

# > Powerful Programming Options for Users and Developers

The PASW Statistics Programmability Extension\* dramatically increases the power, capabilities, and usability of PASW® Statistics\*. Developers and end users can use this feature to extend the command syntax language, introduce additional statistical functionality, and access the PASW Statistics engine from external applications.

The PASW Statistics Programmability Extension enables your organization to extend PASW Statistics with external programming languages such as Python®, R, and the .NET version of Microsoft® Visual Basic®. It also allows external applications to access the PASW Statistics Processor and draw upon its vast wealth of functionality.

With the PASW Statistics Programmability Extension, you can:

- Use external programming languages from within the PASW Statistics command syntax by using the BEGIN PROGRAM and END PROGRAM commands
  - The external language for which you have installed integration support is invoked via BEGIN PROGRAM
  - Statements between BEGIN PROGRAM and END PROGRAM are written in the external programming language you have chosen, and are executed entirely by the external language's processor
  - Different supported languages can be called in separate programs within command syntax
- Gain programmatic access to the PASW Statistics analytical engine through an application program interface (API). APIs provide programs with:
  - Direct access to the active dataset's variables, variable properties and attributes (name, format, labels, measurement level, type, and user-defined attributes), case count, and case data
  - Access to an in-memory, XML version of the data dictionary and procedure output
  - An XPath evaluation engine that allows access to and navigation of the in-memory XML workspace
  - A method for queuing and executing command syntax
  - Direct access to the last error code and message
- Develop your own procedures — including those for statistical analyses not included in PASW Statistics
  - Define new syntax in PASW Statistics style via an XML schema and have PASW Statistics handle parsing and error checking
  - The procedure can send results into an PASW Statistics pivot table or into text blocks—essentially extending the analytical capabilities of PASW Statistics

- Obtain server-side scripting through external languages
  - An open extension to the PASW Statistics backend enables you to write code using suitable external programming languages and include the code within production syntax jobs
  - Scripts execute at the location of your PASW Statistics processor. Depending on the type of system you are using, your scripts will execute on either the client or the server. If you execute scripts on PASW® Statistics Server\*, you can perform operations previously available only through client-side scripting.

### Programming capabilities

Combining backend processor APIs with an external programming or scripting language opens up a limitless set of new possibilities from within syntax jobs.

For example, use the PASW Statistics Programmability Extension to control the flow of your command syntax jobs through conditional execution control statements (such as “If/Then/Else”) and looping control statements (such as “For” and “While”) found in the external programming language’s syntax.

Use scripts written in external programming languages to conditionally execute or make decisions about which syntax is executed based on a particular condition, such as:

- The value of the variable attributes in the data dictionary
- Values in the output
- Values in the active dataset
- Error-level return codes from PASW Statistics procedures

In short, you can create reusable code that speeds the process of turning data into decisions.

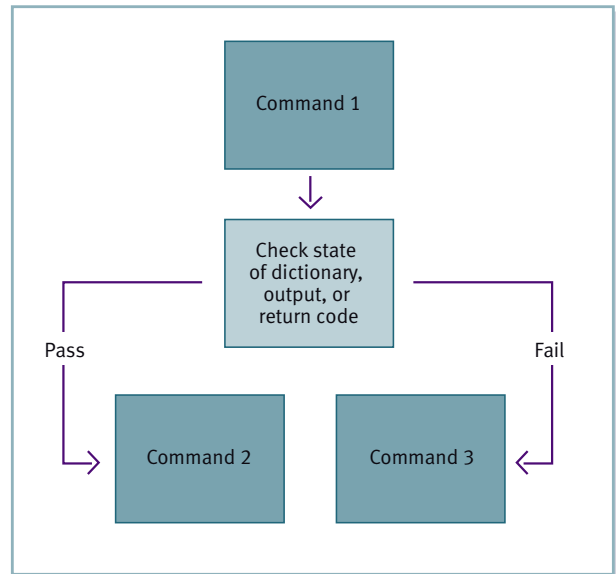
Additionally, take advantage of all your external programming language’s non-PASW Statistics-related capabilities in your scripts. For example, have a production job trigger an e-mail notification once your job has successfully completed.

\* PASW Statistics Programmability Extension, PASW Statistics, and PASW Statistics Server, formerly called SPSS Programmability Extension, SPSS Statistics, and SPSS Statistics Server, are part of SPSS Inc.’s Predictive Analytics Software portfolio.

### Benefits

- Extend PASW Statistics functionality. The PASW Statistics Programmability Extension enables you to add functionality not included in PASW Statistics Modules.
- Write generalized and more flexible jobs. Create generalized jobs by controlling logic based on the Variable Dictionary, procedure output (XML or datasets), case data, and environment. Reusable code means data are not tied to a single program.
- Handle errors with generated exceptions. The PASW Statistics Programmability Extension makes it easy to check whether a long syntax job worked.
- React to results and metadata
- Build PASW Statistics functionality into other applications

### PASW Statistics Syntax Job Flow



Control the flow of your PASW Statistics syntax jobs. In this example, command 1 is executed. Then, if the dictionary, output, or return code passes, command 2 is performed. If it fails, command 3 is performed instead.

