What's New in Batch Processing
Dynamics 365 FastTrack TechTalk

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About this TechTalk

Objectives of this TechTalk
✓ Why utilizing the Batch Framework
✓ Important aspects of batch parallelism
✓ Patterns and Anti-Patterns
✓ Overview of new Batch Management features
✓ Roadmap insights

What it doesn’t cover
• Detailed how-to on batch schedule management
• Cover other frameworks that allow parallelism and asynchronous processing
• Provide silver bullets to address your business scenario
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Batch Parallelism Overview and Architecture
Parallelism is the future

More processors, and processors have more cores
Azure gives you elastic scaling

But none of these matter if your code runs in a single sequential process

Each Finance and Operations session runs sequentially in a single thread if no parallelism is used

Utilize Batch Framework and AOS Services to reach parallelism
Use Batch Framework for Parallelism
Batch Parallelism

The three common approaches are

- Individual task modeling
- Batch Bundling
- Top Picking

In addition you could use a combination of last two
Individual Task modeling

Pros:
• Will work fine with uneven workload.
• Simple to write.
• Can scale up or down along with the batch schedule.
• Best fit to create dependency among the work items.

Cons:
• Relies on the batch framework fully.
• When the number of tasks are huge, overhead from framework could be high.
• It can negatively affect the other batch jobs as it is putting pressure on the framework tables.
Batch Bundling

**Pros:**
- Will work fine for simple even workload.
- No need for a staging table, no extra maintenance by the application code.
- Not over pollute the batch table.

**Cons:**
- Fixed number of tasks is created while scheduling the job (usually) preventing elastic adjustment.
- For uneven workload you may need complex algorithm to find equal distribution of the work
- In some applications, it may not be possible to distribute the workload evenly.

**Uneven Workload**

- **Increase in Run time**

  - Bundling
  - Individual Task Modeling
  - Top Picking

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Top picking

Pros:
- Will work fine with uneven workload.
- Simple to write.
- Not over pollute the batch table.

Cons:
- Need an extra staging table to track the progress and workload.
- Tracking overhead on staging table.
- Will not scale up and down based on available threads.

Huge number of work Items

- Increase in Run time
Key Patterns and Anti-Patterns
Key Patterns and Anti-Patterns

- Start identifying batch workloads in your project early on
- Define your end-to-end batch schedule early on
- Fine tune logical grouping and sequential order of your batch schedule
- Optimize first before running it in parallel
- Do fine tune configuration of standard processes running in batch
- Train your user base to run relevant processes in batch
Key Patterns and Anti-Patterns

- Do not assume batch maintenance is on Microsoft
  - Keep the framework healthy by using clean-up mechanisms
  - Monitor batch during operations

- Do not flood the batch framework

- Test scalability of your batch scenarios

- Tune your batch framework

- Do fine tune batch server allocation or scheduling priority of batch groups

- Do not assume unlimited scalability
New Batch Management Features
Batch Management: Enhancements Drivers

- High volume batch loads: Enterprise customers
  - Reduce contention and increase throughput
- Batch orchestration and Automated optimization
- Decoupling of Batch infrastructure, to prepare for:
  - Batch scheduling as a microservice
  - Elastic compute (dynamic number of batch servers)
  - nearZeroDownTime (nZDT)
Recent Batch Features

• Batch framework contention reduction (PU31)
  • Performance enhancements have been made to reduce heavy blocking/contention on batch framework tables
  • Processing based on snapshot/temp tables - Update

• Batch load balancing (PU29)
  • Distributes tasks between server to utilize full available capacity

• Abort an executing batch job (PU27)
  • Canceling a long running executing batch job can take time to finish
  • The abort option provides a much faster mechanism to cancel a long running job which is impacting system usage elsewhere.

• Batch jobs single scheduler (PU25)
  • Only one batch scheduler will be active at a time
  • Reduce contention on batch tables and increase throughput
Recent Batch Features

- Enhanced batch form (PU25)
  - Summarize the batch tasks and constraints that are related to the selected batch job
  - Improves search and investigations of batch jobs and tasks
  - Leverages Saved views (PU29) for even better analysis
- Batch alerts and notifications (PU25)
  - Enable alert rules for when a batch job ends, ends in error, or is canceled
  - View batch job notifications in the action center or have them emailed
- Clean-up the batch history (PU25)
  - Performance enhancement
Currently In Preview (Public from PU37)

- Priority-based batch scheduling
  - Decouples batch groups from infrastructure
  - Relative priorities determines the order that tasks run in across available batch threads
  - Priority classifications are used to declare relative priorities between jobs
  - Enables automatic optimizing the use of batch threads
  - Option to reserve batch capacity, based on batch threads

