Scheduler R2

Contents

Introduction

WAY4™ Scheduler is a tool used to execute various jobs such as programs or scripts by starting WAY4 Manager/DB Manager menu items following predetermined rules set up on workstations with access to the database.

This document is intended for WAY4 system administrators (bank or processing centre employees) responsible for the daily operation of the system and describes operations involved in Scheduler installation and configuration.

While working with this document, it is recommended that users refer to the following reference material from OpenWay's documentation series:

- Administering WAY4™ Application Server
- Administering WAY4™ Universe
- Administering WAY4™ Universe BPM
- WAY4™ Dictionaries
- DB Manager User Management

The following conventions are used throughout this document:

- Field labels in screen forms are typed in *italics*
- Button labels used in screen forms are placed in square brackets, such as [Approve]
- Menu selection sequences are shown with the use of arrows, such as Full → Issuing → Contracts Input & Update
- Key combinations used while working with WAY4 Manager are shown in angular brackets, such as <Ctrl>+<F3>
- The names of directories and/or files that vary for each local instance of the program are also displayed in angular brackets, like <OWS_HOME>
- Warnings of possible erroneous actions are marked with the  sign
- Messages marked with the  sign contain information about important features, additional facilities, or the optimal use of certain functions of the system.

Chapter 1. Scheduler Purpose and Structure

Scheduler: Basic Definitions

An instance is a copy of Scheduler with an ID unique within the database. It is a WAY4U application started on the application server (see the document "Administering WAY4™ Application Server"). The ability of a Scheduler instance to access the database is determined by the privileges of the user specified in its configuration file.

A job is a sequence of actions executed by a Scheduler service command at a particular time specified during job setup. A job is a WAY4 Manager user menu item (Menu Item Definition) interpreted as a BPM task.

In this document, a Menu Item Definition is referred to as a "user menu item". In the document "WAY4 Manager Menu Editor" the term "user menu item definition" is used to refer to a Menu Item Definition.

Purpose of Scheduler

Scheduler executes jobs according to preconfigured rules specified in the WAY4U application configuration file.

Scheduler has the following capabilities:

- Runs processes that require large numbers of calculations, as a rule, on special Scheduler workstations
- Assures additional security of various jobs by running them by Scheduler instances installed on dedicated workstations excluded from general use and on behalf of users with the corresponding privileges
- Executes routine or continuous operations according to preset schedules, the results being controlled through the process log
- Processes the commands of external applications managing the start of WAY4 jobs. Scheduler web services are used for this purpose.

There are two options for supplying Scheduler: with support of web services and without.

Scheduler jobs are WAY4 Manager menu items. The current version of the application supports execution of DB Manager menu items. For more information on the use of WAY4 Scheduler together with DB Manager, please contact WAY4 customer support.

For AIX, Linux and Solaris platforms, starting operating system processes is supported as well as the operation of certain java pipes. For more information, contact WAY4 customer support.

Examples of Most Common Scheduler Jobs

The following are examples of the most common Scheduler jobs:

- Daily procedures.
- Periodic generation of reports.
- Periodic import of external files, such as banking system files.
- Start (scheduled) of configuration and management scripts on servers with WAY4 applications working on WAY4 Application Server.

Structure of Scheduler

Scheduler comprises the following three components:

1. Scheduler executive system: a WAY4 application installed on the application server. Its functions are as follows:
   - Analysing the list of jobs in the database as to their readiness for execution and executing jobs
   - Tracking job execution results and registering them in the corresponding system logs (see the section "Logging Results and Monitoring Job Execution")
   - Sending messages by e-mail about changes in the state of a Scheduler instance or changes in the statuses of Scheduler jobs.

   These tasks are executed using the data from the configuration file of the application.
2. Database tables and procedures. The basic functions of this component are as follows:
   - Storing job data
   - Providing access to the data and verifying data input from various workstations.
3. WAY4 Manager user menu items and forms. This component ensures:
   - Registering users with Scheduler access privileges
   - Editing and creating jobs (see "Creating and Editing Jobs")
   - Managing jobs (see "Managing Job Execution")
   - Monitoring Scheduler operation (see "Logging Results and Monitoring Job Execution").

Fig. 1 shows the interaction of these components.

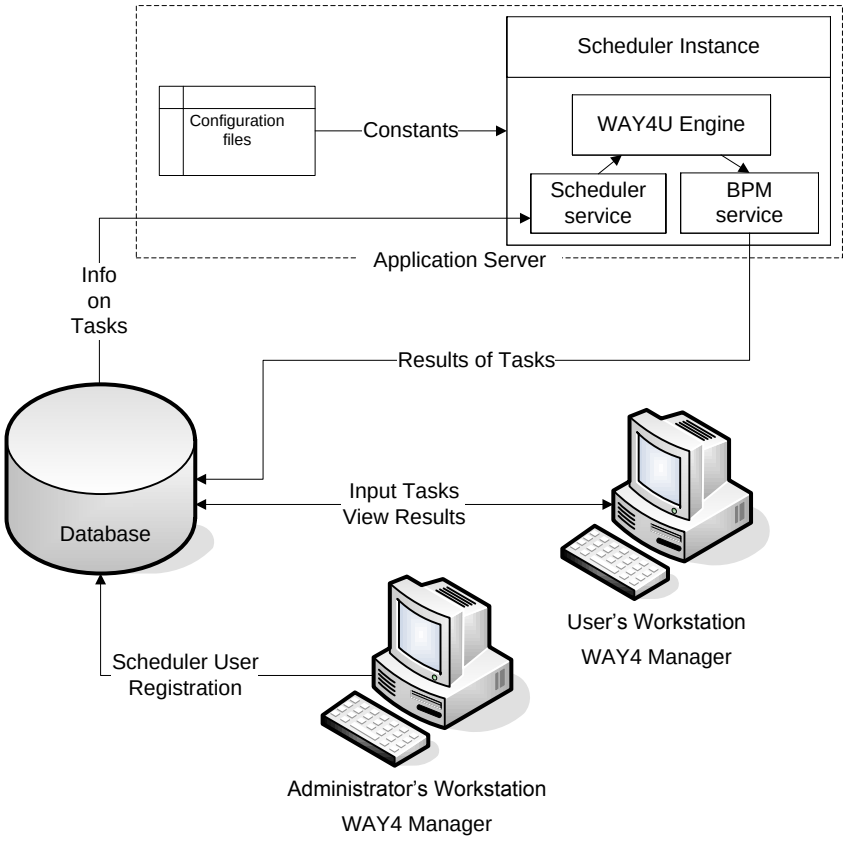


Fig. 1. Interaction of Scheduler components in the system

The Health Monitoring Module can be used to monitor Scheduler operation (see the document "Health Monitoring Module").

Scheduler Operation

Before running Scheduler to execute a job, users must configure it using WAY4 Manager (see "Configuring Scheduler in WAY4 Manager". In particular, it is necessary to indicate the Scheduler instance to execute the job and its time of execution. Scheduler is run on the indicated workstation (see "Starting and Stopping Scheduler").

At start-up, Scheduler reads the following data from configuration files:

- Scheduler instance ID
- Login information

Scheduler checks if conditions are correct for the execution of a job at the time intervals preset in WAY4U application configuration files.

Chapter 2. Scheduler Installation and Configuration

Registering Scheduler Instances

Scheduler instances are registered in the "Scheduler Instances Setup" grid from opened through the "WAY4 Scheduler → Configuration Setup → Scheduler Instances" menu item (see Fig. 2).

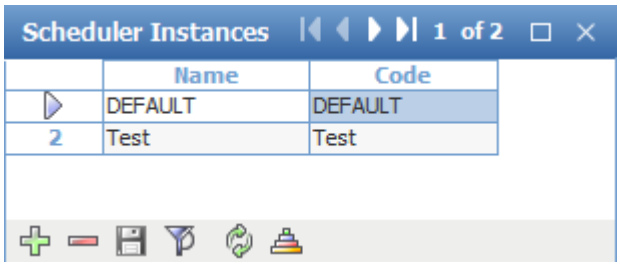


Fig. 2. Registering a Scheduler instance

This form contains the following fields:

- *Name* – Scheduler instance name
- *Code* – instance code.

The value of the Code field is specified in the corresponding parameter contained in the configuration file "config.properties" of the Scheduler instance on the application server, see "Scheduler Configuration".

To ensure interaction between Scheduler service and WAY4U BPM service, in the "BP Domains" table (WAY4U → Configuration Setup → BP Domains) for each instance, register a BPM transaction identifier element as shown in Fig. 3. In the *Code* field for each instance, specify a value in the format "SCH:<name of instance>". A record in this table is created automatically when a Scheduler instance is started.

