IO (Managed Instance)

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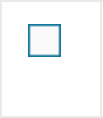

```
//*****************************************************************************************************************
// IO Performance
//*****************************************************************************************************************
// IO.01
// MonSQLXstore 503 (throttlng error)
MonSQLXStore
| where AppName == "{AppName}" // and NodeName == "{NodeName}"
| where  TIMESTAMP >= datetime({StartTime}) and  TIMESTAMP <= datetime({EndTime})
| where http_errorcode == 503
| top-nested of bin(TIMESTAMP,5m) by count(), top-nested 5 of file_path by  Error_Count=count() desc
| order by TIMESTAMP asc nulls last
| project TIMESTAMP, file_path, Error_Count
| render timechart

 // IO.02
 // Virtual File Stats throttling unpivot. If Worker.DW app, use MonDwIoVirtualFileStats (as of T41
Worker.DW deployment)
MonDmIoVirtualFileStats
| where AppName =~"{AppName}"  //and NodeName =~ "{NodeName}"
| where  TIMESTAMP >= datetime({StartTime}) and  TIMESTAMP <= datetime({EndTime})
| where db_name !in("tempdb", "msdb", "master", "model")
| extend file_id_str=tostring(file_id)
| summarize sum(delta_io_stall_queued_write_ms), sum(delta_io_stall_queued_read_ms),
sum(delta_num_of_bytes_written), sum(delta_num_of_bytes_read)  by bin(TIMESTAMP, 1min), file_id_str
| render timechart

 // Virtual File Stats throttling. If Worker.DW app, use MonDwIoVirtualFileStats (as of T41 Worker.DW
deployment)
MonDmIoVirtualFileStats
| where AppName =~ "{AppName}" // and NodeName =~ "{NodeName}"
| where  TIMESTAMP >= datetime({StartTime}) and  TIMESTAMP <= datetime({EndTime})
| where db_name !in("tempdb", "msdb", "master", "model")
| extend file_id_str=tostring(file_id)
| summarize sum(delta_io_stall_queued_write_ms), sum(delta_io_stall_queued_read_ms),
sum(delta_num_of_bytes_written), sum(delta_num_of_bytes_read)  by TIMESTAMP=bin(TIMESTAMP,
1min), file_id_str
| project TIMESTAMP, file_id_str, Packed=pack('delta_io_stall_queued_write_ms',
sum_delta_io_stall_queued_write_ms, 'delta_io_stall_queued_read_ms',
sum_delta_io_stall_queued_read_ms, 'delta_num_of_bytes_written', sum_delta_num_of_bytes_written,
'delta_num_of_bytes_read', sum_delta_num_of_bytes_read)
| mvexpand Packed
| parse tostring(Packed) with '{"'Category'":'Value:double'}'
| project TIMESTAMP, file_id_str, Category, Value
| render timechart
```

```
// IO.03
// Peak file size (PRS file size matters). If Worker.DW app, use MonDwIoVirtualFileStats (as of T41 Worker.DW deployment)
MonDmIoVirtualFileStats
| where AppName =~"{AppName}"  //and NodeName =~ "{NodeName}"
| where  TIMESTAMP >= datetime({StartTime}) and  TIMESTAMP <= datetime({EndTime})
| where db_name !in("tempdb", "msdb", "master", "model")
| extend file_id_str=tostring(file_id)
| extend size_in_gb=round(size_on_disk_bytes/1024.0/1024.0/1024,1)
| summarize arg_max(size_in_gb,*) by db_name, file_id
//| summarize sum(size_in_gb)
| order by size_in_gb desc nulls last

// IO.04
// REtry pattern
MonSQLXStore
| where LogicalServerName == "{LogicalServerName}" and AppName == "{AppName}"
| where event == 'xio_failed_request'
| where http_errorcode == '503'
| where file_path contains "mdf"  or file_path contains "ndf"
| where  TIMESTAMP >= datetime({StartTime}) and  TIMESTAMP <= datetime({EndTime})
| summarize count(), retry_count = max(retry_count) by bin(TIMESTAMP, 1m), file_byte_offset, file_path, request_type,  NodeName
| summarize ios_throtled = count(), throtles = sum(count_), max(retry_count), percentiles(retry_count, 95, 99, 99.9) by bin(TIMESTAMP, 5m) , file_path, NodeName
| where max_retry_count > 0

// IO.05
// XStore IO Stats
// from Sandu
MonSQLXStoreIOStats
| where LogicalServerName == "{LogicalServerName}" and AppName == "{AppName}"
| where  TIMESTAMP >= datetime({StartTime}) and  TIMESTAMP <= datetime({EndTime})
| where event == 'xstore_io_stats'
| where (file_path contains "ldf") or (file_path contains "mdf")
| project TIMESTAMP, iops = total_requests/30.
