Monitoring Tibero Database Server

eG Innovations Product Documentation

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Total Performance Visibility

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Chapter 1: Introduction

Tibero 6 is a high-performance, highly secure, highly scalable relational database management system (RDBMS) for enterprises that want to fully leverage their mission-critical data. In a world where data is at the core of everything, Tibero provides an enhanced view of processing, managing and securing large-scale databases.

The eG Enterprise includes extensive monitoring capabilities for Tibero databases. A single eG agent is capable of monitoring all of the Tibero database instances being executed on a system. Monitoring of the Tibero database instances is performed non- intrusively, with administrators having the option of configuring whether the monitoring is to be performed in an agent- based or agentless manner. eG Enterprise's 100% web- based architecture, allows geographically distributed database servers to be managed from a central manager. Administrators can view and analyze the performance of their database servers in real-time over the web. To avoid overwhelming the administrator with a ton of performance data, the eG Enterprise includes a specialized model for a Tibero database server. By viewing the layer model of a database server, an administrator can quickly determine which layer(s) of the database server is causing a problem.

Chapter 2: How does eG Enterprise monitor the Tibero Database Server?

eG Enterprise can monitor Tibero Database server in an agent-based or agentless manner. In case of the agentless approach, the remote agent used to monitor the Tibero Database server should be deployed on a remote Windows host in the environment.

2.1 Pre-requisites for Monitoring Tibero Database Server using eG Enterprise

In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. Ensure that this user is vested with the *select any dictionary* and *create session* privileges.

2.2 Managing the Tibero Database Server

The eG Enterprise cannot automatically discover the Tibero Database server. This implies that you need to manually add the component for monitoring. Remember that the eG Enterprise automatically manages the components that are added manually. To manage a Tibero Database Server, do the following:

1. Log into the eG administrative interface.
2. Follow the Components -> Add/Modify menu sequence in the **Infrastructure** tile of the **Admin** menu.
3. In the **COMPONENT** page that appears next, select Tibero Database Server as the **Component type**. Then, click the **Add New Component** button. This will invoke Figure 2.1.

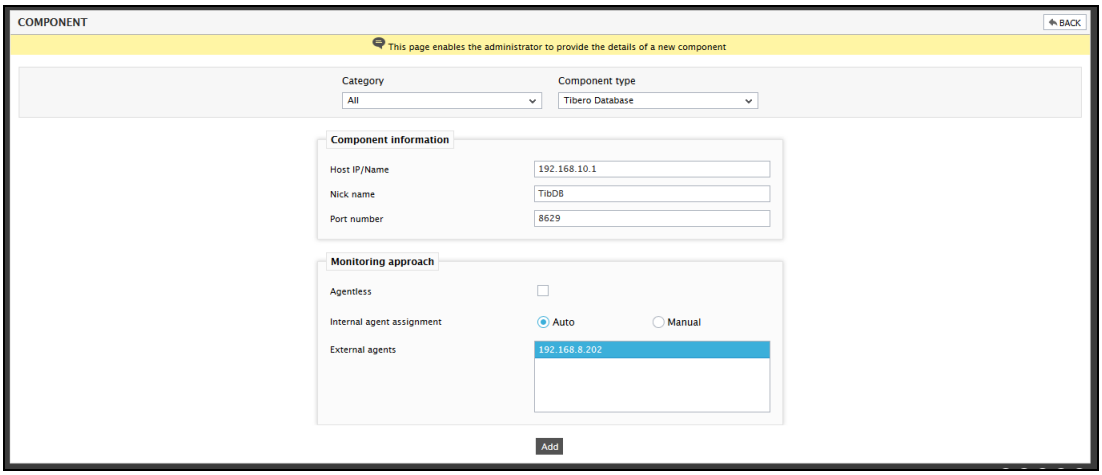
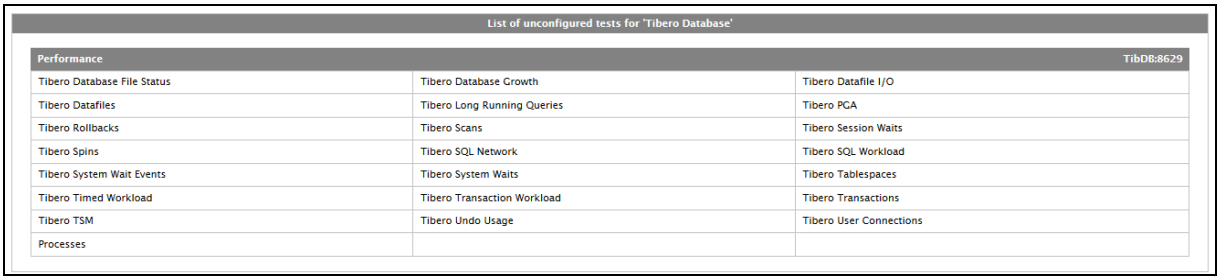


Figure 2.1: Adding a Tibero Database Server

4. Specify the **Host IP** and the **Nick name** of the Tibero Database Server in Figure 2.1. By default, the Port at which the server listens to is specified as 8629. If the server listens to any other port, then specify the port number in the **Port** text box.
5. By default, the **Agentless** option will be unchecked while you add the Tibero Database Server.
6. Click the **Add** button to add the component.
7. When you attempt to sign out, a list of unconfigured tests will appear as shown in Figure 2.2.



List of unconfigured tests for 'Tibero Database'

Performance		TibDB:8629
Tibero Database File Status	Tibero Database Growth	Tibero Datafile I/O
Tibero Datafiles	Tibero Long Running Queries	Tibero PGA
Tibero Rollbacks	Tibero Scans	Tibero Session Waits
Tibero Spins	Tibero SQL Network	Tibero SQL Workload
Tibero System Wait Events	Tibero System Waits	Tibero Tablespaces
Tibero Timed Workload	Tibero Transaction Workload	Tibero Transactions
Tibero TSM	Tibero Undo Usage	Tibero User Connections
Processes		

Figure 2.2: List of unconfigured tests to be configured for the Tibero Database Server

8. Click on the any test from the list of unconfigured tests. For instance, click on the **Tibero Database File Status** test to configure it. In the page that appears, specify the parameters as shown in Figure 2.3.

