KNIME Server Workshop

KNIME.com AG
## Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:30 – 11:45</td>
<td>KNIME Products Overview</td>
</tr>
<tr>
<td>11:45 – 12:00</td>
<td>KNIME Server</td>
</tr>
<tr>
<td>12:00 – 12:15</td>
<td>KNIME Server Basic Features</td>
</tr>
<tr>
<td>12:15 – 12:45</td>
<td>KNIME Server Advanced Features</td>
</tr>
<tr>
<td>12:45 – 13:00</td>
<td>Q&amp;A</td>
</tr>
<tr>
<td>13:00</td>
<td>Close</td>
</tr>
</tbody>
</table>

**KNIME Products Overview**
- KNIME Analytics Platform
- Collaboration Extensions
- Performance Extensions
- Productivity Extensions

**KNIME Server**
- Server Architecture and Administration

**KNIME Server Basic Features**
- Connecting to KNIME Server
- Shared Workflows, Metanodes and Data Permissions
- Remote and scheduled execution

**KNIME Server Advanced Features**
- Consuming workflows with the WebPortal
- WebPortal templates
- Deploying workflows with the REST API
KNIME Products Overview

- KNIME Analytics Platform
- Collaboration Extensions
- Performance Extensions
- Productivity Extensions
KNIME Products Overview

Productivity
- KNIME Personal Productivity
- KNIME Partner Productivity

Collaboration
- KNIME Server
- KNIME Cloud Server
- KNIME Server Lite
- KNIME WebPortal
- KNIME TeamSpace

Performance
- KNIME Big Data Connector
- KNIME Spark Executor
- KNIME Cluster Executor

Community & Partner Extensions
KNIME Analytics Platform

- Open solution for data-driven innovation
- Data & Tool Integrations
- ETL
- Analysis & Modelling
- Reporting & Deployment
KNIME Products Overview

**Productivity**
- KNIME Personal Productivity
- KNIME Partner Productivity

**Collaboration**
- KNIME Server
- KNIME Cloud Server
- KNIME Server Lite
- KNIME WebPortal
- KNIME TeamSpace

**Performance**
- KNIME Big Data Connector
- KNIME Spark Executor
- KNIME Cluster Executor

**KNIME Analytics Platform**

**Community & Partner Extensions**
Personal Productivity

- **LocalSpace repository**
  - Reuse metanodes
  - Propagate changes in reused metanodes

- **Local automation**
  - Enhanced batch executor
  - Batch executor report

- **Workflow difference**
  - Track changes between workflows
Partner Productivity

- Encrypt and lock metanodes to secure your intellectual property
KNIME Products Overview

Productivity
- KNIME Personal Productivity
- KNIME Partner Productivity

Collaboration
- KNIME Server
- KNIME Cloud Server
- KNIME Server Lite
- KNIME WebPortal
- KNIME TeamSpace

Performance
- KNIME Big Data Connector
- KNIME Spark Executor
- KNIME Cluster Executor

Community & Partner Extensions
Big Data Connectors
KNIME Products Overview

- **Productivity**
  - KNIME Personal Productivity
  - KNIME Partner Productivity

- **Collaboration**
  - KNIME Server
  - KNIME Cloud Server
  - KNIME Server Lite
  - KNIME WebPortal
  - KNIME TeamSpace

- **Performance**
  - KNIME Big Data Connector
  - KNIME Spark Executor
  - KNIME Cluster Executor

- **Community & Partner Extensions**

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## KNIME Collaboration Extension Products

<table>
<thead>
<tr>
<th>Feature</th>
<th>TeamSpace</th>
<th>Server Lite</th>
<th>Cloud Server</th>
<th>KNIME Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Management</td>
<td>Basic</td>
<td>Basic</td>
<td>Basic</td>
<td>Advanced</td>
</tr>
<tr>
<td>Shared Repositories</td>
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<tr>
<td>Flexible Execution</td>
<td></td>
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<tr>
<td>WebPortal</td>
<td>Optional</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REST Services</td>
<td></td>
<td></td>
<td>Optional</td>
<td></td>
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<tr>
<td>Commercial Support</td>
<td></td>
<td></td>
<td>Optional</td>
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</table>
## KNIME Performance Extensions

Designed to integrate your advanced hardware and infrastructure capabilities for even better KNIME performance

- KNIME Cluster Execution
- KNIME Big Data Extension
KNIME TeamSpace

KNIME TeamSpace helps to share work with all team members

- Includes all personal productivity features
- Shared workflow repository
- Shared data space
- Shared metanodes
KNIME Server Lite

KNIME Server Lite has advanced collaborative features:

• User authentication & user rights
• Remote & scheduled execution
• Report generation
• Shared workflow repository
• Shared data space
• Shared metanodes
KNIME Cloud Server

KNIME Cloud Server has the power and functionality of KNIME Server and additionally leverages collaboration.

