uses the ABIGetDBInfo and ABIGetReadCount functions.

```
#include <stdio.h>
#include <stdlib.h>
#include <altibaseMonitor.h>

void printDBInfo( ABIDBInfo *aDBInfo );
void printReadCount( ABIReadCount *aReadCount );
void errorHandling( int aErrCode );

int main()
{
    ABIDBInfo    *sDBInfo = NULL;
    ABIReadCount *sReadCount = NULL;
    int           sRc = 0;

    // Testing ABIInitialize
    sRc = ABIInitialize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    // Testing ABICheckConnection()
    if( ABICheckConnection() != -1 )
    {
        // Testing ABIGetDBInfo
        sRc = ABIGetDBInfo( &sDBInfo );
        if( sRc >= 0 )
        {
            printf( "******************************\n" );
            printf( "*          DB Info           *\n" );
            printf( "******************************\n" );
            printDBInfo( sDBInfo );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Testing ABIGetReadCount
        sRc = ABIGetReadCount( &sReadCount );
        if( sRc >= 0 )
        {
            printf( "********************************\n" );
            printf( "*          Read Count          *\n" );
            printf( "********************************\n" );
            printReadCount( sReadCount );
```

```
            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }
    }
    else
    {
        // Exception handling
    }

    // Testing ABIFinalize
    sRc = ABIFinalize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    return 0;
}

void printDBInfo( ABIDBInfo *aDBInfo )
{
    printf( "DB NAME : %s\n", aDBInfo->mDBName );
    printf( "VERSION : %s\n\n\n", aDBInfo->mDBVersion );
}

void printReadCount( ABIReadCount *aReadCount )
{
    printf( "Logical Read Count : %d\n", aReadCount->mLogicalReadCount );
    printf( "Physical Read Count : %d\n\n\n", aReadCount->mPhysicalReadCount );
}

void errorHandling( int aErrCode )
{
    const char *sErrMsg = NULL;

    ABIGetErrorMessage( aErrCode, &sErrMsg );
    printf( "%s\n\n\n", sErrMsg );
    exit(1);
}
```

sample_7.c

This sample program uses a global variable of the pthread_mutex_t type to synchronize the function calls of ABIGetVSession and ABIGetSessionCount.

```
#include <stdio.h>
#include <stdlib.h>
#include <pthread.h>
#include <unistd.h>
#include <altibaseMonitor.h>
```

```
#define LOOP_COUNT 1000

pthread_mutex_t gMutex;

void *call_ABIGetVSession( void *aArgs );
void *call_ABIGetSessionCount( void *aArgs );
void errorHandling( int aErrCode );

int main()
{
    pthread_t sThread[2];
    int       sRc = 0;

    sRc = ABIInitialize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    sRc = pthread_mutex_init( &gMutex, NULL );
    if( sRc != 0 )
    {
        printf( "Mutex init" );
        exit(1);
    }

    sRc = pthread_create( &( sThread[0] ), NULL, call_ABIGetVSession, NULL );
    if( sRc != 0 )
    {
        printf( "Create thread_1 [ Calling ABIGetVSession ]" );
        exit(1);
    }

    sRc = pthread_create( &( sThread[1] ), NULL, call_ABIGetSessionCount, NULL );
    if( sRc != 0 )
    {
        printf( "Create thread_2 [ Calling ABIGetSessionCount ]" );
        exit(1);
    }

    pthread_join( sThread[0], NULL );
    pthread_join( sThread[1], NULL );

    pthread_mutex_destroy( &gMutex );

    sRc = ABIFinalize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    return 0;
}
```

```
void *call_ABIGetVSession( void *aArgs )
{
    ABIVSession *sVSession = NULL;
    int          sRc = 0;
    int          sI;

    for( sI = 0; sI < LOOP_COUNT; sI++ )
    {
        pthread_mutex_lock( &gMutex );

        sRc = ABIGetVSession( &sVSession, 1 );

        pthread_mutex_unlock( &gMutex );

        if( sRc < 0 )
        {
            // Error handling
            errorHandling( sRc );
        }

        sleep( 0.05 );
    }

    return NULL;
}

void *call_ABIGetSessionCount( void *aArgs )
{
    int sRc = 0;
    int sI;

    for( sI = 0; sI < LOOP_COUNT; sI++ )
    {
        pthread_mutex_lock( &gMutex );

        sRc = ABIGetSessionCount( 1 );

        pthread_mutex_unlock( &gMutex );

        if( sRc < 0 )
        {
            // Error handling
            errorHandling( sRc );
        }
    }

    return NULL;
}

void errorHandling( int aErrCode )
{
    const char *sErrMsg = NULL;

    ABIGetErrorMessage( aErrCode, &sErrMsg );
    printf( "%s\n\n\n", sErrMsg );
```

```
    exit(1);
}
```

