PUMA MR3 SQL 2016 Express verify work

Ralf Wang 2020-01-08

The team is plan to use the SQL server 2016 express to instead of the standard one in our future release. This configuration will offer to the mall hospital or clinical. The QA team will do some verification for this design.

The follow figure is display the difference between express and standard one. Some limitation is also marked in the figure:

| **Feature** | **Standard** | **Express** |
| --- | --- | --- |
| Maximum compute capacity used by a single instance - SQL Server Database Engine1 | Limited to lesser of 4 sockets or 24 cores | Limited to lesser of 1 socket or 4 cores |
| Maximum compute capacity used by a single instance - Analysis Services or Reporting Services | Limited to lesser of 4 sockets or 24 cores | Limited to lesser of 1 socket or 4 cores |
| Maximum memory for buffer pool per instance of SQL Server Database Engine | 128 GB | 1410 MB 6G-8G |
| Maximum memory for Column store segment cache per instance of SQL Server Database Engine | 32 GB2 | 352 MB2 |
| Maximum memory-optimized data size per database in SQL Server Database Engine | 32 GB2 | 352 MB2 |
| Maximum memory utilized per instance of Analysis Services | Tabular: 16 GB  MOLAP: 64 GB | N/A |
| Maximum memory utilized per instance of Reporting Services | 64 GB | N/A |
| Maximum relational database size | 524 PB | 10 GB |

Follow the figure, we can find the risk of our design is the database file size is limited to 10GB and the memory usage is limited to 1.4GB.

In order to get the max capacity of system, we design the test scenario as follow:

1. Stop the SMS service to avoid delete the history data.
2. Stop the LRU service to avoid delete the history data.
3. Set the database memory min and max value to 1433.
4. The database data and log auto grown to 100MB.
5. The DICOM file size is 10 MB.
6. Use the simulate tool to simulate 20 workstation clients to send DICOM to PS every 60 seconds.
7. Simulate **8** K2/K3 client to print films and report.
8. Simulate 13 PUMA client to print the paper report.
9. Simulate 10 users to do the web query, setting and other operations.

After we execute this scenario for 3 days. We find that there are 32,000 films records store in the database. All the database`s data file size is 2GB. The detail information as follow:

| **Database** | **Size (MB)** |
| --- | --- |
| WGGC | 1,441 |
| Printer | 208 |
| AUDIT | 120 |
| ECS | 20 |
| OCRConfigDB | 8 |
| TempDB | 144 |
| Total | 1,941 |

Follow the statistical data and database limitation. We reckon the capacity of system is:

The system can store 160,000 records of film in our system. (3200 \* (10/2) = 160,000).

As our default LRU configuration, this service will clean the database data after 365 days. The system month capacity is 160,000/12 = 13,333. That means it will print **106** boxes films in a month.

Our hard disk resource cost down. There are only 700GB space used to store our films and reports. We assume the film average size is 20MB. （TBD） Our system can store 35,000 films. We assume that customer want to keep 365 days` history data. We can calculate the month capacity is 35,000/12 = 2916 films. That means it will print **23** boxes films in a month.

If we want to keep a year history data, our system capacity is 35,000. The max film print value of a month is 23 boxed.

If we want to fit the database max capacity ability, we should add some hard disk resource. The added size are 160,000\*20MB/1000-700GB=2,500 GB. Thant means we need 2.5T extend disk resource.

The performance of system is not have big decline with current settings. Even some API response time (Report related) have some increase, but the throughput are not decline. We will do some testing after team give a clear goal of this server hardware configuration.

In order to get more performance and reliability, I suggest we should change some default settings of our system.

1. Reduce the database data and log file auto growth size to small value like 50-100MB.
2. Make sure the auto shrink settings is Close and status is “OFF”.
3. Make sure the database auto close is closed and status is “OFF”.
4. Change the LRU default settings of keep history data to small value.
5. Change the SMS service settings of keep history data to small value.

Ralf Wang 2020-01-10

We collect the database data from customer site. We import the WGGC and Printer database data to database. We compare the data between site and performance prepared data. It seems the prepared performance data is simulate with the site.



