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June 17, 2015

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Presentation schedule to start at :
14.00 IST (Ireland, Britain, Portugal, North Africa)
15.00 CEST (Central Europe, Egypt, South Africa)
16.00 EEST (Eastern Europe, Russia, Middle East)
09.00 EST (East Coast US)
06.00 PST (West Coast US)

IBM P8 BPM and Case Manager Workflow system: Administration Overview

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Objectives

- List currently required or recommended administrative tasks that will insure optimal usage of the workflow system.
- Explain generic concepts involved in such administrative tasks
- Provide some knowledge of further administrative tools

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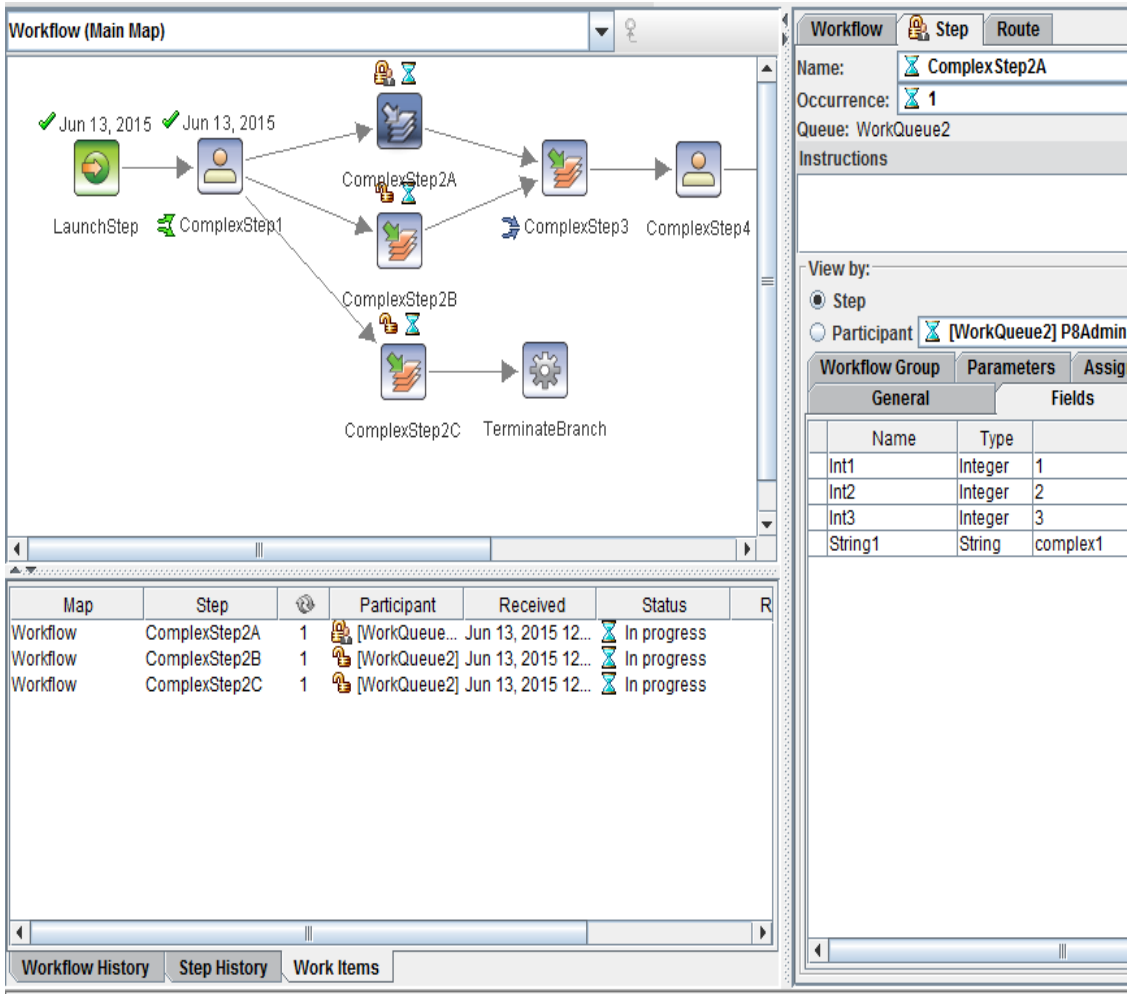
Agenda

- Overview
- Concept:
  - What is a Workflow?
  - Workflow and Work items
  - Queues and Rosters
  - The life of a Workflow: define, launch, process, terminate
- Administrative tasks:
  - How to find and update a Workflow?
  - Event Log and pelog (vwlog)
  - Tracker items
  - Troubleshooting
  - Handling work items in conductor queue
  - Processing work items left in lock state
  - Looking for non-terminating Workflows
  - Impact of LDAP changes
  - Monitor 'vwtool> loadstatus'
- Tools :
  - vwtool
  - Other tools (PA, PCC, ACCE, Process Tracker)
- How does this apply to Case Manager?
- Questions



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Overview

- The workflow is one of the main features of IBM P8 Business Process Manager and Case Manager
- Inherit and enhance concepts defined in FileNet Visual Workflow
- If left unattended, some behavior may lead to actual issue impacting the health of your system.
- Generic workflow related concepts help to define expected behavior, and therefore make it easier to understand and correct unexpected behavior (e.g. workflow error routed to Conductor queue)
- The presentation is mainly based on P8 5.2 version. Most of the details are also applicable to previous versions, even if the architecture changed:
  - In 5.2, workflow system is included in Content Platform Engine (CPE), running within J2E application server
  - In 5.0, Process Engine as a Java application (running in its own JVM)
  - In 4.5 and earlier, Process Engine as stand-alone application

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VISUAL WORKFLOW

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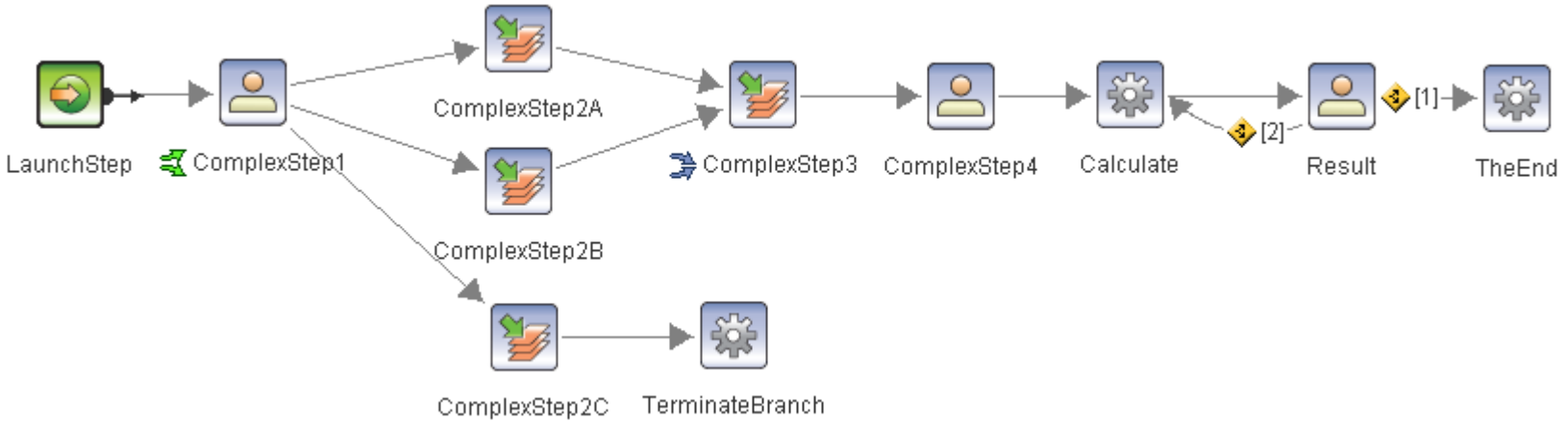
What is a Workflow?