sample_8.c

This sample program uses the ABIGetVSessionWait and ABIGetVSessionWaitBySID functions to select wait event information for sessions connected to the Altibase server.

```
#include <stdio.h>
#include <stdlib.h>
#include <altibaseMonitor.h>

void printVSessionWait( ABIVSessionWait *aVSessionWait, int aRowCount );
void errorHandling( int aErrCode );

int main()
{
    ABIVSessionWait *sVSessionWait = NULL, *sVSessionWaitBySID = NULL;
    int              sRc = 0;

    // Test ABIInitialize
    sRc = ABIInitialize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    // Test ABICheckConnection
    if( ABICheckConnection() != -1 )
    {
        /*
           IF the second argument sets to
           0 - Return all session information.
           1 - Return executing session information only.
         */
        // Test ABIGetVSessionWait
        sRc = ABIGetVSessionWait( &sVSessionWait );
        if( sRc >= 0 )
        {
            printf( "************************************\n" );
            printf( "*          V$Session_Wait          *\n" );
            printf( "************************************\n" );
            printVSessionWait( sVSessionWait, sRc );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetVSessionWaitBySID
```

```
        sRc = ABIGetVSessionWaitBySID( &sVSessionWaitBySID, sVSessionWait[0].mSID
);
        if( sRc >= 0 )
        {
            printf( "*********************************************************\n" );
            printf( "*          V$Session_Wait [ specified SID ]          *\n" );
            printf( "*********************************************************\n" );
            printVSessionWait( sVSessionWaitBySID, sRc );

            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }
    }
    else
    {
        // Exception handling
    }

    // Test ABIFinalize
    sRc = ABIFinalize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    return 0;
}

void printVSessionWait( ABIVSessionWait *aVSessionWait, int aRowCount )
{
    int sI;

    for( sI = 0; sI < aRowCount; sI++ )
    {
        printf( "SID : %d\n", aVSessionWait[sI].mSID );
        printf( "SEQNUM : %d\n", aVSessionWait[sI].mSeqNum );
        printf( "P1 : %lld\n", aVSessionWait[sI].mP1 );
        printf( "P2 : %lld\n", aVSessionWait[sI].mP2 );
        printf( "P3 : %lld\n", aVSessionWait[sI].mP3 );
        printf( "WAIT_CLASS_ID : %d\n", aVSessionWait[sI].mWaitClassID );
        printf( "WAIT_TIME : %lld\n", aVSessionWait[sI].mWaitTime );
        printf( "SECOND_IN_TIME : %lld\n\n", aVSessionWait[sI].mSecondInTime );
    }
    printf( "\n" );
}

void errorHandling( int aErrCode )
{
    const char *sErrMsg = NULL;

    ABIGetErrorMessage( aErrCode, &sErrMsg );
```

```
    printf( "%s\n\n\n", sErrMsg );
    exit(1);
}
```