   , niops = total_xio_requests/30.
   , file_path , NodeName
| where file_path !contains 'ldf'
| where ( niops > 1.1 * iops and niops > 50 ) or niops > 250



// IO being governed


MonSqlRgHistory
```

```
| where AppName == "{AppName}" // and NodeName == "{NodeName}"
//| where physical_database_name  =~ "{physical_database_id}" // user database
| where database_id == 2 //tempdb
| where  (end_aggregated_sample >= datetime({StartTime}) and  end_aggregated_sample <=
datetime({EndTime}))
  //  or end_aggregated_sample >= datetime({StartTime2}) and  end_aggregated_sample <=
datetime({EndTime2})
| where event == 'aggregated_virtual_files_io_history'
| where type_desc =~ "ROWS"
//| where delta_num_of_reads > 0 and delta_num_of_writes > 0
| extend IOStallMsPerIO = round(delta_io_stall*1.0/(delta_num_of_writes + delta_num_of_reads),1)
| extend IOStallWriteMsPerWrite = round(delta_io_stall_write_ms*1.0/delta_num_of_writes,1)
| extend IOStallQueueMsPerWrite = round (delta_io_stall_queued_write_ms*1.0/delta_num_of_writes,2)
| extend IOStallQueueMsPerRead = round (delta_io_stall_queued_read_ms*1.0/delta_num_of_reads,2)
| extend IOStallReadMsPerRead = round(delta_io_stall_read_ms*1.0/delta_num_of_reads,1)
| extend duration = round(duration_time_ms / 1000.,1)
| extend TotalMbps = round((delta_num_of_bytes_read  + delta_num_of_bytes_written)/ (duration *
1024.0*1024),1)
| extend ReadMbps = round((delta_num_of_bytes_read )/ (duration * 1024.0*1024),1)
| extend WriteMbps = round((delta_num_of_bytes_written)/ (duration * 1024.0*1024),1)
| extend KbPerWrite = round(delta_num_of_bytes_written*1.0/delta_num_of_writes/1024.0,1)
| extend KbPerread = round(delta_num_of_bytes_read*1.0/delta_num_of_reads/1024.0,1)
| extend IOStallreadMs_Per_Read_Outside_RG=IOStallReadMsPerRead-IOStallQueueMsPerRead
| extend IOStallreadMs_Per_Write_Outside_RG=IOStallWriteMsPerWrite-IOStallQueueMsPerWrite
| where IOStallMsPerIO>0 and TotalMbps>0
| project end_utc_date = end_aggregated_sample
   ,IOStallReadMsPerRead, IOStallWriteMsPerWrite
   , IOStallQueueMsPerRead, IOStallQueueMsPerWrite
   , IOStallreadMs_Per_Read_Outside_RG, IOStallreadMs_Per_Write_Outside_RG
   , KbPerWrite, KbPerread, IOStallMsPerIO
   , TotalMbps, ReadMbps, WriteMbps
   ,   type_desc
```

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