- Available via AWS Marketplace & Azure Marketplace
- All KNIME Server features
- Click and launch
KNIME Server

- Shared Metanode Repository
- Shared Data File Repository
- Shared Workflow Repository

Remote Execution

Scheduled Execution

REST API

Custom Application Access

KNIME Client Access

Web Browser Access

User Access Rights

Active Directory/LDAP and Single-sign on (Kerberos)

WebPortal
Architecture & Administration
KNIME Server – Architecture

- KNIME WebPortal
- VAADIN 7
- Tomcat/TomEE Application Server
- KNIME Server
- KNIME Executor (headless KNIME Analytics Platform)
- Java 8
Why TomEE?

• Apache TomEE is based on Apache Tomcat
  – Much higher adoption than Glassfish
  – Additional libraries to support EJB

• Communication solely via HTTP
  – Less firewall problems
  – SSL Encryption for client- and web-to-server communication

• Installation and deployment considerably easier

• Better user and group management

• Simultaneous connection to multiple servers
Installation Overview

- Install Java 8
- Install KNIME Analytics Platform
- Create shared workflow repository
- Install Tomcat/TomEE 1.7
- Configure Application Server
  - JVM Options
  - KNIME Server settings
  - Create email resource
- Define users (or configure LDAP/AD)
- Deploy KNIME Server
- Deploy KNIME WebPortal
Administration Overview

Typical responsibilities of the KNIME Server Administrator:

• Perform server side updates (~ 2x per year)
  – Intermediate bug fix releases provided if necessary

• Structure the workflow repository

• Manager user access via permissions
## Server-Executor Compatibility Matrix

<table>
<thead>
<tr>
<th>Server</th>
<th>3.2</th>
<th>3.1</th>
<th>2.12</th>
<th>2.11</th>
<th>2.10</th>
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<tbody>
<tr>
<td>4.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Client-Server Compatibility Matrix

<table>
<thead>
<tr>
<th>Server</th>
<th>3.2</th>
<th>3.1</th>
<th>2.12</th>
<th>2.11</th>
<th>2.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3</td>
<td>green</td>
<td>yellow</td>
<td>limited functionality</td>
<td>yellow</td>
<td>limited functionality</td>
</tr>
<tr>
<td>4.2</td>
<td>green</td>
<td>yellow</td>
<td>limited functionality</td>
<td>yellow</td>
<td>limited functionality</td>
</tr>
<tr>
<td>4.1</td>
<td>green</td>
<td>red</td>
<td>via 4.0 connector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>green</td>
<td>red</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.10</td>
<td>green</td>
<td>red</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.9</td>
<td>green</td>
<td>red</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Client-Server-Executor Compatibility Matrix

• https://www.knime.org/knimecom-product-downloads

• Details about KNIME Server/Executor compatibility and Server/Analytics Platform (client) version compatibility

• Access to above URL requires activation of forum username

• Please contact us at support@knime.com to get your forum username activated (admins only)
KNIME Server – Basic Features
Client Access
Defining a new ServerSpace

Server connections are shown as “mount points” in the KNIME Explorer. To add a new mount point simply:

1. Click on the configure button in the KNIME Explorer.
2. Click New...
3. Configure a ServerSpace with your details
ServerSpace as a shared repository

The Server provides an area in the Explorer for sharing work with your colleagues. Use workflow groups to organize your workflows, metanodes, and data files.

