

Troubleshooting Polaris Performance issues

Prepared by: Wes Osborn

[Troubleshooting Polaris Performance issues](#)

[Hardware](#)

[Isolate the problem](#)

[Check the network](#)

[Check the SQL Server service](#)

[Make sure the problem isn't active directory](#)

[SIP Testing](#)

[Other troubleshooting steps](#)

[Post performance issue clean-up](#)

Hardware

Always start with the physical hardware. Although failure rates are low, they can still happen. If you don't check the hardware first you'll end up regretting it later.

1. Check the hardware diagnostics in Idrac or something similar
 - a. Are there **any** HDD, RAM or CPU failures or predictive failures or warnings?
 - b. Are there any patrolled reads happening? Patrolled reads examine all disk sectors for bit rot. It is possible that the patrolled read might be "stuck" on something meaning there is horrible disk performance that might not show at the OS level.
2. Do a basic task manager check
 - a. Are CPU, Disk and Network (Polaris traffic is typically only a few megs) all in good shape?
 - b. Make sure you do this basic check from ALL Polaris servers and all VM HOST servers, not just the database server.
3. Examine historic performance using PRTG or a similar tool. See if the CPU/RAM usage are normal or out of whack.
4. Disable any power saving performance features, especially on the database server. The only reason to enable power saving features if you are paying per KWh at your data center.
5. If any of your servers are running as a VM, make sure that the NUMA alignment is correct. This is the amount of RAM that is available on each CPU in the host. One easy way to check the NUMA setting is to make sure that the amount of RAM and CPUs reported in the guest OS task manager match those that are listed in the VM configuration. If the guest OS thinks that it has less RAM or CPU than it has been allocated, then you likely have a NUMA configuration issue.
6. Some Polaris processes (like sending email notices) are single threaded. This means that they are GREATLY impacted by the clock speed of a SINGLE core. If you've recently switched environments, you might want to make sure that you didn't end up with a CPU platform that has more SLOWER cores than your previous hardware. The trend for the past 3+ years has been to more cores and clock speeds have not increased at the pace they used to.
7. If you have a VM using dynamic RAM, you may want to consider switching it to a static RAM setup. Some applications aren't good about requesting more RAM if they don't see it available in the OS.

8. Make sure that [Microsoft SQL server has been configured to use as much available RAM as possible](#).
9. Check the disk queue length (should be very low, below 5) using PRTG or Resource Monitor to see if a slow or bust storage environment is causing your problem.
10. Check to make sure that any anti-virus tools aren't causing the problem, try disabling them temporarily.
11. We've had weird network problems happen in the past with Broadcom network adapters. Try disabling Large Sender Offload and Virtual Machine Queues to see if they help. They're typically not needed if you're running 1GB networks anyhow.
12. We've also had a weird situation where a dual NIC network adapter from Intel was returning the proper MAC addresses. You might want to try running getmac or get-netadapter to make sure the return looks correct.
13. 10 GB cables are MUCH pickier, make sure you're using cables certified for your network card/switch.

Isolate the problem

Attempt to determine the "main" system that is causing your performance issue. If you have most Polaris services on one system, this won't help but if you've distributed the tasks, then you may want to look at this.

1. Start at the database server
 - a. Launch the Polaris client
 - b. Use Help->About to make sure the application server for this client is the DATABASE server itself. If it is not, then modify the SERVERNAME in the shortcut to use this as the application server for this client.
 - c. Search for a title, place it on hold and then check it in to fill the hold
2. If the steps work well for the database server, then start expanding out to other servers, double checking the application server name each time.
3. Check to make sure that any anti-virus tools aren't causing the problem, try disabling them temporarily.
4. Once Polaris has been checked on all Polaris servers, begin checking from library networks to see if the problem is only happening from ONE library network.

Check the network

1. The Polaris staff desktop client is very latency sensitive. Ideally you want connectivity between the database and all other Polaris servers to be below 10ms.
2. Typical ICMP ping tests are not very reliable, although it is fine to start with them, it should be noted that many network providers or network equipment will de-prioritize ICMP traffic if they are under load. It is possible that ICMP tests could show a problem when the actual TCP traffic that Polaris is communicating over would have no issues at all. **Start with ICMP ping tests, but also perform the TCP ping test mentioned in the next step.**
3. From a CLIENT with problems, check connectivity to the main **ports** that Polaris uses
 - a. Use tcping or test-network (powershell)
 - b. You can use this script to automate the process:
<https://bitbucket.org/clcdpc/powershell-stuff/src/master/testcommonpolarisports.ps1>
4. Check firewall logs to see if any "new" ports are being used for Polaris communication that are being blocked.

5. If using local Windows server firewall, be sure to check its logs. Try turning it off completely to see if that helps.
6. Traditional desktop client to application and database server should be able to communicate with less than 100ms of ICMP latency (ping test - https://iihelp.iinet.net.au/How_to_run_a_ping_test).

Check the SQL Server service

If any of your isolation tests appear to point to a widespread, across the board problem, then the issue might be the SQL database server. Even if it only impacts a few clients, it might be worth checking the database server to make sure that it isn't a problem that is impacting all transactions of a certain type.