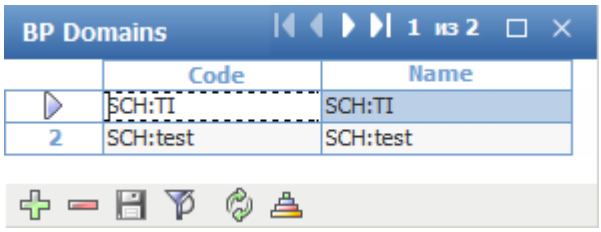


Fig. 3. BPM transaction identifier element

Registering Scheduler Officers

Users who run Scheduler under their own login names (see "Starting and Stopping Scheduler") must have certain privileges to access DB tables and user menu items.

To register WAY4 users with the required privileges, the administrator must register a special user group (see the section "WAY4 System Users" in the

document "DB Manager User Management"). The group must be granted privilege to work with the user menu folder containing all the menu items for running Scheduler. The folder must also contain a link to the menu item"WAY4 Scheduler → Privileges → Privileges".

New users with the above privileges must be registered within this group.

Scheduler Installation

Scheduler is a WAY4 application started on the application server, meaning that before installing Scheduler, it is necessary to make sure that the application server is installed and operating (see the document "Administering WAY4™ Application Server").

There are two options for supplying Scheduler: with support of web services and without. Web services allow Scheduler to accept external applications' jobs for managing the start of WAY4 jobs.

Installing Scheduler without Support of Web Services

The Scheduler distribution kit is an archive named "scheduler<version number>.war". The archive contains files used to install a WAY4U application (instance) on the application server and additional data.

To install a Scheduler instance, start the installation process using the creinst console utility located in the <AppServer_HOME>/bin directory. To do so, start the creinst utility, with the following parameters specified in the command string:

```
creinst app_name=<name of application, for example scheduler> file=<path to
application archive file, for example C:/Distr/scheduler.war or
/home/way4/Distr/scheduler.war> http_port=
```

Rules for installing applications on the application server are described in more detail in the section "Managing WAY4 Applications" of the document "Administering WAY4™ Application Server".

Installing Scheduler with Support of Web Services

The Scheduler distribution kit is an archive named scheduler<version number>.war. This archive contains files for installing WAY4U applications (instances) on the application server, as well as additional data.

To install a Scheduler instance, start the installation process using the creinst console utility located in the "<AppServer_HOME>/bin" directory. To do so, start the creinst utility, with the following parameters specified in the command string:

```
creinst app_name=<application name, for example scheduler_web> file=<path
to application archive file, for example C:/Distr/scheduler.war or
/home/way4/Distr/scheduler.war > http_port=<free port number, for example
11111>
```

Rules for installing applications on the application server are described in more detail in the section "Managing WAY4 Applications" of the document "Administering WAY4™ Application Server".

Scheduler Configuration

To configure Scheduler, use the application configuration file "<AppServer_HOME>/appserver/applications/<application name on the application server specified during installation>/conf/config.properties.

The values of the following parameters are specified in the file:

```
site_name=<bank name and instance ID specified in logs for WAY4 system
vendor>

scheduler_instance=<instance code>

ows_home=<home directory>

ows_work=<work directory>

db_url=<connection string in java notation, for example,
jdbc:oracle:thin:@TEST:1521:OWSMODEL>

db_owner=<name of database scheme owner>

_db_user=<name of user during whose session Scheduler connects to the
database>

db_password=<password of scheduler_db_user>

db_password_encryption_key=<password_encryption_key>

db_password_encryption_type=<password encryption type>

bpm_log=no

log_console=no

log_level=<the default value is 30; other values are specified by the WAY4
vendor's recommendation for more detailed logging of the Scheduler service>

log_level_bpm=<the default value is 30; other values are specified by the
WAY4 vendor's recommendation for more detailed logging of the BPM service>

log_level_mail=<the default value is 20; other values are specified by the
WAY4 vendor's recommendation for more detailed logging in e-mail messages>

mail_server=<the mail server used to send messages about Scheduler job
statuses, as well as about changes in the state of a Scheduler instance>

mail_address_from=<e-mail address used to send messages about Scheduler job
statuses, as well as about changes in the state of a Scheduler instance>

mail_address_to=<e-mail address used as recipient address for sending
messages about Scheduler job statuses, as well as about changes in the
state of a Scheduler instance>

odbc_dsn=Oracle

odbc_connect_string=DBQ=<database instance name>

oracle_tns_name=<database instance tns name>
```

 The slash ("/") must be used in "ows_home" and "ows_work" variables to separate elements when specifying the filepath.

- The parameters site_name, scheduler_instance, ows_home, ows_work, db_url, db_owner, db_user, db_password are mandatory.
- The parameters log_level_mail, mail_server, mail_address_from, mail_address_to are used to configure e-mail.

- The parameters odbc_dsn, odbc_connect_string and oracle_tns_name are used during C-pipe operation.
- The db_password_encryption_key and db_password_encryption_type parameters are used if user db_user is registered in WAY4 Manager, where password encryption is used (see section "Data Access Restriction through User Password Encryption" in the document "DB Manager User Management).

Parameters for log cleaning and file deletion Services can be additionally specified in the config.properties file (see the section "Cleaning Logs").

Access to Standard Network Resources

For Scheduler to get access to WAY4's home and work directories on the network disk, in some cases it is necessary to connect a system resource.

For MS Windows

Connect the network resource using the "net use" command.

For example:

```
net use <disk name:> \\<server name>\path /user:<user name> <password>
```

This can be done using the "before_start_cmd" before starting WAY4 Application Server. To do so, the following command must be added to the file "<AppServer_HOME>/conf/AppContainer.properties":

```
before_start_cmd=<operating system command>
```

Examples of commands added to the file "<AppServer_HOME>/conf/AppContainer.properties":

1. Basic option:

```
before_start_cmd=net use <disk name> <path to the network resource>
/user:<user name> <password>
```

2. A more flexible way of specifying settings:

- The password is entered from the keyboard (recommended):

```
before_start_cmd=cmd.exe /c call mount_disks.bat <password>
```

The file mount_disks.bat must contain the commands:

```
net use <name of disk 1> <path to network resource 1> /user:<user name> %1
net use <name of disk 2> <path to network resource 2> /user:<user name> %1
```

Where %1 is the password passed as an input parameter.

- The password is specified in the batch command file (this option is used if the password contains special characters, for example "#"):

```
before_start_cmd=<path to file>/mount_disks.bat
```

The mount_disks.bat file must contain the command:

```
net use <name of disk> <path to network resource> /user:<user name>
<password> >> <path to log file >/<name of log file> 2>&1
```

If the code contained in the mount_disks.bat file does not work, add the command to output information to a file. The command must be added to the end of the mount_disks.bat file or to the end of the before_start_cmd command.

```
net use >> <path to output file>\<file name> 2>&1
```

If the command must be encrypted, this can be done using the "nscipher " programme included in the WAY4 Application Server distribution (see the document "Administering WAY4™ Application Server"). To encrypt, run this programme, specifying the Product code "ApplicationServer-E55X74D" as its parameter.

```
<AppServer_HOME>/appserver/bin/tools/nscipher. ApplicationServer-E55X74D
```

During execution of this programme, a prompt will be made in dialogue mode to specify data for encryption, and to confirm them. After doing so, the encrypted data will be shown on the screen.

The following encrypted command must be added to the file "<AppServer_HOME>/conf/AppContainer.properties":

```
encr_before_start_cmd= <encrypted command>
```

For Unix

Connect the network resource using the mount command. Instructions for connecting depend on the Unix operating system. For more information, refer to Unix documentation.

Parameter Encryption

If necessary, Scheduler passwords can be encrypted.

If the password must be entered in encrypted form, in the configuration file (see "Scheduler Configuration") the parameter containing the password ("db_password") should be specified with the prefix "encrypted":

```
_encrypted_db_password=<encrypted db_user password>
```

Passwords are encrypted using the "nscipher.exe" programme. To encrypt a password, run this program, specifying the Product code as the parameter, for example:

```
<AppServer_HOME>/appserver/bin/tools/nscipher ows_application
```

If the Product code is not provided by the vendor, it is recommended to use the value "ows_application" as the parameter value.

During execution of this program, the password and its confirmation will be requested in dialogue mode. After these data are entered, the encrypted password will be shown on the screen.

Chapter 3. Working with Scheduler

Starting and Stopping Scheduler

Scheduler is a WAY4U application started on the application server.

A Scheduler instance is started using the start console utility located in the <AppServer_HOME>/bin directory, with the following parameters specified in the command string:

```
start <application name, for example, scheduler>
```

An Scheduler instance is stopped using the stop console utility located in the <AppServer_HOME>/bin directory, with the following parameters specified in the command string:

```
stop <application name, for example, scheduler>
```

More detailed information about starting and stopping applications can be found in the section "Managing WAY4 Applications" of the document "Administering WAY4™ Application Server".

