

SAS/C[®] Software: Changes and Enhancements, Release 7.00

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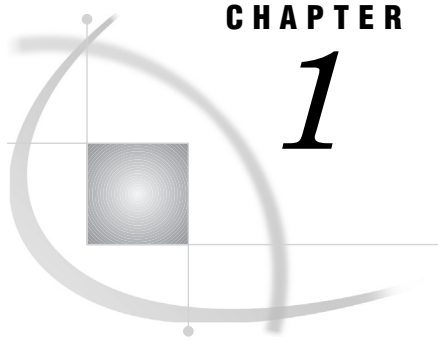
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CHAPTER

1

SAS/C and SAS/C++ Compiler Release 7.00 Changes and Enhancements

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New Features

The evolution of the SAS/C and SAS/C++ Compiler continues to reflect the development requirements of the SAS/C and SAS/C++ community, compatibility with developments in ESA/390 architecture, and adherence to the latest C and C++ standards. Release 7.00 contains new features and enhancements that are intended to meet the diverse requirements for ESA/390 software development environments. The significant new features in Release 7.00 include the following:

- Implementation of Access Register Mode (ARMODE) support in the System Programming Environment (SPE), through the use of a new pointer type called a **far pointer**.
- Implementation of the **long long** data type in accordance with the ISO ANSI/C9X standard.
- Implementation of C++ exception handling, namespace support, and a C++ standard library in accordance with the ISO ANSI/C++ standard.

The following sections highlight the new features for Release 7.00.

SAS/C Compiler and Utilities Enhancements

- Access Register Mode (ARMODE) support for SPE C programs. Access to data in a data space is enabled via an eight-byte **far pointer**. The SPE library support includes functionality to allocate and delete data spaces and various ARMODE string functions.
- Support for the **long long** data type in accordance with the ANSI/ISO C9X standard. This support includes pre-processor directives, compiler inline functions, and full library support for **long long** format specifiers for the **printf** and **scanf** family of functions. This support is implemented with a feature test macro, `_SASC_HIDE_LLLIB`. This macro, when defined, will enable existing programs that use **long long** for other purposes to compile without modification.
- SAS/C COOL Pre-linker serviceability and reliability enhancements to support C and C++ Compiler enhancements, including the following new features:

- - Promotion of unresolved extended name references from a warning to an error condition. This feature enhances the use of the existing **clet** option with a new qualifier, **noex**.
 - Implementation of a new option, **endisplaylimit**, which allows developers to control the processing for extended name cross-reference listings.
 - Implementation of new formatting for C++ extended names in the COOL extended names cross-reference listings. The feature supports new C++ features such as **namespace**, **bool**, and **wchar_t**.
 - Implementation of compression algorithms to reduce the size of executable load modules.
 - Implementation of additional validity checking and error diagnosis for input objects, archives, and output objects.

SAS/C C++ Development System Enhancements

- Support for C++ exception handling, **catch**, **try**, and **throw** specifications. This support also includes debugger enhancements to trap exceptions during the exception handling processing.
- Support for the **namespace** specifier and **using** declaration. The namespace support includes header file specification of the **std** namespace for C standard headers. Argument-dependent function name lookup is also supported.
- Enhanced compatibility with the ISO C++ standard in areas such as overload resolution, name lookup, temporary handling, and access checking.
- Enhanced template support including the following new features:
 - default arguments
 - template template formals
 - function member pointer formals
 - restricted nested templates.
- Support for the following features:
 - the **mutable**, **explicit**, **bool**, and **wchar_t** keywords
 - **operator new[]** and **operator delete[]**
 - explicit zero initialization and the {} empty initializer syntax
 - the **long long** data type
 - the **extern OS** linkage specifier.
- Integration of a standard C++ library, which includes the following functionality:
 - Standard Template Library (STL)
 - IOStream library
 - Locale facility
 - templatized string classes
 - vector, arrays, algorithms and numeric classes, as defined in the ISO/ANSI C++ standard.
- Integration of a Tools++ class library, which includes the following functionality:
 - String class library
 - Time class library
 - Expression class library.

