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IMPLEMENTING A COMPUTING ARCHITECTURE WITH WISDOM (U)

by

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Implementing a computing architecture with WISDOM

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Over the past two years, the Savannah River Site (SRS) work force has expanded by more than 6,000 employees. This large influx of personnel, in conjunction with the limited office space, has resulted in an overcrowding problem on site. To alleviate some of the overcrowding, Westinghouse Savannah River Company (WSRC) has been in the process of leasing space from several office buildings within Aiken, SC.

Brookhaven, the latest off-site office building to be leased, is the starting point for a new direction in office automation which will eventually spread throughout SRS. The computing architecture in place at Brookhaven was designed to adhere to the SRS computer architecture guidelines as published by the WSRC Computer Architecture Standards Team (CAST). At the heart of the Brookhaven implementation is a Workstation Integration System for DOS, OS/2 and Macintosh (WISDOM). The key features of the WISDOM system include: it's utilization of a Local Area Network (LAN), it's Graphical User Interface (GUI), it's cross-platform capability, it's portable user interface, and the installation program.

To begin, I will give an overview of the network architecture, then discuss WISDOM in detail, mention some platform integration problems that need to be addressed and conclude with a summary of the user benefits that WISDOM provides.

ARCHITECTURAL OVERVIEW

Since the key features of the Brookhaven architecture appear in the top layers of the ISO model, I would like to describe the architecture starting from the bottom up. At the physical and data link layer we are using 10-base-T Ethernet. There are approximately 280 IBM PS/2's equipped with 3Com Etherlink cards, and 135 Macintosh's equipped with Cabletron TC connect cards. The workstations connect into modular jacks, within each office, which feed into one of two main coax segments. Each segment connects to one of several Cabletron multi-media access centers which are then fed into a cisco router. The cisco connects to a T1 line via a CSU/DSU after having passed through a Timeplex multiplexer. The purpose of the multiplexer is to allow both Ethernet and 3174 data streams to pass through the same T1 line back to the site. To handle Macintosh printing on the network, there are several Farallon Star Controllers and a Shivia Fastpath. At the network, session and transport layers, the following protocols are being routed : TCP/IP, DECnet, IPX, and Appletalk. At the presentation and application layers, Novell's

Netware386 3.1 provides the network operating system and utilities for the LAN. On the IBM PS/2 workstations, the GUI is provided by Microsoft Windows 3.0, VT220 emulation is provided by Novell's Host Presenter 1.0 using TCP/IP and 3270 emulation is achieved by connecting Eicon's Access for Windows to an Eicon gateway via Novell's IPX. On the Macintosh workstations, VT220 emulation is achieved using Pacer's Pacerlink 5.3 via TCP/IP, and 3270 emulation is provided by a public domain package called Telenet 3270 which uses TCP/IP.

As a separate category, I would like to mention the end user application packages that are currently provided on the server. Since Windows provides the GUI for WISDOM, the server applications were selected with a preference towards fully windowed products. Hence, the majority are from Microsoft, (e.g. Word, Excel, Powerpoint, and Project). The graphics package provided on the server is Micrographx Draw Plus. There are also three non-windowed packages that are provided due to their large customer base: Lotus 123, WordPerfect, and dBase III. Currently, there are no Macintosh applications provided by the server, but this is a matter that I will discuss later in the presentation.

WISDOM

WISDOM is a collection of computer programs which provide a means for implementing architectural guidelines and standards. Functionally, WISDOM acts as a coordinator between three separate entities all requiring certain rights to a workstation. First, the system administrator wants to control access to applications, network utilities, and security features. Secondly, the workstation requires a valid configuration file to operate as intended, and therefore needs to be protected from unintentional modification. Finally the user wants the ability to personalize his workstation but needs to be protected from making any changes that would cause his workstation to deviate from the set standards. All three entities share some portion of the overall control of the workstation.

At Brookhaven, both segments of the Ethernet network have IBM PS/2 Model 80's, with dual 650 meg hard drives, set up as dedicated Netware servers, BH01 and BH02. Within each server, the SYS volume is reserved for Netware system files and the applications that will be run under each platform. There is also a logical drive, K, that is mapped to the application portion of the SYS volume. The second volume has two drives, I and J, mapped to the root directory. The I drive provides space for individual user directories and the J

drive is reserved for data that is to be shared among users on the same server, i.e. a shared directory. There is also an option within WISDOM to allow individual departments to map an M drive to a separate departmental server or to any location where they want to store shared data.

When a WISDOM workstation is booted, the *autoexec.bat* file calls the *network.bat* file which among other things establishes network connectivity, executes the sign-on screen program, and if needed, runs Prewin, Windows and Postwin.