1. Check the SQL Server Management Studio activity monitor for any major CPU issues.
 - a. Innovative may suggest purchasing the Quest SQL analyzer tool, the cost for the tool is around \$2,000. While it is not a bad product, the activity monitor can help you troubleshoot many of the same issues particularly if you are able to look at it in real-time while the performance issue is happening. One advantage Quest has is that it is able to replay events that happened in the past so it is helpful for Innovative to analyze issues that they're not able to monitor in real-time.
2. Look for anything that has a Wait Resource of non-blank.
 - a. There are a few acceptable ones here: DBMail is fine as would be ones that are for the backup process.
 - b. If the wait type is [CXCONSUMER it can typically be ignored](#).
3. Check for any Head Blockers in the SQL Server Management Studio activity monitor
4. Look at the recent expensive queries, is it possible that you need a new index? Check the execution plan.
 - a. Do NOT add any new indexes yourself, pass them through Innovative for feedback
5. Make sure you have [multiple EQUALLY SIZED tempdb DATA files to make sure that you are taking advantage of your multi-core CPUs](#).
6. Check sp_configure to make sure that your system is able to use the available RAM that you have on the machine.
 - a. Typically SQL should be configured to use 80% of system memory, giving MORE to SQL may cause issues with system performance (more is not always better)
 - b. This article has good recommendations and a SQL statement to monitor memory usage: <https://www.sqlskills.com/blogs/jonathan/wow-an-online-calculator-to-misconfigure-your-sql-server-memory/>
7. Check and adjust MAXDOP (which should typically NOT be higher than 8), check Microsoft and Brent Ozar for recommendations
 - a. Check with Innovative for their current recommendations
8. Check and adjust *cost threshold for parallelism* the default is 5; many places recommend setting to 50
 - a. Check with Innovative for their current recommendations
9. Check the SQL job history to make sure that there are no job that are not completing or are having errors.
10. Make sure you are running the latest cumulative update for your version of SQL
 - a. If you don't feel comfortable installing it, then go through the list of fixes to see if any of the fixed items might help with the issues you're having.
11. Run sp_blitz and look through the list of suggestions: <https://www.brentozar.com/archive/2008/03/sql-server-2005-setup-checklist-part-1-before-the-install/>

- a. Do NOT make any suggested changes without first checking with the Polaris support team.
12. Check the SQL Server log files: Program Files\Microsoft SQL Server\MSSQL12.MSSQLSERVER\MSSQL\Log (adjust version numbers as needed)
13. Enable the query store feature if you're using SQL 2016+
<https://docs.microsoft.com/en-us/sql/relational-databases/performance/monitoring-performance-by-using-the-query-store?view=sql-server-2017> You'll see lots of info about regression in the docs.
Regression is when a process was running OK, but the the performance recently took a hit.
 - a. When you enable this, you won't get immediate results. You should wait a day or two and then the information will be a lot more useful.
 - b. You might also want to consider enabling auto-tuning (we've done this at CLC):
<https://docs.microsoft.com/en-us/sql/relational-databases/automatic-tuning/automatic-tuning?view=sql-server-2017>

Make sure the problem isn't active directory

Polaris relies HEAVILY on active directory, if something is going wrong there, you're bound to have problems.

NOTE: That if you authenticate against multiple library AD domains, then a major issue in any ONE domain can cause the ENTIRE Polaris system to suffer.

1. Enable NETLOGON logging on all active directory domain controllers and all Polaris servers
 - a. <https://support.microsoft.com/en-us/help/109626/enabling-debug-logging-for-the-netlogon-service>
 - b. <https://blogs.technet.microsoft.com/askpfeplat/2014/01/12/quick-reference-troubleshooting-diagnosing-and-tuning-maxconcurrentapi-issues/>
2. Ideally you should be using Kerberos for authentication. If you see NTLM in your event viewer security log for the Polaris application, then check the following:
 - a. Have you got your SPNs set up properly:
<https://blogs.technet.microsoft.com/tristank/2006/05/08/3-simple-rules-to-kerberos-authenticationdelegation-spn/>
 - b. Did you make sure they got updated the last time you upgraded Polaris?
 - c. If you're using a multi-domain environment have you properly setup Kerberos Forest Search Order?
[https://technet.microsoft.com/en-us/library/configure-kerberos-forest-search-order-kfso\(v=ws.10\).aspx](https://technet.microsoft.com/en-us/library/configure-kerberos-forest-search-order-kfso(v=ws.10).aspx)
 - d. Check Kerberos usage by looking at klist after doing a kerberos ticket purge and then logging into a Polaris service.
 - e. Make sure that your domain functional level is at least 2008R2.
 - f. For Leap, are you using a browser that supports kerberos tickets? (Need to check on this one).
3. Is DNS working properly?
 - a. You should never use IPs when testing/checking Polaris services.
 - b. In a multi-domain environment (for authentication) you need to make sure that the LIBRARY'S AD has the A records for Polaris servers. Because Polaris can't support using FQDN, you can only use the hostname when installing the local client.

SIP Testing

If the problem appears to be with SIP, use CLC's SIP testing tool to help isolate the problem:

<http://www.clcoho.org/sip-testing-tool>

Other troubleshooting steps

In 2013 I presented a session on Polaris under the hood. It listed some additional troubleshooting tools, you can find out more about that session here: <http://www.clcoho.org/news-and-events/13900919>

Post performance issue clean-up

A common situation can occur after you've recovered from a perform issue, sometimes transactions that were "in flight" during the performance issue might not complete. It is recommended that you check for these problems (using SQL queries after the performance issue has been resolved):

- Items that have a status of held but aren't actually held by a patron
- Items that have a status of checked out, but aren't actually checked out by a patron
- If your library uses Innreach, check you Innreach "console" to see if there are any circulations transactions that need re-processed due to the system being unresponsive.