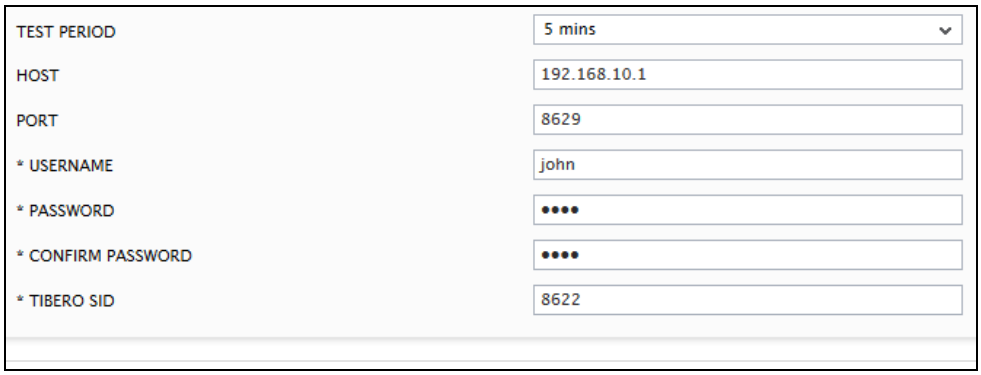


Figure 2.3: Configuring the Tibero Database File Status test

9. To know how to configure these parameters, refer to **Monitoring Tibero Database Server**.
10. Next, try to signout of the eG administrative interface, now you will be prompted to configure the **Processes** test and **Log Monitor** test. To know how to configure the **Processes** and **Log Monitor** tests, refer to *Monitoring Unix and Windows* document.
11. Finally signout of the eG administrative interface.

Chapter 3: Monitoring Tibero Database Server

Figure 3.1 depicts the layer model that the eG Enterprise suite uses to monitor an Tibero Database server.

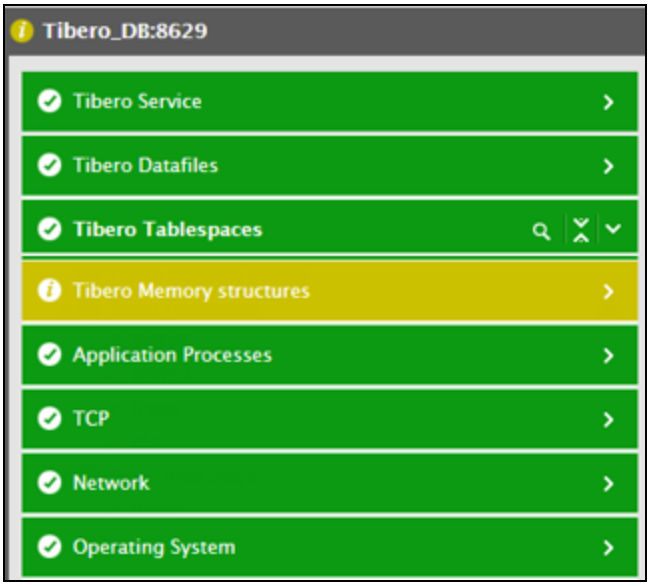


Figure 3.1: Layer model for the Tibero Database Server

Each of the layers in Figure 3.1 above is mapped to a wide variety of tests, which collect a wealth of performance data from the Tibero Database Server. Using this data, the following questions can be answered:

Database service monitoring	• Is the database server available for servicing requests and what is the response time for a typical request?
Transaction monitoring	• What is the commit and rollback behavior of the applications using the database?
Rollback segment monitoring	• Is there heavy contention for the rollback segments?
Lock and latch monitoring	• Is there contention for locks? Is a specific application holding a lock for a long time? Which lock(s) are these?
Full table scan monitoring	• Is there any full table scan happening on the database? If so, how frequently?

Tablespace monitoring	• Are any of the tablespaces reaching their storage capacity? Is the load adequately balanced across the tablespaces?
Hot file monitoring	• Is the disk I/O (read/write) being balanced across the datafiles or is there a particular hot datafile that is handling all the requests?

Since the tests pertaining to the **Application Processes**, **TCP**, **Network** and **Operating System** layers have been dealt in detail in the Monitoring Unix and Windows Servers document, let us discuss the tests pertaining to the remaining layers in the forthcoming sections.

3.1 The Tibero Memory Structures Layer

This layer tracks the health of the SGA, the lock structures, and the rollback segments (see Figure 3.2).

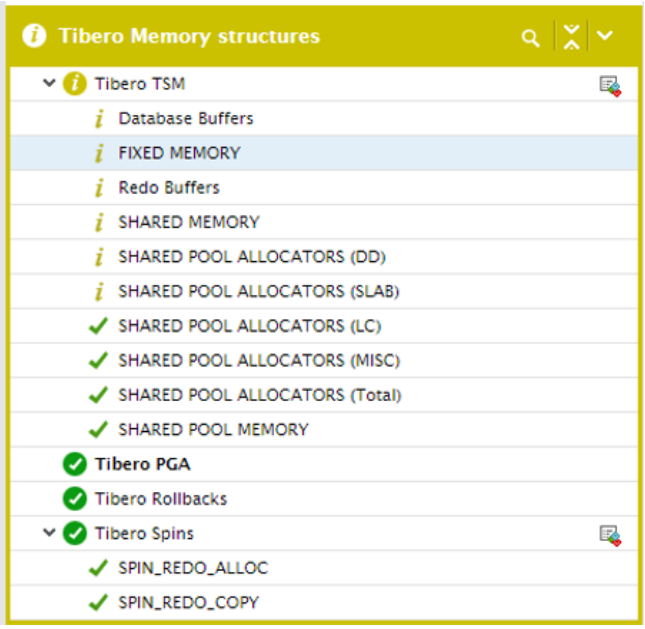


Figure 3.2: Tests mapped to the Tibero Memory Structures layer

3.1.1 Tibero TSM Test

This test periodically monitors the space usage of the shared memory, and proactively alerts administrators to excessive space consumption by, or deficiencies in space allocations to, the shared memory.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the target Tibero Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total size	Indicates the total size of the shared memory space.	MB	
Used size	Indicates the used size of	MB	

Measurement	Description	Measurement Unit	Interpretation
	the shared memory space.		
Free size	Indicates the free size of the shared memory space.	MB	Ideally, the value of this measurement should be very high.
Space usage	Indicates the space usage of the shared memory space.	Percent	Typically, a low percentage of free space is desired. A value close to 100 or a consistent increase in the value of this measure could indicate excessive space consumption by the shared memory or insufficient space allocation; lack of free space for shared memory can severely affect database performance, and can even cause the database to hang! To avoid such adversities, you might want to consider allocating more space to the shared memory.

3.1.2 Tibero PGA Test

A PGA is a memory region that contains data and control information for a server process. It is nonshared memory created by Tibero Database when a server process is started. Access to the PGA is exclusive to the server process. There is one PGA for each server process. Background processes also allocate their own PGAs.

If the PGA runs out of memory, then critical server processes may not run. To avoid this, administrators can use the TibPgaTest test to keep an eye on the memory consumption by the PGA and be proactively alerted administrator if one/more server processes are draining memory from the PGA rapidly.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each target database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Current size	Indicates the amount of PGA memory that is currently in use.	MB	Ideally, the value of this measure should be low. A steady rise in this value is a sign of excessive consumption of PGA memory by server processes.
PGA usage ratio	Indicates the percentage of PGA memory that is consumed by the server	Percent	Ideally, the value of this measure should be low. If this value rapidly approaches 100%, it indicates that the

Measurement	Description	Measurement Unit	Interpretation
	processes.		PGA is about to run out of free memory.