When Scheduler operation is started and stopped, a message with the appropriate notification is sent by e-mail. See "Scheduler Configuration" for mail sending configurations.

Safely Stopping Scheduler

The command to safely stop Scheduler allows a Scheduler instance to be stopped without interrupting the jobs belonging to the selected instance. When all jobs have been completed, the Scheduler instance stops.

The menu item "WAY4 Scheduler → Stopping Scheduler Instance" is used to execute the command for safely stopping Scheduler. When this menu item is selected, the "Stopping Scheduler Instance" form (see Fig. 4) will be displayed. This form shows information about all registered Scheduler instances, as well as the "Messages" child form (see "Service Messages").

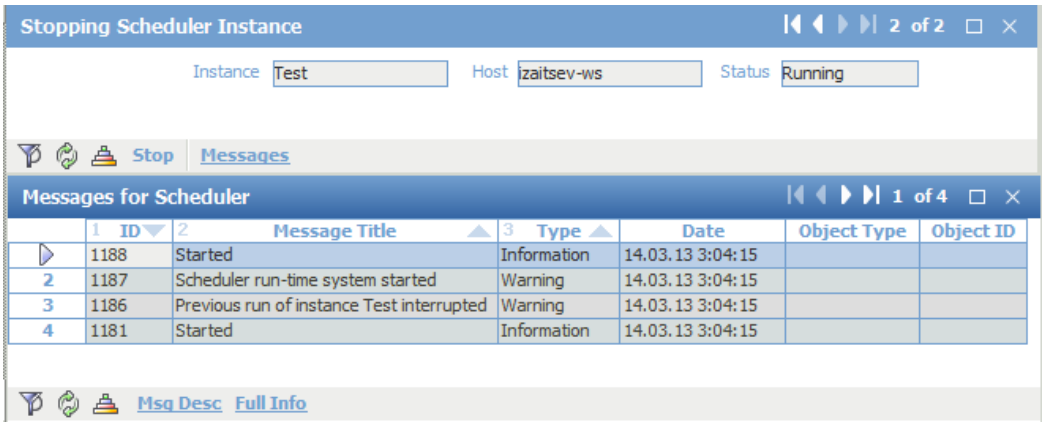


Fig. 4. Stopping Scheduler

To stop Scheduler, select the required Scheduler instance in the "Stopping Scheduler Instance" form (see Fig. 4) and click the [Stop] button.

Configuring Scheduler in WAY4 Manager

Scheduler is configured in WAY4 Manager through the "WAY4 Scheduler → Configuration Setup" menu folder.

Creating and Editing Jobs

New jobs are created or existing ones edited in the "Scheduler Jobs" form (see Fig. 5) opened by selecting the "WAY4 Scheduler → Configuration Setup → Scheduler Jobs" user menu item.

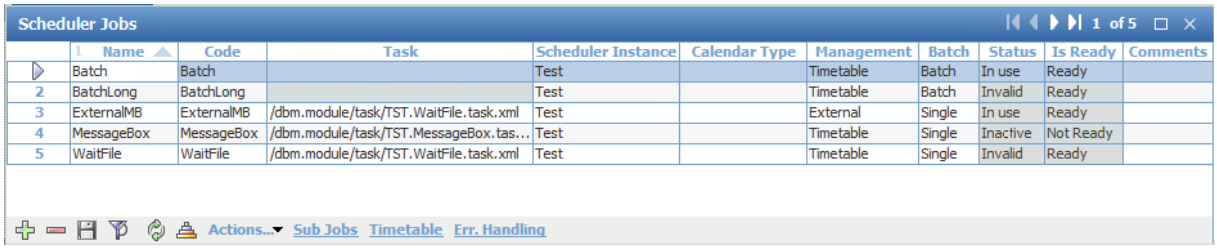


Fig. 5. Form for entering new jobs

This form contains the following fields:

- *Name* – job name
- *Code* – job code unique in the database
- *Task* – path to the file of the menu item executed in the job, for example: /dbm.module/task/OWS.Predefined_Commodities_Import.task.xml.
- *Scheduler Instance* – the name of the Scheduler instance (see Fig. 2 in the section "Registering Scheduler Instances").
- *Calendar Type* – type of business calendar (see the section "Business Calendar" in the document "WAY4™ Dictionaries")
- *Comments* – additional information about a job
- *Management* – the means by which the job will be started:
  - "External" – a job is started when an external application's command is executed (see "External Management of Scheduler Jobs (Scheduler Web Services)")
  - "Timetable" – a job is executed according to the job's time parameters (see Fig. 7). When a record containing this value is selected, the [Timetable] button will be shown in the "Scheduler Jobs" form (see Fig. 5). This button is used to enter the parameters of subordinate jobs. An empty value in the *Management* field corresponds to the "Timetable" value
- *Batch* – specifies whether this is a batch job (whether it includes subordinate jobs). This field may have one of the following values:
  - "Batch" – batch job; when a record containing this value is selected, the [Sub Jobs] button will be shown in the "Scheduler Jobs" form (see Fig. 5). This button is used to enter the parameters of subordinate jobs (see Fig. 6)
  - "Single" – single job.

The *Batch* field is filled in when a new job is created; after this, the field becomes unavailable for editing. An empty value in the *Batch* field corresponds to the "Single" value

A batch job must have an empty value in the *Task* field, meaning it should not call the execution of a menu item. If the *Task* field of a batch job is filled in, the value in this field will be ignored.

- *Status* – job execution status (see "Monitoring Job Execution")
- *Is Ready* – shows whether the job is ready to be executed; the field will have the "Ready" value after a job is successfully approved.
- *Comments* – additional information about a job.

To add a job, click the button in the "Scheduler Jobs" form (see Fig. 5). An empty row will be added to the table of jobs. .To enter the parameters of subordinate jobs included in a batch job (that is, a job for which the "Batch" value is specified in the *Batch* field), in the "Scheduler Jobs" form (see Fig. 5), select the required job record and click the [Sub Jobs] button. As a result, the "Sub Jobs for <name of batch job>" form will appear (see Fig. 6).

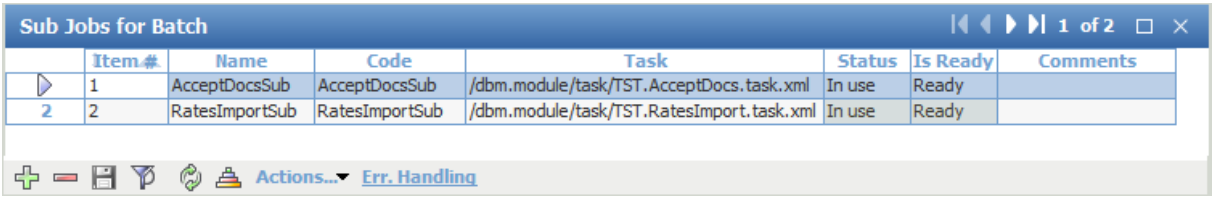


Fig. 6. Entering the parameters of subordinate jobs

The "Sub Jobs for <name of batch job> form (see Fig. 6) contains the following fields:

- *Item #* - the number that specifies the order in which the subordinate job will be executed (this field must contain a number larger than zero); the number of the subordinate job must be unique within the batch.
- *Name* – the name of the job
- *Code* – the job's unique code in the database
- *Task* – path to the file of the menu item executed in the job, for example: /dbm.module/task/OWS.Predefined_Commodities_Import.task.xml
- *Status* – job execution status (see "Monitoring Job Execution")
- *Is Ready* – indicates whether the subordinate job is ready to be executed; this field will have the "Ready" value after the parent job is approved.

Subordinate jobs are executed sequentially, in the order specified in the *Item #* field.

The [Actions] button of the "Sub Jobs for <name of batch job>" form (see Fig. 6) is used to open a context menu containing the following items:

- "Activate" – allows the "In Use" status to be restored for a job that was omitted earlier (see "Monitoring Job Execution").

- "Deactivate" – allows a subordinate job to be omitted. This job's *Status* field will show the "Inactive" value. This subordinate job will be skipped when executing a batch job.

The [Err Handling] button of the "Sub Jobs for <name of batch job>" form (see Fig. 6) is used to configure Scheduler actions when errors occur during job execution (see Fig. 8).

To specify parameters determining the time a job will be started, use the "Timetable for <name of job>" and "Time " forms (see Fig. 7) opened by clicking the [Timetable] button in the "Scheduler Jobs" form (see Fig. 5).

The [Timetable] button in the "Scheduler Jobs" form (see Fig. 5) is shown when a job record is selected that has the "Timetable" value or an empty value in the *Management* field.

