The Common Desktop Environment

By Rebecca F. Austen

The Common Desktop Environment (CDE) is a unified graphical user interface for open systems, jointly developed by IBM, Hewlett-Packard® (HP™), Sun®, and Novell®. This article provides an overview of CDE and its components, describes the benefits of CDE to end users and application developers, and explains how CDE will be integrated into AIX.

The desktop, an interactive graphical user environment, has become a natural extension of the computer, as essential to many users as the display, keyboard, or mouse. The desktop enables people to access and share information electronically; it is how we work, study, and communicate with others across networks of computers. Based on industry-standard technology and jointly developed by industry leaders IBM, HP, Sun, and Novell, the Common Desktop Environment (CDE) is a rich and intuitive user interface for open systems. Designed for enterprise computing, CDE unifies the scales across a variety of UNIX platforms and provides a complete desktop appealing to a wide range of users from the novice to the expert.

Target Audiences

The Common Desktop Environment addresses three key audiences: end users, system administrators, and application developers. The following sections discuss its appeal to each group.

End Users

A visually appealing and highly customizable interface, CDE is innovative, consistent, and easy to use. It ensures end users transparent access to data and applications across a network, and supports both stand-alone workstations and distributed, heterogeneous environments. Optimized to take advantage of client/server configurations, CDE enables users to run shared applications and manipulate data at remote servers, even if they do not know the names or locations of these systems. Because CDE provides a common "look and feel" and behavior for different platforms, users familiar with CDE can easily move from one platform to another. To further assist users, CDE is equipped with extensive online help as well as hardcopy manuals for more detailed explanations of the various tools and features.

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System Administrators

For system administrators, CDE presents an integrated approach to accessing applications, either local or on remote hosts. System administrators can configure the desktop to enable users to access their data and applications without knowing complex commands or host names. Installation of CDE is simple for administrators; most of the setup is handled by tools packaged with the desktop or through ASCII configuration files that are stored for future editing.

Both the runtime and development environments have a well-defined packaging scheme. Although most file names, locations, and formats are the same regardless of the operating system, there can be differences in the actual installation of the desktop on each platform. CDE is designed for distributed computing; users and applications can rely on location transparency for display services, execution, data, and sessions. Configuration files handle the definition and location of session and application servers, and support both standard network filesystems and distributed filesystems. CDE allows for varying points of administrative control—either centralized or distributed.

Tunable and scalable to the needs of the user community, CDE allows administrators to leverage existing hardware and software investments. All systems can participate as application servers, even those that do not have CDE installed. While the initial installation and setup of the desktop

can be simple, administrators deploying CDE in a broad network with many users should have some knowledge of network configuration procedures.

Application Developers

CDE provides a broad and comprehensive set of standardized Application Programming Interfaces (APIs), formats, and policies for developers. The CDE toolkit facilitates development of applications that are seamlessly integrated with the desktop and with one another. Programmers enjoy a rapid development cycle, which enables them to build on the core services provided by CDE and focus their efforts on their applications. The suite of development tools and services increases programmer productivity; that is, they can use tools such as the Graphical User Interface (GUI) builder instead of programming to lower-level APIs.

There is a high degree of application portability across multiple platforms. Since CDE is implemented from a common source base, it is compatible across different systems. CDE fully supports the installed base of applications; existing X Windows, OSF/Motif®, and OpenLook® applications are binary compatible and should run in CDE without modifications.

The COSE Process

The Common Desktop Environment has been developed under the Common Open Software Environment (COSE) process that was introduced in March 1993 to accelerate the development of industry standards in several core technology areas. This process promotes rapid delivery of specifications, while preserving customer choice of products across a range of platforms. CDE, based on the established standard X Window System® (X11) Release 5 and OSF/Motif 1.2, incorporates proven desktop technology from IBM, HP, Sun, and Novell. These four companies are jointly developing a sample implementation of CDE from a single, shared source base; their combined efforts will result in nearly identical desktops on all the supported platforms, including AIX 4.1. (Some differences may exist in operating system-specific areas such as installation and packaging, or value-added tools.)

