Process Engine Automation - Developer Guide

Owner: Resultmaker Research & Development
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Contents

1 Introduction

This document, describes shortly how to use Process Engine Automation to start a workflow and fill forms on the started workflow using the Windows Task Scheduler, and how one programmatically can use the ProcessEngineAutomation.dll to start, resume and fill forms on a Process Engine.

2 Installation

The Process Engine Automation is installed on the Process Engine Server as a part of the Process Engine installation, and has the following default location: “C:\Program Files\Resultmaker\ProcessEngineAutomation”.

When needed the Process Engine Automation can be installed on any .Net PC/Server by running the installation file: “ResultmakerProcessEngineStarter.msi”.

When used programmatically you can just reference the ProcessEngineAutomation.dll.

This documentation covers version Process Engine Automation 1.1.0 or later.

3 Installation content

The following files are installed as part of the Process Engine Automation installation:

3.1 ProcessEngineAutomation.dll

This DLL can be used to programmatically access the Process Engine.

3.2 ResultmakerProcessStarter.exe

An executable used to start a workflow in the Process Engine.

This executable has the following arguments:

ResultmakerProcessEngineStarter.exe /W: [/F:] [/S:] [/U:] [/T:] [/D:]

-REQUIRED-

/Workflow:<name> or /WorkflowName:<name>

The name of the project to be started. Short form is '/w'.

- OPTIONAL -

/FormFilling:<string> or /FormFillingCollection:<string>

The FormFillingCollection is used to fill forms on a workflow. The string must contain a collection of activity references as well as form element names and values to be filled. The format is like this:

/FormFillingCollection:"ActivityReference=Transaction\WorkflowGroup\FormActivity|TextField0=Value 1|TextField1=Value 2&ActivityReference=Transaction\WorkflowGroup\FormActivity2|TextField0=Value 3|TextField1=Value 4|"

The FormFillingCollection contains a collection of one or more strings separated by the &-character. Thise strings contain an ActivityReference element with the format: Transaction\WorkflowGroup\FormActivity and a section with name of the form question elements and the values to be filled out, the format is like this: |TextField0=Value 1|TextField1=Value 2. Short form is '/f'.

/Security:<token> or /SecurityToken:<token>

The SecurityToken is used to login to the Process Engine. If not applied the default value is the windows user credentials, which are delegated to the Process Engine. Short form is '/s'.

/Uri:<uri>

An uri to the Process Engine process.aspx page. A default value is stored in a config file App.config and do not have to be applied. Short form is '/u'.

/Temp:<folderName> or /TempFolder:<folderName>

Folder name of folder in the users temp folder, used to dump input and output files if activated. Default temp folder is stored in the App.config file and do not have to be applied.

An example of the temp folder and file name is like this:

"C:\Users\UserName\\AppData\Local\Temp\[folderName]\[WorkflowName]_d9f33c76-bb6b-4ec3-a161-8f2e363be34d.xml".

Short form is '/t'.

/DumpInputOutput:<boolean> or /Dump:<boolean>

Activates or deactivates the dumping of input and output file in temp store. Default value is located in App.config and do not have to be applied. Short form is '/d'.

3.3 ReadThis.txt

This file contains a description of the required/allowed arguments for the executable "ResultmakerProcessEngineStarter.exe", similar to the one given in section 3.2.

3.4 Resultmaker.ico

The resultmaker icon.

3.5 ResultmakerProcessStarter.exe.config

Configuration file, which makes it possible to setup default values for most of the parameters already described. The following is an example showing all the setting parameters.

```
<setting name="ProcessEngineServer" serializeAs="String">
        <value>127.0.0.1</value>
</setting>
<setting name="ProcessEngineServerTransport" serializeAs="String">
        <value>http</value>
</setting>
<setting name="ProcessEngineServerPort" serializeAs="String">
        <value>80</value>
</setting>
<setting name="ProcessEngineServerResource" serializeAs="String">
        <value>/OC/5.2/process.aspx</value>
</setting>
<setting name="DefaultSecurityToken" serializeAs="String">
        <value>WinDelegation:OUTOFBANDPAYLOAD==</value>
</setting>
<setting name="DumpInputOutput" serializeAs="String">
        <value>False</value>
</setting>
<setting name="TempDumpFolder" serializeAs="String">
            <value>Resultmaker/ProcessEngineAutomation</value>
</setting>
```

Notice, the special value of the DefaultSecurityToken = "WinDelagation:OUTOFBANDPAYLOAD==", which is used to indicate that as default we use Windows Credential Delegation to delegate ones windows credentials on executing command to the Process Engine.

3.6 ProcessEngineBatch.bat

Small batch file example, could be used if one prefer to execute the ResultmakerProcessStarter.exe including arguments from a batch file.

4 How-to schedule Process Engine tasks

One can use the Windows Task Scheduler to schedule Process Engine tasks, in the following two different versions of the Windows Task Scheduler are explained.

4.1 Using the Task Scheduler on Windows 98, NT, 2000, XP, and Server 2003.

To use the scheduling service on Windows 98, NT, 2000, click on the My Computer icon located on the Desktop. Then double-click on Control Panel to get to the Scheduled Tasks folder.

