



KNIME Server Administration Guide

KNIME AG, Zurich, Switzerland
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Introduction

This guide covers in detail the configuration options for KNIME Server.

If you are looking to install KNIME Server, you should first consult the [KNIME Server Installation Guide](#).

For administration options to configure KNIME WebPortal please refer to the [KNIME WebPortal Administration Guide](#).

For guides on connecting to KNIME Server from KNIME Analytics Platform, or using KNIME WebPortal please refer to the following guides:

- [KNIME Explorer User Guide](#)
- [KNIME WebPortal User Guide](#)

An additional resource is also the [KNIME Server Advanced Setup Guide](#).

Release Notes

KNIME Server 4.11 is a feature release of the 4.x release line. All clients that have worked with KNIME Server 4.10 will continue to work with KNIME Server 4.11 without restrictions.



To find out which version of KNIME Server you are currently running, you can check the [Administration pages](#) on the WebPortal.

New Features

For a list that includes the new Analytics Platform 4.2 features see [here](#).

Highlighted new functionality is:

- Improved OAuth authentication ([Setup guide](#))
- Executor Groups ([what's new](#))
- Executor Reservation ([what's new](#))
- Autoscaling on AWS ([AWS Guide](#))
- Switch to Apache Tomcat (over TomEE) ([Release notes](#))

A detailed changelog for [KNIME Server 4.11](#) is also available.

Switch to Apache Tomcat

In previous releases, the application server component of KNIME Server was based on Apache TomEE - the Java Enterprise Edition of Apache Tomcat. Now, in the new KNIME Server 4.11, TomEE is replaced by the standard Apache Tomcat.

In line with the switch to the standard Apache Tomcat, the use of the old EJB mountpoints to connect to KNIME Server is now discouraged in favor of the newer REST implementation. Migrating to a REST mountpoint has been made very simple. As soon as the user logs in with an existing EJB mountpoint, there is a prompt from which they can switch to REST with a single click. REST provides many benefits in comparison to EJB - particularly advantages in terms of performance and stability.

The Tomcat version used is 9.0.36. Note that for existing customers who are hesitant to switch to Tomcat, we still provide a KNIME Server installer based on Apache TomEE. This has been updated to the latest version, TomEE 8.0.3.

Execution via Qpid

Previous releases of KNIME Server used RMI to establish a connection between an application server and KNIME Executor. RMI has now been replaced by an embedded message queue based on Apache Qpid. Rather than having direct communication between application Server and Executor, events such as requests for job execution are passed on via the message queue.

Qpid technology comes bundled with the KNIME Server installer, so no additional setup is necessary. All new KNIME Server installations are configured to use Qpid as default. In addition, the KNIME Server installer makes various adjustments to the Executor's `knime.ini` file to facilitate the connection to Qpid.

Note that Qpid only supports a single KNIME Executor running on the same host as the application server. In case you want to run multiple distributed KNIME Executors, it is still necessary to set up RabbitMQ. Unlike with previous releases the Executor is **not** automatically started together with the Server, but instead has to be started individually. The necessary steps are described in the [KNIME Server Installation Guide](#)

Switch to REST mountpoints

Starting with the release of KNIME Server 4.11, the use of the old EJB mountpoints to connect to KNIME Server is now discouraged in favor of the newer REST implementation. In case of a Tomcat-based KNIME Server, this will be the only valid connection method. I.e., EJB is not supported anymore for KNIME Servers running on Apache Tomcat.

We have made migrating to a REST mountpoint very simple. Just log in with an existing EJB mountpoint and there will be a prompt from which you can switch to REST with a single click. REST provides many benefits in comparison to EJB - particularly advantages in terms of performance and stability.

After you switch to REST, you will notice some slight differences in behavior. Most notably, we do not show a popup dialog anymore when you start a workflow that uses either `Workflow Variables` or `Workflow Credentials`. These options have now been made accessible directly from the workflow execution dialog. To get there, right-click a workflow in the server repository → `Execute`. Then open the `Configuration options` tab. This allows you to enter `Workflow Variables` and `Workflow Credentials`.

In addition, the `Configuration options` tab also allows you to set values for all `Configuration nodes` inside a particular workflow that are located on the top-level of the workflow (i.e., that are not inside a component or metanode). This is available for all nodes with no incoming connection (**including** flow variables) included in the `Workflow Abstraction` → `Configuration`

category of the KNIME Analytics Platform node repository

Local file system access by KNIME workflows

A growing number of KNIME nodes (see below) are being revised to use a new shared framework for file access. More nodes will follow over the next releases, so that eventually the file access of all KNIME nodes uses the shared framework.

When executing on KNIME Server, a preference controls whether those nodes may access the local file system of the KNIME Server Executor or not. With this release, local file system access is **disallowed** by default (previously it was allowed).

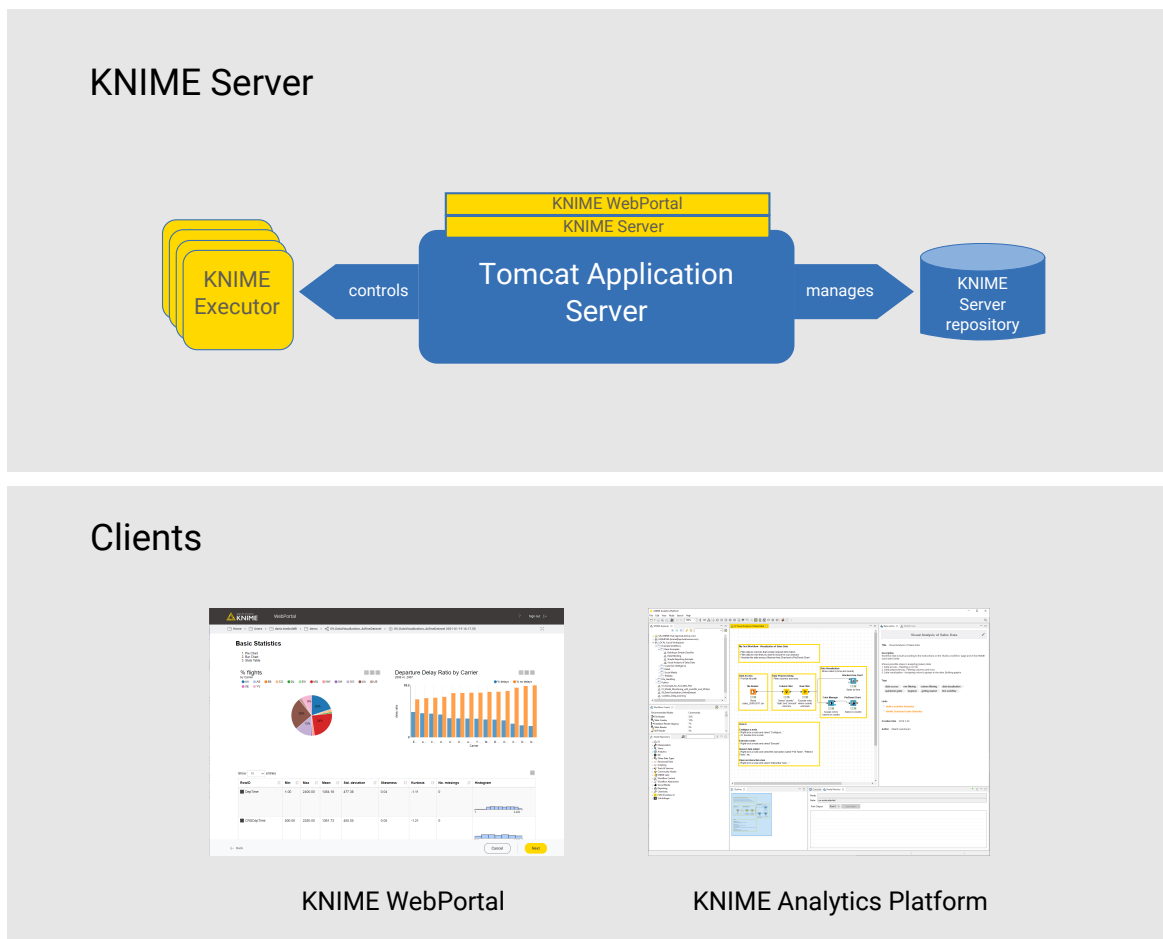
To **allow** local file system access (not recommended), you can add the following line to the customization profile used by your KNIME Server Executor(s):

```
/instance/org.knime.filehandling.core/allow_local_fs_access_on_server=true
```

This preference currently affects the following KNIME nodes: Excel Reader (XLS), Excel Writer (XLS), Excel Sheet Appender (XLS), Line Reader. In addition, this affects all nodes within the new File Handling (Labs) category. Any other KNIME nodes are not affected by this setting.

Server architecture

KNIME Server is a Java Enterprise Application, and the KNIME WebPortal a standard Java Web Application, both installed on a Tomcat application server, the blue box in the middle of the figure below. Users can log in to the server and the server will authenticate against any authentication source provided by Tomcat.



One of the main tasks of KNIME Server is to manage and control the server's repository. Workflows uploaded to the server go through the server application and are stored in the repository which is just a folder on the server's file system (the blue cylinder on the right in the diagram). Access to the stored workflows is controlled in KNIME Server and access rights for the workflows can be manipulated from KNIME Explorer once the client side server extensions are installed.

Workflow execution on the server is carried out by a KNIME Executor. The KNIME Executor is a persistent headless instance of a normal KNIME Analytics Platform application (leftmost element in the diagram above).

It is important to note that workflows can only be successfully loaded and executed on the server, if the executor has the required features installed and is of the same version (or

newer) than the KNIME Analytics Platform version that was used to create the workflow.

Server configuration files and options

KNIME Server configuration file

KNIME Server is configured by a knime-specific configuration file named `knime-server.config`. The file can be found in `<server-repository>/config/knime-server.config`. Most of the parameters defined in this file can be changed at runtime and will take effect as soon as possible. Default values will be used for empty or missing configuration options.

The section [KNIME Server configuration file options](#) contains a comprehensive list of all configuration options and explanations. For a list of all configuration options and explanations valid for KNIME WebPortal please refer to the [configuration file options section](#) of the KNIME WebPortal Administration Guide.

KNIME Server configuration file options

Below you will find a table with all supported configuration options (in alphabetical order). Some of them are described in more detail in later sections. The options can be set in the file `<server-repository>/config/knime-server.config`.

For Windows users: For paths in the server configuration file either use forward slashes ("/") or double backslashes ("\\"). A single backslash is used to escape characters.

The following annotations to the table, provide some additional information about which Executor type is affected, and whether changes take effect at runtime, or require a server restart.

[ST] changes take effect after a restart of KNIME Server

[RT] changes can take effect at runtime

[RE] changes only affect RMI executors

[DE] changes only affect KNIME Executors (see [here](#))

Some options can be set as property in the `knime-server.config` file as well as by defining an environment variable (Env). The environment variable changes will only take effect after a restart of KNIME Server. If the environment variable for an option is set, the property in the configuration file will be ignored.

`com.knime.server.admin_email=<email>,<email>,...` **[RT]**

A comma separated list of email addresses that will get notified when there is a problem with the server, e.g. the license is about to expire or the maximum number of users has been reached.

`com.knime.server.canonical-address=<URL to server>` **[RT]**

The communication between Executor and server is performed through the server's REST interface. In case auto-detection of the server's address doesn't work correctly, you have to specify the canonical address here, e.g. `http://knime-server:8080/`. This option is not required if server and Executor are running on the same computer. See also section [enabling workflow execution](#) below for more details.

Env: `KNIME_SERVER_CANONICAL_ADDRESS=<URL to server>`

`com.knime.server.config.watch=<true|false>` **[ST]**

If set to true changes to the configuration file are applied immediately without a server restart. Default is false, i.e. all changes will require a server restart.

`com.knime.server.csp-report-only=<true|false>` **[RT]**

Tells the browser to still serve content that violates the Content-Security-Policy and instead display a warning, by setting the Content-Security-Policy-Report-Only header rather than the Content-Security-Policy header (defaults to false). For more information about Content-Security-Policy-Report-Only, please refer to this [resource](#).

`com.knime.server.default_mount_id=<mount ID>` **[RT]**

Specifies the name of the default mount ID. This is fetched, when clients set up their mount point to the server. Defaults to the server's hostname.

Env: `KNIME_SERVER_DEFAULT_MOUNT_ID=<mount ID>`

`com.knime.enterprise.executor.embedded-broker=<true|false>` **[ST]**

Enables the use of the embedded message queue (Apache Qpid) instead of a separate RabbitMQ installation. This allows you to run distributed KNIME Executors on the same system as the KNIME Server. By default this is disabled.

`com.knime.enterprise.executor.embedded-broker.port=<value> [ST]`

Allows to configure the port for the embedded message queue (see option above). The default is 5672 and you should only change it if the port is already in use by another service. You also need to adjust the message broker address in the Executor's *knime.ini* in this case.

`com.knime.enterprise.executor.msgq=amqp://<user>:<password>@<rabbitmq-host>/<vhost> [DE][ST]`

URL to the RabbitMQ virtual host. In case [RabbitMQ High Available Queues](#) are used, simply add additional `<rabbitmq-host>:<port>` separated by commas to the initial amqp address:

`com.knime.enterprise.executor.msgq=amqp://<username>:<password>@rabbitmq-host/knime-server,amqp://<rabbitmq-host2>:<port2>,amqp://<rabbitmq-host3>:<port3>` Note, this is supported with KNIME Server 4.11.3 onward.

Env: `KNIME_EXECUTOR_MSGQ=amqp://<user>:<password>@<rabbitmq-host>/<vhost>`

`com.knime.enterprise.executor.msgq.connection_retries=<value> [DE][ST]`

Defines the maximum number of connection retries for the message queue, that should be performed during server startup. The delay between retries is 10 seconds. The default is 9, `<value>` has to be an integer value greater or equal to 1.

Env: `KNIME_MSGQ_CONNECTION_RETRIES=<value>`

`com.knime.enterprise.executor.msgq.names=<value>,<value>,... [DE][ST]`

Defines the names of Executor Groups. The number of names must match the number of rules defined with `com.knime.enterprise.executor.msgq.rules`. See [executor groups](#) for more information.

`com.knime.enterprise.executor.msgq.rules=<value>,<value>,... [DE][ST]`

Defines the exclusivity rules of the Executor Groups. The number of rules must match the number of rules defined with `com.knime.enterprise.executor.msgq.names`. See [executor groups](#) for more information.

`com.knime.server.executor.blacklisted_nodes=<node>,<node>,...` **[RT]**

Specifies nodes that are blacklisted by the server, i.e. which aren't allowed to be executed. For blacklisting a node you have to provide its factory name. Wildcards (*) are supported. For more information see [here](#).

`com.knime.server.executor.knime_exe=<path to knime executable>` **[RE][RT]**

Specifies the KNIME executable that is used to execute flows on the server. Default is none (no execution available on the server). This option is not used when using the default queue-based execution mode.

`com.knime.server.executor.prestart=<true|false>` **[RE][ST]**

Specifies whether an Executor should be started during server startup or if it should be started on-demand when the first workflow is being executed. Default is to prestart the Executor.

`com.knime.server.executor.reject_future_workflows=<true|false>` **[RT]**

Specifies whether the Executor should reject loading workflows that have been create with future versions. For new installations the value is set to true. If no value is specified the Executor will always try to load and execute any workflow by default.

`com.knime.server.executor.start_port=<port>` **[RE][ST]**

Specifies the start port that the server uses to communicate with the KNIME Executor. Default is 60100. With multiple Executors and/or automatic Executor renewal multiple consecutive ports are used.

`com.knime.server.executor.update_metanodelinks_on_load=<true|false>` **[RT]**

Specifies whether component links in workflows should be updated right after the workflow has been loaded in the KNIME Executor. Default is not to update component links.

`com.knime.server.gateway.timeout=<duration with unit, e.g. 30sm, 1m>` **[DE][RT]**

Specifies the timeout used internally for gateway requests coming from the KNIME Analytics Platform Remote Job View or from KNIME WebPortal. Default value is 1m.

`com.knime.server.job.async_load_reconnect_timeout=<duration with unit, e.g. 60m, 36h, or 2d> [DE][RT]`

Specifies the default connection timeout of asynchronously loaded jobs in case of a server restart. If a server restart occurs the server tries to reconnect to jobs that have been loaded asynchronously, as they might be still in the message queue or discarded due to an error. For this the maximum of the remaining load timeout or the `async_load_reconnect_timeout` is used to wait for status updates. If the time elapses without a status update loading will be canceled and the job state will be set to `LOAD_ERROR`.

`com.knime.server.job.default_cpu_requirement=<number of cores as decimal, e.g. 0, 0.1, 1, 2, 4> [RT]`

Specifies the default CPU requirement in number of cores of jobs without a specific requirement set. See [CPU and RAM requirements](#) for more information. The default is 0.

`com.knime.server.job.default_load_timeout=<duration with unit, e.g. 60m, 36h, or 2d> [RT]`

Specifies how long to wait for a job to get loaded by an Executor. If the job does not get loaded within the timeout, the operation is canceled. The default is 1m. This timeout is only applied if no explicit timeout has been passed with the call.

`com.knime.server.job.default_ram_requirement=<memory with unit, e.g. 512MB, 4GB> [RT]`

Specifies the default RAM requirement of jobs without a specific requirement set. See [CPU and RAM requirements](#) for more information. In case no unit is provided it is automatically assumed to be provided in megabytes. The default is 0MB.

`com.knime.server.job.default_report_timeout=<duration with unit, e.g. 60m, 36h, or 2d> [RT]`

Specifies how long to wait for a report to be created by an Executor. If the report is not created within the timeout, the operation is canceled. The default is 1m. This timeout is only applied if no explicit timeout has been passed with the call.

`com.knime.server.job.default_swap_timeout=<duration with unit, e.g. 60m, 36h, or 2d> [RT]`

Specifies how long to wait for a job to be swapped to disk. If the job is not swapped within the timeout, the operation is canceled. The default is 1m. This timeout is only applied if no explicit timeout has been passed with the call (e.g. during server shutdown).

`com.knime.server.job.discard_after_timeout=<true|false> [RT]`

Specifies whether jobs that exceeded the maximum execution time should be canceled and discarded (`true`) or only canceled (`false`). May be used in conjunction with `com.knime.server.job.max_execution_time` option. The default (`true`) is to discard those jobs.

`com.knime.server.job.exclude_data_on_save=<true|false> [DE][RT]`

Specifies whether node outputs of jobs that are saved as workflows shall be excluded. If this is set to `true` the resulting workflows will be reset, i.e. no output data are available at the nodes. The default value is `false`.

`com.knime.server.job.max_execution_time=<duration with unit, e.g. 60m, 36h, or 2d> [RT]`

Allows to set a maximum execution time for jobs. If a job is executing longer than this value it will be canceled and eventually discarded (see `com.knime.server.job.discard_after_timeout` option). The default is unlimited job execution time. Note that for this setting to work, `com.knime.server.job.swap_check_interval` needs to be set a value **lower** than `com.knime.server.job.max_execution_time`.

`com.knime.server.job.max_lifetime=<duration with unit, e.g. 60m, 36h, or 2d> [RT]`

Specifies the time of inactivity, before a job gets discarded (defaults to 7d), negative numbers disable forced auto-discard.

`com.knime.server.job.max_time_in_memory=<duration with unit, e.g. 60m, 36h, or 2d> [RT]`

Specifies the time of inactivity before a job gets swapped out from the Executor (defaults to 60m), negative numbers disable swapping.

`com.knime.server.job.save_workflow_summary=<true|false> [RT]`

Specifies if the workflow summary should be stored with the job upon swapping. This should be only disabled in case there are problems during job swapping. Default value is true.

`com.knime.server.job.status_update_interval=<duration with unit, e.g. 500ms, 2s, or 5m> [RE][RT]`

Specifies the interval at which the running Executor instances are checked for unnoticed status changes and if they are still alive. Default is every 60s.

`com.knime.server.job.swap_check_interval=<duration with unit, e.g. 30s, 1m, or 1h> [RT]`

Specifies the interval at which the server will check for inactive jobs that can be swapped to disk. Default is every 1m.

`com.knime.server.login.allowed_groups =<group>,<group>,... [RT]`

Defines the groups that are allowed to log in to the server. Default value allows users from all groups.

Env: KNIME_LOGIN_ALLOWED_GROUPS=<group>,<group>,...

`com.knime.server.login.consumer.allowed_accounts =<account>,<account>,... [RT]`

Defines account names that are allowed to log in to the server as *consumer*. Default value allows login as consumer for all users.

Env: KNIME_CONSUMER_ALLOWED_ACCOUNTS=<account>,<account>,...

`com.knime.server.login.consumer.allowed_groups =<group>,<group>,... [RT]`

Defines the groups that are allowed to log in to the server as *consumer*. Default value allows login as consumer from all groups.

Env: KNIME_CONSUMER_ALLOWED_GROUPS=<group>,<group>,...

`com.knime.server.login.jwt-lifetime=<duration with unit, e.g. 12h or 30d> [RT]`

Defines the maximum lifetime of JSON Web Tokens issued by the server. The default value is 30d. A negative value allows unrestricted tokens (use this value with care because there is no way to revoke issued tokens).

`com.knime.server.login.user.allowed_accounts =<account>,<account>,... [RT]`

Defines account names that are allowed to log in to the server as *user*. Default value allows login as user for all users.

`com.knime.server.login.user.allowed_groups =<group>,<group>,... [RT]`

Defines the groups that are allowed to log in to the server as a *user*. Default value allows login as user from all groups.

`com.knime.server.report_formats=<formats> [RT]`

Defines the different formats available for report generation as a comma separated list of values. Possible values are `html`, `pdf`, `doc`, `docx`, `xls`, `xlsx`, `ppt`, `pptx`, `ps`, `odp`, `odt` and `ods`. If this value is empty or not set the default list of formats is `html`, `pdf`, `docx`, `xlsx` and `pptx`.

`com.knime.server.repository.hide_unreadable_groups=<true|false> [RT]`

When set to `true`, if a user does not have:

- read-permission for workflow groups, e.g. `<workflow_group1>`, `<workflow_group2>`
- and, write-permission for the parent workflow group, e.g. `<parent_workflow_group>` in path `<parent_workflow_group>/<workflow_group1>`

then the not readable workflow groups are hidden to the user.

