



SAS® Scoring Accelerator

High-performance model scoring and deployment with faster time to results

What does SAS® Scoring Accelerator do?

SAS Scoring Accelerator enables customers to translate scoring models created in SAS® Enterprise Miner™ and linear models created in SAS/STAT® into database-specific functions to be deployed and then executed directly within the database environment.

Why is SAS® Scoring Accelerator important?

SAS Scoring Accelerator automates model-scoring processes within the database so you can improve model-scoring performance and achieve faster time to results. It reduces excessive data movement and streamlines analytic deployment processes, enhances the productivity of analytic and IT groups, helps you better manage, provision and govern data, and enables IT to more efficiently use their resources and reduce costs.

For whom is SAS® Scoring Accelerator designed?

SAS Scoring Accelerator is specifically designed for organizations that use SAS Enterprise Miner or SAS/STAT. It is for chief scoring officers and IT staff members who want to take champion models and score them directly inside a database. It is also suitable for real-time enterprise scoring needs to reduce the time to results and improve operational decision making.

Organizations today want fast answers with complete accuracy. Unfortunately, most companies simply can't aggregate, analyze and process large volumes of data quickly enough to support critical decisions that must be made in hours, minutes or seconds.

Conventional model scoring requires the transfer of data from databases back to SAS. Scores must then be bulk loaded *back* to the database. This excessive data movement and data latency creates inconsistent data and problems with data governance. In addition, slow performance runtimes for analytical processing cause delays in model scoring. The inability to capture timely insights from growing volumes of data results in missed opportunities.

Unfortunately, many analysts and modelers manually code models in SQL for scoring purposes and must revalidate that code against original results. The problem is further compounded by the costly replication of data and models in production environments. Along with the resource-intensive steps of moving models into a production environment, the entire model deployment process becomes more time-consuming, costly and prone to errors.

With SAS® Scoring Accelerator, customers can publish scoring models created in SAS® Enterprise Miner™ and linear models created in SAS/STAT® into database-specific functions and exploit the parallel processing architectures of databases to achieve faster time to results. In-database scoring reduces unnecessary data movement, streamlines model deployment processes and improves the productivity for analytical professionals and IT.

Key Benefits

- **Achieve higher model-scoring performance and faster time to results.** Using in-database processing, SAS Scoring Accelerator eliminates the need to move data between SAS and the database for scoring purposes, further reducing the cost, complexity and latency of the scoring process. The performance of the entire modeling process is improved, enabling faster predictive results and competitive advantage.
- **Enhance the productivity of your data mining and IT groups.** Rather than using manual transformation and scoring steps, SAS Scoring Accelerator allows IT to automate model deployment processes. Faster deployment frees the analytics team to focus on new projects. Organizations incur fewer labor costs by avoiding manual scoring because that reduces the need to revalidate code for scoring purposes.
- **Reduce data movement and latency, and streamline analytic deployment.** In-database scoring reduces data movement and replication to streamline analytic processing. This helps organizations deliver analytics quickly while maintaining data reliability and integrity.
- **Better manage, provision and govern data.** Reducing data movement and consolidating data in a data warehouse addresses data governance and helps ensure regulatory compliance. The common security, auditing and administration features of the database help ensure that regulated data is accessed properly. In addition, by running model-scoring steps inside the database, programs can be executed in such a way that



enables detail data to be summarized and analyzed without crossing the regulatory boundary created in the database.

- **Make better use of IT resources and reduce costs.** Proper integration and efficient use of investments in data warehouse platforms, analytic software and processes result in the delivery of consistent, reliable and timely insights to decision makers. Providing operational insights in an efficient manner yields faster time to value at a reduced cost.

Product Overview

SAS Scoring Accelerator takes models that have been developed in SAS Enterprise Miner or SAS/STAT and translates them into scoring functions that can be deployed inside the database. The scoring process is performed within the database environment and thus does not require manual transfer of data.

SAS Scoring Accelerator interfaces are currently available for the following relational databases: Aster, Pivotal (previously Greenplum), IBM DB2, IBM Netezza, Oracle and Teradata.