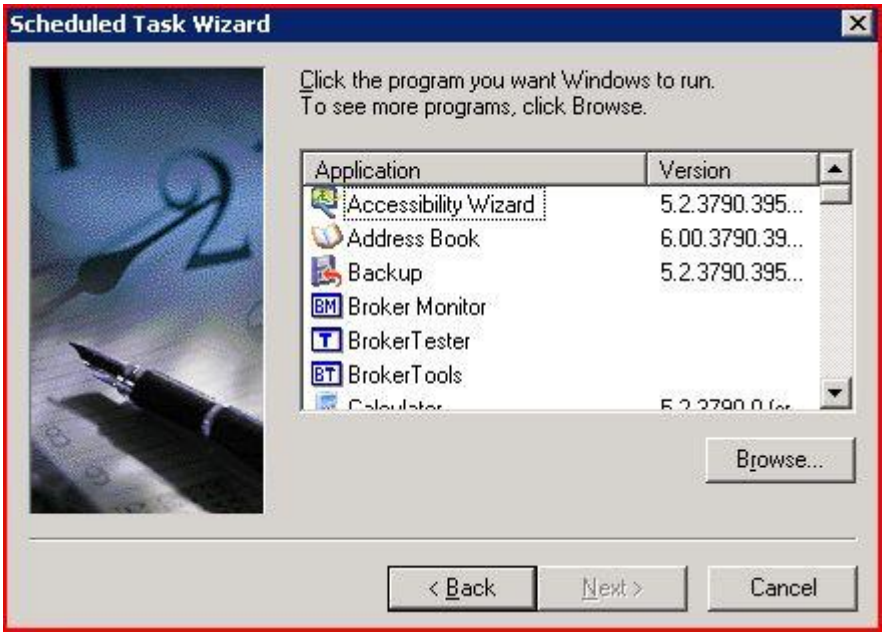
On Windows XP and Server 2003 you can access this from the Start Menu and clicking on Settings and then Control Panel to Scheduled Tasks.

Double-click Add Scheduled Task. Follow the instructions in the Add Scheduled Task wizard.

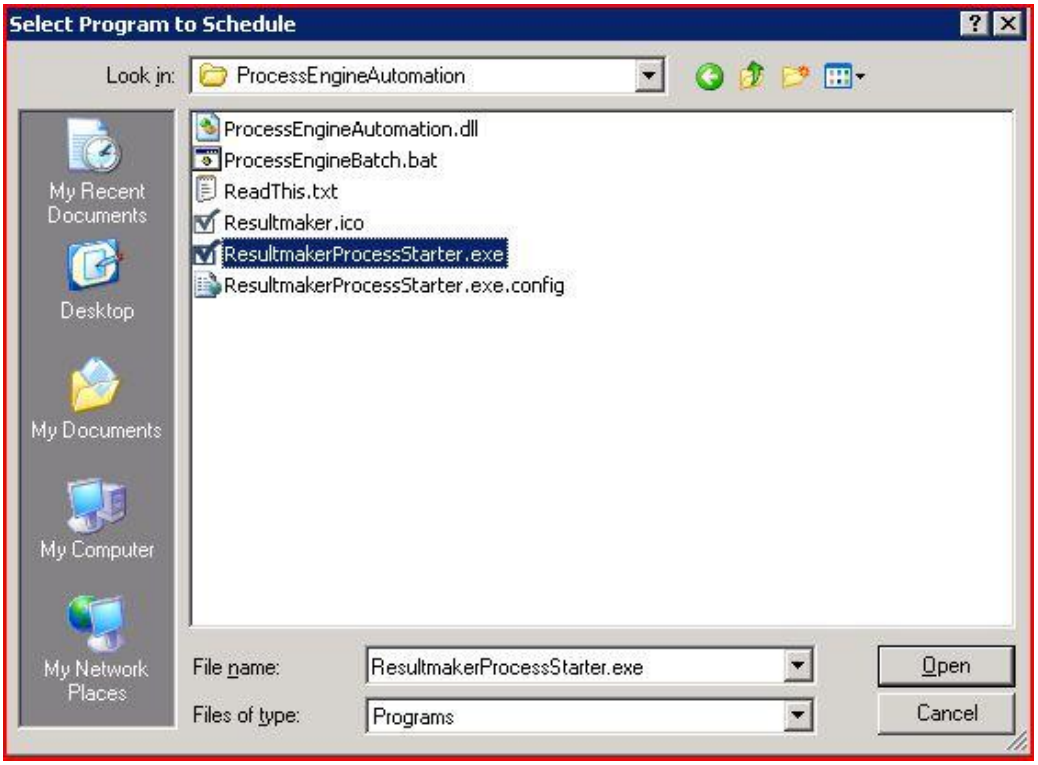
4.1.1 Add a task and select the ResultmakerProcessStarter.exe program

Click Add Scheduled Task.

Click Next



Click Browse



Select
c:\Program Files\Resultmaker\ProcessEngineAutomation\ResultmakerProcessStarter.exe

Click Open

Type in name that describes the task, and choose how often the task has to be done.

