Error 41935 Reached the total capacity of storage account

Last updated by | Radhika Shah | Mar 14, 2023 at 2:39 PM PDT

Contents

Issue

Customer may encounter below error when restoring a database on managed instance:

```
Non retriable error occurred while restoring backup with index 1 - 41935 Managed Instance has reached the tota
RESTORE DATABASE is terminating abnormally.
```

Investigation/Analysis

These errors occur because the instance reached the storage account limit (35 TB) and there is an operation in progress which is constantly trying to allocate more space. Disk sizes are 128 GB, 256 GB, 512 GB, 1 TB, or 4 TB. So, for every file it is allocated minimum 128 GB. So, there can be at most 280 files on the disk. For that reason, if the customer has more than 280 files, account quota is exceeded. Usually customers have 280 small (<1GB) files and hit the limit, even if the used storage is not near maximum value. In most cases this is caused by customer trying to create/restore a new database for which there is no space.

Note: There is an existing ASC insight for this issue.

Customer might also run into this scenario when adding and/or resizing database files due to 35 TB storage account limit being hit on the Managed Instance.

Confirm the issue occurred

```
MonSQLXStore
| where AppName =~ '{AppName}'
| where event == 'xio_failed_request' and errorcode == 'AccountQuotaExceeded'
| extend StorageAccount = extract("https://([0-9,a-z]+).blob.*", 1, file_path, typeof(string))
| where StorageAccount contains 'prs' or StorageAccount contains 'pdw'
| summarize min(TIMESTAMP), max(TIMESTAMP), count(TIMESTAMP) by StorageAccount, AppName, AppTypeName, LogicalS
| extend FailureCount = count_TIMESTAMP
| project StorageAccount, AppName , AppTypeName, FailureCount, LogicalServerName, ClusterName, min_TIMESTAMP,
| where max_TIMESTAMP >= ago(10h)
```

Sample output:

StorageAccount	AppName	AppTypeName	FailureCount	LogicalServerName	Clus
wasdpswno1aprsmi814	<AppName>	Worker.CL	2	<Server>	tr92 a.wc

or

```
MonSQLSystemHealth
| where PreciseTimeStamp >= ago(10h)
| where AppName == '{AppName}' and message != '' and message contains 'Error: 41935'
| project PreciseTimeStamp, AppName, message, error_id
```

Sample output:

PreciseTimeStamp	AppName	message	error_id
2023-02-22 20:50:22.9843150	<AppName>	2023-02-22 20:50:07.76 spid61s Error: 41935, Severity: 16, State: 1. 2023-02-22 20:50:07.76 spid61s [Filtered Args] Managed Instance has reached the total capacity of underlying Azure storage account. Azure Premium Storage account is limited to 35TB of allocated space.	41935
2023-02-22 20:50:22.9843150	<AppName>	2023-02-22 20:50:07.76 spid61s Error: 41935, Severity: 16, State: 1. 2023-02-22 20:50:07.76 spid61s [Filtered Args] Managed Instance has reached the total capacity of underlying Azure storage account. Azure Premium Storage account is limited to 35TB of allocated space.	41935
2023-02-23 10:43:27.0121930	<AppName>	2023-02-23 10:43:08.43 spid63s Error: 41935, Severity: 16, State: 1. 2023-02-23 10:43:08.43 spid63s [Filtered Args] Managed Instance has reached the total capacity of underlying Azure storage account. Azure Premium Storage account is limited to 35TB of allocated space.	41935
2023-02-23 10:43:27.0121930	<AppName>	2023-02-23 10:43:08.43 spid63s Error: 41935, Severity: 16, State: 1. 2023-02-23 10:43:08.43 spid63s [Filtered Args] Managed Instance has reached the total capacity of underlying Azure storage account. Azure Premium Storage account is limited to 35TB of allocated space.	41935

