

# An Intelligent Adjustive Method for Workflow Management System

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## Abstract

In this paper, an intelligent adjustive method for WfMS is proposed for the workflow process. Firstly, the intelligent adjustive principle is introduced and the operation frame of the adjustive system is shown. Then the activity information table is designed in detail. Subsequently, the modification operations and the running control method are discussed respectively. These researches play an important role in the modification of the workflow process in WfMS.

**Keywords:** Workflow, WfMS, Adjustive method

## 1. Introduction

Workflow technology is a new hotspot in the area of computer application after 1990s and is widely applied in many information system including E-Service, E-business, and so on [1, 2]. As we known, the workflow process can be adjusted conveniently in workflow management system for the developing requirements [3-6]. But the adjustive method of WfMS is the key issue in this field and now we gives an intelligent adjustive method in this paper including the evaluation system, the export system and the adjustive system, which are shown in Figure 1.

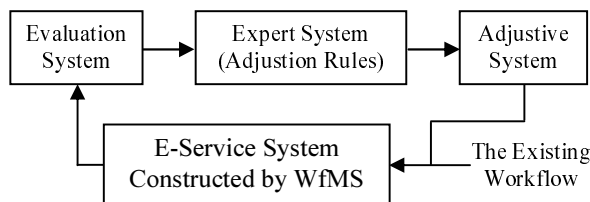


Figure 1 The Intelligent adjustive principle

The evaluation system runs for evaluating the E-Service System constructed by WfMS if necessary. Based on the evaluation results, the expert system finds out the activities needed to adjust and transfers to

the adjustive system. The adjustive system is used to regulate the executive logic of E-Service System.

In our previous research, the evaluation system has been discussed in detail by using dynamic neural net [7-10]. Now the adjustive system is our focus in this paper.

In order to design the adjustive system to adjust the applications/modules in WfMS, our paper is organized as follow. The operation frame is shown in the next section and the activity information table is designed in Section 3. Then the modification operations and the running control method are discussed in Section 4 and Section 5 respectively. Finally, we conclude these researches with the future works.

## 2. The operation frame

After the process redefinition, the workflow relative data must be updated for the new requirements. Correspondingly, the workflow process data including estimation table is needed to adjusted, which refers to the executive applications/modules. Certainly, the workflow application data operated by the applications is independent of the workflow relative data and isn't required to modify expect for the modification of the applications. The basic operation frame is shown in Figure 2.

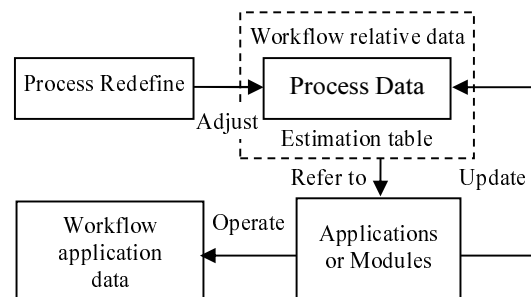


Figure 2 The adjution operation frame

Taken as an example, the adjustive method is discussed in detail for the special applications which operate the same table. Firstly, the necessary information of those activities in the processes are analyzed and saved in a special table. Then the modification operations are focused including the adding operation, deleting operation and the update operation. Finally, the operation control method based on the adjustive method is discussed

### 3. Activity Information Table

Firstly, we must save the information of those activities, which are listed in Table 1. Furthermore, several input parameters and output parameters are needed for some activities. The codes of the processes and those activities can be used in it.

Table 1 The activity information

No.	Process	Activity	Module or Application	Input or Output	Parameters	Value
1	A	A <sub>1</sub>	A <sub>1</sub>	Input	Ap <sub>11</sub>	Av <sub>11</sub>
2	A	A <sub>1</sub>	A <sub>1</sub>	Output	Ap <sub>12</sub>	Av <sub>12</sub>
3	A	A <sub>1</sub>	A <sub>1</sub>	Output	Ap <sub>13</sub>	Av <sub>13</sub>
4	A	A <sub>2</sub>	A <sub>2</sub>	Input	Ap <sub>21</sub>	Av <sub>21</sub>
...	...	...	...	...	...	...
i	B	B <sub>1</sub>	B <sub>1</sub>	Input	Bp <sub>11</sub>	Bv <sub>11</sub>
i+1	B	B <sub>1</sub>	B <sub>1</sub>	Output	Bp <sub>12</sub>	Bv <sub>12</sub>
i+2	B	B <sub>2</sub>	B <sub>2</sub>	Input	Bp <sub>21</sub>	Bv <sub>21</sub>
i+3	B	B <sub>2</sub>	B <sub>2</sub>	Onput	Bp <sub>22</sub>	Bv <sub>22</sub>
...	...	...	...	...	...	...