- Definition of a workflow: “series of stages that a particular piece or type of work passes through from the beginning until it is finished”
- In P8, a workflow is also a series of tasks, usually centered around a document or a case.
- Such workflows first need to be defined by designing a map listing each steps and the flows between these steps.
- At this point, a workflow instance can be launched, processed through the steps according to the defined flow, up to completion.
- Each step is handled either by:
  - a user who will update fields within a step processor before completing the step.
  - the P8 server itself (system step).
  - or through interaction with other applications (through API call, Component steps, WebServices calls, ...).

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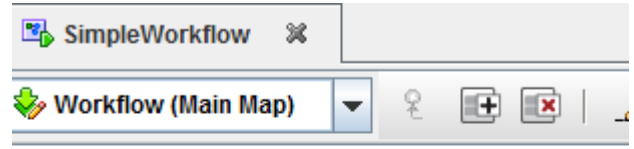
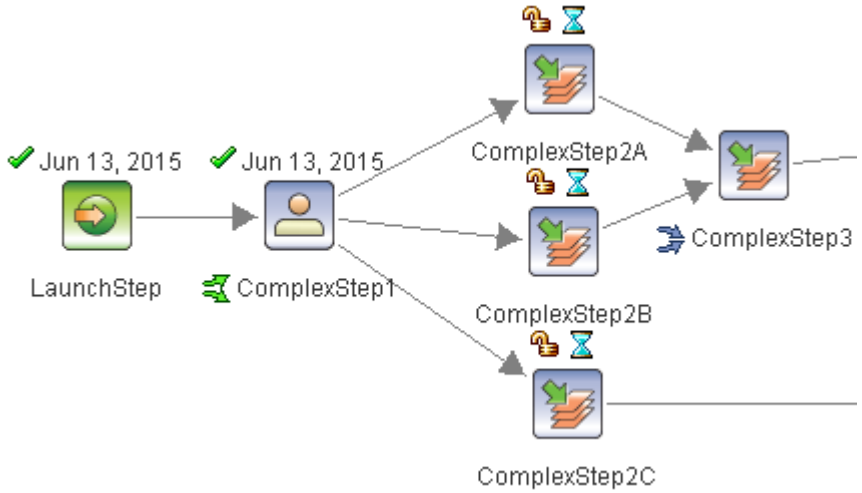
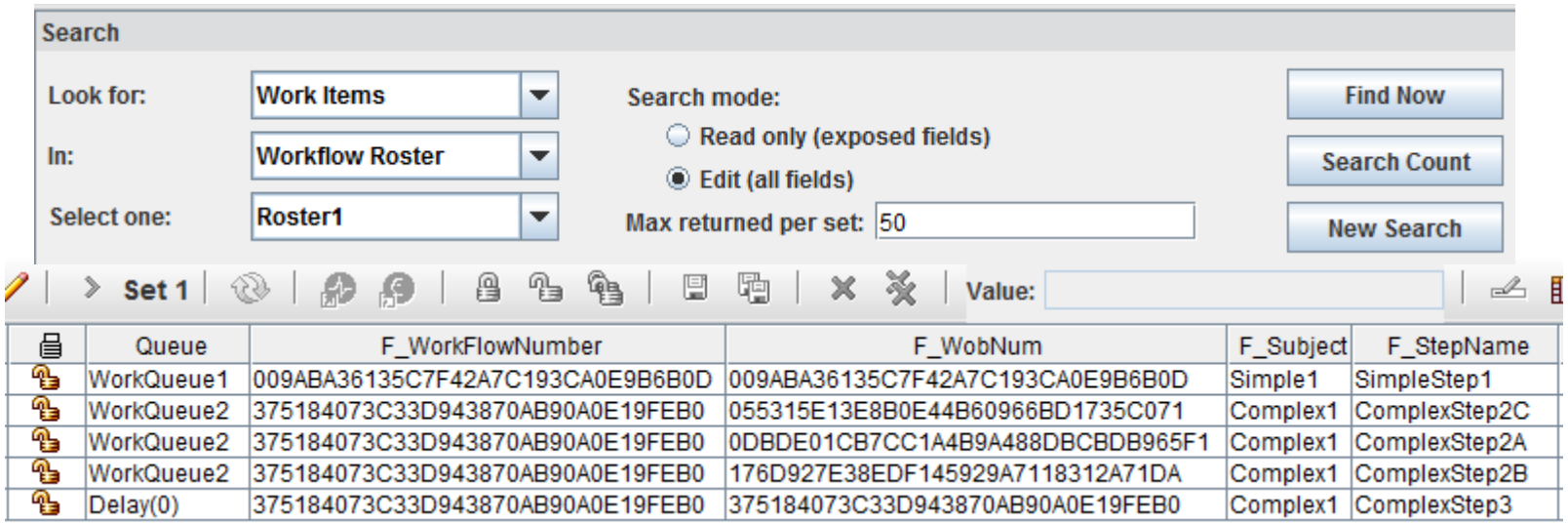
Workflow and Work Items



- For each concurrent piece of work in a workflow, we will have a work item.
- A simple (sequential) workflow may require only one work item from beginning to end.
- A more complex workflow will lead to several pieces of work being processed simultaneously. In this case, for this one workflow, we will have several work items.





Queue	F_WorkFlowNumber	F_WobNum	F_Subject	F_StepName
WorkQueue1	009ABA36135C7F42A7C193CA0E9B6B0D	009ABA36135C7F42A7C193CA0E9B6B0D	Simple1	SimpleStep1
WorkQueue2	375184073C33D943870AB90A0E19FEB0	055315E13E8B0E44B60966BD1735C071	Complex1	ComplexStep2C
WorkQueue2	375184073C33D943870AB90A0E19FEB0	0DBDE01CB7CC1A4B9A488DBCBDB965F1	Complex1	ComplexStep2A
WorkQueue2	375184073C33D943870AB90A0E19FEB0	176D927E38EDF145929A7118312A71DA	Complex1	ComplexStep2B
Delay(0)	375184073C33D943870AB90A0E19FEB0	375184073C33D943870AB90A0E19FEB0	Complex1	ComplexStep3

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Queues, Roster and Event Log

- The workflow system uses:
  - queues to organize the flow of work
  - rosters to keep track of work in progress
  - event logs to record each event occurring on workflows
- Each step of the workflow corresponds to a queue:
  - activity steps assigned to an individual (or workgroups) are handled via the Inbox queue, or else linked to a work queue
  - system queue (e.g. Conductor queue)
  - component queue
- Queues, rosters and event logs correspond to tables at the database level. The 'config' command in 'vwtool' allows the link between the table and the corresponding queue, roster, or event log to be seen.

```
<vwtool:20> config
Work Queue                          Table                           Physical Table
Name                                Name                            Name
----------                          -----                           --------------
Delay(0)                            Delay(0)                        VWQueue20_132
Inbox(0)                            Inbox(0)                        VWQueue20_129
Conductor                           Conductor                       VWQueue20_129
InstructionSheetInterpreter(0)      InstructionSheetInterpreter(0)  VWQueue20_133
CE_Operations                       CE_Operations                   VWQueue20_130
WorkQueue1                          WorkQueue1                      VWQueue20_144
WorkQueue2                          WorkQueue2                      VWQueue20_148
WSRequest(0)                        WSRequest(0)                    VWQueue20_131
Tracker(0)                          Tracker(0)                      VWQueue20_129

Roster                              Physical Table Roster
Name                                Name           ID
------                              -------------- ------
DefaultRoster                       VWRoster20_141       4
Roster1                             VWRoster20 150       7
```

- Each work item corresponds to a row in a queue and another in a roster. When going from one step to the next, records usually move from the current queue to the next queue. But the roster record stays in the same roster for the life of the work item.
- Event log stores events recording the life of the workflow e.g. workflow created, step processed and terminated. What is recorded depends on the configured options.

