

The Foxhound 3 Database Monitor

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2014 11 17

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Introduction

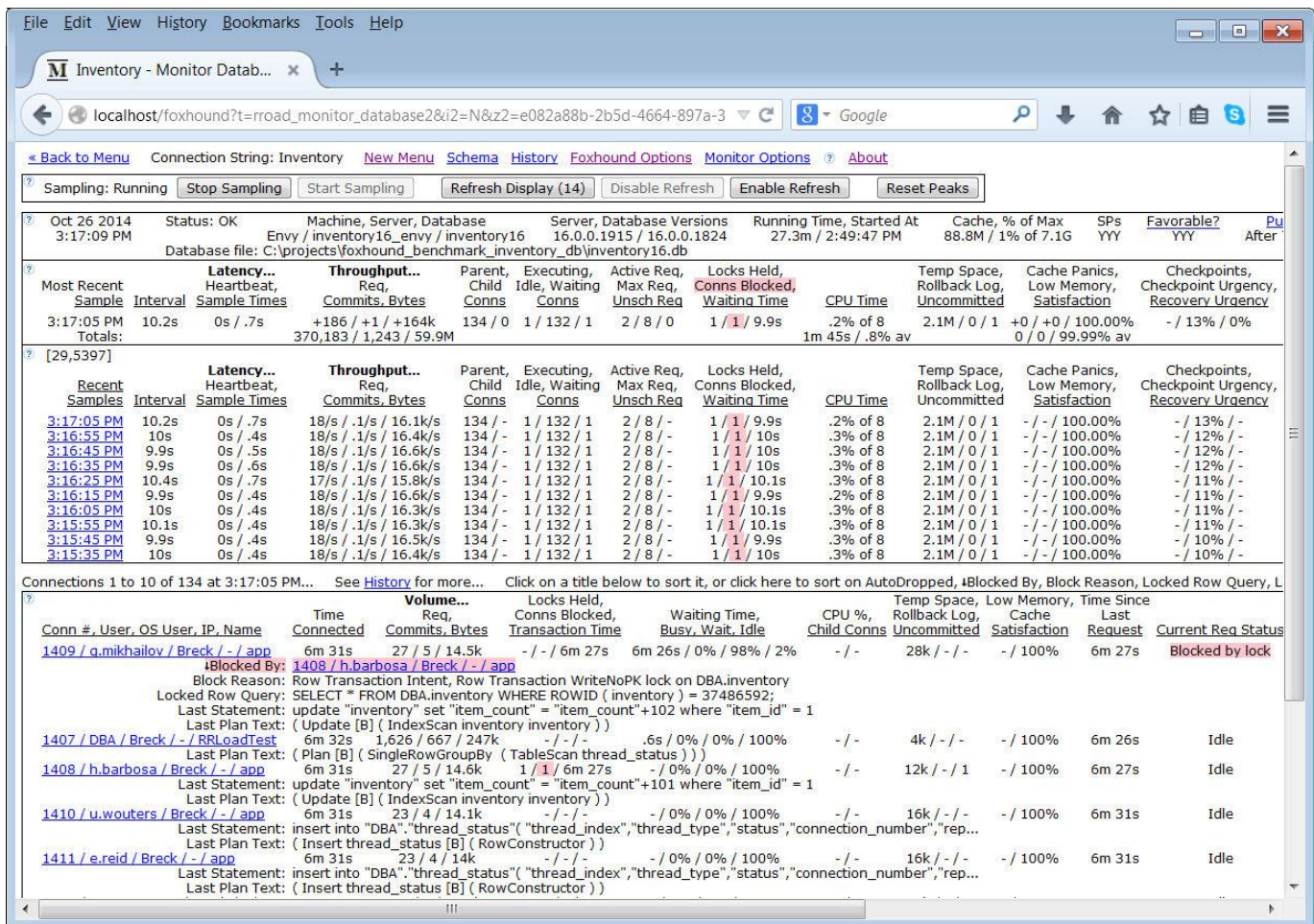
A database monitor is a computer program that measures the activity of a database management system and displays those measurements in a meaningful way so you can see everything's OK... or quickly learn about problems and threats to performance and availability.

Foxhound 3 is a third-party database monitor for SAP® SQL Anywhere®. Here's how it works:

- Every 10 seconds Foxhound retrieves performance statistics from your database.
- Foxhound then
 - stores these statistics in its own SQL Anywhere 16 database,
 - performs summarization and other value-added calculations, and
 - displays the results via HTML using SQL Anywhere's built-in HTTP server.

Figure 1 shows the [Foxhound Monitor page](#) for a lightly-loaded SQL Anywhere server with 134 connections, one of which is blocked by an uncommitted operation made by a long-running transaction on another connection.

Figure 1. The Foxhound Monitor Page Showing An Idle Server With One Blocked Connection



Foxhound Versus The Alternatives

Table 1 compares Foxhound Version 3 with four alternative products:

- the [SQL Anywhere Monitor](#) that is available with the SQL Anywhere 16 Standard and Advanced Editions,
- the [Sybase Central Performance Monitor](#) that comes with every edition of SQL Anywhere 16,
- the [DBConsole utility](#) that also comes with every edition of SQL Anywhere 16 and
- the [Windows 7 Performance Monitor](#).

Table 1. Comparing Foxhound 3 With Alternative Products					
	SQL Anywhere Monitor 16	Sybase Central Performance Monitor 16	DBConsole Utility 16	Windows 7 Performance Monitor	Foxhound 3
Primary purpose	Health and availability monitor	Performance monitor	Connection monitor	Performance monitor	Health, availability and performance monitor
Setup required	A lot	Everything	Some	Everything	Very little
Collection interval	30 sec default, 10 sec minimum	1 sec fixed	4 sec default, 1 sec minimum	1 sec default, 1 sec minimum	10 sec fixed
Presentation	Graphs, Text	Graphs	Text	Graphs	Text
Implementation	Adobe Flash	Java	Native Windows	Native Windows	HTML
Historical data	Yes	-	-	-	Yes
Adhoc reporting	-	-	-	-	Yes
SQL Anywhere statistics	Some, variable	All, variable	All, variable	All, variable	Some, fixed
Latency measured	-	-	-	-	Yes
Peaks recorded	-	-	-	-	Yes
Database Alerts	9 point-in-time events	-	-	-	32 conditions
Alert "All Clear"	-	-	-	-	Yes
Drop connection	manual	-	manual	-	AutoDrop
Target databases supported	11, 12, 16, On Demand 1.0	11, 12, 16, On Demand 1.0	11, 12, 16, On Demand 1.0	5.5, 6, 7, 8, 9, 10, 11, 12, 16, On Demand 1.0	5.5, 6, 7, 8, 9, 10, 11, 12, 16, On Demand 1.0
Target hosts supported	local, network	local, network	local, network	local	local, network
MobiLink and Relay Server support	Yes	-	-	-	-
What's good?	Pretty	Free	Free	Free	Businesslike
What else?	Confusing	Hideous	Basic	Hideous	Crowded

Primary purpose: The SQL Anywhere Monitor omits the phrase "performance monitor" from the docs as does DBConsole.

Setup required: Both DBConsole and Foxhound let you "connect and go" to see something useful while the others require varying degrees of effort just to get started.

Collection interval: Only one Foxhound customer has ever asked for "faster", nobody wants "slower".

Presentation: Nobody's ever asked for graphs so they remain a low-priority item for Foxhound.

Implementation: How a product was built can explain a lot about how it looks and feels and works.

Historical data: This sets the SQL Anywhere Monitor and Foxhound far, far apart from the others.

Adhoc reporting: This is about historical data, not retrieving current statistics from SQL Anywhere or Windows.

SQL Anywhere statistics: Like the collection interval, Foxhound's choice of which statistics to display is fixed.

Latency measured: Response time isn't one of the statistics provided by SQL Anywhere.

Peaks recorded: Peak values are displayed as hypertext links into Foxhound's historical data.

Database Alerts: Events happen once, conditions go into and out of effect.

Alert "All Clear": It's important to know when an Alert condition is no longer in effect.

Drop connection: Runaway connections are a big deal in some shops... not all, but some.

Target databases supported: Foxhound support for Version 5.5 databases will disappear someday, but not yet.

Target hosts supported: The Windows 7 Performance Monitor reports on the computer it's running on.

MobiLink and Relay Server support: The SQL Anywhere Monitor is the only game in town for this.

What's good? "If you had to use a single word to describe what you **like** about..."

What else? "Give me another word, this time describing what you **don't** like about..."

Hallmarks of Foxhound

Here's a list of Foxhound characteristics you can take advantage of:

Functionality out of the box Foxhound requires two clicks to get started; the next thing you see is your database in the Foxhound Monitor page; there are no widgets or wizards to deal with, and no need to pick and choose which statistics to display.

Guidance Foxhound provides on-screen guidance for everything it displays. The column titles, tooltip text, field descriptions and context-sensitive Help are all designed to help you understand what you are looking at.

Information at a glance Foxhound presents a straightforward interface for professional developers with no graphs, waveforms or "data visualization" artwork. All the relevant data and value-added calculations are gathered together on single pages with color highlighting to show peak values and hypertext links to scroll through history and open different views in new browser tabs.