The SRS network sign-on screen is generated by *Srsnet.exe*, which accepts a text file as a parameter and displays the default server and printer for the workstation. The user is asked to enter a userid and the name of a file server. The user has the option of connecting to the default server e.g. (BH01 or BH02), exiting to DOS, running the workstation in local mode, or connecting to any other accessible server. If a user is away from his office, he can enter the name of his default office server, BH01 for example, and his I drive will will be pulled from BH01, however, any applications that the user needs will be run from BH02 or whichever server is closest to the workstation in use. This feature makes the WISDOM user interface portable and eliminates unnecessary traffic on the network.

Prewin is a program written in Clipper which dynamically builds Window's two initialization files *progman.ini* and *win.ini*. By dynamically building these two files, Prewin allows for system administrator control of the Windows environment. The *progman.ini* file determines which group icons appear when Windows is executed. A file called *progman.dir* contains a list of directories to be searched for *.grp* files. Prewin reads the *progman.dir* file and updates the *progman.ini* file with a list of group files to display on the desktop. The second file, *win.ini*, lists the remaining modifiable features of Windows. Manipulation of this file provides the major basis for the division of control within WISDOM. The *win.ini* options are divided into three files, *win.sys*, *win.ws*, and *win.usr*, each representing a controlling entity. A fourth file, *win.prg*, acts as a driver file instructing Prewin how to merge the system, workstation, and user files to form *win.ini* .

To illustrate how the files are merged, I would like to give an example of a Prewin command line as found in the *win.prg* driver file.

.RLS [WINDOWS] LOAD

The syntax of the command line includes a three character code which is used to determine which entity has control, and therefore,

which file contains the necessary information for an option. The first character of the code is always R, to indicate Replace. The second character is either L or B to indicate Line or Block. and the third character is either S, U, or W, to indicate System, User or Workstation, respectively. The example above indicates that the LOAD line in the [WINDOWS] block of the *win.ini* file should be replaced by the LOAD statement from the *win.sys* file.

Postwin also uses *win.prg* and updates files in a similar manner. Postwin extracts changes from *win.ini* and updates the *win.usr* file with any allowable changes made by the user. For example, if the user changes the wallpaper feature within Windows, the change will be recorded in *win.ini*. After Windows has finished running, Postwin will update *win.usr* with the appropriate .RLU or .RBU statement to reflect any changes that were made. The next time the user signs on to a workstation, Prewin will execute and incorporate the changes into *win.ini* as a result of the new .RLU or .RBU statements.

The installation program for WISDOM, which is stored on a separate server, NSC01, was written in Clipper, Advanced Revelation, and dBase III. The installation program is menu driven, easy to use and designed to solicit several types of information from the installer. The key advantage to the install program is it's use of a database to store options and workstation specific information. During an install of a workstation, the installer is required to input the Ethernet address, the TCP/IP address and the workstation serial number. This information can then be utilized by the system administrator or support personnel to track equipment and trouble-shoot problems. The install program also collects user specific information and generates the necessary mappings of the I and J drives on the appropriate server. Another feature of the install program is it's utilization of configuration variables. For example, if a workstation has an 5 1/4 inch high density drive and needs to be equipped with Windows' SmartDrive, then the *config.sys* file for that workstation will be created to include the appropriate device statements. If a previously installed workstation needs to have specific options changed, a soft install utility is provided which will only load the files that are necessary for the change. A typical option that requires this type of modification is the assignment of default print queues. The soft install allows the system administrator to change the default print queues without completely re-installing.

MACINTOSH INTEGRATION

Originally, the Macintosh portion of WISDOM was to be fully implemented along with the DOS and OS/2 machines. However, the Netware386 version which provides Macintosh support was still in the beta test phase when WISDOM was put into production. Eventually, version 3.11 of Netware 386 will be implemented to provide support for Macintosh's on the network. As it stands, Macintosh users are currently connected to an Appleshare server which mimics the configuration of the Novell servers. For example, users who sign on to an PS/2 have access to their personal data (I drive) , group data (J drive), applications (K drive), and departmental servers (M drive). On the Appleshare server, users have access to personal folders, group folders, and other Appleshare servers, however, applications are stored on the individual workstations. Some differences that appear between the Netware and Appleshare servers include the number of levels of security, 8 vs. 3, and the ability to hide unaccessible files under Netware vs. the "greyed-out" effect under Appleshare. When Netware 386, 3.11 is implemented, the Appleshare servers will be phased out and everyone will connect to a Netware server.

SUMMARY

So far, WISDOM has been installed at two offsite locations. The WISDOM project team is currenty working with users at these locations to determine to what extent WISDOM has helped or hindered their productivity. On the positive side, WISDOM supplies a GUI which, when fully integrated, will provide users with one method for "dealing with their computers". In regard to support, WISDOM users can expect a more knowledgeable support staff due to the limited number of applications on the server. For example, since Microsoft Word and Word Perferct are the standard word processors on the server, support personnel do not have to learn the intricacies of every word processor in the marketplace. WISDOM's portable user interface allows users to conduct their work wherever there is an available workstation and at a location the size of SRS, portability is a major productivity aid. Finally, since WISDOM utilizes a local area network, all the benefits associated with a LAN, such as shared devices and client-server capability, can be attained.

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