- Private preview request:
  - Send Sandbox environment ID to PlaCphEng@microsoft.com
## Feature management

**Do not enable new features automatically**

<table>
<thead>
<tr>
<th>Feature name</th>
<th>Enable date</th>
<th>Feature added</th>
<th>Preview feature</th>
<th>Module</th>
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<tr>
<td>(Preview) Batch priority-based scheduling</td>
<td>![ ] 5/20/2020</td>
<td>![ ] ✔</td>
<td>![ ] ✔</td>
<td>System administration</td>
</tr>
<tr>
<td>Daylight Saving Time support for batch job active periods</td>
<td>![ ] 5/10/2020</td>
<td>![ ] ✔</td>
<td>![ ] ✔</td>
<td>System administration</td>
</tr>
<tr>
<td>Batch framework contention reduction</td>
<td>![ ] 10/7/2019</td>
<td>![ ] ✔</td>
<td>![ ] ✔</td>
<td>System administration</td>
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**Description**

Batch priority-based scheduling decouples batch groups from infrastructure and instead uses a relative priority to determine a sequence in which tasks are executed. This feature takes a dependency on “Batch framework contention reduction.” Reordering of batch group associations to batch jobs has been done based on legacy group associations to tasks; most popular group within a job was associated to the job. The association should be reviewed before enabling the feature.

**Learn more**

This is a preview feature. By enabling this feature, you are confirming that you have read and understand the preview feature terms and conditions: [https://go.microsoft.com/fwlink/?linkid=2105274](https://go.microsoft.com/fwlink/?linkid=2105274)
Demo - PBS
Reserved capacity

- **No reserved capacity** – This value is the default value.
- **Low reserved capacity** – 10% of the cumulative batch threads are reserved.
- **Medium reserved capacity** – 15% percent are reserved.
- **High reserved capacity** – 25% percent are reserved.

- Any reserved capacity is exclusive to batch jobs that have **Reserved capacity** priority. The reserved capacity won't be made available for batch jobs that have other priorities, even if there is idle reserved capacity.

Sample values are for the purpose of illustration only. The actual reserved capacity depends on the configuration of the batch server and the number of available batch threads at any given point.
The batch group assignment on a job is based on the batch group that is most used for the tasks for the job.

Because the schedule priority is set to **Normal** for all existing batch groups when the feature is enabled,

- It's important to plan and update the scheduling priority for each batch group to actually represent the relative priorities according to business requirements

To facilitate this review, the **Batch group** field for tasks is read-only.

- To support backward compatibility, the value of this field will be propagated from the job when new batch tasks are added.
Coming in PU36

- Daylight Saving Time support for batch job active periods
  - Introduces support for daylight saving time to the batch job active periods.
  - Existing periods will be based on UTC and start and end times will be adjusted accordingly.
What’s next for Batch?
Candidates for future releases

- **Batch Scheduling as a microservice**
  - Decoupling with F&O for agility and offload
  - Candidate for cross-CAP
- **Batch Queue Insights (Load per priority queue)**
  - Telemetry for optimization
- **Intelligent Scheduling**
  - Optimize and prioritized based on expected execution time, CPU Load
  - Prevent and/or react to risk for data locks etc. Job(s) and their load on same table
- **Job Dependencies**
  - Define that job X is dependent on job Y
- **Dedicated Scale**
Resources

• Improvements to the batch framework of MSDyn365FO: MsDyn365FO.Blog
• Priority-based batch scheduling
• Abort an executing batch job
• Enhanced batch form
• Batch alerts and notifications
• Clean-up the batch history ...
• Batch Jobs; Take control of the executions - kurthatlevik
  • https://blogs.msdn.microsoft.com/axperf/2012/02/24/batch-parallelism-in-ax-part-i/
  • https://blogs.msdn.microsoft.com/axperf/2012/02/24/batch-parallelism-in-ax-part-ii/
  • https://blogs.msdn.microsoft.com/axperf/2012/02/28/batch-parallelism-in-ax-part-iii/
  • https://blogs.msdn.microsoft.com/axperf/2012/03/01/batch-parallelism-in-ax-part-iv/
• TechTalk: Finance and Operations: Performance Key Patterns and Anti-patterns for Dynamics 365 | January 15, 2019
• TechTalk: Performance Testing Approach | April 30, 2018
• Channel:
  https://www.yammer.com/dynamicsaxfeedbackprograms/#!/threads/inGroup?type=in_group&feedId=29605519360&view=all
Thank you.