



Case Study: Performance Problem with Services Accessing External Systems

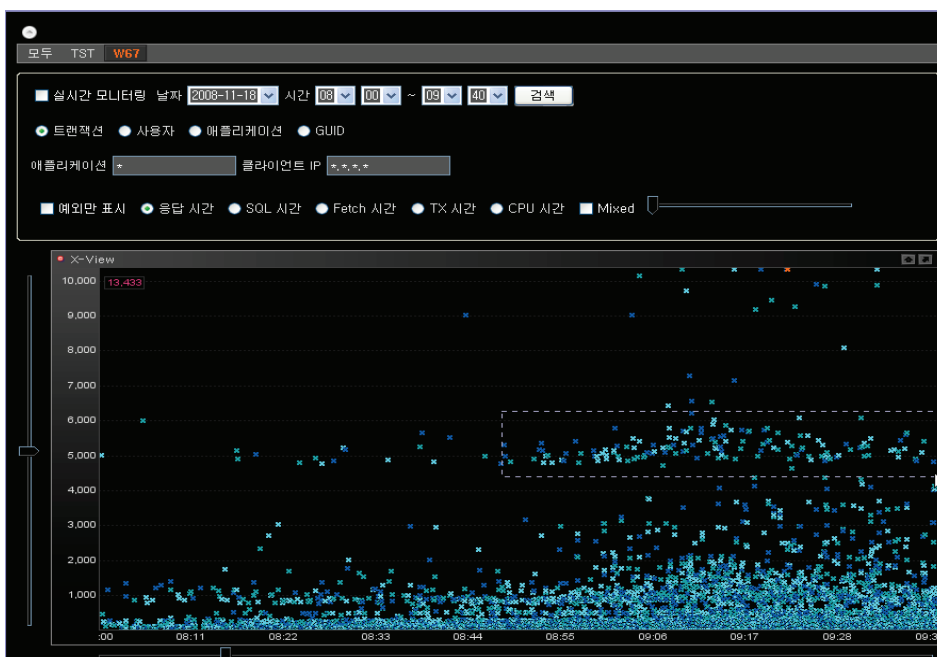
Background

System "S" is part of credit checking system for "T" finance company. System is used to check and manage credit score of customers for loan approval. This portal system is accessed by more than 2,500 users daily.

System "S" is composed of 2 application servers and an LDAP server for user access management. Recently, servers were experiencing more than 50% CPU utilization and delayed response time, resulting in many complaints from the users.

Analysis

After installing JENNIFER, Administrator found out that LDAP process is using CPU excessively; Users who are using LDAP was getting delayed response time from application. Since administrator could not figure out which LDAP process is causing the delay in response time, JENNIFER was used to trace method level detail for further analysis.



[Pic 1 X-View Response Time Scatter Graph]

As seen in X-View, a group of service transactions are taking more than 5 seconds to finish. Analyzing several of these service transactions, administrator found common factor which delayed response time were associated; all of the service transactions were executing same search method during the LDAP Process.

The screenshot displays the 'Method-Level Profiling Data' window in JENNIFER. It shows a table of transactions with columns for UID, GUID, Method Name, and Execution Time. The 'Execution Time' column highlights several transactions that took more than 5 seconds to complete. Below the table, the 'SQL' tab is selected, showing the corresponding SQL queries for the highlighted transactions. The queries are mostly related to LDAP operations, such as 'public Object com.ibm.ws.wmm.idap.LdapRepositoryImpl.getValue(PluginAttribute, Object)' and 'public boolean com.ibm.ws.wmm.idap.LdapRepositoryImpl.isMemberUnderBase(short, String, String)'.

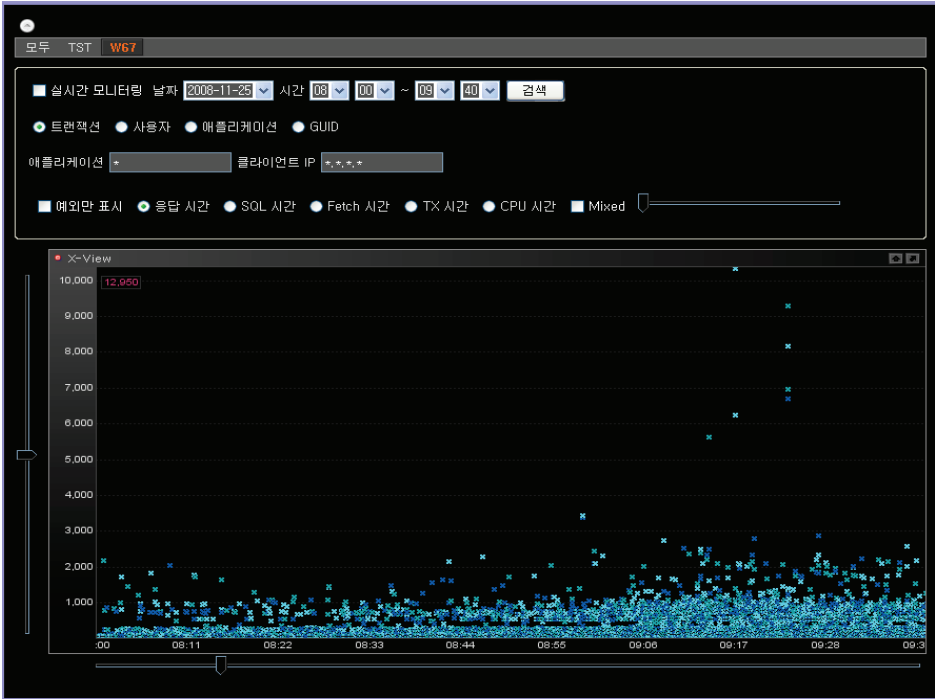
[Pic 2 Method-Level Profiling Data]

But since there was different range of delay in response time even within this group of transactions, administrator used JENNIFER's monitoring capability to get parameter values for further analysis.

