

# **CA-Endevor<sup>®</sup>/DB**

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Concepts and Facilities

15.0

OS/390



Computer Associates

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**First Edition, December 2000**

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# Preface

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## About This Guide

This document provides a technical introduction to CA-Endevor/DB. It contains the following chapters:

- Chapter 1 — provides a brief conceptual overview of the product.
- Chapter 2 — provides a system overview.
- Chapter 3 — provides an in-depth, technical description of CA-Endevor/DB as it pertains to software management in the CA-IDMS environment.
- Chapter 4 — describes the high-level benefits of this automated, integrated software management system.

## Related Documentation

Refer to the following manuals for more information about CA-Endevor/DB :

- *CA-Endevor/DB Batch Reference*
- *CA-Endevor/DB Administrator Guide*
- *CA-Endevor/DB User Guide*
- *CA-Endevor/DB Messages and Codes*
- *CA-IDMS Installation and Maintenance Guide-OS/390*



# Chapter 1. CA-Endevor/DB Conceptual Overview

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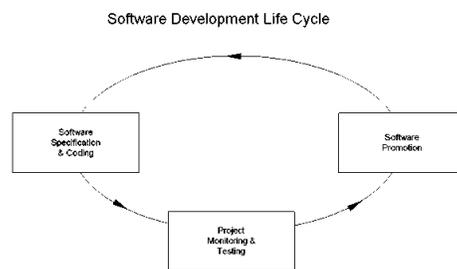


## 1.1 Overview

In today's highly sophisticated CA-IDMS environment, managing development activities and operations can be extremely complex and unpredictable. Hundreds of environmental changes are evaluated, tested and implemented monthly, sometimes weekly, to keep up with growing business demands. Until now, many software management tasks have been performed manually. Given the sheer volume and complexity of present-day CA-IDMS environments, however, manual software management methodologies are becoming less feasible in terms of accuracy, reliability and attainment of audit requirements. The only viable solution is one in which an automated, integrated approach is applied to all stages of software management.

### 1.1.1 The Software Development Life Cycle

While the software development life cycle varies from installation to installation within the CA-IDMS environment, the basic ingredients are the same, as are the major concerns.



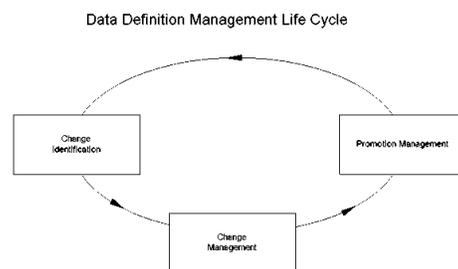
**Software Specification and Coding** In the CA-IDMS environment, programmers design and code applications interactively using 4th generation tools. CA-IDMS provides a built-in data dictionary structure within which component interrelationships (applications, dialogs, maps, records, etc.) are classified and stored. Problems arise when updates made to one part of the dictionary are not properly propagated to other affected components. For example, changes made to a map used by one dialog can prevent execution of another dialog which shares that map if the changes are not synchronized. These problems multiply quickly in the real-time CA-IDMS environment. Programmers and managers seek accurate methods of identifying and keeping track of changing dictionary interrelationships — while maintaining the benefits of a dynamic programming environment.

**Project Monitoring and Testing.** During this stage of development, project leaders and managers monitor programming activity, and perform testing and change impact analysis. Project monitoring requires the ability to obtain project status and to classify changes relating to specific project teams. Testing requires the ability to pinpoint exactly what has changed so that the impact of those changes can be accurately determined. These capabilities are not readily provided in the native CA-IDMS environment.

**Promotion** When moving information from one dictionary to another within CA-IDMS, it is difficult to determine what a promotion package should consist of — its dialogs, records, maps and so forth. And since the interrelationships of all those components are architecturally complex, so too is the promotion process. To solve the problems inherent in CA-IDMS promotions, installations often resort to copying and promoting entire applications and/or dictionaries, a procedure which quickly becomes impractical and resource-intensive. The ideal solution ensures a complete promotion — not too much or too little.

## 1.1.2 The Data Definition Management Life Cycle

The life cycle events of data definition management mirror those of the software development life cycle. The functional areas within CA-IDMS software management include change identification, change management and release management.



**Change Identification** Dictionary updates are captured and logged during the process of change identification, providing an audit trail which accurately reflects what entities were changed by whom, when, and why. With this information, it is possible to focus testing efforts on those areas of systems which have changed and to further determine accountability for all changes. These statistics not only provide vital audit information, but also serve as the basis for all change management and release management activities.