The large records are archive in these tables in database.

|  |  |  |  |
| --- | --- | --- | --- |
| **Site** | | **Performance** | |
| AUDIT.Audit\_Log: | 224 | AUDIT.Audit\_Log: | 417 |
| AUDIT.QC\_Log: | 6 | AUDIT.QC\_Log: | 350135 |
| Printer.DeliveryJob: | 106404 | Printer.DeliveryJob: | 64573 |
| Printer.ImageBox: | 106433 | Printer.ImageBox: | 79520 |
| Printer.Page: | 106404 | Printer.Page: | 79527 |
| Printer.PLut: | 128 | Printer.PLut: | 79555 |
| Printer.Session: | 273136 | Printer.Session: | 79552 |
| wggc.AFP\_ExamInfo: | 164616 | WGGC.AFP\_ExamInfo: | 129756 |
| wggc.AFP\_FilmInfo: | 294488 | WGGC.AFP\_FilmInfo: | 61037 |
| wggc.AFP\_PrintMode: | 228944 | WGGC.AFP\_PrintMode: | 129679 |
| wggc.AFP\_PrintTask: | 53418 | WGGC.AFP\_PrintTask: | 90978 |
| wggc.AFP\_PrintTaskOfFilm: | 103246 | WGGC.AFP\_PrintTaskOfFilm: | 32114 |
| wggc.AFP\_PrintTaskOfReport: | 45293 | WGGC.AFP\_PrintTaskOfReport: | 58864 |
| wggc.AFP\_ReportInfo: | 76988 | WGGC.AFP\_ReportInfo: | 65013 |
| wggc.Image: | 294488 | WGGC.Image: | 61037 |
| wggc.OverlayGroup: | 2079 | WGGC.OverlayGroup: | 2079 |
| wggc.Patient: | 86888 | WGGC.Patient: | 445033 |
| wggc.Series: | 294488 | WGGC.Series: | 61037 |
| wggc.SMS: | 294488 | WGGC.SMS: | 61037 |
| wggc.Study: | 294488 | WGGC.Study: | 61037 |
| wggc.T\_Integration\_ExamInfo: | 238774 | WGGC.T\_Integration\_ExamInfo: | 129763 |
| wggc.vi\_KIOSK\_ExamInfo\_Order: | 0 | WGGC.vi\_KIOSK\_ExamInfo\_Order: | 508665 |

From the figures, we can see the prepared test environment is simulate with the site. We will use the prepared database to execute our performance testing work.

We plan to use the express database to support the site which month films print ability is under 40 boxes. Then the performance test scenario as the follow information:

1. Prepare a database environment that have archived a year records. The film and report records in DB should more than 40\*125\*12 = 60,000. Now the prepare environment data as follow:



|  |  |
| --- | --- |
| AUDIT.Audit\_Log: | 417 |
| AUDIT.QC\_Log: | 350135 |
| Printer.DeliveryJob: | 64573 |
| Printer.ImageBox: | 79520 |
| Printer.Page: | 79527 |
| Printer.PLut: | 79555 |
| Printer.Session: | 79552 |
| WGGC.AFP\_ExamInfo: | 129756 |
| WGGC.AFP\_FilmInfo: | 61037 |
| WGGC.AFP\_PrintMode: | 129679 |
| WGGC.AFP\_PrintTask: | 90978 |
| WGGC.AFP\_PrintTaskOfFilm: | 32114 |
| WGGC.AFP\_PrintTaskOfReport: | 58864 |
| WGGC.AFP\_ReportInfo: | 65013 |
| WGGC.Image: | 61037 |
| WGGC.Patient: | 445033 |
| WGGC.Series: | 61037 |
| WGGC.SMS: | 61037 |
| WGGC.Study: | 61037 |
| WGGC.T\_Integration\_ExamInfo: | 129763 |
| WGGC.vi\_KIOSK\_ExamInfo\_Order: | 508665 |
| WGGC.AFP\_View\_AvailablePatient: | 40948 |
| WGGC.AFP\_View\_AvailableStudy: | 41305 |
| WGGC.AFP\_View\_FilmMediaSize: | 64573 |
| WGGC.AFP\_View\_FilmsForPayment: | 60875 |
| WGGC.AFP\_View\_FilmsToPrintAN: | 41262 |
| WGGC.AFP\_View\_FilmsToPrintANWithoutHoldingTime: | 41262 |
| WGGC.AFP\_View\_FilmsToPrintSI: | 41305 |
| WGGC.AFP\_View\_FilmsToPrintSIWithoutHoldingTime: | 41305 |
| WGGC.AFP\_View\_PrintTaskStatus: | 90978 |
| AFP\_View\_UnprintedReportByAccNo: | 10031 |