3.1.3 Tibero Rollbacks Test

The immediate availability of rollback segments for the various activities that occur in a database server is very critical. Contention for rollback segments can adversely impact the performance of a database server and hence, needs to be detected and reported immediately. To detect contention for rollback segments, the **Tibero Rollbacks** test monitors the degree of contention for buffers that contain rollback segment blocks.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each target database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to

Parameter	Description
	query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
System segment waits	Indicates the ratio of the number of waits for acquiring a header block or a block of the SYSTEM rollback segment to the total number of requests for data, measured over a period of time.	Percent	If the number of waits for any class of block exceeds 1% of the total number of requests, the size of the SYSTEM rollback segment needs to be increased.
Non-system segment waits	Indicates the ratio of the number of waits for acquiring a header block or any other block of a non-SYSTEM rollback segment to the total number of requests for data, measured over a period of time.	Percent	If the number of waits for any class of block exceeds 1% of the total number of requests, the sizes of the existing rollback segments may need to be increased. Alternatively, additional rollback segments to may be created to reduce contention.

3.1.4 Tibero Scans Test

Full table scans on a database instance can degrade the performance of the database. This test monitors the extent of full table scans happening on the database.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each target database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Full table scans	Indicates the number of full table scans that happened on the database instance during the last measurement period.	Number	This type of scan reads all rows from a table and filters out those that do not meet the selection criteria. Full table scans may happen due to several reasons. For instance, the indexes of a table may not be used properly in queries. By tuning the queries, the full table scans can be reduced and the database performance significantly improved.

3.2 The Tibero Tablespaces Layer

A tablespace is a logical database structure that is designed to store other logical database structures. The objects that may be stored in a tablespace include tables, indexes, rollback segments, etc. If a tablespace runs out of space then all the statements that try to acquire new space in that tablespace will fail. If there are too much read or write operations to a specific tablespace this could result in serious performance problems. Hence it is critical to monitor individual tablespaces of a database server instance.

The Tibero **Tablespaces** layer monitors the health of the individual tablespaces of a database server instance.

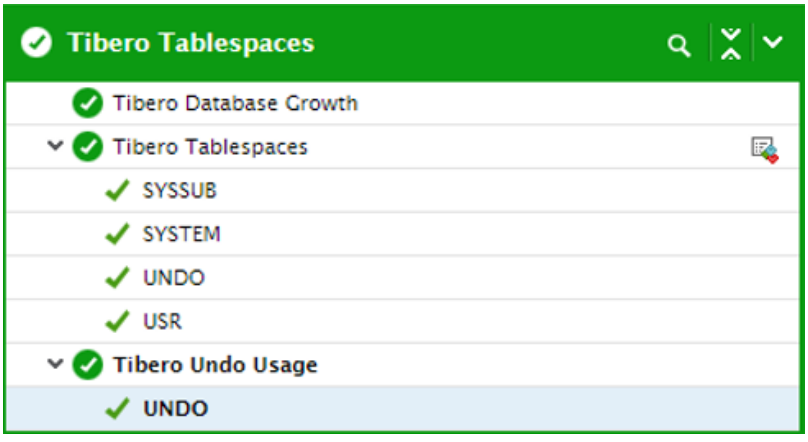


Figure 3.3: Tests mapped to the Tibero Tablespaces layer

3.2.1 Tibero Database Growth Test

Periodic monitoring of the usage of the database is essential to ensure that the database is always adequately sized to handle current and future loads. The **Tibero Database Growth** test monitors the usage of a managed Tibero database instance, and indicates if it requires resizing.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each target database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.
Use Max Size	Set the Use Max Size flag to **Yes**, if you want the *Free space in database*, *Space*

Parameter	Description
	usage, and *Space free* measures of this test to be computed based on the maximum size upto which a database can grow. Set this flag to **No**, so that the aforesaid measures are computed based on the space allocated to a database.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total size of database	Indicates the total size of this database instance.	MB	
Used space in database	Indicates the amount of database space that has been currently utilized.	MB	
Free space in database	Indicates the amount of free space in this database instance currently.	MB	If the USE MAX size parameter of this test has been set to Yes, then the value of this measure will include the amount of allocated space that is still unused by the database and the amount of space that will be available to the database if more free space is added to it until its maximum size is reached. If the USE MAX size parameter of this test has been set to No, then the value of this measure will only indicate the amount of allocated space that is still unused by the database. In this case, the database's growth capacity will be disregarded.
Space usage	Indicates the percentage of database space that has been utilized.	Percent	If the USE MAX size parameter of this test has been set to No, then the value of this measure will be computed using the following

Measurement	Description	Measurement Unit	Interpretation
			formula: *Used space/Total size of database * 100* If the USE MAX size parameter of this test has been set to Yes, then the value of this measure will be computed using the following formula: *Used space/Maximum size upto which the database can grow * 100* Ideally, this value should be low. A value close to 100% is a cause for concern.
Space free	Indicates the percentage of free space in this database instance.	Percent	If the USE MAX size parameter of this test has been set to No, then the value of this measure will be computed using the following formula: *Free space/Total size of database * 100* If the USE MAX size parameter of this test has been set to Yes, then the value of this measure will be computed using the following formula: *Free space/Maximum size upto which the database can grow * 100* Ideally, this value should be high. A sudden/consistent decrease in the value of this measure could indicate excessive utilization of the database caused by a sporadic/steady

Measurement	Description	Measurement Unit	Interpretation
			increase in database activity. Very low free space in a database instance could significantly deteriorate its performance. Under such circumstances therefore, you might want to check the measures reported by the Tibero Datafile Growth test to figure out which datafile is consuming too much space. You might then want to resize the datafile.

3.2.2 Tibero Tablespaces Test

This test tracks both the disk space usage per tablespace, as well as the rates at which data is written to and read from a tablespace.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each tablespace on the target Tibero Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges.

