

A workflow Case Review on how to lower the number of Workflow Background Processes

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Recently I have been corresponding with a site that is having a few issues with their workflow application and this has prompted me to put together a case review to articulate how I would look to resolve the issue of too many workflow background processes for the particular scenario outlined. Of special note is the fact that this entire case review is based only on these two pieces of information:

- ❖ An aged Workflows report - [Free Workflow Report](#)
- ❖ A scheduled request list

No other information or understanding of the site is either known or provided; in addition I have no other information or understanding of the site and their business processes. All items discussed below are based on the two (2) pieces of information only. **Clearly this is a site specific exercise**; if you were undertaking a similar exercise at your site you would factor in all this additional knowledge to **your own plan**.

For what it is worth, this case review shows the actions I would consider undertaking when presented with this scenario. I will show how it is potentially possible (including my rationale) to reduce the number of workflow background processes being run from 11,000 per day to a mere 370 per day a reduction of 96.7% and as a by-product reduced the number of concurrent request per day by approximately 10,000 requests per day.

1 The Issue

The site was estimated to be running approximately 34,000 concurrent requests per day of which approximately 11,000 (32%) are WBP (**W**orkflow **B**ackground **P**rocess) requests.

Actual WBP runs were - 458 runs per hour or 10,988 runs per day

Contributing to the overall high number of concurrent requests per day were a large number of duplicate scheduled requests which should be addressed in a separate exercise.

Furthermore, with the high number of workflow background processes being run there would be high read competition on the underlying tables and indexes impacting the overall application performance.

1.1 Adding a WBP is easy - Try removing one...

So how do we get so many WBPs? Adding a WBP is as simple as adding a scheduled concurrent request and generally does not require a change request even in highly controlled environments.

Most are often added for no more reason than “it was a good idea at the time”. In this case review for example why do we have so many duplicates for OEOL – (OEOL, , , Y, N, N) WBPs – Seven of them all the same... Somebody must have thought this a good idea..... ☺

Removing a WBP however will most likely be a long and involve process involving change control and vast amounts of discussion by all interested parties and documentation. That's just the way it is in a production environment.

1.2 Workflow Background Process Run Times

All Workflow Background Processes are being run by the STANDARD manager. The average run time for the Workflow Background Process was 42 seconds with a maximum run time of 6 Hours 49 minutes and 15 seconds.

When any WBP takes longer than 1 minute to run another one will have started that will compete with the first...

1.3 Manager Flooding

This site was running 50 standard managers and a large number of custom manager processes, so unless there is at least 25 CPUs available the site would most likely be experiencing intermittent performance issues during high processing times.

This site has five (5) WBPs actioning GLBATCH every 1 minute; given this frequency at any one time this would require up to five (5) STANDARD managers running processes (running $24 * 7$) just to run these 5 WBPs let alone the other WBPs. It would have been interesting to see how many WBP's are running at any one time.

The high number of STANDARD managers and the high number of WBPs makes me wonder if additional managers were added at any time in the past just to cope with the flooding caused by increasing numbers of WBPs. It would be hoped that one of the outcomes of remedial action would be to be able to lower the number of STANDARD managers and thus reduce the overhead on the OEBS application.

2 Background

First we need to understand a few things about the WFP, including the program parameters and what it actually does when it runs.

2.1 Program Parameters

The workflow background process when submitted has a number of parameters, for this case review we are interested in the following parameters as these were the only ones used by the site:

- Parameter 1 – The workflow to be actioned. A null value indicates all workflows
- Parameter 2 – The minimum cost (hundredths of a second) an item must have to be actioned
- Parameter 3 – The maximum cost (hundredths of a second) an item must have to be actioned
- Parameter 4 – Action Deferred items (Valid Values 'Y' or 'N')
- Parameter 5 – Action Timeout items (Valid Values 'Y' or 'N')
- Parameter 6 – Action Stuck Items (Valid Values 'Y' or 'N')

Examples:

The following examples are parameters from WBPs for the site:

, , N, Y, N

In this example the WBP will action Timeout items only for all workflows

GLBATCH, , Y, Y, N

In this example the WBP will action both Deferred and Timeout items for GLBATCH (Journal Batch) workflows only

2.2 Definitions

Deferred

In OEBS “real-time” workflow load is managed by identifying costly activities / processes, so that when they are encountered by the workflow engine they are immediately given a “deferred” status and the workflow engine continues processing the next activity. The deferred processes are then processed by a Workflow Background Process which can be run at an appropriate time.

Timeout

The workflow background process set to action timeout items, checks activities with a status of 'NOTIFIED'. If any have been set with a timeout value and that value has been exceeded the activity is given the status of 'TIMEOUT' and the background process executes the defined timeout activity.

Stuck

A workflow activity will be given a status of 'STUCK' when a workflow activity with a workflow activity status of 'ACTIVE' cannot progress. This can be for any number of reasons including:

- ❖ The workflow cannot proceed due to the next activity not being available
- ❖ An unexpected or unhandled result is returned from the workflow activity
- ❖ A loop back to a prior activity where the prior activity has the on revisit set to 'ignore'

The workflow background process set to clear stuck workflows sets the workflow activities with a status of 'STUCK' to 'ERROR' and executes the defined error process for the workflow item – let's hope it has one....

