Содержание:

1) Introduction

Multimedia is a modern computer information technology that allows you to combine text, sound, video, graphics, and animation(animation) in a computer system. Multimedia is the sum of technologies that allow a computer to enter, process, store, transmit, and display (output) data types such as text, graphics, animation, digitized still images, video, sound, and speech.

30 years ago, multimedia was limited to the "Consul" typewriter, which not only typed but could also attract the attention of a sleeping operator with a melodious crackle. A little later, computers were reduced to household appliances, which allowed them to be assembled in garages and rooms. The invasion of Amateurs gave a new impetus to the development of multimedia (computer horoscope in 1980, which using a speaker and a programmable timer synthesized vague verbal threats for each day, and even moved the stars on the screen (the beginnings of animation)). Around this time, the term multimedia itself appeared. Most likely, it served as a screen that shielded the laboratory from the eyes of the uninitiated.

A critical mass of technologies is accumulating. Blasters, CD ROM and other fruits of evolution appear, the Internet, WWW, and microelectronics appear. Humanity is experiencing an information revolution. And now we are witnessing how the public need for means of transmitting and displaying information is bringing to life a new technology, for lack of a more correct term, calling it multimedia. Today, this concept can completely replace the computer in almost any context.

The emergence of multimedia systems is certainly making revolutionary changes in such areas as education, computer training, in many areas of professional activity, science, art, computer games, etc.

The appearance of multimedia systems is prepared both with the requirements of practice and with the development of theory. However, the sharp leap in this direction that has occurred in this direction over the past few years is primarily due to the

development of technical and system tools. This is the progress in the development of personal computers: dramatically increased memory capacity, performance, graphics capabilities, characteristics of external memory, and advances in video technology, laser disks — analog and CD-ROM, as well as their mass implementation. The development of methods for fast and efficient data compression / scanning also played an important role.

A modern multimedia PC in full “armament” resembles a home stereo Hi-Fi complex combined with a display TV. It is equipped with active stereo speakers, a microphone and a CD–ROM optical disc drive (CD–Compact Disc, CD — ROM; ROM–Read only Memory, read — only memory). In addition, a new device for PC is hidden inside the computer-an audio adapter that allows you to switch to listening to pure stereo sounds through speakers with built-in amplifiers.Multimedia technologies are one of the most promising and popular areas of computer science. They aim to create a product containing " collections of images, texts, and data accompanied by sound, video, animation, and other visual effects (Simulation), including an interactive interface and other control mechanisms." This definition was formulated in 1988 by the largest European Commission dealing with the problems of introduction and use of new technologies. The concept of memory organization "MEMEX", proposed in 1945 by the American scientist Vanniver Bush, is considered an ideological prerequisite for the emergence of multimedia technology. It provided for the search for information in accordance with its semantic content, and not by formal signs (by the order of numbers, indexes, or alphabets, etc.). This idea found its expression and computer implementation first in the form of a hypertext system (a system for working with combinations of text materials), and then hypermedia (a system that works with a combination of graphics, sound, video, and animation), and finally in multimedia, combining both these systems.However, the surge of interest in the late 80's in the application of multimedia technology in the humanitarian fields (and, in particular, in the, in historical and cultural terms) is undoubtedly associated with the name of an outstanding American computer scientist-businessman bill gates, who owns the idea of creating and successfully implementing a multimedia (commercial) product based on a service (!) Museum inventory database using all possible "environments": images, sound, animation, hypertext system ("National Art Gallery. London")

This product has accumulated three main principles of multimedia:

Representation of information using a combination of multiple human-perceived environments;

Multiple storylines in the product content (including those that are built by the user based on "free search" within the information offered in the product content);

Artistic design of the interface and navigation tools.

The following multimedia features are an undoubted advantage and feature of the technology, which are actively used in the presentation of information:

the ability to store a large volume of various information on a single medium (up to 20 volumes of author's text, about 2000 or more high-quality images, 30-45 minutes of video recording, up to 7 hours of audio);

The ability to increase (detail) the image or its most interesting fragments on the screen, sometimes in twenty-fold magnification while maintaining the image quality. This is especially important for the presentation of works of art and unique historical documents;

The ability to compare images and process them with various software tools for research or educational purposes;

The ability to highlight "hot layers" in the accompanying image text or other visual material for which you can immediately get reference or any other explanatory (including visual) information (hypertext and hypermedia technologies);

The ability to perform continuous music or any other audio accompaniment corresponding to a static or dynamic visual series;

The ability to use video clips from movies, videos, etc., the "freeze frame" function, frame-by-frame" scrolling " of the video;

The ability to include databases, image processing techniques, animation (for example, accompanying a story about the composition of a picture with a graphic animation demonstration of the geometric structures of its composition), etc.;

Ability to connect to the global Internet network;

Ability to work with various applications (text, image and sound editors, map information);

Ability to create your own "galleries" (selections) from the information presented in the product ("pocket" or "my notes" mode");

The ability to "remember the way you have traveled" and create "bookmarks" on the screen page that interests you";

The ability to automatically view the entire content of the product ("slide show") or create an animated and voiced "guide-guide" for the product ("speaking and showing user instructions"); the inclusion of game components with information components in the product;

The ability to" freely " navigate through the information and exit to the main menu (enlarged content), to the full table of contents, or even from the program at any point in the product.