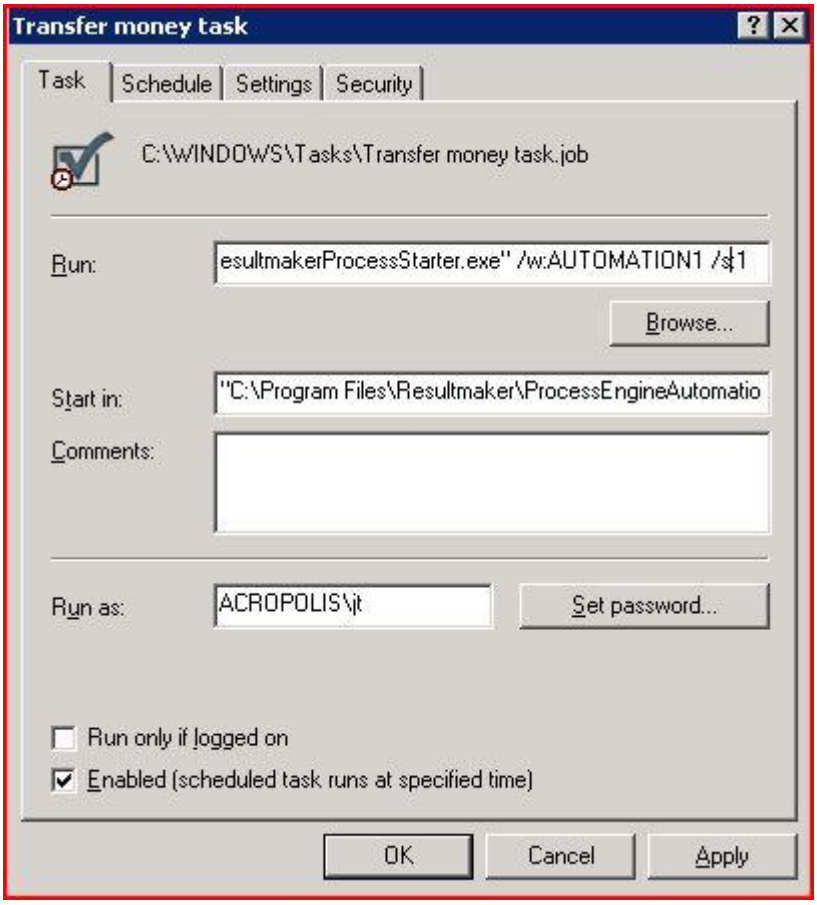
In this example we choose weekly, click Next.

Select additional timing options, here the options for a weekly task is shown, click Next.

The execution of the task in the task scheduler needs to be executed as a windows user, add here the user name and password.

Use a system/machine user with a never expiring password; else the task will stop working, when the password expires.

Set the check mark “Open advanced properties to add arguments to the execution”. Click Finish.



Add arguments to the program in the text field named “Run”.

Important: The command line options must be placed OUTSIDE of the "" that surround the path. Uncheck the “Run only if logged on” else it won’t run if the user is not logged on.

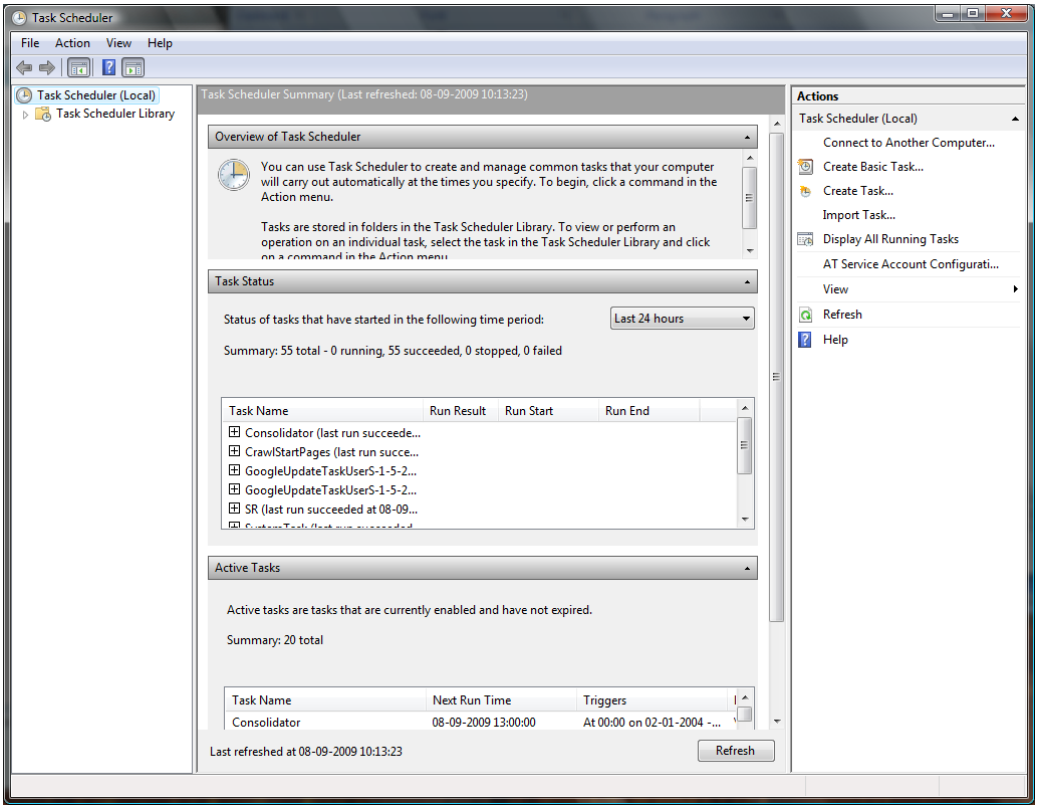
Click Apply and Click OK (you probably have to type in password again if you changed anything).

Tip: Alternatively you can point to a Batch File that contains the specific command line instructions to start the software. Also, with batch files you can conveniently execute several commands in a sequence.