3 The site's WBP Configuration

The configuration of workflow background processes for the site is as follows:

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value	Runs Per Hour	Runs Per Day
1	SYSADMIN	, , , N, N, Y	7	DAYS	0	0
2	SYSADMIN	, , , N, Y, N	15	MINUTES	4	96
3	USER1	CREATEPO, , , Y, N,	5	MINUTES	12	288
4	USER1	CREATEPO, , , Y, Y, Y	5	MINUTES	12	288
5	SYSADMIN	GLBATCH, , , N, Y, N	1	MINUTES	60	1,440
6	SYSADMIN	GLBATCH, , , Y, N, N	1	MINUTES	60	1,440
7	SYSADMIN	GLBATCH, , , Y, N, Y	1	MINUTES	60	1,440
8	SYSADMIN	GLBATCH, , , Y, Y, N	1	MINUTES	60	1,440
9	SYSADMIN	GLBATCH, , , Y, Y, Y	1	MINUTES	60	1,440
10	CMSCHED	OEOH, , , N, N, Y	1	DAYS	0	1
11	SYSADMIN	OEOH, , , Y, Y, N	1	HOURS	1	24
12	CMSCHED	OEOH, , , Y, Y, N	1	HOURS	1	24
13	CMSCHED	OEOH, , , Y, Y, N	1	HOURS	1	24
14	CMSCHED	OEOL, , , N, N, Y	4	HOURS	0	6
15	CMSCHED	OEOL, , , N, Y, N	4	HOURS	0	6
16	CMSCHED	OEOL, , , Y, N, N	5	MINUTES	12	288
17	CMSCHED	OEOL, , , Y, N, N	5	MINUTES	12	288
18	CMSCHED	OEOL, , , Y, N, N	5	MINUTES	12	288
19	CMSCHED	OEOL, , , Y, N, N	5	MINUTES	12	288
20	CMSCHED	OEOL, , , Y, N, N	5	MINUTES	12	288
21	CMSCHED	OEOL, , , Y, N, N	5	MINUTES	12	288
22	CMSCHED	OEOL, , , Y, N, N	5	MINUTES	12	288
23	USER1	POAPPRV, , , Y, N,	5	MINUTES	12	288
24	USER1	POERROR, , , Y, N,	5	MINUTES	12	288
25	CMSCHED	REQAPPRV, , , N, N, Y	1	DAYS	0	1
26	CMSCHED	REQAPPRV, , , N, Y, N	4	HOURS	0	6
27	CMSCHED	REQAPPRV, , , Y, N, N	10	MINUTES	6	144
28	SYSADMIN	REQAPPRV, , , Y, Y, N	5	MINUTES	12	288

I have included Run # as a unique reference to each WBP scheduled request; this number will be used to reference individual scheduled requests throughout the case study.

3.1 Configuration Observations

The configuration observations are based on the workflow scheduled requests as shown above and the aged Workflow report for the site:

Aged Active Workflow Report

Workflow	Display Name	Sample size	Oldest (Days)	Current	30 Day	60 Day	90 Day	120 +
CREATEPO	PO Create Documents	8	1,141	0	0	0	0	8
GLBATCH	Journal Batch	17	25	17	0	0	0	0
GMDQMSM	OPM Quality Management Sample Creation	6	1,022	0	0	0	0	6
IBYOPCC	iPayment Operations Credit Card/Purchase Card	30	1,196	0	0	0	0	30
MRPEXWF	ASCP Exception WorkFlow in Source Instance	13	1,324	0	0	0	0	13
MSCEXPW	ASCP Exception Messages	3,092	1,303	0	0	0	0	3,092
MTLTXNR	MTL Transaction Reasons Workflow	269	1,194	10	21	15	21	202
OEOL	OM Order Header	9,954	1,345	9,116	528	49	58	203
OEOL	OM Order Line	53,601	1,338	52,474	636	78	65	348
OMERROR	OM Error	41,469	1,141	0	0	0	38	41,431
POAPPRV	PO Approval	189	1,197	4	1	1	3	180
POERROR	PO Approval Error	424	1,194	0	0	0	8	416
REQAPPRV	PO Requisition Approval	4,539	1,268	19	7	20	34	4,459
WFERROR	System: Error	56,262	1,427	19	31	19	51	56,142
WIPISHPW	WIP: Shipping & Receiving Intermediate	889	1,198	3	24	8	30	824
Total Active Workflows:		170,762						

This is a great report for showing what workflows are actually being used.

Possible unused workflows:

Based on the sample size and ageing numbers the workflows below appear to either be not currently in use or not operating successfully:

- ❖ GMDQMSM – OPM Quality Management Sample Creation
- ❖ IBYOPCC – iPayment Operations Credit Card/Purchase Card
- ❖ MRPEXWF – ASCP Exception Workflow in source instance
- ❖ MSCEXPW – ASCP Exception Message

The exception to this appears to be CREATPO (PO Create Documents), whilst the aged (120+ days) number of 8 is the same as the sample size, the number of WBPs in the current configuration would indicate this workflow is currently in use and has been completing successfully.