**Change Management** activities revolve around tracking, reporting and analyzing dictionary updates. To effectively perform these activities, managers need online access to a database which automatically stores and maintains the relationships between users, entities and updates. They also require the ability to categorize and track that change information in ways that directly relate to their organization's business structure.

**Promotion Management** encompasses the promotion and distribution of software throughout the development life cycle and beyond. The complex nature of the CA-IDMS environment — multiple dictionaries in multiple central versions on multiple machines — poses a number of serious problems when managing software releases, whether those software systems are built or bought. Accurately identifying a complete promotion package is only part of the bigger management challenge of handling multiple releases, determining potential impact on the target system, and incorporating internal customizations with vendor updates.

### 1.1.3 Supporting Functionality

Additional functionality that applies to all functional areas of software management in the CA-IDMS environment includes security management, information management, and the Endeavor for OS/390-Endeavor/DB Bridge.

**Security Management** A complete security system provides security at all levels within the dictionary: project, user and entity. In shops where parallel development is being performed within a single dictionary, the security system prevents individuals from inadvertently overwriting each other's changes.

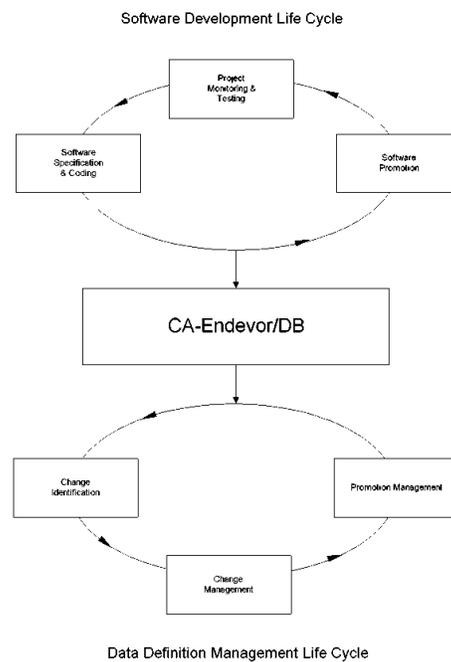
**Information Management** To make informed decisions, managers require access to information about project status, as well as the impact of proposed changes. Information management tools provide easy access to this information through online displays and hardcopy reports.

**Endeavor for OS/390-Endeavor/DB Bridge** allows you to use CA-Endeavor/DB's promotion management capabilities to control and track the promotion of non-data dictionary entities, along with their related CA-IDMS data dictionary entities. This powerful product interface provides complete control over all related entities being promoted — whether they exist within the CA-IDMS Integrated Data Dictionary (IDD) structure or in Endeavor for OS/390.

## 1.2 CA-Endevor/DB: An Automated, Integrated Data Definition

### System

CA-Endevor/DB (Environment for Development and Operations) is an automated data definition management system that controls the dynamic processes of operations and change in the dictionary-driven, CA-IDMS environment. Designed to address all functional areas of data definition management, CA-Endevor/DB provides an integrated structure within which entity changes are monitored, security administration is enhanced, and promotion activities are controlled.



Only an automated, integrated system can provide the level of accuracy, reliability and control that software managers need in today's CA-IDMS environment. CA-Endevor/DB meets the challenge.

# Chapter 2. CA-Endevor/DB — System Overview

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## 2.1 Introduction

CA-Endevor/DB provides automated facilities for performing change identification, change management, and promotion management in the CA-IDMS environment. These facilities are further enhanced through supporting functionality which includes security management, software information management and the Endevor for OS/390-Endevor/DB Bridge. When combined, these powerful capabilities improve data dictionary operation and administration by:

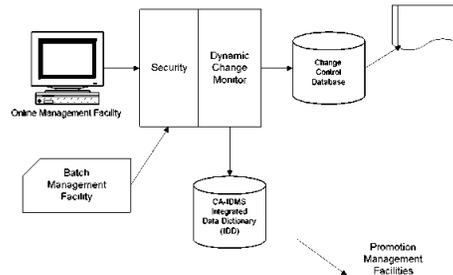
- Creating a permanent audit trail of all dictionary development and migration activity.
- Automatically associating each change with a Change Control ID (CCID), which categorizes and reports the reason for change.
- Grouping related changes for project management and reporting.
- Coordinating the shared use of dictionaries between different project teams.
- Automating and enforcing standard procedures.
- Providing a security system that controls access to data dictionary entities.
- Preventing concurrent updates to data dictionary entities.
- Accurately identifying entity "pick lists" for promotion from one stage of development to another.
- Validating entities prior to promotion in order to prevent "old bugs" from recurring in new system versions.
- Comparing and validating vendor-supplied source against in-house changes in order to isolate and resolve conflicts.