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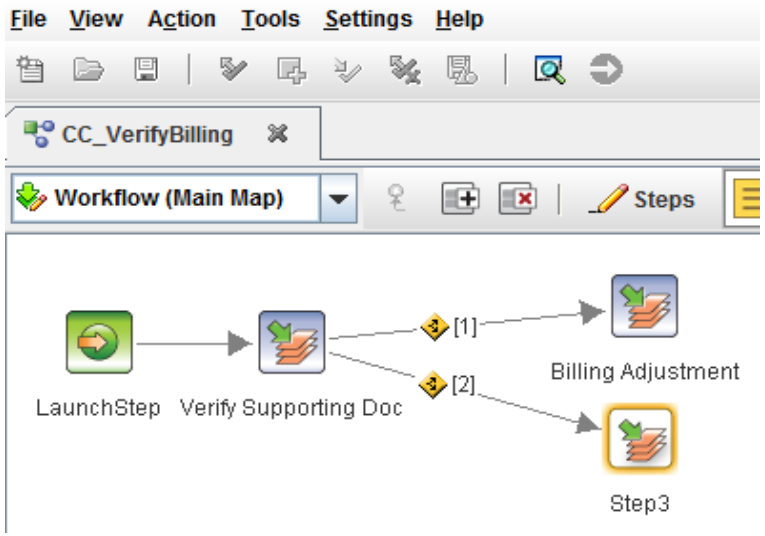
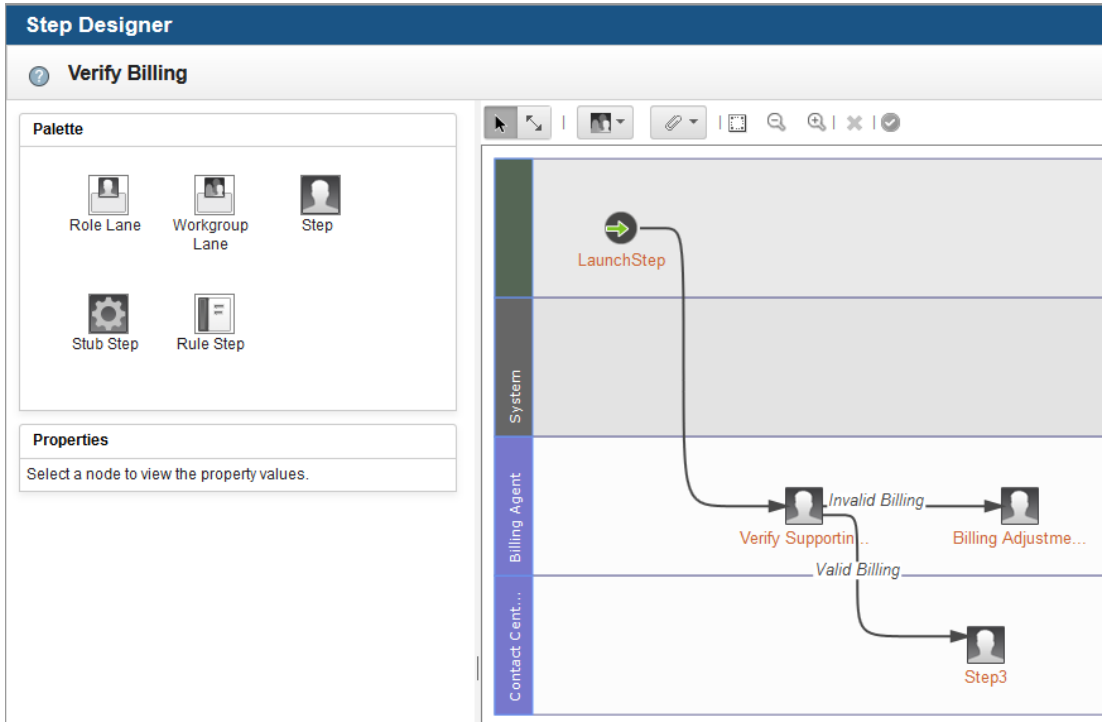
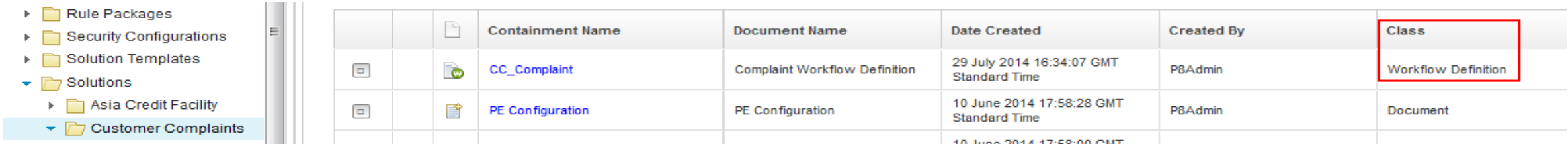
The life of a Workflow: define





- In P8, Workflow Definition is created using Process Designer
- For Case Manager, Case Builder enables workflows to be defined. Process Designer is sometimes also needed for some specific implementation.
- A workflow definition is generated. This is an XML file representing the workflow map(s) and details of each step. Such workflow definition is then stored in an ObjectStore as a document of class 'Workflow Definition'



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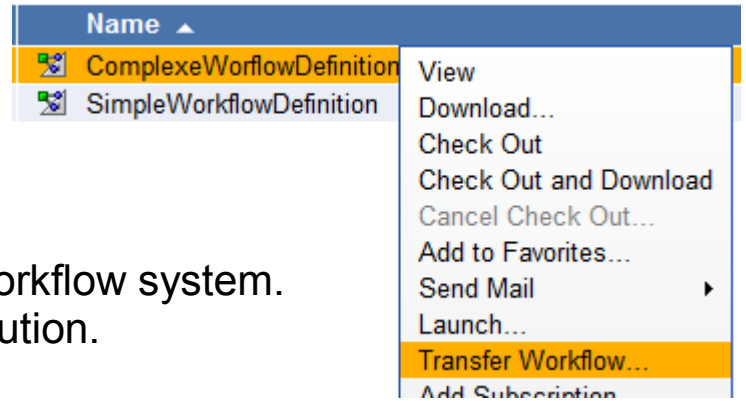
The life of a Workflow: launch