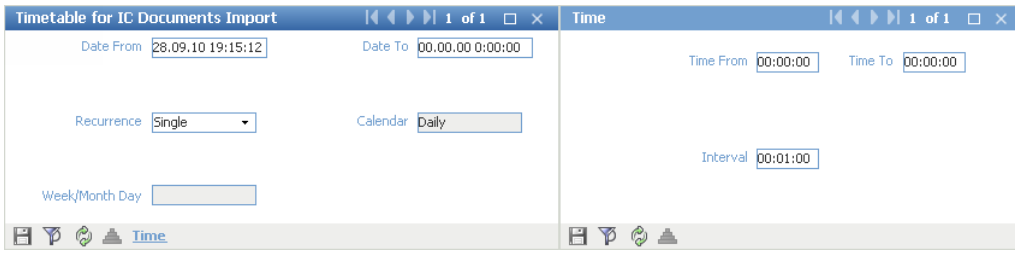


Fig. 7. Editing time parameter parameters of a job

The "Timetable for <name of job>" form (see Fig. 7) contains the following fields:

- *Date From/To* is a group of two fields. The earliest date when the job may be executed is specified in the first field. The latest date (inclusive) when the job may be executed is specified in the second one.

  For a job to be executed continuously over an indefinite period of time, a past date such as 01.01.01 should be entered in the first field of the *Date From/To* field group and an empty date in the second field.

- *Recurrence* – job execution frequency:
  - "Single" – once
  - "Day" – the frequency is measured in days
  - "Week" – the frequency is measured in weeks (the job will be executed on a certain day of the week)
  - "Month" – the frequency is measured in months (the job will be executed on a certain day of the month).

  Processed jobs that must be executed only once (*Status* = "Closed", *Recurrence* = "Single") are shown in the "Scheduler Jobs" form (see Fig. 5) for 8 days after their execution.

- *Calendar* – business/non-business day for *Recurrence* ≠ "Single" mode:
  - "Daily" – the day the job is executed does not depend on whether it is a business or non-business day
  - "Workdays" – on business days

- "Nonworkdays" – on non-business days

Business and non-business days are specified according to the business calendar with the type specified in the *Calendar Type* field of the "Scheduler Jobs" form (see Fig. 5).

A more detailed description of how values in the *Calendar* field of the "Timetable for <name of job>" form (see Fig. 7) influence job execution is given in Table 1.

- *Week/Month Day* – the number of the day (entered from the keyboard). The way in which the number of the day is specified depends on the combination of values specified in the *Recurrence* and *Calendar* fields (see Table 1).

Table 1. Possible values of "Timetable for <name of job>" form fields

Value in the *Recurrence* field	**Value in the *Calendar* field**	**Value in the *Week/Month Day* field**	**Parameters for job execution frequency**
Single	-	-	The job is executed once
Day	Daily	-	The job is executed daily
	Workdays	-	The job is executed on working days (according to the calendar whose type is specified in the *Calendar Type* field of the "Scheduler Jobs" form, see Fig. 5).
	Nonworkdays	-	The job is executed on non-working days (according to the calendar whose type is specified in the *Calendar Type* field of the "Scheduler Jobs" form, see Fig. 5).
Week	Daily	The number of the day of the week (1-7) is specified in the field: 1 – Monday, 2 – Tuesday, 3 – Wednesday, 4 – Thursday, 5 – Friday, 6 – Saturday. 7 – Sunday.	The job is executed on the day of the week whose number is specified in the *Week/Month Day* field.
	Workdays		The job is executed if the day of the week whose number is specified in the *Week/Month Day* field is a working day according to the calendar whose type is specified in the *Calendar Type* field of the "Scheduler Jobs" form, (see Fig. 5).
	Nonworkdays		The job is executed if the day of the week whose number is specified in the *Week/Month Day* field is a non-working day according to the calendar whose type is specified in the *Calendar Type* field of the "Scheduler Jobs>" form, (see Fig. 5).
Month	Daily	Required day of the month (from 1 to 31).	The job is executed on the day of the month that is specified in the *Week/Month Day* field.
	Workdays	Sequence number of the required working day from the start of the month (from 1 to 31).	The job is executed on the working day (according to the calendar whose type is specified in the *Calendar Type* field of the "Scheduler Jobs" form, see Fig. 5) whose sequence number is specified in the *Week/Month Day* field.
	Nonworkdays	Sequence number of the required non-working day from the start of the month (from 1 to 31).	The job is executed on the non-working day (according to the calendar whose type is specified in the *Calendar Type* field of the "Scheduler Jobs>" form, see Fig. 5) whose sequence number is specified in the *Week/Month Day* field.

When the "Week" or "Month" value is selected in the *Recurrence* field, the *Week/Month Day* field may not contain a null value (that is, the field is mandatory).

The "Time" form opened by clicking the [Time] button in the "Timetable for <name of job>" form (see Fig. 7) contains the following fields:

- *Time From/To* is a group of two fields. The earliest time in the day when the job may be executed is specified in the first field. The latest time in the day (inclusive) when the job may be executed is specified in the second field

  Note that the first field of the *Time From/To* group may contain a value exceeding the second field value. In this case, job execution may be continued on the following day. For example, a job may be executed between 22.00 and 02.00 of the next day.

- *Interval* is t he time interval between job starts if the job must be executed more than once during the same day

To set up Scheduler actions in case of job execution errors, use the "Err. Handling for …" form (see Fig. 8) opened by clicking the [Err. Handling] button in the "Scheduler Jobs" form (see Fig. 5) or the "Sub Jobs for <name of job>" form (see Fig. 6).

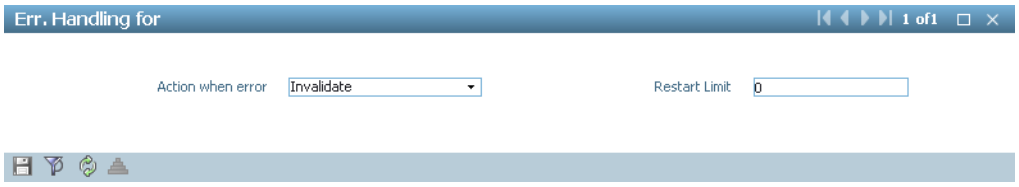


Fig. 8. Configuring actions in case of job execution errors

Scheduler actions in case of job execution errors are specified in the *Action when error* field by selecting a value from the following list:

- "Invalidate" – the job is set to the "Invalid" status (see "Monitoring Job Execution")
- "Restart" – the job is immediately restarted; the maximum number of successive runs is specified in the *Restart Limit* field. If the job cannot be executed after the specified number of restarts, it is set to the "Invalid" status
- "Ignore" – the job is considered executed

  When errors occur in the process of executing subordinate jobs included in a batch job:

  - If the "Ignore" value is specified in the *Action when error* field for the subordinate job, the next job from the batch will be started; this does not affect the status of the batch (parent) job.
  - If the "Reset" value is specified in the *Action when error* field for the subordinate job, an attempt will be made to restart the subordinate job according to settings for actions to be taken in the case of errors. If the repeat attempt to execute the subordinate job is successful, the status of the batch (parent) job does not change. If the repeat attempt to execute

the subordinate job was not successful (and the permissible number of starts has been reached), the subordinate and batch (parent) jobs are given the "Invalid" status (see "Monitoring Job Execution"), and the batch job is processed according to settings for actions to be taken in the case of error

- If the "Invalidate" value is specified in the *Action when error* field for the subordinate job, the batch (parent) job is given the "Invalid" status (see "Monitoring Job Execution") and is processed according to settings for actions to be taken in the case of error.

The [Actions] button of the "Scheduler Jobs" form (see Fig. 5) is used to open a context menu containing the following items:

- "Approve One" – used to approve changes made when editing a job.

  Subordinate jobs are approved at the same time as the batch job to which they belong.

- "Approve All" – used to approve all jobs in the list.
- "Activate" – allows the "In Use" status to be restored for a job that was omitted earlier (see "Monitoring Job Execution").
- "Deactivate" – allows a subordinate job to be omitted. This job's *Status* field will show the "Inactive" value. This subordinate job will be skipped when executing a batch job.

Switching between Daylight Savings/Standard Time

When creating and editing Scheduler jobs, it is necessary to consider the following particularities of Scheduler operation connected with switching between daylight savings/standard time:

- If the start time of a job coincides with the switch to daylight savings time (clocks are moved one hour forward), the scheduled start time may fall out of the specified time interval

  For example:

  - A job must be started in the time interval from 02:20 to 02:50
  - When switching to daylight savings time, the clocks are moved from 02:00 to 03:00
  - In this case, start of the job will be scheduled for 03:20

- If a repeat interval is specified for the job and the job must be executed more than once within the time interval, when the clocks are moved back, a delay will arise between repeat starts

  For example:

  - A job must be started in the interval from 01:00 to 04:00 every 15 minutes
  - When switching to standard time, the clocks are moved from 03:00 to 02:00

- In this case, after the job is executed at 02:45, it will next be started at 03:00, meaning the interval between starts will be one hour and 15 minutes

Logging Results and Monitoring Job Execution

To analyse results and manage job execution, use the "WAY4 Scheduler → Scheduler Monitor" user menu item.