When set to `false`, which is the default value for this option, all workflow groups are shown as soon as the user has read permissions for the parent workflow group.

`com.knime.server.repository.throttling.concurrent_fetches=<value, e.g. 5, 10>`
[ST]

Defines the maximum number of concurrent fetches for the repository. In case the number of the currently fetching clients reaches the number of allowed fetches further clients will be kept waiting by a throttle. Note that only clients are handled by the throttle that request at least the number of specified levels (see `com.knime.server.repository.throttling.min_level`). The default value is the number of available cores.

`com.knime.server.repository.throttling.enable=<true|false>` **[RT]**

In case it is set to `true` throttling for repository requests is enabled, otherwise it is disabled. The default value is `false`.



This option is experimental and should only be activated in case there are problems where KNIME Server might get unresponsive after too many clients are connected at the same time.

`com.knime.server.repository.throttling.keep_alive_interval=<duration with unit, e.g. 30s, 1m>` **[RT]**

The interval in which the repository throttle sends a whitespace (' ') to waiting clients to ensure that they won't run into a read timeout.

`com.knime.server.repository.throttling.min_level=<value, e.g. 4, 8>` **[RT]**

The minimum number of repository levels (query parameter `level=X` or `deep=true`) that have to be requested for a client to go through the throttle. Clients in the throttle may have to wait until their request is handled until free resources are available. Requests that fetch fewer levels are handled immediately.

`com.knime.server.repository.update_recommendations_at=<time>` **[RT]**

Defines a time during the day (in ISO format, i.e. 24h notation, e.g. 21:15) at which the node recommendations for the workflow coach are updated based on the current workflow repository contents. Default is undefined which means that no node recommendations will be computed and provided by the server.

com.knime.server.server_admin_groups=<group>,<group>,... [RT]

Specifies the admin group(s). Users belonging to at least one of these groups are considered KNIME Server admins (not Tomcat server admins). Default is no admin groups.

Env: KNIME_SERVER_ADMIN_GROUPS=<group>,<group>,...

com.knime.server.server_admin_users=<user1>,<user2>,... [RT]

Specifies the user(s) that are KNIME Server admins (not Tomcat admins). Default is no users.

com.knime.server.user_directories.directory_location=<location> [ST]

Specifies the base directory in which user directories shall be created on first login. When the base directory is created its <owner> is set to the one defined with `com.knime.server.user_directories.parent_directory_owner`. Also all non existing directories under <location> will be created and their owner set to <owner>. The permissions of the created directories are: owner: `rwX`, world: `r--`. If left empty no user directories will be created and all `com.knime.server.user_directories` options will be ignored. Note that only logins via the KNIME Analytics Platform will cause a user directory to be created.

com.knime.server.user_directories.parent_directory_owner=<owner> [ST]

Specifies the owner of the base directory created at <location> (see `com.knime.server.user_directories.directory_location`). If left empty the default value `knimeadmin` will be used.

com.knime.server.user_directories.owner_permissions=<permission> [ST]

Specifies the permissions of the owners (users themselves) for their created user directories. The defined permissions have to be in a block of 3 characters (`r,w,x,-`), e.g. `rwX` or `r-x`. If left empty the default value `rwX` is used.

com.knime.server.user_directories.inherit_permissions=<true|false> [ST]

Specifies if the permissions of the created user directories shall be inherited from their parent directory. If left empty the default value `false` is used.

`com.knime.server.user_directories.groups=<group1>:<permission1>,<group2>:<permission2>,...` **[ST]**

Specifies the permissions of groups for the created user directories. The defined permissions have to be in a block of 3 characters (r,w,x,-), e.g. rwx or r-x. If left empty no group permissions are set.

`com.knime.server.user_directories.users=<user1>:<permission1>,<user2>:<permission2>,...` **[ST]**

Specifies the permissions of users for the created user directories. The defined permissions have to be in a block of 3 characters (r,w,x,-), e.g. rwx or r-x. If left empty no user permissions are set.

`com.knime.server.user_directories.world_permissions=<permission>` **[ST]**

Specifies the permissions of others for the created user directories. The defined permissions have to be in a block of 3 characters (r,w,x,-), e.g. rwx or r-x. If left empty the default value r-- is used.

`com.knime.server.action.upload.force_reset=<true|false>` **[RT]**

Specifies if all workflows shall be reset before being uploaded. This only works for workflows that are uploaded in the KNIME Analytics Platform 4.2 or higher. If left empty the default value false is used. The user can only change the reset behavior manually if `/instance/org.knime.workbench.explorer.view/action.upload.enable_reset_checkbox` is set to true, otherwise the behavior cannot be changed by the user.

`com.knime.server.action.upload.enable_reset_checkbox=<true|false>` **[RT]**

If set to true together with `com.knime.server.action.upload.force_reset` the user has the option to change the reset behavior in the Deploy to Server dialog. This only works for workflows that are uploaded in the KNIME Analytics Platform 4.2 or higher. If left empty the default value false is used.

`com.knime.server.action.snapshot.force_creation=<true|false>` **[RT]**

Specifies if a snapshot shall always be created when overwriting a workflow or file. This only works when overwriting workflows or files in the KNIME Analytics Platform 4.2 or higher. If left empty the default value false is used.

In KNIME Analytics Platform, these options are supported by KNIME Server: add them to the `knime.ini` file, after the `-vmargs` line, each in a separate line.

```
-Dcom.knime.server.server_address=<KNIME server>
```

Sets the `<KNIME server>` as the default Workflow Server in the client view.

Default mount ID

KNIME supports mountpoint relative URLs using the `knime` protocol (see the [KNIME Explorer User Guide](#) for more details). Using this feature with KNIME Server requires both the workflow author and their collaborator to use the shared Mount IDs. With this in mind, you can now set a common name (Mount ID) for the server to all users.

The default name for your server can be specified in the configuration file:

```
com.knime.server.default_mount_id=<server name>
```



Please note that a valid Mount ID contains only characters a-Z, A-Z, '.' or '-'. It must start with a character and not end with a dot nor hyphen. Additionally, Mount IDs starting with `knime.` are reserved for internal use.

Blacklisting nodes

You might want to prevent the usage of certain nodes on the Executor of KNIME Server. While you can decide, which extensions you install for the Executor there might be nodes in the basic installation of KNIME Analytics Platform or in a required extension that shouldn't be used.

The configuration option

```
com.knime.server.executor.blacklisted_nodes=<node>,<node>,...
```

allows you to define a list of nodes that should be blocked by the Executor. This list also supports wildcards (*). If a workflow contains a blacklisted node the Executor will throw an error and abort loading the workflow.

To blacklist a node you have to provide the full name of the node factory. The easiest way to determine the factory names of the nodes you want to block is to create a workflow with all

nodes that should be blacklisted. After saving the workflow you are able to access the `settings.xml` of each node under `<knime-workspace>/<workflow>/<node>/settings.xml`. The factory name can be found in the entry with key "factory".

The following shows an example on how to block the Java Snippet nodes. The factory information for the Java Snippet node is

```
<entry key="factory" type="xstring"
value="org.knime.base.node.jsnippet.JavaSnippetNodeFactory"/>
```

To block the Java Snippet node we simply provide the value (without the quotes)

```
com.knime.server.executor.blacklisted_nodes=org.knime.base.node.jsnippet.JavaSnippetNode
Factory
```

The factory names for Java Snippet (simple), Java Snippet Row Splitter, and Java Snippet Row Filter are

```
org.knime.ext.sun.nodes.script.JavaScriptingNodeFactory
org.knime.ext.sun.nodes.script.node.rowsplitter.JavaRowSplitterNodeFactory
org.knime.ext.sun.nodes.script.node.rowfilter.JavaRowFilterNodeFactory
```

Since they all share the same prefix, we append n factory name making use of wildcards:

```
com.knime.server.executor.blacklisted_nodes=org.knime.base.node.jsnippet.JavaSnippetNode
Factory,org.knime.ext.sun.nodes.script.*Java*
```

While users are still able to upload workflows containing these nodes, the Executor won't load a workflow containing any of them.

KNIME Executor job handling

Job swapping

Jobs that are inactive for a period of time may be swapped to disc and removed from the Executor to free memory or Executor instances. A job is inactive if it is either fully executed or waiting for user input (on the KNIME WebPortal). If needed, it will be retrieved from disk automatically.

The configuration option


```
com.knime.server.job.max_time_in_memory=<duration with unit, e.g. 60m, 36h, or 2d>
```

controls the period of inactivity allowed before a job will be swapped to disk (default = 60m). If you specify a negative number this feature is disabled and inactive jobs stay in memory until they are discarded.



There are certain flows that will not be restored in the exact same state that it was in, before it got swapped out. For example, if a flow gets swapped with a loop partially executed, this loop iteration will be reset and the loop execution is restarted.

Job auto-discard

There is an additional threshold for inactivity of a job after which it may be discarded automatically. A discarded job due to inactivity cannot be recovered. The time threshold for a job to be automatically discarded is controlled by setting

```
com.knime.server.job.max_lifetime=<duration with unit, e.g. 60m, 36h, or 2d>
```

The default value (if the option is not set) is 7d.

Managing User and Consumer Access

It is possible to restrict which groups (or which individual users) are eligible to log in as either users or consumers. In this context, a user is someone who logs in from a KNIME Analytics Platform client to e.g. upload workflows, set schedules, or adjust permissions. On the other hand, a consumer is someone who can only execute workflows from either the KNIME WebPortal or via the KNIME Server REST API.

In order to control who is allowed to log in as either user or consumer, the following settings need to be adjusted in the `knime-server.config`:

`com.knime.server.login.allowed_groups`: This setting has to include **all** groups that should be allowed to login to KNIME Server, regardless of whether they are users or consumers.

`com.knime.server.login.consumer.allowed_groups`: List of groups that should be allowed to use the WebPortal or REST API to execute workflows.

`com.knime.server.login.user.allowed_groups`: List of groups that should be allowed to connect to KNIME Server from a KNIME Analytics Platform client.

Usage Example

```
com.knime.server.login.allowed_groups=marketing,research,analysts
```

```
com.knime.server.login.consumer.allowed_groups=marketing,research,analysts
```

```
com.knime.server.login.user.allowed_groups=research
```

In the above example, we first restrict general access to KNIME Server to individuals in the groups `marketing`, `research`, and `analysts`. All individuals who are not in any of these groups won't be able to access KNIME Server at all. Next, we allow all three groups to login as consumers via WebPortal or REST API. Finally, we define that only individuals in the group `research` should be able to log in as users from a KNIME Analytics Platform client.



By default, these settings are left empty, meaning that as long as users are generally able to login to your KNIME Server (e.g. because they are in the allowed AD groups within your organization), they can log in as either users or consumers. Since the number of available user licenses is typically lower than the number of consumers, it is recommended to restrict user access following the above example.

Executor Preferences

If the KNIME Executor requires certain preferences (e.g. database drivers or path to Python environment), you need to provide a preference files that the Executor(s) can retrieve from the application server.

To get a template of the preferences:

1. Start KNIME (with an arbitrary workspace).
2. Set all preferences via "File" → "Preferences") and export the preferences via "File" → "Export Preferences". This step can also be performed on a client computer but make sure that any paths you set in the preferences are also valid on the server.

Open the exported preferences and insert the relevant lines into:

```
<knime-server-repository>/config/client-profiles/executor/executor.epf
```

Note: Make sure to specify the paths of all database drivers in the new preference page, in order to be able to execute workflows with database nodes. The page is available in the *KNIME* → *Database Drivers* category of the preferences.



It is recommended to only copy over the settings you will actually use on the Executor, like database drivers or Python preferences. The full preferences export is likely to contain e.g. host-specific paths that are not valid on the target system.

We have bundled a file called `executor.epf` into the `<server-repository>/config/client-profiles/executor` folder. In order for those preferences to be used, you must edit the `knime.ini` file of the executor and insert

```
-profileLocation
http://127.0.0.1:8080/<WebPortal Context ROOT, most likely
"knime">/rest/v4/profiles/contents
-profileList
executor
```

before the line containing `-vmargs`. This only has to be done in case no Executor has been provided during the installation of KNIME Server, otherwise it is set automatically.

Adding Executor preferences for headless Executors

In order to be able to execute workflows that contain database nodes that use custom or proprietary JDBC driver files on KNIME Server, the `executor.epf` file must contain the path to the JDBC jar file, or the folder containing the JDBC driver. This may be specified in the KNIME Analytics Platform (Executor) GUI and the `executor.epf` file exported as described in the above section. This is the recommended route for systems that have graphical access to the KNIME Analytics Platform (Executor).

Some systems do not have graphical access to the KNIME Analytics Platform (Executor) GUI. In that case the `executor.epf` can be manually created, or created on an external machine and copied into location on the server. The relevant lines that must be contained in the `executor.epf` file are:

```
file_export_version=3.0
\!/=
/instance/org.knime.workbench.core/database_drivers=/path/to/driver.jar;/path/to/driver-
folder
/instance/org.knime.workbench.core/database_timeout=60
```

Note that `driver.jar` may also reference a folder in some cases (e.g. MS SQL Server and Simba Hive drivers).



If you are using distributed KNIME Executors, please see the [Server-managed Customization Profiles](#) section of the [KNIME Database Extension Guide](#) for how to distribute JDBC drivers.

knime.ini file

You might want to tweak certain settings of this KNIME instance, e.g. the amount of available memory or set system properties that are required by some extensions. This can be changed directly in the `knime.ini` in the KNIME Executor installation folder.

KNIME Server will read the `knime.ini` file next to the KNIME executable and create a custom ini file for every Executor that is started. However, if you use a shell script that prepares an environment the server may not be able to find the ini file if this start script is in a different folder. In this case the `knime.ini` file must be copied to `<server-repository>/config/knime.ini`. If this file exists, the server will read it instead of searching for a `knime.ini` next to the executable or start script.

Log files

There are several log files that could be inspected in case of unexpected behavior:

Tomcat server log

Location: `<tomcat-folder>/logs/catalina.yyyy-mm-dd.log`

This file contains all general Tomcat server messages, such as startup and shutdown. If Tomcat does not start or the KNIME Server application cannot be deployed, you should first look into this file.

Location: `<tomcat-folder>/logs/localhost.yyyy-mm-dd.log`

This file contains all messages related to the KNIME Server operation. It does not include messages from the KNIME Executor!

For new installations these files are kept for 90 days before being removed. The default behaviour can be changed by editing the `<tomcat-folder>/conf/logging.properties` file and amending any entries with:

```
1catalina.org.apache.juli.FileHandler.maxDays = 90
```

KNIME executor log

Location: `<executor-workspace>/ .metadata/knime/knime.log`

The *executor-workspace* is usually in the home directory of the operating system user that runs the executor process and is called *knime-workspace*. If you provided a custom workspace using the `-data` argument when starting the executor you can find it there.

If you are still using deprecated RMI executors, the *executor-workspace* is `<server-repository>/runtime/runtime_knime-rmi_<suffix>`.

This file contains messages from the KNIME Executor that is used to execute workflows on the server (for manually triggered execution, scheduled jobs, and also for generated reports, if KNIME Report Server is installed)

The executor's log file rotates every 10MB by default. If you want to increase the log file size (to 100MB for example), you have to append the following line at the end of the executor's `knime.ini`:

```
-Dknime.logfile.maxsize=100m
```

Also useful in some cases is the Eclipse log file `<executor-workspace>/ .metadata/ .log`

KNIME Analytics Platform (client) log

Location: `<local workspace>/ .metadata/knime/knime.log`

This file contains messages of the client KNIME application. Messages occurring during server communications are logged there. The Eclipse log of this application is in `<local workspace>/ .metadata/ .log`

Email notification

KNIME Server allows users to be notified by email when a workflow finishes executing. The emails are sent from a single email address which can be configured as part of the web application's mail configuration. If you don't want to enable the email notification feature, no email account is required. You can always change the configuration and enter the account details later.

Setting up the server's email resource

The email configuration is defined in the web application context configuration file which is `<tomcat-folder>/conf/Catalina/localhost/knime.xml` (or `com.knime.enterprise.server.xml` or similar). The installer has already created this file. In order to change the email configuration, you have to modify or add attributes of/to the `<Resource name="mail/knime" ... />` element. All configuration settings must be added as attributes to this element. The table below shows the list of supported parameters (see also [the JavaMail API documentation](#)). Note that the mail resource's name must be `mail/knime` and cannot be changed.

Name	Value
<code>mail.smtp.from</code>	Address from which all mails are sent
<code>mail.smtp.host</code>	SMTP server, required
<code>mail.smtp.port</code>	SMTP port, default 25
<code>mail.smtp.auth</code>	Set to <code>true</code> if the mail server requires authentication; optional
<code>mail.smtp.user</code>	Username for SMTP authentication; optional
<code>password</code>	Password for SMTP authentication; optional
<code>mail.smtp.starttls.enable</code>	If <code>true</code> , enables the use of the STARTTLS command (if supported by the server) to switch the connection to a TLS-protected connection before issuing any login commands. Defaults to <code>false</code> .

Name	Value
mail.smtp.ssl.enable	If set to true, use SSL to connect and use the SSL port by default. Defaults to false.

If you do not intend to use the email notification service (available in the [KNIME WebPortal](#) for finished workflow jobs), you can skip this step.

Note that the mail configuration file contains the password in plain text. Therefore, you should make sure that the file has restrictive permissions.

User authentication

As described briefly in the [Server architecture](#) section it is possible to use any of the authentication methods available to Tomcat in order to manage user authentication. By default the KNIME Server installer configures a database (H2) based authentication method. Using this method it is possible for admin users to add/remove users/groups via the AdminPortal using a web-browser. Other users may change their password using this technique.

For enterprise applications, use of LDAP authentication is recommended, and user/group management is handled in Active Directory/LDAP itself.

In all cases the relevant configuration information is contained in the

```
`<Realm className="org.apache.catalina.realm.LockOutRealm">`
```

tag in `<tomcat-folder>/conf/server.xml`.

The default configuration uses a `CombinedRealm` which allows multiple authentication methods to be used together. Examples for each of database, file and LDAP authentication are contained within the default installation. Configuration of all three authentication methods are described briefly in the following sections. In all cases the [Tomcat documentation](#) should be considered the authoritative information source.

LDAP authentication

LDAP authentication is the recommended authentication in any case where an LDAP server is available. If you are familiar with your LDAP configuration you can add the details during installation time, or edit the `server.xml` file post installation. If you are unfamiliar with your LDAP settings, you may need to contact your LDAP administrator, or use the configuration details for any other Tomcat based system in your organization. Please refer to the [KNIME Server Advanced Setup Guide](#) for details on setting up LDAP.

Connecting to an SSL secured LDAP server

In case you are using encrypted LDAP authentication and your LDAP server is using a self-signed certificate, Tomcat will refuse it. In this case you need to add the LDAP server's certificate to the global Java keystore, which is located in `<jre-folder>/lib/security/cacerts`:


```
keytool -import -v -noprompt -trustcacerts -file \  
  <server certificate> -keystore <jre>/lib/security/cacerts \  
  -storepass changeit
```

Alternatively you can copy the `cacerts` file, add your server certificate, and add the following two system properties to `<tomcat-folder>/conf/catalina.properties`:

```
javax.net.ssl.trustStore=<copied keystore>  
javax.net.ssl.keyStorePassword=changeit
```

Single-sign-on with LDAP and Kerberos

It is possible to use Kerberos in combination with LDAP for Single-Sign-On for authentication with KNIME Server.

This is an advanced topic and is covered in the [KNIME Server Advanced Setup Guide](#).

Token-based authentication

KNIME Server also allows authentication by JWT (JSON Web Tokens) that have previously been issued by the server. The REST endpoint `/rest/v4/auth/jwt` can be used to acquire such a JWT for the currently logged in user. Subsequent requests need to carry the token in the Authorization header as follows:

```
Authorization: Bearer xxx.yyy.zzz
```

where `xxx.yyy.zzz` is the JWT. Token-based authentication is enabled by default and cannot be disabled. However, you can restrict the maximum lifetime of JWTs issued by the server via the server configuration option `com.knime.server.login.jwt-lifetime`, see section [KNIME Server configuration file options](#).

The OpenAPI documentation for the REST API which can be found at:

`https://<hostname>/knime/rest/doc/index.html#/Session` should be considered the definitive documentation for this feature.

Large number of users in a group

Since the JWT includes the group membership for the user, this can get very large in some cases. JWTs with more than 30 groups and that are larger than 2kB are now compressed. If

they are still larger than 7kB a warning is logged with hints how to resolve potential problems.

One solution is to increase the maximum HTTP header size in Tomcat by adding the attribute `maxHttpHeaderSize="32768"` to all defined Connectors in the `server.xml` (the default is 8kB). In case Tomcat is running behind a proxy, the limit may need to be increased there, too. In case of Apache it's the global setting `LimitRequestFieldSize 32768`.

Database-based authentication

Database-based authentication is recommended to be used by small workgroups who do not have access to an LDAP system, or larger organisations in the process of trialing KNIME Server. If using the previously described H2 database it is possible to use the AdminPortal to manage users and groups. It is possible to use other SQL databases e.g. PostgreSQL to store user/group information, although in this case it is not possible to use the AdminPortal to manage users/groups, management must be done in the database directly.

For default installations this authentication method is enabled within the `server.xml` file. No configuration changes are required. In order to add/remove users, or create/remove groups the administration pages of the WebPortal can be used. The administration pages can be located by logging into the WebPortal as the admin user, see section [Administration pages](#) on the KNIME WebPortal Administration Guide for more details.

Batch insert/update of usernames and roles is possible using the admin functionality of the KNIME Server REST API. This is described in more detail in the section [RESTful webservice interface](#). A KNIME Workflow is available in the distributed KNIME Server installation package that can perform this functionality.

File-based authentication

For KNIME Server versions 4.3 or older the default configuration used a file-based authentication which we describe for legacy purposes. It is now recommended to use either database-based or LDAP authentication. The advantages of each are described in the corresponding sections above and below.

The XML file `<tomcat-folder>/conf/tomcat-users.xml` contains examples on how to define users and groups (roles). Edit this file and follow the descriptions. By default this user configuration file contains the passwords in plain text. Encrypted storage of passwords is described in the Tomcat documentation.

Configuring a license server

Since version 4.3 KNIME Server can distribute licenses for extensions to the KNIME Analytics Platform (e.g. Personal Productivity, TeamSpace, or Big Data Connectors) to clients. In order to use the license server functionality, you require a master license. Every KNIME Server Large automatically comes with TeamSpace client licenses for the same number of users as the server itself.

