Using MSC/MVISION to Simplify and Expedite Access to and Analysis of Benchmark Data

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ABSTRACT

MSC/MVISION is an extremely flexible database application which can be used to manage any type of information.

At Raytheon, Waco, MSC/MVISION is being developed to store data from a major benchmark. A schema is in development which will enable retrieval of results from any benchmark, performed on any platform, testing any new software package. When complete, queries will be possible over all data acquired during a benchmark, allowing vastly improved assimilation and analysis.

INTRODUCTION

When determining the performance of software, the product will often be tested on several machine platforms. There may be multiple runs of software jobs, performed in several different situations. In the benchmark just performed, there were two versions of software, three machine architectures, and nine parts. For each run, data was collected both from the operating system of the machine and from the software itself.

Along with all this data, there was correspondence and documentation for the benchmark. Keeping track of all this information, and evaluating it properly, required that it be all in one place and organized meaningfully. Since the data is essentially static in nature (all data has been collected), MSC/MVISION is an excellent tool for its organization and maintenance.

After some necessary background on the methods of the benchmark, this paper illustrates the process of developing the MSC/MVISION schema, populating the database, making necessary modifications, and customizing it for use.

THE BENCHMARK

Nine parts and three machines were selected to provide a range of situations for running the software. The parts were chosen with their "size" in mind -- size as it related to the software, which in this case was measured by the number of elements in a mesh of the part (Figure 1). The three machines were a representative selection of the workstations in use at the Raytheon Waco site: an SGI Indigo 2, an Indigo 2 with impact graphics, and an O2. The machines had varying memory, disk space, swap space, and processors (Figure 2). The parts were run through the software on each machine, comparing versions of the software, while data collection proceeded on the operating system. The aim was not to determine whether the software worked, but rather to observe performance on the type of machines to which normal users would have access.