### Take advantage of procedures created and shared by other users through SPSS Developer Central

#### How to get started—integration plug-ins

Since the PASW Statistics Programmability Extension is included with PASW Statistics, you can get started quickly. PASW Statistics Programmability Integration Plug-Ins are available online at SPSS Developer Central, [www.spss.com/devcentral](http://www.spss.com/devcentral). This allows you to take advantage of this advanced programmability functionality immediately.

A PASW Statistics Programmability Integration Plug-In provides the crucial link and configuration instructions that enable a syntax job to take advantage of a specific external programming language or dynamic link library (DLL).

Also available for download is the PASW Statistics Programmability Extension SDK. This provides software developers with the information needed to develop a PASW Statistics Programmability Integration Plug-In for a programming language's use with the PASW Statistics Programmability Extension. In addition to providing documentation for creating a new plug-in, it includes the full source code for the example PASW Statistics-Python Integration Plug-In.

New Programmability Integration Plug-Ins are being developed by SPSS Inc., and will be available to download at SPSS Developer Central as soon as they are ready.

#### ***PASW Statistics-Python Integration Plug-In***

The PASW Statistics-Python Integration Plug-In is a complete, freeware example plug-in for integrating the open source Python\*\* programming language with the PASW Statistics Programmability Extension.

The PASW Statistics-Python Integration Plug-In includes:

- An installer that configures itself for use with PASW Statistics
- A native Python package, which contains a library of functions that interact with the PASW Statistics backend processor API
- Complete documentation with examples

The PASW Statistics-Python Integration Plug-In enables you to use the BEGIN PROGRAM and END PROGRAM syntax commands to extend syntax with Python programming. You can also use this plug-in to access and drive the PASW Statistics backend processor from an external application.

Before installing the PASW Statistics-Python Integration Plug-In, you will need to install Python. The version of Python recommended for your version of PASW Statistics is included with your PASW Statistics software.

#### ***PASW Statistics-.NET Integration Plug-In***

The PASW Statistics-.NET Integration Plug-In is a complete, freeware example plug-in for integrating the .NET\*\*\* version of Microsoft Visual Basic with the PASW Statistics Programmability Extension.

The PASW Statistics-.NET Integration Plug-In includes:

- An installer that configures itself for use with PASW Statistics
- A native .NET package, which contains a library of functions that interact with the PASW Statistics backend processor API
- Complete documentation with examples

The PASW Statistics-.NET Integration Plug-In allows you to drive the PASW Statistics analytical engine from an external application.

Before installing the PASW Statistics-.NET Integration Plug-In, you will need to download and install a copy of the .NET Framework from the Microsoft Download Center at [www.microsoft.com/downloads](http://www.microsoft.com/downloads).

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### **PASW Statistics-R Integration Plug-In**

The PASW Statistics-R Integration Plug-In is a complete, freeware example plug-in for integrating the R<sup>†</sup> programming language with the PASW Statistics Programmability Extension.

The PASW Statistics-R Integration Plug-In includes:

- An installer that configures itself for use with PASW Statistics
- An integrated R package, which contains a library of functions that interact with the PASW Statistics backend processor API
- Complete documentation with examples

The PASW Statistics-R Integration Plug-In enables you to use the BEGIN PROGRAM and END PROGRAM syntax commands to extend syntax with R programming.

Before installing the PASW Statistics-R Integration Plug-In, you will need to download and install a copy of the R language from [www.r-project.org](http://www.r-project.org).

### **Create user-defined procedures**

Extend the functionality of PASW Statistics by creating user-defined procedures for specific statistical applications.

Using the Custom Dialog Builder in combination with the PASW Statistics Programmability Extension enables you to:

- Build customized user interfaces to support algorithms written in Python or R
- Add those custom interfaces to your menu system, where they can be accessed by other users

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### **SPSS Developer Central**

SPSS Developer Central can be found at [www.spss.com/devcentral](http://www.spss.com/devcentral). It is the online resource for end users and software developers interested in PASW Statistics-related programming and development. From this Web site, you can download programmability extensions and sample code, access forums and participate in discussions on programmability practices, and read in-depth articles on PASW Statistics programmability topics.

At SPSS Developer Central, you'll also find many example libraries and syntax jobs for use with plug-ins such as the PASW Statistics-Python Integration Plug-In. Some examples of Python resources include:

- Functions for simplifying the calls to the PASW Statistics backend processor for common tasks
- Functions for working with the PASW Statistics Viewer
- Bootstrap regression
- Poisson regression

Another great resource for programmability in PASW Statistics is *SPSS Programming and Data Management: A Guide for SPSS and SAS® Users*. This book documents the wealth of functionality beneath the PASW Statistics user interface. It includes detailed examples of command syntax, the Output Management System (OMS), and extending command syntax with the Python® programming language.

For information on how to obtain a copy of this guide, visit [www.spss.com/statistics/base/data\\_management\\_book.htm](http://www.spss.com/statistics/base/data_management_book.htm).



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