The Export node in SAS Enterprise Miner is used to export the model into files that are ready to deploy to the database.

SAS Model Manager (in conjunction with SAS Scoring Accelerator) is used to register and publish linear models built using SAS/STAT.

There are two methods that can be used to deploy the score code files to the database (see Figures 1 and 2).

You can publish and compile a vendor-defined function (VDF); or you can register a DS2 program (a new SAS

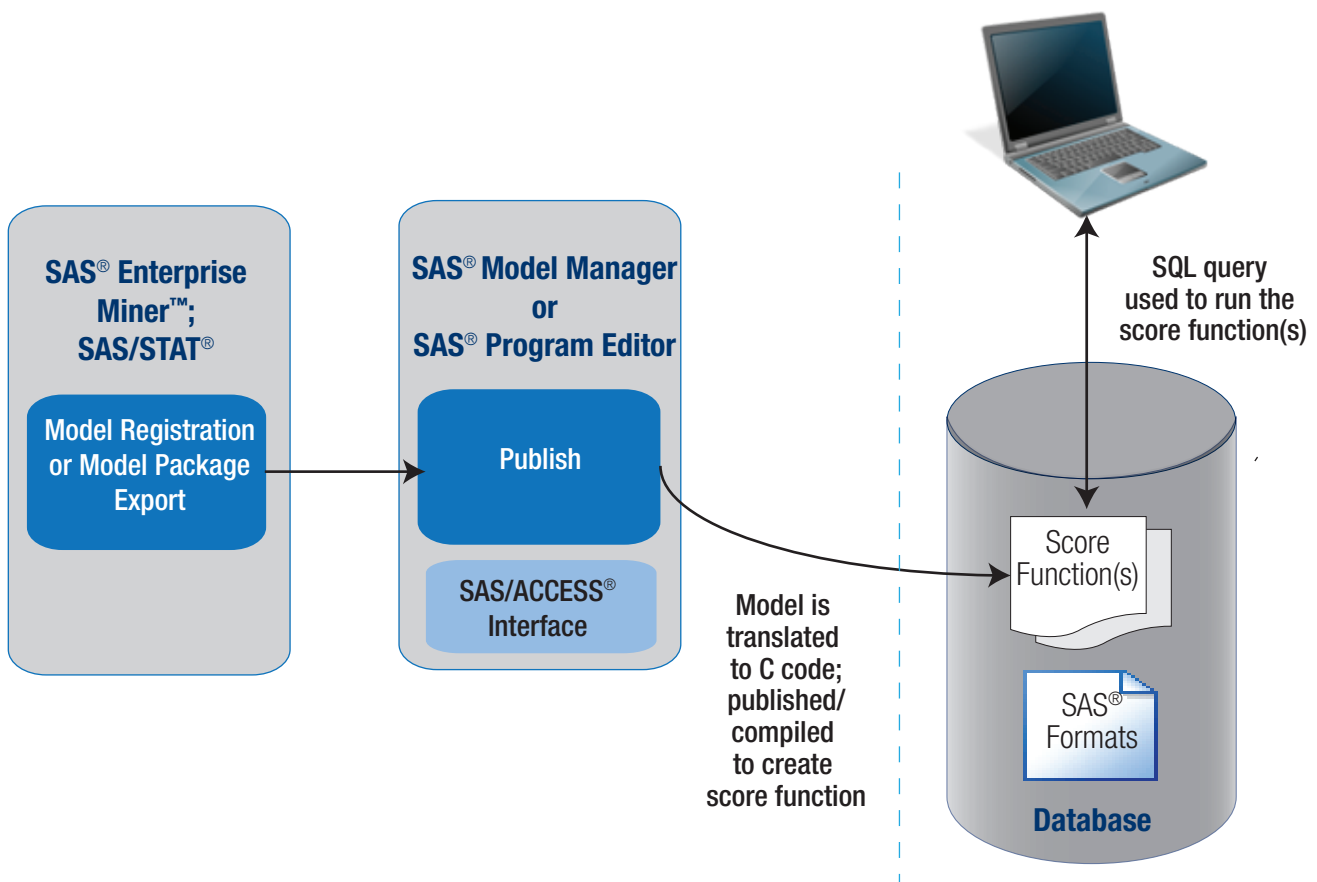


Figure 1: SAS Scoring Accelerator uses vendor-defined functions to deploy score code files to the database.

proprietary programming language) to the database to execute using the SAS Embedded Process. The SAS Embedded Process is a new run-time environment for processing DS2 code.