The master license file(s) should be copied into the `licenses` folder of the server repository (next to the server's license). The server will automatically pick up the license and offer them to clients. For configuring the client, see the section about "Retrieving client licenses" in the [KNIME Explorer User Guide](#).

Client licenses distributed by the server are stored locally on the client and are tied to the user's operating system name (not the server login!) and its KNIME Analytics Platform installation and/or the computer. They are valid for five days by default which means that the respective extensions can be used for a limited time even if the user doesn't have access to the license server.

If the user limit for a license has been reached, no further licenses will be issued to clients until at least one of the issued licenses expires. The administrator will also get a notification email in this case (if their email notification is configured, see previous section [Email notification](#)).

License renewal

If the server is not behaving as expected due to license issues, please contact KNIME by sending an email to support@knime.com or to your dedicated KNIME support specialist.

If the license file is missing or is invalid a message is logged to the server's log file during server start up. KNIME clients are not able to connect to the server without a valid server license. Login fails with a message "No license for server found".

If the KNIME Server license has expired connecting clients fail with the message "License for enterprise server has expired on ...". Please contact KNIME to renew your license.

If more users than are licensed attempt to login to the WebPortal, some users will see the message: "Maximum number of WebPortal users exceeded. The current server license allow at most <number of licensed users> WebPortal users.". In this case you will need to email KNIME at support@knime.com to discuss options to increase the number of licensed users.

After you receive a new license file, remove the old expired license from the <server-repository>/licenses folder. In case there are multiple license files in this folder, find the one containing a line with

```
"name" = "KNIME Server"
```

and the "expiration date" set to a date in the past. The license file is a plain text file and can be read in any text editor.

Store the new license file in the license folder with the same owner and the same permissions as the old file.

The new license is applied immediately; a server restart is not necessary.

Backup and recovery

The following files and/or directories need to be backed up:

- The full server repository folder, except the temp folder
- The full Tomcat folder
- In case you installed your own molecule sketcher for the KNIME WebPortal (see above), also backup this folder.

A backup can be performed while the server is running but it's not guaranteed that a consistent state will be copied as jobs and the workflow repository may change while you are copying files.

In order to restore a backup copy the files and directories back to their original places and restart the server. You may also restore to different location but make sure to adjust the paths in the start script, the repository location in the context configuration file, and paths in the server configuration.

KNIME Executor installation

Install the open-source KNIME Analytics Platform 4.2 on the server. Install all additional extensions users may need to run their workflows on the server. Make sure to include the "KNIME Report Designer" extension. Also install all extensions listed in the "KNIME Server Executor" category, either from the default online update site that or from the update site archive that you can get from the download area there. **Note that the versions of the KNIME Server Executor extensions must match the server's version (e.g. "4.11")!** Therefore, please check that you are installing from these extensions from correct update sites if you are not using the latest released versions of both the server and Executor.



The easiest way to achieve this is to download the KNIME Executor full build from [here](#) and extract it. It includes all extensions required for running as an Executor for a KNIME Server.

Make sure that users other than the installation owner either have no write permissions to the installation folder at all or that they have full write permission to at least the "configuration" folder. Otherwise you may run into strange startup issues. We strongly recommend revoking all write permissions from everybody but the installation owner.

If the server does not have internet access, you can download zipped update sites (from the commercial downloads page) which contain the extensions that you want to install. Go to the KNIME preferences at *File → Preferences → Install/Update → Available Software Sites* and add the zip files as "Archives". In addition you need to disable all online update sites on the same page, otherwise the installation will fail. Now you can install the required extensions via *File → Install KNIME Extensions...*

Installing additional extensions

The easiest way to install additional extensions into the Executor (e.g. Community Extensions or commercial 3rd party extensions) is to start the Executor in GUI mode and install the extensions as usual. In case you don't have graphical access to the server you can also install additional extensions without a GUI. The standard `knime` executable can be started with a different application that allows changing the installation itself:

```
./knime -application org.eclipse.equinox.p2.director -nosplash  
-consolelog -r _<list-of-update-sites>_ -i _<list-of-features>_ -d _<knime-  
installation-folder>_
```

Adjust the following parameters to your needs:

- `<list-of-update-sites>`: a comma-separated list of remote or local update sites to use. ZIP files require a special syntax (note the single quotes around the argument). Example:

```
-r 'https://update.knime.org/analytics-  
platform/4.2,jar:file:/tmp/org.knime.update.analytics-platform_4.2.0.zip!/'
```



Some extensions, particularly from community update sites, have dependencies to other update sites. In those cases, it is necessary to list **all** relevant update sites in the installation command.

- Adding the following four update sites should cover the vast majority of cases:
 - <https://update.knime.com/analytics-platform/4.2>
 - <https://update.knime.com/community-contributions/4.2>
 - <https://update.knime.com/community-contributions/trusted/4.2>
 - <https://update.knime.com/partner/4.2>
- `<list-of-features>`: a comma-separated list (spaces after commas are not supported) of features/extensions that should be installed. You can get the necessary identifiers by looking at *Help* → *About KNIME* → *Installation Details* → *Installed Software* in a KNIME instance that has the desired features installed. Take the identifiers from the "Id" column and make sure you don't omit the `.feature.group` at the end (see also screenshot on the next page). Example:

```
-i org.knime.product.desktop,org.knime.features.r.feature.group
```

You can get a list of all installed features with:

```
./knime -application org.eclipse.equinox.p2.director -nosplash \  
-consolelog -lir -d _<knime-installation-folder_
```

- `<knime-installation-folder>`: the folder into which KNIME Analytics Platform should be installed (or where it is already installed). Example:

```
-d /opt/knime/knime_4.2
```

Updating the Executor

Update of an existing installation can be performed by using the `update-executor.sh` script in the root of the installation. You only have to provide a list of update sites that contain the new versions of the installed extensions and all installed extension will be updated (given that an update is available):

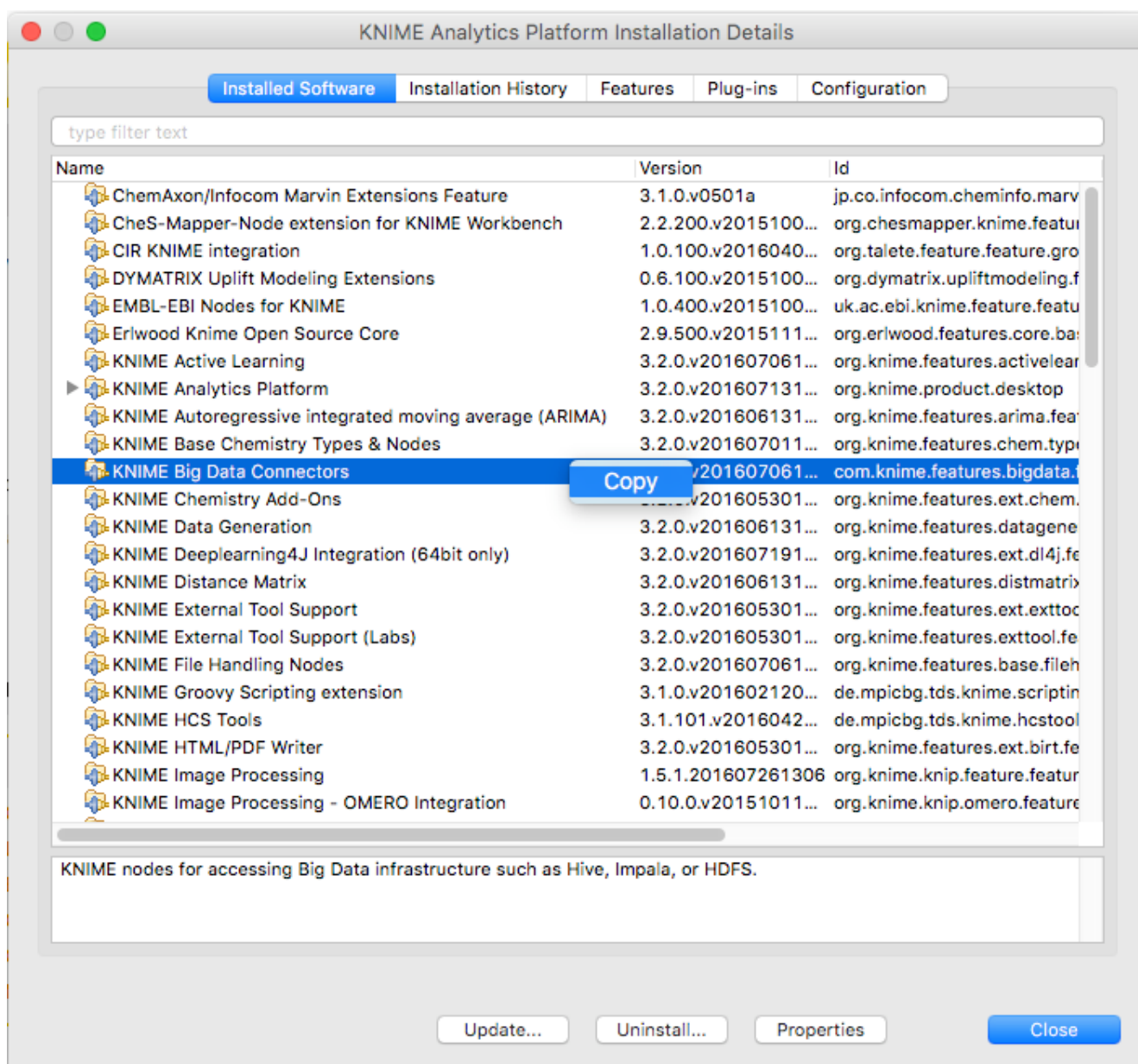
```
./update-executor.sh https://update.knime.com/analytics-platform/4.2
```

If you want to selectively update only certain extensions, you have to build the update command yourself. An update is performed by uninstalling (`-u`) and installing (`-i`) an extension at the same time:

```
./knime -application org.eclipse.equinox.p2.director -nosplash -consolelog -r <list-of-  
update-sites> -i  
<list-of-features> -u <list-of-features> -d <knime-installation-folder>
```

To update the Big Data Extensions, for example, run the following command:

```
./knime -application org.eclipse.equinox.p2.director -nosplash \  
-consolelog -r https://update.knime.com/analytics-platform/4.2 -i  
  
org.knime.features.bigdata.connectors.feature.group,org.knime.features.bigdata.spark.fe  
ature.group  
-u  
org.knime.features.bigdata.feature.group,org.knime.features.bigdata.spark.feature.group  
-d $PWD
```

Enabling workflow execution

Once you have installed the KNIME Executor with all necessary extensions, you have to tell the server where to find the Executor. Set the value of `com.knime.server.executor.knime_exe` in the server configuration to the `knime` executable. The path can be absolute or relative to the server's configuration folder (`<server-repository>/config`). The path to the Executor can be changed while the server is running it will be used when a new Executor should be started (e.g. when the first workflow is being loaded).

For Windows users: For paths in the server configuration file either use forward slashes ("/") or double backslashes ("\\"). A single backslash is used to escape characters.

Sometimes workflow jobs running in the Executor want to access files on the server, e.g. via

workflow-relative URLs or by a URL using the server's mount point ID. Since the Executor cannot authenticate itself to the server with the user's password (because it's generally not known by neither the server nor the Executor) a token is generated by the server, when the workflow is started (or scheduled). This token represents the user including its group membership *at the time it is created*. If group membership changes while the workflow job is still running or there are further scheduled executions, these changes will not be reflected in the workflow execution. Also if access has been revoked from the user completely, existing (scheduled) jobs can still access the server repository.

If the Executor is running on a different computer than the server, please pay attention to the following: The communication between server and Executor is partially performed via the REST interface, e.g. when a workflow requests files from the server repository. Therefore the Executor must know the server's address. The server tries to auto-detect its address and sends it to the Executor. However, if the server is running behind a proxy (e.g. Apache) or has a different external IP address than internally, auto-detection will give a wrong address and the Executor will not be able to reach the server. In this case you have to set the configuration option `com.knime.server.canonical-address` to the server's canonical address, e.g. `http://knime-server.behind.proxy/` (you do not need to provide the path to the server application). This address must be usable by the Executor.

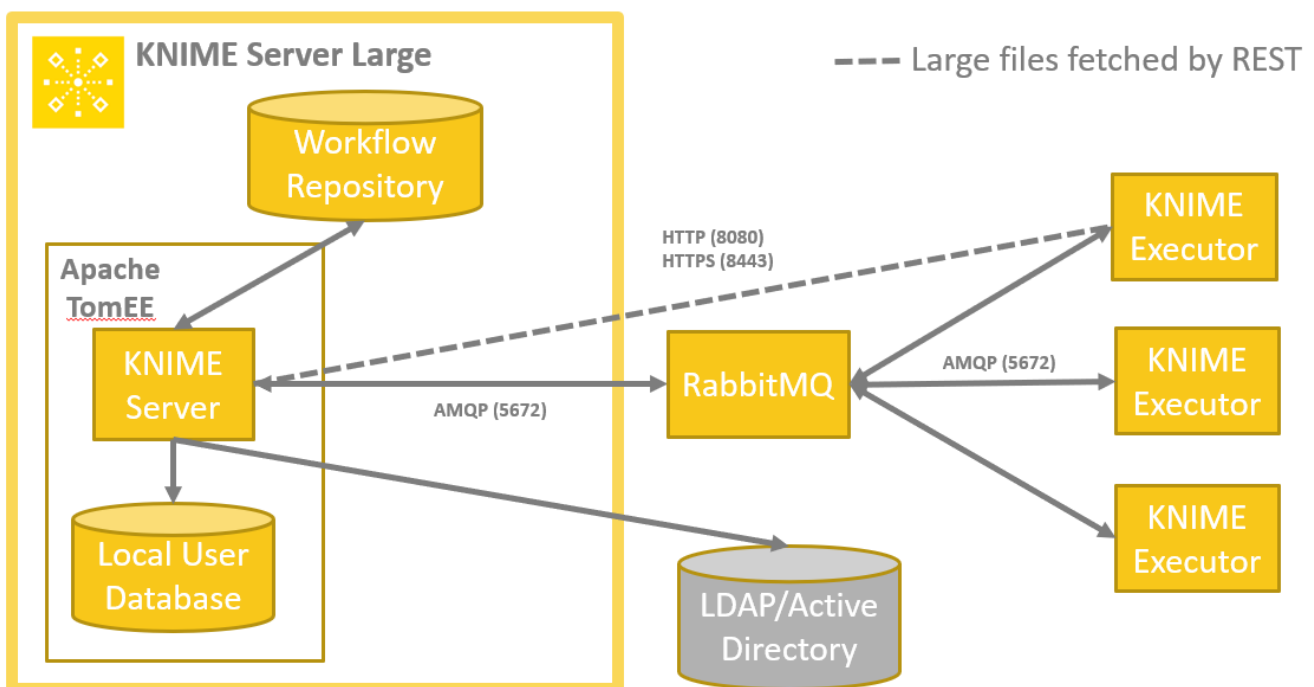
KNIME Executors

Distributed KNIME Executors: Introduction

As part of a highly available architecture, KNIME Server 4.11 allows you to distribute execution of workflows over several Executors that can sit on separate hardware resources. This allows KNIME Server to scale workflow execution with increasing load because it is no longer bound to a single computer.

If you're planning to use the distributed KNIME Executors in production environments please get in touch with us directly for more information.

Installation, configuration, and operation is very similar to the single Executor setup. The server communicates with the Executors via a message queueing system (and HTTP(S)). We use RabbitMQ for this purpose, and it's recommended, although not required, to install that on a separate machine as part of a highly available architecture.



Distributed KNIME Executors: Installation instructions

Enabling KNIME Executors consists of the following steps:

- In case you haven't installed KNIME Server already, please follow the [KNIME Server Installation Guide](#).
- Shut down the server if it has been started by the installer.

- Install RabbitMQ following the instructions below.
- Adjust configuration files for the server and Executor following the instructions below.
- Start the server and one or more Executors.

Installing RabbitMQ

The server talks to the Executors via a message queueing system called **RabbitMQ**. This is a standalone service that needs to be installed in addition to KNIME Server and the executors. You can install it on the same computer as KNIME Server or on any other computer directly reachable by both KNIME Server and the Executors.

KNIME Server requires RabbitMQ 3.6+ which can be installed according to the Get Started documentation on their [web page](#).

Make sure RabbitMQ is running, then perform the following steps:

- Enable the RabbitMQ management plug-in by following the [online documentation](#)
- Log into the RabbitMQ Management which is available at `http://localhost:15672/` (with user *guest* and password *guest* if this is a standard installation). The management console can only be accessed from the host on which RabbitMQ is installed.
- Got to the *Admin* tab and add a new user, e.g. *knime*.
- Also in the *Admin* tab add a new virtual host (select the virtual hosts section on the right), e.g. using the hostname on which KNIME Server is running or simply *knime-server*.
- Click on the newly created virtual host, go to the *Permissions* section and set permission for the new *knime* user (all to `.*` which is the default).

Connecting Server and KNIME Executors

KNIME Server and the KNIME Executors now need to be configured to connect to the message queue.

For KNIME Server you must specify the address of RabbitMQ instead of the path to the local Executor installation in the `knime-server.config`. I.e. comment out the `com.knime.server.executor.knime_exe` option (with a hash sign) and add the option `com.knime.enterprise.executor.msgq`. The latter takes a URL to the RabbitMQ virtual host: `amqp://<user>:<password>@<rabbit-mq-host>/<virtual host>`, e.g.

```
com.knime.enterprise.executor.msgq=amqp://<username>:<password>@rabbitmq-host/knime-server
```

Note that any special characters in the password must be URL encoded.

The same URL must also be provided to the Executor as system property via the `knime.ini`:

```
-Dcom.knime.enterprise.executor.msgq=amqp://<username>:<password>@rabbitmq-host/knime-server
```

Alternatively you can provide the message queue address as an environment variable:

```
KNIME_EXECUTOR_MSGQ=amqp://<username>:<password>@rabbitmq-host/knime-server
```



In case **RabbitMQ High Available Queues** are used, simply add additional `<rabbitmq-host>:<port>` separated by commas to the initial `amqp` address (this is supported with KNIME Server 4.11.3 onward):

```
-Dcom.knime.enterprise.executor.msgq=amqp://<username>:<password>@rabbitmq-host/knime-server,amqp://<rabbitmq-host2>:<port2>,amqp://<rabbitmq-host3>:<port3>
```



In order to use RabbitMQ, you need to explicitly deactivate the embedded Qpid message broker by setting `com.knime.enterprise.executor.embedded-broker=false` in `knime-server.config`. Qpid does not support more than one KNIME Executor, and it doesn't support Executors running on separate hosts.

While commands between the server and KNIME Executors are exchanged via the message queue, actual data (e.g. workflows to be loaded) are exchanged via HTTP(S). Therefore, the KNIME Executors must know where to reach the server. The server tries to auto-detect its own address however in certain cases this address is not reachable by the KNIME Executors or – in case of https connections – the hostname doesn't match the certificate's hostname. In such cases you have to specify the correct public address in the `knime-server.config` with the option `com.knime.server.canonical-address`, e.g.

```
com.knime.server.canonical-address=https://knime-server:8443/
```

You don't have to specify the context path as this is reliably auto-detected. Now you can start the server.

The KNIME Executors must be started manually, the server does **not** start them. In order to

start an Executor (on any machine) launch the KNIME application (that has been created by the installer) with the following arguments:

```
./knime -nosplash -consolelog -application  
com.knime.enterprise.slave.KNIME_REMOTE_APPLICATION
```

You can also add these arguments at the top of the `knime.ini` if the installation is only used as an Executor. You can start as many KNIME Executors as you like and they can run on different hosts. They will all connect to RabbitMQ (you can see them in the RabbitMQ Management in the *Connections* tab).

When you start the Executor in a shell, a very simple command line interface is available to control the Executor. Enter `help` at the `Executor>` prompt to get a list of available commands.

On Windows a separate window is opened for the Executor process. In case there is a problem during startup (e.g. the Executor cannot acquire core tokens from the server) then this window closes immediately. In this case you can add `-noexit` to the command above to keep it open and look at the log output or open at the log file which by default is `<user home>/knime-workspace/.metadata/knime/knime.log` unless you provided a different workspace location with `-data`.

You may find it helpful for an Executor to use customization profiles provided by the KNIME Server. In this case consult the documentation section for [Customizations](#). For example editing the startup command for the Executor will apply the `executor` profile.

```
./knime -nosplash -consolelog -profileLocation http://knime-  
server:8080/knime/rest/v4/profiles/contents -profileList  
executor com.knime.enterprise.slave.KNIME_REMOTE_APPLICATION
```

Running KNIME Executors as services

It's also possible to run KNIME Executors as services that are automatically started during system startup (and stopped during shut down). This is the recommended method to use when not running on a docker deployment.

Linux with systemd

Running KNIME Executors as services is only supported on Linux distributions that use *systemd* (e.g. Ubuntu \geq 16.04, RHEL 7.x and derivatives). The following steps assume that you have a KNIME Executor installed that contains the *KNIME Executor connector* extension as described in the section [KNIME executor installation](#).

1. Copy the whole folder

```
<knime-installation>/systemd/
```

to the root of your file system. The folder includes the `systemd` service description for `knime-executor` and an override file that allows configuration of the service (such as file system location or the `userid` under which the Executor should run).

2. Run

```
systemctl daemon-reload
```

3. Run

```
systemctl edit knime-executor.service
```

Adjust the settings in the editor that will open, and save the changes. Make sure that the `User` specified in this file exists on the system. Otherwise startup will fail unless your version of `systemd` supports `DynamicUser`. In this case a temporary user account will be created.

4. Enable the service with

```
systemctl enable knime-executor.service
```

Windows

On Windows KNIME Executors can be run as Windows services by using *NSSM* (Non-Sucking Service Manager). The following steps assume that you have a KNIME Analytics Platform installation that contains the *KNIME Executor connector* extension as described in [KNIME Server Installation Guide](#).

1. Edit

```
<knime-installation>/install-executor-as-service.bat
```

and adjust the variables at the top of the file to your needs.