Instance Status

Selecting the user menu item "WAY4 Scheduler → Scheduler Monitor" will open the "Scheduler Monitor" form (see Fig. 9). It contains information on all registered Scheduler instances. In addition, the "Jobs" form (see Fig. 10) showing the jobs for an instance will be automatically opened.

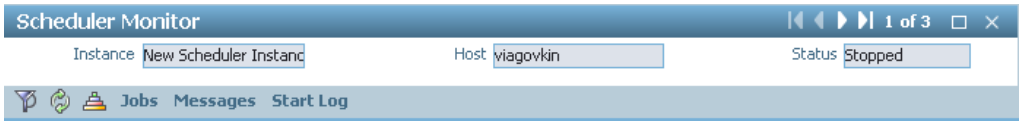


Fig. 9. Information on the current mode of Scheduler instances

The "Scheduler Monitor" form contains the following fields:

- *Instance* – instance name
- *Host* – name of the server where the corresponding Scheduler instance is started
- *Status* – current status of the Scheduler instance:
  - "Running" – the instance is running
  - "Stopped" – the instance has been stopped
  - "Interrupted" – the instance has been paused as it was started repeatedly (see "History of Scheduler Sessions").

The "Scheduler Monitor" form contains the following control buttons:

- [Jobs] – opens the list of job set up for the instance (see "Monitoring Job Execution")
- [Messages] – opens the list of messages generated by the Scheduler service and BPM service for the current session of the instance (see "Service Messages")
- [Start Log] – opens the history of starting the instance (see "History of Scheduler Sessions").

Monitoring Job Execution

The "Jobs" form (see Fig. 10) shows the list of jobs set up for a Scheduler instance. This form opens automatically when the "Scheduler Monitor" form (see Fig. 9 in the section "Instance Status") is opened, or by clicking the [Jobs] button in the "Scheduler Monitor" form.

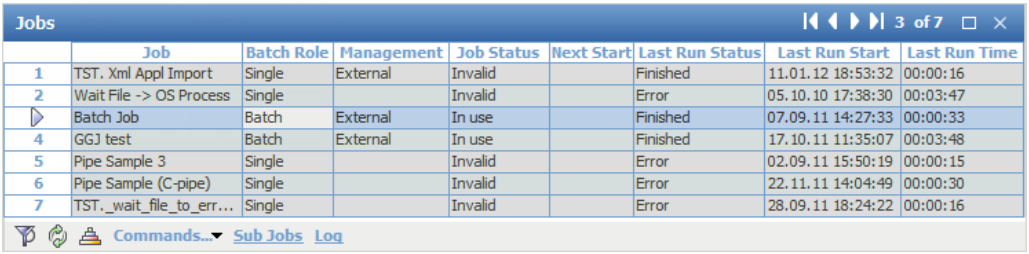


Fig. 10. List of jobs for an instance

This form contains the following fields:

- *Job* – job name
- *Batch Role* – shows whether this is a batch job (whether it includes subordinate jobs). The field may contain the following values:
  - "Batch" – batch job; when a record containing this value is selected, the [Sub Jobs] button will be shown. This button is used to view the parameters of subordinate jobs (see Fig. 11.)
  - "Single" – single job
- *Management* – method for managing job execution:
  - "External" – a job is started when the command of an external application is executed (see "External Management of Scheduler Jobs (Scheduler Web Services)")
  - "Timetable" – a job is executed according to fixed time parameters (see Fig. 7 in the section "Creating and Editing Jobs"). When a record containing this value is selected, the [Timetable] button is shown in the "Jobs" form (see Fig. 10). This button is used to view the parameters of subordinate jobs. An empty value in the *Management* field corresponds to the "Timetable" value
- *Job Status* – job execution status; the field can take on the following statuses:

"Prepared" – the job has been edited and successful approved; after Scheduler checks whether the conditions for job execution are met, the value of the field changes to "In use" (see "Scheduler Operation")

- "In use" – the job is included in the schedule, it is either being executed or in waiting mode
- "Invalid" – an error occurred during execution of the job (see "Creating and Editing Jobs")
- "Closed" – the maximum number of restarts has been exceeded for the job. This status is also assigned to completed jobs that should be

executed only once (Recurrence=Single, see the section "Creating and Editing Jobs")

Processed jobs that must be executed only once (*Status* = "Closed", *Recurrence* = "Single) are shown in the "Jobs" form (see Fig. 10) for 8 days after their execution.

- "Suspended" – the scheduled execution of the job has been paused by the user (see "Managing Job Execution")

When a job status changes, a message with the corresponding notification is sent by e-mail. For mail sending configurations, see "Scheduler Configuration".

- *Next Start* – date and time of the next job start calculated by Scheduler during regular polling according to parameters determining the job execution time (see "Creating and Editing Jobs")
- *Last Run Status* – result of the previous job start
- *Last Run Start* – date and time of the previous job start
- *Last Time* – period of job execution after the previous start.

The "Jobs" form (see Fig. 10) contains the [Commands…] button used to start associated procedures (see "Managing Job Execution").

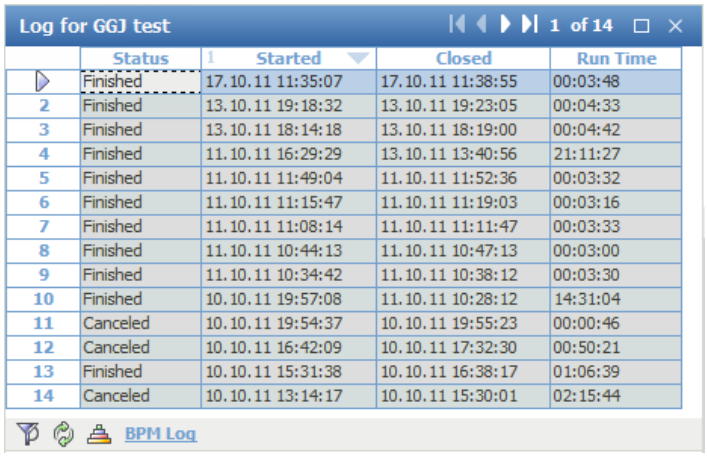
To view the parameters of subordinate jobs included in a batch job (jobs for which the "Batch" value is specified in the *Batch* field), in the "Jobs" form (see Fig. 10), select the required job record and click the [Jobs] button. The "Sub Jobs for <name of batch job>" form will appear (see Fig. 11.).

Fig. 11. Viewing the parameters of subordinate jobs

The "Sub Jobs for <name of batch job> form (see Fig. 11.) contains the following fields:

- # – a number specifying the order in which the subordinate job will be executed (this field must contain a number larger than zero)
- *Job* – job name
- *Job Status* – job execution status (see "Monitoring Job Execution")
- *Last Run Status* – the result of the last time the job was run
- *Last Run Start* – the date and time the job was last run.

The [Log] button in the "Jobs" form (see Fig. 10) and the "Sub Jobs for <name of batch job>" form (see Fig. 11.) is used to open a log with the execution history of the selected job (see Fig. 12).



	Status	Started	Closed	Run Time
1	Finished	17.10.11 11:35:07	17.10.11 11:38:55	00:03:48
2	Finished	13.10.11 19:18:32	13.10.11 19:23:05	00:04:33
3	Finished	13.10.11 18:14:18	13.10.11 18:19:00	00:04:42
4	Finished	11.10.11 16:29:29	13.10.11 13:40:56	21:11:27
5	Finished	11.10.11 11:49:04	11.10.11 11:52:36	00:03:32
6	Finished	11.10.11 11:15:47	11.10.11 11:19:03	00:03:16
7	Finished	11.10.11 11:08:14	11.10.11 11:11:47	00:03:33
8	Finished	11.10.11 10:44:13	11.10.11 10:47:13	00:03:00
9	Finished	11.10.11 10:34:42	11.10.11 10:38:12	00:03:30
10	Finished	10.10.11 19:57:08	11.10.11 10:28:12	14:31:04
11	Canceled	10.10.11 19:54:37	10.10.11 19:55:23	00:00:46
12	Canceled	10.10.11 16:42:09	10.10.11 17:32:30	00:50:21
13	Finished	10.10.11 15:31:38	10.10.11 16:38:17	01:06:39
14	Canceled	10.10.11 13:14:17	10.10.11 15:30:01	02:15:44

Fig. 12. Job execution history

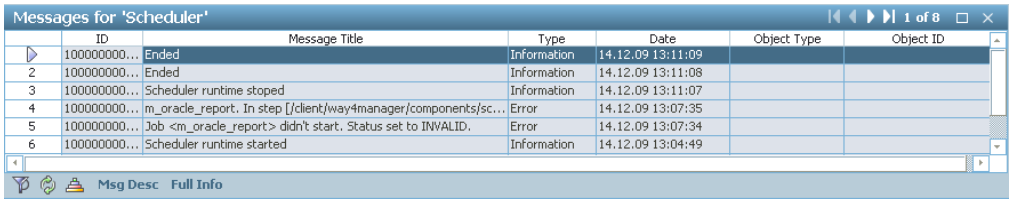
The job log form contains the following fields:

- *Status* – job execution result:
  - "Running" – in the process of execution
  - "Finished" – executed
  - "Error" – error occurred during execution
  - "Canceled" – execution canceled
- *Started* – the date and time the job was started
- *Closed* – the date and time of job completion
- *Run Time* –job execution.