The VDF method is available for DB2, Pivotal Greenplum Database, IBM Netezza and Teradata. The embedded process method is available for DB2, IBM Netezza, Teradata, Aster Data, Oracle and Pivotal Greenplum Database.

By moving the scoring function to the database, any security “envelope” used by the database is honored. This requires less movement of data, provides better use of the enterprise data

warehouse stored in the database and reduces overall costs.

SAS Scoring Accelerator has three key components:

- The SAS format library is an XML file that is deployed once to the database system.
- The Score Export node functions as a plug-in to SAS Enterprise Miner. It exports the model-scoring logic, including metadata about the required input and output variables.
- The publishing client pushes the scoring function into the database. Once the VDF or DS2 program is available inside the database, a SQL expression is used to execute the score.

In addition, SAS Model Manager is available as an add-on to SAS Scoring Accelerator. It provides an analytic model management and deployment environment that is fully integrated with SAS Scoring Accelerator (using either VDF or the SAS Embedded Process).

Using SAS Model Manager together with SAS Scoring Accelerator streamlines the registration, validation and scoring of SAS models in database. Note: SAS Model Manager is required for customers who want to publish SAS/STAT linear models inside the database using SAS Scoring Accelerator and is optional for those using SAS Enterprise Miner.

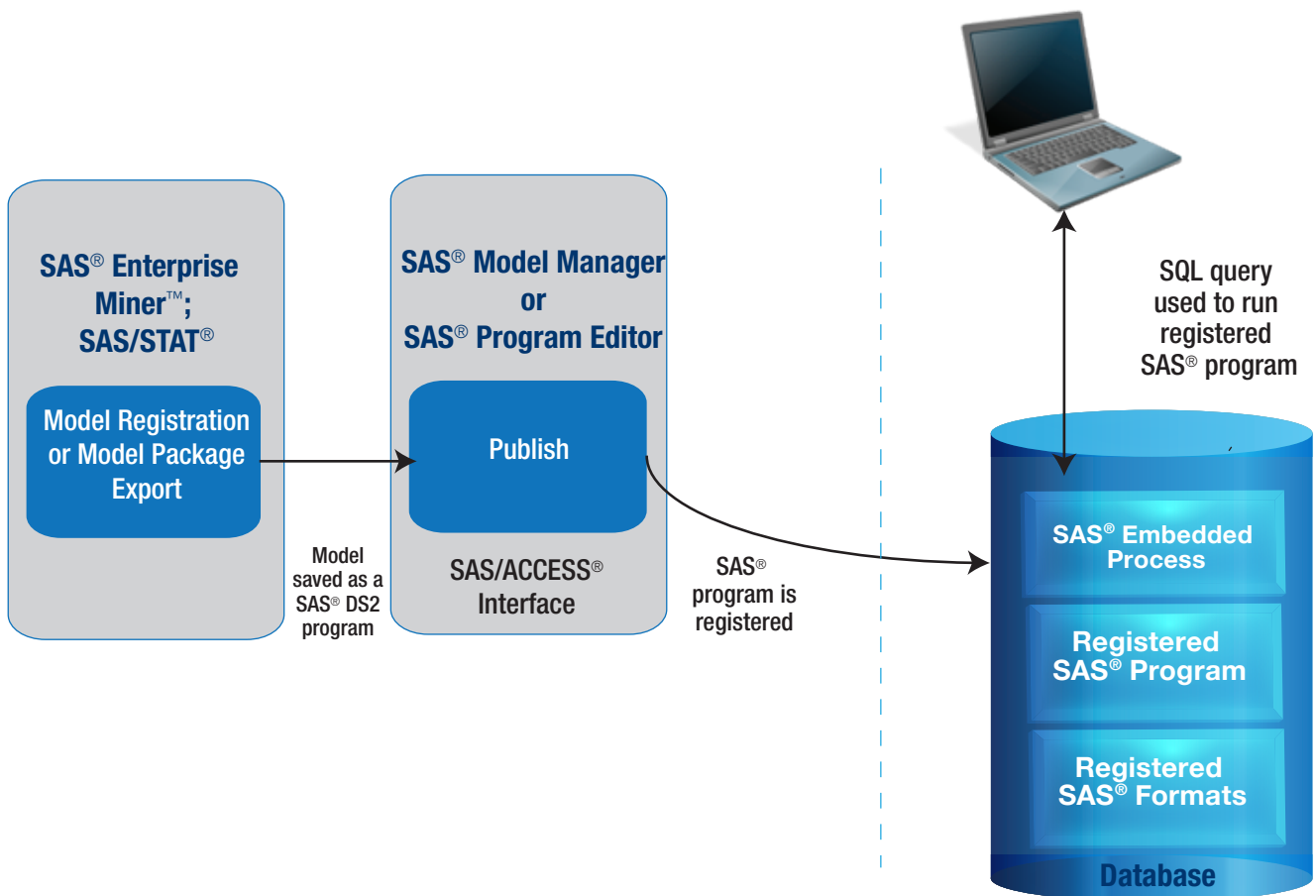


Figure 2: SAS Scoring Accelerator uses the SAS Embedded Process to deploy score code files to the database.

Key Features

SAS® format library

- File that is deployed once to the database system.

SAS® Enterprise Miner™ Score Export node

- Automatically included in your SAS Enterprise Miner installation for adding to your process flow diagram analyses.
- Exports the model-scoring logic, including metadata about the required input and output variables.
- Generates sample training and a scoring data set for testing.