CA-Endevor/DB accommodates both small and large-scale CA-IDMS installations, working in conjunction with existing standards and procedures.

**Note:** CA-Endevor/DB may not be used with Data Sharing, and Dictionaries managed by CA-Endevor/DB may not be shared.

## 2.2 CA-Endevor/DB Components

The CA-Endevor/DB system is comprised of these major components: the Management Facility, the Security System, the Dynamic Change Monitor, the Change Control Database, and the Promotion Management Facilities.



All dictionary update requests (by batch or online compilers) are first captured by the Dynamic Change Monitor, routed to the Security System for validation, logged to the Change Control Database, and then passed to the CA-IDMS Integrated Data Dictionary (IDD). The Online Management Facility permits users to define and view information contained within the Change Control Database, while the Batch Management Facility permits users to define, view, and migrate information contained in the Change Control Database. CA-Endevor/DB's Promotion Management Facilities, working in conjunction with the Dynamic Change Monitor and the Change Control Database, perform quality assurance, create audit trails, and streamline promotion by selecting and limiting the number of entities to be promoted

- **Change Control Database (CCDB)** - maintains a complete log of changes made to data dictionary entities. The CCDB stores information about users, entities, projects, workflow status, migration activity and security. CA-Endevor/DB supports any number of data dictionaries, and the CCDB can be viewed as a logical extension of the dictionary.
- **Dynamic Change Monitor** - automatically captures changes to data dictionary entities and creates a Change Log Entry (CLE) in the Change Control Database. Each Change Log Entry contains the date and time of the change, the updating compiler and the action. CLEs are automatically associated with the user responsible for the change, the entity being changed, a user-defined change control identifier (CCID) and, optionally, other status and organizational information.
- **Security System** - a complete CA-IDMS security system that provides security at the project, user and entity levels. The CA-Endevor/DB Security System also enforces authorization through automatic signin/signout, pre-authorization and lock facilities. It protects and ensures the integrity of entities between checkout and release by using the "intelligence" contained in the CCDB to control all access to data dictionary entities.
- **Online Management Facility** - permits CA-Endevor/DB users to define and view information contained within Change Control Databases. This facility allows users to browse the history of changes made to IDD entities, maintain information used

to monitor project and operational workflow, and administer all aspects of CA-Endevor/DB.

- **Batch Management Facility** - permits CA-Endevor/DB users to define, view, and migrate information contained in the Change Control Database. This facility provides a CCDB language that can be used to modify, view, and/or punch the contents of the CCDB.
- **Promotion Management Facilities** - create essential audit trails and streamline promotion by selecting and limiting the number of entities that need to be involved in the process. CA-Endevor/DB's Promotion Management Facilities, in conjunction with the Dynamic Change Monitor and the Change Control Database, help ensure accurate promotions by expertly determining and automating the selection and transportation processes of software distribution.

CA-Endevor/DB operates in any CA-IDMS environment under OS/390 and requires no operating system, database software or physical dictionary changes. Installation normally takes less than one day, providing immediate benefit without manual administrative effort.



# Chapter 3. Software Management in the CA-IDMS Environment

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## 3.1 Introduction

Database Administrators, Development Managers, and operations personnel in the CA-IDMS environment continuously develop, test, and maintain software systems, implementing hundreds of changes. CA-Endevor/DB establishes an environment in which operational procedures and development activities are controlled automatically — without imposing restrictions. The system directly addresses all three functional areas of CA-IDMS software management:

- Change Identification
- Change Management
- Promotion Management

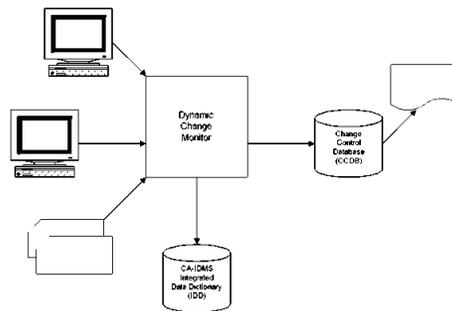
Following is a description of how CA-Endevor/DB performs each of these functions.

## 3.2 Change Identification

During the process of change identification, changes are monitored and logged for purposes of change tracking, audit trail creation and historical reporting. CA-Endevor/DB provides two facilities which perform change identification functions: the Dynamic Change Monitor and the Change Control Database.