Service Messages

To access Scheduler service and BPM service messages generated during the current instance session, use the [Messages] button in the "Scheduler Monitor" form (see Fig. 9 in the section "Instance Status").

Clicking the button will open the "Messages for …" form (see Fig. 13).



	ID	Message Title	Type	Date	Object Type	Object ID
1	100000000...	Ended	Information	14.12.09 13:11:09		
2	100000000...	Ended	Information	14.12.09 13:11:08		
3	100000000...	Scheduler runtime stoped	Information	14.12.09 13:11:07		
4	100000000...	m_oracle_report. In step [/client/way4manager/components/sc...	Error	14.12.09 13:07:35		
5	100000000...	Job <m_oracle_report> didn't start. Status set to INVALID.	Error	14.12.09 13:07:34		
6	100000000...	Scheduler runtime started	Information	14.12.09 13:04:49		

Fig. 13. Scheduler service and BPM service messages

This form contains the following fields:

- *ID* – message ID
- *Message Title* – message text
- *Type* – type (error message, warning, or information message)
- *Date* – date and time of message generation
- *Object Type* – name of the database table to which the message belongs
- *Object ID* – number of a row in the table specified in the *Object Type* field.

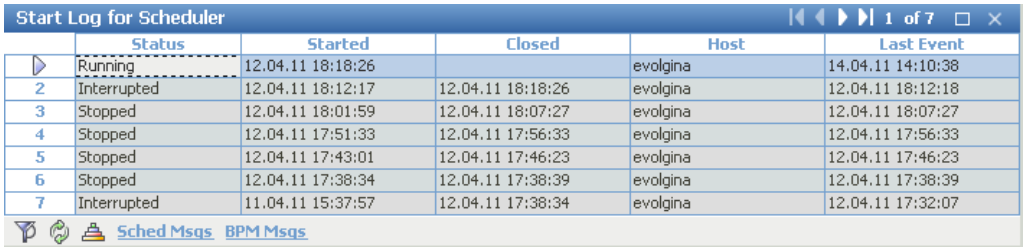
The [Msg Desc] button is used to open a message description.

The [Full Info] button is used to display the contents of the *Message Title* field.

History of Scheduler Sessions

To access the history of Scheduler instance sessions, use the [Start Log] button in the "Scheduler Monitor" form (see Fig. 9 in the section "Instance Status").

Clicking this button will open the "Start Log for …" form (see Fig. 14).


Start Log for Scheduler 1 of 7

	Status	Started	Closed	Host	Last Event
	Running	12.04.11 18:18:26		evolgina	14.04.11 14:10:38
2	Interrupted	12.04.11 18:12:17	12.04.11 18:18:26	evolgina	12.04.11 18:12:18
3	Stopped	12.04.11 18:01:59	12.04.11 18:07:27	evolgina	12.04.11 18:07:27
4	Stopped	12.04.11 17:51:33	12.04.11 17:56:33	evolgina	12.04.11 17:56:33
5	Stopped	12.04.11 17:43:01	12.04.11 17:46:23	evolgina	12.04.11 17:46:23
6	Stopped	12.04.11 17:38:34	12.04.11 17:38:39	evolgina	12.04.11 17:38:39
7	Interrupted	11.04.11 15:37:57	12.04.11 17:38:34	evolgina	12.04.11 17:32:07

Sched Msgs BPM Msgs

Fig. 14. History of instance sessions

This form contains the following fields:

- *Status* – status of a Scheduler instance session (see "Instance Status"):
  - "Stopped" – the session was completed normally
  - "Running" – the session was not completed
  - "Interrupted" – the session was interrupted

  When a Scheduler instance is started (see the section "Starting and Stopping Scheduler"), the application checks for sessions with the "Running" status. If this session is found, Scheduler checks whether the value in the *Last Event* field of the session exceeds the limit specified in the configuration files. If the limit is exceeded, the session is assigned the "Interrupted" status, and the Scheduler instance is started. If the limit is not exceeded, the session is rechecked until the session is completed (set to the "Stopped" status) or the limit is exceeded.
- *Started* – start date and time
- *Closed* – end date and time
- *Station* – name of the workstation where the corresponding Scheduler instance is started
- *Last Event* – date and time that a Scheduler instance records in the field with the frequency specified in the configuration file; the value of the field is used to determine whether the current session should be interrupted.

The control buttons [Sched Msg] and [BPM Msg] are used to access the messages generated by Scheduler service and BPM service respectively during the selected session of the instance.

Managing Job Execution

Users can manage job execution using the "Jobs" form (see "Monitoring Job Execution").

Clicking the [Commands…] button in the form will open the context menu for managing jobs (see Fig. 15).

Fig. 15. Context menu for managing jobs

Using the menu, users can:

- Start job execution by selecting the "Start Now" item (if the corresponding Scheduler instance is running)
- Forbid job execution (adjust the schedule) by selecting the "Suspend" item; in this case, Scheduler will not start the job until the user allows its execution by selecting the "Resume" item or approving the job
- Assign the executed with error status to the job by selecting the "Interrupt" item
- Allow job execution by selecting the "Resume" item.

Chapter 4. External Management of Scheduler Jobs (Scheduler Web Services)

Execution of Scheduler jobs can be called using external applications, for example, an external scheduler. An external call is a special Scheduler function provided by Scheduler web services. Scheduler web services are available if the corresponding Scheduler supply option was installed (see the section "Installing Scheduler with Support of Web Services").

Scheduler jobs are managed using web services by sending http requests containing an additional attached file in wsdl format. Scheduler web services perform four functions:

- startSchedulerJob – execute Scheduler job
- getSchedulerJobStatus – check the status of a Scheduler job
- getSchedulerJobLog – request the job log.
- stopSchedulerJob – stop Scheduler job.

Examples:

1. To get the wsdl file containing a description of Scheduler's Web service software interface syntax, send a request (http get request) in the following format:

```
http://<name of Scheduler web server>:<port number specified during
Scheduler installation>/name of application on the application server set
during Scheduler installation>/ws?wsdl
```

   After executing the request, a file will be sent to the user containing a description of Scheduler's Web service softwareinterface syntax.

2. To start execution of a Scheduler job, send a request (http post request) in the following format:

```
http://<name of Scheduler web server>:<port number specified during
Scheduler installation>/name of application on the application server set
during Scheduler installation>/ws
```

The request must contain an attached file in the following format:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:wsin="http://www.openwaygroup.com/wsint">
   <soapenv:Header/>
   <soapenv:Body>
      <wsin:startSchedulerJob>
         <wsin:instanceCode>Scheduler instance code
         </wsin:instanceCode>
         <wsin:jobCode>Job code, unique in the database</wsin:jobCode>
         <wsin:addParameters>Additional parameters</wsin:addParameters>
      </wsin:startSchedulerJob>
   </soapenv:Body>
</soapenv:Envelope>
```

For information about Scheduler instance codes, see the section "Registering Scheduler Instances". The job code is specified when creating and editing Scheduler jobs (see "Creating and Editing Jobs").

Additional parameters are sent to the process started using a Scheduler job (a Scheduler job itself does not use additional parameters). Additional parameters are set in the following format:

```
<wsin:addParameters>Parameter1 = Value1, Parameter2 =
Value2…</wsin:addParameters>
```

Where *Parameter1*, *Parameter2*, etc. are the names of parameters of a specific WAY4 process started by Scheduler. These parameters and their values (*Value1*, *Value2*, etc.) are determined by the process being started.

The section for setting additional parameters <wsin:addParameters> is optional (not mandatory).

Sent parameters will be shown in the WAY4 Process Log as parameters of the process started using a Scheduler job.

After the request is executed, the user will be sent a file in the following format, containing the identifier of the job started (cmdId).