1. Stop the SMS service to avoid delete the history data.
2. Stop the LRU service to avoid delete the history data.
3. Set the database memory min and max value to 1433.
4. The database data and log auto grown to 100MB.
5. Set the “Auto shrink” option in database to **OFF**.
6. Set the “Auto Close” option in database to **OFF**.
7. The DICOM file size is 10 MB.
8. Use the simulate tool to simulate **eight** workstation clients to send DICOM to PS every 6 minutes.
9. Simulate **two** K2/K3 clients to print films and report.
10. Simulate **ten** users to do the web query, setting and other operations.
11. Open the E-Bulletin client in one terminal.
12. Open the Alert tool in one PC machine.
13. Execute the scenario for **two** workdays.

We estimate there are 4 hours work time as the peak period. Then this scenario will simulate 12 workdays ` stress. We hope the system can archive and print films and reports more than 200 for a workday. The query and print operations pass rate should more than 95%. The transaction response time should less than 3 seconds. There is no hardware and software issues during the testing.

The test scenario execute during 1/10/2020 3:01 PM to 1/12/2020 3:01 PM (48 hours). The film and report archives and prints operation and result as follow:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Module** | **All** | **Success** | **Failed** | **Pass rate** | **Average (hour)** | **Comment** |
| Film archive | 3,744 | 3,188 | 626 | 85% | 78 | OCR cannot identify the Image, not test error. |
|  |  |  |  |  |  |  |
| Film print | 5,570 | 5,568 | 2 | 99.96% | 116 | Test tool issues. |
| Report archive | 3,923 | 3,923 | N/A | 100% | 81 |  |
| Report print | 3,923 | 3,923 | N/A | 100% | 81 |  |
|  |  |  |  |  |  |  |

The hardware and software usage are have no risk during the testing. The detail information please see the attachment as follow:



The test result and transaction response time is meet our requirement. Current hardware and software settings can support to print 40 boxes of films in a hospital.

40\*125/25 = **200** < Min (116, 81)\*4(busy work times) = **324**

About the DICOM file size, we collect serval hospitals and get the average size is about 20M.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hospital** | **Time** | **Space** | **DICOM files** | **Average** |
| 重医 | 20191214~20200112 | 1.23TB | 33825 | 36.4M |
| 内蒙古附属医院 | 20191214~20200112 | 0.99TB | 63675 | 15.5M |
| 重庆铜梁县中医院 | 20191214~20200112 | 135GB | 10361 | 13.00M |
| 山东省影像研究所 | 20191214~20200112 | 674GB | 24928 | 27M |
| 云南省邵通市中医院 | 20191214~20200112 | 36.3GB | 1531 | 11.9M |
| 云南省红河州瑞丽市人民医院 | 20191214~20200112 | 72.1GB | 5722 | 12.6M |
|  |  |  |  | 19.4M |

If the hospital reserve one year of the history records, it will cost disk as follow:

40\*125\*12\*20MB/0.8(80% films will print) = **1.5T**

The current hardware configuration can support the design of SQL Server 2016 Express.

