X11/96-34

MUMPS Development Committee

Extension to the MDC Standard
Type A Release of the MUMPS Development Committee

Modulo by Zero

June 1993

Produced by the MDC Subcommittee #13
Data Management and Manipulation

Thomas Salander, Chairman
MUMPS Development Committee

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The reader is hereby notified that the following MDC specification has been approved by the MUMPS Development Committee but that it may be a partial specification that relies on information appearing in many parts of the MDC Standard. This specification is dynamic in nature, and the changes reflected by this approved change may not correspond to the latest specification available.

Because of the evolutionary nature of MDC specifications, the reader is further reminded that changes are likely to occur in the specification released, herein, prior to a complete republication of the MDC Standard.

1.1 Title:

Modulo by Zero

1.2 MDC Proposer and Sponsor:

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1.3 Motion

None: This document is the final write-up and supersedes X11/SC13/93-36.

1.4 History:

April 1996	X11/96-34	Final write-up.
June 1993	X11/SC13/93-36	Proposed as MDC type 'A'. Passed (42:0:3)
February 1993	X11/SC13/93-2	Changed to reference the RMDS v4. Approved by SC13 21:0:1 as a type 'A'.
20 October 1992	X11/SC13/92-36	Passed as a SC13 type 'B'.
21 August 1992	X11/SC13/92-27	approved by MDCC-E 8:0:0
June 1992	X11/SC13/92-27	initial proposal, proposal accepted by X11/SC13/TG5 for presentation to X11/SC13 as a Type B proposal.

2. Justification of Proposed Change

2.1 Needs

In section I.4.2.1.2, Arithmetic Binary Operators, of the RMDS, the product of the modulo operator is defined only for nonzero values of its right operand. The result of using modulo with a right operand equal to zero is unspecified.

2.2 Existing Practice in Area of the Proposed Change

In DTM, DSM, MSM, ISM, and CCSM, using modulo with a right operand equal to zero produces an error condition. The result of using modulo with a right operand of zero in other MUMPS implementations is unknown.

3. Description of Proposed Change

3.1 General Description of the Proposed Change.

This document proposes changing the definition of modulo in the standard to specify that using modulo with a right operand of zero would produce an error condition with ecode = "M9".

3.2 Annotated Examples of Use

The following code would produce an error condition with ecode = "M9".

```
S X=A#0
```

3.3 Formalization

I.4.2.1.2 Arithmetic Binary Operators

Add to the end of the definition of modulo:

A value of 0 (zero) for B will produce an error condition with ecode = "M9".

The definition of modulo in section I.4.2.1.2 of the RMDS would then read as follows.

\# produces the value of the left operand modulo the right operand. It is defined only for nonzero values of its right operand, as follows.

```
A # B = A - (B * floor(A/B))
where floor(x) = the largest integer '>x.
```

A value of 0 (zero) for B will produce an error condition with ecode = "M9".

4. Implementation Impacts

4.1 Impact on Existing User Practices and Investments

None known for users of surveyed implementations.

4.2 Effect on Existing Vendor Practices and Investments

As standard error handling is incorporated into MUMPS implementations, changes will be required in the codes reported during an error condition and possibly in the algorithms for error handling. No additional changes specific to the modulo operator should be required for the surveyed implementations. The impact on implementations not surveyed is not known.

4.3 Techniques and Costs for Compliance Verification

Compliance could be verified by visual inspection of the result of using modulo with a right operand equal to zero. The cost of compliance verification is unknown.

4.4 Legal Considerations

None known.

5. Closely Related Standards Activities

5.1 Other X11 Proposals Under Consideration.

None known.

5.2 Other Related Standards Efforts

ANSI X3J
ISO committee draft

5.3 Recommendations for Coordinating Liaison

none.

6. Associated Documents

none

7. Issues, Pros and Cons, and Discussion

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Pro:
1. Consistent with other languages
2. Consistent with division
3. Resolves Ambiguity

8. Glossary

none

9. Appendix

none