Register SAS/STAT® linear models to SAS® Model Manager

- SAS Model Manager is required to register linear models created using SAS/STAT into SAS Scoring Accelerator.
- In-database scoring for SAS/STAT is supported for EMC Greenplum, IBM DB2, IBM Netezza, Oracle and Teradata.
- Support is available for a select set of linear models created using the following procedures: LOGISTIC, GENMOD, REG, GLMSELECT, GLM, GLIMMIX and MIXED.

SAS® Scoring Accelerator publishing client

- Automatically translates and publishes the model as a scoring function or SAS DS2 program inside the database.
- Generates a script of database commands for registering the scoring function or SAS DS2 program inside the database.
- Scoring functions or SAS DS2 programs are available for use in any SQL expression wherever database-specific built-in functions are typically used.
- Publishes model as protected or unprotected.
- Supports SAS intrinsic and user-defined formats.
- Supports a robust class of SAS Enterprise Miner predictive and descriptive models, including the preliminary transformation layer (such as data imputations).
- Provides variable binning and reduction.

Integrated environment for tracking and monitoring model performance over time

- Fully integrated with SAS Model Manager (required for linear models created using SAS/STAT and optional for models created using SAS Enterprise Miner), to further streamline the registration, validation and scoring of SAS models in the database.

Databases supported

- Aster Database (only supports SAS Enterprise Miner models).
- IBM DB2.
- IBM Netezza.
- Oracle, including Exadata.
- Pivotal Greenplum Appliance.
- Teradata Enterprise Data Warehouse.

SAS® Scoring Accelerator System Requirements

To learn more about SAS Scoring Accelerator system requirements, download white papers, view screenshots and see other related material, please visit sas.com/scoringaccelerator.

In addition, for more information and system requirements for SAS Enterprise Miner, SAS/STAT, SAS Model Manager, SAS/ACCESS interfaces or other SAS products, please visit our product and solution Web pages at sas.com/products/index.html.