Open access Foxhound provides read-only SQL access to all the historical data pertaining to your database: it's your data, you own it. The Foxhound FAQ contains sample queries, and to make your own queries easier to write important internal primary key values are displayed together with the data on the Monitor and other pages; e.g., `sampling_id`, `sample_set_number` and the new `connection_id_string`.

Legacy support Someday, support for SQL Anywhere 5.5 target databases might be dropped from Foxhound but that hasn't happened yet. And while it's true that older versions of SQL Anywhere don't provide (and Foxhound doesn't display) modern performance statistics, statistics that **are** available **do** get displayed, not a lowest common denominator.

Feature: The Foxhound Menu Page

The [Menu page](#) is Foxhound's home page. The DSN tab in Figure 2 lets you pick a target database from a drop-down list of ODBC DSNs and then click on the Monitor Database button.

Alternatively, the String tab in Figure 3 lets you create a DSN-less connection to a target database.

Figure 2. The DSN Tab on the Foxhound Menu Page

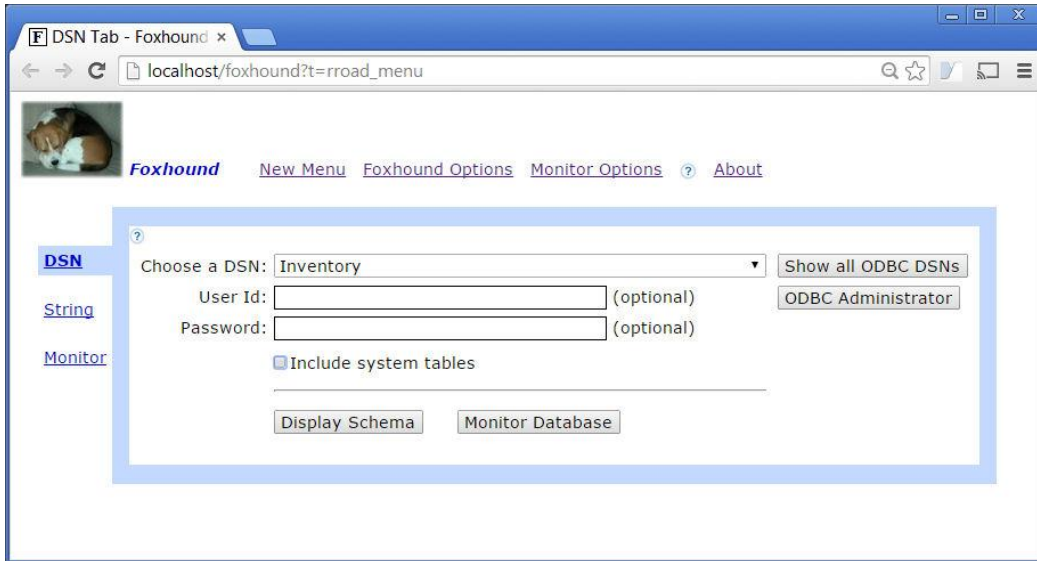
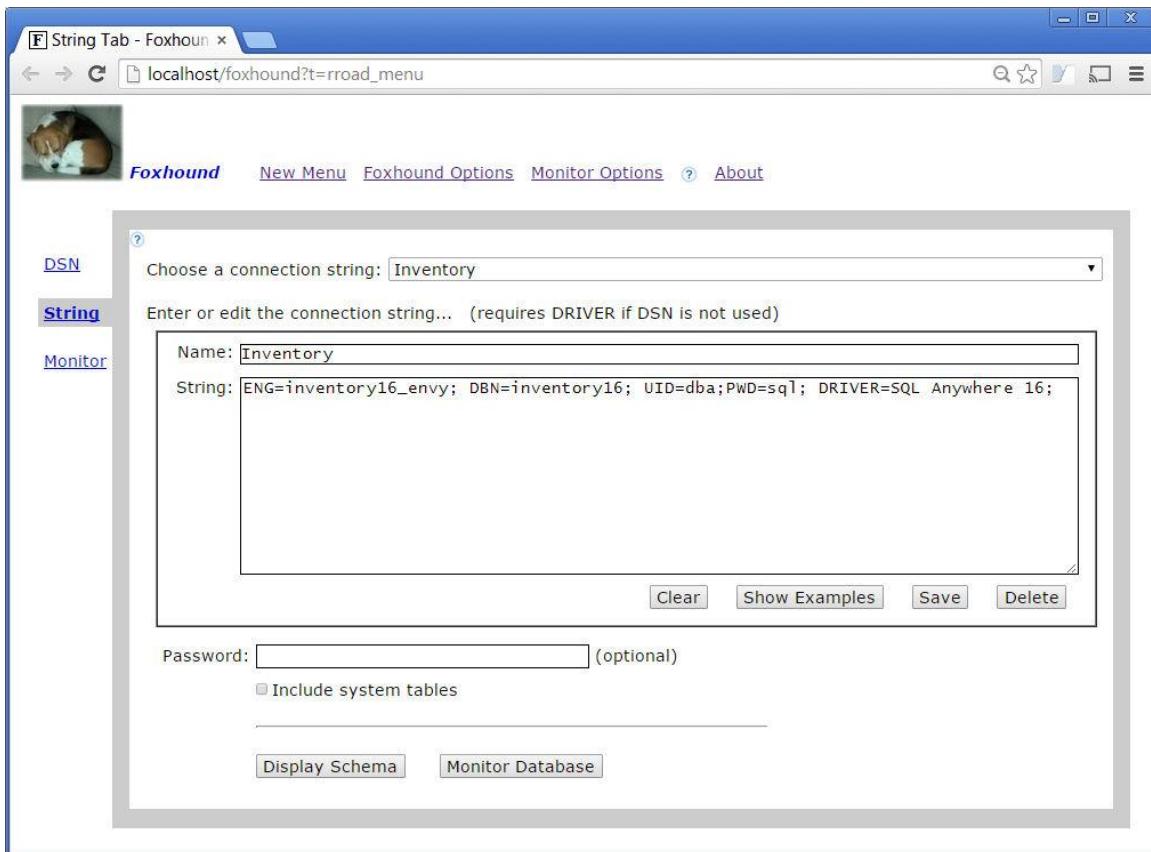


Figure 3. The String Tab on the Foxhound Menu Page

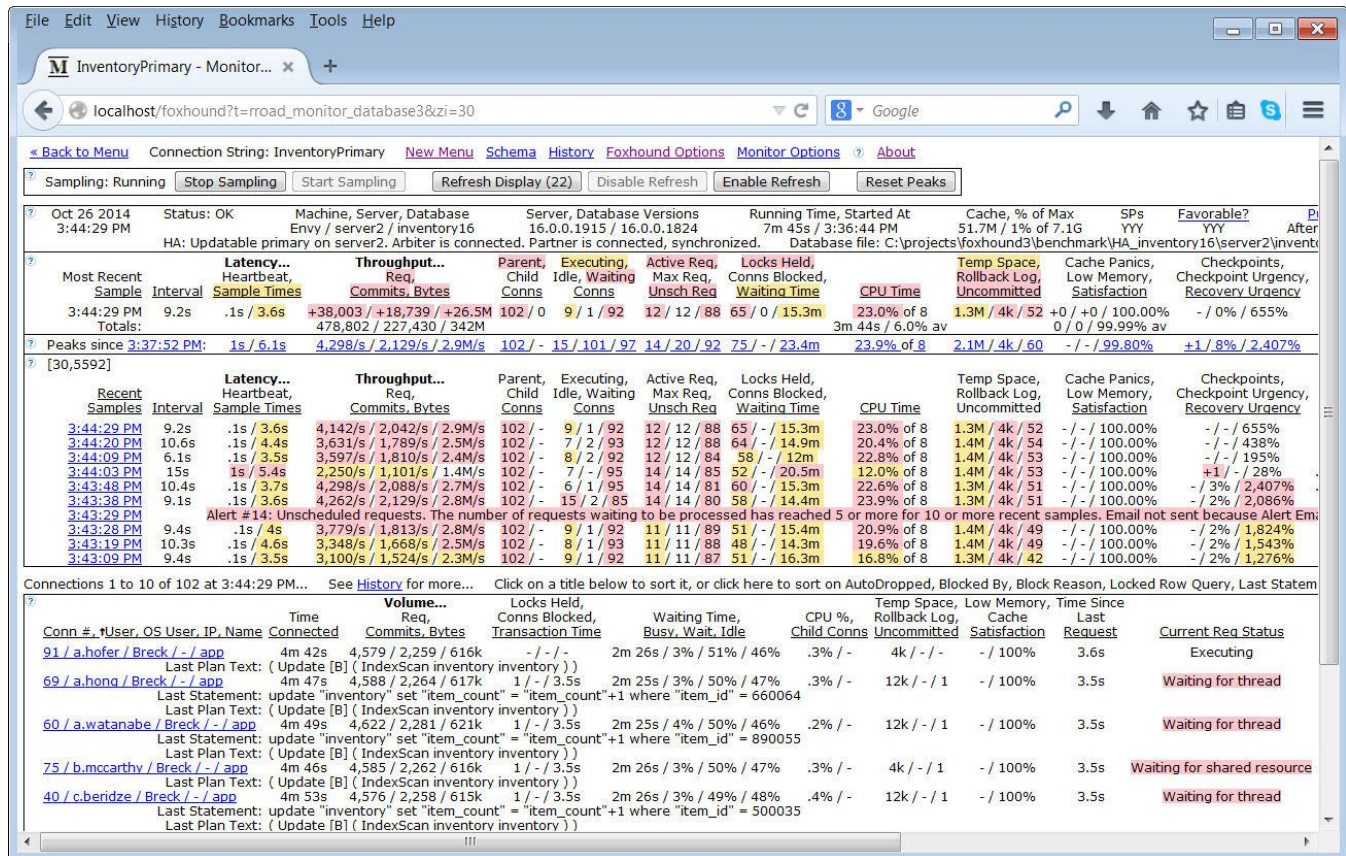


Feature: The Monitor Page

The [Monitor page](#) is automatically refreshed every 10 seconds to show a snapshot of current activity: the most recent 10 samples plus the most recent details of 10 connections.