```
<s:Envelope xmlns:s="http://schemas.xmlsoap.org/soap/envelope/">
   <s:Body>
      <startSchedulerJobResponse xmlns="http://www.openwaygroup.com/wsint"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
         <startSchedulerJobResult>
            <cmdId>parameter value cmdId</cmdId>
            <errMsg>I Job has been accepted to execute</errMsg>
         </startSchedulerJobResult>
      </startSchedulerJobResponse>
   </s:Body>
</s:Envelope>
```

3. To check Scheduler job status, send a request (http post request) in the following format:

```
http://<name of Scheduler web server>:<port number specified during
Scheduler installation>/<name of application on the application server set
during Scheduler installation>/ws
```

The request must contain an attached file in the following format:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:wsin="http://www.openwaygroup.com/wsint">
   <soapenv:Header/>
   <soapenv:Body>
      <wsin:getSchedulerJobStatus>
         <wsin:cmdId>parameter value cmdId</wsin:cmdId>
      </wsin:getSchedulerJobStatus>
   </soapenv:Body>
</soapenv:Envelope>
```

The value of the started job's identifier (cmdId) is specified in the response file sent when the http request calling the start of the Scheduler job is executed (see Item 2 in the current section).

After execution of the request, the user will be sent a file in the following format, containing information about the Scheduler job status:

```
<s:Envelope xmlns:s="http://schemas.xmlsoap.org/soap/envelope/">
   <s:Body>
      <getSchedulerJobStatusResponse
xmlns="http://www.openwaygroup.com/wsint"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
         <getSchedulerJobStatusResult>
            <status>name of Scheduler job status</status>
         </getSchedulerJobStatusResult>
      </getSchedulerJobStatusResponse>
   </s:Body>
</s:Envelope>
```

The full list of possible job statuses is contained in a wsdl file that also contains a description of Scheduler web service software interface syntaxes.

4. To get the Scheduler job log, send a request (http post request) in the following format:

```
http://<name of Scheduler web server>:<port number specified during
Scheduler installation>/name of application on the application server set
during Scheduler installation>/ws
```

During execution of a Scheduler job, several processes may be executed, including those organised in a hierarchical structure (tree). For messages shown in the job log, the process to which they belong is specified. The Scheduler job log is a view from database's PROCESS_MESS table. For more

information about the process log, see the section "Process Log" of the document "DB Manager Manual".

The request must contain an attached file in the following format:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:wsin="http://www.openwaygroup.com/wsint">
   <soapenv:Header/>
   <soapenv:Body>
      <wsin:getSchedulerJobLog>
         <wsin:cmdId> cmdId </wsin:cmdId>
         <wsin:rowLimit> rowLimit </wsin:rowLimit>
         <wsin:processPattern> processPattern </wsin:processPattern>
         <wsin:messagePattern> messagePattern </wsin:messagePattern>
         <wsin:messageType> messageType </wsin:messageType>
      </wsin:getSchedulerJobLog>
   </soapenv:Body>
</soapenv:Envelope>
```

Where:

- *cmdId* – the ID of the started job. This value is specified in the response file sent when executing an http request starting the execution of a Scheduler job (see Item 2 in the current section). This parameter is mandatory.
- *rowLimit* – a number limiting the number of messages in the requested log
- *processPattern* – a parameter allowing messages to be filtered by process name. SQL "LIKE" syntax is used; for example, "EXPORT%". Filtering is performed according to the PROCESS_NAME field of the PROCESS_MESS table
- *messagePattern* – a parameter allowing messages to be filtered according to message text. SQL "LIKE" syntax is used, for example, "EXPORT%". Filtering is performed according to the MESSAGE_TEXT field of the PROCESS_MESS table
- *messageType* – a parameter allowing messages to be filtered according to type:
  - "E" – only error messages
  - "W" – only error and warning messages

  After the request is executed, the user will be sent a file containing the Scheduler job log. An example of such a file is shown below.

```
<s:Envelope xmlns:s="http://schemas.xmlsoap.org/soap/envelope/">
  <s:Body>
    <getSchedulerJobLogResponse xmlns="http://www.openwaygroup.com/wsint"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
      <getSchedulerJobLogResult>
        <log>
```

```
          <logRecord>
            <id>24071535</id>
            <process>Test Job</process>
            <message>Started</message>
            <type>I</type>
          </logRecord>
          <logRecord>
            <id>24071538</id>
            <process>Test Job</process>
            <message>Ended</message>
            <type>I</type>
          </logRecord>
        </log>
      </getSchedulerJobLogResult>
    </getSchedulerJobLogResponse>
  </s:Body>
</s:Envelope>
```

The following parameters are used in the file:

- *id* – message ID
- *process* – process name
- *message* – message text
- *type* – message type:
  - "I" – only information messages
  - "E" – only error messages
  - "W" – only error and warning messages.

5. To stop execution of a Scheduler job, send a request (http post request) in the following format:

```
http://<name of Scheduler web server>:<port number specified during
Scheduler installation>/name of application on the application server set
during Scheduler installation>/ws
```

The request must contain an attached file in the following format:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:wsin="http://www.openwaygroup.com/wsint">
   <soapenv:Header/>
   <soapenv:Body>
      <wsin:stopSchedulerJob>
         <wsin:cmdId>value of the parameter cmdId</wsin:cmdId>
      </wsin:stopSchedulerJob>
   </soapenv:Body>
```

```
</soapenv:Envelope>
```

For information about Scheduler instance codes, see "Registering Scheduler Instances". A job code is specified when creating and editing Scheduler Jobs (see "Creating and Editing Jobs").

After executing the request, the user will be sent a file in the following format:

```
<s:Envelope xmlns:s="http://schemas.xmlsoap.org/soap/envelope/">
   <s:Body>
      <stopSchedulerJobResponse xmlns="http://www.openwaygroup.com/wsint"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
         <stopSchedulerJobResult>
            <errMsg>I STOP command registrated</errMsg>
         </stopSchedulerJobResult>
      </stopSchedulerJobResponse>
   </s:Body>
</s:Envelope>
```

The following parameters are used in the file:

- *errMsg* – message:
  - "I" – informational message, stop command has been sent.
  - "E" – an error has occurred, stop command has not been sent.
  - "W" – warning, stop command has been sent.

Chapter 5. Special Functions of Menu Items used in Scheduler Operation

Scheduler uses special functions of menu items (of BPM service). For more information about configuring these functions, see "WAY4 Manager Menu Editor" document.

Parallel Data Export

Scheduler supports execution of C-pipes in parallel mode, i.e. when several pipe copies are run simultaneously. This mode is only used for pipes exporting data to files and is used to improve performance.

Parallel Data Import

Scheduler supports execution of Java pipes in parallel mode, i.e. when several pipe copies are run simultaneously. This mode is only used for pipes importing data from files and is used to improve performance.

To enable this mode, using WAY4 Manager Menu Editor, set the *Parallel Mode* property for the menu subitem with the "Java Pipe" type and configure a Scheduler job for this menu subitem (see "Creating and Editing Jobs").

Working with the WAY4 Manager menu editor is described in the document "WAY4 Manager Menu Editor". For information about configuring the "Java Pipe" type menu subitem, see the section "Java Pipe Type" of this document.

Business Exception Handling

When executing a Scheduler job, a menu item definition consisting of subitems is called. Usually, subitems included in the menu item are executed sequentially. During Scheduler operation, it is often necessary to change the sequence of executed actions depending on the results of subitems executed earlier.

To do so, BPM service functionality is used. This functionality allows business exception handling (i.e. creation of "branched" algorithms for executing menu items. An example of a two-tiered scheme for business exception handling is shown in Fig. 16.