sample_9.c

This sample program uses the ABIGetErrorMessage function to select an error message by its error code.

```
#include <stdio.h>
#include <stdlib.h>
#include <altibaseMonitor.h>

void printErrorMessage( int aErrCode, const char *aErrMsg );
void errorHandling( int aErrCode );

int main()
{
    int         sI;
    int         sRc = 0;
    const char *sErrMsg = NULL;

    // Test ABIInitialize
    sRc = ABIInitialize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    // Test ABICheckConnection
    if( ABICheckConnection() != -1 )
    {
        printf( "************************************\n" );
        printf( "*          Error Message           *\n" );
        printf( "************************************\n" );

        for( sI = -21; sI < 0; sI++ )
        {
            // Test ABIGetErrorMessage
            ABIGetErrorMessage( sI, &sErrMsg );
            printErrorMessage( sI, sErrMsg );
        }
        printf( "\n" );
    }
    else
    {
        // Exception handling
    }

    // Test ABIFinalize
    sRc = ABIFinalize();
    if( sRc < 0 )
    {
        // Error handling
```

```
        errorHandling( sRc );
    }

    return 0;
}

void printErrorMessage( int aErrCode, const char *aErrMsg )
{
    printf( "Error Code : %d\n", aErrCode );
    printf( "%s\n\n", aErrMsg );
}

void errorHandling( int aErrCode )
{
    const char *sErrMsg = NULL;

    ABIGetErrorMessage( aErrCode, &sErrMsg );
    printf( "%s\n\n\n", sErrMsg );
    exit(1);
}
```

sample_10.c

This program sample uses the ABIGetRepGap and ABIGetRepSentLogCount functions.

```
#include <stdio.h>
#include <stdlib.h>
#include <altibaseMonitor.h>

void printRepGap( ABIRepGap *aRepGap, int aRowCount );
void printRepSentLogCount( ABIRepSentLogCount *aRepSentLogCount, int aRowCount );
void errorHandling( int aErrCode );

int main()
{
    ABIRepGap          *sRepGap = NULL;
    ABIRepSentLogCount *sRepSentLogCount = NULL;
    int                 sRc = 0;

    // Test ABIInitialize
    sRc = ABIInitialize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    // Test ABICheckConnection
    if( ABICheckConnection() != -1 )
    {
        // Test ABIRepGap
        sRc = ABIGetRepGap( &sRepGap );
        if( sRc >= 0 )
        {
            printf( "*******************************\n" );
```

```
            printf( "*           RepGap            *\n" );
            printf( "*******************************\n" );
            printRepGap( sRepGap, sRc );
            sRepGap = NULL;
            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }

        // Test ABIGetRepSentLogCount
        sRc = ABIGetRepSentLogCount( &sRepSentLogCount );
        if( sRc >= 0 )
        {
            printf( "***********************************************\n" );
            printf( "*               RepSentLogCount               *\n" );
            printf( "***********************************************\n" );
            printRepSentLogCount( sRepSentLogCount, sRc );
            sRepSentLogCount = NULL;
            sRc = 0;
        }
        else
        {
            // Error handling
            errorHandling( sRc );
        }
    }
    else
    {
        // Exception handling
    }

    // Test ABIFinalize
    sRc = ABIFinalize();
    if( sRc < 0 )
    {
        // Error handling
        errorHandling( sRc );
    }

    return 0;
}

void printRepGap( ABIRepGap *aRepGap, int aRowCount )
{
    int sI;

    for( sI = 0; sI < aRowCount; sI++ )
    {
        printf( "REP_NAME : %s\n", aRepGap[sI].mRepName );
        printf( "REP_GAP : %lld\n", aRepGap[sI].mRepGap );
    }
    printf( "\n" );
}
```

```
void printRepSentLogCount( ABIRepSentLogCount *aRepSentLogCount, int aRowCount )
{
    int sI;

    for( sI = 0; sI < aRowCount; sI++ )
    {
        printf( "REP_NAME : %s\n", aRepSentLogCount[sI].mRepName );
        printf( "TABLE_NAME : %s\n", aRepSentLogCount[sI].mTableName );
        printf( "INSERT_LOG_COUNT : %d\n", aRepSentLogCount[sI].mInsertLogCount
);
        printf( "DELETE_LOG_COUNT : %d\n", aRepSentLogCount[sI].mDeleteLogCount
);
        printf( "UPDATE_LOG_COUNT : %d\n", aRepSentLogCount[sI].mUpdateLogCount
);
    }
    printf( "\n" );
}

void errorHandling( int aErrCode )
{
    const char *sErrMsg = NULL;

    ABIGetErrorMessage( aErrCode, &sErrMsg );
    printf( "%s\n\n\n", sErrMsg );
    exit(1);
}
```