Finding the Root Cause of Application Performance Issues in Production

The most enjoyable part of my job at AppDynamics is to witness and evangelize customer success. What’s slightly strange is that for this to happen, an application has to slow down or crash.
It’s a bittersweet feeling when End Users, Operations, Developers and many Businesses suffer application performance pain. Outages cost the business money, but sometimes they cost people their jobs—which is truly unfortunate. However, when people solve performance issues, they become overnight heroes with a great sense of achievement, pride, and obviously relief.

To explain the complexity of managing application performance, imagine your application is 100 haystacks that represent tiers, and somewhere a needle is hurting your end user experience. It’s your job to find the needle as quickly as possible! The problem is, each haystack has over half a million pieces of hay, and they each represent lines of code in your application. It’s therefore no surprise that organizations can take days or weeks to find the root cause of performance issues in large, complex, distributed production environments.

End User Experience Monitoring, Application Mapping and Transaction profiling will help you identify unhappy users, slow business transactions, and problematic haystacks (tiers) in your application, but they won’t find needles. To do this, you’ll need x-ray visibility inside haystacks to see which pieces of hay (lines of code) are holding the needle (root cause) that is hurting your end users. This X-Ray visibility is known as “Deep Diagnostics” in application monitoring terms, and it represents the difference between isolating performance issues and resolving them.

For example, AppDynamics has great End User Monitoring, Business Transaction Monitoring, Application Flow Maps and very cool analytics all integrated into a single product. They all look and sound great (honestly they do), but they only identify and isolate performance issues to an application tier. This is largely what Business Transaction Management (BTM) and Network Performance Management (NPM) solutions do today. They’ll tell you what and where a business transaction slows down, but they won’t tell you the root cause so you can resolve the issues.
**Why Deep Diagnostics for Production Monitoring Matters**

A key reason why AppDynamics has become very successful in just a few years is because our Deep Diagnostics, behavioral learning, and analytics technology is 18 months ahead of the nearest vendor. A bold claim? Perhaps, but it’s backed up by bold customer case studies such as Edmunds.com and Karavel, who compared us against some of the top vendors in the application performance management (APM) market in 2011. Yes, End User Monitoring, Application Mapping and Transaction Profiling are important—but these capabilities will only help you isolate performance pain, not resolve it.

AppDynamics has the ability to instantly show the complete code execution and timing of slow user requests or business transactions for any Java or .NET application, in production, with incredibly small overhead and no configuration. We basically give customers a metal detector and X-Ray vision to help them find needles in haystacks. Locating the exact line of code responsible for a performance issue means Operations and Developers solve business pain faster, and this is a key reason why AppDynamics technology is disrupting the market.

Below is a small collection of needles that customers found using AppDynamics in production. The simple fact is that complete code visibility allows customers to troubleshoot in minutes as opposed to days and weeks. Monitoring with blind spots and configuring instrumentation are a thing of the past with AppDynamics.

**Needle #1 - Slow SQL Statement**

**Industry:** Education  
**Pain:** Key Business Transaction with 5 sec response times  
**Root Cause:** Slow JDBC query with full-table scan
Needle #2 - Slice of Death in Cassandra
Industry: SaaS Provider
Pain: Key Business Transaction with 2.5 sec response times
Root Cause: Slow Thrift query in Cassandra

Needle #3 - Slow & Chatty Web Service Calls
Industry: Media
Pain: Several Business Transactions with 2.5 min response times
Root Cause: Excessive Web Service Invocation (5+ per trx)
Needle #4 - Extreme XML processing  
Industry: Retail/E-Commerce  
Pain: Key Business Transaction with 17 sec response times  
Root Cause: XML serialization over the wire.

Needle #5 - Mail Server Connectivity  
Industry: Retail/E-Commerce  
Pain: Key Business Transaction with 20 sec response times  
Root Cause: Slow Mail Server Connectivity
Needle #6 - Slow Result Set Iteration
Industry: Retail/E-Commerce
Pain: Several Business Transactions with 30+ sec response times
Root Cause: Querying too much data

Needle #7 - Slow Security 3rd Party Framework
Industry: Education
Pain: All Business Transactions with > 3 sec response times
Root Cause: Slow 3rd party code
Needle #8 - Excessive SQL Queries
Industry: Education
Pain: Key Business Transactions with 2 min response times
Root Cause: Thousands of SQL queries per transaction

Needle #9 - Commit Happy
Industry: Retail/E-Commerce
Pain: Several Business Transactions with 25+ sec response times
Root Cause: Unnecessary use of commits and transaction management.
Needle #10 - Locking under Concurrency
Industry: Retail/E-Commerce
Pain: Several Business Transactions with 5+ sec response times
Root Cause: Non-Thread safe cache forces locking for read/write consistency

Needle #11 - Slow 3rd Party Search Service
Industry: SaaS Provider
Pain: Key Business Transaction with 2+ min response times
Root Cause: Slow 3rd Party code
Needle #12 - Slow 3rd Party Search Service
Industry: SaaS Provider
Pain: Key Business Transaction with 2+ min response times
Root Cause: Slow 3rd Party code

Needle #13 - Slow 3rd Party Search Service
Industry: SaaS Provider
Pain: Key Business Transaction with 2+ min response times
Root Cause: Slow 3rd Party code