The CDE technology can also be licensed to other vendors. An open process is used for standardizing the CDE specifications. Through its desktop working group, X/Open is soliciting industry feedback and establishing the branding and certification process for the standard. The result is an open desktop with broad industry acceptance and choice of vendors for the implementation.

A snapshot of the CDE software and documentation was released on CD-ROM for wide public distribution at the CDE Developer's Conference in October 1993; the snapshot was updated and redistributed in April 1994. By providing early access to the technology, this preview enabled end users and developers to begin porting their applications to CDE and to provide direct feedback to the engineering teams before the completion of the joint sample implementation.

Desktop Overview

IBM is introducing a subset of the CDE technology in AIX 4.1. This desktop, based on the content of the April 1994 snapshot, represents a derivative of the CDE joint sample implementation, targeted primarily at end users. It fully replaces the AIX desktop offered in previous versions of AIXwindows/6000; migration tools will be provided in a subsequent release for users who make the transition from previous versions of AIX to the new desktop.

CDE incorporates proven desktop technology from IBM, HP, Sun, and Novell.

Although most features of CDE are available in AIX 4.1, tools such as mail and calendar are offered only as sample programs in the initial release. There is currently limited support for application developers. Subsequent releases of AIX will incorporate the remaining CDE features, including the complete development environment and deployment in multiple national languages. Once the joint sample implementation of CDE is complete, IBM will integrate CDE fully into AIX.

Getting Started

The AIX 4.1 desktop, packaged with the operating system, is the default environment at system initialization (assuming a graphics adapter is present). At startup, the user is presented with a graphical login screen. Upon entering a valid user name and password (optional), the user reaches the default desktop, shown in Figure 1.

Users can begin using the desktop and applications immediately, or customize the desktop for a more personal configuration. Many familiar AIX tools, such as the System Management Interface Tool (SMIT), Visual System Management (VSM), and InfoExplorer, can be launched directly from the desktop. Other products, including third-party applications, are easily deployed on the desktop by using the Create Action tool, which defines an icon and execution instructions for launching the program from the desktop. After invoking Create