- C++ supports the generation of ASCII character sequences with the use of the **asciout** option. This option will enable all string and character literals to be generated as ASCII characters. This option simplifies the porting of C++ applications developed for non-EBCDIC hosts, which may have source code dependencies on collating sequences. The A and E prefixes for string and character literals are also supported.
- Performance improvements for processing user-defined and system header files. The compiler automatically generates protected INCLUDE statements to prevent parsing of previously processed header files.

SAS/C Run-time Library Enhancements

- Library support for **long long** format specifiers to include the following functions:
 - **printf**
 - **sprintf**
 - **llabs**
 - **atoll**
 - **strtoll**
 - **strtoull**
 - **scanf**
 - **fscanf**
 - **sscanf**.
- SPE library support for the **far pointer** pointer type.
- Multitasking applications, which share SYSOUT data sets, may now exploit a new feature called *interleaved sysout*. This feature instructs the library to synchronize write access to these data sets and thereby prevents various operating system abends that are associated with multiple tasks trying to write to the same data set. The feature is enabled by defining the **_isysout** external variable. The feature is especially valuable for **stdout** and **stderr** when allocated to SYSOUT.
- Implementation of OS/390 eNetwork Communication Server (TCP/IP) enhancements for Integrated (UNIX System Services, USS) and non-Integrated sockets. With newer versions of OS/390, USS sockets offer improved performance and reliability versus non-USS sockets. The SAS/C Library will now automatically select USS sockets when available. Optionally, the application may choose to override the default behavior with a new environment variable, **=_SASC_SOCKIMP**.
- Serviceability enhancements to isolate and identify configuration problems associated with OS/390 eNetwork Communication Server (TCP/IP). A new run-time option, **=cnftrace**, will enable a series of diagnostic messages that will detail the files processed by the library to obtain configuration parameters.
- Implementation of USS socket functions that are supported under new versions of OS/390, including the following functions: **getclientidpid**, **givesocket_pid**, and **takesocket_pid**.
- NFS Client serviceability enhancements to isolate and identify configuration problems associated with implementation of the Cross-debugger feature. These enhancements include diagnosing SAF errors, NFS Server authorization errors, and RPC data access errors.
- Implementation of the **osfeov** function, which enables end-of-volume checking for multi-volume BSAM data sets.

- Implementation of the **ossysinfo** function, which enables the application to query an operating system for its specific version information. Access to this information is typically available only to assembler level programs.
- Implementation of the storage check function, **storck**, which enables an application to programmatically validate that library control blocks are not corrupted. This function is intended as a diagnostic tool for isolating intermittent application overlays of library and application stack and heap storage.
- SAS/C Inline Assembler implementation of the most current version of ESA/390 operations codes.
- CMS/ESA enhancements to detect and process files with Year 2000 dates, including the following functions: **cmsfcnt**, **cmsffind**, and **cmsfnext**.

Debugger Enhancements

- Support for **long long** data types, C++ templates, C++ exception handling, and C++ namespace constructs.
- Integration of the new **set search** commands and formats for specifying locations of source code, headers, and debugger files.
- Integration of the new Remote Debugger feature, which enables applications running under Batch, UNIX Systems Services, or CICS Transaction Server to be debugged from a Native TSO or CMS environment.
- Integration of the new Cross-debugging feature, which enables SAS/C and SAS/C++ developers to debug applications developed under UNIX or Windows NT while retaining all source code and debugger files on the cross-compiler host. The Cross-debugger component includes an integrated NFS Client to facilitate the exchange of data between the local and remote host.
- Support for extended name, exception handling, and namespace in a C++ Environment.
- Enhancing the online Debugger Help files to include new commands and syntax.
- Restructuring the *SAS/C Debugger User's Guide and Reference, Release 7.00*, such that emphasis is placed on task processing, to improve the ease and implementation of using the debugger in the development environment.

CICS Enhancements

- The CICS Command Language Translator supports the latest versions of CICS Transaction Server for OS/390 V1R3 and V1R2. Transaction Server support includes processing for the Application Programming Interface, System Programming Interface, and Business Transaction Services.
- The CICS Command Language Translator supports the **long long** data type.
- Implementation of the **selectecb** function under CICS run-time environments.

Your Turn

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