An introduction to the CREWES CD

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ABSTRACT

After seven years and 3000 pages of research reports, the CREWES Project has turned to the compact disk to disseminate its latest results efficiently and effectively. The compact disk (CD) was developed as way to distribute high quality digital audio. In recent years, this same technology has become the media of choice for distributing large (2 MB-650 MB) amounts of data to millions of computer and workstation users. The technologies used to make the first CREWES CD allow it to be used on all popular computers and we hope it will be immediately useful to the majority of CREWES sponsors.

INTRODUCTION

In previous years distributing our research report on CD had been contemplated, but only recently has a satisfactory software solution been available. Our biggest concern was that a fully electronic research report would not be worth the time investment. We needed to find a document format that could satisfactorily replicate our hard copy reports. These reports are extremely complex documents, including numerous equations, diagrams, monochrome seismic plots, and colour images. We also needed software to view this electronic report on all popular computing platforms. Finally, we had to produce the CD and provide viewing software at a reasonable cost.

CONTENTS OF THE 1995 CREWES CD

In addition to the research report, we intend to put other useful information in the CREWES CD. The latest release of prototype software used by CREWES researchers will fill a portion of the CD. A detailed discussion of the available software may be found in chapter 47, "1995 CREWES Software Release". If space permits, we will include some sections of seismic data from the Blackfoot broad-band experiment.

ADOBE ACROBAT

In June of 1993 Adobe released its Acrobat family of products: Reader, Distiller and Exchange. Using Acrobat software one can create, view, navigate, annotate, distribute and print electronic documents in a special cross-platform file format, the Portable Document Format (PDF). PDF files preserve the appearance of a document regardless of the hardware platform, operating system, or application software used to create the original. Acrobat was initially marketed as a document archival system for large corporations. The licensing fees for Acrobat made it an unrealistic option for small groups like the CREWES Project. In the past year, the price of PDF authoring software has dropped considerably, and the viewing software is now free. This makes Acrobat PDF an ideal format for electronic publishing.

The PDF format is based on Postscript: an industry standard page description language used to operate laser printers. Generating a PDF file is relatively simple. Though some applications can generate PDF directly (Adobe Pagemaker 6.0), most require an intermediate step. The word processing application must first print the

document into a Postscript file. The Postscript file is then translated into PDF by Acrobat Distiller. PDF files for each chapter are collected, and a hypertext table of contents is generated.

Distiller's translation of Postscript to PDF not only changes the file format, but it also compresses the images in the document using CCITT Group 4 compression (used by Fax machines) and JPEG compression. The resulting PDF file is generally much smaller than the original Postscript file. If the research report was distributed using Postscript, it would require five to ten times the storage, and would probably not fit on a single CD.

The viewing program for PDF files is called Acrobat Reader. Acrobat Reader displays the contents of a PDF file on the screen and allows the end-user to make a hardcopy version on a printer. Acrobat reader is given away freely by Adobe and runs on a variety of systems (Table 1).

Table 1. Available versions of Adobe Acrobat Reader

Version Available	Computer type	Operating System
1.0	PC Compatible	MS-DOS
1.0	Silicon Graphics	IRIX 5.3
2.1	Apple Macintosh	MacOS 7.0
2.1	Sun	SunOS 4.1.X
2.1	Sun	Solaris 2.4
2.1	HP	HPUX 9.X
2.1	PC Compatible	Microsoft Windows 3.1

Acrobat reader is very easy to use. Buttons are used to turn the electronic "pages" forward or backward. The text can be displayed at various levels of magnification, and the mouse can be used to move the virtual paper about the viewing area. Images and diagrams are displayed in full colour (when appropriate), and photographic images embedded into documents are realistically reproduced on the screen. In many cases, colour-filled documents are viewed better with Acrobat reader than they would be if reproduced by a colour printer.

MEDIA AND DUPLICATION

Audio CDs are mass produced using a "stamping" technique, but this method of duplication is only cost effective for large volumes. Since we are producing less than 100 CDs, we are using a write-once technology known as CD-Recordable (CD-R). Recordable CDs are made using a recording unit which burns the digital data onto the CD's surface using a laser. The CD recorder used to create the CREWES CD is a Yamaha CDR-100 recorder. It is capable of recording at "four times" speed. This speed factor relates to the standard recording speed for audio information on CDs. In computing terms, "four times" speed is equivalent to a data rate of 600 KB/s. Since CDs contain a maximum of 650 MB of data, this results in a recording time of 18 minutes per CD. In reality, one must add a few extra minutes per CD for setup and calibration. The overall duplication rate is still very reasonable for small runs.

In addition to the recorder, one needs a system which is capable of a sustained transfer rate of 600 KB/s. Most high end PCs and Macintosh systems can maintain this speed. It is usually recommended that a separate disk drive (different from the boot drive) is used as the source of the CD data. This guarantees that the stream of data is uninterrupted. The final component to the CD recording process is the CD recording software. We used the program called "Toast" by Astarte GmbH. We found the program easy to use, and ideal for creating CDs that work well in Macintosh, PC, and Unix environments.

WORLD WIDE WEB

The PDF format is an ideal way to distribute documents on the World Wide Web. Most web viewers (including Mosaic and Netscape) can be instructed to run Acrobat Reader to view PDF files stored on the web. Upcoming versions of Netscape will have native support for PDF, allowing one to retrieve and view PDF files from within a single program.

In order to further improve sponsors' access to our research, we will be placing the entire 1995 research report on our CREWES Web site:

`http://www.crewes.ucalgary.ca/`

CONCLUSION

The production of the first CREWES CD improves the flow of results from CREWES' researchers to its sponsors. The availability of the research report on CD will make it easy to reprint chapters for circulation inside sponsor companies. We predict that many will prefer to read the research report directly from the CD because it offers excellent reproduction of colour images and diagrams. It will also be easier for sponsors to obtain additional copies of the research report on CD since duplication and postage costs will be reduced. Finally, the CD will have enough capacity so that data an software can also be distributed at the same time.

REFERENCES

Adobe Systems, 1994, Acrobat -The universal publishing tool, http://www.adobe.com/Acrobat/Acrobat0.html

Hoffmann, M., 1994, Toast CD-ROM Pro reference manual: Astarte GmbH, Germany