Transaction Snapshots

A transaction snapshot depicts a set of diagnostic data, taken at a certain point in time, for an individual transaction across all app servers through which the transaction has passed.

Transaction snapshots are the vehicle for troubleshooting the root causes of performance problems.

Deep Code-Level Visibility in Production

Code level visibility is essential for troubleshooting performance problems in production. You

Expert Advice

See how AppDynamics monitored performance in real time during elections

by Sandy Mappic

need details about the exact code path taken by a particular transaction and the time spent in the methods that were executed. A distributed environment presents a challenge because multiple code paths are executed across multiple application servers.

AppDynamics generates a transaction snapshot to capture the code paths executed on instrumented application servers involved in a distributed transaction.

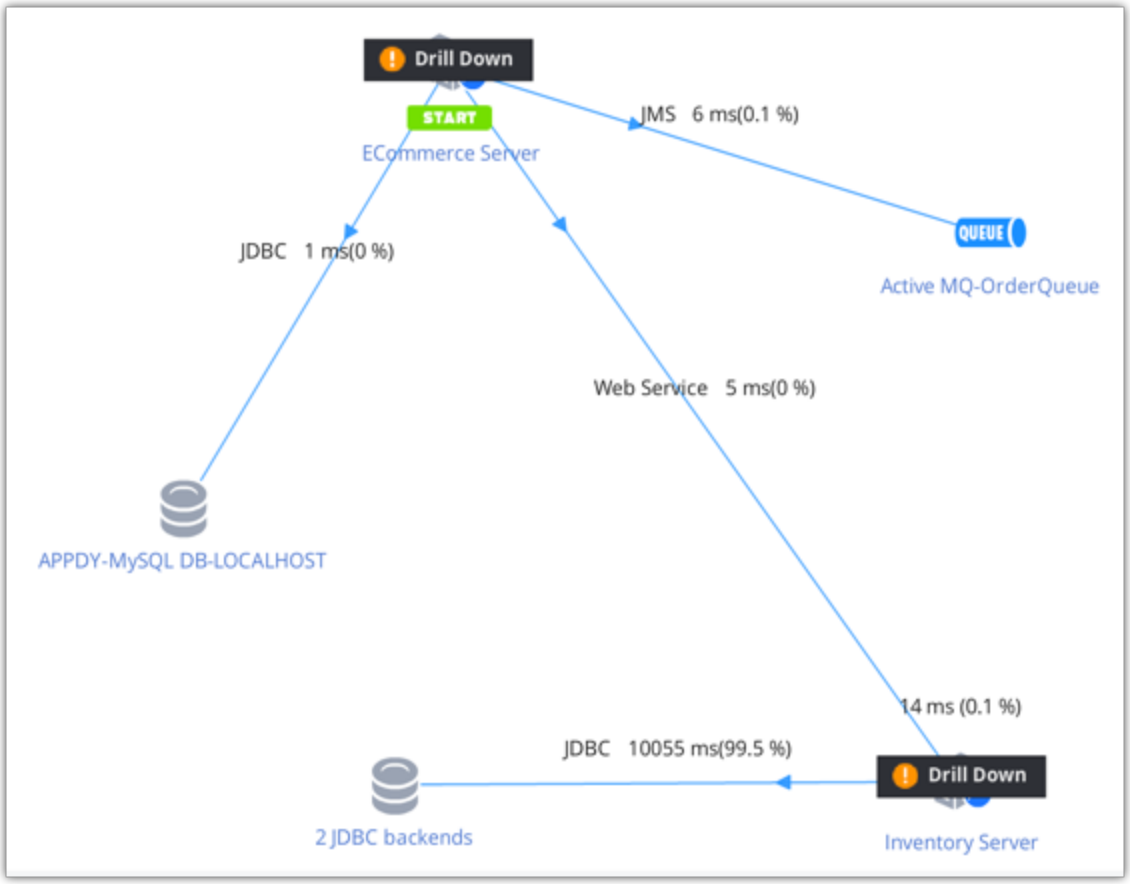
Overview of Transaction Snapshots

When Transaction Snapshots are Captured

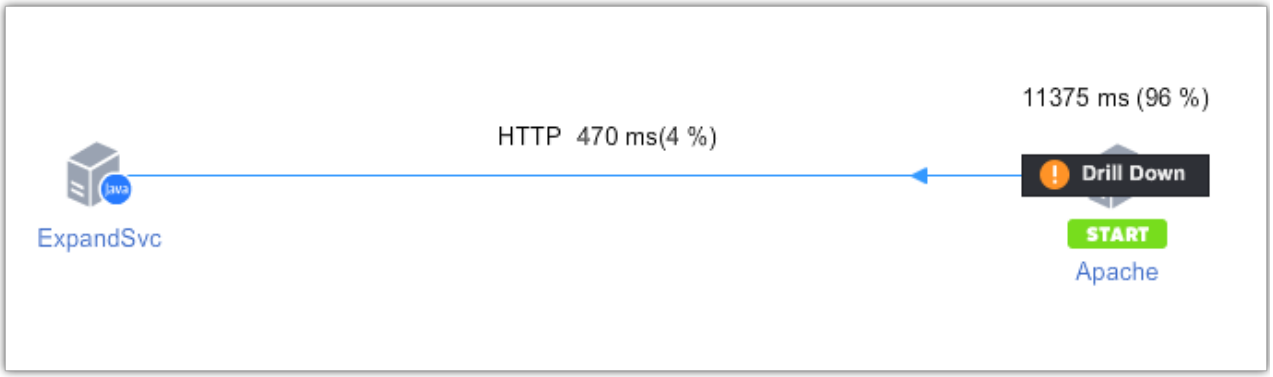
Transaction snapshots contain considerable amounts of data. They are generated by the application server (tier) where the code they contain is running.

In the AppDynamics console, a **Drill Down** button on a tier in a transaction view indicates that transaction snapshots exist on that tier and that you can drill down into them to learn more about why your application is experiencing problems.

Typically in a distributed transaction you will see **Drill Down** buttons on all the tiers. In the following very slow transaction, you can see that transaction snapshots have been captured by the originating ECommerce server and by the downstream Inventory server:



Sometimes transaction snapshots are not captured by all the tiers in a distributed transaction. In the next example, transaction snapshots were captured on the originating Apache server but not the downstream ExpandSvc server. Why not?



Here are the rules governing whether transaction snapshots are captured on a tier. The rules are slightly different for originating and downstream tiers. An originating tier is the tier that contains the entry point to the transaction.

Transaction snapshots are captured by the **originating tier** in a distributed transaction:

- **When a diagnostic session is triggered** by the originating tier.
  The agent starts diagnostic sessions when it detects a pattern of performance problems. In addition you can manually start a diagnostic session from the Business Transaction

