Daylight Saving Time (DST) and the Pentaho Scheduler

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Change log:

Date	Version	Author	Changes
2/28/2020	1.1	Chris Deptula	

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Overview

This document describes the behavior of the Pentaho Scheduler when a Daylight Saving Time (DST) change occurs. You will learn how the Pentaho Scheduler will react to the time change, and a few strategies for how to reduce the impact of the change.

Our intended audience is Pentaho users or administrators, or anyone with a background in scheduling on the Pentaho Server.

The intention of this document is to speak about topics generally; however, these are the specific versions covered here:

Software	Version(s)
Pentaho	7.x, 8.x, 9.0

The Components Reference in Pentaho Documentation has a complete list of supported software and hardware.

Before You Begin

Before beginning, use the following information to prepare for the procedures described in the main section of the document.

Terms You Should Know

Here are some terms you should be familiar with:

- `cron`: a software utility that allows you to set up jobs to run at specific times or particular intervals.
- **DST:** Daylight Saving Time, one hour ahead of Standard Time for a particular time zone.
- **Standard Time**: regular or "winter" time for a particular time zone.

Other Prerequisites

This document assumes that you have knowledge of Pentaho and have already installed it and configured some scheduled jobs.

Pentaho Scheduler Behavior

The Pentaho Scheduler uses one of two types of triggers to schedule a job:

- Simple
- Complex

The Daylight Saving Time behavior depends on which of these types of trigger you use when scheduling your job. You can find details on these topics in the following sections:

- [Mapping Pentaho Scheduling Types to Trigger Types](#)
- [Understanding Simple Trigger Behavior](#)
- [Understanding Complex Trigger Behavior](#)

Mapping Pentaho Scheduling Types to Trigger Types

This section maps the Pentaho recurrence types and patterns to the type of trigger that Pentaho uses. Mapping the Pentaho recurrence to the type of trigger is important to understand the behavior that occurs when the time changes.

Table 1: Pentaho Scheduling and Trigger Types

Recurrence Type	Recurrence Pattern	Trigger Type
Seconds	Every *n* seconds	Simple
Minutes	Every *n* minutes	Simple
Hours	Every *n* hours	Simple
Daily	Every *n* days	Simple
Daily	Every weekday	Complex
Weekly	Recur every week on	Complex
Monthly	Day *n* of every month (such as the 21st day of the month)	Complex
Monthly	The *n*th day of every month (such as the third Sunday of every month)	Complex
Yearly	Every *month day*	Complex
Yearly	The *n*th day of *month*	Complex
Cron		Complex

Understanding Simple Trigger Behavior

The simple Pentaho Scheduler trigger configures a job to run every *n* seconds, but it does not take time changes into account. For example, scheduling something to run every minute will configure a simple trigger to run every 60 seconds. Scheduling something to run every day will configure a simple trigger to run every 86,400 seconds.

DST Begins ("Spring Forward")

The simple trigger will run every *n* seconds after the last execution, regardless of the time change.

For example, if you have a job scheduled to run every two hours, and the last execution was 1:30 AM, the job will not run again until 4:30 AM during the "spring forward" time change. This happens because the hour between 2:00 and 3:00 AM was zero seconds long during the time change:

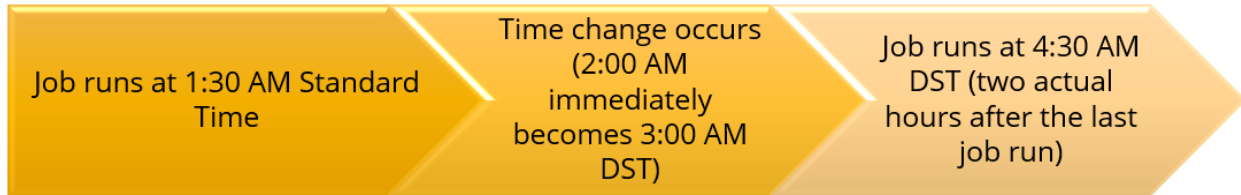|		
Job runs at 1:30 AM Standard Time	Time change occurs (2:00 AM immediately becomes 3:00 AM DST)	Job runs at 4:30 AM DST (two actual hours after the last job run)

Figure 1: Simple Trigger Job Running at DST Beginning

Similarly, if you have a job scheduled to run every day at 3:00 AM prior to the time change, the job will run at 4:00 AM every day after the time change, because it is configured to run every 86,400 seconds and the 2-3:00 AM hour was zero seconds long during the time change.