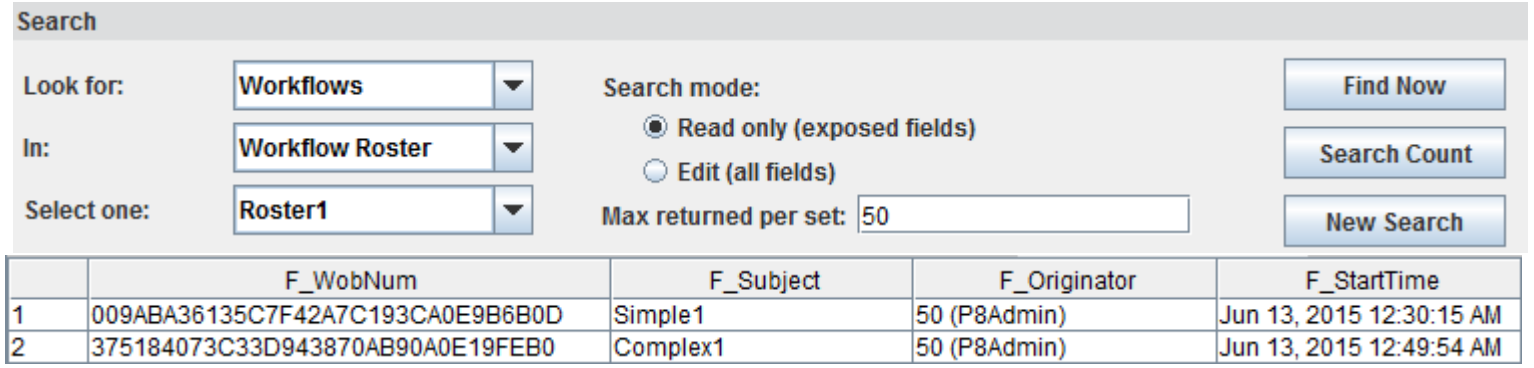
- Transferring a workflow definition creates a representation of the workflow map in the workflow system.
  For Case Manager, the transfer is automatically done as you define and deploy your solution.

- We can use 'vwtool' and 'config' command to see the list of transferred workflow definitions (called Work Class)

```
Work Class Name                Class ID Roster Name
                                        Event Log Name
---------------                -------- --------------
ComplexWorflow                        9 Roster1
                                        EventLog1
```

- At this point, we can launch an instance of the workflow. This is usually automatically done as a result of an event.
  In P8, document creation can trigger a workflow launch via a workflow subscription.
  In Case Manager, tasks are started based on predefined criteria.

- Once a workflow instance is launched, we can find it in Process Administrator



	F_WobNum	F_Subject	F_Originator	F_StartTime
1	009ABA36135C7F42A7C193CA0E9B6B0D	Simple1	50 (P8Admin)	Jun 13, 2015 12:30:15 AM
2	375184073C33D943870AB90A0E19FEB0	Complex1	50 (P8Admin)	Jun 13, 2015 12:49:54 AM

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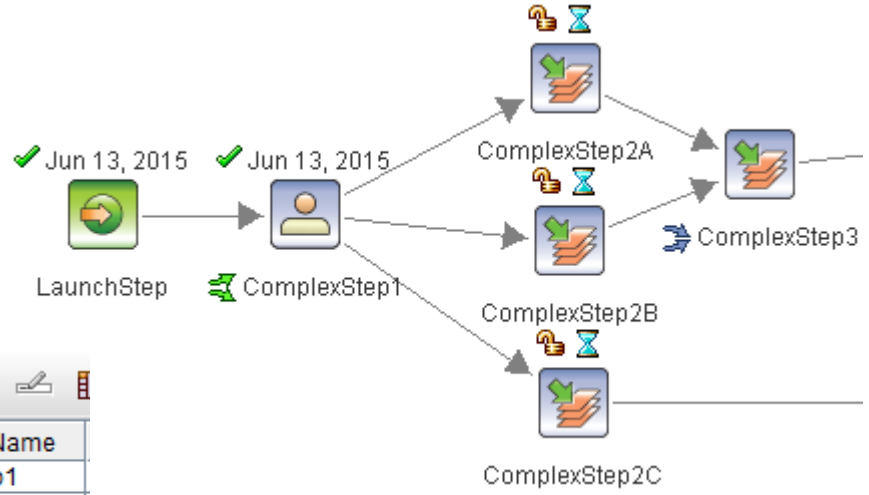
The life of a Workflow: process

- At this point, the workflow is ready to be processed, going through each required step.
- A workflow may lead to several pieces of work being processed simultaneously. In this case, for this one workflow, we will have several work items.
  e.g. on a workflow split, we will have 2 (or more) work items, each one assigned to one user/queue. The system will also use another workitem to manage the collection point.
- Using Process Administrator, we can search for Workflow or for Work Item.
- All workitems part of the same workflow have the same F_WorkFlowNumber.
  But each one has its own F_WobNum.
  'Wob' stands for 'work object'. This is the same as work item.



Set 1 | Value:

Queue	F_WorkFlowNumber	F_WobNum	F_Subject	F_StepName
WorkQueue1	009ABA36135C7F42A7C193CA0E9B6B0D	009ABA36135C7F42A7C193CA0E9B6B0D	Simple1	SimpleStep1
WorkQueue2	375184073C33D943870AB90A0E19FEB0	055315E13E8B0E44B60966BD1735C071	Complex1	ComplexStep2C
WorkQueue2	375184073C33D943870AB90A0E19FEB0	0DBDE01CB7CC1A4B9A488DBCBDB965F1	Complex1	ComplexStep2A
WorkQueue2	375184073C33D943870AB90A0E19FEB0	176D927E38EDF145929A7118312A71DA	Complex1	ComplexStep2B
Delay(0)	375184073C33D943870AB90A0E19FEB0	375184073C33D943870AB90A0E19FEB0	Complex1	ComplexStep3

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The life of a Workflow: terminate

- A work item terminates when it reaches the end of its branch (i.e. no further step, collector step) or a Terminate Branch system step.
- A workflow terminates when all work items have terminated or as a result of a Terminate Workflow system step.
- Once terminated, there is no more record of the workflow (or work item) in the queues and rosters.
- Only information remaining would be in the event log, if such event logging is activated.
  Each event (creation, dispatch, …) is recorded in a table like this one.

	F_WorkFlowNumber	F_EventType	F_TimeStamp
1	009ABA36135C7F42A7C...	140 (WOParentCreation)	Jun 13, 2015 12:30:15 AM
2	009ABA36135C7F42A7C...	352 (WPWorkObjectQueued)	Jun 13, 2015 12:30:15 AM
3	009ABA36135C7F42A7C...	350 (WPBeginService)	Jun 13, 2015 1:56:08 AM
4	009ABA36135C7F42A7C...	365 (WPWOBSaveWithLock)	Jun 13, 2015 1:56:20 AM
5	009ABA36135C7F42A7C...	360 (WPEndServiceNormal)	Jun 13, 2015 1:56:20 AM
6	009ABA36135C7F42A7C...	352 (WPWorkObjectQueued)	Jun 13, 2015 1:56:20 AM
7	009ABA36135C7F42A7C...	350 (WPBeginService)	Jun 13, 2015 1:56:48 AM
8	009ABA36135C7F42A7C...	365 (WPWOBSaveWithLock)	Jun 13, 2015 1:56:50 AM
9	009ABA36135C7F42A7C...	360 (WPEndServiceNormal)	Jun 13, 2015 1:56:50 AM
10	009ABA36135C7F42A7C...	500 (WOEmptyStepMsg)	Jun 13, 2015 1:56:50 AM
11	009ABA36135C7F42A7C...	160 (WOParentTermination)	Jun 13, 2015 1:56:50 AM
12	009ABA36135C7F42A7C...	165 (WFTerminationMsg)	Jun 13, 2015 1:56:51 AM