Check XIO storage usage (approximation)

```
let startTime = ago(1d); // issue start time
let endTime = now(); // issue end time (scope this as much as possible)
let appName = '{AppName}';
let StorageAccountQuotaGB = 35 * 1024; // XIO allows storage account to allocate up to 35 GB of data
MonDmIoVirtualFileStats
| where TIMESTAMP between (startTime .. endTime)
| where AppName =~ appName
| where is_remote == 1 // check only remote storage files; this eliminates files from: master (physical master
| summarize by end_utc_date, database_id, db_name, size_on_disk_GB = size_on_disk_bytes / 1024. / 1024. / 1024
| extend used_storage_space_GB = case(
    size_on_disk_GB <= 129., 128.,
    size_on_disk_GB <= 513., 512.,
    size_on_disk_GB <= 1025., 1024.,
    size_on_disk_GB <= 2049., 2048.,
    size_on_disk_GB <= 4097., 4096.,
    size_on_disk_GB <= 8193., 8192., -1.)
| summarize TotalSizeOnDiskGB = sum(size_on_disk_GB), TotalUsedStorageSpaceGB = sum(used_storage_space_GB), In
| summarize arg_max(TotalUsedStorageSpaceGB, *)
| extend TotalRemainingSpaceOnXIOGB = StorageAccountQuotaGB - TotalUsedStorageSpaceGB
| project StorageAccountQuotaGB, TotalUsedStorageSpaceGB, TotalRemainingSpaceOnXIOGB
```

Sample output:

StorageAccountQuotaGB	TotalUsedStorageSpaceGB	TotalRemainingSpaceOnXIOGB
35840	4096	31744

Only around 4TB (out of 35TB) is used on the storage account.

To check individual file allocation (optional):

```
let startTime = ago(1d); // issue start time
let endTime = now(); // issue end time (scope this as much as possible)
let appName = '{AppName}';
MonDmIoVirtualFileStats
| where TIMESTAMP between (startTime .. endTime)
| where AppName =~ appName
| where is_remote == 1 // check only remote storage files; this eliminates files from: master (physical master
| summarize max(TIMESTAMP), max(size_on_disk_bytes) by database_id, file_id
| extend sizegb = max_size_on_disk_bytes / 1024.0 / 1024.0 / 1024.0
| extend allocgb = iff(sizegb < 128.0, 128.0, sizegb)
```

If the resulted TotalUsedStorageSpace is under 35TB (in the summarized query), further check to see how many files customer has with their restore request.

Check to see how many files the source database has with the restore request

```
MonManagementOperations
| where originalEventTimestamp > ago(3d)
| where request_id contains "E1C0991E-A815-40CF-93DB-09E62A6E9697"
| project originalEventTimestamp, operation_parameters
```

