

# Base SAS® Software

Flexible and extensible fourth-generation programming language designed for data access, transformation and reporting



Many IT organizations struggle with problems arising from complex and distributed data, spending excessive time synchronizing and reformatting data for various applications. Producing accurate and visually appealing reports often requires disproportionate programming resources. Additionally, IT often must manage a plethora of software packages that only support a specific demand.

To streamline and expedite programming tasks, reduce costs and produce the analyses and reports that decision makers need, organizations turn to SAS. As a foundational product of the SAS Platform, Base SAS is used by industries worldwide that rely on it for data access, transformations and reporting. Addressing data questions with reliable Base SAS code, while supporting new business requirements with one tool, enables more effective use of your existing hardware resources and staff skills.

Base SAS software optimizes all hardware resources and scales across different infrastructure environments. Numerous components are available for additional

## What does Base SAS® software do?

Base SAS is a fourth-generation programming language (4GL) for data access, data transformation, analysis and reporting. It is included with the SAS Platform. Base SAS is designed for foundational data manipulation, information storage and retrieval, descriptive statistics and report writing. It also includes a powerful macro facility that reduces programming time and maintenance headaches.

## Why is Base SAS® software important?

Base SAS runs on all major operating systems. It significantly reduces programming and maintenance time, while enabling your IT organization to produce the analyses and reports that decision makers need in the format they prefer.

## For whom is Base SAS® software designed?

Base SAS is used by SAS programming experts and power users who prefer to code to manipulate data, produce and distribute ad hoc queries and reports, and/or interpret the results of descriptive data analysis.

functionality, including direct access to standardized data sources and advanced statistical analysis.

## Key Benefits

- Integrate data across environments.** Available with the SAS Platform, Base SAS integrates into any computing environment infrastructure, unifying computing efforts to provide a single view of your data.
- Read, format and analyze any data.** From small data issues to large and complex data problems, programmers can quickly read, format and report on data in any format.
- Make programming fast and easy.** With its intuitive, easy-to-learn and easy-to-use programming language, Base SAS significantly reduces the amount of code required to deliver information, increasing your programmers' productivity.
- Extend the ease of SAS to more users.** Python programmers can access and execute Base SAS capabilities via their
- familiar Python interface using the SAS pipefitter package, fostering consistency of code in the organization.
- Simplify reporting and delivery to mobile devices.** Base SAS provides maximum reporting flexibility. Easily create reports in formats such as RTF, PDF, Microsoft PowerPoint, HTML and e-books that can be read on many devices.
- Incorporate Hadoop capabilities into SAS applications.** Using Base SAS, you can not only incorporate Hadoop capabilities such as the Pig and Hive languages and MapReduce framework, you can also apply them across all SAS products and solutions.
- Access industry-standard data security.** SAS/SECURE™ is delivered as part of Base SAS 9.4 and provides access to industry-standard data encryption, including the Advanced Encryption Standard (AES), enabling you to encrypt SAS data on disks.

## Product Overview

### Intuitive fourth-generation programming language

Base SAS provides a highly flexible and extensible 4GL. Easy-to-learn syntax and hundreds of language elements and functions support programming everything from data extraction, formatting and cleansing to reporting and information delivery.

### A rich library of prewritten, ready-to-use integrated procedures

Prewritten SAS procedures handle many common tasks, including data manipulation and management, information storage and retrieval, and report writing. They encapsulate and deliver significant functionality that can be executed with just a few simple commands, so programmers can be more efficient and productive.

### Powerful data analysis tools

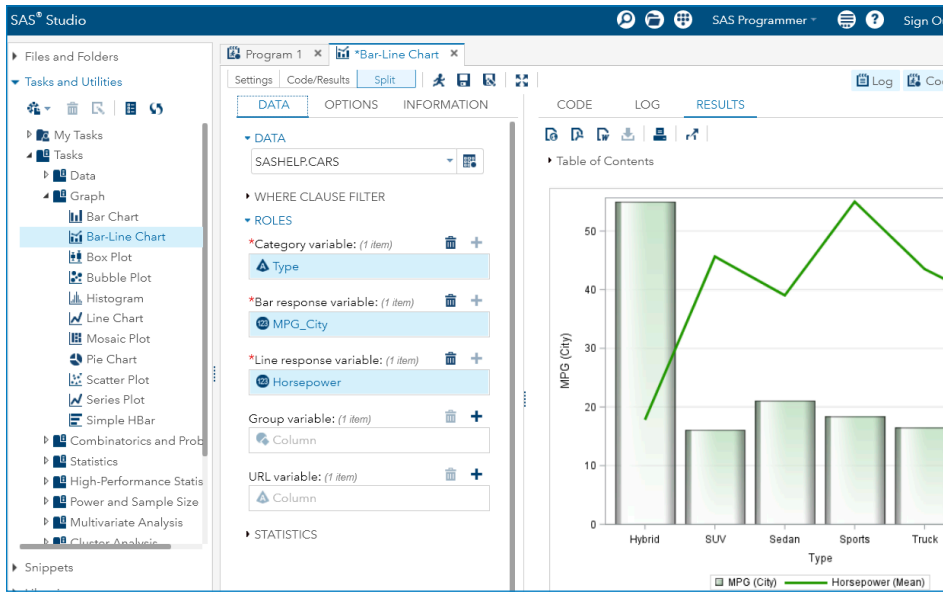
Base SAS can be used for a wide variety of tasks - from deriving simple descriptive statistics to more advanced data correlation, cross-correlation and detailed data distribution analysis.

