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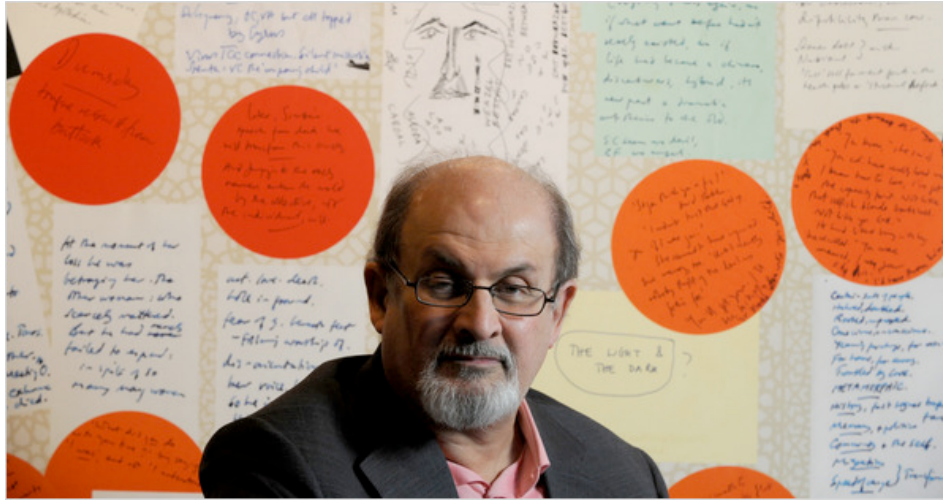
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Fending Off Digital Decay, Bit by Bit



Erik Lesser for The New York Times

Salman Rushdie at Emory University in Atlanta, which is currently exhibiting his personal papers, and electronically produced drafts of his novels.

By PATRICIA COHEN
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Among the archival material from [Salman Rushdie](#) currently on display at [Emory University](#) in Atlanta are inked book covers, handwritten journals and four Apple computers (one ruined by a spilled Coke). The 18 gigabytes of data they contain seemed to promise future biographers and literary scholars a digital wonderland: comprehensive, organized and searchable files, quickly accessible with a few clicks.

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But like most Rushdian paradises, this digital idyll has its own set of problems. As research libraries and archives are discovering, "born-digital" materials — those initially created in electronic form — are much more complicated and costly to preserve than anticipated.

Electronically produced drafts, correspondence and editorial comments, sweated over by contemporary poets, novelists and nonfiction authors, are ultimately just a series of digits — o's and 1's — written on floppy disks, CDs and hard drives, all of which degrade much faster than old-fashioned acid-free paper. Even if

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those storage media do survive, the relentless march of technology can mean that the older equipment and software that can make sense of all those 0's and 1's simply don't exist anymore.

Imagine having a record but no record player.

All of which means that archivists are

finding themselves trying to fend off digital extinction at the same time that they are puzzling through questions about what to save, how to save it and how to make that material accessible.

"It's certainly one of those issues that keeps a lot of people awake at night," said Anne Van Camp, the director of the [Smithsonian Institution](#) Archives and a member of a task force on the economics of digital preservation formed by the [National Science Foundation](#), among others.

Though computers have been commonly used for more than two decades, archives from writers who used them are just beginning to make their way into collections. Last week, for instance, the Harry Ransom Center at the [University of Texas](#), Austin, announced that it had bought the archive of [David Foster Wallace](#), who committed suicide in 2008. Emory opened an exhibition of its Rushdie collection in February, and last year, not long before his death, [John Updike](#) sent 50 5 1/4-inch floppy disks to the Houghton Library at [Harvard](#).

Leslie Morris, a curator at the Houghton Library, said, "We don't really have any methodology as of yet" to process born-digital material. "We just store the disks in our climate-controlled stacks, and we're hoping for some kind of universal Harvard guidelines," she added.

Among the challenges facing libraries: hiring computer-savvy archivists to catalog material; acquiring the equipment and expertise to decipher, transfer and gain access to data stored on obsolete technologies like floppy disks; guarding against accidental alterations or deletions of digital files; and figuring out how to organize access in a way that's useful.