2) The major carriers

Multimedia products are used as media that can store a huge amount of various information. Typically, multimedia products are focused either on computer media and playback media (CD-ROM), or on special set-top boxes (CD-i), or on telecommunications networks and their systems.

CD-ROM (CD-Read Only Memory) is an optical disk designed for computer systems. Among its advantages - the versatility inherent in the computer, among the disadvantages-the lack of the ability to replenish information - its "re-recording" to disk, not always satisfactory playback of video and audio information.

CD-i (CD - Interactive) is a special compact disc format developed by Philips for TV set - top boxes. Among its advantages - high quality playback of dynamic video information and sound. Among the disadvantages - the lack of multi-functionality, poor quality of static visual information playback, associated with the quality of TV monitors.

Video-CD (TV CD format)-replacement of video cassettes with much higher image quality. Among the disadvantages is the lack of multi-functionality and interactivity (which it was not designed for when it was created).

DVD-i (Digital Video Disk Interactive) is a format of the near future that represents "interactive TV" or cinema. In General, a DVD is nothing more than a compact disc (CD), only faster and much larger capacity. In addition, a new sector format, more reliable error correction code, and improved channel modulation have been applied. The video signal stored on a DVD-video disc is obtained by compressing the Studio video signal CCIR-601 according to the MPEG-2 algorithm (60 fields per second with a resolution of 720x480). If

the image is complex or changes quickly, there may be noticeable compression defects such as splitting or blurring of the image. The visibility of defects depends on the correct compression and its value (data flow rate). At a speed of 3, 5 MB/s, compression defects are sometimes noticeable. At a speed of 6 MB / s, the compressed signal is almost identical to the original. The main drawback of DVD video as a format is the presence of a complex copy protection scheme and regional blocking (a disk purchased in one part of the world may not play on a DVD device purchased in another part of the world.

Another problem is that not all existing DVD-ROM drives on the market today read discs with movies recorded for household readers.

Goals of using products created in multimedia technologies

The main goals of using products created in multimedia technologies (CD-ROMs with information recorded on them) are:

Popularization and entertainment (CDS are used as home libraries for art or literature).

Scientific-educational or educational (used as teaching AIDS).

Research - in museums and archives, etc. (used as one of the most advanced media and "repositories" of information).

3) Promotional purpose

Perhaps the widest use of multimedia products for this purpose is not in doubt, especially since popularization has now become some equivalent of advertising. Unfortunately, many developers sometimes do not understand that the simple use of a well-known media (CD-ROMa) and software does not yet provide a truly multimedia character of the product. Nevertheless, we have to admit that the "multicolored" of the presented works is a reflection of the existing public consciousness in the Humanities.

4) Scientific and educational purpose

The use of multimedia products for this purpose goes in two directions:

The selection of those products that can be used in the relevant courses through extremely rigorous analysis from existing market products. As practice shows, the

selection task is extremely difficult, since only a few finished products can meet the subject of the courses taught and the high requirements for reliability, representativeness and completeness of the material, which are usually imposed by teachers. This is due to the fact that "subject matter specialists" who have the necessary knowledge in the presented field do not participate in the creation of products. And those few authors who try to work together with technical staff to create such multimedia products do not know the specifics of this computer genre and the psychology of perception of information presented on the computer screen.

Development of a multimedia product by teachers in accordance with the goals and objectives of training courses and disciplines.

5) The research objectives

There is clearly a confusion of terminology. In "pure" scientific developments, software is really actively used, which is also used in products created on the basis of multimedia technology. However, this technology itself can hardly meet the conditions and process of scientific search, which implies the dynamic development of the process of knowledge, since it fixes a single-stage state or achieved result, without giving the opportunity to change anything in it. In this sense, these tools can only be used at the stage of publishing the results of the study, when we get a multimedia product instead of the usual "hard" printed publications. The most obvious and almost automatically recalled area of application of multimedia products in the research field is electronic archives and libraries - for documenting collections of sources and exhibits, cataloging and scientific description, creating "insurance copies", automating search and storage, storing data on the location of sources, storing reference information, providing access to non-Museum databases, organizing the work of scientists not with the documents themselves, but with their electronic copies, etc.). the development and implementation of these areas of archival and Museum scientific work is coordinated by the International Committee on documentation (CIDOC) under the International Council of museums, The Museum's computer network under the Committee for the computer exchange of Museum information (CIMI), as well as the Getty International program in art history (AHIP). In addition, these organizations are engaged in the development of common international standards for documenting and cataloging Museum and archival values, the implementation of opportunities for the exchange of information components of research systems.