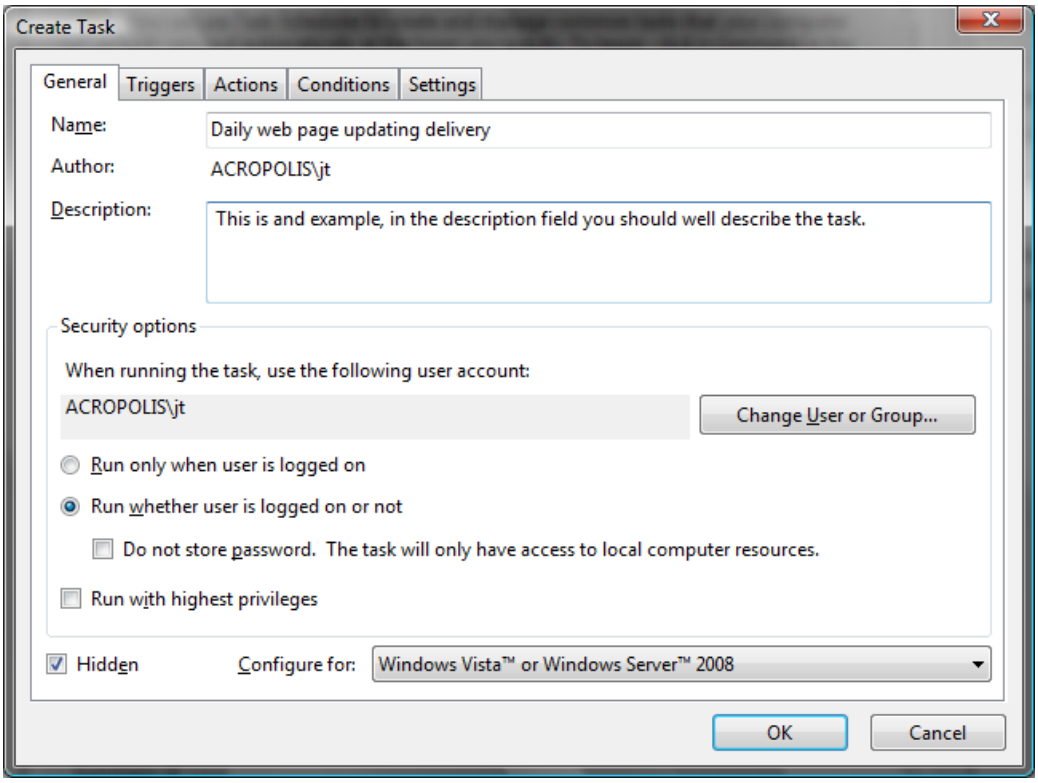
4.2 Using the Task Scheduler on Windows Vista, Server 2008, and 7.

In this example all the possible options are not shown, only a simple example.

Start The Task Scheduler (For instance type “Task Scheduler” in the start search at the start menu).

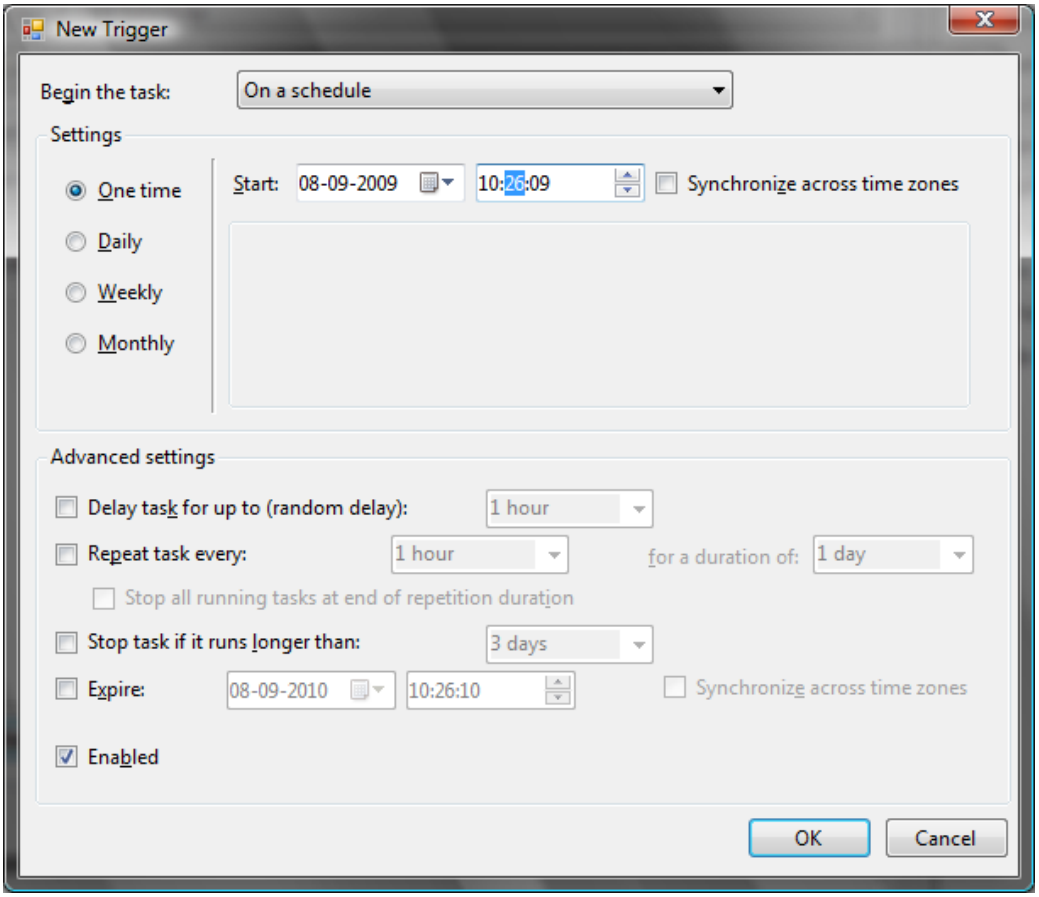


Click Create Task in the Actions pane.