Dashboard. For details see See Detailed Data Using Diagnostic Sessions.

- **When the agent identifies slow, very slow, or stalled response times, or errors** on the originating tier.
  These snapshots may have partial call graph information, because they start at the time when the transaction slowed or experienced an error.
- **Based on the periodic collection schedule**.
  By default the agent captures one snapshot every 10 minutes. For details see Configure Transaction Snapshots.

Any tier (originating, continuing and terminating tiers) can take a snapshot, thus enabling driil down, when it knows that it is experiencing slow, very slow, or stalled response times or that it has errors.

In addition, any **downstream tier** captures snapshots if the tier immediately upstream to it tells it to take a snapshot. An upstream tier might direct its downstream tier to take a snapshot under these circumstances:

- The upstream tier is taking a snapshot for a diagnostic session.
- The upstream tier is taking a snapshot based on the periodic collection schedule.

If none of these conditions exists, the downstream tier may not take a snapshot, hence no drill down is available on that tier.

Bear in mind that in addition to these rules, there is a limit on the number of snapshots per minute per tier, so if this limit is reached, snapshots will not be created for that minute notwithstanding conformity to the rules.

To view transaction snapshots

You can get a list of transaction snapshots for the selected time range:

- From the **Transaction Snapshots** tab of the application, tier, node, or business transaction dashboards
- From the links in the transaction scorecards in the application, tier, node, or business transaction dashboards
- From the **Troubleshoot-> Slow Response Time** or **Troubleshoot-> Errors** in the left navigation pane

1. Navigate to an application, tier, node, or business transaction dashboard.

2. Click the **Transaction Snapshots** tab.

3. From the list of transaction snapshots that displays, select the snapshot that you want to view and click **View Transaction Snapshot**.

4. In the transaction flow map click **Drill Down**.

Or

1. Navigate to an application, tier, node, or business transaction dashboard.

2. Click the individual slow, very slow, stalls or errors links in the Transaction Scorecard section of the dashboard.

3. From the list of transaction snapshots that displays, select the snapshot that you want to view and click **View Transaction Snapshot**.