MULTIMEDIA is a buzzword in the computer world. The term MULTIMEDIA defines the cherished dream of most computer users. This concept defines information technology based on a software and hardware complex that has a core in the form of a computer with means of connecting audio and video equipment to it. Multimedia technology allows us to combine computer capabilities with traditional means of presenting audio and video information for the synthesis of the three elements when solving problems of intellectual activity automation

The tasks to be solved cover all areas of intellectual activity: science and technology, education, culture, business, and are also used in the service environment when creating electronic guides with immersion in a real environment, multitecs. Until the end of the 80s, multimedia technology was not widely used in our country due to the lack of hardware and software support. In the early 90's, relatively inexpensive multimedia systems based on IBM PC appeared in our country, and the myth of multimedia technologies became a reality. One of the main areas of application of multimedia systems is education in the broad sense of the word, including such areas as video encyclopedias, interactive guides, simulators, situational role-playing games, etc. A computer equipped with a multimedia Board immediately becomes a universal training or information tool for almost any branch of knowledge and human activity - just install a CD-ROM with the appropriate course in it (or put the required files on a hard drive).

There are great prospects for multimedia in medicine: knowledge bases, methods of operations, catalogues of medicines, etc. In the business sector, real estate firms are already using multimedia technology to create catalogs of homes for sale - the buyer can see the house on the screen in different angles, make an interactive video tour of all the premises, get acquainted with the plans and drawings. Technology sultimedia enjoys great attention of the military: for example, the Pentagon is implementing a program for transferring all technical, operational and training documentation on all weapons systems to interactive video disks, creating and mass using simulators based on such disks.

Companies that specialize in the production of hypermedia publications-books, encyclopedias, and guidebooks-are quickly emerging.

Among the well-known products of the "encyclopedic" plan-published in France by the society Act Informatic "Electronic dictionary"," Electronic encyclopedia " Grolier, Information Finder company World Book. All the properties of multimedia has a complete encyclopedia "Birds of America". All color images and accompanying text were taken from the original first edition. The user hears the voices of birds recorded on a disk with the help of the Cornell University library of natural sounds.

The relatively large volume of the CD makes it an ideal medium for encyclopedic publications. The user "travels" through the encyclopedia using the keyboard or using graphic images, which include photos, maps, hint screens, electronic bookmarks, and a dictionary consisting of 150,000 articles.

An example of the use of multimedia in art can be "music CD-ROMs, which allow you not only to listen (with the highest quality) to the works of a particular composer, but also to view the scores on the screen, select and listen to individual themes or instruments, get acquainted with reviews. View text photos and videos related to the life and work of the composer, the composition and location of the orchestra and chorus, the history of the device of each instrument of the orchestra, etc. In particular, CD-ROMs dedicated to Beethoven's 9th Symphony, Mozart's "Magic flute", and Stravinsky's "sacred Spring" were released. Another example is the recording of art Museum collections on interactive video discs; this work is already underway in Russia.

In addition to " informational "applications," creative " ones should also appear, allowing you to create new works of art. Even now, the multimedia station is becoming an indispensable author's tool in film and video art. The author of the film behind the screen of such a desktop system collects, "oranges", creates works from pre-prepared - drawn, filmed, recorded, etc. - fragments. It has almost instant access to every frame of footage, the ability to dialog "electronic" editing with accuracy to the frame. It is subject to all sorts of video effects, image overlays and transformations, manipulations with sound, "assembling" sound from sounds from various external audio sources, from the sound Bank, from sound effects programs. Further, the use of computer-generated or processed images can lead to the emergence of new visual techniques in painting or cinema.

The implementation of artificial intelligence elements in the multimedia system looks very promising. They have the ability to "feel" the communication environment, adapt to it and optimize the process of communication with the user; they adapt to the readers, analyze their range of interests, remember issues that cause difficulties, and can themselves offer additional or clarifying information. Systems that understand natural language and speech recognizers further expand the range of interaction with the computer.

