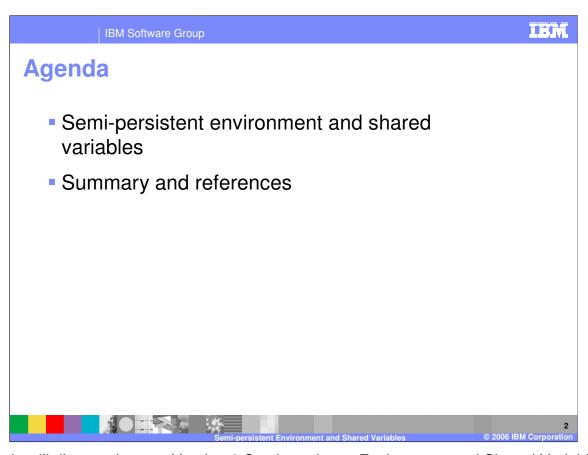


This presentation discusses Semi-persistent Environment and Shared Variables.



This topic will discuss the new Version 6 Semi-persistent Environment and Shared Variables enhancements.



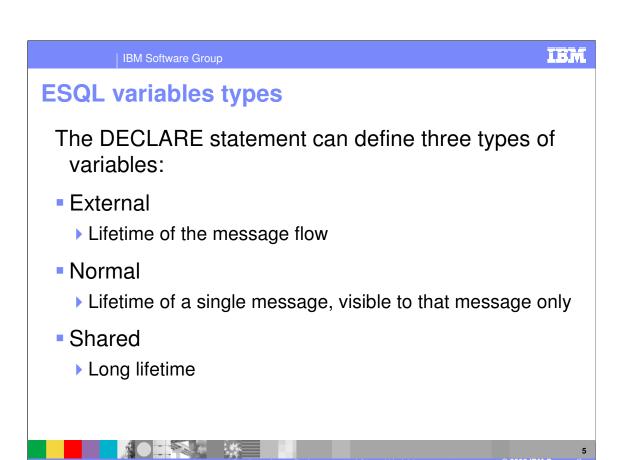
This section provides technical detail about the Version 6 Semi-persistent Environment and Shared Variables.

Semi-persistent environment

- ESQL provides data types with lifetimes longer than current message
 - Lifetime qualifier extension to current ESQL data types
- Improved performance in many scenarios
 - Static routing tables
 - Counting messages
 - Assigning sequence numbers



In previous releases, data types had a lifetime that lasted generally for the period of time that the current message was being processed in one particular node. If you wanted data types to persist longer, you were required to create your own process to do that, which might involve writing the information to a database, reducing efficiency because writing and reading a database is generally a slow process. In Version 6, a semi-persistent environment or "cache" is provided so that data types can now persist across more than one node and longer than the lifetime of the current message. This results in improved performance in many scenarios, especially since database access is not required to retrieve the values for the data types.



You can use the DECLARE statement to define three types of variables:

External

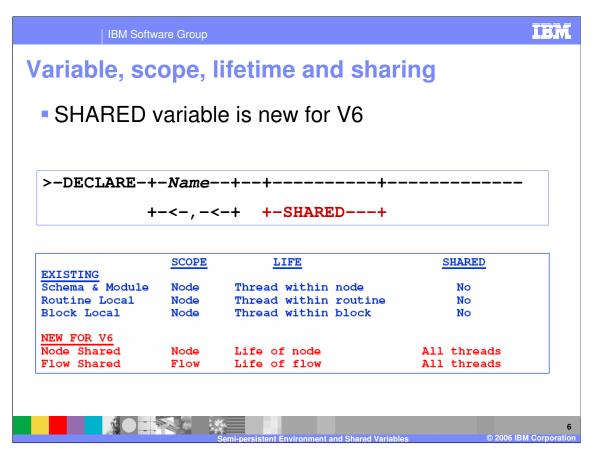
External variables, defined with the EXTERNAL keyword, are also known as *user-defined properties*, or UDPs. They exist for the entire lifetime of a message flow and are visible to all messages passing through the flow. Their initial values, optionally set by the DECLARE statement, can be modified at design time by the Message Flow editor, or at deployment time by the BAR editor. Their values cannot be modified by ESQL.

Normal

"Normal" variables have a lifetime of just one message passing through a node. They are visible to that message only. To define a "normal" variable, omit both the EXTERNAL and SHARED keywords.