Compare the performance result of MR3 SQL Server 2008 STD version, the performance of API response time is low.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **MR3 STD 2008** | | **MR3 2016 Express** | |
| **Transaction Name** | **Average** | **90 Percent** | **Average** | **90 Percent** |
| [**Report Update report printer info**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20Update%20report%20printer%20info)0000) | 0.027 | 0.047 | 0.027 | 0.047 |
| [**Film TerminalStatus**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film%20TerminalStatus)0000) | 0.037 | 0.062 | 0.034 | 0.047 |
| [**Film\_PrintStatus\_CheckService**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film_PrintStatus_CheckService)0000) | 0.039 | 0.062 | 0.031 | 0.047 |
| [**Report TerminalStatus**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20TerminalStatus)0000) | 0.039 | 0.062 | 0.028 | 0.047 |
| [**Report PrintTask Status Check**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20PrintTask%20Status%20Check)0000) | 0.042 | 0.076 | 0.029 | 0.047 |
| [**Report Update PrintTask**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20Update%20PrintTask)0000) | 0.094 | 0.156 | 0.076 | 0.14 |
| [**Film PrintTask**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film%20PrintTask)0000) | 0.104 | 0.172 | 0.072 | 0.125 |
| [**Report PrintTask**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20PrintTask)0000) | 0.144 | 0.221 | 0.072 | 0.125 |
| [**Film Create\_PrintTask**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film%20Create_PrintTask)0000) | 0.164 | 0.263 | 0.936 | 1.295 |
| [**Report Create\_PrintTask**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20Create_PrintTask)0000) | 0.171 | 0.265 | 0.96 | 1.326 |
| [**Report QueryFilmReportInfo**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20QueryFilmReportInfo)0000) | 0.182 | 0.265 | 0.944 | 1.31 |
| [**Report Create New Patient**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Create%20New%20Patient)0000) | 0.236 | 0.359 | 0.559 | 1.248 |
| [**Report Notify File 100k**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Notify%20File%20100k)0000) | 0.313 | 0.499 | 1.179 | 1.747 |
| [**Report Notify File 4M**](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Notify%20File%204M)0000) | 0.418 | 0.671 | 1.247 | 1.868 |
| **Average** | 0.14 | 0.23 | 0.44 | 0.67 |

Even the test result has meets the requirement of our design. QA team still suggest to do some enhance for express version:

1. Reduce the database data and log file auto growth size to small value like 50-100MB.
2. Make sure the auto shrink settings is Close and status is “OFF”.
3. Make sure the database auto close is closed and status is “OFF”.
4. Change the LRU default settings of keep history data to small value such as 3-6 months.
5. Change the SMS service settings of keep history data to small value such as 3-6 months or Size.

Ralf Wang 2020-01-19

We plan to use the express database to support the site which month films print ability is under 80 boxes. Then the performance test scenario as the follow information:

1. Prepare a database environment that have archived half of year records. The film and report records in DB should more than 100\*125\*12/2 = 75,000. Now the prepare environment data as follow:

|  |  |
| --- | --- |
| AUDIT.Audit\_Log: | 489 |
| AUDIT.QC\_Log: | 422203 |
| Printer.DeliveryJob: | 81699 |
| Printer.ImageBox: | 96646 |
| Printer.Page: | 96653 |
| Printer.PLut: | 96681 |
| Printer.Session: | 96678 |
| WGGC.AFP\_ExamInfo: | 155003 |
| WGGC.AFP\_FilmInfo: | 75996 |
| WGGC.AFP\_PrintMode: | 154926 |
| WGGC.AFP\_PrintTask: | 101083 |
| WGGC.AFP\_PrintTaskOfFilm: | 38042 |
| WGGC.AFP\_PrintTaskOfReport: | 63041 |
| WGGC.AFP\_ReportInfo: | 75391 |
| WGGC.Image: | 75996 |
| WGGC.Patient: | 464084 |
| WGGC.Series: | 75996 |
| WGGC.SMS: | 75996 |
| WGGC.Study: | 75996 |
| WGGC.T\_Integration\_ExamInfo: | 155010 |
| WGGC.vi\_KIOSK\_ExamInfo\_Order: | 536191 |
| WGGC.AFP\_View\_AvailablePatient: | 55828 |
| wggc.AFP\_View\_AvailableStudy | 56274 |
| wggc.dbo.AFP\_View\_FilmMediaSize | 81699 |
| wggc.dbo.AFP\_View\_FilmsForPayment | 75835 |
| wggc.dbo.AFP\_View\_FilmsToPrintAN | 56226 |
| wggc.dbo.AFP\_View\_FilmsToPrintANWithoutHoldingTime | 56226 |
| wggc.dbo.AFP\_View\_FilmsToPrintSI | 56274 |
| wggc.dbo.AFP\_View\_FilmsToPrintSIWithoutHoldingTime | 56274 |
| wggc.dbo.AFP\_View\_PrintTaskStatus | 101083 |
| wggc.dbo.AFP\_View\_UnprintedReportByAccNo | 16133 |