Figure 4 shows a busy primary database in a SQL Anywhere 16 High Availability setup. One Alert has been issued: [Alert #14 Unscheduled requests](#) indicates there's a bottleneck in satisfying client requests. The [Max Req column](#) shows that SQL Anywhere's "AutoMultiProgrammingLevel" has been adjusting the maximum number of tasks that can be active (Max Req is currently 12) but there's a serious backlog (Unsch Req 88).

Figure 4. The Monitor Page For A Busy Database



The Monitor page is filled with hypertext links, most of them opening new tabs showing historical data; e.g.:

- The Recent Samples links like [3:44:29 PM](#) open the Sample History page positioned on the selected sample, and
- the connection links like [91 / a.hofer / Breck / - / app](#) open the Connection History page for the selected connection.

Sample History and Connection History pages are described in the next two sections.

Note: The 10-second HTTP refresh cycle of the Monitor page is not related to the 10-second Foxhound sampling interval. The underlying Foxhound sampling process continues until instructed to stop, whether or not the Monitor page is displayed at all.

Feature: The Sample History Page

Figure 5 shows the same server as Figure 4, this time using the [Sample History page](#) which

- doesn't get refreshed automatically, but
- does show more data (100 samples and 100 connections at a time),
- does let you jump and scroll through the samples and the connections recorded for one sample, and
- does provide layout control with frames and hide/show buttons.

Figure 5. The Sample History Page For The Same Busy Database

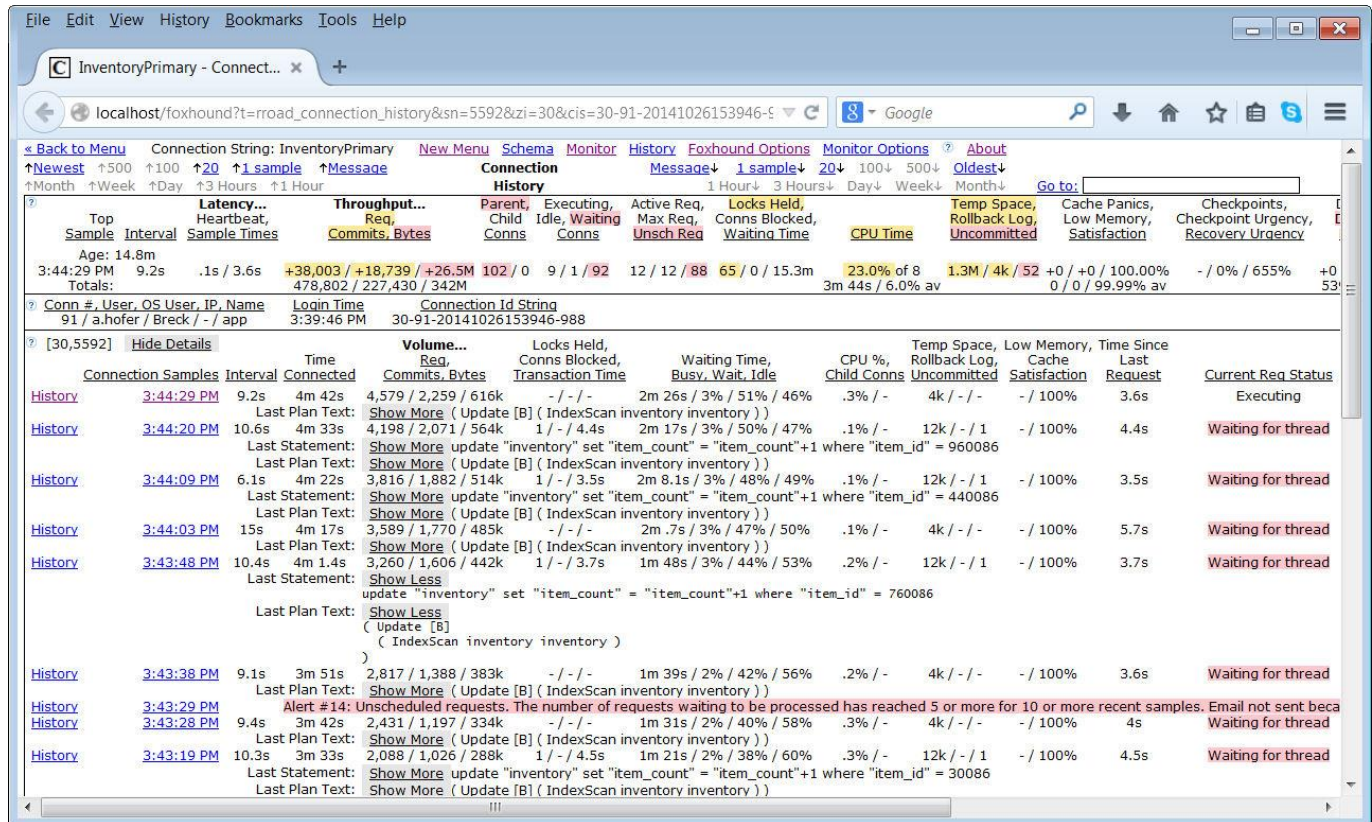
The screenshot displays the 'Sample History' page for a database. The top section shows a summary of the database's current state, including connection string, server versions, and running time. Below this is a table of performance metrics for various samples, with columns for latency, throughput, parent/child connections, executing/idle/waiting connections, active requests, locks held, CPU time, temp space, cache panics, and checkpoints. A red alert message is visible: 'Alert #14: Unscheduled requests. The number of requests waiting to be processed has reached 5 or more for 10 or more recent samples. Email not sent because Alert Emails'. The bottom section, titled 'Connections 1 to 100 of 102 at 3:44:29 PM...', shows a table of connection details with columns for connection number, user, OS user, IP, name, time connected, volume (requests, commits, bytes), locks held, waiting time, CPU %, temp space, low memory, cache satisfaction, time since last request, and current request status.

The connection links like [91 / a.hofer / Breck / - / app](#) open a Connection History page for the selected connection in a new tab. This "drill down" view is shown in the next section.

Feature: The Connection History Page

Figure 6 shows yet another view of the busy server in Figures 4 and 5. The [Connection History page](#) is new in Foxhound Version 3, and it shows the history of performance statistics for one single connection over time. A snapshot of the most recent server and database statistics is included at the top of the page, but the rest of the page is devoted to that one connection.

Figure 6. The Connection History Page



Alert messages are displayed even if they have nothing to do with connection being displayed because it's always important to know what's going on.

Each [History](#) link opens a Sample History page in a new tab, positioned to the same sample, in effect returning to the "big picture" view shown in the previous section.

Note: The [Connection Id String](#) was introduced in Foxhound 3 to uniquely identify connections by connection number and login time so the Connection History page doesn't mix up different connections with the same connection number. It is also useful for adhoc queries; that's the only reason it's displayed on the Connection History page, so you can copy and paste the value into your ISQL session.

Feature: Alerts

Figure 7 shows an [Alert email](#) for a connection that has violated a strict limit placed on the amount of temporary space a single connection can use; in this case, 100M for 3 or more samples (about 30 seconds).

The email subject line is a highly condensed summary:

- What happened? [Alert #22 Conn temp file usage](#)
- Where did it happen? DSN Inventory
- Where exactly was that? Machine Envy, Server inventory16_envy, Database inventory16

As well as describing this Alert, the body of the email contains a list of recent alerts for this database and a snapshot of the Monitor page when this Alert was issued.

Figure 7. An Alert Email

Alert #22 Conn temp file usage - "Inventory / Envy / inventory16_envy / inventory16"

Foxhound Alert <breck.carter@gmail.com>
to me

Foxhound Alert #22 went into effect for database "Inventory / Envy / inventory16_envy / inventory16" at 2014-10-26 16:35:05:
Conn temp file usage. At least one single connection has used 100M or more of temporary file space during 3 or more recent samples.

Recent alert history...

[Oct 26 4:35 PM](#): Alert #21: Temp file usage. The total temporary file space used by all connections has been 100M or larger for 3 or more recent samples.
[Oct 26 4:35 PM](#): Alert #22: Conn temp file usage. At least one single connection has used 100M or more of temporary file space during 3 or more recent samples.
[Oct 26 3:35 PM](#): ALL CLEAR - Alert #28: Long transaction. The transaction running time has reached 1m or more for at least one connection during 10 or more recent samples.
[Oct 26 3:13 PM](#): Alert #28: Long transaction. The transaction running time has reached 1m or more for at least one connection during 10 or more recent samples.
[Oct 26 2:57 PM](#): ALL CLEAR - Alert #26: Connections. The number of connections has reached 1,000 or more for 10 or more recent samples.
[Oct 26 2:53 PM](#): Alert #26: Connections. The number of connections has reached 1,000 or more for 10 or more recent samples.