Shared

Shared variables can be used to implement an in-memory cache in the message flow. Shared variables have a long lifetime and are visible to multiple messages passing through a flow. They exist for the lifetime of the execution group process, the lifetime of the flow or node, or the lifetime of the node's ESQL that declares the variable, whichever is shortest. They are initialized when the first message passes through the flow or node after each broker starts up.



The Version 6 SHARED variable uses the semi-persistent environment for storage and access of shared variable data. In the bottom portion of the diagram, you see a summary of the scope, lifetime, and thread visibility of the new SHARED variable. Where you define the variable determines whether the variable is "Node Shared" or "Flow Shared".

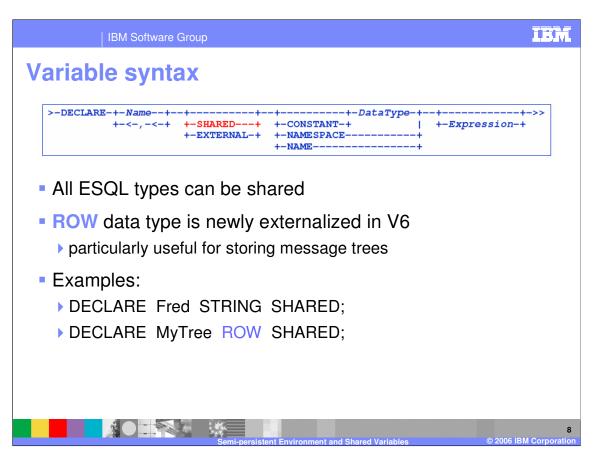
Shared variables lifetime and scope

- Lifetime according to node or flow defining variable
 - ▶ MODULE variables have node scope
 - > SCHEMA variables have flow scope
 - ▶ Flow or execution group stopping ends variable lifetime
- A shared variable is NOT shared
 - Across different schemas
 - Across different message flows



The lifetime and scope of sharing is determined by where the variable is defined. Variables defined as SHARED within modules are "Node Shared" and have node scope for all threads in that node. Variables defined as SHARED within schemas are "Flow Shared" and have flow scope for all threads and all nodes in the message flow. If the flow or execution group is stopped, the variable lifetime ends.

Shared variables are NOT shared if they are defined within different schemas, or if they are defined within different message flows, even if the different message flows are using the same schema.



This slide summarizes the "DECLARE variable" syntax with emphasis on the new functionality. If neither SHARED nor EXTERNAL is specified, the variable is a normal unshared variable. A new parameter "SHARED" is provided in V6 to define a shared variable, which is stored in the semi-persistent environment. All ESQL types can be shared.

A newly externalized ROW *DataType* is particularly useful for storing message trees, either as a normal variable or a shared variable.

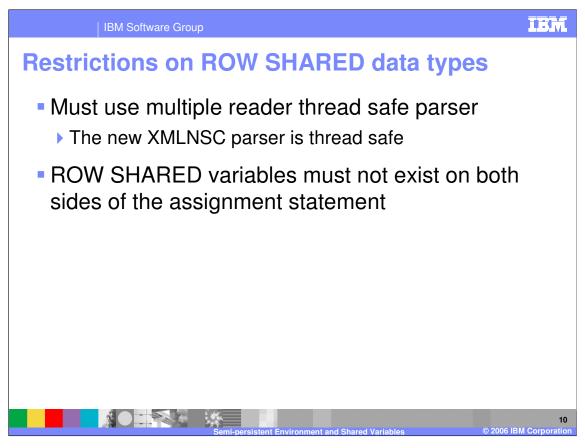
ROW variables

- ROW data type is new
 - ▶ Allows ESQL programmer to create named trees
 - Allows for very flexible data structures
- ROW operates as expected
 - Assign to other variables with data type ROW or to subtrees
 - Compare with other variables with data type ROW
 - Scalar value is root element value
- Variables with data type ROW can be SHARED



The ROW data type is new to V6. It allows you to create an entire named tree with very flexible data structures. Variables defined with the ROW data type operate as you would expect. You can assign the variable to other variables with data type ROW or to sub-trees. You can compare the variable to other variables with data type ROW. The scalar value of a variable defined with data type ROW is its root element value.

If a variable with data type ROW is defined as SHARED, its lifetime, scope and visibility is handled in the same way by the semi-persistent environment as other SHARED variables.



Shared variables with ROW data types must be parsed with a thread safe parser. The new XMLNSC parser is thread safe and can be used.

ROW SHARED variables must not exist on both sides of an assignment statement. For example, a ROW SHARED variable cannot be assigned to a ROW SHARED variable.