As mentioned, this configuration equates to approximately 11,000 (32%) of all concurrent managers daily activity which will have an overall impact on the application including but not limited to:

- ❖ 11,000 reads of the [wf_item_activity_statuses](#) table, and hits on the associated indexes and reference objects
- ❖ 11,000 entries in the [fnd_concurrent_request](#) table, one per WBP run. There are also nine (9) indexes on the [fnd_concurrent_requests](#) table that would be impacted
- ❖ The WBP will be running into each other competing for resources on the underlying workflow tables

There is no background process to clear deferred items that are not included with WBPs set to action specific workflows. - At the time of the review there were 208 deferred items.

4 Plan of Attack

The plan of attack is divided in to 3 sub projects in increasing risk order.

Project 1 - Triage - Lower the number of runs by removing redundant runs

This part of the action plan is designed to “remove” all but one of the WBPs that perform the same task- duplicates if you will.

The risk level for this project is almost non-existent (I have to say this as there is always some risk 😊)

The duplicates are not actually removed as a first pass but merely placed on-hold until such times as you are satisfied they can be deleted. At any point you can take the request off hold and it will continue to run as before.

The aim is to not change any of the existing functionality – in affect with this part of the plan the users would not know anything has happened.

Project 2 – Revised “Global” Timeout & Stuck Schedules

In this part of the project we will assess the clearing of both timeout and stuck workflow items by the WBPs. The aim is to set the schedule times for the “Global” workflow background processes to more realistic values.

Project 3 – Deferred Workflow items

In this part of the project I cover Deferred workflow items. We will create a Default WBP to clear all deferred items that are not currently being actioned, and that will catch any new workflows started. We will then assess the current WBPs that are actioning deferred items and see what we can do with these.

5 Project 1 - Triage– Remove redundant runs (duplicates)

Risk Level = Miniscule

Project 1 – Triage - The action plan is designed to “remove” all but one of the WBPs that perform the same task- duplicates if you will.

The risk level for this project is almost non-existent (I have to say this as there is always some risk ☺)

The duplicates are not actually removed as a first pass but merely placed on-hold and till such times as you are satisfied they can be deleted. At any point you can take the request of hold and it will continue to run as before.

The aim is to not change any of the existing functionality – in affect with this part of the plan the users would not know anything has happened.

5.1 “Global” WBP

“Global WFB” are defined as those WBP runs that act on all workflows. The base configuration has two (2) “Global WFBs”

Run Number	Submitted By	Parameters	Frequency Unit	Frequency Value
1	SYSADMIN	, , , N, N, Y	7	DAYS
2	SYSADMIN	, , , N, Y, N	15	MINUTES

In project 1 we will keep these two in place. Given they exist and their run schedules these two (2) were most likely created early in the site’s workflow history. The run frequencies are a bit suspect and we will revisit these later.

5.2 CREATEPO – PO Create Documents

Workflows that action CREATEPO Workflows:

Run Number	Submitted By	Parameters	Frequency Unit	Frequency Value
3	USER1	CREATEPO, , , Y, N,	5	MINUTES
4	USER1	CREATEPO, , , Y, Y, Y	5	MINUTES

Run 4 clears Deferred, Timeout & Stuck workflow items for CREATEPO every 5 minutes. Run 3 also runs every 5 minutes and only clears Deferred workflow items for CREATEPO.

“Removing” Run 3 will have no effect as deferred are cleared at the same rate by Run 4

This will equate to a saving of 12 WBP per hour or 288 per day

5.3 GLBATCH – Journal Batch

Workflows that action GLBATCH Workflows:

Run Number	Submitted By	Parameters	Frequency Unit	Frequency Value
5	SYSADMIN	GLBATCH, , , N, Y, N	1	MINUTES
6	SYSADMIN	GLBATCH, , , Y, N, N	1	MINUTES
7	SYSADMIN	GLBATCH, , , Y, N, Y	1	MINUTES
8	SYSADMIN	GLBATCH, , , Y, Y, N	1	MINUTES
9	SYSADMIN	GLBATCH, , , Y, Y, Y	1	MINUTES

Run 9 actions Deferred, Timeout & Stuck for GLBATCHES once every minute.

- ❖ Run 5 clears Timeout only every minute which is covered by run 9
- ❖ Run 6 clears Deferred only every minute which is covered by run 9
- ❖ Run 7 clears Deferred and Stuck every minute which is covered by run 9
- ❖ Run 8 clears Deferred and Timeout every minute which is covered by run 9

In this instance runs 5, 6, 7 and 8 can be “removed” as their activity is covered by run 9

This will equate to a saving of 1,152 WBP per hour or 5,760 per day

Removing Run 5 runs every 1 minute = 60 per Hour = 288 per day = 1,440

Removing Run 6 runs every 1 minute = 60 per Hour = 288 per day = 1,440

Removing Run 7 runs every 1 minute = 60 per Hour = 288 per day = 1,440

Removing Run 8 runs every 1 minute = 60 per Hour = 288 per day = 1,440

5.4 OEOH – OM Order Header

Workflows that action OEOH Workflows:

Run Number	Submitted By	Parameters	Frequency Unit	Frequency Value
10	CMSCHED	OEOH, , , N, N, Y	1	DAYS
11	SYSADMIN	OEOH, , , Y, Y, N	1	HOURS
12	CMSCHED	OEOH, , , Y, Y, N	1	HOURS
13	CMSCHED	OEOH, , , Y, Y, N	1	HOURS

Run 10 actions OEOH Stuck workflow items once per day; we will leave this one in place for the time being.