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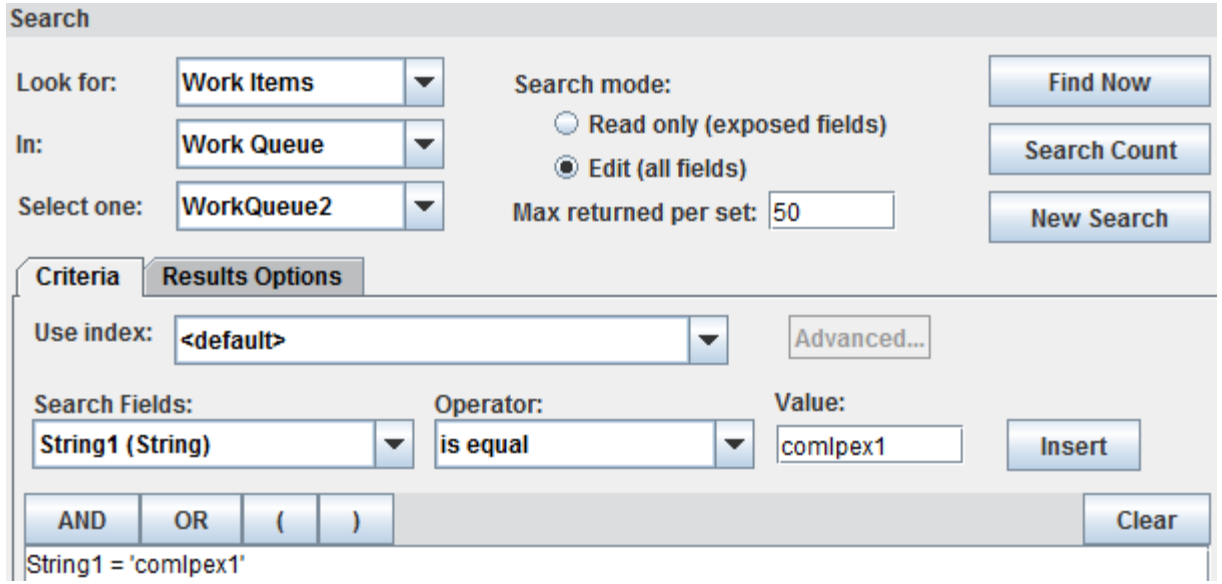
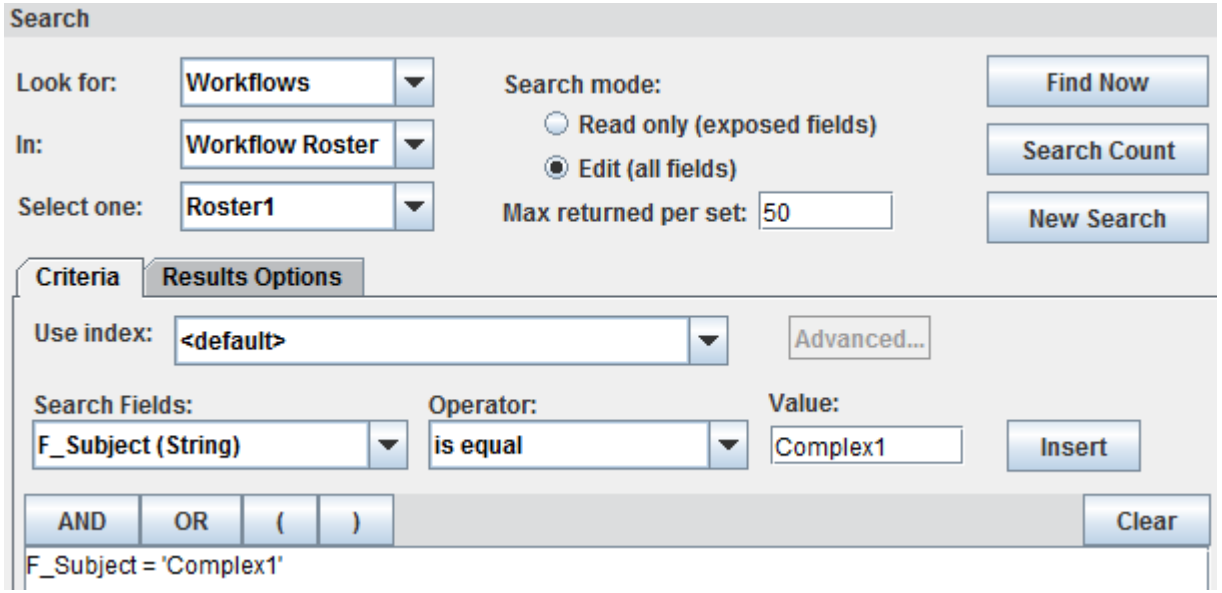
How to find and update a Workflow

- Use Process Administrator.
- Search using what you know about the workflow or work item:
  - What queue is it in?
  - When was it started (F_StartTime)?
  - What is the workflow subject (F_Subject)?
  - Who is it assigned to (F_BoundUser)?
  - What is the value of the custom exposed datafield?
- If you don't know the queue, search in the roster.
- Search criteria available depends on whether you are searching against roster, queue or event log.
- You can also search on exposed field, i.e. system or data field added to the queue or roster.
- Once found, you can then lock the workflow or work item to be able to update a field.
- Note: if a workflow has several work items, updates at workflow level are applied to all work items.
- If event log is used, you can check workflow history in tracker.





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Event Log and pelog (vwlog)

- Event Log - and corresponding database - table can become very large if not maintained.
- Event history is needed for Process Tracker, Case Analyzer (Process Analyzer) or other auditing requirements.
- If not needed, disable event logging option at isolated region level in ACCE → Object Store → Workflow System → Connections Points → select your connection point → Event Logging Options.
- If using Event Log, set-up and use different event logs for different sets of workflows.
- Use 'pelog' in P8 5.2 - or 'vwlog' in previous versions - to regularly purge events no longer needed.
- Use options '-Terminated' and '-TimeOnly' introduced with 'pelog', rather than using legacy start/end time option (as previously defined with 'vwlog'). See details of 'pelog' usage at:

  http://www-01.ibm.com/support/docview.wss?uid=swg27036649

- If using 'vwlog' don't forget to delete System Event (e.g. user login) using '-Z' option. See further 'vwlog' guidelines at:

  http://www-01.ibm.com/support/docview.wss?uid=swg21384885

- As Event Log table contains more rows, this impacts the performance of 'vwlog', especially when using '-T' option.
- Check if the older events have a good reason to still be present.