1. Stop the SMS service to avoid delete the history data.
2. Stop the LRU service to avoid delete the history data.
3. Set the database memory min and max value to 1433.
4. The database data and log auto grown to 100MB.
5. Set the “Auto shrink” option in database to **OFF**.
6. Set the “Auto Close” option in database to **OFF**.
7. The DICOM file size is 10 MB.
8. Use the simulate tool to simulate **12** workstation clients to send DICOM to PS every 3 minutes.
9. Simulate **6** K2/K3 clients to print films and report.
10. Simulate **5** users to do the web query, setting and other operations.
11. Open the E-Bulletin client in one terminal.
12. Open the Alert tool in one PC machine.
13. Execute the scenario for **24 hours**.

We estimate there are 4 hours work time as the peak period. Then this scenario will simulate 6 workdays ` stress. We hope the system can archive and print films and reports more than 400 for a workday. The query and print operations pass rate should more than 95%. The transaction response time should less than 3 seconds. There is no hardware and software issues during the testing.

The test scenario execute during 1/17/2020 10:59 AM to 1/18/2020 11:01 AM (24 hours). The film and report archives and prints operation and result as follow:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Module** | **All** | **Success** | **Failed** | **Pass rate** | **Average (hour)** | **Comment** |
| Film archive | 5,141 | 2,639 | 2,502 | 51% | 101 | OCR cannot identify the Image, not test error. |
|  |  |  |  |  |  |  |
| Film print | 3,436 | 3,423 | 12 | 99.91% | 143 | Test tool issues and network stop |
| Report archive | 2,973 | 2,973 | N/A | 100% | 124 |  |
| Report print | 2,973 | 2,973 | N/A | 100% | 124 |  |
|  |  |  |  |  |  |  |

The database have the too muck latches during the testing. There is some risk about the database. The detail information please see the attachment as follow:



Current hardware and software settings can support to archived 80 boxes of films in a hospital for half a year.

80\*125/25 = **400** < Min (124, 143)\*4(busy work times) = **496**

About the DICOM file size, we collect serval hospitals and get the average size is about 20M.

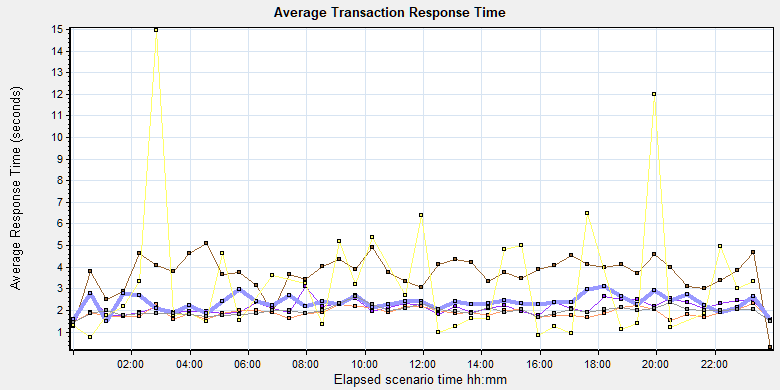
If the hospital reserve half a year of the history records, it will cost disk as follow:

100\*125\*12\*20MB/2/0.8(80% films will print) = **1.875T**

The current hardware configuration can support the design of SQL Server 2016 Express.