Run 11, 12 and 13 do the same thing, clearing Deferred and timeout every 1 hour.

Removing runs 11 and 12 would have no effect as this is being covered by run 13.

This will equate to a saving of 2 WBP per hour or 48 per day

5.5 OEOL – OM Order Line

Workflows that action OEOL Workflows:

Run Number	Submitted By	Parameters	Frequency Unit	Frequency Value
14	CMSCHED	OEOL, , , N, N, Y	4	HOURS
15	CMSCHED	OEOL, , , N, Y, N	4	HOURS
16	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
17	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
18	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
19	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
20	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
21	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
22	CMSCHED	OEOL, , , Y, N, N	5	MINUTES

Run 14 clears OEOL Stuck workflow items is run every 4 hours. We will leave this one for the time being.

Run 15 clears OEOL Timeout workflow items is run every 4 hours. We will leave that one for the time being.

Runs , 16, 17, 18, 19, 20, 21 and 22 all clear Deferred workflow items only every 5 minutes, in affect they are all doing the same thing. Removing all but one of the duplicates will have no effect on the application.

This will equate to a saving of 72 WBP per hour or 1,728 per day

Removing Run 16 runs every 5 minutes = 12 per Hour = 288 per day = 288

Removing Run 17 runs every 5 minutes = 12 per Hour = 288 per day = 288

Removing Run 18 runs every 5 minutes = 12 per Hour = 288 per day = 288

Removing Run 19 runs every 5 minutes = 12 per Hour = 288 per day = 288

Removing Run 20 runs every 5 minutes = 12 per Hour = 288 per day = 288

Removing Run 21 runs every 5 minutes = 12 per Hour = 288 per day = 288

5.6 REQAPPRV – PO Requisition Approval

Workflows that action REQAPPRV Workflows:

Run Number	Submitted By	Parameters	Frequency Unit	Frequency Value
25	CMSCHED	REQAPPRV, , , N, N, Y	1	DAYS
26	CMSCHED	REQAPPRV, , , N, Y, N	4	HOURS
27	CMSCHED	REQAPPRV, , , Y, N, N	10	MINUTES
28	SYSADMIN	REQAPPRV, , , Y, Y, N	5	MINUTES

Run 25 clears REQAPPRV Stuck workflow items once per day. We will leave this one for the time being

Run 26 clears REQAPPRV Timeout workflow items every 4 hours. We will leave this one for the time being

As the aim of the first pass is to remove duplicates, we can remove Run 27 that actions deferred REQAPPRV workflow items every 10 minutes as Run 28, actions REQAPPRV actions both Deferred and Timeout workflow items every 5 minutes.

This will equate to a saving of 6 WBP per hour or 144 per day

5.7 Project 1 - Outcome

So at the end of Project 1 - Triage (removing redundant runs) we expect the new scheduled request list to be as follows:

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
1	SYSADMIN	, , , N, N, Y	7	DAYS
2	SYSADMIN	, , , N, Y, N	15	MINUTES
4	USER1	CREATEPO, , , Y, Y, Y	5	MINUTES
9	SYSADMIN	GLBATCH, , , Y, Y, Y	1	MINUTES
10	CMSCHED	OEOL, , , N, N, Y	1	DAYS
13	CMSCHED	OEOL, , , Y, Y, N	1	HOURS
14	CMSCHED	OEOL, , , N, N, Y	4	HOURS
15	CMSCHED	OEOL, , , N, Y, N	4	HOURS
22	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
23	USER1	POAPPRV, , , Y, N,	5	MINUTES
24	USER1	POERROR, , , Y, N,	5	MINUTES
25	CMSCHED	REQAPPRV, , , N, N, Y	1	DAYS
26	CMSCHED	REQAPPRV, , , N, Y, N	4	HOURS
28	SYSADMIN	REQAPPRV, , , Y, Y, N	5	MINUTES

With this project we have been able to remove **14 (50%)** of workflow background process scheduled requests equating to the removal of approximately 332 runs per hour or 7,968 runs per day. Removing these requests equates to removing **72%** of the original number of workflow background process runs.

We are now be left with 14 scheduled Workflow background process requests which equates for approximately 125 WBP runs per hour or 3,020 runs per day.

The estimated saving from this Project Triage are:

A reduction of 50% of the current number of scheduled workflow background process requests
 A reduction of 7,968 (72%) workflow background processes being run per day

5.8 Post Project activity

We should now let the application run for at least a week or two to assess the overall impact on the application; at the end of this period it would be OK to cancel the workflow background processes that were placed on-hold during the first pass.