Parameter	Description
	The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Current usage	Indicates the current actual usage with respect to the current allocated size (Current size).	Percent	As a rule of thumb, at any time, about 20% of the space allocated to a tablespace should be available. In case of auto-extensible tablespaces, even if this percentage touches 100%, there would be no cause for concern. However, if a tablespace is not auto-extensible, then when the percentage disk space usage reaches 100%, all statements that attempt to acquire new space in the tablespace will fail. Under such circumstances, the underlying datafiles of the tablespace may need to be resized or reorganized. Alternately, additional datafiles could be mapped to the tablespace.
Physical reads	Indicates the rate of physical reads happening on a tablespace.	Reads/Sec	A sudden increase in the rate of data accesses may indicate a change in application characteristics. At any stage, if more than 50% of the total reads for a database instance happen

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>to be on a particular tablespace, this may result in performance degradation.</td></tr>
<tr><td>Physical writes</td><td>Indicates the rate of physical writes happening on a tablespace.</td><td>Writes/Sec</td><td>More than 50% of the total writes for a database instance happening on a particular tablespace may be indicative of a problem scenario that needs further investigation.</td></tr>
<tr><td>Auto extensible</td><td>Indicates whether the tablespace has the capability to grow automatically or not.</td><td></td><td>If the tablespace is auto-extensible, then this measure will report the value Yes. If it is not extensible, then the value of this measure will be No.

The numeric values that correspond to the measure values discussed above are as follows:

<table><tr><th>Measure Value</th><th>Numeric Value</th></tr><tr><td>No</td><td>0</td></tr><tr><td>Yes</td><td>1</td></tr></table>
Note:

By default, the measure reports the Measure Values listed in the table above to indicate whether/not a tablespace is auto-extensible. In the graph of this measure however, the same is represented using the numeric equivalents only.</td></tr>
<tr><td>Max size</td><td>Indicates the maximum extent (in MB) upto which a tablespace can grow.</td><td>MB</td><td></td></tr>
<tr><td>Current size</td><td>Indicates the current allocated size of the tablespace.</td><td>MB</td><td>If a tablespace is not auto-extensible, then its Current size will be equal to the Max size. For auto-extensible tablespaces though, the values of the Current size and Max size measures could be different.</td></tr>
</table>

Measurement	Description	Measurement Unit	Interpretation
Free space	Indicates the amount of unused space in the tablespace.	MB	The value of this measure is computed using the formula: *Max size - Current actual usage*, where Current actual usage is arrived at by applying the Current usage percentage on the Current size (current allocated size) measure. For example, assume that the Max size of a tablespace is 2500 MB and its Current size is 1000 MB. Also, note that nearly 30% of the Current size has already been utilized. Therefore, the Current actual usage of the tablespace will be 30% of 1000MB, which is 300 MB. The available Free space will hence be, 2500-300, i.e. 2200 MB. If this value is very low, then it indicates over-utilization of the tablespace.
Percent free space	Indicates the space available for overall growth expressed as a ratio of *Free space* with respect to the *Max size* of the tablespace. The formula used is: *Free space/Max size*100*	Percent	If this value is very low, then it indicates over-utilization of the tablespace.
Biggest extent	Indicates the size of the biggest extent in the tablespace.	MB	From both these values, you can figure out how space allocation, fragmentation, etc. have been performed on the tablespace.
Smallest extent	Indicates the size of the smallest extent in the tablespace.	MB	
Remaining extents	Indicates the number of extents that can be added to a tablespace.	Number	If this value is low and the tablespace is not auto-extensible, then it indicates that the tablespace requires resizing. In the case of auto-extensible

Measurement	Description	Measurement Unit	Interpretation
			tablespaces, this phenomenon is not a cause for concern. This measure is not applicable to tablespaces that have dictionary based extent management and allocation type is user.

3.2.3 Tibero Undo Usage Test

This test periodically monitors the space usage of the UNDO tablespace, and proactively alerts administrators to excessive space consumption by, or deficiencies in space allocations to, the UNDO tablespace.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the target Tibero Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this

Parameter	Description
	user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total size	Indicates the total size of the UNDO tablespace.	MB	
Used size	Indicates the used size of the UNDO tablespace.	MB	
Free size	Indicates the free size of the UNDO tablespace.	MB	Ideally, the value of this measurement should be very high.
Free percent	Indicates the percentage of space allocated to the UNDO tablespace, which is still unused.	Percent	Typically, a high percentage of free space is desired. A value close to 0 or a consistent decrease in the value of this measure could indicate excessive space consumption by the UNDO tablespace or insufficient space allocation; lack of free space for the UNDO tablespace can severely affect database performance, and can even cause the database to hang! To avoid such adversities, you might want to consider allocating more space to the UNDO tablespace.

3.3 The Tibero Datafiles Layer

Since the datafiles contain the user data and the data dictionary and represent a major component of the database, monitoring the activity on the different datafiles is critical for optimizing database performance. The tests pertaining to this layer helps administrators identify the level of activity that is happening on each datafile of a database. The results can be used to reorganize the data storage,

so as to balance the activity across the different datafiles and among the different physical disks in use.

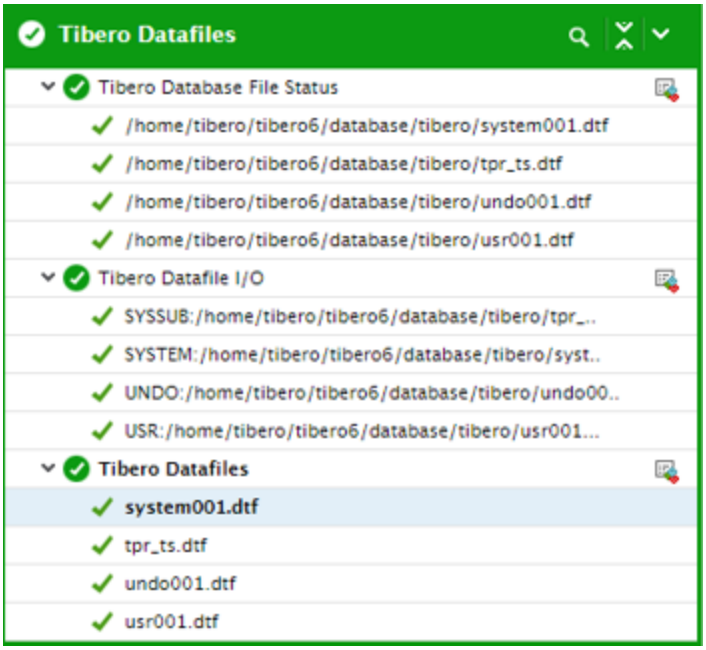


Figure 3.4: Tests mapped to the Tibero Datafiles layer

3.3.1 Tibero Database File Status Test

This test reports the status of each datafile in each database of a Tibero Database instance and the current access mode of every datafile.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every datafile on the target database server.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be

Parameter	Description
	created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
File status	Indicates the current status of this datafile.	Number	The table below indicates the values that this measure can report and their corresponding numeric equivalents: **Measure value** / **Numeric Value** System / 1 Online / 2 Recover / 3 Unknown / 4 If a datafile is part of the SYSTEM tablespace, its status is SYSTEM (unless it requires recovery). If a datafile in a non-SYSTEM tablespace is online, its status is ONLINE. If a