Sample Output:

```
operation_parameters
<?xml version="1.0"?>
<InputParameters xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-inst
  <SubscriptionId xsi:nil="true" />
  <SourceSubscriptionId>00000000-0000-0000-0000-000000000000</SourceSubscriptionId>
  <RestoreId>3661734b-7ccc-4547-8885-cb0466f62db9</RestoreId>
  <TargetManagedServerName>dpstrackit</TargetManagedServerName>
  <TargetManagedDatabaseName>THA.DPS.Services.PostalBusiness</TargetManagedDatabaseName>
  <SourceManagedServerName />
  <SourceManagedDatabaseName />
  <SourceManagedDatabaseDroppedDateTime xsi:nil="true" />
  <SourceManagedServerDroppedDateTime xsi:nil="true" />
  <RestoreType>NativeRestore</RestoreType>
  <PointInTime>1753-01-01T00:00:00</PointInTime>
  <NativeRestoreConfigNonSecret>
    <Files>
      <string>DPS.Services.PostalBusiness,D,1</string>
      <string>MailItemPartition1,D,3</string>
      <string>MailItemPartition2,D,4</string>
      <string>MailItemPartition3,D,5</string>
      <string>MailItemPartition4,D,6</string>
      <string>MailItemPartition5,D,7</string>
      <string>MailItemPartition6,D,8</string>
      <string>MailItemPartition7,D,9</string>
      <string>MailItemPartition8,D,10</string>
      <string>MailItemPartition9,D,11</string>
      <string>MailItemPartition10,D,12</string>
      <string>MailItemPartition11,D,13</string>
      <string>MailItemPartition12,D,14</string>
      <string>MailItemPartition13,D,15</string>
      <string>MailItemPartition14,D,16</string>
      <string>MailItemPartition15,D,17</string>
      <string>MailItemPartition16,D,18</string>
      <string>MailItemAttributePartition1,D,19</string>
      <string>MailItemAttributePartition2,D,20</string>
      <string>MailItemAttributePartition3,D,21</string>
      <string>MailItemAttributePartition4,D,22</string>
      <string>MailItemAttributePartition5,D,23</string>
      <string>MailItemAttributePartition6,D,24</string>
      <string>MailItemAttributePartition7,D,25</string>
      <string>MailItemAttributePartition8,D,26</string>
      <string>MailItemAttributePartition9,D,27</string>
      <string>MailItemAttributePartition10,D,28</string>
      <string>MailItemAttributePartition11,D,29</string>
      <string>MailItemAttributePartition12,D,30</string>
      <string>MailItemAttributePartition13,D,31</string>
      <string>MailItemAttributePartition14,D,32</string>
      <string>MailItemAttributePartition15,D,33</string>
      <string>MailItemAttributePartition16,D,34</string>
      <string>EventPartition1,D,35</string>
      <string>EventPartition2,D,36</string>
      <string>EventPartition3,D,37</string>
      <string>EventPartition4,D,38</string>
      <string>EventPartition5,D,39</string>
      <string>EventPartition6,D,40</string>
      <string>EventPartition7,D,41</string>
      <string>EventPartition8,D,42</string>
      <string>EventPartition9,D,43</string>
      <string>EventPartition10,D,44</string>
      <string>EventPartition11,D,45</string>
      <string>EventPartition12,D,46</string>
      <string>EventPartition13,D,47</string>
      <string>EventPartition14,D,48</string>
      <string>EventPartition15,D,49</string>
      <string>EventPartition16,D,50</string>
      <string>EventAttributePartition1,D,51</string>
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      <string>EventAttributePartition3,D,53</string>
```

```
<string>EventAttributePartition4,D,54</string>
<string>EventAttributePartition5,D,55</string>
<string>EventAttributePartition6,D,56</string>
<string>EventAttributePartition7,D,57</string>
<string>EventAttributePartition8,D,58</string>
<string>EventAttributePartition9,D,59</string>
<string>EventAttributePartition10,D,60</string>
<string>EventAttributePartition11,D,61</string>
<string>EventAttributePartition12,D,62</string>
<string>EventAttributePartition13,D,63</string>
<string>EventAttributePartition14,D,64</string>
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<string>EventAttributePartition16,D,66</string>
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<string>ObjectLastDetailPartition7,D,73</string>
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<string>ReceptacleAttributePartition3,D,85</string>
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<string>ReceptacleAttributePartition7,D,89</string>
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<string>ReceptaclePartition5,D,103</string>
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<string>ReceptaclePartition12,D,110</string>
<string>ReceptaclePartition13,D,111</string>
<string>ReceptaclePartition14,D,112</string>
<string>ReceptaclePartition15,D,113</string>
<string>ReceptaclePartition16,D,114</string>
<string>DispatchPartition1,D,115</string>
<string>DispatchPartition2,D,116</string>
<string>DispatchPartition3,D,117</string>
<string>DispatchPartition4,D,118</string>
<string>DispatchPartition5,D,119</string>
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<string>DispatchPartition9,D,123</string>
```

```
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<string>DispatchPartition11,D,125</string>
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<string>DispatchPartition13,D,127</string>
<string>DispatchPartition14,D,128</string>
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<string>BundlePartition3,D,133</string>
<string>BundlePartition4,D,134</string>
<string>BundlePartition5,D,135</string>
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<string>BundlePartition7,D,137</string>
<string>BundlePartition8,D,138</string>
<string>BundlePartition9,D,139</string>
<string>BundlePartition10,D,140</string>
<string>BundlePartition11,D,141</string>
<string>BundlePartition12,D,142</string>
<string>B
```

We can see that the customer has atleast 142 files (if not more). Each and every one of these will allocate at least a page blob of 128GB on the underlying storage account. Confirm with customer how many files they are restoring. Based on that, see if they might breach the 280 file limit.

Mitigation

Possible mitigations:

1. Consolidate source database to have fewer database files.
2. Upgrade to Business critical tier on Managed Instance which has a limit of 32k files per instance (documentation link)

RCA

Every database file in SQL MI with General Purpose service tier is placed on a separate Azure Premium disk (one file per disk). Azure Premium disks that are used in storage layer have fixed sizes: 128 GB, 512 GB, 1 TB, 2 TB, and 4 TB, and Managed Instance uses minimal disk size that is required to fit the database file with specified size. For example, database file with a size of 100 GB will be placed on 128 GB disk, a database file with 800 GB will be placed on 1 TB disk. Every Managed Instance with General Purpose service tier has up to 35 TB of total internal storage reserved for Azure Premium disks storage layer. If you create many files and the total size of the underlying disks reaches 35 TB, you will get internal storage limit error.

Public Doc Reference

- Exceeding storage space with small database files
- Resource limits on managed instance
- Limitations with restore on managed instance
- How many files you can create in General Purpose Azure SQL Managed Instance?
- Reaching Azure disk storage limit on General Purpose Azure SQL Database Managed Instance

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