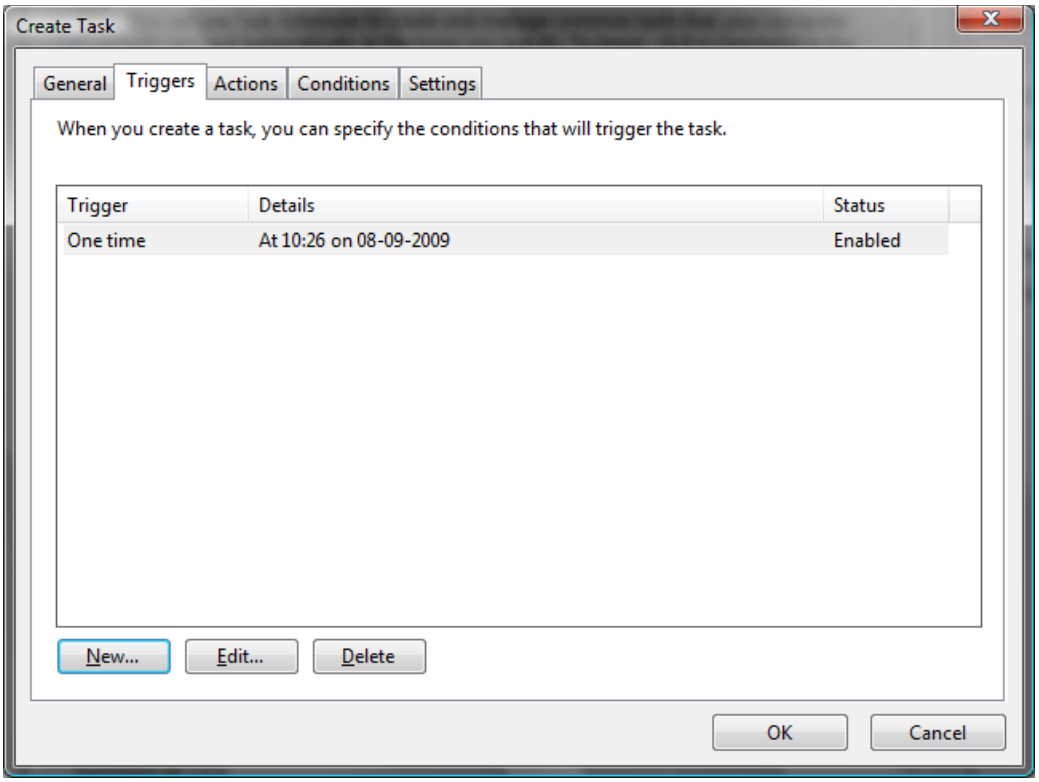


The recommended settings are shown, Use a system/machine user with a never expiring password; else the task will stop working, when the password expires.

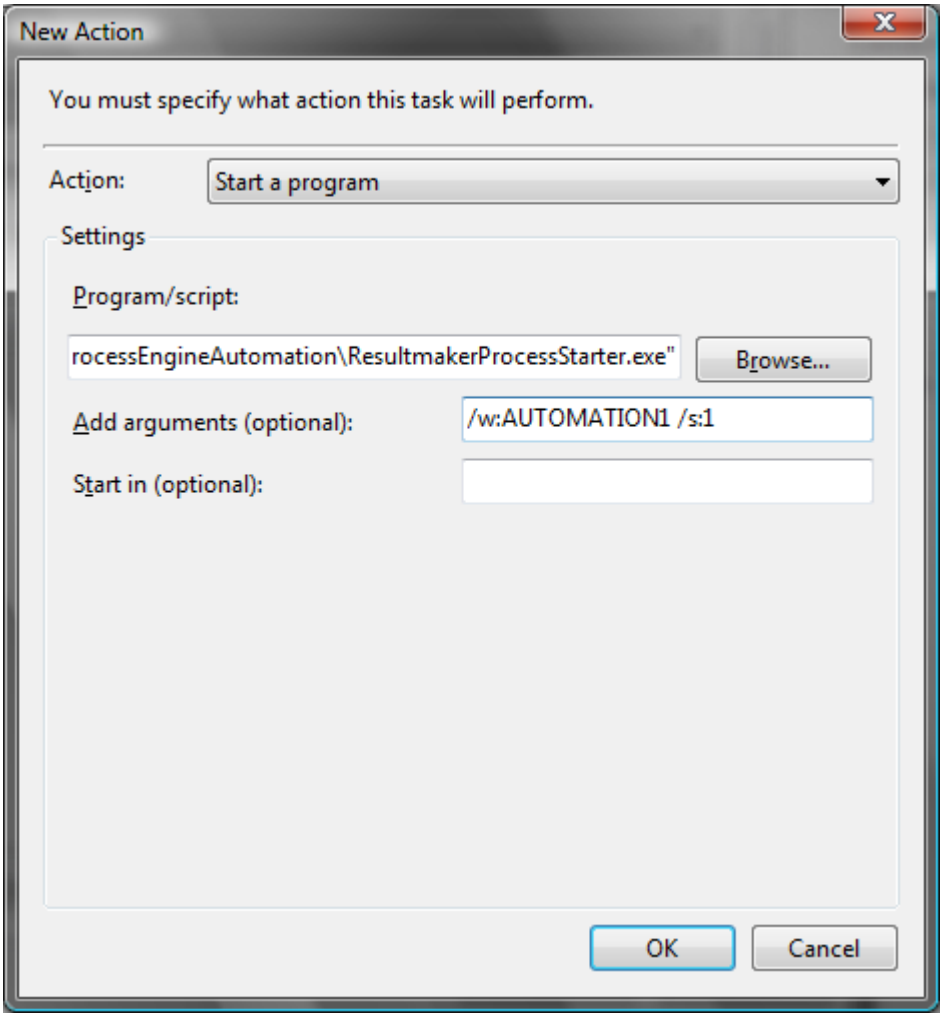
Select the tab Triggers, and click New



There are many option in the dropdown “Begin the task”; here we only show “on a schedule”. After you have setup the trigger, click “OK”.