<table>
<tr><th>Measurement</th><th>Description</th><th>Measurement Unit</th><th>Interpretation</th></tr>
<tr><td></td><td></td><td></td><td>datafile in a non-SYSTEM tablespace is offline, its status can be either OFFLINE or RECOVER.
Note:
By default, this measure reports the above-mentioned Measure Values while indicating the current status of a datafile. However, in the graph of this measure, data file states will be represented using the corresponding numeric equivalents only - i.e., 1 to 4.</td></tr>
<tr><td>File access mode</td><td>Indicates the current access mode of this datafile.</td><td></td><td>The table below indicates the values that this measure can report and their corresponding numeric equivalents:
<table><tr><th>State</th><th>Numeric Value</th></tr><tr><td>Disabled</td><td>0</td></tr><tr><td>Read Only</td><td>1</td></tr><tr><td>Read Write</td><td>2</td></tr><tr><td>Unknown</td><td>3</td></tr></table>Note:
By default, this measure reports the above-mentioned States while indicating the mode through which this data file can be accessed. However, the graph of this measure will be represented using the corresponding numeric equivalents i.e., 0 to 3.</td></tr>
</table>

3.3.2 Tibero Datafile I/O Test

This test indicates the level of activity on a specific datafile in terms of the rate of physical reads and physical writes.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every datafile on the target database server.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.
IncludePath	This test reports a set of results for each datafile on the target Tibero database server. This means that every datafile is a descriptor of this test. By default, while displaying the descriptors of this test, the eG monitoring console does not prefix the datafile names with the full path to the datafiles. This is why, the IncludePath flag is set to **No** by default. If you want the data file names to be prefixed by the full path to the data files, then, set the IncludePath flag to **Yes**.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Physical block read rate	Indicates the rate at which disk blocks are being read from this datafile.	Blocks/Sec	A scenario in which more than 50% of blocks are being read from a single datafile could signify a problem.
Physical block write rate	Indicates the rate at which disk blocks are being written to this datafile.	Blocks/Sec	A scenario in which more than 50% of blocks are being written to a single datafile could signify a problem. Too much activity to a specific datafile can result in reduced database performance. To improve performance, consider balancing I/O across disks, and reorganize tables across tablespaces to reduce activity to a specific datafile.
Percent total I/O	Indicates the percentage of total I/O operations on the database server that were handled by a data file.	Percent	Disk reads and writes are expensive operations and all I/Os should be balanced across the different data files of an Tibero database for optimal performance. This metric reports the percentage of all I/O of an Tibero database that are happening on each of the data files of the Tibero database. This metric allows an Tibero administrator to determine which is/are the hot data file(s) (e.g., which data file is handling 80% of the total I/O).

3.3.3 Tibero Datafile I/O Test

If a Tibero datafile is able to process I/O requests to it quickly, it is a sign of the good health of the Tibero database server. On the other hand, any slowdown in IOPS could indicate a serious processing bottleneck on the server, probably caused by a poor indexing engine or badly structured tables in a datafile. Administrators should hence continuously track the I/O requests to every datafile on the Tibero database server, and measure the time taken by that datafile to process the requests. For this purpose, you can run the **Tibero Datafile I/O** test!

This test auto-discovers the datafiles on the Tibero database server and reports the time taken by each datafile to process I/O requests. In the process, I/O processing bottlenecks can be detected and the datafiles affected can be identified.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every datafile on the target database server.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Read rate	Indicates the rate at which this datafile was read during the last measurement period.	Reads/sec	A scenario in which more than 50% of blocks are being read from a single datafile could signify a problem.
Write rate	Indicates the rate at which disk blocks were written to this datafile during the lsat measurement period.	Writes/sec	A scenario in which more than 50% of blocks are being written to a single datafile could signify a problem. Too much activity to a specific datafile can result in reduced database performance. To improve performance, consider balancing I/O across disks, and reorganize tables across tablespaces to reduce activity to a specific datafile.
Total I/O	Indicates the percentage of total I/O operations on the database server that were handled by this datafile.	Percent	Disk reads and writes are expensive operations and all I/Os should be balanced across the different data files of the database for optimal performance. This metric reports the percentage of all I/O of the database that are happening on each of the data files of the Tibero database. This metric allows the database administrator to determine which is/are the hot data file(s) (e.g., which data file is handling 80% of the total I/O).
Average I/O time	Indicates the average time taken by the I/O operations on the database server that were handled by this datafile.	Seconds	A high value could indicate a processing bottleneck with the datafile. Compare the value of this measure across datafiles to identify that datafile to which the read/write requests take too long to be serviced.
Average read time	Indicates the average time taken for disk block reads from this datafile during the	Seconds/read	A very high value of this measure could indicate a bottleneck when processing disk block write requests

Measurement	Description	Measurement Unit	Interpretation
	last measurement period.		to a particular datafile. Compare the value of this measure across files to accurately identify that datafile from which block of data was read most slowly.
Average write time	Indicates the average time taken for disk block writes from this datafile during the last measurement period.	Seconds/write	A very high value of this measure could indicate a bottleneck when processing disk block write requests to a particular datafile. Compare the value of this measure across files to accurately identify that datafile to which block of data was written most slowly.

3.4 The Tibero Service Layer

This layer tracks the overall health of the service offered by the database server to clients. The availability and responsiveness of the database server and session-level information regarding the usage of the database server are measured and reported by running the tests pertaining to this layer.