4. In the transaction flow map click **Drill Down**.

Or

1. Click **Troubleshoot-> Slow Response Time** or **Troubleshoot-> Errors** in the left navigation pane.

2. Select a slow or error transaction from the list.

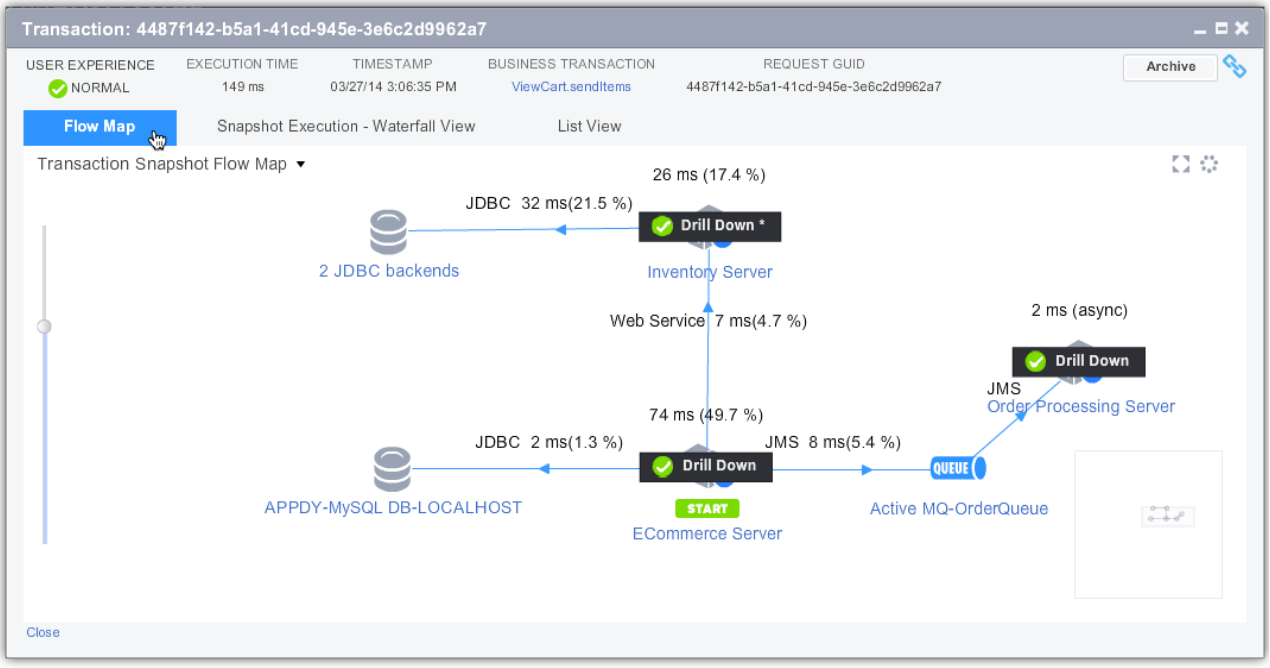
3. Click **View Transaction Snapshot**.

4. In the transaction flow map click **Drill Down**.

Transaction Snapshot Views

Snapshot Flow Map

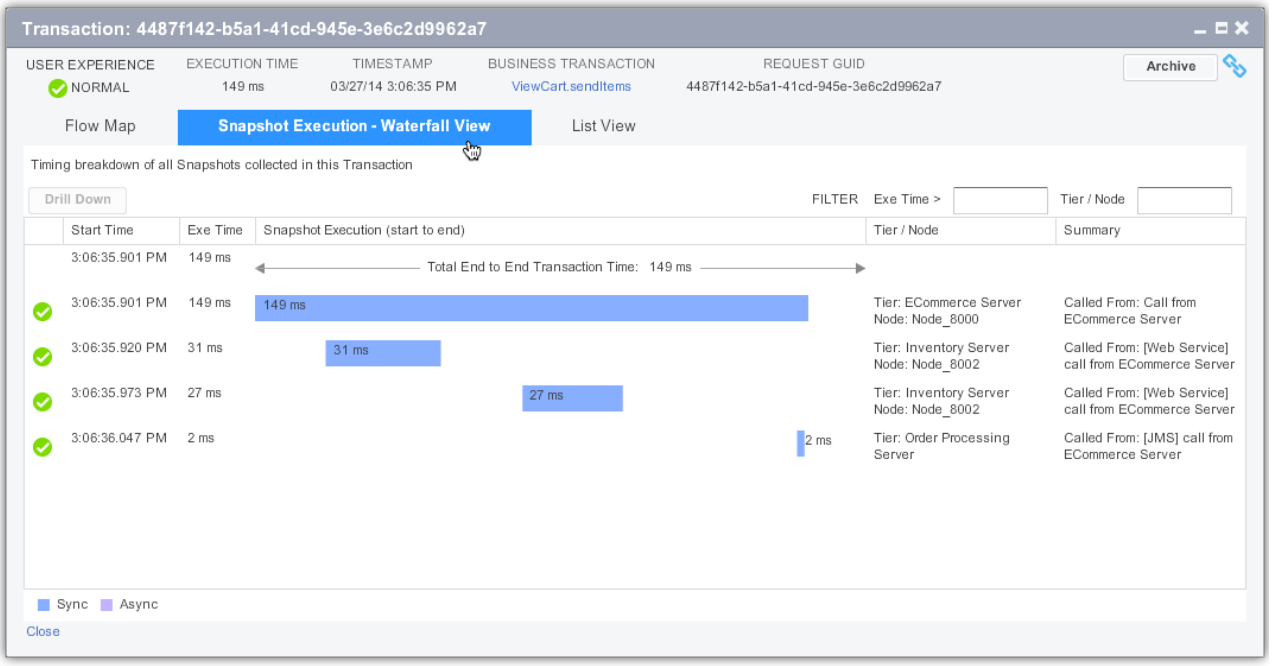
When you double-click on any item in the list of transaction snapshots, a Transaction Snapshot Flow Map displays. You can see the user experience, execution time, and timestamp of the transaction. The flow map also provides details of the overall time that is spent in a particular tier and in database and remote service calls.