Select the tab Actions, and click New.



Select Start a program, and add the Program “C:\Program Files\Resultmaker\ProcessEngineAutomation\ResultmakerProcessStarter.exe”, and add at least the /workflow: argument to start a workflow.

Click OK.

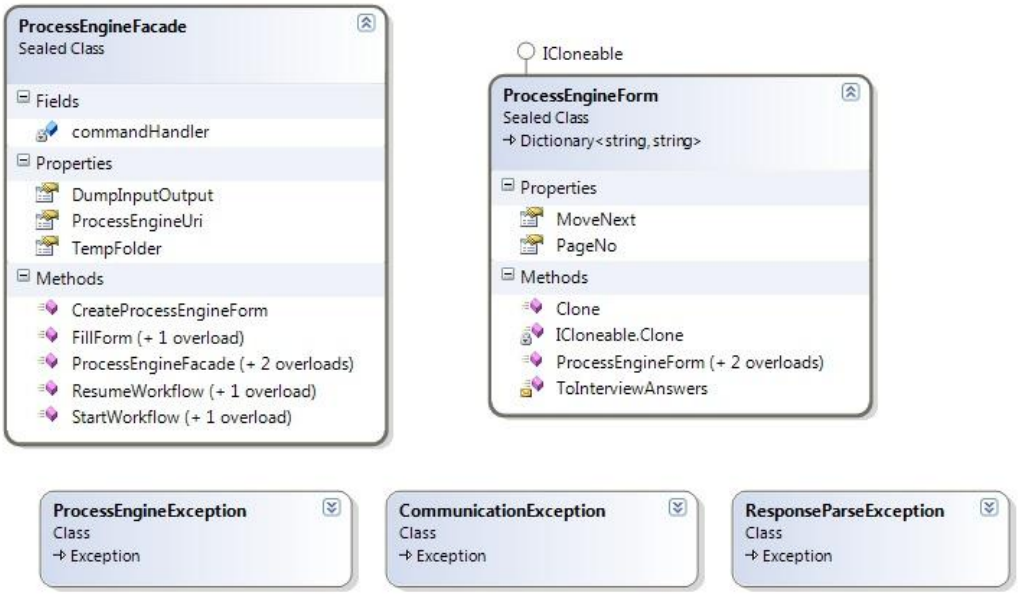
The tabs conditions and settings contains additional options which we do not need to change is this example.

Click “OK” and type in the user password.

5 How-to Programmatically Automate The Process Engine

The assembly ProcessEngineAutomation.dll can be used to start, resume and fill forms in the Process Engine.

This assembly contains two public classes and three custom exception classes, the main class is named ProcessEngineFacade and represents the available Process Engine functionalities, and the other is named ProcessEngineForm and represents a Form in the Process Engine. Se the class diagram shown below:



In the following, an example is given of how to start, resume and fill a form by using these classes.

5.1 How to start a workflow

The following code example shows how a workflow can be started:

```
var facade = new ProcessEngineFacade(new
Uri("http://octest02/OC4/process.aspx"));

int workflowId = facade.StartWorkflow("WorkflowExample");
```

The first code line creates a new ProcessEngineFacade, this constructor demands at least one parameter an URI containing an URL to the Process Engine process.aspx page.

In this example we are using windows credential delegation to delegate our windows credentials to the Process Engine, if we need to use another login strategy one has to use the overloaded constructor including a parameter called security token.

For debugging purposes there are also two properties where one can enable the InputOutputDump and setup the temp folder wherein all input and output commands to the Process Engine can be dumped as XML.

In the second line the workflow with the name "`WorkflowExample`" is started.

The “StartWorkflow” method returns an integer which is the id of the just started workflow instance; this id is used as a handle to the just started instance of the workflow.

5.2 How to resume a workflow

In this example we expect that an instance of a workflow is already started somehow, and that we somehow have got the workflow id:

```
var facade = new ProcessEngineFacade(new
Uri("http://octest02/OC4/process.aspx"), "1")
{
    DumpInputOutput = true,
    TempFolder = @"Resultmaker\ProcessEngineAutomation"
};
facade.ResumeWorkflow(workflowId);
```

First we have to create a ProcessEngineFacade to be able to communicate with the Process Engine, in this example we have added a second parameter a security token “1”, which is the “demo” user on the present Process Engine 5.2 system (the security system will be changed in the new 6.0 release, and it will therefore not necessarily be possible just to specify the UMSId in later versions of the Process Engine).

Moreover, we have enabled dump of commands, which dumps the commands send as XML to the specified folder in the user’s temp folder.