Note: For audit purposes, you have a record of the requests that were placed on-hold in this document each of which can be re implemented based on information in this document.

6 Project 2 – Revised “Global” Timeout & Suck Schedules

Risk Level = Minimal

The first step is to understand how both timeout and stuck work and how they are actioned by the workflow background process.

6.1 Timeout

A workflow background process set to action timeout items, checks activities with a status of 'NOTIFIED'. If any have been set with a timeout value and that value has been exceeded the activity is given the status of 'TIMEOUT' and the background process executes the defined timeout activity.

Note: In most cases, when a timeout is actioned a record is added to the workflow item activity statuses history table I have seen cases with several thousand entries in history table for items that have been timing out over a number of years.

At the time of the review there were no workflow items with a status of Timeout.

6.2 Stuck

A workflow activity will be given a status of 'STUCK' when a workflow activity with a workflow activity status of 'ACTIVE' cannot progress. This can be for any number of reasons including:

- ❖ The workflow cannot proceed due to the next activity not being available
- ❖ An unexpected or unhandled result is returned from the workflow activity
- ❖ A loop back to a prior activity where the prior activity has the on revisit set to 'ignore'

The workflow background process set to clear stuck workflows sets the workflow activities with a status of 'STUCK' to 'ERROR' and executes the defined error process for the workflow item.

So in affect this converts STUCK to ERROR....

At the time of the review there were 84,000 workflow items with a status of ERROR.

A review of the age of workflow items with a status of error indicates the majority are “old”.

Aged Active Workflow Report

Workflow	Display Name	Sample size	Oldest (Days)	Current	30 Day	60 Day	90 Day	120 +
CREATEPO	PO Create Documents	8	1,141	0	0	0	0	8
GLBATCH	Journal Batch	17	25	17	0	0	0	0
GMDQMSM	OPM Quality Management Sample Creation	6	1,022	0	0	0	0	6
IBYOPCC	iPayment Operations Credit Card/Purchase Card	30	1,196	0	0	0	0	30
MRPEXWF	ASCP Exception WorkFlow in Source Instance	13	1,324	0	0	0	0	13
MSCEXPW	ASCP Exception Messages	3,092	1,303	0	0	0	0	3,092
MTLTXNR	MTL Transaction Reasons Workflow	269	1,194	10	21	15	21	202
OEOH	OM Order Header	9,954	1,345	9,116	528	49	58	203
OEOL	OM Order Line	53,601	1,338	52,474	636	78	65	348
OMERROR	OM Error	41,469	1,141	0	0	0	38	41,431
POAPPRV	PO Approval	189	1,197	4	1	1	3	180
POERROR	PO Approval Error	424	1,194	0	0	0	8	416
REQAPPRV	PO Requisition Approval	4,539	1,268	19	7	20	34	4,459
WFERROR	System: Error	56,262	1,427	19	31	19	51	56,142
WIPISHPW	WIP: Shipping & Receiving Intermediate	889	1,198	3	24	8	30	824
Total Active Workflows:		170,762						

Almost all the documentation states that you should have a background process that actions Stuck Workflow items not more than once per day.

The question is how fast do you want to process Stuck items into an error.

And a WBP that actions Timeout workflow items once or twice per day (Stuck not more often than once per day)

6.3 Global WBP

“Global WFB” are defined as those WBP runs that act on all workflows. The base configuration has two (2) “Global WFBs”

Run Number	Submitted By	Parameters	Frequency Unit	Frequency Value
1	SYSADMIN	, , , N, N, Y	7	DAYS
2	SYSADMIN	, , , N, Y, N	15	MINUTES

In this instance Run 1 is actioning stuck items for all workflows once every 7 days. Whilst this is generally considered less frequent than the normally recommended once per day there are several existing WBPs actioning Stuck items on an individual workflow basis.

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
4	USER1	CREATEPO, , , Y, Y, Y	5	MINUTES
9	SYSADMIN	GLBATCH, , , Y, Y, Y	1	MINUTES
10	CMSCHED	OEOH, , , N, N, Y	1	DAYS
14	CMSCHED	OEOL, , , N, N, Y	4	HOURS
25	CMSCHED	REQAPPRV, , , N, N, Y	1	DAYS

6.3.1 Frequency of clearing Stuck items

Why would the site need to action:

- ❖ CREATEPO Stuck items every 5 minutes
- ❖ GLBATCH Stuck items every 1 minute

What this indicates is that for GLBATCH within 1 minute and for CREATEPO within 5 minutes of that workflow obtains a status of Stuck (remembering that a Stuck status is generally due to an unhandled exception – which should be quite rare) that workflow will action the workflows error process.

OEOL Stuck workflow items are being actioned one every 4 hours.
 OEOL and REQAPPRV Stuck workflow items are being actioned one per day.
 Other workflows such as POAPPRV workflows with stuck items will be actioned by the WBP “Global” Run 1 which is every 7 days.

6.4 Timeout

Run Number	Submitted By	Parameters	Frequency Unit	Frequency Value
1	SYSADMIN	, , , N, N, Y	7	DAYS
2	SYSADMIN	, , , N, Y, N	15	MINUTES

In this instance Run 2 is actioning Timeout items for all workflows once every 15 minutes. This is generally considered more frequent than the normally recommended couple of times per day.

