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Title of Presentation: A Support Database System for ISHM
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Abstract (500 words or less):

The development, deployment, operation and maintenance of Integrated Systems Health Management (ISHM) applications require the storage and processing of tremendous amounts of low-level data. This data must be shared in a secure and cost-effective manner between developers, and processed within several heterogeneous architectures. Modern database technology allows this data to be organized efficiently, while ensuring the integrity and security of the data. The extensibility and interoperability of the current database technologies also allows for the creation of an associated support database system. A support database system provides additional capabilities by building applications on top of the database structure. These applications can then be used to support the various technologies in an ISHM architecture.

This presentation and paper propose a detailed structure and application description for a support database system, called the Health Assessment Database System (HADS). The HADS provides a shared context for organizing and distributing data as well as a definition of the applications that provide the required data-driven support to ISHM. This approach provides another powerful tool for ISHM developers, while also enabling novel functionality. This functionality includes: automated firmware updating and deployment, algorithm development assistance and electronic datasheet generation.

The architecture for the HADS has been developed as part of the ISHM toolset at Stennis Space Center for rocket engine testing. A detailed implementation has begun for the Methane Thruster Testbed Project (MTTP) in order to assist in developing health assessment and anomaly detection algorithms for ISHM. The structure of this implementation is shown in Figure 1. The database structure consists of three primary components: the system hierarchy model, the historical data archive and the firmware codebase. The system hierarchy model replicates the physical relationships between system elements to provide the logical context for the database. The historical data archive provides a common repository for sensor data that can be shared between developers and applications. The firmware codebase is used by the developer to organize the intelligent element firmware into atomic units which can be assembled into complete firmware for specific elements.
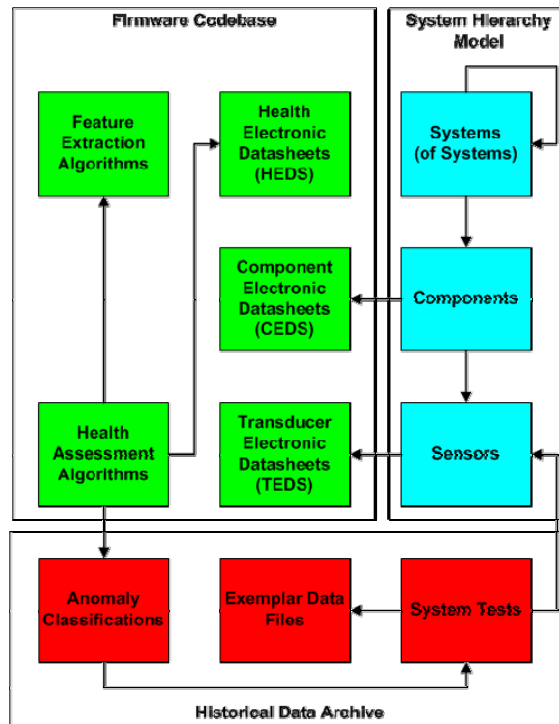
Fig. 1. Health Assessment Database Structure.