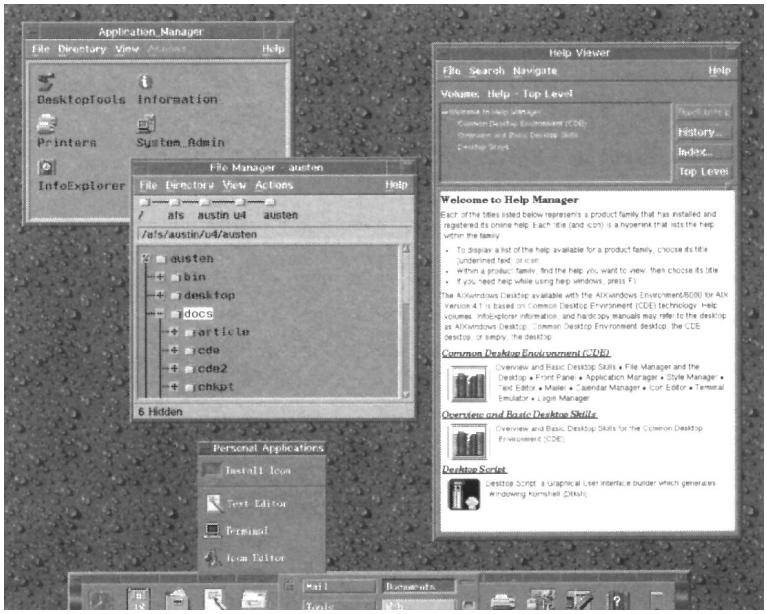

Figure 1. Default desktop

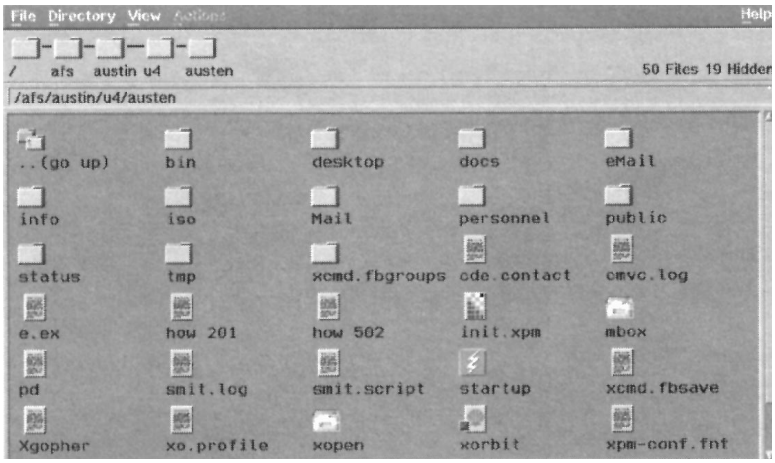

Figure 2. Desktop file manager

Action, the user completes a simple dialog, and an icon is created in the user's home directory (viewed from the desktop file manager, shown in Figure 2).

The user double-clicks on the icon to invoke the application. This icon can also be dragged and dropped into the Personal Applications slide-up on the front panel (see Figure 3). This provides quick access to frequently used programs.

This procedure—the combination of creating an action icon and accessing it through either double-clicking or the slide-up—is the simplest way to begin running applications on the desktop. Creating actions to launch applications can be performed by the end user or preconfigured by the system administrator. To learn more about the desktop, new users are encouraged to navigate through the online help system (Figure 4) or explore the tools in the front panel or in the application manager.

To run traditional command-driven programs, users have two options. They can either launch the terminal emulator or use the desktop tools to easily create a graphical front end.

Desktop Features

The broad scope of the desktop encompasses core services as well as productivity tools and applications. The base support covers areas such as window management, file management, customization, and online help. Advanced programming services for inter-application communication include messaging, drag and drop, data interchange, and session and workspace management. CDE also offers a complete development environment, including libraries, custom widgets, header files, and application building tools.

Not all of these capabilities, particularly the development environment, will be available in the initial AIX 4.1 desktop release, but additional features will be included in subsequent releases once the CDE specification is complete.

Window Management/Front Panel

The window manager and front panel control access workspaces, applications, devices, and frequently used objects. The window manager, based on OSF/Motif 1.2 standards, incorporates extensions to support multiple workspaces (additional areas of screen space). Figure 5 shows the front panel with the workspace selectors in the center and slide-up subpanels that provide access to additional selections.

There are also convenient screen-lock and logout icons. Simple pop-up menus enable the front panel to be customized: users can add, delete, or rename workspaces; create subpanels; and create or delete subpanel entries. By modifying additional configuration files, the front panel can be significantly altered to support specific installation needs, such as changing the front panel dimensions or screen placement, replacing controls, and so on. Although this level of modification is not recommended for the average user, it can be useful when deploying CDE for users

who have different levels of experience or need access to a predefined set of applications.

File Manager

The file manager (Figure 2) is used to browse and manipulate objects, folders, and directories. It includes the following actions: browsing files and directories; creating, moving, copying, and deleting objects; and changing the properties of objects. Most of these actions can be performed either via direct manipulation (drag and drop) or through the menu interface. For example, a file can be deleted by dragging and dropping it to the trash can in the front panel, or by selecting the object and choosing "delete" from the menu.

Style Manager

The desktop and its applications are customizable through the style manager, which enables users to change color palettes, backdrops, mouse and keyboard settings, window behavior, screensavers, and session support.

Users can create their own colors and backdrops or use the defaults supplied with the system. System administrators can also preconfigure the desktop and make these settings available to other users.

Online Help

The desktop provides an interactive online help system that includes browsing and hypertext support for information based on SGML.

The help manager includes an API so that applications can present their own context-sensitive help windows. The author creates the help information in a tagged format. During the application integration process, the application help volumes are registered with the help manager to ensure that keywords can be searched in the central index and that application-specific help information is displayed properly. This eliminates the need for application developers to create a help system. It also ensures that online information is displayed in a consistent format.