- Workflow groups
- Data files
- Workflows
- Metanodes

To move resources simply drag and drop or copy and paste
Permissions

Available in KNIME Server
Remote Execution and Scheduling

Available in KNIME Server
Remote Execution and Scheduling

Available in KNIME Server
Workflow Jobs

Remotely executed workflows are run as “Jobs”

- A workflow job is a copy of the workflow with specific settings and data.
- Jobs are tied to a particular version of a workflow.
- Orphaned jobs are colored red.
- Jobs have messages (e.g. successful, or failure).
- Can be saved as workflow for data provenance and debugging (right-click save as).
KNIME Server – Advanced Features
KNIME – License Distribution

• License files distributed from Server to Analytics Platform
KNIME – License Distribution

• Checked out from KNIME Server
• Centrally managed, less configuration required
• TeamSpace with all KNIME Server licenses
• Also for Big Data Connector and Spark Executor licenses
KNIME WebPortal
Wrapped Metanodes

• Similar to Metanodes
• Differ in key areas:
  – Limited variable scope (c.f. global scope for Metanodes)
  – Use with Quick Form nodes (Analytics Platform 3.1+)
• Key to advanced functionality in KNIME products:
  – Use for new WebPortal pages
Wrapped Metanodes

Select

Wrap
# Metanodes vs. Wrapped Metanodes (WebPortal)

<table>
<thead>
<tr>
<th></th>
<th>Metanodes</th>
<th>Wrapped Metanodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Forms</td>
<td>Legacy</td>
<td>Standard</td>
</tr>
<tr>
<td>Variable scope</td>
<td>Global</td>
<td>Local</td>
</tr>
<tr>
<td>WebPortal Execution</td>
<td>Old</td>
<td>New (work with loops/switches)</td>
</tr>
<tr>
<td>JavaScript views in WebPortal</td>
<td>Not supported</td>
<td>Supported</td>
</tr>
<tr>
<td>WebPortal Usage</td>
<td>Quickforms used globally</td>
<td>Views/Quickforms must be embedded in a Wrapped Metanode</td>
</tr>
<tr>
<td>Recommended uses</td>
<td>Legacy workflows</td>
<td>New developments</td>
</tr>
<tr>
<td>Compatibility</td>
<td>KNIME Server 3.x/4.x</td>
<td>KNIME Server 4.2+</td>
</tr>
</tbody>
</table>

* Valid for KNIME Analytics Platform 3.1 and above
WebPortal Enabled Data Mining
WebPortal Enabled Data Mining

Execution on Server via WebPortal - 1

[Image of KNIME interface showing workflow repository and WebPortalDataMining workflow]
WebPortal Enabled Data Mining

Execution on Server via WebPortal - 2
WebPortal Enabled Data Mining

Execution on Server via WebPortal - 3
WebPortal Enabled Data Mining

Execution on Server via WebPortal - 4
WebPortal Enabled Data Mining

Execution on Server via WebPortal - 5
KNIME WebPortal: URL Parameter

http://<Server_Address>:<port>/<ContextRoot>/#/<ItemPath>&<WorkflowParameters>

<ItemPath> = The path to a workflow, workflow group, or workflow job.

(A workflow job is referenced with its ID like: WorkflowGroup/Workflow?exec=job_id)

<WorkflowParameters> can appear in any order, but have to be after the <ItemPath>. Parameters are always appended with a leading '
'

Available Workflow Parameters

&single - Single mode: hides the workflow tree, so that only the selected item is visible.

&run - Auto run: If appended to workflow path, a new job is automatically executed.

&wv:<name>=<value> - Set variable: Sets the named workflow variable to the specified value.

&cr:<name>=<user>:<password> - Set credentials: Sets the user name and password for the named workflow credentials. Please note that the credentials and user name cannot contain the “=” and “:” symbols and that the password is transmitted in plain text.

&emails=sample@mail.com - Enable email notification: enables email notification and sets the specified comma separated list of email addresses.

&formats=<formats> - Set report formats: sets the report formats included as attachments in the notification email specified by a comma separated list. Available formats are: pdf (enabled by default), html, doc, xls, ppt, ps, odt, ods and odp.