The screenshot displays the 'Monitoring Data' window in JENNIFER. It shows a table of transactions with columns for UID, GUID, Method Name, and Execution Time. The 'Execution Time' column highlights several transactions that took more than 5 seconds to complete. Below the table, the 'SQL' tab is selected, showing the corresponding SQL queries for the highlighted transactions. The queries are mostly related to LDAP operations, such as 'protected void com.ibm.wps.engine.commands.LoginUser.doPrepareSession(RunData, User)' and 'private void com.ibm.wps.engine.commands.LoginUser.doPostLogin(RunData, String, String)'.

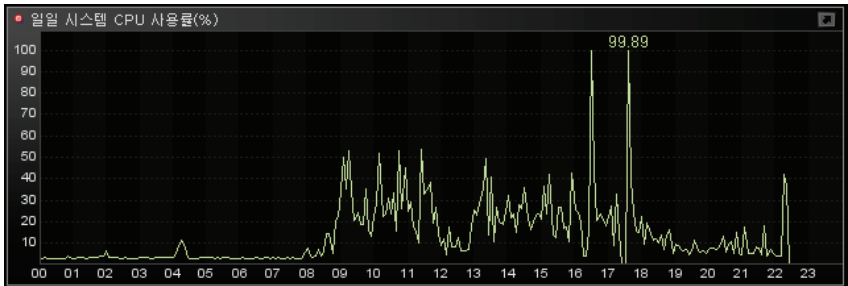
Looking at it further, administrator found that delay in response time was specifically associated with certain user group (Parameter = username) and after confirmed it with IT manager, administrator found that when a member of one specific user group submitted service request, the delay in response time was longest with increase in CPU utilization.

When a group of users executes this slow LDAP search, These LDAP processes used CPU resource excessively, resulting in delay in overall response time and deficient CPU resource. The cause was identified as corrupted search index. Once the search index was repaired, response times for all service transactions were minimized to below 2 seconds.

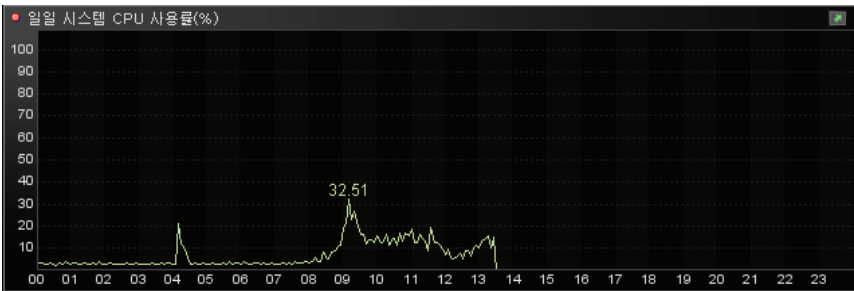


[Pic 3: X-View Graph after Fix]

CPU utilization was also decreased from 50% to 20% after search index was repaired. Overall, CPU usage by java process remained 15~20%, meaning that while delay in response time was caused by corrupt search index in LDAP, increase in Java CPU usage was attributed to some other process in the application server.



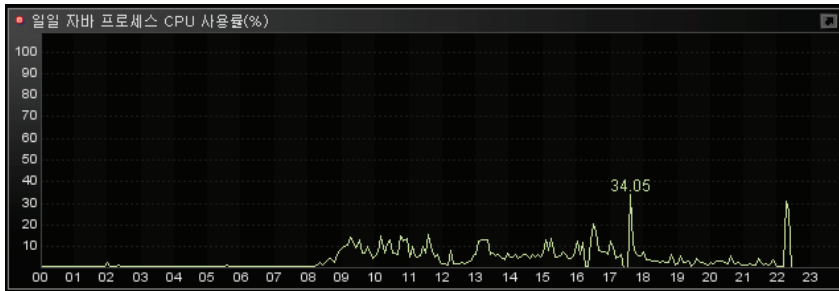
Before LDAP Index Update (System CPU)



After LDAP Index Update (System CPU)

Method Profiling/External Transaction Monitoring

Method Profiling/External Transaction Monitoring
JENNIFER's X-View graph provides external transaction monitoring data (FILE I/O, Network I/O, JDBC transaction) by default. However, if method level monitoring is also necessary, JENNIFER can provide method level profiling at external system level or system logic level.



Before LDAP Index Update (WAS CPU)



After LDAP Index Update (WAS CPU)

Conclusion

For monitoring application logics using external resources (LDAP, CICS etc...), an effective way of monitoring transactions down to method level profiling is necessary as well monitoring external transaction data in order to effectively manage application performance.

Key Message :

1. System "S" is composed of 2 application servers and an LDAP server for user access management. Recently, servers are experiencing more than 50% CPU usage and delay in response time, leading to many complaints from the users.
2. For monitoring application logics using external resources (LDAP, CICS etc...), an effective way of monitoring transactions down to method level profiling is necessary as well monitoring external transaction data in order to effectively manage application performance.

Note

JENNIFER Review Downloads:
<http://www.jennifersoft.com/docs/apm-jennifer-installation--file-download.html>

JENNIFER Introduction Document
<http://www.jennifersoft.com/docs/apm-jennifer-documents.html>