Compare the performance result of MR3 SQL Server 2008 STD version, the performance of API response time is low.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **MR3 STD 2008** | | **MR3 2016 Express （80box）** | |
| **Transaction Name** | **Average** | **90 Percent** | **Average** | **90 Percent** |
| Report Update report printer info | 0.027 | 0.047 | 0.171 | 0.499 |
| Film TerminalStatus | 0.037 | 0.062 | 0.195 | 0.557 |
| [Film\_PrintStatus\_CheckService](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film_PrintStatus_CheckService)0000) | 0.039 | 0.062 | 0.294 | 0.753 |
| [Report TerminalStatus](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20TerminalStatus)0000) | 0.039 | 0.062 | 0.179 | 0.546 |
| [Report PrintTask Status Check](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20PrintTask%20Status%20Check)0000) | 0.042 | 0.076 | 0.286 | 0.702 |
| [Report Update PrintTask](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20Update%20PrintTask)0000) | 0.094 | 0.156 | 0.76 | 2.249 |
| [Film PrintTask](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film%20PrintTask)0000) | 0.104 | 0.172 | 0.564 | 1.747 |
| [Report PrintTask](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20PrintTask)0000) | 0.144 | 0.221 | 0.611 | 1.858 |
| [Film Create\_PrintTask](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film%20Create_PrintTask)0000) | 0.164 | 0.263 | 2.161 | 4.524 |
| [Report Create\_PrintTask](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20Create_PrintTask)0000) | 0.171 | 0.265 | 1.901 | 3.411 |
| [Report QueryFilmReportInfo](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20QueryFilmReportInfo)0000) | 0.182 | 0.265 | 1.979 | 3.744 |
| [Report Create New Patient](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Create%20New%20Patient)0000) | 0.236 | 0.359 | 3.735 | 9.594 |
| [Report Notify File 100k](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Notify%20File%20100k)0000) | 0.313 | 0.499 | 2.371 | 4.701 |
| [Report Notify File 4M](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Notify%20File%204M)0000) | 0.418 | 0.671 | 3.238 | 8.642 |
| **Average** | 0.14 | 0.23 | 1.3175 | 3.109071429 |



|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Color | Scale | Measurement | Graph's Minimum | Graph's Average | Graph's Maximum | Graph's Median | Graph's Std. Deviation | |  | 1 | Film Create\_PrintTask | 1.366 | 2.152 | 3.125 | 2.118 | 0.336 | |  | 1 | Report Create New Patient | 0.286 | 3.679 | 5.109 | 3.815 | 0.900 | |  | 1 | Report Create\_PrintTask | 1.423 | 1.896 | 2.322 | 1.897 | 0.221 | |  | 1 | Report Notify File 100k | 1.508 | 2.359 | 3.127 | 2.361 | 0.363 | |  | 1 | Report Notify File 4M | 0.751 | 3.250 | 14.951 | 1.846 | 2.957 | |  | 1 | Report QueryFilmReportInfo | 1.423 | 1.970 | 2.625 | 1.989 | 0.213 | |
|  |

There are two API average response time is not meet the requirement: Report Create New Patient and Report Notify File 4M. The system get the process threshold value of express version.

`During the testing, we find that the integration database table have no index and major key. We add the major key and indexes on table wggc.dbo.T\_Integration\_ExamInfo with the script as this:



