

MASTER OF SCIENCE IN SOFTWARE ENGINEERING

EVALUATION OF THE EXTENSIBLE MARKUP LANGUAGE (XML) AS A MEANS OF ESTABLISHING INTEROPERABILITY BETWEEN MULTIPLE DOD DATABASES

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This thesis evaluates the ability of the Extensible Markup Language (XML) to address the interoperability problem that exists between Department Of Defense (DOD) legacy systems. Due to the different Database Management Systems (DBMS) used within DOD, interoperability is a major flaw. The need for communication between the DBMS within DOD is necessary and this thesis will focus on this problem.

This thesis focuses in on the problems that exist, and assesses XML as a means of correcting these problems. This thesis uses the Joint Common Database (JCDB) as a means of showing XML to be a viable solution.

DoD KEY TECHNOLOGY AREAS: Battlefield Environments, Command Control and Communications, Computing and Software

KEYWORDS: Extensible Markup Language, Interoperability, Database Management

EXTENSIBLE MARKUP LANGUAGE (XML) BASED ANALYSIS AND COMPARISON OF HETEROGENEOUS DATABASES

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In the Department of Defense there currently exist multiple databases required to support command and control of some portion of the battlefield force. Interoperability between forces will become crucial as the force structure continues to be reduced. This interoperability will be facilitated through the integration of these command and control databases into a singular joint database or by developing inter-communication schemas to support inter-database communications. The first step in either of these alternatives is the identification of equivalent components among the multiple databases.

This thesis describes how Extensible Markup Language (XML) can be used to facilitate the process of analyzing and comparing multiple databases. Each step of the process is described in detail accompanied by explanations of the XML tools/resources required to execute the step and rationale of why the step is necessary. Detailed graphics and examples are employed to simplify and justify the step by step explanations. The JavaScript code developed as part of the research to execute the XML based analysis is included. This thesis concludes with discussions of the overall value of this XML based analysis and comparison process and of potential future work that could be pursued to further exploit this XML analysis and comparison method.

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DoD KEY TECHNOLOGY AREAS: Battlefield Environments, Command Control and Communications, Computing and Software

KEYWORDS: Extensible Markup Language, XML Analysis, Heterogeneous Databases, Database Comparison, Database Analysis, C4I

APPLICATION OF THE NOGUEIRA RISK ASSESSMENT MODEL TO REAL-TIME EMBEDDED SOFTWARE PROJECTS

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This thesis addresses the application of a Formal Model for Risk Assessment to real-time embedded software development projects. It specifically targets the use of existing military and defense software development projects as a way to validate, or refine the formal model. In this case the Nogueira model. Data will be gathered from real projects and analyze through use of the Nogueira model. Selected projects were based on specific criteria, listed later in this thesis. This is, in essence, a “post mortem” of these projects. It gives the ability to compare the model’s predictions against what the real data collected from the projects indicated. Results will be reported with our conclusions as to the model’s viability for use in determining risk as to probability of completion given the time allowed for the projects. These are data points in the validation of the model and the results, good or bad, cannot be used as a definitive substantiation of the model’s fitness for use on other real projects.

DoD KEY TECHNOLOGY AREAS: Other (Project Management and Risk Assessment)

KEY WORDS: Requirements Volatility (RV), Change Rate (CR), Birth Rate (BR), Death Rate (DR), Complexity (CX), Large Granularity Complexity (LGC), Operators, Data Streams, Abstract Data Types (ADTs), Efficiency Factor (EF), Software Engineering, Risk Assessment, Estimation Models, Bi-dimensional Plot, SLIM, Putnam, Function Points, COCOMO, Boehm, Prototype System Description Language (PSDL), Computer Aided Prototyping System (CAPS), Weibull Distribution

A REQUIREMENTS SPECIFICATION OF MODIFICATIONS TO THE FUNCTIONAL DESCRIPTION OF THE MISSION SPACE RESOURCE CENTER

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The Defense Modeling and Simulation Office developed the Functional Description of the Mission Space (FDMS) Resource Center under the guidance of Department of Defense (DoD) 5000.59-P, DoD Modeling and Simulation Master Plan. The FDMS Resource Center provides a controlled repository for modeling and simulation (M&S) data and promotes data standardization and reuse. The Resource Center is currently operational at <http://38.241.48.9>.

Use of the FDMS Resource Center is voluntary on the part of DoD M&S organizations, although maximum use of the Center is paramount if standardization and reuse synergies are to be realized. In an effort to encourage more use of the Resource Center's capabilities, the author analyzed the Resource Center, interviewed the Center's principals, and developed a set of requirements governing screenshot

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appearance, data workflow control, and privilege permission selections which should simplify and clarify the Center's user processes.

DoD KEY TECHNOLOGY AREAS: Computing and Software, Modeling and Simulation

KEYWORDS: Modeling, Simulation, FDMS, DMSO, MSRR, Requirements, Software Engineering, Systems Engineering, Software Intensive

AN APPLICATION OF ROLE-BASED ACCESS CONTROL IN AN ORGANIZATIONAL SOFTWARE PROCESS KNOWLEDGE BASE

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The Organizational Software Process Knowledge Base (OSPKB) is the repository of an organization's software process, product performance, quality metrics, and corporate lessons learned. The knowledge is maintained on a project-by-project basis, as well as by business domain. The OSPKB contains sensitive data and information that needs to be protected from unauthorized disclosure or modification. In this thesis, we address the challenge of controlling access to the data and information stored in the OSPKB. In particular, we investigate approaches to applying role-based access control (RBAC) to OSPKB applications.

DoD KEY TECHNOLOGY AREA: Computing and Software

KEYWORDS: Project Management, Software Process Management, Role-Based Access Control, Security