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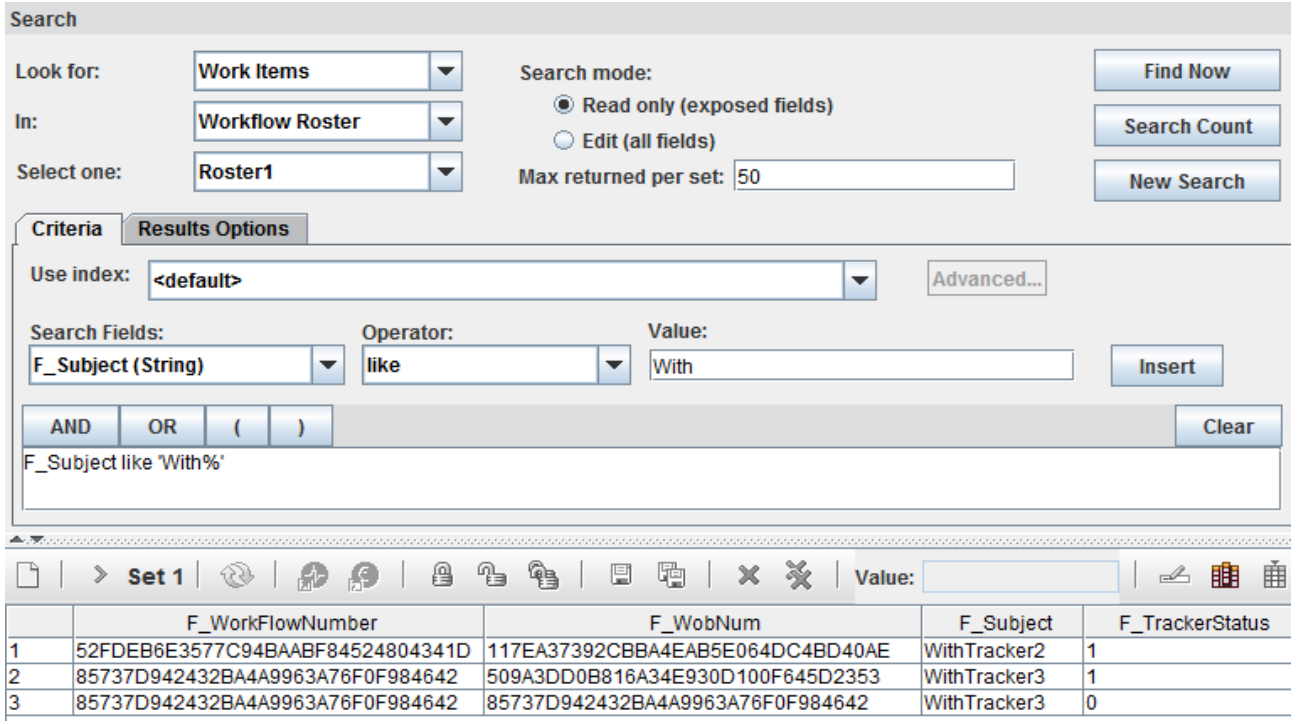
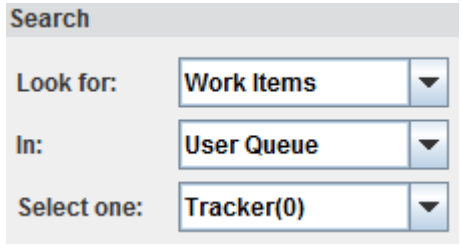
About Tracker Items

- Tracker Items are used to track activity on a workflow.
- A tracker item is itself a separate work item in Tracker(0) queue.
- Tracker item is not deleted automatically when the corresponding workflow is completed.
- Example on the right shows a live workflow with its tracker item (F_Subject = 'WithTracker3').
  The other workflow (F_Subject = 'WithTracker2') has been completed but the tracker item still exists.



	F_WorkFlowNumber	F_WobNum	F_Subject	F_TrackerStatus
1	52FDEB6E3577C94BAABF84524804341D	117EA37392CBBA4EAB5E064DC4BD40AE	WithTracker2	1
2	85737D942432BA4A9963A76F0F984642	509A3DD0B816A34E930D100F645D2353	WithTracker3	1
3	85737D942432BA4A9963A76F0F984642	85737D942432BA4A9963A76F0F984642	WithTracker3	0

- Use Process Administrator, or 'pelog' (or 'vwlog' option -D) to delete tracker items.
  Searching items in Tracker(0) queue shows if corresponding work item is completed.



	!	F_WobNum	F_Subject
1		509A3DD0B816A34E930D100F645D...	WithTracker3
2	✓	117EA37392CBBA4EAB5E064DC4B...	WithTracker2

Work item is completed

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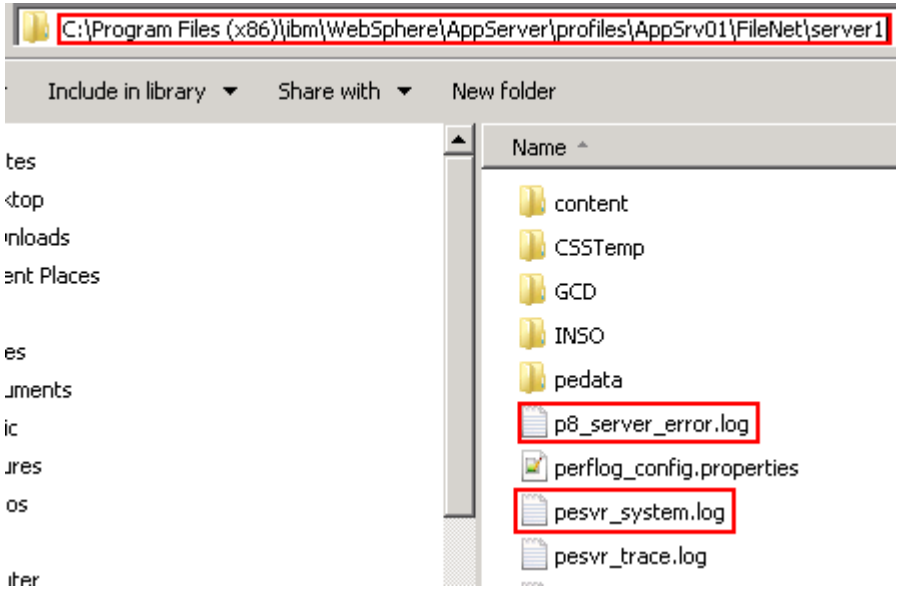
Troubleshooting



- Logs:
  - Overall P8 system logs: p8_server_error.log
  - Process specific messages are in pesvr_system.log
  - if trace enabled: pesvr_trace.log
- Check basic system version and availability using ping page:
  - P8 ping page: http://<server>:<port>/FileNet/Engine
  - Process ping page: http://<server>:<port>/peengine/IOR/ping
    - can use this to confirm 'Log File Location'.
    - display the list of Process related threads (VWTime, ...).
    - link to Component Manager logs and stats.
- MustGather links:
  - 5.2: http://www.ibm.com/support/docview.wss?uid=swg21589938
  - 5.0: http://www.ibm.com/support/docview.wss?uid=swg21446755
  - 4.5: http://www.ibm.com/support/docview.wss?uid=swg21327304
- Data Collector available to automatically collect a full set of logs and outputs:
  http://www.ibm.com/support/docview.wss?uid=swg21627110

