University of Edinburgh

Performance audit

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Contents

Summary

The Edinburgh environment is currently running **stable** on its own instance **on 5.4SP1**. During the visit adjustments have been made to create optimal performance.

Some issues cannot be solved in the current version:

- Performance due to **reverse proxy for Apache** (Bespoke work for authentication)
- **Connection pooling** issues (Bespoke work for database expander)
- **Database locking** due to intensive **Reporting** and **Planboard** usage
- "Connection lost" errors

Decreasing the **amount of data** by deleting or archiving data would not help in performance. Decreasing data with 50% might save time from 6 to 4 minutes, but this is still not OK. Moving Edinburgh to its own instance has been a solution to handle the data, for now.

TOPdesk advises to **upgrade to 5.6SP1** > but not before start of term.
The upgrade was originally planned for **October 2015** – this will OK.

With the update (to at least 5.6SP1):

- The **performance is expected to increase** and previous issues like TOPdesk being unable to recover from database (server/ **connection pooling) issues** have been **solved**.
- It also allows for **authentication with UKFed**. Shibboleth, the required **bespoke work and the Apache reverse proxy are not necessary** anymore. As Apache is expected to influence the current experience and maintaining bespoke work is always cost and time intensive, this is seen as a benefit.
- In general 5.6 can **handle larger databases better**, because of improvements in connection pooling

TOPdesk will continue the Support intensively. And will be on **stand-by** for monitoring performance during (and just before) start of term.

Actions that can be done in the meantime:

- Increase the memory (RAM) of the SQL Database server > Edinburgh.
- Secure maintenance plan e.g. run SQL scripts regularly to optimize the database indexes > Edinburgh
- Set up testenvironment with UKFed authentication > TOPdesk
- Secure actions for Development > TOPdesk

Overview of main issues and fixes related to version (subject to further development):

Version / Issue	5.4SP1	5.6	5.6SP1	5.7
Apache / reverse proxy authentication	Bespoke work needed	Bespoke work needed	Patch for UKfed (SAML authentication)	Standard UKfed/ SAML authentication No bespoke work needed
Connection pooling issues	Database expander Bespoke work needed	fixed	fixed	fixed
Planboard	workaround	workaround	workaround	Possible patch
Reporting	workaround	workaround	workaround	Possible patch
Searchfunctionality	workaround	workaround	Partly fixed	fixed

Background

Why

In Summer 2014 UniDesk has been updated to TOPdesk 5.4SP1. Since then performance has never been optimal. Together with TOPdesk several solutions to solve the problems have been implemented, but each solution separately did not meet the expectations and was therefore rolled back.

Who

To better support the people at the University of Edinburgh, it was decided by TOPdesk to do a performance audit on location. A team of specialists from TOPdesk has been gathered: Niels van Klaveren (performance specialist), Kasper van der Leeden (ICT specialist and former application manager of the internal TOPdesk application /TOPhelp) and Yvette Vermeer (Project manager).

From the University of Edinburgh all people involved with the TOPdesk application are standby for support and providing the necessary means: Andrew Gleeson, Mark McGowan, Peter Jackson and Maurice Franceschi.

When

The visit was originally planned for April/May 2015, when performance issues were very common and working with TOPdesk was almost not doable anymore. Due to circumstances the audit could only be done at the end of June.

In the meantime it was decided to move Edinburgh to its own instance (application and database tier). TOPdesk will review the set up and infrastructure as part of the performance audit.

What

At the end of the performance audit the University of Edinburgh should have a well functioning TOPdesk application and all people involved should have gained trust in the application and TOPdesk as their supplier.

How

This will be achieved by:

- Investigating and observing the current status
- Tackling open issues: e.g database locking, reporting, dashboard, searchfunctionality, infrastructure etc.
- Setting up different performance tests
- Communicating all findings to the stakeholders
- Creating a set of recommendations
- Provinding guidelines to be prepared for future updates

Observations of infrastructure

Also see attachment A for complete overview of settings.
Underneath are the findings and observations from the different tests that have been done.