DST Ends ("Fall Back")

The simple trigger will again run every *n* seconds after the last execution, regardless of the time change.

For example, if you have a job scheduled to run every two hours, and the last execution was 1:30 AM, the job will run during the second occurrence of 2:30 AM when the time change occurs. This is because the first occurrence of 2-3AM took 3,600 seconds of the 7,200 second interval this job is scheduled to run:
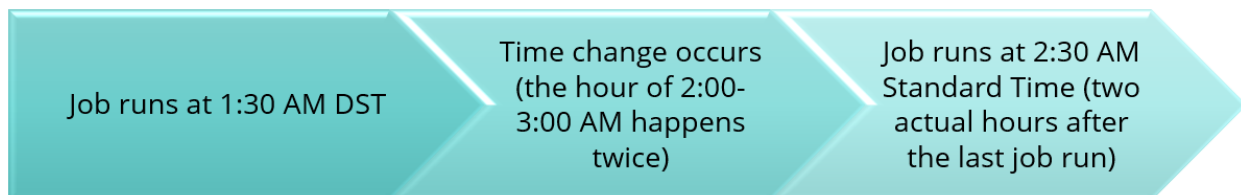
Job runs at 1:30 AM DST	Time change occurs (the hour of 2:00-3:00 AM happens twice)	Job runs at 2:30 AM Standard Time (two actual hours after the last job run)

Figure 2: Simple Trigger Job Running at DST End

Similarly, if you have a job scheduled to run every day at 3:00 AM prior to the time change, the job will then run at 2:00 AM every day after the time change, because it is configured to run every 86,400 seconds and the second occurrence of the 2-3:00 AM hour was 3,600 seconds during the time change. On the day of the time change, that job would run during the second occurrence of 2:00 AM.

Understanding Complex Trigger Behavior

The complex trigger uses a `cron` type scheduler, which takes time changes into account.

For example, a schedule set to run at 4:00 AM before the time change will continue to run at 4:00 AM after the time change, using a complex trigger.

DST Begins ("Spring Forward")

Because the complex trigger takes time changes into account, there will be no change to the time jobs are scheduled to start. A schedule that is set to start at 3:30 AM will start at 3:30 AM after a time change.

However, any job scheduled to run between 2:00 and 3:00 AM on the day of the spring time change will not run. This is because the hour between 2:00 and 3:00 AM did not occur, so the trigger to start the job will not run. Instead, the job scheduled between 2:00 and 3:00 AM will run at its next regularly scheduled execution time after the time change. It will only skip the one execution when time "springs forward."
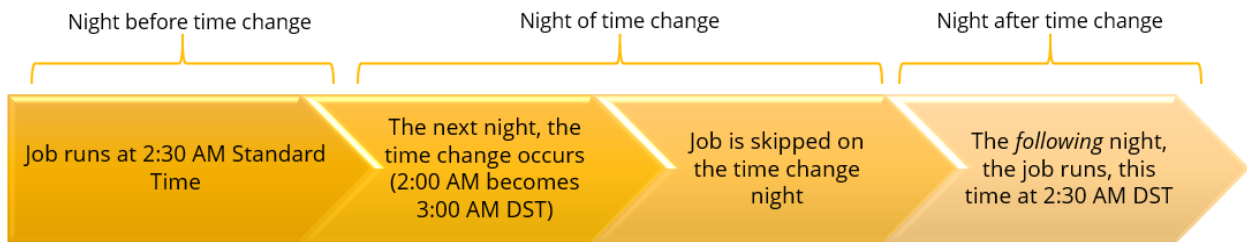

Figure 3: Complex Trigger Job Between 2:00-3:00 AM at DST Beginning

This behavior is not true in one particular case: when you attempt to schedule a job whose very first execution will be between 2:00 and 3:00 AM on the day of the time change. In this special case, the job will be scheduled for the 3:00 AM hour instead of the requested 2:00 AM hour.