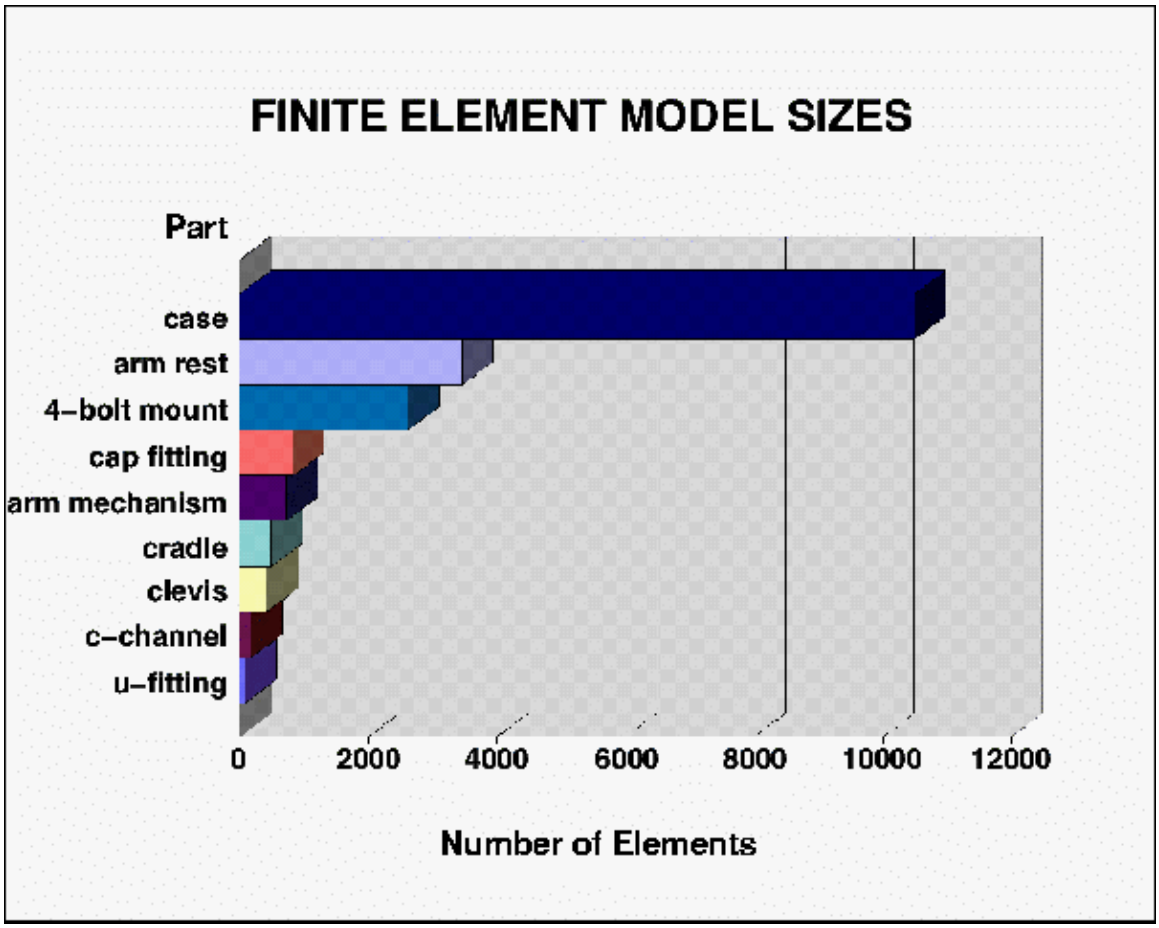

Figure 1 -- Part Size Comparison

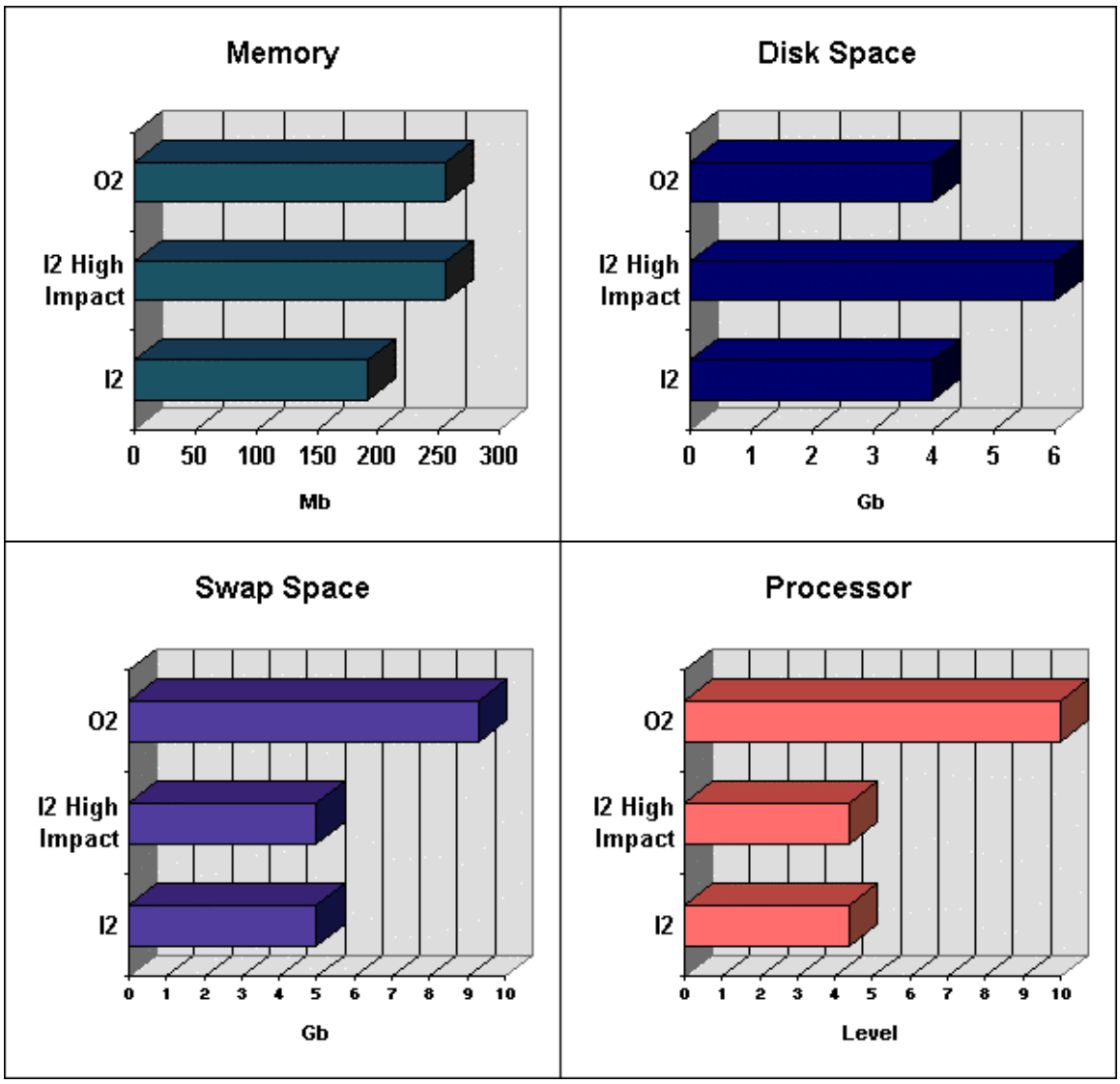

Figure 2 -- Machine Comparison

During the course of the benchmark several types of data were compiled. There were images of the parts, MS Excel files containing performance data and charts, and a presentation which was given to management upon completion of the benchmark. Not all data was in the same place, and the MS Excel files were exceedingly cumbersome to work with. MSC/MVISION provided a solution.

THE SCHEMA

In consultation with Gerry Norvell of The MacNeal-Schwendler Corporation in Grapevine, Texas, a hierarchy and schema were developed. The hierarchy consists of five levels and the 'source' data level: Benchmark, Software, Model, Machine, and Test. Attributes were assigned and supplemented as development continued (Figure 3). Some

sample data was brought in to evaluate the schema; several changes were made over time as the need for new attributes appeared, which involved re-building the database each time. This process continues in tandem with customization, made simple by the input files which can be created by MSC/MVISION.

Figure 3 -- Hierarchy and Attributes

POPULATING THE DATABASE

Putting the actual data into the MSC/MVISION database involved use of the spreadsheet. The MS Excel files were saved as text files (some editing was necessary) and the spreadsheet instructed to do a "read" on an individual file. Polylines were used to make the graphs which had been so tedious to create in MS Excel, automatically reading the data and plotting it against time (Figure 4). The data was then "put" into the database. Unfortunately, at the time the data was being collected, there was no thought of using MSC/MVISION to store it. With MSC/MVISION in mind, the data could have been collected differently in order to avoid a great deal of editing during the population phase.