Recent sample history...

Oct 26 2014	Machine, Server, Database	Server, Database Versions	Running Time, Started At	Cache, % of Max	SPs	Favorable?				
4:35:04 PM	Envy / inventory16_envy / inventory16	16.0.0.1915 / 16.0.0.1824	1h 45m / 2:49:47 PM	147M / 2% of 7.1G	YYY	YYY	After			
Database file: C:\projects\foxhound_benchmark_inventory_db\inventory16.db										
Top Sample	Interval	Latency... Heartbeat, Sample Times	Throughput... Req, Commits, Bytes	Parent, Child Conns	Executing, Idle, Waiting Conns	Active Req, Max Req, Unsch Req	Locks Held, Conns Blocked, Waiting Time	CPU Time	Temp Space, Rollback Log, Uncommitted	Cache Panics, Low Memory, Satisfaction
4:35:04 PM	10.5s	.1s / .7s	+169 / +1 / +160k	129 / 0	2 / 127 / 0	2 / 8 / 0	0 / 0 / 2.8s	8.9% of 8	258M / 85.8M / 0	+0 / +0 / 100.00%
Totals:			421,083 / 1,220 / 98.2M					29m / 3.4% av		0 / 0 / 100.00% av
Peaks since 3:17:15 PM:		33.9s / 18.7s	309/s / 84/s / 152k/s	134 / 8	10 / 132 / 1	4 / 19 / -	1 / 1 / 48.4s	95.9% of 8	258M / 85.8M / 1	- / - / 99.98%
[29,6344]										
4:35:05 PM		Latency... Heartbeat, Sample Times	Throughput... Req, Commits, Bytes	Parent, Child Conns	Executing, Idle, Waiting Conns	Active Req, Max Req, Unsch Req	Locks Held, Conns Blocked, Waiting Time	CPU Time	Temp Space, Rollback Log, Uncommitted	Cache Panics, Low Memory, Satisfaction
4:35:05 PM		Alert #22: Conn temp file usage. At least one single connection has used 100M or more of temporary file space during 3 or more recent samples. Email to be								
4:35:04 PM	10.5s	.1s / .7s	16/s / .1/s / 15.3k/s	129 / -	2 / 127 / -	2 / 8 / -	- / - / 2.8s	8.9% of 8	258M / 85.8M / 0	- / - / 100.00%
4:34:54 PM	9.7s	.1s / .6s	17/s / .1/s / 16.6k/s	129 / -	2 / 127 / -	2 / 8 / -	- / - / 1.3s	11.1% of 8	206M / 65.8M / 0	- / - / 100.00%
4:34:44 PM	5.9s	.1s / .5s	28/s / .2/s / 27.1k/s	129 / -	2 / 127 / -	2 / 8 / -	- / - / 1.4s	9.6% of 8	132M / 41.8M / 0	- / - / 100.00%
4:34:38 PM	6.9s	.1s / .7s	24/s / .1/s / 23.2k/s	129 / -	2 / 127 / -	2 / 8 / -	- / - / 38.3s	3.8% of 8	84.9M / 28.7M / 0	- / - / 100.00%
4:34:31 PM	27.2s	2.2s / 18.7s	6.2/s / - / 5.9k/s	129 / -	1 / 127 / 1	2 / 8 / -	- / - / 10.7s	1.1% of 8	72.9M / 25.3M / 0	- / - / 100.00%
4:34:04 PM	11.7s	.2s / 2.4s	14/s / .1/s / 13.7k/s	129 / -	1 / 127 / 1	2 / 8 / -	- / - / 10.1s	2.7% of 8	57M / 20.8M / 0	- / - / 100.00%

Table 2 shows the default definitions for [all the Alert conditions supported in Foxhound 3](#). The values shown in [square braces] can be changed for each target databases, except for [server2] which is determined at runtime.

Table 2. Default Alert Criteria	
1 Database unresponsive	Foxhound has been unable to gather samples for [1m] or longer.
2 Long heartbeat	The heartbeat time has been [1.0s] or longer for [10] or more recent samples.
3 Long sample time	The sample time has been [10.0s] or longer for [10] or more recent samples.
4 CPU usage	The CPU time has been [90]% or higher for [10] or more recent samples.
5 Database disk space	The free disk space on the drive holding the main database file has fallen below [1G].
6 Temp disk space	The free disk space on the drive holding the temporary file has fallen below [1G].
7 Log disk space	The free disk space on the drive holding the transaction log file has fallen below [1G].
8 Other disk space	The free disk space on one or more drives holding other database files has fallen below [1G].
9 Arbiter unreachable	The high availability target database has become disconnected from the arbiter server.
10 Partner unreachable	The high availability target database has become disconnected from the partner database.
11 ServerName change	The real server name has changed to [server2], possibly because of an HA failover or OnDemand move.
13 File fragmentation	There are [1,000] or more fragments in the main database file.
14 Unscheduled requests	The number of requests waiting to be processed has reached [5] or more for [10] or more recent samples.
16 I/O operations	There have been [1,000] or more disk and log I/O operations per second for [10] or more recent samples.
17 Checkpoint urgency	The Checkpoint Urgency has been [100]% or more for [10] or more recent samples.
18 Recovery urgency	The Recovery Urgency has been [1,000]% or more for [10] or more recent samples.
19 Cache size	The cache has reached [100]% of its maximum size for [10] or more recent samples.
20 Cache satisfaction	The cache satisfaction (hits/reads) has fallen to [90]% or lower for [10] or more recent samples.
21 Temp file usage	The total temporary file space used by all connections has been [1G] or larger for [10] or more recent samples.
22 Conn temp file usage	At least one single connection has used [512M] or more of temporary file space during [10] or more recent samples.
23 Blocked connections	The number of blocked connections has reached [10] or more during [10] or more recent samples.
24 Conn blocking others	At least one single connection has blocked [5] or more other connections during [10] or more recent samples.
25 Locks	The number of locks has reached [1,000,000] or more during [10] or more recent samples.
26 Connections	The number of connections has reached [1,000] or more for [10] or more recent samples.

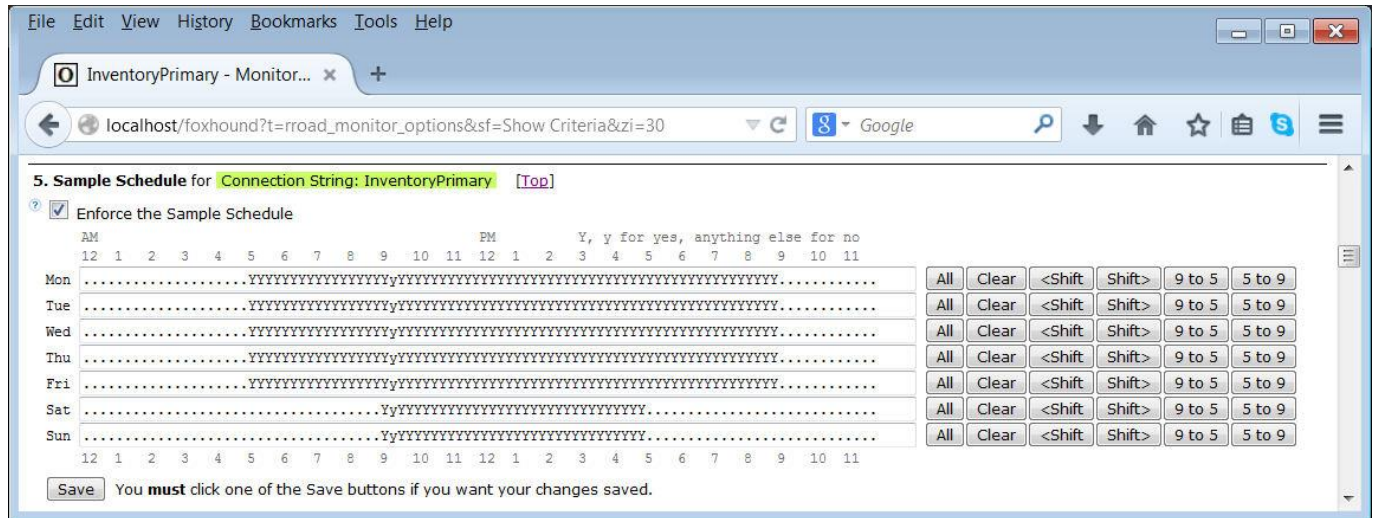
27 Connection CPU	The approximate CPU time has been [25]% or higher for at least one connection during [10] or more recent samples.
28 Long transaction	The transaction running time has reached [1m] or more for at least one connection during [10] or more recent samples.
29 Cache panics	There have been [1] or more cache panics per second for [10] or more recent samples.
30 Database read-only	The target database has changed from accepting updates to read-only processing.
31 Database updatable	The target database has changed from read-only processing to accepting updates.
32 Rollback log usage	The total rollback log space used by all connections has been [1G] or larger for [10] or more recent samples.
33 Uncommitted operations	The total number of uncommitted operations for all connections has reached [1,000,000] or more during [10] or more recent samples.
34 Long uncommitted	The number of uncommitted operations has reached [1,000,000] or more while the transaction running time has reached [1m] or more for at least one connection.