Metrics

The logfiles of TOPdesk contain 'Metrics' with detailed information on the connections between browser and TOPdesk since application startup.

These seemed to indicated some issues with the connections and the latency of the connection.

The metrics show that (Between application startup June 25th, 10:18 PM and the time of downloading the log files (June 29th, 1:40 PM):

75% of the successful requests was fast (less than 30 ms), However, above this 75% request time can increase to over 1200 millisecond. Every action in TOPdesk will exist of multiple requests. It cannot be concluded from the delays are only experienced within a certain timeframe (potentially only affecting the users at that time) or that all users are affected by a small amount all the time

About 640 packets received an HTTP Error which was not generated by TOPdesk, but most likely from the Apache proxy.

Based on the issues that were experienced on the TOPdesk Software as a Service platform when running on Apache:

- Improvements in the TOPdesk code have been made, to have TOPdesk and Apache perform better together, resolving the issue
- Modification to the TOPdesk webserver and Apache reserve proxy may improve experience now.
- It is possible that the apache reverse proxy is influencing the connection to TOPdesk in a negative way, however, it cannot be concluded to which extend the apache reverse proxy is causing delays or loss of sessions.

It would be advised to remove the apache reverse proxy if possible. TOPdesk 5.6 would make it possible to authenticate directly to UKFed, thus not requiring the authentication of Apache and the bespoke work of TOPdesk.

Locks on the database

Certain user actions in TOPdesk seem to cause several kinds of locks on the database of TOPdesk. These can currently be seen in:

1. Reporting in TOPdesk
2. The use of the Planboard in TOPdesk

Add 1: Reporting

The queries of the reports on the SQL server seem to be processed in a way that can cause locks on the database. It is suspected that if TOPdesk would modify the queries that these cannot be split up in parts which are processed in parallel, this would cause other queries to be unaffected.

Alternatives are a patch for TOPdesk or a modification on the database. These were tested, however improvements cannot yet be seen in a significant degree. Modification on the environment or infrastructure of the University of Edinburgh would not yet be suggested.

Add 2: Planboard

The occurrence of the issue was confirmed in the log files of TOPdesk. The issues needs further investigation.

Mailimport

Currently 131 mailimports are active at an interval of 5 minutes

Based on the log file of TOPdesk, this interval is sometimes too short to process all mailboxes. Times up to 9 minutes were seen.

TOPdesk seems to be able to catch up in subsequent runs, likely when no e-mail needs to be processed.

Restarting the application server

Based on the size of the environment of the University of Edinbugh, periodic restarts of the environment are advised.

The environment before the ‘split’ had a daily restart. On the new server this restart does not seem to be in effect.

Database cache

At times, the spotlight monitoring application reports a low ‘memory – page life expectancy’ and decreased ‘memory – cache hit rates’. Increasing the memory on the database might allow the database to improve caching and providing results faster from the cache.

Additional database index on incidents

Previously, based on the slow performance of the dashboard an additional database index was suggested in an incidents. Questions were raised whether this index was still active. We’ve been able to confirm that the index is still active.

In the same incident a query was suggested to optimize the indexes. It is advised to run the optimization periodically.

Overview issues and solutions

Database locks

Reports that include multiple layers in grouping and use complex selections, have a high risk in creating database locks.

- Not to be solved in 5.6. Development is working on a (patch) solution for 5.7
- Workaround for 5.4SP1:
  - schedule reports after working hours
  - limit the amount of people with reporting rights
  - Report on a copy of the LIVE environment

Database connection lost

TOPdesk cannot connect with the database due to network issues or moving a VM (= connection pooling). This results in running out of memory in the backend and/or TOPdesk stops working.

- Adjustments have been made in VM configurations
- Edinburgh currently uses Bespoke work to handle this in 5.4SP1
- Connection pooling issue is solved in 5.6 > The Edinburgh instance will still need adjustments in config-file, because of the amount of users.