The performance test result have some enhance and information as follow:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Transaction Name** | **SLA Status** | **Minimum** | **Average** | **Maximum** | **Std. Deviation** | **90 Percent** | **Pass** | **Fail** | **Stop** |
| [Film Create\_PrintTask](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Film%20Create_PrintTask)0000) | [Show SLA Results](slarules:transaction_response_time_FilmCreate_PrintTask) | 0.082 | 0.916 | 32.453 | 1.498 | 2.106 | 3,540 | 0 | 0 |
| [Film GetTaskID\_Fail](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Film%20GetTaskID_Fail)0000) | [Show SLA Results](slarules:transaction_response_time_FilmGetTaskID_Fail) | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0 |
| [Film PrintTask](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Film%20PrintTask)0000) | [Show SLA Results](slarules:transaction_response_time_FilmPrintTask) | 0.031 | 0.4 | 8.549 | 0.78 | 1.343 | 3,532 | 0 | 0 |
| [Film PrintTask\_Result\_Correct](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Film%20PrintTask_Result_Correct)0000) | [Show SLA Results](slarules:transaction_response_time_FilmPrintTask_Result_Correct) | 0 | 0 | 0.016 | 0 | 0 | 3,517 | 0 | 0 |
| [Film PrintTask\_Result\_Fail](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Film%20PrintTask_Result_Fail)0000) | [Show SLA Results](slarules:transaction_response_time_FilmPrintTask_Result_Fail) | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 |
| [Film TerminalStatus](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Film%20TerminalStatus)0000) | [Show SLA Results](slarules:transaction_response_time_FilmTerminalStatus) | 0 | 0.155 | 11.655 | 0.453 | 0.456 | 3,532 | 0 | 0 |
| [Film\_PrintStatus\_CheckService](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Film_PrintStatus_CheckService)0000) | [Show SLA Results](slarules:transaction_response_time_Film_PrintStatus_CheckService) | 0 | 0.209 | 9.804 | 0.537 | 0.546 | 13,396 | 0 | 0 |
| [Report Print Task Correct](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20%20Print%20Task%20Correct)0000) | [Show SLA Results](slarules:transaction_response_time_ReportPrintTaskCorrect) | 0 | 0 | 0.016 | 0.001 | 0 | 3,130 | 0 | 1 |
| [Report Print Task fail](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20%20Print%20Task%20fail)0000) | [Show SLA Results](slarules:transaction_response_time_ReportPrintTaskfail) | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| [Report Create New Patient](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20Create%20New%20Patient)0000) | [Show SLA Results](slarules:transaction_response_time_ReportCreateNewPatient) | 0.094 | 2.116 | 23.525 | 3.407 | 6.365 | 3,133 | 0 | 0 |
| [Report Create\_PrintTask](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20Create_PrintTask)0000) | [Show SLA Results](slarules:transaction_response_time_ReportCreate_PrintTask) | 0.197 | 0.705 | 17.644 | 0.949 | 1.464 | 3,133 | 0 | 0 |
| [Report Notify File 100k](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20Notify%20File%20100k)0000) | [Show SLA Results](slarules:transaction_response_time_ReportNotifyFile100k) | 0.359 | 1.253 | 52.531 | 2.023 | 2.621 | 3,061 | 0 | 0 |
| [Report Notify File 4M](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20Notify%20File%204M)0000) | [Show SLA Results](slarules:transaction_response_time_ReportNotifyFile4M) | 0.499 | 2.348 | 45.417 | 5.778 | 5.85 | 72 | 0 | 0 |
| [Report PrintTask](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20PrintTask)0000) | [Show SLA Results](slarules:transaction_response_time_ReportPrintTask) | 0.031 | 0.414 | 9.017 | 0.807 | 1.388 | 3,132 | 0 | 0 |
| [Report PrintTask Status Check](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20PrintTask%20Status%20Check)0000) | [Show SLA Results](slarules:transaction_response_time_ReportPrintTaskStatusCheck) | 0 | 0.21 | 10.234 | 0.583 | 0.515 | 3,216 | 0 | 0 |
| [Report QueryFilmReportInfo](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20QueryFilmReportInfo)0000) | [Show SLA Results](slarules:transaction_response_time_ReportQueryFilmReportInfo) | 0.194 | 0.699 | 19.679 | 1.128 | 1.353 | 6,266 | 0 | 0 |
| [Report TerminalStatus](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20TerminalStatus)0000) | [Show SLA Results](slarules:transaction_response_time_ReportTerminalStatus) | 0 | 0.133 | 3.416 | 0.231 | 0.413 | 6,266 | 0 | 0 |
| [Report Update PrintTask](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20Update%20PrintTask)0000) | [Show SLA Results](slarules:transaction_response_time_ReportUpdatePrintTask) | 0.029 | 0.491 | 12.161 | 0.949 | 1.669 | 3,132 | 0 | 0 |
| [Report Update report printer info](file:///E:\T440%20Single%20Server_2016%20Express\Terminal_20200117_integration_enhance\ResponseTime0000(Report%20Update%20report%20printer%20info)0000) | [Show SLA Results](slarules:transaction_response_time_ReportUpdatereportprinterinfo) | 0 | 0.123 | 10.936 | 0.34 | 0.39 | 6,266 | 0 | 0 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Service Level Agreement Legend:** | E:\T440 Single Server_2016 Express\Terminal_20200117_integration_enhance\led_ok.gif | Pass | E:\T440 Single Server_2016 Express\Terminal_20200117_integration_enhance\led_error.gif | Fail | E:\T440 Single Server_2016 Express\Terminal_20200117_integration_enhance\led_no_data.gif | No Data |