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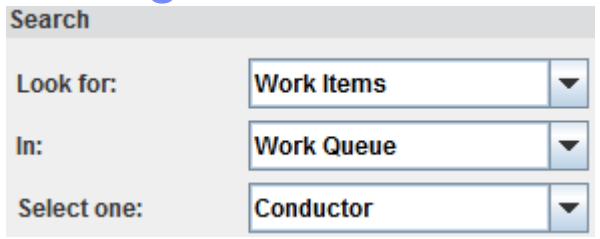
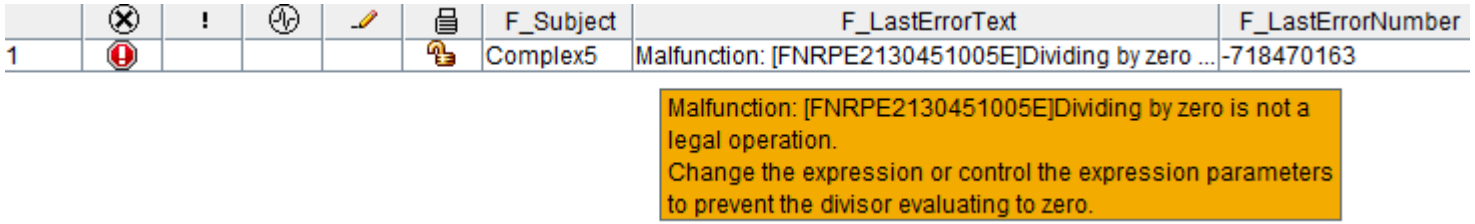
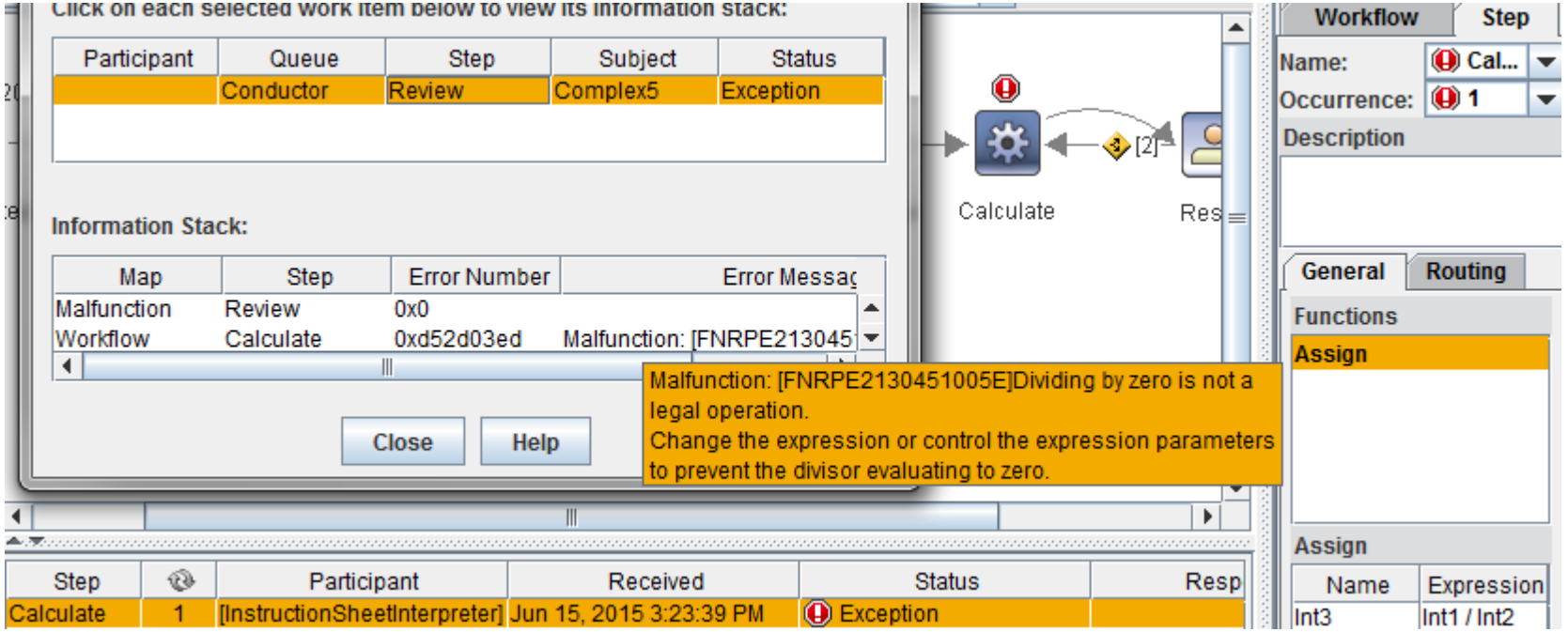
Handling workitems in conductor queue





- When an error occurs on a workflow, it is sent to the malfunction map. By default, the work items go in the conductor queue.
- Use Process Administrator to review and correct workflows in the conductor queue.
  - search in Edit mode to be able to select the fields; F_LastErrorNumber, F_LastErrorText
  - or open in Process Tracker, for the current step → view information stack.

- You can hover over the error message to see the full message.
- Depending on workflow logic, you may be able to update the data field.
- In this case, the problem is that int2 is set to zero.
  Set int2 to 10 and int3 to 2.
  Then 'Complete Work'
- Setting 'F_WFReminder' to 1 sends the work item back to the step where the exception occurred.



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Monitor 'vwtool> loadstatus'

- Command 'loadstatus' in 'vwtool' displays RPC counters and error counters.
- Full list described at : http://www-01.ibm.com/support/knowledgecenter/SSNW2F_5.2.1/com.ibm.p8.pe.vw.doc/bpfvl039.htm?lang=en
- RPC counters can be used to define a base line for the system load. Such a base line can be used to compare with current load when investigating performance related behavior.
- The error counters represent events that may happen, even on healthy systems, but should not be too frequent.
- For example, a large number of 'Timer manager update errors' may indicate that some work items are left in a locked state.

```
<vwtool:20>loadstatus
[ For Region 20 from: Sun, 14 Jun 2015 03:33:31, To: Mon, 15 Jun 2015 22:50:48 ]

[ Total seconds:    155837, minutes:   2597.28, hours:     43.29 ]
                                        Total   Average  Average
                                        Count   Per Min  Per Hour
# Executed Regular Steps:                 26      0.01      0.60
# Executed System Steps:                  5      0.00      0.12
# Java RPCs:                              0      0.00      0.00
# Object Service RPCs:                    0      0.00      0.00
# Work Object Inject RPCs:                5      0.00      0.12
# Queue Query RPCs:                      81      0.03      1.87
# Roster Query RPCs:                    422      0.16      9.75
# Lock Work Object RPCs:                 37      0.01      0.85
# Update Work Object RPCs:               32      0.01      0.74
# Invoke Web Service Instructions:        0      0.00      0.00
# Receive Web Service Instructions:       0      0.00      0.00

# Lock work object errors:                0      0.00      0.00
# email notification errors:              0      0.00      0.00
# Transaction deadlock errors:            0      0.00      0.00
# Database reconnect:                     0      0.00      0.00
# Timer manager update errors:           75      0.03      1.73
# Work objects skip due to sec errors:    0      0.00      0.00
# Exceed the Work Space Cache:            0      0.00      0.00
# Exceed the Isolated Region Cache:       0      0.00      0.00
# Authentication errors:                  0      0.00      0.00
# Authentication token timeouts:          0      0.00      0.00
# Bkg task row lock lease extensions:     0      0.00      0.00
```

