

as NIFTI was needed to query, update, modify, and make deletions within the ISS vehicle master database (VMDB), a repository of engineering data that includes an indented parts list and associated resource data (power, thermal, volume, weight, and the like). Since the VMDB is used both as a collection point for data and as a common repository for engineering, integration, and operations teams, a tool such as NIFTI had to be designed that could expedite the creation of database query/update forms which could then be shared among users.

The present state of the art with COTS browsers means a user must have completed a form to access data in the VMDB. This means a user brings his/her need to the attention of management. The management then brings it to the attention of vehicle data management. The importance of data access is measured against other competing needs for database access, and the required access is eventually deemed sufficiently important to allocate requirements for the VMDB team. This requirement is scheduled for satisfaction at some future release of the VMDB and is assigned to a VMDB team developer. The developer meets with the requester to

hammer out requirements for the form. The form is then implemented with Oracle and is captured within the software configuration management system for the VMDB. There the software will likely exist and continue to be maintained for at least the next decade. If the user requires any changes to the form afterwards, the lengthy process detailed above must be repeated.

NIFTI truncates this process. With NIFTI, a user selects the table he/she wants to access and then selects columns from that table. The field is sized to the user's specifications, and labels and titles are added. A search string is entered on the user's form, including a wildcard, and the user presses the query button. The data needed are now there. If the user is responsible for updating or inserting in the database, he/she corrects the data on the form or enters new data and selects the update or insert button. Since the form has been saved in the database, it has also been saved as part of the database backup; that is, it is not part of the configuration management process. This means that should the user want to add another column or perform a join with

another table, he/she can do this as well. The user can then share created forms with another VMDB user simply by pressing a toggle button and saving. However, should the user not wish to share his/her form, this can be done too by marking the form private. Private forms, which are viewable only by the user, are unlike public forms, which can be viewed by all NIFTI users.

NIFTI is an extremely flexible and reliable tool that can be used in place of Oracle forms. As an X-Windows-based application, NIFTI can run on various platforms. At the time of reporting this information, NIFTI was running on a Sun SPARC workstation at Johnson Space Center.

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## Predicting Numbers of Problems in Development of Software

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A method has been formulated to enable prediction of the amount of work that remains to be performed in developing flight software for a spacecraft. The basic concept embodied in the method is that of using an idealized curve (specifically, the Weibull function) to interpolate from (1) the numbers of problems discovered thus far to (2) a goal of discovering no new problems after launch (or six months into the future for software already in use in orbit).

The steps of the method can be summarized as follows:

1. Take raw data in the form of problem reports (PRs), including the dates on which they are generated.
2. Remove, from the data collection, PRs that are subsequently withdrawn or to which no response is required.
3. Count the numbers of PRs created in 1-week periods and the running total number of PRs each week.
4. Perform the interpolation by making a

least-squares fit of the Weibull function to (a) the cumulative distribution of PRs gathered thus far and (b) the goal of no more PRs after the currently anticipated launch date. The interpolation and the anticipated launch date are subject to iterative re-estimation.

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