OVERVIEW
SimOffice™ is a stand-alone environment in which engineers can build, test, review, and improve their designs. SimOffice gives product development engineers the shared technologies they need to assess product performance and accelerate innovation.

The MSC.Nastran™ product family is modular, enabling you to analyze products ranging from simple components to complex structures and systems. This also enables you to start simply and to grow your analysis capabilities as your Virtual Product Development (VPD) needs expand. As part of your VPD process, you can use MSC.Nastran to assess many functional aspects of your products, such as the structural response (displacement, strain, stress, vibration, and temperature) due to its material properties and the loads and boundary conditions that are applied to it during operation.

MSC.Nastran™ DMAP
The MSC.Nastran™ DMAP (Direct Matrix Abstraction Program) product module provides the ability to modify MSC.Nastran's prewritten solution sequences or to write customized solution sequences to solve specialized problems. DMAP delivers a high-level, highly-flexible, powerful programming language that allows users to expand MSC.Nastran's capabilities by writing their own applications and installing their own custom modules. DMAP has its own grammatical rules and compiler built inside of MSC.Nastran that provide matrix operations for the manipulation and creation of data blocks for use by MSC.Nastran or other programs. DMAP statements are instructions that operate on parameters (variables) and data blocks (tables and matrices) through various DMAP modules.

Example DMAP Program

Solve for matrix \( [X] \) in the following equation:

\[
[B][X] + [C] = [X]
\]

If we define \( [X_{m}] = [B][X] + [C] \),
then \( [X_{m}] \) is a solution if \( [X_{m}] - [X] \equiv [0] \).

The DMAP program will solve for \( [X_{m}] \) until the error is less than or equal to \( 10^{-6} \)
or nine iterations are performed.

```
TYPE PARM , PS , N , XNORM=1, $  
TYPE PARM , I , N , KNT=1 $  
DMINI DMI , DMINDX / B , X , C , , , , , / $  
MATPRN B , X , C / / $ PRNT INPUTS  
DO WHILE ( KNT< = 0 AND XNORM > 1 , E = -5 ) $  
MPYAD B , X , C / XX / $ B TIMES X PLUS C  
ADD X , XX / DIF / (-1 , 0) $  
MATPRN DF / / $  
NORM DF / DFN / / S , N , XNORM $  
MESSAGE / / "ITERATION NO. " / KNT / ERROR " / XNORM $  
EQUIV XX / X / ALWAYS $  
KNT = KNT +1 $  
ENDDO $  
MATPRN X / / $ FINAL ANSWER
```
Alter and Create Your Own Solution Sequences

MSC.Nastran is made up of solution sequences that are written with a series of DMAP statements. These MSC.Nastran solution sequences can be modified or altered to add analysis capabilities or to capture other useful data. Unique solutions sequences can be created to solve problems unique to your product's design characteristics or external programs can be imbedded into MSC.Nastran as callable DMAP programs or alters. You can create your own solution sequences to solve systems of equations. Data from your virtual product development processes can be imported into or exported from MSC.Nastran using DMAP.

MSC.Nastran DMAP Major Capabilities and Features

Increase the Functionality of MSC.Nastran by Incorporating Additional DMAP Applications Supplied by MSC.Nastran and Others.

- Coupled Dynamic Analysis.
- Cross-Orthogonality Checks of Test and Analysis Eigenvectors.
- Propeller Whirl Analysis
- Frequency-Dependent Impedance.
- Dynamic Model Checkout.
- Analysis of Rotating Structures (including Gyroscopic Effects).
- Dynamic Design Analysis Method (DDAM) for Shipboard Equipment Analysis.

Write Your Own Custom Solution Sequences Using DMAP to Customize MSC.Nastran for Specific Applications.

- Matrix Arithmetic.
  - Add, Subtract, Multiply, and Transpose Matrices.
  - Solve Simultaneous Equations.
  - Decomposition.
  - Forward-Backward Substitution.
  - Compute Real and Complex Eigenvalues.
  - Normalize, Diagonalize, and Exponentiate Matrices.
- Structured Programming with Fortran-Like Syntax.
  - Conditional Branching with IF( )THEN Statements.
  - Looping with DO ( ) WHILE Statements.
  - SubDMAP and CALL Statements.
- Matrix Manipulation.
  - Merge and Partition Matrices.
  - Extract Columns from a Matrix.
  - Append Matrices.
  - Print Matrices with Degree-of-Freedom Labeling.
- Table Manipulation.
  - Edit Tables with PARAML Function.
  - Print Tables with Labeling.

DMAP uses MSC.Nastran Database to store and fetch tables and matrices:

- Automatic Store and Fetch to the Database.
- Data Definition Language (NDDL) Describes All Tables and Matrices.

Integrate MSC.Nastran with Other Software Programs by Outputting Data Blocks or Matrices for Use with External Programs

- Finite Element Postprocessors.
- Kinematics Programs.
- Test-Analysis Correlation Programs.

Easily Correct Known Problems By Incorporating DMAP Updates Supplied by MSC.Software and Others

- MSC.Nastran Solution Sequences are Written with DMAP.
- Errors Corrections Made by Modifying the Solution Sequences.

EXTEND YOUR INVESTMENT

MSC.Software recommends MSC.Patran™ or MSC.SOFY™ for an integrated modeling and analysis environment.

MSC.MasterKey™ delivers a flexible, token-based licensing system that provides access to the breadth and depth of MSC.Software's world-class Virtual Product Development software portfolio, allowing you to use whatever simulation tools you want, whenever you need them – maximizing your productivity and reducing cost.

MAXIMIZE YOUR RETURN ON INVESTMENT

MSC.Software provides the most comprehensive training, support, and professional services with offices worldwide to provide local and centralized support. Investing in MSC.Software gives you access to extensive client support through comprehensive documentation, direct technical expertise, and customized onsite and offsite training classes taught by experienced engineers.

To find your local MSC.Software office or to learn more about our company and our products, please contact:

Corporate:
MSC.Software Corporation
2 MacArthur Place
Santa Ana, California 92707 USA
Tel: 1 714 560.8900
Fax: 1 714 784.4056

Customer Care Center:
1 800 642.7437 (U.S. only)
1 978 453.5310 (international)
customer.care@mscsoftware.com

Worldwide Web - www.mscsoftware.com

MSC, MSC., the MSC.Software corporate logo, Simulating Reality, SimOffice, and the names of the MSC.Software products and services referenced herein are trademarks or registered trademarks of the MSC.Software Corporation in the United States and/or other countries.

NASTRAN is a registered trademark of NASA. All other products names, brand names, or trademarks belong to their respective owners.

MSC SOFTWARE
SIMULATING REALITY

© 2005 MSC.Software Corporation. All rights reserved. NA*2004NOV*Z*DMAP*Z*LT-DAT