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DOCUMENT TRANSFER AND TRANSLATION**

by

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**PERSONNEL COMPUTERS AND ALL-IN-1:
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ABSTRACT

The Savannah River site is currently utilizing a multi-vendor approach to provide Office Automation. Personal computer workstations include the Apple Macintosh, IBM PC, DEC Rainbow and DEC VAXmate. Users of these workstations typically employ a variety of word processing and graphics packages to produce documents, many of which need to be exchanged in reviseable form with users of different word processing packages.

Since most of these same users are utilizing terminal emulators to access the departmental ALL-IN-1 systems, the need/desire to translate and/or transfer workstation-created documents via electronic mail naturally arose.

We will discuss our enhancements to document transfer capabilities of ALL-IN-1 to support host-initiated file transfers to and from any of the above mentioned workstations. Documents, including attachments, may be uploaded to, or downloaded from, ALL-IN-1 in their native format or with conversion. Document conversions are performed "transparently" using ALL-IN-1 DSAB's or third party packages with attributes such as rulers, soft returns, bolding, and underscoring preserved. Support for translation independent of transfer is also provided and a "Get From Personal Computer" option has been added to the editor menus.

Included in our discussion will be a summary of the supported terminal emulator file transfer packages, the various workstation to VAX hardware connections utilized, and the capabilities of the file conversion packages that are currently available.

INTRODUCTION

The phone just rang; it was your boss. His superintendent had just called and said that the report originally due next week must be ready in one hour. Your group has been working on the individual sections, but nothing has been pulled together yet. Jane has a great graphic that she's done on the Macintosh, while Bill has his data analysis prepared in a WPS-Plus document under ALL-IN-1. Joe is just finishing up his conclusions using Displaywrite 3 on the IBM PC, while you've been using Word Perfect to write the introduction. To top it all off, your boss, who's office is 20 miles away, wants to add a last minute management overview section and he's a Macintosh Microsoft Word user.

As personal computer and local area networks increase in numbers, scenarios like the one described above

become increasingly frequent occurrences. This paper will discuss the approach taken by the Savannah River Plant in addressing the challenges of document transfer and translation.

BACKGROUND

The Savannah River Plant (SRP) is a Department of Energy facility located on a 350-square-mile reservation outside of Aiken, South Carolina. The plant, which is operated for the government by E. I. du Pont de Nemours and Co. Inc., produces special nuclear materials, primarily for use in the nation's defense programs. The site currently employs about 13,000 workers in technical, production, clerical, construction, and security roles.

In January of 1985, Du Pont management commissioned a study of how the long-term information needs

of the site could be met. The result of this study was a 10-year plan calling for the implementation of a sitewide information system which would help solve problems like the one described above. The final system would include:

- Extensive local area networks
- Personal computers in all work locations
- Direct workstation to workstation and workstation to central computing facility (CCF) access
- Office Automation and CAD/CAM computers

The Computer Projects Department (CPD) was subsequently formed to address the needs of the information system plan. Since that time, one of the major tasks of CPD has been to procure and install personal and office computers and the networks necessary to tie them together.

Currently, local area networks are being installed at major plant facilities. These networks are interconnected via Applitek bridges to the large sitewide broadband system. (There are 41 miles of broadband cable at the site.) Twelve departmental office automation systems, consisting of Digital VAX 8550 and MicroVAX II computers, are in place. ALL-IN-1 is the primary user interface for information system access and approximately 1,800 of the projected 4,400 users currently have accounts.

Objectives

There are a variety of word processors and personal computers in use at the Savannah River Plant. Currently Apple, IBM, and Digital personal computers (pc's) comprise the 4,000 workstations in use at the plant. Of these workstations, approximately 2,000 are IBM (XT's AT's or PS/2's), 1,500 are Apple Macintoshes, and 500 are Digital Rainbow or VAXmates. On these workstations, a variety of word processors are used and require interchange. Additionally, a variety of other applications are in use including graphics, spreadsheets, and databases.

The goal of the document transfer and conversion effort was to allow users to electronically exchange reviseable form documents throughout the site. This was desirable in order to eliminate the existing "foot-net" method of transferring documents - a method impractical when facilities are as much as 15 miles apart. It was also desirable to eliminate the re-typing of documents which

occurred whenever two users of dissimilar word processors wanted to exchange documents.

Given the multivendor environment present at the site, another of the objectives of the document transfer/translation application was to allow users to continue to utilize their existing workstations and word processors, whenever possible. It would be impossible to replace all of the existing workstations at once, much less with a single vendor solution. Additionally, it was felt that the training and support workload would be smaller, and automation efforts would be more openly received, if users retained as much of their existing environment as possible.

A final objective was that any document translation solution be an integral component of the site ALL-IN-1 Information System.