Feature: Schedules

For every target database being monitored by Foxhound, four separate schedules may be created to turn specific features on and off in 15-minute intervals over a 7-day week:

- start and stop [the entire monitor process](#) (as shown in Figure 8 below),
- start and stop [the gathering of connection-level statistics](#) for each sample,
- start and stop [the sending of Alert emails](#), and
- start and stop [the AutoDrop process](#) that deals with runaway connections.

Figure 8. Sample Schedule

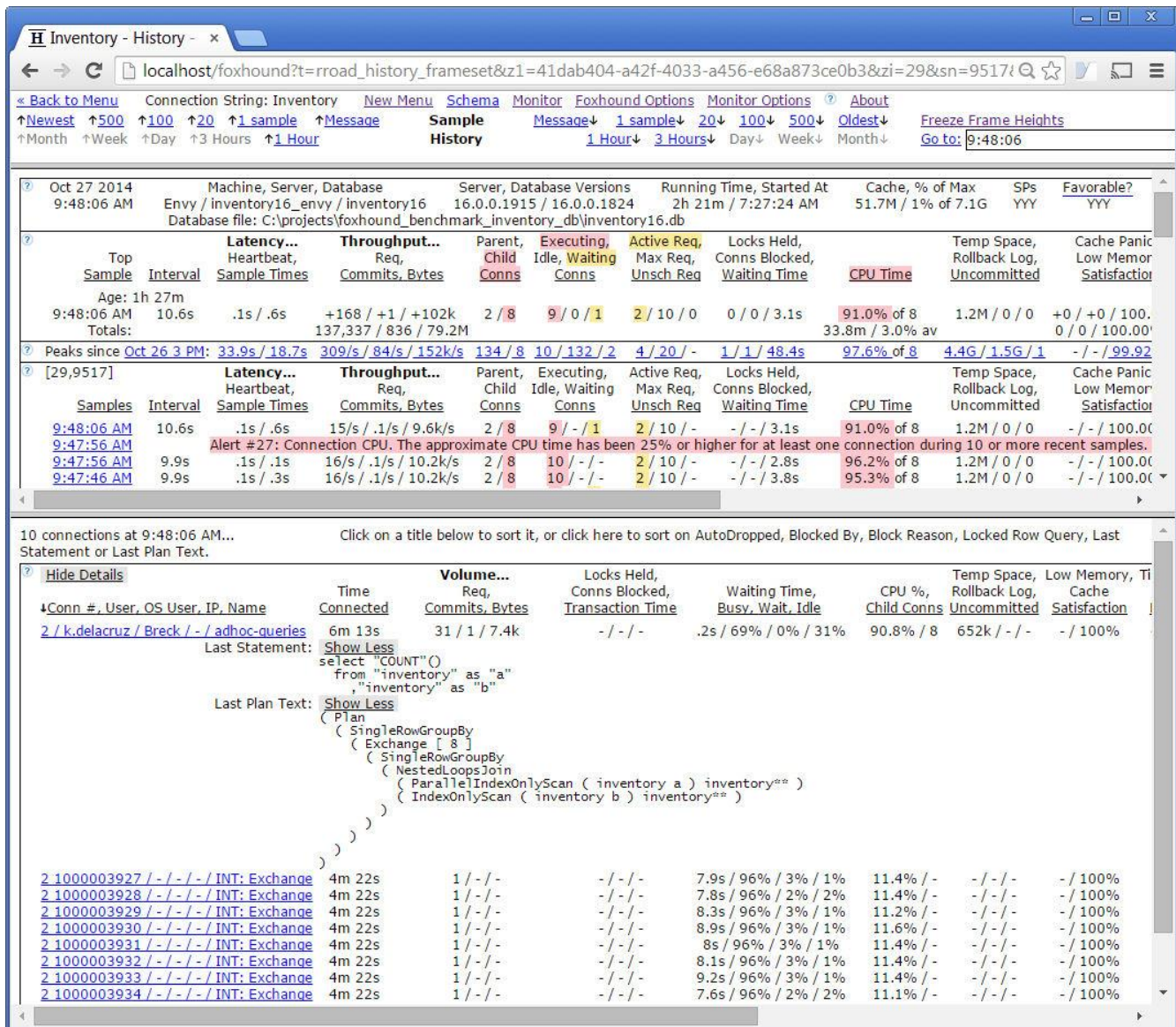


Usage 1: Runaway Connection

Figure 9 shows a single database connection that is using up all the CPU time (91% of 8 processors). The [Parent, Child Conns column](#) shows there are 2 external database connections and 8 internal child connections, and the connections frame at the bottom of the page shows that connection 2 is the external connection responsible for creating all 8 internal connections named "INT: EXCHANGE". The [Last Plan Text field](#) shows why: SQL Anywhere's intra-query parallelism feature is in full force with all 8 processors devoted to performing a "Parallel Index-Only Scan".

In this case, the details of the "why" may not be as important as the "what": Connection 2 is a runaway. A quick solution might be to drop connection 2, and Foxhound's AutoDrop feature can be used to automate that solution. Another solution might be to "turn down the volume" on the intra-query parallelism feature by setting the MAX_QUERY_TASKS database option to something other than "all processors"; e.g., 4, or even 1 to turn it off altogether. Other solutions might be to change the query to be less aggressive, or schedule it in off-peak hours.

Figure 9. Runaway Connection



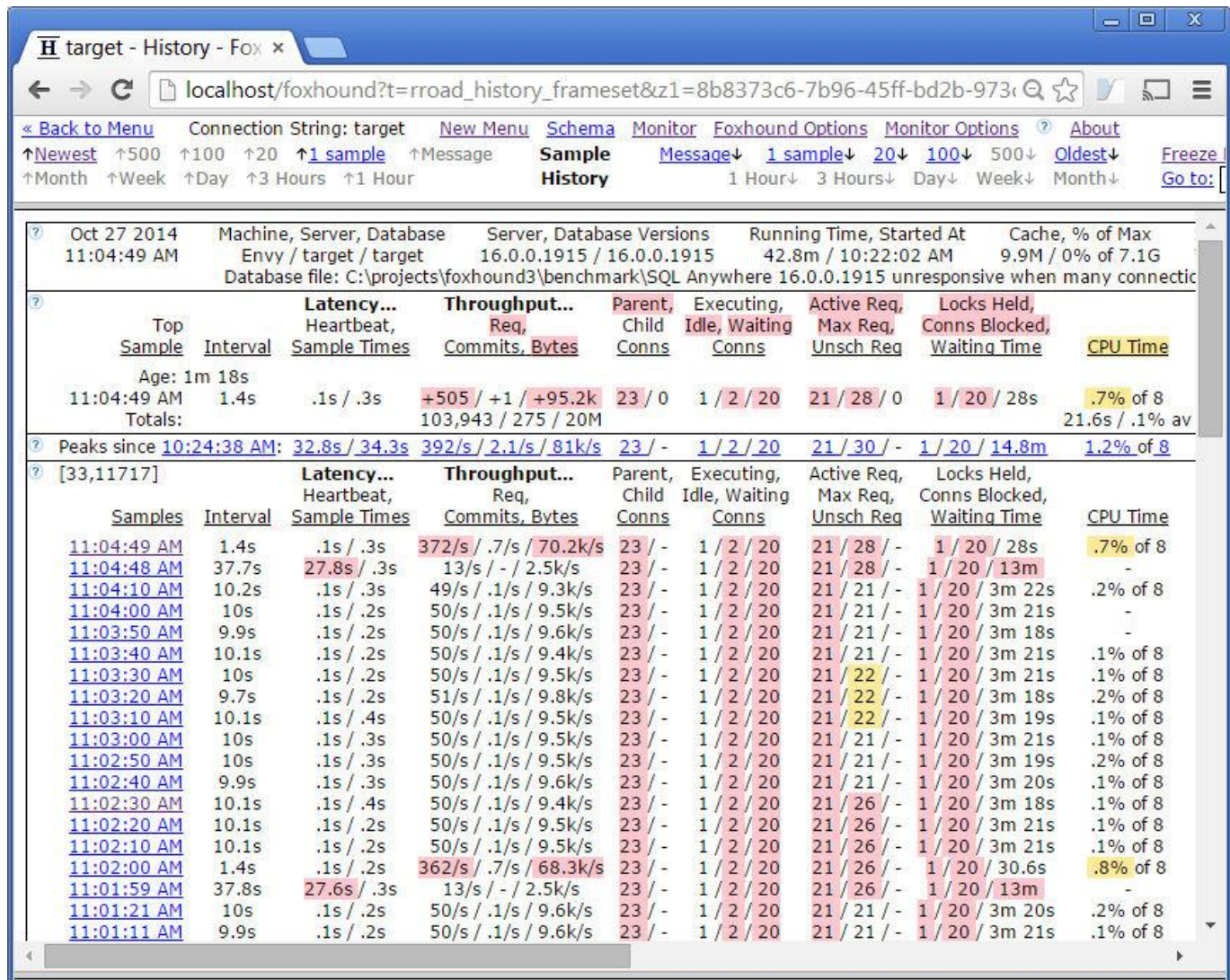
Usage 2: Occasionally Unresponsive Database

The phrase "unresponsive database" is often a euphemism for "server crash", but sometimes it's worse... a crash you can fix (by restarting the server) but a database that just sits there and doesn't respond to requests can be more of a challenge. Either way, Foxhound lets you know by issuing an [Alert #1 Database unresponsive](#) after one minute.