To action timeout it means a user has not actioned a notification within a set amount of time for a given workflow notification. Unless the amount of time to action a workflow notification is in minutes, one would have to question why a timeout / escalation notification needs to be sent within 15 minutes of a timeout occurring.

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
4	USER1	CREATEPO, , , Y, Y , Y	5	MINUTES
9	SYSADMIN	GLBATCH, , , Y, Y , Y	1	MINUTES
13	CMSCHED	OEOL, , , Y, Y , N	1	HOURS
15	CMSCHED	OEOL, , , N, Y , N	4	HOURS
26	CMSCHED	REQAPPRV, , , N, Y , N	4	HOURS
28	SYSADMIN	REQAPPRV, , , Y, Y , N	5	MINUTES

OEOL and REQAPPRV Timeout workflow items are being actioned once every 4 hours.
 OEOL and Stuck workflow items are being actioned every hour.
 Other workflows such as POAPPRV workflows with stuck items will be actioned by the WBP “Global” Run 1 which is every 15 minutes.

In this instance I would set the WBP to check timeouts every 4 hours, and if the does not present an issue with business processes then I would set it at a later time to once every 8 hours.

6.5 Revised Global WBP schedules

Assuming there is no compelling business reason for setting the original “Global” WBP schedule times I would change the schedules as follows:

FROM

Run Number	Submitted By	Parameters	Frequency Unit	Frequency Value
1	SYSADMIN	, , , N, N, Y	7	DAYS
2	SYSADMIN	, , , N, Y, N	15	MINUTES

TO

Run Number	Parameters	Frequency Unit	Frequency Value
Rev 1	, , , N, N, Y	1	DAYS
Rev 2	, , , N, Y, N	4	HOURS

This change should have little to no effect on the overall performance of the OEBS workflow application as currently most of the high transaction workflows such as OEOL and OEOH etc... have their own WBP to action Timeout and Stuck workflow items. At this stage the “Global” WFP’s catch those workflow items not actioned by workflow specific WBPs.

This is a simple process to execute. Create two (2) new “Global” WBP requests with the new schedule, then place the two “Old” “Global” WBPs on-hold.

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
10	CMSCHED	OEOH, , , N, N, Y	1	DAYS
14	CMSCHED	OEOL, , , N, N, Y	4	HOURS
15	CMSCHED	OEOL, , , N, Y, N	4	HOURS
25	CMSCHED	REQAPPRV, , , N, N, Y	1	DAYS
26	CMSCHED	REQAPPRV, , , N, Y, N	4	HOURS

Once the new “Global” WBP schedules are in place you can now:

Remove Run10 as the OEOH Stuck workflow items being actioned every 1 day will now be actioned by the Rev 1 “Global” WBP set to action Stuck workflow items every 1 day – No functional change.

Remove Run 25 as the OEOL Stuck workflow items being actioned every 1 day will now be actioned by the Rev 1 “Global” WBP set to action Stuck workflow items every 1 day – No functional change.

Remove Run 14 as the OEOL Stuck workflow items being actioned every 4 hours will now be actioned by the Rev 1 “Global” WBP set to action Stuck workflow items every 1 day – **Actioned on a less frequent basis.**

Remove Run 15 as the OEOL Timeout workflow items being actioned every 4 hours will now be actioned by the Rev 2 “Global” WBP set to action Timeout workflow items every 4 hours – No functional change.

Remove Run 15 as the OEOL Timeout workflow items being actioned every 4 hours will now be actioned by the Rev 2 “Global” WBP set to action Timeout workflow items every 4 hours – No functional change.

Remove Run 26 as the REQAPPRV Timeout workflow items being actioned every 4 hours will now be actioned by the Rev 2 “Global” WBP set to action Timeout workflow items every 4 hours – No functional change.

Remember – Just place them on-hold for the time being and revisit when you are sure all is OK.

6.6 Project 2 - Outcome

So at the end of project 2 - Revised “Global” Timeout & Stuck Schedules we expect the new scheduled request list to be as follows:

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
REV 1	SYSADMIN	, , , N, N, Y	1	DAYS
REV 2	SYSADMIN	, , , N, Y, N	4	HOURS
4	USER1	CREATEPO, , , Y, Y, Y	5	MINUTES
9	SYSADMIN	GLBATCH, , , Y, Y, Y	1	MINUTES
13	CMSCHED	OEOH, , , Y, Y, N	1	HOURS
22	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
23	USER1	POAPPRV, , , Y, N,	5	MINUTES
24	USER1	POERROR, , , Y, N,	5	MINUTES
28	SYSADMIN	REQAPPRV, , , Y, Y, N	5	MINUTES

So this exercise of increasing the frequency of the “Global” WBP Stuck runs and increasing the “Global” Time out WBP to what would be considered close to normal industry standard frequencies we have been able to save an addition 20 WBP runs with very little impact on the structure we started with. What we have achieved is to remove complexity from the WBP runs.