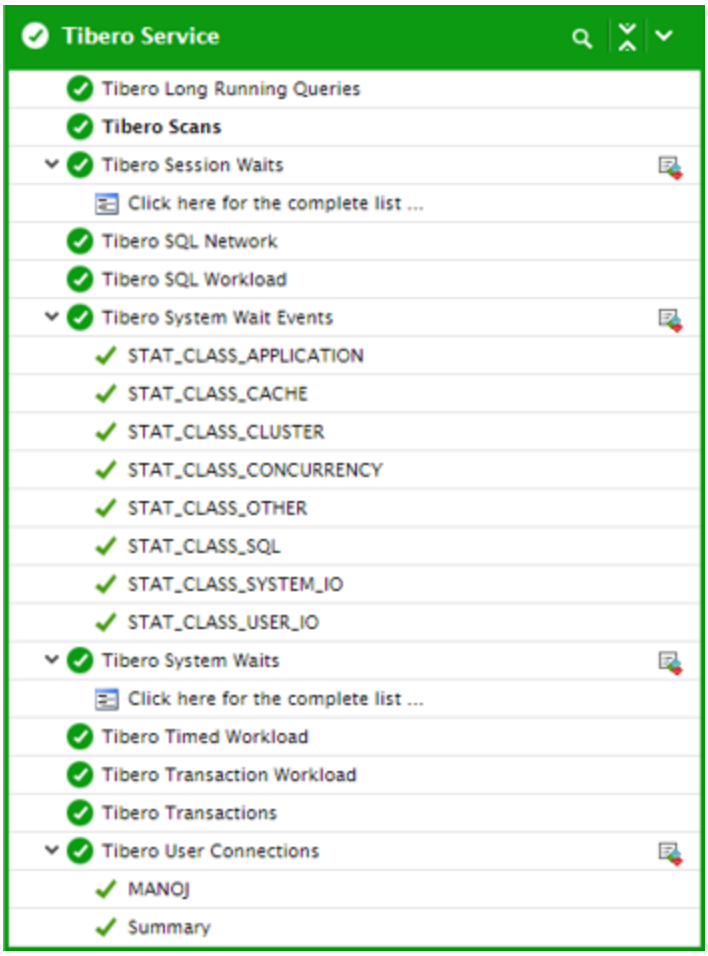


Figure 3.5: Tests mapped to the Tibero Service layer

3.4.1 Tibero Long Running Queries Test

This test reports the number and state of sessions of each user who is currently connected to the Tibero database server. Using the metrics reported by this test, administrators can promptly isolate idle sessions, which are a drain on a server's resources.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each target database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.

Parameter	Description
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.
Avg Elapsed Time Per Execution (Seconds)	Here, specify the duration (in seconds) for which a query should have executed for it to be regarded as a long running query. The default value is 10.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Number of queries	Indicates the number of queries currently executing on the database server that have been running for more time than the configured **Avg Elapsed Time Per Execution (Seconds)**.	Number	The detailed diagnosis for this measure indicates the exact queries and which user is executing the queries. This information can be very useful in identifying queries that may be candidates for optimization.
Max elapsed time	Indicates the maximum time taken by the queries to this database.	Seconds	

3.4.2 Tibero Scans Test

Full table scans on a database instance can degrade the performance of the database. This test monitors the extent of full table scans happening on the database.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each target database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges.

Parameter	Description
	The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Full table scans	Indicates the number of full table scans that happened on the database instance during the last measurement period.	Number	This type of scan reads all rows from a table and filters out those that do not meet the selection criteria. Full table scans may happen due to several reasons. For instance, the indexes of a table may not be used properly in queries. By tuning the queries, the full table scans can be reduced and the database performance significantly improved.

3.4.3 Tibero Session Waits Test

The test monitors the session level wait events on the Tibero database server and reports key performance statistics pertaining to every event. Effective wait analysis helps determine where the database spends most of its time, and which current connections are responsible for the reported waits.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each target database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Parameter	Description
Exclude	Here, provide a comma-separated list of wait events that need not be monitored. For example, your specification can be: b*uffer_busy_waits,SQL*Net_message_from_client*. By default, 'none' is displayed here indicating that all wait events are monitored, by default.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
New waits	Indicates the total number of times waits happened on this event since the last measurement period.	Number	If the value of this measure is very high, then you can drill down further using the detailed diagnosis capability (if enabled) of the eG Enterprise suite to discover which current connections may be responsible for this. The detailed diagnosis of this measure reveals the session IDs of the sessions that caused the wait events to occur, the users who initiated the sessions, and the total number of waits, wait time, and the maximum wait time for every session.
Total waits timedout	Indicates the total number of waits on this event that timed out since the last measurement period.	Number	A large number of timed out wait events is typically, undesirable.

Measurement	Description	Measurement Unit	Interpretation
Average time waited	Indicates the average duration for which the waits on this wait event persisted since the last measurement period.	Secs	Ideally, the value of this measure should be low. A very high value or a consistent increase in this value is indicative of a problem situation requiring further investigation. Use the detailed diagnosis capability to zoom into the session that has contributed to the abnormal increase in wait time.
Maximum time waited	Indicates the high watermark of wait time for this wait event.	Secs	

3.4.4 Tibero SQL Network Test

Using the JDBC API, this test reports the availability and responsiveness of the server, and collects statistics pertaining to the traffic into and out of the database server.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each target database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is:

Parameter	Description
	create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>; *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Immediate misses	This metric measures the latch contention for requests that were not willing to wait to acquire a latch. The value of this metric represents the percentage of “not willing to wait” latch requests that failed. In other words: the number of “not willing to wait” request misses / the total number of “not willing to wait” requests.	Percent	
Willing-to-wait misses	This measures the latch contention for requests that were willing to wait to acquire a latch. The value of this metric represents the ratio of the number of requests that could not acquire a latch, to those that could acquire a latch.	Percent	

3.4.5 Tibero SQL Workload Test

Nothing can degrade the performance of a Tibero database server like a resource-hungry or a long-running query! When such queries execute on the server, they either hog almost all the available CPU, memory, and disk resources or keep the resources locked for long time periods, thus leaving little to no resources for carrying out other critical database operations. This can significantly slowdown the database server and adversely impact user experience with the server. To ensure peak performance of the Tibero database server at all times, such queries should be rapidly identified and quickly optimized to minimize resource usage. This is where the **Tibero SQL Workload** test helps.

At configured intervals, this test compares the usage levels and execution times of all queries that started running on the server in the last measurement period and identifies a 'top query' in each of the following categories - CPU usage, memory usage, disk activity, and execution time. The test then reports the resource usage and execution time of the top queries and promptly alerts administrators if any query consumes more resources or takes more time to execute than it should. In such a scenario, administrators can use the detailed diagnosis of this test to view the inefficient queries and proceed to optimize them to enhance server performance.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the target Tibero Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is:

Parameter	Description
	create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>; *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Maximum physical reads	Indicates the number of physical disk reads performed by the top query per execution.	Reads/execution	If the value of this measure is abnormally high, you can use the detailed diagnosis of this measure to view the top-5 (by default) queries generating maximum physical disk activity. From this, you can identify the top query in terms of number of physical disk reads. You may then want to optimize the query to reduce the disk reads.
Maximum buffer gets	Indicates the number of memory buffers used by the top query per execution.	Memorybuffergets / execution	If the value of this measure is abnormally high, you can use the detailed diagnosis of this measure to view the top-5 (by default) queries consuming memory excessively. From this, you can easily pick that query which is consuming the maximum memory. You may then want to optimize the query to minimize memory usage.
Maximum CPU time	Indicates the duration for which each execution of	Secs/execution	If the value of this measure is over 30 seconds, you can use the detailed

Measurement	Description	Measurement Unit	Interpretation
	the top query was hogging the CPU resources.		diagnosis of this measure to the top-5 (by default) queries hogging the CPU resources. From this, you can easily pick that query which is consuming the maximum CPU. You may then want to optimize the query to minimize CPU usage.
Maximum elapsed time	Indicates the running time of each execution of the top query.	Secs/execution	If the value of this measure crosses 10 seconds, you can use the detailed diagnosis of this measure to view the top-5 (by default) queries that are taking too long to execute. From this, you can easily pick that query with the maximum execution time. You may then want to optimize the query to minimize execution time.

