

## SOFTWARE REVIEWS

In modern society, quality of products and services is greatly emphasized because of the competitive global market environment. For computer hardware and software (analogous to products and services, respectively), the marketplace is particularly competitive, since the computer engineering industry is now maturing. Advances in computing power are generally evolutionary rather than revolutionary. Manufacturers and vendors of computer software can therefore provide a competitive advantage to computer users and to themselves if their software enhances the performance of both computers and users.

### PURPOSE OF A SOFTWARE REVIEW

A software review provides for computer users a similar service that a traditional book review provides for potential

purchasers and readers of a book. The review of computer software describes and evaluates the software, and then makes recommendations for readers of the review about acquiring and using the software. Similarly, just as a review of a textbook, for example, is often intended either for educational administrators or for individual readers, a software review may be directed toward either system managers or individual computer end users, depending on whether the software would more likely be used by a large group (as with networking software) or by individuals and small groups (as is common for specialized engineering and scientific applications).

Most software reviews are written for specific groups of end users, such as those involved in operating systems, management information systems (MIS), research and development (R&D), teaching and training, or “edutainment” (education plus entertainment). Typically, the software reviewer describes and evaluates user interfaces, on-line support, and interoperability (the transportability of the software between different computer systems).

The level of a software review is often quite different, depending on the level of computer experience of the intended readership. A simply written low-level review will often be directed toward a readership of technical and clerical staff in engineering companies or toward small office/home office (SOHO) users. For example, a software package such as Microsoft Office might be reviewed for a potential readership of millions of computer users. A middle-level review may be intended for engineers and applied scientists. For example, a computer-aided design and manufacturing (CAD/CAM) system may be reviewed for tens of thousands of possible users. A high-level specialized review, often written using technical terminology and assuming a great deal of familiarity with computer systems, will have a targeted readership numbering only in the thousands. An example is a fluid-flow visualization package that can compute and display streamlines and vortices around an airfoil.

Efficiency of software installation, use, and maintenance are often also key issues, and these are also usually included in a software review. Installation and checkout efficiency are particularly important for computer system administrators and technical staff. Use efficiency is often evaluated in terms of efficiency for the human user (such as intuitive interfaces and clear documentation) and in terms of computer system efficiency (such as speed of execution, storage requirements, or network communication bandwidth needed for software involving networks). Maintenance efficiency is important for system administrators, technical staff, and end users, since if maintenance is not straightforward it is unlikely to be performed correctly and promptly. (See also SOFTWARE MAINTENANCE.)

The price of computer software is also an important issue in a software review, since the price of a given piece of software may vary by a factor of two or more, depending on the customer (e.g., industry and business vertical markets, R&D, university faculty, or student). Moreover, two software packages may differ only slightly in functionality and ease of use but by a large amount in price. A user may be willing to forgo a few features that are unlikely to be used in a particular engineering field in order to save significantly on the price of the software.

## KINDS OF SOFTWARE REVIEWED

The kinds of computer software reviewed are manifold, ranging from operating systems to network systems to applications. For example, an operating system might be a version of the popular Unix system; an application package might be the Mathematica system for doing mathematics by computer under this operating system. A particular application of Mathematica might be a package for doing circuit analysis. A particular algorithm or procedure under review might be the optimization scheme used to minimize the size of the circuit and to do this in optimal time.

A software review therefore requires experience on the part of the reader and expertise of the reviewer in a hierarchy of system levels, with the depth of experience and expertise required usually increasing as one accesses the deeper levels of an application.

## SOFTWARE AND HARDWARE

In software reviews the distinction between the functions of the computer software and those of the hardware is often very fuzzy because it is computer programs and systems, working in concert in particular computer environments, that are being evaluated. When the human-machine interface is particularly important for the software, there is even less distinction between software and hardware.

For example, in multimedia systems delivered on digital video disk (DVD) or over the Internet, a software review will necessarily involve a discussion of appropriate hardware. (See also MULTIMEDIA INFORMATION SYSTEMS.)

## SOFTWARE PORTABILITY AND REUSABILITY

An important issue in a software review is whether versions of the software are available for several different computers and operating systems, a concept termed *portability*. If the software is highly portable, it will be useful to a broad base of computer users, which is especially important if users are in a collaboration that uses different platforms. For example, they may be in a network that has a mix of Macintosh, Windows, and Unix systems. If versions of the software can run on all three systems, then collaboration will usually be simple.

It is also important for readers of a software review to have an idea whether the software is likely to be usable if the computer system changes slightly, for example, to a new version of the operating system. Furthermore, it is useful to ask if parts of the software under review can be modified easily and reliably then reused. Such software reusability saves a lot in developing new applications from old ones. Software is usually updated (new versions) more frequently than are books (new editions). An important facet of a software review is therefore whether the price of such updates and the effort required to install them are reasonable in the opinion of the reviewer. (See also SOFTWARE REUSABILITY.)

## HOW SOFTWARE IS REVIEWED

Software reviews are often conducted and described informally, rather than by using detailed quantified measures

such as standardized benchmarks. In this aspect, software reviews are not intended to provide detailed tests of program correctness, although reviewers often identify weaknesses of the use of the software and they sometimes locate program bugs while evaluating programs.

Reviews of software are also less formal than, for example, the structured walkthrough strategy, which is sometimes used when software is being designed and built. An approximate scale of overall software quality is used in some publications of software reviews, especially if several competing products are compared within the same review. (See also SOFTWARE METRICS and SOFTWARE STANDARDS.)

For these reasons, those who review software are usually both expert in the particular software and also broadly experienced in many of the likely applications of the software. Whereas almost anyone trained in a particular field of engineering is encouraged to submit manuscripts describing their work to journals and magazines in that field, software reviewers are experienced engineers or applied scientists who are invited by the journal editors to prepare reviews.

The editorial procedure for software reviews is similar to that used for book reviews. However, like regular submitted manuscripts, a software review is usually refereed before being accepted for publication, in order to ensure the highest possible quality of the review. Because software reviews require both expertise and experience, locating and soliciting appropriate reviewers can be difficult, which generally discourages publishers and their editors from providing software review sections in their journals and magazines.

## SOURCES OF SOFTWARE REVIEWS

Relatively few electrical and electronics engineering journals contain regular software review sections. Similarly, in other engineering fields and in the physical sciences, software reviews are less common than book reviews, which themselves are quite uncommon in engineering and science publications. This scarcity of software reviews is partly historical; computer software is a much more recent medium of information exchange than is the printed book, and therefore software reviews are often considered by editors to be somewhat more difficult to obtain.

Although knowing how to read a book is a prerequisite for graduating from high school, knowing how to use computer software in one's field of engineering is not always required for a college baccalaureate degree. Also, senior engineers and scientists are not always experienced computer users. The audience for software reviews in engineering is therefore somewhat smaller than for book reviews.

Software reviews are generally found as occasional pieces in software engineering journals and computer magazines, and they are sometimes mixed with book reviews in magazines published in various fields of engineering (including computer science) and specialized sciences.

The Internet can be a source of software reviews. However, the reviews are often only descriptions of the software, without critical evaluation of its quality. Reviews of software on the Internet are therefore more likely to be advertisements than genuine reviews.