2. Run this batch file **as administrator**. This will install the service.

3. Open the Windows *Services* application, look for the *KNIME Executor* service in the list and start it.
4. If you want to remove the Executor service again, run the following **as administrator**:

```
<knime-installation>/remove-executor-as-service.bat
```

Note that if you move the KNIME Executor installation you first have to remove the service **before** moving the installation and then re-create it.

Load throttling

If too many jobs are sent to KNIME Executors this may overload them and all jobs running on that Executor will suffer and potentially even fail if there aren't sufficient resources available any more (most notably memory). Therefore an Executor can reject new jobs based on its current load. By default an Executor will not accept new jobs any more if its memory usage is above 90% (Java heap memory, averaged over 1-minute) or the average system load is above 90% (averaged over 1-minute). These settings can be changed by two system properties in the Executor's `knime.ini` file:

Some options can be set as property in the `knime.ini` file as well as by defining an environment variable (Env). The environment variable changes will only take effect after a restart of the KNIME Executor. If the environment variable for an option is set, the property in the 'knime.ini' file will be ignored.

```
-Dcom.knime.enterprise.executor.heapUsagePercentLimit=<value-in-percent e.g. 90>  
    The average Heap space usage of the executor JVM over one minute. Default 90  
    percent
```

```
Env: KNIME_EXECUTOR_HEAP_USAGE_PERCENT_LIMIT=<value-in-percent e.g. 90>
```

```
-Dcom.knime.enterprise.executor.cpuUsagePercentLimit=<value-in-percent e.g. 90>  
    The average CPU usage of the executor JVM over one minute. Default 90 percent.
```

```
Env: KNIME_EXECUTOR_CPU_USAGE_PERCENT_LIMIT=<value-in-percent e.g. 90>
```

If only one KNIME Executor is available it will accept every job despite the defined Heap space and CPU limits. With KNIME Server 4.9.0 and later an option to change this behavior has been added. For more information see the [Automated Scaling](#) section.

Resource throttling

It is possible to restrict the number of cores/threads used by the Executor. In normal operation, you do not need to set this preference. Typically, the JVM will determine how many cores are available in the system (including identifying hyper-threaded cores as a 'core'), and the Executor will then set `knime.maxThreads=2*num_cores`.

In some cases, though, you may wish to restrict how many cores/threads the Executor can use. Examples of when this may be desired include when additional KNIME Executor cores on the machine must be reserved for another task, or in a local Docker setup where containers detect all cores available on a machine. Both of these configurations are typically not recommended, as it can be difficult to guarantee good resource sharing. Generally, it is better to run workloads on individual machines or in isolated pods using Kubernetes.

However, should you need to do so, you would use the following setting:

```
/instance/org.knime.workbench.core/knime.maxThreads=<maximum number of threads to use>
```

This setting controls the number of threads that the KNIME Executor will use to process workflows, and must be added to one of the preferences (.epf) files used by the Executor. (For more information on Executor preferences, see [Executor Preferences](#).)

Automated Scaling

Currently we allow automated scaling by monitoring Executor heap space and CPU usage. It is also possible to blend these metrics using custom logic to invent custom scaling metrics. In some cases it may also be desirable to allow jobs to stack up on the queue and use the 'queue depth' as a fourth metric type. In order to do so, it is necessary to edit the `knime.ini` of the Executors.

```
-Dcom.knime.enterprise.executor.allowNoExecutors=<true|false>
```

<Experimental Setting> Specifies whether the last Executor accepting jobs is allowed to reject jobs. That will result in the behaviour that it is possible for jobs to pile-up on RabbitMQ. It may be necessary to increase the `com.knime.server.job.default_load_timeout` and the `com.knime.explorer.job.load_timeout` in the Analytics Platform to ensure sensible behaviour. The default is `false`, which emulates the behaviour before the setting was added.

When using an automatic scaling setup, jobs that are waiting for an Executor to start, might run into timeouts. The default wait time for a job to be loaded by an Executor can be increased by setting the `com.knime.server.job.default_load_timeout` option in the server configuration as described in section [Server configuration files and options](#).

When starting jobs interactively using the Analytics Platform, the connection might also time out. The timeout can be increased by adding the following option to the `knime.ini` file of the KNIME Analytics Platform.

```
-Dcom.knime.explorer.job.load_timeout=<duration with unit, e.g. 60m, 36h, or 2d>  
    Specifies the timeout to wait for the job to be loaded. The default duration is 5m.
```

Generally, the timeout in the Analytics Platform should be higher than the timeout set in the KNIME server. This prevents the interactive session from running into read timeouts.

Reconnecting to message queue

In case the connection to the message queue gets lost (e.g. by restarting RabbitMQ), starting with KNIME Server 4.11 the Executor will try to reconnect to the message queue. The following option can be adjusted in the `knime.ini` file of the Executor:

```
-Dcom.knime.enterprise.executor.connection_retries=<number of retries>  
    Specifies the number of retries that should be attempted to reconnect to the  
    message queue. Between each attempt the Executor waits 10 seconds. The default  
    value is set to 9 i.e. the Executor tries reconnecting for 90 seconds. Note that this  
    option can be also set via the environment variable  
    KNIME_EXECUTOR_CONNECTION_RETRIES, which takes precedence over the system  
    property set in the knime.ini file. For number of retries less than 0 the number of  
    retries is infinite.
```

Swapping upon shutdown

Starting with KNIME Server 4.12.2 the Executor contains an option to define the time the Executor waits until a job is swapped during shutdown.

`-Dcom.knime.enterprise.executor.swap-wait=<duration, e.g. 30s, 1m, 1h, 1d>`

Specifies the time the Executor will wait for a single job to be swapped. In case the job has not been swapped within the timeout the Executor will continue with the next job in the list. In case no other job has to be swapped the Executor will continue with its shutdown routine. The default value is 1m. Note that this option can also be set via the environment variable `SHUTDOWN_SWAP_WAIT`, which takes precedence over the system property set in the `knime.ini` file.

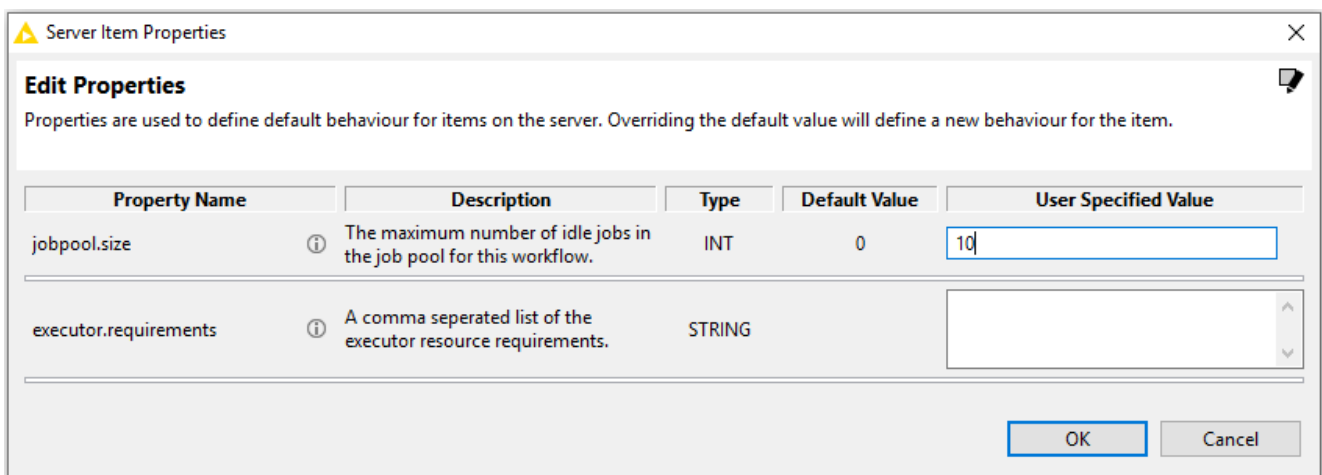
Note: The total time the Executor will wait for all jobs to be swapped depends on the number of jobs currently loaded. Please ensure that the Executor is not forcefully shutdown in case the shutdown routine takes too long as it may result in uncleaned temporary files and lost jobs.

Job Pools

For workflows that are frequently executed it's now possible (starting with KNIME Server 4.8.1) to keep a certain number of jobs from that workflow in memory. This eliminates the overhead of loading the workflow in an Executor after the first use of that job. This should be particularly beneficial in cases where job loading time is large compared to job execution time.

Enabling job pools

In order to enable a job pool, a property has to be set on the workflow that should be pooled. Setting workflow properties can be done in the KNIME Explorer (starting with KNIME Server 4.9.0) by right-clicking on a workflow and selecting 'Properties...'. A dialog will open that lets the user view and edit the properties of the workflow.



Property Name	Description	Type	Default Value	User Specified Value
jobpool.size	The maximum number of idle jobs in the job pool for this workflow.	INT	0	10
executor.requirements	A comma separated list of the executor resource requirements.	STRING		

Otherwise, workflow properties can also be set via a REST call, e.g. using `curl`:

```
curl -X PUT -u <user>:<password> http://<server-address>/knime/rest/v4/repository/<workflow>;properties?com.knime.enterprise.server.jobpool.size=<pool size>
```

This will enable a pool with at most *pool-size* jobs for the workflow *workflow*.

It is only possible for single-call executions that do loading, execution, and discard in one call (i.e. the current `:execution` resource). Jobs that clients execute with multiple REST calls (load, execute, re-execute, discard) cannot be pooled.

Disabling job pools

Job pools can be disabled by setting the job pool size to 0, either in the KNIME Explorer or via a REST call:

```
curl -X PUT -u <user>:<password> http://<server-address>/knime/rest/v4/repository/<workflow>;properties?com.knime.enterprise.server.jobpool.size=0
```

Using job pools

In order to make use of the pooled jobs, a special REST resource has to be called for executing a job. Instead of calling out to `:execution` you have to call to `:job-pool`. Apart from that both calls are identical concerning semantics and allowed parameters.

Executing a pooled job might look as follows:

```
curl -u <user>:<password> http://<server-address>/knime/rest/v4/repository/<workflow>;job-pool?p1=v1&p2=v2
```

This will call *workflow* passing *v1* for input parameter *p1* and *v2* for input parameter *p2*. Calls using POST will work in a similar way using the `:job-pool` resource.

Behaviour of job pools

Job pools exhibit a certain behaviour which is slightly different from executing a non-pooled job. Clients should be aware of those differences.

- If the pool is empty (either initially or if all pooled jobs are currently in use) the job will be loaded from the workflow and thus the call will take longer.
- A used job will be put back into the pool right after the result has been returned if the pool isn't already full. Otherwise the job will be discarded.
- Pooled jobs are tied to the user that triggered initial loading of the job. A pooled job will never be shared among different users.
- If there is no job in the pool for the current user, the oldest job in the pool from a different user will be removed. This can lead to contention if there are more distinct users calling out to the pool than the pool size.
- Pooled jobs will be removed if they are unused for more than the configured job swap timeout (see the [server configuration options](#)).

- A pooled job **without** any input nodes will be reset before every invocation, even the first one! This is different from executing a non-pooled job but is required for consistent behaviour across multiple invocations. Otherwise the first and subsequent operations may behave differently if the workflow is saved with some executed nodes.
- In a pooled job **with** input nodes all of them will receive input values before execution: either the value that has been passed in the call, or if no explicit value has been provided its default value. This means that **all** input nodes will be reset prior to execution and not just the nodes explicitly set in the call. Again, this is different from executing a non-pooled job where only input nodes with explicitly provided values will be reset but required for consistency. Otherwise the results of a call may depend on the parameters passed in the previous call.

Workflow Pinning

Workflow Pinning can be used to let workflows only be executed by a specified subset of the available KNIME Executors when distributed **KNIME Executors** are enabled.

For workflows that need certain system requirements (e.g. specific hardware, like GPUs, or system environments, like Linux) it's now possible (starting with KNIME Server 4.9.0) to define such Executor requirements per workflow. Only KNIME Executors that fulfill the Executor requirements will accept and execute the workflow job. To achieve this behaviour, a property has to be set for the workflows. Additionally, the system admin of the KNIME Executors has to specify a property for each Executor separately. The properties consist of values that define the Executor requirements, set for a workflow, and Executor resources, set for an Executor, respectively.

Prerequisites for workflow pinning

In order to use workflow pinning, the **KNIME Server Distributed Executors** must be enabled and **RabbitMQ** must be installed. Otherwise, the set Executor requirements are ignored.

Setting executor.requirements property for a workflow

Executor requirements for a workflow can be defined by setting a property on the workflow. The Executor requirements are a simple comma-separated list of user-defined values. Setting workflow properties can be done in the KNIME Explorer by right-clicking on a workflow and selecting 'Properties...'. A dialog will open that lets the user view and edit the properties of a workflow.

Property Name	Description	Type	Default Value	User Specified Value
jobpool.size	The maximum number of idle jobs in the job pool for this workflow.	INT	0	0
executor.requirements	A comma separated list of the executor resource requirements.	STRING		large-GPU, Linux, 32GB-RAM

Alternatively, workflow properties can also be set via a REST call, e.g. using `curl`:

```
curl -X PUT -u <user>:<password> http://<server-  
address>/knime/rest/v4/repository/<workflow>;properties?com.knime.enterprise.server.exec  
utor.requirements=<executor requirements>
```

This will set the executor requirements *executor-requirements* for the workflow *workflow*.

Setting executor.resources property for an executor

To define which resources an Executor can provide, a property has to be set for the Executors. This can be done in two ways:

1. Setting an environment variable on the system of an Executor. The name of the variable has to be 'KNIME_EXECUTOR_RESOURCES' and the value must be a comma-separated list of user-defined values.

```
KNIME_EXECUTOR_RESOURCES=value1, value2, value3
```

2. Setting a system property in the *knime.ini* file, which is located in the installation folder of the Executor. The file contains the configuration settings of the Executor, i.e. options used by the Java Virtual Machine. The name of the property has to be 'com.knime.enterprise.executor.resources' and the value must be a comma-separated list of user-defined values.

```
-Dcom.knime.enterprise.executor.resources=value1, value2, value3
```



The environment variable has priority over the system property if both are specified.

Removing executor.requirements property for a workflow

Executor requirements can be removed by setting the property to an empty field. This can be done either in the KNIME Explorer or via a REST call:

```
curl -X PUT -u <user>:<password> http://<server-  
address>/knime/rest/v4/repository/<workflow>;properties?com.knime.enterprise.server.exec  
utor.requirements=
```


Removing executor.resources property for an Executor

The property can be removed either by completely removing the environment variable or by completely removing the property in the *knime.ini* file depending on the way the property was set. Alternatively, the property can also be removed by leaving the value of the environment variable or the value of the property in the *knime.ini* file empty.



A restart of the Executor is required to apply the changes.

Behaviour of Executor requirements

An Executor only accepts a job if it can fulfill all the Executor requirements that were defined for the workflow. Otherwise, it will just ignore the job.

- Jobs with no Executor requirements will be accepted by all available Executors.
- The `executor.requirements` property values only need to be a subset of the Executor's defined `executor.resources` property values in order for the workflow to be accepted by the Executor for execution.
- If no Executor can fulfill the Executor requirements, the queued job will be discarded.
- If the appropriate Executors cannot accept new jobs because their load is too high, the new queued job will run in a timeout (normally after 60 seconds) and discard itself, see [Load throttling](#).

Example:

```
Workflow1 executor.requirements: medium_RAM, two GPU, Linux
Workflow2 executor.requirements: small-RAM, Linux
Workflow3 executor.requirements:
Executor1 executor.resources: small-RAM, Linux, two GPU
Executor2 executor.resources: medium_RAM, Windows, two GPU
Workflow1 will be ignored by both Executors and will be discarded.
Workflow2 will be ignored by Executor2 and accepted by Executor1.
Workflow3 will be accepted by any of the available Executors.
```

CPU and RAM requirements

Starting with KNIME Server 4.11 it is possible to define CPU and RAM requirements for a workflow. By default these requirements are ignored and disabled, unless at least one of the default values `com.knime.server.job.default_cpu_requirement` or `com.knime.server.job.default_ram_requirement` of the [KNIME Server configuration file](#)

`options` is set.

Setting CPU and RAM requirements property for a workflow

CPU and RAM requirements can be set in the same way as Executor requirements and is described in [Setting executor.requirements property for a workflow](#). To set the CPU and RAM requirements the following keywords have been introduced:

```
cpu=<number of cores as decimal, e.g. 0, 0.1, 1, 2, 4>
```

The number of cores needed to execute the workflow. Note, that this value also allows decimals with one decimal place (further decimal places are ignored) in case workflows are small and don't need a whole core. The default is 0.

```
ram=<memory with unit, e.g. 512MB, 4GB>
```

An integer describing the size of memory needed for execution. The following units are allowed: GB (Gigabyte) and MB (Megabyte). In case no unit is provided it is automatically assumed to be provided in megabytes. The default is 0MB

In case no CPU or RAM requirement has been set for the workflow the default values `com.knime.server.job.default_cpu_requirement` and `com.knime.server.job.default_ram_requirement` defined in the [KNIME Server configuration file](#) are used. If both default values are either not set at all or set to 0 the CPU and RAM requirements of workflows are ignored.

Setting CPU and RAM properties for a KNIME Executor

The Executor detects the available number of cores and the maximum assignable memory automatically at startup.

Behaviour of CPU and RAM requirements

An Executor only accepts a job if it can fulfill the CPU and RAM requirements that were defined for the workflow. Otherwise, it will ignore the job. If a job gets accepted by an Executor its required CPU and RAM will be subtracted from the available resources until it gets either discarded/deleted or swapped back to KNIME Server. The time a job is kept on the Executor can be changed via the option `com.knime.server.job.max_time_in_memory` defined in the [KNIME Server configuration file](#).

Example:

Workflow1 executor.requirements: cpu=1, ram=16gb

Workflow2 executor.requirements: cpu=1, ram=8gb

Workflow3 executor.requirements: cpu=0.1, ram=512mb

Executor: number of cores: 4, available RAM: 32GB

Workflow1 can be executed 2 times in parallel, since RAM is limiting

Workflow2 can be executed 4 times in parallel, since CPU and RAM is limiting

Workflow3 can be executed 40 times in parallel, since CPU is limiting

Executor Reservation

With the release of KNIME Server 4.11, we introduce the possibility to reserve KNIME Executors for exclusive use. This goes beyond the already existing [workflow pinning](#) since KNIME Executors can now refuse to accept jobs unless certain requirements are met.

There are two main use cases where this can be helpful:

1. Executor reservation based on workflow requirements: This allows you to ensure that Executors with certain properties (e.g. large memory, GPU) only accept jobs which are flagged as requiring these properties.
2. Executor reservation based on availability requirements for individual users or groups of users: This allows you to guarantee availability of execution resources to individuals or groups. E.g., you can reserve a KNIME Executor to only accept jobs if they are issued by users from a certain group.

Prerequisites for Executor Reservation

In order to use Executor reservation the same prerequisites as for workflow pinning are needed. The distributed [KNIME Executors](#) must be enabled and [RabbitMQ](#) must be installed. Reservations are ignored in single-executor deployments.

Setting executor.reservation property for a KNIME Executor

To define which requirements a job has to fulfill in order to get accepted by an Executor a property has to be set (in addition to defining the resources the Executor provides for [workflow pinning](#)) for this Executor. This can be done in two ways:

1. Setting an environment variable on the system of an Executor. The name of the variable has to be `KNIME_EXECUTOR_RESERVATION` and the value must be a valid boolean expression of Executor resources.

```
KNIME_EXECUTOR_RESERVATION=resource1 && resource2 || resource3
```

2. Setting a system property in the `knime.ini` file, which is located in the installation folder of the Executor. The file contains the configuration settings of the Executor, i.e. options used by the Java Virtual Machine. The name of the property has to be `com.knime.enterprise.executor.reservation` and the value must be a valid boolean expression of Executor resources.

```
-Dcom.knime.enterprise.executor.reservation=resource1 && resource2 || resource3
```



The environment variable has priority over the system property if both are specified.

Removing executor.reservation property for a KNIME Executor

The property can be disabled by either removing the environment variable or by removing the property in the *knime.ini* file, depending on how the property was set. Alternatively, the environment variable or the value of the property in *knime.ini* can be set to an empty string.



A restart of the Executor is required to apply the changes.

Setting Executor reservation properties for a workflow

Setting the Executor reservation rules for individual workflows uses the same procedure as for [workflow pinning](#). I.e., execution reservation is accessed by right-clicking a workflow in the KNIME Explorer and opening the 'Properties...' dialog.

Syntax and behaviour of Executor Reservation

The rule for Executor reservation is defined by a boolean expression and supports the following operations:

resource: value

A resource evaluates to `true` if and only if the job requirements contain the specified resource (see [workflow pinning](#)).

&&: r1 && r2

Logical AND evaluates to `true` if and only if `r1` and `r2` evaluate to `true`, otherwise evaluates to `false`.

||: r1 || r2

Logical OR evaluates to `true` if either `r1` or `r2` or both evaluate to `true`, otherwise evaluates to `false`.

!: !r

Logical negation evaluates to `true` if and only if `r` evaluates to `false`, otherwise evaluates to `false`.

user: (user = <user>)

Evaluates to `true` if and only if the user loading the job is `<user>`. Note that the parentheses are mandatory.

group: (group = <group>)

Evaluates to `true` if and only if the user loading the job is in the specified group. Note that the parentheses are mandatory.

Note: the usual operator precedence of logical operators applies, i.e. `!` has a high precedence, `&&` has a medium precedence and `||` has a low precedence. Additionally, you can use parentheses, to overcome this precedence, e.g.:

```
A && B || A && C = A && (B || C)
```

A KNIME Executor only accepts a job if

- the Executor can fulfill **all** requirements that the job has, **and**
- if the job's resources requirements match the Executor's reservation rule.

Otherwise, the job will be rejected by the Executor. This also means that jobs with no resource requirements will be rejected if at least one resource is defined in the Executor's reservation rule.

The resources used in the reservation rule should be a subset of resources provided by the Executor, otherwise all jobs may get rejected as the Executor won't be able to fulfill the requirements.

If a job is not accepted by any Executor it will be discarded. If there are Executors that would accept a job but cannot do so right now because their load is too high, the new job will run into a timeout (normally after 60 seconds) and discard itself, see [Load Throttling](#).