DOCUMENT TRANSLATION

Requirements

As stated above, there were several word processors in use at SRP which require support. These are listed in Table 1:

Table 1. Word Processors in Use

<u>Apple</u>	<u>Digital</u>	<u>IBM</u>
Macwrite Microsoft Word	WPS-Plus	Displaywrite Wordstar Word Perfect Multimate Microsoft Word

There needed to be a way to convert a document created using these word processors into any other format, while retaining as many attributes as possible, especially character attributes (bold, underline, etc.) and rulers.

Technical Approaches

There are two approaches which can be taken in order to meet the above requirements. One can either:

- (1) Enhance ALL-IN-1 so that it can read/write/convert these document types, or

- (2) Develop software outside of ALL-IN-1 that performs the translations, using ALL-IN-1 just to mail the documents.

The first option is the more desirable solution because:

- It would not be necessary to translate the entire document in order to read a portion of it - with ALL-IN-1, translation occurs a line at a time
- ALL-IN-1 has an implicit conversion capability, allowing translation to be performed by a simple copy operation
- Append, merge, list, and other ALL-IN-1 functions would work on any document.

There are disadvantages to option (1) however, which include:

- Digital does not supply sufficient technical information for users to develop and integrate the required conversion mechanisms
- The programming effort would be large and time consuming
- CPD would have to support any custom conversion software
- It assumes access to all word processor file formats

The second option, likewise, has its advantages and disadvantages.

On the positive side:

- CPD already knew of a vendor who produced a personal computer based system which did most of the required conversions.
- The conversion software need not be dependent upon internal knowledge of ALL-IN-1

On the negative side,

- It would not be a true integration with ALL-IN-1, therefore a mechanism would have to be developed to allow ALL-IN-1 to "deal with" the document types, while not interpreting them.
- The existing software was relatively slow
- A translation would require converting the entire document in order to read a single line

The final solution, as might be expected, is a hybrid of both approaches.

Translation Software

The word processing document translation is performed using two pieces of purchased software, ALL-IN-1 and KEYpak, which minimizes the support and development and support required.

KEYpak

The stand-alone translation system which CPD had experience with is produced by Keyword of Calgary, Alberta. To use that system, floppies are inserted into a disk drive unit attached to a personal computer, and software is run to translate between the source and target formats. CPD approached Keyword with the idea that they port the translation software to run in a VAX/VMS environment in order to translate files which had been uploaded from personal computers. Keyword ported the software to VMS and it is now available as their KEYpak product. KEYpak does not support all translations available on the stand-alone system, but the translations CPD desired are available.

To use KEYpak, an image is run and the following information is provided on the command line: source file name and format, target file name and format, conversion log file name, and optionally, a configuration file name. The configuration file contains special translation directives. A status is returned which indicates the success of the translation.

ALL-IN-1

In addition to Keyword, CPD also met with Digital to discuss adding functionality to ALL-IN-1 which would allow it to read additional word processing formats. [This ALL-IN-1 facility is commonly referred to as a Data Set Access Block (DSAB). Standard ALL-IN-1 has DSAB's for WPS-Plus, ASCII, and DEC DX.]

Savannah River first requested that Digital develop a DSAB which would allow ALL-IN-1 to read and write Macwrite files. Macwrite was selected because it was the dominant word processor on the Apple Macintosh and because Keyword did not provide a Macwrite translation routine. Also, the users of Macwrite were typically persons who would want the ability to read a Macwrite document without waiting on a translation to take place. Digital did develop the DSAB, which is currently available as the "Macwrite Handler for ALL-IN-1."

If we were to be able to use ALL-IN-1 to mail documents that were of any file type, we also required a DSAB which deals with files irrespective of their contents. A "foreign" or "binary" DSAB was already under development by Digital and met just those requirements. When a user attempts to read or edit a document which has a DSAB type of "BINARY," a message appears which reads: "This file cannot be read by ALL-IN-1." Whenever binary files are copied using ALL-IN-1, the copy is done in a block-mode fashion and no interpretation of the contents is attempted.

Supported Translations

Using KEYpak and ALL-IN-1, translations can be performed between any two of the word processing formats in use at the site. This is possible because both translation packages support DEC DX as an input or output format. Because of this, DX can serve as an intermediate format when no direct translation is possible. To convert from WPS-Plus to Word Perfect, for example, the WPS-Plus file would first be converted to DX using ALL-IN-1, then the DX file would be converted to Word Perfect using KEYpak.

Translations supported by each of the conversion packages are listed in Table 2.