Comments:

1. The fields “process” and “activity” can be replaced by the corresponding codes of processed and activities in WfMS for convenience. As a simple solution, the first three fields can be integrated as one field like “A02I03”, which denotes the third (03) input (I) parameter of the second (02) activity in the process A.

2. Usually, the field “application” includes the application’s path. Sometimes, the function items are used to substitute for the application, such as menu item. You can save this application information only one time.

3. The value of the field “Input or Output” can be assigned the first letter of the word “Input” and “Output”.

### 4. The Modification Operations

The basic modification operations of workflow process includes adding activity, deleting activity and update activity, which are described as follow in turn.

#### 4.1. Adding Operation

This adding operation is used to add a new activity into the existing workflow process.

In Figure 3, the activity A<sub>p</sub> is inserted the process A at the position between the activities A<sub>i</sub> and A<sub>i+1</sub>. In the activity information table, the input and output parameters and its values must be inserted; then the output parameters and its values of A<sub>i</sub> are modified to the input parameters and its values of A<sub>p</sub>; the output parameters and its values of A<sub>p</sub> are modified to the input parameters and its values of A<sub>i+1</sub>.

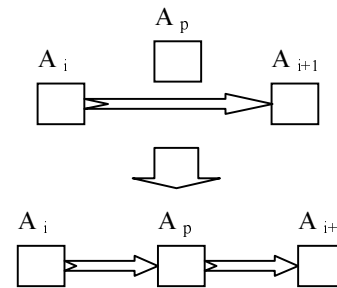


Figure 3 The adding operation

#### 4.2. Deleting Operation

The deleting operation is used to delete an existing activity from the workflow process.

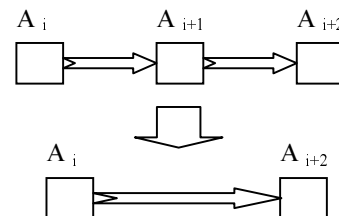


Figure 4 The delete operation

In Figure 4, the activity A<sub>i+1</sub> is deleted from the process A. Correspondingly, the output parameters and these values of A<sub>i</sub> are changed to the output parameters and those values of A<sub>i+2</sub> in the activity information table.

If the order of the activities is denoted as the field “no”, the regulation of “no” is needed for the correct running of the applications.

#### 4.3. Update Operation

The update operation operation includes:

A) the modification of the relations among the activities;

B) the modification of the number, the type and the value of the parameters.

In A-type modification, the input and output parameters and its values of the updating activities must be modified correspondingly. It is clearly that the number, the type and the values of the parameters will be regulated in it.

In the updating activity operation, some records may be added into the activity information table or deleted from it. Of course, the B-type modification is simpler than the A-type modification.

The executive validation of the modified workflow process is discussed in the previous research. Please refer to the paper [11].

## 5. The Running Control

When the application is running, the relative information of the running processes must be saved in the running control table, which is listed in Table 2.

Table 2 the running control table

No.	Process	Activity	Parameter	Value	Relative record
1	A <sub>01</sub>	A <sub>1</sub>	Ap <sub>12</sub>	A <sub>v</sub> <sub>12</sub>	Ano <sub>1</sub>
2	A <sub>01</sub>	A <sub>1</sub>	Ap <sub>13</sub>	A <sub>v</sub> <sub>13</sub>	Ano <sub>1</sub>
3	B <sub>01</sub>	B <sub>2</sub>	Bp <sub>22</sub>	B <sub>v</sub> <sub>22</sub>	Bno <sub>1</sub>
...	...	...	...	...	...

In Table 2, the output parameters of the activities are sorted and have the same order to the activity information table for the convenient comparison. In WfMS, the same application may be instantiated several times. So the process “A” follows “01” which shows the instantiation ordinal number.

It is obvious that a **control module** must be programmed in each application (function) and runs at the beginning and end of the applications.

When an application according to an activity runs, the **control module** in it will read the input parameters and its value of that activity from the activity information table and compare to the output parameters and its value in the running control table firstly. If those information matches, the workflow application data with respect to the field “relative record” will be loaded for the operator’s disposal. At the same time, the records related to the match information will be erased from the running table.

After the disposal, the **control module** will also read the output parameters and its value of that activity from the activity information table and save the output parameters and its value into the running control table with the process, such as “A01”.

The practical program for the adjustive system is implemented and the experimental results show it is effective.

## 6. Conclusions

This paper gives an intelligent adjustive method for WfMS firstly by an example in which the workflow process operates the same table. The next question is the adjustive method for the workflow process in WfMS operates the different tables, including the differences between the two conditions and the solution to it. Maybe, the method to untread and the design method of the applications are involved.

## Acknowledgement

This research thanks to the support of the National Natural Fund of China (Grant no. 60474022), Plan Project of Science and Technology Department of Zhejiang Province in China (Grant No. 2005C31005).

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