Most of special characters with exception of `'` are allowed to be part of users, groups, or resources. In this case the user names, group names, and resources values have to be put between `'`, e.g.:

```
(user = 'knime@knime.com') || (group = '@knime.com') && 'Python+Windows'
```

Example:

- Resources required by workflows:
 - *w1* requires `large_RAM`, `Linux`
 - *w2* requires `large_RAM`, `GPU`
 - *w3* requires `Linux`
 - *w4* requires `Windows`
 - *w5* requires nothing
- Resources provided by Executors and reservation rules:
 - *e1* provides `large_RAM`, `Linux`, `GPU` and is reserved for `large_RAM && (GPU || Linux)`
 - *e2* provides `GPU`, `Windows` and is reserved for `!Linux`
- Possible job executions
 - *w1* will be rejected by *e2* (because *e2* is reserved for `!Linux`) and will be accepted by *e1*.
 - *w2* will be rejected by *e2* (because *e2* does not provide `large_RAM`) and will be accepted by *e1*.
 - *w3* will be rejected by both KNIME Executors (because *e1* is reserved for `large_RAM` and *e2* is reserved for `!Linux`) and will be discarded.
 - *w4* will be rejected by *e1* (because *e1* does not provide `Windows`) and accepted by *e2*.
 - *w5* will be rejected by *e1* (because *e1* is reserved for `large_RAM`) and accepted by *e2* (because the empty requirement matches `!Linux`).

Executor Groups

With the release of KNIME Server 4.11, we introduce the possibility to group KNIME Executors for exclusive use. This extends the [executor reservation](#) since jobs are assigned to the specified KNIME Executor Group matching their requirements.

The main use case where this can be helpful is to allow you to ensure that jobs with certain properties (e.g. large memory, GPU), or based on certain user and groups are only handled by a specific group of KNIME Executors. This decreases potential delay in picking up the job as only possibly matching KNIME Executors will see the message. Furthermore it allows you to divide KNIME Executors into logical groups for easy maintenance (e.g. concerning scaling).

Prerequisites for KNIME Executor Groups

In order to use KNIME Executor Groups the same prerequisites as for workflow pinning are needed. The distributed [KNIME Executors](#) must be enabled and [RabbitMQ](#) must be installed. Groups are ignored in single-Executor deployments.

Creating KNIME Executor Groups

To define KNIME Executor Groups the following options have to be set in the [KNIME Server configuration file](#):

```
com.knime.enterprise.executor.msgq.names=<value>,<value>,...
```

Defines the names of the KNIME Executor Groups. The number of names must match the number of rules defined with `com.knime.enterprise.executor.msgq.rules`. Note, that names starting with `amqp` are reserved for RabbitMQ.

```
com.knime.enterprise.executor.msgq.rules=<value>,<value>,...
```

Defines the exclusivity rules of the KNIME Executor Groups. The number of rules must match the number of rules defined with `com.knime.enterprise.executor.msgq.names`.

Assigning KNIME Executors to a group

There are the following two ways to assign an Executor to a group.

1. Setting an environment variable on the system of a KNIME Executor. The name of the variable has to be `KNIME_EXECUTOR_GROUP` and the value must be one of the names defined in `com.knime.enterprise.executor.msgq.names`.

```
KNIME_EXECUTOR_GROUP=DefaultGroup
```

2. Setting a system property in the `knime.ini` file, which is located in the installation folder of the Executor. The file contains the configuration settings of the Executor, i.e. options used by the Java Virtual Machine. The name of the property has to be `com.knime.enterprise.executor.group` and the value must be one of the names defined in `com.knime.enterprise.executor.msgq.names`.

```
-Dcom.knime.enterprise.executor.group=DefaultGroup
```



The environment variable has priority over the system property if both are specified.

In addition, it is necessary to also specify the resources that are offered by an Executor. The process is the same as described for [workflow pinning](#). The list needs to contain at least all elements that are needed to distinguish the Executors within their group (except for rules based on user and/or group membership).

Setting Executor group properties for a workflow

Setting the KNIME Executor Groups for individual workflows uses the same procedure as for [workflow pinning](#). I.e., execution reservation is accessed by right-clicking a workflow in the KNIME Explorer and opening the 'Properties...' dialog.

Syntax and behaviour of KNIME Executor Groups

The rules for KNIME Executor Groups are defined the same way as for [executor reservation](#) with the exception that a group with an empty rule accepts **every** job. KNIME Server sets up new message queues in RabbitMQ according to the provided groups.

If a workflow is loaded its requirements are considered and matched with the first workflow group for which the job fulfills the rules. Hence, the **order of the groups** in `com.knime.enterprise.executor.msgq.rules` may have an impact on which group gets selected. In case no suitable group can be found an error is thrown. Once a job is loaded it is associated with a single selected KNIME Executor Group.



While Executor reservations are not necessary, the KNIME Executors still have to fulfill the requirements according to [workflow pinning](#).

Example:

- Resources required by workflows:
 - *w1* requires Python, GPU, group=G1
 - *w2* requires Python, GPU
 - *w3* requires Python, Linux
 - *w4* requires Python, Windows
 - *w5* requires nothing
 - *w6* requires huge_RAM
- Executors groups with the rules:
 - *eg1* is reserved for user='U1') || (group='G1' && Python && GPU
 - *eg2* is reserved for Python || GPU
 - *eg3* is reserved for Python || Windows
 - *eg4* is reserved for !huge_RAM
 - *eg5* isn't reserved
- Possible job executions
 - *w1* will be passed to executor group *eg1*.
 - *w2* will be passed to executor group *e2*.
 - *w3* will be passed to executor group *eg2* (because *eg2* accepts every job that either has requirement Python **or** GPU).
 - *w4* will be passed to executor group *eg2* (because *eg2* accepts every job that either has requirement Python **or** GPU and does occur before group *eg3*).
 - *w5* will be be passed to executor group *eg4* (because it doesn't require huge_RAM).
 - *w6* will be be passed to executor group *eg5* (because it doesn't match any of the previous groups and *eg5* accepts every job).

Execution lifecycle

During the course of executing (or running) a workflow, there are several things that happen. Most of the time you don't need to know about this, but sometimes in more complex deployments, or for detailed debugging it may be helpful to understand the lifecycle of a workflow that is executed.

Workflows, Jobs and Job states

Workflows

The workflow is the collection of nodes, setup to perform your data analysis task. A workflow will contain all of the relevant (default) settings to perform the analysis. In addition to the settings a workflow may contain some data, e.g. if the workflow has been partially executed locally and then uploaded to the KNIME Server. A more full description of a workflow, and how to create one is available [create-your-first-workflow](#)

Jobs

On the KNIME Server, a Job is created whenever a workflow is executed. A full copy of the workflow is made into a location where other workflow executions can't interfere with it. For full details see [executing-a-workflow-on-the-server](#)

Job states

Jobs exist in a variety of different states, which are displayed in either the Explorer view of the KNIME Analytics Platform, or the Jobs tab on the AdminPortal. The job states are:

- **UNDEFINED** - This is the first state of a job, and may be seen in the case where a KNIME Executor cannot communicate with the server due to network issues, or the Executor not having enough free CPU/RAM resources.
- **CONFIGURED** - The Job has executed to a certain point, and is waiting for user input e.g. waiting for WebPortal page input by the user clicking Next.
- **IDLE** - With the current configuration of the nodes, no further nodes can be executed. This is either because a scheduled workflow failed, or if the workflow is executed via the Webportal or via REST it might wait for input.
- **EXECUTING** - Job is currently executing.

- **EXECUTED** - Job has been executed (may still be in memory, see notes below)
- **DISCARDED** - Job has been executed and discarded (meaning Executor resources, and server disk space are freed up.)

Note that in addition to the job states there is the `In Memory` flag. The flag tells us whether the workflow is residing in the Executor memory, or has been swapped back to disk in the KNIME Server Repository. The setting `com.knime.server.job.max_time_in_memory` documented in [KNIME Server configuration file options](#) defines how long a job will remain in memory before being swapped. Additionally, when an Executor is gracefully shutdown then all jobs currently in memory are swapped back to disk. Additionally it's possible to manually force a job to swap to disk by issuing a REST call via [SwaggerUI for Workflows](#) using the job UUID.

Remote Workflow Editor

Introduction

The KNIME Remote Workflow Editor enables users to investigate the status of jobs on the server. Whenever a workflow is executed on the KNIME Server, it is represented as a job on the server. This instance of your workflow will be executed on the KNIME Server, which can be helpful in cases where the server hardware is more powerful than your local hardware, the network connection to external resources such as databases is faster, and does not require traversing firewalls/proxies.

What is the Remote Workflow Editor

The Remote Workflow Editor looks just like your local workflow editor, apart from the fact that it is labelled and the canvas has a watermark to help identify that the workflow is running on the KNIME Server.

Most of the edit functionality that you would expect from editing a workflow locally on your machine is possible. Notable cases where it's not yet supported are: copying nodes from a local workflow to a remote workflow (and vice-versa), browse dialog for file reader/writer nodes browses the local filesystem rather than the remote filesystem.

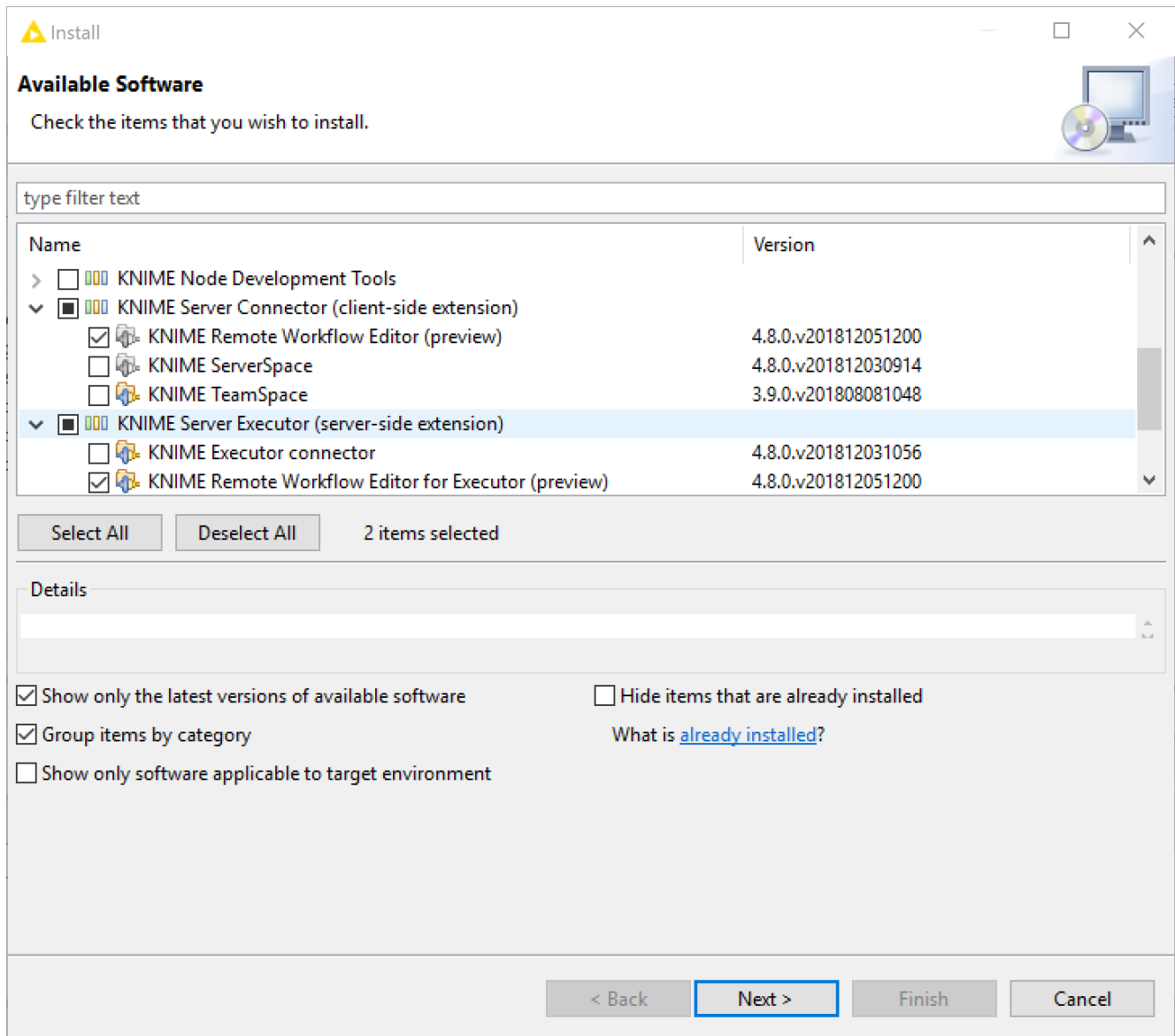
Installation

The Remote Workflow Editor is installed on the KNIME Analytics Platform as part of the KNIME Server Connector extension, and on the KNIME Server it must be installed into each KNIME Executor. Detailed instructions are found below.

Server setup

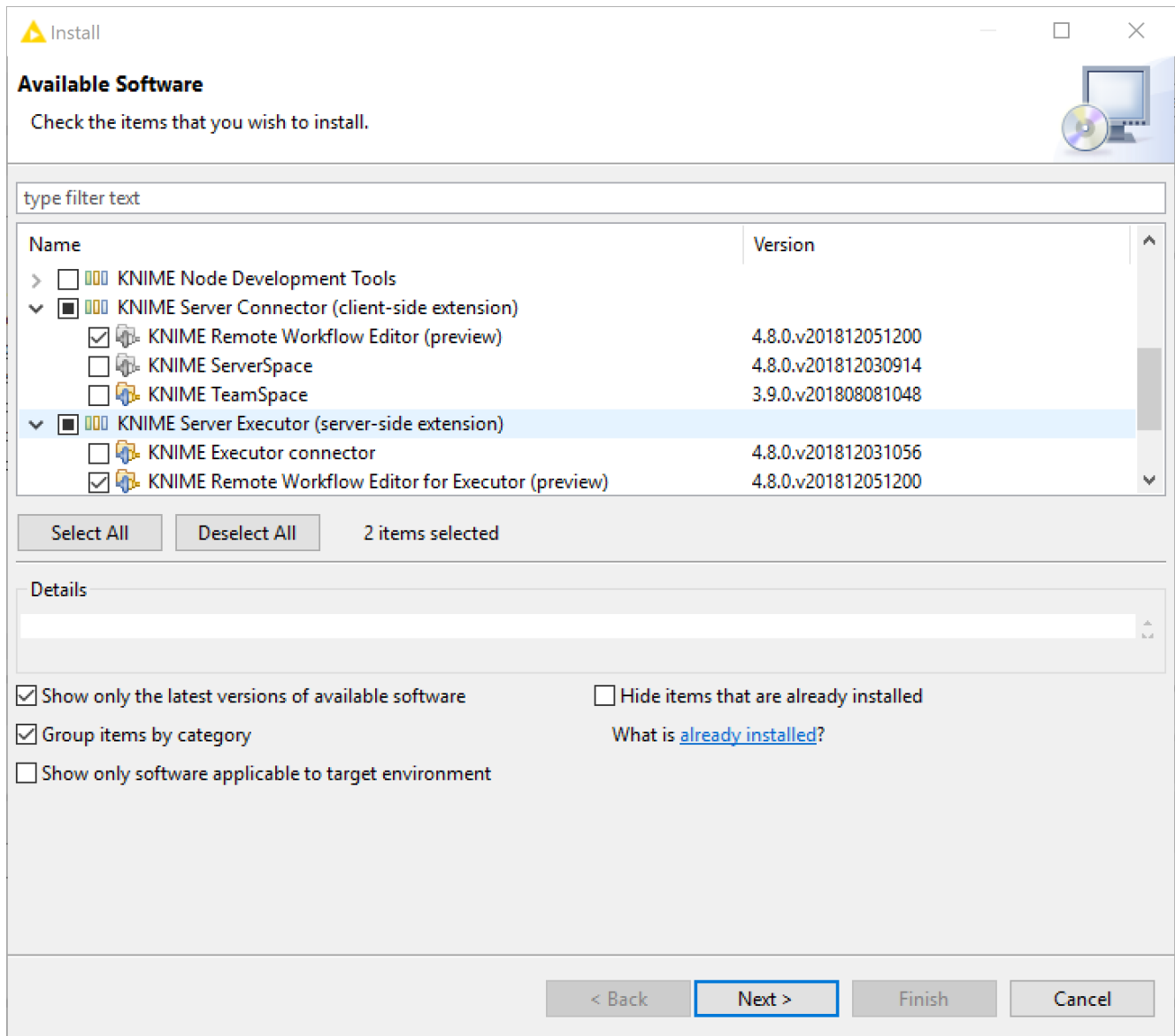
If KNIME Server is installed on Windows Server, then you may use the GUI to install the "KNIME Executor connector" from the "KNIME Server Executor (server-side extension)" feature. For Linux servers it is normally easier to use the command line to install the feature. Change to the KNIME Executor installation directory, and use the command:

```
./knime -application org.eclipse.equinox.p2.director -nosplash \  
-consolelog -r +https://update.knime.com/analytics-platform/{version_exe}+ -i \  
com.knime.features.gateway.remote.feature.group -d $PWD
```



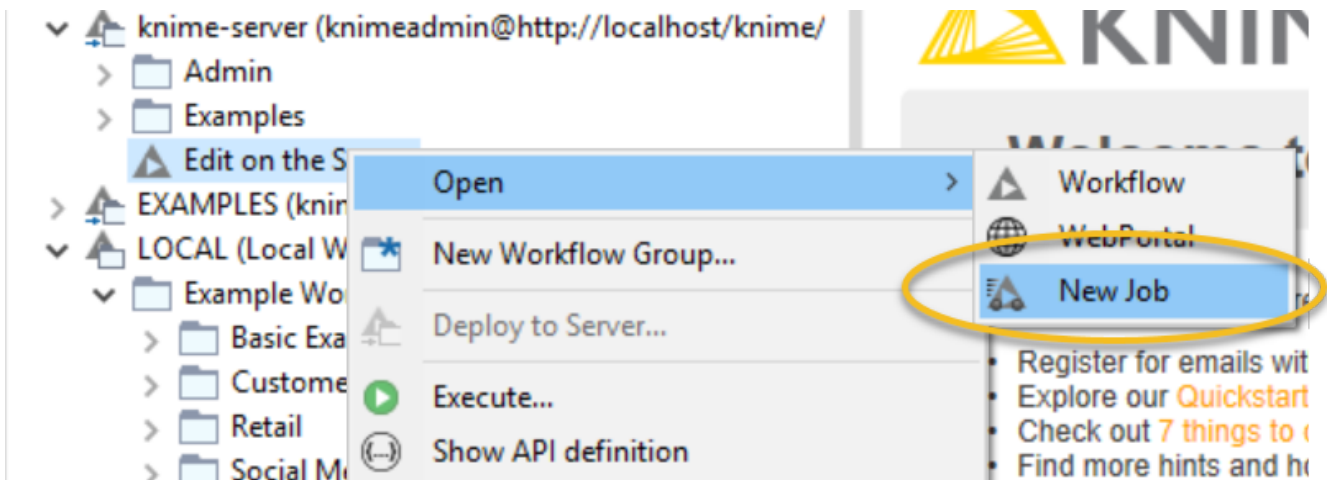
Analytics Platform setup

The Remote Workflow Editor feature needs to be installed in the KNIME Analytics Platform. Choose File > Install KNIME Extensions, and then select "KNIME Remote Workflow Editor" from the "KNIME Server Connector (client-side extension)" category.

