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The Next Generation Computer Resources (NGCR) Database Management System Standards Working Group (DBWG) Update

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1.0 INTRODUCTION

The Navy's traditional 'standard embedded computer' approach is no longer competitive or viable in the present and emerging computing resources environment. Rapidly changing commercially based standards and technologies permit more efficient and effective solutions to the full range of Navy computing resource requirements. Computing resources include the totality of computer equipment, computer data, computer programs, associated documentation, personnel, services, and support.

The objective of the Next Generation Computer Resources (NGCR) program is to provide a new basis for the Navy's acquisition of computing resources to take better advantage of open system commercial advances and investments. We expect that this approach will result in reduced production costs; reduced operational and maintenance costs; minimized development, test and evaluation costs; and more effective system integration and upgrade.

This report presents the status of the NGCR Program's Database Management System Standards Working Group (DBWG). It includes a brief background of the NGCR program, the organization of the DBWG, the issues currently under consideration by the DBWG, as well as the status and future plans of the Working Group.

2.0 NGCR BACKGROUND

The intent of the NGCR Program is to incorporate commercially based, widely accepted, nonproprietary interface standards into the acquisition and development processes of computing resources for new systems and the modernization of existing systems. The NGCR standardization efforts are in the areas of operating system, backplane, database, graphics, project support environments and networking. These commercially based standards will be adopted as formal military standards. Specific standards currently being adopted by the NGCR Program include the following: IEEE P1003 POSIX, ANSI X3T9.5 FDDI, and IEEE 896 Futurebus+. The NGCR Program will not establish strictly Navy standards, but will adopt standards that leverage the international and national standards bodies' work.

The charter of the NGCR Program's DBWG is to establish an open, commercially based, nonproprietary set of standard database interfaces and services. These standards will be the result of the cooperative efforts of government, industry, and academia, and will be available for use in NGCR-based systems in the mid 1990s and beyond. The DBWG will adopt (or develop) reference model(s); identify military systems' database interface requirements; identify capabilities of existing and evolving database interface standards, implementations, and

technology; determine the applicability of identified and projected capabilities to the requirements; and recommend a set of database interface standards to the Program Office (SPAWAR 231) for military standardization.

3.0 DBWG ORGANIZATION

Essentially, the DBWG will determine the requirements, evaluate the available standards in terms of the requirements and select a standard for adoption. The DBWG is comprised of three subgroups that perform the various tasks required to fulfill the working group's charter. These are the Requirements Subgroup, Current Standards and Available Technologies Subgroup, and the Approach Subgroup.

3.1 Requirements Subgroup

The DBWG Requirements Subgroup will identify the requirements for the NGCR database management systems and support the selection and adaptation of database interface standards. The Subgroup will examine current Navy and commercial database system functions, performance requirements, security requirements, as well as the hardware, software, and language interface issues.

3.2 Current Standards and Available Technology Subgroup

The DBWG Current Standards and Available Technology Subgroup will examine the incorporation of the current and evolving database interfaces and services into the NGCR database

interface standards. In addition to identifying issues associated with existing and evolving database management systems functions and interfaces, this Subgroup will also evaluate existing and evolving technologies relative to the criteria for NGCR. Additionally, the group will consider the existing and potential testing and benchmark technologies.

3.3 Approach Subgroup

The DBWG Approach Subgroup will define the process for establishing a family of NGCR database interface standards. This activity includes identifying the process for industry and Navy cooperation in defining standard database interfaces and services. The group will adopt or adapt a representative model of existing database management systems architectures. This Subgroup will also define the procedures for comparing identified database management systems' elements against identified NGCR database requirements.

4.0 DBWG ISSUES

Currently, the DBWG has a number of issues under consideration. Resolution of these issues will facilitate the eventual selection of the database management system interface standard.

4.1 Areas for Standardization

Below are some potential areas for standardization, along with existing

standards or standards efforts in those areas.

Database Language: SQL

Data Interchange formats:

Data Representations: EDI, EDIF, ODA, PDES/STEP, ODIF

Data Access Protocol: RDA

Transaction Processing languages:

POSIX, X3T5 Transaction Processing

Data Repositories: IRDS, CIS, EIA CDIF

4.2 Standards Hierarchy

The primary goal of the NGCR Program is to select nonproprietary, commercially based standards. The objective, then, is to select standards at as high a level in the international standards hierarchy as possible, while still satisfying the program's goals.