But what if the database becomes unresponsive once in a while, for a little while, then wakes up and starts responding normally? Figure 10 shows just such a situation: Most of the time the [Heartbeat response time](#) is a tiny fraction of one second which is what you might expect for SELECT * FROM DUMMY (the query Foxhound uses to measure Heartbeat). However, every minute or so the Heartbeat increases to almost half a minute... not long enough to trigger Alert #1 unless you reduce the threshold, but certainly long enough to feel like forever to an end user.

In this case the underlying cause was an obscure bug in the way the SQL Anywhere dynamically tunes the multiprogramming level when there are a lot of blocked connections, but that's not the point... the point is, Foxhound gives you hard numbers like Heartbeat when all you had before was adjectives like "unresponsive".

Figure 10. Occasionally Unresponsive Database



Usage 3: Large Deployments

SQL Anywhere, and in particular the On Demand Edition, makes it easy to deploy large numbers of separate database servers on the same and different computers, each one running multiple databases. Foxhound deals with large deployments in a number of ways:

- The [Manage Multiple Monitor Sessions facility](#) lets you define a connection strings file to make it easier to start and stop Foxhound monitor session for large numbers of target databases.
- The [Save and Restore Monitor Options facility](#) lets you manipulate the Monitor Options settings for each target database, plus a separate set of "Default Settings", in ways that make it easier to deal with large deployments. In particular, you can edit the Default Settings separately from actual target databases, then use the Force Default Settings on All Targets button to publish the same set of Monitor Options to all the actual Foxhound monitor sessions.
- The [Monitor tab on the Foxhound Menu page](#) (shown in Figure 11) shows all the Foxhound monitor sessions at a glance.

Figure 11. The Monitor Tab on the Foxhound Menu Page

The screenshot shows the 'Monitor Tab' in a web browser. The interface includes a navigation menu with 'Foxhound', 'New Menu', 'Foxhound Options', 'Monitor Options', and 'About'. Below the menu is a table of monitor sessions. The table has columns for DSN, String, Show Monitor..., Show..., Active Alerts, Sampling, Status, Heartbeat, Conns, Unsch Req, Locks Held, Conns Blocked, CPU Time, Temp Space, Disk Reads, and Disk Writes. Each row represents a monitor session with its respective values and control buttons (Stop, Start, Delete).

DSN	String	Show Monitor...	Show...	Active Alerts	Sampling	Status	Heartbeat, Conns, Unsch Req	Locks Held, Conns Blocked	CPU Time	Temp Space	Disk Reads, Writes	Control
String: ddd10	String: ddd10s ddd10a	History, Options	-	Running	OK	.1s / 2 / 0	0 / 0	0.0%	128k	0 / 0	Stop Start Delete	
String: ddd11	String: ddd11s ddd11a	History, Options	-	Running	OK	.1s / 2 / 0	0 / 0	0.0%	404k	0 / 0	Stop Start Delete	
String: ddd12	String: ddd12s ddd12a	History, Options	-	Running	OK	.1s / 2 / 0	0 / 0	0.0%	440k	0 / 0	Stop Start Delete	
String: ddd16	String: ddd16s ddd16a	History, Options	-	Running	OK	.1s / 2 / 0	0 / 0	0.0%	536k	0 / 0	Stop Start Delete	
String: ddd16s ddd16b	String: ddd16s ddd16b	History, Options	-	Running	OK	.1s / 2 / 0	0 / 0	0.0%	628k	0 / 0	Stop Start Delete	
DSN: ddd5	String: ddd5s ddd5a	History, Options	-	Stopped	-	- / - / -	- / -	-	-	- / -	Stop Start Delete	
DSN: ddd5s ddd5b	String: ddd6	History, Options	-	Running	OK	.1s / 3 / 0	0 / 0	0.0%	0	0 / 0	Stop Start Delete	
String: ddd6s ddd6a	String: ddd6s ddd6b	History, Options	-	Running	OK	.1s / 2 / 0	0 / 0	.3%	0	0 / 0	Stop Start Delete	
String: ddd7	String: ddd7s ddd7a	History, Options	-	Running	OK	.1s / 2 / 0	0 / 0	0.0%	0	0 / 0	Stop Start Delete	
String: ddd7s ddd7b	String: ddd8	History, Options	-	Running	OK	.1s / 2 / 0	0 / 0	0.0%	0	0 / 0	Stop Start Delete	
String: ddd8s ddd8a	String: ddd8s ddd8b	History, Options	-	Running	OK	.1s / 1 / 0	0 / 0	.1%	158k	0 / 0	Stop Start Delete	
String: ddd9	String: ddd9s ddd9a	History, Options	-	Running	OK	.1s / 1 / 0	0 / 0	.1%	132k	0 / 0	Stop Start Delete	
String: ddd9s ddd9b	String: ddd9s ddd9b	History, Options	-	Running	OK	.1s / 1 / 0	0 / 0	0.0%	132k	0 / 0	Stop Start Delete	

What's New In Foxhound Version 3

1. Release-Defining Features

1. Support for [SQL Anywhere 16 and OnDemand 1.0 target databases](#) has been added.
Foxhound now supports target databases that use SQL Anywhere 16, as well as target databases running in an OnDemand 1.0 cloud environment.
2. The new [Connection History](#) page shows the performance of a single connection over time.
The Connection History page is available for target databases running on SQL Anywhere 9 and later.
It shows the same data as the connection section of the Sample History page, except it shows only one connection instead of many, and multiple samples instead of only one sample per connection.
3. The Blocked Connections section of the Foxhound Monitor page has been [merged into the Connections section](#).
The Monitor and Sample History pages are now simpler and easier to read because all the information about a blocked connection is now found in one place.
All except for one column, that is: the Blocked by Transaction Running Time (the Transaction Running Time of the other connection) was removed because was easily confused with the Transaction Running Time of the blocked connection.
The Blocked by Transaction Running Time can be determined by looking at the details for that other connection, which can be displayed by clicking on the Blocked By: link.

2. New Features

1. The new [Change Target Settings](#) page lets you set RememberLastPlan, RememberLastStatement and RequestTiming.
The new Change Target Settings popup window lets you change target server options on the fly, to control the level of detail available for Foxhound to display: RememberLastPlan, RememberLastStatement and RequestTiming.
You can open this popup via links on the Monitor, Sample History and Monitor Options pages.
2. The [Machine, Server, Database](#) names have been added to page titles and Alert messages.
The Monitor and Sample History pages have been enhanced to display the machine or host name used for the target database, as well as the SQL Anywhere server and database names.
These fields have been added as part of the support for OnDemand 1.0 environments where it's important to know which target database is which when there are many hundreds spread across different servers and hosts.
The Alert email subject has been simplified and expanded:

```
Alert #n title - "name / machine / server / database"
```


The first line in the email body now looks like this:

```
Foxhound Alert #n went into effect for database "name(id) / machine / server / database" at  
yyyy-mm-dd hh:nn:ss:
```
3. The new [OS User](#) column has been added to help identify connections: Conn #, ID, OS User, IP, Name.
Many applications use the same database user id (ID) for all connections so it's hard to tell who's doing what. The new OS User column has been added to help with that.
4. The new [Busy, Wait, Idle](#) columns have been added for each connection.

The cumulative Busy, Wait, Idle percentage columns have been added to the Monitor and Sample History pages to show how each connection has spent the time since it was established:

- Busy is the percentage of time the connection was busy processing requests,
- Wait is the percentage of time the connection was waiting for
 - atomic access to a resource,
 - I/O to complete
 - a lock to be acquired, and/or
 - the server to process requests.
- Idle is the percentage of time the connection was neither busy nor waiting.

5. The Conns connection count column has been expanded to show [Parent and Child Conns](#).

The Parent, Child Conns column set show the numbers of parent and child (internal) connections to target databases running on SQL Anywhere 12 or later.

Child Conns is a new column, and a separate entry has been added to the peaks row.

6. The new total [Waiting Time](#) column has been added to the Foxhound Monitor.

A new Waiting Time column has been added to the Locks Held, Conns Blocked, Waiting Time column set in the sample section of the Monitor and Sample History pages. It contains the total time all current connections were blocked or forced to wait during the previous interval.

The new Waiting Time column is calculated from the existing Waiting Time column in the connection section, but rather than show the cumulative waiting time since the connections started, the new Waiting Time column shows the total time spent waiting during the previous sample interval.

Waiting Time is a new column, and a separate entry has been added to the peaks row.

7. The new [Last Plan Text](#) column has been added to the connection section.

The Last Plan Text line has been added to the connection section of the Monitor and Sample History display pages, and to the new Connection History page.

8. The new [Favorable? YYY](#) column has been added as a link to open the [Change Target Settings](#) window.

The "Favorable? xxx" field on the Monitor and Sample History pages shows whether or not the target server is gathering extra diagnostic data that Foxhound can display.

The "xxx" string is made up of Y, N and/or - characters, where - means "unknown". The three characters correspond to these target server settings: RememberLastPlan, RememberLastStatement and RequestTiming.

The "Favorable?" field is also a link that lets you open the new Change Target Settings popup window.