Another fast-growing field of computer applications that is already quite fantastic for us, in which multimedia technology plays an important role, is virtual or alternative reality systems, as well as "telepresence" systems close to them. With the help of special equipment-a system with two miniature stereo displays, headphones, special touch gloves, and even a suit, you can "enter" a computer-generated or simulated world (rather

than look into it through a flat window of the display), turning your head, look to the left or right, go further, extending your hand forward - and see it in this virtual world; you can even take a virtual object (feeling its weight) and move it to another place; you can thus build, create this world from within.

TYPES OF MULTIMEDIA INFORMATION DATA AND THEIR PROCESSING TOOLS:

MPS standard (more precisely, the tools of the Multimedia Windows software package - an operating environment for creating and playing multimedia information) provide work with various types of multimedia data.

Multimedia information contains not only traditional statistical elements such as text and graphics, but also dynamic elements such as video, audio, and animation sequences.

STILL PICTURE. This includes vector graphics and bitmap images; the latter include images obtained by digitizing using various capture boards, grabbers, scanners, as well as computer-generated or purchased as ready-made image banks. The maximum resolution is 640 * 480 with 256 colors (8 bits / pixel); this image takes about 300 KB of memory; compression is not provided as standard; loading one image on a CD-ROM takes " seconds. Tools for working with 24-bit color are usually included in the accompanying software for certain 24-bit video boards; such tools are not yet available in Windows. A person perceives 95% of the information coming to him from the outside visually in the form of an image, that is, "graphically". This representation of information is by its nature more visual and easier to perceive than a purely textual one, although the text is also a graphic. However, due to the relatively low bandwidth of existing communication channels, the passage of image files through them requires considerable time. This forces us to focus on data compression technologies, which are methods for storing the same amount of information by using fewer bits. Optimization (compression) - presenting graphical information in a more efficient way, in other words, "squeezing the water out" of their data. You need to take advantage of three generalized properties of graphical data: redundancy, predictability, and optional. A scheme similar to group encoding (RLE) that uses redundancy says: "here are three identical yellow pixels", instead of "here's a yellow pixel, here's another yellow pixel, here's the next yellow pixel". Huffman algorithm encoding and arithmetic encoding based on a statistical model uses predictability, assuming shorter codes for more frequently occurring pixel values. The presence of optional data implies the use of a lossy encoding scheme ("JPEG lossy compression"). For example, random viewing by the human eye does not require the same resolution for color information in the image that is required for intensity information. Therefore, data that represents a high color resolution may be excluded. But this is not an interesting

theory, and as for practice, the graphics intended for publication on the Internet must be pre-optimized to reduce its volume and as a result, traffic. Unfortunately, there are nodes in the network with completely "unsightly" graphics. When I get to such a place, I personally try to get away from it as quickly as possible or turn off the graphics display in the browser. In this way, the node owner obviously puts himself at a disadvantage. All his efforts to" decorate " the page remain unclaimed, moreover, he loses potential customers. Network graphics are mainly represented by two file formats - GIF (Graphics Interchange Format) and JPG (Joint photography Experts Group). Both of these formats are compression formats, meaning the data in them is already compressed. Compression, however, is a matter of choosing the optimal solution. Each of these formats has a number of configurable parameters that allow you to control the quality-size ratio of the file, so by deliberately reducing the quality of the image, often with little effect on perception, to achieve a reduction in the size of the image file, sometimes to a significant extent.GIF supports 24-bit color, implemented as a palette containing up to 256 colors. Features of this format include the sequence or overlap of multiple images (animation) and display with alternating rows (Interlaced). Several customizable GIF format parameters allow you to control the size of the resulting file. The greatest influence is the depth of the color palette. A GIF file can contain from 2 to 256 colors. Accordingly, a smaller content of colors in the image (the depth of the palette), all other things being equal, gives a smaller file size. Another parameter that affects the size of the GIF file is diffusion. This allows you to create a smooth transition between different colors or display a color that is not in the palette by mixing pixels of different colors. The use of diffusion increases the file size, but this is often the only way to more or less adequately transmit the original drawing palette after reduction. In other words, the use of diffusion allows you to reduce the depth of the GIF file palette to a greater extent and thus contribute to its "simplification". When creating an image that will later be converted to GIF format, you should consider the following feature of the LZW compression algorithm. The degree of compression of graphic information in GIF depends not only on the level of its repeatability and predictability (a single-color image has a smaller size than a randomly "noisy" one), but also on the direction, since the image is scanned line by line. This is clearly seen in the example of creating a GIF file with a gradient fill. For example, there are two drawings. All other things being equal, a file with a vertical gradient is compressed by 15% more than a file with a horizontal gradient (2.6 KB vs. 3.0 KB). In fact, there is no JPG format per se. In most cases, these are JFIF and JPEG-TIFF files compressed using JPEG compression technologies. However, this does not matter much in practice, so we will stick to the generally accepted terminology. The lossy JPEG compression algorithm does not handle images with a small number of colors and sharp