The following order of precedence exists when selecting interface, service, and protocol standards for the NGCR Program and the NGCR database interface standards. Table 1 describes the hierarchy of standardization, along with an example of a standards body for a given level.

Table 1: Hierarchy of standards.

Level	Standards Bodies
International	ISO/IEC
U.S. National	ANSI
Industry	IEEE, EIA
Consortia	X/Open, SQL Access

Other types of standards include the following:

NIST Standards
de facto Standards
DoD Standards
Navy Standards

Consider the following example. SQL is an ISO International Standard (it is also an ANSI National Standard). An implementation of the SQL standard would be a relational database management system such as SYBASE or ORACLE.

4.3 Products versus NGCR Standards

Proprietary products are considered only as potential sources for development of interface standards. This is the case either in an area for which an existing standard effort cannot be identified (i.e., a gap), or for which an interface basis can be distilled from interfaces (implicitly) defined by the product.

4.4 Interoperability

Interoperability is the ability of multiple systems to exchange information (data) and to mutually use the exchanged information. (IEEE P1003.0 Draft 15, Guide to the POSIX Open Systems Environment.)

The DBWG is concerned with the interoperability of a variety of different database platforms and systems. Many of the current standards bodies do not address the issue of interoperability between the various standards. The

DBWG recognizes the need to select standards that will ultimately lead to interoperability.

4.5 Portability

Portability refers to the ability to transfer software from one information system to another. (IEEE P1003.0 Draft 15, Guide to the POSIX Open Systems Environment.)

From the Database Management System (DBMS) perspective, application portability refers to the ability to move application software from one DBMS to another DBMS with little or no change to the application code.

The application program interface (API) is the interface between the application software and the application platform, across which all services are provided. The API is primarily in support of application portability, but system and application interoperability are also supported via the communications API. (IEEE P1003.0 Draft 15, Guide to the POSIX Open Systems Environment.)

When the DBMS is considered to be an application (to the operating system, network, etc.), then portability refers to the situation in which the DBMS can be move from system to system with little or no change to the DBMS software.

If the NGCR DBWG concerns itself with the interface between the DBMS and the operating system, the DBWG needs to accommodate the DBMS related operating system requirements in POSIX, via the NGCR Operating System

Standards Working Group. We need to determine whether the NGCR DBWG will focus on the operating system interface level.

Figure 1. illustrates a possible implementation of the DBMS related APIs.

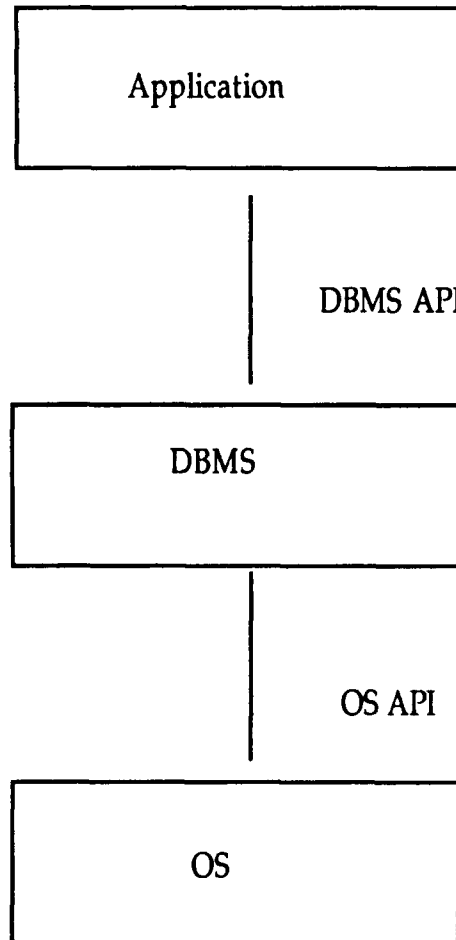


Figure 1
Application program interfaces.

5.0 DBWG CURRENT STATUS AND FUTURE PLANS

The DBWG membership currently consists of Navy laboratory and

operational personnel. The working group is evaluating the need for Navy standardization in the database interface area and will make recommendations to the Program Office by the end of fiscal year 1992. The current plan is to open the group to industry and academia in the early part of fiscal year 1993.

5.1 Proposed Meeting Schedule

The DBWG meets on a quarterly basis with the following proposed meeting schedule:

October 27-28 (Navy only), Orlando, FL
December 8-9, Silver Springs, MD
February 9-11, 1993, TBD

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