Size of database

The database of Edinburgh is significantly large. The question is raised if decreasing the amount of data by deleting or archiving data would help in performance?

- TOPdesk should be able to handle this amount of data. Decreasing data with 50% might save time from 6 to 4 minutes, but this is still not OK.
- Moving Edinburgh to its own instance has been a solution to handle the data.
- In general 5.6 can handle larger databases better, because of improvements in connection pooling.

“Connection lost”

Users sometime get the message: Connection lost. Adjustments to Apache settings have been done successfully to decrease these amounts of issues.

CPU uses vs. Search functionality

When using the searchbox in the top left corner it was noticed that CPU usage went up to 100%. TOPdesk is aware of this issue and provides a workaround until issue is solved.

- Searchfunctionality issues are currently being solved, not yet available in 5.6
- Current workaround (disabled=true, autosuggest=99999) still valid

Planboard

Opening Planboard with all Operators and their dedicated Incidents, creates multiple queries in the backend. For example; one user opens the Planboard and creates over 4000 queries.

- Dispatching should be possible. This is not yet fixed in 5.6
- TOPdesk has been in contact with Development to create a better solution in handling this in the backend. Possible patch for 5.7
- Workaround: not to open all Operatorgroups (and their calls) at the same time. Start with all closed and just open the group that needs to be dispatched.

Dashboard > Index.optimization was in place.
We suggest to add it to the maintenance plan, maybe execute it weekly.

Mailimport > Suggested to do a change from 5 mins to 30 sec

Conclusions and Recommendations

Current status

TOPdesk observed the infrastructure and investigated the current status. It can be concluded that the steps that have been taken to move Edinburgh to its own instance have been successful. The other Unidesk environments do not experience any performance issues anymore and also the performance of Edinburgh has improved.

Because of the move it was easier to define where the main performance issues can be allocated. (Complex) Reporting during workhours and opening Planboard by a keyuser has been observed and a workaround (report on a back-up system) is communicated to the application managers.

During the performance audit adjustments to Apache configuration has been done. TOPdesk will continue to monitor the performance remote, as results are not directly shown within days.

Edinburgh is currently running stable on 5.4SP1. The amount of users in this period is not the same as in September 2015 (start of new college year). Of course the amount of users has an impact on performance, but the current issues are not related to that, as most of these users do not create reports.

Why update?

In TOPdesk 5.6 the main issues with the connection pooling have been addressed.
We expect this will allow Edinburgh to have a smoother experience with TOPdesk. The performance is expected to increase and previous issues like TOPdesk being unable to recover from database (server) issues have been solved.

In addition, TOPdesk 5.6 SP1 allows for authentication against UKFed. In this situation the current set-up with shibboleth, the required bespoke work and the Apache reverse proxy are not necessary anymore. As Apache is expected to influence the current experience and maintaining bespoke work is always cost and time intensive, this is seen as a benefit.

Therefore our explicit advice would be to **update to 5.6 SP1**.

When

Let's not do things too hastily. While 5.6 SP1 would bring benefits, the issues identified on site with reporting and the Planboard will not be resolved in this version. TOPdesk 5.6 SP1 will bring benefits, however, full benefit will be possible when authentication with UKFed is possible and the current shibboleth solution can be phased out. The upgrade to 5.6 SP1 and changing the authentication mechanism can be seen as two major changes which need preparation.

Completing this before 'start of term' (14th September) could mean rushing major changes. In addition, the major (remaining) issues will not be resolved. The issues have been put on a higher development priority list > possible patch for 5.7.

Application management had originally planned to start up the **update process for October 2015**. We would like to advise to keep this original schedule for the update of the production/LIVE environment. In the meantime, this would be an opportunity to set up the **test environment** and investigate the functionality of **UKfed (SAML authentication**). Our technical consultants are able to assist you in this matter.