9. You can now specify [Purge after \[xx\] day\(s\)](#) instead of being limited to 1 day, 1 week, 1 month or 1 year.

The Purge section of the Foxhound Options page now gives you complete freedom in setting the thresholds for deleting data.

```
Purge all sample data enabled: [x] after [xx] day(s)
```

```
Purge uninteresting connection data enabled: [x] after [xx] day(s)
```

10. The new [Purge - Off / After xx days](#) column has been added as a link to the [Purge section of the Foxhound Options page](#).

The Monitor and Sample History page now display the Purge field to let you know how soon your data's going to be deleted.

11. [CPU Time calculations](#) have been improved for connections using intra-query parallelism.

The CPU Time is no longer displayed as zero for a connection making heavy use of intra-query parallelism.

When a connection makes use of the intra-query parallelism feature, it spawns a number of internal child connections which do most of the work; e.g., one INT: EXCHANGE child connection for each available processor.

SQL Anywhere tends to report the total CPU time used by all the child connections as the ApproximateCPUTime value for each child connection in use, and almost none for the parent connection. This inflates the amount of CPU time used by each child connection without reporting any CPU usage by the parent connection.

In an attempt to make sense of this behavior, Foxhound now calculates the average non-zero ApproximateCPUTime for the child connections and reports it as the CPU time for the parent connection. The inflated values reported by SQL Anywhere for each child connection are still shown by Foxhound; only the parent connection CPU time is adjusted.

One consequence of this improvement is that AutoDrop #5 CPU Usage now works on parent connections using intra-query parallelism whereas before it did not. Note that the AutoDrop process is never performed on a child connection or any other internal connection that isn't directly associated with a client application.

12. The new total [Rollback Log and Uncommitted](#) columns have been added to the Foxhound Monitor page.
13. The separate Req, Commits and Bytes In/Out columns have been gathered into the new connection-level [Volume... Req, Commits, Bytes](#) columns.
14. The new [Connection Id String](#) can be used to uniquely identify connections in adhoc queries; e.g., '1-1-20140504073924-692'.
15. A new emergency patch process is built in to Foxhound for fixing bugs without running a full upgrade.

An "Emergency Patch" process has been built into Foxhound whereby SQL patch scripts may be provided in the future and automatically applied to the Foxhound database at startup time.

16. Five new Alerts have been added: [Database read-only](#), [Database updatable](#), [Rollback log usage](#), [Uncommitted operations](#) and [Long uncommitted](#).

Here's the list of new Alerts:

- Alert #30. Database read-only. The target database has changed from accepting updates to read-only processing.
- Alert #31. Database updatable. The target database has changed from read-only processing to accepting updates.
- Alert #32. Rollback log usage. The total rollback log space used by all connections has been 1G or larger for 10 or more recent samples.
- Alert #33. Uncommitted operations. The total number of uncommitted operations for all connections has reached 1,000,000 or more during 10 or more recent samples.
- Alert #34. Long uncommitted. The number of uncommitted operations has reached 10 or more while the transaction running time has reached 1m or more for at least one connection.

Alert #12 HA mode change has been removed and replaced by Alert #30 and #31 for the following reasons:

- An Alert #12 was issued for non-HA databases when they are restarted with `dbsrv16 -r` for read-only operations,
- an Alert #12 all-clear never appeared for a non-HA database, and
- an Alert #12 appeared exactly once for a non-HA database when it changed from updatable to read-only.

For a new installation of Foxhound 3, the five new Alerts are all enabled by default.

For an upgrade from an existing installation of Foxhound 2 or earlier, the new Alerts are disabled on the Monitor Options page for all existing target databases (to avoid surprises) as well as the "Default Settings", but they are enabled in the "Factory Settings" and "Extreme Settings".

After an upgrade

- if you want to enable the new Alerts for an existing target database, you will have to use the Monitor Options page to set that up, and
- if you want to enable the new Alerts by default for new target databases, you will have to use the Monitor Options page to modify the "Default Settings".

17. The new [DB File and Used](#) columns have been added to the Foxhound Monitor.

Foxhound now keeps track of the amount of disk space allocated to the SYSTEM DBSPACE (the DB File column) and the percentage of that space used to store data (the Used column).

3. Usability Improvements

1. Major layout changes have been made to the [Foxhound Monitor](#) and [Sample History](#) pages, including the [connection sections](#).
2. The new [Hide Details and Show Details](#) buttons let you reduce scrolling on the Sample History and Connection History pages.

Buttons have been added to the connection section of the Sample History page as well as the Connection History page to hide and show the following lines for each connection:

- AutoDrop Result:
 - Blocked By:
 - Block Reason:
 - Locked Row Query:
 - Last Statement:
 - Last Plan Text:
3. The new [Show More and Show Less](#) buttons let you expand and contract the Last Statement and Last Plan Text connection data.

Buttons have been added to the Last Statement and Last Plan Text connection-level fields to Show More and Show Less of the data:

The display starts off in "space saving" mode:

```
Last Statement: Show More select "COUNT_BIG"() from "SYSCOLUMN" as "A" cross join ...
Last Plan Text: Show More ( Plan ( SingleRowGroupBy ( Exchange [ 8 ] ( SingleRowGroupBy ...
```

When you Show More all the data is displayed:

```
Last Statement: Show Less
select "COUNT_BIG"()
  from "SYSCOLUMN" as "A"
     cross join "SYSCOLUMN" as "B"
     cross join "SYSCOLUMN" as "C"
Last Plan Text: Show Less
( Plan
  ( SingleRowGroupBy
    ( Exchange [ 8 ]
      ( SingleRowGroupBy
        ( NestedLoopsJoin
          ( NestedLoopsJoin
            ( ParallelTableScan ( ISYSTABCOL col ) )
            ( TableScan ( ISYSTABCOL col ) )
          )
          ( TableScan ( ISYSTABCOL col ) )
        )
      )
    )
  )
)
```

-)
)
)
4. A new [warning about duplicate Foxhound sampling sessions](#) has been added to the Foxhound Monitor page.

This warning can appear on the Monitor page:

Duplicate Foxhound sampling sessions. There is more than one Foxhound connection to this target database.

This can happen when two different Foxhound connection strings are created pointing to the same target database, or a ODBC DSN is used as well as a Foxhound connection string. This is almost always a mistake, and it can lead to multiple Alert email messages when the duplicate sampling sessions all detect the same condition; e.g., Alert #1 Database unresponsive.

5. The Foxhound option to [show the Help frame](#) is turned back on when Foxhound is upgraded, as a reminder that new Help content is available.
6. Descriptive text has been added to all menu items on the [Monitor Options](#) page.
7. The [Peaks since](#) timestamp has radically abbreviated to reduce horizontal scrolling.
8. Alert [email error messages](#) have been improved.

In previous versions of Foxhound, when an Alert or other email failed a message like this would be displayed:

SMTP start test email failed with return code 100 when sending "Foxhound Test Email (2014-08-30 16:47:48)"

Now the error messages contain more diagnostic information:

SMTP start test email failed with return code 5 when sending "Foxhound Test Email (2014-08-30 16:46:22)". Connect error 10047 [Google: smtp error 10047]

9. [Concise Alert titles](#) are included in all Alert-related messages; e.g., Alert #10: Partner unreachable.
10. The Foxhound post-setup process has been streamlined.
11. A new [Start Foxhound via default browser](#) shortcut has been added.
12. There's no more "Can't open Message window log file" message when starting Foxhound.

All the desktop shortcuts that start the Foxhound database have been modified to run the dbping.exe utility before running dbsrv16.exe. If the dbping utility determines that the Foxhound database is already running, it doesn't bother running dbsrv16 and skips straight to launching Foxhound in the browser... not only is the whole process much faster, it eliminates the annoying error message "Can't open Message window log file".

13. The Adhoc Schema connection string has been renamed to [Foxhound 3 Adhoc Schema - autostart and connect](#).

The default connection string for starting the Adhoc Schema database has been renamed to "Foxhound 3 Adhoc Schema - autostart and connect".

You can select this connection string and click on the Display Schema button to see all the views and tables that are available for adhoc reporting.

The name has been changed to include "Foxhound 3" to differentiate this database from earlier versions of Foxhound.

If the current copy of Foxhound was upgraded from Foxhound version 2, the previous Adhoc Schema connection string was renamed to "old Foxhound 2 Adhoc Schema - autostart and connect" during the upgrade process.

14. The handling of the diagnostic text files produced during the Foxhound Post Setup process has been improved.
15. [Scrolling](#) on the Sample History page is faster.
16. [Color highlighting](#) of Foxhound Monitor data has been improved.
17. The sampling id and DSN or Connection String name are now appended to all target-related email [exception diagnostics](#).
18. The [Running Time](#), [Waiting Time](#), [Transaction Time](#) and other durations have been abbreviated to make them easier to read.
19. There are no longer any limitations on the number or names of [multiple Extended Edition Foxhound servers](#).

The Extended Edition of Foxhound no longer limits the number of separate copies of the Foxhound database that may be created and started using separate instances of SQL Anywhere on the same local network. This eliminates the previous limit of 1,000 target databases that may be monitored (10 copies of Foxhound x 100 target databases per copy).

Note: Here's what the End User License Agreement has to say...

In the case of the Extended Edition, an unlimited number of copies of the Foxhound database may be created and started using separate instances of SQL Anywhere on the same local network, with the requirement that a separate Extended Edition registration key be purchased for each multiple of 10 copies of Foxhound started.