### SAS® macro facility

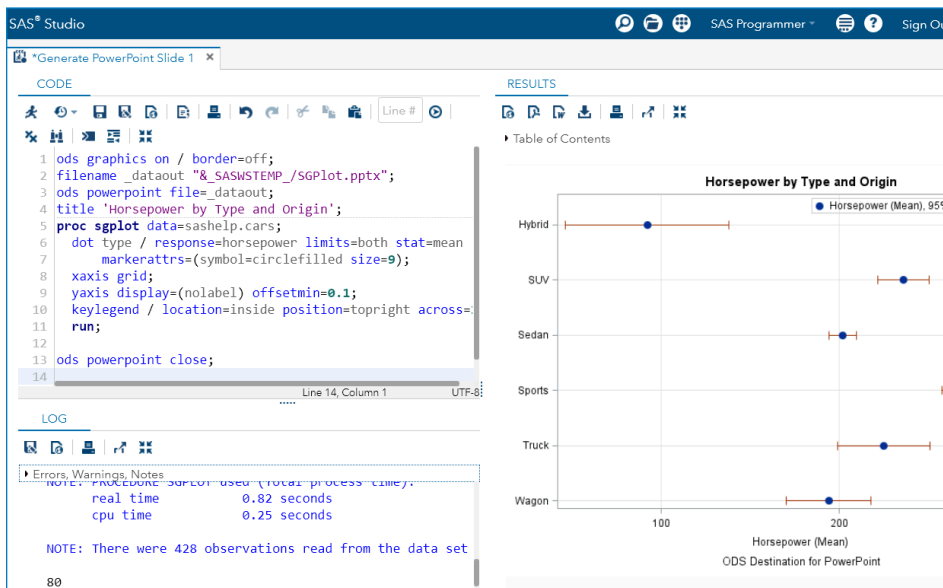
Included with the Base SAS programming language, the SAS macro facility lets you build parameter-driven executables to customize common tasks for use across the organization. With the macro facility, you encapsulate small or large amounts of text into units with names and then work with the names rather than the longer text. Development staff can modularize its work for easy reuse and maintenance.

### Powerful, in-database processing

Some of the most widely used Base SAS procedures now support SQL push-down capabilities. SAS format catalogs also can be published and compiled inside databases to minimize data movement, allowing formats to be applied to the actual data values during query execution. Threaded, parallel processing is enabled within Base SAS, as well as support for ANSI-standard SQL syntax. These capabilities work with SAS data management products, such as SAS In-Database Code Accelerator, to push code to the data.



SAS Studio, a part of Base SAS, provides a web-based programming interface for data transformation, analysis and reporting.



You can produce powerful graphics and easily integrate them into your Microsoft Office applications.

### Cross-platform and multiple-platform support

With MultiVendor Architecture™, Base SAS runs on all major computing platforms, can access virtually any data source and easily integrates into any organization's computing environment. SAS code developed on one platform is portable and runs easily on others.

## Output Delivery System (ODS)

ODS, included with Base SAS, is ideal for data capture, report formatting and information delivery. It offers an almost limitless number of choices for reporting and displaying analytical results, with a wide variety of output formats and destinations. While providing an array of options for customizing the output, ODS takes care of arranging the output in the form most appropriate for the chosen format. Programmers can create and deliver accurate and visually appealing reports in less time with reduced effort. With ODS statistical graphics, a statistical procedure generates appropriate graphical displays for its analyses by default.

## Industry-standard data encryption

SAS/SECURE software is now included with Base SAS 9.4, and is available to countries where encryption technologies can be legally distributed. The AES algorithm is included, enabling you to encrypt SAS data on disks.