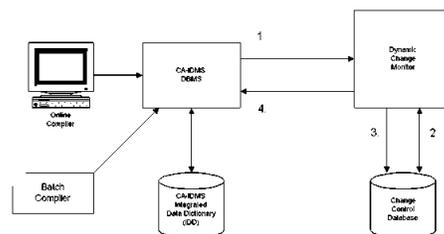
### 3.2.1 The Dynamic Change Monitor

CA-Endevor/DB monitors change through the Dynamic Change Monitor which, in turn, logs those changes into the Change Control Database.



Upon initial installation, the Dynamic Change Monitor immediately begins keeping an audit trail in the Change Control Database of all updates performed against CA-IDMS Integrated Data Dictionary (IDD). Entities and, optionally, users are automatically established in the Change Control Database when they are first encountered.

As the Dynamic Change Monitor captures changes to data dictionary entities, it creates a Change Log Entry (CLE) in the Change Control Database. Each Change Log Entry contains the date and time of the change, the updating compiler, and the action. CLEs also draw an association between the user responsible for the change, the entity being changed and a user-defined change control identifier (CCID). Optionally, CLEs can contain other status and organizational information. Individual installations can determine whether the Dynamic Change Monitor is to intercept update requests for all or for only selected entity types.



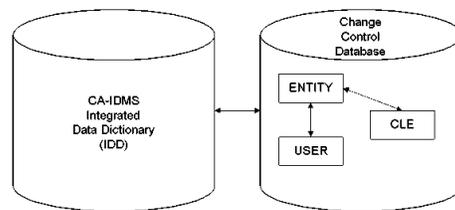
How it Works: **1.** Update requests are intercepted by the Dynamic Change Monitor. **2.** The request is validated against security information in the Change Control Database.

3. A Change Log Entry is stored in the Change Control Database. 4. The dictionary update is performed by CA-IDMS.

The Dynamic Change Monitor is activated on a dictionary-by-dictionary basis, allowing a site to bring one dictionary at a time under CA-Endevor/DB control.

### 3.2.2 The Change Control Database

CA-Endevor/DB's Change Control Database (CCDB) is a CA-IDMS database that contains change management information, including a log of changes and significant activities that have occurred against data dictionary entities. As a central repository, the CCDB maintains information about users, entities, projects, Change Control Identifiers (CCIDs), workflow status, migration activity and security.



The categories of information in the Change Control Database that are used to perform Change Identification are: Change Log Entries, Entities, Users, and Dictionaries.

- **Change Log Entries (CLEs)** CLEs contain information about modifications to both IDD entities and CA-Endevor/DB entities within the Change Control Database itself. The Dynamic Change Monitor automatically creates a CLE each time an entity is modified. Each entry identifies the modified entity and the user who made the modification, and further includes the date and time of the modification, the modification action (ADD, MODIFY, DELETE, MIGRATE IN, MIGRATE OUT, STATUS CHANGE, SIGNIN or SIGNOUT), the updating program name and any user-provided comments.
- **Entities** Identified by name, type and version, entity information is automatically captured and created by the Dynamic Change Monitor when it detects a modification to that entity. The Dynamic Change Monitor identifies each entity for which a CLE has been created.
- **Users.** As with entities, users are registered automatically, if desired, by the Dynamic Change Monitor which identifies each CA-Endevor/DB user and the associated security classification and change information.
- **Dictionaries** This category of information includes the name of the data dictionary associated with the Change Control Database, the system or site name to be used as a cross-reference in migration, and a user-defined comment. The dictionary record also contains a list of the entity types to be monitored and/or automatically signed out upon first modification, along with a default security classification.

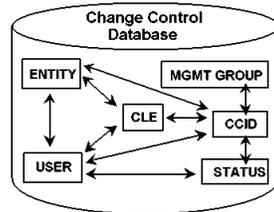
CA-Endevor/DB ensures that the Change Control Database (CCDB) reflects changes made to its associated dictionary and to the CCDB itself. No change can be made to a monitored entity type in the data dictionary or in the CCDB without a corresponding Change Log Entry (CLE) being created in the CCDB by the Dynamic Change Monitor. Changes that are attempted but not completed will not have CLEs associated with them.

## 3.3 Change Management

Change management is the process of transforming change data into strategic information for purposes of decision-making. For this reason, change management requires the ability to track, quantify and report on change information as it relates to specific project groups and business units. In addition to its change identification function, CA-Endevor/DB's Change Control Database plays a key role in change management.

## 3.4 CCDB Change Management Functions

As a central repository, the Change Control Database contains information that can be used to produce reports for project monitoring, workflow analysis, resource allocation, productivity analysis and project planning.



The categories of information in the CCDB that are used when performing change management are: Change Control Identifiers, Management Groups, Status Codes and Security Classes.