transition borders very well. For example, an image or text drawn in an ordinary image editor. For such images, it may be more effective to present them in GIF format. At the same time, it is indispensable when preparing for web publishing of photos. This method can restore a full-color image that is almost indistinguishable from the original, while using about one bit per pixel to store it.The JPEG compression algorithm is quite complex, so it works slower than most others. In addition, this type of compression includes several technologies that are similar in their properties to JPEG. The main parameter present in all of them is the image quality (Q-parameter) measured as a percentage. The size of the output JPG file is directly dependent on this parameter, i.e. when the "Q" is reduced, the file size decreases.

Video and animation. Now, when the scope of personal computers is expanding, there is an idea to create a home video Studio based on a computer. However, when working with a digital video signal, you need to process and store very large amounts of information, for example, one minute of a digital video signal with SIF resolution (compatible with VHS) and true color rendering (millions of colors).

(288 x 358) pixels x 24 bits x 25 frames / s x 60 c = 442 MB,

in other words, it is not possible to save a full-time video recorded in this format on media used in modern PCs, such as a CD-ROM (about 650 MB) or a hard disk (several gigabytes). Using MPEG compression, the volume of video information can be reduced without noticeable image degradation. What is MPEG?

MPEG is an acronym for Moving Picture Experts Group. This expert group works under the joint leadership of two organizations - ISO (international standards Organization) and IEC (international electrotechnical Commission). The official name of the group is ISO/IEC JTC1 SC29 WG11. Its task is to develop common standards for encoding audio and video signals. MPEG standards are used in CD-i and CD-Video technologies, are part of the DVD standard, and are actively used in digital radio broadcasting, cable and satellite TV, Internet radio, multimedia computer products, ISDN communications, and many other electronic information systems. The abbreviation MPEG is often used to refer to standards developed by this group. To date, the following are known:

MPEG-1 is designed for recording synchronized video images (usually in SIF format, 288 x 358) and audio on a CD-ROM with a maximum reading speed of about 1.5 Mbit/s.

The quality parameters of video data processed by MPEG-1 are in many ways similar to normal VHS video, so this format is used primarily where it is inconvenient or impractical to use standard analog video carriers.

MPEG-2 is designed for processing video images of comparable quality with television at the bandwidth of the data transmission system in the range of 3 to 15 Mbit / s, and professionals use the best streams. hardware uses streams up to 50 Mbit/s. Many TV channels are switching to technologies based on MPEG-2. the signal compressed in accordance with this standard is transmitted via television satellites and is used for archiving large volumes of video material.

MPEG-3-intended for use in high-definition television systems (high-definition television, HDTV) with a data stream speed of 20-40 Mbit/s, but later became part of the MPEG-2 standard and is no longer separately mentioned. By the way, the MP3 format, which is sometimes confused with MPEG-3, is intended only for audio compression and the full name of MP3 sounds like MPEG Audio Layer III

MPEG-4-defines the principles for working with digital representation of media data for three areas: interactive multimedia (including products distributed on optical disks and over the Network), graphic applications (synthetic content), and digital television.

How does compression work? The basic encoding object in the MPEG standard is a frame of a television image. Since the background of the image remains fairly stable in most fragments, and the action takes place only in the foreground, compression begins with the creation of the original frame. Source (Intra) frames are encoded only using intra-frame compression using algorithms similar to those used in JPEG . The frame is divided into blocks of 8x8 pixels. A discrete-cosine transformation (DCP) is performed over each block, followed by quantization of the obtained coefficients. Due to the high spatial brightness corellation between neighboring pixels of the image, DCP leads to the concentration of the signal in the low-frequency part of the spectrum, which after quantization is effectively compressed using variable-length encoding codes. Predicted frames are processed using forward predictions based on previous source or predictable frames.

The frame is divided into macro blocks of 16x16 pixels. each macro block is assigned the most similar section of the image from the reference frame, shifted by the displacement vector. This procedure is called motion analysis and compensation.

The acceptable compression ratio for predictable frames is 3 times higher than for original frames. Depending on the nature of the video image, bi-directional interpolated frames are encoded in one of four ways: forward prediction; reverse prediction with motion compensation - used when new image objects appear in the encoded frame; bidirectional prediction with motion compensation; intra - frame prediction-when the plot

changes abruptly or when the image elements move at a high speed. Bidirectional frames are associated with the deepest compression of video data, but because a high compression rate reduces the accuracy of restoring the original image, bidirectional frames are not used as reference frames. If the DCP coefficients were transmitted accurately, the restored image would completely match the original one. However, errors in the recovery of DCP coefficients associated with quantization lead to image distortion.

