Application Note

ASIC-100/200 Symbol Server General Description

The ASIC Symbol Server provides a user application interface to read and write ASIC global symbols via a DLL. The interface is accessed using any programming language that has ability to make calls to a DLL.

The user application calls the Enumerate Symbols function to extract an enumerated list of symbols present in the current ASIC Symbol Map. Only global ASIC symbols in the active configuration are accessible through the Symbol Server.

The user application calls the Lookup Symbols function to get Sym handles to the ASIC symbols which are read from or written to by the user code.

The user application calls the Get Symbol Values and Set Symbol Values functions to read and write data to ASIC global symbols.

During the application development, new ASIC configuration files are occasionally activated. During ASIC configuration activation, the ASIC run-time system calls the Invalidate Symbols function to invalidate the ASIC Symbol Map. When the ASIC Symbol Map changes due to the activation of an ASIC-100/200 configuration, the Get Symbol Values and Set Symbol Values functions returns an error. At this point, the user application must call the Lookup Symbols function again to get new Sym Handles for the ASIC symbols (Lookup Symbols will return an error during configuration). If enumeration is in use, the Enumerate Symbols function should also be called again after ASIC-100/200 configuration has been activated.

Data Descriptions

Symbol Validation Data

Symbols Valid - Symbol Map valid indicator.

Current Serial Number - serial number of current Symbol Map. The serial number is incremented by one when a new version of the Symbol Map is created.

Symbol Map

Run-time map of global symbols. Symbols are mapped by ASCII name.

Symbol Pointer Table

Table of Symbol pointers, mapped by Sym Handle. This table is created during the Lookup Symbols function call.

Runtime Data Image

Map of Memory, Input and Output execution data tables.

Symbol Index

Indicates current position in the Symbol Map for symbol enumeration. The index will start at 0 and increase to the number of symbols contained in the Symbol Map.

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Application Note

Symbol Block

Returned from the Enumerate Symbols function. Contains a list of ASCII symbol names and types present in the Symbol Map.

Function Descriptions

Initialize Symbols

The ASIC Symbol Server automatically calls Initialize Symbols on startup, and the ASIC runtime system calls Initialize Symbols after configuration activation is completed. The Initialize Symbols function sets the Current Serial Number for the symbol table and sets the Symbols Valid indicator. This function obtains and stores a local copy of the pointer to the Symbol Map.

Invalidate Symbols

The ASIC run-time system calls Invalidate Symbols to notify the Symbol Server that the Symbol Map is about to become invalid. The Invalidate Symbols function clears the Symbols Valid indicator and returns an Invalidation Complete acknowledgment.

The Invalidate Symbols function automatically waits for any active Symbol Server operations to complete before proceeding.

Enumerate Symbols

The user application optionally calls the Enumerate Symbols function to extract global symbol names and types that are present in the active ASIC configuration. The Enumerate Symbols function must be called a number of times to obtain the complete list of ASIC symbol names. The Symbol Index indicates the current index for the enumeration. The new Symbol Index is passed back to the user application. When the Symbol Index is zero the enumeration begins from the start of the Symbol Map. If the Symbol Index is non zero, the Serial Number passed in must match the Current Serial Number. If they do not match an Error is returned. The Enumerate Symbols function returns the Current Serial Number of the Symbol Map and a Symbol Block. The Symbol Block contains a list of ASCII symbol names and types included in the current Symbol Map. If the Symbols Valid indicator is FALSE the function will return an error.

Types supported in version 1.0 of the ASIC Symbol Server include as follows: DWORD, REAL, STRING (ASIC DWORD, WORD, INT, and BOOL types will be mapped to DWORD).

The Enumerate Symbols function is excluded from any alterations of the Symbol Map. This may occur when new symbols are added to the Symbol Map at will (a future enhancement in ASIC-100/200).

Lookup Symbols

The user application calls the Lookup Symbols function to get Sym Handles for a list of ASCII symbols. The Lookup Symbols function looks up the ASCII symbols in the ASIC Symbol Map, creates an entry in the Symbol Pointer Table for the symbol and returns the Sym Handle (index into Symbol Pointer Table) to the caller. A list of ASCII symbol are passed into the Lookup Symbols function and a list of Sym Handles corresponding to the ASCII symbols are returned to the caller. The Current Serial Number is returned to the caller. For each Sym Handle returned, a -1 indicates

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the symbol was not found in the Symbol Map. If the Symbols Valid indicator is FALSE the function will return an error.

The Lookup Symbols function is internally automatically excluded from any alterations of the Symbol Map.

Get Symbol Values

The user application calls the Get Symbols Values function to get the current values of a list of ASIC symbols. The caller passes in a list of Sym Handles, and the current runtime values for those symbols are returned. The caller must pass in the Symbol Map Serial Number. If the Serial Number does not match the Current Serial Number the function returns an error. If the Symbols Valid indicator is FALSE the function will return an error.

For symbol values of greater size than a single CPU fetch operation (32 bits for 80X86 style processors) or values which are contained in a structure, the Get Symbol Value function protects its access to the Runtime Data Image to ensure data integrity.

Set Symbol Values

The user application calls the Set Symbol Values function to set the current values of a list of ASIC symbols. The caller passes in a list of Sym handles along with an associated list of values for those symbols. The Set Symbol Values function sets the values of the specified symbols to the new values. The caller must pass in the Symbol Map Serial Number. If the Serial Number does not match the Current Serial Number, the function returns an error. If the Symbols Valid indicator is FALSE, the function will return an error.

For symbol values of greater size than a single CPU set operation (32 bits for 80X86 style processors) or values which are contained in a structure, the Set Symbol Value function will internally protect its access to the Runtime Data Image to ensure data integrity.

Implementation Notes

The ASIC Symbol Server is implemented in a shared DLL (only one copy of the code and data will reside in memory).

All buffers that return data must be provided by the calling application and filled in by the Symbol Server. Data created by the caller must be deleted by the caller.

Only common types will be used for passing parameters between the calling application and the Symbol Server (such as DWORD, DOUBLE, LPTSTR).

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AUTOMATION

Data communications with the ASIC runtime system uses RPC, shared memory, and OLE 2.0. For symbol map access and symbol map invalidation during ASIC configuration, RPC or some similar mechanism is used. For accessing ASIC symbol values, the ASIC shared memory DLL is used. For remote data access, OLE is used as the transport mechanism (remote access is not available in version 1.0 of the Symbol Server). All of these are hidden from the user except, when using remote access, a node name is passed into the Enumerate Symbols and Lookup Symbols functions.

Serial Number — Sym Handle List — Error — ASCII Symbol List — Sym Handle List

Symbol Map → Lookup Symbols

Serial Number — Sym Handle List — Error — Value List

Get Symbol Values ← Runtime Data Image

Symbol Index — Serial Number — Symbol Index — Serial Number — Error — Symbol Block

Enumerate Symbols

Symbol Pointer Table

Set Symbol Values

Serial Number — Sym Handle List — Error — Value List

Symbol Validation Data

Invalidate Symbols — Invalidation Complete — Invalidate

Initialize Symbols — Symbols Valid — Initialize

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