At Emory, Mr. Rushdie's outdated computers presented archivists with a choice: simply save the contents of files or try to also salvage the look and organization of those early files. Because of Emory's particular interest in the impact of technology on the creative process, Naomi Nelson, the university's interim director of Manuscript Archives and Rare Book Collection, said that the archivists decided to try to recreate Mr. Rushdie's writing experience and the original computer environment.

Mr. Rushdie started using a computer only when the Ayatollah Khomeini's 1989 fatwa drove him underground. "My writing has got tighter and more concise because I no longer have to perform the mechanical act of re-typing endlessly," he explained during an interview while in hiding. "And all the time that was taken up by that mechanical act is freed to think."

He added: "I had this kind of fetish about presenting clean copy. I don't like presenting my publisher with pages with lots of crossings-out and scribbling. So I would be manic at the end of typing a page where actually I didn't want to change anything, not at all."

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Some of the early files chronicle Mr. Rushdie's self-conscious analysis of how computers affected his work. In an imaginary dialogue with himself that he composed in 1992 when he was writing "The Moor's Last Sigh," he wrote about choosing formatting, fonts and spacing: "I am doing this so that I can see how a whole page looks when it's typed at this size and spacing.

"Oh, my God, suppose it looks terrible?"

"Oh, my God, yeah. And doesn't this look wrong?"

"Where's the paragraph indent thing?"

"I don't know. I will look."

"How about this? Is this good for you?"

"A lot better. How about fixing the part above?"

At the Emory exhibition, visitors can log onto a computer and see the screen that Mr. Rushdie saw, search his file folders as he did, and find out what applications he used. (Mac Stickies were a favorite.) They can call up an early draft of Mr. Rushdie's 1999 novel, "The Ground Beneath Her Feet," and edit a sentence or post an editorial comment.

"I know of no other place in the world that is providing access through emulation to a born-digital archive," said Erika Farr, the director of born-digital initiatives at the Robert W. Woodruff Library at Emory. (The original draft is preserved.)

To the Emory team, simulating the author's electronic universe is equivalent to making a reproduction of the desk, chair, fountain pen and paper that, say, [Charles Dickens](#) used, and then allowing visitors to sit and scribble notes on a copy of an early version of "Bleak House."

"If you're interested in primary materials, you're interested in the context as well as the content, the authentic artifact," Ms. Farr said. "Fifty years from now, people may be researching how the impact of word processing affected literary output," she added, which would require seeing the original computer images.

It may even be possible in the future to examine literary influences by matching which Web sites a writer visited on a particular day with the manuscript he or she was working on at the time.

Michael Olson, the digital collections project manager at [Stanford University](#), said that the only people who really had experience with excavating digital information were in law enforcement. "There aren't a lot of archives out there capturing born-digital material," he said, referring to the process of extracting all data accurately from a device.

Located in Silicon Valley, Stanford has received a lot of born-digital collections, which has pushed it to become a pioneer in the field. This past summer the library opened a digital [forensics](#) laboratory – the first in the nation.

The heart of the lab is the Forensic Recovery of Evidence Device, nicknamed FRED, which enables archivists to dig out data, bit by bit, from current and antiquated floppies, CDs, DVDs, hard drives, computer tapes and flash memories, while protecting the files from corruption. (Emory is giving the Woodruff library \$500,000 to create a computer forensics lab like the one at Stanford, Ms. Farr said.)

With the new archive from David Foster Wallace, the Ransom Center now has 40 collections with born-digital material, including [Norman Mailer's](#). Gabriela Redwine, an archivist at Ransom, is impressed by Emory's digital emulation, but said the center was not pursuing that kind of reproduction at the moment.

"Our focus is preservation and storage now," she said. "Over the last couple of years, we've been learning about computer forensics."

The center is trying to raise endowment money to hire a digital collections coordinator while Ms. Redwine works on preservation and processing. In the meantime, most of the digital material is off limits to researchers.

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