There is of course always the possibility to upgrade to 5.7 at the end of the year or the beginning of next year, depending on when the scheduling of terms allows you to. In this case it might be wise to also take a look at the functional changes with your consultant.

What can be done now?

Together we've already made **improvements to the Apache reverse proxy**, based on current best practices with TOPdesk. While no immediate gains could be seen, this will hopefully allow the environment to cope with the expected increased use with the start of term.

One thing we could recommend to try is to **increase the memory (RAM) of the SQL Database server**. It was seen that SQL would clear the results in memory prematurely and the 'hits' from memory with at times less than optimal. Increased resources would allow the SQL Database server to better maintain 'cached' information and return these results instead of having the retrieve this information from the disks.

Related to the issue, a **SQL scripts** to optimize the database indexes has been suggested in one of the incidents. The advice would be to perform this script regularly, for example every weekend, is this is not yet the case.

Regarding the reporting issues, it would be a good workaround to **report on (off-line) copy of the database**. This is not in place yet, we could help in setting this up.

Attachment A – Overview TOPdesk application instance Edinburgh

General information

TOPdesk server	Production	
Virtual server (yes/no)	Yes	
Virtual platform	VMware	
Operating system	Windows Server 2008R2	
Platform (x86 / x64)	X64	
Available physical memory	28GB	
# CPU cores	4	
Java version	JRE 1.7 update 51	
Disk space available	C: 100GB, G: 50GB, H: 300GB	Free: c:\52GB, G: 43 GB, h: 131 GB
# TOPdesk instances on server	1	
Hostname	Tdeskapp3.is.ed.ac.uk	
Any other services / programs running on this server	Apache reverse proxy	

Technical details

Platform (x86 / x64)	x64
Version (Major.Minor(.ServicePack))	5.4.SP1
Assigned memory (topdesk.conf)	14336 MB

List addition parameters (topdesk.conf)	# Additional UoE specific settings
	wrapper.java.additional.10=-Djava.io.tmpdir=H:/TOPdesk-live-ed/temp
	
	# Java Garbage Collect Parameters
	wrapper.java.additional.20=-XX:+UseG1GC
	wrapper.java.additional.21=-XX:+ExplicitGCInvokesConcurrent
	wrapper.java.additional.22=-XX:+ParallelRefProcEnabled
	wrapper.java.additional.23=-Xloggc:log/gclog.txt
	wrapper.java.additional.24=-XX:+PrintGCDetails

Running on HTTP or HTTPS	HTTP (8199) + HTTPs (8443)
Location searchindex files	H:\TOPdesk-live-ed\searchindex
Location upload files	H:\TOPdesk-live-ed\uploads
Service account	-
TOPdesk service restart scheduled	No
Most recent TOPdesk service restart(s)	2015-06-25 22:19
TOPdesk logging	11 files of 200MB

Other Settings

Scheduled reports

# scheduled report(s) active	1 daily, 08:00
# scheduled report(s) active	4 weekly
# scheduled report(s) active	6 monthly
# scheduled report(s) active	1 yearly

Imports

# scheduled imports	1
Scheduled at	22:00
Average running times	2h to 5h
SQL transfer	Yes
SQL transfer scheduled at	7:00
SQL transfer running times	2m

Mailimport

# of active mail import(s)	131
Mail import interval	300s

Database clean-up

Database clean-up schedule	Fri: 22:00

Database server

Oracle or MSSQL DBMS	MSSQL
MSSQL: integratedSecurity?	NO
Hostname : port (or instance)	TDESKDB-KB3.IS.ED.AC.UK:1433
Same host as TOPdesk?	No
Memory assigned to this instance	9GB

Fileserver

Separate fileserver used?	No
Hostname	-
Available disk space for TOPdesk	300GB

Email integration

xSMTP server hostname : port	129.215.17.199 : 25
Authentication required?	No
IMAP server hostname : port	Outlook.office365.com : 993