What's New
in WPS version 4.3

Version: 4.3.1

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Contents

Introduction

World Programming is pleased to announce version 4.3 of the World Programming System. This version includes many improvements, including updates to the Workbench workflows, new and updated procedures, and new functionality. The new and updated features in this version are described in this document.

Workbench

New and enhanced features in the SAS language and Workflow perspectives of WPS Workbench.

Workbench – new

The following features have been added:

- The folder containing the workspace log file can now be accessed from the Workbench Help menu.
- You can now create an IBM Spectrum LSF connection in the Link Explorer. Processing engine instances created using this connection can be run on any of the clusters in that connection.
- Perspectives can now be specified to automatically change dependent on the file type opened. Programs can be automatically opened in the SAS Language perspective; workflows can be automatically opened in the Workflow perspective.

SAS language perspective

New and enhanced features in the SAS language perspective are provided in this version of WPS Workbench.

SAS language perspective – new

The following feature has been added:

- Hub program run configuration. SAS language, Python language, and R language programs located in WPS Hub can now be configured to run in locally in Workbench. Parameters can be specified for program execution, and the results viewed once the execution is complete.

Workflow perspective

New and enhanced blocks and features in the Workflow perspective are provided in this version of WPS Analytics.

Workflow perspective – new

The following features have been added:

- Database connections in the **Database Explorer** view:
  - One or more datasets (tables) can now be selected and dragged from a database connection to a new **Database Import** block on the Workflow canvas. The block can be used to add or remove other tables from the database connection to the workflow.
- The **Hub** group has been added and contains:
  - The **Hub Program** block. Configure a workflow ready to be deployed as an executable program for use in WPS Hub. The block creates:
    - An **Input Parameters** block is used to create a parameters dataset that can be connected to:
      - A **Database Import** block where the database connection is defined in the Hub.
      - All **Data Preparation** blocks.
      - All **Code** Blocks.
      - The **PSI** and **Score** blocks in the **Scoring** group.
      - A **Database Export** block that uses database connections defined in the Hub.
    - A **Program Results** block that contains the Workflow-generated program to be uploaded to Hub.
- The **Import** group now includes:
  - The **WPS Dataset Import** block.
    - Import and select variables from a permanent dataset (`.wpd`).
    - Import and merge multiple permanent datasets into a single output working dataset.
- The **Data Preparation** group now includes:
  - The **Copy** block. Duplicates an input dataset.
- The **Export** group now includes:
  - The **WPS Dataset Export** block. Export a working dataset to a permanent dataset (`.wpd`).
- The number of observations in a dataset can now be displayed on the Workflow canvas.
- A layout grid can now be displayed on the Workflow canvas and blocks can be automatically aligned to the canvas grid.
- Connections to and from a single block on the canvas can now be displayed. On the required block, click and hold the left mouse button down to highlight its connected blocks in the Workflow.
- You can now connect datasets that have variable names containing leading or trailing spaces to blocks in a workflow.
- Searching for, and filtering of, variables in variable selection panels in Workflow blocks can now be carried out using *fuzzy matching*. Matched variables are now highlighted in the variables list.

Workflow perspective – enhanced

The following features have been enhanced:

- The **Excel Import** block:
  - Now enables individual variables (columns) to be selected and imported from a spreadsheet.
  - Now enables the properties of each imported column to be specified.
  - Now supports locale-specific date, date-time and time formats for input variables.
  - Rows containing errors can be removed from the *Working Dataset* and output to a separate *Errors* dataset.
- The **Text File Import** block:
  - Now enables individual variables (columns) to be selected and imported from a delimited text file.
  - Now enables the properties of each imported column to be specified.
  - Now supports locale-specific date, date-time and time formats for input variables.
  - Rows containing errors can be removed from the *Working Dataset* and output to a separate *Errors* dataset.
- Optional model report datasets can now be generated by the following modelling blocks:
  - The **Decision Forest** block.
  - The **K-Means Clustering** block.
  - The **Linear Regression** block
  - The **Logistic Regression** block.
  - The **Reject Inference** block.
- The **Mutate** block:
  - Now lists all available SAS language functions that can be specified when creating a variable.
  - Now includes a preview tab that enables you view the mutated variables in the dataset.
  - An expression statement can now be applied to multiple input variables to create multiple output variables.
  - An expression can now be applied across different groupings of the input dataset using the grouping variable selection.
- The **Decision Forest** block:
  - Can now generate a confusion matrix.
  - Has improved support for Japanese characters in variable names.
- The **Decision Tree** block:
  - Can now generate a confusion matrix.
  - Has improved support for Japanese characters in variable names.
  - A growth algorithm is no longer required to manually grow a decision tree.
- The **Scorecard Model** block:
  - Can now generate scores from a dataset that contains probabilities. Probabilities can be generated using any probability model and the **Score** block.
  - Can now generate either integer or decimal scores for point allocation.