This will equate to a saving of 20 per day

7 Project 3 – Deferred Workflow Items

Risk Level = Medium

The risk is set to Medium as you can always release the original workflow background processes from on-hold. In this section we will be lowering the frequency with which Deferred items are checked.

7.1 What is a Deferred Item?

To recap - In OEBS “real-time” workflow load is managed by identifying costly activities / processes, so that when they are encountered by the workflow engine they are immediately given a “deferred” status and the workflow engine continues processing the next activity. The deferred processes are then processed by a Workflow Background Process which can be run at an appropriate time.

The underlying aim with deferred items was to defer known “high” resource activities to a time when there are processing can be completed without impacting the normal activity of the application. That is, collect all the deferred items and run them at scheduled work breaks such as “lunch” time... But alas this did not happen. What we often see is deferred items being run every 1 – 5 minutes just to action them “now” even though they are actioned in background.

The questions that should be asked with any item that is deferred are:

- ❖ Why was it deferred in the first place?
- ❖ Should it be deferred?
- ❖ How fast should it be processed?

Here is the updated information for the site after projects 1 and 2:

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
REV 1	SYSADMIN	, , , N, N, Y	1	DAYS
REV 2	SYSADMIN	, , , N, Y, N	4	HOURS
4	USER1	CREATEPO, , , Y, Y, Y	5	MINUTES
9	SYSADMIN	GLBATCH, , , Y, Y, Y	1	MINUTES
13	CMSCHED	OEOL, , , Y, Y, N	1	HOURS
22	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
23	USER1	POAPPRV, , , Y, N,	5	MINUTES
24	USER1	POERROR, , , Y, N,	5	MINUTES
28	SYSADMIN	REQAPPRV, , , Y, Y, N	5	MINUTES

The first part is to see what workflows are actually being used and how often. The Aged Active workflow report is an excellent place for this information:

Aged Active Workflow Report

Workflow	Display Name	Sample size	Oldest (Days)	Current	30 Day	60 Day	90 Day	120 +
CREATEPO	PO Create Documents	8	1,141	0	0	0	0	8
GLBATCH	Journal Batch	17	25	17	0	0	0	0
GMDQMSM	OPM Quality Management Sample Creation	6	1,022	0	0	0	0	6
IBYOPCC	iPayment Operations Credit Card/Purchase Card	30	1,196	0	0	0	0	30
MRPEXWF	ASCP Exception WorkFlow in Source Instance	13	1,324	0	0	0	0	13
MSCEXPW	ASCP Exception Messages	3,092	1,303	0	0	0	0	3,092
MTLTXNR	MTL Transaction Reasons Workflow	269	1,194	10	21	15	21	202
OEOH	OM Order Header	9,954	1,345	9,116	528	49	58	203
OEOL	OM Order Line	53,601	1,338	52,474	636	78	65	348
OMERROR	OM Error	41,469	1,141	0	0	0	38	41,431
POAPPRV	PO Approval	189	1,197	4	1	1	3	180
POERROR	PO Approval Error	424	1,194	0	0	0	8	416
REQAPPRV	PO Requisition Approval	4,539	1,268	19	7	20	34	4,459
WFERROR	System: Error	56,262	1,427	19	31	19	51	56,142
WIPISHPW	WIP: Shipping & Receiving Intermediate	889	1,198	3	24	8	30	824
Total Active Workflows:		170,762						

From this report we can see that OEOH and OEOL are the most active workflows by a long shot.

Firstly we would setup a “Global” WBP (New 1) to action deferred items every 2 hours:

Run Number	Parameters	Frequency Unit	Frequency Value
Rev 1	, , , N, N, Y	1	DAYS
Rev 2	, , , N, Y, N	4	HOURS
New 1	, , , Y, N, N	30	MINUTES

We will use this new WBP to catch all deferred items for workflows not specified within the current configuration.

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
REV 1	SYSADMIN	, , , N, N, Y	1	DAYS
REV 2	SYSADMIN	, , , N, Y, N	4	HOURS
4	USER1	CREATEPO, , , Y, Y, Y	5	MINUTES
9	SYSADMIN	GLBATCH, , , Y, Y, Y	1	MINUTES
13	CMSCHED	OEOH, , , Y, Y, N	1	HOURS
22	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
23	USER1	POAPPRV, , , Y, N,	5	MINUTES
24	USER1	POERROR, , , Y, N,	5	MINUTES
28	SYSADMIN	REQAPPRV, , , Y, Y, N	5	MINUTES

For the less used workflows, unless there is a very compelling business reason for their existence you would:

Remove Run 4 CREATEPO, , , Y, Y, Y – Rather than every 5 minutes:

- Deferred CREATEPO workflow items will be picked up by the “Global” WBP every 30 minutes
- Timeout CREATEPO workflow items will be picked up by the “Global” WBP every 4 hours

How to lower the number of Workflow Background Processes (Sep 2010)

Stuck CREATEPO workflow items will be picked up by the “Global” WBP every 1 day

Remove Run 9 GLBATCH, , , Y, Y, Y – Rather than every 1 minute:

Deferred GLBATCH workflow items will be picked up by the “Global” WBP every 30 minutes