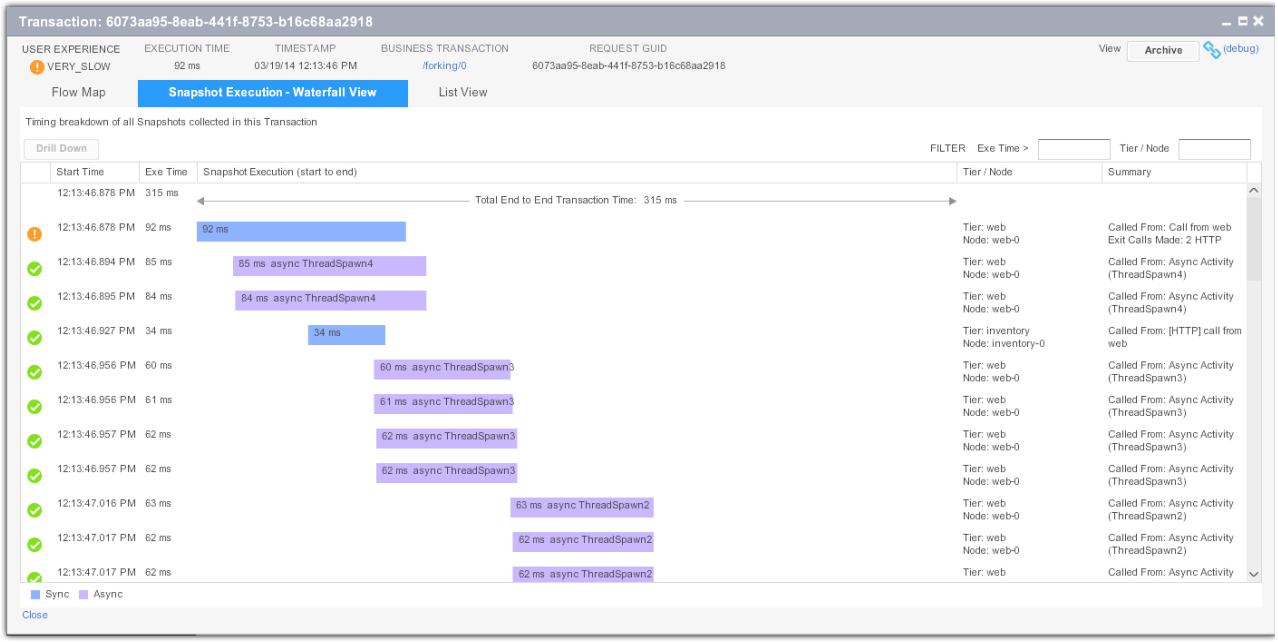
Snapshot Waterfall View

When you click the Snapshot Waterfall View tab, you see a timing waterfall chart of the snapshots collected for a business transaction. The chart visualizes the call execution times as they occur

during the end-to-end transaction time.

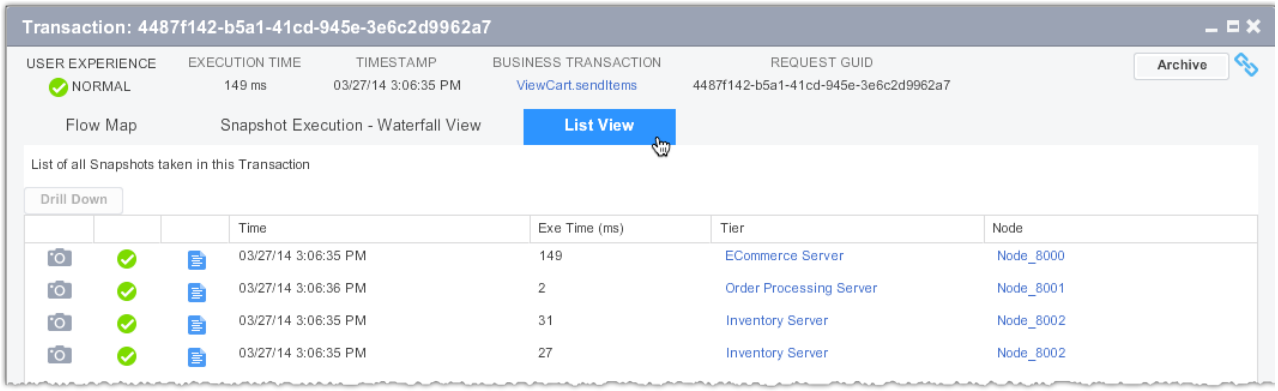


If there is asynchronous activity the waterfall view displays those calls in a different color.