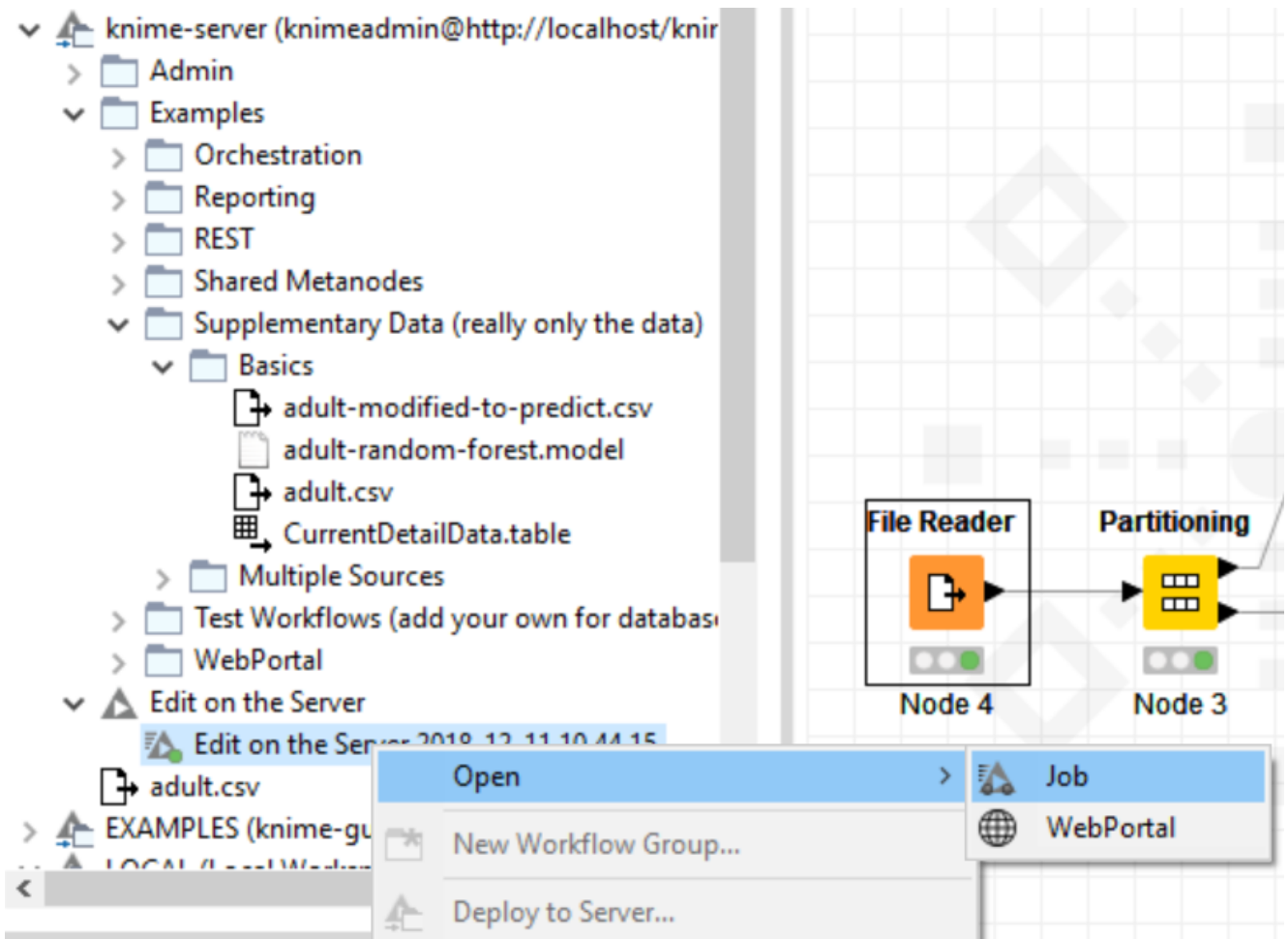


Usage

It's possible to create and open a new job from a workflow residing on the KNIME Server, using the KNIME Analytics Platform, by using the 'Open Job' context menu. See:



Jobs that are already created, e.g. by using the Execute context menu, a scheduled job, or a job started in the WebPortal, can be visualized by selecting the job and using the 'Open Job' context menu. See:

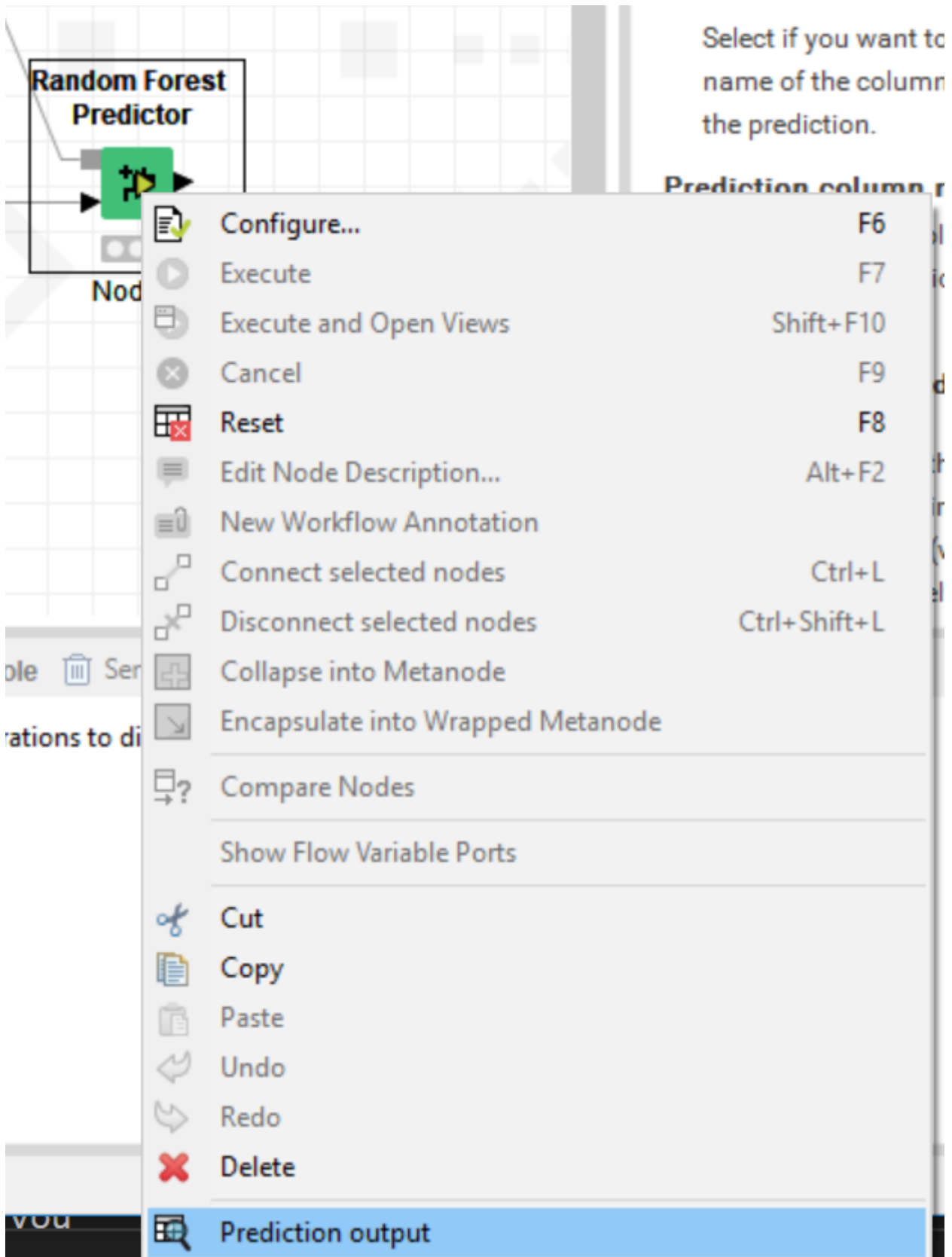


All jobs (executed from Analytics Platform, or via WebPortal) can be viewed, meaning that it's possible to see node execution progress, number of rows/columns generated, and any warning/error messages.

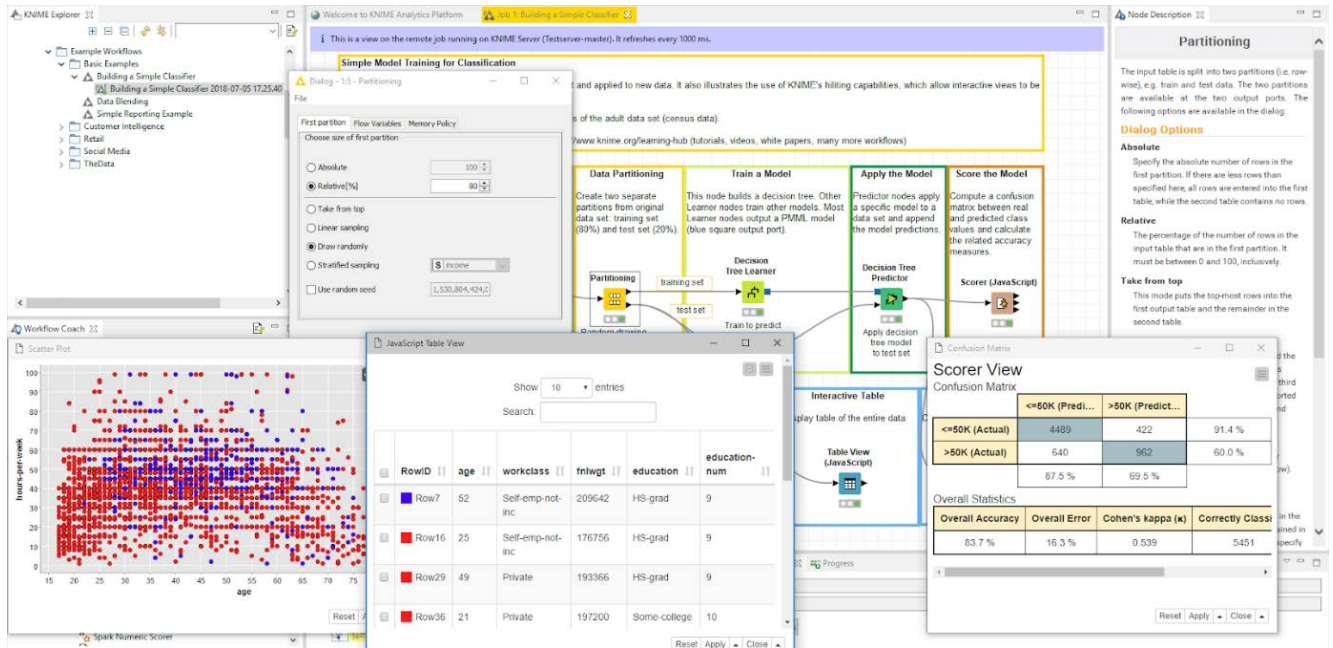
It's also possible to view and edit configuration settings, of most nodes as you would if the

workflow was on your local KNIME Analytics Platform. Currently it's not supported to configure file paths in some file reader nodes.

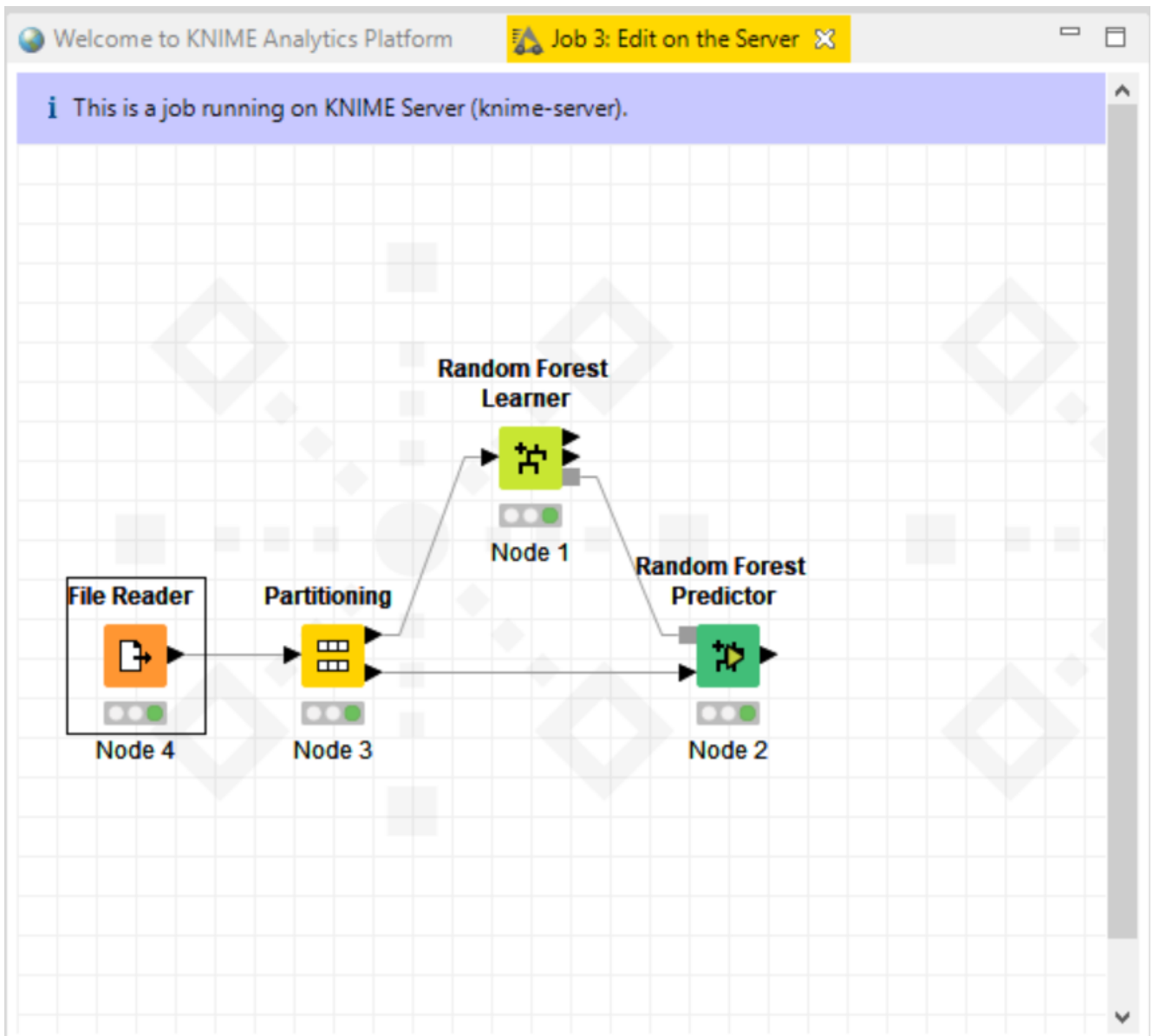
It's also possible to move, add and remove nodes from the workbench, as you would for a local workflow.



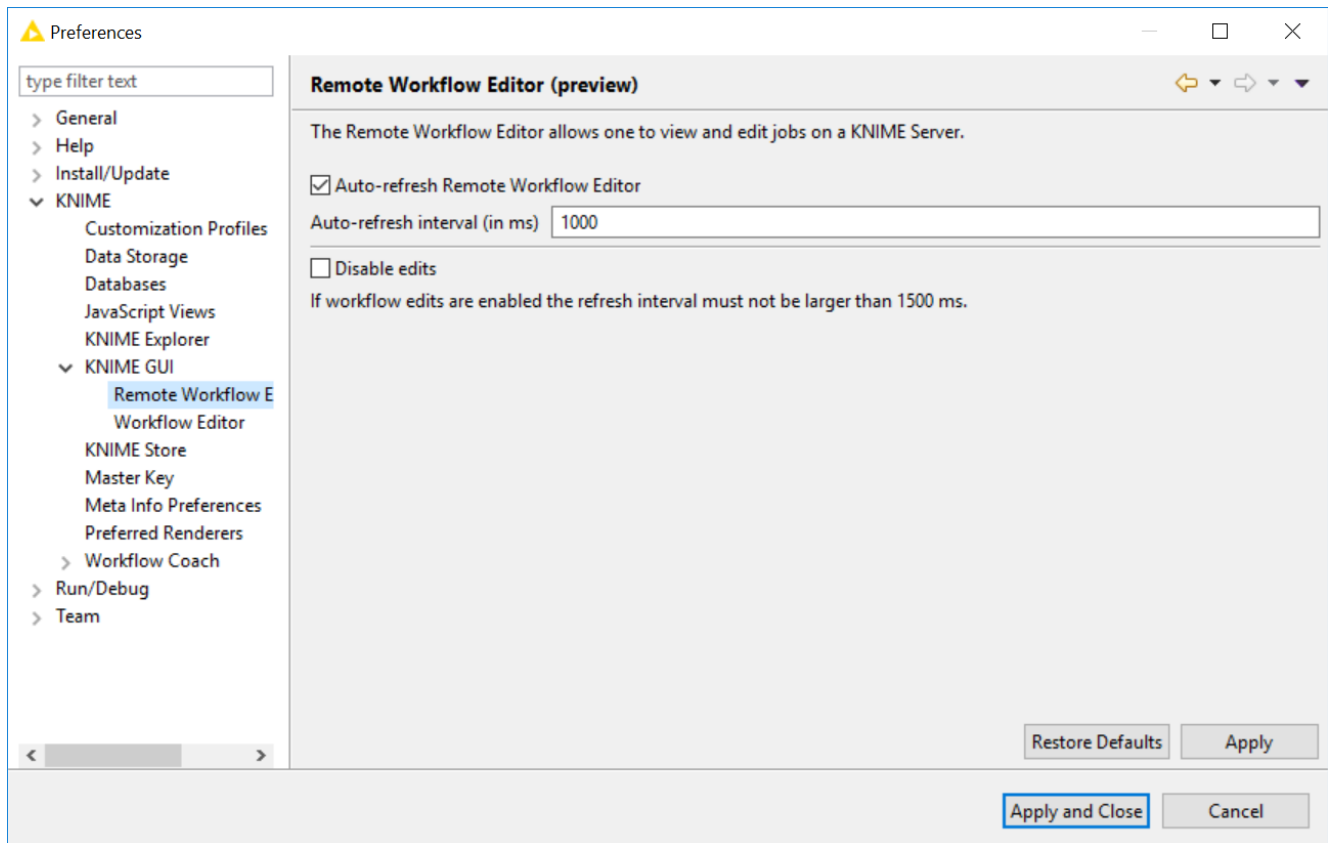
With the KNIME Server 4.8 release it's possible to view data via the normal data view.



It's possible to view data and views by using the JavaScript Views.

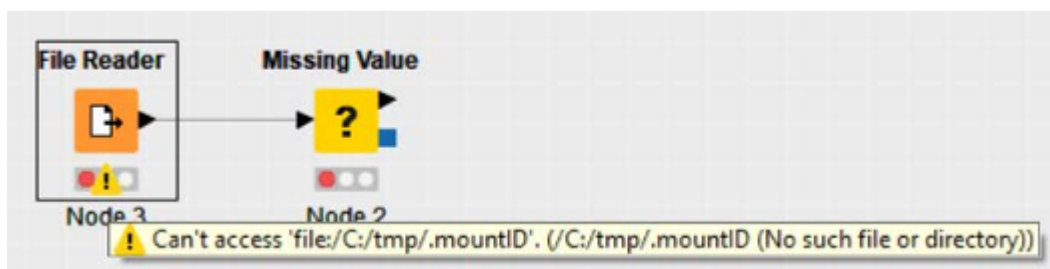


The KNIME Remote Workflow Editor enables you to view and edit workflow jobs on the KNIME Server.



Remote Workflow Editor preferences allow to change the auto-refresh interval, and also optionally to uncheck the 'Enable job edits' to enforce view only mode for all workflows.

You will be able to see which nodes are currently executing, which are already executed, and which are queued to be the next in execution. You can see errors and warning in the workflow by mouseover on the respective sign.



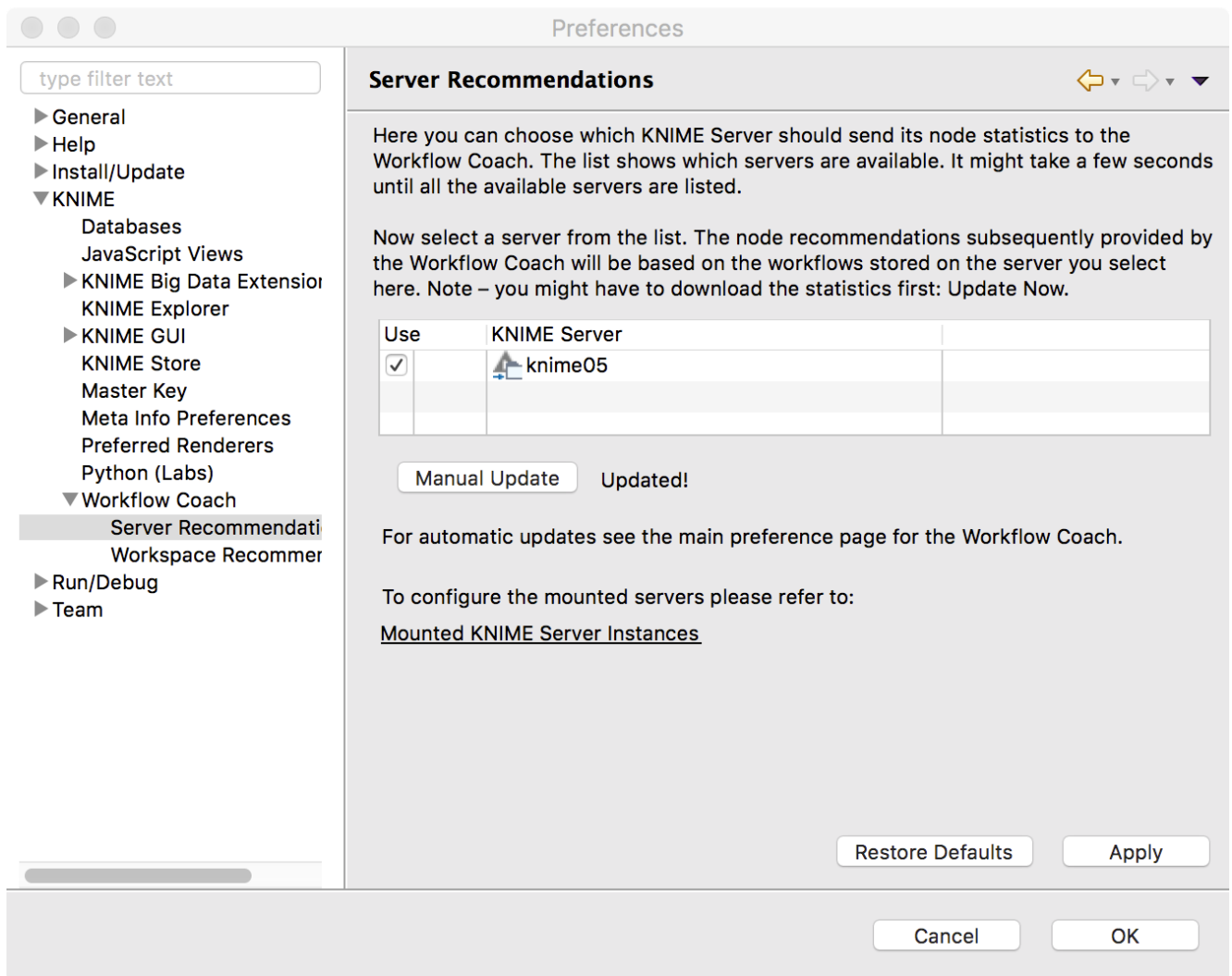
Inside a failing job you can see the error and warning messages by mouse-over the respective sign

Custom Workflow Coach recommendations

KNIME Server is able to serve custom node recommendations to the workflow coach. In order to enable this functionality

`com.knime.server.repository.update_recommendations_at=` must be set as described in the `knime-server.config` settings table.

The KNIME Analytics Platform preferences must be updated to enable the additional workflow coach recommendations:



Management Services for KNIME Analytics Platform: Customizations

Customizations allows to define centrally managed:

- Update sites
- Preference profiles (Database drivers, proxy settings, Python/R settings, etc.)

KNIME Server allows you to distribute customization profiles to connected KNIME Analytics Platform clients. A profile consists of a set of files that are fetched by the client during startup. The files are copied into the user's workspace. Files ending with `.epf` are treated as Eclipse preferences and can be used to override the *default* preferences which are usually defined by the extension vendors. Settings that an Analytics Platform user has already changed (i.e. which don't have the default value any more) are not affected. However, the user can choose to *"Restore ALL preferences to defaults"* via the preference page in the KNIME Analytics Platform. In this case the user is first prompted, then a backup of the preferences file is stored in the `<knime-workspace>/ .metadata/knime/preferences-backup.epf`, finally, the server-managed settings will replace any preferences with the configured default values. The feature is available to all KNIME Server named-users and additionally to all registered consumers.

Analytics Platform Customization

The server installer will create a customization template profile in `config/client-profiles.template/customizations`. It consists of a preference file that contains all available configuration settings (including detailed descriptions) as well as some additional files that may be referenced in the preference file. Please see `customizations.epf` for details.