- The **Analyse Models** block:
  - Can now output a summary statistics dataset.
  - The classification threshold can now be configured for classification models.
  - Can now generate a confusion matrix for classification models.
- The **Chart Builder** block:
  - Can now output pie charts.
  - Can now output radar plots.

WPS Analytics

New and enhanced features in this version of WPS Analytics.

Core SAS language support

New and enhanced core SAS language support is provided in this version of WPS Analytics.

System options

The following system options have been added at this release:

- CHARTRANINVALID
- NETEZZACHARCOLUMNTYPE
- SETINITLOCATIONS
- SITEINITSTMT
- SITETERMSTMT
- TCPMSGLEN
- VARINITCHK
- WPSRESIZEDSARRAY

Global statements

The following global statement has been added at this release:

FILENAME ZIP
: Enables the reading and writing of compressed archive files.

DATA step

The following DATA step feature has been added at this release:

Resizeable direct (_TEMPORARY_) arrays can now be created in the DATA step.

- The `WPSRESIZEDSARRAY` system option must be specified in a program before the DATA step is run.
- Direct arrays created with the `ARRAY` statement can be resized using the `CALL DYNAMIC_ARRAY` routine.

Output Delivery System

The Output Delivery System (ODS) produces output in various formats. Existing ODS features have been significantly enhanced and augmented in this version of WPS Analytics.

ODS procedures – new

The following procedures have been added at this release:

ODSLIST
: Outputs styled bulleted and numbered lists.

ODSTEXT
: Outputs styled blocks of text.

The ODLIST and ODSTEXT procedures are experimental in this release, and subject to change.

ODS Statements – new

The following ODS features have been added at this release:

- The `ODS PACKAGE` statement is now supported, enabling you to create zipped (`.zip`) archive files.
- The `NEWFILE` option is now supported for the following destinations:
  - `ODS EXCELXP`
  - `ODS HTML`
  - `ODS MSOFFICE2K`
  - `ODS PDF`
  - `ODS RTF`

General procedures

New core procedures are provided, and updates have been made to some existing procedures.

General procedures – new

The following procedure has been added at this release:

FCMP
: Enables the creation of custom functions and routines for use in SAS language programs and Workflows.

General procedures – enhanced

The following procedures have been enhanced at this release:

IMPORT

- Now supports the `NAMEROW` statement.
- Now supports the `ENCODING` statement for delimited and DBF files.

EXPORT
: Now supports the `ENCODING` statement for delimited and DBF files.

Graphing procedures

Graphing procedures – new

The following graphical procedures have been added at this release:

GCONTOUR
: Enables the creation of a contour plot.

SGPIE
: Enables the creation of a pie chart.

SGRADAR
: Enables the creation of a radar chart.

Statistical procedures

New statistical procedures are provided, and updates have been made to the following statistical procedures.

Statistical procedures – new

The following procedures have been added at this release:

GLIMMIX
: Applies a generalised linear mixed effects model to data.

NLMIXED
Fits a non-linear mixed model to data.

SURVEYMEANS
Calculates elementary statistics for a sample dataset.

Statistical procedures – enhanced

The following procedures have been enhanced at this release:

GENMOD
Now supports the `LSMEANS` statement.

GLM
Now supports the `MANOVA` statement.

MIXED
Now supports the `PARMS` statement.

PHREG

- Now supports the `ASSESS` statement.
- Now supports the `HAZARDRATIO` statement.

Operational Research procedures

The following operational research procedure has been added at this release:

OPTQP
Solves a quadratic programming problem that might have linear constraints and defined upper or lower bounds, or defined upper and lower bounds.

Data engines

New data engines have been added at this release, and some existing data engines have been updated or enhanced.

Data engines – general

In this version, the following multi-threaded engines are now the standard engines, and have the standard engine name. The non-threaded engine has the original name with `OLD` appended; for example, `MYSQLOLD`. The multi-threaded engines will now be used if you have the standard engine name specified.

The engine names are:

Multi-threaded version	Legacy version
MYSQL	MYSQLOLD
MARIADB	MARIADBOLD

Data engines – new

The following data engines have been added at this release:

POSTGRESQLM

Enables access to PostgreSQL databases using a multi-threaded connection.

SNOWFLAKE

Enables access to a Snowflake Data Warehouse.

Data engines – enhanced

The following data engines have been enhanced at this release:

TERADATA

Now supports options to bulk insert data on the Library reference statement.