Table 2. Supported Translations

<u>ALL-IN-1</u>	<u>KEYpak</u>
WPS-Plus	Displaywrite
ASCII	Wordstar
Binary	Word Perfect
Macwrite	Multimate
	Microsoft Word
DEC DX	DEC DX

ALL-IN-1 Integration

The next step which we faced was to integrate the DSAB and Keyword conversion mechanisms into ALL-IN-1. This meant that we would have to incorporate, to some extent, the following support for those document types ("foreign formats") that ALL-IN-1 could not read or convert:

- File cabinet storage
- Use as mail message attachments (e.g., Wordstar attachments to WPS-Plus messages)

- "Gold-G" from the editor, with automatic conversion
- A "Show Document" function to show the document type of documents (and any attachments)
- Convert document support
- Translation during document transfer to or from a workstation

The first task to be performed was to allow ALL-IN-1 to handle and distinguish the various "foreign format" documents. For compatibility with electronic mail, this also means that the format of an attached document must be discernable at the receiving node, provided it is running the same software. To accommodate this, it was necessary to modify ALL-IN-1 (i.e., the tables within OAET.MAR) to define a DSAB for each of the formats to be supported. This required specification of a DSAB name, a default file extension, and the routine to be called to read or write the file. Since there weren't any action routines which would allow ALL-IN-1 to process the files, the action routine was specified as being the same as that for the "binary" DSAB. This ensures (1) that the user is told if he tries to read/edit an "unreadable" document, and (2) that copies do not affect the document.

Next several tables were set up as indexed files accessed by ALL-IN-1 entry forms. The document file specifies all document types the DSAB required, whether or not the file was intrinsically supported by ALL-IN-1, and the KEYword translation support and attributes. A conversion file specifies an action to perform (KEYpak or ALL-IN-1 translation) for each possible conversion. Conversions not directly possible (e.g., WPS-Plus to Wordstar) are handled in a two-step process with DEC DX being the standard intermediate format.

The assignment of a DSAB to each document type ensures proper file cabinet storage and electronic mail transmission. The data tables are used during operations such as "Gold-G," "Convert Document," and "Document Transfer" to determine the proper routine to execute to convert the document to the output format specified by the user.

Document Transfer

Requisite for any VAX-based personal computer file translation is a good file transfer package. At the time CPD was formed, there were already a few terminal emulator/file transfer packages in use. Our task was to

integrate the packages under the ALL-IN-1 document transfer subsystem in as transparent a fashion as possible.

Users are required to provide three pieces of information in their user profiles which are related to document transfer: workstation, emulator, and hardware connection. The workstation field indicates whether the user has an Apple, IBM, or DEC personal computer. The emulator field indicates which terminal emulator/file transfer package is being used, and the hardware connection indicates either an Ethernet or serial connection. These values are used to select the forms and command files necessary to perform the file transfer.

For Apple file uploads, the user is first prompted for the file type (e.g., Macwrite, binary, etc) and ALL-IN-1 document filing information (i.e., destination folder and title). A dialog box then appears and the user indicates which file is to be transferred through standard point and click mechanisms. The file is transferred, translated if necessary, and the ALL-IN-1 document created. For MS-DOS workstations, the procedure is similar, except that instead of a dialog box, the user is asked to input the full file specification.

For file transfers to the workstation, the procedure is roughly the reverse of the above. The user first selects a document to download. He then indicates the desired format of the document that is to be created on the workstation. For the Macintosh, he is presented with a dialog box and indicates the output file and directory. For the MS-DOS systems, the user specifies a full target file specification. If the document has attachments, the user is asked to specify which combination of original document and attachments are to be transferred. Additionally, he is given the option of specifying a single or multiple output files.

The desirable characteristics for a standard terminal emulator were those which would allow the most seamless integration with ALL-IN-1. These included:

- Supports host-initiated file transfers
- Allows specification of host output file characteristics
- Efficient as well as fast
- Robust in a variety of network connection environments
- Inexpensive
- Available on all CPD-supported workstations

- Has or plans REGIS graphics support
- Has or plans Ethernet support

After having investigated many packages, we chose pcLINK (from Pacer software) as the emulator we recommend to new users, although our document transfer enhancements (except for Ethernet support) work with several terminal emulators, as shown in Table 3.

Table 3. Supported Terminal Emulators

	<u>Apple</u>	<u>Digital</u>	<u>IBM</u>
Serial:	pcLINK MACterminal	pcLINK Poly-COMM	pcLINK VTERM
Ethernet:	pcLINK	pcLINK	pcLINK

CONCLUSION

Now, let's re-visit the scenario that we started with.

Jane uploaded her graphics from the Macintosh into a binary document in ALL-IN-1 and mailed it to you as an attachment to her message. Bill mailed you his WPS-Plus conclusions and Joe sent his Displaywrite 3 document. You file all the attachments in their original format and then begin composing a mail message to your boss. When it's done, you attach your introduction, Bill's analysis, Joe's conclusions, and Jane's graphics. You then send the message to your boss.

After your boss reads your message, he performs two document transfer operations. For the first, he downloads all of the text files into a single Microsoft Word document on his Macintosh. Then, he downloads the graphic. He adds his overview to the report and then prints the report and graphic on his laser printer. With 5 minutes to spare, he carries the document upstairs to his boss.

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