Powerful Programming Options for SPSS Users and Developers

The SPSS Programmability Extension dramatically increases the power, capabilities, and usability of SPSS Base and modules. Developers and end-users can use this feature to extend the SPSS command syntax language, introduce additional statistical functionality, and access the SPSS engine from external applications.

The SPSS Programmability Extension enables your organization to extend SPSS with external programming languages, such as Python®, R and the .NET version of Microsoft® Visual Basic®. It also allows external applications to access the SPSS Processor and draw upon its vast wealth of functionality. Introduced in SPSS 14.0.2, the SPSS Programmability Extension, enhanced in SPSS 16.0, is included with SPSS Base—making SPSS a very powerful solution for statisticians and developers.

With the SPSS Programmability Extension, you can:

- Use external programming languages from within the SPSS 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 SPSS command syntax
- Gain programmatic access to the SPSS 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 SPSS command syntax
  - Direct access to the last error code and message
- Develop your own procedures—including those for statistical analyses not included in SPSS
  - Define new syntax in SPSS style via an XML schema and have SPSS handle parsing and error checking
  - The procedure can send results into an SPSS pivot table or into text blocks—essentially extending the analytical capabilities of SPSS

- Obtain server-side scripting through external languages
  – An open extension to the SPSS backend enables you to write code using suitable external programming languages and include the code within SPSS production syntax jobs
– Scripts execute at the location of your SPSS 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 SPSS 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 SPSS syntax jobs.

For example, use the SPSS Programmability Extension to control the flow of your SPSS 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 SPSS 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-SPSS-related capabilities in your scripts. For example, have a production job trigger an e-mail notification once your job has successfully completed.

Benefits
- Extend SPSS functionality. The SPSS Programmability Extension enables you to add functionality not included in SPSS.
- 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 is not tied to a single program.
- Handle errors with generated exceptions. The SPSS Programmability Extension makes it easy to check whether a long syntax job worked. Hundreds of standard modules for Python are available.
- React to results and metadata
- Build SPSS functionality into other applications

■ SPSS Syntax Job Flow
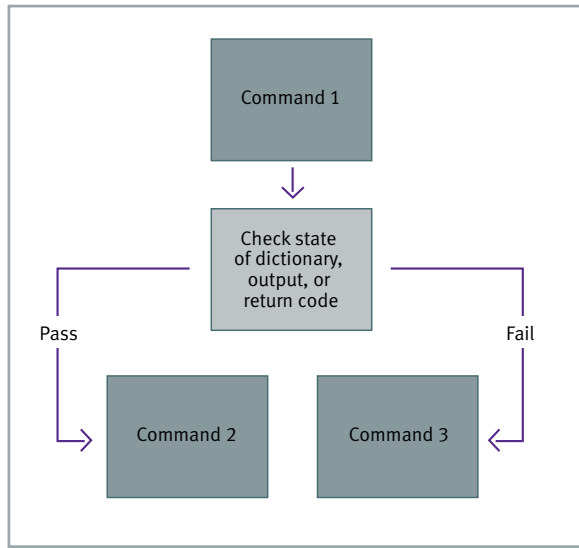
Control the flow of your SPSS syntax jobs. In this example, command 1 is executed. Then if the dictionary, output, or return code passes, command 2 is performed. If it fails, then command 3 is performed instead.

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

How to get started–integration plug-ins
Since the SPSS Programmability Extension is included with SPSS Base 16.0, you can get started quickly. SPSS Programmability Integration Plug-Ins are available online

at SPSS Developer Central www.spss.com/devcentral/, allowing you to take advantage of this advanced programmability functionality immediately.

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

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

SPSS-Python Integration Plug-In

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

The SPSS-Python Integration Plug-In includes:
- An installer that configures itself for use with SPSS
- A native Python package, which contains a library of functions that interact with the SPSS backend processor API
- Complete documentation with examples

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

Before installing the SPSS-Python Integration Plug-In, you will need to install Python. The version of Python recommended for your version of SPSS is included on the SPSS installation CD.

SPSS-.NET Integration Plug-In

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

The SPSS-.NET Integration Plug-In includes:
- An installer that configures itself for use with SPSS
- A native .NET package, which contains a library of functions that interact with the SPSS backend processor API
- Complete documentation with examples

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

Before installing the SPSS-.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.**

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SPSS-R Integration Plug-In

The SPSS-R Integration Plug-In is a complete, freeware example plug-in for integrating the R*** programming language with the SPSS Programmability Extension

The SPSS-R Integration Plug-In includes:

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

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

Before installing the SPSS-R Integration Plug-In, you will need to download and install a copy of the R language from **www.r-project.org/.**

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SPSS Developer Central

SPSS Developer Central can be found at www.spss.com/devcentral/. It is the online resource for end users and software developers interested in SPSS-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 SPSS programmability topics.

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

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

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