The Snapshot List View

The Snapshot List View shows a simple list. The list is very useful for sorting snapshots according to execution time.



Transaction Snapshot Call Drill Downs

An individual transaction snapshot contains diagnostic information for individual business transaction instances. It provides information to help diagnose why a particular transaction or series of transactions are not performing as well as expected.

To get the call drill down information:

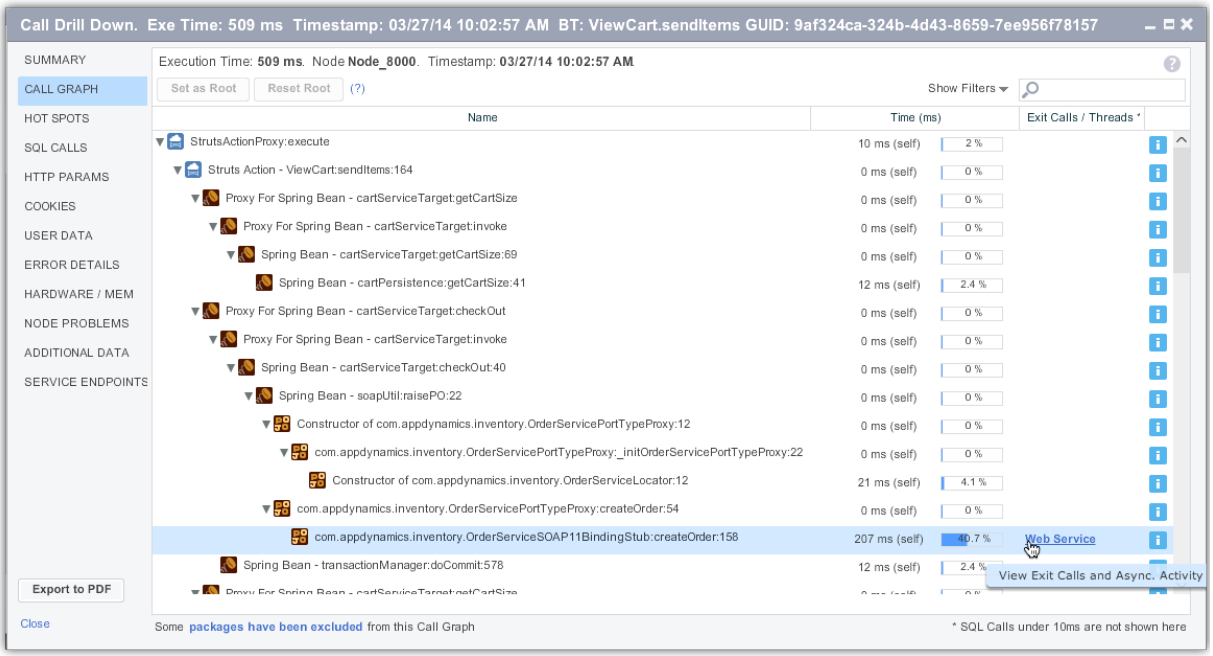
- In the Transaction Snapshot Flow Map view, click **Drill Down** on a tier.
- In the Snapshot Waterfall View select a snapshot and double-click or click **Drill Down**.
- In the Snapshot List View select a snapshot and double-click or click **Drill Down**.

The contents of a transaction snapshot containing async segments look slightly different if you access the snapshot via the Business Transaction view or via the App/Tier/Server view. In the Business Transaction view, only the originating segments are shown initially, and then you can drill down to the async segments as desired. Because the App/Tier/Server view surfaces all the segments that are relative to that entity, all segments, originating or async, are listed initially.