The coarser the kvntovanie, the smaller the volume occupied by the coefficients and the stronger the compression of the signal, but also the more visual distortion.

SOUND. Digital recording, editing, working with wave forms of audio data, as well as background playback of digital music is possible (Fig. 8). work via MIDI ports is Provided. The Converter mentioned above also converts audio data between WAVE, PCM, and AIFF formats (Apple audio file format). Recently, the Mp3 format has become particularly popular. It is based on MPEG-1 Layer III (this is the part of the standard we are talking about) based on the features of human auditory perception, reflected in the "pseudo-acoustic" model. MPEG developers proceeded from the postulate that not all the information contained in the audio signal is useful and necessary - most listeners do not perceive it. Therefore, some of the data may be considered redundant. This "extra" information is deleted without much harm to the subjective perception. The acceptable degree of "cleaning" was determined by repeated expert auditions. This standard allows to set limits to change the encoding settings to get less compression with the best quality, or conversely, to go on the loss of perception for a higher compression ratio. An audio wav file converted to MPEG-1 Layer III format with a bitrate of 128 Kbytes/sec takes up 10-12 times less space on the hard drive. A 100-megabyte ZIP diskette can hold about an hour and a half of sound, while a CD can hold about 10 hours. When encoding at a speed of 256 Kbytes / sec, about 6 hours of music can be recorded on a CD with a difference in quality compared to a CD, accessible only to a trained expert ear.

TEXT. In the Microsoft guide, special attention is paid to the means of entering and processing large arrays of text. We recommend various methods and programs for converting text documents between different storage formats, taking into account the structure of documents, control codes of text processors or typesetting machines, links, tables of contents, hyperlinks, etc., inherent in the source document. You can also work with scanned texts and use optical character recognition tools.

The Multimedia Development Kit (MDK) developer package includes tools (programs) for preparing multimedia data BitEdit, PalEdit, WaveEdit, FileWalk, as well as MSDK libraries of the C language for working with data structures and multimedia devices, extensions of

the Windows 3.0 SDK.

Among the author's tools recommended for MOS are Schoolbook, Guide, and Authorware Professional.

Multimedia Windows architecture provides device independence and extensibility. The upper system level of translation, represented by the MMsystem module, isolates user programs (application level) from device-specific drivers.

MMsystem includes Media Control Interface (MCI) tools that control video recorders, video disks, audio CDs, and work with scanners, digitizers, and other devices. To do this, they turn to the MCI drivers that provide the upper level of control. MCI drivers, after processing the request, access the devices, as well as MEDIAMAN (Media Element Manager). MEDIAMAN manages I / o handlers for bitmap files and audio WAVE files. MMsystem also includes lower-level programs Low-Level Functions that control drivers of audio and WAVE devices, MIDI, and joysticks.

The necessary drivers are connected at the execution stage. Contacting drivers is based on the principles of sending messages, which simplifies and unifies their writing and working with them.

To represent multimedia data, the RIFF file structure (Resourse Interchange File Formal) has been developed, which should provide uniform rules for recording and playing multimedia data, data exchange between applications, and in the future - between different platforms.

In General, Multimedia Windows tools are designed with an interface, although somewhat heavy, devoid of elegance, lightness, for the user. In the near future, with the advent of new tools created specifically for this architecture or ported from other platforms, with the overcoming of the VGA resolution barrier, the Multimedia Windows environment will be quite "true multimedia" - a system of "true multimedia". Already there are applications for this environment that use methods of software compression of information and play video-up to 15 frames / s in a small window on the screen (Fig. 9). Microsoft developed its own software compression tools, Audio-Video Interieaved (AVI), which it released in the second half of 1992.

The Microsoft Windows 3.1 operating environment, which comes with multimedia systems, integrates many properties of Multimedia Windows, and provides standard support for CD-ROM players. In 1992-93, the MPC consortium switched to multimedia systems based on IBM PC AT 486 personal computers with high-speed CD-ROM (MPC

Level 2). The main requirement for a multimedia system that meets the second level is the ability to play a digital video in a 320 * 40-point window at a speed of 15 frames / s, as well as the presence of a video adapter that provides at least 65,000 color shades.

6) Multimedia hardware

To build a multimedia system, additional hardware support is required: analog-to-digital and digital-to-analog converters for converting analog audio and video signals to a digital equivalent and back, video processors for converting conventional television signals to the form reproduced by the cathode ray tube display, decoders for mutual conversion of television standards, special integrated circuits for compressing data into files of acceptable sizes, and so on. All equipment responsible for sound is combined into so-called sound cards, and for video into video cards. Further details are discussed separately about the device and characteristics of sound cards, video cards and CD-ROM drives.