- **Change Control Identifiers (CCIDs)** CCIDs are optional identifiers that combine one or more Change Log Entries (CLEs) into groups for purposes of control, security or reporting. A CLE can be related to more than one CCID. CCIDs are associated with either programmers or entities in the CCDB, and this association must precede dictionary update. When the update occurs, CA-Endevor/DB then automatically relates each entity update performed by a user to the associated CCID. CCIDs can be used as selectors for entity promotion.
- **Management Groups.** These are user-defined identifiers that group one or more related CCIDs. Information stored in a Management Group includes the Management Group name and a user-defined description of the relationship between the CCIDs it manages. For example, a Management Group called "Release 2.0" might stand for all the changes needed for the next release of a system. A CCID can participate in any number of Management Groups. And like CCIDs, Management Groups can be used as selectors for entity promotion.
- **Status Codes.** These are optional user-defined values that can be used for many purposes in the change control cycle such as workflow tracking, project reporting or entity promotion. Typically, an installation will define Status Codes that represent milestones in the development and implementation cycle such as coding, testing, quality assurance or production migration. Status values can be associated within the context of a CCID. This capability allows a shared entity to have a unique status for each project to which the entity belongs. Online and offline reports summarize all entities associated with a particular status.
- **Security Classes** Security classes control access to data dictionary entities and CA-Endevor/DB functions. A security class can be associated with a user, dictionary or CCID. Typically created once per job function or project, the Security Class can be associated with any number of users or CCIDs. Each CA-Endevor/DB user and CCID is associated with a Security Class. When a user is added automatically by the Dynamic Change Monitor, a default Security Class is assigned.

An important function of the Dynamic Change Monitor is to automatically associate Change Control IDs with a user's work in a particular data dictionary. This action is performed implicitly by the Dynamic Change Monitor by accessing the user's profile contained in the CCDB to obtain the current CCIDs for that individual, or by accessing the entity's profile in the CCDB to obtain the current CCIDs for that entity. From that point forward, all Change Log Entries (CLEs) in the CCDB for that individual or entity will be associated with the CCIDs obtained.

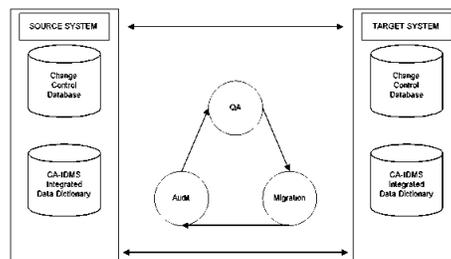
From the standpoint of Change Management, the benefits derived from the automatic association of CCIDs to work performed in a dictionary are numerous. This capability enables managers to examine the data dictionary entities modified for an individual project or for a group of programmers sharing the same CCID. Additionally, the CCID can be used as a selection criterion to identify the minimum set of dictionary entities to be promoted from testing to quality assurance or production.

## 3.5 Promotion Management

Promotion Management is the process wherein entities are moved from environment to environment within the software development life cycle. When these environments consist of multiple dictionaries, application development typically involves staged promotions of entities from one dictionary to another, such as Test to Quality Assurance to Production. This movement can be in any direction, from a variety of sources.

## 3.6 Overview

During Promotion Management, entities are copied from a Source data dictionary to a Target data dictionary. Unlike stand-alone migrators which treat migration as a separate function, CA-Endevor/DB provides full promotion management support by integrating quality assurance and audit functionality with the migration process.

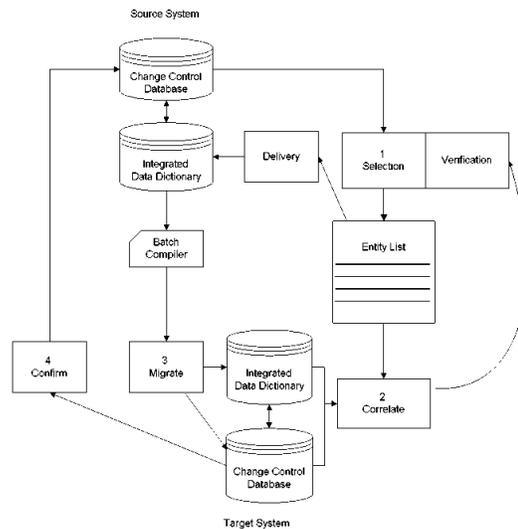


In order to successfully move an entity from one environment to another, a number of key questions must first be addressed:

- Exactly what needs to be promoted?
- Are there configuration dependencies which need to be resolved prior to promotion?
- How can concurrent updates be prevented?
- What impact will this promotion have on the target environment?
- Are there developmental differences which need to be resolved prior to the promotion?
- How can regression be prevented while migration is in progress?
- How is it possible to determine if the promotion is successful?