Server-side setup

In order to enable server-managed customization on the server side you have to create one or more subdirectories inside `<server-repository>/config/client-profiles`. New server installations already come with an example profile that you can use as a starting point. You can have an arbitrary number of profiles. Which profiles are fetched by the client and in which order is defined by settings in the client (see below). If more than one profile defines a preference value, the *last* profile in the list requested by the client will determine the actual default value. Let's have a look at an example.

Suppose the `config/client-profiles` folder on the server has the following contents:

```
.../config/client-profiles/base/base.epf
    org.knime.workbench.explorer.view/knime.explorer.mountpoint=...
    org.knime.workbench.ui/knime.maxThreads=4
.../config/client-profiles/base/my-db-driver.jar
.../config/client-profiles/linux/linux.epf
    org.knime.workbench.ui/knime.maxThreads=8
    org.knime.python2/python2Path=/usr/bin/python2
    org.knime.python2/python3Path=/opt/anaconda3/bin/knime-python
.../config/client-profiles/windows/windows.epf
    org.knime.python2/python3Path=C:/Anaconda3/bin/knime-python.bat
.../config/client-profiles/windows/my-lib.dll
.../config/client-profiles/windows/my-db-driver.jar
```

If the client request the profiles "base,linux" (in this order), the default number of threads used by KNIME nodes will be 8. The python paths are set to the correct Linux paths. If another client requests "base,windows" the default number of threads will be 4 (from the base profile) and the Python 3 path will be set to a folder on the C:\ drive. The pre-defined KNIME Explorer mount points will be identical for both clients because the value is only defined in the base profile.

A profile may contain several preferences files. They are all virtually combined into a single preference file for this profile in alphabetical order.

A profile may contain additional resources, for example JDBC driver files. The entire contents of the client-profiles folder including hidden files is sent to the client as a zip file and unpacked into a location in the client workspace. There is no conflict handling for any other files in the requested profiles (e.g. `my-db-driver.jar`) because they will end up in separate subdirectories on the client and not be processed further.

For further details and an example on how to distribute JDBC driver files go to the [Server-managed Customization Profiles](#) section of the [KNIME Database Extension Guide](#).

If KNIME Server is running on Linux or macOS then the permissions of files inside profiles are transferred to the clients. This is useful for executable files on Linux or macOS clients, such as shell scripts. If you have such files in your profiles make sure to set the permissions accordingly on the server. KNIME Servers running on Windows don't support this feature because Windows file systems handle permissions differently.

Note that the profiles on the server are accessible without user authentication therefore they shouldn't contain any confidential data such as passwords.

In order to create preference files for clients, start a KNIME Analytics Platform with a *fresh workspace* on the desired environments (e.g. Linux, Windows). This ensures that all preferences are set to their vendor defaults. Then change the preferences to your needs and export them via *File* → *Export* → *KNIME Preferences*. Then copy the resulting epf file to the

profile folder on the server.

Variable replacement

It is possible to use variables inside the preferences files (only those files ending in .epf) which are replaced on the client right before they are applied. This makes the server-managed customizations even more powerful. These variables have the following format: `${prefix:variable-name}`. The following prefixes are available:

- **env**: the variable is replaced with the value of an environment value. For example, `${env:TEMP}` will be replaced with `/tmp` under most Linux systems.
- **sysprop**: the variable is replaced with a Java system property. For example, `${sysprop:user.name}` will be replaced with the current user's name. For a list of standard Java system properties see [the JavaDoc](#). Additional system properties can be defined via `-vmargs` in the `knime.ini`.
- **profile**: the variable will be replaced with a property of the profile in which the current preference file is contained in. Currently "location" and "name" are supported as variable names. For example, `${profile:location}` will be replaced by the file system location of the profile on the client. This can be used to reference other files that are part of the profile, such as database drivers:
`org.knime.workbench.core/database_drivers=${profile:location}/db-driver.jar`
- **origin**: the variable will be replaced with a HTTP response header sent by the server with the downloaded profiles. In addition to standard HTTP headers (which are probably not very useful), the following KNIME-specific origin variables are available:
 - `${origin:KNIME-Default-Mountpoint-ID}` – the server's configured default mount ID
 - `${origin:KNIME-EJB-Address}` – the address used by the KNIME Explorer; see the client profile templates in the repository created by the installer for an example
 - `${origin:KNIME-REST-Address}` – base address of the server's REST interface
 - `${origin:KNIME-WebPortal-Address}` – address of the server's WebPortal
 - `${origin:KNIME-Context-Root}` – base path on the server where all KNIME resources are available, usually `/knime`.
- **custom**: the variable will be replaced by the custom profile provider implementation that is also used to provide the profile location and list.

In case you want to have a literal in a preference value that looks like a variable, you have to use two dollar signs to prevent replacement. For example `$$${env:HOME}` will be replaced with

the plain text `${env:HOME}`. If you want to have two dollars in plain text, you have to write three dollars (`$$$${env:HOME}`) in the preference file.

Note that once you use variables in your preference files they are not standard Eclipse preference files anymore and cannot be imported as they are.

Client-side setup

The client has three possibilities to request profiles from a KNIME Server.

1. Two command line arguments which define the address and the (ordered) list of requested profiles (note that the command line argument and the variable must be separated onto two lines – as seen below):

```
-profileLocation
http://knime-server:8080/knime/rest/v4/profiles/contents
-profileList
base,linux
```

Both arguments must be supplied either directly on the command line or in the `knime.ini` **before** the `-vmargs`.

2. Two preference settings in the "KNIME/Customization profiles" preference page. There the user can select a server and then define the ordered list of profiles that he/she wants to apply. Note that this setting cannot be controlled by the server-managed customization profiles. Changes will take effect after the next start.
3. A custom profile provider defined in a custom Eclipse plug-in. Since this involves writing Java code and is likely only of interest for large-scale installations we cover this approach in the [KNIME Server Advanced Setup Guide](#).

The three possibilities are tried in exactly this order, i.e. if one of them provides a server address and a non-empty list of profiles it will be used and all following providers will be skipped.

It's also possible to provide a local file system folder as the `profileLocation` on the command line (or in your custom profile provider). The layout of this local folder must be the same as the profiles folder on the server.

Client customization

Besides the preferences that are exportable by KNIME Analytics Platform there are additional settings that can be added to the preference files to customize clients:

```
/instance/org.knime.workbench.explorer.view/defaultMountpoint/defaultMountpoints=<mount id1>,<mount id2>,...
```

A comma separated list of default mount points that should be loaded, e.g. LOCAL, EXAMPLES, My-KNIME-Hub. Changes to this list only affects new workspaces, i.e. workspaces which already contain default mount points will still contain them even though only they haven't been defined here. If this option is absent and defaultMountpoint/enforceExclusion isn't set to true then all default mount points will be added. The current default mount points are LOCAL, EXAMPLES, and My-KNIME-Hub.

```
/instance/org.knime.workbench.explorer.view/defaultMountpoint/enforceExclusion=<true|false>
```

If set to true then all default mount point not defined by /instance/org.knime.workbench.explorer.view/defaultMountpoint/defaultMountpoints will be removed on start up.

```
/instance/com.knime.customizations/helpContact.buttonText=<label, e.g. Contact Support>
```

If set together with /instance/com.knime.customizations/helpContact.address a button with the provided label will occur under Help in KNIME Analytics Platform. Clicking on the button will, depending on the helpContact.address, either open the default mail client or the default browser with the provided address.

```
/instance/com.knime.customizations/helpContact.address=<uri, e.g. mailto:support@company or https://company/support>
```

Sets the address of the support contact. This option only takes effect in combination with /instance/com.knime.customizations/helpContact.buttonText.

```
/instance/com.knime.customizations/documentation.buttonText=<label, e.g. Documentation>
```

Sets the label of the documentation button that can be found under Help in KNIME Analytics Platform. Clicking on the button will open the default browser and navigate to the documentation. If set to - the button will be hidden.

```
/instance/com.knime.customizations/documentation.address=<uri, e.g.  
https://company/documentation or file:///sharedSpace/documentation>
```

Sets the address of the documentation. By default the documentation address points to the KNIME documentation.

```
/instance/com.knime.customizations/windowTitle.appendix=<appendix, e.g.  
sponsored by company>
```

Adds the appendix to the window title of KNIME Analytics Platform.

```
/instance/com.knime.customizations/updateSite.uris=<uri>,<uri>,...
```

Adds the provided addresses to the update sites.

```
/instance/com.knime.customizations/updateSite.names=<name>,<name>,...
```

The names that are shown under Available Software Sites for the provided update sites of option. Note that the number of names must match the number of provided URIs.

```
/instance/com.knime.customizations/updateSite.default.disable=<true|false>
```

Disables the default added update sites added by KNIME after a fresh installation or update. If a user enables these update sites again they will remain enabled.

```
/instance/com.knime.customizations/updateSite.default.forceDisable=<true|false>
```

Disables the default added update sites added by KNIME after a fresh installation or update. If a user enables these update sites again they will be disabled with the restart of their client.

```
/instance/com.knime.explorer.server/oauth_login_success_page=<path, e.g.  
${profile:location}/success.html>
```

Replaces the redirect site that is shown by KNIME Analytics Platform after a successful login to KNIME Server via OAuth. Note, this option is only available starting with the extension KNIME ServerSpace 4.12.1.

```
/instance/com.knime.explorer.server/oauth_login_failed_page=<path, e.g.  
${profile:location}/error.html>
```

Replaces the redirect site that is shown by KNIME Analytics Platform after a failed login to KNIME Server via OAuth. Note, this option is only available starting with the extension KNIME ServerSpace 4.12.1.

Security considerations

The following section describe some general security considerations for running a KNIME Server. Some of them are active by default, some other require manual configuration based on your specific environment.

Protecting configuration files

The configuration files must be accessible by the system account running the KNIME Server. However, this account also runs the KNIME Executor which executes the workflows. This means that a malicious workflow can in principle access the server configuration files if the absolute file system paths are known. Therefore, for high security environments we recommend removing write permissions on the configurations files from the system account so that at least the workflow cannot modify them. This includes the following directories and their contained files:

- <tomcat-folder>/conf
- <tomcat-folder>/bin
- <tomcat-folder>/endorsed
- <tomcat-folder>/lib
- <server-repository>/config

Encrypted communication

Communication between KNIME Analytics Platform and KNIME Server is performed via HTTP(S). By default, both unencrypted communication via HTTP and encrypted communication via HTTPS (SSL) is enabled.

All encryption is handled by Tomcat, see the [Tomcat SSL Configuration How-to](#) for full documentation.

Server configuration

The KNIME Server installer will enable encryption using a generic server certificate that the client accepts. Note that most browsers will issue a certificate warning when you access the KNIME WebPortal via https for the first time. For production it is recommended to add your own certificate as follows:

1. Obtain a certificate and create a new Java keystore file named `knime-server.jks` as described in [Tomcat SSL Configuration How-to](#)
2. Replace the `<tomcat-folder>/conf/knime-server.jks` with the keystore file created in the previous step (note: this will replace the generic server certificate)
3. Adjust the `certificateKeystorePassword` of the following “`<Connector... />`” definition found in `<tomcat-folder>/conf/server.xml` to match the password used in the first step:

```
<Connector SSLEnabled="true" compression="on" maxThreads="150"
  protocol="org.apache.coyote.http11.Http11Nio2Protocol"
  port="8443" scheme="https" secure="true" server="Apache Tomcat">
  <SSLHostConfig protocols="TLSv1, TLSv1.1, TLSv1.2">
    <Certificate
      certificateKeystoreFile="conf/knime-server.jks"
      certificateKeystorePassword=<your password>
      type="RSA"/>
    </SSLHostConfig>
  </Connector>
```

You can also adjust the port number but you should not change any of the other value unless you understand the implications.

4. Restart Tomcat.

If you want to enforce using only encrypted communications (HTTPS), we suggest to completely disable the unencrypted HTTP connector on port 8080 (by default). To do this remove the line that defines the first HTTP Connector in the `server.xml` or embed it into an XML comment so that it is not processed on startup.

Client configuration

If you want encrypted connection from KNIME Analytics Platform to KNIME Server, you have to make sure that KNIME accepts the server certificate. If you have a "real" certificate that was signed by a well-known certification authority then you should be safe. If the signing CA is not known to Java you have to add the CA's certificate to the keystore used by KNIME:

1. Get the CA's certificate in PEM format.
2. Add the CA certificate to the JRE's keystore file in

(For Linux and Windows)

```
`<knime-folder>/jre/lib/security/cacerts`
```

(KNIME Analytics Platform 3.4.3 and older) or

```
`<knime-folder>/plugins/org.knime.binary.jre.<..>/jre/lib/security/cacerts`
```

(For macOS)

```
`/plugins/org.knime.binary.jre.macosx.x86_64_11.0.10.20210416/cacerts`
```

(KNIME Analytics Platform 3.5.0 and newer). This is performed with the `keytool` command that is part of any Java installation (e.g. `<knime-folder>/<jre-folder>/bin/keytool`):

```
keytool -import -trustcacerts -alias <ca-alias> \  
-file <CA.crt> -keystore jre/lib/security/cacerts
```

You can choose an arbitrary name for `<ca-alias>`. For `<CA.crt>` insert your CA's certificate file. The password for the keystore file is "changeit".

Disabling the Manager application

The default KNIME Server installation does not add any users with permissions to access the manager application. The Tomcat manager application is not required for the correct functioning of KNIME Server. You may wish to disable the functionality by deleting the `manager`, `host-manager` and `ROOT` directories from your installation. Note that you should not delete the `ROOT` directory if you chose to install KNIME Server using the context root of `ROOT`.

Tomcat shutdown port

The Tomcat shutdown port is accessible on port 8005, which should not be accessible from machines other than localhost. We have renamed the `SHUTDOWN` command to a random string that is generated at installation time.

You may choose to remove this option completely by finding the following configuration in the `server.xml`:

```
<Server port="8005" shutdown="<RANDOMSTRING>">
```

and changing it to: `<Server port="-1" shutdown="<RANDOMSTRING>">`

CSRF prevention

Cross-site request forgery (CSRF) is a type of malicious exploit of a website where unauthorized commands are transmitted from a user that the website trusts (see the [Wikipedia entry](#) for more technical details). In the context of KNIME Server this means that some other web page issues a (hidden) REST request to KNIME Server using the current user's active WebPortal session. The user usually doesn't notice anything but operations are performed with their account. Since version 4.3.4 KNIME Server contains a CSRF protection which prevents any modification requests (e.g. POST, PUT, or DELETE) to REST methods from hosts other than KNIME Server itself.

In case you have internal web pages on other hosts that deliberately perform valid requests you can disable CSRF protection by adding the following line to `<apache-tomcat>/conf/Catalina/localhost/knime.xml`:

```
<Parameter name="com.knime.server.rest.csrf-protection" value="false"
  override="false" />
```

Avoid clickjacking attacks

Clickjacking is also a malicious attempt to trick a user into clicking on something different than perceived, potentially revealing confidential information or taking control of the computer. (See the [Wikipedia entry](#) for more technical details). The best option to avoid clickjacking is setting the HTTP header `X-Frame-Options` to an appropriate value to prevent the WebPortal being embedded in a third party website. In KNIME Server this can be done with a configuration option `com.knime.server.webportal.restrict_x_frame_options`. The value can be one of DENY, SAMEORIGIN or ALLOW-FROM `any_origin_url`. See also this [article from MDN](#) about more details of the header and available options.

Please note that, if you want to embed the WebPortal on a different website and want this setting to be enabled, you will have to set the value to `ALLOW-FROM xxx` (where `xxx` has to be replaced with the URL of the embedding website).

Hiding server details

By default, Tomcat prints its name and version number on error pages (e.g. if a location entered in the browser does not exist) and in standard HTTP headers. This information can be used by an attacker to target potential security issues for this particular version. Therefore for high security environments it's recommended to at least hide the server's version. Fresh installations from 4.5 onwards already hide the version. If you are upgrading from an existing

installation, you can apply the following two small configuration changes:

- Add a file `<tomcat-folder>/lib/org/apache/catalina/util/ServerInfo.properties` with the following contents:

```
server.info=Apache Tomcat
server.number=8.5.11.0
server.built= Jan 10 2017 21:02:52 UTC
```

Only the value of “server.info” is shown in error pages and by default includes the version number. The above example only exposes the server’s name.

- Modify the `<Connector>` entries in `<tomcat-folder>/conf/server.xml` and add an attribute “server” with “Apache Tomcat” as value:

```
<Connector port="8080" *server="Apache Tomcat"* ... />
```

This change hides the server version in HTTP headers.

You may also choose to set the following parameter in the `knime-server.config` file. For full details see [KNIME Server configuration file options](#):

```
com.knime.server.webportal.hide_version=true
```

Advanced settings

There are a couple more actions you can take to make the server and the application even more secure which we don’t discuss in detail here because they are only useful in special setups. Example are

- [Cross-Origin Resource Sharing](#)
- [Strict Transport Security](#)
- [Content Security Policy](#) (this policy cannot be implemented in Tomcat without writing custom code; see the section about [Running behind frontend server](#) for a possible solution)

Running behind frontend server

In some cases it makes sense to run KNIME Server (Tomcat) behind a frontend server.

Examples are:

- Running several KNIME Servers under the same (public) hostname
- Adding custom HTTP headers (e.g. Content Security Policy, see above)
- Reusing existing HTTPS configurations
- Using standard ports (80, 443)

No configuration changes are required on the KNIME Server side, however, the frontend server must ensure that:

- The public hostname is passed to KNIME Server in all HTTP requests. See the example below for details
- The context root is passed to KNIME Server if it differs from the value configured in KNIME Server
- Information about the public protocol (HTTP or HTTPS) is passed onto the KNIME Server.

Otherwise links generated by KNIME Server may point to the internal address which is useless for outside clients and can even expose sensitive information. A sample configuration for Apache HTTPD looks as follows:

```
<VirtualHost *:443>
  ServerName public.knime.server

  # Make sure the public protocol is passed to the server;
  # not required if internal and external protocol are the same
  RequestHeader set X-Forwarded-Proto "https"

  # If a different context root than in KNIME Server is used
  # then the ProxyPass config should also be changed to reflect this
  # n.b. the leading slash is mandatory
  RequestHeader set KNIME-Context-Root-Rewrite "/apache-root"

  # Ensure that the public hostname is also used in forwarded requests
  ProxyPreserveHost On
  ProxyRequests Off

  ProxyPass /tomee/ejb http://internal:8080/tomee/ejb
    keepalive=On nocanon
  ProxyPass /knime http://internal:8080/knime

  # Optional
  ProxyPass /com.knime.enterprise.sketcher.ketcher
    http://internal:8080/com.knime.enterprise.sketcher.ketcher
</VirtualHost>
```

Please note that such advanced setups require detailed knowledge about Tomcat and Apache configuration (or whatever frontend server you are using) and we can only provide limited support.

Managing access to files/workflows/components

You can assign access permissions to each server item (workflows or workflow groups) to control the access of other users to your workflows and groups.

The owner

The server stores the owner of each server item, which is the user that created the item. When you upload a flow, copy a workflow, save a workflow job (an executed flow) or create a new workflow group you are assigned to the new item as owner. When a new server item is created, you can set the permissions how you want this item to be available to other users. Later on, only the owner can change permissions on an item.

User groups

When the KNIME Server administrator defines the users that have access to the KNIME Server, the users are assigned to groups. Groups can be defined as needed – for example one group per department, or per research group, etc. Each user must be in at least one group, and could be in many groups.

You can set a group to be an administrator group (with the configuration option “`com.knime.server.server_admin_group=<group name>`”). Users assigned to that group are considered server administrators.

Server administrator

Specific users can be set server administrator with a configuration option (`com.knime.server.server_admin_users=<user>,<user>,...`) or by assigning them to the administrator group (see section [User groups](#)). Server administrators are not restricted by any access permissions. Administrators always have the right to perform any action usually controlled by user access rights. They can always change the owner of an item, change the permissions of an item, they see all workflow jobs (while regular users only see their own jobs) and they can delete all jobs and items.

Access rights

There are three different access rights that control access to a workflow and two for a workflow group:

Workflow group permissions

Read	Allows the user to see the content of the workflow group. All workflows and subgroups contained are shown in the repository view.
Write	If granted, the user can create new items in this workflow group. The user can create new subgroups and can store new workflows or Shared Components in the group. Also deletion of the group is permitted.

Please note that in order to access a workflow it is not necessary to have read-permissions in the workflow group the workflow is contained in. Only the listing of contained workflows is controlled by the read-right. Also, a workflow can be deleted without write permission in a group (if the corresponding permission on the workflow is granted).

Finally, in order to add a workflow to a certain group, you only need permissions to write to that particular workflow group, not to any parent workflow group.



It is also possible to hide workflow groups to users that do not have read-permission to those groups and do not have write-permission to the parent workflow group. To do so please refer to the option `com.knime.server.repository.hide_unreadable_groups` in the [KNIME Server configuration file options section](#).

Workflow permissions

Execute	Allows the user to execute the flow, to create a workflow job from it. It does not include the right to download that job, or even store the job after it finishes (storing requires the right to download).
Write	If granted, the user can overwrite and delete the workflow.

Read	Allows the user to download the workflow (including all data stored in the flow) to its local desktop repository and inspect the flow freely.
------	---

Note: Executing or downloading/reading a flow does not require the right to read in the group that contains the flow. In fact, there is currently no right controlling the visibility of a single flow (there is no "hidden" attribute).

Access to workflow jobs and scheduled jobs

There are no permissions to be set on a workflow job or a scheduled job. Only the owner – the user that created the job – can see the job in the repository view, and this user is the only one that can delete it (besides any server administrator).

In order to store a workflow job as new workflow in the server's repository, the user needs the right to download the original workflow (the flow the job was created from). (This is a requirement, because the newly created workflow is owned by the user that stores the job – and the owner can easily grant itself the right to download the flow. Thus, if the original flow didn't have the download right set, the user that is allowed to execute the flow could easily work around the missing download right.)

"Owner", "Group", and "Other" rights

As the owner of a server item (workflow, shared component or workflow group) you can grant access rights to other users. But you can only assign permissions on a group level, not for particular users.

Owner rights

The owner can assign permissions to themselves to protect a flow from accidental deletion. The owner can change their own permissions at any time.