7) Sound card

Over time, the list of tasks performed on the PC went beyond just using spreadsheets or text editors. CDs with audio files, preparing multimedia presentations, holding video conferences and telephone facilities, as well as playing games and listening to audio CDS all this requires that sound become an integral part of the PC. This requires a sound card. Game lovers will be satisfied with the new surround sound features.

The following trends are observed for IBM compatible computer sound cards:

First, instead of frequency modulation (FM), more and more people use wavetable or wt Synthesis to play sound. The signal received in this way is more similar to the sound of real instruments than with FM Synthesis. Using the appropriate algorithms, even just one tone of a musical instrument can reproduce everything else, that is, restore its full sound. Samples of such signals are stored either in the device's permanent memory (ROM), or programmatically loaded into the sound card's RAM.

In cheaper boards, frequency modulated synthesis using sinusoidal vibrations is more often implemented, which leads to an imperfect sound of instruments, the reflection of sound and roar characteristic of the latest generation of games in gaming halls. A wave

synthesis chip located on the Board stores pre-recorded digitized samples of the sound of musical instruments and sound effects. The results are obvious, the music recordings are more convincing, and the gamblers are more impressionable.

Ensoning became a pioneer in the implementation of Wtsynthesis in 1984. Soon Wtsynthesizers were produced by such well-known companies as Emu, Korg, Roland and Yamaha.

Companies that produce sound cards add wtsynthesis in two ways, either by embedding it on the sound card as chips, or by implementing It as a child Board. In the second case, the sound card is cheaper, but the total cost of the main and child boards is higher.

Second, it is compatible with sound cards. For a relatively short history of multimedia development, several basic de facto standards for sound cards have already appeared. So almost all sound cards designed for games and entertainment support compatibility with Adlib and Sound Blaster. All business - oriented sound cards are usually compatible with Microsoft's MS Windows Sound System.

Third, one of the components of modern sound cards has become a signal processor DSP (Digital Signal Processor). the main functional responsibilities of this device include: speech recognition, three-dimensional sound, Wtsynthesis, compression and decompression of audio signals. The number of sound cards equipped with DSP is not so large. The reason for this is that such a powerful device helps only when solving strictly defined tasks.

As a rule, a DSP device is quite expensive, so it can only be installed on professional music cards right away. One of the most powerful DSP manufacturers is now Texas Instruments.

Fourth, there is a steady trend of integrating the functions of sound cards on the system Board. Despite the fact that a number of manufacturers of motherboards already include microchips for audio reproduction in their products, concerns are not noticeable in the ranks of suppliers of sound cards.

A potential problem when using built-in audio processing tools is the limited system resources of IBM PC compatible computers, namely the possibility of conflicts over direct memory access (DMA) channels. An example of such a Board is the OPTi495 SLC system Board, which uses a 16-bit AD 1848 audio stereo codec from ANALOG DEVICES.

Fifth, the desire for more natural sound reproduction forces manufacturers to use three-dimensional or three-dimensional (3D) sound technologies.

The most fashionable direction in the field of sound reproduction these days provides the so-called surround sound. The use of these surround sound effects allows you to expand the stereo space which in turn gives greater depth to the limited field of reproduction inherent in not large closely spaced speakers.

Sixth, it is the connection of CD-ROM drives. Almost all sound cards have built-in interfaces for connecting CD-ROM drives of one or all three companies Sony, Panasonic/Matsushita and Mitsumi. However, most sound cards are designed to connect Sony drives.

There are cards and drives that support the standard ATA interface (IDE), used for computers with a hard drive.

Seventh, the cards use Dual DMA mode, i.e. double direct access to memory. Using two DMA channels, you can realize simultaneous recording and playback.

And the last is the steady introduction of sound technologies in telecommunications.

Sound cards are purchased in 90% of cases for games, of the remaining 10% for speech accompaniment of multimedia programs. In this case, the consumer quality depends only on the DAC (digital-analog Converter) and the audio frequency amplifier. Even more important is compatibility with the Sound Blaster standard, since not all programs will support less common standards.

The set of Sound cards includes drivers, utilities, programs for recording and playing sound, tools for preparing and producing presentations, encyclopedias, and games.

8) Laser disks, CD-ROM

Due to the growing volume and complexity of software, and the widespread introduction of multimedia applications that combine moving images, text, and sound, CD - ROM readers have recently become extremely popular. These devices and the disks themselves are relatively inexpensive, very reliable, and can store very large amounts of information (up to 650 MB), so they are very convenient for delivering more programs and data, such as catalogs, encyclopedias, as well as training, demonstration, and game

programs. And many programs are fully or partially delivered on CD-ROM.