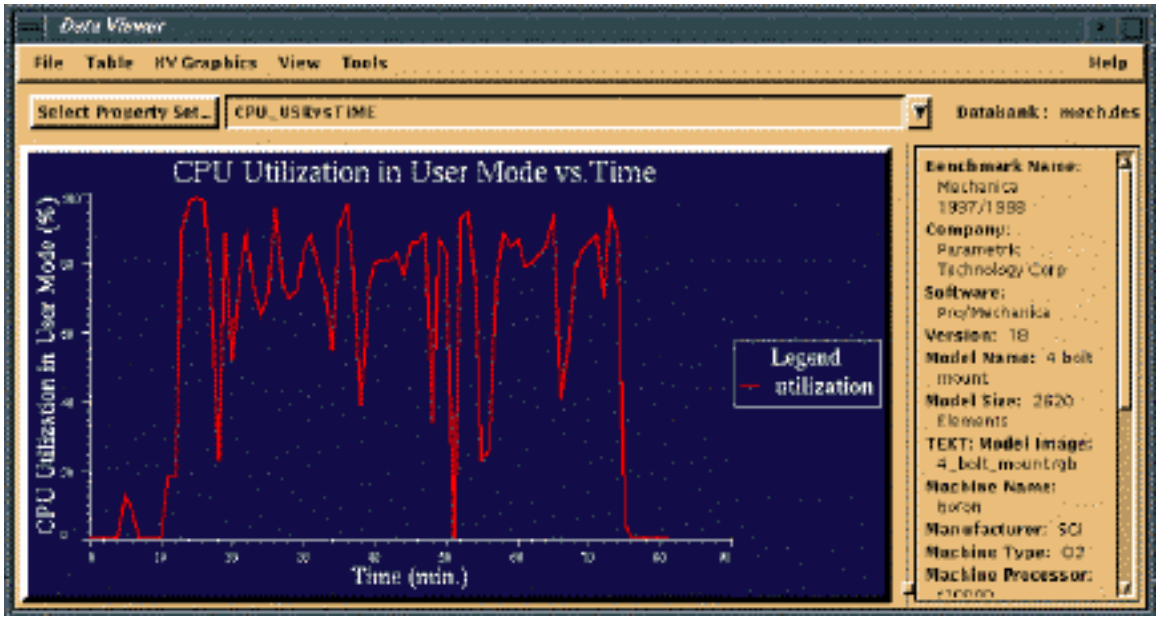

Figure 4 -- Example of MSC/MVISION Graph Creation

Since MS Excel data was not the only type collected, more spreadsheet templates were required to input different kinds of files. Data which is not in MS Excel format, such as presentations and documents pertaining to a benchmark, can be represented and accessed by MSC/MVISION using helpers (figure 5). Helpers allow the database administrator to design icons which tell the database user what type of data will be accessed. The helper can automatically bring up any application specified for the file type, and also allows command line options when starting the helper application (such as providing a URL for netscape).

Documentation Type	Date Created	Documentation	Author
Presentation to Mgmt.	03/02/1998	 showcase	Michael Farley
Netscape Slideshow	03/15/1998	 Netscape	Kirsten Husak
Meeting 10/18/97	10/18/1998	 Mail	Kirsten Husak

Figure 5 -- Helpers

MODIFICATIONS

MSC/MVISION is not intended to be used for dynamically changing data. It is ideal for storage of data which needs to be referenced but not changed, such as benchmark data, stress reports, and parts and material data. Some modifications were made using the data editor, but in general few changes were required.

CUSTOMIZATION

In this ongoing phase, the criteria and categories are both being modified. The criteria is being set up to reflect simple queries, such as “Model Name Like: “ and “Machine Name Like: “. The categories can be far more complicated, and are being developed to answer complex queries which will enable the user to view the data in such a way that comparisons between benchmark results are easy to see and evaluate.

SUMMARY

Because of the plethora of data which a benchmark produces, Raytheon Waco needed a database application which would keep the data organized and in one place, and would

allow easy and efficient access to that data. MSC/MVISION, which is certainly not limited to containing materials data, is ideal for this purpose. The broader uses of MSC/MVISION are being explored at Raytheon, and it is expected that its use will spread, ensuring data integrity and ease of use.

FUTURE PLANS

Having gained experience in the creation and customization of a MSC/MVISION database, the plan is to expand use of the application. The next database developed will contain flight test data, which includes measurements of fuel flow, performance, handling, acceleration, pressure, and strain. These measurements are needed for the process of airframe certification and are used to evaluate structural performance and to validate the finite element model of an airframe. The amount of data collected (as much as 10 Gb for one flight) and the need for engineers to be able to identify specific measurements at specific times during flight makes MSC/MVISION an excellent choice for maintenance of and access to this test data.

ACKNOWLEDGMENTS

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