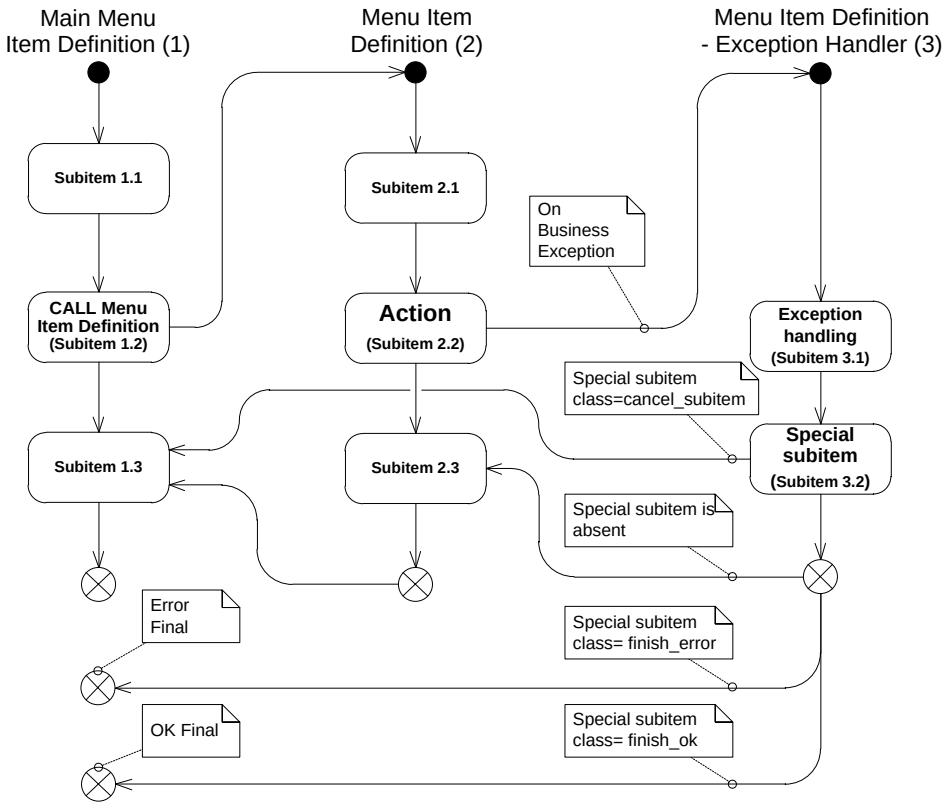


Fig. 16. Business exception handling scheme

In this scheme:

- *Main Menu Item Definition (1)* – menu item in one of the subitems of which (Subitem 1.2) another menu item (*Menu Item Definition (2)*) is called (CALL Menu Item Definition)
- *Menu Item Definition (2)* – menu item in one of the subitems of which (Subitem 2.2) a special menu item used for business handling (*Exception Handler (3)*) is called if an error occurs (On Business exception)
  - If in the process of executing the subitem (Subitem 2.2) an error does not occur, the subitems (Subitem 2.3) of this menu item (*Menu Item Definition (2)*) continue to be executed. After this process is completed, a return is made to the first menu item (*Main Menu Item Definition (1)*) (to the subitem next to the subitem that called the transition; in this case, Subitem 1.3)
  - If in the process of executing the subitem (Subitem 2.2) an error occurs, a transition is made (On Business exception) to a special menu item used for business exception handling (*Exception Handler (3)*)

    In order for another menu item to be called if an error occurs when executing a subitem, the menu subitem property *Execute Menu Item on Error* is used. When configuring subitem properties, a link can be specified in this field to the menu item executed if an error occurs (Exception Handler)

The *Execute Menu Item on Error* field can be filled in for the following types of menu subitems:

- SQL (see "Checking Conditions")
- Flag (see "Synchronising Processes")
- Waiting Files
- Java Pipe

In this scheme, the *Execute Menu Item on Error* property is specified for the menu subitem Subitem 2.2.

- *Exception Handler (3)* – special menu item used for business exception handling. This item includes:
  - Subitem(s) (Subitem 3.1) – used for exception handling (Exception Handling)
  - Subitem with the "Other" type (Special Subitem, Subitem 3.2) – used to select the actions executed after exception handling. When configuring this type of menu subitem, the following values can be specified in the *Class* field of the "Other" form:
    - "finish_error" – after exception handling (Exception Handling, Subitem 3.1), menu items are completed and the job status will be returned to Scheduler (error message)
    - "finish_ok" – after exception handling (Exception Handling, Subitem 3.1) menu items are completed and the job status will be returned to Scheduler (successful execution message)
    - "cancel_subitem" – after exception handling (Exception Handling), execution of the menu item calling the transition to exception handling (*Menu Item Definition (2)*)is cancelled and a transition will be made to the subitem Subitem 1.3 belonging to the menu item *Main Menu Item Definition (1)*
  - If the "Other" type subitem is absent (Special Subitem is absent) from the menu item used for business exception handling (*Exception Handler (3)*), after exception handling (Exception Handling, Subitem 3.1) the subitem (Subitem 2.3) will be executed that is next to the subitem calling the transition to exception handling (On Business Exception).

Menu subitems and items are configured using WAY4 Manager menu editor. For more information about the WAY4 Manager menu editor, see the document "WAY4 Manager Menu Editor".

Synchronising Processes

Scheduler uses BPM service functionality for synchronising processes. This functionality is available by creating a menu subitem with the "Flag" type. This subitem makes it possible to set up a special parameter ("flag") and depending on its state, to differentiate access (in time) to a resource or wait for the execution of an Event. If the conditions specified in the flag settings are not met, business exception handling may be called (see Fig. 16 in the section "Business Exception Handling").

For more information about working with the WAY4 Manager menu editor, see the document "WAY4 Manager Menu Editor". For configuration of the "Flag" type menu subitem, see the "Type "Flag"" section of the document "WAY4 Manager Menu Editor".

Checking Conditions

In the process of executing jobs, Scheduler allows conditions to be checked using SQL requests and the further logical branching of menu items depending on the results of executing a stored procedure or function. This can be used for business logic exception handling (see Fig. 16 in the section "Business Exception Handling").

To use this functionality, create a menu subitem with the "Sql" type and when configuring its properties, specify the "Check and interrupt" value in the *Action* field.

For more information about working with the WAY4 Manager menu editor, see the document "WAY4 Manager Menu Editor". For configuration of the "Sql" type menu subitem, see the "Type "Sql"" section of the document "WAY4 Manager Menu Editor".

Chapter 6. Cleaning Logs

Log Cleaner is a service that makes it possible to delete old extra log files and temporary files (these files are created by pipes when a high logging level is enabled). Log Cleaner always runs in the background. The Service supports cleaning the following directories:

- <AppServer directory>/appserver/applications/<Scheduler Instance> /webapps/<Scheduler Instance>/logs.
- <AppServer directory>/appserver/applications/<Scheduler Instance> /webapps/<Scheduler Instance>/temp.

The Log Cleaner procedure deletes old files.

The way in which the Service operates is determined by the values of the following parameter:

- log_cleaner_interval – interval between calls of Log Cleaner. The unit of measurement is seconds. The default value is 600.
- log_cleaner_saving_period – period for storing extra log files and temporary files. The value is specified in "Xd, Xh, Xs, Xm" format, where d is days, h is hours, m is minutes and s is seconds (the default values is "5d").
- log_cleaner_max_file_size_total – maximum permissible size of extra log files and temporary files (i.e. if the total amount of all files stored in the folder exceeds that specified, the oldest file will be deleted). The unit of measurement is bytes; the default value is 1000000000.

Default values can be changed with a job in the config.properties file of the Scheduler instance on the application server, see "Scheduler Configuration".

Example:

```
log_cleaner_interval=800
log_cleaner_saving_period=2d
log_cleaner_max_file_size_total=20000000
```

Other directories can also be cleaned. To do so, the extra_file_cleaner Service is used. It is possible to simultaneously set up calling nine instances of the extra_file_cleaner Service with various parameters. Service instance parameters are configured in the config.properties file of the Scheduler instance on the application server (see "Scheduler Configuration").

The Service is called in the following format:

```
extra_file_cleaner_*=<base dir>;<regex mask>;<total size limit>;<saving
period>;<delete dirs>
```

Where:

- * is a number from 1 to 9 (mandatory parameter).
- base_dir is the path to the directory to be cleaned (mandatory parameter).
- regex_mask is a file deletion mask set with a regular expression.

- total_size_limit is the maximum permissible size of files (i.e. if the total amount of all files stored in the folder exceeds that specified, the oldest file will be deleted). The unit of measurement is bytes; the default value is 1000000000).
- saving_period is the period for which files will be stored. The value is specified in "Xd, Xh, Xs, Xm" format, where d is days, h is hours, m is minutes and s is seconds (the default values is "5d").
- delete_dirs - indicator for deletion of empty directories (possible values are "true"/"false", the default value is "false").

Example 1: Deletion of a file with the name "logfile" located in the directory "C:/Temp/Log" if its size exceeds 50000000 bytes or it was created more than one day ago.

```
extra_file_cleaner_1=C:/Temp/Log;logfile;50000000;1d
```

Example 2: Deletion of files in the directory nested in the third level of the directory "C:/ows_works/my_work" that meet the following conditions: the amount of all files stored in the directory exceeds 50000000 bytes, or file was created more than three days ago.

```
extra_file_cleaner_2=C:/ows_works/my_work;.*/.*/.*;50000000;3d
```


The extra_file_cleaner Service can delete files with any attributes, including system files. It is recommended to ensure Service parameters are set correctly, to avoid violation of system performance.


Optional parameters of the extra_file_cleaner Service can be skipped. In this case, a ";" should be used in the place of the skipped parameter. Example (the "total_size_limit" parameter is skipped):

```
extra_file_cleaner_1=C:/iz/tmp/test;2/.*;;10s
```