Diagnostic Data Captured by a Transaction Snapshot in the Call Drill Down Window

The following details are captured in a transaction snapshot:

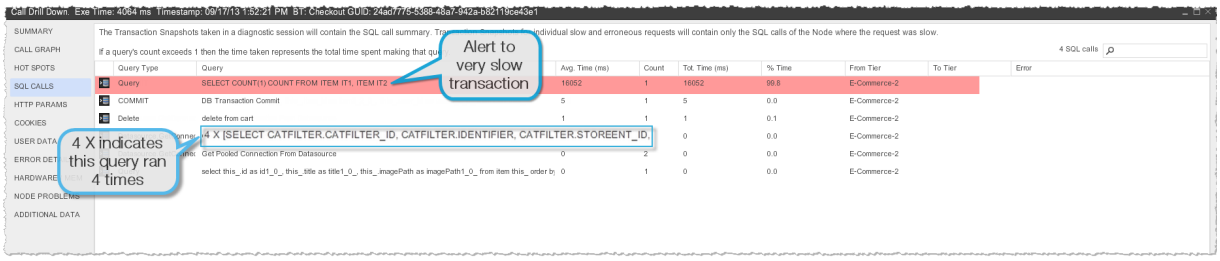
- **Summary:** Problem summary, execution time, CPU, timestamps tier, node process ID, thread name, etc.
- **Call Graphs:** Call graphs in which you can drill down to the method call that is causing the problem. AppDynamics automatically filters non-application classes such as core Java classes, third party libraries, application server and database driver implementation classes. You can configure call graph settings to control which classes should be included or excluded from the call graph. To configure, see Configure Call Graphs.
  In the Node.js Agent, transaction snapshots do not include call graphs, but they do include exit calls. See Monitor Node.js Business Transactions. Call graphs are included in Node.js Agent process snapshots. See View Process Snapshots.



- **Hot Spots:** Sorts the calls by execution time, with the most expensive calls at the top. To see the invocation trace of a single call in the lower panel, select the call in the upper panel. Use the slider to filter which calls to display as hot spots. For example, the following setting filters out all calls faster than 30 ms from the hot spots list.

  Using the force-hotspot-if-diag-session and hotspot-collect-cpu node properties you can respectively control whether or not hot spot snapshots are collected for manually started diagnostic sessions and whether CPU time or real time is collected within the hot spot snapshots.

- **SQL Calls:** All SQL queries fired during a request. AppDynamics normalizes the queries and by default does not display raw/bind values. You can configure SQL capture settings to monitor raw SQL data in the queries. Calls taking less than 10 ms are not reported but when they occur multiple times you may see <SQL Call(s)> in the Query column to identify these calls. To configure, see Configure Call Graphs.



- **HTTP Params:** HTTP payloads contain basic data such as the URL and session ID, and additional data for Servlet entry points, Struts, JSF, Web Services, etc. You can use HTTP data collectors to specify which query parameter or cookie values should be captured in the transaction snapshot. To configure, see Configure Data Collectors.

- **Cookies:** The snapshot can use cookie values to help identify the user who initiated the slow or error transaction. To configure, see Configure Data Collectors.
- **User Data:** User data from any method executed during a transaction, including parameter values and return values, to add context to the transaction. You can use method invocation data collectors to specify the method and parameter index. To configure, see Configure Data Collectors.
  ⚠ In cases where an exit call is made just before a business transaction starts, exit call information can show up in this field, particularly if the transaction is marked as slow or having errors. Please note that sensitive information on the exit call may be shown in this situation.
- **Error Details:** Exception stack traces and HTTP error codes.
- **Hardware/Mem:** Graphs for hardware (CPU Memory, Disk IO, Network IO), Memory (Heap, Garbage Collection, Memory Pools), JMX, etc.
- **Node Problems**: Viewer to analyze node problems. See Troubleshoot Node Problems.
- **Additional Data**

Transaction snapshots include distributed call graphs and response time distribution details only when a series of bad transactions or a performance policy violation trigger a diagnostic session on a node.

Using Transaction Snapshots

Sorting and Searching for Specific Transaction Snapshots

To filter transaction snapshots using search criteria

1. In the **Transaction Snapshots** tab click the **All Snapshots** subtab.
2. Click **Show Filters** if filters are not showing.
3. Click **Search Criteria**. Check the following criteria to sort the list:
   - **User Experience**
     - Slow
     - Very Slow
     - Stall
   - **Execution Time** in milliseconds
   - **Business Transaction**
     - Click **Add** (the + icon) to select a Business Transaction as a search criteria
   - **Errors**
     - Click **Error Occurred** to list all errors

        - Click **Add** (the + icon) to select a particular error as a search criteria
    - **HTTP Request Data**
        - URL
        - Session ID
        - User Principal
    - **Data Collector Data**
        - Collector Type: Any, HTTP Parameter, Business Data, Cookie
        - Name
        - Value
    - **Archived**
        - Return Only Archived Snapshots
    - **Advanced**
        - Request GUIDs
3. Click **Search**.