20. Some Help topics previously found only in the [Foxhound FAQ](#) have been moved to the Help.

In particular, all links from the Help pages to the FAQ pages have been eliminated by "bringing home" those topics to the Help.

The Foxhound FAQ exists in one location only (the web at Foxhound 3.0 FAQ), while the Help exists in three locations:

- in the Foxhound database for display in the Foxhound Help frame,
- as a separate set of local HTML files for display via All Programs - Foxhound 3 - Help, and
- on the web at Foxhound 3.0 Help.

Links from FAQ pages to the Help will continue to exist, but not in the other direction; if a topic is important to the Help it will be stored there.

21. The number of processors has been moved from the heading section to the [CPU Time xx% of x](#) column, with a link from the [Peaks since](#) line.
22. The HTML generated by Foxhound now works better with the zoom features in Chrome, Firefox and IE.
The easiest way to zoom the Foxhound display is to spin the mouse wheel while pressing Ctrl.

4. Behavior Changes

1. SQL Anywhere 16.0.0.1915 or later is [required to run Foxhound 3](#).
2. The Cumulative CPU Time and Total Waits columns have been removed from connection-level displays. These numbers proved to be of little use so they were removed to make room for other numbers. However, the property values on which they were based are still available for adhoc reporting.

3. The Client Requests, Time columns have been removed from connection-level displays.
The Client Requests column (based on the RequestsReceived property) has been removed from the connection section of the Monitor and Sample History pages in order to reduce confusion with the server Req column, and the Time column (based on the ReqTimeActive property) has been removed because it is not directly related to client requests.
Both property values are still available for adhoc reporting using the sample_connection view, and the ReqTimeActive property is now used in the calculation of the Busy portion of the new Busy, Wait, Idle columns.
4. The Total, Current Prepares and Rollbacks columns have been removed from connection-level displays.
These numbers proved to be of little use so they were removed to make room for other numbers.
However, the property values on which they were based are still available for adhoc reporting.
5. The Bytes In / Out columns have been removed from connection-level displays and summarized in [Volume... Req, Commits, Bytes](#).
6. Alert #11 HA failover has been renamed to [Alert #11 ServerName change](#).
Alert #11 was formerly described as HA failover - The high availability target database server has switched over to [server2].
It is now described as ServerName change - The real server name has changed to [server2], possibly because of an HA failover or OnDemand move.
The reason for this change is that it is possible for a target database to be shut down on purpose and restarted with a different server name without High Availability being involved or a failover occurring. For example, when a database is running in a volatile OnDemand cloud environment it is quite likely that it may be moved from one server to another.
The alert description has been changed to stick to the facts, that PROPERTY ('ServerName') has changed which may or may not be the result of an HA failover or an OnDemand database move to a different server.
7. The Waiting Req column has been renamed to [Unsch Req](#) to reduce confusion with SQL Anywhere documentation.
The Monitor and Sample History pages now show the title "Unsch Req" instead of "Waiting Req" for the columns based on the UnschReq property.
This has been done to reduce confusion between this and other properties which use the word "waiting" in their descriptions... and to reflect the fact that "unscheduled requests" is common parlance when talking about this property. The data remains unchanged, only the titles are affected.
8. Alert #14 Waiting Requests has been renamed to [Alert #14 Unscheduled Requests](#).
9. The [Last Statement sort order](#) is only changed when you click on the title text, not the data value.
Previously, the sort order of the connections section on the Monitor page could be changed by clicking anywhere on the Last Statement line.
That behavior has now changed so that you must click the "Last Statement" title text to change the sort order. Clicking on the Last Statement data value has no effect.
10. The [security rules](#) are different for connecting to SQL Anywhere 16 target databases.
The new role-based security model introduced by SQL Anywhere 16 affects how Foxhound connects to those databases.

For example, the Foxhound connection to a SQL Anywhere 16 target database must use a user id with the MONITOR system privilege in order to gather information about all the connections to that database. Without the MONITOR privilege, Foxhound will only be able to display information about its own connection.

11. The [dbsrv16 -ufd restart](#) option has been added to the desktop shortcuts to keep Foxhound running.
12. Foxhound is no longer being extensively tested on Windows XP or IE8.
13. The Rollbacks column has been removed from database-level displays.
This number proved to be of little use so it was removed to make room for other numbers.
However, the property value on which it was based is still available for adhoc reporting.
14. The Checkpoints column has been merged into the [Checkpoints, Checkpoint Urgency, Recovery Urgency](#) column set because the values are related.
15. The Log Writes column has been merged into the [Disk Reads, Disk Writes, Log Writes](#) column set because the values are related.
16. The [Free Disk Space Sys, Temp, Log, Other](#) columns have been moved to the heading section because the values don't change very often.
17. The [Throughput... Commits](#) column has been rounded so rates like 0.099/s are displayed as 0.1/s, because the extra precision was not helpful.

5. Bug Fixes

1. Support for [Snapshot Isolation](#) has been added, thus eliminating the fatal "Cannot convert 'Snapshot' to a decimal" error.
Previously Foxhound expected the Isolation Level to be a numeric value.
This error has now been fixed.
2. The "Column '@alert11_actual_current_ServerName' not found" error has been fixed.
After an Alert #11 HA failover (now Servername changed) was issued, an attempt to use the Monitor Options page resulted in the error message "Column '@alert11_actual_current_ServerName' not found".
This error has now been fixed.
3. A bogus [Alert #9 Arbiter unreachable](#) is no longer issued for an OnDemand database.
When sampling was started for a database running in an OnDemand cloud environment an invalid Alert #9 was immediately issued: "Arbiter unreachable. The high availability target database has become disconnected from the arbiter server."
This error has now been fixed.
4. The ALTER MATERIALIZED VIEW statement has been moved after CREATE INDEX on the [Display Schema](#) page.
Previously an ALTER MATERIALIZED VIEW IMMEDIATE REFRESH statement would be generated ahead of a CREATE UNIQUE INDEX statement, which is the wrong order for execution.
This error has now been fixed.
5. The [click here to sort on](#) list has been made version-specific.
6. A bogus [Alert #1 Database unresponsive](#) is no longer issued when Foxhound is started after being upgraded.

7. The email status is no longer displayed as "Email sent, status unknown." before the attempt to send an email is actually made.
8. The popup tips for several [Alert](#) and [AutoDrop criteria](#) fields on the Monitor Options page have been changed to "Percent, 1 to 100".
9. The minimum input value for the [AutoDrop #3 Long transaction](#) duration field on the Monitor Options pages has been changed to 1.0s.
10. Bad input values entered on the Monitor Options page for integer [Alert](#) and [AutoDrop criteria](#) fields are now silently changed to the minimum allowed values.
11. The [Foxhound Options - Purge Run](#) report no longer displays 2 as the number of Orphan/Old Sample Set Rows Deleted when no change is reported in the total number of rows.
12. The Start Foxhound via Chrome shortcut no longer has trouble finding Chrome.
13. The No Transaction Log [curiosity message](#) is no longer displayed for read-only databases.
14. An error message is displayed instead of suppressing the sample when Foxhound [can't call sa_locks\(\)](#) to diagnose a blocked connection.
15. The handling of invalid SQL Anywhere property values coming from target databases has been improved.
16. [Heartbeat durations](#) are no longer rounded upwards; instead, values between .001s and 0.099s are changed to 0.1s to distinguish them from 0s.
17. Foxhound no longer tries to [AutoDrop](#) the same connection more than once.

A dropped connection may keep running for a while as SQL Anywhere rolls back its work even though the client application has been disconnected. For that reason Foxhound will not try to AutoDrop a connection more than once.
18. The CPOOL=NO connection parameter has been added to the connection string Foxhound uses to [connect to target databases](#).

This does not affect target databases running on SQL Anywhere 11 or earlier, but it does help prevent problems when sampling is stopped and restarted on target databases running on SQL Anywhere 12 and later.
19. It is now possible to start Foxhound in [Safe Mode](#) when it is [run as a service](#).

Previously Foxhound was unable to read the startup.txt file when started as a service.
This error has now been fixed.
20. [Safe Mode startup](#) now marks all timed out sampling sessions as no longer timed out, just stopped.

Safe Mode startup is supposed to stop all sampling sessions in such a way they can only be restarted manually.
Previously Foxhound did not clear the timed out status of a stopped sampling session when Foxhound was started in Safe Mode. That meant when Foxhound was restarted in non-Safe Mode it would automatically restart the timed out sampling session when the timeout retry period passed, thus defeating one of the reasons for using Safe Mode startup in the first place.
This error has now been fixed.
21. The Foxhound Options [Timeout Retry - never retry](#) setting now works properly.

Previously Foxhound implemented the never retry setting as retry immediately.
This error has now been fixed.

22. Concurrent usage of the [Global Overrides sections of the Foxhound Options](#) and [Monitor Options](#) pages is now properly handled.

The same three global checkboxes (Enable Emails, Enable Schedules and Enable Autodrop) can be updated by the user in two different places: the Global Overrides sections of the Foxhound Options and Monitor Options pages.

Previously, switching back and forth (e.g., saving a change on one page and then clicking Save on the other page) could result in the wrong checkbox value being saved and/or displayed.

This error has now been fixed.

-- end --