Programming Services

The desktop provides application integration services, including application launching, data exchange, drag-and-drop, and cut-and-paste conventions. Object behavior is defined through actions and file type definitions that are generated through the Create Action tool or that can be manually entered in editable ASCII files in a simple

Figure 3. Personal Applications slide-up

configuration language. Object behavior is keyed off the file name, content, or other attributes.

For example, all files with the extension `.ps` (PostScript®) can be defined to automatically launch a PostScript browser when double-clicked (default action), or be sent to the PostScript printer when the Print action is selected. Alternatively, the behavior can be defined by the file's content or format rather than by name. By setting up actions and file types within CDE, the user obtains an intuitive, object-oriented, or data-centered desktop. Objects have predictable behavior when they are manipulated, and applications can be launched naturally through the data types they support. For example, the user can double-click on a spreadsheet data file to launch the spreadsheet program rather than launching the program before opening the data file.

Network services within CDE include the ToolTalk® messaging facility for communication among applications and a remote execution capability that ensures transparent access to network applications. The messaging service handles notification of events and data transfer. All applications should be able to receive and respond to basic desktop messages, and many applications will send messages as well. This enables seamless integration of applications with the desktop and with other programs.

Drag and drop, pervasive in the desktop, is supported through convenience functions and extensions to the OSF/Motif 1.2 drag-and-drop

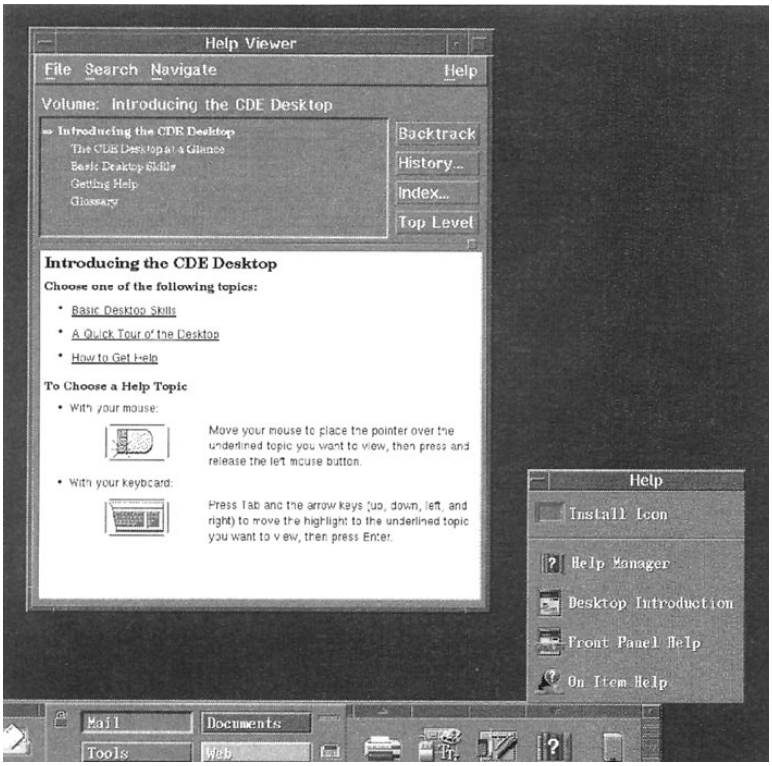

Figure 4. Online help system

Figure 5. Front panel

interface. Once an object registers itself as a drop site, it is notified of events via callbacks. It can then respond with appropriate visual feedback, data transfer, and behavior.

The session manager is based on standard ICCCM conventions for saving and restoring application state; the application is notified when the session is ending so that it can preserve its current state, and then restore it when the session restarts. With the session manager, users can restart a previously exited desktop session and resume working as if they had never left.

The workspace manager ensures that applications behave properly when the user moves from one workspace to another. Default behavior is handled by the workspace manager; that is, the application remains in its defined workspace when the user moves to another space. Applications can control their own behavior across multiple workspaces if necessary, although it is not recommended since it may interrupt the user unexpectedly. Using the workspace manager can be especially useful, for example, if an application needs to post a warning message in the current workspace to get the user's immediate attention.

Productivity Tools

The desktop offers a set of graphical tools for displaying and editing data and collaborating with other users. Figure 6 shows some of these tools: a text editor, an icon editor, and a calendar tool. The mail tool is not pictured.