To filter transaction snapshots by refining the results list

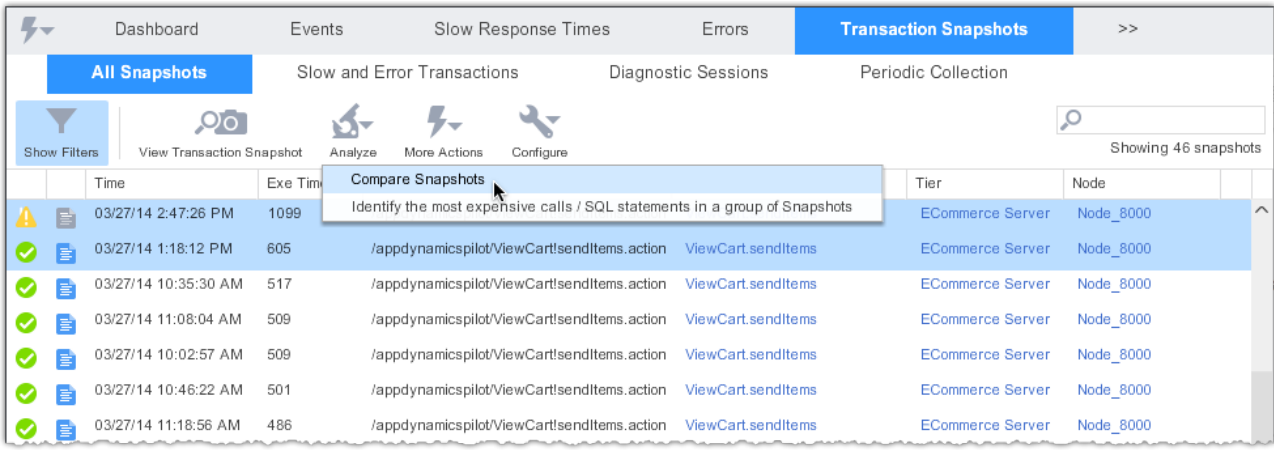
You can refine the results list of a previous query. AppDynamics instantly updates the list as you select or deselect the **Refine Results** filters.

1. In the **Transaction Snapshots** tab of a dashboard click the **All Snapshots** subtab.
2. Click **Show Filters**.
3. Click **Refine Results**. Use the following criteria to sort the list:
    - **User Experience**
        - Normal
        - Slow
        - Very Slow
        - Stall
    - **Business Transactions**
    - Business Transactions by name
      AppDynamics also shows the number of snapshots.
    - **Tiers**
    - Tiers by name
      AppDynamics also shows the number of snapshots.
    - **Nodes**
      Nodes by name
      AppDynamics also shows the number of snapshots.
    - **Errors**
      Snapshots where an error occurred

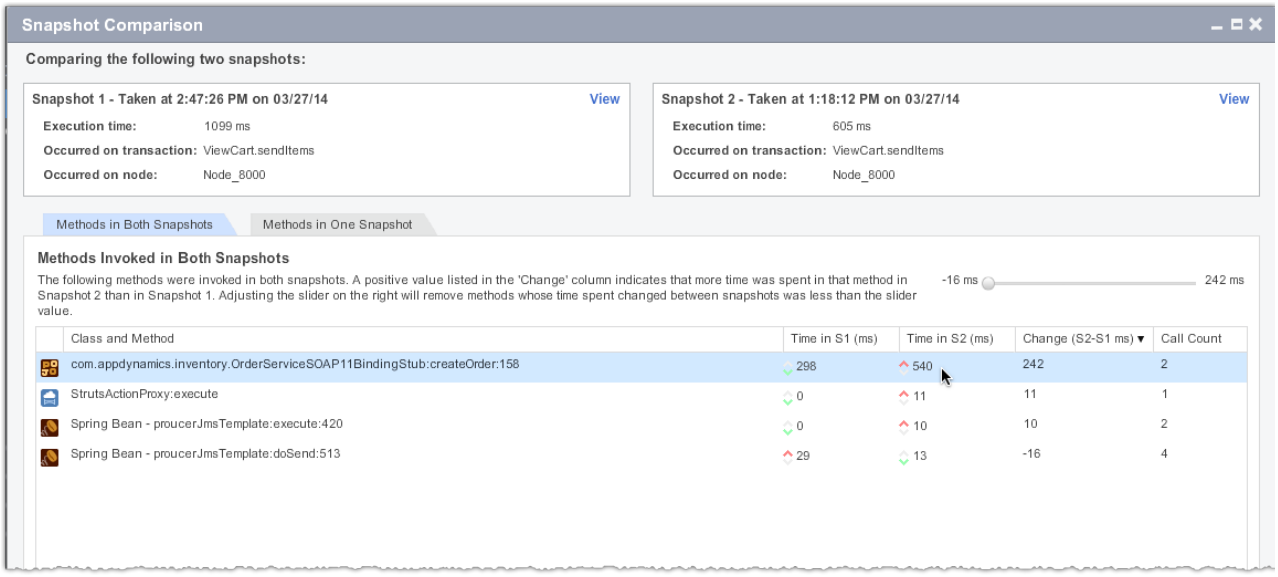
Comparing Snapshots

To compare snapshots

1. In the Business Transactions All Snapshots list, select two snapshots that you want to compare.
2. Click **Analyze -> Compare Snapshots**.



