What is emulation?

Introduction

Each computer consists of hardware and software. By integrating these two components a computer can offer a wide range of possibilities, like creating office documents, surfing the web and playing games. The strong dependency between hardware and software also introduces a risk. If one of these fails, it will have influence on the computer's operation and thereby its capabilities. As each hardware device eventually will break down, accessibility to digital objects is at stake. Emulation offers a solution to this problem.

Emulation is best described as imitating a certain computer platform or program on another platform or program. In this manner, it is possible to view documents or run programs on a computer not designed to do so. An emulator is itself a program that creates an extra layer between an existing computer platform (host platform) and the platform to be reproduced (target platform), as pictured in Figure 1.

Examples: Donkey Kong and Windows 2000

Many of us will remember the games from the early years of the game computer and later the PC. Although they evoke feelings of nostalgia in long-time game enthusiasts, most of these games no longer run on today's computers. Emulation can offer a solution. As shown in Figure 3, using a specially built Commodore 64-emulator, the game Donkey Kong can run on any modern computer. Figure2 pictures MS Windows 2000 being emulated on MS Windows XP.

Digital Preservation

When dealing with digital preservation there are basically two possible strategies: migration and emulation. Where emulation focuses on recreating the original computer environment, migration adapts the original digital document to the current known computer environment. Although original attributes can be lost, it allows easier access to the document than using an emulated environment.

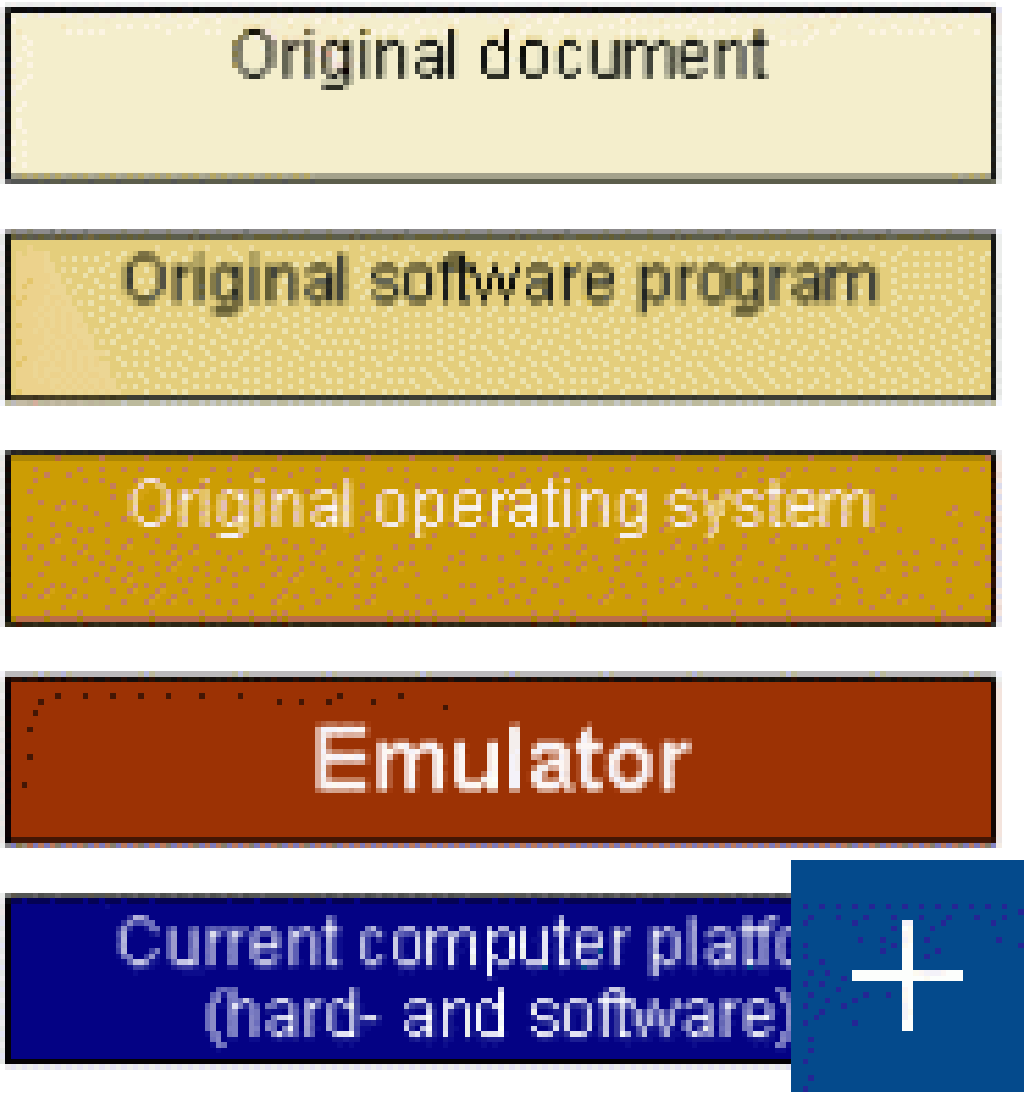
Migration is best applied to relatively simple objects such as text documents and images. However, complex objects like the latest generation of PDF files, websites and computer applications, are often strongly dependent on layout and functionality. Especially these attributes may be affected during a migration process. That is, functionality like user interaction or the interaction of a program with a computer platform may show significant problems. Another disadvantage of migration is that it has to be carried out on a regular basis, which increases the chance of errors.