DST Ends ("Fall Back")

As with the beginning of DST, if jobs are scheduled with the complex trigger, then at the end of DST there will be no change to the time jobs are scheduled to start. A job scheduled to start at 3:30 AM will still start at 3:30 AM after the time change.

However, any job scheduled to run between 2:00 and 3:00 AM on the day of the time change will run twice. This is because the 2-3:00 AM hour occurs twice, so the trigger to start the job will have its criteria met twice on that night:
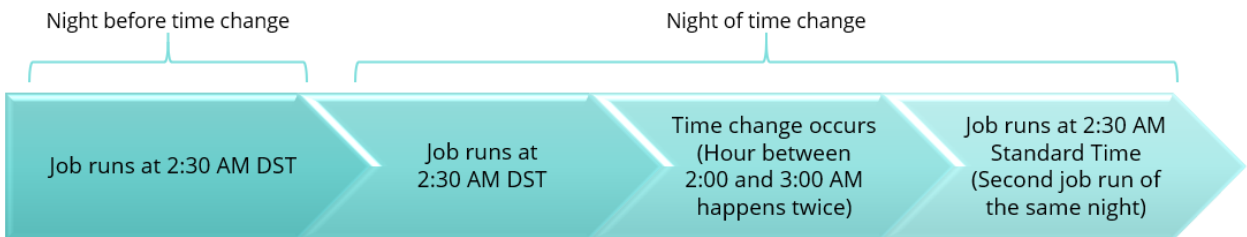

Figure 4: Complex Trigger Job Between 2:00-3:00 AM at DST End

Schedule Jobs Around Daylight Saving Time

Now that you understand how the Pentaho Scheduler operates regarding DST, you can use the following sections to explore some options to minimize the impact of DST on your scheduling:

- Using Weekly Option to Schedule Daily Executions
- Avoiding Scheduling Between 2:00 and 3:00 AM
- Blocking Out Scheduling During "Fall Back" Time Change

Using Weekly Option to Schedule Daily Executions

As mentioned earlier, the daily scheduling option that is triggered to run every *n* days is affected by DST. If you use the daily scheduling option, these jobs will have to be rescheduled twice a year when the time changes, to keep them running at the same time.

An alternative to using the daily scheduling option is to use the weekly schedule and select every day of the week you want the job to run. Weekly schedules are not impacted as significantly by the daylight saving time change and, with limited exceptions, will not have to be rescheduled when the time changes. For example:
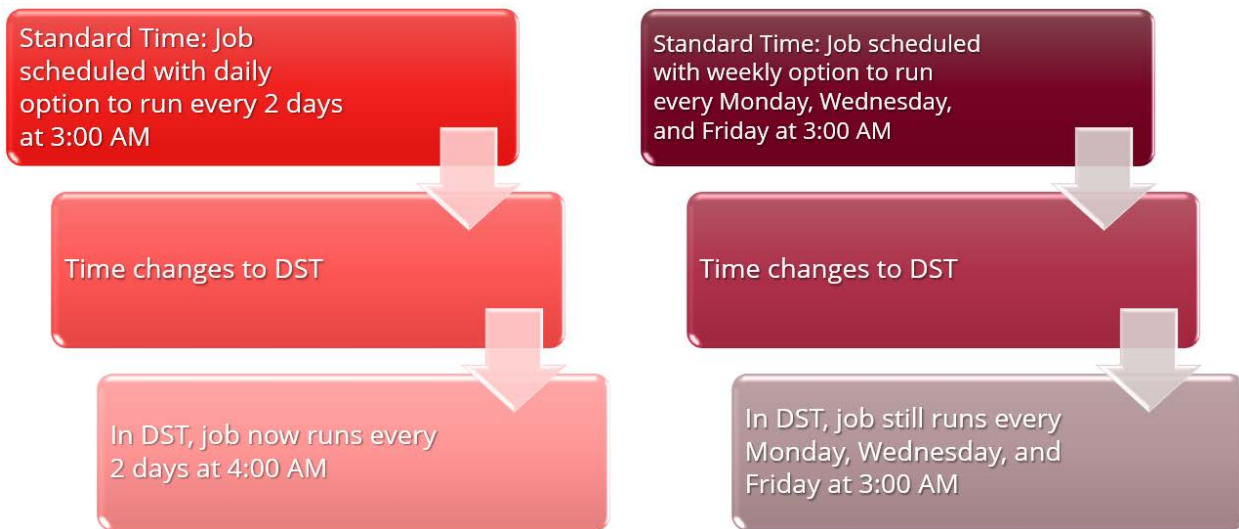

Figure 5: Daily Versus Weekly Option

Avoiding Scheduling Between 2:00 and 3:00 AM

Depending on the type of schedule you use, a job scheduled to run between 2:00 and 3:00 AM may be skipped or execute twice during the time change.