Group rights

The owner of a server item can assign permissions to all users of a specific group. If an access right is granted to a group, all users that are assigned to this group have this right.

"Other" rights

Permissions can be set to all users that are not the owner and that are not in one of the groups.

Note: Access rights are adding up and can't be withdrawn – that means, if, for example, you grant the right to execute a flow to "other" users and you define permissions for a certain group of users not including the execute right, these users of that group are still able to execute that flow, as they obtain that right through the "other" permissions.

Webservice interfaces

RESTful webservice interface

KNIME Server supports execution of workflows via a REST interface. The entry point for the REST interface is `http://server-address/knime/rest/`.

The interface is based on a hypermedia-aware JSON format called Mason. Details about the interface, its operations, endpoints and message formats are provided at the following locations (best opened in an internet browser):

- `http://<server-address>/knime/rest/_profile/knime-server-doc.xml` for the general interface and
- `http://<server-address>/knime/rest/v4/_profile/knime-server-doc-v4.xml` for the 4.x API

(see also the "Link" HTTP header in all responses returned by the server).

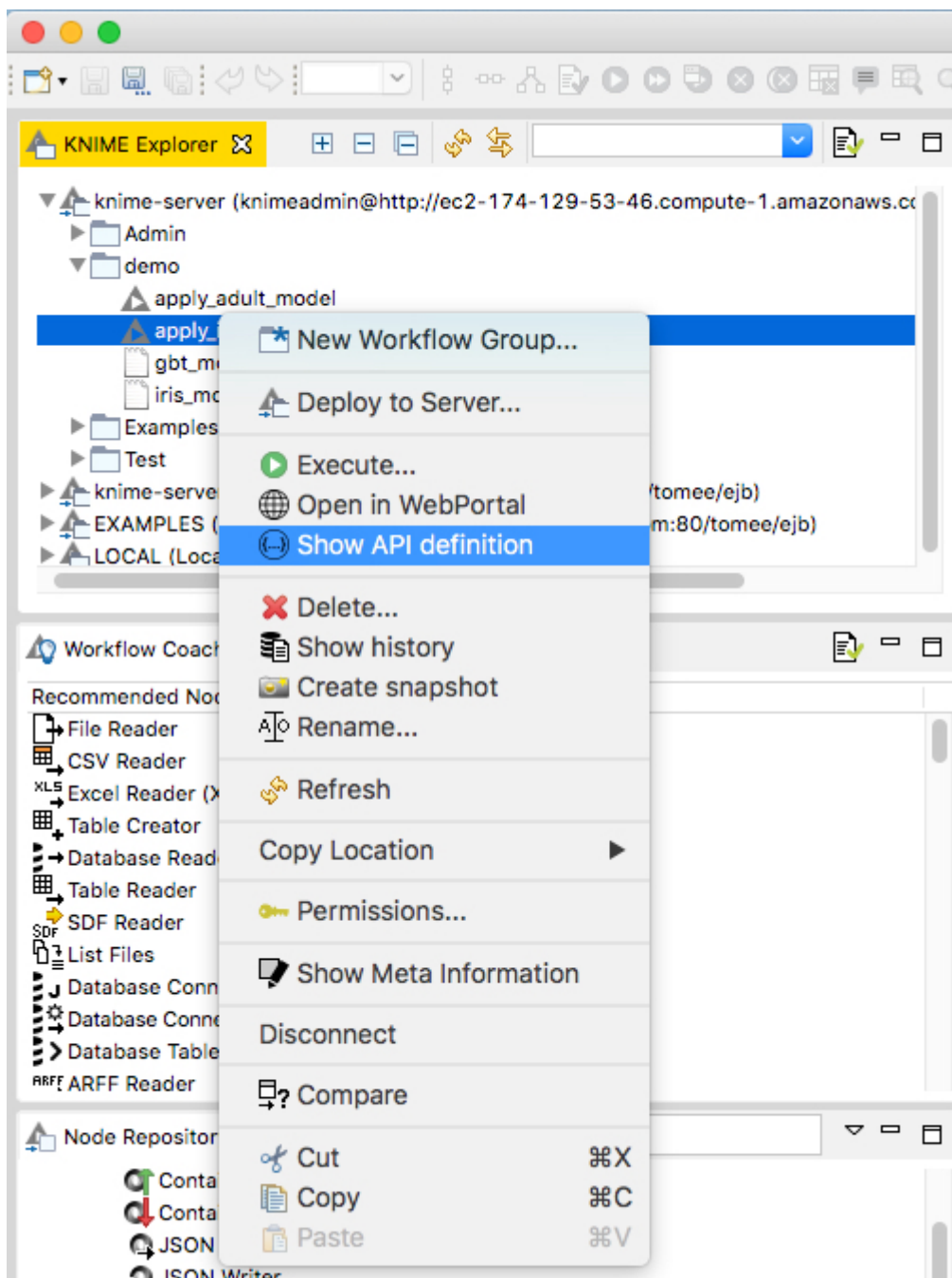
The usual starting point to query the repository and to execute operations is

`http://<server-address>/knime/rest/v4/repository/`


(note the trailing '/'). The returned document also contains links to further operations.

SwaggerUI for Workflows

The KNIME Server automatically generates SwaggerUI pages for all workflows that are present on the KNIME Server. From the KNIME Analytics Platform you can access that functionality using the Show API definition context menu item.



Clicking the menu item will open a SwaggerUI page for that workflow in your browser. It's also possible to browse to that page using the REST API as described in the above section.

POST /v4/repository/demo/apply_iris_model:execution Executes a job from this workflow 

This call combines loading, executing, and deleting a job in one call. You can pass input parameter for quickform nodes defined in the workflow. All input parameters are suffixed with their unique node ID in order to make the parameters unique themselves. If a parameter name is unique without the node ID suffix you can also omit the suffix when sending it to the server. For example, if the fully qualified parameter name is `int-Input-1` and there is no other input parameter that begins with `int-Input` you can use `int-Input` as the name in your request.

Parameters Try it out

Name	Description
<code>timeout</code> integer (query)	Sets a timeout in milliseconds that the call should wait for the job being loaded. If the workflow doesn't load within the time a 504 error will be returned.
<code>format</code> string (query)	If the workflow creates a report you can specify the desired report format. If no report format is provided no report will be generated.
<code>reset</code> boolean (query)	True if the job should be reset before execution. If false (the default) job execution continues from its saved state.

Request body application/json

Inline input parameters for the job

Example Value | Model

```
{
  "json-input-1": {
    "sepal length": 5.2,
    "sepal width": 5.3,
    "petal length": 0.3,
    "petal width": 0.4
  }
}
```

Common problems

Always reset with flow variables

If the values of flow variables are changed in the remote execution dialog, the flow must be reset in order for the new values to be propagated. In this case, don't remove the checkmark "Reset before Execution" in the execution dialog.

knime.ini file not found

If the KNIME instance that is used to execute flows on the server doesn't seem to have the settings specified in the `knime.ini` file, it is possible that the server didn't find the ini-file: The server takes the default ini-file from the same folder as the KNIME executable. If you specify a wrapper script as executable that is located outside the installation folder it doesn't find the default ini-file. In this case copy the ini-file from the installation folder into `<server-repository>/config`.

Server startup takes a long time

In some cases it may take quite some time (up to several minutes) until the server responds to requests on Linux systems.

Insufficient entropy

This is usually caused by insufficient entropy for the random number generator used by Tomcat. You can work around this issue by specifying a different random number source, which will provide numbers faster but which are also less random:

1. Edit `<tomcat-folder>/conf/catalina.properties`.
2. Add a line `java.security.egd=file:/dev/./urandom` at the bottom of the file (note the `"/./"`)
3. Restart TomEE

Large number of jobs

In cases where the KNIME Server retains a large number of jobs then it may be necessary to increase the amount of memory that TomEE can access. Simply edit the file `setenv.bat`

(Windows) or `setenv.sh` (Linux) to increase the value of `-Xmx` to double the current setting.

Changelog (KNIME Server 4.11)

KNIME Server 4.11.6 (released November 8, 2021)

Bugfixes

- [SRV-3612] - Directory path traversal when requesting client profiles^[1]
- [WEBP-876] - Cross-Site-Scripting vulnerability in old WebPortal login^[2]
- [SRV-3522] - Time intervals of scheduled don't behave correctly in some cases
- [SRV-3501] - Admin username not case insensitive
- [SRV-3500] - Race condition in ObjectStore
- [SRV-3488] - Response compression does not work any more due to change in Tomcat
- [SRV-3481] - Error on loading swapped job yields unexpected job state
- [SRV-3375] - Server installer must use executor JVM when installing executor
- [SRV-3371] - Discarding a job after load timeout may lead to error

KNIME Server 4.11.5 (released March 4, 2021)

Enhancement

- [SRV-3379] - Make swap timeout during executor shutdown configurable
- [SRV-3206] - Auto-forward to identity provider authentication page

Bugfixes

- [SRV-3386] - User list in Admin Console not updated correctly
- [SRV-3360] - Parent job directories on executor aren't deleted on discard or swap
- [SRV-3359] - Remote Workflow Editor prevents jobs from being swapped
- [SRV-3352] - Too large configuration/input parameters may render server unusable for the current user
- [SRV-3338] - Swapped jobs may fail to get restored right after server restart
- [SRV-3334] - Swapped jobs cannot be found any more after server repository has been renamed/moved

- [WEBP-671] - Direct access to a workflow from unauthenticated session redirects to landing page when using OAuth

KNIME Server 4.11.4 (released December 11, 2020)

Enhancement

- [SRV-3247] - Option to hide folders without view permissions
- [SRV-3289] - Make creation of workflow summary configurable
- [SRV-3303] - Allow custom content in "Thanks for logging in" page

Bugfixes

- [SRV-3138] - Timeouts in remote workflow editor are too low
- [SRV-3167] - lastEditedOn in server meta information is never updated
- [SRV-3169] - Script install-executor-as-service.bat fails if path contains blanks
- [SRV-3215] - Race condition when updating job states in interactive execution
- [SRV-3227] - Timeouts while swapping a job don't mark the job as non-swappable
- [SRV-3229] - Executor group is not set in case server is restarted
- [SRV-3230] - Race condition between job swapping and status update
- [SRV-3260] - Cannot set configuration nodes via WebPortal when using OAuth
- [SRV-3269] - Maximum JWT lifetime not set if parameter cannot be parsed
- [SRV-3290] - Possible null pointer when OAuthAuthenticator tries to bring KAP to front
- [SRV-3296] - Workflow summary endpoint returns 500 when summary does not exist

KNIME Server 4.11.3 (released November 4, 2020)

Enhancement

- [SRV-3123] - Rabbitmq HA support
- [SRV-3200] - CSRF protection should allow null Origin

Bugfixes

- [SRV-3149] - Server login Credentials (knime.system.default) get lost after job swapping
- [SRV-3169] - Script install-executor-as-service.bat fails if path contains blanks
- [SRV-3171] - update-executor.sh corrupts installation if there are no updates
- [SRV-3176] - Job swapping and saving as workflow doesn't work with KNIME Server Small and queue-based executor
- [SRV-3178] - Requests are not properly forwarded to social workflows
- [SRV-3191] - String literals in reservation rules or executor group rules break the executor endpoint
- [SRV-3192] - Server configuration map is not updated after adjusting settings
- [SRV-3193] - JobLifecycleHandler doesn't handle all jobs in case an exception is thrown
- [SRV-3194] - Empty default cpu and ram requirements yield error
- [SRV-3202] - Executor service installer adds TomEE instead of Tomcat9 as dependency
- [SRV-3208] - Some operations in distributed executors don't work with default https certificate
- [SRV-3226] - Renaming cannot overwrite workflow in REST mountpoints
- [WEBP-524] - JavaScript views are not working in legacy Edge
- [WEBP-562] - Link to current admin guide from WebPortal footer
- [WEBP-573] - Re-executing wizard page in a loop causes webportal to display wrong page

KNIME Server 4.11.2 (released September 28, 2020)

Enhancement

- [SRV-3153] - Check during server startup if a tomee.war is used in a Tomcat server (and vice versa)
- [SRV-3154] - Update COMMUNITY mount point to use OAuth

Bugfixes

- [SRV-3091] - Social Workflow Repository not reachable anymore
- [SRV-3135] - Mail session is not forwarded to server properly

- [SRV-3136] - Cannot update the executor from command line due to -profileLocation
- [SRV-3148] - Authenticator may throw NullPointerException if token verification fails
- [WEBP-530] - Nuxt routing depends on final '/'
- [WEBP-536] - File upload: old webportal displays file location with object store path
- [WEBP-541] - Workflows with execute-permission only can't be executed

KNIME Server 4.11.1 (released August 26, 2020)

Enhancement

- [SRV-2952] - Propagate JWT Parsing Errors to the log
- [SRV-2979] - Suppress warnings about missing metainformation for simple files during workflow group upload
- [SRV-3001] - Save workflow summary together with the job
- [SRV-3064] - Improve Explorer performance for many jobs
- [SRV-3100] - Allow knime.system.default to be used in Configuration Options
- [SRV-3110] - Increase maximum number of in-memory jobs in local queue-based executor
- [WEBP-70] - Allow passing variables for config nodes via browser URL
- [WEBP-138] - Add option to deactivate old Webportal
- [WEBP-422] - Interactive execution endpoint: Allow configurations to be provided as string-key-value pairs instead of json-objects
- [WEBP-437] - Improve behaviour of "Connection lost" message
- [WEBP-439] - Add keyboard navigation and focus style for expand icons of messages

Bugfixes

- [SRV-2869] - Server Executor dialog does not scale
- [SRV-3035] - "Reset workflow" gets checked when I select a workflow group in "deploy to server"
- [SRV-3039] - OIDC: nullpointer in authenticator
- [SRV-3054] - No different font for disabled schedules visible via REST connection to the server

- [SRV-3069] - Potential deadlock when modifying scheduled job on old workflows
- [SRV-3078] - OAuth: admin rights missing in Analytics Platform
- [SRV-3088] - OpenAPI index page not loaded properly
- [SRV-3095] - Installer does not contain the files to start KNIME Server as service on Windows
- [SRV-3097] - Repository items named 'services' are not accessible any more
- [SRV-3113] - Authentication Tokens of jobs lose their validity after server restart
- [SRV-3117] - Reading files from the server repository randomly fails with 403
- [SRV-3126] - Credentials Configuration isn't filled with Server Login
- [SRV-3130] - Embedded user database from pre-4.11 installations is not readable any more
- [WEBP-298] - Unwanted default scrollbar of page content on small screens
- [WEBP-302] - Cursor: pointer should be used consistently on clickable things
- [WEBP-314] - WebPortal button-footer takes up a lot of the available space when zoomed in
- [WEBP-333] - After clicking "show more" in the WebPortal job list, the focus should not reset to the top
- [WEBP-355] - Error page message contains unsupported characters
- [WEBP-364] - Unnecessary scroll bar appears when window is resized smaller
- [WEBP-365] - Credential Widget not working with 'Use server account information'
- [WEBP-367] - Empty repositories should be shown in the WebPortal
- [WEBP-384] - No error message when job can't be opened
- [WEBP-395] - Error Message: undefined
- [WEBP-401] - Labels are cut off
- [WEBP-408] - Set the percent of job execution to 1% as soon as the job is started
- [WEBP-427] - Breadcrumb text gets cut off
- [WEBP-433] - Filter out HTML responses from notification body
- [WEBP-440] - Vertical text cursor is not centered
- [WEBP-445] - Report url paramters inconsistent behavior
- [WEBP-453] - File up and download can use wrong node ids for generating URLs
- [WEBP-457] - URL parameter for email notification wrong

- [WEBP-458] - URL parameter for report formats should be all lowercased
- [WEBP-460] - Tooltip on Progress bar can be negative
- [WEBP-473] - File Upload should not use colons in file names
- [WEBP-495] - KnimePageBuilderAPI is not created in some circumstances
- [WEBP-496] - File uploaded via file upload widget fails to be read by the executor due to a 401 error (auth issue)
- [WEBP-498] - Workflow with `knime.system.default` cannot be loaded
- [WEBP-500] - Race condition if wizard page is in a loop
- [WEBP-503] - New style widget in single view should not load any css
- [WEBP-504] - WebPortal job cannot be discarded when session is destroyed
- [WEBP-505] - Interactive JS Views show error when executed in a loop

KNIME Server 4.11.0 (released July 13, 2020)

Enhancement

- [SRV-2033] - Dialogs of DB nodes not available in remote workflow editor
- [SRV-2154] - Permissions for scheduled jobs in REST interface
- [SRV-2155] - Permissions for scheduled jobs in KNIME Explorer
- [SRV-2534] - Allow to reserve executors for exclusive use
- [SRV-2562] - Improve message on forbidden symbols in mountID in server installer
- [SRV-2580] - Allow re-connecting to existing jobs after server restart
- [SRV-2600] - Add max core setting to preferences.epf.template
- [SRV-2639] - Provide versions of server components in REST interface
- [SRV-2696] - Enable dynamic port configuration in remote workflow editor
- [SRV-2712] - Executor should retry connections to message queue
- [SRV-2733] - Port for embedded message queue should be configurable
- [SRV-2798] - [OAuth] Webportal landing page when using OIDC
- [SRV-2807] - Improve job logging
- [SRV-2820] - Dialog option to keep or change history when moving/copying workflows
- [SRV-2821] - Add possibility to map JWT claims to groups
- [SRV-2823] - Reuse OAuth Configuration From AuthenticationValve in KNIME Server

- [SRV-2824] - Automatic OIDC endpoint discovery
- [SRV-2830] - Define multiple queues in server config
- [SRV-2871] - Prevent loss of OIDC configuration when war is updated
- [SRV-2904] - Remove Glassfish support from KNIME Server Client
- [SRV-2920] - Add option to force-enable "Create Snapshot"
- [SRV-2921] - Add option to force-enable "Reset Workflow before upload"
- [SRV-2922] - Change default executor starting port
- [SRV-2926] - Installer should set path to embedded queue in executor knime.ini
- [SRV-2927] - Add new template for server managed customizations specific to executors
- [SRV-2928] - Remove preferences.epf.template from installer
- [SRV-2930] - Fix behavior of Use REST option
- [SRV-2932] - Show warning when using EJB mountpoints
- [SRV-2938] - Extract user and group information for executor reservation
- [SRV-2940] - Executor using embedded message queue should get as many core tokens as available
- [SRV-2948] - Make table view chunk size editable and use smaller default value
- [SRV-2958] - Do not send emails during Remote Job Edits
- [SRV-2962] - 'Workflow summary' endpoint for jobs
- [SRV-2963] - Default.epf template should use REST mountpoint
- [SRV-2971] - New REST endpoint with executor information
- [SRV-2977] - Add job IDs to all job related messages
- [SRV-2982] - Executor should have a start script
- [SRV-2985] - Server client should check for EJB support
- [SRV-2988] - Improve UI of EJB warning dialog
- [SRV-3002] - Support String claim as group-mapping-claim
- [SRV-3013] - Allow force-reset of jobs before saving as workflow
- [SRV-3015] - Update KNIME logo on OIDC login page
- [SRV-3026] - Improve error message if no queue can be found due to group restrictions
- [WEBP-454] - New WebPortal with improved layout and design

Bugfixes

- [SRV-2352] - Improve error message if unexpected logout occurs
- [SRV-2492] - IPv6 addresses are not correctly handled in canonical host name autodetection
- [SRV-2718] - Closing KNIME OAuth Pop-Up (ESC Key) Will Block Port Used For Redirect
- [SRV-2849] - Unexpected Basic Auth Pop-Up When "Opening API Definition" From the AP in the Browser Without an Authenticated Session
- [SRV-2862] - Subnode-execution mode once set in server get's overwritten with every job update
- [SRV-2874] - NullPointerException in AP when connecting to server stored as OAuth with OAuth disabled
- [SRV-2883] - OAuth redirect page doesn't show error
- [SRV-2884] - Edit Mount Point Dialog does not remember Authentication Type
- [SRV-2890] - Mount Point Dialog resizes when large error is displayed
- [SRV-2892] - Wrong error message from executor when workflow cannot be loaded
- [SRV-2899] - NullPointerException exception when trying to open configuration window of google updater on a remote job view
- [SRV-2908] - Remote Job View does not refresh after an Executor restart
- [SRV-2934] - Wrong error message when loading workflow failed in executor
- [SRV-2941] - Email notification dialog in Call Workflow action advanced options not displayed correctly
- [SRV-2943] - server_logs.zip sometimes contains folders with incomplete executor ID
- [SRV-2967] - Overwriting workflow group via REST removes existing schedules
- [SRV-2990] - Lazily loaded table rows are not updated in port table view (job view)
- [SRV-3025] - Account settings of KNIME server are not applied on runtime
- [SRV-3032] - Workflow pinning/reservation rules dont accept the @ character
- [SRV-3034] - Failure to read updated server config prevents further updates
- [SRV-3044] - Force reset workflow is ignored on temporary copies of workflows
- [SRV-3051] - Unable to enter username in "Edit Mount Point" dialog
- [SRV-3052] - Server sends multiple Status Emails for loops in workflows
- [SRV-3060] - OAuth: NullPointerException when trying to refresh the access token

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- jackson-datatype-jsr310-2.8.11.jar

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¹ The server managed customizations functionality of KNIME Server up to version 4.13.3 is vulnerable to Directory Path Traversal attacks. By manipulating variables that reference files by prepending "dot-dot-slash (../)" sequences and their variations or by using absolute file paths, it is possible to access arbitrary files and directories stored on the file system including application source code, configuration, and database. Due to the file-based architecture of KNIME Server, this vulnerability allows stealing users' data such as password hashes, workflows, licenses, jobs, and so on. No authentication is required to exploit this vulnerability. The vulnerability was found and reported by Dawid Czarnecki from NATO and is recorded as [CVE-2021-44726](#)

² The old KNIME WebPortal login page up to version 4.13.3 contains a DOM-based XSS vulnerability that once exploited, can be used to run any action as a victim user via malicious JavaScript. If the victim user is an administrator, it could be used to create a new administrator. To exploit the vulnerability it is required to create a specially crafted URL and convince the victim to open it. No authentication is required to exploit the vulnerability, however, authenticated users can be targeted. The vulnerability was found and reported by Dawid Czarnecki from NATO and is recorded as [CVE-2021-44725](#)

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