The Snapshot Comparison window displays a comparison of the selected snapshots. Look at the Time and Change columns to find slow methods.



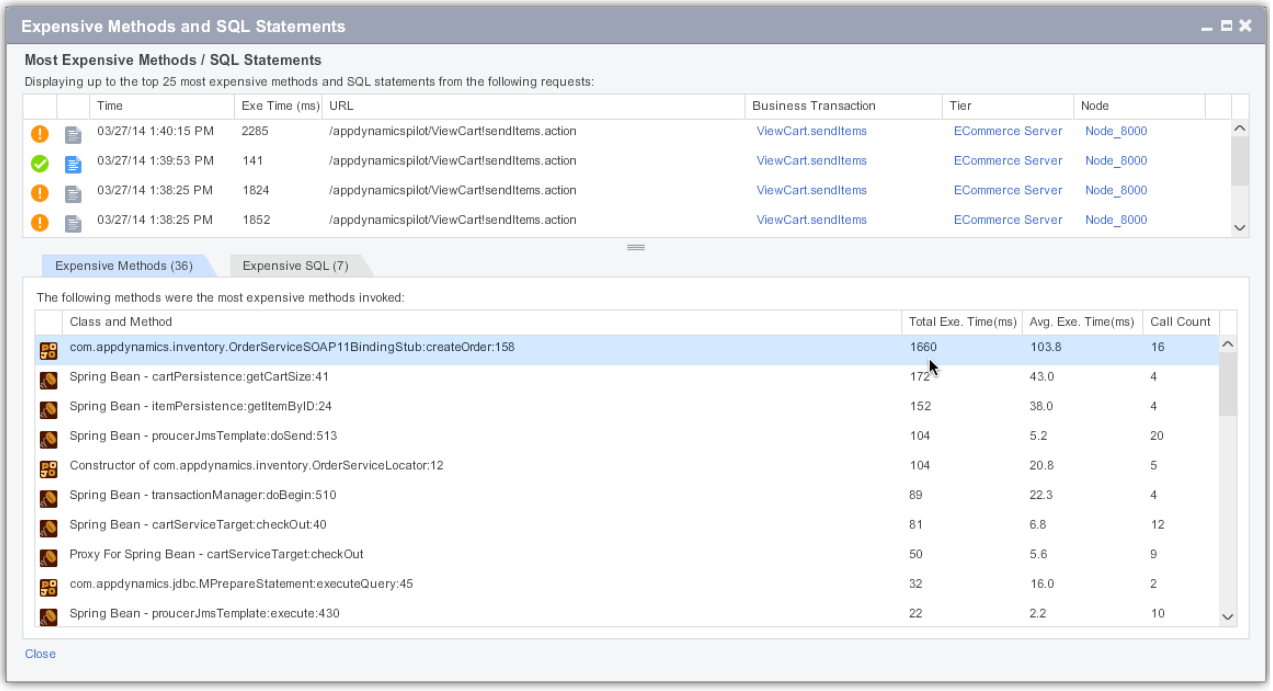
Troubleshooting With Snapshots

To analyze the most expensive calls and SQL statements

1. In the Business Transactions All Snapshots list, select a single or a group of snapshots that you want to analyze. You can select up to 30 snapshots.

2. Click **Analyze -> Identify the most expensive calls / SQL statements in a group of snapshots**.

AppDynamics displays the most expensive calls (methods) in the snapshots and the most expensive SQL statements.



Archiving Snapshots

Normally transaction snapshots are purged after a configurable time - by default, two weeks. To save a snapshot beyond the normal snapshot lifespan – for example, if you want to make sure a snapshot associated with a particular problem is retained for future analysis – archive the snapshot.

Customers with on-premise controllers can modify the default two-week period by configuring the snapshots.retention.period in the Controller Settings section of the Administration console.

To Archive a Transaction Snapshot

1. Display the Transaction Snapshot flow map.
2. Click the **Archive** button in the upper right corner.

When you are viewing your snapshot list, a small icon in the far right column indicates that a snapshot has been archived.

To Find Archived Transaction Snapshots

To display only archived snapshots in the snapshot list, filter the snapshot list and check **Return Only Archived Snapshots**. See To filter transaction snapshots using search criteria.

Learn More

- Configure Transaction Snapshots
- Call Graphs
- See Detailed Data Using Diagnostic Sessions
- Configure Data Collectors
- Configure Call Graphs
- Access the Administration Console
- Monitor Node.js Business Transactions
- Monitor Node.js Processes
- View Process Snapshots