History of development. Compact discs originally designed for fans of high-quality sound, firmly entered the market of computer devices. Optical CDs were replaced by vinyl in 1982. It was decided that the standard is designed for 74 minutes of "Red Book"sound. When 74 minutes were converted to bytes, it turned out to be 640 MB.

The first drives had a single speed of 150 KB/s. Models of drives with double speed appeared in 1992. Drives with tripled and quadrupled speed in early 1994. Today we are talking about a speed increased by six or even eight times. The speed increase coefficient is not necessarily a whole one.

Principle of operation. As in CDs used in household CD players, information on computer CDs is encoded by alternating between reflective and non-reflective areas on the disk substrate. In the industrial production of compact discs, this substrate is made of aluminum, and the areas that do not reflect light are made by pushing holes in the substrate with a special presform. In a single production of compact discs (so-called CD-R discs, see below), the substrate is made of gold, and information is applied to it by a laser beam. In any case, there is a transparent coating on top of the CD-ROM backing that protects the information stored on the CD from damage.

Although the appearance and size of CDs used in computers do not differ from those used in household CD players, however, computer devices for reading CDs are significantly more expensive. This is not surprising, because reading programs and computer data should be performed with much higher reliability than is sufficient when playing music. Therefore, the reading used in the computer's CD-ROM drive is carried out using a laser beam of low power. Using this technology allows you to write a very large amount of information (650 MB) to CD-ROMs, and provides high reliability of information.

However, the speed of reading data from CD-ROMs is significantly lower than from hard disks. One of the reasons for this is that CD-ROMs do not rotate at a constant angular speed when reading, but rather in such a way as to ensure a constant linear rate of departure of information under the reading head. The standard speed of reading data from CD-ROMs is only 150-200 KB / s, and the access time is 0, 4 s. However, in recent years, mainly devices with double, triple and even fourth rotation speeds are produced, they provide correspondingly higher speed indicators: access time 0, 2-0, 3 seconds, reading speed 500 Kbytes/s. Note, however, that devices with triple speed in real-world tasks do not increase the speed of working with a CD by one and a half or two times compared to a device with double speed, but only by 30 to 60%.

9) Video card

There are a large number of devices designed to work with video signals on IBM PC compatible computers. It can be divided into several groups: devices for entering and capturing video sequences (Cupture play), framegrabbers (Framegrabber), TV tuners, vgatv signal converters, and MPEG players.

TV-tuners:

These devices are usually made in the form of cards or a box (a small box). They convert an analog video signal coming over a cable TV network or from an antenna, a video recorder, or a camcorder. TV tuners can be part of other devices such as MPEG players or frame grabbers.

Some of them have built-in audio conversion chips. A number of tuners have the ability to output Teletext.

The frame grabbers:

They appeared about 6 years ago. As a rule, they combine graphics, analog-digital and video processing chips that allow you to sample the video signal, save individual image frames in a buffer and then write them to disk, or output them directly to a window on a computer monitor. The contents of the buffer is updated every 40 MS. that is, with the frame rate. Video signals are output in overlay mode (overby). To implement a window on the monitor screen with live video, the frame grabber card is connected to the graphics adapter via a 26-pin Feature connector. It usually comes with a Video fjr package that outputs images of 240*160 pixels when playing 256 colors or more. The first devices are Video Blaster, Video Spigot.

VGA-TV converters:

These devices transmit a signal in a digital image of a VGA image to an analog signal suitable for input to a television receiver. Manufacturers usually offer such devices made either as an internal ISA card or as an external unit.

A number of converters allow you to overlay a video signal for example to create titles. In this case, the converted computer signal is fully synchronized via external (gtnlok). When overlaying, a special key signal of three types is formed: lumakey, chromakey, or alpha chenol.

1.in the first case, the overlay is made where the brightness Y exceeds the specified level.

2. The superimposition image is transparent only where its color matches with the set.

3. alpha channel is used in professional equipment based on the formation of a special signal with a simple distribution, which determines the degree of displacement of the video image at various points.

MPEG players:

These devices allow you to play sequences of video images (movies) recorded on CD-ROMs with VNS quality, the speed of compressed information flow does not usually exceed 150 KB/s.

The main difficulty of the problem solved by the MPEG encoder is to determine the optimal correlation between three types of images for each specific video stream: (I)ntra, (P)redicated, and (B)idirectional. The first MPEG players were the sigina Desing Reel Magic Board in 1993.

10) Conclusion

Multimedia technologies are constantly developing and moving forward. If floppy disks were popular and breakthrough before, now they seem useless and weak compared to other modern devices.

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