These applications are tightly integrated with one another and with the desktop services, so that information can be shared and transferred among them. For example, a user can use the editor to compose a mail message (including a meeting notice), use the mail tool to send the message to another user, then drag the embedded appointment and drop it into the calendar for scheduling. A print tool, which acts as a drop site for objects to be printed, displays the status of queues. Additional tools come with the desktop, such as a graphical calculator, a front panel clock, and screensaver support.

Application Development Tools

The desktop provides a dialog and scripting service (based on the windowing Korn Shell technology) and a basic application builder; both support rapid prototyping and development of graphical interfaces for the desktop without requiring advanced programming skills. IBM also offers Desktop Script, a graphical front end to the scripting service, which enables the user to create a graphical interface using drag-and-drop and then automatically generates the script.

Desktop Script is an easy way to create highly portable user interfaces without programming; it is also a convenient tool to use if the developer's environment is not available or installed.

IBM's AIXwindows Interface Composer (AIC) is an advanced graphical user interface builder currently offered as a separate product for AIX. Future versions of AIC will incorporate the CDE style and interfaces.

The User Model

The Common Desktop Environment is based on a consistent user model for interaction, behavior, and application design. It centers on an object-oriented, direct manipulation approach, and its "look and feel" is based on the OSF/Motif 1.2 style guide, with extensions to support OpenLook compatibility and convergence with IBM's Common User Access™ (CUA™) standards. The

desktop has its own style guide, including a checklist to verify that applications comply with the user model.

Internationalization

The desktop is fully internationalized with industry-standard interfaces (XPG4, POSIX, X11R5, and so on). The implementation maintains codeset independence and enables languages to be selected at runtime.

Summary

The Common Desktop Environment brings significant unification to open systems. By presenting a consistent GUI across multiple operating platforms, users have the power of a desktop that was designed for distributed computing from several vendors. The programming interfaces for CDE are fully documented and standardized, promoting a robust and portable environment for application developers.

IBM is introducing an early version of the CDE technology into AIX 4.1 and will follow in subsequent releases with more advanced features and conformance to the CDE joint sample implementation and specification. By offering the desktop with the operating system, CDE will become the pervasive graphical environment for AIX users.

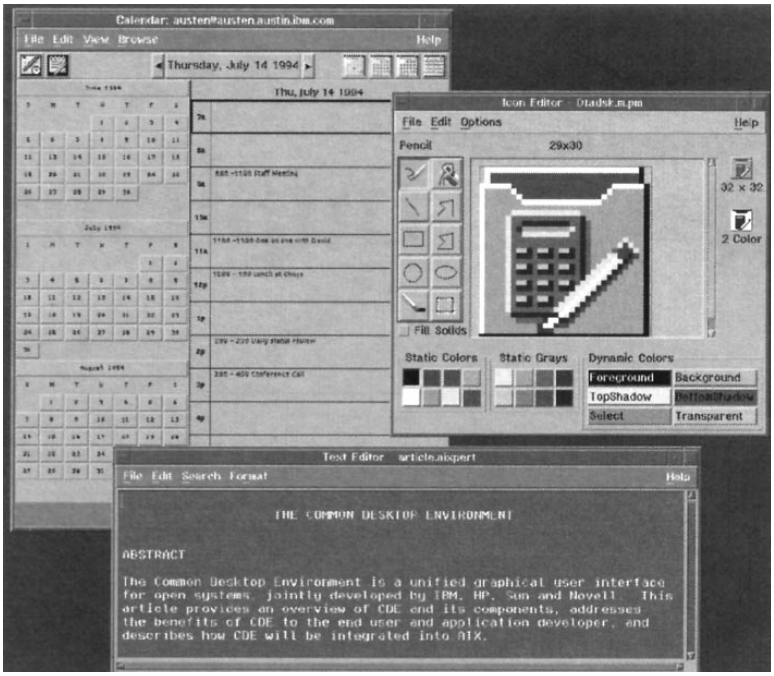

Figure 6. Graphical tools for displaying and editing data

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