Compare with the history data as follow:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **MR3 STD 2008** | | **MR3 2016 Express （80box）** | | **MR3 2016 Express Integration Enhance** | |
| **Transaction Name** | **Average** | **90 Percent** | **Average** | **90 Percent** | **Average** | **90 Percent** |
| [Report Update report printer info](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20Update%20report%20printer%20info)0000) | 0.027 | 0.047 | 0.171 | 0.499 | 0.123 | 0.39 |
| [Film TerminalStatus](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film%20TerminalStatus)0000) | 0.037 | 0.062 | 0.195 | 0.557 | 0.155 | 0.456 |
| [Film\_PrintStatus\_CheckService](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film_PrintStatus_CheckService)0000) | 0.039 | 0.062 | 0.294 | 0.753 | 0.209 | 0.546 |
| [Report TerminalStatus](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20TerminalStatus)0000) | 0.039 | 0.062 | 0.179 | 0.546 | 0.133 | 0.413 |
| [Report PrintTask Status Check](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20PrintTask%20Status%20Check)0000) | 0.042 | 0.076 | 0.286 | 0.702 | 0.21 | 0.515 |
| [Report Update PrintTask](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20Update%20PrintTask)0000) | 0.094 | 0.156 | 0.76 | 2.249 | 0.491 | 1.669 |
| [Film PrintTask](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film%20PrintTask)0000) | 0.104 | 0.172 | 0.564 | 1.747 | 0.4 | 1.343 |
| [Report PrintTask](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20PrintTask)0000) | 0.144 | 0.221 | 0.611 | 1.858 | 0.414 | 1.388 |
| [Film Create\_PrintTask](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Film%20Create_PrintTask)0000) | 0.164 | 0.263 | 2.161 | 4.524 | 0.916 | 2.106 |
| [Report Create\_PrintTask](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20Create_PrintTask)0000) | 0.171 | 0.265 | 1.901 | 3.411 | 0.705 | 1.464 |
| [Report QueryFilmReportInfo](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Report%20QueryFilmReportInfo)0000) | 0.182 | 0.265 | 1.979 | 3.744 | 0.699 | 1.353 |
| [Report Create New Patient](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Create%20New%20Patient)0000) | 0.236 | 0.359 | 3.735 | 9.594 | 2.116 | 6.365 |
| [Report Notify File 100k](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Notify%20File%20100k)0000) | 0.313 | 0.499 | 2.371 | 4.701 | 1.253 | 2.621 |
| [Report Notify File 4M](file:///E:\MR3%20Performance%20result\phase3_MR_B36_20191104_1\ResponseTime0000(Notify%20File%204M)0000) | 0.418 | 0.671 | 3.238 | 8.642 | 2.348 | 5.85 |
| **Average** | 0.14 | 0.23 | 1.32 | 3.11 | 0.73 | 1.89 |

The system performance have enhance after we add the index on the integration related tables. We suggest the integration team to do this operation for their code. The issue has submitted in the PLI:

|  |  |
| --- | --- |
| 100057459 | [Integration] The table wggc.dbo.T\_Integration\_ExamInfo need add some index to enhance the performance. |

So if we do some enhance operation in our system, it seemed can support to archived and print 80n boxes a month. Bu the performance will have a big decline. It will closed to the threshold value of system.