## Key Features

### Flexible 4GL

- Intuitive 4GL with easy-to-learn syntax.
- Access Base SAS from a familiar Python interface. The SAS pipefitter package provides a Python API for developing pipelines - translating and executing SAS code behind the scenes. The pipefitter package is available as a free download from GitHub at: <https://github.com/sassoftware/python-pipefitter>.
- SAS macro facility reduces coding for common tasks and lets you modularize work for easy reuse and maintenance.
- Runs interactively or in batch mode, and code is portable across different IT environments.
- DS2, another SAS programming language, ships with the SAS Platform. It lets you perform data manipulation inside databases to reduce data movement and improve performance.
- Checkpoint and restart capabilities allow users to resubmit a failed program in restart mode to complete execution, resuming with the step that did not complete when the failure occurred.

### Support for a wide and powerful range of formats and data manipulations

- Ability to read data in any format, from any file type, including variable-length records, binary files, free-formatted data and even files with messy or missing data.
- Support for Structured Query Language (SQL).
- XML engine imports and exports a wide variety of XML documents. A drag-and-drop interface creates XML maps.
- A library of prewritten programming procedures speeds up managing, analyzing and presenting data.
- Analysis capabilities - ranging from simple descriptive statistics to advanced data correlations - for interrogating data.
- Geographic data manipulation procedures, including GEOCODE, GPROJECT and MAPIMPORT, are now included with Base SAS.
- Globalization with full support for the most widely used character encodings (such as Latin1, Latin2 and multiple-byte character sets for Hebrew, Arabic and Asian languages).
- Unicode support so that SAS works with data in multiple languages on all platforms.

### Performance and scalability

- Parallel I/O optimization lets you work with huge data volumes in a timely manner. Data can be partitioned across devices for faster access but referenced as a single data set.
- Parallel index creation reduces time needed to create large data sets with multiple indexes or to append data to existing data sets.
- Support for Pig, MapReduce and HDFS commands from the SAS execution environment.
- Supports external file references from within any SAS component. Delimiters are externalized, making it easy to work with Hadoop files. Key SAS procedures are multithreaded for faster execution of standard tasks, such as sorting and data summarization.
- Several Base SAS procedures support SQL push-down optimization to Aster Data, Pivotal Greenplum Database, DB2, IBM Netezza, Oracle and Teradata.
- SAS format catalogs can be published and compiled inside databases (Aster Data, Pivotal Greenplum Database, DB2, IBM Netezza, Oracle and Teradata) so that formats can be applied to the actual data values during query execution.

TO LEARN MORE »

Base SAS takes advantage of the SAS®9 engine, part of the SAS Platform. Many SAS procedures have been enhanced so code launched from SAS®9 can run in SAS® Viya™, the latest extension of the SAS Platform. SAS Viya enhances the SAS Platform with high availability, faster in-memory processing, image data types and native cloud support. For more information, visit [sas.com/platform](https://sas.com/platform).

To learn more about Base SAS system requirements, download white papers, view screenshots and see other related material, please visit [sas.com/basesas](https://sas.com/basesas).

## Key Features (continued)

### Interoperability and multiple-platform deployment

- MultiVendor Architecture allows programs to be written once and run anywhere, regardless of hardware or operating system.
- Can execute Apache Groovy code on the Java Virtual Machine.
- Cross-environment data access provides easy-to-access files across a network.

### Flexible report output formats

- ODS provides choices for reporting and displaying analytical results.
- High-quality graphics are included in Base SAS for statistical graphics, graph manipulations, creating templates, and designing and editing graphics output.
- Create reports in standard formats such as RTF, Microsoft PowerPoint and PDF. All formats are available on all platforms.
- Create reports as e-books that can be read with iBooks® on the iPad® and iPhone®.
- Create visually appealing graphics from analytical output by default (no additional programming).
- HTML 4, HTML 5 and XML are among the markup languages provided. Modify any markup language that SAS provides or create your own markup language for output. HTML is the default destination for output.
- Customize or modify output hierarchy; replay output to different destinations without rerunning the program.

### Industry-standard data encryption algorithms

- By establishing a connection between the physical data tables and the metadata, SAS ensures that security is consistently enforced, regardless of how a user requests access from SAS.
- SAS/SECURE is now delivered along with Base SAS. While a separate product, there is no additional charge to use SAS/SECURE with Base SAS under SAS 9.4.
- AES algorithm. Using this industry-standard algorithm, you can encrypt SAS data on disks. Note: Available only to countries where encryption technologies can be legally distributed.

To contact your local SAS office, please visit: [sas.com/offices](https://sas.com/offices)