Now supports the following dataset options:

- `CHECKPOINT`
- `TPT_APPL_PHASE`
- `TPT_CHECKPOINT`
- `TPT_RESTART`

WPS Hub

WPS Hub is an enterprise management tool consisting of WPS Hub Enterprise, used to manage access to data sources; and Deployment Services, enabling programs to be run externally. Supporting these core functions are numerous administration functions, that enable access control to the features of WPS Hub.

WPS Hub portal

WPS Hub portal contains the following new feature at this release:

- A new invocation interface has been added to enable programs to be submitted as asynchronous jobs.
- The invocation interface has the following additions:
  - Custom labels. Jobs can now be given labels, helping with filtering and searching in the future.
  - Re-run jobs. Jobs can now be re-run with the same details.
  - Favourites. Jobs can be set as favourites, helping with filtering and searching in the future.

Administration

The following new features have been added for WPS Hub Administrators at this release:

- New configuration and installation methods:
  - The installation and configuration process has been simplified.
  - Installation packages are supplied for Microsoft Windows and Linux.
  - The Hub service on Windows now installs with a manual startup type.
  - WPS Hub now uses a YAML-formatted file for configuration. Post-installation configuration can be made through the WPS Hub portal, or by editing the configuration file.
  - The configuration file can now be specified using an environment variable.
- Changes to licence application:
  - The WPS Hub licence key can now either be placed in the WPS Hub installation folders or the location specified in the WPS Hub configuration file.
- Flexible LDAP support:
  - LDAP queries can now be configured to find users and groups in the directory.
- Hub permissions controlled by access roles:
  - New *User* and *Portal User* roles have been added to control access permissions.
  - The *HubUsers* and *HubAdministrators* groups no longer control access permissions.
  - Users imported from LDAP are no longer automatically added to the *HubUsers* group.

- New keys have been added to the Hub configuration file as follows:
  - A new `E-mail` settings group has been added to the configuration file. These settings are used for licence expiry e-mails and e-mail notifications from asynchronous job triggers. Secondary keys are as follows:
    - `fromAddress`: The email address to use for the "from" field. Defaults to user@hostname.
    - `listID`: If `useListID` is set to true, this specifies the List-ID to include.
    - `smtpServer`: The location of the SMTP server to use to send emails.
    - `smtpPort`: The port number for the SMTP service.
    - `useListID`: Whether a List-ID header is included in the email.
  - `Bootstrap` has the following new keys:
    - `adminEmail`: Email address for the WPS Hub admin user.
    - `createDeploymentServicesEnvironments`: Create the default Deployment Services environments during the bootstrap process.
    - `createOndemandExamples`: Create the example Deployment Services Environment and Examples during bootstrap.
    - `createRoleGroups`: Create a group corresponding to each of the installation supplied roles during bootstrap.
    - `createDemoArtifactRepositories`: Create the default Deployment Services Artifact Repositories during bootstrap.
  - `Hostmonitor` has the following new keys:
    - `coreThreadPoolSize`: The core number of threads in monitoring thread pool.
    - `maxThreadPoolSize`: The maximum number of threads in monitoring thread pool.
  - `Licence` has the following new keys:
    - `key`: The text of the licence key.
    - `expiryWarning`: Number of days before expiry when the warning notifications will start.
  - `Ondemandclient` has the following new key:
    - `timeout`: The maximum time allowed for requests to ondemand runtime servers.
  - `Packagemanager` has the following new keys:
    - `monitorFrequency`: The interval, in seconds, at which WPS Hub checks whether external program packages have been checked out on the file system.
    - `transportTimeout`: The maximum timeout for input and output operations to and from external git repositories.
    - `shutdownTimeout`: The maximum time allowed for asynchronous git operations to complete after a graceful shutdown is initiated.
    - `allowInternalProgramPackages`: Specifies whether the creation of Internally hosted Program Packages is permitted.
  - `Portal` has the following new key:

  - `portalURL`: The URL of the WPS Hub web portal, to be used when constructing links in automatically generated e-mails.

- `Userpasswords` has the following new key:

  - `hashAlgorithm`: The algorithm used to hash the passwords when a password is not already hashed.

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The phrases "program", "SAS program", and "SAS language program" used in this document are used to refer to programs written in the SAS language. These may also be referred to as "scripts", "SAS scripts", or "SAS language scripts".

The phrases "IML", "IML language", "IML syntax", "Interactive Matrix Language", and "language of IML" used in this document are used to refer to the computer programming language often referred to in any of these ways.

WPS includes software developed by third parties. More information can be found in the THANKS or acknowledgments.txt file included in the WPS installation.