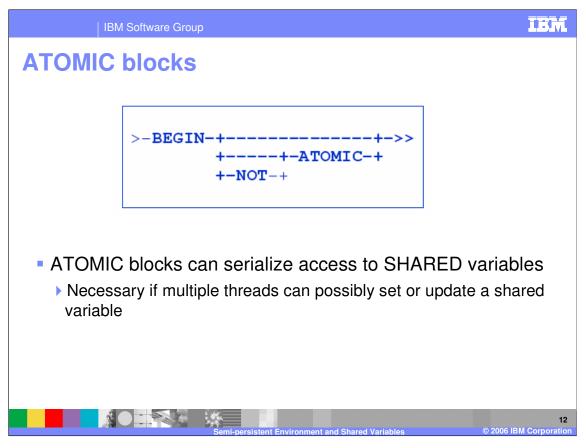
SHARED variable initialization

- MODULE initialization is declaration order in node's ESQL text
 - Initialization can refer to previous initialization
- SCHEMA initialization does not have implied order
 - Keep SHARED SCHEMA variables initialization independent

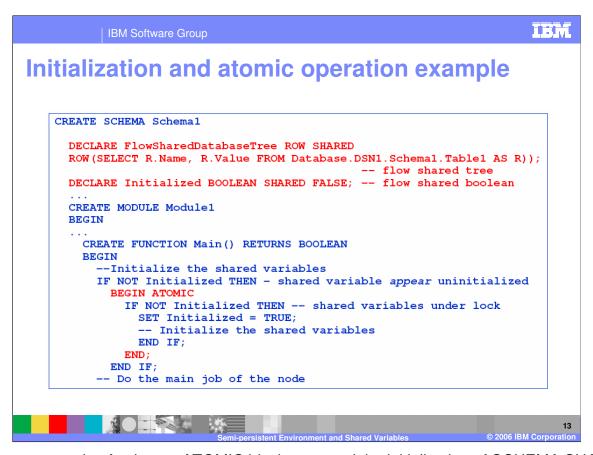


The SHARED variables defined within modules are initialized in the order in which they are declared within the node's ESQL text.

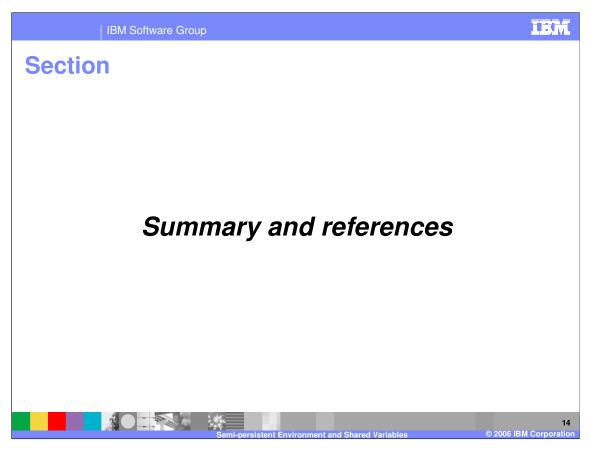
Since schema initialization has no implied order, your application design should allow for this when working with SHARED SCHEMA variables.



Because it is possible that more than one thread can be setting or updating a shared variable, you can ensure the integrity of that shared variable by using an Atomic block to enclose the code that does the set or update of the variable. An Atomic block uses a lock to ensure that only one thread runs within the block at the same time; all other threads are suspended on the lock until the lock owner exits the block. In that way, setting or updating the variable is serialized.



Here is an example of using an ATOMIC block to control the initialization of SCHEMA SHARED variables.



The last portion of the presentation contains a summary and references.

Summary

Semi-persistent environment is new for Version 6

- The scope and lifetime of a shared variable is determined by where it is defined
- All threads within a respective scope can access a shared variable
- The new ROW data type provides greater programming flexibility for message tree data
- The ATOMIC block allows you to serialize setting and updating variables



This presentation discussed the semi-persistent environment, which is new for Version 6. Shared variables use this environment for storing and controlling access to their data. The scope and lifetime of a shared variable is determined by where the variable is defined. All threads within a respective scope can access a shared variable. In Version 6, a new ROW data type was introduced which can be used within normal or shared variable definitions, providing you greater programming flexibility for message tree data. For protecting the integrity of shared variables in a multi-threaded environment, you can use the ATOMIC block within your ESQL to serializing the setting or updating of the shared variables.

References

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http://www-

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Semi-persistent Environment and Shared Variables

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