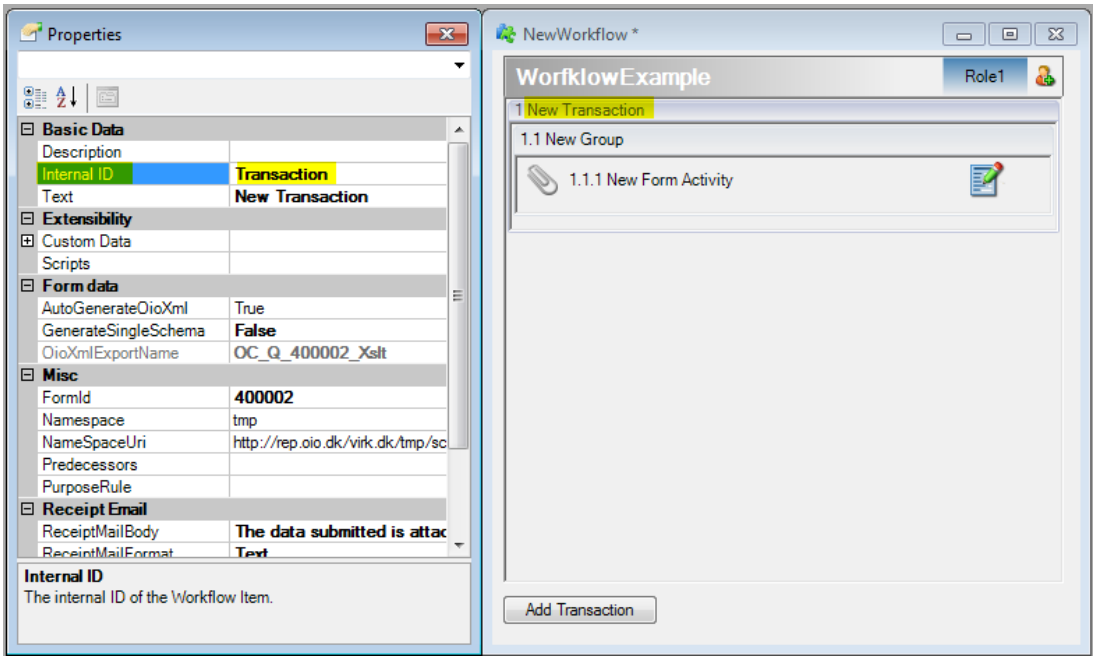
Next, we call the “ResumeWorkflow” method with the workflow Id as the first parameter, and if no exceptions are thrown the resuming of the workflow went okay without error.

5.3 How to fill a form in an instance of a workflow.

In the following example we start a workflow and fill the first page of a specified activity. Moreover, we use delegation of windows credentials, which is used if no security token is specified.

```
var facade = new ProcessEngineFacade(new
Uri("http://octest02/OC4/process.aspx"));
int workflowId = facade.StartWorkflow("WorkflowExample");
var form = new ProcessEngineForm();
form.Add("LastName", "Ackerman");
form.Add("FirstName", "Peter");
var activityId = new[] { "Transaction", "WorkflowGroup",
"FormActivity" };
facade.FillForm(workflowId, activityId, form);
Below this WorkflowExample is shown in the Process designer.
```

The strings for the “activityId” string array are taken from the “Internal ID” properties of the Transaction, Group and activity level in the Workflow Designer. In the figure below the properties for the transaction level are shown.



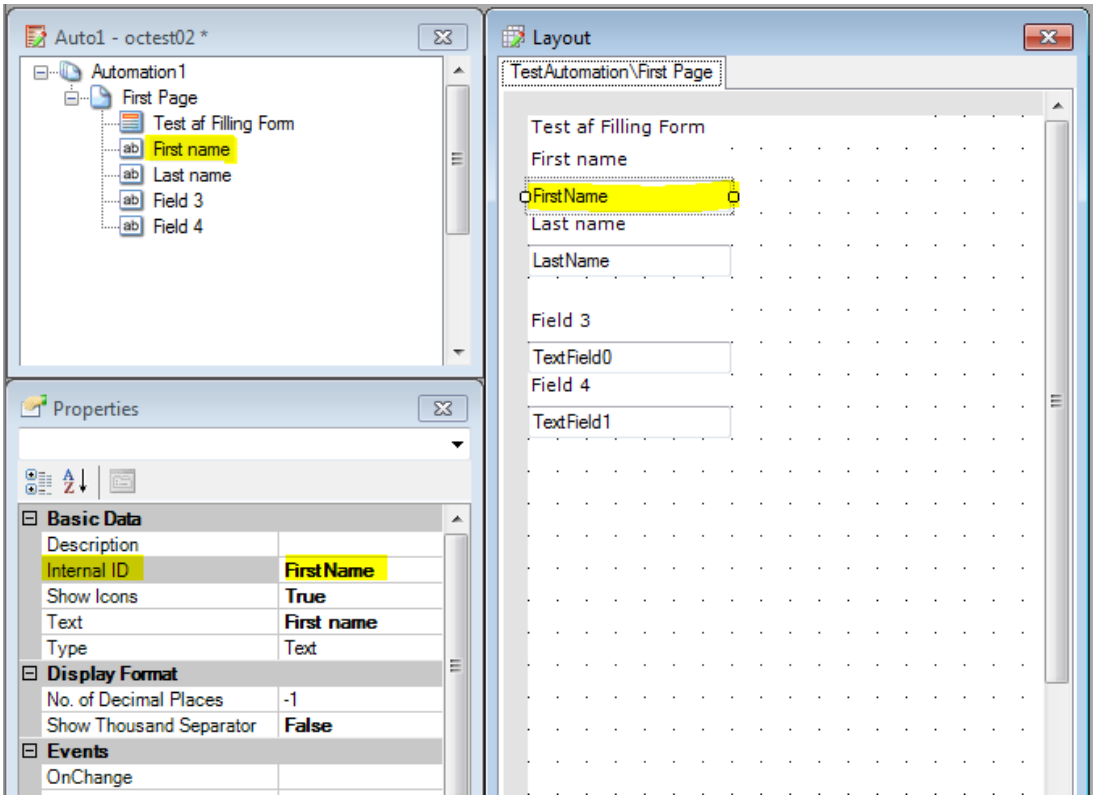
First a new Process Engine façade is created, and a new workflow instance of the workflow with the name “WorkflowExample” is created. An workflow id is received as a return value.