To avoid the challenges created during a time change, we recommend that you avoid scheduling jobs between 2:00 and 3:00 AM whenever possible.

Blocking Out Scheduling During "Fall Back" Time Change

During the fall time change, when the 2:00 to 3:00 AM hour occurs twice, and schedules set during this hour may run twice, consider blocking out scheduling during this hour.
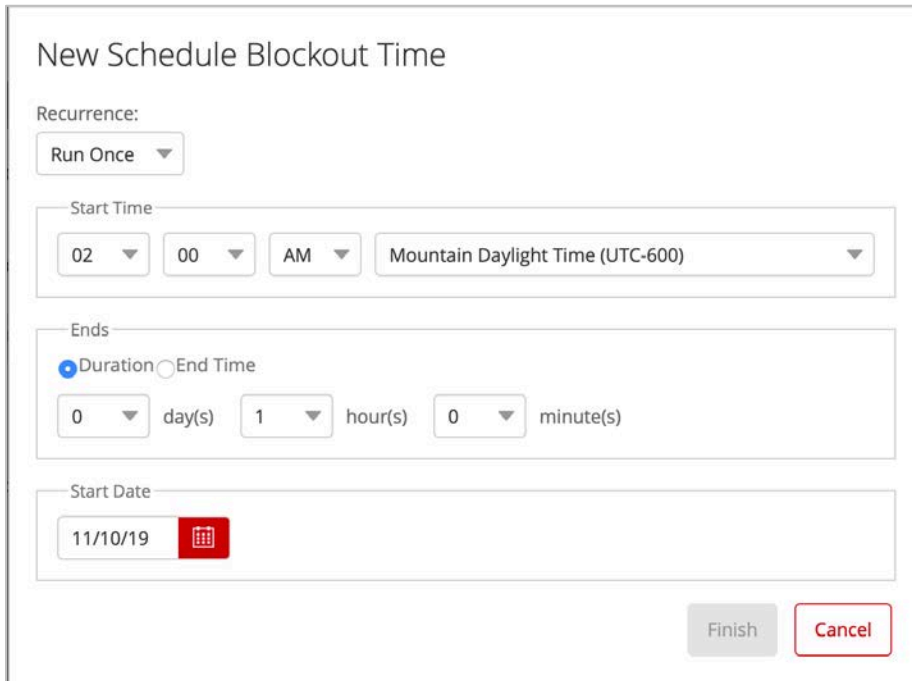
Depending on your jobs, running a schedule twice could cause unintended consequences. To prevent the schedules from running twice, you can configure a blockout time in the Pentaho Scheduler, keeping the jobs from running at all that night. Not running at all may be preferable to running twice.

To create a blockout time:

1. In the Pentaho User Console (PUC), open the **Scheduler** perspective.
2. Click the **Create Blockout Time** button:

<div align="center">

Create Blockout Time

</div>

3. Create a blockout time of one hour to run once at 2:00 AM on the day the time changes:

New Schedule Blockout Time

Recurrence:

Run Once

Start Time

02   00   AM   Mountain Daylight Time (UTC-600)

Ends
● Duration ○ End Time

0   day(s)   1   hour(s)   0   minute(s)

Start Date

11/10/19

Finish   Cancel

Finalization Checklist

This checklist is designed to be added to any implemented project that uses this collection of best practices, to verify that all items have been considered and reviews have been performed.

Name of the Project:_____

Date of the Review:_____

Name of the Reviewer:_____

Item	Response	Comments
Did you use the weekly schedule instead of the daily schedule?	YES_____ NO_____	
Did you check to see if you have jobs scheduled to run between 2:00 AM and 3:00 AM on Sundays?	YES_____ NO_____	
Did you schedule a blockout time during the fall time change?	YES_____ NO_____	