CA-Endevor/DB addresses these concerns through four integrated release management facilities:

1. Selection/ Verification
2. Correlation
3. Migration
4. Confirmation



How It Works: **1.** By examining change log entries, the Selection/Verification facility produces a list of those entities (and only those entities) that should be released or promoted. **2.** The Correlation facility expertly determines the impact of the promotion by identifying potential regression situations at the target system. **3.** The Migration facility transports the entities to the target system. **4.** The Confirmation facility completes the cycle by sending confirmation information back to the source system.

These facilities, in conjunction with the Dynamic Change Monitor and the Change Control Database, ensure accurate promotions while eliminating many of the time-consuming, manual tasks currently associated with CA-IDMS Release Management.

CA-Endevor/DB's Selection/Verification facility automatically produces a promotion candidate list based on your selection criteria and the change log information in the CCDB. Only those entities that have actually been modified in the source system since the last promotion to the target system are initially eligible for inclusion on this list. As an added quality assurance measure, the Selection/Verification facility determines dictionary configuration dependencies and incomplete development activities relating to selected entities.

The criteria used to select entities for promotion include CCIDs, users, status codes, management groups and date/time ranges. Entities in the candidate list can be signed out automatically at promotion time by the CA-Endevor/DB Verification processor to protect selected entities against unintended changes until the promotion process is complete. For this reason, selected entities remain signed out until they are received on the target system and confirmation is sent back to the source system, at which point they are automatically signed in.

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## 3.6.1 Correlation

Following successful verification of the entity candidate list, CA-Endevor/DB's Correlation facility performs additional quality assurance activities on the target system:

- **Impact Analysis.** Each entity in the candidate list is checked against the target system CCDB in order to determine which listed entities have been changed since they were last promoted from the source system. CA-Endevor/DB's Correlation facility utilizes IDD configuration information to determine not only which entities have changed since the last promotion but also which related entities might be adversely affected by the promotion or prevent successful promotion. In this way, CA-Endevor/DB isolates and identifies potential problems before any damage is done.
- **Source Comparison** CA-Endevor/DB's source comparator function can be used to further identify differences between separate copies of the same entity or system, line-by-line. This capability is especially useful when upgrading vendor-supplied application software, particularly if the original version has been modified by the user. Source comparison can also be performed as part of the standard promotion procedure to produce a full report of changes at migration time, or to merge source from parallel development activity.

## 3.6.2 Migration

Once the candidate list has undergone QA, the final promotion "picklist" is used by CA-Endevor/DB's Migration facility to copy source statements, executable modules or both from the source system to the target system. During Migration, the Dynamic Change Monitor on the target system is run in a special migration mode to reflect that data dictionary modifications are the result of migration.

After migration has been successfully committed and tested on the target system, the CA-Endevor/DB Confirmation facility sends a confirmation file back to the source system, reflecting the exact time the entities were received on the target system. The Confirmation facility then signs the migrated entities back in. At this point, a complete migration audit trail exists on both the source and target systems, identifying exactly what was sent, what was received, when and where. Furthermore, the migrated entities are freed so that the software development life cycle can continue.

## 3.7 Supporting Functionality

In addition to its change identification, change management, and release management facilities, CA-Endevor/DB provides security management, information management and the Endevor for OS/390-Endevor/DB Bridge.

### 3.7.1 Security Management

CA-Endevor/DB's security system controls access to data dictionary entities. It is designed to run either as a stand-alone system or in conjunction with existing security procedures.

The following capabilities are supplied with the CA-Endevor/DB Security System:

- **Signin/Signout** By automatically signing out an entity when it is first modified, this facility protects against concurrent updates to dictionary entities. Once signed out, an entity can only be modified by the user to whom it is signed out. To address those cases where teams of users must share entity access, CA-Endevor/DB's Security System supports signout to a Change Control Identifier (CCID). When an entity is signed out to a CCID, any individual working under that CCID can update the entity. If desired, automatic signout can be applied to specific entity types. Explicit signout is also supported for situations that warrant "reserving" an entity prior to actual modification.
- **Lock/Unlock.** This facility disables the use of a userid, CCID or dictionary. Using this facility, it is possible to "freeze" access to a dictionary, "shut out" a user from dictionary access, and "turn off" the use of a particular CCID.
- **Pre-Authorization** This capability is used to restrict certain users or groups of users from modifying particular entity occurrences and also to protect critical or sensitive entities from being modified by the general user population. Through pre-authorization, an installation can restrict the actions of selected individuals while allowing full or partial dictionary access to others. Certain individuals can also be allowed to override pre-authorization.
- **Entity Type Restrictions** This security option restricts update activity against all entities of a particular type. Through this function, for example, a user may be barred from modifying database definitions, but be allowed to update processes, dialogs and maps. Entity type restrictions can be set at the data dictionary, user or CCID levels. Using this function, it is possible to set up dictionaries for predetermined development functions.
- **Menu Tailoring** This facility authorizes privileged users to perform administrative CA-Endevor/DB tasks. Since CA-Endevor/DB's online screen design is menu-driven it is possible, through discrete function control, to define and display specific menu options as they apply to individual user authority levels.
- **Security Classes** These categories are provided to permit security access and discrete function control by organizational function and/or business unit. Defined only once per unique set of permissions, security classes contain a profile of security rules and can be associated with any user or CCID.

The CA-Endevor/DB Security System, in conjunction with the Dynamic Change Monitor, ensures that each entity update request is valid according to the security restrictions defined in the Change Control Database. If a request to update an entity violates established security rules, the Dynamic Change Monitor returns an error message to the user and prevents the request from passing to the data dictionary.

## 3.7.2 Information Management

CA-Endevor/DB provides extensive display and reporting facilities which can be used to perform workflow analysis, project tracking, trouble-shooting and audit management.

### 3.7.2.1 Displays

CA-Endevor/DB's Online Management Facility allows administrators to define and view change control information in the Change Control Database, to browse the history of changes made by programmers to dictionary entities, and to define and maintain information used to monitor project workflow and productivity. The following information is available online:

- CCID Change Log Detail
- CCID/Entity Status
- CCID List
- Change Log Detail
- Dictionary Detail
- Entity Current Status
- Entity List
- Entity Pre-Authorization by CCID
- Entity Pre-Authorization by User
- Entity Pre-Authorization Detail
- Entity Signout by CCID
- Entity Signout by User
- Entity Signout Detail
- Entity Status History
- Locked CCID Detail
- Locked Dictionary Detail
- Locked User Detail
- Management Group/CCID
- Management Group List
- Security Class List

- Status List
- User Change Log Detail
- User List

### 3.7.2.2 Batch Support

CA-Endevor/DB's Batch Management Facility provides batch support for many of the same functions as the Online Management Facility. The Batch Management Facility allows administrators to define, view, and/or punch change control information in the CCDB. The following information is available in batch:

- CCID Detail
- CCID List
- Dictionary Detail
- Entity Detail
- Management Group Detail
- Management Group List
- Preauthorization Detail
- Preauthorization List
- Security Class Detail
- Security Class List
- Signin
- Signout
- Status Detail
- Status List
- User Detail
- User List

### 3.7.2.3 Reports

CA-Endevor/DB's Management Facility enables managers to define the reporting structure by project or management group. This makes it possible to monitor and analyze change activity within the context of specific projects — the same way they are staffed and budgeted at the organizational level. The following information is available in report format:

- CCID Change Log Detail
- CCID Change Log Summary
- CCID/Entity Status
- CCID List

- Change Log Detail
- Entity/CCID Change Log Summary
- Entity Change Log Summary
- Entity Pre-Authorization by CCID
- Entity Pre-Authorization by User
- Entity Pre-Authorization Detail
- Entity Signout by CCID
- Entity Signout by User
- Entity Signout Detail
- Entity Status History
- Entity/User Change Log Summary
- Locked CCID Detail
- Locked Dictionary Detail
- Locked User Detail
- Management Group/CCID
- Management Group List
- Post Migration Activity
- Security Class/CCID
- Security Class/User
- Source Migration Summary
- Status List
- Target Migration Summary
- User Change Log Detail
- User Change Log Summary
- User List

### 3.7.3 Endeavor for OS/390-Endevor/DB Bridge

The Endeavor for OS/390-Endevor/DB Bridge assists in the promotion management process when both dictionary and non-dictionary entities (COBOL programs, for instance) are involved. As a link between CA-Endevor/DB and Endeavor for OS/390, this product interface provides centralized change logging and promotion management capabilities.

- **Centralized Change Logging** Using the Endeavor for OS/390-Endevor/DB Bridge, changes to both dictionary and non-dictionary entities are logged, tracked and reviewed in one central location — the CA-Endevor/DB Change Control Database (CCDB). As changes are made to Endeavor for OS/390 entities, that

change activity can be dynamically monitored through the Endeavor for OS/390-Endevor/DB Bridge and logged to CA-Endevor/DB's Change Control Database. The end result is a centralized view of all related change activity, regardless of whether that activity takes place in the dictionary or in Endeavor for OS/390. And through the use of CA-Endevor/DB CCIDs, all change activity pertaining to a particular maintenance request, development activity, or software release activity can be logged to the same CCID within the Change Control Database.