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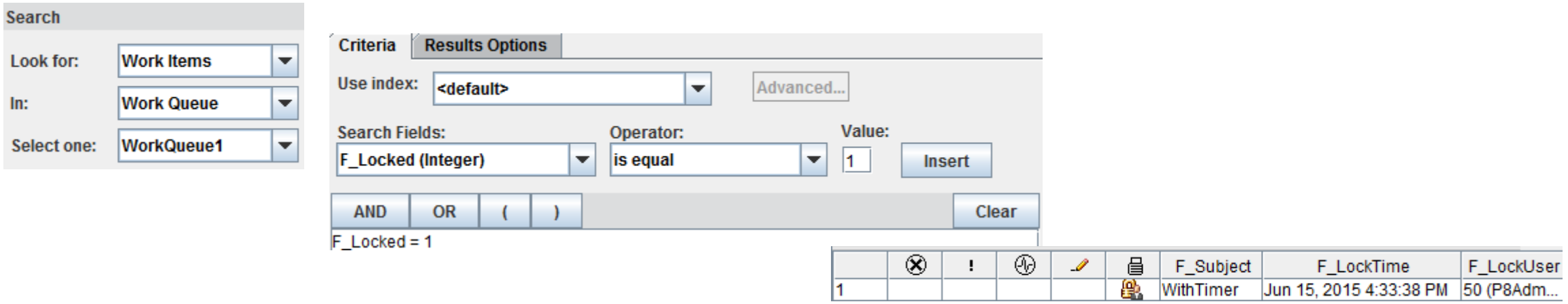
Process work item left in lock state

- Work items can be left locked for various reasons e.g. application failure.
- Such work items may stay locked forever – or until someone realizes that a workflow is not progressing as expected.
- Deadlines will not process such work items, as the user may be using lock for a valid reason.
- To find the locked work item, use Process Administrator to search queue with 'F_Locked = 1' or F_LockTime older than expected.



- Check with the user or review the workflow in Process Tracker to confirm if the lock is needed.
- Process Administrator allows you to override the lock. Also provides a feature to 'Unlock Work By Users/Queues'.

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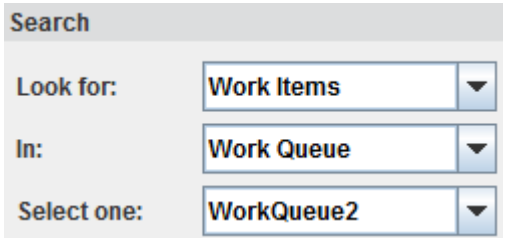
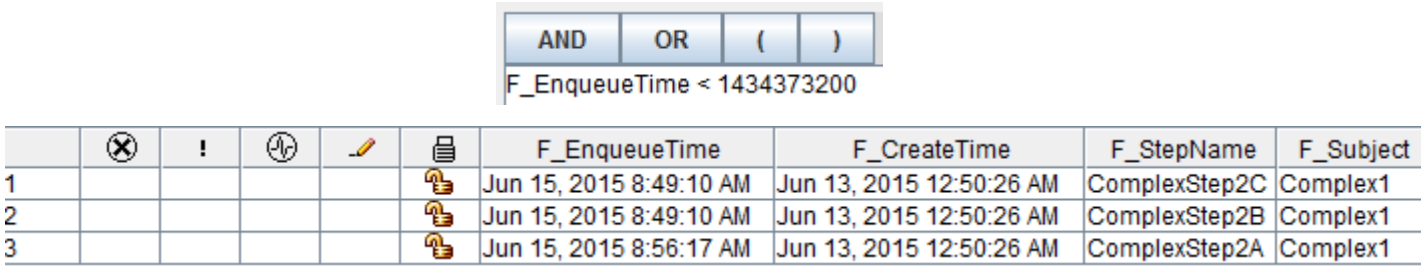
Looking for non terminating or blocked Workflow

- It is possible that a workflow never terminates.
- This could be part of the workflow design, but good practice, especially in a Case Manager system, is to limit the lifetime of a workflow.
- In Process Administrator, search for old workflows, or work items inactive for a long period of time using criteria such as F_StartTime or F_EnqueueTime.





	⊗	!				F_EnqueueTime	F_CreateTime	F_StepName	F_Subject
1						Jun 15, 2015 8:49:10 AM	Jun 13, 2015 12:50:26 AM	ComplexStep2C	Complex1
2						Jun 15, 2015 8:49:10 AM	Jun 13, 2015 12:50:26 AM	ComplexStep2B	Complex1
3						Jun 15, 2015 8:56:17 AM	Jun 13, 2015 12:50:26 AM	ComplexStep2A	Complex1

- Use 'vwtool> convert' to get a timestamp value for a date.
- Process Tracker can help you review whether the workflow is stuck in a dead end, or if this is still following a valid flow.
- 'vwtool> count' may show queues with a continually increasing number, so you should check whether work items are being correctly processed from these queues.

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Impact of LDAP changes

- Process server in Content Platform Engine caches users from LDAP by storing user information into the workflow system database as environment records.
- If users are removed from LDAP prior to reassigning the work items or security definitions associated with those users, the following behaviors might be encountered:
  - Orphaned work items
  - Work items end up going to the malfunction submap
  - Work items unable to proceed forward
  - Timer work items will not process
  - Administrators unable to administer security on queues or rosters
- example of an error that is logged:

```
2014/08/07 10:39:43.524-0700 VWUserSync PESecondary2 DB=CLD6_TOS_DBCONN [Warning] Suspect user peuser1 is deleted from
LDAP. Can't find either his shortname nor secondary key(s) in LDAP
```

- TechNote describes “How to remove users from LDAP while limiting impact to Process service in Content Platform Engine?” http://www-01.ibm.com/support/docview.wss?uid=swg21678829

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Tools: vwtool

- vwtool : The vwtool utility is a command line-driven system support and administration program you can use to analyze and modify various components of a workflow system.
- Main command :
  - *config*: provides configuration information for current region
  - *count*: shows number of work items in queues and rosters. Should have the same total for queues and rosters.
  - *environment*: displays or reconciles user/group information.
  - *loadstatus*: displays statistics on the load handled by the server. Also shows counter for some specific events: high number could be result of underlying issue.
  - *trace*: shows trace server activity, usually used at the request of IBM support.
  - *wobquery*: finds and displays details of a work item in queue or roster.

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Tools

- ACCE (Administration Console for Content platform Engine): manages workflow systems, isolated regions, connection points and related configuration.
- Process Configuration Console (PCC): manages global parameters, queues, rosters, event logs, application spaces. Note that many features are implemented in ACCE.
- Process Administrator: finds (and edits) workflows, work items and events.
- Process Tracker: visualizes workflow history, updates workflows.
- pelog (vwlog): maintains Event Log.
- vwmsg: shows or deletes web services messages that were not claimed by a work item by using a Receive system function.
- peverify: verifies the integrity of the Process Engine Process Store. The tool should be run after a significant Process Engine operation has been performed, e.g. restore.
  http://www-01.ibm.com/support/docview.wss?uid=swg27022275

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How does this apply to Case Manager?

- Case Manager uses the same underlying workflow mechanism.
- Defining and deploying a solution in Case Manager automatically takes care of workflow related actions such as:
  - defining workflow definition and transfer
  - defining queues
- As a result, Case Manager is often used without accessing Process Designer or Process Configuration Console.
- Process Administrator (available through ACCE) would still be used to find and review workflows.
- Deleting a Case folder may leave an orphaned workflow. Correct steps to follow are described here: http://www.ibm.com/support/knowledgecenter/SSCTJ4_5.2.0/com.ibm.casemgmt.design.doc/acmta012.htm

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Questions

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- Do not hesitate to send me your comments or any further questions.
- Any suggestions for further presentations would be welcome.

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