3.4.6 Tibero System Wait Events Test

This test monitors system wait classes for the number and average time of system wait events. Using this test, administrators can nail the wait class on which the Tibero database server spends more time and why, so that performance tuning decisions can be taken.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each system wait class monitored on the Tibero Database server.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be

Parameter	Description
	created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.
Exclude	In the Exclude text box, provide a comma-separated list of wait events that need not be monitored. For example, your specification can be: *Data_file_init_write,db_file_single_write*. By default, 'none' is displayed here indicating that all system wait events are monitored, by default.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
New wait events	This measure indicates the number of waits for each wait class during this measurement period.	Number	
Average time waited	Indicates the average time in seconds for each wait event in this class, during this measurement period.	Secs	If the value of this measure is unusually high, then you can get the identify time-consuming wait event, using the detailed diagnosis of this measure.
Maximum time waited	Indicates the maximum	Secs	

Measurement	Description	Measurement Unit	Interpretation
	time in seconds for each wait event in this class persisted during the last measurement period.		

3.4.7 Tibero System Waits Test

This test monitors the system level wait events on the Tibero database server and reports key performance statistics pertaining to every event. Effective wait analysis helps determine where the database spends most of its time, and which current connections are responsible for the reported waits.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for each target database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this

Parameter	Description
	user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.
Exclude	In the Exclude text box, provide a comma-separated list of wait events that need not be monitored. For example, your specification can be: *Data_file_init_write,db_file_single_write*. By default, 'none' is displayed here indicating that all system wait events are monitored, by default.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
New waits	Indicates the total number of times waits happened on this event system-wide, since the last measurement period.	Number	High waits indicate a problem, but not always. Sometimes waits are just a normal part of database operations. For example, high waits on 'db file sequential read' events may indicate a disk bottleneck, but you must check your average disk queue length for each disk spindle to be sure that these waits are abnormal. If a high number of waits are observed on a specific event, you can use the detailed diagnosis capability of the **Tibero Session Waits** test to figure out whether any current connections have contributed to the increase in waits.
Total wait timeouts	Indicates the total number of waits on this event that timed out since the last measurement period.	Number	A large number of timed out wait events is typically, undesirable. Use the Tibero-specific documentation to probe the cause of the timeout.
Average time waited	Indicates the average duration for which the	Secs	By comparing the value of this measure across all monitored wait

Measurement	Description	Measurement Unit	Interpretation
	waits on this wait event persisted since the last measurement period.		events, you can determine where the database spends most of its time.
Time waited	Indicates the total amount of time for which the waits on this wait event persisted.	Secs	

3.4.8 Tibero Timed Workload Test

Workload analysis for a Tibero database server involves:

- Determining the number of transactions that applications execute on the database server at any given point in time;
- Understanding the type of database operations these transactions trigger - executes? Updates? reads? Writes? Rollbacks? Parses?
- Knowing how many users are active on the database server at a given point in time;
- Determining how quickly the server processes this load and how much processing power was spent on the same.

This not only reveals the current workload of the database server, but also highlights the processing ability of the server, pinpoints bottlenecks in processing, and leads administrators to where these bottlenecks lie. To perform such detailed workload analysis, administrators can use the **Tibero Timed Workload** test.

This test reports the current CPU usage of the server to indicate its current load. In addition, the test reveals the number and type of transactions the server processes every second, so that administrators can understand how well the server handles the load and can accurately identify where bottlenecks lie. By comparing the CPU usage of the server with its processing ability, administrators can intelligently figure out if the server requires additional CPU resources for improved performance.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the target Tibero Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Database CPU usage	Indicates the percentage CPU used by the server.	Percent	A value close to 100% is indicative of excessive CPU usage. This in turn indicates that the server is using up all its processing power to service its current workload. It could be because the load is very high. It could also be owing to a few resource-intensive transactions executing on the server. In case of the former, you may want to

Measurement	Description	Measurement Unit	Interpretation
			allocate more CPU resources to the server, so as to enhance its processing ability.
CPU time	Indicates the time for which the server has been hogging the CPU resources since the last measurement period.	Secs	A consistent increase in the value of this measure could indicate a steady increase in the workload of the server.
Redo size	Indicates the rate at which modifications were written to the redo logs since the last measurement period.	MB/Sec	If the value of this measure keeps growing, it could indicate that data is changing rapidly in the databases. A steady drop in this value could indicate that changes are not written to the redo logs as quickly as they occur.
Logical reads	Indicates the rate at which logical reads were performed by the server.	Reads/Sec	These measures are good indicators of the level of activity on the database server and how well the server handles these activity levels. In the event of a slowdown, you can compare the value of these measures to know where the slowdown may have originated - when making changes to data? When reading?
Block changes	Indicates the rate at which database blocks were changed.	Blocks/Sec	
Physical reads	Indicates the rate at which the server performed physical reads.	Reads/Sec	
User calls	Indicates the rate at which the server made user calls.	Calls/Sec	
Parses	Indicates the rate at which the server parsed SQL statements.	Parses/Sec	Parsing is one stage in the processing of a SQL statement. When an application issues a SQL statement, the application makes a parse call to Tibero Database. During the parse call, Tibero Database: • Checks the statement for syntactic and semantic validity.

Measurement	Description	Measurement Unit	Interpretation
			• Determines whether the process issuing the statement has privileges to run it. • Allocates a private SQL area for the statement. If the value of this measure keeps increasing consistently, it could indicate that many SQL statements are being executed on the server, thus generating more parses every second. If the value of this measure drops consistently, it could indicate a bottleneck in parsing.
Hard parses	Indicates the rate at which the server hard parsed SQL statements.	Parses/Sec	As opposed to a soft parse, a hard parse loads the SQL source code into RAM for parsing. If the value of this measure is decreasing steadily, it could mean that hard parsing is taking too long. It could also mean that very few hard parses are actually performed.
Logons	Indicates the rate at which users login to the database server.	Number	A steady rise in this value is indicative of a steady increase in user activity on the server.
Executes	Indicates the rate at which executions are performed by the server.	Executions/Sec	
Rollbacks	Indicates the rate at which the server performs rollbacks.	Rollbacks/Sec	Ideally, the value of this measure should be low. This is because, rollbacks are expensive operations and should be avoided at all costs. A consistent increase in the value of this measure is hence a cause for concern.
Transactions	Indicates the rate at which transactions were executed by the server.	Trans/Sec	A steady increase in the value of this measure could indicate an increase in the transaction load on the server. A

Measurement	Description	Measurement Unit	Interpretation
			consistent and notable drop in the value of this measure could indicate a bottleneck in transaction processing.

3.4.9 Tibero Transaction Workload Test

Knowing the count of transactions executing on the Tibero database server per second can indicate the transaction load on the server. However, the true impact of this load can be assessed and understood only if administrators are enabled to determine the number and type of database operations each transaction triggers. This is where the **Tibero Transaction Workload** test helps!