- **Centralized Promotion Management** When all change activity is being logged to the Change Control Database, it is possible to use CA-Endevor/DB's promotion management facilities to control the promotion cycle for both dictionary and non-dictionary entities. The Selection process can be used to produce an entity list that includes related non-dictionary structures (supporting COBOL programs for an ADS/Online application, for example) as well as all appropriate dictionary structures (maps, dialogs, processes, etc.). The Verification and Correlation processes can be used to assess the impact of both dictionary and non-dictionary changes. The Migration process can then be used to migrate changed dictionary entities from one dictionary to the next and move the related non-dictionary entities from one Endeavor for OS/390 location to the next. Finally, the Confirmation process can be used to complete the cycle by confirming the successful promotion of both the dictionary and non-dictionary entities.

### 3.7.4 CA-Endevor/DB: Benefit Summary

CA-Endevor/DB ensures complete control over applications development and operations in the CA-IDMS environment, yielding a number of immediate benefits:

- All change activity is automatically monitored and controlled, reducing human errors while increasing staff productivity.
- Projects can be tracked and reported on by management group or business unit — the same way they are planned and budgeted.
- Vendor-supplied updates and user modifications can be automatically compared, eliminating this resource-intensive, manual chore.
- Change control standards and security are administered automatically, saving time and assuring accuracy.
- A complete audit trail of development and migration activity is created and stored, thereby addressing all security and audit concerns.
- Promotion management activities are significantly enhanced, both in terms of accuracy and auditability.

# Chapter 4. Summary

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## 4.1 The Challenges of Software Management

In today's highly sophisticated CA-IDMS environment, managing development activities and operations can be extremely complex and unpredictable. Hundreds of environmental changes are evaluated, tested and implemented monthly, and sometimes weekly, to keep up with growing business demands. While these efforts are essential to controlling application backlogs, they require increasing numbers of skilled personnel — each with clearly defined responsibilities, and each with specific requirements for controlling change:

- **Development and Maintenance** groups develop and maintain software systems to meet both internal service requirements and external competitive demands. They are involved with tracking and analyzing the impact of change and are concerned with preventing concurrent updates as they juggle parallel development activities.
- **Technical Services and Production Control** are responsible for maximizing system availability — and quickly identifying and solving problems which affect uptime. In addition, these groups typically manage vendor releases and seek secure and reliable ways to automate promotion control.
- **Auditors and Security** groups are involved with ensuring system and data integrity and recoverability. Consequently, they are concerned with controlling security access and establishing audit trails of *who* did *what* and *when*.
- **Database Administrators and Quality Assurance** personnel are responsible for developing effective and consistent procedures for testing and promoting applications throughout the development life-cycle. These groups require methods for controlling problem correction and preventing regression.

## 4.2 Solutions for Software Management

Computer Associates directly addresses these requirements through an automated, integrated software management system — CA-Endevor (Environment for Development and Operations). The CA-Endevor system provides a comprehensive framework within which all change activities are automatically monitored and controlled throughout the entire software development life cycle, from specification through production. CA-Endevor's integrated components cover all functional areas of software management: change identification, change management and release management.

## 4.3 The Benefits of Automated Software Management

Up until now, many of the tasks associated with change control have been performed manually. Given the size and complexity of today's growing CA-IDMS environments, however, manual methodologies are becoming less feasible in terms of accuracy, reliability and manageability. Automated software management systems can be used cost-effectively to perform repetitive and time-consuming chores such as tracking change information, comparing software versions from release to release, and detecting problems as they occur. This, in turn, enables skilled personnel to spend their time more productively by doing impact analysis, project management and strategic planning.

CA-Endevor/DB provides facilities for maintaining, controlling and securing computer operations and application development processes in the CA-IDMS environment. Based on advanced change control technology, CA-Endevor/DB provides an automated and accurate method for:

- Protecting corporate software assets by ensuring system and data integrity.
- Providing integrated dictionary change management.
- Delivering total accountability and auditability through change tracking and reporting.
- Comparing and implementing vendor software releases.
- Managing parallel development and testing activities.
- Preventing regression and concurrent updates during software promotion.
- Extending and enforcing security standards and ensuring system integrity.

CA-Endevor/DB has proven to be the exclusive method used to fully satisfy the most rigorous challenges and concerns of both internal and external auditors.