Emulation is difficult, the main reason why it is not applied on a large scale in digital preservation. Developing an emulator is a precise and time-consuming task, especially because the emulated environment must appear authentic and must function accurately too. If future users are interested in the contents of a file, migration remains the better option. When it is the authentic look and feel and functionality of a file they seak, emulation is worth the effort. This can be the case with PDF documents or websites. For multimedia applications, emulation is in fact the only suitable preservation strategy as they require a full operating environment just like the one it was created for.

Multimedia

The KB takes a great interest in emulation as a preservation strategy. In 2003, it was decided to include interactive multimedia applications in the collection, as well as electronic academic publications. These multimedia applications usually appear on CD- or DVD-ROM and are difficult to keep accessible as they make use of images, sound and animation and are designed for user interaction. Preserving the contents of the optical disk is useless as the program depends on hardware, an operating system and, in some cases, certain additional software. Furthermore, the rapid developments in hard- and software make matters more complicated. As a temporary solution, multimedia programs have been installed on a standardised computer with software, called the Reference Workstation (RWS). After installation, the contents of the hard disk was copied and stored in the e-Depot. As these programs still depend on the workings of a computer, this is not a long-term solution. This is the main reason why the KB has started the emulation project.

Further reading: project emulation


Original document
Original software program
Original operating system
Emulator
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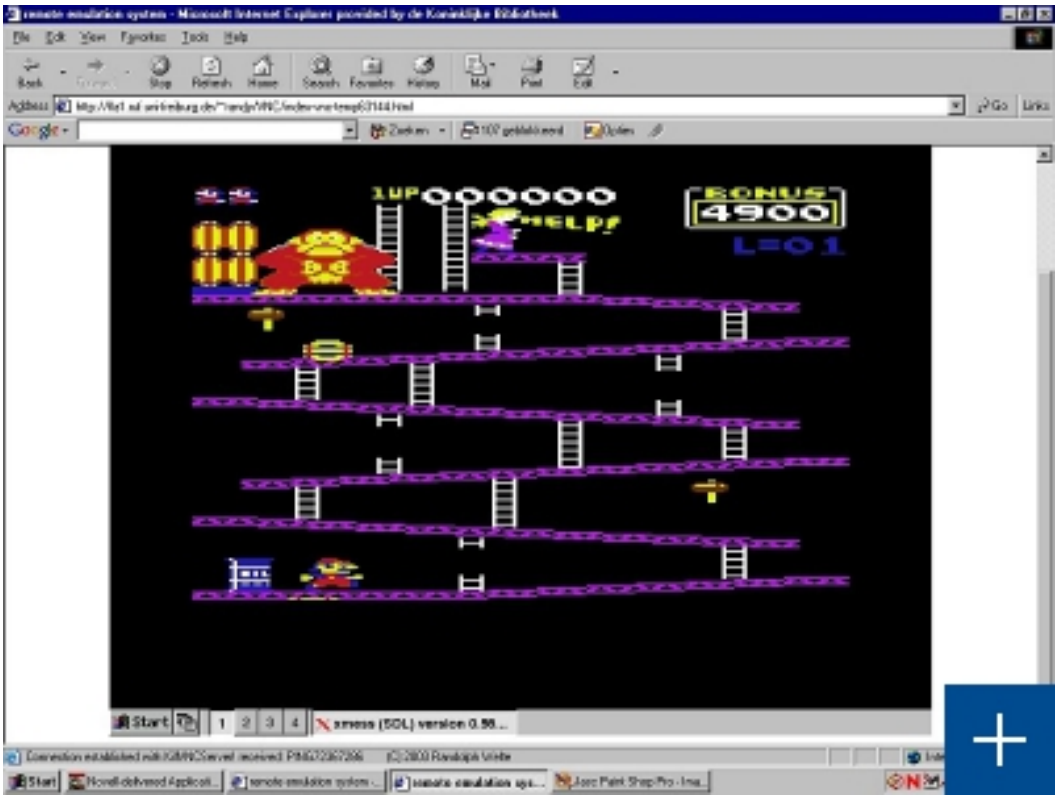
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