This test reports how many key database operationSs - eg., data modifications, block changes, reads/writes, parses, rollbacks, etc. - are performed on the server per transaction. This way, the test reveals the real workload of the server. In addition, the test also enables administrators to compare current CPU usage with the real workload, so that they can figure out whether/not the server needs to be resized to handle its load.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the target Tibero Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is:

Parameter	Description
	create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>; *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Redo size	Indicates the amount of data written to the redo logs per transaction since the last measurement period.	MB/Trans	If the value of this measure keeps growing, it could indicate that transactions are making numerous and frequent changes to the data in the databases.
Logical reads	Indicates the number of logical reads performed by the server per transaction.	Reads/Trans	These measures are good indicators of the level of activity that every transaction generated on the database server.
Block changes	Indicates the number of database blocks that were changed per transaction.	Blocks/Trans	
Physical reads	Indicates the number of physical reads performed per transaction.	Reads/Trans	
User calls	Indicates the number of user calls made per transaction.	Calls/Trans	
Parses	Indicates the number of parses executed by the server per transaction.	Parses/Trans	Parsing is one stage in the processing of a SQL statement. When an application issues a SQL statement, the application makes a

Measurement	Description	Measurement Unit	Interpretation
			parse call to Tibero Database. During the parse call, Tibero Database: • Checks the statement for syntactic and semantic validity. • Determines whether the process issuing the statement has privileges to run it. • Allocates a private SQL area for the statement. If the value of this measure keeps increasing consistently, it could indicate on an average, transactions are executing many SQL statements on the server, thus generating more parses.
Hard parses	Indicates the number of hard parses executed per transaction.	Parses/Trans	As opposed to a soft parse, a hard parse loads the SQL source code into RAM for parsing. A high value for this measure therefore indicates that the server is performing many hard parses.
Logons	Indicates the number of users logging in per transaction.	Logons/Trans	A steady rise in this value is indicative of a steady increase in user activity on the server.
Executes	Indicates the number of executes performed per transaction.	Executions/Trans	
Rollbacks	Indicates the number of rollbacks performed per transaction.	Rollbacks/Trans	Ideally, the value of this measure should be low. This is because, rollbacks are expensive operations and should be avoided at all costs. A consistent increase in the value of this measure is hence a cause for concern.

Measurement	Description	Measurement Unit	Interpretation
Transactions	Indicates the rate at which transactions were executed by the server.	Trans/Sec	A steady increase in the value of this measure could indicate an increase in the transaction load on the server. A consistent and notable drop in the value of this measure could indicate a bottleneck in transaction processing.

3.4.10 Tibero Transactions Test

Rollbacks are costly operations on the database. This test monitors the percentage of rollbacks happening for user transactions with a database instance.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for the target Tibero Database server being monitored.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to

Parameter	Description
	query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
User commits	Indicates the number of user commits that have happened during the last measurement period.	Number	
User rollbacks	Indicates the number of user rollbacks that have happened during the last measurement period.	Number	Ideally, there should be few user rollbacks happening. Typically, whenever a delete, insert or update operation is performed on the database, Undo tablespace is consumed, I/O overheads increase, and considerable server time is spent in performing that operation. When such operations are rolledback, these resources are wasted! To conserve resources, its best to keep rollbacks at a minimum.
Percent rollbacks	Indicates The number of user rollbacks as a percentage of the total user transactions (user commits + user rollbacks) with the database.	Percent	The closer the percentage of rollbacks is to zero, the lower the overhead on the database due to rollbacks. The acceptable value of rollbacks will vary from one instance to another and will have to be configured based on the patterns of requests being handled by the database instance.

3.4.11 Tibero User Connections Test

This test reports the number and state of sessions of each user who is currently connected to the Tibero database server. Using the metrics reported by this test, administrators can promptly isolate idle sessions, which are a drain on a server's resources.

Target of the test : A Tibero Database server

Agent deploying the test : An internal agent

Outputs of the test : One set of results for every user who is currently connected to the target database server.

Configurable parameters for the test

Parameter	Description
Test Period	How often should the test be executed.
Host	The host for which the test is to be configured.
Port	The port to which the specified host listens. By default, the port number is 8629.
User and Password	In order to monitor a Tibero database server, a special database user account has to be created in every Tibero database instance that requires monitoring. A **Click here** hyperlink is available in the test configuration page, using which a new Tibero database user can be created. Alternatively, you can manually create the special database user. When doing so, ensure that this user is vested with the *select any dictionary* and *create session* privileges. The sample script we recommend for user creation for eG monitoring is: *create user tibeg identified by tibeg default tablespace <users> temporary tablespace<temp>;* *grant create session, select any dictionary tibeg;* The name of this user has to be specified in the User text box, and the password of this user has to be entered in the Password text box. This login information is required to query Tibero's internal dynamic views, so as to fetch the current status / health of the various database components.
Confirm Password	Confirm the Password by retyping it here.

Parameter	Description
Tibero SID	Specify the SID of the target Tibero database instance that is to be monitored in this text box.
Detailed Diagnosis	To make diagnosis more efficient and accurate, the eG Enterprise suite embeds an optional detailed diagnostic capability. With this capability, the eG agents can be configured to run detailed, more elaborate tests as and when specific problems are detected. To enable the detailed diagnosis capability of this test for a particular server, choose the **On** option. To disable the capability, click on the **Off** option. The option to selectively enable/disable the detailed diagnosis capability will be available only if the following conditions are fulfilled: • The eG manager license should allow the detailed diagnosis capability • Both the normal and abnormal frequencies configured for the detailed diagnosis measures should not be 0.

Measurements made by the test

Measurement	Description	Measurement Unit	Interpretation
Total connections	Indicates the total number of connections currently established by this user on the server.	Number	
Assigned connections	Indicates the number of connections of this user that were assigned on the server.	Number	
Closing connections	Indicates the number of connections established by this user that were closed.	Number	
Ready connections	Indicates the number of connections established by this user that were in Ready state.	Number	

Measurement	Description	Measurement Unit	Interpretation
Running connections	Indicates the number of connections established by this user that are currently running.	Number	
Resource cleaning connections	Indicates the number of connections established by this user that are clearing all the resources utilized.	Number	
Transaction recovering connections	Indicates the number of connections established by this user that are in transaction recovery state.	Number	
Rolling back connections	Indicates the number of connections established by this user that contained rollback transactions.	Number	
Rolling back connections usage	Indicates the percentage of connections established by this user that contained rollback transactions.	Percentage	
Session usage	Indicates the number of sessions established by this user that were utilized.	Number	
Maximum connections	Indicates the maximum number of connections that can be established by this user on the server.	Number	

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