Timeout GLBATCH workflow items will be picked up by the “Global” WBP every 4 hours

Stuck GLBATCH workflow items will be picked up by the “Global” WBP every 1 day

Remove Run 23 POAPPRV, , , Y, N, N – Rather than every 5 minutes:

Deferred POAPPRV workflow items will be picked up by the “Global” WBP every 30 minutes

Remove Run 24 POERROR, , , Y, N, N – Rather than every 5 minutes:

Deferred POERROR workflow items will be picked up by the “Global” WBP every 30 minutes

Remove Run 28 REQAPPRV, , , Y, Y, N – Rather than every 5 minutes:

Deferred REQAPPRV workflow items will be picked up by the “Global” WBP every 30 minutes

Timeout REQAPPRV workflow items will be picked up by the “Global” WBP every 4 hours

Given the volume of OEOH and OEOL they deserve their own WBP to action deferred workflow items.

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
REV 1	SYSADMIN	, , , N, N, Y	1	DAYS
REV 2	SYSADMIN	, , , N, Y, N	4	HOURS
4	USER1	CREATEPO, , , Y, Y, Y	5	MINUTES
9	SYSADMIN	GLBATCH, , , Y, Y, Y	1	MINUTES
13	CMSCHED	OEOH, , , Y, Y, N	1	HOURS
22	CMSCHED	OEOL, , , Y, N, N	5	MINUTES
23	USER1	POAPPRV, , , Y, N,	5	MINUTES
24	USER1	POERROR, , , Y, N,	5	MINUTES
28	SYSADMIN	REQAPPRV, , , Y, Y, N	5	MINUTES

Change OEOH, , , Y, Y, N which is currently being run every hour to run deferred items every hour and let the “Global” Timeout and Stuck WBP take care of Timeout and Stuck workflow items....

FROM

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
13	CMSCHED	OEOH, , , Y, Y, N	1	HOURS

TO

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
New 13	CMSCHED	OEOH, , , Y, N, N	1	HOURS

...on the understanding that OEOL may have most of the deferred items that require actioning on a more frequent basis until a OEOL workflow review can be conducted by the workflow functional team it Run 22 should remain unchanged

7.2 Project 3 - Outcome

So at the end of Project 3 – (Deferred Workflow Items) we expect the new scheduled request list to be as follows:

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
REV 1	SYSADMIN	, , , N, N, Y	1	DAYS
REV 2	SYSADMIN	, , , N, Y, N	4	HOURS
New 1		, , , Y, N, N	30	MINUTES
New 13	CMSCHED	OEOH, , , Y, N, N	1	HOURS
22	CMSCHED	OEOL, , , Y, N, N	5	MINUTES

In this project we have added a new “Global” WBP to action deferred workflow items every 30 minutes, revised the OEOH WBP to transfer Timeout Actions to the “Global” timeout WBP and kept the OEOL deferred WBP in place with its original 5 minute frequency.

Taking into account an addition 48 WBP runs added with the new “Global” Deferred WBP, we will have net saving of 106 WBP runs per hour or 2,544 per day.

This will equate to a saving of 106 WBP per hour or 2,544 per day

8 The End Game

The end configuration should look something like the following:

Run Ref Number	Submitted By	Parameters	Frequency Unit	Frequency Value
REV 1	SYSADMIN	, , , N, N, Y	1	DAYS
REV 2	SYSADMIN	, , , N, Y, N	4	HOURS
New 1		, , , Y, N, N	30	MINUTES
New 13	CMSCHED	OEOH, , , Y, N, N	1	HOURS
22	CMSCHED	OEOL, , , Y, N, N	5	MINUTES

With a total of 12 WBP runs per hour or 367 per day

The site was estimated to be running approximately 34,000 concurrent requests per day of which approximately 11,000 (32%) are WBP (**W**orkflow **B**ackground **P**rocess) requests.

Actual WBP runs were - 458 runs per hour or 10,988 runs per day

I have shown how and why I would undertake actions to reduce this number:

Proposed WBP runs were - 12 runs per hour or 367 runs per day

This achieves a reduction of **96.7%** of the current WBP load on the application with very little effect on the overall processing of workflows.

Of course there are any number of reasons why this may not work at the site as I have no background information on which to base what I would propose in this instance.

One of the biggest issues is testing this, you really need live activity which means controlled implementation in production. This is why we would place the existing WBPs on-hold and not remove them until fully satisfied it all works as planned.

But reducing the overall overhead of the WBPs by 96.7% and their impact in the overall application including 10,000 less concurrent requests per day (30 % reduction in concurrent requests) makes a compelling argument!

9 Want to know more?

There is loads more **FREE** information on this topic and all aspects of OEBS Application Administration at the **PIPER-Rx** website. After over 20+ years working with Oracle (the product, not the Company) and Oracle E-Business Suite (since Release 5) I have visited countless sites and pretty much seen it all when it comes to Applications Administration. Since the late 1990's I have spent more time sharing these learnings and the most popular papers and case studies I have presented are available at the **PIPER-Rx.com** website as well as a whole host of Tips and Reports I have used throughout my career.

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