A complete URL might look like:

http://localhost:8080/webportal/#/demo/file%20to%20csv&wv:title=foo&emails=sample@mail.com&run&single
WebPortal Templates (I)

Open for Innovation

KNIME

WebPortal

Version 4.1.0

Username

Password

Login
WebPortal Templates (II)
WebPortal Templates (III)
WebPortal Templates (IV)
WebPortal Templates (V)
WebPortal Templates (VI)

• Layout can be configured by templates
  – Footer & header
  – Main panel
  – Login page
  – ...
• Custom stylesheet
• Custom JavaScript libraries
  – Can be re-used in JS-based views
WebPortal Templates (VII)

- Templates are part of the configuration and are not overridden by updates
Webservice Access (REST)
KNIME Server – Extended REST API

• Integrate KNIME Server functionality with IT infrastructure
• REST = Representational State Transfer
  – Communication based on HTTP
  – Usually clear text
• REST is a design pattern used for building networked applications
• Execute workflows, check server status, and more

• See Blog Posts for detailed tutorials:
  – https://www.knime.org/blog/giving-the-knime-server-a-rest
  – https://www.knime.org/blog/the-knime-server-rest-api
• Run a simple model training for a classification problem on a schedule (predict income group from demographic attributes)
KNIME Server REST API – Use Case

• Build and upload a REST Workflow on the KNIME Server
KNIME Server REST API – Use Case

• Execute the workflow via Call Remote Workflow node
  – Analyzes input parameters
  – Prepare input data accordingly
  – Executes job and gets back results
KNIME Server REST API – Use Case

- The workflow can be executed even via Call Remote Workflow by an external tool such as Postman or Curl
System Administration
KNIME Server Installer

Step-by-step guided Server installation (Windows and Linux)
KNIME Server – Admin made easy

• KNIME Administrator is often not a KNIME Analytics Platform user

• Make tasks like user administration easier

• Get an overview of the KNIME Server health
KNIME Server – Admin made easy

Go to the administration portal
KNIME Server – Admin made easy

- Status Info
  - Host: unknown
  - Version: 4.3.0
  - Uptime: 0 days, 0 hours, 6 minutes, 46 seconds,
  - Executors Info: KNIME Executors associated with user: (none): 0: RMI Executor 0 (user: (none), port: 50100, uptime: 00:06:20, status: Accepting, jobs: 1)
  - Config Info

- License and Users Info
  - License Type: KNIME Server
  - Expiration Date: 2016-08-15
  - Company: KNIME.com AG
  - Customer: Jon Fuller
  - Host Identifiers: ("AWS Instance ID": "i-0c1d9ec6c03686c1d"
  - Comment:
  - Users
## License Info

**License Type:** KNIME Server  
**Expiration Date:** 2016-07-08  
**Company:** KNIME.com AG  
**Customer:** Jon Fuller  
**Host Identifiers:** `{ "Host IP": "10.0.0.26" }`  
**Comment:** Demo license  

### Users

#### Desktop  
- limit: 5  
- current: 0

#### Webportal  
- limit: 50  
- current: 1  
  - **active Users**  
    - name: admin  
    - last login: 2016-06-09T10:23:32.268

#### Webservice  
- limit: 50  
- current: 1  
  - **active Users**  
    - name: admin  
KNIME Server – Admin made easy

<table>
<thead>
<tr>
<th>Name</th>
<th>Workflow</th>
<th>Owner</th>
<th>Notifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Webportal Data Mining - KNIME 20151204 2016-07-19 11.01.07</td>
<td>/Basic KNIME Examples/Webportal/Webportal Data Mining - KNIME 20151204</td>
<td>knimeadmin</td>
<td></td>
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<td>Webportal Data Mining - KNIME 20151204 2016-07-19 11.05.33</td>
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<td>knimeadmin</td>
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<td>knimeadmin</td>
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### KNIME Server – Admin made easy

#### Users

<table>
<thead>
<tr>
<th>User</th>
<th>Groups</th>
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<tbody>
<tr>
<td>knimeadmin</td>
<td>admin,knime</td>
</tr>
<tr>
<td>easilycreateanu</td>
<td>knime</td>
</tr>
</tbody>
</table>

#### Groups

<table>
<thead>
<tr>
<th>Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>admin</td>
<td></td>
</tr>
<tr>
<td>knime</td>
<td></td>
</tr>
</tbody>
</table>
KNIME Server – Admin made easy

Create New User

Name

easilycreateanewuser

Password

Password (repeat)

Groups

admin

knime

To grant access to the administration page, the user must be in the ‘admin’- and the ‘knime’-group. To allow a user to change his password, he must be in the ‘knime’-group.

submit
Summary and Q&A