Thereafter a ProcessEngineForm is created, the default constructor is the first page form where the pageNo = 0 and MoveNext = 1, if one uses more than one form page per activity one must use the overloaded constructor to specify the pageNo and MoveNext parameters of the form.

We then add two fields to the form (field names are “LastName” and “FirstName”). These are taken from the form element’s “Internal ID” properties.

A string array named ActivityId is created and instantiated as an array of strings containing names identifying the activity to fill out.

Below the form used in this example is shown in the Process Designer:



Last the FillForm method is called, with no security token specified, hence delegation of windows user credentials is used.

If no exception is raised the filling of the form went fine.

5.4 How to get a form from an instance of a workflow

In this example we expect that an instance of a workflow is already started somehow, and that we have got the workflow id:

```
var activityId = new[] { "Transaction", "WorkflowGroup",
"FormActivity" };

var form = facade.GetForm(workflowId, activityIdentification);
```

A string array named ActivityId is created and instantiated as an array of strings containing names identifying the activity to get the first form of the specified activity.

Thereafter we call GetForm and a form with the present values of this instances form is returned.

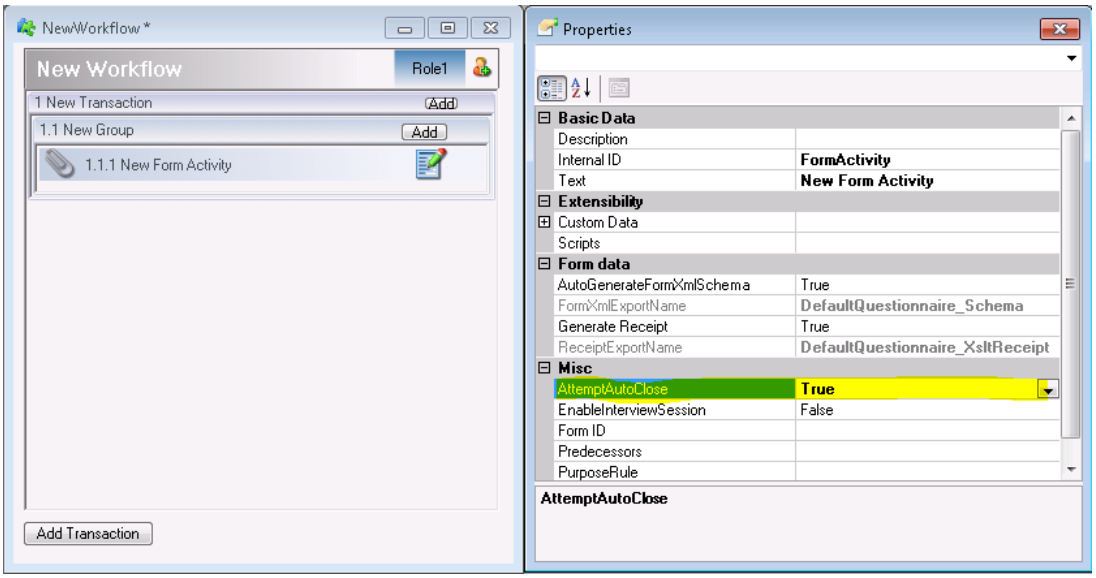
The returned form object can be enumerated, and the form field names and the values in the fields can be retrieved.

```
foreach (var keyvalue in  form)
{
    string formFieldName = keyvalue.Key;
    string formFieldValue = keyvalue.Value;
}
```

5.5 How to signal an activity to autoclose

A workflow can be signaled to autoclose an activity. Autoclosing means that the activity completes as if the form attached to it (if any) were filled out with the values already available from prefilling with workflow and user variable mappings. An

activity cannot autoclose unless the "AttemptAutoClose" property on the activity is set to true, or if any of the questions set to "required" on the form cannot be prefilled.



In this example we suppose that a workflow has already been started, that we have the workflow id, and that we have a ProcessEngineFacade object properly initialized to operate on the process engine that the workflow resides on:

```
int activityId = facade.GetActivityId(workflowId, "Transaction",
"WorkflowGroup", "FormActivity");

bool didAutoClose = facade.AutoCloseActivity(workflowId, activityId);
```

As in the previous example we get the activityId by navigating through the activities comprising the path to the desired activity by their InternalID property.
We then call the facade's AutoCloseActvity metod with the workflow id and the activity id as parameters.
The method returns a bool which indicates whether or not the activity was in the closed state after the operation. Note that this is the case even if the operation had no effect because the activity was already closed.

Attempting to autoclose an activity to which the security token does not provide write access results in an error.

5.6 How to signal a workflow to autoclose all eligible activities

A workflow can be signaled to close all activities eligible for autoclosing. An activity is eligible for autoclosing if it's "AttemptAutoClose" property is set to true and if it is possible to prefill all required questions on the attached form of the activity (if any). In addition, the executing identity as conveyed by the security token passed to the process engine must have write access to an activity in order for it to be eligible.

In this example we assume that a workflow has already been started, that we have the workflow id, and that we have a ProcessEngineFacade object properly initialized to operate on the process engine that the workflow resides on:

```
var activityIds = facade.AutoCloseAll(workflowId);
```

We call the facade's "AutoCloseAll" method, supplying the workflow id. The method returns an IEnumerable<int> with the activity ids of any activities that were

closed as a result of the autoclose attempt. Only the ids of those activities that were not in the closed state before the command but are in that state after its execution are returned.

5.7 How to delete a workflow

In the following example we delete a workflow based on the worklowId.

```
var facade = new ProcessEngineFacade(new
Uri("http://octest02/OC4/process.aspx"));

facade.DeleteWorkflow("WorkflowExample");
```